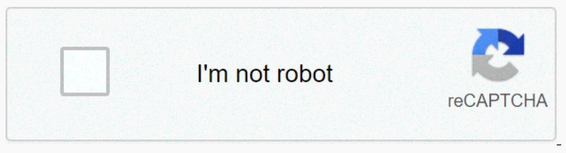

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NISSAN PATROL Y61 - SERVICE MANUAL - REPAIR MANUAL- English Service Manual to vehicles NISSAN PATROL MODELS Y61.CONTENTS:-First Edition-Supplement I-Supplement II-Supplement III Diesel-Supplement III Petrol-Supplement IVINDEX FIRST EDITION BR QUICK REFERENCE INDEX CONTENTS PRECAUTIONS AND PREPARATION Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" Precautions for Brake System Commercial Service Tools NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING NVH Troubleshooting Chart CHECK AND ADJUSTMENT Checking Brake Fluid Level Checking Brake Line Changing Brake Fluid Bleeding Brake System BRAKE HYDRAULIC LINE/CONTROL VALVE Brake Hydraulic Line Load Sensing Valve BRAKE PEDAL AND BRACKET Removal and Installation Inspection Adjustment MASTER CYLINDER Removal Disassembly Inspection Assembly Installation BRAKE BOOSTER Brake Booster VACUUM PIPING (LHD models) Vacuum Hose VACUUM PIPING (RHD models) Vacuum Hose VACUUM PIPING VACUUM PUMP Removal and Installation FRONT DISC BRAKE Pad Replacement Removal Disassembly Inspection - Caliper Inspection - Rotor Assembly Installation REAR DISC BRAKE Pad Replacement Removal Disassembly Inspection - Caliper Inspection - Rotor Assembly Installation PARKING CENTER BRAKE CONTROL Removal Inspection Installation Adjustment PARKING CENTER BRAKE Removal and Installation Inspection - Drum Inspection - Lining ANTI-LOCK BRAKE SYSTEM Purpose Operation ABS Hydraulic Circuit System Components System Description Removal and Installation TROUBLE DIAGNOSES How to Perform Trouble Diagnoses for Quick and Accurate Repair Preliminary Check Component Parts and Harness Connector Location Circuit Diagram for Quick Pinpoint Check Wiring Diagram - ABS - Self-diagnoses CONSULT CONSULT Inspection Procedure Ground Circuit Check TROUBLE DIAGNOSES FOR SELF-DIAGNOSTIC ITEMS Diagnostic Procedure 1 (Wheel sensor or rotor) Diagnostic Procedure 2 (ABS actuator solenoid valve and solenoid valve relay) Diagnostic Procedure 3 (Motor relay or motor) Diagnostic Procedure 4 (Low voltage) Diagnostic Procedure 5 (G sensor) Diagnostic Procedure 6 (Control unit) TROUBLE DIAGNOSES FOR SYMPTOMS Diagnostic Procedure 7 (ABS works frequently.) 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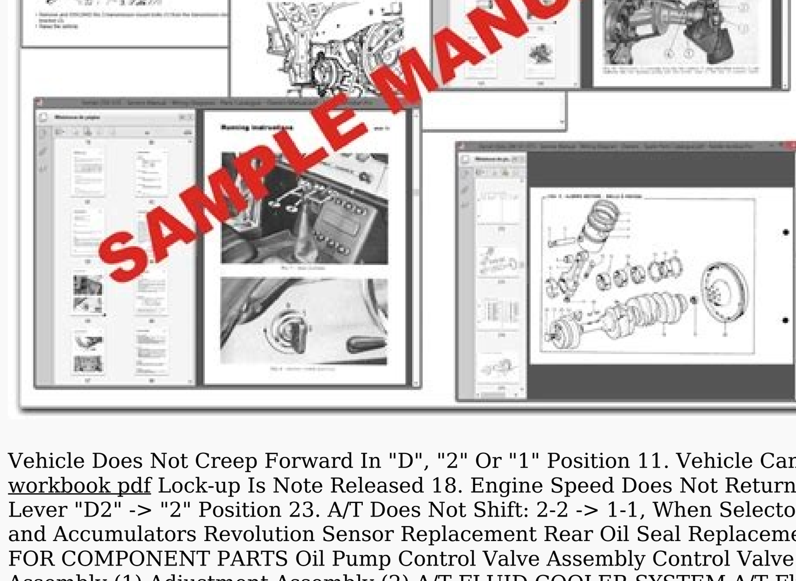
SPORT Indicator Lamp Does Not Come On 2. SPORT Indicator Lamp Does Not Come On 3.

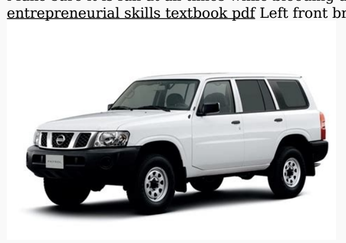
O/D OFF Indicator Lamp Does Not Come On 4. SPORT Indicator Lamp Does Not Come On 5. Engine Cannot Be Started In "P" and "N" Position 6. In "P" Position, Vehicle Moves Forward Or Backward When Pushed 7. In "N" Position, Vehicle Moves 8. Large Shock. "N" -> "R" Position 9. Vehicle Does Not Creep Backward In "R" Position 10.



Vehicle Does Not Creep Forward In "D", "2" Or "1" Position 11. Vehicle Cannot Be Started From D1 12. A/T Does Not Shift: D1 -> D2 Or Does Not Kickdown: D4 -> D2 13. A/T Does Not Shift: D2 -> D3 14. A/T Does Not Shift: D3 -> D4 15. A/T Does Not Perform Lock-up 16. A/T Does Not Hold Lock-up Condition 17. emotionally healthy relationships workbook pdf Lock-up Is Note Released 18. Engine Speed Does Not Return To Idle (Light Braking D4 -> D3) 19. Vehicle Does Not Start From D1 20. A/T Does Not Shift: D2 -> D1 When Depressing Accelerator Pedal 21. A/T Does Not Shift: D4 -> D3, When Overdrive Control Switch "ON" -> "OFF" 22. A/T Does Not Shift: D3 -> 2-2, When Selector Lever "D2" -> "2" Position 23. A/T Does Not Shift: 2-2 -> 1-1, When Selector Lever "2" -> "1" Position 24. Vehicle Does Not Decelerate By Engine Brake TROUBLE DIAGNOSES - A/T Shift Lock System Description Wiring Diagram - SHIFT - Diagnostic Procedure Key Interlock Cable Component Check ON-VEHICLE SERVICE Control Valve Assembly and Accumulators Revolution Sensor Replacement Rear Oil Seal Replacement Parking Pawl Components Inspection PNP Switch Adjustment Manual Control Linkage Adjustment REMOVAL AND INSTALLATION Removal Installation MAJOR OVERHAUL Oil Channel Locations of Needle Bearings, Thrust Washers and Snap Rings DISASSEMBLY REPAIR FOR COMPONENT PARTS Oil Pump Control Valve Assembly Control Valve Upper Body Control Valve Lower Body Reverse Clutch High Clutch Forward and Overrun Clutches Low & Reverse Brake Forward Clutch Drum Assembly Rear Internal Gear and Forward Clutch Hub Band Servo Piston Assembly Parking Pawl Components ASSEMBLY Assembly (1) Adjustment Assembly (2) A/T FLUID COOLER SYSTEM A/T Fluid Cooler SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications Specifications and Adjustment FUSE BLOCK - Junction Box (J/B) FUSE AND FUSIBLE LINK BOX ELECTRICAL UNITS SUPPLEMENT-II BR QUICK REFERENCE INDEX FIRST EDITION CONTENTS TROUBLE DIAGNOSES Schematic Wiring Diagram - ABS - Self-diagnosis SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications FUSE BLOCK - Junction Box (J/B) FUSE AND FUSIBLE LINK BOX ELECTRICAL UNITS SUPPLEMENT-II BT QUICK REFERENCE INDEX FIRST EDITION CONTENTS PRECAUTIONS Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" DOOR Front Door Limit Switch Reset (Driver side only) INTERIOR TRIM Door Trim SEAT Front Seat MIRROR Door Mirror SUPPLEMENT-II CL QUICK REFERENCE INDEX FIRST EDITION CONTENTS CLUTCH SYSTEM HYDRAULIC CLUTCH CONTROL Clutch Operating Cylinder SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications Inspection and Adjustment SUPPLEMENT-II EC QUICK REFERENCE INDEX FIRST EDITION CONTENTS ZD30DDTi PRECAUTIONS AND PREPARATION Special Service Tool Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" TROUBLE DIAGNOSIS - INDEX Alphabetical & Numerical Index for DTC PRECAUTIONS Precautions ENGINE AND EMISSION CONTROL OVERALL SYSTEM ECCS-D Component Parts Location Circuit Diagram System Diagram Vacuum Hose Drawing System Chart ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION Fuel Injection Control System Fuel Injection Timing Control System Air Conditioning Cut Control Fuel Cut Control (at no load & high engine speed) Crankcase Ventilation System BASIC SERVICE PROCEDURE Injection Tube and Injection Nozzle Electronic Control Fuel Injection Pump Air Bleeding ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION DTC and MI Detection Logic Diagnostic Trouble Code (DTC) Malfunction Indicator (MI) CONSULT-II TROUBLE DIAGNOSIS - INTRODUCTION Introduction Work Flow TROUBLE DIAGNOSIS - BASIC INSPECTION Basic Inspection TROUBLE DIAGNOSIS - GENERAL DESCRIPTION Symptom Matrix Chart CONSULT-II Reference Value in Data Monitor Mode Major Sensor Reference Graph in Data Monitor Mode ECM Terminals and Reference Value TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT Description Diagnostic Procedure TROUBLE DIAGNOSIS FOR POWER SUPPLY Main Power Supply and Ground Circuit DTC 0102 MASS AIR FLOW SEN Component Description CONSULT-II Reference Value in Data Monitor Mode ESM Terminals and Reference Value On Board Diagnosis Logic DTC Confirmation Procedure Wiring Diagram Diagnostic Procedure DTC 0103 COOLANT TEMP SEN Description On Board Diagnosis Logic DTC Confirmation Procedure Wiring Diagram Diagnostic Procedure DTC 0104 VEHICLE SPEED SEN Description ECM Terminals and Reference Value On Board Diagnosis Logic Overall Function Check Wiring Diagram Diagnostic Procedure DTC 0203 ACCEL POS SW (F/C) Description + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. pozobefoweturawalar.pdf Spiral Cable and wiring harnesses covered with yellow insulation either just before the harness connectors or for the complete harness are related to the SRS. Precautions for Brake System Use brake fluid ‘‘DOT 3’’. Never reuse drained brake fluid. Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately. + To clean master cylinder parts, disc brake caliper parts or wheel cylinder parts, use clean brake fluid. + Never use mineral oils such as gasoline or kerosene. They will ruin rubber parts of hydraulic system. + Use flare nut wrench when removing and installing brake tubes. + Always torque brake lines when installing. WARNING: Clean brakes with a vacuum dust collector to minimize risk of health hazard from powder caused by friction. + + + SBR686C Commercial Service Tools Tool name Description j 1 Flare nut crowfoot j 2 Torque wrench Removing and installing each brake piping a: 10 mm (0.39 in) NT360 Brake fluid pressure gauge Measuring brake fluid pressure NT151 BR-1 Symptom BRAKE — — BR-23, 27, 31 BR-23, 27, 31 Shims damaged Rotor or drum imbalance Rotor or drum damage Rotor or drum runout X X X X Shake X Shimmy, Judder X X X: Applicable BR-2 X X X X — Rotor or drum rust X X NHV in PD section NHV in PD section NHV in FA, RA section NHV in FA section NHV in FA section NHV in FA section NHV in ST section DIFFERENTIAL AXLE AND SUSPENSION TIRES ROAD WHEEL AXLE SHAFT STEERING BR-31 PROPELLER SHAFT Drum out of round BR-23, 27 — Rotor or drum deflection Rotor thickness variation — Rotor or drum deformation BR-31 — Noise Return spring damaged Possible cause and SUSPECTED PARTS Linings or pads - uneven wear BR-20, 24, 31 Reference page Linings or pads - damaged NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING NVH Troubleshooting Chart Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts. X X X X X X X X X X X X X X X X X X CHECK AND ADJUSTMENT Checking Brake Fluid Level + + + Check fluid level in reservoir tank. It should be between Max and Min lines on reservoir tank. If fluid level is extremely low, check brake system for leaks. If the brake warning lamp comes on, check brake fluid level switch and parking brake switch. SBR451D Checking Brake Line CAUTION: If leakage occurs around joints, retighten or, if necessary, replace damaged parts. 1. Check brake lines (tubes and hoses) for cracks, deterioration or other damage. Replace any damaged parts. 2.

Check for oil leakage by fully depressing brake pedal while engine is running. SBR389C Changing Brake Fluid SBR419C CAUTION: + Refill with new brake fluid ‘‘DOT 3’’. + Always keep fluid level higher than minimum line on reservoir tank. + Never reuse drained brake fluid. + Be careful not to splash brake fluid on painted areas; it may cause paint damage.
If brake fluid is splashed on painted areas, wash it away with water immediately. 1. Clean inside of reservoir tank, and refill with new brake fluid. 2. Connect a vinyl tube to each air bleeder valve. 3. Drain brake fluid from each air bleeder valve by depressing brake pedal. 4. Refill until brake fluid comes out of each air bleeder valve. Use same procedure as in bleeding hydraulic system to refill brake fluid. Refer to ‘‘Bleeding Brake System’’, BR-4.

BR-3 CHECK AND ADJUSTMENT Bleeding Brake System SBR995 CAUTION: + Carefully monitor brake fluid level at master cylinder during bleeding operation. + If master cylinder is suspected to have air inside, bleed air from master cylinder first. Refer to ‘‘Installation’’, ‘‘MASTER CYLINDER’’, BR-14. + Fill reservoir with new brake fluid ‘‘DOT 3’’. Make sure it is full at all times while bleeding air out of system. + Place a container under master cylinder to avoid spillage of brake fluid. + For models with ABS, turn ignition switch OFF and disconnect ABS actuator connectors or battery ground cable. + Bleed air in the following order. 1. LSV air bleeder 2. Left rear brake 3. Right rear brake 4. entrepreneurial skills textbook pdf Left front brake 5. Right front brake 1. Connect a transparent vinyl tube to air bleeder valve. 2. Fully depress brake pedal several times. 3. further mathematics textbook pdf free download With brake pedal depressed, open air bleeder valve to release air. 4. Close air bleeder valve.



5. manual for centurion d5 gate motor Release brake pedal slowly.
6.
Repeat steps 2. through 5. bovomolubafojidixitig.pdf until clear brake fluid comes out of air bleeder valve. 7. Tighten air bleeder valve. : 7 - 9 Nzm (0.7 - 0.9 kg-m, 61 - 78 in-lb) SBR419C BR-4 BRAKE HYDRAULIC LINE/CONTROL VALVE Brake Hydraulic Line YBR146 SBR161E BR-5 BRAKE HYDRAULIC LINE/CONTROL VALVE Brake Hydraulic Line (Cont’d) REMOVAL SBR992 CAUTION: + Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately. + All hoses must be free from excessive bending, twisting and pulling. 1. Connect vinyl tube to air bleeder valve. 2.
Drain brake fluid from each air bleeder valve by depressing brake pedal. 3. Remove flare nut connecting brake tube and hose, then withdraw lock spring. 4. Cover openings to prevent entrance of dirt whenever disconnecting brake line. INSPECTION Check brake lines (tubes and hoses) for cracks, deterioration or other damage. Replace any damaged parts. INSTALLATION SBR686C CAUTION: + Refill with new brake fluid ‘‘DOT 3’’. + Never reuse drained brake fluid. 1. Tighten all flare nuts and connecting bolts. Flare nut: : 15 - 17 Nzm (1.5 - 1.7 kg-m, 11 - 12 ft-lb) Connecting bolt: : 17 - 19 Nzm (1.7 - 1.9 kg-m, 12 - 14 ft-lb) 2. Refill until new brake fluid comes out of each air bleeder valve. 3. Bleed air. Refer to ‘‘Bleeding Brake System’’, BR-4. Load Sensing Valve INSPECTION CAUTION: + Carefully monitor brake fluid level at master cylinder. + Use new brake fluid ‘‘DOT 3’’. + Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on paint areas, wash it away with water immediately. + Depress pedal slowly when raising front brake pressure. compound verb exercises + Check rear brake pressure 2 seconds after front brake pressure reaches specified value. + For models with ABS disconnect harness connectors from ABS actuator relay before checking. BR-6 BRAKE HYDRAULIC LINE/CONTROL VALVE Load Sensing Valve (Cont’d)
1. Ensure vehicle is unladen condition*. * Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions. 2.

Have a driver sit in the driver’s seat and one person sit on the rear end. Then have the person on the rear end slowly get off the vehicle. This is necessary to stabilize suspension deflection. 3. Gradually depress brake pedal and attach a lever to the stopper bolt, then adjust length ‘‘L’’ as follows: Length ‘‘L’’: Approx.
ludnosc_i_urbanizacja_sprawdzian_nowa_era.pdf 175.2 - 178.2 mm (6.90 - 7.02 in) SBR287E 4. Remove front LH tire. 5. Connect tool to air bleeders on front LH brake caliper and rear LH or RH brake wheel cylinder. SBR822BA 6. Install front LH tire.
Before installing front LH tire, confirm the tool is not touching the front LH wheel. 7.
Bleed air from Tool. SBR823BA 8. Raise front brake pressure to 4,904 kPa (49.0 bar, 50 kg/cm2, 711 psi) and 9,807 kPa (98.1 bar, 100 kg/cm2, 1,422 psi) and check rear brake pressure. Rear brake pressure: Refer to table on next page. SBR377D BR-7 BRAKE HYDRAULIC LINE/CONTROL VALVE Load Sensing Valve (Cont’d) 9.
Set down weight slowly over axle center so that sensor spring length becomes the same as when in loaded condition (Refer to table below). Check rear brake pressure in the same way described in step 7. 4-door rear disc brake Unit: kPa (bar, kg/cm2, psi) Sensor spring length ‘‘L’’* mm (in) Front brake pressure 4,904 (49.0, 50, 711) Front brake pressure 9,807 (98.1, 100, 1,422) Without weight 175.2 - 178.2 (6.90 - 7.02) 2,158 - 3,138 (21.58 - 31.38, 22.0 - 32.0, 313 - 455) 3,629 - 4,609 (36.29 - 46.09, 37.0 - 47.0, 526 - 668) With weight 193.6 - 196.6 (7.62 - 7.74) 2,746 - 4,707 (27.46 - 47.07, 28.0 - 48.0, 398 - 683) 4,217 - 6,178 (42.17 - 61.78, 43.0 - 63.0, 611 - 896) SBR378D Rear brake pressure *: Depressed brake pedal. 10. Bleed air after disconnecting the tool. Refer to ‘‘Bleeding Brake System’’, BR-4. 11. Install front LH tire. REMOVAL AND INSTALLATION CAUTION: + Refill with new brake fluid ‘‘DOT 3’’. + Be careful not to splash brake fluid on painted areas; it may cause paint damage.
If brake fluid is splashed on painted areas, wash it away with water immediately. + Do not reuse Load Sensing Valve once it is disassembled. + Replace damaged Load Sensing Valve as an assembly. + When disassembling, apply multi-purpose grease to all rubbing areas. mary gillespie circleville BR-8 BRAKE HYDRAULIC LINE/CONTROL VALVE Load Sensing Valve (Cont’d) SBR162E 1. Tighten all flare nuts and mounting bolts. Flare nut: : 15 - 17 Nzm (1.5 - 1.7 kg-m, 11 - 12 ft-lb) 2. Refill until new brake fluid comes out of each air bleeder valve. 3. Bleed air. Refer to ‘‘Bleeding Brake System’’, BR-4. BR-9 BRAKE PEDAL AND BRACKET Removal and Installation SBR163E Inspection Check brake pedal for following items.
+ Brake pedal bend + Clevis pin deformation + Crack of any welded portion + Crack or deformation of clevis pin stopper Adjustment Check brake pedal free height from dash lower panel. H: Free height Refer to SDS (BR-72). D: Depressed height Refer to SDS (BR-72). Under force of 490 N (50 kg, 110 lb) with engine running C1, C2: Clearance between pedal stopper and threaded end of stop lamp switch and ASCD switch 0.3 - 1.0 mm (0.012 - 0.039 in) A: Pedal free play 1 - 3 mm (0.04 - 0.12 in) If necessary, adjust brake pedal free height. SBR463CB BR-10 BRAKE PEDAL AND BRACKET Adjustment (Cont’d) SBR824B 1. Loosen lock nut and adjust pedal free height by turning brake booster input rod.
Then tighten lock nut. world of dragon nest.apk Make sure that tip of input rod stays inside. 2. Adjust clearance ‘‘C1’’ and ‘‘C2’’ with stop lamp switch and ASCD switch respectively. Then tighten lock nuts. 3. Check pedal free play. Make sure that stop lamp is off when pedal is released. 4. Check brake pedal’s depressed height while engine is running. If depressed height is below specified value, check brake system for leaks, accumulation of air or any damage to components (master cylinder, wheel cylinder, etc.). Then make necessary repairs. 97697920029.pdf BR-11 MASTER CYLINDER Removal CAUTION: + Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately. + In the case of brake fluid leakage from the master cylinder, disassemble the cylinder. Then check piston cups for deformation or scratches and replace necessary parts. 1. Connect a vinyl tube to air bleeder valve. 2. Drain brake fluid from each air bleeder valve, depressing brake pedal to empty fluid from master cylinder. 3. Remove brake pipe flare nuts. 4. Remove master cylinder mounting nuts. SBR164E BR-12 MASTER CYLINDER Disassembly 1. Bend claws of stopper cap outward. SBR165E 2.
Remove piston stopper while piston is pushed into cylinder (Models with ABS only). 3. Remove piston assemblies. If it is difficult to remove secondary piston assembly, gradually apply compressed air through fluid outlet. 4. Draw out reservoir tank. SBR166E Inspection Check master cylinder inner wall for pin holes or scratches. Replace if damaged. Assembly 1. Insert secondary piston assembly. Then insert primary piston assembly. + Pay attention to direction of piston cups in figure at left. sketchup for schools lesson plans pdf Also, insert pistons squarely to avoid scratches on cylinder bore. + Pay attention to alignment of secondary piston slit with valve stopper mounting hole of cylinder body (Models with ABS only). SBR354C 2. Install stopper cap. Before installing stopper cap, ensure that claws are bent inward. 3. Push reservoir tank seals into cylinder body. 4. Push reservoir tank into cylinder body. SBR167E BR-13 MASTER CYLINDER Assembly (Cont’d) 5. Install valve stopper while piston is pushed into cylinder (Model with ABS only). SBR168E Installation SBR169E CAUTION: + Refill with new brake fluid ‘‘DOT 3’’. + Never reuse drained brake fluid. 1. Place master cylinder onto brake booster and secure mounting nuts lightly. 2. Torque mounting nuts. : 12 - 15 Nzm (1.2 - 1.5 kg-m, 9 - 11 ft-lb) 3. Fill up reservoir tank with new brake fluid. 4. Plug all ports on master cylinder with fingers to prevent air suction while releasing brake pedal. 12908247271.pdf 5. Have driver depress brake pedal slowly several times until no air comes out of master cylinder. 6. Fit brake lines to master cylinder. 7. Tighten flare nuts. : 15 - 17 Nzm (1.5 - 1.7 kg-m, 11 - 12 ft-lb) 8. the wolves by sarah delappe script pdf Bleed air. Refer to ‘‘Bleeding Brake System’’, BR-4. BR-14 BRAKE BOOSTER Brake Booster ON-VEHICLE SERVICE Operating check + + SBR002A Depress brake pedal several times with engine off.
After exhausting vacuum, make sure there is no change in pedal stroke. Depress brake pedal, then start engine.
If pedal goes down slightly, operation is normal. the_strength_in_our_scars_free.pdf Airtight check + + Start engine, and stop it after one or two minutes. Depress brake pedal several times slowly. Booster is airtight if pedal stroke is less each time. 8535550437.pdf Depress brake pedal while engine is running, and stop engine with pedal depressed. The pedal stroke should not change after holding pedal down for 30 seconds. SBR365AA REMOVAL CAUTION: + Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately. + Be careful not to deform or bend brake pipes, during removal of booster. SBR170E INSPECTION Output rod length check 1.
Apply vacuum of −66.7 kPa (−500 mmHg, −19.69 inHg) to brake booster with a hand vacuum pump. 2. Check output rod length. Specified length: 10.275 - 10.525 mm (0.4045 - 0.4144 in) SBR281A INSTALLATION SBR116BF CAUTION: + Be careful not to deform or bend brake pipes during installation of booster. + Replace clevis pin if damaged. + Refill with new brake fluid ‘‘DOT 3’’. + Never reuse drained brake fluid. + Take care not to damage brake booster mounting bolt thread when installing. Due to the narrow angle of installation, the threads can be damaged by the dash panel. BR-15 BRAKE BOOSTER Brake Booster (Cont’d) 1. Before fitting booster, temporarily adjust clevis to dimension shown. 2. Fit booster, then secure mounting nuts (brake pedal bracket to brake booster) lightly. 3. Connect brake pedal and booster input rod with clevis pin. 4. Secure mounting nuts. Specification: 13 - 16 Nzm (1.3 - 1.6 kg-m, 9 - 12 ft-lb) 5. Install master cylinder. Refer to ‘‘Installation’’ in ‘‘MASTER CYLINDER’’, BR-14. 6. Adjust brake pedal height and free play. Refer to ‘‘Adjustment’’ in ‘‘BRAKE PEDAL AND BRACKET’’, BR-10. 7. land of stories worlds collide summary Secure lock nut for clevis. : 16 - 22 Nzm (1.6 - 2.2 kg-m, 12 - 16 ft-lb) 8. Bleed air. Refer to ‘‘Bleeding Brake System’’, BR-4. BR-16 VACUUM PIPING (LHD models) Vacuum Hose YBR147 BR-17 VACUUM PIPING (RHD models) Vacuum Hose YBR148 BR-18 VACUUM PIPING REMOVAL AND INSTALLATION CAUTION: When installing vacuum hoses, pay attention to the following points. + Do not apply any oil or lubricants to vacuum hose and check valve. + Insert vacuum tube into vacuum hose as shown. + Install check valve, paying attention to its direction. SBR454D INSPECTION Hoses and connectors Check vacuum lines, connections and check valve for airtightness, improper attachment chafing and deterioration. Check valve Check vacuum with a vacuum pump. Connect to booster side Vacuum should exist. Connect to engine side Vacuum should not exist. SBR844B Vacuum warning switch* Test continuity through vacuum warning switch with an ohmmeter and vacuum pump.
Less than 26.7 kPa (267 mbar, 200 mmHg, 7.87 inHg) 0Ω 33.3 kPa (333 mbar, 250 mmHg, 9.84 inHg) or more ∞Ω Vacuum * Diesel engine models except Australia SBR321E BR-19 VACUUM PUMP Removal and Installation RD28 engine models 17 - 22 (1.7 - 2.2 kg-m, 12 - 16 ft-lb) Vacuum pump Rocker cover gasket Rocker cover SBR319E 1.
Rotate crankshaft so intake cam nose for No. 1 cylinder faces straight up when viewed through oil filler cap mounting hole. 2. Rotate crankshaft approximately 240° counterclockwise.
3. Remove vacuum pump.
CAUTION: Loosen mounting nuts equally and gradually. Always remove mounting nuts by pushing to keep the vacuum pump from jumping up. Do not disassemble vacuum pump. 4. Install the vacuum pump in the location from which it was removed with cam nose set in position. BR-20 FRONT DISC BRAKE Pad Replacement SBR171E WARNING: Clean brakes with a vacuum dust collector to minimize the hazard of airborne particles or other materials. battlefleet gothic 2 campaign guide
CAUTION: + When cylinder body is removed, do not depress brake pedal, or piston will pop out. + Be careful not to damage piston boot or get oil on rotor. Always replace shims when replacing pads. + If shims are rusted or show peeling of the rubber coat, replace them with new shims. + It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. how to activate euro truck simulator 2 without product key In this case, suspend cylinder body with wire so as not to stretch brake hose. + Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston. + Always remove pad retainer in the direction of the arrow. Failure to do so will damage pawl areas, causing pad retainer to be unsuitable for further use. 1. Remove master cylinder reservoir cap. 2. Remove upper and lower pin bolts. 3. Remove cylinder body from torque member. Then remove pads, pad retainers, and inner and outer shims. Standard pad thickness: 12.0 mm (0.472 in) Pad wear limit: 2.0 mm (0.079 in) Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston. SBR172E BR-21 FRONT DISC BRAKE SBR173E j 1 j 2 j 3 j 4 j 5 j 6 Main pin Pin boot Shim cover Inner shim Inner pad Torque member fixing bolt j 7 j 8 j 9 j 10 j 11 j 12 Washer Torque member Outer pad Outer shim Pad retainer Connecting bolt BR-22 j 13 j 14 j 15 j 16 j 17 j 18 Copper washer Main pin bolt Cylinder body Piston seal Piston Piston boot FRONT DISC BRAKE Removal WARNING: Clean brake pads with a vacuum dust collector to minimize the hazard of airborne particles or other materials. CAUTION: Suspend caliper assembly with wire so as not to stretch brake hose. Remove torque member fixing bolts and connecting bolt.
It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend caliper assembly with wire so as not to stretch brake hose. SBR174E Disassembly WARNING: Do not place your fingers in front of piston. CAUTION: Do not scratch or score cylinder wall. 1.
Push out piston with dust seal with compressed air. 2. Remove piston seal with a suitable tool.
SBR085A Inspection — Caliper CYLINDER BODY Check inside surface of cylinder for score, rust, wear, damage or presence of foreign objects. If any of the above conditions are observed, replace cylinder body. + Minor damage from rust or foreign objects may be eliminated by polishing surface with a fine emery paper. Replace cylinder body if necessary. CAUTION: Use brake fluid to clean. Never use mineral oil. + PISTON Check piston for score, rust, wear, damage or presence of foreign objects. Replace if any of the above conditions are observed. CAUTION: Piston sliding surface is plated.
Do not polish with emery paper even if rust or foreign objects are stuck to sliding surface. SLIDE PIN, PIN BOLT AND PIN BOOT Check for wear, cracks, rust or other damage. Replace if any of the above conditions are observed. BR-23 FRONT DISC BRAKE Inspection — Rotor RUNOUT SBR019B 1. Secure rotor to wheel hub with at least two nuts (M12 × 1.25). 2.
Check runout using a dial indicator. Make sure that wheel bearing axial end play is within the specifications before measuring. Refer to FA section (‘‘Front Wheel Bearing’’, ‘‘ON-VEHICLE SERVICE’’).
Maximum runout: 0.1 mm (0.004 in) 3. If the runout is out of specification, find minimum runout position as follows: a. pro_rider_easy_fold_mobility_scooter_manual.pdf Remove nuts and rotor from wheel hub. b.
Shift the rotor one hole and secure rotor to wheel hub with nuts. c. Measure runout. d. Repeat steps a. to c. so that minimum runout position can be found. 4. If the runout is still out of specification, turn rotor with on-car brake lathe (‘‘MAD, DL-8700’’, ‘‘AMMCO 700 and 705’’ or equivalent). THICKNESS Thickness variation (At least 8 positions): Maximum 0.015 mm (0.0006 in) If thickness variation exceeds the specification, turn rotor with oncar brake lathe. Rotor repair limit: 30.0 mm (1.181 in) SBR020B Assembly 1. Insert piston seal into groove on cylinder body. 2. With piston boot fitted to piston, insert piston boot into groove on cylinder body and install piston. 3.
Properly secure piston boot CAUTION: Secure dust seal properly. SBR574 Installation CAUTION: + Refill with new brake fluid ‘‘DOT 3’’. + Never reuse drained brake fluid. 1. Install caliper assembly. 2. Install brake hose to caliper securely.
3. Install all parts and secure all bolts. 4. Bleed air. Refer to ‘‘Bleeding Brake System’’, BR-4. SBR175E BR-24 REAR DISC BRAKE Pad Replacement WARNING: Clean brakes with a vacuum dust collector to minimize the hazard of airborne particles or other materials. CAUTION: + When cylinder body is open, do not depress brake pedal, or piston will pop out.
+ Be careful not to damage piston boot or get oil on rotor. Always replace shims when replacing pads. + If shims are rusted or show peeling of the rubber coat, replace them with new shims. + It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend cylinder body with wire so as not to stretch brake hose.
+ Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston. 1. Remove master cylinder reservoir cap.
2.
Remove lower pin bolt. 3. Open cylinder body upward. Then remove pad retainers, and inner and outer shims. Standard pad thickness: 10.0 mm (0.394 in) Pad wear limit: 2.0 mm (0.079 in) Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston. SBR181E BR-25 REAR DISC BRAKE SBR182E j 1 j 2 j 3 j 4 j 5 j 6 Main pin Pin boot Shim cover Inner shim Inner pad Torque member fixing bolt j 7 j 8 j 9 j 10 j 11 j 12 Washer Torque member Outer pad Outer shim Pad retainer Connecting bolt BR-26 j 13 j 14 j 15 j 16 j 17 j 18 Copper washer Main pin bolt Cylinder body Piston seal Piston Piston boot REAR DISC BRAKE Removal WARNING: Clean brake pads with a vacuum dust collector to minimize the hazard of airborne particles or other materials. CAUTION: Suspend caliper assembly with wire so as not to stretch brake hose. Remove torque member fixing bolts and connecting bolt. It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend caliper assembly with wire so as not to stretch brake hose. SBR183E Disassembly WARNING: Do not place your fingers in front of piston. CAUTION: Do not scratch or score cylinder wall. 1. Push out piston with dust seal with compressed air. 2. Remove piston seal with a suitable tool. SBR772 Inspection — Caliper CYLINDER BODY Check inside surface of cylinder for score, rust, wear, damage or presence of foreign objects. If any of the above conditions are observed, replace cylinder body. + Minor damage from rust or foreign objects may be eliminated by polishing surface with a fine emery paper. Replace cylinder body if necessary. CAUTION: Use brake fluid to clean. Never use mineral oil. + PISTON Check piston for score, rust, wear, damage or presence of foreign objects. Replace if any of the above conditions are observed. CAUTION: Piston sliding surface is plated. Do not polish with emery paper even if rust or foreign objects are stuck to sliding surface. SLIDE PIN, PIN BOLT AND PIN BOOT Check for wear, cracks, rust or other damage. Replace if any of the above conditions are observed. BR-27 REAR DISC BRAKE Inspection — Rotor RUNOUT SBR389A 1. Secure rotor to wheel hub with at least two nuts (M12 × 1.25). 2. Check runout using a dial indicator. Make sure that wheel bearing axial end play is within the specifications before measuring. Refer to ‘‘Rear Wheel Bearing’’ in RA section.
Maximum runout: 0.1 mm (0.004 in) 3.
If the runout is out of specification, find minimum runout position as follows: a. Remove nuts and rotor from wheel hub. b. Shift the rotor one hole and secure rotor to wheel hub with nuts. c. Measure runout. d. Repeat steps a. to c.
so that minimum runout position can be found. 4. If the runout is still out of specification, turn rotor with on-car brake lathe (‘‘MAD, DL-8700’’, ‘‘AMMCO 700 and 705’’ or equivalent).
THICKNESS Thickness variation (At least 8 positions): Maximum 0.015 mm (0.0006 in) If thickness variation exceeds the specification, turn rotor with oncar brake lathe. Rotor repair limit: 16.0 mm (0.630 in) SBR390A Assembly 1. Insert piston seal into groove on cylinder body. 2.
With piston boot fitted to piston, insert piston boot into groove on cylinder body and install piston. 3. Properly secure piston boot SBR574 Installation CAUTION: + Refill with new brake fluid ‘‘DOT 3’’. + Never reuse drained brake fluid. 1. Install caliper assembly. 2. Install brake hose to caliper securely. 3. Install all parts and secure all bolts. 4. Bleed air. Refer to ‘‘Bleeding Brake System’’, BR-4. SBR184E BR-28 PARKING CENTER BRAKE CONTROL SBR437A Removal 1. 2. 3. 4. Disconnect harness connector. Disconnect control cable from control lever and bracket. Remove control lever and bracket. Disconnect control cable from center brake and remove control cable. SBR209E Inspection 1. Check control lever and ratchet for evidence of wear or other damage. Replace if necessary. 2.
Check wires for evidence of discontinuity or other deterioration. Replace if necessary. 3. Check parts at each connection for deformation or damage. Replace if necessary. 4. Check warning lamp and switch. Replace if necessary. BR-29 PARKING CENTER BRAKE CONTROL Installation 1. Apply a coating of grease to sliding contact surfaces. 2. Insert clevis pin from left side. 3. After installation is completed, adjust entire system. Adjustment 1. Pull control lever with specified amount of force. Check lever stroke and ensure smooth operation. Number of notches: 7 - 9 SBR033A 2. Bend parking brake warning lamp switchplate so that brake warning lamp comes on when ratchet at parking brake lever is pulled notches and goes out when fully released.
Number of notches: 2 SBR438A BR-30 PARKING CENTER BRAKE SBR251E Removal and Installation SBR180E WARNING: Clean brake lining with a vacuum dust collector to minimize the hazard of airborne particles or other materials. CAUTION: Make sure parking brake lever is released completely. 1. Release parking brake lever fully. 2. Remove rear propeller shaft and drum. 3. After removing shoe hold pin by rotating push retainer, remove leading shoe then remove trailing shoe.
Remove spring by rotating shoes in direction arrow. 4.
Remove adjuster and return spring. 5. Disconnect parking brake cable from center brake lever. Be careful not to damage parking brake cable when separating it. 6. Remove retainer ring with a suitable tool. Then separate center brake lever and brake shoe. BR-31 PARKING CENTER BRAKE Removal and Installation (Cont’d) When installing, measure brake drum inside diameter and diameter of brake shoes. Check that the difference between diameters is the correct shoe clearance. Shoe clearance: 0.25 - 0.4 mm (0.0098 - 0.0157 in) If necessary, adjust by rotating adjuster.
SBR367A Inspection — Drum + SBR095A + + Standard inner diameter: 203.2 mm (8 in) Maximum inner diameter: 204.5 mm (8.05 in) Out-of-roundness (Ellipticity): 0.03 mm (0.0012 in) or less Radial runout (Total indicator reading): 0.05 mm (0.0020 in) or less Contact surface should be finefinished with No. 120 to 150 emery paper. Using a drum lathe, lathe brake drum if it shows scoring, partial wear or stepped wear. After brake drum has been completely reconditioned or replaced, check drum and shoes for proper contact pattern. Inspection — Lining Check lining thickness. Lining wear limit: 1.5 mm (0.059 in) Lining standard thickness: 5.1 mm (0.201 in) Before installing new shoes, rotate nut until adjuster rod is at its shortest point. After installation, adjust shoe-to-drum clearance. Refer to Removal and Installation. + SBR021A BR-32 ANTI-LOCK BRAKE SYSTEM Purpose The Anti-Lock Brake System (ABS) consists of electronic and hydraulic components. It allows for control of braking force so locking of the wheels can be avoided.
The ABS: 1) Improves proper tracking performance through steering wheel operation. 2) Eases obstacle avoidance through steering wheel operation. 3) Improves vehicle stability. Operation + + + + When the vehicle speed is less than 10 km/h (6 MPH) this system does not work. The Anti-Lock Brake System (ABS) has a self-test function. The system turns on the ABS warning lamp for 1 second each time the ignition switch is turned ‘‘ON’’. After the engine is started, the ABS warning lamp turns off.
The system performs a test the first time the vehicle reaches 6 km/h (4 MPH). A mechanical noise may be heard as the ABS performs this self-test. This is a normal part of the self-test feature. If a malfunction is found during this check, the ABS warning lamp will stay on. While driving, a mechanical noise may be heard during ABS operation. This is a normal condition. While DIFF-LOCK is on, the anti-lock brake warning light flashes. This indicates that anti-lock may not be fully operated.
(ABS only) ABS Hydraulic Circuit SBR211E j 1 j 2 j 3 Inlet solenoid valve Outlet solenoid valve Reservoir j 4 j 5 j 6 Pump Motor Inlet valve BR-33 j 7 j 8 j 9 Outlet valve Bypass check valve Damper ANTI-LOCK BRAKE SYSTEM System Components SBR185E System Description WHEEL SENSOR The sensor unit consists of a gear-shaped sensor rotor and a sensor element. The element contains a bar magnet around which a coil is wound. The sensor is installed on the back of the brake rotor. As the wheel rotates, the sensor generates a sine-wave pattern. The frequency and voltage increase(s) as the rotating speed increases. CONTROL UNIT (built in ABS actuator and electric unit) The control unit computes the wheel rotating speed by the signal current sent from the sensor. Then it supplies a DC current to the actuator solenoid valve. It also controls ON-OFF operation of the valve relay and motor relay. If any electrical malfunction should be detected in the system, the control unit causes the warning lamp to light up. In this condition, the ABS will be deactivated by the control unit, and the vehicle’s brake system reverts to normal operation. (For control unit layout, refer to ABS ACTUATOR AND ELECTRIC UNIT, BR-34.) SBR186E BR-34 ANTI-LOCK BRAKE SYSTEM System Description (Cont’d) G SENSOR The G sensor senses deceleration during braking to determine whether the vehicle is being driven on a high µ road (asphalt road, etc.) or a low µ road (snow-covered road, etc.). It then sends a signal to the ABS control unit. SBR189E The reed switch turns on when it is affected by a magnetic field. During sudden deceleration (braking on a high µ road), the weight moves and the magnet in the weight moves away from the reed switch. The magnetic field then diminishes and the reed switch turns off. ABS ACTUATOR AND ELECTRIC UNIT SBR176E The ABS actuator and electric unit contains: + An electric motor and pump + Two relays + Six solenoid valves, each inlet and outlet for — LH front — RH front — Rear + ABS control unit This component controls the hydraulic circuit and increases, holds or decreases hydraulic pressure to all or individual wheels. The ABS actuator and electric unit are not disassemble. ABS actuator operation Inlet solenoid valve Outlet solenoid valve OFF (Open) OFF (Closed) Master cylinder brake fluid pressure is directly transmitted to wheel cylinder via the inlet solenoid valve. Pressure hold ON (Closed) OFF (Closed) Hydraulic circuit is shut off to hold the wheel cylinder brake fluid pressure. Pressure decrease ON (Closed) ON (Open) Wheel cylinder brake fluid is sent to reservoir via the outlet solenoid valve. Then it is pushed up to the master cylinder by pump. Pressure increase OFF (Open) OFF (Closed) Master cylinder brake fluid pressure is transmitted to wheel cylinder. Normal brake operation ABS operation BR-35 ANTI-LOCK BRAKE SYSTEM Removal and Installation CAUTION: Be careful not to damage sensor edge and sensor rotor teeth. When removing the front wheel hub or rear axle shaft assembly, disconnect the ABS wheel sensor from the assembly and move it away. FRONT WHEEL SENSOR SBR187E BR-36 ANTI-LOCK BRAKE SYSTEM Removal and Installation (Cont’d) REAR WHEEL SENSOR SBR188E G SENSOR Always replace G sensor if bumped or dropped. Otherwise, performance characteristics of G sensor will be changed, which in turn changes ABS control performance characteristics. SBR190E BR-37 ANTI-LOCK BRAKE SYSTEM Removal and Installation (Cont’d) ABS ACTUATOR AND ELECTRIC UNIT SBR191E Removal 1. 2. 3. 4. Disconnect battery cable. Drain brake fluid.
Refer to ‘‘Changing Brake Fluid’’, BR-3. Remove mounting bracket fixing bolts and nuts. Disconnect connector, brake pipes and remove fixing nuts. Installation CAUTION: After installation, refill brake fluid.
Then bleed air. Refer to Bleeding Brake System’’, BR-4.
1. Connect brake pipes temporarily.
2. Tighten fixing bolts and nuts. 3. Tighten brake pipes. 4. Connect connector and battery cable. BR-38 TROUBLE DIAGNOSES How to Perform Trouble Diagnoses for Quick and Accurate Repair INTRODUCTION SEF233G SEF234G The ABS system has an electronic control unit to control major functions. The control unit accepts input signals from sensors and instantly drives the actuators. It is essential that both kinds of signals are proper and stable. It is also important to check for conventional problems: such as air leaks in booster lines, lack of brake fluid, or other problems with the brake system. It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or faulty wiring. In this case, careful checking of suspicious circuits may help prevent the replacement of good parts. A visual check only may not find the cause of the problems, so a road test should be performed.
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a ABS complaint. The customer is a very good source of information on such problems; especially intermittent ones. Through the talks with the customer, find out what symptoms are present and under what conditions they occur. Start your diagnosis by looking for ‘‘conventional’’ problems first. This is one of the best ways to troubleshoot brake problems on an ABS controlled vehicle. BR-39 TROUBLE DIAGNOSES Preliminary Check Check brake fluid level in reservoir tank. ----------Low fluid level may indicate brake pad wear or leakage from brake line. SBR451D . Check brake line for leakage.
NG Repair.
c OK b . Check brake booster for operation and air tightness. Refer to BR-15. NG Replace. c OK b SBR389C . Check brake pads and rotor. Refer to BR-21, 25. NG Replace.
c OK . Check brake fluid level in reservoir tank again. NG Fill up brake fluid. c OK . SBR058C Check warning lamp activation. When ignition switch is turned on, warning lamp turns on. NG c Check fuse, warning lamp bulb and warning lamp circuit. OK . Check warning lamp for deactivation after engine is started. NG c Go to Self-diagnosis, BR-46, 50. c Go to Self-diagnosis, BR-46, 50. OK . Drive vehicle at speeds over 30 km/h (19 MPH) for at least 1 minute. SBR059C . Ensure warning lamp remains off while driving. OK . END SBR186E BR-40 NG TROUBLE DIAGNOSES Component Parts and Harness Connector Location SBR192E BR-41 TROUBLE DIAGNOSES Circuit Diagram for Quick Pinpoint Check TBR098 BR-42 TROUBLE DIAGNOSES Wiring Diagram — ABS — TBR099 BR-43 TROUBLE DIAGNOSES Wiring Diagram — ABS — (Cont’d) TBR100 BR-44 TROUBLE DIAGNOSES Wiring Diagram — ABS — (Cont’d) TBR101 BR-45 TROUBLE DIAGNOSES Wiring Diagram — ABS — (Cont’d) TBR102 BR-46 TROUBLE DIAGNOSES Self-diagnosis FUNCTION + + When a problem occurs in the ABS, the warning lamp on the instrument panel comes on. To start the self-diagnostic results mode, ground the self-diagnostic (check) terminal located on ‘‘Data Link Connector for CONSULT’’. The location of the malfunction is indicated by the warning lamp flashing.

While DIFF-LOCK is on, anti-lock warning light flashes. SELF-DIAGNOSIS PROCEDURE Turn off DIFF-LOCK switch. Drive vehicle over 30 km/h (19 MPH) for at least one minute. . Turn ignition switch ‘‘OFF’’. . SBR193E Ground terminal ‘‘4’’ of ‘‘Data link connector for CONSULT’’ with a suitable harness. . Turn ignition switch ‘‘ON’’ while grounding
terminal ‘‘4’’. Do not depress brake pedal.
. After 3.0 seconds, the warning lamp starts flashing to indicate the malfunction code No. (See NOTE.) SBR186E . Verify the location of the malfunction with the malfunction code chart. Refer to BR-48.
Then make the necessary repairs following the diagnostic procedures. . After the malfunctions are repaired, erase the malfunction codes stored in the control unit. Refer to BR-47. SBR194E . Rerun the self-diagnostic results mode to verify that the malfunction codes have been erased.
. Disconnect the check terminal from the ground. The self-diagnostic results mode is now complete. .
j A BR-47 NOTE: The indication terminates after five minutes.
However, when the ignition switch is turned from ‘‘OFF’’ to ‘‘ON’’, the indication starts flashing again. TROUBLE DIAGNOSES Self-diagnosis (Cont’d) j A . Check warning lamp for deactivation after driving vehicle over 30 km/h (19 MPH) for at least one minute. . After making certain that warning lamp does not come on, test the ABS in a safe area to
verify that it functions properly. HOW TO READ SELF-DIAGNOSTIC RESULTS (Malfunction codes) + + + + Determine the code No. by counting the number of times the warning lamp flashes on and off. When several malfunctions occur at one time, up to three code numbers can be stored; the latest malfunction will be indicated first. The indication
begins with the start code 12. After that a maximum of three code numbers appear in the order of the latest one first. The indication then returns to the start code 12 to repeat (the indication will stay on for five minutes at the most). The malfunction code chart is given on the next page. SBR457D HOW TO ERASE SELF-DIAGNOSTIC RESULTS
(Malfunction codes) 1.
Disconnect the check terminal from ground (ABS warning lamp will stay lit).
2. Within 12.5 seconds, ground the check terminal 3 times. Each terminal ground must last more than 1 second. The ABS warning lamp goes out after the erase operation has been completed. 3. Perform self-diagnosis again. Refer to BR-47. Only the startcode should appear, no malfunction codes. ABR256 BR-48 TROUBLE DIAGNOSES Self-diagnosis
(Cont’d) MALFUNCTION CODE/SYMPTOM CHART Code No. (No. of warning lamp flashes) Malfunctioning part Diagnostic procedure 45 Actuator front left outlet solenoid valve 2 46 Actuator front left inlet solenoid valve 2 41 Actuator front right outlet solenoid valve 2 42 Actuator front right inlet solenoid valve 2 55 Actuator rear outlet solenoid
valve 2 56 Actuator rear inlet solenoid valve 2 25 .1 Front left sensor (open-circuit) 1 26 .1 Front left sensor (short-circuit) 1 21 .1 Front right sensor (open-circuit) 1 22 .1 Front right sensor (short-circuit) 1 31 .1 Rear right sensor (open-circuit) 1 32 .1 Rear right sensor (short-circuit) 1 35 .1 Rear left sensor (open-circuit) 1 36 .1 Rear left sensor (short-
circuit) 1 18 .1 Sensor rotor 1 17 61 G sensor and circuit 63 57 5 .3 Actuator motor or motor relay Solenoid valve relay 2 .2 Power supply (Low voltage) 71 3 4 Control unit 6 Warning lamp stays on when ignition switch is turned on Control unit power supply circuit Warning lamp bulb circuit Control unit or control unit connector Solenoid valve relay
stuck Power supply for solenoid valve relay coil 13 Warning lamp does not come on when ignition switch is turned on Fuse, warning lamp bulb or warning lamp circuit Control unit 12 Pedal vibration and noise — 11 Long stopping distance — 9 Unexpected pedal action — 8 ABS does not work — 10 ABS works frequently — 7 .1: If one or more wheels
spin on a rough or slippery road for 40 seconds or more, the ABS warning lamp will illuminate. This does not indicate a malfunction. Only in the case of the short-circuit (Code Nos. 26, 22, 32 and 36), after repair the ABS warning lamp also illuminates when the ignition switch is turned ‘‘ON’’. In this case, drive the vehicle at speeds greater than 30
km/h (19 MPH) for approximately 1 minute as specified in ‘‘SELF-DIAGNOSIS PROCEDURE’’, BR-47. Check to ensure that the ABS warning lamp goes out while the vehicle is being driven. .2: The trouble code ‘‘57’’, which refers to a low power supply voltage, does not indicate that the ABS control unit is malfunctioning. Do not replace the ABS
control unit with a new one. .3: The trouble code ‘‘61’’ can sometimes appear when the ABS motor is not properly grounded. If it appears, be sure to check the condition of the ABS motor ground circuit connection. BR-49 TROUBLE DIAGNOSES CONSULT CONSULT APPLICATION TO ABS EE960 program card is not applicable to ABS. Use on board
diagnostic system with ABS warning lamp until the next program card will be introduced. (Refer to ‘‘Self-diagnosis’’, BR-47.) SELF-DIAGNOSTIC RESULTS DATA MONITOR ACTIVE TEST Front right wheel sensor X X — Front left wheel sensor X X — Rear right wheel sensor X X — Rear left wheel sensor X X — G switch (G sensor) X X X Stop lamp
switch — X — Front right inlet solenoid valve X X X Front right outlet solenoid valve X X X Front left inlet solenoid valve X X X Front left outlet solenoid valve X X X Rear inlet solenoid valve X X X Rear outlet solenoid valve X X X Actuator solenoid valve relay X X — Actuator motor relay (ABS MOTOR is shown on the Data Monitor screen.) X X X ABS
warning lamp — X — Battery voltage X X — ITEM X: Applicable —: Not applicable ECU (ABS control unit) part number mode Ignore the ECU part number displayed in the ECU PART NUMBER MODE. Refer to parts catalog to order the ECU. BR-50 TROUBLE DIAGNOSES CONSULT Inspection Procedure SELF-DIAGNOSIS PROCEDURE 1) Turn
ignition switch OFF. 2) Connect CONSULT to Data Link Connector for CONSULT. . SBR195E 1) Start engine. 2) Drive vehicle over 30 km/h (19 MPH) for at least one minute. . 1) Stop vehicle with engine running and touch ‘‘START’’ on CONSULT screen.
2) Touch ‘‘ABS’’. SBR455D 3) Touch ‘‘SELF-DIAG RESULTS’’. + The screen shows the detected malfunction and how many times the ignition switch has been turned since the malfunction. . Make the necessary repairs following the diagnostic procedures. . SBR080E After the malfunctions are repaired, erase the self-diagnostic results stored in the
control unit by touching ‘‘ERASE’’. . Check warning lamp for deactivation after driving vehicle over 30 km/h (19 MPH) for at least one minute. . Test the ABS in a safe area to verify that it functions properly. SST412B Note: ‘‘SELF-DIAG RESULTS’’ screen shows the detected malfunction and how many times the ignition switch has been turned since
the malfunction. SBR950C BR-51 TROUBLE DIAGNOSES CONSULT Inspection Procedure (Cont’d) SELF-DIAGNOSTIC RESULTS MODE Diagnostic item FR RH SENSOR .1 [OPEN] FR LH SENSOR .1 [OPEN] RR RH SENSOR .1 [OPEN] RR LH SENSOR .1 [OPEN] FR RH SENSOR .1 [SHORT] FR LH SENSOR .1 [SHORT] RR RH SENSOR .1 [SHORT]
RR LH SENSOR .1 [SHORT] ABS SENSOR .1 [ABNORMAL SIGNAL] FR RH IN ABS SOL [OPEN] FR LH IN ABS SOL [OPEN] RR IN ABS SOL [OPEN] FR RH IN ABS SOL [SHORT] FR LH IN ABS SOL [SHORT] RR IN ABS SOL [SHORT] FR RH OUT ABS SOL [OPEN] FR LH OUT ABS SOL [OPEN] RR OUT ABS SOL [OPEN] FR RH OUT ABS SOL
[SHORT] FR LH OUT ABS SOL [SHORT] RR OUT ABS SOL [SHORT] ABS ACTUATOR RELAY [ABNORMAL] ABS MOTOR RELAY [ABNORMAL] BATTERY VOLT [VB-LOW] CONTROL UNIT G-SENSOR [ABNORMAL] Diagnostic item is detected when ... + Circuit for front right wheel sensor is open. (An abnormally high input voltage is entered.) +
Circuit for front left wheel sensor is open. (An abnormally high input voltage is entered.) + Circuit for rear right sensor is open. (An abnormally high input voltage is entered.) + Circuit for rear left sensor is open. (An abnormally high input voltage is entered.) + Circuit for front right wheel sensor is shorted. (An abnormally low input voltage is
entered.) + Circuit for front left wheel sensor is shorted. (An abnormally low input voltage is entered.) + Circuit for rear right sensor is shorted. (An abnormally low input voltage is entered.) + Circuit for rear left sensor is shorted. (An abnormally low input voltage is entered.) + Teeth damage on sensor rotor or improper installation of wheel sensor.
(Abnormal wheel sensor signal is entered.) + Circuit for front right inlet solenoid valve is open. (An abnormally low output voltage is entered.) + Circuit for front left inlet solenoid valve is open. (An abnormally low output voltage is entered.) + Circuit for rear inlet solenoid valve is open. (An abnormally low output voltage is entered.) + Circuit for front
right inlet solenoid valve is shorted.
(An abnormally high output voltage is entered.) + Circuit for front left inlet solenoid valve is shorted. (An abnormally high output voltage is entered.) + Circuit for rear inlet solenoid valve is shorted.
(An abnormally high output voltage is entered.) + Circuit for front right outlet solenoid valve is open. (An abnormally low output voltage is entered.) + Circuit for front left outlet solenoid valve is open. (An abnormally low output voltage is entered.) + Circuit for rear outlet solenoid valve is open. (An abnormally low output voltage is entered.) + Circuit
for front right outlet solenoid valve is shorted. (An abnormally high output voltage is entered.) + Circuit for front left outlet solenoid valve is shorted.
(An abnormally high output voltage is entered.) + Circuit for rear outlet solenoid valve is shorted. (An abnormally high output voltage is entered.) + Actuator solenoid valve relay is ON, even if control unit sends off signal. + Actuator solenoid valve relay is OFF, even if control unit sends on signal.
+ Circuit for ABS motor relay is open or shorted. + Circuit for actuator motor is open or shorted. + Actuator motor relay is stuck. Diagnostic procedure 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 + Power source voltage supplied to ABS control unit is abnormally low. 4 + Function of calculation in ABS control unit has failed. 6 + G sensor circuit is
open or shorted. 5 .1: If one or more wheels spin on a rough or slippery road for 40 seconds or more, the ABS warning lamp will illuminate.
This does not indicate a malfunction. Only in the case of the short-circuit (Code Nos. 26, 22, 32 and 36), after repair the ABS warning lamp also illuminates when the ignition switch is turned ‘‘ON’’. In this case, drive the vehicle at speeds greater than 30 km/h (19 MPH) for approximately 1 minute as specified in ‘‘SELF-DIAGNOSIS PROCEDURE’’, BR-
47. Check to ensure that the ABS warning lamp goes out while the vehicle is being driven. BR-52 TROUBLE DIAGNOSES CONSULT Inspection Procedure (Cont’d) DATA MONITOR PROCEDURE 1) Turn ignition switch OFF.
2) Connect CONSULT to Data Link Connector for CONSULT. 3) Turn ignition switch ON. . SBR455D 1) Touch ‘‘START’’ on CONSULT screen. 2) Touch ‘‘ABS’’. 3) Touch ‘‘DATA MONITOR’’. . 1) Touch ‘‘SETTING’’ on ‘‘SELECT MONITOR ITEM’’ screen. 2) Touch ‘‘LONG TIME’’ on ‘‘SET RECORDING COND’’ screen. 3) Touch ‘‘START’’ on ‘‘SELECT
MONITOR ITEM’’. SBR080E SST412B SBR936C SBR937C BR-53 TROUBLE DIAGNOSES CONSULT Inspection Procedure (Cont’d) ACTIVE TEST PROCEDURE + + When conducting Active test, vehicle must be stationary. When ABS warning lamp stays on, never conduct Active test. 1) Turn ignition switch OFF. 2) Connect CONSULT to Data Link
Connector for CONSULT. 3) Start engine. . SBR455D 1) Touch ‘‘START’’ on CONSULT screen. 2) Touch ‘‘ABS’’. 3) Touch ‘‘ACTIVE TEST’’. . 1) Select active test item by touching screen. 2) Touch ‘‘START’’. . Carry out the active test by touching screen key. SBR080E SST412B SBR857D SBR934C BR-54 TROUBLE DIAGNOSES CONSULT Inspection
Procedure (Cont’d) DATA MONITOR MODE MONITOR ITEM CONDITION SPECIFICATION FR RH SENSOR FR LH SENSOR RR SENSOR RR RH SENSOR RR LH SENSOR Drive vehicle. (Each wheel is rotating.) Wheel speed signal (Almost the same speed as speedometer.) STOP LAMP SW Brake is depressed. Depress the pedal: ON Release the
pedal: OFF G-SWITCH Vehicle is driven. Vehicle is stopped. Brake is applied. During sudden braking while driving on high µ roads (asphalt roads, etc.): OFF While vehicle is stopped or during constant-speed driving: ON 1. Drive vehicle at speeds over 30 km/h (19 MPH) for at least one minute.
2.
Engine is running.
Operating conditions for each solenoid valve are indicated. ABS is not operating: OFF FR RH IN SOL FR RH OUT SOL FR LH IN SOL FR LH OUT SOL RR IN SOL RR OUT SOL MOTOR RELAY ABS is not operating: OFF ABS is operating: ON ACTUATOR RELAY Ignition switch ON (Engine stops): OFF Engine running: ON WARNING LAMP Ignition
switch is ON or engine is running. BATTERY VOLT ABS warning lamp is turned on: ON ABS warning lamp is turned off: OFF Power supply voltage for control unit ACTIVE TEST MODE TEST ITEM CONDITION JUDGEMENT Brake fluid pressure control operation FR RH SOLENOID FR LH SOLENOID REAR SOLENOID Engine is running. UP
(Increase): KEEP (Hold): DOWN (Decrease): IN SOL OUT SOL OFF ON ON OFF OFF ON ABS MOTOR ABS actuator motor ON: Motor runs (ABS motor relay ON) OFF: Motor stops (ABS motor relay OFF) G SWITCH G SWITCH (G SENSOR), ON: Set G SWITCH MONITOR ‘‘ON’’ (G switch circuit is closed.) OFF: Set G SWITCH MONITOR ‘‘OFF’’ (G
switch circuit is open.) Ignition switch is ON. Note: Active test will automatically stop ten seconds after the test starts. (LIMIT SIGNAL monitor shows ON.) BR-55 TROUBLE DIAGNOSES Ground Circuit Check ABS ACTUATOR AND ELECTRIC UNIT GROUND + Check resistance between ABS actuator and electric unit connector terminals and ground.
Resistance: approximately 0Ω SBR045EB BR-56 TROUBLE DIAGNOSES FOR SELF-DIAGNOSTIC ITEMS Diagnostic Procedure 1 (Wheel sensor or rotor) Malfunction code No. 21, 22, 25, 26, 31, 32, 35, 36 or 18 No INSPECTION START Inspection end c --
--1. Disconnect connectors from ABS actuator and electric unit and wheel sensor of malfunction code No. Check terminals for damage or loose connections.
Then reconnect connectors.
SBR196E 2. Carry out self-diagnosis again.
Does warning lamp activate again? Yes . CHECK WHEEL SENSOR ELECTRICAL. OK A (Go to next page.) cj --1. Disconnect ABS actuator and electric unit connector.
2. Check resistance between ABS actuator and electric unit connector E18 SBR048EB (body side) terminals. Code No. 21 or 22 (Front RH wheel) Terminals j 4 and j 5 Code No. 25 or 26 (Front LH wheel) Terminals j 6 and j 7 Code No. 31 or 32 (Rear RH wheel) Terminals j 1 and j 2 Code No. 35 or 36 (Rear LH wheel) Terminals j 8 and j 9 Resistance:
1.44 - 1.76 kΩ NG SBR197E . OK CHECK WHEEL SENSOR. Check the following. c ---+ Harness connectors Check each sensor for resistance. E18 , E77 , E62 , C6 , Resistance: 1.44 - 1.76 kΩ C5 + Harness for open or NG short between wheel sensor
connectors and ABS actuator and electric unit If NG, repair harness or connectors. . REPLACE. ---Replace wheel sensor.
BR-57 TROUBLE DIAGNOSES FOR SELF-DIAGNOSTIC ITEMS Diagnostic Procedure 1 (Wheel sensor or rotor) (Cont’d) j A Note Note . NG CHECK TIRE. Adjust tire pressure or c ---replace tire(s). Check for inflation pressure, wear and size of each tire.
OK Note . CHECK WHEEL BEARING. --Check wheel bearing axial end play. OK Note Note . CHECK SENSOR ROTOR. --Check sensor rotor for teeth
damage. NG c Replace sensor rotor. OK . CHECK HARNESS CONNECTOR.
--Check ABS actuator and electric unit pin terminals for damage or the connection of ABS actuator and electric unit harness connector. Reconnect ABS actuator and electric unit harness connector.
Then retest. Note: Wheel position should be distinguished by code numbers except code No. 18 (sensor rotor). BR-58 TROUBLE DIAGNOSES FOR SELF-DIAGNOSTIC ITEMS Diagnostic Procedure 2 (ABS actuator solenoid valve and solenoid valve relay) Malfunction code No. 41, 45, 55, 42, 46, 56, 63 NG CHECK FUSIBLE LINK. A (Go to next page.) cj
--Check 30A fusible link i . For fusible link layout, refer to POWER SUPPLY ROUTING in EL section. OK . NG CHECK FUSE. B (Go to next page.) cj --
Check 7.5A fuse 7 . For fuse layout, refer to POWER SUPPLY ROUTING in EL section.
OK . No CHECK CONNECTOR. Inspection end c ---1. Disconnect ABS actuator and electric unit connector. Check terminals for SBR198E damage or loose connection. Then reconnect connector. 2.
Carry out self-diagnosis again.
Does warning lamp activate again? Yes . CHECK ABS ACTUATOR AND ELECTRIC NG Repair harness and conc UNIT GROUND CIRCUIT. nector.
--Refer to ABS ACTUATOR AND ELECTRIC UNIT GROUND in Ground Circuit Check, SBR052EB BR-56. OK . NG CHECK SOLENOID VALVE RELAY Check the following. c POWER SUPPLY CIRCUIT. + Harness connector E18 --
--+ Harness for open or 1. Disconnect ABS actuator and electric short between ABS unit connector. actuator and electric unit 2. Check voltage between ABS actuator and fusible link and electric unit connector E18 (body If NG, repair harness or side) terminal j 18 and ground.
connector. Battery voltage should exist. OK . REPLACE. --Replace ABS actuator and electric unit. BR-59 TROUBLE DIAGNOSES FOR SELF-DIAGNOSTIC ITEMS Diagnostic Procedure 2 (ABS actuator solenoid valve and solenoid valve relay) (Cont’d) j A .
No Inspection end REPLACE. c ---Replace fusible link. Does the fusible link blow out when ignition switch is turned ‘‘ON’’? Yes SBR053EB . NG Check the following. CHECK SOLENOID VALVE RELAY c POWER SUPPLY CIRCUIT. + Harness connector
E18 ---+ Harness for open or short 1. Disconnect ABS actuator and electric between ABS actuator unit connector. and electric unit and 2. Check continuity between ABS actuator fusible link and electric unit connector E18 (body If NG, repair harness or
connector. side) terminal j 18 and ground. Continuity should not exit. OK . REPLACE. --Replace ABS actuator and electric unit. j B . Yes Check the following. REPLACE. c --
------------------------+ Harness connector E18 Replace fuse. + Harness for open or Does the fuse blow out when ignition short between ABS switch is turned ‘‘ON’’? actuator and electric unit and fuse No If NG, repair harness or connector. . END --
INSPECTION END BR-60 TROUBLE DIAGNOSES FOR SELF-DIAGNOSTIC ITEMS Diagnostic Procedure 3 (Motor relay or motor) Malfunction code No. 61 NG CHECK FUSIBLE LINK. cj A (Go to next page.) --Check 30A fusible link d . For fusible link
layout, refer to POWER SUPPLY ROUTING in EL section. OK . No CHECK CONNECTOR.
Inspection end c --1. Disconnect ABS actuator and electric unit connector. Check terminals for damage or loose connection. Then reconnect connector. 2. Carry out self-diagnosis again. Does warning lamp activate again? Yes . NG Check the following.
CHECK MOTOR RELAY POWER SUPc + Harness connector E18 PLY CIRCUIT. SBR199E --+ Harness for open or 1. Disconnect ABS actuator and electric short between ABS unit connector. actuator and electric unit 2. Check voltage between ABS
actuator and fusible link and electric unit connector E18 (body If NG, repair harness or connector. side) terminal j 17 and ground. Battery voltage should exist. OK . CHECK ABS ACTUATOR AND ELECTRIC NG Repair harness and termic nals. UNIT GROUND.
SBR055EB --Refer to ABS ACTUATOR AND ELECTRIC UNIT GROUND in Ground Circuit Check, BR-56. OK . REPLACE. --Replace ABS actuator and
electric unit.
BR-61 TROUBLE DIAGNOSES FOR SELF-DIAGNOSTIC ITEMS Diagnostic Procedure 3 (Motor relay or motor) (Cont’d) j A . No Inspection end REPLACE. c --Replace fusible link. Does the fusible link blow out when ignition switch is turned ‘‘ON’’? Yes
SBR056EB . NG Check the following CHECK ABS ACTUATOR MOTOR c + Harness connector E18 POWER SUPPLY CIRCUIT. --+ Harness for open or 1. Disconnect battery cable and ABS short between ABS actuator and electric unit connector actuator
and electric unit and fusible link E18 . If NG, repair harness or 2. Check continuity between ABS actuator connector. and electric unit connector E18 (body side) terminal j 17 and ground. Continuity should not exist. OK . CHECK HARNESS CONNECTOR. ---
----Check ABS actuator and electric unit pin terminals for damage or the connection of ABS actuator and electric unit harness connector. Reconnect ABS actuator and electric unit harness connector. Then retest. BR-62 TROUBLE DIAGNOSES FOR SELF-DIAGNOSTIC ITEMS Diagnostic Procedure 4 (Low voltage) Malfunction code No. 57 CHECK
CONNECTOR. ---1. Disconnect ABS actuator and electric unit connector. Check terminals for damage or loose connection. Then reconnect connector.
2. Carry out self-diagnosis again. Does warning lamp activate again? No c Inspection end Yes SBR200E . CHECK ABS CONTROL UNIT POWER SUPPLY CIRCUIT. ---1. Disconnect ABS actuator and electric unit connector. 2. Check voltage between ABS
actuator and electric unit connector E18 (body side) terminal j 15 and ground. Battery voltage should exist when ignition switch is turned ON. NG cj A (See below.) OK SBR058EB . CHECK ABS CONTROL UNIT GROUND. ---Refer to ABS ACTUATOR AND
ELECTRIC UNIT GROUND in Ground Circuit Check, BR-56. NG c Repair harness and connector.
OK . CHECK HARNESS CONNECTOR.
--Check ABS actuator and electric unit pin terminals for damage or the connection of ABS actuator and electric unit harness connector. Reconnect ABS actuator and electric unit harness connector. Then retest. j A . CHECK FUSE. -----------------------------------
--Check 7.5A fuse 7 . For fuse layout, refer to POWER SUPPLY ROUTING in EL section. NG c Replace fuse. OK .
CHECK ABS CONTROL UNIT POWER SUPPLY CIRCUIT. ---Check continuity between battery and ABS actuator and electric unit connector E18 (body side) terminal j 15 . OK . CHECK BATTERY. ---
--Check battery. Refer to BATTERY in EL section. BR-63 NG c Check the following. + Harness connector E18 + Harness for open or short between ABS actuator and electric unit and fuse If NG, repair harness or connector. TROUBLE DIAGNOSES FOR SELF-DIAGNOSTIC ITEMS Diagnostic Procedure 5 (G
sensor) Malfunction code No. 17 NG Replace fuse. CHECK G SENSOR POWER SUPPLY c CIRCUIT. ---Check 7.5A fuse 7 . For fuse layout, refer to POWER SUPPLY ROUTING in EL section. OK SBR201E . CHECK CONNECTOR. ---
---1.
Disconnect ABS actuator and electric unit connector. Check terminals for damage or loose connection. Then reconnect connector. 2.
Carry out self-diagnosis again. Does warning lamp activate again? . No c Inspection end Yes NG Replace G sensor.
CHECK G SENSOR. c ---Refer to G SENSOR in Electrical CompoSBR202E nents Inspection, BR-64. OK .
NG Check the following. CHECK G SENSOR POWER SUPPLY c CIRCUIT. + Harness connectors --: B34 , B33 , E18 , 1.
Disconnect G sensor connector. : B121 , B120 , E18 2. Check voltage between G sensor con+ Harness for open or short nector between G sensor and : B34 , B33 , : B121 , ABS actuator and electric B120 (body side) terminal j 15 and unit ground.
If NG, repair harness or Battery voltage should exist. SBR203E connectors. OK . NG Check the following. CHECK G SENSOR GROUND. c ---+ Harness connectors 1. Disconnect ABS actuator and electric : B34 , B33 , E18 , unit connector and G sensor
connectors. : B121 , B120 , B18 2. Check continuity between ABS actuator + Harness for open or short and electric unit connector E18 (body between G sensor and ABS actuator and electric side) terminals j 10 , j 20 and G sensor unit connectors : B34 , B33 , : If NG, repair harness or B121 , B120 (body side) terminals j 10 , j 20 . connectors.
Continuity should exist. OK .
CHECK HARNESS CONNECTOR. --Check ABS actuator and electric unit pin terminals for damage or the connection of ABS actuator and electric unit harness connector. Reconnect ABS actuator and electric unit harness connector. Then retest.
BR-64 TROUBLE DIAGNOSES FOR SELF-DIAGNOSTIC ITEMS Diagnostic Procedure 5 (G sensor) (Cont’d) ELECTRICAL COMPONENTS INSPECTION G sensor CAUTION: The G sensor is easily damaged if it sustains an impact. Be careful not to drop or bump it. 1. Measure resistance between terminals j 15 and j 20 of G sensor unit connector. G
sensor condition SBR844DC Resistance between terminals j 15 and j 20 G sensor switch condition Installed in vehicle 1.4 - 1.6 kΩ ‘‘ON’’ Tilted as shown in figure 4.7 - 5.5 kΩ ‘‘OFF’’ 2. Measure resistance between terminals j 10 and j 15 of the G sensor unit connector. 70 - 124 Ω Resistance: Diagnostic Procedure 6 (Control unit) Malfunction code No.
71 CHECK CONNECTOR. ---1.
Disconnect ABS actuator and electric unit connector. Check terminals for damage or loose connections.
Then reconnect connector. 2. Carry out self-diagnosis again. Does warning lamp activate again? SBR204E . No c Inspection end Yes ABS CONTROL UNIT POWER SUPPLY CHECK ---Check voltage. Refer to in Diagnostic Procedure 4, BR-63.
. CHECK SELF-DIAGNOSTIC RESULTS ---Does warning lamp indicate code No. 71 again?
. No INSPECTION ---Inspect the system according to the code No. BR-65 Yes c Replace ABS actuator and electric unit. TROUBLE DIAGNOSES FOR SYMPTOMS Diagnostic Procedure 7 (ABS works frequently.) NG CHECK BRAKE FLUID PRESSURE.
Perform Preliminary c --Check, refer to BR-40. Check brake fluid pressure distribution.
Refer to proportioning valve inspection. OK . NG CHECK WHEEL SENSOR. Repair. c ---1. Check wheel sensor connector for terminal damage or loose connections.
2. Perform wheel sensor mechanical check. Refer to Diagnostic Procedure 1, BR-57. OK . NG CHECK FRONT AXLES. Repair. c ---Check front axles for excessive looseness. Refer to FA section (‘‘Front Wheel Bearing’’, ‘‘ON-VEHICLE SERVICE’’).
OK . Go to BR-66. in Diagnostic Procedure 8, BR-66 TROUBLE DIAGNOSES FOR SYMPTOMS Diagnostic Procedure 8 (Unexpected pedal action) CHECK BRAKE PEDAL STROKE. --Check brake pedal stroke. Is stroke excessively large? Yes c Perform
Preliminary Check, refer to BR-40. c Perform Preliminary Check, refer to BR-40. c Carry out self-diagnosis. Refer to BR-47, 51.
c Repair. No . SBR540A CHECK BRAKE PERFORMANCE. --Disconnect ABS actuator and electric unit connector and check whether brake is effective. No Yes . CHECK WARNING LAMP ACTIVATE. --
---Ensure warning lamp remains off while driving.
. OK CHECK WHEEL SENSOR. SBR186E --1. Check wheel sensor connector for terminal damage or loose connection. 2. Perform wheel sensor mechanical check. Refer to Diagnostic Procedure 1, BR-57. . NG NG OK CHECK HARNESS CONNECTOR. ----
--Check ABS actuator and electric unit pin terminals for damage or the connection of ABS actuator and electric unit harness connector. Reconnect ABS actuator and electric unit harness connector. Then retest. Diagnostic Procedure 9 (Long stopping
distance) No CHECK ABS PERFORMANCE. in Diagnostic Go to c --Procedure 8, BR-67. Disconnect ABS actuator and electric unit connector and check whether stopping distance is still long. Yes . Perform Preliminary Check and air bleeding. Note:
Stopping distance may be larger than vehicles without ABS when road condition is slippery.
BR-67 TROUBLE DIAGNOSES FOR SYMPTOMS Diagnostic Procedure 10 (ABS does not work.) CHECK WARNING LAMP ACTIVATE. --Does the ABS warning lamp activate?
Yes c Carry out self-diagnosis. Refer to BR-47, 51. No . Go to BR-67. in Diagnostic Procedure 8, Note: ABS does not work when vehicle speed is under 10 km/h (6 MPH). Diagnostic Procedure 11 (Pedal vibration and noise) INSPECTION START --1. Apply
brake. 2. Start engine. 3. Does the symptom appear only when engine is started?
Yes c Carry out self-diagnosis. Refer to BR-47, 51. c Go to in Diagnostic Procedure 8, BR-67. No . SAT797A CHECK IF SYMPTOM APPEARS. ---Does the symptom appear when electrical equipment switches (such as headlamp) are operated?
No Yes . CHECK WHEEL SENSOR.
--Check wheel sensor shield ground. For location of shield ground, refer to wiring diagram and ‘‘HARNESS LAYOUT’’ in EL section. OK . CHECK HARNESS CONNECTOR.
--Check ABS actuator and electric unit pin terminals for damage or the connection of ABS actuator and electric unit harness connector. Reconnect ABS actuator and electric unit harness connector. Then retest. BR-68 NG c Repair wheel sensor.
TROUBLE DIAGNOSES FOR SYMPTOMS Diagnostic Procedure 11 (Pedal vibration and noise) (Cont’d) Note: ABS may operate and cause vibration under any of the following conditions. + Applying brake gradually when shifting or operating clutch. + Low friction (slippery) road. + High speed cornering. + Driving over bumps and pot holes. + Engine
speed is over 5,000 rpm with vehicle stopped.
Diagnostic Procedure 12 (Warning lamp does not come on when ignition switch is turned ON.) NG CHECK FUSE. Replace fuse. c --Check 10A fuse 28 . For fuse layout, refer to POWER SUPPLY ROUTING in EL section. SBR205E OK .
Yes CHECK WARNING LAMP ACTIVATE. A (Go to next page.) c j ---Disconnect ABS actuator and electric unit connector. Does the warning lamp activate? No SBR186E . NG CHECK HARNESS FOR SHORT. Repair harness or connecc ------------------------------
--tor. 1. Disconnect ABS actuator and electric unit connector. 2. Check voltage between ABS actuator and electric unit connector E18 (body side) terminal j 21 and ground. Battery voltage should not exist.
OK . SBR144EB CHECK COMBINATION METER.
--Check combination meter. Refer to WARNING LAMPS in EL section. BR-69 TROUBLE DIAGNOSES FOR SYMPTOMS Diagnostic Procedure 12 (Warning lamp does not come on when ignition switch is turned ON.) (Cont’d) j A . CHECK HARNESS
CONNECTOR. --Check ABS actuator and electric unit pin terminals for damage or connection of ABS actuator and electric unit harness connector. Reconnect ABS actuator and electric unit harness connector. Then retest. NG . REPLACE. -----------------------
--Replace ABS actuator and electric unit. BR-70 OK c Inspection end TROUBLE DIAGNOSES FOR SYMPTOMS Diagnostic Procedure 13 (Warning lamp stays on when ignition switch is turned ON.) NG CHECK WARNING LAMP. Repair combination meter. c -----------------
---Check the following. 1. Disconnect ABS actuator and electric + Harness connector E18 unit connector. + Harness for open or 2.
Connect suitable wire between ABS short between ABS actuator and electric unit connector actuator and electric unit SBR206E and fuse E18 (body side) terminal j 21 and If NG, repair harness or ground. connector. Warning lamp should not activate.
OK . OK Inspection end CHECK HARNESS CONNECTOR. c ---Check ABS actuator and electric unit pin terminals for damage or the connection of ABS actuator and electric unit harness connector. Reconnect ABS actuator and electric unit harness
connector. Then SBR146EA retest. NG . NG CHECK ABS MOTOR GROUND. Check the following. c ---+ Harness connector E18 1. Turn ignition switch ‘‘OFF’’. + Harness for open or 2. Disconnect ABS actuator and electric short between ABS unit
connector.
actuator and electric unit 3. Check continuity between ABS actuator and ground and electric unit connector E18 (body If NG, repair harness or SBR147E connector. side) terminal j 16 and ground. Continuity should exist. OK .
REPLACE. --Replace ABS actuator and electric unit. BR-71 SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications Europe, Australia and Middle East Except for Europe, Australia and Middle East Applied model Standard Option All Front
brake Type CL36VE disc brake Cylinder bore diameter mm (in) Pad dimension Length x width x thickness mm (in) 48.1 (1.894) x 2 147 x 56.5 x 12 (5.79 x 2.224 x 0.47) Rotor outer diameter x thickness 306 x 32 (12.05 x 1.26) mm (in) Rear brake Type LT30 drum brake CL18VF disc brake Cylinder bore diameter mm (in) 25.4 (1.00) 48.1 (1.894) Lining
or pad dimension Length x width x thickness mm (in) 296 x 50 x 6.1 (11.65 x 1.97 x 0.240) 111 x 41.8 x 10 (4.37 x 1.646 x 0.39) Drum inner diameter mm (in) 295 (11.61) — — 316 x 18 (12.44 x 0.71) Rotor outer diameter x thickness mm (in) Except for 4-door rear disc brake Applied model 4-door rear disc brake Brake booster Model 235T Diaphragm
diameter mm (in) Primary: 252 Secondary: 230 Master cylinder bore diameter mm (in) 25.4 (1.00) Control valve Type Split point x reducing ratio kPa (bar, kg/cm2, psi) LSV (Variable) x 0.15 Recommended brake fluid (Variable) x 0.3 DOT 3 BR-72 SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment DISC BRAKE BRAKE PEDAL
Unit: mm (in) Brake model CL36VE CL18VF Applied model Pad wear limit Free height ‘‘H’’* Minimum thickness 2.0 (0.079) Rotor repair limit Minimum thickness 30.0 (1.181) 16.0 (0.630) PARKING CENTER BRAKE Unit: mm (in) Brake model Unit: mm (in) DS20HB Depressed height ‘‘D’’ [under force of 490 N (50 kg, 110 lb) with engine running]
More than 80 (3.15) Clearance ‘‘C’’ between pedal stopper and threaded end of stop lamp switch or ASCD switch 0.3 - 1.0 (0.012 - 0.039) Pedal free play Lining wear limit Minimum thickness 1.5 (0.059) Drum repair limit Maximum inner diameter M/T 184 - 194 (7.24 - 7.64) At clevis 1.0 - 3.0 (0.039 - 0.118) At pedal pad 3.0 - 11.0 (0.118 - 0.433) *:
Measured from surface of melt sheet to pedal pad. 204.5 (8.05) PARKING CENTER BRAKE CONTROL Control type Lever stroke [under force of 196 N (20 kg, 44 lb)] Lever stroke when warning switch comes on BR-73 Center lever 7-9 2 BODY & TRIM SECTION BT CONTENTS PRECAUTIONS ....1 Service
Notice...1 Supplemental Restraint System (SRS) ‘‘AIR BAG’’ and ‘‘SEAT BELT PRE-TENSIONER’’..............1 GENERAL SERVICING ....2 Clip and Fastener ....2 BODY END ....4 Body Front
End...4 Body Rear End and Opener.......................................6 DOOR..9 Front Door..9 Rear Door ....10 INSTRUMENT PANEL...11 INTERIOR TRIM
....14 Side and Floor Trim ....14 Door Trim ....18 Roof Trim ....20 Back Door Trim..24 EXTERIOR ....26 SEAT
....32 Front Seat ....32 Heated Seat...34 Rear Seat...35 3rd Seat ....37 SUNROOF..39 WINDSHIELD AND
WINDOWS ....42 Windshield ....43 Rear Side Window...44 Back Door Window ....45 MIRROR ....46 Door Mirror...46 CAB BODY
....47 Body Mounting..48 BODY ALIGNMENT...49 Engine Compartment...49 Underbody ....51 . For seat belt, refer to MA and RS section. . For wiring diagrams of body electrical
systems, refer to EL section.
BT PRECAUTIONS Service Notice + + + + + When removing or installing various parts, place a cloth or padding onto the vehicle body to prevent scratches. Handle trim, molding, instruments, grille, etc. carefully during removing or installing. Be careful not to soil or damage them. Apply sealing compound where necessary when installing parts.
When applying sealing compound, be careful that the sealing compound does not protrude from parts. When replacing any metal parts (for example body outer panel, members, etc.), be sure to take rust prevention measures. Supplemental Restraint System (SRS) ‘‘AIR BAG’’ and ‘‘SEAT BELT PRE-TENSIONER’’ The Supplemental Restraint System
such as ‘‘AIR BAG’’ and ‘‘SEAT BELT PRE-TENSIONER’’ used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The SRS system composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination.): Driver air bag module
(located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioner, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the RS section of this Service Manual. WARNING: + To avoid
rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by
unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation either just before the harness connectors or for the complete
harness are related to the SRS. BT-1 GENERAL SERVICING Clip and Fastener + + Clips and fasteners in BT section correspond to the following numbers and symbols. Replace any clips and/or fasteners which are damaged during removal or installation. Symbol No. Shapes Removal & Installation j C101 SBF302H SBF367BA j C103 SBF303H
SBF423H j C203 SBF258G SBF708E MBT080A SBF638C j C205 BT-2 GENERAL SERVICING Clip and Fastener (Cont’d) Symbol No. Shapes Removal & Installation j CE103 SBF104B SBF147B j CF109 SBF651B SBF652B j CR103 SBF768B SBF770B j CS101 SBF078B SBF992G BT-3 BODY END Body Front End + + + + + When removing or installing
hood, place a cloth or other padding on front fender panel and cowl top. This prevents vehicle body from being scratched.
Bumper fascia is made of plastic. Do not use excessive force and be sure to keep oil away from it.
Hood adjustment: Adjust at hinge portion. Hood lock adjustment: After adjusting, check hood lock control operation. Apply a coat of grease to hood locks engaging mechanism. Hood opener: Do not attempt to bend cable forcibly. Doing so increases effort required to unlock hood. REMOVAL — Front bumper assembly 1 V 2 V 3 V 4 V 5 V 6 V 7 V 8 V
Remove front guard bar. Refer to ‘‘EXTERIOR’’ for details, BT-26.
Remove left and right headlamp wipers (on models with headlamp wipers). Remove clips securing front grille and remove the front grille. Remove screws and bolts securing left and right front bumper side bracket. Remove bolts securing bumper lower to engine under cover. Remove bolts securing left and right front bumper stay upper (without
winch). Remove bolts securing left and right front bumper stay side. Extract bumper assembly. SBT518 BT-4 BODY END Body Front End (Cont’d) SBT519 BT-5 BODY END Body Rear End and Opener Bumper fascia is made of plastic. Do not use excessive force and be sure to keep oil away from it. Back door lock system adjustment: Adjust lock &
striker so that they are in the center. After adjustment, check back door lock operation.
+ Back door hatch lock system adjustment: Adjust lock & striker so that they are in the center.
After adjustment, check back door hatch lock operation.
+ Opener cable: Do not attempt to bend cable using excessive force. + After installation, make sure that back door and fuel filler lid open smoothly. WARNING: + Be careful not to scratch back door stay and/or back door hatch stay when installing back door and/or back door hatch. A scratched stay may cause gas leakage. + The contents of the back
door stay and back door hatch stay are under pressure. Do not take apart, puncture, apply heat or allow fire near them. + + REMOVAL — Rear bumper assembly 1 V 2 V 3 V 4 V 5 V 6 V 7 V 8 V 9 V Remove screws securing left and right mudguard. Remove bolts securing left and right rear side bumper to rear fender.
Remove screws and clips securing left and right rear side bumper to rear bumper side reinforcement. Remove bolts securing left and right rear side bumper to rear center bumper. Remove bolts securing left and right rear bumper side reinforcement to rear center bumper. Remove bolts securing left and right rear bumper side reinforcement to frame
assembly. Remove bolts securing rear hook assembly. Extract rear bumper assembly. Remove bolts securing left and right rear bumper side reinforcement to rear center bumper. SBT520 BT-6 BODY END Body Rear End and Opener (Cont’d) SBT521 BT-7 BODY END Body Rear End and Opener (Cont’d) SBT571 BT-8 DOOR Front Door + + For
removal of door trim, refer to ‘‘Door Trim’’ in ‘‘INTERIOR TRIM’’ (BT-18). After adjusting door or door lock, check door lock operation. SBT522 BT-9 DOOR Rear Door SBT523 BT-10 INSTRUMENT PANEL CAUTION: + Disconnect both battery cables in advance. + Disconnect air bag system line in advance. + Never tamper with or force air bag lid
open, as this may adversely affect air bag performance. + Be careful not to scratch pad and other parts. REMOVAL — Instrument panel assembly Instrument panel assembly Combination meter Remove air bag module (driver) and steering wheel. Refer to ‘‘SUPPLEMENTAL RESTRAINT SYSTEM’’ in RS section for details. Remove dash side lower
finishers. Refer to ‘‘Side and Floor Trim’’ in ‘‘INTERIOR TRIM’’ for details, BT-14. 1 V Steering column cover and combination switch + Remove screws. 2 V Lower instrument panel on driver side + Remove bolts and screws. 3 V Cluster lid A + Remove screws then disconnect harness connectors.
4 V Combination meter + Remove screws then disconnect harness connectors. 5 V Cluster lid C + Pull out then disconnect harness connectors. + Remove screws then remove in-vehicle sensor. 6 V Audio + Remove screws then disconnect harness connectors. 7 V A/C control unit + Remove screws then disconnect harness connectors. 8 V Console M/T
or A/T finisher + Remove screws then disconnect harness connectors. 9 V Console box assembly + Remove screws then disconnect harness connectors. 10 V Instrument panel stay cover + Remove screws then disconnect harness connectors. 11 V Glove box assembly and lower instrument panel on passenger side + Remove screws. 12 V Passenger air
bag module + Refer to ‘‘SUPPLEMENTAL RESTRAINT SYSTEM’’ in RS section. 13 V Mirror control switch + Disconnect harness connector. Remove front pillar garnish. Refer to ‘‘Side and Floor Trim’’ in ‘‘INTERIOR TRIM’’ for details, BT-14.
14 V Mask instrument LH/RH or sensors. + Disconnect harness connectors (models with sensors). 15 V Instrument panel and pads + Remove bolts and nuts then disconnect harness connectors. BT-11 Audio & A/C control Console box INSTRUMENT PANEL SBT524 BT-12 INSTRUMENT PANEL SBT525 BT-13 INTERIOR TRIM Side and Floor Trim
CAUTION: Wrap the tip of flat-bladed screwdriver with a cloth when removing metal clips from garnishes. REMOVAL — Body side trim (WAGON) 1 V 2 V 3 V 4 V 5 V 6 V 7 V 8 V 9 V 10 V 11 V 12 V 13 V 14 V 15 V 16 V 17 V 18 V 19 V Remove front, rear and 3rd seats. Refer to ‘‘SEAT’’ for details, BT-32. Remove front, rear and 3rd seat belts. Refer to
‘‘SEAT BELTS’’ in RS section for details. Remove front and rear kicking plates. Remove front and rear body side welts.
Remove dash side lower finishers. Remove assist grips. Remove front pillar garnishes. Remove center pillar lower garnishes. Remove assist grips. Remove center pillar upper garnishes. Remove luggage floor retainer. Remove back door welt. Remove assist grips or clips. Remove luggage side upper finishers. Remove luggage side lower finishers. (On
vehicles equipped with power supply sockets, remove connector from luggage side lower finisher LH.) Remove console box assembly. Refer to ‘‘INSTRUMENT PANEL’’ for details, BT-11. Remove clips and luggage floor rope hooks, then remove luggage floor trim. Remove screws and clips, then remove rear floor trim.
Remove clips, footrest and accel stopper, then remove front floor trim. SBT526 BT-14 INTERIOR TRIM Side and Floor Trim (Cont’d) WAGON SBT527 BT-15 INTERIOR TRIM Side and Floor Trim (Cont’d) CAUTION: Wrap the tip of flat-bladed screwdriver with a cloth when removing metal clips from garnishes. REMOVAL — Body side trim (HARDTOP)
1 V 2 V 3 V 4 V 5 V 6 V 7 V 8 V 9 V 10 V 11 V 12 V 13 V 14 V 15 V 16 V 17 V 18 V 19 V 20 V Remove tonneau cover. Remove front and rear seats. Refer to ‘‘SEAT’’ for details, BT-32. Remove kicking plates. Remove body side welts. Remove dash side lower finishers. Remove assist grips. Remove front pillar garnishes. Remove luggage floor retainer.
Remove back door welt. Remove assist grips. Remove lap outer covers. Remove anchor bolt of seat belts. Refer to ‘‘SEAT BELTS’’ in RS section for details. Remove seat belt escutcheons. Remove rear parcel shelf holders.
Remove luggage side upper finishers.
Remove clips securing luggage side lower finishers. (On vehicles equipped with power supply sockets, remove connector from luggage side lower finisher LH.) Remove console box assembly. Refer to ‘‘INSTRUMENT PANEL’’ for details, BT-11. Remove clips and luggage floor rope hooks, then remove luggage floor trim. Remove screws, then remove
rear floor trim. Remove clips, footrest and accel stopper, then remove front floor trim. SBT528 BT-16 INTERIOR TRIM Side and Floor Trim (Cont’d) HARDTOP SBT529 BT-17 INTERIOR TRIM Door Trim REMOVAL — Door trim 1 V 2 V 3 V 4 V 5 V 6 V Remove inside handle escutcheon. Remove door armrest. Remove screw securing power window
switches, then disconnect the connector. Remove screw securing door trim. Remove clips securing door trim. Lift out door trim. SBT530 BT-18 INTERIOR TRIM Door Trim (Cont’d) SBT566 BT-19 INTERIOR TRIM Roof Trim REMOVAL — Headlining (WAGON) 1 V 2 V 3 V 4 V 5 V 6 V 7 V 8 V 9 V 10 V 11 V 12 V Remove Remove Remove Remove
Remove Remove Remove Remove Remove Remove Remove front, rear and 3rd seats.
Refer to ‘‘SEAT’’ for details, BT-32. front, rear and 3rd seat belts. Refer to ‘‘SEAT BELTS’’ in RS section for details. body side trim.
Refer to ‘‘Side and Floor Trim’’ for details, BT-14. roof console assembly, then disconnect connectors. inside mirror assembly. sun visors. interior lamp assembly. luggage room lamp assembly. assist grips. clips securing headlining. rear headlining from vehicle through either back door. front headlining from vehicle through either back door. SBT531
BT-20 INTERIOR TRIM Roof Trim (Cont’d) SBT569 BT-21 INTERIOR TRIM Roof Trim (Cont’d) REMOVAL — Headlining (HARDTOP) 1 V 2 V 3 V 4 V 5 V 6 V 7 V 8 V 9 V Remove Remove Remove Remove Remove Remove Remove Remove Remove front and rear seats.
Refer to ‘‘SEAT’’ for details, BT-32. front and rear seat belts.
Refer to ‘‘SEAT BELTS’’ in RS section for details. body side trim. Refer to ‘‘Side and Floor Trim’’ for details, BT-14.
roof console assembly, then disconnect connector. inside mirror assembly. sun visors. interior lamp assembly. assist grips. clips securing headlining from vehicle through either back door.
SBT532 BT-22 INTERIOR TRIM Roof Trim (Cont’d) SBT569 BT-23 INTERIOR TRIM Back Door Trim REMOVAL — Back door trim 1 V 2 V 3 V 4 V 5 V 6 V 7 V Remove bolts securing pull handle (LH only). Remove inside handle escutcheon (LH only). Remove clip securing high-mounted stop lamp cover (RH only). Remove back door cover (RH only).
Remove clips securing back door upper garnish. Remove clips securing back door trim.
Pull out back door trim. SBT533 BT-24 INTERIOR TRIM Back Door Trim (Cont’d) SBT568 BT-25 EXTERIOR SBT534 BT-26 EXTERIOR 1 V Hood front seal 2 V Cowl top seal and cowl top grille SBT535 3 V 4 V Front windshield molding SBT536 5 V Sunroof lid weatherstrip + Upper and side molding SBT538 6 V Body side welt SBT537 SBT540 + Lower
molding Mounted with screws. BT-27 EXTERIOR 7 V Drip molding 10 V Side guard molding SBT572 8 V Drip weatherstrip SBT544 SBT539 11 V Rear combination lamp Rear combination lamps are installed with bolts. 9 V High-mounted stop lamp 12 V SBT545 BT-28 Back door weatherstrip SBT543 EXTERIOR 13 V Over fender SBT548 14 V Door
outside molding SBT542 BT-29 EXTERIOR 15 V Side step SBT546 16 V Front door parting seal 17 V SBT570 BT-30 Door weatherstrip SBT541 EXTERIOR 18 V Front grille guard SBT549 19 V Air outlet grille 20 V SBT547 BT-31 Roof rack SBT574 SEAT Front Seat + When removing or installing the seat trim, carefully handle it to keep dirt out and
avoid damage. MANUAL SEAT SBT550 BT-32 SEAT Front Seat (Cont’d) + When removing or installing the seat trim, carefully handle it to keep dirt out and avoid damage. POWER SEAT SBT567 BT-33 SEAT Heated Seat + + + When handling seat, be extremely careful not to scratch heating unit. To replace heating unit, seat trim and pad should be
separated. Do not use any organic solvent, such as thinner, benzene, alcohol, gasoline, etc. to clean trims. Seatback heating unit removal & installation SBF424H . For Wiring Diagram, refer to ‘‘HEATED SEAT’’ in EL section. BT-34 SEAT Rear Seat WAGON & HARDTOP (Type-I) SBT551 BT-35 SEAT Rear Seat (Cont’d) HARDTOP (Type-II) SBT552 BT-
36 SEAT 3rd Seat TYPE I SBT553 BT-37 SEAT 3rd Seat (Cont’d) TYPE II SBT554 BT-38 SUNROOF ADJUSTMENT Install motor & limit SW assembly and sunroof rail assembly in the following sequence: 1. 2. 3. 4.

5. 6. 7. 8. 9. Arrange equal lengths of link and wire assemblies on both sides of sunroof opening. Connect sunroof connector to sunroof switch and positive (+) power supply. Set lid assembly to fully closed position by operating OPEN switch and TILT switch. Fit outer side of lid assembly to the surface of roof on body outer panel. Remove motor, and keep OPEN switch pressed until motor pinion gear reaches the end of its rotating range. Install motor. Check that motor drive gear fits properly in wires. Press TILT-UP switch to check lid assembly for normal tilting. Check sunroof lid assembly for normal operations (tilt-up, tilt-down, open, and close). SBF920F BT-39 SUNROOF REMOVAL + After any adjustment, check sunroof operation and lid alignment. + Handle finisher plate and glass lid with care so as not to cause damage. + It is desirable for easy installation to mark each point before removal. CAUTION: Always work with a helper. Shade assembly Sunroof frame assembly Wind deflector assembly Tilt glass lid up.
1 V Side trim 2 V Sunroof lid mounting nuts 3 V Lid assembly 4 V Rear drain mounting screws 5 V Rear drain assembly Use the sunroof switch to tilt the glass lid downward and slide it about 300 mm (11.81 in) backward. 6 V Wind deflector holder 7 V Wind deflector mounting screws 8 V Wind deflector assembly Sunroof switch/interior accessories/headlining + For details, refer to ‘‘Roof Trim’’ in ‘‘INTERIOR TRIM’’, BT-20. 9 V Motor switch bracket 10 V Motor assembly 11 V Drain hoses 12 V Sunroof unit bracket 13 V Sunroof frame assembly 14 V Shade stopper 15 V Shade assembly BT-40 Lid assembly Motor assembly SUNROOF . For Wiring Diagram, refer to ‘‘ELECTRIC SUNROOF’’ in EL section. SBT555 BT-41 WINDSHIELD AND WINDOWS REMOVAL SBF034B After removing moldings, remove glass using piano wire or power cutting tool and an inflatable pump bag. WARNING: When cutting the glass from the vehicle, always wear safety glasses and heavy gloves to help prevent glass splinters from entering your eyes or cutting your hands.
CAUTION: + Be careful not to scratch the glass when removing. + Do not set or stand the glass on its edge. Small chips may develop into cracks. INSTALLATION Use a genuine Nissan Urethane Adhesive Kit or equivalent and follow the instructions furnished with it. + While the urethane adhesive is curing, open a door window. This will prevent the glass from being forced out by passenger compartment air pressure when a door is closed. + The molding must be installed securely so that it is in position and leaves no gap. + Inform the customer that the vehicle should remain stationary until the urethane adhesive has completely cured (preferably 24 hours). Curing time varies with temperature and humidity.
WARNING: + Keep heat and open flames away as primers and adhesive are flammable. + The materials contained in the kit are harmful if swallowed, and may irritate skin and eyes. Avoid contact with the skin and eyes. + Use in an open, well ventilated location. Avoid breathing the vapors. They can be harmful if inhaled. If affected by vapor inhalation, immediately move to an area with fresh air. + Driving the vehicle before the urethane adhesive has completely cured may affect the performance of the windshield in case of an accident. CAUTION: + Do not use an adhesive which is past its usable term. Shelf life of this product is limited to six months after the date of manufacture. Carefully adhere to the expiration or manufacture date printed on the box. + Keep primers and adhesive in a cool, dry place. Ideally, they should be stored in a refrigerator. + Do not leave primers or adhesive cartridge unattended with their caps open or off. + The vehicle should not be driven for at least 24 hours or until the urethane adhesive has completely cured. Curing time varies depending on temperature and humidities. The curing time will increase under higher temperatures and lower humidities. + SBT472 SBT473 BT-42 WINDSHIELD AND WINDOWS Windshield SBT556 REPAIRING WATER LEAKS FOR WINDSHIELD Leaks can be repaired without removing and reinstalling glass. If water is leaking between caulking material and body or glass, determine the extent of leakage. This can be determined by applying water while pushing glass outward. To stop the leak, apply primer and then sealant to the leak point. BT-43 WINDSHIELD AND WINDOWS Rear Side Window SBT557 BT-44 WINDSHIELD AND WINDOWS Back Door Window SBT558 BT-45 MIRROR Door Mirror CAUTION: Be careful not to scratch door rearview mirror body. .
For Wiring Diagram, refer to ‘‘POWER DOOR MIRROR’’ in EL section. REMOVAL — Door mirror 1 V 2 V 3 V 4 V 5 V Remove door trim. Refer to ‘‘Door Trim’’ for details, BT-18. Remove clip securing inner cover, then remove inner cover. Roll back sealing screen and remove door mirror harness connector. Remove door mirror harness clip. Remove bolts securing door mirror, then remove door mirror assembly. SBT559 BT-46 CAB BODY CAB BODY + (1) + + (1) (2) (3) Remove following parts in engine room at least. Main harness and other wiring harness Disconnect brake and clutch line in engine compartment. Remove following parts from underbody at least. Transmission and transfer control levers Parking brake control lever and cable Main harness and other wiring harness SBF025E BT-47 CAB BODY Body Mounting When removing, be sure to replace bolts and nuts (sealant applied bolts or self-lock nuts are used for all mounting). SBT573 BT-48 BODY ALIGNMENT + + + + + + All dimensions indicated in figures are actual ones. When using a tracking gauge, adjust both pointers to equal length. Then check the pointers and gauge itself to make sure there is no free play. When a measuring tape is used, check to be sure there is no elongation, twisting or bending. Measurements should be taken at the center of the mounting holes. An asterisk (*) following the value at the measuring point indicates that the measuring point on the other side is symmetrically the same value.
The coordinates of the measurement points are the distances measured from the standard line of ‘‘X’’, ‘‘Y’’ and ‘‘Z’’. SBF874GD Engine Compartment MEASUREMENT SBT560 BT-49 BODY ALIGNMENT Engine Compartment (Cont’d) MEASUREMENT POINTS Unit: mm SBT561 BT-50 BODY ALIGNMENT Underbody MEASUREMENT Wagon SBT562 BT-51 BODY ALIGNMENT Underbody (Cont’d) MEASUREMENT POINTS Wagon SBT563 BT-52 BODY ALIGNMENT Underbody (Cont’d) MEASUREMENT (Hardtop) SBT564 BT-53 BODY ALIGNMENT Underbody (Cont’d) MEASUREMENT POINTS (Hardtop) SBT565 BT-54 CLUTCH SECTION CL CONTENTS PRECAUTIONS AND PREPARATION.....1 Precautions .....1 Special Service Tools .....1 Commercial Service Tools .....2 NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING .....3 NVH Troubleshooting Chart.....3 CLUTCH SYSTEM.....4 INSPECTION AND ADJUSTMENT .....5 Adjusting Clutch Pedal .....5 Air Bleeding Procedure.....6 HYDRAULIC CLUTCH CONTROL .....7 Clutch Master Cylinder .....7 Clutch Operating Cylinder .....8 Clutch Booster .....9 CLUTCH RELEASE MECHANISM .....11 CLUTCH DISC AND CLUTCH COVER .....13 Clutch Disc.....13 Clutch Cover and Flywheel .....14 SERVICE DATA AND SPECIFICATIONS (SDS) .....16 General Specifications.....16 Inspection and Adjustment .....16 CL PRECAUTIONS AND PREPARATION Precautions + + + + + + Recommended fluid is brake fluid ‘‘DOT 3’’. Do not reuse drained brake fluid. Be careful not to splash brake fluid on painted areas. When removing and installing clutch piping, use Tool. Use new brake fluid to clean or wash all parts of master cylinder, operating cylinder and clutch damper. Never use mineral oils such as gasoline or kerosene. It will ruin the rubber parts of the hydraulic system. SBR820BA WARNING: After cleaning clutch disc, wipe it with a dust collector. Do not use compressed air. Special Service Tools Tool number Tool name Description ST20050010 Base plate Inspecting diaphragm spring of clutch cover a: 357 mm (14.06 in) dia. b: 43 mm (1.69 in) NT403 ST20050100 Distance piece Inspecting diaphragm spring of clutch cover a: 25 mm (0.98 in) dia. b: 7.8 mm (0.307 in) NT402 GG94310000 Flare nut torque wrench Removing and installing each clutch piping a: 10 mm (0.39 in) : 16.2 Nzm (1.65 kg-m, 11.9 ft-lb) NT406 ST20630000 Clutch aligning bar Installing clutch cover and clutch disc a: 15.8 mm (0.622 in) dia. b: 22.9 mm (0.902 in) dia. c: 45 mm (1.77 in) NT405 ST20050240 Diaphragm spring adjusting wrench Adjusting unevenness of clutch cover diaphragm spring a: 150 mm (5.91 in) b: 25 mm (0.98 in) NT404 CL-1 PRECAUTIONS AND PREPARATION Commercial Service Tools Tool name 1 V 2 V Description Flare nut crowfoot Torque wrench Removing and installing clutch piping a: 10 mm (0.39 in) NT684 Bearing puller Removing release bearing NT077 Wire Installing clutch cover Wire: 3.2 mm (0.126 in) dia. NT727 Bearing drift Installing release bearing a: 52 mm (2.05 in) dia. b: 45 mm (1.77 in) dia. NT474 CL-2 Reference page (CL- Symptom Clutch grabs/chatters Clutch pedal spongy 1 1 Clutch noisy 2 3 8 OPERATING CYLINDER PISTON CUP (Damaged) 13 13 13 13 13 13 13 14 14 14 14 CLUTCH DISC (Lining broken) CLUTCH DISC (Dirty or burned) CLUTCH DISC (Oily) CLUTCH DISC (Worn out) CLUTCH DISC (Hardened) CLUTCH DISC (Lack of spline grease) DIAPHRAGM SPRING (Damaged) DIAPHRAGM SPRING (Out of tip alignment) PRESSURE PLATE (Distortion) FLYWHEEL (Distortion) Refer to EM section. 7 MASTER CYLINDER PISTON CUP (Damaged) CLUTCH DISC (Runout is excessive) 1 13 1 CLUTCH DISC (Out of true) Clutch does not disengage 2 11 1 2 RELEASE BEARING (Worn, dirty or damaged) Clutch slips 2 ENGINE MOUNTING (Loose) 6 CLUTCH LINE (Air in line) SUSPECTED PARTS (Possible cause) 5) CLUTCH PEDAL (Free play out of adjustment) NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING NVH Troubleshooting Chart Use the chart below to help you find the cause of the symptom. The numbers indicate the order of inspection. If necessary, repair or replace these parts. 2 2 2 4 5 4 5 CL-3 5 5 5 2 2 5 2 3 5 6 6 7 CLUTCH SYSTEM SCL768 CL-4 INSPECTION AND ADJUSTMENT Adjusting Clutch Pedal 1. Adjust pedal height with pedal stopper. Pedal height ‘‘H*’’: 195 - 205 mm (7.68 - 8.07 in) *: Measured from surface of dash reinforcement panel to pedal pad 2.
Adjust pedal free play with master cylinder push rod or clutch booster input rod. Then tighten lock nut. Pedal free play ‘‘A’’: 1.0 - 3.0 mm (0.039 - 0.118 in) SCL788 Pedal free play means the following total measured at position of pedal pad: + Play due to clevis pin and clevis pin hole in clutch pedal. + Play due to piston and push rod. + Push or step on clutch pedal until resistance is felt, and check the distance the pedal moves.
SCL702 CL-5 INSPECTION AND ADJUSTMENT SCL769 Air Bleeding Procedure 1. Bleed air from clutch operating cylinder according to the following procedure. Carefully monitor fluid level at master cylinder during bleeding operation. a. Top up reservoir with recommended brake fluid. b. Connect a transparent vinyl tube to air bleeder valve. c.
Slowly depress clutch pedal to its full stroke and release it completely. Repeat this operation several times at 2 to 3 second intervals. d. Hold clutch pedal depressed, open bleeder valve to release air. e. Close bleeder valve. f.
Release clutch pedal and wait at least 5 seconds.
g . Repeat steps c through e above until brake fluid flows from air bleeder valve without air bubbles. 2. Repeat the above bleeding procedure 1 several times. CL-6 HYDRAULIC CLUTCH CONTROL Clutch Master Cylinder SCL770 DISASSEMBLY AND ASSEMBLY + When removing and installing stopper ring. Pry out or in with screwdriver while pushing stopper. INSPECTION + + + + + Check cylinder and piston rubbing surface for uneven wear, rust or damage. Replace if necessary. Check piston with piston cup for wear or damage. Replace if necessary. Check return spring for wear or damage. Replace if necessary. Check reservoir for deformation or damage. Replace if necessary. Check dust cover for cracks, deformation or damage. Replace if necessary.
CL-7 HYDRAULIC CLUTCH CONTROL Clutch Operating Cylinder SCL786 INSPECTION + + + + Check rubbing surface of cylinder for wear, rust or damage. Replace if necessary.
Check piston with piston cup for wear or damage. Replace if necessary. Check dust cover for cracks, deformation or damage. Replace if necessary. Check piston spring for wear or damage. Replace if necessary. CL-8 HYDRAULIC CLUTCH CONTROL Clutch Booster SCL772 INSPECTION Hoses and connectors + + Check condition of vacuum hoses and connections. Check vacuum hoses and check valve for air tightness. Vacuum hose check valve 1. Remove the vacuum hose. 2. Blow air through one end (booster side) of the vacuum hose and make sure that air passage continuity exists. 3. Blow air through the other end (engine side) of the vacuum hose and make sure that air passage continuity does not exist.
SCL782 Check valve 1. Remove the vacuum hose. 2. Check the condition of the check valve using a handy vacuum pump. 1 V Vacuum pump connected to the engine side No vacuum pressure is applied. SCL783 CL-9 2 V Vacuum pump connected to the booster side Vacuum drop is less than 1.3 kPa (13 mbar, 10 mmHg, 0.39 inHg) at a vacuum pressure of −66.7 kPa (−667 mbar, −500 mmHg, −19.69 inHg).
HYDRAULIC CLUTCH CONTROL Clutch Booster (Cont’d) ADJUSTMENT Output rod length: Length ‘‘A’’ 1.30 - 1.55 mm (0.0512 - 0.0610 in) SCL135 If amount of adjustment required exceeds 0.5 mm (0.020 in), reaction disc may have either been dislocated or fallen off. Replace clutch booster assembly. SCL140 Input rod length: Length ‘‘B’’ 130 mm (5.12 in) SCL136 CL-10 CLUTCH RELEASE MECHANISM SCL775 REMOVAL AND INSTALLATION + Install retainer spring and holder spring. + Remove release bearing. + Install release bearing with suitable drift. SCL217 CL145 SCL705 CL-11 CLUTCH RELEASE MECHANISM INSPECTION + + Check release bearing to see that it rolls freely and is free from noise, cracks, pitting or wear. Replace if necessary. Check release sleeve and withdrawal lever rubbing surface for wear, rust or damage. Replace if necessary. SCL706 LUBRICATION + + Apply recommended grease to contact surface and rubbing surface. Too much lubricant might damage clutch disc facing. WATERPROOF + Apply recommended sealant to contact surface of transmission case dust cover and withdrawal lever, then install dust cover clip.
Recommended sealant: Nissan genuine part (KP115-00100) or equivalent. SCL697-A CL-12 CLUTCH DISC AND CLUTCH COVER SCL778 Clutch Disc INSPECTION Check clutch disc for wear of facing. Wear limit of facing surface to rivet head: 0.3 mm (0.012 in) SCL780 + SCL779 + Check clutch disc for backlash of spline and runout of facing. Maximum backlash of spline (at outer edge of disc): Model 240 1.0 mm (0.039 in) Runout limit: Model 240 0.7 mm (0.028 in) Distance of runout check point (from hub center): Model 240 115.0 mm (4.53 in) Check clutch disc for burns, discoloration or oil or grease leakage. Replace if necessary. INSTALLATION Apply recommended grease to contact surface of spline portion. Too much lubricant might cause clutch disc facing damage. + CL-13 CLUTCH DISC AND CLUTCH COVER Clutch Cover and Flywheel INSPECTION + + + + Set Tool and check height and unevenness of diaphragm spring. Diaphragm spring height ‘‘A’’: Model 240 37.5 - 39.5 mm (1.476 - 1.555 in) Check thrust rings for wear or damage by shaking cover assembly up and down to listen for chattering noise, or lightly hammering on rivets for a slightly cracked noise. Replace clutch cover assembly if necessary. Check pressure plate and clutch disc contact surface for slight burns or discoloration. Repair pressure plate with emery paper. Check pressure plate and clutch disc contact surface for deformation or damage. Replace if necessary. SCL219-C + Adjust unevenness of diaphragm spring with Tool. Uneven limit: 0.7 mm (0.028 in) + Check flywheel and clutch disc contact surface for slight burns or discoloration. Repair flywheel with emery paper. Check flywheel runout. Maximum allowable runout: Refer to EM section (‘‘Inspection’’, ‘‘CYLINDER BLOCK’’). SCL466-A + SEM929A CL-14 CLUTCH DISC AND CLUTCH COVER Clutch Cover and Flywheel (Cont’d) INSTALLATION Model 240 + + + Insert Tool into clutch disc hub while installing clutch cover and disc. Be careful not to allow grease to contaminate clutch facing. Tighten bolts in numerical order, in two steps. First step: : 10 - 20 Nzm (1.0 - 2.0 kg-m, 7 - 14 ft-lb) Final step: : 22 - 29 Nzm (2.2 - 3.0 kg-m, 16 - 22 ft-lb) SCL787 CL-15 SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications CLUTCH CONTROL SYSTEM Type of clutch control CLUTCH DISC CLUTCH MASTER CYLINDER (with clutch damper) Unit: mm (in) Inner diameter Model 240 Engine RD28ETi Facing size (Outer dia. x inner dia. x thickness) mm (in) 240 x 160 x 3.5 (9.45 x 6.30 x 0.138) Thickness of disc assembly with load mm (in)/N (kg, lb) 7.7 - 8.1 (0.303 - 0.319)/ 8,336 (850, 1,874) Hydraulic 17.46 (11/16) CLUTCH OPERATING CYLINDER Unit: mm (in) Inner diameter CLUTCH COVER 20.64 (13/16) CLUTCH BOOSTER Unit: mm (in) Type Diaphragm diameter Check valve type Model 240 Engine RD28ETi Destination M45 — Full load 114.3 (4.50) N (kg, lb) 5,835 - 6,620 (595 - 675, 1,312 - 1,488) Built-in hose type Inspection and Adjustment CLUTCH PEDAL CLUTCH DISC Unit: mm (in) Pedal height ‘‘H*’’ Pedal free play ‘‘A’’ (at pedal pad) Unit: mm (in) Model 195 - 205 (7.68 - 8.07) 1.0 - 3.0 (0.039 - 0.118) Wear limit of facing surface to rivet head 0.3 (0.012) Runout limit of facing 0.7 (0.028) *: Measured from surface of melt sheet to pedal pad Distance of runout check point (from the hub center) 115.0 (4.53) Maximum backlash of spline (at outer edge of disc) 1.0 (0.039) CLUTCH BOOSTER Unit: mm (in) Output rod length ‘‘A’’ Input rod length ‘‘B’’ 1.30 - 1.55 (0.0512 - 0.0610) 130 (5.12) 240 CLUTCH COVER Unit: mm (in) Model Diaphragm spring height ‘‘A’’ Uneven limit of diaphragm spring toe height CL-16 240 37.5 - 39.5 (1.476 - 1.555) 0.7 (0.028) ENGINE CONTROL SYSTEM SECTION EC CONTENTS EC DIAGNOSTIC TROUBLE CODE INDEX.....1 Alphabetical & Numerical Index for DTC .....1 PRECAUTIONS AND PREPARATION.....2 Special Service Tools .....2 Commercial Service Tool.....3 Supplemental Restraint System (SRS) ‘‘AIR BAG’’ and ‘‘SEAT BELT PRE-TENSIONER’’.....4 PRECAUTIONS AND PREPARATION.....5 Engine Fuel & Emission Control System .....5 Precautions .....6 ENGINE AND EMISSION CONTROL OVERALL SYSTEM.....8 ECCS-D Component Parts Location .....8 Circuit Diagram .....11 System Diagram .....12 Vacuum Hose Drawing .....13 System Chart .....14 ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION .....15 Fuel Injection System .....15 Fuel Injection Timing System .....18 Air Conditioning Cut Control.....19 Fuel Cut Control (at no load & high engine speed) .....20 CRANKCASE VENTILATION SYSTEM.....21 Description .....21 Inspection.....21 INJECTION NOZZLE.....22 Removal and Installation .....22 Disassembly (No. 2 - 4 nozzles) .....22 Inspection (No. 2 - 4 nozzles) .....23 Cleaning (No. 2 - 4 nozzles) .....23 Assembly (No. 2 - 4 nozzles) .....24 Test and Adjustment .....25 ELECTRONIC FUEL INJECTION PUMP.....27 Removal.....27 Installation.....28 Disassembly and Assembly.....29 ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION .....30 DTC and MIL Detection Logic .....30 Diagnostic Trouble Code (DTC) .....30 Malfunction Indicator Lamp (MIL).....31 CONSULT .....36 TROUBLE DIAGNOSIS — Introduction.....42 Introduction .....42 Diagnostic Worksheet.....43 TROUBLE DIAGNOSIS — Work Flow .....44 Work Flow.....44 Description for Work Flow .....45 TROUBLE DIAGNOSIS — Basic Inspection .....46 Basic Inspection.....46 TROUBLE DIAGNOSIS — General Description .....48 Symptom Matrix Chart.....48 CONSULT Reference Value in Data Monitor Mode .....51 Major Sensor Reference Graph in Data Monitor Mode .....53 ECM Terminals and Reference Value .....54 TROUBLE DIAGNOSIS FOR POWER SUPPLY.....63 Main Power Supply and Ground Circuit.....63 TROUBLE DIAGNOSIS FOR ‘‘CAM POS SEN (PUMP)’’ (DTC 11).....69 Camshaft Position Sensor (CMPS) (PUMP) .....69 TROUBLE DIAGNOSIS FOR ‘‘MASS AIR FLOW SEN’’ (DTC 12) .....74 Mass Air Flow Sensor (MAFS) .....74 TROUBLE DIAGNOSIS FOR ‘‘COOLANT TEMP SEN’’ (DTC 13) .....79 Engine Coolant Temperature (ECT) Sensor .....79 TROUBLE DIAGNOSIS FOR ‘‘VEHICLE SPEED SEN’’ (DTC 14) .....83 Vehicle Speed Sensor (VSS) .....83 TROUBLE DIAGNOSIS FOR ‘‘CONT SLEEV POS SEN’’ (DTC 15) .....87 Control Sleeve Position Sensor (CSPS) .....87 TROUBLE DIAGNOSIS FOR ‘‘ADJUST RESISTOR’’ (DTC 17) .....92 Adjustment Resistor.....92 TROUBLE DIAGNOSIS FOR ‘‘F/INJ F/B 2’’ (DTC 18), ‘‘F/INJ F/B’’ (DTC 22), ‘‘ELECTRIC GOV’’ (DTC 25).....96 Electric Governor .....96 TROUBLE DIAGNOSIS FOR ‘‘F/INJ TIMG F/B’’ (DTC 21).....101 Injection Timing Control Valve .....101 TROUBLE DIAGNOSIS FOR ‘‘ACCEL POS SW (F/C)’’ (DTC 23) .....106 Accelerator Switch (F/C).....106 TROUBLE DIAGNOSIS FOR ‘‘ECM 1’’ (DTC 27), ‘‘ECM 2’’ (DTC 31).....111 Engine Control Module (ECM)-ECCS-D Control Module .....111 TROUBLE DIAGNOSIS FOR ‘‘OVER HEAT’’ (DTC 28).....113 Cooling Fan (Overheat) .....113 TROUBLE DIAGNOSIS FOR ‘‘I/C INT/A TEMP SEN’’ (DTC 33) .....122 Charge Air Temperature Sensor.....122 TROUBLE DIAGNOSIS FOR ‘‘NEEDLE LIFT SEN’’ (DTC 34) .....126 Needle Lift Sensor (NLS) .....126 TROUBLE DIAGNOSIS FOR ‘‘FUEL CUT S/V 1’’ (DTC 36), ‘‘FCV SHORT’’ (DTC 37), ‘‘FUEL CUT S/V 2’’ (DTC 38).....130 Fuel Cut Solenoid Valve .....130 TROUBLE DIAGNOSIS FOR ‘‘FUEL TEMP SENSOR’’ (DTC 42) .....135 Fuel Temperature Sensor (FTS).....135 TROUBLE DIAGNOSIS FOR ‘‘ACCEL POS SENSOR’’ (DTC 43) .....139 Accelerator Position Sensor .....139 TROUBLE DIAGNOSIS FOR ‘‘CRANK POS SEN (TDC)’’ (DTC 47).....144 Crankshaft Position Sensor (TDC) .....144 TROUBLE DIAGNOSIS FOR ‘‘GOV CUT CIRCUIT’’ (DTC 48).....149 Governor Cut Circuit.....149 TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS.....151 Glow Control System.....151 EGRC-Solenoid Valve A, B and Throttle Control Solenoid Valve .....156 Start Signal .....163 Accelerator Position Switch .....165 Park/Neutral Position Switch .....170 A/T Control.....175 Charge Air Cooler Fan Control.....178 Heat Up Switch.....183 Air Conditioner Control .....187 MIL & Data Link Connectors .....188 SERVICE DATA AND SPECIFICATIONS (SDS) .....189 General Specifications.....189 Injection Nozzle .....189 Inspection and Adjustment .....189 When you read wiring diagrams: + Read GI section, ‘‘HOW TO READ WIRING DIAGRAMS’’. + See EL section, ‘‘POWER SUPPLY ROUTING’’ for power distribution circuit. When you perform trouble diagnoses, read GI section, ‘‘HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES’’ and ‘‘HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT’’. DIAGNOSTIC TROUBLE CODE INDEX Alphabetical & Numerical Index for DTC ALPHABETICAL INDEX FOR DTC NUMERICAL INDEX FOR DTC X: Applicable —: Not applicable Items (CONSULT screen terms) ACCEL POS SENSOR DTC MIL illumination 43 X X: Applicable —: Not applicable Reference page DTC MIL illumination Items Reference (CONSULT screen terms) page EC-139 11 X CAM POS SEN (PUMP) EC-69 — MAS AIR FLOW SEN EC-74 ACCEL POS SW (F/C) 23 X EC-106 12 ADJUST RESISTOR 17 — EC-92 13 X COOLANT TEMP SEN EC-79 CAM POS SEN (PUMP) 11 X EC-69 14 — VEHICLE SPEED SEN EC-83 CONT SLEEV POS SEN 15 X EC-87 15 X CONT SLEEV POS SEN EC-87 COOLANT TEMP SEN 13 X EC-79 17 — ADJUST RESISTOR EC-92 CRANK POS SEN (TDC) 47 X EC-144 18 X F/INJ F/B 2 EC-96 ECM 1 27 X EC-111 21 — F/INJ TIMG F/B EC-101 ECM 2 31 X EC-111 22 X F/INJ F/B EC-96 ELECTRIC GOV 25 X EC-96 23 X ACCEL POS SW (F/C) EC-106 FCV SHORT 37 X EC-130 25 X ELECTRIC GOV EC-96 FUEL CUT S/V 1 36 X EC-130 27 X ECM 1 EC-111 FUEL CUT S/V 2 38 X EC-130 28 X OVER HEAT EC-113 FUEL TEMP SENSOR 42 — EC-135 31 X ECM 2 EC-111 F/INJ F/B 22 X EC-96 33 *1 — I/C INT/A TEMP SEN EC-122 F/INJ F/B 2 18 X EC-96 34 — NEEDLE LIFT SEN EC-126 F/INJ TIMG F/B 21 — EC-101 36 X FUEL CUT S/V 1 EC-130 GOV CUT CIRCUIT 48 X EC-149 37 X FCV SHORT EC-130 I/C INT/A TEMP SEN 33 *1 — EC-122 38 X FUEL CUT S/V 2 EC-130 MAS AIR FLOW SEN 12 — EC-74 42 — FUEL TEMP SENSOR EC-135 NATS MALFUNCTION 141 - 148 X EL section* 43 X ACCEL POS SENSOR EC-139 NEEDLE LIFT SEN 34 — EC-126 47 X CRANK POS SEN (TDC) EC-144 NO SELF DIAGNOSTIC FAILURE INDICATED 55 — — 48 X GOV CUT CIRCUIT EC-149 OVER HEAT 28 X EC-113 55 — NO SELF DIAGNOSTIC FAILURE INDICATED — VEHICLE SPEED SEN 14 — EC-83 141 - 148 X NATS MALFUNCTION EL section*2 *1: When nothing is displayed or the meaningless symbol is displayed in the ‘‘Self-diag result’’ mode with CONSULT, perform ‘‘Diagnostic Test Mode II (Self-diagnostic results)’’ with ECM. Refer to EC-32. *2: Refer to ‘‘NATS (Nissan Anti-Theft System)’’ in EL section. EC-1 PRECAUTIONS AND PREPARATION Special Service Tools FOR DIESEL ENGINE INJECTION PUMP Tool number Tool name Description KV11229352 Measuring device 1 KV11229350 V Holder 2 KV11229360 V Nut 3 V KV11229370 Pin 4 V KV11254410 Dial gauge Measuring plunger lift NT570 KV11102900 Pulley puller Removing injection pump sprocket NT647 FOR DIESEL ENGINE INJECTION NOZZLE Tool number Tool name Description KV11289004 Nozzle cleaning kit 1 KV11290012 V Box 2 KV11290110 V Brush 3 KV11290122 V Nozzle oil sump scraper 4 V KV11290140 Nozzle needle tip 5 V KV11290150 Nozzle seat scraper 6 KV11290210 V Nozzle holder 7 KV11290220 V Nozzle hole cleaning needle NT296 EC-2 PRECAUTIONS AND PREPARATION Special Service Tools (Cont’d) Tool number Tool name Description KV11292010 Nozzle centering device NT293 KV11100300 Nozzle holder socket (For No. 2 - 4 injection nozzles) NT563 KV119E0010 No. 1 injection nozzle holder socket NT648 Commercial Service Tool Tool name Description Fuel filler cap adapter Checking fuel tank vacuum relief valve opening pressure NT653 EC-3 PRECAUTIONS AND PREPARATION Supplemental Restraint System (SRS) ‘‘AIR BAG’’ and ‘‘SEAT BELT PRE-TENSIONER’’ The Supplemental Restraint System such as ‘‘AIR BAG’’ and ‘‘SEAT BELT PRE-TENSIONER’’ used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The SRS system composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination.): Driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioner, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the RS section of this Service Manual.
WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation either just before the harness connectors or for the complete harness are related to the SRS. EC-4 PRECAUTIONS AND PREPARATION Engine Fuel & Emission Control System SEF656V EC-5 PRECAUTIONS AND PREPARATION Precautions + Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned off. + When connecting ECM harness connector, tighten securing bolt until the gap between orange indicators disappears. : 3.0 - 5.0 Nzm (0.3 - 0.5 kg-m, 26 - 43 in-lb) + When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break). Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors. + Before replacing ECM, perform Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-54. + If MIL illuminates or blinks irregularly when engine is running, water may have accumulated in fuel filter. Drain water from fuel filter. If this does not correct the problem, perform specified trouble diagnostic procedures. After performing each TROUBLE DIAGNOSIS, perform ‘‘OVERALL FUNCTION CHECK’’ or ‘‘DTC (Diagnostic Trouble Code) CONFIRMATION PROCEDURE’’. The DTC should not be displayed in the ‘‘DTC CONFIRMATION PROCEDURE’’ if the repair is completed.
The ‘‘OVERALL FUNCTION CHECK’’ should be a good result if the repair is completed. SEF289H SEF308Q SEF291H MEF040D + SEF051P EC-6 PRECAUTIONS AND PREPARATION Precautions (Cont’d) + When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor. SEF348N EC-7 ENGINE AND EMISSION CONTROL OVERALL SYSTEM ECCS-D Component Parts Location SEF657V EC-8 ENGINE AND EMISSION CONTROL OVERALL SYSTEM ECCS-D Component Parts Location (Cont’d) SEF658V EC-9 ENGINE AND EMISSION CONTROL OVERALL SYSTEM ECCS-D Component Parts Location (Cont’d) SEF659V EC-10 ENGINE AND EMISSION CONTROL OVERALL SYSTEM Circuit Diagram TEC420 EC-11 ENGINE AND EMISSION CONTROL OVERALL SYSTEM System Diagram SEF660V EC-12 ENGINE AND EMISSION CONTROL OVERALL SYSTEM Vacuum Hose Drawing SEF661V 1 V 2 V 3 V 4 V Charge air cooler to vacuum gallery Throttle control valve to throttle control solenoid valve Vacuum pump to 3-way connector Vacuum gallery to wastegate valve actuator 5 V 6 V 7 V 3-way connector to throttle control solenoid valve 3-way connector to EGRC-solenoid valve A 3-way connector to EGRC-solenoid valve A Refer to ‘‘System Diagram’’, EC-12 for vacuum control system. EC-13 8 V 9 V 3-way connector to EGRC-solenoid valve B EGR valve and 3-way connector ENGINE AND EMISSION CONTROL OVERALL SYSTEM System Chart Camshaft position sensor (PUMP) c Crankshaft position sensor (TDC) c Control sleeve position sensor c Fuel temperature sensor c Engine coolant temperature sensor c Needle lift sensor c Accelerator position sensor c Accelerator position switch c Accelerator switch (F/C) c Neutral position switch c Ignition switch c Battery voltage c Vehicle speed sensor c Air conditioner switch c Mass air flow sensor c Charge air temperature sensor c Heat up switch c ECM (ECCS-D control module) Fuel injection control c Electric governor Fuel injection timing control c Injection timing control valve Fuel cut control c Fuel cut solenoid valve Glow control system c Glow relay & glow lamp On board diagnostic system c Malfunction indicator lamp (On the instrument panel) EGR valve & throttle control valve control c EGRC-solenoid valve A, B & throttle control solenoid valve Cooling fan control c Cooling fan relay Air conditioning cut control c Air conditioner relay Charge air cooler fan control c Charge air cooler fan relay EC-14 ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION Fuel Injection System SYSTEM DESCRIPTION Three types of fuel injection control are provided to accommodate engine operating conditions; normal control, idle control and start control. The ECM determines the appropriate fuel injection control. Under each control, the amount of fuel injected is compensated to improve engine performance. The ECM performs duty control on the electric governor (built into the fuel injection pump) according to sensor signals to compensate the amount of fuel injected to the preset value. START CONTROL Input/output signal line Engine coolant temperature sensor Crankshaft position sensor (TDC) Ignition switch Control sleeve position sensor Engine coolant temperature c Engine speed c Start signal ECM c Electric governor c Control sleeve position c When the ECM receives a start signal from the ignition switch, the ECM adapts the fuel injection system for the start control. The amount of fuel injected at engine starting is a preset program value in the ECM. The program is determined by the engine speed and engine coolant temperature. For better startability under cool engine conditions, the lower the coolant temperature becomes, the greater the amount of fuel injected. The ECM ends the start control when the engine speed reaches 400 rpm (for M/T models), 600 rpm (for A/T models) and shifts the control to the normal or idle control. SEF648S EC-15 ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION Fuel Injection System (Cont’d) IDLE CONTROL Input/output signal line Engine coolant temperature sensor Crankshaft position sensor (TDC) Neutral position switch Battery Control sleeve position sensor Accelerator position switch Vehicle speed sensor Air conditioner switch Heat up switch Engine coolant temperature c Engine speed c Gear position c Battery voltage c ECM Control sleeve position c c Electric governor Idle position c Vehicle speed c Air conditioner signal c Heat up switch signal c When the ECM determines that the engine speed is at idle, the fuel injection system is adapted for the idle control.
The ECM regulates the amount of fuel injected corresponding to changes in load applied to the engine to keep engine speed constant. The ECM also provides the system with a fast idle control in response to the engine coolant temperature and heat up switch signal. NORMAL CONTROL Input/output signal line Crankshaft position sensor (TDC) Control sleeve position sensor Engine speed c Control sleeve position c ECM Accelerator position sensor Vehicle speed sensor Accelerator position c Electric governor c Vehicle speed c The amount of fuel injected under normal driving conditions is determined according to sensor signals. The crankshaft position sensor (TDC) detects engine speed and the accelerator position sensor detects accelerator position. These sensors send signals to the ECM. The fuel injection data, predetermined by correlation between various engine speeds and accel

TIMG C/V [%] DECELER F/CUT [ON/OFF] Remarks + Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal. + Indicates [ON/OFF] condition from ignition switch signal.
+ The signal voltage of the mass air flow sensor is displayed. + When the engine is stopped, a certain value is indicated. + The actual injection timing angle determined by the ECM (an approximate average angle between injection start and end from TDC) is displayed. + Indicates the duty ratio of fuel injection timing control valve. j + Indicates [ON/OFF] condition from decel- + When the accelerator pedal is released eration fuel cut signal. quickly with engine speed at 3,000 rpm or more, ‘‘ON’’ is displayed. j + The control condition of the fuel cut sole- + When the fuel cut solenoid valve is not operating, fuel is not supplied to injection noid valve (determined by ECM accordnozzles. ing to the input signal) is indicted. + OFF ... Fuel cut solenoid valve is not operating. ON ... Fuel cut solenoid valve is operating. j + The glow relay control condition (determined by ECM according to the input signal) is displayed. j + Indicates the control condition of the cooling fans (determined by ECM according to the input signal). + LOW ... Operates at low speed. HI ... Operates at high speed. OFF ... Stopped. j + Indicates the control condition of the charge air cooler fan (determined by ECM according to the input signals). FUEL CUT S/V [ON/OFF] GLOW RLY [ON/OFF] COOLING FAN [LOW/HI/OFF] I/C FAN RLY [ON/OFF] Description EGRC SOL/V A [ON/OFF] + The control condition of the EGRC-solenoid valve A (determined by ECM according to the input signal) is indicated. + OFF ...

EGRC-solenoid valve A is not operating. ON ... EGRC-solenoid valve A is operating. EGRC SOL/V B [ON/OFF] + The control condition of the EGRC-solenoid valve B (determined by ECM according to the input signal) is indicated. + OFF ...
EGRC-solenoid valve B is not operating.

ON ... EGRC-solenoid valve B is operating. THROT RLY [ON/OFF] + The control condition of the throttle control solenoid valve (determined by ECM according to the input signal) is indicated. + OFF ... Throttle control solenoid valve is not operating. ON ... Throttle control solenoid valve is operating. EC-39 ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION CONSULT (Cont’d) ACTIVE TEST MODE TEST ITEM CONDITION JUDGEMENT CHECK ITEM (REMEDY) COOLING FAN + Ignition switch: ON + Operate the cooling fan at ‘‘LOW’’, ‘‘HI’’ speed and turn ‘‘OFF’’ using CONSULT. OFF ACCEL PO SIG + Clears the self-learning fully closed accelerator position, detected by accelerator position sensor, from the ECM. FUEL CUT SOL/V + Ignition switch: ON + Turn solenoid valve ‘‘ON’’ and ‘‘OFF’’ with the CONSULT and listen to operating sound. Solenoid valve makes an operating sound. + Harness and connector + Solenoid valve EGRC SOL/V A + Ignition switch: ON + Turn solenoid valve ‘‘ON’’ and ‘‘OFF’’ with the CONSULT and listen to operating sound. Solenoid valve makes an operating sound. + Harness and connector + Solenoid valve EGRC SOL/V B + Ignition switch: ON + Turn solenoid valve ‘‘ON’’ and ‘‘OFF’’ with the CONSULT and listen to operating sound. Solenoid valve makes an operating sound.

+ Harness and connector + Solenoid valve THROT CONT SOL/V + Ignition switch: ON + Turn solenoid valve ‘‘ON’’ and ‘‘OFF’’ with the CONSULT and listen to operating sound. Solenoid valve makes an operating sound. + Harness and connector + Solenoid valve GLOW RLY + Ignition switch: ON (Engine stopped) + Turn the glow relay ‘‘ON’’ and ‘‘OFF’’ using CONSULT and listen to operating sound. Glow relay makes the operating sound. + Harness and connector + Glow relay INJ TIMING + Engine: Return to the original trouble condition + Retard the injection timing using CONSULT. If trouble symptom disappears, see CHECK ITEM. + Adjust initial injection timing Cooling fan moves at ‘‘LOW’’, ‘‘HI’’ speed and stops. EC-40 + Harness and connector + Cooling fan motor ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION CONSULT (Cont’d) REAL TIME DIAGNOSIS IN DATA MONITOR MODE CONSULT has two kinds of triggers and they can be selected by touching ‘‘SETTING’’ in ‘‘DATA MONITOR’’ mode. 1. ‘‘AUTO TRIG’’ (Automatic trigger): + The malfunction will be identified on the CONSULT screen in real time. In other words, the malfunction item will be displayed at the moment the malfunction is detected by ECM. DATA MONITOR can be performed continuously until a malfunction is detected.

However, DATA MONITOR cannot continue any longer after the malfunction detection. 2. ‘‘MANU TRIG’’ (Manual trigger): + The malfunction item will not be displayed automatically on CONSULT screen even though a malfunction is detected by ECM. DATA MONITOR can be performed continuously even though a malfunction is detected. Use these triggers as follows: 1. ‘‘AUTO TRIG’’ + While trying to detect the DTC by performing the ‘‘DTC CONFIRMATION PROCEDURE’’, be sure to select to ‘‘DATA MONITOR (AUTO TRIG)’’ mode. You can confirm the malfunction at the moment it is detected. + While narrowing down the possible causes, CONSULT should be set in ‘‘DATA MONITOR (AUTO TRIG)’’ mode, especially in case the incident is intermittent. Inspect the circuit by gently shaking (or twisting) suspicious connectors, components and harness in the ‘‘DTC CONFIRMATION PROCEDURE’’. The moment a malfunction is found the malfunction item will be displayed. (Refer to GI section, ‘‘Incident Simulation Tests’’ in ‘‘HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT’’.) 2.

‘‘MANU TRIG’’ + If the malfunction is displayed as soon as ‘‘DATA MONITOR’’ is selected, reset CONSULT to ‘‘MANU TRIG’’. By selecting ‘‘MANU TRIG’’ you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition. SEF529Q EC-41 TROUBLE DIAGNOSIS — Introduction Introduction SEF858S SEF233G The engine has an ECM to control major systems such as fuel injection control, fuel injection timing control, glow control system, etc. The ECM accepts input signals from sensors and instantly drives electronic fuel injection pump. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no problems such as vacuum leaks, or other problems with the engine. It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts. A visual check only may not find the cause of the problems. A road test with CONSULT or a circuit tester connected should be performed. Follow the ‘‘Work Flow’’, EC-44. Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A ‘‘Diagnostic Worksheet’’ like the example on next page should be used.

Start your diagnosis by looking for ‘‘conventional’’ problems first. This will help troubleshoot driveability problems on an electronically controlled engine vehicle. SEF234G EC-42 TROUBLE DIAGNOSIS — Introduction Diagnostic Worksheet There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate. In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint. Utilize a diagnostic worksheet like the one shown below in order to organize all the information for troubleshooting. SEF907L WORKSHEET SAMPLE Customer name MR/MS Model & Year VIN Engine # Trans. Mileage Incident Date Manuf. Date In Service Date h Startability Symptoms h Impossible to start h No combustion h Partial combustion when engine is warm h Partial combustion when engine is cool h Possible but hard to start h Others [h Idling h No fast idle h Others [h Unstable h Driveability h Stumble h Others [h Engine stall h At the time of start h While accelerating h Just after stopping h Surge Incident occurrence h Just after delivery h In the morning Frequency h All the time Weather conditions h Not affected Weather h Fine Temperature h Hot h While idling h While decelerating h While loading h Recently h At night h In the daytime h Snowing h Cool h During warm-up h Sometimes h Others [h Cold Engine speed Road conditions h In town Driving conditions h Not affected h At starting h While idling h At racing h While accelerating h While cruising h While decelerating h While turning (RH/LH) h In suburbs Vehicle speed h Turned on h Not turned on EC-43 h Humid h After warm-up Engine conditions Malfunction indicator lamp h Low idle h Lack of power] h Under certain conditions h Warm] h High idle] h Knock h Raining h Cold h Partial combustion h Highway h Off road (up/down)] °F TROUBLE DIAGNOSIS — Work Flow Work Flow CHECK IN . CHECK INCIDENT CONDITIONS. Listen to customer complaints. (Get symptoms.) .... STEP I . Check and PRINT OUT (write down) Diagnostic Trouble Code (DTC). Then clear. Also check related service bulletins for information. Symptoms collected.

.... STEP II No symptoms, except MIL lights up, or Malfunction Code exists at STEP II.

. Verify the symptom by driving in the condition the cus*1 .... STEP III tomer described. Normal Code (at STEP II) Malfunction Code (at STEP II) .

. INCIDENT CONFIRMATION Verify the DTC by performing the ‘‘DTC CONFIRMATION PROCEDURE’’. *1 .... STEP IV . c .... STEP V *2 Choose the appropriate action. Malfunction Code (at STEP II or IV) Normal Code (at both STEP II and IV) . BASIC INSPECTION SYMPTOM BASIS (at STEP I or III)

....c . Perform inspections according to Symptom Matrix Chart. . . STEP VI TROUBLE DIAGNOSIS FOR DTC XX. . REPAIR/REPLACE . NG FINAL CHECK Confirm that the incident is completely fixed by performing BASIC INSPECTION and DTC CONFIRMATION PROCEDURE (or OVERALL FUNCTION CHECK).

Then, erase the unnecessary (already fixed) DTCs in ECM. .... STEP VII OK . CHECK OUT *1: If the incident cannot be duplicated, refer to GI section (‘‘Incident Simulation Tests’’, ‘‘HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT’’). *2: If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to ‘‘TROUBLE DIAGNOSIS FOR POWER SUPPLY’’, EC-63. EC-44 TROUBLE DIAGNOSIS — Work Flow Description for Work Flow STEP DESCRIPTION STEP I Get detailed information about the conditions and the environment when the incident/symptom occurred using the ‘‘DIAGNOSTIC WORKSHEET’’ as shown on EC-43. STEP II Before confirming the concern, check and write down (print out using CONSULT) the Diagnostic Trouble Code (DTC), then erase the code. Refer to EC-30. Study the relationship between the cause, specified by DTC, and the symptom described by the customer. (The ‘‘Symptom Matrix Chart’’ will be useful. Refer to EC-48.) STEP III Try to confirm the symptom and under what conditions the incident occurs. The ‘‘DIAGNOSTIC WORK SHEET’’ is useful to verify the incident. Connect CONSULT to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform INCIDENT SIMULATION TESTS. Refer to GI section. If the malfunction code is detected, skip STEP IV and perform STEP V. STEP IV Try to detect the Diagnostic Trouble Code (DTC) by driving in (or performing) the ‘‘DTC CONFIRMATION PROCEDURE’’. Check and read the DTC by using CONSULT. During the DTC verification, be sure to connect CONSULT to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform INCIDENT SIMULATION TESTS. Refer to GI section. In case the ‘‘DTC CONFIRMATION PROCEDURE’’ is not available, perform the ‘‘OVERALL FUNCTION CHECK’’ instead. The DTC cannot be displayed by this check, however, this simplified ‘‘check’’ is an effective alternative. The ‘‘NG’’ result of the ‘‘OVERALL FUNCTION CHECK’’ is the same as the DTC detection. STEP V Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC XX. If the normal code is indicated, proceed to the BASIC INSPECTION. Refer to EC-46. Then perform inspections according to the Symptom Matrix Chart. Refer to EC-48. STEP VI Identify where to begin diagnosis based on the relationship study between symptom and possible causes.

Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) ‘‘Harness Layouts’’. Gently shake the related connectors, components or wiring harness with CONSULT set in ‘‘DATA MONITOR (AUTO TRIG)’’ mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT. Refer to EC-54. The ‘‘DIAGNOSTIC PROCEDURE’’ in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the DIAGNOSTIC PROCEDURE. For details, refer to GI section (‘‘Circuit Inspection’’, ‘‘HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT’’). Repair or replace the malfunction parts. STEP VII Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer’s initial complaint. Perform the ‘‘DTC CONFIRMATION PROCEDURE’’ and confirm the normal code (Diagnostic trouble code No. 55) is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) DTC in ECM. (Refer to EC-30.) EC-45 TROUBLE DIAGNOSIS — Basic Inspection Basic Inspection Precaution: Perform Basic Inspection without electrical or mechanical loads applied; + Headlamp switch is OFF, + Air conditioner switch is OFF, + Rear defogger switch is OFF, + Steering wheel is in the straight-ahead position, etc. SEF142I SEF670V BEFORE STARTING 1. Check service records for any recent repairs that may indicate a related problem, or the current need for scheduled maintenance. 2. Open engine hood and check the following: + Harness connectors for improper connections + Vacuum hoses for splits, kinks, or improper connections + Wiring for improper connections, pinches, or cuts 3. Using priming pump, bleed air from fuel system. Refer to ‘‘DRAINING WATER’’, ‘‘Checking and Replacing Fuel Filter and Draining Water’’ of ‘‘ENGINE MAINTENANCE’’ in MA section. . CONNECT CONSULT TO THE VEHICLE. Connect ‘‘CONSULT’’ to the data link connector for CONSULT and select ‘‘ENGINE’’ from the menu. Refer to EC-36. SEF669V . DOES ENGINE START? Yes . Run engine for 10 minutes. .

CHECK IDLE SPEED. SEF714V --Read engine idle speed in ‘‘DATA MONITOR’’ mode with CONSULT. -- OR --Check idle speed using tachometer tester. ----------------------

--775±25 rpm .

A on next page.) (Go to j SEF671V EC-46 No c Turn ignition switch OFF, wait 5 seconds and then start engine. If engine fails to start, check diagnostic trouble code (DTC). TROUBLE DIAGNOSIS — Basic Inspection Basic Inspection (Cont’d) j A . SEF672V CHECK INJECTION TIMING. 1. Set No. 1 piston at TDC on its compression stroke. 2. Remove injection tubes and air bleeder on the back of injection pump. 3. Set dial gauge so its indicator points to somewhere between 1.0 and 2.0 mm (0.039 and 0.079 in) on the scale. 4. Turn crankshaft 1 turn clockwise and check that dial gauge indicates the same value again. 5. Turn crankshaft counterclockwise about 100 degrees, then turn crankshaft clockwise slowly, and set dial gauge indicator to 0 mm at the position it stops.

6. Turn crankshaft clockwise and set the injection timing mark on the crankshaft pulley to the timing indicator. 7. Read plunger lift. Plunger lift: 0.92±0.04 mm (0.0362±0.0016 in) + When repeating the checking, start with step 5. SEF664V OK c + Bleed air from fuel system. + After this inspection, unnecessary diagnostic trouble code No. might be displayed. Erase the stored memory in ECM. Refer to ‘‘ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION’’ (EC-30) and ‘‘HOW TO ERASE DTC’’ (EC-30). OK . INSPECTION END NG . SEF673V SEF666V ADJUSTING 1. If plunger lift is not within the specified value, adjust by turning injection pump. + If indication is smaller than the specified value, turn pump body away from engine. + If indication is larger than the specified value, turn pump body towards engine. 2. Tighten injection pump securing bolts and nuts. Nut: : 16 - 21 Nzm (1.6 - 2.1 kg-m, 12 - 15 ft-lb) Bolt: : 22 - 29 Nzm (2.2 - 3.0 kg-m, 16 - 22 ft-lb) 3. Remove dial gauge and install air bleeder with new washer. 4. Install injection tubes. Flare nut: : 22 - 25 Nzm (2.2 - 2.5 kg-m, 16 - 18 ft-lb) 5. Bleed air from fuel system. Refer to ‘‘DRAINING WATER’’, ‘‘Checking and Replacing Fuel Filter and Draining Water’’ of ‘‘ENGINE MAINTENANCE’’ in MA section. EC-47 c Go to . TROUBLE DIAGNOSIS — General Description Symptom Matrix Chart + + + + Injection Advanced timing Retarded j j Electric injection pump mainframe + + + + Injection nozzle j j j j j j j Glow system j j + + j j + + Engine body j j j + + j j j j j + j j j + + j j + j j j j j j j j + + j j j j j + Air cleaner and ducts + + + EC-48 Feature of symptom, Check point HA j EC-47 + j EC-47 j j j j — *1 EC-22 *2 + + + ; High Possibility Item j ; Low Possibility Item *1: Insufficient or excess amount. Governor malfunction may be the cause. *2: Depends on open-valve pressure and spray pattern. *3: Caused mainly by insufficient compression pressure. *4: Symptom varies depending on off-position of air duct, etc. DEAD BATTERY (UNDER CHARGE) ABNORMAL SMOKE COLOR + EGR system + WHITE SMOKE + + + + + AP Reference page AG AH AJ AK AL AM BLACK SMOKE EXCESSIVE OIL CONSUMPTION EXCESSIVE FUEL CONSUMPTION OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE SLOW/NO RETURN TO IDLE IDLING VIBRATION ROUGH IDLE/HUNTING LOW IDLE HI IDLE AF Fuel cut AE j j j j POOR ACCELERATION LACK OF POWER KNOCK/DETONATION AC AD Can be detected by CONSULT? AB HESITATION/SURGING/FLAT SPOT WHEN DECELERATING DURING DRIVING AT IDLE HARD TO START WHEN ENGINE IS HOT HARD TO START WHEN ENGINE IS COLD AA Malfunction indicator lamp illuminates. Warranty symptom code NO START (without first firing) NO START (with first firing) SYSTEM — Basic engine control system ENGINE STALL HARD/NO START/RESTART (EXCP. HA) SYMPTOM + EC-151 + EM section *3 EC-156 j MA section *4 SYSTEM — ECCS system ECCS EC-49 open, short open, short noise Crankshaft position sensor (TDC) circuit Accelerator position sensor circuit open, short short ground short open, short ground short open, short open, short open, ground short open, short j j HARD TO START WHEN ENGINE IS HOT Fuel temperature sensor circuit Fuel cut solenoid valve circuit Charge air temperature sensor circuit Needle lift sensor circuit Accelerator switch (FC) circuit Malfunction j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j HI IDLE Injection timing control valve circuit NO START (without first firing) j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j Fuel cut Electric governor circuit HARD TO START WHEN ENGINE IS COLD j AT IDLE open, short open, short open, short open, ground short short HARD/NO START/ RESTART (EXCP. HA) DURING DRIVING Vehicle speed sensor circuit Control sleeve position sensor circuit Adjustment resistor circuit WHEN DECELERATING j HESITATION/SURGING/FLAT SPOT j KNOCK/DETONATION open, short LACK OF POWER j ROUGH IDLE/HUNTING Engine coolant temperature sensor circuit ENGINE STALL HA Malfunction indicator lamp illuminates. Mass air flow sensor circuit IDLING VIBRATION AP Can be detected by CONSULT? j j j SLOW/NO RETURN TO IDLE j OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE AG AH AJ AK AL AM EC-144 EC-139 EC-135 EC-130 EC-122 EC-126 EC-106 EC-101 EC-96 EC-83 EC-87 EC-92 EC-79 EC-74 EC-69 Reference page j LOW IDLE AF EXCESSIVE FUEL CONSUMPTION j POOR ACCELERATION AE BLACK SMOKE AC AD EXCESSIVE OIL CONSUMPTION AB WHITE SMOKE AA ABNORMAL SMOKE COLOR open, short noise open, ground short short Engine runs on after turning ignition switch OFF. Compensation for amount of fuel injected according to fuel temperature does not function. Injection timing cannot be controlled. Compensation according to engine coolant temperature does not function. Tachometer malfunction Feature of symptom Check point Camshaft position sensor (PUMP) circuit DEAD BATTERY (UNDER CHARGE) Warranty symptom code SYMPTOM TROUBLE DIAGNOSIS — General Description Symptom Matrix Chart (Cont’d) NO START (with first firing) SYSTEM — ECCS system EC-50 ECCS Air conditioner switch circuit Air conditioner relay circuit short open, ground short short open, short open short j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j HI IDLE ECM, Connector circuit ECCS relay (Self-shutoff) circuit j NO START (with first firing) Glow relay circuit Malfunction EGRC-solenoid valve A, B circuit NO START (without first firing) Throttle control solenoid valve circuit HARD TO START WHEN ENGINE IS COLD j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j j Fuel cut Power supply for ECM circuit HARD TO START WHEN ENGINE IS HOT j AT IDLE Ignition switch circuit HARD/NO START/ RESTART (EXCP. HA) DURING DRIVING open short open short open, short ground short open, short ground short open short open WHEN DECELERATING open, short HESITATION/SURGING/FLAT SPOT j j Malfunction indicator lamp illuminates. Accelerator position switch (Full) circuit KNOCK/DETONATION j LACK OF POWER j ROUGH IDLE/HUNTING j ENGINE STALL HA Can be detected by CONSULT? short IDLING VIBRATION AP EC-187 EC-187 EC-111 EC-63 EC-151 EC-156 EC-156 EC-63 EC-63 EC-165 EC-165 EC-170 EC-163 Reference page Accelerator position switch (Idle) circuit SLOW/NO RETURN TO IDLE AG AH AJ AK AL AM OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE j LOW IDLE AF Air conditioner Air conditioner operating.

Air conditioner operating. Air conditioner does not work. does not stop does not operate. does not stop Ground short makes engine unable to stop. Does not stop operating.

Glow lamp does not turn on. Glow lamp does not turn off. Does not operate. Does not stop operating. Engine does not stop. Accelerator position sensor NG signal is output.

Start control does not function. Feature of symptom Check point Neutral position switch circuit POOR ACCELERATION AE EXCESSIVE FUEL CONSUMPTION AC AD BLACK SMOKE AB EXCESSIVE OIL CONSUMPTION j WHITE SMOKE AA j ABNORMAL SMOKE COLOR open, short open, short ground short open, ground short DEAD BATTERY (UNDER CHARGE) Warranty symptom code Start signal circuit SYMPTOM TROUBLE DIAGNOSIS — General Description Symptom Matrix Chart (Cont’d) TROUBLE DIAGNOSIS — General Description CONSULT Reference Value in Data Monitor Mode Remarks: + Specification data are reference values. + Specification data are output/input values which are detected or supplied by the ECM at the connector. * Specification data may not be directly related to their components signals/values/operations. MONITOR ITEM CONDITION SPECIFICATION CKPSzRPM (TDC) + Tachometer: Connect + Run engine and compare tachometer indication with the CONSULT value. Almost the same speed as the CONSULT value. COOLAN TEMP/S + Engine: After warming up More than 70°C (158°F) VHCL SPEED SE + Turn drive wheels and compare speedometer indication with the CONSULT value Almost the same speed as the CONSULT value FUEL TEMP SEN + Engine: After warming up More than 40°C (104 °F) + Ignition switch: ON (Engine stopped) Accelerator pedal: released 0.40 - 0.60V ACCEL POS SEN Accelerator pedal: depressed Approx. 4.0V + Ignition switch: ON (Engine stopped) Accelerator pedal: depressed ON Except above OFF + Ignition switch: ON (Engine stopped) Accelerator pedal: released CLOSE Accelerator pedal: slightly open OPEN + Ignition switch: ON (Engine stopped) Accelerator pedal: released ON Accelerator pedal: slightly open OFF CKPSzRPM (REF) CMPSzRPM-PUMP FULL ACCEL SW ACCEL SW (FC) OFF ACCEL SW C/SLEEV POS/S + Engine: After warming up 1.0 - 3.5V BATTERY VOLT + Ignition switch: ON (Engine stopped) 11 - 14V P/N POSI SW + Ignition switch: ON START SIGNAL + Ignition switch: ON → START → ON AIR COND SIG + Engine: After warming up, idle the engine IGN SW WARM UP SW OFF OFF → ON → OFF Air conditioner switch: ON (Compressor operates.) ON ON → OFF Heat up switch: ON ON Heat up switch: OFF OFF Idle 1.6 - 2.0V Idle −9.5 to −12.0° 2,000 rpm −10.0 to −15.5° + Ignition switch: ON + + + + Engine: After warming up Air conditioner switch: OFF Shift lever: ‘‘N’’ No-load ACT INJ TIMG + + + + Engine: After warming up Air conditioner switch: ‘‘OFF’’ Shift lever: ‘‘N’’ No-load DECELER F/CUT ON Except above + Ignition switch: ON → OFF MAS AIR/FL SE INJ TIMG C/V Shift lever: Neutral/Park + Engine: After warming up, idle the engine. + Engine: After warming up FUEL CUT S/V + Ignition switch: ON → OFF GLOW RLY + Refer to EC-151. Approx. 50% Idle OFF When accelerator pedal is released quickly with engine speed at 3,000 rpm or more. ON ON → OFF EC-51 TROUBLE DIAGNOSIS — General Description CONSULT Reference Value in Data Monitor Mode (Cont’d) MONITOR ITEM CONDITION SPECIFICATION + When cooling fan is stopped. OFF + When cooling fan operates. ON + When charge air cooler fan is stopped. OFF + When charge air cooler fan operates. ON COOLING FAN I/C FAN RLY EGRC SOL/V A EGRC SOL/V B THROT RLY + + + + Engine: After warming up Air conditioner switch: ‘‘OFF’’ Shift lever: ‘‘N’’ No-load Idle ON Revving engine from idle to 3,750 rpm OFF + + + + Engine: After warming up Air conditioner switch: ‘‘OFF’’ Shift lever: ‘‘N’’ No-load Idle ON Revving engine from idle to 2,600 rpm OFF + + + + Engine: After warming up Air conditioner switch: ‘‘OFF’’ Shift lever: ‘‘N’’ No-load Idle ON Revving engine from idle to 2,500 rpm OFF EC-52 TROUBLE DIAGNOSIS — General Description Major Sensor Reference Graph in Data Monitor Mode The following are the major sensor reference graphs in ‘‘DATA MONITOR’’ mode. (Select ‘‘HI SPEED’’ in ‘‘DATA MONITOR’’ with CONSULT.) ACCEL POS SEN, C/SLEEV POS/S, ACT INJ TIMG Below is the data for ‘‘ACCEL POS SEN’’, ‘‘C/SLEEV POS/S’’ and ‘‘ACT INJ TIMG’’ when revving engine quickly up to 3,000 rpm under no load after warming up engine sufficiently. Each value is for reference, the exact value may vary. SEF663S EC-53 TROUBLE DIAGNOSIS — General Description ECM Terminals and Reference Value PREPARATION 1. ECM is located behind the instrument lower panel. For this inspection, remove the driver’s side instrument lower cover. SEF519V 2. Remove ECM harness protector. AEC913 3. Perform all voltage measurements with the connector connected. Extend tester probe as shown to perform tests easily. + Open harness securing clip to make testing easier. + Use extreme care not to touch 2 pins at one time. + Data is for comparison and may not be exact. SEF367I Be sure ECM unit is properly grounded before checking. SEF665S EC-54 TROUBLE DIAGNOSIS — General Description ECM Terminals and Reference Value (Cont’d) ECM HARNESS CONNECTOR TERMINAL LAYOUT SEF064P ECM INSPECTION TABLE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter. TERMINAL NO. WIRE COLOR ITEM CONDITION 43 V (ECCS DATA (DC Voltage and Pulse Signal) Engine is running. (Warm-up condition) Approximately 0.4V 1 W Throttle control solenoid valve Idle speed Engine is running.

(Warm-up condition) Revving engine from idle to 2,500 rpm BATTERY VOLTAGE (11 - 14V) Ignition switch ‘‘ON’’ Ignition switch ‘‘OFF’’ 4 B/Y ECCS relay (Self-shutoff) 0 - 1.5V For a few seconds after turning ignition switch ‘‘OFF’’ Ignition switch ‘‘OFF’’ A few seconds passed after turning ignition switch ‘‘OFF’’ BATTERY VOLTAGE (11 - 14V) Approximately 1.0 - 2.0V Engine is running.

(Warm-up condition) Idle speed SEF715V 5 Y/B Tachometer Approximately 1.0 - 2.0V Engine is running. (Warm-up condition) Engine speed is 2,000 rpm. SEF716V EC-55 TROUBLE DIAGNOSIS — General Description ECM Terminals and Reference Value (Cont’d) TERMINAL NO. WIRE COLOR ITEM CONDITION Engine is running. 8 G/OR Charge air cooler fan relay Charge air cooler fan is not operating. DATA (DC Voltage and Pulse Signal) BATTERY VOLTAGE (11 - 14V) Engine is running. 0 - 1V Charge air cooler fan is operating. 10 P Fuel temperature sensor Engine is running. Engine is running. Cooling fan is not operating. 14 L Approximately 0 - 4.8V Output voltage varies with fuel temperature. BATTERY VOLTAGE (11 - 14V) Cooling fan relay Engine is running. 0 - 1V Cooling fan is operating. Engine is running. Air conditioner switch is ‘‘OFF’’. 15 Y/L Air conditioner relay BATTERY VOLTAGE (11 - 14V) Engine is running.

Both air conditioner switch and blower fan switch are ‘‘ON’’. (Compressor is operating.) 0 - 1V Ignition switch ‘‘ON’’ 0 - 1.5V Glow lamp is ‘‘ON’’. 16 L/W Glow lamp Ignition switch ‘‘ON’’ Glow lamp is ‘‘OFF’’.

18 G Malfunction indicator lamp Ignition switch ‘‘ON’’ 0 - 1.5V Engine is running. BATTERY VOLTAGE (11 - 14V) Idle speed 19 20 LG/R R/W Engine coolant temperature sensor Engine is running. Approximately 0 - 4.8V Output voltage varies with engine coolant temperature. Ignition switch ‘‘ON’’ Approximately 0V Ignition switch ‘‘START’’ BATTERY VOLTAGE (11 - 14V) Start signal Engine is running. Air conditioner switch is ‘‘OFF’’. 21 LG/B Air conditioner switch BATTERY VOLTAGE (11 - 14V) BATTERY VOLTAGE (11 - 14V) Engine is running. Both air conditioner switch and blower fan switch are ‘‘ON’’. (Compressor is operating.) EC-56 Approximately 0V TROUBLE DIAGNOSIS — General Description ECM Terminals and Reference Value (Cont’d) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage and Pulse Signal) Ignition switch ‘‘ON’’ 22 P/B Inhibitor switch/ Neutral position switch Gear position is ‘‘N’’ or ‘‘P’’ (A/T models). Gear position is ‘‘Neutral’’ (M/T models). Ignition switch ‘‘ON’’ Except the above gear position Approximately 0V BATTERY VOLTAGE (11 - 14V) Ignition switch ‘‘ON’’ 0.4 - 0.6V 23 W Accelerator position sensor Accelerator pedal fully released Ignition switch ‘‘ON’’ Approximately 4.3V Accelerator pedal fully depressed Engine is running.

24 PU/W A/T signal No. 1 6 - 8V Idle speed 0 - BATTERY VOLTAGE (11 - 14V) Engine is running. 26 L/OR Vehicle speed sensor Lift up the vehicle. In 1st gear position Vehicle speed is 40 km/h. SEF717V 28 33 B Camshaft position sensor (PUMP) ground Engine is running. (Warm-up condition) Approximately 0V Idle speed Ignition switch ‘‘ON’’ Accelerator pedal fully released 29 R/L BATTERY VOLTAGE (11 - 14V) Accelerator switch (F/C) Ignition switch ‘‘ON’’ Approximately 0V Accelerator pedal depressed Engine is running. 30 P A/T signal No. 3 Approximately 0V Idle speed Ignition switch ‘‘ON’’ 31 R/L Accelerator position switch (Idle) Accelerator pedal fully released BATTERY VOLTAGE (11 - 14V) Ignition switch ‘‘ON’’ Approximately 0V Accelerator pedal depressed Ignition switch ‘‘ON’’ Approximately 0V 32 W/G Accelerator position switch (Full) Accelerator pedal released Ignition switch ‘‘ON’’ Accelerator pedal fully depressed EC-57 BATTERY VOLTAGE (11 - 14V) TROUBLE DIAGNOSIS — General Description ECM Terminals and Reference Value (Cont’d) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage and Pulse Signal) Approximately 0V Engine is running. (Warm-up condition) Idle speed SEF718V 34 W Needle lift sensor Approximately 0V Engine is running. (Warm-up condition) Engine speed is 2,000 rpm. SEF719V Engine is running.

(Warm-up condition) 35 R Mass air flow sensor 1.6 - 2.0V Idle speed 36 LG Charge air temperature sensor 37 P/B A/T signal No. 2 Engine is running. Approximately 0 - 4.8V Output voltage varies with charge air temperature. Engine is running. 6 - 8V Idle speed 38 39 43 B/Y Ignition switch ‘‘OFF’’ 0V Ignition switch ‘‘ON’’ BATTERY VOLTAGE (11 - 14V) Ignition switch Engine is running. B ECCS ground Idle speed EC-58 Engine ground (Probe this terminal with @ tester probe when measuring.) TROUBLE DIAGNOSIS — General Description ECM Terminals and Reference Value (Cont’d) TERMINAL NO.

WIRE COLOR ITEM CONDITION DATA (DC Voltage and Pulse Signal) Approximately 0V Engine is running. (Warm-up condition) Idle speed 40 44 L SEF720V Crankshaft position sensor (TDC) Approximately 0V Engine is running. (Warm-up condition) Engine speed is 2,000 rpm. SEF721V Approximately 0V Engine is running.

(Warm-up condition) Idle speed 41 45 W SEF722V Camshaft position sensor (PUMP) Approximately 0V Engine is running. (Warm-up condition) Engine speed is 2,000 rpm.

SEF723V 42 L/G 64 Y/G 65 Y/R Engine is running.

Data link connector for CONSULT Idle speed (CONSULT is connected and turned on) Approximately 0V Approximately 0 - 12V Approximately 0 - 9V Approximately 0 - 4.6V (Voltage varies with part number of adjustment resistor.) 46 Y Adjustment resistor Ignition switch ‘‘ON’’ 47 52 Crankshaft position sensor (TDC) ground Engine is running. (Warm-up condition) B/W 48 G/R Accelerator position sensor power supply Ignition switch ‘‘ON’’ Approximately 5V 49 G/R Sensor’s power signal to TCM Ignition switch ‘‘ON’’ Approximately 5V Approximately 0V Idle speed EC-59 TROUBLE DIAGNOSIS — General Description ECM Terminals and Reference Value (Cont’d) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage and Pulse Signal) Engine is running. (Warm-up condition) 50 B Sensors’ ground Approximately 0V Idle speed 51 L/W Accelerator position sensor ground Engine is running. (Warm-up condition) Approximately 0V Idle speed Approximately 2.6V 53 57 W Control sleeve position sensor power supply Engine is running. Idle speed SEF724V 56 61 W Power supply for ECM Ignition switch ‘‘ON’’ BATTERY VOLTAGE (11 - 14V) Ignition switch ‘‘ON’’ 0V Heat up switch is ‘‘OFF’’.

59 BR/W Heat up switch Ignition switch ‘‘ON’’ Heat up switch is ‘‘ON’’.

BATTERY VOLTAGE (11 - 14V) Approximately 2.6V 62 66 B Control sleeve position sensor ground Engine is running. Idle speed SEF725V Approximately 2.6V 63 67 R Control sleeve position sensor Engine is running. Idle speed SEF726V Ignition switch ‘‘ON’’ 0.4 - 0.6V 68 B/W Accelerator position sensor signal to TCM Accelerator pedal fully released Ignition switch ‘‘ON’’ Approximately 4.3V Accelerator pedal fully depressed 70 BR Power supply (Back-up) 101 107 R/B Electric governor Ignition switch ‘‘OFF’’ Engine is running. Idle speed EC-60 BATTERY VOLTAGE (11 - 14V) BATTERY VOLTAGE (11 - 14V) TROUBLE DIAGNOSIS — General Description ECM Terminals and Reference Value (Cont’d) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage and Pulse Signal) Approximately 10V Engine is running. Idle speed 102 108 SEF727V G/Y Electric governor ground Approximately 10V Engine is running. Engine speed is 2,000 rpm.

SEF728V Engine is running. (Warm-up condition) 0 - 1V Idle speed 103 L/Y EGRC-solenoid valve A Engine is running. (Warm-up condition) Engine is revving from idle up to 3,750 rpm. BATTERY VOLTAGE (11 - 14V) BATTERY VOLTAGE (11 - 14V) Engine is running.

(Warm-up condition) Idle speed 104 110 L/W SEF729V Injection timing control valve BATTERY VOLTAGE (11 - 14V) Engine is running. (Warm-up condition) Engine speed is 2,000 rpm. SEF730V 106 112 118 Engine is running. B ECCS ground Approximately 0V Idle speed Engine is running. (Warm-up condition) 0 - 1V Idle speed 109 BR/Y EGRC-solenoid valve B Engine is running.

(Warm-up condition) Engine is revving from idle up to 2,600 rpm. EC-61 BATTERY VOLTAGE (11 - 14V) TROUBLE DIAGNOSIS — General Description ECM Terminals and Reference Value (Cont’d) TERMINAL NO. 111 WIRE COLOR LG/B 113 115 R/W 116 117 W ITEM Glow relay CONDITION Refer to ‘‘Glow Control System’’, EC-151. Ignition switch ‘‘OFF’’ Approximately 0V Ignition switch ‘‘ON’’ BATTERY VOLTAGE (11 - 14V) Ignition switch ‘‘ON’’ BATTERY VOLTAGE (11 - 14V) Fuel cut solenoid valve Power supply for ECM DATA (DC Voltage and Pulse Signal) EC-62 TROUBLE DIAGNOSIS FOR POWER SUPPLY Main Power Supply and Ground Circuit ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter. TERMINAL NO. WIRE COLOR ITEM CONDITION 43 V (ECCS DATA (DC Voltage and Pulse Signal) Ignition switch ‘‘ON’’ Ignition switch ‘‘OFF’’ 4 B/Y ECCS relay (Self-shutoff) 0 - 1.5V For a few seconds after turning ignition switch ‘‘OFF’’ Ignition switch ‘‘OFF’’ A few seconds passed after turning ignition switch ‘‘OFF’’ 38 B/Y BATTERY VOLTAGE (11 - 14V) Ignition switch ‘‘OFF’’ 0V Ignition switch ‘‘ON’’ BATTERY VOLTAGE (11 - 14V) Ignition switch Engine is running. Engine ground (Probe this terminal with @ tester probe when measuring.) 39 43 B 56 61 W Power supply for ECM Ignition switch ‘‘ON’’ BATTERY VOLTAGE (11 - 14V) 70 BR Power supply (Back-up) Ignition switch ‘‘OFF’’ BATTERY VOLTAGE (11 - 14V) 106 112 118 B ECCS ground 116 117 W ECCS ground Idle speed Engine is running.

Approximately 0V Idle speed Power supply for ECM Ignition switch ‘‘ON’’ EC-63 BATTERY VOLTAGE (11 - 14V) TROUBLE DIAGNOSIS FOR POWER SUPPLY Main Power Supply and Ground Circuit (Cont’d) TEC421 EC-64 TROUBLE DIAGNOSIS FOR POWER SUPPLY Main Power Supply and Ground Circuit (Cont’d) TEC422 EC-65 TROUBLE DIAGNOSIS FOR POWER SUPPLY Main Power Supply and Ground Circuit (Cont’d) INSPECTION START . No Start engine. Is engine running?

c Yes SEF065P CHECK POWER SUPPLY-I.

1. Turn ignition switch ‘‘ON’’. 2. Check voltage between ECM terminal V 38 and ground with CONSULT or tester. Voltage: Battery voltage If NG, check the following. + Harness connectors M51 , F6 + 10A fuse + Harness for open or short between ECM and fuse If NG, repair harness or connectors.

. Go to ‘‘CHECK GROUND CIRCUIT’’ on EC-68. SEF056R . CHECK POWER SUPPLY-II. 1. Stop engine.

2. Check voltage between ECM terminal 70 and ground with CONSULT or V tester. Voltage: Battery voltage NG c Check the following.

+ Harness connectors E127 , M21 + Harness connectors M52 , F7 + 7.5A fuse + Harness for open or short between ECM and battery If NG, repair harness or connectors. c ‘‘CHECK Go to GROUND CIRCUIT’’ on EC-68. OK SEF566S OK .

CHECK POWER SUPPLY-III. 1. Turn ignition switch ‘‘ON’’ and then ‘‘OFF’’.

2. Check voltage between ECM terminals 56 , V 61 , 116 , 117 and ground with V CONSULT or tester. Voltage: After turning ignition switch ‘‘OFF’’, battery voltage will exist for a few seconds, then drop to approximately 0V. OK Case-1: Battery voltage does not exist. Case-2: Battery voltage exists for more than a few seconds. NG SEF567S Case-2 Case-1 . j A EC-66 c ‘‘CHECK ECCS Go to RELAY’’ on next page. TROUBLE DIAGNOSIS FOR POWER SUPPLY Main Power Supply and Ground Circuit (Cont’d) j A . SEF513V CHECK HARNESS CONTINUITY BETWEEN ECCS RELAY AND ECM. 1. Disconnect ECM harness connector. 2. Disconnect ECCS relay. 3. Check harness continuity between ECM terminals V 56 , V 61 and relay terminal 7 , and ECM terminals 116 , 117 V and relay terminal V 5 . Continuity should exist. If OK, check harness for short to ground and short to power. NG c OK Check the following. + Harness connectors M52 , F7 + Harness connectors M50 , F5 + Harness for open or short between ECM and ECCS relay If NG, repair open circuit or short to ground or short to power in harness or connectors. . SEF569S CHECK VOLTAGE BETWEEN ECCS RELAY AND GROUND. Check voltage between relay terminals 1 , V 3 , V 6 and ground with CONSULT V or tester.

Voltage: Battery voltage NG c OK Check the following.

+ Harness connectors E127 , M21 + 15A fuse + Harness for open or short between ECCS relay and battery If NG, repair harness or connectors. . SEF030S CHECK OUTPUT SIGNAL CIRCUIT. Check harness continuity between ECM terminal V 4 and relay terminal V 2 . Continuity should exist. If OK, check harness for short to ground and short to power. NG c OK Check the following. + Harness connectors M52 , F7 + Harness for open or short between ECM and ECCS relay If NG, repair open circuit or short to ground or short to power in harness or connectors. . SEC202B CHECK ECCS RELAY. 1. Apply 12V direct current between relay terminals V 1 and V 2 . 2. Check continuity between relay terminals V 3 and V 5 , V 7 and V 6 . 12V (V 1 - V 2) applied: Continuity exists. No voltage applied: No continuity . j B EC-67 OK NG c Replace ECCS relay. TROUBLE DIAGNOSIS FOR POWER SUPPLY Main Power Supply and Ground Circuit (Cont’d) j B . SEF570S CHECK GROUND CIRCUIT. 1. Turn ignition switch ‘‘OFF’’. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals V 39 , V 43 , 106 , 112 , 118 and engine ground. Continuity should exist. If OK, check harness for short to ground and short to power. OK . Check ECM pin terminals for damage and check the connection of ECM harness connector. . INSPECTION END EC-68 NG c Check the following. + Joint connector F18 + Harness for open or short between ECM and ground If NG, repair open circuit or short to ground or short to power in harness or connectors. TROUBLE DIAGNOSIS FOR ‘‘CAM POS SEN (PUMP)’’ (DTC 11) Camshaft Position Sensor (CMPS) (PUMP) SEF674V The camshaft position sensor (PUMP) is located on the electronic fuel injection pump. The sensor consists of a permanent magnet, core and coil.

When engine is running, gap between sensor and drive shaft rotating plate will periodically change. Permeability near the sensor also changes. Due to the permeability change, the magnetic flux near the core is changed. Therefore, the voltage signal generated in the coil is changed. The ECM receives the voltage signal (6 pulses/2 engine revolutions).

These signals are used for tachometer indication. CONSULT REFERENCE VALUE IN DATA MONITOR MODE Remarks: Specification data are reference values. MONITOR ITEM CKPSzRPM (REF) CKPSzRPM-PUMP CONDITION SPECIFICATION + Tachometer: Connect + Run engine and compare tachometer indication with the CONSULT value. Almost the same speed as the CONSULT value. ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter. TERMINAL NO. 28 33 WIRE COLOR B ITEM Camshaft position sensor (PUMP) ground CONDITION 43 V (ECCS DATA (DC Voltage and Pulse Signal) Engine is running. (Warm-up condition) Approximately 0V Idle speed Approximately 0V Engine is running. (Warm-up condition) Idle speed 41 45 W SEF722V Camshaft position sensor (PUMP) Approximately 0V Engine is running. (Warm-up condition) Engine speed is 2,000 rpm. SEF723V EC-69 TROUBLE DIAGNOSIS FOR ‘‘CAM POS SEN (PUMP)’’ (DTC 11) Camshaft Position Sensor (CMPS) (PUMP) (Cont’d) ON BOARD DIAGNOSIS LOGIC Diagnostic Trouble Code No. 11 Malfunction is detected when .... + An improper signal from the sensor is detected by ECM during engine running. Check Items (Possible cause) + Harness or connectors [The camshaft position sensor (PUMP) circuit is open or shorted.] + Camshaft position sensor (PUMP) DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE 1) SEF714V Turn ignition switch ‘‘ON’’ and select ‘‘DATA MONITOR’’ mode with CONSULT. 2) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to ‘‘START’’ for at least 2 seconds.) -- OR --1) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to ‘‘START’’ for at least 2 seconds.) 2) Turn ignition switch ‘‘OFF’’, wait at least 5 seconds and then ‘‘ON’’. 3) Perform ‘‘Diagnostic Test Mode II (Self-diagnostic results)’’ with ECM. EC-70 TROUBLE DIAGNOSIS FOR ‘‘CAM POS SEN (PUMP)’’ (DTC 11) Camshaft Position Sensor (CMPS) (PUMP) (Cont’d) TEC423 EC-71 TROUBLE DIAGNOSIS FOR ‘‘CAM POS SEN (PUMP)’’ (DTC 11) Camshaft Position Sensor (CMPS) (PUMP) (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START . SEF675V CHECK INPUT SIGNAL CIRCUIT. 1.

Turn ignition switch ‘‘OFF’’. 2. Disconnect electronic fuel injection pump harness connector and ECM harness connector. 3. Check harness continuity between terminal V 1 and ECM terminals V 41 , V 45 . Continuity should exist. If OK, check harness for short to ground and short to power. NG c Repair open circuit or short to ground or short to power in harness or connectors. OK . SEF731V CHECK GROUND CIRCUIT-I.

1. Turn ignition switch ‘‘OFF’’. 2. Check harness continuity between terminal V 2 and ECM terminals V 28 , V 33 . Continuity should exist. If OK, check harness for short to ground and short to power.

NG c Repair open circuit or short to ground or short to power in harness or connectors. OK . SEF732V CHECK GROUND CIRCUIT-II. 1. Loosen and retighten engine ground screws. 2. Check harness continuity between terminal V 3 and engine ground. Continuity should exist. If OK, check harness for short to ground and short to power. NG c Check the following. + Joint connector F19 + Harness for open or short between electronic fuel injection pump and engine ground If NG, repair harness or connectors. OK . CHECK COMPONENT [Camshaft position sensor (PUMP)]. Refer to ‘‘COMPONENT INSPECTION’’ on next page. OK . SEF676V Disconnect and reconnect harness connectors in the circuit. Then retest. Trouble is not fixed. . Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest. . INSPECTION END SEF733V EC-72 NG c Replace camshaft position sensor (PUMP). TROUBLE DIAGNOSIS FOR ‘‘CAM POS SEN (PUMP)’’ (DTC 11) Camshaft Position Sensor (CMPS) (PUMP) (Cont’d) COMPONENT INSPECTION Camshaft position sensor (PUMP) 1.

2. 3. 4.

Disconnect electronic fuel injection pump harness connector. Loosen the camshaft position sensor (PUMP). Remove the sensor. Visually check the sensor for chipping.

SEF573S 5. Check resistance between terminals V 1 and V 2 . Resistance: Approximately 1,360 - 1,840Ω [at 25°C (77°F)] If NG, replace camshaft position sensor (PUMP). SEF677V EC-73 TROUBLE DIAGNOSIS FOR ‘‘MASS AIR FLOW SEN’’ (DTC 12) Mass Air Flow Sensor (MAFS) COMPONENT DESCRIPTION SEF734V The mass air flow sensor is placed in the stream of intake air. It measures the intake air flow rate by measuring a part of the entire intake air flow. It consists of a hot wire that is supplied with electric current from the ECM.

The temperature of the hot wire is controlled by the ECM a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it.

The more air, the greater the heat loss. Therefore, the ECM must supply more electric current to the hot wire as air flow increases. This maintains the temperature of the hot wire.

The ECM detects the air flow by means of this current change. CONSULT REFERENCE VALUE IN DATA MONITOR MODE Remarks: Specification data are reference values. MONITOR ITEM CONDITION + + + + MAS AIR/FL SE Engine: After warming up Air conditioner switch: ‘‘OFF’’ Shift lever: ‘‘N’’ No-load SPECIFICATION Idle 1.6 - 2.0V ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values, and are measured between each terminal and ground) with a voltmeter. TERMINAL NO. WIRE COLOR ITEM 43 V DATA (DC voltage) CONDITION Engine is running. (Warm-up condition) 35 R Mass air flow sensor 1.6 - 2.0V Idle speed Engine is running.

(Warm-up condition) 50 B Sensors’ ground Approximately 0V Idle speed ON BOARD DIAGNOSIS LOGIC Diagnostic Trouble Code No. 12 Check Items (Possible Cause) Malfunction is detected when ... + An excessively high or low voltage from the sensor is sent to ECM. EC-74 (ECCS + Harness or connectors (The sensor circuit is open or shorted.) + Mass air flow sensor TROUBLE DIAGNOSIS FOR ‘‘MASS AIR FLOW SEN’’ (DTC 12) Mass Air Flow Sensor (MAFS) (Cont’d) DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE SEF735V 1) Turn ignition switch ‘‘ON’’, and wait at least 6 seconds. 2) Select ‘‘DATA MONITOR’’ mode with CONSULT. 3) Start engine and wait at least 3 seconds.

-- OR --1) Turn ignition switch ‘‘ON’’, and wait at least 6 seconds. 2) Start engine and wait at least 3 seconds. 3) Turn ignition switch ‘‘OFF’’, wait at least 5 seconds and then turn ‘‘ON’’.

4) Perform ‘‘Diagnostic Test Mode II (Self-diagnostic results)’’ with ECM. EC-75 TROUBLE DIAGNOSIS FOR ‘‘MASS AIR FLOW SEN’’ (DTC 12) Mass Air Flow Sensor (MAFS) (Cont’d) TEC424 EC-76 TROUBLE DIAGNOSIS FOR ‘‘MASS AIR FLOW SEN’’ (DTC 12) Mass Air Flow Sensor (MAFS) (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START . SEF713V CHECK POWER SUPPLY. 1. Turn ignition switch ‘‘OFF’’. 2. Disconnect mass air flow sensor harness connector. 3. Turn ignition switch ‘‘ON’’.

4. Check voltage between terminal V 1 and ground with CONSULT or tester. Voltage: Battery voltage NG c OK . SEF736V CHECK GROUND CIRCUIT. 1. Turn ignition switch ‘‘OFF’’. 2. Loosen and retighten engine ground screws. 3.

Check harness continuity between terminal V 2 and engine ground.

Continuity should exist. If OK, check harness for short to ground and short to power. NG c OK . SEF676V CHECK INPUT SIGNAL CIRCUIT.

1. Disconnect ECM harness connector. 2. Check harness continuity between terminal V 3 and ECM terminal V 35 . Continuity should exist. If OK, check harness for short to ground and short to power. NG c Check the following. + Harness connectors M52 , F7 + Harness for open or short between mass air flow sensor and ECM + Harness for open or short between mass air flow sensor and ECCS relay If NG, repair harness or connector. Check the following. + Harness connectors E106 , M88 + Harness connectors M51 , F6 + Harness for open or short between mass air flow sensor and ECM + Harness for open or short between mass air flow sensor and TCM If NG, repair open circuit or short to ground or short to power in harness or connectors.

Repair open circuit or short to ground or short to power in harness or connectors. OK . CHECK COMPONENT (Mass air flow sensor).

Refer to ‘‘COMPONENT INSPECTION’’ on next page. .

SEF737V OK Disconnect and reconnect harness connectors in the circuits. Then retest. . Trouble is not fixed. Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest. . INSPECTION END SEF738V EC-77 NG c Replace mass air flow sensor. TROUBLE DIAGNOSIS FOR ‘‘MASS AIR FLOW SEN’’ (DTC 12) Mass Air Flow Sensor (MAFS) (Cont’d) COMPONENT INSPECTION Mass air flow sensor 1. Start engine and warm it up to normal operating temperature. 2. Check voltage between ECM terminal V 35 and ground under the following condition. Conditions SEF739V Voltage V Ignition switch ‘‘ON’’ (Engine stopped.) Less than 1.0 Idle (Engine is warmed-up sufficiently.) 1.0 - 1.7 2,500 rpm Idle to about 4,000 rpm* Approximately 2.1 1.0 - 1.7 to Approx. 4.0 *: Check for linear voltage rise in response to increase to about 4,000 rpm in engine speed. 3. If NG, remove mass air flow sensor from air duct. Check hot wire for damage and dust. SEF740V EC-78 TROUBLE DIAGNOSIS FOR ‘‘COOLANT TEMP SEN’’ (DTC 13) Engine Coolant Temperature (ECT) Sensor The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input.

The sensor uses a thermistor which is sensitive to the change in temperature.

The electrical resistance of the thermistor decreases as temperature increases. SEF594K SEF012P Diagnostic Trouble Code No. 13 Engine coolant temperature °C (°F) Voltage* (V) Resistance (kΩ) −10 (14) 4.4 7.0 - 11.4 20 (68) 3.5 2.1 - 2.9 50 (122) 2.3 0.68 - 1.00 90 (194) 1.0 0.236 - 0.260 *: These data are reference values and measured between ECM terminal V 19 (Engine coolant temperature sensor) and ECM terminal V 43 (ECCS ground). Check Items (Possible Cause) Malfunction is detected when ... + An excessively high or low voltage from the sensor is entered to ECM. + Harness or connectors (The sensor circuit is open or shorted.) + Engine coolant temperature sensor DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE SEF741V 1) Turn ignition switch ‘‘ON’’. 2) Select ‘‘DATA MONITOR’’ mode with CONSULT. 3) Wait at least 5 seconds.

-- OR --1) Turn ignition switch ‘‘ON’’ and wait at least 5 seconds. 2) Turn ignition switch ‘‘OFF’’, wait at least 5 seconds and then turn ‘‘ON’’. 3) Perform ‘‘Diagnostic Test Mode II (Self-diagnostic results)’’ with ECM.

EC-79 TROUBLE DIAGNOSIS FOR ‘‘COOLANT TEMP SEN’’ (DTC 13) Engine Coolant Temperature (ECT) Sensor (Cont’d) TEC425 EC-80 TROUBLE DIAGNOSIS FOR ‘‘COOLANT TEMP SEN’’ (DTC 13) Engine Coolant Temperature (ECT) Sensor (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START . SEF678V CHECK POWER SUPPLY. 1. Turn ignition switch ‘‘OFF’’. 2. Disconnect engine coolant temperature sensor harness connector. 3. Turn ignition switch ‘‘ON’’. 4. Check voltage between terminal V 2 and ground with CONSULT or tester. Voltage: Approximately 5V NG c OK . SEF541P CHECK GROUND CIRCUIT. 1.

Turn ignition switch ‘‘OFF’’. 2. Check harness continuity between terminal V 1 and engine ground. Continuity should exist. If OK, check harness for short to ground and short to power. NG c OK SEF542P . CHECK COMPONENT (Engine coolant temperature sensor). Refer to ‘‘COMPONENT INSPECTION’’ on next page. OK . Disconnect and reconnect harness connectors in the circuit. Then retest. Trouble is not fixed. . Check ECM pin terminals for damage and check the connection of ECM harness connector.

Reconnect ECM harness connector and retest. . INSPECTION END EC-81 NG c Check the following. + Harness connectors E202 , E69 + Harness connectors E127 , M21 + Harness connectors M51 , F6 + Harness for open or short between ECM and engine coolant temperature sensor If NG, repair harness or connectors.

Check the following. + Harness connectors E202 , E69 + Harness connectors E127 , M21 + Harness connectors M50 , F5 + Harness connectors F6 , M51 + Harness connectors M88 , E106 + Harness for open or short between ECM and engine coolant temperature sensor + Harness for open or short between TCM and engine coolant temperature sensor If NG, repair open circuit or short to ground or short to power in harness or connectors. Replace engine coolant temperature sensor.

TROUBLE DIAGNOSIS FOR ‘‘COOLANT TEMP SEN’’ (DTC 13) Engine Coolant Temperature (ECT) Sensor (Cont’d) COMPONENT INSPECTION Engine coolant temperature sensor Check resistance as shown in the figure. SEF152P Temperature °C (°F) Resistance kΩ 20 (68) 2.1 - 2.9 50 (122) 0.68 - 1.0 90 (194) 0.236 - 0.260 If NG, replace engine coolant temperature sensor. SEF012P EC-82 TROUBLE DIAGNOSIS FOR ‘‘VEHICLE SPEED SEN’’ (DTC 14) Vehicle Speed Sensor (VSS) The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM. AEC110 ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter. TERMINAL NO. WIRE COLOR ITEM CONDITION 43 V (ECCS DATA (DC Voltage and Pulse Signal) 0 - BATTERY VOLTAGE (11 - 14V) Engine is running. 26 L/OR Vehicle speed sensor Lift up the vehicle. In 1st gear position Vehicle speed is 40 km/h (25 MPH). SEF717V ON BOARD DIAGNOSIS LOGIC Diagnostic Trouble Code No. 14 Malfunction is detected when .... Check Items (Possible Cause) + The almost 0 km/h (0 MPH) signal from vehicle speed + Harness or connector (The vehicle speed sensor circuit is open or shorted.) sensor is sent to ECM even when vehicle is being + Vehicle speed sensor driven. EC-83 TROUBLE DIAGNOSIS FOR ‘‘VEHICLE SPEED SEN’’ (DTC 14) Vehicle Speed Sensor (VSS) (Cont’d) OVERALL FUNCTION CHECK SEF941N Use this procedure to check the overall function of the vehicle speed sensor circuit. During this check, a DTC might not be confirmed.

1) Jack up drive wheels. 2) Start engine. 3) Read vehicle speed sensor signal in ‘‘DATA MONITOR’’ mode with CONSULT. The vehicle speed on CONSULT should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position. -- OR --1) Jack up drive wheels. 2) Start engine. 3) Rotate drive wheel by hand. 4) Check voltage between ECM terminal V 26 and ground with tester. Voltage should vary between 0V - battery voltage. SEF811R EC-84 TROUBLE DIAGNOSIS FOR ‘‘VEHICLE SPEED SEN’’ (DTC 14) Vehicle Speed Sensor (VSS) (Cont’d) TEC426 EC-85 TROUBLE DIAGNOSIS FOR ‘‘VEHICLE SPEED SEN’’ (DTC 14) Vehicle Speed Sensor (VSS) (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START . SEF742V CHECK INPUT SIGNAL CIRCUIT. 1. Turn ignition switch ‘‘OFF’’. 2. Disconnect ECM harness connector and combination meter harness connector. 3.

Check harness continuity between ECM terminal V 26 and meter terminal V 26 .

Continuity should exist. If OK, check harness for short to ground and short to power. NG c OK Check the following. + Harness connectors M52 , F7 + Joint connector M79 + Harness for open or short between ECM and combination meter If NG, repair open circuit or short to ground or short to power in harness or connectors. . CHECK SPEEDOMETER FUNCTION. Make sure that speedometer functions properly. OK .

Disconnect and reconnect harness connectors in the circuit. Then retest. Trouble is not fixed. . Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest. . INSPECTION END EC-86 NG c Check the following. + Harness connectors M86 , E104 (LHD models) + Harness connectors M21 , E127 (RHD models) + Harness connectors E70 , E201 + Harness for open or short between combination meter and vehicle speed sensor If NG, repair open circuit or short to ground or short to power in harness or connectors. Check vehicle speed sensor and its circuit. Refer to EL section. TROUBLE DIAGNOSIS FOR ‘‘CONT SLEEV POS SEN’’ (DTC 15) Control Sleeve Position Sensor (CSPS) The control sleeve position sensor is installed on the electric governor. It senses the position of control sleeve (rotor angle) while the control sleeve is being driven by the electric governor, and feeds it back to the ECM. SEF743V CONSULT REFERENCE VALUE IN DATA MONITOR MODE Remarks: Specification data are reference values. MONITOR ITEM C/SLEEV POS/S CONDITION SPECIFICATION + Engine: After warming up 1.0 - 3.5V ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter. TERMINAL NO. WIRE COLOR ITEM CONDITION 43 V (ECCS DATA (DC Voltage and Pulse Signal) Approximately 2.6V 53 57 W Control sleeve position sensor power supply Engine is running. Idle speed SEF724V Approximately 2.6V 62 66 B Control sleeve position sensor ground Engine is running. Idle speed SEF725V Approximately 2.6V 63 67 R Control sleeve position sensor Engine is running. Idle speed SEF726V EC-87 TROUBLE DIAGNOSIS FOR ‘‘CONT SLEEV POS SEN’’ (DTC 15) Control Sleeve Position Sensor (CSPS) (Cont’d) ON BOARD DIAGNOSIS LOGIC Diagnostic Trouble Code No. 15 Malfunction is detected when .... Check Items (Possible cause) + An excessively high or low voltage from the sensor is + Harness or connectors (The control sleeve position sensor circuit is open or detected by ECM. shorted.) .... + Control sleeve position sensor + An improper voltage signal from the sensor is detected by ECM during engine running.

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE 1) SEF714V Turn ignition switch ‘‘ON’’ and select ‘‘DATA MONITOR’’ mode with CONSULT. 2) Start engine and run it for at least 2 seconds at idle speed. -- OR --1) Start engine and run it for at least 2 seconds at idle speed. 2) Turn ignition switch ‘‘OFF’’, wait at least 5 seconds and then ‘‘ON’’. 3) Perform ‘‘Diagnostic Test Mode II (Self-diagnostic results)’’ with ECM. EC-88 TROUBLE DIAGNOSIS FOR ‘‘CONT SLEEV POS SEN’’ (DTC 15) Control Sleeve Position Sensor (CSPS) (Cont’d) TEC427 EC-89 TROUBLE DIAGNOSIS FOR ‘‘CONT SLEEV POS SEN’’ (DTC 15) Control Sleeve Position Sensor (CSPS) (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START . SEF679V CHECK POWER SUPPLY CIRCUIT. 1. Turn ignition switch ‘‘OFF’’. 2. Disconnect ECM harness connector and electronic fuel injection pump harness connector. 3. Check harness continuity between terminal V 2 and ECM terminals V 53 , V 57 . Continuity should exist. If OK, check harness for short to ground and short to power. NG c Repair open circuit or short to ground or short to power in harness or connectors. OK . SEF744V CHECK INPUT SIGNAL CIRCUIT. Check harness continuity between sensor terminal V 3 and ECM terminals V 63 , V 67 . Continuity should exist. If OK, check harness for short to ground and short to power.

NG c Repair open circuit or short to ground or short to power in harness or connectors. OK . CHECK GROUND CIRCUIT-I. Check harness continuity between sensor terminal V 6 and ECM terminals V 62 , V 66 . Continuity should exist. If OK, check harness for short to ground and short to power. NG c Repair open circuit or short to ground or short to power in harness or connectors.

OK SEF745V .

CHECK GROUND CIRCUIT-II. 1. Loosen and retighten engine ground screws. 2. Check harness continuity between terminal V 4 and engine ground. Continuity should exist. If OK, check harness for short to ground and short to power. OK SEF746V . j A SEF676V EC-90 NG c Check the following. + Joint connector F19 + Harness for open or short between control sleeve position sensor and engine ground If NG, repair open circuit or short to ground or short to power in harness or connectors. TROUBLE DIAGNOSIS FOR ‘‘CONT SLEEV POS SEN’’ (DTC 15) Control Sleeve Position Sensor (CSPS) (Cont’d) j A . CHECK COMPONENT (Control sleeve position sensor). Refer to ‘‘COMPONENT INSPECTION’’ below. NG c Take proper action. OK . SEF747V Disconnect and reconnect harness connectors in the circuit.

Then retest. .

Trouble is not fixed. Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest. . INSPECTION END COMPONENT INSPECTION Control sleeve position sensor 1. Disconnect electronic fuel injection pump harness connector.

2. Check continuity between terminals V 2 and V 3 , V 2 and V 6 . Resistance: Approximately 5.9Ω [at 23°C (73°F)] If NG, take proper action. SEF680V EC-91 TROUBLE DIAGNOSIS FOR ‘‘ADJUST RESISTOR’’ (DTC 17) Adjustment Resistor The adjustment resistor is used to achieve uniform pump characteristics. SEF681V ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter. TERMINAL NO. WIRE COLOR ITEM 46 Y Adjustment resistor 50 B Sensors’ ground CONDITION 43 V (ECCS DATA (DC Voltage and Pulse Signal) Approximately 0 - 4.6V (Voltage varies with part number of adjustment resistor.) Ignition switch ‘‘ON’’ Engine is running. (Warm-up condition) Approximately 0V Idle speed ON BOARD DIAGNOSIS LOGIC Diagnostic Trouble Code No. 17 Check Items (Possible Cause) Malfunction is detected when ... + An excessively high or low voltage from the resistor is detected by ECM. + Harness or connectors (The adjustment resistor circuit is open or shorted.) + Adjustment resistor DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE SEF748V 1) Turn ignition switch ‘‘ON’’. 2) Select ‘‘DATA MONITOR’’ mode with CONSULT.

3) Wait at least 5 seconds. -- OR --1) Turn ignition switch ‘‘ON’’ and wait at least 5 seconds. 2) Turn ignition switch ‘‘OFF’’, wait at least 5 seconds and then turn ‘‘ON’’. 3) Perform ‘‘Diagnostic Test Mode II (Self-diagnostic results)’’ with ECM. EC-92 TROUBLE DIAGNOSIS FOR ‘‘ADJUST RESISTOR’’ (DTC 17) Adjustment Resistor (Cont’d) TEC428 EC-93 TROUBLE DIAGNOSIS FOR ‘‘ADJUST RESISTOR’’ (DTC 17) Adjustment Resistor (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START . SEF682V CHECK POWER SUPPLY. 1. Turn ignition switch ‘‘OFF’’. 2. Disconnect electronic fuel injection pump harness connector. 3. Turn ignition switch ‘‘ON’’. 4. Check voltage between terminal V 2 and ground. Voltage: Approximately 5V NG c Repair harness or connectors. OK . SEF749V CHECK GROUND CIRCUIT. 1. Turn ignition switch ‘‘OFF’’. 2. Check harness continuity between terminal V 6 and engine ground. Continuity should exist. If OK, check harness for short to ground and short to power. NG c OK Check the following. + Harness connectors F6 , M51 + Harness connectors M88 , E106 + Harness for open or short between ECM and adjustment resistor + Harness for open or short between TCM and adjustment resistor If NG, repair open circuit or short to ground or short to power in harness or connectors. .

SEF750V CHECK COMPONENT (Adjustment resistor). Refer to ‘‘COMPONENT INSPECTION’’ on next page. OK . Disconnect and reconnect harness connectors in the circuit.

Then retest. Trouble is not fixed. .

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest. . INSPECTION END EC-94 NG c Replace adjustment resistor. TROUBLE DIAGNOSIS FOR ‘‘ADJUST RESISTOR’’ (DTC 17) Adjustment Resistor (Cont’d) COMPONENT INSPECTION Adjustment resistor Check resistance between terminals V 2 and V 6 . Resistance: Approximately 0.2 - 15.0 kΩ [at 25°C (77°F)] Resistance value varies with adjustment sensor numbers. If NG, replace adjustment resistor.

Always replace adjustment resistor with a new one which has same number on label. SEF683V EC-95 TROUBLE DIAGNOSIS FOR ‘‘F/INJ F/B 2’’ (DTC 18), ‘‘F/INJ F/B’’ (DTC 22), ‘‘ELECTRIC GOV’’ (DTC 25) Electric Governor The electric governor is built into the electronic fuel injection pump. It moves the control sleeve to increase or decrease the amount of fuel injected. When current flows through the coil, a magnetic force is produced, rotating the rotor.

The rotor shaft is installed to the control sleeve via a ball pin which is eccentrically situated in relation to the rotor shaft.

With this arrangement, the control sleeve can be moved in relation to rotor rotation. The rotor’s rotating angle is determined by a balanced condition of magnetic force (generated by current flow regulated by means of the ECM) and tension of return spring (installed to rotor). The larger the current flow through the coil, the greater the rotor’s rotating angle. This means that the control sleeve moves to the right, increasing the amount of fuel injected. The ECM regulates the current flow through the coil by changing the duty ratio which controls the ON-OFF operation of the electric governor grounding circuit. SEF632S SEF633S ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter. TERMINAL NO. WIRE COLOR ITEM CONDITION 43 V (ECCS DATA (DC Voltage and Pulse Signal) Ignition switch ‘‘ON’’ Ignition switch ‘‘OFF’’ 4 B/Y ECCS relay (Self-shutoff) 0 - 1.5V For a few seconds after turning ignition switch ‘‘OFF’’ Ignition switch ‘‘OFF’’ A few seconds passed after turning ignition switch ‘‘OFF’’ 101 107 Engine is running. R/B Electric governor Idle speed EC-96 BATTERY VOLTAGE (11 - 14V) BATTERY VOLTAGE (11 - 14V) TROUBLE DIAGNOSIS FOR ‘‘F/INJ F/B 2’’ (DTC 18), ‘‘F/INJ F/B’’ (DTC 22), ‘‘ELECTRIC GOV’’ (DTC 25) Electric Governor (Cont’d) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage and Pulse Signal) Approximately 10V Engine is running. Idle speed 102 108 SEF727V G/Y Electric governor ground Approximately 10V Engine is running. Engine speed is 2,000 rpm. SEF728V 116 117 W Power supply for ECM Ignition switch ‘‘ON’’ BATTERY VOLTAGE (11 - 14V) ON BOARD DIAGNOSIS LOGIC Diagnostic Trouble Code No. 18, 22, 25 Malfunction is detected when ....

Check Items (Possible cause) + Fuel injection feedback system does not operate prop- + Main power supply circuit (ECM terminals 116 , 117) erly. (This system consists essentially of ECM, electric and fuse governor and control sleeve position sensor.) + Harness or connectors (Electric governor and control sleeve position sensor circuit) + Electric governor + Electronic fuel injection pump + ECM EC-97 TROUBLE DIAGNOSIS FOR ‘‘F/INJ F/B 2’’ (DTC 18), ‘‘F/INJ F/B’’ (DTC 22), ‘‘ELECTRIC GOV’’ (DTC 25) Electric Governor (Cont’d) DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE SEF751V Note: If DTC 18, 22, 25 and DTC 15 are displayed, perform TROUBLE DIAGNOSIS FOR DTC 15. (See EC-87.) 1) Turn ignition switch ‘‘ON’’ and select ‘‘DATA MONITOR’’ mode with CONSULT. 2) Start engine and warm it up to normal operating temperature. 3) Run engine for 2 seconds at 3,000 rpm. Return engine speed to idle, then increase to 3,000 rpm under no load. -- OR --1) Start engine and warm it up to normal operating temperature. 2) Run engine for 2 seconds at 3,000 rpm. Return engine speed to idle, then increase to 3,000 rpm under no load. 3) Turn ignition switch ‘‘OFF’’, wait at least 5 seconds and then turn ‘‘ON’’. 4) Perform ‘‘Diagnostic Test Mode II (Self-diagnostic results)’’ with ECM. Note: If a malfunction occurs intermittently, conduct suitable driving pattern for 10 minutes. This makes it possible to determine DTC.

EC-98 TROUBLE DIAGNOSIS FOR ‘‘F/INJ F/B 2’’ (DTC 18), ‘‘F/INJ F/B’’ (DTC 22), ‘‘ELECTRIC GOV’’ (DTC 25) Electric Governor (Cont’d) TEC429 EC-99 TROUBLE DIAGNOSIS FOR ‘‘F/INJ F/B 2’’ (DTC 18), ‘‘F/INJ F/B’’ (DTC 22), ‘‘ELECTRIC GOV’’ (DTC 25) Electric Governor (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START . CHECK POWER SUPPLY. Refer to EC-63. .

SEF679VA CHECK POWER SUPPLY CIRCUIT. 1. Turn ignition switch ‘‘OFF’’. 2. Disconnect ECM harness connector and electronic fuel injection pump harness connector.

3. Check harness continuity between terminal V 1 and ECM terminals 101 , 107 . Continuity should exist. If OK, check harness for short to ground and short to power. NG c Repair open circuit or short to ground or short to power in harness or connectors. OK . SEF752V CHECK GROUND CIRCUIT. Check harness continuity between terminal V 5 and ECM terminals 102 , 108 . Continuity should exist. If OK, check harness for short to ground and short to power. NG c Repair open circuit or short to ground or short to power in harness or connectors. OK . CHECK COMPONENT (Electric governor). Refer to ‘‘COMPONENT INSPECTION’’ below. SEF753V NG c Take proper action. OK . Disconnect and reconnect harness connectors in the circuit. Then retest. . Trouble is not fixed. Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest. . INSPECTION END COMPONENT INSPECTION Electric governor 1. Disconnect electronic fuel injection pump harness connector. 1 and V 5 . 2. Check continuity between terminals V Resistance: Approximately 0.68Ω [at 23°C (73°F)] If NG, take proper action. SEF684V EC-100 TROUBLE DIAGNOSIS FOR ‘‘F/INJ TIMG F/B’’ (DTC 21) Injection Timing Control Valve SEF638S The injection timing control valve is built into the electronic fuel injection pump. It controls the timer piston to change the fuel injection timing. The timing control valve is a solenoid valve located in the line between high-pressure chamber and low-pressure chamber. It changes fuel pressure in the high-pressure chamber. When current flows through the solenoid (the solenoid turns ON), the timing control valve opens, advancing fuel injection timing. When current does not flow through it, the timing control valve closes, retarding injection timing. The ECM emits an ON-OFF duty signal. The longer the OFFduration, the greater the advance angle. The longer the ON-duration, the greater the retard angle. This means that changing the ON-OFF duty ratio makes it possible to achieve an optimal advance angle and accurately control fuel injection timing. CONSULT REFERENCE VALUE IN DATA MONITOR MODE Remarks: Specification data are reference values. MONITOR ITEM ACT INJ TIMG INJ TIMG C/V CONDITION + + + + Engine: After warming up Air conditioner switch: ‘‘OFF’’ Shift lever: ‘‘N’’ No-load SPECIFICATION Idle −9.5 to −12.0° 2,000 rpm −10.0 to −15.5° + Engine: After warming up, idle the engine. Approx. 50% ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter.

TERMINAL NO. WIRE COLOR ITEM CONDITION 43 V (ECCS DATA (DC Voltage and Pulse Signal) BATTERY VOLTAGE (11 - 14V) Engine is running. (Warm-up condition) Idle speed 104 110 L/W SEF729V Injection timing control valve BATTERY VOLTAGE (11 - 14V) Engine is running. (Warm-up condition) Engine speed is 2,000 rpm. SEF730V EC-101 TROUBLE DIAGNOSIS FOR ‘‘F/INJ TIMG F/B’’ (DTC 21) Injection Timing Control Valve (Cont’d) ON BOARD DIAGNOSIS LOGIC Diagnostic Trouble Code No. 21 Malfunction is detected when .... + Injection timing feedback system does not operate properly. (This system consists essentially of ECM, injection timing control valve and needle lift sensor.) Check Items (Possible cause) + Harness or connectors [Injection timing control valve, needle lift sensor, crankshaft position sensor (TDC) circuits] + Injection timing control valve + Needle lift sensor + Crankshaft position sensor (TDC) + Air in fuel line DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE SEF751V Note: If both DTC 21 and 34 or 47 are displayed, perform TROUBLE DIAGNOSIS FOR DTC 34 or 47. (See EC-126 or EC-144.) 1) Turn ignition switch ‘‘ON’’ and select ‘‘DATA MONITOR’’ mode with CONSULT. 2) Start engine and warm it up to normal operating temperature. 3) Run engine for 2 seconds at 3,000 rpm. Return engine speed to idle, then increase to 3,000 rpm under no load.

-- OR --1) Start engine and warm it up to normal operating temperature. 2) Run engine for 2 seconds at 3,000 rpm. Return engine speed to idle, then increase to 3,000 rpm under no load. 3) Turn ignition switch ‘‘OFF’’, wait at least 5 seconds and then turn ‘‘ON’’. 4) Perform ‘‘Diagnostic Test Mode II (Self-diagnostic results)’’ with ECM. Note: If a malfunction occurs intermittently, conduct suitable driving pattern for 10 minutes. This makes it possible to determine DTC. EC-102 TROUBLE DIAGNOSIS FOR ‘‘F/INJ TIMG F/B’’ (DTC 21) Injection Timing Control Valve (Cont’d) TEC430 EC-103 TROUBLE DIAGNOSIS FOR ‘‘F/INJ TIMG F/B’’ (DTC 21) Injection Timing Control Valve (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START . SEF670V CHECK FOR AIR IN FUEL FILTER. 1. Move priming pump up and down to purge air from fuel filter.

2. Perform ‘‘DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE’’. OK c INSPECTION END NG . CHECK POWER SUPPLY. 1. Turn ignition switch ‘‘OFF’’. 2. Disconnect injection timing control valve harness connector. 3. Turn ignition switch ‘‘ON’’. 4. Check harness continuity between terminal V 2 and ground with CONSULT or tester. Voltage: Battery voltage SEF685V c CHECK OUTPUT SIGNAL CIRCUIT. 1. Turn ignition switch ‘‘OFF’’. 2. Disconnect ECM harness connector. 3. Check harness continuity between terminal V 1 and ECM terminals 104 , 110 . Continuity should exist. If OK, check harness for short to ground and short to power. F3 NG c . . SEF755V OK Disconnect and reconnect harness connectors in the circuit. Then retest. . Trouble is not fixed. Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest. . INSPECTION END EC-104 Check the following. + Electronic fuel injection pump harness connector F3 + Harness for open or short between injection timing control valve and ECM If NG, repair open circuit or short to ground or short to power in harness or connectors.

OK CHECK COMPONENT (Injection timing control valve). Refer to ‘‘COMPONENT INSPECTION’’ on next page. Check the following. + Harness connectors M51 , F6 + Electronic fuel injection pump harness connector + 10A fuse + Harness for open or short between injection timing control valve and fuse If NG, repair harness or connectors. OK .

SEF754V NG NG c Replace injection timing control valve. TROUBLE DIAGNOSIS FOR ‘‘F/INJ TIMG F/B’’ (DTC 21) Injection Timing Control Valve (Cont’d) COMPONENT INSPECTION Injection timing control valve 1. Reconnect injection timing control valve harness connector.

2. Disconnect electronic fuel injection pump harness connector. 3. Check resistance between terminals V 3 and V 7 . Resistance: Approximately 11Ω [at 20°C (68°F)] If NG, replace injection timing control valve. SEF686V EC-105 TROUBLE DIAGNOSIS FOR ‘‘ACCEL POS SW (F/C)’’ (DTC 23) Accelerator Switch (F/C) The accelerator switch is installed to the accelerator pedal assembly. The switch senses accelerator position and sends an ON-OFF signal to the ECM. The ECM uses the signal to control the fuel cut operation at deceleration for better fuel efficiency. SEF687V CONSULT REFERENCE VALUE IN DATA MONITOR MODE Remarks: Specification data are reference values. MONITOR ITEM ACCEL SW (FC) DECELER F/CUT CONDITION + Ignition switch: ON (Engine stopped) + Engine: After warming up SPECIFICATION Accelerator pedal: released CLOSE Accelerator pedal: slightly open OPEN Idle OFF When accelerator pedal is released quickly with engine speed at 3,000 rpm or more. ON ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter. TERMINAL NO. WIRE COLOR ITEM CONDITION Ignition switch ‘‘ON’’ Accelerator pedal fully released 29 R/L 43 V DATA (DC Voltage and Pulse Signal) BATTERY VOLTAGE (11 - 14V) Accelerator switch (F/C) Ignition switch ‘‘ON’’ Approximately 0V Accelerator pedal depressed ON BOARD DIAGNOSIS LOGIC Diagnostic Trouble Code No. 23 Malfunction is detected when .... + The OFF signal (short) is sent to the ECM for a certain period of time even when the accelerator pedal is not being depressed. EC-106 (ECCS Check Items (Possible cause) + Harness or connectors (The switch circuit is shorted.) + Accelerator switch (F/C) TROUBLE DIAGNOSIS FOR ‘‘ACCEL POS SW (F/C)’’ (DTC 23) Accelerator Switch (F/C) (Cont’d) DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE 1) SEF756V Turn ignition switch ‘‘ON’’ and select ‘‘DATA MONITOR’’ mode with CONSULT. 2) Depress and release accelerator pedal once for 15 seconds. 3) Repeat step 2 for 26 times. -- OR --1) Turn ignition switch ‘‘ON’’. 2) Depress and release accelerator pedal once for 15 seconds. 3) Repeat step 2 for 26 times. 4) Turn ignition switch ‘‘OFF’’, wait at least 5 seconds and then turn ‘‘ON’’. 5) Perform ‘‘Diagnostic Test Mode II (Self-diagnostic results)’’ with ECM. EC-107 TROUBLE DIAGNOSIS FOR ‘‘ACCEL POS SW (F/C)’’ (DTC 23) Accelerator Switch (F/C) (Cont’d) TEC431 EC-108 TROUBLE DIAGNOSIS FOR ‘‘ACCEL POS SW (F/C)’’ (DTC 23) Accelerator Switch (F/C) (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START . CHECK OVERALL FUNCTION. 1. Turn ignition switch ‘‘ON’’. 2.

Check ‘‘ACCEL SW (F/C)’’ in ‘‘DATA MONITOR’’ mode with CONSULT. Accelerator pedal released: OFF Accelerator pedal depressed: SEF688V ON -- OR --1. Turn ignition switch ‘‘ON’’.

2. Check voltage between ECM terminal V 29 and ground. Voltage: Accelerator pedal released Battery voltage Accelerator pedal depressed Approximately 0V OK c INSPECTION END NG .

SEF589S CHECK GROUND CIRCUIT. 1. Turn ignition switch ‘‘OFF’’. 2. Loosen and retighten engine ground screws. 3. Disconnect accelerator switch (F/C) harness connector. 4. Check harness continuity between terminal V 3 and engine ground. Continuity should exist. If OK, check harness for short to ground and short to power. NG c OK . SEF590S CHECK INPUT SIGNAL CIRCUIT. 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal V 29 and terminal V 1 .

Continuity should exist. If OK, check harness for short to ground and short to power.

NG c OK . CHECK COMPONENT [Accelerator switch (F/C)]. Refer to ‘‘COMPONENT INSPECTION’’ on next page.

SEF591S . OK Disconnect and reconnect harness connectors in the circuit. Then retest. . Trouble is not fixed. Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest. . INSPECTION END SEF592S EC-109 NG c Check the following. + Harness connectors M51 , F6 (RHD models) + Joint connector F18 + Harness for open or short between accelerator switch (F/C) and engine ground If NG, repair open circuit or short to ground or short to power in harness or connectors. Check the following.

+ Harness connectors F6 , M51 (RHD models) + Harness for open or short between ECM and accelerator switch (F/C) If NG, repair open circuit or short to ground or short to power in harness or connectors. Replace accelerator pedal assembly. TROUBLE DIAGNOSIS FOR ‘‘ACCEL POS SW (F/C)’’ (DTC 23) Accelerator Switch (F/C) (Cont’d) COMPONENT INSPECTION Accelerator switch (F/C) 1. Disconnect accelerator switch (F/C) harness connector. 2. Check continuity between terminals V 1 and V 3 . Conditions Continuity Accelerator pedal released No Accelerator pedal depressed Yes If NG, replace accelerator pedal assembly. SEF689V EC-110 TROUBLE DIAGNOSIS FOR ‘‘ECM 1’’ (DTC 27), ‘‘ECM 2’’ (DTC 31) Engine Control Module (ECM)-ECCS-D Control Module The ECM consists of a microcomputer and connectors for signal input and output and for power supply.

The unit controls the engine. SEC220B Diagnostic Trouble Code No. 27, 31 Malfunction is detected when .... + ECM calculation function is malfunctioning. Check Item (Possible Cause) + ECM (ECCS-D control module) DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE SEF748V 1) Turn ignition switch ‘‘ON’’. 2) Select ‘‘DATA MONITOR’’ mode with CONSULT. 3) Wait at least 2 seconds. -- OR --1) Turn ignition switch ‘‘ON’’. 2) Wait at least 2 seconds. 3) Turn ignition switch ‘‘OFF’’, wait at least 5 seconds and then turn ‘‘ON’’.

4) Perform ‘‘Diagnostic Test Mode II (Self-diagnostic results)’’ with ECM. EC-111 TROUBLE DIAGNOSIS FOR ‘‘ECM 1’’ (DTC 27), ‘‘ECM 2’’ (DTC 31) Engine Control Module (ECM)-ECCS-D Control Module (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START .

1) Turn ignition switch ‘‘ON’’. 2) Select ‘‘SELF DIAG RESULTS’’ mode with CONSULT. 3) Touch ‘‘ERASE’’. -- OR --1) Turn ignition switch ‘‘ON’’. 2) Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. . PERFORM SELF-DIAGNOSIS. Select ‘‘SELF DIAG RESULTS’’ mode with CONSULT. -- OR --PERFORM ‘‘Diagnostic Test Mode II’’ (SELF-DIAGNOSTIC RESULTS). . Is the DTC 27, 31 displayed again? No . INSPECTION END EC-112 Yes c Replace ECM. TROUBLE DIAGNOSIS FOR ‘‘OVER HEAT’’ (DTC 28) Cooling Fan (Overheat) SYSTEM DESCRIPTION Vehicle speed Vehicle speed sensor c Engine coolant temperature sensor Engine coolant temperature ECM (ECCS-D control c module) c Cooling fan relay Air conditioner ‘‘ON’’ signal Air conditioner switch c The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, air conditioner system pressure and air conditioner ON signal. The control system has 2-step control [ON/OFF]. Operation SEF757V CONSULT REFERENCE VALUE IN DATA MONITOR MODE Remarks: Specification data are reference values. MONITOR ITEM AIR COND SIG COOLING FAN CONDITION + Engine: After warming up, idle the engine SPECIFICATION Air conditioner switch: OFF OFF Air conditioner switch: ON (Compressor operates.) ON + When cooling fan is stopped.

OFF + When cooling fan operates.

ON ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter. TERMINAL NO. WIRE COLOR ITEM CONDITION Engine is running. Cooling fan is not operating. 14 L BATTERY VOLTAGE (11 - 14V) Engine is running. 0 - 1V EC-113 (ECCS DATA (DC Voltage and Pulse Signal) Cooling fan relay Cooling fan is operating. 43 V TROUBLE DIAGNOSIS FOR ‘‘OVER HEAT’’ (DTC 28) Cooling Fan (Overheat) (Cont’d) TERMINAL NO. WIRE COLOR ITEM DATA (DC Voltage and Pulse Signal) CONDITION Engine is running. Air conditioner switch is ‘‘OFF’’. 15 Y/L Air conditioner relay BATTERY VOLTAGE (11 - 14V) Engine is running. Both air conditioner switch and blower fan switch are ‘‘ON’’. (Compressor is operating.) 0 - 1V ON BOARD DIAGNOSIS LOGIC This diagnosis continuously monitors the engine coolant temperature. If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise. When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated. Diagnostic Trouble Code No. 28 Malfunction is detected when ... + Cooling fan does not operate properly (Overheat).

+ Cooling fan system does not operate properly (Overheat). + Engine coolant was not added to the system using the proper filling method. Check Items (Possible Cause) + Harness or connectors (The cooling fan circuit is open or shorted.) + Cooling fan + Radiator hose + Radiator + Radiator cap + Water pump + Thermostat + Fan belt + Engine coolant temperature sensor For more information, refer to ‘‘MAIN 12 CAUSES OF OVERHEATING’’, EC-120.

CAUTION: When a malfunction is indicated, be sure to replace the coolant following the procedure in the MA section (‘‘Changing Engine Coolant’’, ‘‘ENGINE MAINTENANCE’’). Also, replace the engine oil. a. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA section (‘‘Anti-freeze Coolant Mixture Ratio’’, ‘‘RECOMMENDED FLUIDS AND LUBRICANTS’’). b. After refilling coolant, run engine to ensure that no water-flow noise is emitted. EC-114 TROUBLE DIAGNOSIS FOR ‘‘OVER HEAT’’ (DTC 28) Cooling Fan (Overheat) (Cont’d) OVERALL FUNCTION CHECK AEC640 SEF758V Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed. WARNING: Never remove the radiator cap when the engine is hot.

Serious burns could be caused by high pressure fluid escaping from the radiator. Wrap a thick cloth around the cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off. 1) Check the coolant level in the reservoir tank and radiator.

Allow engine to cool before checking coolant level. If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to ‘‘DIAGNOSTIC PROCEDURE’’, EC-117. 2) Confirm whether customer filled the coolant or not.

If customer filled the coolant, skip the following steps and go to ‘‘DIAGNOSTIC PROCEDURE’’, EC-117. 3) Turn ignition switch ‘‘ON’’. 4) Perform ‘‘COOLING FAN’’ in ‘‘ACTIVE TEST’’ mode with CONSULT and make sure that cooling fan operates when touching ‘‘ON’’. -- OR --3) Disconnect engine coolant temperature sensor harness connector. 4) Connect 150Ω resistor to engine coolant temperature sensor harness connector. 5) Start engine and make sure that cooling fan operates. Be careful not to overheat engine. SEF979S EC-115 TROUBLE DIAGNOSIS FOR ‘‘OVER HEAT’’ (DTC 28) Cooling Fan (Overheat) (Cont’d) TEC432 EC-116 TROUBLE DIAGNOSIS FOR ‘‘OVER HEAT’’ (DTC 28) Cooling Fan (Overheat) (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START . OK Go to CHECK COOLING FAN OPERATION. ‘‘CHECK COOLc 1. Turn ignition switch ‘‘OFF’’. ING SYSTEM FOR LEAK’’, EC-119. 2.

Turn ignition switch ‘‘ON’’. 3. Perform ‘‘COOLING FAN’’ in ‘‘ACTIVE TEST’’ mode with CONSULT and make sure that SEF758V cooling fan operates when touching ‘‘ON’’. -- OR --2. Disconnect engine coolant temperature sensor harness connector. 3. Connect 150Ω resistor to engine coolant temperature sensor harness connector.

4. Start engine and make sure that cooling fan operates. SEF979S NG . SEF690V NG Check the following. CHECK POWER SUPPLY. c + 10A fuse 1. Turn ignition switch ‘‘OFF’’.

+ 30A fusible link 2. Disconnect cooling fan relay-1.

+ Harness for open or short 3. Turn ignition switch ‘‘ON’’. between cooling fan 4. Check voltage between terminals V 2 , relay-1 and fuse 5 and ground with CONSULT or tester. V + Harness for open or short Voltage: Battery voltage between cooling fan OK relay-1 and battery If NG, repair harness or connectors. . SEF759V CHECK GROUND CIRCUIT. 1. Turn ignition switch ‘‘OFF’’. 2. Disconnect cooling fan motor harness connector. 3. Check harness continuity between relay terminal V 3 and motor terminals V 1 , V 3 . Continuity should exist. If OK, check harness for short to ground and short to power. 4. Check harness continuity between motor terminals V 2 , V 4 and body ground. Continuity should exist. If OK, check harness for short to ground and short to power. . j A SEF691V EC-117 OK NG c Repair open circuit or short to ground or short to power in harness or connectors. TROUBLE DIAGNOSIS FOR ‘‘OVER HEAT’’ (DTC 28) Cooling Fan (Overheat) (Cont’d) j A . SEF760V CHECK OUTPUT SIGNAL CIRCUIT. 1. Disconnect ECM harness connector.

2. Check harness continuity between ECM terminal V 14 and terminal V 1 . Continuity should exist. If OK, check harness for short to ground and short to power. NG c OK Check the following. + Harness connectors E127 , M21 + Harness connectors M52 , F7 + Harness for open or short between cooling fan relay-1 and ECM If NG, repair open circuit or short to ground or short to power in harness or connectors. .

CHECK COMPONENT (Cooling fan relay-1). Refer to ‘‘COMPONENT INSPECTION’’, EC-121. NG Replace cooling fan relay. c OK SEF761V . CHECK COMPONENT (Cooling fan motor-1).

Refer to ‘‘COMPONENT INSPECTION’’, EC-121. OK . Disconnect and reconnect harness connectors in the circuit. Then retest. . SEF762V Trouble is not fixed. Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest. . INSPECTION END EC-118 NG Replace cooling fan motor. c TROUBLE DIAGNOSIS FOR ‘‘OVER HEAT’’ (DTC 28) Cooling Fan (Overheat) (Cont’d) CHECK COOLING SYSTEM FOR LEAK. Apply pressure to the cooling system with a tester, and check if the pressure drops. Testing pressure: 157 kPa (1.57 bar, 1.6 kg/cm2, 23 psi) Pressure should not drop. CAUTION: Higher than the specified pressure may cause radiator damage. NG c Check the following for leak. + Hose + Radiator + Water pump Refer to LC section (‘‘Water Pump’’). OK SLC754AA . CHECK RADIATOR CAP. Apply pressure to cap with a tester.

Radiator cap relief pressure: 78 - 98 kPa (0.78 - 0.98 bar, 0.8 - 1.0 kg/cm2, 11 - 14 psi) NG c Replace radiator cap. OK . SLC755AB CHECK THERMOSTAT. 1. Check valve seating condition at normal room temperatures. It should seat tightly. 2. Check valve opening temperature and valve lift.

Valve opening temperature: 82°C (180°F) [standard] Maximum valve lift: More than 10 mm/95°C (0.39 in/203°F) 3. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to LC section (‘‘Thermostat’’). . SLC343 c Replace thermostat.

OK Check engine coolant temperature sensor.

Refer to ‘‘COMPONENT INSPECTION’’, EC-82. . NG NG c Replace engine coolant temperature sensor. OK If the cause cannot be isolated, go to ‘‘MAIN 12 CAUSES OF OVERHEATING’’ on next page. . INSPECTION END Perform FINAL CHECK by the following procedure after repair is completed. 1. Warm up engine. Run the vehicle for at least 20 minutes. Pay attention to engine coolant temperature gauge on the instrument panel. If the reading shows an abnormally high temperature, another part may be malfunctioning. 2. Stop vehicle and let engine idle. Check the intake and exhaust systems for leaks by listening for noise or visually inspecting the components.

3. Allow engine to cool and visually check for oil and coolant leaks. Then, perform ‘‘OVERALL FUNCTION CHECK’’.

EC-119 TROUBLE DIAGNOSIS FOR ‘‘OVER HEAT’’ (DTC 28) Cooling Fan (Overheat) (Cont’d) MAIN 12 CAUSES OF OVERHEATING Engine Step Inspection item Equipment Condition OFF 1 + Blocked radiator + Blocked radiator grille + Blocked bumper + Visual No blocking 2 + Coolant mixture + Coolant tester 50 - 50% coolant mixture See ‘‘RECOMMENDED FLUIDS AND LUBRICANTS’’ in MA section. 3 + Coolant level + Visual Coolant up to MAX level in reservoir tank and radiator filler neck See ‘‘Changing Engine Coolant’’, ‘‘ENGINE MAINTENANCE’’ in MA section. 4 + Radiator cap + Pressure tester 78 - 98 kPa (0.78 - 0.98 bar, 0.8 - 1.0 kg/cm2, 11 - 14 psi) See ‘‘System Check’’ ‘‘ENGINE COOLING SYSTEM’’ in LC section. ON*2 5 + Coolant leaks + Visual No leaks See ‘‘System Check’’ ‘‘ENGINE COOLING SYSTEM’’ in LC section. ON*2 6 + Thermostat + Touch the upper and lower radiator hoses Both hoses should be hot See ‘‘Thermostat’’ and ‘‘Radiator’’, ‘‘ENGINE COOLING SYSTEM’’ in LC section. ON*1 7 + Cooling fan + CONSULT Operating OFF 8 + Combustion gas leak + Color checker chemical Negative tester 4 Gas analyzer — ON*3 9 + Coolant temperature gauge + Visual — Gauge less than 3/4 when driving Reference page — See ‘‘TROUBLE DIAGNOSIS FOR DTC 28’’, EC-113. + Coolant overflow to res- + Visual ervoir tank No overflow during driving See ‘‘Changing Engine and idling Coolant’’, ‘‘ENGINE MAINTENANCE’’ in MA section.

OFF*4 10 + Coolant return from res- + Visual ervoir tank to radiator Should be initial level in reservoir tank See ‘‘ENGINE MAINTENANCE’’ in MA section. OFF 11 + Cylinder head + Straight gauge feeler gauge 0.1mm (0.004 in) Maximum distortion (warping) See ‘‘Inspection’’, ‘‘CYLINDER HEAD’’ in EM section. 12 + Cylinder block and pistons + Visual No scuffing on cylinder walls or piston See ‘‘Inspection’’, ‘‘CYLINDER BLOCK’’ in EM section. *1: Turn the ignition switch ON. *2: Engine running at 3,000 rpm for 10 minutes. *3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes. *4: After 60 minutes of cool down time. For more information, refer to ‘‘OVERHEATING CAUSE ANALYSIS’’ in LC section. EC-120 TROUBLE DIAGNOSIS FOR ‘‘OVER HEAT’’ (DTC 28) Cooling Fan (Overheat) (Cont’d) COMPONENT INSPECTION Cooling fan relay-1 Check continuity between terminals 3 V and Conditions SEF511P 5 . V Continuity 12V direct current supply between terminals V 1 and V 2 Yes No current supply No If NG, replace relay. Cooling fan motor-1 1. Disconnect cooling fan motor harness connector. 2. Supply cooling fan motor terminals with battery voltage and check operation. Terminals Cooling fan motor SEF763V Cooling fan motor should operate. If NG, replace cooling fan motor. EC-121 (⊕) (@) 1 , V 3 V 2 , V 4 V TROUBLE DIAGNOSIS FOR ‘‘I/C INT/A TEMP SEN’’ (DTC 33) Charge Air Temperature Sensor The charge air temperature sensor is used to detect the charge air temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the charge air temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases. The ECM uses this signal for the charge air cooler control. SEF594K Charge air temperature °C (°F) Voltage (V) Resistance (kΩ) −10 (14) 4.4 7.0 - 11.4 20 (68) 3.5 2.1 - 2.9 50 (122) 2.3 0.68 - 1.00 90 (194) 1.0 0.236 - 0.260 110 (230) 0.64 0.143 - 0.153 150 (302) 0.30 0.050 - 0.065 SEF012P ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter. TERMINAL NO. WIRE COLOR ITEM 36 LG Charge air temperature sensor 50 B Sensors’ ground CONDITION 43 V (ECCS DATA (DC Voltage and Pulse Signal) Approximately 0 - 4.8V Output voltage varies with charge air temperature. Engine is running. Engine is running. (Warm-up condition) Approximately 0V Idle speed ON BOARD DIAGNOSIS LOGIC Diagnostic Trouble Code No. 33 *1 Check Items (Possible Cause) Malfunction is detected when ... + An excessively high or low voltage from the sensor is entered to ECM. + Harness or connectors (The sensor circuit is open or shorted.) + Charge air temperature sensor *1: When nothing is displayed or the meaningless symbol is displayed in the ‘‘Self-diag result’’ mode with CONSULT, perform ‘‘Diagnostic Test Mode II (Self-diagnostic results)’’ with ECM. Refer to EC-32. DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE 1) 2) 3) Turn ignition switch ‘‘ON’’ and wait at least 5 seconds. Turn ignition switch ‘‘OFF’’, wait at least 5 seconds and then turn ‘‘ON’’. Perform ‘‘Diagnostic Test Mode II (Self-diagnostic results)’’ with ECM. EC-122 TROUBLE DIAGNOSIS FOR ‘‘I/C INT/A TEMP SEN’’ (DTC 33) Charge Air Temperature Sensor (Cont’d) TEC438 EC-123 TROUBLE DIAGNOSIS FOR ‘‘I/C INT/A TEMP SEN’’ (DTC 33) Charge Air Temperature Sensor (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START . SEF710V CHECK POWER SUPPLY. 1. Turn ignition switch ‘‘OFF’’. 2. Disconnect charge air temperature sensor harness connector. 3. Turn ignition switch ‘‘ON’’. 4. Check voltage between terminal V 2 and ground with CONSULT or tester. Voltage: Approximately 5V NG c Repair harness or connectors. OK . SEF764V CHECK GROUND CIRCUIT. 1. Turn ignition switch ‘‘OFF’’. 2. Check harness continuity between terminal V 1 and engine ground. Continuity should exist.

If OK, check harness for short to ground and short to power. NG c OK . SEF765V CHECK COMPONENT (Charge air temperature sensor). Refer to ‘‘COMPONENT INSPECTION’’ on next page. OK . Disconnect and reconnect harness connectors in the circuit. Then retest. Trouble is not fixed. . Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest. . INSPECTION END EC-124 NG c Check the following. + Harness connectors F6 , M51 + Harness connectors M88 , E106 + Harness for open or short between ECM and charge air temperature sensor + Harness for open or short between TCM and charge air temperature sensor If NG, repair open circuit or short to ground or short to power in harness or connectors. Replace charge air temperature sensor. TROUBLE DIAGNOSIS FOR ‘‘I/C INT/A TEMP SEN’’ (DTC 33) Charge Air Temperature Sensor (Cont’d) COMPONENT INSPECTION Charge air temperature sensor Check resistance as shown in the figure. Temperature °C (°F) Resistance kΩ 20 (68) 2.1 - 2.9 50 (122) 0.68 - 1.0 90 (194) 0.236 - 0.260 SEF152P If NG, replace charge air temperature sensor. SEF012P EC-125 TROUBLE DIAGNOSIS FOR ‘‘NEEDLE LIFT SEN’’ (DTC 34) Needle Lift Sensor (NLS) Terminal The needle lift sensor is built into the No. 1 injection nozzle. Its piezoelectric element senses changes in fuel injection timing caused by fuel temperature, etc.

This change of fuel injection timing is sent as a pulse signal to the ECM. Piezoelectric element SEF604S ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter. TERMINAL NO. WIRE COLOR ITEM CONDITION 43 V (ECCS DATA (DC Voltage and Pulse Signal) Approximately 0V Engine is running. (Warm-up condition) Idle speed SEF718V 34 W Needle lift sensor Approximately 0V Engine is running. (Warm-up condition) Engine speed is 2,000 rpm. SEF719V ON BOARD DIAGNOSIS LOGIC Diagnostic Trouble Code No. 34 Malfunction is detected when ....

+ An improper signal from the sensor is sent to ECM. EC-126 Check Items (Possible Cause) + Harness or connectors (The sensor circuit is open or shorted.) + Needle lift sensor + Air in fuel line + Clogging No. 1 injection nozzle TROUBLE DIAGNOSIS FOR ‘‘NEEDLE LIFT SEN’’ (DTC 34) Needle Lift Sensor (NLS) (Cont’d) DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE 1) SEF714V Turn ignition switch ‘‘ON’’ and select ‘‘DATA MONITOR’’ mode with CONSULT. 2) Start engine and run it for at least 10 seconds at idle speed.

-- OR --1) Start engine and run it for at least 10 seconds at idle speed. 2) Turn ignition switch ‘‘OFF’’, wait at least 5 seconds and then turn ‘‘ON’’. 3) Perform ‘‘Diagnostic Test Mode II (Self-diagnostic results)’’ with ECM. EC-127 TROUBLE DIAGNOSIS FOR ‘‘NEEDLE LIFT SEN’’ (DTC 34) Needle Lift Sensor (NLS) (Cont’d) TEC433 EC-128 TROUBLE DIAGNOSIS FOR ‘‘NEEDLE LIFT SEN’’ (DTC 34) Needle Lift Sensor (NLS) (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START . OK CHECK FOR AIR IN FUEL FILTER. INSPECTION END c 1. Move priming pump up and down to purge air from fuel filter. 2. Perform ‘‘DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE’’. SEF670V NG . Loosen and retighten engine ground screws. . SEF676V CHECK INPUT SIGNAL CIRCUIT. 1. Turn ignition switch ‘‘OFF’’. 2. Disconnect ECM harness connector and needle lift sensor harness connector. 3. Check harness continuity between terminal V 1 and ECM terminal V 34 . Continuity should exist. If OK, check harness for short to ground and short to power. NG c Repair open circuit or short to ground or short to power in harness or connectors. OK . NG CHECK GROUND CIRCUIT. Repair open circuit or short c 2 and Check resistance between terminal V to ground or short to power engine ground. in harness or connectors. Continuity should exist. If OK, check harness for short to ground and short to power. SEF692V OK . CHECK NO. 1 INJECTION NOZZLE FOR CLOGGING. Refer to ‘‘SPRAY PATTERN TEST’’, ‘‘Test and Adjustment’’, ‘‘INJECTION NOZZLE’’, EC-26. OK . Disconnect and reconnect harness connectors in the circuit. Then retest. . SEF766V Trouble is not fixed. Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

. INSPECTION END SEF767V EC-129 NG c Replace No. 1 injection nozzle. TROUBLE DIAGNOSIS FOR ‘‘FUEL CUT S/V 1’’ (DTC 36), ‘‘FCV SHORT’’ (DTC 37), ‘‘FUEL CUT S/V 2’’ (DTC 38) Fuel Cut Solenoid Valve When the ignition switch is OFF, the ECM turns the fuel cut solenoid valve OFF (under this condition, no current flows through the fuel cut solenoid valve), shutting off fuel supply. When the engine is not operating due to trouble, the fuel cut solenoid valve may or may not be OFF even when the ignition switch is ON. SEF667S CONSULT REFERENCE VALUE IN DATA MONITOR MODE Remarks: Specification data are reference values. MONITOR ITEM DECELER F/CUT FUEL CUT S/V CONDITION + Engine: After warming up SPECIFICATION Idle OFF When accelerator pedal is released quickly with engine speed at 3,000 rpm or more. ON + Ignition switch: ON → OFF ON → OFF ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter. TERMINAL NO. WIRE COLOR ITEM CONDITION 43 V (ECCS DATA (DC Voltage and Pulse Signal) Ignition switch ‘‘ON’’ Ignition switch ‘‘OFF’’ 4 B/Y ECCS relay (Self-shutoff) 0 - 1.5V For a few seconds after turning ignition switch ‘‘OFF’’ Ignition switch ‘‘OFF’’ A few seconds passed after turning ignition switch ‘‘OFF’’ 56 61 W 113 115 R/W 116 117 W Power supply for ECM Ignition switch ‘‘ON’’ BATTERY VOLTAGE (11 - 14V) Ignition switch ‘‘OFF’’ Approximately 0V Ignition switch ‘‘ON’’ BATTERY VOLTAGE (11 - 14V) Ignition switch ‘‘ON’’ BATTERY VOLTAGE (11 - 14V) Fuel cut solenoid valve Power supply for ECM BATTERY VOLTAGE (11 - 14V) EC-130 TROUBLE DIAGNOSIS FOR ‘‘FUEL CUT S/V 1’’ (DTC 36), ‘‘FCV SHORT’’ (DTC 37), ‘‘FUEL CUT S/V 2’’ (DTC 38) Fuel Cut Solenoid Valve (Cont’d) ON BOARD DIAGNOSIS LOGIC Diagnostic Trouble Code No. 36, 37, 38 Malfunction is detected when ... + Fuel cut solenoid valve circuit is malfunctioning. Check Items (Possible Cause) + Main power supply circuit (ECM terminals 116 , and fuse + Harness or connectors (The solenoid valve circuit is open or shorted.) + Fuel cut solenoid valve + ECM 117) DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE 1) 2) 3) 4) SEF748V Turn ignition switch ‘‘ON’’.

Select ‘‘DATA MONITOR’’ mode with CONSULT. Start engine.

Turn ignition switch ‘‘OFF’’, wait at least 5 seconds and then turn ‘‘ON’’. -- OR --1) Start engine. 2) Turn ignition switch ‘‘OFF’’, wait at least 5 seconds and then turn ‘‘ON’’. 3) Perform ‘‘Diagnostic Test Mode II (Self-diagnostic results)’’ with ECM. EC-131 TROUBLE DIAGNOSIS FOR ‘‘FUEL CUT S/V 1’’ (DTC 36), ‘‘FCV SHORT’’ (DTC 37), ‘‘FUEL CUT S/V 2’’ (DTC 38) Fuel Cut Solenoid Valve (Cont’d) TEC434 EC-132 TROUBLE DIAGNOSIS FOR ‘‘FUEL CUT S/V 1’’ (DTC 36), ‘‘FCV SHORT’’ (DTC 37), ‘‘FUEL CUT S/V 2’’ (DTC 38) Fuel Cut Solenoid Valve (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START . CHECK POWER SUPPLY FOR ECM. Check power supply circuit. Refer to EC-63. OK SEF860S . NG CHECK OUTPUT SIGNAL CIRCUIT. Repair open circuit or short c to ground or short to power 1. Turn ignition switch ‘‘ON’’. in harness or connectors. 2. Select ‘‘FUEL CUT SOL/V’’ in ‘‘ACTIVE TEST’’ mode with CONSULT.

3. Touch ‘‘ON’’ and ‘‘OFF’’ alternately. 4. Check that operating sound is emitted. -- OR --1. Turn ignition switch ‘‘OFF’’. 2. Disconnect ECM harness conSEF682VA nector and electronic fuel injection pump harness connector. 3. Check harness continuity between terminal V 4 and ECM terminals 113 , 115 . Continuity should exist. If OK, check harness for short to ground and short to power. OK . SEF768V CHECK COMPONENT (Fuel cut solenoid valve). Refer to ‘‘COMPONENT INSPECTION’’ on next page. OK . Disconnect and reconnect harness connectors in the circuit. Then retest. Trouble is not fixed. .

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

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INSPECTION END EC-133 NG c Replace fuel cut solenoid valve. TROUBLE DIAGNOSIS FOR ‘‘FUEL CUT S/V 1’’ (DTC 36), ‘‘FCV SHORT’’ (DTC 37), ‘‘FUEL CUT S/V 2’’ (DTC 38) Fuel Cut Solenoid Valve (Cont’d) COMPONENT INSPECTION Fuel cut solenoid valve Fuse Shaft 1. Remove fuel cut solenoid valve. 2. Check shaft to see if it is lifted when applying 12V direct current to terminals.

If NG, replace fuel cut solenoid valve. SEF859S EC-134 TROUBLE DIAGNOSIS FOR ‘‘FUEL TEMP SENSOR’’ (DTC 42) Fuel Temperature Sensor (FTS) The fuel temperature sensor is used to detect the fuel temperature in the injection pump. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases. SEF666S Engine coolant temperature °C (°F) Voltage (V) Resistance (kΩ) −20 (−4) 4.6 13.67 - 16.37 20 (68) 3.5 2.306 - 2.568 60 (140) 1.8 0.538 - 0.624 80 (176) 1.2 0.289 - 0.344 SEF012P ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter.

TERMINAL NO. WIRE COLOR ITEM CONDITION 10 P Fuel temperature sensor 50 B Sensors’ ground 43 V (ECCS DATA (DC Voltage and Pulse Signal) Approximately 0 - 4.8V Output voltage varies with fuel temperature. Engine is running. Engine is running. (Warm-up condition) Approximately 0V Idle speed ON BOARD DIAGNOSIS LOGIC Diagnostic Trouble Code No. 42 Malfunction is detected when ...

+ An excessively high or low voltage from the sensor is detected by ECM. Check Items (Possible Cause) + Harness or connectors (The sensor circuit is open or shorted.) + Fuel temperature sensor DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE SEF748V 1) Turn ignition switch ‘‘ON’’. 2) Select ‘‘DATA MONITOR’’ mode with CONSULT. 3) Wait at least 5 seconds. -- OR --1) Turn ignition switch ‘‘ON’’ and wait at least 5 seconds. 2) Turn ignition switch ‘‘OFF’’, wait at least 5 seconds and then turn ‘‘ON’’. 3) Perform ‘‘Diagnostic Test Mode II (Self-diagnostic results)’’ with ECM. EC-135 TROUBLE DIAGNOSIS FOR ‘‘FUEL TEMP SENSOR’’ (DTC 42) Fuel Temperature Sensor (FTS) (Cont’d) TEC435 EC-136 TROUBLE DIAGNOSIS FOR ‘‘FUEL TEMP SENSOR’’ (DTC 42) Fuel Temperature Sensor (FTS) (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START .

SEF682VB CHECK POWER SUPPLY. 1. Turn ignition switch ‘‘OFF’’. 2. Disconnect electronic fuel injection pump harness connector. 3. Turn ignition switch ‘‘ON’’. 4. Check voltage between terminal V 1 and ground with CONSULT or tester. Voltage: Approximately 5V NG c Repair harness or connectors. OK . SEF769V CHECK GROUND CIRCUIT. 1. Turn ignition switch ‘‘OFF’’. 2. Check harness continuity between terminal V 5 and engine ground. Continuity should exist. If OK, check harness for short to ground and short to power. NG c OK Check the following. + Harness connectors F6 , M51 + Harness connectors M88 , E106 + Harness for open or short between ECM and electronic fuel injection pump + Harness for open or short between TCM and electronic fuel injection pump If NG, repair open circuit or short to ground or short to power in harness or connectors. SEF770V . CHECK COMPONENT (Fuel temperature sensor). Refer to ‘‘COMPONENT INSPECTION’’ on next page. OK . Disconnect and reconnect harness connectors in the circuits. Then retest. Trouble is not fixed. . Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest. .

INSPECTION END EC-137 NG c Take proper action. TROUBLE DIAGNOSIS FOR ‘‘FUEL TEMP SENSOR’’ (DTC 42) Fuel Temperature Sensor (FTS) (Cont’d) COMPONENT INSPECTION Fuel temperature sensor Wait until fuel temperature sensor reaches room temperature. Check resistance as shown in the figure. SEF693V Temperature °C (°F) Resistance kΩ 20 (68) 2.306 - 2.568 60 (140) 0.538 - 0.624 80 (176) 0.289 - 0.344 If NG, take proper action. SEF012P EC-138 TROUBLE DIAGNOSIS FOR ‘‘ACCEL POS SENSOR’’ (DTC 43) Accelerator Position Sensor The accelerator position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.

SEF861SA CONSULT REFERENCE VALUE IN DATA MONITOR MODE Remarks: Specification data are reference values. MONITOR ITEM ACCEL POS SEN CONDITION + Ignition switch: ON (Engine stopped) SPECIFICATION Accelerator pedal: released 0.40 - 0.60V Accelerator pedal: depressed Approx. 4.0V ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter. TERMINAL NO. WIRE COLOR ITEM CONDITION 43 V (ECCS DATA (DC Voltage and Pulse Signal) Ignition switch ‘‘ON’’ 0.4 - 0.6V 23 W Accelerator position sensor Accelerator pedal fully released Ignition switch ‘‘ON’’ Approximately 4.3V Accelerator pedal fully depressed 48 G/R Accelerator position sensor power supply 51 L/W Accelerator position sensor ground Ignition switch ‘‘ON’’ Approximately 5V Engine is running. (Warm-up condition) Approximately 0V Idle speed EC-139 TROUBLE DIAGNOSIS FOR ‘‘ACCEL POS SENSOR’’ (DTC 43) Accelerator Position Sensor (Cont’d) ON BOARD DIAGNOSIS LOGIC Diagnostic Trouble Code No. 43 Malfunction is detected when ... + An excessively low or high voltage from the sensor is detected by the ECM. Check Items (Possible Cause) + Harness or connectors (The sensor circuit is open or shorted.) + Accelerator position sensor + Accelerator position switch + Accelerator switch (F/C) DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE SEF748V 1) Turn ignition switch ‘‘ON’’. 2) Select ‘‘DATA MONITOR’’ mode with CONSULT. 3) Wait at least 2 seconds. -- OR --1) Turn ignition switch ‘‘ON’’ and wait at least 2 seconds. 2) Turn ignition switch ‘‘OFF’’, wait at least 5 seconds and then turn ‘‘ON’’. 3) Perform ‘‘Diagnostic Test Mode II (Self-diagnostic results)’’ with ECM. EC-140 TROUBLE DIAGNOSIS FOR ‘‘ACCEL POS SENSOR’’ (DTC 43) Accelerator Position Sensor (Cont’d) TEC436 EC-141 TROUBLE DIAGNOSIS FOR ‘‘ACCEL POS SENSOR’’ (DTC 43) Accelerator Position Sensor (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START . SEF694V CHECK POWER SUPPLY.

1. Turn ignition switch ‘‘OFF’’. 2. Disconnect accelerator position sensor harness connector. 3. Turn ignition switch ‘‘ON’’. 4. Check voltage between terminal V 1 and ground with CONSULT or tester. Voltage: Approximately 5V NG c OK . SEF771V CHECK GROUND CIRCUIT. 1. Turn ignition switch ‘‘OFF’’. 2. Loosen and retighten engine ground screw. 3. Check harness continuity between terminal V 3 and engine ground. Continuity should exist.

If OK, check harness for short to ground and short to power. NG c OK . CHECK INPUT SIGNAL CIRCUIT. 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal V 23 and terminal V 2 . Continuity should exist. If OK, check harness for short to ground and short to power.

SEF676V c OK . CHECK COMPONENT (Accelerator position sensor). Refer to ‘‘COMPONENT INSPECTION’’ on next page. OK . SEF772V NG Disconnect and reconnect harness connectors in the circuit. Then retest. Trouble is not fixed. .

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest. . INSPECTION END SEF773V EC-142 NG c Check the following. + Harness connectors F7 , M52 (RHD models) + Harness for open or short between ECM and accelerator position sensor If NG, repair harness or connectors. Check the following. + Harness connectors F7 , M52 (RHD models) + Harness for open or short between ECM and accelerator position sensor If NG, repair open circuit or short to ground or short to power in harness or connectors.

Check the following. + Harness connectors F7 , M52 (RHD models) + Harness for open or short between ECM and accelerator position sensor If NG, repair open circuit or short to ground or short to power in harness or connectors. Replace accelerator pedal assembly. TROUBLE DIAGNOSIS FOR ‘‘ACCEL POS SENSOR’’ (DTC 43) Accelerator Position
Sensor (Cont’d) COMPONENT INSPECTION Accelerator position sensor 1. Disconnect accelerator position sensor harness connector. 2 and 2. Make sure that resistance between terminals V changes when depressing accelerator pedal manually. Accelerator pedal conditions Completely released Partially depressed SEF695V Completely depressed 3 V
Resistance [at 25°C (77°F)] Approximately 0.5 kΩ 0.5 - 4 kΩ Approximately 4 kΩ If NG, replace accelerator pedal assembly. CAUTION: If accelerator position sensor or ECM connector is disconnected, perform the following procedures: Select ‘‘OFF ACCEL PO SIG’’ in ‘‘ACTIVE TEST’’ mode. Touch CLEAR. --
--- OR --Start and warm up engine. After engine has warmed up, idle for 10 minutes. EC-143 TROUBLE DIAGNOSIS FOR ‘‘CRANK POS SEN (TDC)’’ (DTC 47) Crankshaft Position Sensor (TDC) The crankshaft position sensor (TDC)
monitors engine speed by means of signals from the sensing plate (with two protrusions) installed to the crankshaft pulley. The datum signal output is detected at ATDC 70° and sent to the ECM. The sensor signal is used for fuel injection control and fuel injection timing control. SEF615S CONSULT REFERENCE VALUE IN DATA MONITOR MODE
Remarks: Specification data are reference values. MONITOR ITEM CKPSzRPM (TDC) CONDITION SPECIFICATION + Tachometer: Connect + Run engine and compare tachometer indication with the CONSULT value. Almost the same speed as the CONSULT value. ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are
reference values and are measured between each terminal and ground) with a voltmeter.
TERMINAL NO. WIRE COLOR ITEM CONDITION 43 V (ECCS DATA (DC Voltage and Pulse Signal) Approximately 0V Engine is running. (Warm-up condition) Idle speed 40 44 L SEF720V Crankshaft position sensor (TDC) Approximately 0V Engine is running. (Warm-up condition) Engine speed is 2,000 rpm. SEF721V 47 52 B/W Crankshaft position
sensor (TDC) ground Engine is running.
(Warm-up condition) Approximately 0V Idle speed ON BOARD DIAGNOSIS LOGIC Diagnostic Trouble Code No. 47 Malfunction is detected when .... + An improper signal from the sensor is detected by ECM during engine running and cranking. EC-144 Check Items (Possible Cause) + Harness or connectors (The sensor circuit is open.) + Crankshaft
position sensor (TDC) TROUBLE DIAGNOSIS FOR ‘‘CRANK POS SEN (TDC)’’ (DTC 47) Crankshaft Position Sensor (TDC) (Cont’d) DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE SEF714V Before performing the following procedure, confirm that battery voltage is more than 10V. 1) Turn ignition switch ‘‘ON’’ and select ‘‘DATA
MONITOR’’ mode with CONSULT. 2) Crank engine for at least 1 second.
3) Start engine and run it for at least 2 seconds at idle speed. -- OR --1) Crank engine for at least 1 second. 2) Start engine and run it for at least 2 seconds at idle speed.
3) Turn ignition switch ‘‘OFF’’, wait at least 5 seconds and then turn ‘‘ON’’. 4) Perform ‘‘Diagnostic Test Mode II (Self-diagnostic results)’’ with ECM. EC-145 TROUBLE DIAGNOSIS FOR ‘‘CRANK POS SEN (TDC)’’ (DTC 47) Crankshaft Position Sensor (TDC) (Cont’d) TEC437 EC-146 TROUBLE DIAGNOSIS FOR ‘‘CRANK POS SEN (TDC)’’ (DTC 47)
Crankshaft Position Sensor (TDC) (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START . SEF696V CHECK INPUT SIGNAL CIRCUIT. 1.
Turn ignition switch ‘‘OFF’’. 2. Disconnect crankshaft position sensor (TDC) harness connector and ECM harness connector. 3. Check harness continuity between ECM terminals V 40 , V 44 and terminal V 1 . Continuity should exist. If OK, check harness for short to ground and short to power.
NG c OK . SEF774V CHECK GROUND CIRCUIT-I. Check harness continuity between terminal V 2 and ECM terminals V 47 , V 52 . Continuity should exist. If OK, check harness for short to ground and short to power. NG c OK . SEF775V CHECK GROUND CIRCUIT-II. 1. Loosen and retighten engine ground screws. 2. Disconnect harness connectors
F13 , EC4 . 3. Check harness continuity between ter3 and engine ground. minal V Continuity should exist. If OK, check harness for short to ground and short to power. NG c Check the following. + Harness connectors F13 , EC4 + Harness for open or short between ECM and crankshaft position sensor (TDC) If NG, repair open circuit or short to
ground or short to power in harness or connectors. Check the following. + Harness connectors F13 , EC4 + Harness for open or short between crankshaft position sensor (TDC) and ECM If NG, repair open circuit or short to ground or short to power in harness or connectors. Check the following. + Joint connector F19 + Harness for open or short
between harness connector F13 and engine ground If NG, repair open circuit or short to ground or short to power in harness or connectors. OK . CHECK COMPONENT [Crankshaft position sensor (TDC)]. Refer to ‘‘COMPONENT INSPECTION’’ on next page. OK SEF676V .
Disconnect and reconnect harness connectors in the circuit. Then retest. . Trouble is not fixed.
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest. . INSPECTION END SEF776V EC-147 NG c Replace crankshaft position sensor (TDC). TROUBLE DIAGNOSIS FOR ‘‘CRANK POS SEN (TDC)’’ (DTC 47) Crankshaft Position Sensor (TDC) (Cont’d) COMPONENT
INSPECTION Crankshaft position sensor (TDC) 1.
Disconnect crankshaft position sensor (TDC) harness connector. 2. Loosen the fixing bolt of the sensor. 3. Remove the sensor.
4.
Visually check the sensor for chipping. SEF620S 5. Check resistance between terminals V 1 and V 2 . Resistance: Approximately 0.8 - 1.2 kΩ [at 25°C (77°F)] If NG, replace crankshaft position sensor (TDC). SEF697V EC-148 TROUBLE DIAGNOSIS FOR ‘‘GOV CUT CIRCUIT’’ (DTC 48) Governor Cut Circuit ON BOARD DIAGNOSIS LOGIC This
diagnostic procedure checks whether or not fuel cut is being performed during deceleration. Signals from the accelerator switch and camshaft position sensor (PUMP) are sent to the ECM. The ECM uses these signals to control the electric governor operation. Accelerator position Accelerator switch (F/C) c ECM Camshaft position sensor (PUMP)
Diagnostic Trouble Code No. 48 Engine speed c Electric governor c Malfunction is detected when .... + Accelerator switch circuit is shorted. + Crankshaft position sensor (PUMP) or ECM is malfunctioning. Check Item (Possible Cause) + Harness or connectors [Accelerator switch (F/C) and camshaft position sensor (PUMP) circuits] + Accelerator
switch (F/C) + Camshaft position sensor (PUMP) + ECM DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE Note: If both DTC 48 and 11 or 23 are displayed, perform TROUBLE DIAGNOSIS FOR DTC 11 or 23 (See EC-69 or 106). 1) Turn ignition switch ‘‘ON’’. 2) Select ‘‘DATA MONITOR’’ mode with CONSULT. 3) Start engine and run it
to 3,000 rpm, then quickly release accelerator pedal. -- OR --1) Start engine and run it to 3,000 rpm, then quickly release accelerator pedal. 2) Turn ignition switch ‘‘OFF’’, wait at least 5
seconds and then turn ‘‘ON’’. 3) Perform ‘‘Diagnostic Test Mode II (Self-diagnostic results)’’. EC-149 TROUBLE DIAGNOSIS FOR ‘‘GOV CUT CIRCUIT’’ (DTC 48) Governor Cut Circuit (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START . 1) Turn ignition switch ‘‘ON’’. 2) Select ‘‘SELF DIAG RESULTS’’ mode with CONSULT. 3) Touch ‘‘ERASE’’.
-- OR --1) Turn ignition switch ‘‘ON’’. 2) Erase the diagnostic test mode II (Self-diagnostic results) memory. .
PERFORM DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE. See previous page. . Is the DTC 48 displayed again? No . INSPECTION END EC-150 Yes c Replace ECM. TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Glow Control System SYSTEM DESCRIPTION Crankshaft position sensor (TDC) Engine speed c c Glow relay c
Glow plugs ECM Engine coolant temperature sensor Engine coolant temperature c c Glow lamp When engine coolant temperature is more than 90°C (194°F), the glow relay turns off, inactivating the quickglow control until coolant temperature drops below 70°C (158°F). When coolant temperature is lower than 90°C (194°F): + Ignition switch ON
After ignition switch has turned to ON, the glow relay turns ON for a certain period of time in relation to engine coolant temperature, allowing current to flow through glow plug. + Cranking The glow relay turns ON, allowing current to flow through glow plug.
+ Starting After engine has started, current continues to flow through glow plug (after-glow mode) for a certain period in relation to engine coolant temperature. When engine speed exceeds 2,400 rpm, current flow through glow plug is interrupted. The glow lamp turns ON for a certain period of time in relation to engine coolant temperature at the
time glow relay is turned ON. COMPONENT DESCRIPTION Glow plug The glow plug is provided with a ceramic heating element to obtain a high-temperature resistance.
It glows in response to a signal sent from the ECM, allowing current to flow through the glow plug via the glow relay. SEF857S ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter. TERMINAL NO. WIRE COLOR ITEM CONDITION 43 V
(ECCS DATA (DC Voltage and Pulse Signal) Ignition switch ‘‘ON’’ 0 - 1.5V Glow lamp is ‘‘ON’’. 16 L/W Glow lamp Ignition switch ‘‘ON’’ Glow lamp is ‘‘OFF’’. 111 LG/B Glow relay Refer to ‘‘SYSTEM DESCRIPTION’’. EC-151 BATTERY VOLTAGE (11 - 14V) TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Glow Control System (Cont’d) TEC441
EC-152 TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Glow Control System (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START .
Check fuel level, fuel supplying system, starter motor, etc. NG c Correct. OK . SEF698V Check that all glow plug connecting plate nuts are installed properly. NG c Install properly. OK . CHECK OVERALL FUNCTION. Check entire glow control system. (Refer to ‘‘System Operation Check’’ on next page.) OK c CHECK COMPONENT (Glow plug).
See page EC-155. NG . SEF699V CHECK VOLTAGE BETWEEN GLOW RELAY AND GROUND. 1. Turn ignition switch ‘‘OFF’’. 2. Disconnect glow relay. 3. Check voltage between terminals V 1 , 3 and ground with CONSULT or V tester. Voltage: Battery voltage NG c Check the following. + 100A fusible link + Harness for open or short between glow
relay and battery If NG, repair harness or connectors. OK . SEF777V CHECK OUTPUT SIGNAL CIRCUIT. 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 111 and terminal V 2 .
Continuity should exist. If OK, check harness for short to ground and short to power. NG c OK . SEF778V CHECK HARNESS CONTINUITY BETWEEN GLOW RELAY AND GLOW PLUG. 1. Disconnect glow plug harness connector. 2. Check harness continuity between glow relay terminal V 5 and glow plug harness connector. Continuity should exist. If
OK, check harness for short to ground and short to power. . j A SEF779V EC-153 OK NG c Check the following.
+ Harness connectors E127 , M21 + Harness connectors M51 , F6 + Harness for open or short between glow relay and ECM If NG, repair open circuit or short to ground or short to power in harness or connectors. Check the following. + Harness connectors E65 , E204 + Harness for open or short between glow relay and glow plug If NG, repair open
circuit or short to ground or short to power in harness or connectors. TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Glow Control System (Cont’d) j A . CHECK COMPONENTS (Glow relay, Glow plug). Refer to ‘‘COMPONENT INSPECTION’’, EC-155.
NG c Replace malfunctioning component(s). OK . Disconnect and reconnect harness connectors in the circuit. Then retest.
. Trouble is not fixed.
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest. . INSPECTION END SYSTEM OPERATION CHECK Set voltmeter between glow plug and engine body. SEF700V SEF780V 1.
Quick-glow (Pre-glow) system a. Turn ignition switch ‘‘ON’’.
b.
Read voltage. Voltage: Battery voltage for about 20* seconds * Engine coolant temperature is lower than 90°C (194°F). [It is lower than 70°C (158°F) after warm-up.] * Repeating ignition switch ‘‘ON’’ and ‘‘OFF’’ may change the time. 2. Quick-glow (Cranking) system a. Disconnect ‘‘S’’ terminal for starter motor to prevent engine from cranking. b.
Read voltage when ignition switch is turned to ‘‘START’’. Voltage: Battery voltage* * For about 20 seconds after returning ignition switch to ‘‘ON’’. EC-154 TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Glow Control System (Cont’d) 3. After-glow system a. Connect ‘‘S’’ terminal to starter motor.
b. Start engine and read voltage.
Voltage: Battery voltage for 5* minutes * Engine coolant temperature is lower than 50°C (122°F). SEF781V COMPONENT INSPECTION Glow relay 1. Check relay for coil continuity. Continuity should exist. 2. Check relay for proper operation. Coil voltage Continuity Contact point 0V No OFF 12V Yes ON SEC564B Glow plug 1. Remove glow plug
connecting plate. 2.
Check each glow plug for continuity.
Continuity should exist: Approximately 0.8Ω [at 25°C (77°F)] + If NG, replace glow plug.
SEF701V 3. Install glow plug connecting plate securely. + Do not bump glow plug heating element.
If it is bumped, replace glow plug with new one.
(If glow plug is dropped from a height of 10 cm (3.94 in), replace with new one.) + If glow plug installation hole is contaminated with carbon, remove using a reamer or suitable tool. + Hand-tighten glow plug by turning it two to three times, then tighten using a tool to specified torque. : 15 - 20 Nzm (1.5 - 2.0 kg-m, 11 - 14 ft-lb) SEC565B EC-155
TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS EGRC-Solenoid Valve A, B and Throttle Control Solenoid Valve SYSTEM DESCRIPTION Camshaft position sensor (TDC) Accelerator position sensor Engine coolant temperature sensor Engine speed c c c c Accelerator position Engine coolant temperature ECM (ECCS-D c control module) c
EGRC-solenoid valve A EGRC-solenoid valve B Throttle control solenoid valve Start signal Ignition switch c Amount of intake air Mass air flow sensor c The ECM receives signals sent from the engine coolant temperature sensor, crankshaft position sensor (TDC), ignition switch, mass air flow sensor and accelerator position sensor to determine engine
speed and operating conditions. Based on these signals, the ECM controls EGR control solenoid valve (A and B) operation and throttle control solenoid valve operation. Engine coolant temperature °C (°F) Below 70 (158) EGRC-solenoid valve B Throttle control solenoid valve EGR valve A Throttle control valve Amount of EGR gas Any OFF (Closed) OFF
(Closed) OFF (Closed) Fully closed Fully open — Low load ON (Open) ON (Open) ON (Open) Fully open Closed Large Medium load-1 ON (Open) ON (Open) OFF (Closed) Fully open Fully open Fully open Medium Medium load-2 ON (Open) OFF (Closed) OFF (Closed) Half open Fully open Small High load OFF (Closed) OFF (Closed) OFF (Closed) Fully closed
Fully open — Load Above 70 (158) COMPONENT DESCRIPTION The EGRC-solenoid valves A and B control vacuum pressure acting on the EGR valve. The EGR control valve will then be fully opened, half-opened or fully closed, as required. The throttle control solenoid valve controls vacuum pressure acting on the throttle chamber. Thus, intake air
passages are opened or closed in relation to exhaust gas and intake air. Utilizing the relationship between exhaust gas pressure and intake air pressure control, the amount of EGR (exhaust gas recirculated) is regulated in three stages — large, medium, small.
SEF784V EC-156 TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS EGRC-Solenoid Valve A, B and Throttle Control Solenoid Valve (Cont’d) CONSULT REFERENCE VALUE IN DATA MONITOR MODE Remarks: Specification data are reference values.
MONITOR ITEM EGRC SOL/V A EGRC SOL/V B THROT RLY CONDITION SPECIFICATION + + + + Engine: After warming up Air conditioner switch: ‘‘OFF’’ Shift lever: ‘‘N’’ No-load Idle ON Revving engine from idle to 3,750 rpm OFF + + + + Engine: After warming up Air conditioner switch: ‘‘OFF’’ Shift lever: ‘‘N’’ No-load Idle ON Revving engine
from idle to 2,600 rpm OFF + + + + Engine: After warming up Air conditioner switch: ‘‘OFF’’ Shift lever: ‘‘N’’ No-load Idle ON Revving engine from idle to 2,500 rpm OFF ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter. TERMINAL
NO. WIRE COLOR ITEM CONDITION 43 V (ECCS DATA (DC Voltage and Pulse Signal) Engine is running. (Warm-up condition) Approximately 0.4V 1 W Throttle control solenoid valve Idle speed Engine is running.
(Warm-up condition) Revving engine from idle to 2,500 rpm BATTERY VOLTAGE (11 - 14V) Engine is running. (Warm-up condition) 0 - 1V Idle speed 103 L/Y EGRC-solenoid valve A Engine is running. (Warm-up condition) Revving engine from idle up to 3,750 rpm. BATTERY VOLTAGE (11 - 14V) Engine is running. (Warm-up condition) 0 - 1V Idle
speed 109 BR/Y EGRC-solenoid valve B Engine is running.
(Warm-up condition) Revving engine from idle up to 2,600 rpm. EC-157 BATTERY VOLTAGE (11 - 14V) TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS EGRC-Solenoid Valve A, B and Throttle Control Solenoid Valve (Cont’d) TEC442 EC-158 TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS EGRC-Solenoid Valve A, B and Throttle
Control Solenoid Valve (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START .
SEF702V SEF703V CHECK OVERALL FUNCTION. 1. Start engine and warm it up to normal operating temperature.
2. Perform diagnostic test mode II (Selfdiagnostic results). Make sure that diagnostic trouble code No. 55 is displayed. 3. Make sure that EGR valve spring moves up and down (Use your finger) under the following conditions. At idle: Spring moves up and down. Revving engine from idle to 3,800 rpm: Spring does not move. 4. Make sure that throttle
control valve rod moves up and down under the following conditions. At idle: Rod moves up and down. Revving engine from idle to 2,500 rpm: Rod does not move. OK c INSPECTION END NG . SEF704V SEF705V CHECK VACUUM SOURCES TO EGR VALVE AND THROTTLE CONTROL VALVE. 1. Disconnect vacuum hose to EGR valve. 2. Make sure
that vacuum exists under the following conditions. At idle: Vacuum should exist. Revving engine from idle to 3,800 rpm: Vacuum should not exist. 3. Disconnect vacuum hose to throttle control valve. 4. Make sure that vacuum exists under the following conditions. At idle: Vacuum should exist. Revving engine from idle to 2,500 rpm: Vacuum should not
exist. NG . j A EC-159 OK c CHECK COMPONENTS (EGR valve and throttle control valve). (See page EC-162.) NG . Replace malfunctioning component(s). TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS EGRC-Solenoid Valve A, B and Throttle Control Solenoid Valve (Cont’d) j A . OK CHECK VACUUM HOSE. CHECK CONTROL FUNCTION. c
Check vacuum hose for 1. Stop engine. clogging, cracks or 2.
Turn ignition switch ‘‘ON’’. improper connection. 3. Turn EGRC-solenoid valve A, B and throttle control solenoid valve ‘‘ON’’ and ‘‘OFF’’ in SEF682S ‘‘ACTIVE TEST’’ mode with CONSULT and check operating sound. -- OR --1. Check voltage between ECM terminal
103 and ground under the following conditions. Voltage: At idle 0 - 1V Revving engine from idle to 3,800 rpm SEF683S Battery voltage 2. Check voltage between ECM terminal 109 and ground under the following conditions.
Voltage: At idle 0 - 1V Revving engine from idle to 2,600 rpm Battery voltage 3. Check voltage between ECM terminal V 1 and ground under SEF816F the following conditions. Voltage: At idle 0 - 1V Revving engine from idle to 2,500 rpm Battery voltage NG . j B EC-160 TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS EGRC-Solenoid Valve A,
B and Throttle Control Solenoid Valve (Cont’d) j B . SEF706V CHECK POWER SUPPLY. 1. Turn ignition switch ‘‘OFF’’. 2.
Disconnect EGRC-solenoid valve A, B and throttle control solenoid valve harness connector. 3. Turn ignition switch ‘‘ON’’. 4.
Check voltage between terminal V 1 and ground with CONSULT or tester. Voltage: Battery voltage NG c OK Check the following. + Harness connectors M21 , E127 + 10A fuse + Harness for open or short between EGRCsolenoid valve A, B and fuse + Harness for open or short between throttle control solenoid valve and fuse If NG, repair harness or
connectors. . SEF782V CHECK OUTPUT SIGNAL CIRCUIT. 1. Turn ignition switch ‘‘OFF’’. 2. Disconnect ECM harness connector. 3.
Check harness continuity between ECM terminal V 1 and terminal V 2 , ECM terminal 103 and terminal V 2 , ECM terminal 109 and terminal V 2 . Continuity should exist. If OK, check harness for short to ground and short to power. NG c OK SEF783V Check the following. + Harness connectors E127 , M21 + Harness connectors M50 , F5 + Harness
for open or short between EGRCsolenoid valve A, B and ECM + Harness for open or short between throttle control solenoid valve and ECM If NG, repair open circuit or short to ground or short to power in harness or connectors. . CHECK COMPONENTS (EGRC-solenoid valve A, B and throttle control solenoid valve).
Refer to ‘‘COMPONENT INSPECTION’’ on next page.
OK . Disconnect and reconnect harness connectors in the circuit. Then retest. . Trouble is not fixed. Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest. . INSPECTION END EC-161 NG c Replace malfunctioning component(s). TROUBLE DIAGNOSES FOR NON-
DETECTABLE ITEMS EGRC-Solenoid Valve A, B and Throttle Control Solenoid Valve (Cont’d) COMPONENT INSPECTION EGR valve Apply vacuum to EGR vacuum port with a hand vacuum pump. EGR valve spring should lift. If NG, replace EGR valve. MEF137D Throttle control valve Apply vacuum to throttle control valve vacuum port with a hand
vacuum pump. Throttle control valve should close. If NG, replace throttle control valve. SEF707V EGRC-solenoid valve A, B and throttle control solenoid valve Check air passage continuity. MEC488B Condition Air passage continuity A and j B between j Air passage continuity A and j C between j 12V direct current supply between terminals V 1 and V
2 Yes No No supply No Yes If NG, replace solenoid valve(s). EC-162 TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Start Signal TEC443 EC-163 TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Start Signal (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START . CHECK OVERALL FUNCTION.
1. Turn ignition switch ‘‘ON’’. 2. Check ‘‘START SIGNAL’’ in ‘‘DATA MONITOR’’ mode with CONSULT. SEF625S IGN ‘‘ON’’ OFF IGN ‘‘START’’ ON OK c INSPECTION END -- OR --1. Turn ignition switch to ‘‘START’’. 2. Check voltage between ECM terminal V 20 and
ground. Voltage: Ignition switch ‘‘START’’ Battery voltage Except above Approximately 0V NG SEF109P .
CHECK INPUT SIGNAL CIRCUIT. 1.
Turn ignition switch ‘‘OFF’’.
2. Disconnect ECM harness connector and ignition switch harness connector. 3. Check harness continuity between ECM terminal V 20 and terminal V 6 . Continuity should exist. If OK, check harness for short to ground and short to power.
OK SEF785V . Disconnect and reconnect harness connectors in the circuit. Then retest. . Trouble is not fixed.
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest. . INSPECTION END EC-164 NG c Check the following. + Harness connectors M52 , F7 + 7.5A fuse + Fuse block M3 , E112 + Harness for open or short between ECM and ignition switch If NG, repair open circuit
or short to ground or short to power in harness or connectors. TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Accelerator Position Switch The accelerator position switch detects OFF-accelerator switch signal and Full-accelerator switch signal and send these signals to the ECM. The ECM will then determine engine idle conditions. These
signals are also used for diagnosing the accelerator position sensor. SEF708V CONSULT REFERENCE VALUE IN DATA MONITOR MODE Remarks: Specification data are reference values. MONITOR ITEM FULL ACCEL SW OFF ACCEL SW CONDITION SPECIFICATION + Ignition switch: ON (Engine stopped) Accelerator pedal: depressed ON
Except above OFF + Ignition switch: ON (Engine stopped) Accelerator pedal: released ON Accelerator pedal: slightly open OFF ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter. TERMINAL NO. WIRE COLOR ITEM CONDITION
Ignition switch ‘‘ON’’ 31 R/L Accelerator position switch (Idle) Accelerator pedal fully released 43 V (ECCS DATA (DC Voltage and Pulse Signal) BATTERY VOLTAGE (11 - 14V) Ignition switch ‘‘ON’’ Approximately 0V Accelerator pedal depressed Ignition switch ‘‘ON’’ Approximately 0V 32 W/G Accelerator position switch (Full) Accelerator pedal
released Ignition switch ‘‘ON’’ Accelerator pedal fully depressed EC-165 BATTERY VOLTAGE (11 - 14V) TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Accelerator Position Switch (Cont’d) TEC444 EC-166 TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Accelerator Position Switch (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION
START . CHECK OVERALL FUNCTION. 1. Turn ignition switch ‘‘ON’’. 2. Select ‘‘FULL ACCEL SW’’ and ‘‘OFF ACCEL SW’’ in ‘‘DATA MONITOR’’ mode with CONSEF626S SULT. 3. Check ‘‘FULL ACCEL SW’’ and ‘‘OFF ACCEL SW’’ signal under the following conditions. OFF ACCEL SW: Accelerator pedal released ON Accelerator pedal depressed
OFF FULL ACCEL SW: Accelerator pedal released OFF Accelerator pedal fully depressed ON SEF627S -- OR --1. Turn ignition switch ‘‘ON’’. 2. Check voltage between ECM terminal V 31 and ground under the following conditions. Voltage: Accelerator pedal released
Battery voltage Accelerator pedal depressed Approximately 0V 3.
Check voltage between ECM terminal V 32 and ground under SEF708V the following conditions. Voltage: Accelerator pedal released Approximately 0V Accelerator pedal fully depressed Battery voltage OK c INSPECTION END NG .
SEF786V CHECK POWER SUPPLY. 1. Turn ignition switch ‘‘OFF’’. 2.
Disconnect accelerator position switch harness connector. 3. Turn ignition switch ‘‘ON’’. 4. Check voltage between terminal V 5 and ground with CONSULT or tester. Voltage: Battery voltage OK . j A EC-167 NG c Check the following.
+ Harness connectors M52 , F7 (LHD models) + Harness for open or short between accelerator position switch and ECCS relay + Harness for open or short between accelerator position switch and ECM If NG, repair harness or connectors. TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Accelerator Position Switch (Cont’d) j A . SEF787V
CHECK INPUT SIGNAL CIRCUIT-I. 1. Turn ignition switch ‘‘OFF’’. 2. Disconnect ECM harness connector. 3. Check harness continuity between terminal V 6 and ECM terminal V 31 . Continuity should exist. If OK, check harness for short to ground and short to power. NG c OK Check the following. + Harness connectors M52 , F7 (RHD models) +
Harness for open or short between ECM and accelerator position switch If NG, repair open circuit or short to ground or short to power in harness or connectors. . SEF788V CHECK INPUT SIGNAL CIRCUIT-II. Check harness continuity between terminal V 4 and ECM terminal V 32 .
Continuity should exist. If OK, check harness for short to ground and short to power. NG c OK Check the following. + Harness connectors M52 , F7 (RHD models) + Harness for open or short between ECM and accelerator position switch If NG, repair open circuit or short to ground or short to power in harness or connectors. . CHECK COMPONENT
(Accelerator position switch). Refer to ‘‘COMPONENT INSPECTION’’ on next page. OK . Disconnect and reconnect harness connectors in the circuits. Then retest. . Trouble is not fixed. Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest. . INSPECTION END EC-
168 NG c Replace accelerator pedal assembly. TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Accelerator Position Switch (Cont’d) COMPONENT INSPECTION Accelerator position switch 1. Disconnect accelerator position switch harness connector. 2. Check continuity between terminals V 5 and V 6 . Conditions SEF709V Continuity
Accelerator pedal released Yes Accelerator pedal depressed No 3. Check continuity between terminals 4 V Conditions and 5 .
V Continuity Accelerator pedal released No Accelerator pedal fully depressed Yes If NG, replace accelerator pedal assembly. CAUTION: If accelerator position sensor or ECM connector is disconnected, perform the following procedures: Select ‘‘OFF ACCEL PO SIG’’ in ‘‘ACTIVE TEST’’ mode. Touch CLEAR. --
--- OR --Start and warm up engine. After engine has warmed up, idle for 10 minutes. EC-169 TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Park/Neutral Position Switch TEC445 EC-170 TROUBLE DIAGNOSES FOR NON-
DETECTABLE ITEMS Park/Neutral Position Switch (Cont’d) When the gear position is in ‘‘N’’, neutral position switch is ‘‘ON’’. The ECM detects the position because the continuity of the line (the ‘‘ON’’ signal) exists. CONSULT REFERENCE VALUE IN DATA MONITOR MODE Remarks: Specification data are reference values. MONITOR ITEM P/N
POSI SW + Ignition switch: ON CONDITION Shift lever: Neutral/Park Except above SPECIFICATION ON OFF ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter. TERMINAL NO. WIRE COLOR ITEM CONDITION 43 V (ECCS DATA (DC
Voltage and Pulse Signal) Ignition switch ‘‘ON’’ 22 P/B Inhibitor switch/ Neutral position switch Gear position is ‘‘N’’ or ‘‘P’’ (A/T models). Gear position is ‘‘Neutral’’ (M/T models). Ignition switch ‘‘ON’’ Except the above gear position Approximately 0V BATTERY VOLTAGE (11 - 14V) DIAGNOSTIC PROCEDURE M/T models INSPECTION START . OK
CHECK OVERALL FUNCTION. c 1.
Turn ignition switch ‘‘ON’’. 2. Select ‘‘P/N POSI SW’’ in SEF963N ‘‘DATA MONITOR’’ mode with CONSULT. 3. Check ‘‘P/N POSI SW’’ signal under the following conditions. Neutral position: ON Except neutral position: OFF -- OR --2. Check voltage between ECM
terminal V 22 and ground under the following conditions. Voltage: Neutral position SEF622S Approximately 0V Except neutral position Battery voltage NG . j A SEF789V EC-171 INSPECTION END TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Park/Neutral Position Switch (Cont’d) j A . CHECK GROUND CIRCUIT. 1. Turn ignition switch
‘‘OFF’’. 2. Disconnect neutral position switch harness connector.
3. Check harness continuity between terminal V 2 and body ground. AEC750 NG c Continuity should exist. If OK, check harness for short to ground and short to power.
OK Check the following. + Harness connectors E202 , E69 + Harness for open or short between neutral position switch and body ground If NG, repair open circuit or short to ground or short to power in harness or connectors. . CHECK INPUT SIGNAL CIRCUIT. 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM
terminal V 22 and terminal V 1 . SEF624S NG c Continuity should exist. If OK, check harness for short to ground and short to power.
OK Check the following.
+ Harness connectors F7 , M52 + Harness connectors M21 , E127 + Harness connectors E70 , E201 + Harness for open or short between ECM and neutral position switch If NG, repair open circuit or short to ground or short to power in harness or connectors. . CHECK COMPONENT (Neutral position switch). Refer to MT section. OK . Disconnect
and reconnect harness connectors in the circuit. Then retest. . Trouble is not fixed. Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest. . INSPECTION END EC-172 NG c Replace neutral position switch. TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS
Park/Neutral Position Switch (Cont’d) A/T models INSPECTION START . OK CHECK OVERALL FUNCTION. c 1. Turn ignition switch ‘‘ON’’. 2. Select ‘‘P/N POSI SW’’ in ‘‘DATA MONITOR’’ mode with SEF963N CONSULT. 3. Check ‘‘P/N POSI SW’’ signal under the following conditions. ‘‘P’’ or ‘‘N’’ position: ON Except above positions: OFF ------------------
--- OR --2. Check voltage between ECM terminal V 22 and ground under the following conditions. Voltage: ‘‘P’’ or ‘‘N’’ position Approximately 0V SEF622S Except above positions Battery voltage INSPECTION END NG .
SEF790V CHECK POWER SUPPLY. 1. Turn ignition switch ‘‘OFF’’. 2. Disconnect inhibitor switch harness connector. 3. Turn ignition switch ‘‘ON’’. 4.
Check voltage between terminal V 3 and ground with CONSULT or tester. Voltage: Battery voltage OK . j A SEF791V SEF792V EC-173 NG c Check the following. + 7.5A fuse + Harness for open or short between inhibitor switch and fuse If NG, repair harness or connectors. TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Park/Neutral
Position Switch (Cont’d) j A . SEF793V CHECK INPUT SIGNAL CIRCUIT-I. 1. Turn ignition switch ‘‘OFF’’. 2. Disconnect TCM harness connector. 3. Check harness continuity between TCM terminal V 36 and terminals V 7 , V 9 . Continuity should exist.
If OK, check harness for short to ground and short to power. NG c OK Check the following. + Diode E103 + Harness continuity between inhibitor switch and TCM If NG, repair open circuit or short to ground or short to power in harness or connectors. . CHECK INPUT SIGNAL CIRCUIT-II. 1. Disconnect ECM harness connector. 2. Check harness
continuity between ECM terminal V 22 and TCM terminal V 14 . Continuity should exist. If OK, check harness for short to ground and short to power. SEF794V NG c OK Check the following. + Harness connectors F7 , M52 + Harness connectors M21 , E127 + Harness for open or short between ECM and TCM If NG, repair open circuit or short to
ground or short to power in harness or connectors. . CHECK COMPONENT (Inhibitor switch).
Refer to AT section. OK . Disconnect and reconnect harness connectors in the circuit. Then retest. . Trouble is not fixed. Check ECM pin terminals for damage or the connection of ECM harness connector.
Reconnect ECM harness connector and retest. . INSPECTION END EC-174 NG Replace inhibitor switch. c TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS A/T Control These circuit lines are used to control the smooth shifting up and down of A/T during the hard acceleration/deceleration. Voltage signals are exchanged between ECM and
TCM. ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter. TERMINAL NO. WIRE COLOR 24 PU/W ITEM CONDITION 43 V DATA (DC Voltage and Pulse Signal) Engine is running. A/T signal No. 1 6 - 8V Idle speed Engine is running. 30
P A/T signal No. 3 Approximately 0V Idle speed Engine is running. 37 P/B A/T signal No. 2 6 - 8V Idle speed EC-175 (ECCS TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS A/T Control (Cont’d) TEC440 EC-176 TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS A/T Control (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START .
SEF792V CHECK OVERALL FUNCTION. 1. Start engine and let it idle. 2. Check voltage between ECM terminals 24 , V 30 , V 37 and ground with CONV SULT or tester. Terminal 24 V 30 V 37 V OK c INSPECTION END Voltage and ground 6 - 8V and ground Approximately 0V and ground 6 - 8V NG . SEF795V CHECK INPUT SIGNAL CIRCUIT-I. 1.
Turn ignition switch ‘‘OFF’’. 2. Disconnect ECM harness connector and TCM harness connector. 3. Check harness continuity between ECM terminal V 24 and terminal V 5 , ECM terminal V 30 and terminal V 7 , ECM terminal V 37 and terminal V 6 . Continuity should exist. NG c Check the following. + Harness connectors M51 , F6 + Harness
connectors E106 , M88 + Harness continuity between ECM and TCM If NG, repair harness or connectors. OK . SEF796V CHECK INPUT SIGNAL CIRCUIT-II. Check harness continuity between ECM terminal V 24 and ground, ECM terminal 30 and ground, ECM terminal V 37 and V ground. Continuity should not exist. If OK, check harness for short to
power. OK . Disconnect and reconnect harness connectors in the circuit. Then retest.
SEF797V Trouble is not fixed. . Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest. . INSPECTION END EC-177 NG c Check the following. + Harness connectors E106 , M88 + Harness connectors M51 , F6 + Harness for short between ECM and TCM If NG, repair
short to ground or short to power in harness or connectors. TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Charge Air Cooler Fan Control SYSTEM DESCRIPTION Crankshaft position sensor (TDC) Engine speed Charge air temperature sensor Charge air temperature Ignition switch Start signal c c ECM c Charge air cooler fan relay c The
ECM controls the charge air cooler fan operation corresponding to the engine speed, the charge air temperature and the start signal. The control system has 2-step control [ON/OFF]. The ECM does not directly drive the charge air cooler fan. It controls the ON/OFF charge air cooler fan relay, which in turn controls the charge air cooler fan. When the
charge air temperature is above 67°C (153°F) and engine speed is more than 1,600 rpm, the charge air cooler fan operates. CONSULT REFERENCE VALUE IN DATA MONITOR MODE Remarks: Specification data are reference values. MONITOR ITEM I/C FAN RLY CONDITION SPECIFICATION + When charge air cooler fan is stopped. OFF + When
charge air cooler fan operates. ON ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground) with a voltmeter. TERMINAL NO. WIRE COLOR ITEM CONDITION Engine is running. 8 G/OR Charge air cooler fan relay Charge air cooler fan is not operating.
BATTERY VOLTAGE (11 - 14V) 0 - 1V EC-178 (ECCS DATA (DC Voltage and Pulse Signal) Engine is running. Charge air cooler fan is operating. 43 V TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Charge Air Cooler Fan Control (Cont’d) TEC439 EC-179 TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Charge Air Cooler Fan Control
(Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START . SEF710V CHECK OVERALL FUNCTION. 1. Turn ignition switch ‘‘OFF’’. 2. Disconnect charge air temperature sensor harness connector. 3. Connect 150Ω resistor to charge air temperature sensor harness connector. 4. Start engine and keep engine speed at 2,000 rpm. 5. Make sure that
charge air cooler fan operates. OK c INSPECTION END NG . SEF798V CHECK POWER SUPPLY. 1.
Stop engine.
2.
Disconnect charge air cooler fan relay. 3. Turn ignition switch ‘‘ON’’. 4. Check voltage between terminals V 2 , 5 and ground with CONSULT or V tester. Voltage: Battery voltage NG c OK Check the following. + Harness connectors M21 , E127 + 10A fuse + 15A fuse + Fuse block M2 + Harness for open or short between charge air cooler fan relay
and fuses If NG, repair harness or connectors. . SEF712V CHECK GROUND CIRCUIT.
1. Turn ignition switch ‘‘OFF’’. 2. Disconnect charge air cooler fan motor harness connector. 3. Check harness continuity between relay terminal V 3 and motor terminal V 1 , motor terminal V 2 and engine ground. Continuity should exist. If OK, check harness for short to ground and short to power.
OK SEF799V . j A SEF711V EC-180 NG c Check the following. + Harness connectors E127 , M21 + Harness connectors M50 , F5 + Harness for open or short between charge air cooler fan relay and charge air cooler fan motor + Harness for open or short between charge air cooler fan motor and engine ground If NG, repair open circuit or short to
ground or short to power in harness or connectors. TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Charge Air Cooler Fan Control (Cont’d) j A . SEF800V CHECK OUTPUT SIGNAL CIRCUIT. 1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal V 8 and relay terminal V 1 . Continuity should exist. If OK, check harness for short to ground and short to power.
NG c OK Check the following.
+ Harness connectors E127 , M21 + Harness connectors M52 , F7 + Harness for open or short between ECM and charge air cooler fan relay If NG, repair open circuit or short to ground or short to power in harness or connectors. .
CHECK COMPONENT (Charge air cooler fan relay). Refer to ‘‘COMPONENT INSPECTION’’ on next page. SEF801V NG c Replace charge air cooler fan relay. c Replace charge air cooler fan motor. OK . CHECK COMPONENT (Charge air cooler fan motor). Refer to ‘‘COMPONENT INSPECTION’’ on next page. OK . Disconnect and reconnect harness
connectors in the circuit.
Then retest. Trouble is not fixed. . Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.
.
INSPECTION END EC-181 NG TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Charge Air Cooler Fan Control (Cont’d) COMPONENT INSPECTION Charge air cooler fan relay Check continuity between terminals Conditions SEF511P 3 V and 5 . V Continuity 12V direct current supply between terminals V 1 and V 2 Yes No current supply No
If NG, replace relay. Charge air cooler fan motor 1. Disconnect charge air cooler fan motor harness connector. 2. Supply charge air cooler fan motor terminals with battery voltage and check operation.
Charge air cooler fan motor should operate. If NG, replace charge air cooler fan motor. SEF802V EC-182 TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Heat Up Switch The heat up switch is located on the lower side of the instrument panel. This switch is used to speed up the heater’s operation when the engine is cold.
When the ECM received the heat up switch ‘‘ON’’ signal, the ECM increases the engine idle speed to 1,100 - 1,200 rpm to warm up engine quickly. This system works when all conditions listed below are met. Heat up switch SEF803V ON Engine coolant temperature Below 70°C (158°F) Shift lever ‘‘P’’ or ‘‘N’’ Accelerator pedal Fully released Vehicle
speed Below 4 km/h (2 MPH) CONSULT REFERENCE VALUE IN DATA MONITOR MODE Remarks: Specification data are reference values. MONITOR ITEM WARM UP SW CONDITION + Ignition switch: ON SPECIFICATION Heat up switch: ON ON Heat up switch: OFF OFF ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data
are reference values and are measured between each terminal and ground) with a voltmeter.
TERMINAL NO. WIRE COLOR ITEM CONDITION 43 V (ECCS DATA (DC Voltage and Pulse Signal) Ignition switch ‘‘ON’’ 0V Heat up switch is ‘‘OFF’’. 59 BR/W Heat up switch Ignition switch ‘‘ON’’ Heat up switch is ‘‘ON’’. EC-183 BATTERY VOLTAGE (11 - 14V) TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Heat Up Switch (Cont’d)
TEC447 EC-184 TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Heat Up Switch (Cont’d) DIAGNOSTIC PROCEDURE INSPECTION START .
OK CHECK OVERALL FUNCTION. c 1. Turn ignition switch ‘‘ON’’. 2. Check ‘‘WARM UP SW’’ signal in ‘‘DATA MONITOR’’ mode with CONSULT. SEF804V Heat up switch is ‘‘ON’’: ON Heat up switch is ‘‘OFF’’: OFF -- OR --2. Check voltage between ECM terminal V
59 and ground under the following condition. Voltage: Heat up switch is ‘‘ON’’ Battery voltage Heat up switch is ‘‘OFF’’ Approximately 0V INSPECTION END NG SEF805V .
CHECK POWER SUPPLY. 1. Turn heat up switch ‘‘OFF’’. 2. Turn ignition switch ‘‘OFF’’. 3. Disconnect heat up switch harness connector. 4. Turn ignition switch ‘‘ON’’. 5. Check voltage between terminal V 6 and ground with CONSULT or tester. Voltage: Battery voltage SEF806V NG c Check the following. + Fuse block M3 + 10A fuse + Harness for
open or short between heat up switch and fuse If NG, repair harness or connectors. OK . CHECK INPUT SIGNAL CIRCUIT. 1. Turn ignition switch ‘‘OFF’’. 2.
Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal V 59 and terminal V 5 . Continuity should exist. If OK, check harness for short to ground and short to power. OK SEF807V . j A EC-185 NG c Check the following. + Harness connectors M51 , F6 + Harness for open or short between heat up switch and ECM If NG,
repair open circuit or short to ground or short to power in harness or connectors. TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Heat Up Switch (Cont’d) j A . CHECK COMPONENT (Heat up switch). Refer to ‘‘COMPONENT INSPECTION’’ below. NG c Replace heat up switch. OK . Disconnect and reconnect harness connectors in the circuit.
Then retest. Trouble is not fixed. . Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest. . INSPECTION END COMPONENT INSPECTION Heat up switch 1. Disconnect heat up switch harness connector. 2. Check continuity between terminals V 5 and V 6 . Condition SEF808V
Continuity Heat up switch ‘‘ON’’ Yes Heat up switch ‘‘OFF’’ No If NG, replace heat up switch.
EC-186 TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS Air Conditioner Control TEC446 EC-187 TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS MIL & Data Link Connectors TEC448 EC-188 SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications Unit: rpm Engine RD28ETi Idle speed 775±25 Maximum engine speed
5,400 Injection pump numbers Engine Part number Pump assembly number RD28ETi 16700 VB300 104721-2000 Injection Nozzle INSPECTION AND ADJUSTMENT Adjusting shims Injection nozzle assembly 2 Unit: kPa (bar, kg/cm , psi) Initial injection pressure Thickness mm (in) Parts No. 0.50 (0.0197) 16613-V0700 0.54 (0.0213) 16613-V0702 Used
14,220 (142.2, 145, 2,062) 0.58 (0.0228) 16613-V0704 New 14,711 - 15,495 (147.1 - 155.0, 150 - 158, 2,133 - 2,247) 0.62 (0.0244) 16613-V0706 0.66 (0.0260) 16613-V0708 0.70 (0.0276) 16613-V0710 0.74 (0.0291) 16613-V0712 0.78 (0.0307) 16613-V0714 0.82 (0.0323) 16613-V0716 0.86 (0.0339) 16613-V0718 0.90 (0.0354) 16613-V0720 0.94
(0.0370) 16613-V0722 0.98 (0.0386) 16613-V0724 1.00 (0.0394) 16613-V0760 Inspection and Adjustment Plunger lift 0.92±0.04 (0.0362±0.0016) (at 9.75° ATDC) mm (in) ENGINE COOLANT TEMPERATURE SENSOR CAMSHAFT POSITION SENSOR (PUMP) Resistance [at 25°C (77°F)] Ω 1,360 - 1,840 Temperature °C (°F) Resistance kΩ 20 (68) 2.1
- 2.9 50 (122) 0.68 - 1.00 90 (194) 0.236 - 0.260 CONTROL SLEEVE POSITION SENSOR Resistance [at 23°C (73°F)] EC-189 Ω 5.9 SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment (Cont’d) ADJUSTMENT RESISTOR Resistance [at 25°C (77°F)] kΩ ACCELERATOR POSITION SENSOR 0.2 - 15.0 Throttle valve conditions
Completely closed INJECTION TIMING CONTROL VALVE Resistance [at 20°C (68°F)] Ω Approximately 11 Ω Completely open 0.68 CRANKSHAFT POSITION SENSOR (TDC) Resistance [at 25°C (77°F)] kΩ Approximately 0.8 - 1.2 Ω 0.8 GLOW PLUG Resistance [at 25°C (77°F)] Approximately 0.5 0.5 - 4 Approximately 4 FUEL TEMPERATURE SENSOR
ELECTRIC GOVERNOR Resistance [at 23°C (73°F)] Partially open Resistance kΩ [at 25°C (77°F)] EC-190 Temperature °C (°F) Resistance kΩ −20 (−4) 13.67 - 16.37 20 (68) 2.306 - 2.568 60 (140) 0.538 - 0.624 80 (176) 0.289 - 0.344 ELECTRICAL SYSTEM SECTION EL When you read wiring diagrams: + Read GI section, ‘‘HOW TO READ WIRING
DIAGRAMS’’. When you perform trouble diagnoses, read GI section, ‘‘HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES’’ and ‘‘HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT’’. + Check for any service bulletins before servicing the vehicle.
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.....24 Room Lamp Harness..........................25 GROUND DISTRIBUTION/RHD MODELS ....26 Engine Room Harness ....26 Main Harness..........................30 Body Harness ....33 Body No. 2 Harness ....34 Back Door and
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EC SECTION ANTI-LOCK BRAKE SYSTEM ...... BR SECTION SRS ''AIR BAG'' ...... RS SECTION HEATER AND AIR CONDITIONER ...... HA SECTION DIFFERENTIAL CARRIER ...... PD SECTION REAR SUSPENSION ...... RA SECTION FUEL SYSTEM ...... FE SECTION

PRECAUTIONS Supplemental Restraint System (SRS) ''AIR BAG'' and ''SEAT BELT PRE-TENSIONER'' The Supplemental Restraint System such as ''AIR BAG'' and ''SEAT BELT PRE-TENSIONER'' used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The SRS system composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination.): Driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioner, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the RS section of this Service Manual. WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation either just before the harness connectors or for the complete harness are related to the SRS. EL-1 HARNESS CONNECTOR Description HARNESS CONNECTOR + All harness connectors have been modified to prevent accidental looseness or disconnection.

+ The connector can be disconnected by pushing or lifting the locking section. CAUTION: Do not pull the harness when disconnecting the connector. [Example] SEL769D EL-2 STANDARDIZED RELAY Description NORMAL OPEN, NORMAL CLOSED AND MIXED TYPE RELAYS Relays can mainly be divided into three types: normal open, normal closed and mixed type relays. SEL881H TYPE OF STANDARDIZED RELAYS 1M .... 1 Make 2M .... 2 Make 1T ....

1 Transfer 1Mz1B .... 1 Make 1 Break SEL882H EL-3 STANDARDIZED RELAY Description (Cont'd) SEL661TA EL-4 POWER SUPPLY ROUTING Schematic TEL478A EL-5 POWER SUPPLY ROUTING Wiring Diagram — POWER — BATTERY POWER SUPPLY — IGNITION SW. IN ANY POSITION TEL479A EL-6 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) TEL480A EL-7 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) TEL481A EL-8 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) TEL482A EL-9 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) ACCESSORY POWER SUPPLY — IGNITION SW. IN ''ACC'' OR ''ON'' TEL483A EL-10 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) IGNITION POWER SUPPLY — IGNITION SW. IN ''ON'' AND/OR ''START'' TEL484A EL-11 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) TEL485A EL-12 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) TEL486A EL-13 POWER SUPPLY ROUTING Fuse a. If fuse is blown, be sure to eliminate cause of problem before installing new fuse. b. Use fuse of specified rating. Never use fuse of more than specified rating. c. Do not partially install fuse; always insert it into fuse holder properly. d. Remove fuse for ''ELECTRICAL PARTS (BAT)'' if vehicle is not used for a long period of time. CEL083 Fusible Link MEL944F A melted fusible link can be detected either by visual inspection or by feeling with finger tip. If its condition is questionable, use circuit tester or test lamp. CAUTION: + If fusible link should melt, it is possible that critical circuit (power supply or large current carrying circuit) is shorted. In such a case, carefully check and eliminate cause of problem. + Never wrap outside of fusible link with vinyl tape. Important: Never let fusible link touch any other wiring harness, vinyl or rubber parts. Circuit Breaker Inspection For example, when current is 30A, the circuit is broken within 8 to 20 seconds. SBF284E EL-14 GROUND DISTRIBUTION/LHD MODELS Engine Room Harness CEL723 EL-15 GROUND DISTRIBUTION/LHD MODELS Engine Room Harness (Cont'd) CEL724 EL-16 GROUND DISTRIBUTION/LHD MODELS Engine Room Harness (Cont'd) CEL725 EL-17 GROUND DISTRIBUTION/LHD MODELS Engine Room Harness (Cont'd) RD ENGINE CEL795 EL-18 GROUND DISTRIBUTION/LHD MODELS Main Harness CEL720 EL-19 GROUND DISTRIBUTION/LHD MODELS Main Harness (Cont'd) CEL721 EL-20 GROUND DISTRIBUTION/LHD MODELS Main Harness (Cont'd) CEL722 EL-21 GROUND DISTRIBUTION/LHD MODELS Body Harness CEL729 EL-22 GROUND DISTRIBUTION/LHD MODELS Body No. 2 Harness CEL730 EL-23 GROUND DISTRIBUTION/LHD MODELS Back Door and Rear Window Defogger Harness CEL731 EL-24 GROUND DISTRIBUTION/LHD MODELS Room Lamp Harness CEL734 EL-25 GROUND DISTRIBUTION/RHD MODELS Engine Room Harness CEL796 EL-26 GROUND DISTRIBUTION/RHD MODELS Engine Room Harness (Cont'd) CEL797 EL-27 GROUND DISTRIBUTION/RHD MODELS Engine Room Harness (Cont'd) CEL798 EL-28 GROUND DISTRIBUTION/RHD MODELS Engine Room Harness (Cont'd) RD ENGINE CEL802 EL-29 GROUND DISTRIBUTION/RHD MODELS Main Harness CEL803 EL-30 GROUND DISTRIBUTION/RHD MODELS Main Harness (Cont'd) CEL804 EL-31 GROUND DISTRIBUTION/RHD MODELS Main Harness (Cont'd) CEL805 EL-32 GROUND DISTRIBUTION/RHD MODELS Body Harness CEL806 EL-33 GROUND DISTRIBUTION/RHD MODELS Body No. 2 Harness CEL807 EL-34 GROUND DISTRIBUTION/RHD MODELS Back Door and Rear Window Defogger Harness CEL791 EL-35 GROUND DISTRIBUTION/RHD MODELS Room Lamp Harness CEL799 EL-36 BATTERY CAUTION: If it becomes necessary to start the engine with a booster battery and jumper cables, a. Use a 12-volt booster battery. b. After connecting battery cables, ensure that they are tightly clamped to battery terminals for good contact. c. Never add distilled water through the hole used to check specific gravity. How to Handle Battery METHODS OF PREVENTING OVER-DISCHARGE MEL040F The following precautions must be taken to prevent over-discharging a battery. + The battery surface (particularly its top) should always be kept clean and dry. + The terminal connections should be clean and tight. + At every routine maintenance, check the electrolyte level. This also applies to batteries designated as ''low maintenance'' and ''maintenance-free''. + When the vehicle is not going to be used over a long period of time, disconnect the negative battery terminal.

+ Check the charge condition of the battery. Periodically check the specific gravity of the electrolyte. Keep a close check on charge condition to prevent over-discharge. MEL041F MEL042F CHECKING ELECTROLYTE LEVEL WARNING: Do not allow battery fluid to come in contact with skin, eyes, fabrics, or painted surfaces. After touching a battery, do not touch or rub your eyes until you have thoroughly washed your hands. If acid contacts eyes, skin or clothing, immediately flush with water for 15 minutes and seek medical attention. EL-37 BATTERY How to Handle Battery (Cont'd) + + Remove the cell plug using a suitable tool. Add distilled water up to the MAX level. MEL043F SULPHATION A battery will be completely discharged if it is left unattended for a long time and the specific gravity will become less than 1.100. This may result in sulphation on the cell plates. To determine if a battery has been ''sulphated'', note its voltage and current when charging it. As shown in the figure, less current and higher voltage are observed in the initial stage of charging sulphated batteries. A sulphated battery may sometimes be brought back into service by means of a long, slow charge, 12 hours or more, followed by a battery capacity test. SEL709E SPECIFIC GRAVITY CHECK 1. Read hydrometer and thermometer indications at eye level. MEL042FA EL-38 BATTERY How to Handle Battery (Cont'd) 2. Convert into specific gravity at 20°C (68°F). Example: + When electrolyte temperature is 35°C (95°F) and specific gravity of electrolyte is 1.230, converted specific gravity at 20°C (68°F) is 1.240. + When electrolyte temperature is 0°C (32°F) and specific gravity of electrolyte is 1.210, converted specific gravity at 20°C (68°F) is 1.196. SEL007Z EL-39 BATTERY Battery Test and Charging Chart Chart I VISUAL INSPECTION + Check battery case for cracks or bends. + Check battery terminals for damage.

+ If the difference between the max. and min. electrolyte level in cells is within 10 mm (0.39 in), it is OK. OK . .

Replace battery. CHECKING SPECIFIC GRAVITY Refer to ''Specific Gravity Check''. . Below 1.100 . SLOW CHARGE Refer to ''A: Slow Charge''. . 1.100 - 1.220 * Above 1.220 QUICK CHARGE Refer to ''C: Quick Charge''. STANDARD CHARGE Refer to ''B: Standard Charge''. CAPACITY TEST Refer to ''Chart II''. . Ready for use + Mount battery again and check loose terminals. Also check other related circuits. CAPACITY TEST Refer to ''Chart II''. NG OK Replace battery. Ready for use . NG . . . CHECKING SPECIFIC GRAVITY Refer to ''Specific Gravity Check''. QUICK CHARGE Refer to ''C: Quick Charge''. + Time required: 45 min. . . RECHARGE Refer to ''C: Quick Charge''. + If battery temperature rises above 60°C (140°F), stop charging. Always charge battery when its temperature is below 60°C (140°F).

OK Ready for use CAPACITY TEST Refer to ''Chart II''. OK CAPACITY TEST Refer to ''Chart II''. . . .

. NG .

. OK CAPACITY TEST Refer to ''Chart II''. OK .

Ready for use . . . NG NG Ready for Replace use battery. * ''STANDARD CHARGE'' is recommended if the vehicle is in storage after charging. EL-40 NG . Replace battery. BATTERY Battery Test and Charging Chart (Cont'd) + Check battery type and determine the specified current using the following table.

Fig. 1 DISCHARGING CURRENT (Load Tester) Chart II CAPACITY TEST . . Test using battery checker. Test using load tester. . OK Ready for use Current (A) 28B19R(L) 90 34B19R(L) 99 46B24R(L) 135 55B24R(L) 135 50D23R(L) 150 55D23R(L) 180 65D26R(L) 195 80D26R(L) 195 75D31R(L) 210 95D31R(L) 240 115D31R(L) 240 95E41R(L) 300 130E41R(L) 330 . Follow manufacturer's instructions to check and determine if battery is serviceable. . Type NG Read load tester voltage when specified discharging current (Refer to Fig. 1.) flows through battery for 15 seconds. . Go to next step. .

Above 9.6 volts . Below 9.6 volts OK . Ready for use NG . Go to next step. SEL008Z EL-41 BATTERY Battery Test and Charging Chart (Cont'd) A: SLOW CHARGE Determine initial charging current from specific gravity referring to Fig. 2. Fig.

2 INITIAL CHARGING CURRENT SETTING (Slow charge) Below 1.100 . . Below 12 volts or above 15 volts 12 to 15 volts OK 4.0 (A) 5.0 (A) 7.0 (A) 8.0 (A) 9.0 (A) 10.0 (A) 130E41R(L) 95E41R(L) 115D31R(L) 95D31R(L) 75D31R(L) 80D26R(L) 65D26R(L) 50D23R(L) 55B24R(L) 46B24R(L) 34B19R(L) 28B19R(L) CONVERTED SPECIFIC GRAVITY 55D23R(L) BATTERY TYPE . + Charge battery. + Check charging voltage 30 minutes after starting the battery charge. 14.0 (A) + Check battery type and determine the specified current using the table shown above. + After starting charging, adjustment of charging current is not necessary. NG . Fig. 3 ADDITIONAL CHARGE (Slow charge) Continue to charge for 12 hours.

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Replace battery. Below 1.150 . . CHECKING SPECIFIC GRAVITY Refer to ''Specific Gravity Check''. . Charge for 5 hours at initial charging current setting. 1.150 - 1.200 1.200 - 1.240 . Above 1.240 . Charge for 4 hours at initial charging current setting. Charge for 2 hours at initial charging current setting. Conduct additional charge as per Fig. 3, if necessary. . . . . . Go to ''CAPACITY TEST''. . Go to ''CAPACITY TEST''. CAUTION: + Set charging current to value specified in Fig. 2. If charger is not capable of producing specified current value, set its charging current as close to that value as possible. + Keep battery away from open flame while it is being charged. + When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark. + If battery temperature rises above 60°C (140°F), stop charging. Always charge battery when its temperature is below 60°C (140°F). EL-42 BATTERY Battery Test and Charging Chart (Cont'd) B: STANDARD CHARGE Fig. 4 INITIAL CHARGING CURRENT SETTING (Standard charge) Determine initial charging current from specific gravity, referring to Fig. 4. CONVERTED SPECIFIC GRAVITY CHECKING SPECIFIC GRAVITY Refer to ''Specific Gravity Check''. 130E41R(L) 115D31R(L) 7.0 (A) 8.0 (A) 9.0 (A) 13.0 (A) 1.130 - 1.160 3.0 (A) 4.0 (A) 5.0 (A) 6.0 (A) 7.0 (A) 8.0 (A) 11.0 (A) 1.160 - 1.190 2.0 (A) 3.0 (A) 4.0 (A) 5.0 (A) 6.0 (A) 7.0 (A) 9.0 (A) 1.190 - 1.220 2.0 (A) 2.0 (A) 3.0 (A) 4.0 (A) 5.0 (A) 5.0 (A) 7.0 (A) 95E41R(L) 95D31R(L) 65D26R(L) 55D23R(L) 6.0 (A) 55B24R(L) 5.0 (A) 46B24R(L) 4.0 (A) 34B19R(L) 1.100 - 1.130 28B19R(L) 75D31R(L) . 80D26R(L) . Charge battery for 8 hours. 50D23R(L) BATTERY TYPE + Check battery type and determine the specified current using the table shown above. + After starting charging, adjustment of charging current is not necessary.

Fig. 5 ADDITIONAL CHARGE (Standard charge) . Below 1.150 1.150 - 1.200 1.200 - 1.240 Above 1.240 Conduct additional charge as per Fig. 5, if necessary. .

.

Go to ''CAPACITY TEST''. . Charge for 3.5 hours at initial charging current setting. . . Charge for 2.5 hours at initial charging current setting. Charge for 1.5 hours at initial charging current setting. . . . . Go to ''CAPACITY TEST''.

CAUTION: + Do not use standard charge method on a battery whose specific gravity is less than 1.100.

+ Set charging current to value specified in Fig. 4. If charger is not capable of producing specified current value, set its charging current as close to that value as possible. + Keep battery away from open flame while it is being charged. + When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark. + If battery temperature rises above 60°C (140°F), stop charging. Always charge battery when its temperature is below 60°C (140°F). EL-43 BATTERY Battery Test and Charging Chart (Cont'd) CONVERTED SPECIFIC GRAVITY . Charge battery.

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Go to ''CAPACITY TEST''. 15 (A) 20 (A) 30 (A) 1.100 - 1.130 2.5 hours 1.130 - 1.160 2.0 hours 1.160 - 1.190 1.5 hours 1.190 - 1.220 1.0 hours Above 1.220 0.75 hours (45 min.) 130E41R(L) 95E41R(L) 115D31R(L) 95D31R(L) 75D31R(L) 80D26R(L) 65D26R(L) 55D23R(L) 50D23R(L) 55B24R(L) 10 (A) 46B24R(L) CURRENT [A] Determine initial charging current setting and charging time from specific gravity, referring to Fig. 6. 34B19R(L) BATTERY TYPE 28B19R(L) Fig. 6 INITIAL CHARGING CURRENT SETTING AND CHARGING TIME (Quick charge) C: QUICK CHARGE 40 (A) + Check battery type and determine the specified current using the table shown above. + After starting charging, adjustment of charging current is not necessary.

CAUTION: + Do not use quick charge method on a battery whose specific gravity is less than 1.100. + Set initial charging current to value specified in Fig. 6. If charger is not capable of producing specified current value, set its charging current as close to that value as possible. + Keep battery away from open flame while it is being charged. + When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark. + Be careful of a rise in battery temperature because a large current flow is required during quickcharge operation. If battery temperature rises above 60°C (140°F), stop charging. Always charge battery when its temperature is below 60°C (140°F). + Do not exceed the charging time specified in Fig. 6, because charging battery over the charging time can cause deterioration of the battery. Service Data and Specifications (SDS) RD28 Applied model Standard Cold areas for Europe Type 95D31L 115D31L 12-80 12-80 Capacity V-AH EL-44 STARTING SYSTEM Wiring Diagram — START — TEL400A EL-45 STARTING SYSTEM Trouble Diagnoses If any abnormality is found, immediately disconnect battery negative terminal. Starter does not stop.

c Replace magnetic switch. Engine does not start. . Does engine turn by cranking? Yes c Yes Does engine turn normally?

No c Check ignition/fuel system.

No (Turns slowly.) . OK Check battery as follows: + Charging condition + Terminal connections + Terminal corrosion . c Repair starter motor. NG j A . Does starter motor turn? Yes c Yes Does gear shaft turn? No c Check pinion clutch. No . Check reduction gear, armature and gear shaft. . Check fuse and fusible link. NG c Replace. OK . Check battery as follows: + Charging condition + Terminal connections + Terminal corrosion A j NG OK . Check starting system wiring. . c + Charge battery. + Repair connections and corrosion of battery terminals. NG c Repair. OK . Does magnetic switch operation sound occur? No c Replace magnetic switch. Yes .

Check condition of pinion and ring gear mesh. OK c Does starter turn under no load by connecting wires as follows? Yes c Replace magnetic switch. NG .

No + Adjust pinion movement. + Check pinion moving mechanism. + Check ring gear. c SEL009Z EL-46 Repair starter motor. STARTING SYSTEM Construction MEL996DB Removal and Installation MEL609I Inspection MAGNETIC SWITCH CHECK + + 1. + Before starting to check, disconnect battery ground cable. Disconnect ''M'' terminal of starter motor. Continuity test (between ''S'' terminal and switch body). No continuity ... Replace.

SEL036H EL-47 STARTING SYSTEM Inspection (Cont'd) 2. Continuity test (between ''S'' terminal and ''M'' terminal). + No continuity ...

Replace. SEL038H PINION/CLUTCH CHECK SEL630BA 1. Inspect pinion teeth. + Replace pinion if teeth are worn or damaged.

(Also check condition of ring gear teeth.) 2. Inspect reduction gear teeth (If equipped). + Replace reduction gear if teeth are worn or damaged. (Also check condition of armature shaft gear teeth.) 3. Check to see if pinion locks in one direction and rotates smoothly in the opposite direction. + If it locks or rotates in both directions, or unusual resistance is evident. ... Replace. BRUSH CHECK Brush Check wear of brush. Wear limit length: Refer to SDS (EL-51).

+ Excessive wear ... Replace. SEL014Z Brush spring pressure Check brush spring pressure with brush spring detached from brush. Spring pressure (with new brush): Refer to SDS (EL-51). + Not within the specified values ... Replace. SEL015Z Brush holder 1. Perform insulation test between brush holder (positive side) and its base (negative side). + Continuity exists. ... Replace. 2. Check brush to see if it moves smoothly. + If brush holder is bent, replace it; if sliding surface is dirty, clean.

SEL568B EL-48 STARTING SYSTEM Inspection (Cont'd) YOKE CHECK Magnet is secured to yoke by bonding agent. Check magnet to see that it is secured to yoke and for any cracks. Replace malfunctioning parts as an assembly. CAUTION: Do not clamp yoke in a vice or strike it with a hammer. SEL305H ARMATURE CHECK 1. + 2. + Continuity test (between two segments side by side). No continuity ... Replace. Insulation test (between each commutator bar and shaft). Continuity exists. ... Replace.

SEL019Z 3. Check commutator surface. + Rough ... Sand lightly with No. 500 - 600 emery paper.

SEL020Z 4.

Check diameter of commutator. Commutator minimum diameter: Refer to SDS (EL-51). + Less than specified value ... Replace. SEL021Z EL-49 STARTING SYSTEM Inspection (Cont'd) 5. Check depth of insulating mold from commutator surface. + Less than 0.2 mm (0.008 in) ... Undercut to 0.5 to 0.8 mm (0.020 to 0.031 in) SEL022Z Assembly Apply high-temperature grease to lubricate the bearing, gears and frictional surface when assembling the starter. Carefully observe the following instructions. PINION PROTRUSION LENGTH ADJUSTMENT Clearance ''!'' With pinion driven out by magnetic switch, push pinion back to remove slack and measure clearance ''!'' between the front edge of the pinion and the pinion stopper. Clearance ''!'': Refer to SDS (EL-51). SEL026Z Movement ''!'' Compare movement ''!'' in height of pinion when it is pushed out with magnetic switch energized and when it is pulled out by hand until it touches stopper. Movement ''!'': Refer to SDS (EL-51). SEL497D EL-50 STARTING SYSTEM Assembly (Cont'd) + Not in the specified value ... Adjust by adjusting plate. SEL633BA Service Data and Specifications (SDS) STARTER S13-502 Type HITACHI make Reduction gear type Applied model System voltage RD28 V 12 No-load Terminal voltage V 11 Current A Less than 125 Revolution rpm 4,000 Minimum diameter of commutator mm (in) 35.5 (1.398) Minimum length of brush mm (in) 11 (0.43) Brush spring tension N (kg, lb) 28.4 - 34.3 (2.9 - 3.5, 6.4 - 7.7) Clearance between bearing metal and armature shaft mm (in) — Clearance ''!'' between pinion front edge and pinion stopper mm (in) — Movement ''!'' in height of pinion assembly mm (in) 0.3 - 2.0 (0.012 - 0.079) EL-51 CHARGING SYSTEM Wiring Diagram — CHARGE — YEL782A EL-52 CHARGING SYSTEM Trouble Diagnoses Before conducting an alternator test, make sure that the battery is fully charged.

A 30-volt voltmeter and suitable test probes are necessary for the test.

The alternator can be checked easily by referring to the Inspection Table. + Before starting, inspect the fusible link.

+ Use fully charged battery. WITH IC REGULATOR Ignition switch ''ON'' Warning lamp ''OFF'' Disconnect connector (S, L) and ground L harness side. Check the following: + Warning lamp bulb + Fuse for warning lamp Warning lamp ''OFF'' Warning lamp ''ON'' Damaged IC regulator. Replace. Warning lamp ''ON'' Engine start. Engine speed: 1,500 rpm Warning lamp ''ON'' Warning lamp ''OFF'' OK Check the following: + Drive belt + Fuse for S terminal + Connector (S, L terminal) connection Engine idling Warning lamp ''OFF'' OK More than 15.5V Damaged IC regulator. Replace. No generation Field circuit is open. Warning lamp ''ON'' Engine speed: 1,500 rpm (Measure B terminal voltage) Warning lamp: ''CHARGE'' warning lamp in combination meter Note: + If the inspection result is OK even though the charging system is malfunctioning, check the B terminal connection. (Check the tightening torque.) + When field circuit is open, check condition of rotor coil, rotor slip ring and brush. If necessary, replace faulty parts with new ones. MALFUNCTION INDICATOR The IC regulator warning function activates to illuminate ''CHARGE'' warning lamp, if any of the following symptoms occur while alternator is operating: + Excessive voltage is produced. + No voltage is produced. EL-53 CHARGING SYSTEM Construction YEL783A Removal and Installation CAUTION: + Start service operation after removing the negative terminal from the battery. + Also remove the undercover, if equipped, before servicing. MEL610I Disassembly REAR COVER CAUTION: Rear cover may be hard to remove because a ring is used to lock outer race of rear bearing. To facilitate removal of rear cover, heat just bearing box section with a 200W soldering iron. Do not use a heat gun, as it can damage diode assembly. SEL032Z EL-54 CHARGING SYSTEM Disassembly (Cont'd) REAR BEARING CAUTION: + Do not reuse rear bearing after removal. Replace with a new one. + Do not lubricate rear bearing outer race. Inspection ROTOR CHECK SEL033Z 1. Resistance test Resistance: Refer to SDS (EL-56). + Not within the specified values ... Replace rotor.

2. Insulator test + Continuity exists ... Replace rotor.

3. Check slip ring for wear. Slip ring minimum outer diameter: Refer to SDS (EL-56). + Not within the specified values ... Replace rotor. BRUSH CHECK 1. + 2. + Check smooth movement of brush. Not smooth ... Check brush holder and clean. Check brush for wear. Replace brush if it is worn down to the limit line. SEL631DA STATOR CHECK 1. Continuity test + No continuity ... Replace stator. SEL108E 2. Ground test + Continuity exists ... Replace stator. SEL109E EL-55 CHARGING SYSTEM Assembly RING FITTING IN REAR BEARING Fix ring into groove in rear bearing so that it is as close to the adjacent area as possible. CAUTION: Do not reuse rear bearing after removal. + SEL044Z REAR COVER INSTALLATION 1. Fit brush assembly, diode assembly, regulator assembly and stator. 2. Push brushes up with fingers and install them to rotor. Take care not to damage slip ring sliding surface. SEL048Z SEL049Z Service Data and Specifications (SDS) ALTERNATOR A3TA4399 Type MITSUBISHI Applied model RD28 Nominal rating V-A Ground polarity 12-100 Negative Minimum revolution under no-load (When 13.5V is applied) rpm Hot output current (When 13.5V is applied) A/rpm Less than 1,300 More than 35/1,300 More than 72/2,500 Regulated output voltage V Minimum length of brush mm (in) 5 (0.20) N (g, oz) 4.6 - 5.8 (470 - 590, 16.58 - 20.81) Brush spring pressure Slip ring minimum outer diameter mm (in) Rotor (Field coil) resistance EL-56 Ω 14.1 - 14.7 22.1 (0.870) 2.1 - 2.5 COMBINATION SWITCH Check RHD MODELS AND LHD MODELS CEL781 EL-57 COMBINATION SWITCH Replacement For removal and installation of spiral cable, refer to RS section [''Installation — Air Bag Module and Spiral Cable'', ''SUPPLEMENTAL RESTRAINT SYSTEM (SRS)''].

+ Each switch can be replaced without removing combination switch base. MEL304D + To remove combination switch base, remove base attaching screw. + Before installing the steering wheel, align the steering wheel guide pins with the screws which secure the combination switch as shown in the left figure. MEL326G SEL151V EL-58 STEERING SWITCH Check WITH ASCD CEL782 EL-59 STEERING SWITCH Check (Cont'd) WITHOUT ASCD CEL783 EL-60 HEADLAMP — Conventional Type — Wiring Diagram — H/LAMP — TEL403A EL-61 HEADLAMP — Conventional Type — Trouble Diagnoses Symptom LH headlamps do not operate. Possible cause 1. Bulb 2. Grounds 3. 15A fuse E25 and E40 1. Bulb 2. Grounds 3. 15A fuse E25 1. Check bulb. 2. Check grounds E25 and E40 . 3. Check 15A fuse (No. 51 , located in fuse and fusible link box). Verify battery positive voltage is present at terminal j 8 of lighting switch. 4. Check lighting switch. 4. Lighting switch RH headlamps do not operate. Repair order and E40 1. Check bulb. 2. Check grounds E25 and E40 . 3.

Check 15A fuse (No. 52 , located in fuse and fusible link box). Verify battery positive voltage is present at 5 of lighting switch. terminal j 4. Check lighting switch. 4. Lighting switch LH high beams do not operate, but 1. Bulbs LH low beam operates. 2. Open in LH high beams circuit 3. Lighting switch LH low beam does not operate, but 1. Bulb LH high beam operates. 2. Open in LH low beam circuit 3. Lighting switch RH high beams do not operate, but 1. Bulbs RH low beam operates. 2. Open in RH high beams circuit 3. Lighting switch RH low beam does not operate, but 1. Bulb RH high beam operates. 2. Open in RH low beam circuit 3. Lighting switch High beam indicator does not work. 1. Bulb 2. Grounds M30 and M98 3. Open in high beam circuit EL-62 1. Check bulbs. 2. Check R/L wire between lighting switch and LH headlamps for an open circuit. 3. Check lighting switch. 1. Check bulb. 2. Check R/G wire between lighting switch and LH headlamp for an open circuit. 3.

Check lighting switch. 1. Check bulbs. 2. Check R/Y wire between lighting switch and RH headlamps for an open circuit. 3. Check lighting switch.

1. Check bulb. 2. Check R/B wire between lighting switch and RH headlamp for an open circuit.

3. Check lighting switch. 1. Check bulb in combination meter. 2. Check grounds M30 and M98 . 3. Check R/L wire between lighting switch and combination meter for an open circuit. HEADLAMP — Conventional Type — Bulb Replacement The headlamp is a semi-sealed beam type which uses a replaceable halogen bulb. The bulb can be replaced from the engine compartment side without removing the headlamp body. + Grasp only the plastic base when handling the bulb. Never touch the glass envelope. 1.

Disconnect the battery cable. 2. Turn the bulb retaining ring counterclockwise until it is free from the headlamp reflector, and then remove it. 3. Disconnect the harness connector from the back side of the bulb. 4.

Remove the headlamp bulb carefully. Do not shake or rotate the bulb when removing it. 5. Install in the reverse order of removal. CAUTION: Do not leave headlamp reflector without bulb for a long period of time.

Dust, moisture, smoke, etc. entering headlamp body may affect the performance of the headlamp. Remove headlamp bulb from the headlamp reflector just before a replacement bulb is installed. SEL995K Aiming Adjustment When performing headlamp aiming adjustment, use an aiming machine, aiming wall screen or headlamp tester. Aimers should be in good repair, calibrated and operated in accordance with respective operation manuals. If any aimer is not available, aiming adjustment can be done as follows: For details, refer to the regulations in your own country. a. Keep all tires inflated to correct pressures. b. Place vehicle and tester on one and same flat surface. c. See that there is no-load in vehicle (coolant, engine oil filled up to correct level and full fuel tank) other than the driver (or equivalent weight placed in driver's position). CAUTION: Be sure aiming switch is set to ''0'' when performing aiming adjustment on vehicles equipped with headlamp aiming control. SEL466V EL-63 HEADLAMP — Conventional Type — Aiming Adjustment (Cont'd) LOW BEAM 1. Turn headlamp low beam on. 2. Use adjusting screws to perform aiming adjustment. + First tighten the adjusting screw all the way and then make adjustment by loosening the screw. CEL735 Adjust headlamps so that main axis of light is parallel to center line of body and is aligned with point P shown in illustration. + Figure to the left shows headlamp aiming pattern for driving on right side of road; for driving on left side of road, aiming pattern is reversed. + Dotted lines in illustration show center of headlamp. ''H'': Horizontal center line of headlamps ''WL'': Distance between each headlamp center ''L'': 5,000 mm (196.85 in) ''C'': 63 mm (2.48 in) + SEL254I EL-64 HEADLAMP — Daytime Light System — System Description OPERATION Headlamp system on vehicles for North Europe contains a daytime light system. The unit operates to illuminate headlamps low beam, parking, tail, license lamps and illuminations automatically in the following conditions. + The engine is running with lighting switch in OFF position.

When the any of following conditions exists, the daytime light operation will be canceled. + Ignition switch is in any position other than ON + Engine is stopped + Lighting switch is turned to 1st or 2nd position. If the daytime light system is canceled, lighting switch operations are the same as for conventional light system. DAYTIME LIGHT IS OPERATING (With engine running and lighting switch in OFF position) SEL490V With engine running, power is supplied + from alternator terminal L + through daytime light control unit terminal j 8 + to base of transistor-2 in the daytime light control unit. The transistor-2 supplies ground path to all relays. Then the relays energize to illuminate lamps. EL-65 HEADLAMP — Daytime Light System — System Description (Cont'd) DAYTIME LIGHT IS CALCELED (Lighting switch in 1st or 2nd position or ignition switch in START position) SEL491V + Ignition switch is in START position + Lighting switch is in 1st or 2nd position. When one of the above conditions exists, power is supplied + to base of the transistor-1 in daytime light control unit + through daytime light control unit terminal j 11 or j 6 . And then, power supply path to the base transistor-2 is interrupted to cancel daytime light operation. EL-66 HEADLAMP — Daytime Light System — Wiring Diagram — DTRL — TEL635A EL-67 HEADLAMP — Daytime Light System — Wiring Diagram — DTRL — (Cont'd) TEL636A EL-68 HEADLAMP — Daytime Light System — Trouble Diagnoses DAYTIME LIGHT CONTROL UNIT INSPECTION TABLE Terminal No. Connections INPUT (I)/ OUTPUT (O) Operated condition Voltage (V) (Approximate values) 1 Power source for illumination & tail lamp — — 12 2 Power source for headlamp LH — — 12 3 Power source for headlamp RH — — 12 ON (daytime light operating*) 12 4 Headlamp RH O OFF 0 ON (daytime light operating*) 12 OFF 0 5 6 7 8 Headlamp LH Start signal Power source Alternator ''L'' terminal O I — Ground — 10 Illumination & tail lamp O 11 Lighting switch 12 ON, ACC or OFF 0 ON or START 12 ACC or OFF 0 Running 12 Stopped 0 Ignition switch I 9 START Ignition switch Engine — — ON (daytime light operating*) 12 OFF 0 1STz2ND position 12 OFF 0 I *: Daytime light operating: Lighting switch in ''OFF'' position with engine running. Bulb Replacement Refer to ''HEADLAMP'' (EL-63). Aiming Adjustment Refer to ''HEADLAMP'' (EL-63). EL-69 HEADLAMP — Headlamp Aiming Control — System Description CIRCUIT OPERATION [Example] Aiming switch ''0'' + When the aiming switch is set to ''0'', the motor will not start. This is because the power terminals are positioned at the nonconductive section of the sensor's rotary unit. SEL465M Aiming switch ''0'' → ''1'' + + + When the aiming switch is moved from ''0'' to ''1'', the sensor's conductive section activates the relay. Power is supplied through the relay to the motor. The headlamps will then move in the ''DOWN'' direction. The motor continues to rotate while the rotary unit of the sensor moves from point A to point B. The power terminals will then be positioned at the nonconductive section, disconnecting the power to the motor. The motor will then stop. SEL364P Aiming switch ''1'' → ''0'' + + When the aiming switch is moved from ''1'' to ''0'', the sensor's conductive section activates the relay. Power is supplied through the relay to the motor. The motor will rotate to move the headlamps in the ''UP'' direction. When the rotary unit of the sensor moves from point B to point A, the motor will stop. SEL365P EL-70 HEADLAMP — Headlamp Aiming Control — Wiring Diagram — H/AIM — TEL406A EL-71 HEADLAMP — Headlamp Aiming Control — Wiring Diagram — H/AIM — (Cont'd) TEL407A EL-72 PARKING, LICENSE AND TAIL LAMPS Wiring Diagram — TAIL/L —/Type A LHD MODELS Rear combination lamps are located on rear bumper. YEL784A EL-73 PARKING, LICENSE AND TAIL LAMPS Wiring Diagram — TAIL/L —/Type A (Cont'd) YEL785A EL-74 PARKING, LICENSE AND TAIL LAMPS Wiring Diagram — TAIL/L —/Type B RHD MODELS Rear combination lamps are located on rear bumper. YEL786A EL-75 PARKING, LICENSE AND TAIL LAMPS Wiring Diagram — TAIL/L —/Type B (Cont'd) YEL787A EL-76 Stop Lamp Wiring Diagram — STOP/L —/Type A Rear combination lamps are located on rear bumper. YEL788A EL-77 BACK-UP LAMP Wiring Diagram — BACK/L —/LHD Models TEL411A EL-78 BACK-UP LAMP Wiring Diagram — BACK/L —/RHD Models TEL640A EL-79 REAR FOG LAMP Wiring Diagram — R/FOG — TEL641A EL-80 TURN SIGNAL AND HAZARD WARNING LAMPS Wiring Diagram — TURN —/Type A LHD MODELS Rear combination lamps are located on rear bumper. YEL789A EL-81 TURN SIGNAL AND HAZARD WARNING LAMPS Wiring Diagram — TURN —/Type A (Cont'd) YEL790A EL-82 TURN SIGNAL AND HAZARD WARNING LAMPS Wiring Diagram — TURN —/Type B RHD MODELS Rear combination lamps are located on rear bumper. YEL791A EL-83 TURN SIGNAL AND HAZARD WARNING LAMPS Wiring Diagram — TURN —/Type B (Cont'd) YEL792A EL-84 TURN SIGNAL AND HAZARD WARNING LAMPS Trouble Diagnoses Symptom Possible cause Repair order Turn signal and hazard warning lamps do not operate. 1. Hazard switch 1. Check hazard switch. 2. Combination flasher unit 2. Refer to combination flasher unit check. 3. Open in combination flasher unit 3. Check wiring to combination flasher unit for open circircuit cuit. Turn signal lamps do not operate but hazard warning lamps operate. 1. 7.5A fuse 1. Check 7.5A fuse [No. 11 , located in fuse block (J/B)]. Turn ignition switch ON and verify battery positive voltage is present at terminal j 2 of hazard switch. 2. Hazard switch 2. Check hazard switch. 3. Turn signal switch 3. Check turn signal switch. 4. Open in turn signal switch circuit 4. Check harness between combination flasher unit and turn signal switch for open circuit. Hazard warning lamps do not oper- 1. 15A fuse ate but turn signal lamps operate. 2. Hazard switch 3.

Open in hazard switch circuit Front turn signal lamp LH or RH does not operate. 1. Bulb 2. Grounds and E40 Rear turn signal lamp LH or RH does not operate. 1. Bulb 2. Grounds B23 and B112 and D106 D83 LH and RH turn indicators do not operate. LH or RH turn indicator does not operate. 1. Check 10A fuse (No. 48 , located in fuse and fusible link box). Verify battery positive voltage is present at terminal j 3 of hazard switch. 2. Check hazard switch. 3. Check harness between combination flasher unit and hazard switch for open circuit.

1. Check bulb.

2. Check grounds E25 and E40 1. Check bulb. 2. Check grounds B23 and D83 1. Ground 1. Check grounds M30 and M98 1.

Bulb 1. Check bulb in combination meter. E25 or . or B112 and D106 . . Electrical Components Inspection COMBINATION FLASHER UNIT CHECK + + Before checking, ensure that bulbs meet specifications. Connect a battery and test lamp to the combination flasher unit, as shown.

Combination flasher unit is properly functioning if it blinks when power is supplied to the circuit. SEL122E EL-85 ILLUMINATION Schematic TEL417A EL-86 ILLUMINATION Wiring Diagram — ILL — TEL418A EL-87 ILLUMINATION Wiring Diagram — ILL — (Cont'd) TEL419A EL-88 ILLUMINATION Wiring Diagram — ILL — (Cont'd) TEL420A EL-89 ILLUMINATION Wiring Diagram — ILL — (Cont'd) TEL421A EL-90 ILLUMINATION Wiring Diagram — ILL — (Cont'd) TEL422A EL-91 ILLUMINATION Wiring Diagram — ILL — (Cont'd) TEL423A EL-92 INTERIOR ROOM LAMP — With Timer — System Description Front interior room lamp timer is controlled by smart entrance control unit while interior room lamp switch is in the ''DOOR'' position. Smart entrance control unit does not control rear interior room lamp. TIMER OPERATION Interior room lamp timer keeps interior room lamp illuminated for about 15 seconds when: + driver's door is unlocked while key is out of ignition key cylinder, + key is withdrawn from ignition key cylinder while driver's door is closed, and + driver's door is opened and then closed while ignition switch is not in the ''ON'' position. The timer is cancelled, and interior room lamp turns off when: + driver's door is locked, or + ignition switch is turned ''ON''. ON-OFF CONTROL When the front driver side door, front passenger side door, rear LH door, rear RH door or back door is opened, interior room lamp turns on. When driver side door is opened and then closed while ignition switch is not in the ON position, interior room lamp timer operates. (Timer does not operate when doors other than the driver side door is opened and closed.) EL-93 INTERIOR ROOM LAMP — With Timer — Schematic TEL611A EL-94 INTERIOR ROOM LAMP — With Timer — Wiring Diagram — ROOM/L —/LHD Models TEL607A EL-95 INTERIOR ROOM LAMP — With Timer — Wiring Diagram — ROOM/L —/LHD Models (Cont'd) TEL608A EL-96 INTERIOR ROOM LAMP — With Timer — Wiring Diagram — ROOM/L —/LHD Models (Cont'd) TEL609A EL-97 INTERIOR ROOM LAMP — With Timer — Wiring Diagram — ROOM/L —/RHD Models TEL646A EL-98 INTERIOR ROOM LAMP — With Timer — Wiring Diagram — ROOM/L —/RHD Models (Cont'd) TEL647A EL-99 INTERIOR ROOM LAMP — With Timer — Trouble Diagnoses DIAGNOSTIC PROCEDURE SYMPTOM: Front interior room lamp does not turn on when any door is opened, or timer does not operate properly. Does room lamp turn on when room lamp switch is in ''ON'' position? No c Check the following. + Bulb + 10A fuse [No. 20 , located in the fuse block (J/B)] + Harness for open or short between fuse and room lamp + Room lamp ground condition Yes SEL152VA . Does key warning chime operate properly? No c Yes SEL153VA Check ''WARNING CHIME'' system. (Refer to EL-135.) . Does power door lock operate using driver side knob lock switch? No c Yes Check ''POWER DOOR LOCK'' system. (Refer to EL-204.) . CHECK ROOM LAMP OUTPUT SIGNAL. 1. Turn room lamp switch to ''DOOR'' position. 2. Disconnect control unit connector.

3. Check voltage between control unit terminal j 17 and ground. Battery voltage should exist.

NG c Check harness for open or short between room lamp and control unit. OK . CHECK DOOR SWITCH INPUT SIGNAL. 1. Connect control unit connector. 2. Check voltage between control unit terminal j 10 and ground. Condition Voltage [V] At least one door is opened. 0 All doors are closed. Approx. 12 OK . Replace control unit. EL-100 NG c Check the following. + Door switch + Door switch ground condition + Harness for open or short between control unit and door switch MAP AND VANITY MIRROR LAMPS Wiring Diagram — INT/L — TEL424A EL-101 METER AND GAUGES System Description UNIFIED CONTROL METER Speedometer, odo/trip meter, tachometer, fuel gauge and water temperature gauge are controlled totally by control unit combined with speedometer. + Digital meter is adopted for odo/trip meter.* *The record of the odo meter is kept even if the battery cable is disconnected. The record of the trip meter is erased when the battery cable is disconnected. + Odo/trip meter segment can be checked in diagnosis mode. + Meter/gauge can be checked in diagnosis mode. Note: Sub fuel gauge is not controlled by the control unit. + HOW TO CHANGE THE DISPLAY FOR ODO/TRIP METER SEL253V Note: Turn ignition switch to the ''ON'' position to operate odo/trip meter. EL-102 METER AND GAUGES Combination Meter CEL785 EL-103 METER AND GAUGES Wiring Diagram — METER —/LHD Models TEL426A EL-104 METER AND GAUGES Wiring Diagram — METER —/LHD Models (Cont'd) TEL427A EL-105 METER AND GAUGES Wiring Diagram — METER —/RHD Models TEL650A EL-106 METER AND GAUGES Wiring Diagram — METER —/RHD Models (Cont'd) TEL651A EL-107 METER AND GAUGES Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode DIAGNOSIS FUNCTION + + Odo/trip meter segment can be checked in diagnosis mode. Meters/gauges (except for sub fuel gauge) can be checked in diagnosis mode. HOW TO ALTERNATE DIAGNOSIS MODE 1. Turn ignition switch to ON and change odo/trip meter to ''TRIP A'' or ''TRIP B''. 2. Turn ignition switch to OFF. 3. Turn ignition switch to ON when pushing odo/trip meter switch. 4. Confirm that trip meter indicates ''000.0''. 5. Push odo/trip meter switch more than three times within 5 seconds. 6. All odo/trip meter segments should be turned on. NOTE: If some segments are not turned on, speedometer (unified meter control unit) with odo/trip meter should be replaced.

At this point, the unified control meter is turned to diagnosis mode. SEL110V 7.

Push odo/trip meter switch. Indication of each meter/gauge should be as shown left during pushing odo/trip meter switch if it is no malfunctioning. NOTE: It takes about 1 minute for indication of fuel gauge to become stable. SEL111V EL-108 METER AND GAUGES Flexible Print Circuit (FPC) Tachometer, fuel gauge and water temperature gauge are connected with unified meter control unit (speedometer) by Flexible Print Circuit (FPC) connector. When replace or remove and install unified control unit (speedometer), disconnect and connect FPC connector according to the following steps. DISCONNECT 1. Open connector cover. 2. Release connector lock by holding both ends of it and pulling it up. 3. Disconnect FPC by pulling it up. SEL109V CONNECT 1. Insert FPC into connector and lock connector pushing FPC downward. 2. Check secure connection of FPC. 3.

Check continuity of check land terminal for secure connection of FPC. Resistance: 0Ω 4. Close connector cover. SEL114V EL-109 METER AND GAUGES Trouble Diagnoses PRELIMINARY CHECK CHECK-IN . Can Diagnosis mode be activated? Refer to ''Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode'', EL-108. No c Do meter warning lamps operate? Yes c No Check the screws securing speedometer and FPC. (The screws are located behind the combination meter. For details refer to EL-114.) c Can Diagnosis mode be activated? m Yes No Yes . Check power supply and ground circuit. Refer to ''POWER SUPPLY AND GROUND CIRCUIT CHECK'', EL-111. . Check meter/gauge operation in Diagnosis mode. b . . Malfunction is indicated in Diagnosis mode. No malfunction is indicated in Diagnosis mode. . . Check the following: + FPC connector connection Refer to ''Flexible Print Circuit (FPC)'', EL-109. + Screws securing the malfunctioning meter/gauge (The screws are located behind the combination meter. For details refer to EL-114.) SYMPTOM CHART 2 Refer to EL-111. NG OK . SYMPTOM CHART 1 Refer to EL-111. . Reconnect FPC connector and check continuity between check land terminals and/or repair malfunctioning part. Refer to ''Flexible Print Circuit (FPC)'', EL-109. EL-110 . Replace speedometer (unified meter control unit). METER AND GAUGES Trouble Diagnoses (Cont'd) SYMPTOM CHART Symptom chart 1 (Malfunction is indicated in Diagnosis mode) Symptom Speedometer and/or odo/trip meter indicate(s) malfunction in Diagnosis mode. Possible causes Repair order + Speedometer (Unified meter control unit) + Replace speedometer (unified meter control unit). + Meter/Gauge + Speedometer (Unified meter control unit) 1. Check resistance of meter/gauge indicating malfunction. If the resistance is NG, replace the meter/gauge. Refer to ''METER/GAUGE RESISTANCE CHECK'', EL-114. 2.

If the resistance is OK, replace speedometer (unified meter control unit). Multiple meter/gauge indicate malfunction in Diagnosis mode. One of tachometer/fuel gauge/ water temp. gauge indicates malfunction in Diagnosis mode. Symptom chart 2 (No malfunction is indicated in Diagnosis mode) Symptom Speedometer and odo/trip meter are malfunctioning. Possible causes Repair order 1. Sensor - Speedometer, Odo/Trip meter 2.

FPC connector 1. Check vehicle speed sensor. INSPECTION/VEHICLE SPEED SENSOR (Refer to EL-112.) 2.

Check FPC connector. Refer to ''Flexible Print Circuit (FPC)'', EL-109. 3. Replace speedometer (unified meter control unit). 3. Speedometer (Unified meter control unit) Multiple meter/gauge are malfunctioning. (except speedometer, odo/trip meter) 1. FPC connector One of tachometer/fuel gauge/ water temp. gauge is malfunctioning. 1. Sensor/Engine revolution signal - Tachometer 1. Check FPC connector. Refer to ''Flexible Print Circuit (FPC)'', EL-109. 2. Replace speedometer (unified meter control unit). 2.

Speedometer (Unified meter control unit) 1. Check the sensor for malfunctioning meter/gauge. INSPECTION/ENGINE REVOLUTION SIGNAL (Refer to EL-113.) INSPECTION/FUEL TANK GAUGE (Refer to EL-113.) INSPECTION/THERMAL TRANSMITTER (Refer to EL-114.) 2. Check FPC connector. Refer to ''Flexible Print Circuit (FPC)'', EL-109.

3. Replace speedometer (unified meter control unit). - Fuel gauge - Water temp. gauge 2. FPC connector 3. Speedometer (Unified meter control unit) Before starting trouble diagnoses above, perform PRELIMINARY CHECK, EL-110. POWER SUPPLY AND GROUND CIRCUIT CHECK Power supply circuit check Terminals Ignition switch position ⊕ @ OFF ACC ON j 33 Ground Battery voltage Battery voltage Battery voltage j 9 Ground 0V 0V Battery voltage If NG, check the following.

+ 7.5A fuse [No. 24 , located in fuse block (J/B)] + 10A fuse [No. 28 , located in fuse block (J/B)] + Harness for open or short between fuse and combination meter SEL419V EL-111 METER AND GAUGES Trouble Diagnoses (Cont'd) Ground circuit check Terminals Continuity j 5 - Ground Yes SEL420V INSPECTION/VEHICLE SPEED SENSOR CHECK VEHICLE SPEED SENSOR OUTPUT. 1. Remove vehicle speed sensor from transmission. 2. Check voltage between combination meter terminals j 43 and j 45 while quickly turning speed sensor pinion. Voltage: Approx. 0.5V OK c Vehicle speed sensor is OK. c Replace vehicle speed sensor. NG . CHECK VEHICLE SPEED SENSOR. Check resistance between vehicle speed sensor terminals j 1 and j 2 .

Resistance: Approx. 250Ω OK .

SEL421V Check harness for open or short between speedometer and vehicle speed sensor. SEL422V EL-112 NG METER AND GAUGES Trouble Diagnoses (Cont'd) INSPECTION/ENGINE REVOLUTION SIGNAL Terminals Engine RD28 (Injection) Check item DC voltage ⊕ j 44 Explanation @ Higher rpm = Higher voltage Lower rpm = Lower voltGround age Voltage should change with rpm.

SEL423V Engine TB45E, RD28 (Injection) Check item + Harness for open or short and connection SEL461V INSPECTION/FUEL TANK GAUGE (MAIN) CHECK GROUND CIRCUIT FOR FUEL TANK GAUGE UNIT.

Check harness continuity between fuel tank gauge unit terminal j 2 and ground. Continuity should exist. NG c Repair harness or connector. c Repair or replace.
Refer to FE section. c Repair harness or connector. OK . SEL424V CHECK GAUGE UNITS. Refer to ''FUEL TANK GAUGE UNIT CHECK'' (EL-115). NG OK . SEL425V CHECK HARNESS FOR OPEN OR SHORT. 1. Disconnect combination connector and fuel tank gauge unit connector.
2. Check continuity between combination meter terminal j 46 and fuel tank gauge unit terminal j 1 . Continuity should exist. 3. Check continuity between combination meter terminal j 46 and ground. Continuity should not exist. OK . Fuel tank gauge is OK. EL-113 NG METER AND GAUGES Trouble Diagnoses (Cont'd) INSPECTION/THERMAL TRANSMITTER NG CHECK THERMAL TRANSMITTER. Refer to ''THERMAL TRANSMITTER CHECK'' (EL-115).
c Repair or replace. OK . SEL426V CHECK HARNESS FOR OPEN OR SHORT. 1.
Disconnect combination connector and thermal transmitter connector. 2. Check continuity between combination meter terminal j 47 and thermal transmitter terminal j 1 . Continuity should exist. 3. Check continuity between combination meter terminal j 47 and ground. Continuity should not exist. NG c Repair harness or connector. OK . Thermal transmitter is OK. Electrical Components Inspection METER/GAUGE RESISTANCE CHECK 1. Disconnect FPC connector. Refer to ''Flexible Print Circuit (FPC)'' (EL-109). 2. Check resistance between installation screws of meter/gauge. Screws Tachometer Fuel/Temp. gauge Sub fuel gauge Resistance Ω A-C A-C — Approx. 104 (±5) B-D B-C — Approx. 134 (±5) — — A-C Approx. 174 (±5) — — B-C Approx. 100 (±5) CEL736 EL-114 METER AND GAUGES Electrical Components Inspection (Cont'd) FUEL TANK GAUGE UNIT CHECK + For removal, refer to FE section.
Check the resistance between terminals j 1 and j 2 . Ohmmeter (+) Float position mm (in) (−) *1 j 1 j 2 Full Resistance value (Ω) 60 (2.36) Approx. 4 - 6 *2 1/2 179 (7.05) 32 - 33 *3 Empty 270 (10.63) 80 - 83 *1 and *3: When float rod is in contact *with stopper. CEL737 THERMAL TRANSMITTER CHECK Check the resistance between the terminals of thermal transmitter and body ground. Water temperature Resistance (Ω) 60°C (140°F) Approx. 170 - 210 100°C (212°F) Approx. 47 - 53 MEL424F VEHICLE SPEED SENSOR CHECK 1. Remove vehicle speed sensor from transmission. 2. Turn vehicle speed sensor pinion quickly and measure voltage between terminals j 2 and j 1 . CEL739 EL-115 COMPASS AND THERMOMETER System Description SEL713U This unit displays the following items: + Earth magnetism and heading direction of vehicle. + Outside air temperature. + Caution for frozen road surfaces. OUTSIDE TEMPERATURE DISPLAY Push the switch when the ignition key is in the ''ACC'' or ''ON'' position. The outside temperature will be displayed in ''°F''. + Selecting the indication range Push the switch to change from ''°F'' to ''°C''. + When the outside temperature drops below freezing point, ICE is displayed on the unit. + When the outside temperature is between 55°C (130°F) and 70°C (158°F), the display shows 55°C (130°F). + When the outside temperature is lower than −30°C (−20°F) or higher than 70°C (158°F), the display shows only ''- - -'' though it is operating. This is not a problem. + The indicated temperature on the thermometer is not readily affected by engine heat. It changes only when one of the following conditions is present. a) The temperature detected by the ambient air temperature sensor is lower than the indicated temperature on the thermometer. b) The difference in temperature detected during a period of 40 seconds is less than 1°C (1.8°F) when vehicle speed has been greater than 24 km/h (15 MPH) for more than 100 seconds. (This is to prevent the indicated temperature from being affected by engine heat or cooling fan operation during low-speed driving.) c) The ignition key has been turned to the ''OFF'' position for more than 4 hours.
(The engine is cold.) DIRECTION DISPLAY Push the switch when the ignition key is in the ''ACC'' or ''ON'' position. The direction will be displayed. EL-116 COMPASS AND THERMOMETER Wiring Diagram — COMPAS — TEL428A EL-117 COMPASS AND THERMOMETER Trouble Diagnoses PRELIMINARY CHECK FOR THERMOMETER Turn the ignition key switch to the ''ACC'' position. . Cool down the ambient air temperature sensor with water or ice, so that the indicated temperature falls. . Does the indicated temperature fall? . No c The system is malfunctioning..1 c The system is malfunctioning..1 Yes Leave the vehicle for 10 minutes, so that the indicated temperature rises. . With the ignition key in the ''ACC'' position, disconnect and reconnect the ambient air temperature sensor connector. . Does the indicated temperature rise? . No Yes The system is OK. .1: Check the system following ''INSPECTION/COMPASS AND THERMOMETER''. INSPECTION/COMPASS AND THERMOMETER Symptom No display at all Possible causes Repair order 1. 7.5A fuse 2. Ground circuit 3. Compass and thermometer 1. Check 7.5A fuse [No. 9 , located in fuse block (J/B)]. Turn the ignition switch ON and verify that battery positive voltage is at terminal j 2 of compass and thermometer. 2. Check ground circuit for compass and thermometer. 3. Replace compass and thermometer. Forward direction indication slips off the mark or incorrect. 1. Drive the vehicle and turn at an angle of 90°.
1.
In manual correction mode (Bar and display vanish.) 2. Zone variation change is not 2. Perform the zone variation change. done. Compass reading remains unchanged. 1. Vehicle speed sensor is not entered. 2. Compass and thermometer 1. Check harness for open or short between combination meter terminal j 26 and compass and thermometer terminal j 8 . 2. Replace compass and thermometer. Displays wrong temperature when ambient temperature is between −30°C (−20°F) and 55°C (130°F). (See NOTE) 1. Check operation 2. Ambient air temperature sensor circuit 3. Vehicle speed sensor is not entered. 4. Ambient air temperature sensor 5. Compass and thermometer 1. Perform preliminary check shown below. 2. Check harness for open or short between ambient air temperature sensor and compass and thermometer. 3. Check harness for open or short between combination meter terminal j 26 and compass and thermometer terminal j 8 . 4. Replace ambient air temperature sensor. 5. Replace compass and thermometer. NOTE: + When the outside temperature is between 55°C (130°F) and 70°C (158°F), the display shows 55°C (130°F). When the outside temperature is lower than −30°C (−20°F) or higher than 70°C (158°F), the display shows only ''- - -''. + The indicated temperature on the thermometer is not readily affected by engine heat. It changes only when one of the following conditions (shown on next page) is present. EL-118 COMPASS AND THERMOMETER Trouble Diagnoses (Cont'd) a) The temperature detected by the ambient air temperature sensor is lower than the indicated temperature on the thermometer. b) The difference in temperature detected during a period of 40 seconds is less than 1°C (1.8°F) when vehicle speed has been greater than 24 km/h (15 MPH) for more than 100 seconds. (This is to prevent the indicated temperature from being affected by engine heat or cooling fan operation during low-speed driving.) c) The ignition key has been turned to the ''OFF'' position for more than 4 hours. (The engine is cold.) Calibration Procedure For Compass The difference between magnetic North and geographical North can sometimes be great enough to cause false compass readings. In order for the compass to operate accurately in a particular zone, it must be calibrated using the following procedure. 1. Determine your location on the worldwide magnetic variation map on next page. Record your zone number. 2. Turn the ignition switch to ACC or ON position. 3. Push the ''Mode'' switch continuously for five seconds until the current zone entry number is displayed.
4. Press the ''Mode'' switch repeatedly until the desired zone number is displayed.
Once the desired zone number is displayed, stop pressing the ''Mode'' switch and the display will show compass direction after a few seconds. CORRECTION FUNCTIONS OF COMPASS The direction display is equipped with automatic correction function.
If the direction is not shown correctly, carry out initial correction. INITIAL CORRECTION PROCEDURE FOR COMPASS SEL065V 1. Pushing the ''Mode'' switch for about 10 seconds will enter the initial correction mode. The direction bar starts blinking. 2. Turn the vehicle slowly in an open, safe place. The initial correction is completed in one or two turns. NOTE: In places where the terrestrial magnetism is extremely disturbed, the initial correction may start automatically. EL-119 COMPASS AND THERMOMETER Calibration Procedure For Compass (Cont'd) SEL427V EL-120 WARNING LAMPS Schematic TEL697A EL-121 WARNING LAMPS Schematic (Cont'd) TEL698A EL-122 WARNING LAMPS Wiring Diagram — WARN — TEL699A EL-123 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL700A EL-124 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL701A EL-125 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL702A EL-126 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL703A EL-127 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL704A EL-128 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL705A EL-129 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL706A EL-130 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL707A EL-131 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) LHD MODELS TEL708A EL-132 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) RHD MODELS TEL709A EL-133 WARNING LAMPS Electrical Components Inspection FUEL WARNING LAMP SENSOR CHECK + It will take a short time for the bulb to light. NOTE: Inspection for sub fuel warning lamp sensor is the same as for fuel warning lamp sensor. MEL828F OIL PRESSURE SWITCH CHECK Oil pressure kPa (bar, kg/cm2, psi) Continuity Engine start More than 10 - 20 (0.10 - 0.20, 0.1 - 0.2, 1 - 3) NO Engine stop Less than 10 - 20 (0.10 - 0.20, 0.1 - 0.2, 1 - 3) YES Check the continuity between the terminals of oil pressure switch and body ground. MEL425F DIODE CHECK Check continuity using an ohmmeter. Diode is functioning properly if test results are as shown in the figure at left. NOTE: Specification may vary depending on the type of tester. Before performing this inspection, be sure to refer to the instruction manual for the tester to be used. + + CEL520 + Diodes for warning lamps are built into the combination meter printed circuit. CEL740 EL-134 WARNING CHIME System Description The warning chime is combined with the smart entrance control unit. Both the ignition key and light warning chime will not sound, when ignition switch in the ON or START position. (When power supply exists at smart entrance control unit terminal j 12 .) IGNITION KEY WARNING CHIME With the key in the ignition key cylinder, the ignition switch in the OFF or ACC position, and the driver's door open, the warning chime will sound.
A battery positive voltage is supplied + from key switch terminal j 1 + to smart entrance control unit terminal j 1 . Ground is supplied + through driver side door switch + to smart entrance control unit terminal j 7 . LIGHT WARNING CHIME With ignition switch in the OFF or ACC position, driver's door open, and lighting switch in 1ST or 2ND position, warning chime will sound. A battery positive voltage is supplied + from lighting switch terminal j 12 or daytime light control unit 14 . + to smart entrance control unit terminal j Ground is supplied + through driver side door switch + to smart entrance control unit terminal j 7 .
EL-135 WARNING CHIME Wiring Diagram — CHIME —/LHD Models TEL441A EL-136 WARNING CHIME Wiring Diagram — CHIME —/RHD Models TEL654A EL-137 WARNING CHIME Trouble Diagnoses Light warning chime does not activate. EL-139 EL-139 DIAGNOSTIC PROCEDURE 3 SYMPTOM EL-138 DIAGNOSTIC PROCEDURE 2 (Key switch input signal check) REFERENCE PAGE DIAGNOSTIC PROCEDURE 1 (Lighting switch input signal check) SYMPTOM CHART X X Ignition key warning chime does not activate. X X All warning chimes do not activate. X DIAGNOSTIC PROCEDURE 1 (Lighting switch input signal check) CHECK LIGHTING SWITCH INPUT SIGNAL. Check voltage between control unit terminal j 14 and ground. SEL851UB Condition of lighting switch Voltage [V] 1ST or 2ND Approx. 12 OFF 0 OK . Go to DIAGNOSTIC PROCEDURE 3. EL-138 NG c Check the following. + 7.5A fuse (No. 42 , located in the fuse and fusible link box) for LHD models + Harness for open or short between control unit and lighting switch/ daytime light control unit WARNING CHIME Trouble Diagnoses (Cont'd) DIAGNOSTIC PROCEDURE 2 (Key switch input signal check) CHECK KEY SWITCH INPUT SIGNAL.
Check voltage between control unit terminal j 1 and ground. Condition of key switch Voltage [V] Key is inserted. Approx. 12 Key is withdrawn. 0 SEL852UB NG c OK Check the following. + Key switch Refer to ''Electrical Components Inspection'' (EL140). + 7.5A fuse [No. 24 , located in fuse block (J/B)] + Harness for open or short between key switch and fuse + Harness for open or short between control unit and key switch .
Go to DIAGNOSTIC PROCEDURE 3. DIAGNOSTIC PROCEDURE 3 CHECK POWER SUPPLY CIRCUIT FOR CONTROL UNIT. Check voltage between control unit terminals j 11 , j 12 and ground. Terminals ⊕ ACC j 11 Ground SEL853UB j 12 Ground c Ignition switch position OFF @ NG Check the following. + M92 circuit breaker + 7.5A fuse [No. 8 , located in the fuse block (J/B)] + Harness for open or short ON Approx. 12V 0V 0V Approx. 12V OK . CHECK GROUND CIRCUIT FOR CONTROL UNIT. Check continuity between control unit terminal j 18 and ground.
Continuity should exist. NG c Repair harness or connectors. OK . SEL854UB CHECK DOOR SWITCH INPUT SIGNAL. Check voltage between control unit terminal j 7 and ground. Condition of driver's door Driver side door is closed. Driver side door is open.
OK . Replace control unit. SEL855UB EL-139 Voltage [V] Approx.
12 0 NG c Check the following. + Driver side door switch Refer to ''Electrical Components Inspection'' (EL140). + Door switch ground circuit + Harness for open or short between control unit and door switch WARNING CHIME Electrical Components Inspection KEY SWITCH (insert) Check continuity between terminals when key is inserted in ignition key cylinder and key is removed from ignition key cylinder. Terminal No. j 1 -j 2 Condition Key is inserted. Key is removed. Continuity Yes No SEL462V DRIVER SIDE DOOR SWITCH Check continuity between terminals when door switch is pushed and released. Terminal No. j 1 -j 3 SEL463V EL-140 Condition Door switch is pushed. Door switch is released. Continuity No Yes FRONT WIPER AND WASHER System Description WIPER OPERATION The wiper switch is controlled by a lever built into the combination switch. There are three wiper switch positions: + LO speed + HI speed + INT (Intermittent) With the ignition switch in the ACC or ON position, power is supplied + through 20A fuse [No. , located in the fuse block (J/B)] 4 . + to wiper motor terminal j Low and high speed wiper operation Ground is supplied to wiper switch terminal j 17 through body grounds. When the wiper switch is placed in the LO position, ground is supplied + through terminal j 14 of the wiper switch + to wiper motor terminal j 2 . With power and ground supplied, the wiper motor operates at low speed. When the wiper switch is placed in the HI position, ground is supplied + through terminal j 16 of the wiper switch 3 . + to wiper motor terminal j With power and ground supplied, the wiper motor operates at high speed. Auto stop operation With wiper switch turned OFF, wiper motor will continue to operate until wiper arms reach windshield base. When wiper arms are not located at base of windshield with wiper switch OFF, ground is provided + from terminal j 14 of the wiper switch 2 , in order to continue wiper motor operation at low speed. + to wiper motor terminal j + through wiper amplifier (OUTPUT) combined with wiper switch and (with intermittent wiper) + through terminal j 13 of wiper switch 5 + to wiper motor terminal j + through terminal j 6 of the wiper motor, and + through body grounds. When wiper arms reach base of windshield, wiper motor terminals j 4 and j 5 are connected instead of terminals j 5 and j 6 . Wiper motor will then stop wiper arms at the PARK position. Intermittent operation The wiper motor operates the wiper arms one time at low speed at a set interval of approximately 3 to 13 seconds.
This feature is controlled by the wiper amplifier (INT SW) combined with wiper switch. When the wiper switch is placed in the INT position, ground is supplied to wiper amplifier. The desired interval time is input to wiper amplifier (INT VR) from wiper volume switch combined with wiper switch. Then intermittent ground is supplied + to wiper motor terminal j 2 + from terminal j 14 of wiper switch + through wiper amplifier (OUTPUT). The wiper motor operates at low speed at the desired interval. WASHER OPERATION With the ignition switch in the ACC or ON position, power is supplied + through 20A fuse [No. , located in the fuse block (J/B)] + to washer motor terminal j 2 . When the lever is pulled to the WASH position, ground is supplied through wiper switch + to washer motor terminal j 1 , and + to wiper amplifier (WASH SW) combined with wiper switch. With power and ground supplied, the washer motor operates.
When the lever is pulled to the WASH position for one second or more, the wiper motor operates at low speed for approximately 3 seconds to clean windshield. This feature is controlled by the wiper amplifier in the same manner as the intermittent operation. EL-141 FRONT WIPER AND WASHER Wiring Diagram — WIPER —/With Intermittent Wiper TEL442A EL-142 FRONT WIPER AND WASHER Removal and Installation WIPER ARMS SEL543TA 1. Prior to wiper arm installation, turn on wiper switch to operate wiper motor and then turn it ''OFF'' (Auto Stop). 2. Lift the blade up and then set it down onto glass surface to set the blade center to clearance ''L1'' & ''L2'' immediately before tightening nut. 3.
Eject washer fluid. Turn on wiper switch to operate wiper motor and then turn it ''OFF''. 4. Ensure that wiper blades stop within clearance ''L1'' & ''L2''. Clearance ''L1'': 25 mm (0.98 in) Clearance ''L2'': 23 mm (0.91 in) + Tighten wiper arm nuts to specified torque. Front wiper: 21 - 26 Nzm (2.1 - 2.7 kg-m, 15 - 20 ft-lb) + Before reinstalling wiper arm, clean up the pivot area as illustrated. This will reduce possibility of wiper arm looseness. SEL024J WIPER LINKAGE CEL741 EL-143 FRONT WIPER AND WASHER Removal and Installation (Cont'd) Removal 1. 2. 3. Be Remove 4 bolts that secure wiper motor. Detach wiper motor from wiper linkage at ball joint. Remove wiper linkage. careful not to break ball joint rubber boot. Installation + Grease ball joint portion before installation. 1. Installation is the reverse order of removal. Washer Nozzle Adjustment + Adjust washer nozzle with suitable tool as shown in the figure at left. Adjustable range: ±10° SEL241P Unit: mm (in) *1 180 (7.09) *5 70 (2.76) *2 170 (6.69) *6 40 (1.57) *3 290 (11.42) *7 370 (14.57) *4 200 (7.87) *8 470 (18.50) *: The diameters of these circles are less than 100 mm (3.94 in). SEL544T Washer Tube Layout CEL742 EL-144 REAR WIPER AND WASHER System Description WIPER OPERATION The rear wiper switch is controlled by a ring built into the combination switch.
There are two wiper switch positions: + ON (LO speed) + INT (Intermittent) With the ignition switch in the ON position, power is supplied + through 10A fuse (No. 18 , located in the fuse block) + to rear wiper motor terminal j 4 , and 5 . + to rear wiper amplifier terminal j Low speed wiper operation Ground is supplied to rear wiper switch terminal j 24 through body grounds. When the rear wiper is placed in the ON position, ground is supplied + through rear wiper switch terminal j 22 + to rear wiper relay terminal j 6 . Then ground is supplied + to rear wiper motor terminal j 1 + through rear wiper amplifier terminals j 2 and j 3 . With power and ground supplied, the wiper motor operates. Auto stop operation With the rear wiper switch turned OFF, rear wiper motor will continue to operate until wiper arm reaches rear window base. When wiper arm is not located at base of rear window with rear wiper switch OFF, ground is supplied + to rear wiper motor terminal j 1 + through rear wiper amplifier terminals j 2 ,j 7 and 3 , in order to continue rear wiper motor operation at low speed. + through rear wiper motor terminal j Ground is also supplied + to rear wiper motor terminal j 2 + through body grounds. When wiper arm reaches base of rear window, rear wiper motor terminals j 3 and j 4 are connected instead of terminals j 2 and j 3 . Rear wiper motor will then stop wiper arm at the PARK position. Intermittent operation The rear wiper motor operates the wiper arm one time at low speed at an interval of approximately 7 seconds. When the rear wiper switch is placed in the INT position, ground is supplied + to rear wiper amplifier terminal j 1 + through rear wiper switch terminal j 21 . Then the rear wiper motor operates intermittently in the same manner as the low speed wiper operation. WASHER OPERATION With the ignition switch in the ACC or ON position, power is supplied + through 10A fuse (No. 18 , located in the fuse block) 2 . + to rear washer motor terminal j When the ring is turned WASH position, ground is supplied + to rear washer motor terminal j 1 , and 4 + to rear wiper amplifier terminal j + through terminal j 23 of rear wiper switch. With power and ground is supplied, the rear washer motor operates. The rear wiper motor operates when the ring is turned to WASH position for one second or more and for approximately 3 seconds after the ring is released. This feature is controlled by the rear wiper amplifier in the same manner as the low speed wiper operation. EL-145 REAR WIPER AND WASHER Wiring Diagram — WIP/R —/LHD Models TEL444A EL-146 REAR WIPER AND WASHER Wiring Diagram — WIP/R —/LHD Models (Cont'd) TEL445A EL-147 REAR WIPER AND WASHER Wiring Diagram — WIP/R —/RHD Models TEL655A EL-148 REAR WIPER AND WASHER Wiring Diagram — WIP/R —/RHD Models (Cont'd) TEL656A EL-149 REAR WIPER AND WASHER Trouble Diagnoses REAR WIPER AMP. INSPECTION TABLE (Data are reference values.) Terminal No. 1 2 Item Intermittent switch Ground 4 Washer switch 5 Power supply 6 Wiper on switch 7 INT Less than 1V OFF, ON or WASH Approx. 10V ON Less than 1V OFF Approx. 12V Rear wiper switch Wiper motor (Ground) 3 Voltage (Approximate value) Condition Rear wiper switch — — WASH Less than 1V OFF Approx.
12V Rear wiper switch — Approx.
12V ON or WASH Less than 1V OFF or INT Approx. 12V Wiper is moving Less than 1V Wiper stop Approx. 12V Rear wiper switch Rear wiper switch should be placed in ''WASH'' or ''INT'' to inspect the value for wiper movement. Wiper amp. output SEL428V EL-150 REAR WIPER AND WASHER Removal and Installation WIPER ARM CEL779 1. Prior to wiper arm installation, turn on wiper switch to operate wiper motor and then turn it ''OFF'' (Auto Stop). 2. Lift the blade up and then set it down onto glass surface. Set the blade center to clearance ''E'' immediately before tightening nut.
3. Eject washer fluid. Turn on wiper switch to operate wiper motor and then turn it ''OFF''. 4. Ensure that wiper blades stop within clearance ''E''. Clearance ''E'': 20 mm (0.79 in) + Tighten windshield wiper arm nuts to specified torque. : 13 - 18 Nzm (1.3 - 1.8 kg-m, 9 - 13 ft-lb) + Before reinstalling wiper arm, clean up the pivot area as illustrated. This will reduce possibility of wiper arm looseness. SEL024J Washer Nozzle Adjustment + Adjust washer nozzle with suitable tool as shown in the figure at left. Adjustable range: ±10° (In any direction) SEL241P Unit: mm (in) *1 30 (1.18) *3 40 (1.57) *2 30 (1.18) *4 20 (0.79) CEL780 EL-151 REAR WIPER AND WASHER Washer Tube Layout CEL743 Check Valve + A check valve is provided in the washer fluid line. Be careful not to connect check valve to washer tube in the wrong direction.
SEL411H EL-152 HEADLAMP WIPER AND WASHER Wiring Diagram — HLC — TEL694A EL-153 HEADLAMP WIPER AND WASHER Electrical Components Inspection HEADLAMP WIPER MOTOR CHECK When wiper motor is locked, a protective circuit built into wiper motor activates to stop wiper motor. If wiper motor will not restart even after cause of problems has been eliminated, turn ignition switch OFF and leave it off for approx.
1 to 3 minutes. 1. Turn headlamp wiper switch OFF. 2. Connect ohmmeter and check continuity. Headlamp wiper motor Ohmmeter probe Continuity (+) (−) j 1 j 4 Yes j 1 j 2 Yes j 1 j 3 Yes j 3 j 5 No Stop position CEL813 Removal and Installation WIPER ARM Tighten nut to secure wiper arm with wiper blade held below lower stopper. After installing wiper arm, position wiper blade on stopper upper surface. + Tighten headlamp wiper arm nut to the specified torque. : 2.3 - 3.0 Nzm (0.23 - 0.31 kg-m, 20.0 - 26.9 in-lb) CEL814 Washer Tube Layout CEL815 Check Valve + A check valve is provided in the washer fluid line. Be careful not to connect check valve to washer tube in the wrong direction. SEL411H EL-154 HORN Wiring Diagram — HORN — TEL446A EL-155 CIGARETTE LIGHTER Wiring Diagram — CIGAR — TEL447A EL-156 CLOCK Wiring Diagram — CLOCK — TEL448A EL-157 REAR WINDOW DEFOGGER System Description The rear window defogger system is controlled by the smart entrance control unit. The rear window defogger operates only for approximately 15 minutes. Power is supplied at all times + to rear window defogger relay terminal j 3 + through 15A fuse (No. 43 , located in the fuse and fusible link box) and 6 + to rear window defogger relay terminal j + through 20A fuse (No. 44 , located in the fuse and fusible link box). With the ignition switch in the ON or START position, power is supplied + to the rear window defogger relay terminal j 1 and + to smart entrance control unit terminal j 12 + through 7.5A fuse [No. 8 , located in the fuse block (J/B)]. Ground is supplied to terminal j 2 of the rear window defogger switch through body grounds. When the rear window defogger switch is turned ON, ground is supplied + through terminal j 1 of the rear window defogger switch + to smart entrance control unit terminal j 8 . Terminal j 9 of the smart entrance control unit then supplies ground to the rear window defogger relay termi2 . nal j With power and ground supplied, the rear window defogger relay is energized. Power is supplied + through terminals j 5 and j 7 of the rear window defogger relay + to the rear window defogger. The rear window defogger has an independent ground. With power and ground supplied, the rear window defogger filaments heat and defog the rear window. When the system is activated, the rear window defogger indicator illuminates in the rear window defogger switch. Power is supplied + to terminal j 3 of the rear window defogger switch 5 of the rear window defogger relay. + from terminal j Terminal j 4 of the rear window defogger switch is grounded through body grounds. EL-158 REAR WINDOW DEFOGGER Wiring Diagram — DEF —/LHD Models TEL449A EL-159 REAR WINDOW DEFOGGER Wiring Diagram — DEF —/LHD Models (Cont'd) TEL450A EL-160 REAR WINDOW DEFOGGER Wiring Diagram — DEF —/RHD Models TEL657A EL-161 REAR WINDOW DEFOGGER Wiring Diagram — DEF —/RHD Models (Cont'd) TEL658A EL-162 REAR WINDOW DEFOGGER Trouble Diagnoses SYMPTOM: Rear window defogger does not activate, or does not go off after activating. CHECK REAR WINDOW DEFOGGER OUTPUT SIGNAL. 1. Turn ignition switch to ON position. 2. Check voltage between control unit harness terminals j 9 and ground. Condition SEL856UA OK c Check the following. + Rear window defogger relay (Refer to EL-164.) + Rear window defogger circuit + Rear window defogger filament (Refer to EL-164.) c Check the following. + 7.5A fuse [No. 8 , located in the fuse block (J/B)] + Rear window defogger relay + Harness for open or short between control unit and fuse c Check the following. + Rear window defogger switch (Refer to EL-164.) + Harness for open or short between control unit and rear window defogger switch + Rear window defogger switch ground circuit c Check the following. + 7.5A fuse [No. 8 located in the fuse block (J/B)] + Harness for open or short between control unit and fuse c Repair harness or connectors. Voltage [V] Rear window defogger switch is released. Approx. 12 Rear window defogger switch is pushed. 0 NG . 1. Disconnect control unit connector.
2. Turn ignition switch to ON position. 3. Check voltage between control unit terminal j 9 and ground. Battery voltage should exist. NG OK SEL857UA . CHECK REAR WINDOW DEFOGGER SWITCH INPUT SIGNAL. Check continuity between control unit terminal j 8 and ground. Condition of defogger switch NG Continuity Rear window defogger switch is pushed. Yes Rear window defogger switch is released. No SEL858UA OK . CHECK IGNITION INPUT SIGNAL. Check voltage between control unit terminal j 12 and ground. Condition NG Voltage [V] Ignition switch is ''ON''. Approx. 12 Ignition switch is ''OFF''. 0 OK . SEL859UA CHECK CONTROL UNIT GROUND CIRCUIT. Check continuity between control unit terminal j 18 and ground. Continuity should exist. OK . Replace control unit. SEL854UC EL-163 NG REAR WINDOW DEFOGGER Electrical Components Inspection REAR WINDOW DEFOGGER RELAY Check continuity between terminals j 3 and j 5 ,j 6 and j 7 . Condition Continuity 12V direct current supply between terminals j 1 and j 2 Yes No current supply No SEC202B REAR WINDOW DEFOGGER SWITCH Check continuity between terminals when rear window defogger switch is pushed and released. Terminals Condition Continuity Rear window defogger switch is pushed Yes Rear window defogger switch is released No j 1 -j 2 SEL430TC Filament Check 1. Attach probe circuit tester (in volt range) to middle portion of each filament. SEL263 + When measuring voltage, wrap tin foil around the top of the negative probe. Then press the foil against the wire with your finger. SEL122R 2. To locate burned out point, move probe to left and right along filament. Test needle will swing abruptly when probe passes the point. + If a filament is burned out, circuit tester registers 0 or 12 volts. SEL266 EL-164 REAR WINDOW DEFOGGER Filament Repair REPAIR EQUIPMENT 1. 2. 3. 4. 5. 6. Conductive silver composition (Dupont No. 4817 or equivalent) Ruler 30 cm (11.8 in) long Drawing pen Heat gun Alcohol Cloth REPAIRING PROCEDURE 1. Wipe broken heat wire and its surrounding area clean with a cloth dampened in alcohol. 2. Apply a small amount of conductive silver composition to tip of drawing pen. Shake silver composition container before use. 3. Place ruler on glass along broken line. Deposit conductive silver composition on break with drawing pen. Slightly overlap existing heat wire on both sides [preferably 5 mm (0.20 in)] of the break.
BE540 4. After repair has been completed, check repaired wire for continuity. This check should be conducted 10 minutes after silver composition is deposited.
Do not touch repaired area while test is being conducted. SEL012D 5. Apply a constant stream of hot air directly to the repaired area for approximately 20 minutes with a heat gun. A minimum distance of 3 cm (1.2 in) should be kept between repaired area and hot air outlet. If a heat gun is not available, let the repaired area dry for 24 hours. SEL013D EL-165 WIPER DEICER System Description SEL505V + + + + A heat line has been added to the lower portion of the windshield.
During cold weather, water can freeze between the wiper blades and windshield. Turning the wiper deicer switch ON melts the ice between the blades and windshield. During snowfall, packed snow can accumulate around the windshield lower surface and surrounding areas. Turning the wiper deicer switch ON melts the snow to allow the wiper blades to more easily remove it. The wiper deicer operates only for approximately 15 minutes while ignition switch is in ON position. The timer is combined with wiper deicer switch. EL-166 WIPER DEICER Wiring Diagram — DEICER — TEL712A EL-167 AUDIO Wiring Diagram — AUDIO —/LHD Models TEL659A EL-168 AUDIO Wiring Diagram — AUDIO —/LHD Models (Cont'd) TEL660A EL-169 AUDIO Wiring Diagram — AUDIO —/RHD Models TEL661A EL-170 AUDIO Wiring Diagram — AUDIO —/RHD Models (Cont'd) TEL662A EL-171 AUDIO Trouble Diagnoses RADIO Symptom Radio inoperative (no digital display and no sound from speakers). See NOTE. Possible causes Repair order 10 , located in fuse block (J/B)].
Turn ignition switch ON and verify battery positive voltage is present at terminal j 10 of radio. 2. Check radio case ground. 3. Remove radio for repair. 1. 10A fuse 1. Check 10A fuse [No. 2. Poor radio case ground 3. Radio Radio controls are operational, 1. Radio output but no sound is heard from 2. Radio any speaker. 1. Check radio output voltages. 2. Remove radio for repair. Radio presets are lost when ignition switch is turned OFF. 2. Radio 1. Check 10A fuse (No. 56 , located in fuse and fusible link box) and verify battery positive voltage is present at terminal j 6 of radio. 2. Remove radio for repair. Individual speaker is noisy or inoperative. 1. 2. 3. 4. 1. 2. 3. 4. Radio stations are weak or noisy. 1. Antenna 2. Poor radio ground 3. Radio 1. Check antenna. 2. Check radio ground. 3. Remove radio for repair. FM stations are weak or noisy but AM stations are OK. (with window antenna) 1. Window antenna 2. Radio 1. Check window antenna. 2. Remove radio for repair. Radio generates noise in AM and FM modes with engine running.
1.
Poor radio ground 2. Loose or missing ground bonding straps 3. Ignition condenser or rear window defogger noise suppressor condenser 4. Alternator 5. Ignition coil or secondary wiring 6. Radio 1. Check radio ground. 2. Check ground bonding straps. 3. Replace ignition condenser or rear window defogger noise suppressor condenser. 4. Check alternator. 5. Check ignition coil and secondary wiring.
6. Remove radio for repair.
Radio generates noise in AM and FM modes with accessories on (switch pops and motor noise). 1.
2. 3. 4. 1. 2. 3. 4. 1. 10A fuse Speaker Radio output Speaker circuit Radio Poor radio ground Antenna Accessory ground Faulty accessory Check speaker. Check radio output voltages. Check wires for open or short between radio and speaker. Remove radio for repair.
Check radio ground. Check antenna. Check accessory ground. Replace accessory. NOTE: If the radio has anti-theft function, check the anti-theft function of the radio before circuit inspection. (Radios which have anti-theft function are equipped with a code indicator. For details, refer to EL-173.) Speaker inspection 1. 2. + 3. + Disconnect speaker harness connector.
Measure the resistance between speaker terminals j 1 and j 2 .
The resistance should be 2 - 4Ω. Using jumper wires, momentarily connect a 9V battery between speaker terminals j 1 and j 2 . A momentary hum or pop should be heard.
Antenna inspection Using a jumper wire, clip an auxiliary ground between antenna and body. + If reception improves, check antenna ground (at body surface). + If reception does not improve, check main feeder cable for short circuit or open circuit. Radio inspection All + + + voltage inspections are made with: Ignition switch ON or ACC Radio ON Radio connected (If removed for inspection, supply a ground to the case using a jumper wire.) EL-172 AUDIO CATS (Code) System/RHD NOTE: + This system is used for code indicator-equipped radios on all models except the Europe LHD model. + The Europe LHD model has a NATS-linked anti-theft function that renders the code system inoperable. DESCRIPTION By using a personal 4-digit code known only to the vehicle owner, the possibility of the audio unit being stolen is effectively reduced, because without the code the unit can not be activated. When in normal use, the unit is unlocked and accessible in the usual way. If however, someone attempts to remove the unit or the battery cable is disconnected, the anti-theft system activates and the unit ''locks''. The only way it can be unlocked is by entering a personal code number known only by the owner. UNLOCKING THE UNIT (How to enter a personal code number) + 1. 2. 3. 4. 5. If the battery supply to the vehicle is interrupted by accident for some reason, the unit will lock. To unlock the unit, proceed as follows: Press the power/volume control knob to turn the unit on. ''CODE IN'' is displayed. Input your personal code by pressing the preset buttons (1 to 4). Press the button. If the entered code number is correct, the radio turns on. When the code is incorrect 1. If the entered code is incorrect, the unit becomes inoperable for 10 seconds for the first three attempts, then the code input mode is automatically set (''CODE IN'' is displayed). 2. If the code is incorrect the fourth time, the unit becomes inoperable for 60 minutes and '' '' is displayed. After 60 minutes, the code input mode is automatically set (''CODE IN'' is displayed). NOTE: If the above is repeated 17 times, the unit will lock and ''LOCKED'' is displayed. 3. After ''LOCKED'' is displayed, radio can be returned to the code input mode only within three attempts as follows. (Only three attempts are allowed to unlock the unit.) a. Press the power/volume control knob while pushing both the MOD and TA switches. b. The unit then returns to the code input mode. CAUTION: If the third attempt is unsuccessful, the unit will lock permanently. EL-173 AUDIO NATS Audio Link/LHD DESCRIPTION The link with the NATS IMMU implies that the radio can basically only be operated if connected to the matching NATS IMMU to which the radio was initially fitted on the production line. Since radio operation is impossible after the link with the NATS is disrupted theft of the radio unit is basically useless since special equipment is required to reset the radio. Initialisation process for radios that are linked to the NATS IMMU New radios will be delivered to the factories in the ''NEW'' state, i.e. ready to be linked with the vehicle's NATS. When the radio in ''NEW'' state is first switched on at the factory, it will start up communication with the vehicle's immobiliser control unit (IMMU) and send a code (the ''Radio Code'') to the IMMU. The IMMU will then store this code, which is unique to each radio, in its (permanent) memory. Upon receipt of the code by the IMMU, the NATS will confirm correct receipt of the radio code to the radio. Hereafter, the radio will operate as normal. During the initialisation process, ''NEW'' is displayed on the radio display. Normally though, communication between Radio and IMMU takes such a short time (300 ms) that the radio seems to switch on directly without showing ''NEW'' on its display. Normal operation Each time the radio is switched on afterwards, the radio code will be verified between the radio unit and the NATS before the radio becomes operational. During the code verification process, ''WAIT'' is shown on the radio display. Again, the communication takes such a short time (300 ms) that the radio seems to switch on directly without showing ''WAIT'' on its display. When the radio is locked In case of a radio being linked with the vehicle's NATS (immobiliser system), disconnection of the link between the radio and the IMMU will cause the radio to switch into the lock (''SECURE'') mode in which the radio unit is fully inoperative. Hence, repair of the radio is basically impossible, unless the radio is reset to the ''NEW'' state for which special decoding equipment is required. Both Blaupunkt and Clarion have provided their authorized service representatives with so called ''decoder boxes'' which can bring the radio unit back to the ''NEW'' state, enabling the radio to be switched on after which repair can be carried out. Subsequently, when the repaired radio is delivered to the final user again, it will be in the ''NEW'' state as to enable re-linking the radio to the vehicle's immobiliser system. As a result of the above, repair of the radio can only be done by an authorized Blaupunkt or Clarion representative.
Note: Radio manufacturer of Nissan Y61 models for Europe is ''Clarion''. SERVICE PROCEDURE Item Service procedure Description Battery disconnection No additional action required.
— Radio needs repair Repair needs to be done by authorized representative of radio manufacturer since radio cannot be operated unless it is reset to NEW state, using special decoding equipment. — Replacement of radio by new No additional action required. part Transferring radio to another vehicle/replacement of radio by an ''old'' part Radio needs to be reset to NEW state by authorized representative of radio manufacturer. Replacement of IMMU by new part No additional action required. EL-174 Radio is delivered in NEW state.
— The new IMMU will be recognized by the radio since a 'blank' code is stored in the memory of the IMMU. In case the radio recognizes this 'blank' code, it will request for input of the correct CATS code after which the radio will switch back to the initialisation process. AUDIO NATS Audio Link/LHD (Cont'd) Item Service procedure Description Replacement of IMMU by old Radio needs to be reset to NEW state by authopart rized representative of radio manufacturer. If a radio code has already been stored in memory of the IMMU, the radio cannot be linked to it. After switching on the radio, it will display ''SECURE'' after 1 minute. No communication from IMMU to radio After switching on the radio, the radio will display ''SECURE'' after 1 minute. Further use of radios impossible until communication is established again, or after radio is reset by authorized representative of (radio) manufacturer. 1. If NATS is malfunctioning, check NATS system. 2. After NATS is repaired, reset radio to NEW state by authorized representative of radio manufacture.
NOTE: Authorized radio manufacturer representatives in Europe are listed in the technical bulletin TB-EL 96-001 issued by Nissan Europe N.V. EL-175 AUDIO — CD AUTO CHANGER — Wiring Diagram — CD/CHG —/LHD Wagon TEL663A EL-176 AUDIO — CD AUTO CHANGER — Wiring Diagram — CD/CHG —/LHD Hardtop TEL664A EL-177 AUDIO — CD AUTO CHANGER — Wiring Diagram — CD/CHG —/RHD Wagon TEL665A EL-178 AUDIO — CD AUTO CHANGER — Wiring Diagram — CD/CHG —/RHD Hardtop TEL710A EL-179 AUDIO — CD AUTO CHANGER — Trouble Diagnoses CD AUTOCHANGER Symptom Possible causes Repair order No play of the CD after CD play button is pushed. There is no error code shown on the radio. Error code [ERR] is shown on the radio. 1. Radio (The radio is not working.) 2. Harness connection (Magazine does not eject.) 3. Changer 1. 3. Changer 1. Remove the radio for repair. 1. Discs 1. Inspect discs. (Refer to testing magazines and discs.) 2. Reset the changer. (Disconnect harness connector at the changer and reconnect after 30 sec.) 3. Remove the changer for repair. 2. Magazine does not eject or a disc remains in CD player. 3. Changer CD skipping. 1. Rough road driving 2. Discs 3. Remove the changer for repair. 1. System is not malfunctioning. 2. Inspect discs. (Refer to testing magazines and discs.) 3. Check and repair bracket and installation of changer. 4. Remove the changer for repair. 3. Bracket 4. Changer Error code [NO DISC] is shown on the radio after CD play button is pressed.
2. Check harness connection. 1. Magazine setting 2. Magazine 1. Confirm the magazine is pushed completely. 2. Inspect magazine.
(Refer to testing magazines and discs.) 3. Remove the changer for repair. 3. Changer Testing magazines and discs 1. Confirm discs are installed correctly into the magazine (not upside down). 2. Visually inspect/compare the customer's discs with each other and other discs. Identify any of the following conditions: + Discs with a large outside diameter. [Normal size is 120 mm (4.72 in).] + Discs with rough or lipped edges. + Discs with excessive thickness [Normal size is 1.2 mm (0.047 in).] + Discs with scratches, abrasions, or pits on the surface. + Discs with grease/oil, fingerprints, foreign material. + Discs are warped due to excessive heat exposure. 3. Slide/place the discs in and out of the various magazine positions. Identify any discs and/or positions that require additional force for placement/ejection. If interference (sticking, excessive tensions) is found, replace the magazine or the discs.
Note: + Discs which are marginally out of specification (ex. dirty, scratched and so on) may play correctly on a home stereo. However, when used in the automotive environment skipping may occur due to the added vehicle movement and/or vibration due to road conditions. Autochangers should not be replaced when discs are at fault. + Use a soft damp cloth to wipe the discs starting from the center outward in radial direction. Never use chemical cleaning solutions to clean the discs. EL-180 AUDIO ANTENNA Wiring Diagram — P/ANT —/LHD Models TEL457A EL-181 AUDIO ANTENNA Wiring Diagram — P/ANT —/RHD Models TEL666A EL-182 AUDIO ANTENNA Trouble Diagnoses POWER ANTENNA Symptom Power antenna does not operate. Possible causes Repair order 1. Check 10A fuse (No. 56 , located in fuse and fusible link box). Verify that battery positive voltage is present at terminal j 1 : LHD, j 2 : RHD of power antenna. 2. Turn ignition switch and radio ON. Verify that battery positive voltage is present at terminal j 3 : LHD, j 1 : RHD of power antenna. 3. Check grounds E25 and E40 . 1. 10A fuse 2. Radio signal 3. Grounds E25 and E40 Location of Antenna CEL744 Antenna Rod Replacement REMOVAL 1. Remove antenna nut and antenna base. CEL745 2. Withdraw antenna rod while raising it by operating antenna motor. CEL746 EL-183 AUDIO ANTENNA Antenna Rod Replacement (Cont'd) INSTALLATION 1. Lower antenna rod by operating antenna motor. 2. Insert gear section of antenna rope into place with it facing toward antenna motor.
3. As soon as antenna rope is wound on antenna motor, stop antenna motor. Insert antenna rod lower end into antenna motor pipe. 4.
Retract antenna rod completely by operating antenna motor. 5. Install antenna nut and base. CEL747 Window Antenna Repair ELEMENT CHECK 1.
Attach probe circuit tester (in ohm range) to antenna terminal on each side. SEL250I 2. If an element is broken, no continuity will exist. SEL252I EL-184 AUDIO ANTENNA Window Antenna Repair (Cont'd) 3. To locate broken point, move probe along element. Tester needle will swing abruptly when probe passes the point. SEL253I ELEMENT REPAIR Refer to ''Filament Repair'', ''REAR WINDOW DEFOGGER'' (EL165). EL-185 ELECTRIC SUNROOF Wiring Diagram — SROOF — TEL458A EL-186 ELECTRIC SUNROOF Wiring Diagram — SROOF — (Cont'd) TEL459A EL-187 POWER DOOR MIRROR Wiring Diagram — MIRROR —/LHD Models TEL460A EL-188 POWER DOOR MIRROR Wiring Diagram — MIRROR —/RHD Models TEL667A EL-189 POWER SEAT Wiring Diagram — SEAT —/LHD Models TEL461A EL-190 POWER SEAT Wiring Diagram — SEAT —/LHD Models (Cont'd) TEL462A EL-191 POWER SEAT Wiring Diagram — SEAT —/RHD Models TEL668A EL-192 POWER SEAT Wiring Diagram — SEAT —/RHD Models (Cont'd) TEL669A EL-193 HEATED SEAT Wiring Diagram — HSEAT — TEL670A EL-194 HEATED SEAT Wiring Diagram — HSEAT — (Cont'd) TEL671A EL-195 POWER WINDOW System Description With ignition switch in ON or START position, power is supplied + through 7.5A fuse [No. 8 , located in the fuse block (J/B)] 1 . + to power window relay terminal j The power window relay is energized and power is supplied + through power window relay terminal j 5 + to power window main switch terminal j 1 , + to power window sub switch terminal j 5 . MANUAL OPERATION NOTE: Numbers in parentheses are terminal numbers, when power window switch is pressed in the UP and DOWN positions respectively. Driver side When the driver side switch in the power window main switch is pressed in the up position, power is supplied 2 ,j 1) + to driver side power window regulator terminal (j + through power window main switch terminal (j 9 ,j 8). Ground is supplied + to driver side power window regulator terminal (j 1 ,j 2) + through power window main switch terminal (j 8 ,j 9). Then, the motor raises or lowers the window until the switch is released. Passenger side MAIN SWITCH OPERATION Power is supplied + through power window main switch (j 5 ,j 6) + to front power window sub-switch (j 3 ,j 4). The subsequent operation is the same as the sub-switch operation. SUB-SWITCH OPERATION Power is supplied + through front power window sub-switch (j 1 ,j 2) 2 ,j 1). + to passenger side power window regulator (j Ground is supplied + to passenger side power window regulator (j 1 ,j 2) 2 ,j 1) + through front power window sub-switch (j + to front power window sub-switch (j 4 ,j 3) 6 ,j 5). + through power window main switch (j Then, the motor raises or lowers the window until the switch is released. Rear door Rear door windows will raise and lower in the same manner as passenger side door window. AUTO OPERATION The power window AUTO feature enables the driver to open or close the driver's window without holding the window switch in the respective position. When the AUTO switch in the main switch is pressed and released, the driver's window will travel to the fully open or closed position. POWER WINDOW LOCK The power window lock is designed to lock operation of all windows except for driver's door window.
When the lock switch is pressed to lock position, ground of the sub-switches in the power window main switch is disconnected. This prevents the power window motors from operating.
EL-196 POWER WINDOW Schematic TEL468A EL-197 POWER WINDOW Wiring Diagram — WINDOW — TEL672A EL-198 POWER WINDOW Wiring Diagram — WINDOW — (Cont'd) TEL673A EL-199 POWER WINDOW Wiring Diagram — WINDOW — (Cont'd) TEL674A EL-200 POWER WINDOW Wiring Diagram — WINDOW — (Cont'd) LHD MODELS TEL675A EL-201 POWER WINDOW Wiring Diagram — WINDOW — (Cont'd) RHD MODELS TEL676A EL-202 POWER WINDOW Trouble Diagnoses Symptom Possible cause None of the power windows can be 1. 7.5A fuse, 40A fusible link and operated using any switch. M92 circuit breaker 2. Grounds M30 and M19 or M98 3. Power window relay 4. Open/short in power window main switch circuit Repair order 1.
Check 7.5A fuse [No. 8 , located in fuse block (J/B)], 40A fusible link (letter e , located in fuse and fusible link box) and M92 circuit breaker.
Turn ignition switch ''ON'' and verify battery positive voltage is present at terminal j 1 of power window main switch and terminal j 5 of sub-switch. 2.
Check grounds M30 and M19 or M98 . 3.
Check power window relay. 4. Check W wire between power window relay and power window main switch for open/short circuit. Driver side power window cannot be 1. Driver side power window regula- 1.
Check harness between power window main switch and power window regulator for open or short circuit. tor circuit operated but other windows can be 2. Driver side power window regula- 2. Check driver side power window regulator. operated. tor Passenger power window cannot be 1.
Power window sub-switches operated. 2.
Passenger side power window regulators 3. Power window main switch 4. Power window circuit 1. Check power window sub-switch. 2. Check passenger side power window regulator. Passenger power window cannot be 1. Power window main switch operated using power window main switch but can be operated by power window sub-switch. 1.
Check power window main switch. Driver side power window auto func- 1. Power window main switch tion cannot be operated using power window main switch. 1. Check power window main switch. EL-203 3. Check power window main switch. 4-1.
Check harnesses between power window main switch and power window sub-switch for open/ short circuit. 4-2. Check harnesses between power window subswitch and power window regulator for open/ short circuit. POWER DOOR LOCK System Description Power is supplied at all times + through 40A fusible link (Letter e , located in the fuse and fusible link box) 1 + to circuit breaker terminal j + through circuit breaker terminal j 2 + to smart entrance control unit terminal j 11 . 18 through body grounds. Ground is supplied to smart entrance control unit terminal j INPUT When the door lock & unlock switch (power window main switch) is in LOCKED position, ground signal is supplied + to smart entrance control unit terminal j 4 + through door lock & unlock switch terminal j 14 . When the door lock & unlock switch (power window main switch) is in UNLOCKED position, ground signal is supplied + to smart entrance control unit terminal j 5 + through door lock & unlock switch terminal j 7 . Driver side door key cylinder and driver side lock knob are connected to driver side door lock switch with a rod. When driver side door lock switch is in UNLOCKED position, ground signal is supplied + to smart entrance control unit terminal j 2 + through driver side door lock switch terminal j 1 (without multi-remote control system) or + through driver side door lock actuator terminal j 2 (with multi-remote control system). When driver side door lock switch is in LOCKED position, ground signal is interrupted. Door lock operates according to the conditions of the door lock & unlock switch (power window main switch) and driver side door lock switch. OUTPUT Unlock Ground is supplied + to passenger side door lock actuator, rear door lock + through smart entrance control unit terminal j 15 .
Power is supplied + to passenger side door lock actuator, rear door lock + through smart entrance control unit terminal j 16 . Then, the doors are unlocked. Lock Ground is supplied + to passenger side door lock actuator, rear door lock + through smart entrance control unit terminal j 16 . Power is supplied + to passenger side door lock actuator, rear door lock + through smart entrance control unit terminal j 15 . Then, the doors are locked. actuator LH and RH terminal j 3 actuator LH and RH terminal j 1 1 actuator LH and RH terminal j actuator LH and RH terminal j 3 EL-204 POWER DOOR LOCK Wiring Diagram — D/LOCK — TEL473A EL-205 POWER DOOR LOCK Wiring Diagram — D/LOCK — (Cont'd) TEL474A EL-206 POWER DOOR LOCK Trouble Diagnosis None of the doors lock/unlock when operating any switch. EL-208 EL-209 EL-210 DIAGNOSTIC PROCEDURE 2 (Door lock actuator check) DIAGNOSTIC PROCEDURE 3 (Driver side door lock switch check) SYMPTOM EL-207 DIAGNOSTIC PROCEDURE 1 (Door lock/unlock switch check) REFERENCE PAGE MAIN POWER SUPPLY AND GROUND CIRCUIT CHECK SYMPTOM CHART X X One or more doors are not locked and/or unlocked. X Door lock/unlock switch does not operate.
X Door knob lock switch/key cylinder on driver's door does not operate. X Driver side door does not lock/unlock when operating remote controller. (With multi-remote control system) X POWER SUPPLY AND GROUND CIRCUIT CHECK Power supply circuit check Terminal Ignition switch ⊕ @ OFF ACC ON j 11 Ground Battery voltage Battery voltage Battery voltage SEL860UB Ground circuit check Terminals Continuity j 18 - Ground Yes SEL854UD EL-207 POWER DOOR LOCK Trouble Diagnosis (Cont'd) DIAGNOSTIC PROCEDURE 1 (Door lock/unlock switch check) CHECK DOOR LOCK/UNLOCK SWITCH INPUT SIGNAL. 1. Disconnect control unit connector. 2. Check continuity between control unit terminal j 4 or j 5 and ground. SEL147VA Terminals j 4 - Ground j 5 - Ground Door lock/ unlock switch (LH or RH) condition Lock N and Unlock Unlock N and Lock OK c Door lock/unlock switch is OK. c Replace door lock/unlock switch. Continuity Yes No Yes No NG .
SEL432V CHECK DOOR LOCK/UNLOCK SWITCH. 1. Disconnect door lock/unlock switch connector.
2. Check continuity between power window main switch (Door lock/unlock switch) terminals. Condition Unlock N Lock Terminals 7 j No continuity 3 j j 14 j OK SEL433V .
Check the following. + Ground circuit for door lock/unlock switch + Harness for open or short between door lock/unlock switch and control unit connector EL-208 NG POWER DOOR LOCK Trouble Diagnosis (Cont'd) DIAGNOSTIC PROCEDURE 2 (Door lock actuator check) CHECK DOOR LOCK ACTUATOR CIRCUIT. Check voltage for door lock actuator. SEL863UB Door lock/unlock switch condition Lock Unlock Terminals @ j 15 ground j 16 ground ⊕ NG c Replace control unit. (Before replacing control unit, perform DIAGNOSTIC PROCEDURE 1.) Voltage (V) Battery voltage OK . CHECK DOOR LOCK ACTUATOR. 1. Disconnect door lock actuator connector. 2. Apply 12V direct current to door lock actuator and check operation. SEL434V Door lock actuator operation Unlocked → Locked Locked → Unlocked Terminals ⊕ @ j j 3 1 j j 1 3 OK . Repair harness between control unit connector and door lock actuator. EL-209 NG c Replace door lock actuator.
POWER DOOR LOCK Trouble Diagnosis (Cont'd) DIAGNOSTIC PROCEDURE 3 (Driver side door lock switch check) CHECK DOOR LOCK SWITCH INPUT SIGNAL. Check voltage between control unit terminal j 2 and ground. SEL861UB Driver side door lock switch condition Lock Unlock OK c Driver side door lock switch is OK. Voltage (V) Approx.
12 0 NG . SEL435V CHECK DOOR LOCK SWITCH. 1. Disconnect driver side door lock switch or door lock actuator connector. 2.
Check continuity between door lock switch terminals. Without multi-remote control system Terminals j 1 -j 2 Condition Locked Unlocked Continuity No Yes With multi-remote control system Terminals j 2 -j 4 Condition Locked Unlocked Continuity No Yes SEL436V OK . Check the following. + Ground circuit for door lock switch + Harness for open or short between door lock switch and control unit EL-210 NG c Replace door lock switch. POWER DOOR LOCK — Super Lock — Component Parts and Harness Connector Location SEL548V EL-211 POWER DOOR LOCK — Super Lock — System Description OUTLINE Power door lock system with super lock and key reminder is controlled by super lock control unit. Super lock has a higher anti-theft performance than conventional power door lock systems. When super lock is in released condition, lock knob operation locks or unlocks door. When super lock is in set condition, lock knob operation cannot lock nor unlock door. NOTE: Super lock function is not applied to back door. (Power door lock only) SEL831U OPERATION Power door lock/unlock and super lock set/release operation by door key cylinder + + With the key inserted into front door key cylinder, turning it to LOCK will lock all doors and set super lock while all doors are closed or one or more door is open. (Super lock will not be set while key is inserted in the ignition key cylinder.) With the key inserted into front door key cylinder, turning it to UNLOCK will unlock all doors and release super lock.
Power door lock/unlock and super lock set/release operation by multi-remote controller + + Pressing multi-remote controller LOCK button will lock all doors and set super lock while all doors are closed and key is not inserted in the ignition key cylinder.

Pressing multi-remote controller UNLOCK button will unlock all doors and release super lock with key not inserted in the ignition key cylinder. Power door lock and super lock release operation (by NATS IMMU signal) + When the super lock is set, turning ignition key switch to ON will release super lock and unlock all doors. EL-212 POWER DOOR LOCK — Super Lock — System Description (Cont’d) Power door lock/unlock operation by lock knob With lock knob on driver or passenger door setting to LOCK while all doors are closed will lock all doors. When one or more door is opened, with lock knob on passenger door setting to LOCK will lock passenger door only.

(Power door lock system will not operate.) + With lock knob on driver or passenger door setting to UNLOCK while all doors are closed will unlock all doors. Lock knob operation cannot control super lock.

+ Key reminder system + If the ignition key is in the ignition key cylinder and any door is open, setting lock/unlock switch or lock knob on driver or passenger door to ‘‘LOCK’’ locks the door once but then immediately unlocks all doors. System initialisation + System initialisation is required when battery cables are reconnected.

Conduct one of the followings to release super lock once; — insert the key into ignition key cylinder and turn it to ON. — LOCK/UNLOCK operation using door key cylinder. EL-213 POWER DOOR LOCK — Super Lock — Schematic TEL677A EL-214 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/LHD Models TEL678A EL-215 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/LHD Models (Cont’d) TEL679A EL-216 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/LHD Models (Cont’d) TEL680A EL-217 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/LHD Models (Cont’d) TEL681A EL-218 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/RHD Models TEL682A EL-219 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/RHD Models (Cont’d) TEL683A EL-220 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/RHD Models (Cont’d) TEL684A EL-221 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/RHD Models (Cont’d) TEL711A EL-222 POWER DOOR LOCK — Super Lock — Trouble Diagnoses PRELIMINARY CHECK CHECK-IN . Open all windows and remove key from ignition key cylinder. . No (All doors) Does power door lock operate properly? c Power door lock does not operate by using; — any switch.

.... — driver side lock knob switch and/or key cylinder. .... — passenger side lock knob switch and/or key cylinder.. Yes c SYMPTOM 1 c SYMPTOM 2 c SYMPTOM 3 c SYMPTOM 4 c SYMPTOM 5 c SYMPTOM 6 c SYMPTOM 9 c SYMPTOM 7 c SYMPTOM 8 c SYMPTOM 9 No (Specific door) . No (All doors) Does super lock set by using door key cylinder? c Super lock does not set by using; — both door key cylinders. .... — one of door key cylinders. Yes No (Specific door) . Does super lock release by using door key cylinder or IGN key switch? No (All doors) c Super lock does not release by using; — one or both door key cylinders.

.... — IGN key switch. (Signal from NATS IMMU) Yes No (Specific door) . Does super lock set/release by using multi-remote controller? (If equipped) No c Does multi-remote control system operate properly? Yes c No c Yes SYMPTOM 11 Check ‘‘MULTIREMOTE CONTROL’’ system. . Insert key to ignition key cylinder, open any door and lock the door using driver or passenger side knob lock switch. . Does key reminder system operate properly?

. No c SYMPTOM 10 Yes INSPECTION END After performing preliminary check, go to symptom chart on the next page. . When one or more doors are opened, with lock knob on passenger door setting to LOCK, will lock passenger door only. (Power door lock system will not operate.) EL-223 POWER DOOR LOCK — Super Lock — Trouble Diagnoses (Cont’d) Before starting trouble diagnoses below, perform preliminary check, EL-223.

Symptom numbers in the symptom chart correspond with those of Preliminary check. SYMPTOM CHART X 3 Power door lock does not operate with any switch of passenger side. X 4 Specific door lock actuator does not operate.

5 Super lock cannot be set by both door key cylinders. 6 Super lock cannot be set by one of door key cylinders. 7 *Super lock cannot be released by one or both door key cylinders. 8 *Super lock cannot be released by ignition key switch. (Signal from NATS IMMU) 9 Specific super lock actuator does not operate. 10 *Key reminder system does not operate. 11 Super lock cannot be set/released by using multi-remote controller. X X Procedure 9 (Remote controller signal check) Procedure 6 (NATS release signal check) Procedure 5 (Door switch check) Procedure 8 (Ignition switch ‘‘ON’’ circuit check) Power door lock does not operate with any switch of driver side. Procedure 7 (Key switch check) 2 Procedure 4 (Super lock actuator check) X Power door lock does not operate using any switch. Procedure 3 (Door lock actuator check) X 1 Procedure 2 (Door key cylinder switch check) Procedure 1 (Door unlock sensor check) SYMPTOM EL-225 EL-226 EL-227 EL-228 EL-229 EL-230 EL-231 EL-232 EL-232 EL-233 Power supply and ground circuit check REFERENCE PAGE X X X X X X X X X X X X X X X: Applicable *: Make sure the power door lock system operates properly. EL-224 POWER DOOR LOCK — Super Lock — Trouble Diagnoses (Cont’d) POWER SUPPLY AND GROUND CIRCUIT CHECK Main power supply circuit check Terminals Ignition switch position ⊕ @ OFF ACC ON j 11 Ground Battery voltage Battery voltage Battery voltage SEL811UB Ground circuit check Terminals Continuity j 16 - Ground Yes SEL812UB EL-225 POWER DOOR LOCK — Super Lock — Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 1 (Door unlock sensor check) CHECK DOOR UNLOCK SENSOR INPUT SIGNAL. Check voltage between control unit termi4 or j 5 and ground. nals j Terminals Condition ⊕ @ Driver side j 4 Ground Passenger side j 5 SEL813UB Locked Unlocked Locked Ground Unlocked OK c Door unlock sensor is OK. Voltage [V] Approx.

5 0 Approx. 5 0 Refer to wiring diagram in EL-215 (LHD), EL-219 (RHD). NG SEL814UB . CHECK DOOR UNLOCK SENSOR. 1. Disconnect door unlock sensor connector.

2. Check continuity between door unlock sensor terminals. Terminals j 2 -j 5 Condition Locked Unlocked Continuity No Yes OK . Check the following. + Door unlock sensor ground circuit + Harness for open or short between control unit and door unlock sensor EL-226 NG c Replace door lock actuator assembly. POWER DOOR LOCK — Super Lock — Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 2 (Door key cylinder switch check) CHECK DOOR KEY CYLINDER SWITCH INPUT SIGNAL (LOCK SIGNAL). Check voltage between control unit termi1 and ground.

nal j Key cylinder switch operation Between neutral and lock Unlock/neutral OK c Door key cylinder switch is OK. c Replace key cylinder switch. Voltage [V] 0 Approx. 5 Refer to wiring diagram in EL-215 (LHD), EL-219 (RHD). NG . SEL815UB CHECK DOOR KEY CYLINDER SWITCH. 1. Disconnect door key cylinder switch connector. 2. Check continuity between door key cylinder switch terminals. Terminals j 1 -j 2 (LH side) j 2 -j 3 (RH side) Key position Neutral Between neutral and lock Unlock/ neutral Continuity No Yes No OK .

SEL492V Check the following. + Door key cylinder switch ground circuit + Harness for open or short between control unit and door key cylinder EL-227 NG POWER DOOR LOCK — Super Lock — Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 3 (Door lock actuator check) NG CHECK OUTPUT SIGNAL FOR DOOR LOCK ACTUATOR. Check voltage for door lock actuator. SEL817UB Terminals Knob lock switch condition ⊕ Unlock → Lock j 15 Lock → Unlock j 14 @ c Door lock actuator is OK. Voltage (V) Ground Approx. 12 (Approx. 5 Ground seconds) Before operating passenger side knob lock switch, close all doors.

Refer to wiring diagram in EL-215 (LHD), EL-219 (RHD). OK . SEL818UB CHECK DOOR LOCK ACTUATOR. 1. Disconnect door lock actuator connector. 2. Apply 12V direct current to door lock actuator and check operation.

Door lock actuator operation Door lock actuator operation Unlocked → Locked Locked → Unlocked Terminals ⊕ @ j 6 j 3 j 3 j 6 Back door lock actuator operation Back door lock actuator operation SEL827UB Unlocked → Locked Locked → Unlocked Terminals ⊕ @ j 3 j 1 NG .

Replace door lock actuator assembly.

SEL434VA EL-228 j 1 j 3 OK c Check harness between control unit and door lock actuator. POWER DOOR LOCK — Super Lock — Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 4 [Super lock actuator (in door lock actuator assembly) check] CHECK OUTPUT SIGNAL FOR SUPER LOCK ACTUATOR. Check voltage for super lock actuator.

SEL819UB Door key cylinder switch condition Lock (Set) Unlock (Released) Terminals NG c Super lock actuator is OK. Voltage (V) ⊕ @ j 18 Ground j 13 Ground Approx. 12 Put the system in set condition before checking release signal. Refer to wiring diagram in EL-215 (LHD), EL-219 (RHD). OK . CHECK SUPER LOCK ACTUATOR. 1. Disconnect door lock actuator assembly connector. 2. Set lever A in Lock position. 3. Apply 12V direct current to door lock actuator assembly and check operation. Super lock actua- Terminals Connection from tor operation ⊕ @ lever B to lever A Released → Set Set → Released j 1 j 4 SEL820UB j 4 j 1 Disconnect Connect NG . Replace door lock actuator assembly. EL-229 OK c Check harness between control unit and door lock actuator assembly.

POWER DOOR LOCK — Super Lock — Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 5 (Door switch check) CHECK DOOR SWITCH INPUT SIGNAL. Check voltage between control unit terminal j 8 and ground. SEL821UB Condition Any door is opened. All doors are closed. OK c Door switch is OK. Voltage [V] 0 Approx. 12 Refer to wiring diagram in EL-215 (LHD), EL-219 (RHD). NG . CHECK DOOR SWITCH. 1. Disconnect door switch connector. 2. Check continuity between door switch terminals.

Driver side door switch Other door switches Terminals Condition Continuity j 2 ground Closed No Open Yes j 1 ground Closed Open No Yes OK . SEL822UC Check the following. + Door switch ground condition + Harness for open or short between control unit and door switch EL-230 NG c Replace door switch. POWER DOOR LOCK — Super Lock — Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 6 (NATS release signal check) No Does engine start properly? c Check NATS system. Yes . SEL493V CHECK NATS SIGNAL CIRCUIT. 1. Disconnect control unit connector and NATS IMMU connector. 2. Check continuity between control unit terminal j 9 and NATS IMMU terminal j 3 (LHD models), j 7 (RHD models). Continuity should exist. 3. Check continuity between control unit terminal j 9 and ground. Continuity should not exist. Refer to wiring diagram in EL-215 (LHD), EL-219 (RHD). NG c Repair harness. OK SEL494V . CHECK NATS RELEASE SIGNAL. 1. Connect control unit connector and NATS IMMU connector. 2. Check voltage between control unit terminal j 9 and ground. Ignition switch condition OFF More than 10 seconds after ignition switch turned ON For 10 seconds after ignition switch turned ON OK .

Replace super lock control unit. SEL495V EL-231 Voltage [V] 5 Pulse NG c Check NATS system. POWER DOOR LOCK — Super Lock — Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 7 (Key switch check) CHECK KEY SWITCH INPUT SIGNAL. Check voltage between control unit termi7 and ground. nal j SEL883UB Condition of key switch Voltage [V] Key is inserted. Approx. 12 Key is withdrawn. 0 OK c Key switch is OK. Refer to wiring diagram in EL-215 (LHD), EL-219 (RHD). NG . SEL496V CHECK KEY SWITCH POWER SUPPLY. 1. Disconnect key switch connector. 2. Check voltage between key switch harness terminal j 2 and ground. Battery voltage should exist. NG c OK Check the following. + 7.5A fuse [No. 24 , located in fuse block (J/B)] + Harness for open or short between key switch and fuse .

CHECK KEY SWITCH. Check continuity between key switch terminals. Terminals SEL462V j 1 -j 2 Condition Continuity Key is inserted. Yes Key is withdrawn. No NG c Replace key switch. OK . Check harness for open or short between control unit and key switch. DIAGNOSTIC PROCEDURE 8 (Ignition switch ‘‘ON’’ circuit check) Terminals SEL829UB Ignition switch position ⊕ @ OFF ACC ON j 6 Ground 0V 0V Battery voltage If NG, check the following. + 10A fuse [No. 25 , located in the fuse block (J/B)] + Harness for open or short EL-232 POWER DOOR LOCK — Super Lock — Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 9 (Remote controller signal check) SEL051VA CHECK REMOTE CONTROLLER INPUT SIGNAL.

1. Withdraw key from ignition key cylinder. 2. Check voltage between control unit terminal j 2 or j 3 and ground. NOTE: The multi-remote control system does not activate with key inserted in ignition key cylinder or if one of the doors is opened. Terminals ⊕ j 2 j 3 @ Condition of remote controller button Voltage [V] LOCK button is pressed 0 (Approx. 0.5 seconds) LOCK button is released 5 UNLOCK button is pressed 0 (Approx. 0.5 seconds) UNLOCK button is released 5 Ground Ground Refer to Wiring Diagram in EL-216. NG . Check harness for open or short between super lock control unit and multi-remote control unit. EL-233 OK c Replace super lock control unit. MULTI-REMOTE CONTROL SYSTEM System Description FUNCTION Multi-remote control system has the following function. + Door lock (and set super lock) + Door unlock (and release super lock) + Hazard reminder LOCK OPERATION To lock door by multi-remote controller, the following two signals must be received. + Key switch OFF (when ignition key is not in ignition key cylinder.) + All door switches CLOSED When the LOCK signal is input to multi-remote control unit (the antenna of the system is combined with multiremote control unit), ground is supplied + through multi-remote control unit terminal j 10 + to super lock control unit terminal j 2 . Then super lock control unit operates to lock doors and set super lock. UNLOCK OPERATION To unlock door by multi-remote controller, the following signal must be received. + Key switch OFF (when ignition key is not in ignition key cylinder) When the UNLOCK signal is input to multi-remote control unit (the antenna of the system is combined with multi-remote control unit), ground is supplied + through multi-remote control unit terminal j 11 + to super lock control unit terminal j 3 .

Then super lock control unit operates to unlock doors and release super lock. HAZARD REMINDER When the doors are locked or unlocked by multi-remote controller, ground is supplied + to terminal j 1 of multi-remote control relay-1 and 2 + through multi-remote control unit terminal j 12 . Then the relays are energized and hazard warning lamp flashes as follows + Lock operation: Flash once + Unlock operation: Flash twice MULTI-REMOTE CONTROLLER ID CODE ENTRY A maximum of four remote controllers can be entered. Any attempt to enter a remote controller will erase all ID codes previously entered. Therefore, be sure to receive all remote controllers from the vehicle owner when any ID code entry is performed. To enter ID code entry, the following signals must be input to the multi-remote control unit. + Driver side LOCKED signal (from driver side door unlock sensor) + Door switch CLOSED signal + Key switch signal (INSERTED/WITHDRAWN) + Accessory power supply + Signal from remote controller For detailed procedure, refer to ‘‘ID Code Entry Procedure’’ in EL-239. EL-234 MULTI-REMOTE CONTROL SYSTEM Wiring Diagram — MULTI —/LHD Models TEL688A EL-235 MULTI-REMOTE CONTROL SYSTEM Wiring Diagram — MULTI —/LHD Models (Cont’d) TEL689A EL-236 MULTI-REMOTE CONTROL SYSTEM Trouble Diagnoses SYMPTOM CHART Symptom Possible cause Diagnoses/service order 1. Check remote controller battery. Refer to EL-238. 2. Check key switch (insert) signal at terminal j 7 of multi-remote control unit. 3. Check door switch signal at terminals j 1 and j 2 of multi-remote control unit. 4. Power supply circuit for multi- 4. Make sure battery voltage is present at remote control unit terminal j 3 of multi-remote control unit. 5. Ground circuit for multi-remote 5. Check continuity between terminal j 5 of multi-recontrol unit mote control unit and ground.

6. Remote controller 6.

Replace remote controller.

Refer to EL-239. 1.

Remote controller battery No doors can be Hazard reminder locked or unlocked also does not oper- 2. Key switch (insert) by remote control ate either. 3. Door switch operation. Hazard reminder operates properly. 1. Super lock system 1. Check that power door lock operates properly. If NG, check super lock, EL-211. 2. Lock/unlock signal to super 2. Check lock/unlock signal to super lock control unit at terminals j lock control unit 10 and j 11 of multi-remote control unit. (See NOTE.) Hazard reminder does not operate properly. 1. 10A fuse 2.

Multi-remote control and 2 3. Hazard reminder circuit The new ID of remote controller cannot be entered. 1. Check 10A fuse (No. 48 , located in the fuse and fusible link box). relay-1 2. Check multi-remote control relay-1 and 2. 3. Check harness for open or short between relays and multi-remote control unit terminal j 12 . 1. Remote controller battery 2. Key switch (insert) 3. 4. 5.

6. 1. Check remote controller battery. Refer to EL-238. 2. Check key switch (insert) signal at terminal j 7 of multi-remote control unit. Door switch 3. Check door switch signal at terminals j 1 and j 2 of multi-remote control unit. Driver’s door unlock sensor 4. Check driver’s door unlock sensor signal at terminal j 6 of multi-remote control unit.

Accessory power supply circuit 5. Make sure battery voltage is present at terminal j for multi-remote control unit 8 of multi-remote control unit while ignition switch is in ACC position. Remote controller 6. Replace remote controller. Refer to EL-239. Refer to ‘‘MULTI-REMOTE CONTROL UNIT INSPECTION TABLE’’ on next page to check the control unit signals. NOTE: + The unlock operation of multi-remote control system does not activate with key inserted in the ignition key cylinder. + The lock operation of multi-remote control remote controller does not activate with the key inserted ignition key cylinder or if one of the door is opened. EL-237 MULTI-REMOTE CONTROL SYSTEM Trouble Diagnoses (Cont’d) MULTI-REMOTE CONTROL UNIT INSPECTION TABLE Terminal No. 1 2 Connections Voltage (V) (approximate values) Condition Driver side door switch Opened 0 Closed 12 Driver side door One of doors is opened 0 All doors are closed 12 Door switch (all doors) 3 Power source (BAT) — 12 5 Ground — — 6 Driver side door unlock sensor 7 8 10 11 12 Locked 5 Unlocked 0 Driver side door Key is in ignition key cylinder 12 Key is not in ignition key cylinder 0 Key switch (insert) Accessory power supply OFF 0 ACC or ON 12 Ignition switch Lock signal (to super lock control unit) Unlock signal (to super lock control unit) Multi-remote control relay-1, 2 Remote controller LOCK button is pushed (All doors are closed and key is not in ignition key cylinder.) 0 Other than above condition 5 Remote controller UNLOCK button is pushed (Key is not in ignition key cylinder.) 0 Other than above condition 5 Remote controller LOCK/UNLOCK button is pushed (All doors are closed and key is not in ignition key cylinder.) 0 Other than above condition 12

SEL439V REMOTE CONTROLLER BATTERY CHECK Remove battery and measure voltage across battery positive and negative terminals, ⊕ and @. Measuring terminal SEL672U Standard value ⊕ @ Battery positive terminal ⊕ Battery negative terminal @ 2.5 - 3.0V Note: Remote controller does not function if battery is not set correctly. EL-238 MULTI-REMOTE CONTROL SYSTEM ID Code Entry Procedure Note: A maximum of four remote controllers can be entered. Any attempt to enter a remote controller will erase all ID codes previously entered.

Therefore, be sure to receive all remote controllers from the vehicle owner when any ID code entry is performed. Enter the identity (ID) code manually when: + remote controller or control unit is replaced. + an additional remote controller is activated. To enter the ID code, follow the procedures below. PROCEDURE Close all doors and lock driver side door. . Insert and remove the key from the ignition more than six times within 10 seconds.

. Turn ignition key switch to ‘‘ACC’’ position.

(The hazard warning lamps will then flash twice. . Push any button on the new remote controller once. (The hazard warning lamps will then flash twice.) At this time, the new ID code is entered and all previous ID memory is completely erased.

b . Do you want to enter any additional remote controller ID codes? A maximum four ID codes may be entered. Any attempt to enter more will be ignored. No Yes . ADDITIONAL ID CODE ENTRY Release the door lock, then lock again with driver side knob lock switch. . Open driver side door or turn the ignition key switch to ‘‘OFF’’ position. . END.

After entering the identity (ID) code, check the operation of multi-remote control system.

NOTE: + If you need to activate more than two additional new remote controllers, repeat the procedure ‘‘Additional ID code entry’’ for each new remote controller. + If the same ID code that exists in the memory is input, the entry will be ignored. + Entry of maximum four ID codes is allowed and any attempt to enter more will be ignored. + Any ID codes cannot be entered after termination of the ‘‘setting mode’’. EL-239 NATS (Nissan Anti-Theft System)/LHD MODELS System Description NATS has the following immobiliser functions: + Since only NATS ignition keys, whose ID nos. have been registered into the ECM and IMMU of NATS, allow the engine to run, operation of a stolen vehicle without a NATS registered key is prevented by NATS. That is to say, NATS will immobilize the engine if someone tries to start it without the registered key of NATS. + Both of the originally supplied ignition key IDs have been NATS registered. If requested by the vehicle owner, a maximum of four key IDs can be registered into the NATS components. + The NATS security indicator (NATS security ind.) blinks when the ignition switch is in ‘‘OFF’’ or ‘‘ACC’’ position. Therefore, NATS warns outsiders that the vehicle is equipped with the anti-theft system. + When NATS detects trouble, the malfunction indicator lamp (MIL) blinks. + NATS trouble diagnoses, system initialisation and additional registration of other NATS ignition key IDs must be carried out using CONSULT hardware and CONSULT NATS software. When NATS initialisation has been completed, the ID of the inserted ignition key is automatically NATS registered. Then, if necessary, additional registration of other NATS ignition key IDs can be carried out. Regarding the procedures of NATS initialisation and NATS ignition key ID registration, refer to CONSULT operation manual, NATS. + When servicing a malfunction of the NATS (indicated by flashing of Malfunction Indicator Lamp) or registering another NATS ignition key ID no., it may be necessary to re-register original key identification. Therefore, be sure to receive all keys from vehicle owner. System Composition The immobiliser function of the NATS consists of the following: + NATS ignition key + NATS immobiliser control unit (NATS IMMU) located in the ignition key cylinder + Engine control module (ECM) + NATS security indicator + Malfunction indicator lamp (MIL) SEL402V EL-240 NATS (Nissan Anti-Theft System)/LHD MODELS Wiring Diagram — NATS — TEL691A EL-241 NATS (Nissan Anti-Theft System)/LHD MODELS CONSULT CONSULT INSPECTION PROCEDURE 1. Turn off ignition switch. 2. Connect ‘‘CONSULT’’ to Data link connector for CONSULT. SEF532V 3.

Insert NATS program card into CONSULT. : Program card NATS-E940 4. Turn on ignition switch. 5. Touch ‘‘START’’. SEL327U 6. Touch ‘‘V.2.0 (GASOLINE)’’. NOTE: ‘‘V.2.0 (GASOLINE)’’ should be selected for electrically controlled diesel and gasoline engines.

SEL328U 7.

Perform each diagnostic test mode according to each service procedure. For further information, see the CONSULT Operation Manual, NATS V2.0 (GASOLINE). SEL329U EL-242 NATS (Nissan Anti-Theft System)/LHD MODELS CONSULT (Cont’d) CONSULT DIAGNOSTIC TEST MODE FUNCTION CONSULT DIAGNOSTIC TEST MODE Description C/U INITIALIZATION When replacing any of the following three components, C/U initialization is necessary. [NATS ignition key/IMMU/ECM] SELF-FUNCTION CHECK ECM checks its own NATS communication interface by itself. SELF-DIAGNOSTIC RESULTS Detected items (screen terms) are as shown in the chart below. NOTE: When any initialisation is performed, all ID previously registered will be erased. So all NATS ignition keys must be registered again. The engine cannot be started with an unregistered key. In this case, the system may show ‘‘DIFFERENCE OF KEY’’ or ‘‘LOCK MODE’’ as a self-diagnostic result on the CONSULT screen. HOW TO READ SELF-DIAGNOSTIC RESULTS SEL332UE NOTE: + If trip number is more than 1, MIL does not blink. + Time data is not indicated for TB45E engine models. SELF-DIAGNOSTIC RESULTS ITEM CHART Detected items (Screen terms) Description Reference page IMMU ECM received the signal from IMMU that IMMU is malfunctioning. EL-246 ECM ECM is malfunctioning. EL-246 CHAIN OF ECM-IMMU Communication impossible between ECM and IMMU. EL-247 DIFFERENCE OF KEY IMMU can receive the key ID signal but the result of ID verification between key ID and IMMU is NG.

EL-249 CHAIN OF IMMU-KEY IMMU cannot receive the key ID signal.

EL-250 ID DISCORD, IMM-ECM The result of ID verification between IMMU and ECM is NG. System initialisation is required. EL-250 MINGLE NOISE Noise (interference) mingled into NATS communication lines during communicating. EL-251 DON’T ERASE BEFORE CHECKING ENG DIAG Engine trouble data and NATS trouble data have been detected in ECM. EL-244 LOCK MODE When an unregistered ignition key is used, or if the starting operation is carried out two or more times consecutively with the ignition key, IMMU or ECM malfunctioning, NATS will shift the mode to one which prevents the engine from being started. EL-252 EL-243 NATS (Nissan Anti-Theft System)/LHD MODELS Trouble Diagnoses WORK FLOW *Lighting-up mode of MIL (Malfunction Indicator Lamp) For single malfunction of NATS: Blinking For dual malfunctions of NATS and an engine-related part: Stays ON For single malfunction of an engine-related part: Stays ON CHECK IN . Listen to customer complaints or request. (Get symptoms) KEY SERVICE REQUEST (Additional key ID registration) TROUBLE . . Verify the MIL*. INITIALISATION (Refer to CONSULT operation manual NATS V2.0.) . Using the CONSULT program card for NATS check the ‘‘SELF- c DIAG RESULTS’’ with CONSULT. b . . Self-diagnostic results referring to NATS, but no information about engine self-diagnostic results is displayed on CONSULT.

. Self-diagnostic results referring to NATS and ‘‘DON’T ERASE BEFORE CHECKING ENG DIAG’’ are displayed on CONSULT. (This means that engine trouble data has been detected in ECM.) Turn ignition switch ‘‘OFF’’. . . Repair NATS. (If necessary, carry out ‘‘SELF-FUNCTION CHECK’’ or ‘‘C/U INITIALISATION’’ with CONSULT.) Turn ignition switch ‘‘OFF’’. . . Turn ignition switch ‘‘ON’’. Repair NATS. (If necessary, carry out ‘‘SELF-FUNCTION CHECK’’ or ‘‘C/U INITIALISATION’’ with CONSULT.) . . Erase the NATS ‘‘SELF-DIAG RESULTS’’ by using CONSULT.

(Touch ‘‘ERASE’’.) Do not erase the NATS ‘‘SELF-DIAG RESULTS’’ by using CONSULT. . Start the engine. . .

Start the engine. Check the NATS ‘‘SELF-DIAG RESULTS’’ by using CONSULT. NG OK NG .

.

Verify no blinking of MIL*. Turn ignition switch ‘‘OFF’’. OK . . CHECK OUT Check the engine ‘‘SELF-DIAG RESULTS’’ with CONSULT by using the CONSULT generic program card. (Engine diagnostic software included) . . Perform running test with CONSULT in engine ‘‘SELF-DIAG RESULTS’’ mode. Repair ECCS. (Refer to EC section.) . . NG Verify ‘‘NO FAILURE’’ displayed on the CONSULT screen. Turn ignition switch ‘‘ON’’. OK . CHECK OUT . Erase the engine ‘‘SELF-DIAG RESULTS’’ by using CONSULT.

(Touch ‘‘ERASE’’.) . Start the engine. EL-244 b NATS (Nissan Anti-Theft System)/LHD MODELS Trouble Diagnoses (Cont’d) SYMPTOM CHART SYMPTOM Displayed ‘‘SELF-DIAG RESULTS’’ on CONSULT screen. DIAGNOSTIC PROCEDURE (Reference page) SYSTEM (Malfunctioning part or mode) IMMU PROCEDURE 1 (EL-246) IMMU ECM PROCEDURE 2 (EL-246) ECM + MIL blinking + Engine will start Open circuit in battery voltage line of IMMU circuit Open circuit in ignition line of IMMU circuit PROCEDURE 3 (EL-247) CHAIN OF ECM-IMMU Open circuit in ground line of IMMU circuit Open or short circuit in communication line between IMMU and ECM ECM IMMU + MIL blinking + Engine does not start DIFFERENCE OF KEY CHAIN OF IMMU-KEY PROCEDURE 4 (EL-249) Unregistered key PROCEDURE 5 (EL-250) Malfunction of key ID chip PROCEDURE 6 (EL-250) ID DISCORD, IMM-ECM IMMU IMMU System initialisation has not yet been completed. ECM IMMU + MIL staying ON + Security indicator does not operate properly. + Engine starts properly. MINGLE NOISE PROCEDURE 7 (EL-251) Noise interference in communication line LOCK MODE PROCEDURE 8 (EL-252) LOCK MODE DON’T ERASE BEFORE CHECKING ENG DIAG WORK FLOW (EL-244) Engine trouble data and NATS trouble data have been detected in ECM. Security indicator circuit PROCEDURE 9 (EL-253) — Security indicator Continuation of initialisation mode *Lighting-up mode of MIL (Malfunction Indicator Lamp) For single malfunction of NATS: Blinking For dual malfunctions of NATS and an engine-related part: Stays ON For single malfunction of an engine-related part: Stays ON EL-245 NATS (Nissan Anti-Theft System)/LHD MODELS Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 1 Self-diagnostic results: ‘‘IMMU’’ displayed on CONSULT screen Confirm SELF-DIAGNOSTIC RESULTS ‘‘IMMU’’ displayed on CONSULT screen. . SEL330U + IMMU is malfunctioning. 1. Replace IMMU. 2. Perform initialisation with CONSULT. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0 (GASOLINE)’’.

DIAGNOSTIC PROCEDURE 2 Self-diagnostic results: ‘‘ECM’’ displayed on CONSULT screen Confirm SELF-DIAGNOSTIC RESULTS ‘‘ECM’’ displayed on CONSULT screen. . SEL331U + ECM is malfunctioning. 1. Replace ECM. 2. Perform initialisation with CONSULT. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0 (GASOLINE)’’. EL-246 NATS (Nissan Anti-Theft System)/LHD MODELS Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 3 Self-diagnostic results: ‘‘CHAIN OF ECM-IMMU’’ displayed on CONSULT screen Confirm SELF-DIAGNOSTIC RESULTS ‘‘CHAIN OF ECMIMMU’’ displayed on CONSULT screen. OK SEL333U . CHECK POWER SUPPLY CIRCUIT FOR IMMU. Check voltage between IMMU terminal j 8 and ground. Battery voltage should exist. NG c OK .

SEL395VA CHECK IGN SW. ON SIGNAL. Check voltage between IMMU terminal j 7 and ground while ignition switch is ‘‘ON’’ position. Battery voltage should exist. NG c OK . CHECK GROUND CIRCUIT FOR IMMU. Check continuity between IMMU terminal j 4 and ground. Continuity should exist. NG c Check the following. + 7.5A fuse (No. 50 : RD engine, 49 : TB engine, located in the fuse and fusible link box) + Harness for open or short between fuse and IMMU connector Check the following. + 10A fuse [No. 25 , located in the fuse block (J/B)] + Harness for open or short between fuse and IMMU connector Repair harness.

SEL396VA OK .

CHECK COMMUNICATION OPEN CIRCUIT. Check continuity between IMMU terminal j 1 and ECM terminal j 55 (RD engine), j 11 (TB engine). Continuity should exist. OK . SEL397VA j A SEL497V EL-247 NG c Repair harness. NATS (Nissan Anti-Theft System)/LHD MODELS Trouble Diagnoses (Cont’d) j A . CHECK COMMUNICATION LINE SHORT CIRCUIT. 1. Disconnect ECM connector and IMMU connector. 2. Check continuity between IMMU terminal j 1 and ground.

Continuity should not exist. 3. Turn ignition switch to ON. 4. Check voltage between IMMU terminal j 1 and ground. No voltage should exist.

NG c Repair harness. OK . SELF-FUNCTION CHECK 1. Connect ECM connector and disconnect IMMU connector. 2. Turn ignition switch ‘‘ON’’. 3. Touch ‘‘SELF-FUNCTION CHECK’’ on CONSULT ‘‘SELECT DIAG MODE’’ screen. SEL399VA . Touch ‘‘START’’. ECM will then check its communication interface by itself. OK SEL340U . + IMMU is malfunctioning. 1. Replace IMMU. 2. Perform initialisation with CONSULT. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0’’. SEL341U SEL342U EL-248 NG c + ECM is malfunctioning. 1. Replace ECM. 2. Perform initialisation with CONSULT. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0 (GASOLINE)’’. NATS (Nissan Anti-Theft System)/LHD MODELS Trouble Diagnoses (Cont’d) SEL343U DIAGNOSTIC PROCEDURE 4 Self-diagnostic results: ‘‘DIFFERENCE OF KEY’’ displayed on CONSULT screen Confirm SELF-DIAGNOSTIC RESULTS ‘‘DIFFERENCE OF KEY’’ displayed on CONSULT screen. OK SEL344U . PERFORM INITIALISATION. Perform initialisation with CONSULT. Re-register all NATS ignition key IDs. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0’’. Can the system be initialized? Note: If the initialisation is not completed or fails, CONSULT shows message on the screen.

Yes SEL372U . END. (The ignition key was unregistered.) EL-249 No c + IMMU is malfunctioning. 1. Replace IMMU. 2. Perform initialisation with CONSULT. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0 (GASOLINE)’’. NATS (Nissan Anti-Theft System)/LHD MODELS Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 5 Self-diagnostic results: ‘‘CHAIN OF IMMU-KEY’’ displayed on CONSULT screen Confirm SELF-DIAGNOSTIC RESULTS ‘‘CHAIN OF IMMUKEY’’ displayed on CONSULT screen. OK SEL373U .

CHECK NATS IGNITION KEY ID CHIP. Can the engine start with another registered NATS ignition key? Yes + Ignition key ID chip is malfunctioning.

1. Replace the ignition key. 2. Perform initialisation with CONSULT.

For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0 (GASOLINE)’’.

c No . + IMMU is malfunctioning. 1. Replace IMMU. 2. Perform initialisation with CONSULT. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0’’. DIAGNOSTIC PROCEDURE 6 Self-diagnostic results: ‘‘ID DISCORD, IMM-ECM’’ displayed on CONSULT screen * ‘‘ID DISCORD, IMM-ECM’’: Registered ID of IMMU is in discord with that of ECM. Confirm SELF-DIAGNOSTIC RESULTS ‘‘ID DISCORD, IMMECM*’’ displayed on CONSULT screen. . SEL383U PERFORM INITIALISATION.

Perform initialisation with CONSULT. Re-register all NATS ignition key IDs. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0’’. Can the system be initialized? Note: If the initialisation is not completed or fails, CONSULT shows message on the screen.

Yes . SEL372U END.

(System initialisation was not completed.) EL-250 No c + ECM is malfunctioning. 1. Replace ECM. 2. Perform initialisation with CONSULT.

For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0 (GASOLINE)’’. NATS (Nissan Anti-Theft System)/LHD MODELS Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 7 Self-diagnostic results: ‘‘MINGLE NOISE’’ displayed on CONSULT screen Confirm SELF-DIAGNOSTIC RESULTS ‘‘MINGLE NOISE’’ displayed on CONSULT screen. b . Turn off or remove any possible noise sources. SEL384U . Touch ‘‘ERASE’’ on CONSULT SELF-DIAGNOSTIC RESULTS screen. . No Can the engine start? Yes . SEL385U END EL-251 NATS (Nissan Anti-Theft System)/LHD MODELS Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 8 Self-diagnostic results: ‘‘LOCK MODE’’ displayed on CONSULT screen Confirm SELF-DIAGNOSTIC RESULTS ‘‘LOCK MODE’’ is displayed on CONSULT screen. . SEL790U 1. Turn the ignition switch to OFF position.

2. Turn the ignition key switch to ON position with a registered key. (Do not start engine.) Wait for 5 seconds. 3. Return the key to the OFF position. 4. Repeat steps 2 and 3 twice (total of three cycles). 5. Start the engine. Can the engine start? Yes c System is OK. (Now the system is escaped from ‘‘LOCK MODE’’.) No . SEL038V CHECK NATS IMMU INSTALLATION. Refer to ‘‘How to Replace NATS IMMU’’ in EL-253. NG c Reinstall NATS IMMU correctly. OK . PERFORM INITIALISATION. Perform initialisation with CONSULT. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0 (GASOLINE)’’. Can the system be initialized? Note: If the initialisation is incompleted or failed, CONSULT shows message on the screen.

No . Go to DIAGNOSTIC PROCEDURE 5, EL-250 to check ‘‘CHAIN OF IMMU-KEY’’.

EL-252 Yes c System is OK. NATS (Nissan Anti-Theft System)/LHD MODELS Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 9 Security indicator check CHECK INDICATOR CIRCUIT. 1. Disconnect NATS IMMU connector. 2. Check voltage between NATS IMMU terminal j 6 and ground. Battery voltage should exist. NG OK SEL400VA c Check the following. + 7.5A fuse [No. 24 , located in the fuse block (J/B)] + Security indicator + Harness for open or short between fuse and security indicator + Harness for open or short between NATS IMMU and security indicator . PERFORM INITIALISATION. Perform initialisation with CONSULT. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0 (GASOLINE)’’. How to Replace NATS IMMU NOTE: + If NATS IMMU is not installed correctly, NATS system will not operate properly and SELF-DIAG RESULTS on CONSULT screen will show ‘‘LOCK MODE’’ or ‘‘CHAIN OF IMMU-KEY’’. SEL498V EL-253 NATS (Nissan Anti-Theft System)/RHD MODELS Component Parts and Harness Connector Location SEL549V EL-254 NATS (Nissan Anti-Theft System)/RHD MODELS System Description NATS has the following immobiliser functions: + Since only NATS ignition keys, whose ID nos. have been registered into the ECM and IMMU of NATS, allow the engine to run, operation of a stolen vehicle without a NATS registered key is prevented by NATS. That is to say, NATS will immobilize the engine if someone tries to start it without the registered key of NATS. + Both of the originally supplied ignition key IDs have been NATS registered. If requested by the vehicle owner, a maximum of four key IDs can be registered into the NATS components. + The NATS security indicator (NATS security ind.) blinks when the ignition switch is in ‘‘OFF’’ or ‘‘ACC’’ position. Therefore, NATS warns outsiders that the vehicle is equipped with the anti-theft system. + When NATS detects trouble, the malfunction indicator lamp (MIL) blinks. + NATS trouble diagnoses, system initialisation and additional registration of other NATS ignition key IDs must be carried out using CONSULT hardware and CONSULT NATS software. When NATS initialisation has been completed, the ID of the inserted ignition key is automatically NATS registered. Then, if necessary, additional registration of other NATS ignition key IDs can be carried out. Regarding the procedures of NATS initialisation and NATS ignition key ID registration, refer to CONSULT operation manual, NATS. + When servicing a malfunction of the NATS (indicated by flashing of Malfunction Indicator Lamp) or registering another NATS ignition key ID no., it may be necessary to re-register original key identification. Therefore, be sure to receive all keys from vehicle owner. System Composition The immobiliser function of the NATS consists of the following: + NATS ignition key + NATS antenna amp. located in the ignition key cylinder + NATS immobiliser control unit (NATS IMMU) + Engine control module (ECM) + NATS security indicator + Malfunction indicator lamp (MIL) SEL304U EL-255 NATS (Nissan Anti-Theft System)/RHD MODELS Wiring Diagram — NATS — TEL693A EL-256 NATS (Nissan Anti-Theft System)/RHD MODELS CONSULT CONSULT INSPECTION PROCEDURE 1. Turn off ignition switch. 2. Connect ‘‘CONSULT’’ to Data link connector for CONSULT. (Data link connector for CONSULT is located behind the fuse box cover.)

SEF532V 3. Insert NATS program card into CONSULT. : Program card NATS-E940 4. Turn on ignition switch. 5.

Touch ‘‘START’’. SEL327U 6. Touch ‘‘V.2.0 (GASOLINE)’’. NOTE: ‘‘V2.0 (GASOLINE)’’ should be selected for electrically controlled diesel and gasoline engines. SEL328U 7. Perform each diagnostic test mode according to each service procedure. For further information, see the CONSULT Operation Manual, NATS V2.0 (GASOLINE). SEL329U EL-257 NATS (Nissan Anti-Theft System)/RHD MODELS CONSULT (Cont’d) CONSULT DIAGNOSTIC TEST MODE FUNCTION CONSULT DIAGNOSTIC TEST MODE Description C/U INITIALIZATION When replacing any of the following three components, C/U initialization is necessary. [NATS ignition key/IMMU/ECM] SELF-FUNCTION CHECK ECM checks its own NATS communication interface by itself. SELF-DIAGNOSTIC RESULTS Detected items (screen terms) are as shown in the chart below. NOTE: When any initialisation is performed, all ID previously registered will be erased. So all NATS ignition keys must be registered again. The engine cannot be started with an unregistered key. In this case, the system may show ‘‘DIFFERENCE OF KEY’’ or ‘‘LOCK MODE’’ as a self-diagnostic result on the CONSULT screen. HOW TO READ SELF-DIAGNOSTIC RESULTS SEL332UC * If trip number is more than 1, MIL does not blink. SELF-DIAGNOSTIC RESULTS ITEM CHART Detected items (Screen terms) Description Reference page IMMU ECM received the signal from IMMU that IMMU is malfunctioning. EL-261 ECM ECM is malfunctioning. EL-261 CHAIN OF ECM-IMMU Communication impossible between ECM and IMMU. EL-262 DIFFERENCE OF KEY IMMU can receive the key ID signal but the result of ID verification between key ID and IMMU is NG. EL-264 CHAIN OF IMMU-KEY IMMU cannot receive the key ID signal. EL-265 ID DISCORD, IMM-ECM The result of ID verification between IMMU and ECM is NG. System initialisation is required. EL-266 MINGLE NOISE Noise (interference) mingled into NATS communication lines during communicating. EL-267 DON’T ERASE BEFORE CHECKING ENG DIAG Engine trouble data and NATS trouble data have been detected in ECM. EL-259 LOCK MODE When an unregistered ignition key is used, or if the starting operation is carried out two or more times consecutively with the ignition key, IMMU or ECM malfunctioning, NATS will shift the mode to one which prevents the engine from being started. EL-268 EL-258 NATS (Nissan Anti-Theft System)/RHD MODELS Trouble Diagnoses WORK FLOW *Lighting-up mode of MIL (Malfunction Indicator Lamp) For single malfunction of NATS: Blinking For dual malfunctions of NATS and an engine-related part: Stays ON For single malfunction of an engine-related part: Stays ON CHECK IN . Listen to customer complaints or request. (Get symptoms) TROUBLE KEY SERVICE REQUEST (Additional key ID registration) . . Verify the MIL*. INITIALISATION (Refer to CONSULT operation manual NATS V2.0.) . Using the CONSULT program card for NATS check the ‘‘SELF- c DIAG RESULTS’’ with CONSULT. b . .

Self-diagnostic results referring to NATS, but no information about engine self-diagnostic results is displayed on CONSULT. . Self-diagnostic results referring to NATS and ‘‘DON’T ERASE BEFORE CHECKING ENG DIAG’’ are displayed on CONSULT. (This means that engine trouble data has been detected in ECM.) Turn ignition switch ‘‘OFF’’. . .

Repair NATS. (If necessary, carry out ‘‘SELF-FUNCTION CHECK’’ or ‘‘C/U INITIALISATION’’ with CONSULT.) Turn ignition switch ‘‘OFF’’. .

. Turn ignition switch ‘‘ON’’. Repair NATS. (If necessary, carry out ‘‘SELF-FUNCTION CHECK’’ or ‘‘C/U INITIALISATION’’ with CONSULT.) . .

Erase the NATS ‘‘SELF-DIAG RESULTS’’ by using CONSULT. (Touch ‘‘ERASE’’.) Do not erase the NATS ‘‘SELF-DIAG RESULTS’’ by using CONSULT. . Start the engine. . . Start the engine. Check the NATS ‘‘SELF-DIAG RESULTS’’ by using CONSULT. NG OK NG . . Verify no blinking of MIL*. Turn ignition switch ‘‘OFF’’. OK . . CHECK OUT Check the engine ‘‘SELF-DIAG RESULTS’’ with CONSULT by using the CONSULT generic program card. (Engine diagnostic software included) . . Perform running test with CONSULT in engine ‘‘SELF-DIAG RESULTS’’ mode. Repair ECCS. (Refer to EC section.) . NG . Verify ‘‘NO FAILURE’’ displayed on the CONSULT screen. Turn ignition switch ‘‘ON’’. OK . CHECK OUT . Erase the engine ‘‘SELF-DIAG RESULTS’’ by using CONSULT. (Touch ‘‘ERASE’’.) . Start the engine. EL-259 b NATS (Nissan Anti-Theft System)/RHD MODELS Trouble Diagnoses (Cont’d) SYMPTOM CHART SYMPTOM Displayed ‘‘SELF-DIAG RESULTS’’ on CONSULT screen. SYSTEM (Malfunctioning part or mode) DIAGNOSTIC PROCEDURE (Reference page) IMMU PROCEDURE 1 (EL-261) IMMU ECM PROCEDURE 2 (EL-261) ECM + MIL blinking + Engine can start. Open circuit in battery voltage line of IMMU circuit Open circuit in ignition line of IMMU circuit Open circuit in ground line of IMMU circuit CHAIN OF ECM-IMMU PROCEDURE 3 (EL-262) Open or short circuit in communication line between IMMU and ECM Open circuit in power source line of ANT/AMP circuit ECM IMMU DIFFERENCE OF KEY PROCEDURE 4 (EL-264) + MIL blinking + Engine hard to start Unregistered key IMMU Open or short circuit in communication line between ANT/AMP and IMMU Open circuit in power source line of ANT/AMP circuit CHAIN OF IMMU-KEY PROCEDURE 5 (EL-265) Open circuit in ground line of ANT/AMP circuit Malfunction of key ID chip IMMU Antenna amp. ID DISCORD, IMM-ECM PROCEDURE 6 (EL-266) System initialisation has not yet been completed. ECM MINGLE NOISE PROCEDURE 7 (EL-267) Noise interference in communication line + MIL blinking + Engine hard to start + NATS security indicator does not blink for 1 minute after ignition switch is turned to ‘‘OFF’’. LOCK MODE PROCEDURE 9 (EL-268) LOCK MODE + MIL staying ON DON’T ERASE BEFORE CHECKING ENG DIAG WORK FLOW (EL-259) Engine trouble data and NATS trouble data have been detected in ECM NATS security ind. + NATS security ind. does not light up. + Engine can start. — PROCEDURE 8 (EL-267) Open circuit between Fuse and NATS IMMU Continuation of initialisation mode NATS IMMU *Lighting-up mode of MIL (Malfunction Indicator Lamp) For single malfunction of NATS: Blinking For dual malfunctions of NATS and an engine-related part: Stays ON For single malfunction of an engine-related part: Stays ON EL-260 NATS (Nissan Anti-Theft System)/RHD MODELS Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 1 Self-diagnostic results: ‘‘IMMU’’ displayed on CONSULT screen Confirm SELF-DIAGNOSTIC RESULTS ‘‘IMMU’’ displayed on CONSULT screen. .

SEL330U + IMMU is malfunctioning.

1. Replace IMMU. 2. Perform initialisation with CONSULT. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0 (GASOLINE)’’. DIAGNOSTIC PROCEDURE 2 Self-diagnostic results: ‘‘ECM’’ displayed on CONSULT screen Confirm SELF-DIAGNOSTIC RESULTS ‘‘ECM’’ displayed on CONSULT screen. . SEL331U + ECM is malfunctioning.

1. Replace ECM. 2. Perform initialisation with CONSULT. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0 (GASOLINE)’’. EL-261 NATS (Nissan Anti-Theft System)/RHD MODELS Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 3 Self-diagnostic results: ‘‘CHAIN OF ECM-IMMU’’ displayed on CONSULT screen Confirm SELF-DIAGNOSTIC RESULTS ‘‘CHAIN OF ECMIMMU’’ displayed on CONSULT screen.

OK SEL333U . CHECK POWER SUPPLY CIRCUIT FOR IMMU. Check voltage between terminal j 4 of IMMU and ground with CONSULT or tester. Voltage: Battery voltage NG c OK . SEL867UD CHECK IGN SW. ON SIGNAL. Check voltage between terminal j 3 of IMMU and ground with CONSULT or tester. Voltage: Battery voltage NG c OK .

CHECK GROUND CIRCUIT FOR IMMU. Check harness continuity between IMMU terminal j 8 ,j 9 and ground. Continuity should exist. NG c Check the following: + 7.5A fuse (No. 50 , located in the fuse and fusible link box) + Harness for open or short between fuse and IMMU connector Check the following: + 10A fuse [No. 25 , located in the fuse block (J/B)] + Harness for open or short between fuse and IMMU connector Repair harness. OK SEL868UD .

CHECK COMMUNICATION ON OPEN CIRCUIT. Check harness continuity between the following ECM terminal and IMMU terminal. ECM j 55 and IMMU j 6 Continuity should exist. OK . j A SEL499V SEL500V EL-262 NG c Repair harness. NATS (Nissan Anti-Theft System)/RHD MODELS Trouble Diagnoses (Cont’d) j A . CHECK COMMUNICATION LINE SHORT CIRCUIT.

1.

Disconnect ECM connector and IMMU connector. 2. Check continuity between IMMU terminal j 6 and ground. Continuity should not exist. 3.

Turn ignition switch to ON. 4. Check voltage between IMMU terminal j 6 and ground. No voltage should exist. NG c Repair harness. OK . CHECK NATS ANTENNA AMP. CIRCUIT. 1.

Disconnect NATS antenna amp. connector.

2. Turn ignition switch ‘‘ON’’. 3. Check voltage between antenna amp. terminal j 4 and ground. Voltage: More than 4.7V SEL501V NG c Repair harness. OK . SELF-FUNCTION CHECK 1. Connect ECM connector and disconnect IMMU connector. 2. Turn ignition switch ‘‘ON’’. 3. Touch ‘‘SELF-FUNCTION CHECK’’ on CONSULT ‘‘SELECT DIAG MODE’’ screen. (See next page) . SEL502V Touch ‘‘START’’. ECM will then check its communication interface by itself. OK (See next page) . SEL340U + IMMU is malfunctioning. 1. Replace IMMU.

2. Perform initialisation with CONSULT. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0 (GASOLINE)’’. SEL341U EL-263 NG c + ECM is malfunctioning. 1. Replace ECM. 2. Perform initialisation with CONSULT. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0 (GASOLINE)’’. NATS (Nissan Anti-Theft System)/RHD MODELS Trouble Diagnoses (Cont’d) SEL342U SEL343U DIAGNOSTIC PROCEDURE 4 Self-diagnostic results: ‘‘DIFFERENCE OF KEY’’ displayed on CONSULT screen Confirm SELF-DIAGNOSTIC RESULTS ‘‘DIFFERENCE OF KEY’’ displayed on CONSULT screen. OK SEL344U . PERFORM INITIALISATION. Perform initialisation with CONSULT. Re-register all NATS ignition key IDs. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0’’. Can the system be initialized? Note: If the initialisation is not completed or fails, CONSULT shows message on the screen. Yes SEL372U .

END. (The ignition key was unregistered.) EL-264 No c + IMMU is malfunctioning. 1. Replace IMMU. 2. Perform initialisation with CONSULT. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0 (GASOLINE)’’.

NATS (Nissan Anti-Theft System)/RHD MODELS Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 5 Self-diagnostic results: ‘‘CHAIN OF IMMU-KEY’’ displayed on CONSULT screen Confirm SELF-DIAGNOSTIC RESULTS ‘‘CHAIN OF IMMUKEY’’ displayed on CONSULT screen. OK SEL373U . CHECK NATS IGNITION KEY ID CHIP. Start engine with another registered NATS ignition key. Does the engine start? Yes c No + Ignition key ID chip is malfunctioning. 1. Replace the ignition key. 2. Perform initialisation with CONSULT. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0 (GASOLINE)’’. . SEL550V CHECK IMMU FUNCTION 1. 1. Turn ignition switch to ‘‘ON’’. 2. Check voltage between NATS antenna amp. terminal j 3 and ground. Voltage Time (After turning ignition switch ‘‘ON’’.) Voltage [V] For approx. 0.5 sec.

Approx.

2.3 - 5 After 1 sec. 0 NOTE: Do not remove NATS antenna amp. from the ignition key cylinder.

SEL551V OK . SEL502V CHECK IMMU FUNCTION 2. 1. Turn ignition switch ‘‘ON’’. 2. Check voltage between NATS antenna amp. terminal j 1 and ground. Voltage: 6 sec. after turning ignition switch ‘‘ON’’ Approx. 4.5 - 5V NOTE: Do not remove NATS antenna amp. from the ignition key cylinder. NG Check harness for open or short between IMMU and NATS antenna amp. If harness is OK, replace IMMU. After replacing IMMU, perform initialisation with CONSULT. For the initialisation procedure, refer to ‘‘CONNG SULT operation manual c NATS V2.0 (GASOLINE)’’. c m OK . CHECK IMMU OUTPUT VOLTAGE. 1. Turn the ignition switch ‘‘ON’’.

2. Check voltage between NATS antenna amp. terminal j 4 and ground. Voltage: More than 4.7V OK . j A EL-265 NG NATS (Nissan Anti-Theft System)/RHD MODELS Trouble Diagnoses (Cont’d) j A . CHECK ANTENNA AMP. GROUND LINE CIRCUIT. 1. Turn ignition switch ‘‘OFF’’. 2.

Check continuity between NATS antenna amp. terminal j 2 and ground. Continuity should exist. NG Check harness for open or short between IMMU and NATS antenna amp. If harness is OK, replace IMMU. After replacing IMMU, perform initialization with CONSULT. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0 (GASOLINE)’’. c OK SEL504V .

NATS antenna amp. is malfunctioning. When replacing the amp. hold on to amp. body. Take care not to pull on amp. harness. DIAGNOSTIC PROCEDURE 6 Self-diagnostic results: ‘‘ID DISCORD, IMM-ECM’’ displayed on CONSULT screen * ‘‘ID DISCORD, IMM-ECM’’: Registered ID of IMMU is in discord with that of ECM. Confirm SELF-DIAGNOSTIC RESULTS ‘‘ID DISCORD, IMMECM*’’ displayed on CONSULT screen. . SEL383U PERFORM INITIALISATION. Perform initialisation with CONSULT. Re-register all NATS ignition key IDs. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0’’. Can the system be initialized? Note: If the initialisation is not completed or fails, CONSULT shows message on the screen. Yes . SEL372U END. (System initialisation was not completed.) EL-266 No c + ECM is malfunctioning.

1.

Replace ECM. 2.

Perform initialisation with CONSULT. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0 (GASOLINE)’’. NATS (Nissan Anti-Theft System)/RHD MODELS Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 7 Self-diagnostic results: ‘‘MINGLE NOISE’’ displayed on CONSULT screen Confirm SELF-DIAGNOSTIC RESULTS ‘‘MINGLE NOISE’’ displayed on CONSULT screen. b . Turn off or remove any possible noise sources. SEL384U . Touch ‘‘ERASE’’ on CONSULT SELF-DIAGNOSTIC RESULTS screen. . NG Start engine. OK .

END SEL385U DIAGNOSTIC PROCEDURE 8 ‘‘NATS SECURITY IND. DOES NOT LIGHT UP’’ CHECK INDICATOR POWER SUPPLY CIRCUIT. Check voltage between security indicator terminal j 1 and ground. Battery voltage should exist. NG c OK SEL552V . Check the following.
+ 7.5A fuse [No. 24 , located in the fuse block (J/B)] + Harness for open or short between fuse and security indicator Check security indicator. .
PERFORM INITIALISATION. Perform initialisation with CONSULT. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0 (GASOLINE)’’. Does security indicator operate after initialisation has been completed?
Yes . END EL-267 No c Check harness for open or short between NATS IMMU and security indicator. NATS (Nissan Anti-Theft System)/RHD MODELS Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 9 Self-diagnostic results: ‘‘LOCK MODE’’ displayed on CONSULT screen Confirm SELF-DIAGNOSTIC RESULTS ‘‘LOCK MODE’’ is displayed on CONSULT screen.
. SEL790U 1. Turn the ignition switch to OFF position and wait 1 minute.
(After 1 minute, security indicator will blink.) 2. Turn the ignition key switch to ON position with a registered key. (Do not start engine.) Wait 5 seconds. 3. Return the key to the OFF position. 4. Repeat steps 2 and 3 twice (total of three cycles). 5. Start the engine. Does the engine start? Yes c System is OK.
(Now the system is escaped from ‘‘LOCK MODE’’.) No SEL372U .
PERFORM INITIALISATION. Perform initialisation with CONSULT. For the initialisation procedure, refer to ‘‘CONSULT operation manual NATS V2.0 (GASOLINE)’’. Can the system be initialised? Note: If the initialisation is incompleted or failed, CONSULT shows message on the screen. No . Go to DIAGNOSTIC PROCEDURE 5, EL-265 to check ‘‘CHAIN OF IMMU-KEY’’. EL-268 Yes c System is OK. LOCATION OF ELECTRICAL UNITS Engine Compartment CEL750 EL-269 LOCATION OF ELECTRICAL UNITS Passenger Compartment — LHD Models CEL751 EL-270 LOCATION OF ELECTRICAL UNITS Passenger Compartment — LHD Models (Cont’d) CEL752 EL-271 LOCATION OF ELECTRICAL UNITS Passenger Compartment — RHD Models CEL816 EL-272 LOCATION OF ELECTRICAL UNITS Passenger Compartment — RHD Models (Cont’d) CEL817 EL-273 LOCATION OF ELECTRICAL UNITS NOTE EL-274 HARNESS LAYOUT How to Read Harness Layout Example: G2 E1 B/6 : ASCD ACTUATOR Connector color / Cavity Connector number Grid reference The following Harness Layouts use a map style grid to help locate connectors on the drawings: + Main Harness + Engine Room Harness (Engine Compartment) To 1) 2) 3) 4) 5) use the grid reference Find the desired connector number on the connector list. Find the grid reference. On the drawing, find the crossing of the grid reference letter column and number row. Find the connector number in the crossing zone. Follow the line (if used) to the connector. CONNECTOR SYMBOL Main symbols of connector (in Harness Layout) are indicated in the below. Water proof type Standard type Connector type Male Female — — Male + Cavity: Less than 4 + Relay connector + Cavity: From 5 to 8 + Cavity: More than 9 + Ground terminal etc. — EL-275 Female HARNESS LAYOUT Outline/LHD Models CEL753 CEL809 EL-276 HARNESS LAYOUT Outline/RHD Models CEL818 CEL811 EL-277 HARNESS LAYOUT Main Harness/LHD Models CEL754 EL-278 HARNESS LAYOUT Main Harness/LHD Models (Cont’d) CEL755 EL-279 HARNESS LAYOUT Main Harness/LHD Models (Cont’d) CEL790 EL-280 HARNESS LAYOUT NOTE EL-281 HARNESS LAYOUT Main Harness/RHD Models CEL819 EL-282 HARNESS LAYOUT Main Harness/RHD Models (Cont’d) CEL820 EL-283 HARNESS LAYOUT Main Harness/RHD Models (Cont’d) CEL821 EL-284 HARNESS LAYOUT NOTE EL-285 HARNESS LAYOUT Engine Room Harness/LHD Models CEL822 EL-286 HARNESS LAYOUT Engine Room Harness/LHD Models (Cont’d) CEL823 EL-287 HARNESS LAYOUT Engine Room Harness/LHD Models (Cont’d) PASSENGER COMPARTMENT CEL758 EL-288 HARNESS LAYOUT Engine Room Harness/LHD Models (Cont’d) CEL759 EL-289 HARNESS LAYOUT Engine Room Harness/RHD Models CEL826 EL-290 HARNESS LAYOUT Engine Room Harness/RHD Models (Cont’d) CEL827 EL-291 HARNESS LAYOUT Engine Room Harness/RHD Models (Cont’d) PASSENGER COMPARTMENT CEL828 EL-292 HARNESS LAYOUT Engine Room Harness/RHD Models (Cont’d) CEL829 EL-293 HARNESS LAYOUT Engine Harness CEL830 EL-294 HARNESS LAYOUT Engine Control Harness and Alternator Harness CEL832 EL-295 HARNESS LAYOUT Body Harness/LHD Models WAGON CEL764 EL-296 HARNESS LAYOUT Body Harness/LHD Models (Cont’d) CEL765 EL-297 HARNESS LAYOUT Body Harness/LHD Models (Cont’d) HARDTOP CEL833 EL-298 HARNESS LAYOUT Body Harness/LHD Models (Cont’d) CEL843 EL-299 HARNESS LAYOUT Body Harness/RHD Models WAGON CEL834 EL-300 HARNESS LAYOUT Body Harness/RHD Models (Cont’d) CEL835 EL-301 HARNESS LAYOUT Body Harness/RHD Models (Cont’d) HARDTOP CEL836 EL-302 HARNESS LAYOUT Body Harness/RHD Models (Cont’d) CEL837 EL-303 HARNESS LAYOUT Body No. 2 Harness/LHD Models WAGON CEL766 EL-304 HARNESS LAYOUT Body No. 2 Harness/LHD Models (Cont’d) HARDTOP CEL838 EL-305 HARNESS LAYOUT Body No. 2 Harness/RHD Models WAGON CEL839 EL-306 HARNESS LAYOUT Body No. 2 Harness/RHD Models (Cont’d) HARDTOP CEL840 EL-307 HARNESS LAYOUT Chassis Harness CEL767 EL-308 HARNESS LAYOUT Room Lamp Harness CEL768 EL-309 HARNESS LAYOUT LHD MODELS Front Door Harness (Driver side) CEL769 RHD MODELS CEL786 EL-310 HARNESS LAYOUT LHD MODELS Front Door Harness (Passenger side) CEL770 RHD MODELS CEL787 EL-311 HARNESS LAYOUT LH SIDE Rear Door Harness CEL771 RH SIDE CEL788 EL-312 HARNESS LAYOUT Back Door Harness and Rear Window Defogger Harness CEL772 EL-313 BULB SPECIFICATIONS Headlamp Wattage (12 volt) High/low (without xenon headlamp) 60/55 (H4) Exterior Lamp Wattage (12 volt) Front turn signal 21 Parking 5 Front combination lamp Side turn signal lamp 5 Turn signal 21 Stop/Tail 21/5 Back-up 21 Rear combination lamp Rear bumper combination lamp Fog 21 Turn signal 21 Stop/Tail 21/5 License plate lamp 5 High-mounted stop lamp 21 Interior Lamp Wattage (12 volt) Interior room lamp 10 Map lamp 10 Vanity mirror lamp 3 EL-314 WIRING DIAGRAM CODES (CELL CODES) Use the chart below to find out what each wiring diagram code stands for. Code Section Wiring Diagram Name Code Section Wiring Diagram Name A/C,A HA Auto Air Conditioner GLOW EC Quick Glow System A/C CUT EC Air Conditioner Cut Control GOVNR EC Electric Governor A/C,M HA Manual Air Conditioner H/AIM EL Headlamp Aiming Control System A/T AT A/T H/LAMP EL Headlamp AAC/V EC IACV-AAC Valve HEATUP EC Heat up Switch ABS BR Anti-lock Brake System HLC EL Headlamp Cleaner ACC/SW EC Accelerator Switch (FC) HORN EL Horn ACL/SW EC Accelerator Position Switch HSEAT EL Heated Seat ADJRES EC Adjustment Resistor IATS EC Intake Air Temperature Sensor APS EC Accelerator Position Sensor IC/FAN EC Charge Air Cooler Fan ASCD EL Automatic Speed Control Device IGN EC Ignition System AT/C EC A/T Control IGN/SG EC Ignition Signal AUDIO EL Audio ILL EL Illumination BACK/L EL Back-up Lamp INJECT EC Injector BCDD EC BCDD System INT/L EL Spot, Vanity Mirror Lamps CD/CHG EL CD Auto Changer KS EC Knock Sensor CHARGE EL Charging System MAFS EC Mass Air Flow Sensor CHIME EL Warning Chime MAIN EC CHOKE EC Automatic Choke Main Power Supply and Ground Circuit CIGAR EL Cigarette Lighter METER EL Speedometer, Tachometer, Temp., Oil and Fuel Gauges CKPS EC Crankshaft Position Sensor (OBD) MIL/DL EC Mil and Data Link Connectors CLOCK EL Clock MIRROR EL Door Mirror CMPS EC Camshaft Position Sensor MULTI EL Multi-remote Control System COMPAS EL Compass and Thermometer NATS EL Nissan Anti-Theft System COOL/B HA Cool Box NLS EC Needle Lift Sensor COOL/F EC Cooling Fan Control P/ANT EL Power Antenna CORNER EL Cornering Lamp PLA EC Partial Load Advance Control CSPS EC Control Sleeve Position Sensor PNP/SW EC Park/Neutral Position Switch D/LOCK EL Power Door Lock POWER EL Power Supply Routing DEICER EL Wiper Deicer PST/SW EC Power Steering Oil Pressure Switch DEF EL Rear Window Defogger R/COOL HA Rear Cooler System DIFF/L PD Differential Lock Control System R/FOG EL Rear Fog Lamp DTRL EL Headlamp — With Daytime Light System R/HEAT HA Rear Heater System ECTS EC Engine Coolant Temperature Sensor ROOM/L EL Interior Room Lamp EGRC/V EC EGRC-Solenoid Valve S/LOCK EL Power Door Lock — Super Lock F/FOG EL Front Fog Lamp S/SIG EC Start Signal F/PUMP EC Fuel Pump S/TANK FE Sub Fuel Tank Control System FCUT EC Fuel Cut Solenoid Valve SEAT EL Power Seat FICD EC IACV-FICD Solenoid Valve SROOF EL Sunroof SRS RS Supplemental Restraint System FTS EC Fuel Temperature Sensor EL-315 WIRING DIAGRAM CODES (CELL CODES) Code Section Wiring Diagram Name STAB RA Rear Stabilizer Release Device Control System START EL Starting System STOP/L EL Stop Lamp TAIL/L EL Parking, License, Tail and Stop Lamps TCV EC Injection Timing Control Valve TPS EC Throttle Position Sensor TURN EL Turn Signal and Hazard Warning Lamps VSS EC Vehicle Speed Sensor WARN EL Warning Lamps WINCH SE Electrical Winch WINDOW EL Power Window WIP/R EL Rear Wiper and Washer WIPER EL Front Wiper and Washer EL-316 SUPER MULTIPLE JUNCTION (SMJ) LHD MODELS Installation To install SMJ, tighten bolts until orange ‘‘fulltight’’ mark appears and then retighten to specified torque as required. : 3 - 5 Nzm (0.3 - 0.5 kg-m, 26 - 43 in-lb) CAUTION: Do not overtighten bolts, otherwise, they may be damaged. CEL773 CEL789 RHD MODELS Installation To install SMJ, tighten bolts until orange ‘‘fulltight’’ mark appears and then retighten to specified torque as required. : 3 - 5 Nzm (0.3 - 0.5 kg-m, 26 - 43 in-lb) CAUTION: Do not overtighten bolts, otherwise, they may be damaged. CEL841 CEL842 EL-317 SUPER MULTIPLE JUNCTION (SMJ) Terminal Arrangement CEL774 FUSE BLOCK — Junction Box (J/B) Terminal Arrangement CEL775 FUSE AND FUSIBLE LINK BOX Terminal Arrangement CEL776 ELECTRICAL UNITS Terminal Arrangement CEL777 JOINT CONNECTOR (J/C) Terminal Arrangement CEL778 ENGINE MECHANICAL SECTION EM CONTENTS PRECAUTIONS

....1 Parts Requiring Angular Tightening............................1 Liquid Gasket Application Procedure ....1 PREPARATION..2 NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING ....6 NVH Troubleshooting Chart — Engine Noise ....7 OUTER COMPONENT PARTS ....8 COMPRESSION PRESSURE.......................................10 Measurement of Compression Pressure..................10 OIL PAN ....13 Removal...13 Installation..14 TIMING BELT...15 Removal...15 Inspection...17 Installation...18 OIL SEAL REPLACEMENT ....20 TURBOCHARGER...23 Removal and Installation ....23 Inspection...24 CHARGE AIR COOLERS...27 CYLINDER HEAD..28 Removal...29 Disassembly..30 Inspection..31 Assembly ....37 Installation...37 VALVE CLEARANCE ....40 Checking ....40 Adjusting ....41 ENGINE REMOVAL..43 Removal...44 Installation...44 CYLINDER BLOCK ....45 Disassembly...46 Inspection ....46 Assembly ....53 SERVICE DATA AND SPECIFICATIONS (SDS) ....56 General Specifications...56 Inspection and Adjustment ....56 EM PRECAUTIONS Parts Requiring Angular Tightening + + + + + + Some important engine parts are tightened using an angulartightening method rather than a torque setting method. If these parts are tightened using a torque setting method, dispersal of the tightening force (axial bolt force) will be two or three times that of the dispersal produced by using the correct angular-tightening method. Although the torque setting values (described in this manual) are equivalent to those used when bolts and nuts are tightened with an angular-tightening method, they should be used for reference only. To assure the satisfactory maintenance of the engine, bolts and nuts must be tightened using an angular-tightening method. Before tightening the bolts and nuts, ensure that the thread and seating surfaces are clean and then coated with engine oil. The bolts and nuts which require the angular-tightening method are cylinder head bolts. Liquid Gasket Application Procedure SEM371C a. Before applying liquid gasket, use a scraper to remove all traces of old liquid gasket from mating surface. b.
Apply a continuous bead of liquid gasket to mating surfaces. (Use Genuine Liquid Gasket or equivalent.) + Be sure liquid gasket is specified width (for oil pan) 3.5 to 4.5 mm (0.138 to 0.177 in) for gasoline engine. + Be sure liquid gasket is 2.0 to 3.0 mm (0.079 to 0.118 in) wide in areas except oil pan for TB and RD series engines and 2.5 to 3.5 mm (0.098 to 0.138 in) for TD series engine. c. Apply liquid gasket to inner surface around hole perimeter area. (Assembly should be done within 5 minutes after coating.) d. Wait at least 30 minutes before refilling engine oil and engine coolant. EM-1 PREPARATION SPECIAL SERVICE TOOLS * Special tool or commercial equivalent Tool number Tool name Description ST0501S000* Engine stand assembly 1 ST05011000 V Engine stand 2 V ST05012000 Base Disassembling and assembling NT042 KV10106500* Engine stand shaft NT028 KV1011070 Engine sub-attachment NT582 KV101092S0 Valve spring compressor 1 KV10109210 V Compressor 2 KV10109220 V Adapter Disassembling and assembling valve components NT718 KV10107902 Valve oil seal puller 1 KV10116100 V Valve oil seal puller adapter NT605 EM-2 PREPARATION * Special tool or commercial equivalent Tool number Tool name Description KV101151S0 Lifter stopper set 1 KV10115110 V Camshaft pliers 2 V KV10115120 Lifter stopper Changing shims NT041 EM03470000* Piston ring compressor Installing piston assembly into cylinder bore NT044 ST16610001* Pilot bushing puller Removing crankshaft pilot bushing NT045 KV10109300 Puller holder a = 68 mm (2.68 in) b = 8 mm (0.31 in) dia. NT628 1 V 2 V 3 V ED19601000 Compression gauge ED19600600 Compression gauge adapter (for glow plug hole) ED19600700 Compression gauge adapter (for injector hole) Checking compression pressure NT742 KV11100300 Nozzle holder socket NT563 EM-3 PREPARATION * Special tool or commercial equivalent Tool number Tool name Description WS39930000* Tube presser Pressing the tube of liquid gasket NT052 KV10107501 Valve oil seal drift NT741 KV111033S0 Engine stopper 1 KV10105610 V Stopper plate 2 V KV10105630 Stopper gear Preventing crankshaft from rotating a: 3 (0.12) b: 6.4 (0.252) c: 2.8 (0.110) d: 6.6 (0.260) e: 119 (4.69) f: 12 (0.47) g: 18 (0.71) Unit: mm (in) NT616 EM-4 PREPARATION COMMERCIAL SERVICE TOOLS Tool name Description Valve guide drift Removing and installing valve guide Intake & Exhaust TB and TD engines a = 11.5 mm (0.453 in) dia. b = 7.6 mm (0.299 in) dia. RD engine a = 11.5 mm (0.453 in) dia. b = 6.5 mm (0.256 in) dia. NT015 Valve guide reamer Reaming valve guide guide V 2 1 V or hole for oversize valve Intake & Exhaust TB engine d1 = 8.0 mm (0.315 in) dia. d2 = 12.2 mm (0.480 in) dia. RD engine d1 = 7.000 mm (0.2756 in) dia. d2 = 11.19 mm (0.4406 in) dia. TD engine d1 = 8.0 mm (0.315 in) dia. NT016 Valve seat cutter set Finishing valve seat dimensions NT048 Front oil seal drift Installing front oil seal TB engine a = 80 mm (3.15 in) dia. b = 58 mm (2.28 in) dia. RD engine a = 52 mm (2.05 in) dia. b = 41 mm (1.61 in) dia. NT049 Rear oil seal drift Installing rear oil seal a = 100 mm (3.94 in) dia. b = 78 mm (3.07 in) dia. NT049 Piston pin drift Removing and installing piston pin a = 22.5 mm (0.886 in) dia. b = 12.5 mm (0.492 in) dia. NT074 EM-5 PREPARATION Tool name Description Piston ring expander Removing and installing piston ring NT030 EM-6 NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING SEM808F EM-7 NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING NVH Troubleshooting Chart — Engine Noise Use the chart below to help you find the cause of the problem. 1. Locate the area where noise occurs. 2. Confirm the type of noise. 3. Specify the operating condition of engine. 4. Check specified noise source. If necessary, repair or replace these parts. Operating condition of engine Location of noise Top of engine Rocker cover Cylinder head Crankshaft pulley Cylinder block (Side of engine) Oil pan Type of noise Before After warm-up warm-up When starting When idling When racing While driving Check item Reference page Ticking or clicking C A — A B — Tappet noise Valve clearance EM-41 Rattle C A — A B C Camshaft bearing noise Camshaft journal clearance Camshaft runout EM-37 Slap or knock — A — B B — Piston pin noise Piston and piston pin clearance Connecting rod bushing clearance EM-47, 53 EM-48, 49 Slap or rap A — — B B A Piston slap noise Piston-to-bore clearance Piston ring side clearance Piston ring end gap Connecting rod bend and torsion Knock A B C B B B Connecting rod bearing noise Connecting rod bushing clearance (Small end) Connecting rod bearing clearance (Big end) EM-52, 53 Knock A B — A B C Main bearing noise Main bearing oil clearance Crankshaft runout EM-51 Whine or hissing C A — A A — Timing belt noise (too tight) Loose timing belt Belt contacting case EM-18 Timing belt cover Front of engine Source of noise Clatter A B — C A — Timing belt noise (too loose) Squeaking or fizzing A B — B — C Other drive belts (Sticking or slipping) Drive belts deflection Idler pulley bearing operation Water pump operation Creaking A B A B A B Other drive belts (Slipping) Squall Creak A B — B A B Water pump noise A: Closely related B: Related C: Sometimes related —: Not related *1: MA section (‘‘Checking Drive Belts’’, ‘‘ENGINE MAINTENANCE’’) *2: LC section (‘‘Water Pump Inspection’’, ‘‘ENGINE COOLING SYSTEM’’) EM-8 *1 *2 OUTER COMPONENT PARTS SEM780F EM-9 OUTER COMPONENT PARTS SEM781F EM-10 COMPRESSION PRESSURE Measurement of Compression Pressure 1. Warm up engine sufficiently. 2. Disconnect injection tube on nozzle side and loosen injection tubes on pump side. Release clamps on injection tubes.
+ Use two wrenches to prevent delivery holder on pump side from loosening. SEM702B SEM703B 3.
Remove spill-tube assembly. + To prevent spill tube from breaking, remove it by gripping nozzle holder. SEM704B 4. Remove all injection nozzles using Tool or a suitable tool. SEM705B 5. Turn ignition switch OFF and disconnect harness connector (black colored) at injection pump. SEM789F EM-11 COMPRESSION PRESSURE Measurement of Compression Pressure (Cont’d) 6. Fit compression gauge adapter to cylinder head. SEM706B 7. Crank engine and read gauge indication. Crank speed: 200 rpm Compression pressure: Standard 3,040 kPa (30.4 bar, 31 kg/cm2, 441 psi) Limit 2,452 kPa (24.5 bar, 25 kg/cm2, 356 psi) Differential limit between cylinders 490 kPa (4.9 bar, 5 kg/cm2, 71 psi) 8. If the pressure appears low, pour about 3 m! (0.11 Imp fl oz) of engine oil through nozzle holes and repeat test. For indications of test, refer to the following table. Gauge indication during tests First reading Trouble diagnosis Second reading + Piston rings are worn or damaged. Increased reading SEM857 Same reading maintained + If two adjacent cylinders are low, gasket is damaged. + Valve is sticking. + Valve seat or valve contact surface is incorrected. SEM858 9.
Replace nozzle gaskets and install injection nozzles. New nozzle gasket installation direction is as shown. Nozzle to cylinder head: : 59 - 69 Nzm (6.0 - 7.0 kg-m, 43 - 51 ft-lb) SEM708B EM-12 COMPRESSION PRESSURE Measurement of Compression Pressure (Cont’d) 10. Install spill tube by holding nozzle holder. Spill tube nut: : 39 - 49 Nzm (4 - 5 kg-m, 29 - 36 ft-lb) SEM704B 11. Install injection tubes using two wrenches as shown. Injection tube: : 22 - 25 Nzm (2.2 - 2.5 kg-m, 16 - 18 ft-lb) SEM702B SEM703B 12. Initialize the ECM. Refer to EC section (‘‘HOW TO ERASE DTC’’). EM-13 OIL PAN SEM782F Removal 1. Remove oil pan guard. SEM783F 2. Drain engine oil. + When installing drain plug washer, ensure it faces in correct direction. + Discard oil drain plug washer and install a new one.
Drain plug: : 29 - 39 Nzm (3.0 - 4.0 kg-m, 22 - 29 ft-lb) SEM063B EM-14 OIL PAN Removal (Cont’d) 3. Remove engine gussets and oil pan bolts. + Remove bolts/nuts in numerical order shown in figure, alternating left and right ones toward the center. SEM739B 4. Remove oil pump assembly. SEM432C Installation Always install with new oil seal. 1. Install oil pump assembly. Location Bolt length mm (in) 1 V 2 V 3 V 4 V 20 (0.79) 35 (1.38) 45 (1.77) 55 (2.17) SEM794F 2. Install oil pan. Tighten bolts in the order shown in the figure. + Always replace oil pan gaskets with new ones when reassembling. + Install oil pan gasket after cleaning the contacting surface.
+ Oil pan bolts/nuts: Bolt : 8 - 12 Nzm (0.8 - 1.2 kg-m, 69 - 104 in-lb) Nut : 10 - 14 Nzm (1.0 - 1.4 kg-m, 87 - 122 in-lb) 3. Install engine gusset and oil pan guard.
SEM739BA EM-15 TIMING BELT CAUTION: + Do not bend or twist timing belt. + After removing timing belt, do not turn crankshaft and camshaft separately because valves will strike piston heads. + Make sure that timing belt, camshaft sprocket, crankshaft sprocket, idler pulley, injection pump pulley and belt tensioner are clean and free from oil and water.
+ Align white lines on timing belt with punch mark on camshaft sprocket, crankshaft sprocket and injection pump pulley. + Installation should be carried out when engine is cold. SMA767BA Removal 1. 2. + + + 3. Remove radiator shroud. Remove the following belts. Power steering drive belt A/C compressor drive belt Alternator drive belt Remove cooling fan coupling and water pump pulley. EM-16 TIMING BELT Removal (Cont’d) 4. Set No. 1 cylinder at bottom dead center (BDC) on its expansion stroke, as shown. SMA768B 5. Remove the starter motor and wipe off the liquid gasket remaining on the connecting part. 6. Install the ring gear stopper using the bolt holes for fixing the starter motor. 7. Remove crankshaft pulley using puller. Be sure to securely attach puller jaws.
Attach jaws only to the rear side of pulley.
8. Remove front cover. SMA769B 9. Remove tensioner spring and loosen belt tensioner lock nut. 10. Remove timing belt. After removing timing belt, do not turn crankshaft and camshaft separately, because valves will strike piston heads. SMA770B EM-17 TIMING BELT Inspection Visually check the condition of timing belt. Replace if any abnormality is found. Item to check Problem Cause Tooth is broken/tooth root is cracked.
+ Camshaft jamming + Distributor jamming + Damaged camshaft/crankshaft oil seal SEM394A Back surface is cracked/ worn. + Tensioner jamming + Overheated engine + Interference with belt cover SEM395A Side surface is worn. + Improper installation of belt + Malfunctioning crankshaft pulley plate/timing belt plate + Belt corners are worn and round. + Wicks are frayed and coming out.
SEM396A Teeth are worn. + + + + + Poor belt cover sealing Coolant leakage at water pump Camshaft not functioning properly Distributor not functioning properly Excessive belt tension + Canvas on tooth face is worn down. + Canvas on tooth is fluffy, rubber layer is worn down and faded white, or weft is worn down and invisible.
SEM397A Oil/Coolant or water is stuck to belt. + Poor oil sealing of each oil seal + Coolant leakage at water pump + Poor belt cover sealing — EM-18 TIMING BELT Installation 1. Confirm that No. 1 cylinder is set at BDC on its expansion stroke as follows: Confirm that crankshaft key is at the bottom. 2. Set timing belt. a. Ensure timing belt, sprockets and pulleys are clean and free from oil or water. Do not bend or twist timing belt too much. b. Align white lines on timing belt with matching mark on camshaft sprocket, crankshaft sprocket and injection pump pulley. c. Point arrow on timing belt toward front. SMA771B EM-19 TIMING BELT Installation (Cont’d) 3. Install tensioner spring and tighten belt tensioner lock nut. : 32 - 40 Nzm (3.3 - 4.1 kg-m, 24 - 30 ft-lb) SMA770B 4. 5. 6. 7. Install front cover. Install crankshaft pulley.
Install water pump pulley and cooling fan coupling. Apply liquid gasket to the connecting surface and install the starter motor. Use Genuine Liquid Gasket or equivalent. 8. Install drive belts and check drive belt deflections by pushing midway between pulleys. Refer to MA section (‘‘Checking Drive Belts’’). SMA015C EM-20 OIL SEAL REPLACEMENT VALVE OIL SEAL 1. Remove timing belts. 2. Remove camshaft sprocket and back covers. 3. Remove camshaft brackets by loosening bracket nuts from center to outside in two or three stages.
4. Remove camshaft oil seals and camshaft. SEM716B 5. Remove valve lifters and mark order No. on each lifter. 6. Replace valve oil seal according to the following procedure. When replacing valve oil seal, set the corresponding piston at TDC. Failure to do so causes the valve to drop into the cylinder. 1) Set No. 1 cylinder at TDC. SEM790F 2) Remove valve springs and valve oil seals for No. 1 and No. 6 cylinders. Valve spring seats should not be removed. SEM745B 3) Install new valve oil seals for No. 1 and No. 6 cylinders as illustrated. Reinstall valve springs. (narrow pitch side toward cylinder head) 4) Install valve spring retainers on intake valves and valve rotators on exhaust valves, and remount valve assembly. 5) Set No. 2 cylinder at TDC. 6) Replace valve oil seals for No. 2 and No. 5 cylinders according to steps 2) and 3). 7) Set No. 3 cylinder at TDC. 8) Replace valve oil seals for No. 3 and No. 4 cylinders according to steps 2) and 3). 9) Install valve lifters in original positions. SEM746B EM-21 OIL SEAL REPLACEMENT CAMSHAFT AND CRANKSHAFT OIL SEAL INSTALLING DIRECTION AND MANNER + + + When installing camshaft and crankshaft oil seals, be careful to install them correctly, as shown in the figure. Apply engine oil to oil seal lip, outer face, camshaft and bracket. Wipe off excess oil after installing oil seal. SEM715A CAMSHAFT OIL SEALS 1. Remove timing belts, sprockets and back covers. 2. Pull out oil seal with a suitable tool. SEM743B 3. Install new oil seals with a suitable tool. SEM733B CRANKSHAFT FRONT OIL SEAL 1. 2. 3. 4. Remove Remove Remove Remove valve timing belt and crankshaft sprocket. oil pan and oil pan gasket. oil pump assembly. front oil seal with a suitable tool. SEM893A 5. Apply engine oil to new oil seal and install oil seal using a suitable tool. SEM894A EM-22 OIL SEAL REPLACEMENT CRANKSHAFT REAR OIL SEAL 1. Remove transmission assembly. (Refer to ‘‘REMOVAL AND INSTALLATION’’ in MT section.) 2. Remove clutch cover assembly. 3. Remove flywheel and rear plate. 4. Remove oil pan and oil pan gasket. 5. Remove oil seal retainer assembly. 6. Remove traces of liquid gasket using a scraper.
SEM896A 7. Remove rear oil seal from retainer. SEM895A 8. Apply engine oil to new oil seal and install oil seal using a suitable tool. SEM897A 9. Apply a continuous bead of liquid gasket to rear oil seal retainer. a. Coat of liquid gasket should be maintained within 2.0 to 3.0 mm (0.079 to 0.118 in) dia. range. b. Attach oil seal retainer to cylinder block within five minutes after coating. c. Wait at least 30 minutes before refilling engine oil or starting engine. d. Use Genuine Liquid Gasket or equivalent.
SLC822 SEM144B EM-23 TURBOCHARGER SEM784F Removal and Installation 1. 2. + + + + + + + 3. Drain engine coolant. Remove the following: Air duct and hoses Air intake pipe EGR pipe Heat shield plates Intake manifold Front (exhaust) tube Oil tube and water tube Remove exhaust manifold with turbocharger from cylinder head. 4. When installing turbocharger to exhaust manifold, securely tighten nuts and lock the nuts. + Turbocharger should not be disassembled. EM-24 TURBOCHARGER Inspection SEM796C OIL AND WATER TUBES Check tubes for clogging. ROTOR SHAFT 1. Check rotor shaft for smooth rotating. SEM798C 2. Check rotor shaft for carbon deposits. SEM799C EM-25 TURBOCHARGER Inspection (Cont’d) 3.
Measure runout of rotor shaft.
Runout (Total indicator reading): 0.056 - 0.127 mm (0.0022 - 0.0050 in) SEM800C 4. Measure end play of rotor shaft. End play: 0.013 - 0.097 mm (0.0005 - 0.0038 in) SEM801C TURBINE WHEEL Check turbine wheel for the following: + Oil + Carbon deposits + Deformed fins + Contact with turbine housing SEM802C COMPRESSOR WHEEL Check compressor wheel for the following: + Oil + Deformed fins + Contact with compressor housing SEM803C WASTEGATE VALVE Remove rod pin and check wastegate valve for cracks, deformation and smooth movement. Check valve seat surface for smoothness. SEM804C EM-26 TURBOCHARGER Inspection (Cont’d) WASTEGATE VALVE ACTUATOR Apply air pressure to wastegate valve actuator and check it for smooth movement. + Do not keep applying air pressure to the actuator. + The air pressure should be in the range of 108 to 118 kPa (1.08 to 1.18 bar, 1.1 to 1.2 kg/cm2, 16 to 17 psi). SEM805C EM-27 CHARGE AIR COOLERS SEM791F EM-28 CYLINDER HEAD SEM785F EM-29 CYLINDER HEAD CAUTION: + When installing sliding parts such as camshaft and oil seal, be sure to apply new engine oil on their sliding surfaces. + When tightening cylinder head bolts, apply new engine oil to thread portions and seat surfaces of bolts. Removal 1. Remove charge air cooler assembly. 2. Set No. 1 cylinder at BDC on its expansion stroke. 3. Drain engine coolant from drain plugs on cylinder block and radiator. 4. Remove air cleaner and/or air duct. 5. Remove timing belt. 6. Remove rocker cover securing bolts/nuts in numerical order shown in figure. To install rocker cover, tighten bolts/nuts in reverse order of removal. Tighten in two or three stages. SEM786F 7. Remove camshaft sprocket, injection pump drive sprocket and back cover. 8. Disconnect exhaust manifold from exhaust tube. SEM711B 9. Remove intake and exhaust manifold. To install manifolds, tighten bolts/nuts in reverse order of removal. Tighten in two or three stages. SEM431C EM-30 CYLINDER HEAD Removal (Cont’d) 10. Remove fuel injection tube assembly and spill tube. 11. Remove cylinder head bolts in numerical order and remove cylinder head. SEM703B Disassembly 1. a. b. c. 2. Remove following parts: Thermostat housing Engine slinger Glow plate and glow plugs Remove camshaft bracket securing nuts in numerical order shown in figure in two or three stages. To install camshaft bracket caps, tighten nuts in reverse order of removal. Tighten in two or three stages. SEM714B 3.
Remove camshaft and oil seal. 4. Remove valve lifters. 5. Remove valve component parts with tool. SEM716B EM-31 CYLINDER HEAD Inspection CYLINDER HEAD DISTORTION SEM718B Warpage of surface: Less than 0.1 mm (0.004 in) If beyond the specified limit, replace it or resurface it. Resurfacing limit: The resurfacing limit of cylinder head is determined by the cylinder block resurfacing in an engine. Amount of cylinder head resurfacing is ‘‘A’’. Amount of cylinder block resurfacing is ‘‘B’’. The maximum limit is as follows: A + B = 0.1 mm (0.004 in) Nominal cylinder head height: 139.9 - 140.1 mm (5.508 - 5.516 in) VALVE GUIDE CLEARANCE SEM719B 1.
Insert the valve stem into the valve guide and move it back, forth and slide it.
If valve stem makes a clatter and moves back and forth excessively out of line, or if it does not slide well, replace valve or valve guide, or both. 2. Install valve stem into the valve guide. 3. Measure the deflection. Stem to guide deflection limit: 0.1 mm (0.004 in) (Half of dial gauge reading) 4. If it exceeds the limit, check valve to valve guide clearance.
(1) Measure valve stem diameter and guide inner diameter.
(2) Check that clearance is within the specification. Valve to valve guide clearance limit: 0.1 mm (0.004 in) (3) If it exceeds the limit, replace valve or valve guide. EM030 VALVE GUIDE REPLACEMENT 1. Heat cylinder head 150 to 160°C (302 to 320°F) in oil. 2. Remove the guide with suitable tool. SEM871 EM-32 CYLINDER HEAD Inspection (Cont’d) 3. Drive in the new guide until it projects out 10.3 mm (0.406 in). 4. Ream the bore using suitable tool. Reaming bore: 7.000 - 7.018 mm (0.2756 - 0.2763 in) SEM872 COMBUSTION CHAMBER REPLACEMENT Usually combustion chamber should not be removed. However, if there are cracks or extensive damage, it should be replaced. 1. Remove glow plug connecting plate, glow plugs and injection nozzle. 2. Remove combustion chamber so that cylinder head will not be damaged. Be careful not to scratch inside of nozzle hole. SEM720B 3. Install combustion chamber. (1) Heat cylinder head 150 to 160°C (302 to 320°F) in oil. (2) Align combustion chamber knock pin with cylinder head notch, and install it into cylinder head using a plastic-tip hammer. SEM721B VALVE SEATS 1.
Check valve and valve seat for contact. Coat the valve face with prussian red lead. If contact is wrong, correct valve seat. If the valve red lead appears 360° around face, the valve stem and face are concentric.
If not, repair or replace valve. SEM722B 2. Check valve seats for any evidence of pitting on valve contact surface, and reseat or replace if worn out excessively. Correct valve seat surface. + When repairing valve seat, check valve and valve guide for wear beforehand. If worn, replace them. Then correct valve seat. + Cut with both hands to uniform the cutting surface. EM-33 CYLINDER HEAD Inspection (Cont’d) VALVE SEAT REPLACEMENT SEM795A 1. Bore out old seat until it collapses. The machine depth stop should be set so that boring cannot continue beyond the bottom face of the seat recess in cylinder head. 2. Ream the cylinder head recess. Reaming bore for service valve seat [Oversize 0.5 mm (0.020 in)]: Intake 40.954 - 40.932 mm (1.6124 - 1.6115 in) Exhaust 34.954 - 34.932 mm (1.3761 - 1.3753 in) Reaming should be done to the concentric circles around the valve guide center so that valve seat will have the correct fit. 3. Heat cylinder head to a temperature of 150 to 160°C (302 to 320°F) and press fit seat until it seats on the bottom. 4. Install valve seat.
When replacing valve seat, valve should also be replaced. SEM008A 5. Cut or grind valve seat using suitable tool at the specified dimensions as shown in SDS. The cutting should be done with both hands for uniform cutting. SEM876 6. Apply small amount of fine grinding compound to valve contacting face and put valve into guide.
Lap valve against its seat until proper valve seating is obtained. Remove valve and then clean valve and valve seat. SEM877 EM-34 CYLINDER HEAD Inspection (Cont’d) 7. Measure distance from cylinder head surface to intake and exhaust valves. If specified distance is exceeded, replace valve(s) or valve seat(s). Specified distance: mm (in) Standard −0.069 to 0.269 (−0.0027 to 0.0106) SEM787F VALVE DIMENSIONS 1. Check dimensions in each valve.
For dimensions, refer to SDS. 2. Correct or replace any valve that is out of tolerance. EM030 3. Valve face or valve stem end surface should be refaced by using a valve grinder.
When valve head has been worn down to 0.5 mm (0.020 in) in margin thickness, replace the valve. Grinding allowance for valve stem tip is 0.2 mm (0.008 in) or less. EM111 VALVE SPRING SQUARENESS Check valve spring for squareness using a steel square and surface plate. If spring is out-of-square ‘‘S’’ more than specified limit, replace with new one. Out-of-square: Outer Less than 1.9 mm (0.075 in) Inner Less than 1.6 mm (0.063 in) SEM333 VALVE SPRING PRESSURE LOAD Measure the free length and the tension of each spring. If the measured value exceeds the specified limit, replace spring. Refer to SDS. EM113 EM-35 CYLINDER HEAD Inspection (Cont’d) VALVE LIFTER 1. Check contact and sliding surfaces for wear or scratches. SEM723B 2. Check diameter of a valve lifter. Outer diameter: 34.960 - 34.975 mm (1.3764 - 1.3770 in) SEM724B 3.
Check valve lifter guide bore. Bore diameter: 34.998 - 35.018 mm (1.3779 - 1.3787 in) Standard clearance: 0.023 - 0.058 mm (0.0009 - 0.0023 in) SEM725B If valve lifters are noisy, check valve lifter.
(1) Depress plunger forcibly with your finger. If it moves about 1 mm (0.04 in), it indicates air is inside valve lifter. (2) Reinstall valve lifter. (3) Bleed air by running engine at 2,400 rpm under no-load for about 20 minutes. CAUTION: When camshaft is removed to install, remove or inspect hydraulic valve lifters, do not start engine for at least 30 minutes after reinstalling camshaft.
(Wait until hydraulic valve lifters have reached their set lengths.) Before starting engine, rotate crankshaft by hand to ensure pistons do not interfere with valves.
(4) Next check to ensure all air is bled. [Refer to step (1) above.] (5) If there is still air, replace valve lifter.
EM-36 CYLINDER HEAD Inspection (Cont’d) CAMSHAFT VISUAL CHECK Check camshaft for scratches, seizure and wear. CAMSHAFT END PLAY 1.
Install camshaft in cylinder head. 2. Measure camshaft end play. Camshaft end play: 0.065 - 0.169 mm (0.0026 - 0.0067 in) SEM726B CAMSHAFT JOURNAL CLEARANCE 1. Measure the inner diameter of camshaft bearing. Standard inner diameter: 30.000 - 30.021 mm (1.1811 - 1.1819 in) SEM727B 2. Measure the outer diameter of camshaft journal. Standard outer diameter: 29.935 - 29.955 mm (1.1785 - 1.1793 in) If the clearance is greater than the maximum, replace camshaft and/or cylinder head. Maximum clearance: 0.045 - 0.086 mm (0.0018 - 0.0034 in) SEM728B CAMSHAFT RUNOUT Camshaft runout [TIR (Total Indicator Reading)]: Limit 0.02 mm (0.0008 in) If beyond the limit, replace. SEM729B CAMSHAFT CAM HEIGHT Standard cam height: Intake 48.005 - 48.195 mm (1.8900 - 1.8974 in) Exhaust 49.505 - 49.695 mm (1.9490 - 1.9565 in) Cam wear: Limit 0.15 mm (0.0059 in) If wear is beyond the limit, replace. SEM730B EM-37 CYLINDER HEAD Assembly 1. Install valve component parts. Install valve spring with its narrow pitch side toward cylinder head side. a. When installing valve, apply engine oil on the valve stem and lip of valve oil seal. b.
Check whether the valve face is free from foreign matter. SEM202 c. Install valve spring retainers on the intake side and valve rotators on the exhaust side. d. Valve rotators cannot be disassembled. SEM731BB 2.
Set camshaft.
Set camshaft so that dowel pin faces up. 3. Install cam bracket caps so that front mark faces forward. Cam bracket nut (Tighten in two or three stages): : 21 - 26 Nzm (2.1 - 2.7 kg-m, 15 - 20 ft-lb) SEM732B 4.
Apply engine oil to new oil seal and install it. SEM733B Installation 1. Install cylinder head gasket. a. When replacing only cylinder head gasket, install same grade gasket as the one formerly used. b. When replacing or repairing cylinder block, cylinder head, piston, connecting rod and crankshaft, select gasket as follows: EM-38 CYLINDER HEAD Installation (Cont’d) Step 1: Measure piston projection. 1) Set dial gauge on cylinder block surface to zero.
2) Set dial gauge at measuring point of piston, being careful not to disturb its zero setting. SEM734B 3) Set each piston at its Top Dead Center. With piston held in that position, measure its projections at four points, M1, M2, M3 and M4, and record measured values. Be sure to measure the projection at four points for every cylinder as shown.
SEM735B Step 2: Calculate the average value of measured projections for each cylinder. Step 3: Calculate the average value of projections for all pistons. Step 4: Round off the average value. Step 5: Determine the gasket thickness, referring to chart A. Relation between piston projection and cylinder head gasket (Chart A) Unit: mm (in) Grade A B C SEM736B Average values piston projections Gasket thickness Less than 0.79 (0.0311) 0.79 - 0.875 (0.0311 - 0.0344) More than 0.875 (0.0344) 1.42±0.05 (0.0559±0.0020) 1.50±0.05 (0.0591±0.0020) 1.58±0.05 (0.0622±0.0020) Number of identifications 1 2 3 Step 6: Check to see if the average value of each projection in step 2 is larger than the max. value of the standard projection (of selected gasket) plus 0.08 mm (0.0031 in). Step 7: If it is, use gasket that is 1 grade thicker.
If it is not, use gasket that was selected in step 4. EM-39 CYLINDER HEAD Installation (Cont’d) 2. Install cylinder head. (1) Make sure that No. 1 cylinder is at Bottom Dead Center. (2) Make sure that No. 1 cam of camshaft is at BDC on its expansion stroke.
SEM732B SEM737BA (3) Tighten cylinder head bolts to the specified torque in the sequence as follows: + Tightening procedure. M12 bolt 1st Tighten all bolts to 29 Nzm (3.0 kg-m, 22 ft-lb). 2nd Tighten all bolts to 113 Nzm (11.5 kg-m, 83 ft-lb).
3rd Loosen all bolts completely. 4th Tighten all bolts to 29 Nzm (3.0 kg-m, 22 ft-lb). 5th Tighten all bolts to 108 to 118 Nzm (11 to 12 kg-m, 80 to 87 ft-lb) or if you have an angle wrench, turn all bolts 89 to 92 degrees clockwise.
M8 bolt 16 - 21 Nzm (1.6 - 2.1 kg-m, 12 - 15 ft-lb) 3. Install front back cover and camshaft pulley. Front back cover: : 3 - 5 Nzm (0.3 - 0.5 kg-m, 26 - 43 in-lb) Camshaft pulley: : 123 - 132 Nzm (12.5 - 13.5 kg-m, 90 - 98 ft-lb) SEM711B 4. Install timing belt. Refer to ‘‘Replacing Timing Belt’’ in section MA. 5. Install rocker cover. Refer to EM-30. Apply sealant to rocker cover gasket as shown. Do not apply too much sealant. 6. Install intake and exhaust manifold. Refer to EM-30. SEM738B EM-40 VALVE CLEARANCE Checking Check valve clearance while engine is warm and not running. 1. Remove rocker cover. 2. Set No. 1 cylinder at TDC on its compression stroke. + Align pointer with TDC mark on crankshaft pulley. + Check that valve lifters on No. 1 cylinder are loose and valve lifters on No. 6 are tight. If not, turn crankshaft one revolution (360°) and align as described above. SEM790F 3. Check only those valves shown in the figure. No. 1 No. 1 cylinder at TDC No. 2 INT EXH INT j j j EXH No. 3 INT No. 4 EXH INT j j EXH No. 5 INT EXH No. 6 INT EXH j SEM799F + + Using a feeler gauge, measure clearance between valve lifter and camshaft. Record any valve clearance measurements which are out of specification. They will be used later to determine the required replacement adjusting shim. Valve clearance for checking (Hot): Intake 0.28 - 0.38 mm (0.011 - 0.015 in) Exhaust 0.32 - 0.42 mm (0.013 - 0.017 in) SEM634F 4. Turn crankshaft one revolution (360°) and align mark on crankshaft pulley with pointer. 5. Check only those valves shown in the figure. No. 1 INT No. 6 cylinder at TDC SEM800F EXH No. 2 INT No. 3 EXH INT j j EXH No. 4 INT No. 5 EXH INT j j EXH No. 6 INT EXH j j + Use the same procedure as mentioned in step 4. 6. If all valve clearances are within specification, install the following parts: + Rocker cover EM-41 VALVE CLEARANCE Adjusting Adjust valve clearance while engine is cold.
1. Turn crankshaft. Position cam lobe upward on camshaft for valve that must be adjusted. SEM636F SEM637F 2. Place Tool (A) around camshaft as shown in figure. Before placing Tool (A), rotate notch toward center of cylinder head. (See figure.) This will simplify shim removal later. CAUTION: Be careful not to damage cam surface with Tool (A). 3. Rotate Tool (A) (See figure.) so that valve lifter is pushed down. 4. Place Tool (B) between camshaft and valve lifter to retain valve lifter. CAUTION: + Tool (B) must be placed as close to camshaft bracket as possible. + Be careful not to damage cam surface with Tool (B). 5. Remove Tool (A). 6. Remove adjusting shim using a small screwdriver and a magnetic finger. 7. Determine replacement adjusting shim size using the following formula. + Use a micrometer to determine thickness of removed shim. + Calculate thickness of new adjusting shim so valve clearance comes within specified values. R = Thickness of removed shim N = Thickness of new shim M = Measured valve clearance S = Standard valve clearance SEM638F Unit: mm (in) HOT COLD SEM145D Intake Exhaust Intake 0.28 - 0.38 (0.0110 - 0.0150) 0.32 - 0.42 (0.0126 - 0.0165) 0.26 - 0.34 (0.0102 - 0.0134) Exhaust 0.30 - 0.38 (0.0118 - 0.0150) Intake: N = R + [M − S] Exhaust: N = R + [M − S] Shims are available in 15 sizes from 2.20 mm (0.0866 in) to 2.90 mm (0.1142 in), in steps of 0.05 mm (0.0020 in). EM-42 VALVE CLEARANCE Adjusting (Cont’d) + Select the closest size shim to the calculated thickness. Refer to chart in SDS, EM-60. AEM236 8. Install new shim using a suitable tool.
+ Install with the surface on which the thickness is stamped facing down. 9. Place Tool (A) as explained in steps 2 and 3. 10. Remove Tool (B). 11. Remove Tool (A). 12. Recheck valve clearance. Valve clearance: Unit: mm (in) Intake Exhaust For adjusting Hot Cold* (reference data) 0.28 - 0.38 0.26 - 0.34 (0.011 - 0.015) (0.010 - 0.013) 0.32 - 0.42 0.30 - 0.38 (0.013 - 0.017) (0.012 - 0.015) *: At a temperature of approximately 20°C (68°F) Whenever valve clearances are adjusted to cold specifications, check that the clearances satisfy hot specifications and adjust again if necessary. EM-43 ENGINE REMOVAL SEM433C EM-44 ENGINE REMOVAL Removal 1. Remove engine, transmission and transfer’s undercovers, oil pan guard and hood.
2. Drain engine coolant.
3. Remove charge air cooler assembly. 4. Remove vacuum hoses, fuel tubes, harnesses, and connectors and so on. 5. Remove radiator assembly. 6.
Remove drive belts. 7. Remove power steering oil pump, alternator and air conditioner compressor. 8. Remove starter motor assembly. 9. Remove front exhaust tube. 10. Remove transmission from vehicle. Refer to MT section.
11. Hoist engine with engine slingers and remove engine mounting bolts from both sides. 12. Remove engine from vehicle.
Installation + Install in reverse order of removal. EM-45 CYLINDER BLOCK SEM788F EM-46 CYLINDER BLOCK CAUTION: + When installing sliding parts such as bearings and pistons, apply engine oil to the sliding surfaces. + Place removed parts, such as bearings and bearing caps, in their proper order and direction. + When installing connecting rod bolts and main bearing cap bolts, apply new engine oil to threads and seating surfaces of nuts. + Do not allow any magnetic materials to contact the ring gear teeth of drive plate. Disassembly PISTON AND CRANKSHAFT 1. 2. 3. 4. 5. 6. 7. Place engine on a work stand. Remove timing belt and injection pump. Drain coolant and remove water pump. Remove front cover.
Drain oil. Remove oil pan and oil pump. Remove cylinder head.
SEM750B 8.
Remove pistons with connecting rod.
+ To disassemble piston and connecting rod, remove snap ring first. Then heat piston to 60 to 70°C (140 to 158°F) and use piston pin press to remove pin. + When piston rings are not replaced, make sure that piston rings are mounted in their original positions. + When replacing piston rings, if there is no punchmark, install with either side up.
SEM877B 9. Remove bearing cap bolts and main bearing caps in the order shown, then remove crankshaft. + Loosen bolts in two or three steps. SEM801F Inspection PISTON AND PISTON PIN CLEARANCE 1. Measure inner diameter of piston pin hole ‘‘dp’’. Standard diameter ‘‘dp’’: 26.995 - 27.005 mm (1.0628 - 1.0632 in) SEM672E EM-47 CYLINDER BLOCK Inspection (Cont’d) 2. Measure outer diameter of piston pin ‘‘Dp’’. Standard diameter ‘‘Dp’’: 26.994 - 27.000 mm (1.0628 - 1.0630 in) 3. Calculate piston pin clearance.
dp − Dp = −0.004 to 0 mm (−0.0002 to 0 in) If it exceeds the above value, replace piston assembly with pin. PISTON RING SIDE CLEARANCE Side clearance: Top ring 0.060 - 0.093 mm (0.0024 - 0.0037 in) 2nd ring 0.040 - 0.073 mm (0.0016 - 0.0029 in) Max. limit of side clearance: 0.1 mm (0.004 in) If out of specification, replace piston ring. If clearance exceeds maximum limit with new ring, replace piston. SEM024AA PISTON RING END GAP SEM822B End gap: Top ring 0.20 - 0.28 mm (0.0079 - 0.0110 in) 2nd ring 0.20 - 0.46 mm (0.0079 - 0.0181 in) Oil ring 0.30 - 0.56 mm (0.0118 - 0.0220 in) Max. limit of ring gap: 0.4 mm (0.016 in) If out of specification, replace piston ring. If gap still exceeds maximum limit with new ring, rebore cylinder and use oversized piston and piston rings. Refer to SDS, EM-62. + When replacing the piston, check cylinder block surface for scratches or seizure. If scratches or seizure are found, hone or replace the cylinder block.
CONNECTING ROD BEND AND TORSION Bend: Limit 0.025 mm (0.0010 in) per 100 mm (3.94 in) length Torsion: Limit 0.025 mm (0.0010 in) per 100 mm (3.94 in) length If it exceeds the limit, replace connecting rod assembly. SEM038F EM-48 CYLINDER BLOCK Inspection (Cont’d) CYLINDER BLOCK DISTORTION AND WEAR SEM907A 1. Clean upper surface of cylinder block. Using a reliable straightedge and feeler gauge, check the flatness of cylinder block surface. + Check along six positions as shown in figure. Limit: 0.10 mm (0.0039 in) 2. If out of specification, resurface it.
The limit for cylinder block resurfacing is determined by the amount of cylinder head resurfacing. Amount of cylinder head resurfacing is ‘‘A’’. Amount of cylinder block resurfacing is ‘‘B’’. The maximum limit is as follows: A + B = 0.2 mm (0.008 in) Nominal cylinder block height from crankshaft center: 227.40 - 227.50 mm (8.9527 - 8.9567 in) 3. If necessary, replace cylinder block. PISTON-TO-BORE CLEARANCE SEM908A 1. Using a bore gauge, measure cylinder bore for wear, out-ofround and taper. Standard inner diameter ‘‘Db’’: 85.000 - 85.030 mm (3.3465 - 3.3476 in) Wear limit: 0.20 mm (0.0079 in) Out-of-round (X − Y): Less than 0.015 mm (0.0006 in) Taper (A − B or A − C): Less than 0.010 mm (0.0004 in) If it exceeds the limit, rebore all cylinders. Replace cylinder block if necessary. 2.
Check for scratches and seizure. If seizure is found, hone it. SEM909A EM-49 CYLINDER BLOCK Inspection (Cont’d) 3. Measure piston skirt diameter. Piston diameter ‘‘A’’: Refer to SDS, EM-61. Measuring point ‘‘a’’ (Distance from the bottom): 18 mm (0.71 in) 4.
Check that piston-to-bore clearance is within specification. Piston-to-bore clearance ‘‘B’’ = Bore measurement ‘‘C’’ − Piston diameter ‘‘A’’: 0.025 - 0.045 mm (0.0010 - 0.0018 in) SEM181B 5. Determine piston oversize according to amount of cylinder wear. Oversize pistons are available for service. Refer to SDS, EM-61. 6. Cylinder bore size is determined by adding piston-to-bore clearance to piston diameter ‘‘A’’.
Rebored size calculation: D=A+B−C where, D: Bored diameter A: Piston diameter as measured B: Piston-to-bore clearance C: Honing allowance 0.02 mm (0.0008 in) SEM755B 7. Install main bearing cap and tighten bolts to 90 to 100 Nzm (9.2 to 10.2 kg-m, 67 to 74 ft-lb). This will prevent distortion of cylinder bores. 8. Cut cylinder bores. + When any cylinder needs boring, all other cylinders must also be bored. + Do not cut too much out of cylinder bore at a time. Cut only 0.05 mm (0.0020 in) or so at a time. 9.
Hone cylinders to obtain specified piston-to-bore clearance. 10. Measure finished cylinder bore for out-of-round and taper. + Measurement should be done after cylinder bore cools down. EM-50 CYLINDER BLOCK Inspection (Cont’d) CRANKSHAFT SEM316A 1. Check crankshaft main and pin journals for score, wear or cracks.
2. With a micrometer, measure journals for taper and out-ofround. Out-of-round (X − Y): Main journal Less than 0.005 mm (0.0002 in) Pin journal Less than 0.0025 mm (0.0001 in) Taper (A − B): Main journal Less than 0.005 mm (0.0002 in) Pin journal Less than 0.0025 mm (0.0001 in) 3. Measure crankshaft runout. Runout (Total indicator reading): Standard Less than 0.025 mm (0.0010 in) Limit 0.05 mm (0.0020 in) SEM906A BEARING CLEARANCE + Use Method A or Method B. Method A is preferred because it is more accurate. Method A (Using bore gauge and micrometer) Main bearing 1. Set main bearings in their proper positions on cylinder block and main bearing cap. SEM157B 2.
Install main bearing cap to cylinder block. Tighten all bolts in correct order in two or three stages. Refer to EM-54. 3. Measure inner diameter ‘‘A’’ of each main bearing.
SEM753B EM-51 CYLINDER BLOCK Inspection (Cont’d) 4. Measure outer diameter ‘‘Dm’’ of each crankshaft main journal. 5. Calculate main bearing clearance. Main bearing clearance = A − Dm: Standard 0.036 - 0.063 mm (0.0014 - 0.0025 in) Limit 0.12 mm (0.0047 in) If it exceeds the limit, replace bearing.
+ If clearance cannot be adjusted within the standard of any bearing, grind crankshaft journal and use undersized bearing. AEM033 If crankshaft or cylinder block is replaced, select thickness of main bearings as follows: a. Grade number of each cylinder block main journal is punched on the respective cylinder block.
These numbers are punched in either Arabic or Roman numerals. + SEM912A b. Grade number of each crankshaft main journal is punched on the respective crankshaft.
These numbers are punched in either Arabic or Roman numerals.
c. Select main bearing with suitable thickness according to the following table. Main bearing grade number: Main journal grade number SEM911A Crankshaft journal grade number 0 1 2 0 0 1 2 1 1 2 3 2 2 3 4 For example: Main journal grade number: 1 Crankshaft journal grade number: 2 Main bearing grade number = 1 + 2 = 3 Connecting rod bearing (Big end) 1. Install connecting rod bearing to connecting rod and cap. 2. Install connecting rod cap to connecting rod. Tighten bolts to the specified torque. Refer to EM-20. 3.
Measure inner diameter ‘‘C’’ of each bearing. AEM027 EM-52 CYLINDER BLOCK Inspection (Cont’d) AEM034 4. Measure outer diameter ‘‘Dp’’ of each crankshaft pin journal. 5. Calculate connecting rod bearing clearance. Connecting rod bearing clearance = C − Dp: Standard 0.014 - 0.054 mm (0.0006 - 0.0021 in) Limit 0.090 mm (0.0035 in) If it exceeds the limit, replace bearing. + If it still exceeds the limit even with a new bearing, regrind crank pin and use undersized bearings. + Refer to SDS for regrinding crankshaft and available service parts. Method B (Using plastigage) CAUTION: + Do not turn crankshaft or connecting rod while plastigage is being inserted. + If incorrect bearing clearance exists, use a thicker or undersized main bearing to ensure specified clearance. EM142 CONNECTING ROD BUSHING CLEARANCE (Small end) 1. Measure inner diameter ‘‘C’’ of bushing. 2. Measure outer diameter ‘‘Dp’’ of piston pin. 3. Calculate connecting rod bushing clearance. Connecting rod bushing clearance = C − Dp Standard: 0.025 - 0.044 mm (0.0010 - 0.0017 in) If it exceeds the limit, replace connecting rod assembly or connecting rod bushing and/or piston set with pin. SEM673E REPLACEMENT OF CONNECTING ROD BUSHING (Small end) 1. Drive in small end bushing until it is flush with end surface of rod. Be sure to align the oil holes. 2. Ream the bushing so that clearance with piston pin is within specification. Clearance between connecting rod bushing and piston pin: 0.005 - 0.017 mm (0.0002 - 0.0007 in) SEM062A FLYWHEEL/DRIVE PLATE RUNOUT Runout (Total indicator reading): Less than 0.15 mm (0.0059 in) CAUTION: + Be careful not to damage the ring gear teeth. + Check the drive plate for deformation or cracks. + Do not allow any magnetic materials to contact the ring gear teeth. + Do not resurface drive plate. Replace as necessary. SEM929A EM-53 CYLINDER BLOCK Assembly PISTON 1. Install new snap ring on one side of piston pin hole. SEM146B 2. Heat piston to 60 to 70°C (140 to 158°F) and assemble piston, piston pin, connecting rod and new snap ring. + Align the direction of piston and connecting rod. + Numbers stamped on connecting rod and cap correspond to each cylinder. + After assembly, make sure connecting rod swings smoothly. SEM754B 3. Set piston rings as shown. CAUTION: + When piston rings are not replaced, make sure that piston rings are mounted in their original positions. + Install new piston rings either side up if there is no punchmark. SEM156B + Align piston rings so that end gaps are positioned as shown. SEM160B CRANKSHAFT 1. Set main bearings in their proper positions on cylinder block and main bearing cap. + Confirm that correct main bearings are selected by using Method A or Method B. Refer to EM-52. + Apply new engine oil to bearing surfaces. SEM157B EM-54 CYLINDER BLOCK Assembly (Cont’d) 2. Install crankshaft and main bearing caps and tighten bolts to the specified torque. + Apply new engine oil to the bolt thread and seat surface. + Prior to tightening bearing cap bolts, shift crankshaft back and forth to properly seat the bearing cap. + Tighten bearing cap bolts gradually in two or three steps. Start with center bearing and move outward as shown in figure. + After securing bearing cap bolts, make sure crankshaft turns smoothly by hand. SEM801FA 3. Measure crankshaft end play. Crankshaft end play: Standard 0.050 - 0.18 mm (0.0020 - 0.0071 in) Limit 0.30 mm (0.0118 in) If beyond the limit, replace thrust bearing with a new one. SEM756B 4. Install connecting rod bearings in connecting rods and connecting rod caps. + Confirm that correct bearings are selected. Refer to ‘‘Connecting rod bearing (Big end)’’, EM-52. + Install bearings so that oil hole in connecting rod aligns with oil

hole of bearing. + Apply new engine oil to bearing surfaces, bolt threads and seating surfaces. SEM757B 5. a. + + + + Install pistons with connecting rods. Install them into corresponding cylinders with Tool. Make sure connecting rod does not scratch cylinder wall. Make sure connecting rod bolts do not scratch crankshaft pin journals. Arrange so that front mark on piston head faces toward front of engine. Apply new engine oil to piston rings and sliding surface of piston. SEM936A b.

Install connecting rod caps. + Apply new engine oil to bolt threads and nut seating surfaces.

Tighten connecting rod cap nuts using the following procedure. (1) Tighten to 14 to 16 Nzm (1.4 to 1.6 kg-m, 10 to 12 ft-lb). (2) Turn nuts 60 to 65° clockwise with an angle wrench. If an angle wrench is not available, tighten nuts to 37 to 45 Nzm (3.8 to 4.6 kg-m, 27 to 33 ft-lb). SEM759B EM-55 CYLINDER BLOCK Assembly (Cont'd) 6. Measure connecting rod side clearance. Connecting rod side clearance: Standard 0.20 - 0.30 mm (0.0079 - 0.0118 in) Limit 0.40 mm (0.0157 in) If beyond the limit, replace connecting rod and/or crankshaft. SEM760B EM-56 SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications Cylinder arrangement Displacement VALVE TIMING In-line 6 cm3 (cu in) Bore and stroke mm (in) Without warm-up three way catalyst 2,826 (172.44) 85 x 83 (3.35 x 3.27) Valve arrangement OHC Firing order 1-5-3-6-2-4 Number of piston rings Compression 2 Oil 1 Number of main bearings 7 Compression ratio 21.8 EM120 Unit: degree a b c d e f 248 220 7 33 8 60 Inspection and Adjustment COMPRESSION PRESSURE Unit: kPa (bar, kg/cm2, psi)/200 rpm Compression pressure Standard 3,040 (30.4, 31, 441) Minimum 2,452 (24.5, 25, 356) Differential limit between cylinders 490 (4.9, 5, 71) CYLINDER HEAD Unit: mm (in) Head surface distortion Standard Limit Less than 0.03 (0.0012) 0.1 (0.004) SEM795F Nominal cylinder head height ''H'' Resurfacing limit 139.9 - 140.1 (5.508 - 5.516) 0.1 (0.004) EM-57 SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment (Cont'd) VALVE Valve guide Unit: mm (in) Unit: mm (in) SEM188A SEM796F Valve head diameter ''D'' Intake 39.0 - 39.3 (1.535 - 1.547) Exhaust 32.0 - 32.3 (1.260 - 1.272) Standard Service Intake 11.023 - 11.034 (0.4340 - 0.4344) 11.233 - 11.234 (0.4422 - 0.4423) Exhaust 11.023 - 11.034 (0.4340 - 0.4344) 11.233 - 11.234 (0.4422 - 0.4423) Valve guide Outer diameter Valve length ''L'' Intake 101.53 - 101.97 (3.9972 - 4.0146) Exhaust 101.38 - 101.82 (3.9913 - 4.0087) Valve guide Inner diameter (Finished size) Valve stem diameter ''d'' Intake 6.965 - 6.980 (0.2742 - 0.2748) Exhaust 6.945 - 6.960 (0.2734 - 0.2740) Cylinder head valve guide hole diameter Valve seat angle ''α'' Intake 7.000 - 7.018 (0.2756 - 0.2763) Exhaust 7.000 - 7.018 (0.2756 - 0.2763) Intake 10.975 - 10.996 (0.4321 - 0.4329) 11.185 - 11.196 (0.4404 - 0.4408) Exhaust 10.975 - 10.996 (0.4321 - 0.4329) 11.185 - 11.196 (0.4404 - 0.4408) Intake 45°15′ - 45°45′ Interference fit of valve guide Exhaust Valve margin ''T'' Intake 1.35 - 1.65 (0.0531 - 0.0650) Exhaust 1.65 - 1.95 (0.0650 - 0.0768) Valve margin ''T'' limit More than 0.5 (0.020) Valve stem end surface grinding limit Less than 0.2 (0.008) Lifter guide hole diameter 34.998 - 35.018 (1.3779 - 1.3787) Clearance between lifter and lifter guide hole 0.023 - 0.058 (0.0009 - 0.0023) Limit Intake 0.020 - 0.050 (0.0008 - 0.0020) 0.1 (0.004) Exhaust 0.040 - 0.070 (0.0016 - 0.0028) 0.1 (0.004) Valve deflection limit 0.2 (0.008) Projection length ''L'' 10.2 - 10.4 (0.402 - 0.409) Unit: mm (in) 34.960 - 34.975 (1.3764 - 1.3770) Standard Stem to guide clearance Valve lifter Valve lifter diameter 0.027 - 0.059 (0.0011 - 0.0023) EM-58 SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment (Cont'd) Valve seat Unit: mm (in) SEM788BA SEM773BA SEM790BA SEM789BA Cylinder head to valve distance Valve spring Unit: mm (in) Free height mm (in) Outer 42.25 (1.6634) Inner 36.57 (1.4398) Pressure height/Load mm/N (mm/kg, in/lb) Outer 25.7/437.69 (25.7/44.63, 1.012/98.41) Inner 22.2/233.21 (22.2/23.78, 0.874/52.43) Out-of-square SEM724C Standard Intake −0.069 to 0.269 (−0.0027 to 0.0106) Exhaust −0.069 to 0.269 (−0.0027 to 0.0106) EM-59 mm (in) Outer 1.9 (0.075) Inner 1.6 (0.063) SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment (Cont'd) Available shim Thickness mm (in) Identification mark 2.90 (0.1142) 2.90 2.85 (0.1122) 2.85 2.80 (0.1102) 2.80 2.75 (0.1083) 2.75 2.70 (0.1063) 2.70 2.65 (0.1043) 2.65 2.60 (0.1024) 2.60 2.55 (0.1004) 2.55 2.50 (0.0984) 2.50 2.45 (0.0965) 2.45 2.40 (0.0945) 2.40 2.35 (0.0925) 2.35 2.30 (0.0906) 2.30 2.25 (0.0886) 2.25 2.20 (0.0866) 2.20 SEM797F CAMSHAFT AND CAMSHAFT BEARING Unit: mm (in) Valve clearance Unit: mm (in) For adjusting Hot Cold* Intake 0.28 - 0.38 (0.011 - 0.015) 0.26 - 0.34 (0.010 - 0.013) Exhaust 0.32 - 0.42 (0.013 - 0.017) 0.30 - 0.38 (0.012 - 0.015) Standard Limit Camshaft journal to bearing clearance 0.045 - 0.086 (0.0018 - 0.0034) 0.1 (0.004) Inner diameter of camshaft bearing 30.000 - 30.021 (1.1811 - 1.1819) — Outer diameter of camshaft journal 29.935 - 29.955 (1.1785 - 1.1793) — Camshaft runout [TIR*] — 0.02 (0.0008) Camshaft sprocket runout [TIR*] Less than 0.25 (0.0098) — Camshaft end play 0.065 - 0.169 (0.0026 - 0.0067) 0.20 (0.0079) *: At a temperature of approximately 20°C (68°F) Whenever valve clearances are adjusted to cold specifications, check that the clearances satisfy hot specifications and adjust again if necessary. EM671 Cam height ''A'' Intake 48.005 - 48.195 (1.8900 - 1.8974) Exhaust 49.505 - 49.695 (1.9490 - 1.9565) Wear limit of cam height 0.15 (0.0059) Valve lift Intake 8.27 (0.326) Exhaust 9.43 (0.371) *: Total indicator reading EM-60 SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment (Cont'd) CYLINDER BLOCK PISTON, PISTON RING AND PISTON PIN Unit: mm (in) Piston Unit: mm (in) SEM964EA SEM750C Piston skirt diameter ''A'' Standard SEM686DA Surface flatness Standard Limit Less than 0.03 (0.0012) 0.1 (0.004) Cylinder bore Grade No. 1 85.000 - 85.010 (3.3465 - 3.3468) Grade No. 2 85.010 - 85.020 (3.3468 - 3.3472) Grade No. 3 85.020 - 85.030 (3.3472 - 3.3476) 0.20 (0.0079) Less than 0.015 (0.0006) Taper (A − B and A − C) Less than 0.010 (0.0004) Difference in inner diameter between cylinders Limit 84.970 - 84.980 (3.3453 - 3.3457) Grade No. 3 84.980 - 84.990 (3.3457 - 3.3461) 0.50 (0.0197) oversize (Service) 85.460 - 85.490 (3.3646 - 3.3657) 1.00 (0.0394) oversize (Service) 85.960 - 85.990 (3.3842 - 3.3854) Piston pin hole diameter Out-of-round (X − Y) Standard Grade No. 2 Piston clearance to cylinder block Standard Standard 84.960 - 84.970 (3.3449 - 3.3453) ''a'' dimension Inner diameter Wear limit Grade No. 1 Less than 0.05 (0.0020) Main journal inner diameter Grade No. 0 58.645 - 58.654 (2.3089 - 2.3092) Grade No. 1 58.654 - 58.663 (2.3092 - 2.3096) Grade No. 2 58.663 - 58.672 (2.3096 - 2.3099) EM-61 14.5 (0.571) 0.030 - 0.050 (0.0012 - 0.0020) 26.995 - 27.005 (1.0628 - 1.0632) SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment (Cont'd) Piston ring CONNECTING ROD Unit: mm (in) Side clearance Unit: mm (in) Center distance Top 140.0 (5.512) Bend [per 100 (3.94)] Standard Limit 0.060 - 0.093 (0.0024 - 0.0037) Limit Torsion [per 100 (3.94)] 0.1 (0.004) Limit 2nd Standard Limit 0.040 - 0.073 (0.0016 - 0.0029) 0.1 (0.004) Oil Standard Limit Connecting rod small end inner diameter 30.000 - 30.013 (1.1811 - 1.1816) Piston pin bushing inner diameter* 27.025 - 27.038 (1.0640 - 1.0645) 0.030 - 0.063 (0.0012 - 0.0025) — Grade No. 0 53.000 - 53.007 (2.0866 - 2.0869) Grade No. 1 53.007 - 53.013 (2.0869 - 2.0871) Side clearance Top Standard Limit 0.20 - 0.28 (0.0079 - 0.0110) Limit *: After installing in connecting rod 1.0 (0.039) 2nd Standard Limit 0.38 - 0.53 (0.0150 - 0.0209) 1.0 (0.039) Oil Standard Limit 0.30 - 0.56 (0.0118 - 0.0220) 1.0 (0.039) Piston pin Unit: mm (in) Piston pin outer diameter Interference fit of piston pin to piston 26.994 - 27.000 (1.0628 - 1.0630) 0.002 - 0.006 (0.0001 - 0.0002) Piston pin to connecting rod bushing clearance Standard 0.025 (0.0010) Connecting rod big end inner diameter Ring gap Standard 0.025 (0.0010) 0.025 - 0.044 (0.0010 - 0.0017) * Values measured at ambient temperature of 20°C (68°F) EM-62 0.20 - 0.30 (0.0079 - 0.0118) 0.40 (0.0157) SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment (Cont'd) CRANKSHAFT MAIN BEARING Unit: mm (in) Main journal dia. ''Dm'' Grade No. 0 54.967 - 54.975 (2.1641 - 2.1644) Grade No. 1 54.959 - 54.967 (2.1637 - 2.1641) Grade No. 2 54.951 - 54.959 (2.1634 - 2.1637) Pin journal dia.

''Dp'' Grade No. 0 49.968 - 49.974 (1.9672 - 1.9675) Grade No. 1 49.961 - 49.968 (1.9670 - 1.9672) Center distance ''r'' 41.47 - 41.53 (1.6327 - 1.6350) Out-of-round (X − Y) SEM157B Standard Main journal Less than 0.005 (0.0002) Pin journal Less than 0.0025 (0.0001) Standard Unit: mm (in) Runout [TIR] Standard Less than 0.025 (0.0010) Limit Less than 0.05 (0.0020) Grade number Thickness ''T'' 0 1.813 - 1.817 (0.0714 - 0.0715) Black 1 1.817 - 1.821 (0.0715 - 0.0717) Brown 2 1.821 - 1.825 (0.0717 - 0.0719) 3 1.825 - 1.829 (0.0719 - 0.0720) Yellow 4 1.829 - 1.833 (0.0720 - 0.0722) Blue Free end play Standard Limit 0.05 - 0.18 (0.0020 - 0.0071) 0.30 (0.0118) Identification color Width ''W'' 19.7 - 19.9 (0.776 - 0.783) — Undersize Unit: mm (in) Undersize Thickness ''T'' Main journal diameter ''Dm'' 0.25 (0.0098) 2.109 - 2.117 (0.0830 - 0.0833) Grind so that bearing clearance is the specified value. SEM645 CONNECTING ROD BEARING Connecting rod bearing Standard size Unit: mm (in) EM715 EM-63 Grade number Thickness ''T'' 0 1.492 - 1.496 (0.0587 - 0.0589) 1 1.496 - 1.500 (0.0589 - 0.0591) 2 1.500 - 1.504 (0.0591 - 0.0592) Width ''W'' Identification color Black 19.9 - 20.1 (0.783 - 0.791) Yellow Brown SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment (Cont'd) Undersize MISCELLANEOUS COMPONENTS Unit: mm (in) Undersize Thickness ''T'' 0.08 (0.0031) 1.536 - 1.540 (0.0605 - 0.0606) 0.12 (0.0047) 1.556 - 1.560 (0.0613 - 0.0614) 0.25 (0.0098) 1.621 - 1.625 (0.0638 - 0.0640) Crank pin journal diameter ''Dp'' Grind so that bearing clearance is the specified value. Unit: mm (in) Camshaft sprocket runout limit [TIR] 0.1 (0.004) Flywheel runout limit [TIR] 0.1 (0.004) Drive plate runout limit [TIR] 0.1 (0.004) Bearing clearance Unit: mm (in) Main bearing clearance Standard Limit 0.036 - 0.063 (0.0014 - 0.0025) 0.12 (0.0047) Connecting rod bearing clearance Standard Limit 0.031 - 0.055 (0.0012 - 0.0022) 0.11 (0.0043) EM-64 FRONT AXLE & FRONT SUSPENSION SECTION FA CONTENTS

PRECAUTIONS AND PREPARATION..........................1 Precautions ....1 Special Service Tools ....1 Commercial Service Tools ....2 NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING ....3 NVH Troubleshooting Chart...3 FRONT AXLE AND FRONT SUSPENSION ....4 ON-VEHICLE SERVICE ....5 Front Axle and Front Suspension Parts ....5 Front Wheel Bearing..5 Front Wheel Alignment ....8 FRONT AXLE — Drive flange and Free-running Hub...10 FRONT AXLE — Manual-lock Free-running Hub ......11 Removal...11 Installation...12 Inspection...12 FRONT AXLE — Auto-lock Free-running Hub ....13 Removal...13 Installation...13 FRONT AXLE — Wheel Hub and Rotor Disc ....14 Removal and Installation ....14 Inspection...15 Assembly ....15 FRONT AXLE — Knuckle Flange................................17 Removal...17 Inspection...19 Installation...19 Knuckle Flange Grease Seal.....................................21 FRONT AXLE — Drive Shaft ....23 Inspection...23 Installation...23 FRONT SUSPENSION ....24 Shock Absorber ....25 Stabilizer Bar ....25 Coil Spring ....25 Leading Arm...26 Panhard Rod...26 SERVICE DATA AND SPECIFICATIONS (SDS) ....27 General Specifications...27 Inspection and Adjustment ....27 FA PRECAUTIONS AND PREPARATION Precautions + + + + When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground. * Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions. Use flare nut wrench when removing and installing brake tubes. After installing removed suspension parts, check wheel alignment and adjust if necessary. Always torque brake lines when installing. SBR820BA Special Service Tools Tool number Tool name Description ST29020001 Gear arm puller Removing tie-rod and drag link a: 34 mm (1.34 in) b: 6.5 mm (0.256 in) c: 61.5 mm (2.421 in) NT551 KV401021S0 Bearing race drift Installing wheel bearing outer race NT153 KV40105400 Wheel bearing lock nut wrench Removing and installing wheel bearing lock nut NT154 GG94310000 Flare nut torque wrench Removing and installing brake piping a: 10 mm (0.39 in) NT406 FA-1 PRECAUTIONS AND PREPARATION Commercial Service Tools Tool name Description Equivalent to GG94310000 1 Flare nut crowfoot V 2 Torque wrench V Removing and installing each brake piping a: 10 mm (0.39 in) NT360 Hub cap drift Installing hub cap a: 57 mm (2.24 in) dia. b: 46 mm (1.81 in) dia. NT115 FA-2 FRONT AXLE AND FRONT SUSPENSION Symptom TIRES ROAD WHEEL AXLE SHAFT X X X X X X X: Applicable FA-3 X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X — — — — FA-23 Non-uniformity Incorrect tire size Excessive joint angle Joint sliding resistance Refer to FRONT AXLE AND FRONT SUSPENSION in this chart. NVH in RA section Refer to TIRES in this chart. Refer to ROAD WHEEL in this chart. Refer to AXLE SHAFT in this chart. NVH in BR section NVH in ST section TIRES ROAD WHEEL AXLE SHAFT BRAKES STEERING NVH in PD section DIFFERENTIAL REAR AXLE AND REAR SUSPENSION X X X X FRONT AXLE AND FRONT SUSPENSION NVH in PD section PROPELLER SHAFT — — Deformation or damage Imbalance — Uneven tire wear FA-8 Out-of-round — FA-5 Wheel bearing damage Incorrect air pressure FA-25 Stabilizer bar fatigue Imbalance FA-8 — Spring fatigue X X X X X Incorrect wheel alignment — Parts interference X X X X X FA-24 — Bushing or mounting deterioration X X X X X Suspension looseness FA-4 Noise Shake Vibration Shimmy Judder Poor quality ride or handling Noise Shake Vibration Shimmy Judder Poor quality ride or handling Noise, vibration Shake FA-25 Possible cause and SUSPECTED PARTS Shock absorber deformation, damage or deflection Reference page Improper installation, looseness NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING NVH Troubleshooting Chart Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts. X FRONT AXLE AND FRONT SUSPENSION SFA850B FA-4 ON-VEHICLE SERVICE Front Axle and Front Suspension Parts SMA525A Check front axle and front suspension parts for excessive play, cracks, wear and other damage. + Shake each front wheel to check for excessive play. + Make sure that cotter pin is inserted. + Retighten all axle and suspensions nuts and bolts to the specified torque. Tightening torque: Refer to FRONT SUSPENSION (FA-24). + Check front axle and front suspension parts for wear, cracks and other damage. + Check shock absorber for oil leakage and other damage.

+ Check knuckle flange for grease leakage and knuckle flange grease seal for cracks and other damage. SFA851B SFA852B Front Wheel Bearing + + + Check that wheel bearings operate smoothly.

Check axial end play.

Axial end play: 0 mm (0 in) Adjust wheel bearing preload if there is any axial end play or wheel bearing does not turn smoothly. SFA413A FA-5 ON-VEHICLE SERVICE Front Wheel Bearing (Cont'd) PRELOAD ADJUSTMENT Adjust wheel bearing preload after wheel bearing has been replaced or front axle has been reassembled. Adjust wheel bearing preload as follows: 1. Before adjustment, thoroughly clean all parts to prevent dirt entry. SFA853B 2. Apply multi-purpose grease sparingly to the following parts: + Wheel hub (as shown at left) SFA469A + + + Wheel bearing Grease seal lip Contact surface between wheel bearing lock washer (chamfered side) and outer wheel bearing FA781 3. Tighten wheel bearing lock nut with Tool. : 167 - 196 Nzm (17 - 20 kg-m, 123 - 145 ft-lb) 4. Turn wheel hub several times in both directions. 5. Loosen wheel bearing lock nut so that torque becomes 0 Nzm (0 kg-m, 0 ft-lb). 6. Retighten wheel bearing lock nut with Tool. : 3 - 5 Nzm (0.3 - 0.5 kg-m, 26 - 43 in-lb) SFA748BA FA-6 ON-VEHICLE SERVICE Front Wheel Bearing (Cont'd) 7. Turn wheel hub several times in both directions. 8. Retighten wheel bearing lock nut with Tool. : 3 - 5 Nzm (0.3 - 0.5 kg-m, 26 - 43 in-lb) 9.

Again turn wheel hub several times in both directions. SFA854B 10. Measure starting force ''A'' at wheel hub bolt. SFA855B SFA470AA 11. Tighten lock nut until screw hole is aligned with screw hole in lock washer. Lock washer may be used with either side up. Temporarily tighten lock washer using screw. 12. Turn wheel hub several times in both directions. 13. Measure starting force ''B'' at wheel hub bolt. Refer to procedure 10. 14. Wheel bearing preload ''C'' can be calculated as shown below. C=B−A Wheel bearing preload ''C'': 0 - 18.6 N (0 - 1.9 kg, 0 - 4.2 lb) 15. If wheel bearing preload ''C'' is outside specifications, loosen lock nut and adjust wheel bearing preload ''C'' to 0 to 18.6 N (0 to 1.9 kg, 0 to 4.2 lb) range. 16. Measure wheel bearing axial end play. Axial end play: 0 mm (0 in) SFA856B 17. Tighten screw. : 1.2 - 1.8 Nzm (0.12 - 0.18 kg-m, 10.4 - 15.6 in-lb) 18. Recheck to ensure that wheel bearing preload and axial end play are within specified ranges. SFA470AA FA-7 ON-VEHICLE SERVICE Front Wheel Bearing (Cont'd) 19. Pack drive flange groove with grease, apply grease to O-ring and mating surface of drive flange, and install flange. SFA417A 20. Place snap ring in drive shaft groove. Choose snap ring so that the gap between groove and snap ring is 0.4 mm (0.016 in) or less. Refer to SDS for selection of snap ring. SFA418AA Front Wheel Alignment Before checking front wheel alignment, be sure to make a preliminary inspection (Unladen*). *: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions. SFA356B PRELIMINARY INSPECTION 1. Check tires for wear and improper inflation. 2. Check wheel runout on outside and inside. Wheel runout average [(Outside runout value + Inside runout value) x 0.5]: Refer to SDS (FA-27). 3. Check front wheel bearings for looseness. 4. Check front suspension for looseness. 5. Check steering linkage for looseness. 6. Check that shock absorbers work properly. 7. Check vehicle posture (Unladen). CAMBER, CASTER AND KINGPIN INCLINATION Camber, caster and kingpin inclination are preset at factory and cannot be adjusted. 1. Measure camber, caster and kingpin inclination of both right and left wheels with a suitable alignment gauge. Camber, Caster and Kingpin inclination: Refer to SDS (FA-27). 2.

If camber, caster or kingpin inclination is not within specification, inspect front suspension parts. Replace damaged or worn out parts. SFA894 FA-8 ON-VEHICLE SERVICE Front Wheel Alignment (Cont'd) TOE-IN SFA614B Measure toe-in using the following procedure. WARNING: + Always perform the following procedure on a flat surface. + Make sure that no person is in front of the vehicle before pushing it. 1. Bounce front of vehicle up and down to stabilize the posture. 2. Push the vehicle straight ahead about 5 m (16 ft). 3. Put a mark on base line of the tread (rear side) of both tires at the same height of hub center. This mark is a measuring point. 4. Measure distance ''A'' (rear side). 5. Push the vehicle slowly ahead to rotate the wheels 180 degrees (1/2 turn). If the wheels have rotated more than 180 degrees (1/2 turn), try the above procedure again from the beginning. Never push vehicle backward. 6. Measure distance ''B'' (front side). Total toe-in: Refer to SDS (FA-27). SFA234AC 7. Adjust toe-in by varying the length of steering tie-rod. (1) Loosen lock nuts. (2) Adjust toe-in by screwing tie-rod in and out. Make sure both tie-rods are the same length. (3) Tighten lock nuts to specified torque. Lock nut tightening torque: Refer to ST section (''POWER STEERING GEAR AND LINKAGE''). SFA857B FRONT WHEEL TURNING ANGLE SFA439BA Turning angle is set by stroke length of steering gear rack and cannot be adjusted. 1. Set wheels in straight-ahead position. Then move vehicle forward until front wheels rest on turning radius gauge properly. 2. Rotate steering wheel all the way right and left; measure turning angle. Do not hold the steering wheel on full lock for more than 15 seconds.

Wheel turning angle (Full turn): Refer to SDS (FA-27). 3. Adjust by stopper bolt if necessary. : 30 - 40 Nzm (3.1 - 4.1 kg-m, 22 - 30 ft-lb) SFA858B FA-9 FRONT AXLE — Drive flange and Free-running Hub SFA859B FA-10 FRONT AXLE — Manual-lock Free-running Hub SFA427AA Removal 1. Set knob of manual-lock free-running hub to the ''FREE'' position. SFA428A 2. Loosen bolts and remove free-running hub assembly. SFA187 3. Remove snap ring and take off drive clutch. SFA188 4. Take out bushing and spacer from wheel hub. SFA189 FA-11 FRONT AXLE — Manual-lock Free-running Hub Installation Install free-running hub in the reverse order of removal. Apply multi-purpose grease to bushing and drive clutch before installing on wheel hub and axle shaft, respectively. SFA860B + + Install drive clutch. Place snap ring in drive shaft groove. Axial end play: 0.4 mm (0.016 in) or less Snap ring size: Refer to SDS. SFA200 When installing manual-lock free-running hub, make sure the position ''FREE''. Apply multi-purpose grease to drive shaft end.

+ Check operation of manual-lock free-running hub after installing it. + SFA428A Inspection + + Check that hub moves smoothly and freely. Check that clutch moves smoothly in the body. FA-12 FRONT AXLE — Auto-lock Free-running Hub SFA861B Removal 1.

Set the auto-lock free-running hub at the condition ''LOCK''. 2. Remove auto-lock free-running hub assembly. SFA862B 3. Remove snap ring. 4. Remove spindle washer and thrust washer. 5. After installing auto-lock free-running hub, check operation of it. When installing it, apply recommended grease to drive shaft end. SFA863B Installation 1. When installing hub's mating parts (such as thrust washer and spindle washer) on drive shaft, select suitable snap ring so that end play between drive shaft and its mating parts is within specifications. Axial end play: 0.4 mm (0.016 in) or less Snap ring size: Refer to SDS. SFA433AA 2. Install auto-lock free-running hub assembly to wheel hub. + When installing auto-lock free-running hub assembly, be sure to align outer brake pawl with notch in spindle. + After inserting auto-lock free-running hub assembly into bore in wheel hub, make sure there is no clearance between hub assembly and wheel hub. If clearance exists, the cause may be one of the following: (1) Hub assembly is set in ''LOCK'' position. (2) Outer brake pawl is not aligned with notch in spindle. SFA864B FA-13 FRONT AXLE — Wheel Hub and Rotor Disc Removal and Installation SFA865B CAUTION: Before removing the front axle assembly, disconnect the ABS wheel sensor from the assembly. Then move it away from the front axle assembly area. Failure to do so may result in damage to the sensor wires and the sensor becoming inoperative. 1. Remove free-running hub assembly. Refer to FRONT AXLE — Auto-lock or Manual-lock Free-running Hub. 2. Remove brake caliper assembly. Brake hose need not be disconnected from brake caliper. In this case, suspend caliper assembly with wire so as not to stretch brake hose. Be careful not to depress brake pedal, or piston will pop out. Make sure brake hose is not twisted. 3.

Remove ABS sensor. 4. Remove lock washer. SFA470AA 5. Remove wheel bearing lock nut with Tool. SFA748BA 6. Remove wheel hub and wheel bearing. Be careful not to drop outer bearing. 7. After installing wheel hub and wheel bearing, adjust wheel bearing preload. Refer to ''Front Wheel Bearing'', ''ON-VEHICLE SERVICE'', FA-5. SFA866B FA-14 FRONT AXLE — Wheel Hub and Rotor Disc Removal and Installation (Cont'd) 8. Separate brake disc to hub.

SFA193 Inspection Thoroughly clean wheel bearings and wheel hub.

WHEEL BEARING + Make sure wheel bearing rolls freely and is free from noise, crack, pitting or wear. WHEEL HUB + SFA435A Check wheel hub for crack by using a magnetic exploration or dyeing test. Assembly 1.

Install bearing outer race with Tool until it seats in hub. SFA197 2. Install the sensor rotor using suitable drift and press.

(Models with ABS) Always replace sensor rotor with new one. Pay attention to the direction of front sensor rotor as shown in figure. SBR400DA 3. Pack multi-purpose grease to hub and hub cap. SFA469A FA-15 FRONT AXLE — Wheel Hub and Rotor Disc Assembly (Cont'd) 4. Apply multi-purpose grease to each bearing cone. FA781 5. Pack grease seal lip with multi-purpose grease, then install it into wheel hub with suitable drift. SFA126 6. Install hub to brake rotor.

: 50 - 68 Nzm (5.1 - 6.9 kg-m, 37 - 50 ft-lb) SFA199 FA-16 FRONT AXLE — Knuckle Flange SFA867B Removal Drain differential oil completely prior to removal. 1. Remove baffle plate and knuckle spindle.

SFA868B 2. Draw out drive shaft. Draw out to remove the drive shaft in the axial direction with the flat surface facing up. SFA869B FA-17 FRONT AXLE — Knuckle Flange Removal (Cont'd) 3. Disconnect tie-rod ends. Refer to ST section. 4. Remove upper and lower bearing caps with inner bearing and O-ring.

SFA870B 5.

Remove seal guard fixing bolts. SFA871B 6. Remove seal guard.

Separate scraper, grease seal and supporting ring from knuckle flange. SFA872B 7. Remove knuckle flange, supporting ring, grease seal and scraper from axle case. SFA873B FA-18 FRONT AXLE — Knuckle Flange Removal (Cont'd) 8. Remove bearing outer race and kingpin plug. SFA874B 9. Remove oil seal from axle shaft.

SFA875B Inspection KNUCKLE FLANGE BEARING CAP Replace knuckle flange bearing if it is worn, pitted or corroded. SFA870B KNUCKLE FLANGE Replace knuckle flange if it is cracked. SFA894B Installation 1. Check kingpin plug for damage before installing. If damaged, use a new one. SFA877B FA-19 FRONT AXLE — Knuckle Flange Installation (Cont'd) 2. Using Tool, place bearing outer race in trunnion socket. SFA878B 3. Install oil seal with tool. SFA879B 4. Place scraper, grease seal and supporting ring in axle case. Grease lip and circumference seals in axle case. SFA880B 5. Apply recommended grease around trunnion socket spherical area, then place knuckle flange in trunnion socket. SFA881B 6. Adjust rotating force of knuckle flange (at hinge pin) to 4.9 to 14.7 N (0.5 to 1.5 kg, 1.1 to 3.3 lb) range by adding or removing upper and lower shims of same thickness. This adjustment must be made without installing grease seal and axle shaft. Shim thicknesses: Refer to SDS.

SFA882B FA-20 FRONT AXLE — Knuckle Flange Installation (Cont'd) 7. Install bearing cap with inner bearing and adjusting shim. Before installing seal guard, scraper, grease seal and supporting ring (as a unit), apply approx. 50 g (1.76 oz) of wheel bearing grease to perimeters shown in figure at left. Slits located in scraper and supporting ring should point straight downward when installed. SFA883B 8. When installing grease seal guard, adjust so painted surface is visible. SFA876B Install knuckle flange stopper bolt and nut on stopper side of axle case. After installing tie rod, adjust it to specified steering angle using turning radius gauge, then tighten with lock nut. SFA884B Knuckle Flange Grease Seal To replace only knuckle flange grease seal, proceed as follows. REMOVAL 1. Turn steering wheel to both the extreme right and left, and remove grease seal guard and scraper from knuckle flange. 2. Extract grease seal and remove it by cutting it from axle case. SFA885B FA-21 FRONT AXLE — Knuckle Flange Knuckle Flange Grease Seal (Cont'd) INSTALLATION 1. Cut off a part of new grease seal and fill lip portion with grease.

Then insert grease seal into axle case. Cut grease seal so that cut surface is straight. SFA886B 2. Apply adhesive to cut surface of grease seal. Install grease seal so that its cut surface is above knuckle flange. Be sure not to allow adhesive to protrude beyond cut surface of grease seal. SFA887B 3. Install scraper and grease seal guard on knuckle flange. After replacing grease seal, adjust steering wheel to specified turning angle with a turning radius gauge. Then tighten lock nut. 4. When installing grease seal guard, adjust so painted surface is visible. SFA876B FA-22 FRONT AXLE — Drive Shaft Inspection Check wheel shaft for signs of binding when turned in a twisting motion. Also check for cracks or damage. SFA447A Installation + Before positioning drive shaft in axle case, pack shaft joint with recommended grease. Refer to MA section (''Fluids and Lubricants'', ''RECOMMENDED FLUIDS AND LUBRICANTS''). SFA448A + Install drive shaft. Insert the drive shaft with the flat surface facing up. SFA869B FA-23 FRONT SUSPENSION SFA889B FA-24 FRONT SUSPENSION Shock Absorber REMOVAL AND INSTALLATION 1. Support front axle case with jack. 2.

Remove both upper and lower sides fixing nuts. INSPECTION SFA890B Except for nonmetallic parts, clean all parts with suitable solvent and dry with compressed air. Use compressed air to blow dirt and dust off of nonmetallic parts. + Check for oil leakage and cracks.

Replace if necessary. + Check piston rod for cracks, deformation and other damage. Replace if necessary. + Check rubber parts for wear, cracks, damage and deformation. Replace if necessary. Stabilizer Bar REMOVAL + Remove stabilizer bar connecting bolts and clamp bolts. INSPECTION + + Check stabilizer bar for twist and deformation.

Replace if necessary. Check rubber bushing for cracks, wear and deterioration. Replace if necessary. SFA891B INSTALLATION + Install stabilizer bar with ball joint socket properly placed. SFA896B Coil Spring INSPECTION Visually check for cracks or damage. If faulty, replace.

Ensure that springs are installed correctly. Incorrect installation will cause vehicle not set in horizontal posture. SFA897B FA-25 FRONT SUSPENSION Leading Arm INSPECTION Check for cracks, bends or damage. Also check bushing. SFA460A If bushing is faulty, replace it using suitable tool. When installing bushing, make sure that it is positioned as shown. SFA892B Panhard Rod INSPECTION + Check for cracks or other damage. Replace if necessary. SFA462A Panhard rod bushing Removal + Using a press and suitable tool as shown in figure at left, remove bushing from vehicle side. + Using a flat-bladed screwdriver, pry bushing out of axle case. SRA030A Installation + Using suitable tool shown in figure at left, gradually press bushing into place.

Always install new bushing. Do not tap end face of bushing directly with a hammer. Apply soap water to outer wall of bushing before installation. SFA893B FA-26 SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications Suspension type Rigid axle, leading arm and panhard rod with coil spring Strut type Double-acting hydraulic Stabilizer bar Standard equipment Inspection and Adjustment WHEEL ALIGNMENT (Unladen*1) Applied model Wagon Camber Minimum 0° (0.00°) Nominal 0°30′ (0.50°) Maximum 1°00′ (1.00°) Degree minute (Decimal degree) Left and right difference Caster 45′ (0.75°) or less Minimum 3°00′ (3.00°) 3°20′ (3.33°) Nominal 3°30′ (3.50°) 3°50′ (3.83°) Maximum 4°00′ (4.00°) 4°20′ (4.33°) Degree minute (Decimal degree) Left and right difference Kingpin inclination 45′ (0.75°) or less Minimum 13°45′ (13.75°) Nominal 14°30′ (14.50°) Degree minute (Decimal degree) Maximum Total toe-in Distance (A − B) 15°15′ (15.25°) Minimum 0 (0) Nominal 1 (0.04) mm (in) Maximum Angle (left plus right) 2 (0.08) Minimum 0′ (0.00°) Nominal Degree minute (Decimal degree) Maximum 5′ (0.08°) Wheel turning angle Inside Hardtop 10′ (0.17°) Minimum 33°00′ (33.00°) Nominal Degree minute (Decimal degree) Maximum 35°00′ (35.00°) 35°00′ (35.00°) Minimum 29°00′ (29.00°) Nominal 31°00′ (31.00°) Full turn*2 Outside Degree minute (Decimal degree) Maximum 31°00′ (31.00°) *1: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

2: On power steering models, wheel turning force (at circumference of steering wheel) of 98 to 147 N (10 to 15 kg, 22 to 33 lb) with engine idle. WHEEL RUNOUT AVERAGE Steel Aluminum Wheel type 6JJ-16 8JJ-16 6JJ-16 8JJ-16 Radial runout limit mm (in) 1.2 (0.047) 0.8 (0.031) 0.3 (0.012) 0.3 (0.012) Lateral runout limit mm (in) 1.2 (0.047) 0.8 (0.031) 0.3 (0.012) 0.3 (0.012) *: Wheel runout average = (Outside runout value + Inside runout value) x 0.5 FA-27 SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment (Cont'd) WHEEL BEARING DRIVE SHAFT Wheel bearing axial end play Birfield joint axial end play mm (in) 0 (0) mm (in) Wheel bearing lock nuts 0 (0) Grease Tightening torque Type 167 - 196 (17 - 20, 123 - 145) Nzm (kg-m, ft-lb) Capacity Retightening torque after untightened Nzm (kg-m, in-lb) Multi-purpose grease g (oz) 3 - 5 (0.3 - 0.5, 26 - 43) Measured starting force At wheel hub bolt A N (kg, lb) Adjusting snap rings mm (in) Turning adjusting nut in tightening direction and measuring starting force At wheel hub bolt B N (kg, lb) Calculated wheel bearing preload; B−A At wheel hub bolt 0 - 18.6 (0 - 1.9, 0 - 4.2) N (kg, lb) KNUCKLE FLANGE BEARING Flange turning torque Without trunnion seal and drive shaft Nzm (kg-m, ft-lb) At knuckle arm ''F'' N (kg, lb) 1 - 3 (0.1 - 0.3, 0.7 - 2.2) 4.9 - 14.7 (0.5 - 1.5, 1.1 - 3.3) Thickness Adjusting shims mm (in) 0.075 0.127 0.254 0.500 0.762 (0.0030) (0.0050) (0.0100) (0.0197) (0.0300) 50 - 60 (1.76 - 2.12) Drive shaft axial end play mm (in) Part number 40606-44000 40605-44000 40604-44000 40571-01J00 40603-44000 SFA882B FA-28 0.4 (0.016) or less Thickness Part number 1.1 1.3 1.5 1.7 1.9 2.1 39253-01J00 39253-01J01 39253-01J02 39253-01J03 39253-01J04 39253-01J05 (0.043) (0.051) (0.059) (0.067) (0.075) (0.083) ACCELERATOR CONTROL, FUEL & EXHAUST SYSTEMS SECTION FE CONTENTS ACCELERATOR CONTROL SYSTEM ....1 Accelerator Control System.......................................1 FUEL SYSTEM ....2 EXHAUST SYSTEM ....3 FE ACCELERATOR CONTROL SYSTEM Accelerator Control System a. Warm up engine to normal operating temperature. b. Check to see if throttle valve fully opens when accelerator pedal is fully depressed and if it returns to idle position when released. c. Adjust accelerator pedal free play by turning adjusting nut. d. Check accelerator control parts for improper contact with any adjacent parts.

e. When connecting accelerator wire, be careful not to twist or scratch its inner wire. f. Apply a light coat of recommended multi-purpose grease to all sliding or friction surfaces. Do not apply grease to wire. YFE001 FE-1 FUEL SYSTEM SFE514A FE-2 EXHAUST SYSTEM CAUTION: + Always replace exhaust gaskets with new ones when reassembling. If gasket is left on flange surface, scrape off completely as shown at left. + With engine running, check all tube connections for exhaust gas leaks, and entire system for unusual noises. + Ensure that mounting brackets and mounting insulators are installed properly and free from undue stress. Improper installation could result in excessive noise or vibration. SFE180A SFE516A FE-3 PLEASE HELP US TO IMPROVE THIS SERVICE MANUAL ON CD! Your comments are important to NISSAN and will help us to improve our Service Manuals on CD. Use this form to report any issues or comments you may have regarding this Service Manual publication. Please print this form and type or print your comments below. Mail or fax to: NISSAN EUROPE S.A.S. S320 Service Engineering 2, Avenue de Denis Papin ZIPEC - F92350 Le Plessis Robinson France Fax: + 33 (0) 1 41 07 16 81 SERVICE MANUAL: Model: Language: Publication Number: Please describe any issues or problems in detail: Page number(s): Note: Please include a copy of each page, marked with your comments. Is the organization of the manual clear and easy to follow? (circle your answer) YES Please comment: What information should be included in NISSAN Service Manuals to better support you in servicing or repairing customer vehicles? Date : Your Name : Position : Dealer : Dealer No. : Address : City : Telephone : Fax : E-mail : Country : NO SUPER MULTIPLE JUNCTION (SMJ) LHD MODELS Installation To install SMJ, tighten bolts until orange ''fulltight'' mark appears and then retighten to specified torque as required. : 3 - 5 Nzm (0.3 - 0.5 kg-m, 26 - 43 in-lb) CAUTION: Do not overtighten bolts, otherwise, they may be damaged. CEL773 CEL789 RHD MODELS Installation To install SMJ, tighten bolts until orange ''fulltight'' mark appears and then retighten to specified torque as required. : 3 - 5 Nzm (0.3 - 0.5 kg-m, 26 - 43 in-lb) CAUTION: Do not overtighten bolts, otherwise, they may be damaged. CEL841 CEL842 EL-317 SUPER MULTIPLE JUNCTION (SMJ) Terminal Arrangement CEL774 FUSE BLOCK — Junction Box (J/B) Terminal Arrangement CEL775 FUSE AND FUSIBLE LINK BOX Terminal Arrangement CEL776 ELECTRICAL UNITS Terminal Arrangement NCEL777 JOINT CONNECTOR (J/C) Terminal Arrangement CEL778 Edition: February 1998 Release: February 1998 (01) Publication No.: SM8E-0Y61E0E Reference No.: 7711346063 QUICK REFERENCE INDEX GENERAL INFORMATION GI MAINTENANCE MA ENGINE MECHANICAL EM PATROL GR ENGINE LUBRICATION & COOLING SYSTEMS LC MODEL Y61 SERIES ENGINE CONTROL SYSTEM EC ACCELERATOR CONTROL, FUEL & EXHAUST SYSTEM FE CLUTCH CL MANUAL TRANSMISSION MT AUTOMATIC TRANSMISSION AT TRANSFER TF PROPELLER SHAFT & DIFFERENTIAL CARRIER PD FRONT AXLE & FRONT SUSPENSION FA REAR AXLE & REAR SUSPENSION RA BRAKE SYSTEM BR STEERING SYSTEM ST RESTRAINT SYSTEM RS BODY & TRIM BT HEATER & AIR CONDITIONER HA ELECTRICAL SYSTEM EL ALPHABETICAL INDEX IDX NISSAN EUROPE S.A.S. © 1998 NISSAN EUROPE S.A.S. Produced in The Netherlands Not to be reproduced in whole or in part without the prior written permission of Nissan Europe S.A.S., Paris, France. FOREWORD This manual contains maintenance and repair procedures for NISSAN PATROL GR, model Y61 series. In order to assure your safety and the efficient functioning of the vehicle, this manual should be read thoroughly. It is especially important that the PRECAUTIONS in the GI section be completely understood before starting any repair task. All information in this manual is based on the latest product information at the time of publication. The right is reserved to make changes in specifications and methods at any time without notice. IMPORTANT SAFETY NOTICE The proper performance of service is essential for both the safety of the technician and the efficient functioning of the vehicle. The service methods in this Service Manual are described in such a manner that the service may be performed safely and accurately. Service varies with the procedures used, the skills of the technician and the tools and parts available. Accordingly, anyone using service procedures, tools or parts which are not specifically recommended by NISSAN must first completely satisfy himself that neither his safety nor the vehicle's safety will be jeopardized by the service method selected. NISSAN EUROPE S.A.S. Service Engineering Section Paris, France GENERAL INFORMATION SECTION GI CONTENTS PRECAUTIONS ....1 Precaution for Supplemental Restraint System (SRS) ''AIR BAG'' and ''SEAT BELT PRE-TENSIONER''...1 General Precautions ....2 Precautions for Multiport Fuel Injection System or ECCS Engine ....3 Precautions for Three Way Catalyst (If so equipped)...4 Precautions for Engine Oils.......................................4 Precautions for Fuel ....5 Precautions for Air Conditioning ....5 HOW TO USE THIS MANUAL.......................................6 HOW TO READ WIRING DIAGRAMS...........................8 Sample/Wiring Diagram — EXAMPL —.....................8 Description ....10 HOW TO CHECK TERMINAL......................................17 How to Probe Connectors ....17 How to Check Enlarged Contact Spring of Terminal ....18 Waterproof Connector Inspection ....19 Terminal Lock Inspection ....19 HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT ....20 Work Flow...20 Incident Simulation Tests..21 Circuit Inspection ....24 HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES ....30 How to Follow This Flow Chart ....31 CONSULT CHECKING SYSTEM ....33 Function and System Application ....33 Lithium Battery Replacement ....33 Checking Equipment..33 Loading Procedure ....34 CONSULT Data Link Connector (DLC) Circuit..........34 IDENTIFICATION INFORMATION...............................35 Model Variation ....35 Identification Number...36 Dimensions ....38 Wheels & Tires ....38 LIFTING POINTS AND TOW TRUCK TOWING...........39 Screw Jack ....39 Garage Jack and Safety Stand ....39 2-pole Lift ....40 Tow Truck Towing ....41 SAE J1930 TERMINOLOGY LIST ....43 SAE J1930 Terminology List 43

GI PRECAUTIONS Observe the following precautions to ensure safe and proper servicing. These precautions are not described in each individual section.

Precaution for Supplemental Restraint System (SRS) ''AIR BAG'' and ''SEAT BELT PRE-TENSIONER'' SGI646 The Supplemental Restraint System such as ''AIR BAG'' and ''SEAT BELT PRE-TENSIONER'' used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The SRS system composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination.): Driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioner, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the RS section of this Service Manual. WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.

+ Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses are covered with yellow insulation either just before the harness connectors or for the complete harness are related to the SRS. GI-1 PRECAUTIONS General Precautions + Do not operate the engine for an extended period of time without proper exhaust ventilation. Keep the work area well ventilated and free of any inflammable materials. Special care should be taken when handling any inflammable or poisonous materials, such as gasoline, refrigerant gas, etc. When working in a pit or other enclosed area, be sure to properly ventilate the area before working with hazardous materials. Do not smoke while working on the vehicle. + Before jacking up the vehicle, apply wheel chocks or other tire blocks to the wheels to prevent the vehicle from moving. After jacking up the vehicle, support the vehicle weight with safety stands at the points designated for proper lifting before working on the vehicle. These operations should be done on a level surface. When removing a heavy component such as the engine or transaxle/transmission, be careful not to lose your balance and drop it. Also, do not allow it to strike adjacent parts, especially the brake tubes and master cylinder. SGI285 + SGI231 + Before starting repairs which do not require battery power: Turn off ignition switch. Disconnect the negative battery terminal. + To prevent serious burns: Avoid contact with hot metal parts. Do not remove the radiator cap when the engine is hot. + Before servicing the vehicle: Protect fenders, upholstery and carpeting with appropriate covers. Take caution that keys, buckles or buttons do not scratch paint.

SEF289H SGI233 SGI234 GI-2 PRECAUTIONS General Precautions (Cont'd) Clean all disassembled parts in the designated liquid or solvent prior to inspection or assembly. + Replace oil seals, gaskets, packings, O-rings, locking washers, cotter pins, self-locking nuts, etc. with new ones. + Replace inner and outer races of tapered roller bearings and needle bearings as a set. + Arrange the disassembled parts in accordance with their assembled locations and sequence. + Do not touch the terminals of electrical components which use microcomputers (such as ECMs). Static electricity may damage internal electronic components. + After disconnecting vacuum or air hoses, attach a tag to indicate the proper connection. + Use only the fluids and lubricants specified in this manual. + Use approved bonding agent, sealants or their equivalents when required. + Use tools and recommended special tools where specified for safe and efficient service repairs. + When repairing the fuel, oil, water, vacuum or exhaust systems, check all affected lines for leaks. + Dispose of drained oil or the solvent used for cleaning parts in an appropriate manner. WARNING: To prevent ECM from storing the diagnostic trouble codes, do not carelessly disconnect the harness connectors which are related to the ECCS system and TCM (Transmission Control Module) system. The connectors should be disconnected only when working according to the WORK FLOW of TROUBLE DIAGNOSES in EC and AT sections. + Precautions for Multiport Fuel Injection System or ECCS Engine + + SGI787 + Before connecting or disconnecting any harness connector for the multiport fuel injection system or ECM (Engine Control Module): Turn ignition switch to ''OFF'' position. Disconnect negative battery terminal. Otherwise, there may be damage to ECM. Before disconnecting pressurized fuel line from fuel pump to injectors, be sure to release fuel pressure. Be careful not to jar components such as ECM and mass air flow sensor. GI-3 PRECAUTIONS Precautions for Three Way Catalyst (If so equipped) If a large amount of unburned fuel flows into the catalyst, the catalyst temperature will be excessively high. To prevent this, follow the instructions below: + Use unleaded gasoline only. Leaded gasoline will seriously damage the three way catalyst. + When checking for ignition spark or measuring engine compression, make tests quickly and only when necessary.

+ Do not run engine when the fuel tank level is low, otherwise the engine may misfire causing damage to the catalyst. Do not place the vehicle on flammable material. Keep flammable material off the exhaust pipe and the three way catalyst. Precautions for Engine Oils Prolonged and repeated contact with used engine oil may cause skin cancer. Try to avoid direct skin contact with used oil. If skin contact is made, wash thoroughly with soap or hand cleaner as soon as possible. HEALTH PROTECTION PRECAUTIONS + + + + + + + + + + + + + + + + + + Avoid prolonged and repeated contact with oils, particularly used engine oils. Wear protective clothing, including impervious gloves where practicable. Do not put oily rags in pockets. Avoid contaminating clothes, particularly underpants, with oil. Heavily soiled clothing and oil-impregnated footwear should not be worn.

Overalls must be cleaned regularly. First Aid treatment should be obtained immediately for open cuts and wounds. Use barrier creams, applying them before each work period, to help the removal of oil from the skin.

Wash with soap and water to ensure all oil is removed (skin cleansers and nail brushes will help). Preparations containing lanolin replace the natural skin oils which have been removed. Do not use gasoline, kerosine, diesel fuel, gas oil, thinners or solvents for cleaning skin. If skin disorders develop, obtain medical advice without delay.

Where practicable, degrease components prior to handling. Where there is a risk of eye contact, eye protection should be worn, for example, chemical goggles or face shields; in addition an eye wash facility should be provided. ENVIRONMENTAL PROTECTION PRECAUTIONS Burning used engine oil in small space heaters or boilers can be recommended only for units of approved design. The heating system must meet the requirements of HM Inspectorate of Pollution for small burners of less than 0.4 MW. If in doubt check with the appropriate local authority and/or manufacturer of the approved appliance.

GI-4 PRECAUTIONS Precautions for Engine Oils (Cont'd) Dispose of used oil and used oil filters through authorized waste disposal contractors to licensed waste disposal sites, or to the waste oil reclamation trade. If in doubt, contact the local authority for advice on disposal facilities. It is illegal to pour used oil on to the ground, down sewers or drains, or into water courses. The regulations concerning the pollution of the environment will vary from country to country. Precautions for Fuel GASOLINE ENGINE: Three way catalyst equipped models ... unleaded gasoline of at least 91 octane (RON) CAUTION: Do not use leaded gasoline. Using leaded gasoline will damage the three way catalyst. Except for the above models ... unleaded or leaded gasoline of above 88 octane (RON) Use unleaded fuel if instructed on the fuel filler lid. DIESEL ENGINE*: Diesel fuel of above 45 cetane for TD42 engine and above 50 cetane for RD28ET engine * If two types of diesel fuel are available, use summer or winter fuel properly according to the following temperature conditions. + Above −7°C (20°F) ... Summer type diesel fuel. + Below −7°C (20°F) ... Winter type diesel fuel. CAUTION: + Do not use home heating oil, gasoline, or other alternate fuels in your diesel engine. The use of those can cause engine damage. + Do not use summer fuel at temperature below −7°C (20°F). The cold temperature will cause wax to form in the fuel. As a result, it may prevent the engine from running smoothly. + Do not add gasoline or other alternate fuels to diesel fuel.

Precautions for Air Conditioning Use an approved refrigerant recovery unit any time the air conditioning system must be discharged. Refer to HA section (''HFC134a (R-134a) Service Procedure'', ''SERVICE PROCEDURES'') for specific instructions. GI-5 HOW TO USE THIS MANUAL + + + + + + ALPHABETICAL INDEX is provided at the end of this manual so that you can rapidly find the item and page you are searching for. A QUICK REFERENCE INDEX, a black tab (e.g.) is provided on the first page. You can quickly find the first page of each section by mating it to the section's black tab. THE CONTENTS are listed on the first page of each section. THE TITLE is indicated on the upper portion of each page and shows the part or system. THE PAGE NUMBER of each section consists of two letters which designate the particular section and a number (e.g. ''BR-5''). THE LARGE ILLUSTRATIONS are exploded views (See below) and contain tightening torques, lubrication points, section number of the PARTS CATALOG (e.g. SEC. 440) and other information necessary to perform repairs.

The illustrations should be used in reference to service matters only. When ordering parts, refer to the appropriate PARTS CATALOG. SBR364AC + THE SMALL ILLUSTRATIONS show the important steps such as inspection, use of special tools, knacks of work and hidden or tricky steps which are not shown in the previous large illustrations. Assembly, inspection and adjustment procedures for the complicated units such as the automatic transaxle or transmission, etc.

are presented in a step-by-step format where necessary.

GI-6 HOW TO USE THIS MANUAL The following SYMBOLS AND ABBREVIATIONS are used: , : Tightening torque , 4WD : Should be lubricated with grease. 2WD Unless otherwise indicated, use recA/C ommended multi-purpose grease. P/S : Should be lubricated with oil. SST : Sealing point SAE : Checking point : Always replace after every disasATF sembly. j P D1 : Apply petroleum jelly. D2 : Apply ATF. . : Select with proper thickness. D3 D4 > : Adjustment is required. SDS : Service Data and Specifications OD LH, RH : Left-Hand, Right-Hand 22 FR, RR : Front, Rear 21 M/T : Manual Transaxle/Transmission 12 11 + + + + + : : : : : : : : : : : : : : : 4-Wheel Drive 2-Wheel Drive Air Conditioner Power Steering Special Service Tools Society of Automotive Engineers, Inc. Automatic Transmission Fluid Drive range 1st gear Drive range 2nd gear Drive range 3rd gear Drive range 4th gear Overdrive 2nd range 2nd gear 2nd range 1st gear 1st range 2nd gear 1st range 1st gear The UNITS given in this manual are primarily expressed as the SI UNIT (International System of Unit), and alternatively expressed in the metric system and in the yard/pound system. ''Example'' Tightening torque: 59 - 78 Nzm (6.0 - 8.0 kg-m, 43 - 58 ft-lb) TROUBLE DIAGNOSES are included in sections dealing with complicated components. SERVICE DATA AND SPECIFICATIONS are contained at the end of each section for quick reference of data. The captions WARNING and CAUTION warn you of steps that must be followed to prevent personal injury and/or damage to some part of the vehicle. WARNING indicates the possibility of personal injury if instructions are not followed. CAUTION indicates the possibility of component damage if instructions are not followed. BOLD TYPED STATEMENTS except WARNING and CAUTION give you helpful information. GI-7 HOW TO READ WIRING DIAGRAMS Sample/Wiring Diagram — EXAMPL — + For Description, refer to GI-10. YGI001 GI-8 HOW TO READ WIRING DIAGRAMS Sample/Wiring Diagram — EXAMPL — (Cont'd) OPTIONAL SPLICE SGI942 GI-9 HOW TO READ WIRING DIAGRAMS Description Number Item Description 1 V Power condition + This shows the condition when the system receives battery positive voltage (can be operated). 2 V Fusible link + The double line shows that this is a fusible link. + The open circle shows current flow in, and the shaded circle shows current flow out. 3 V Fusible link/fuse location + This shows the location of the fusible link or fuse in the fusible link or fuse box. For arrangement, refer to EL section (''POWER SUPPLY ROUTING''). V Fuse + The single line shows that this is a fuse. + The open circle shows current flow in, and the shaded circle shows current flow out. 5 V Current rating + This shows the current rating of the fusible link or fuse. 6 V Connectors + This shows that connector E3 is female and connector M1 is male. + The G/R wire is located in the 1A terminal of both connectors. + Terminal number with an alphabet (1A, 5B, etc.) indicates that the connector is SMJ connector. Refer to GI-16. 7 V 8 V 9 V Optional splice + The open circle shows that the splice is optional depending on vehicle application. Splice + The shaded circle shows that the splice is always on the vehicle. Page crossing + This arrow shows that the circuit continues to an adjacent page. + The A will match with the A on the preceding or next page. 10 V 11 V 12 V Common connector + The dotted lines between terminals show that these terminals are part of the same connector. Option abbreviation + This shows that the circuit is optional depending on vehicle application. Relay + This shows an internal representation of the relay. For details, refer to EL section (''STANDARDIZED RELAY'').

13 V Connectors + This shows that the connector is connected to the body or a terminal with bolt or nut. 14 V Wire color + This shows a code for the color of the wire. B = Black BR = Brown W = White OR = Orange R = Red P = Pink G = Green PU = Purple L = Blue GY = Gray Y = Yellow SB = Sky Blue LG = Light Green CH = Dark Brown DG = Dark Green When the wire color is striped, the base color is given first, followed by the stripe color as shown below: Example: L/W = Blue with White Stripe 15 V Option description + This shows a description of the option abbreviation used on the page. 16 V Switch + This shows that continuity exists between terminals 1 and 2 when the switch is in the A position. Continuity exists between terminals 1 and 3 when the switch is in the B position. 17 V Assembly parts + Connector terminal in component shows that it is a harness incorporated assembly. 18 V Cell code + This identifies each page of the wiring diagram by section, system and wiring diagram page number. 4 GI-10 HOW TO READ WIRING DIAGRAMS Description (Cont'd) Number Item Description 19 V Current flow arrow + Arrow indicates electric current flow, especially where the direction of standard flow (vertically downward or horizontally from left to right) is difficult to follow. + A double arrow ''b—c'' shows that current can flow in either direction depending on circuit operation. 20 V System branch + This shows that the system branches to another system identified by cell code (section and system). 21 V Page crossing + This arrow shows that the circuit continues to another page identified by cell code. + The C will match with the C on another page within the system other than the next or preceding pages. 22 V 23 V 24 V Shielded line + The line enclosed by broken line circle shows shield wire. Component box in wave line + This shows that another part of the component is also shown on another page (indicated by wave line) within the system. Component name + This shows the name of a component. 25 V Connector number + This shows the connector number. + The letter shows which harness the connector is located in. Example: M: main harness. For detail and to locate the connector, refer to EL section (''Main Harness'', ''HARNESS LAYOUT'').

A coordinate grid is included for complex harnesses to aid in locating connectors. 26 V 27 V 28 V Ground (GND) + The line spliced and grounded under wire color shows that ground line is spliced at the grounded connector. Ground (GND) + This shows the ground connection. Connector views + This area shows the connector faces of the components in the wiring diagram on the page. 29 V Common component + Connectors enclosed in broken line show that these connectors belong to the same component. 30 V Connector color + This shows a code for the color of the connector. For code meaning, refer to wire color codes, Number V 14 of this chart. 31 V Fusible link and fuse box + This shows the arrangement of fusible link(s) and fuse(s), used for connector views of ''POWER SUPPLY ROUTING'' in EL section.

The open square shows current flow in, and the shaded square shows current flow out. 32 V Reference area + This shows that more information on the Super Multiple Junction (SMJ) and Joint Connectors (J/C) exists on the foldout page. Refer to GI-16 for details.

GI-11 HOW TO READ WIRING DIAGRAMS Description (Cont'd) CONNECTOR SYMBOLS Most of connector symbols in wiring diagrams are shown from the terminal side. + Connector symbols shown from the terminal side are enclosed by a double line and followed by the direction mark . + Connector symbols shown from the harness side are enclosed by a single line and followed by the direction mark . + Male and female terminals Connector guides for male terminals are shown in black and female terminals in white in wiring diagrams. SGI364 SGI363 GI-12 HOW TO READ WIRING DIAGRAMS Description (Cont'd) Harness indication + + Letter designations next to test meter probe indicate harness (connector) wire color. Connector numbers in a single circle M33 indicate harness connectors.

Component indication + Connector numbers in a double circle indicate component connectors. AGI070 SWITCH POSITIONS Switches are shown in wiring diagrams as if the vehicle is in the ''normal'' condition. A vehicle is in the ''normal'' condition when: + ignition switch is ''OFF'', + doors, hood and trunk lid/back door are closed, + pedals are not depressed, and + parking brake is released.

SGI860 GI-13 HOW TO READ WIRING DIAGRAMS Description (Cont'd) DETECTABLE LINES AND NON-DETECTABLE LINES In some wiring diagrams, two kinds of lines, representing wires, with different weight are used. + A line with regular weight (wider line) represents a ''detectable line for DTC (Diagnostic Trouble Code)''. A ''detectable line for DTC'' is a circuit in which ECM (Engine Control Module) can detect its malfunctions with the on board diagnostic system. + A line with less weight (thinner line) represents a ''non-detectable line for DTC''.

A ''non-detectable line for DTC'' is a circuit in which ECM cannot detect its malfunctions with the on board diagnostic system. SGI862-A GI-14 HOW TO READ WIRING DIAGRAMS Description (Cont'd) MULTIPLE SWITCH The continuity of multiple switch is described in two ways as shown below. + The switch chart is used in schematic diagrams. + The switch diagram is used in wiring diagrams.

SGI875 GI-15 HOW TO READ WIRING DIAGRAMS Description (Cont'd) FOLDOUT PAGE The foldout page should be opened when reading wiring diagram. Super multiple junction (SMJ) In wiring diagram, connectors consisting of terminals having terminal numbers with an alphabet (1B, 0D, etc.) are SMJ connectors. If connector numbers are shown in Reference Area, these connector symbols are not shown in Connector Area. For terminal arrangement of these connectors, refer to the foldout page at the end of this manual. Joint connector Joint connector symbols are shown in Connector Area in the wiring diagram concerned. Foldout page also carries inside wiring layout together with such joint connector symbols. SGI943 GI-16 HOW TO CHECK TERMINAL How to Probe Connectors Connector damage and an intermittent connection can result from improperly probing of the connector during circuit checks. The probe of a digital multimeter (DMM) may not correctly fit the connector cavity. To correctly probe the connector, follow the procedures below using a ''T'' pin.

For the best contact grasp the ''T'' pin using an alligator clip. PROBING FROM HARNESS SIDE Standard type (not waterproof type) connector should be probed from harness side with ''T'' pin. + If the connector has a rear cover such as a ECM connector, remove the rear cover before probing the terminal. + Do not probe waterproof connector from harness side. Damage to the seal between wire and connector may result. SGI841 PROBING FROM TERMINAL SIDE Female terminal There is a small notch above each female terminal. Probe each terminal with the ''T'' pin through the notch. Do not insert any object other than the same type male terminal into female terminal. + SEL265V + Some connectors do not have a notch above each terminal. To probe each terminal, remove the connector retainer to make contact space for probing. SEL266V Male terminal Carefully probe the contact surface of each terminal using a ''T'' pin. Do not bend terminal. SEL267V GI-17 HOW TO CHECK TERMINAL How to Check Enlarged Contact Spring of Terminal An enlarged contact spring of a terminal may create intermittent signals in the circuit. If the intermittent open circuit occurs, follow the procedure below to inspect for open wires and enlarged contact spring of female terminal. 1. Assemble a male terminal and approx. 10 cm (3.9 in) of wire. Use a male terminal which matches the female terminal. 2. Disconnect the suspected faulty connector and hold it terminal side up. SEL270V 3. While holding the wire of the male terminal, try to insert the male terminal into the female terminal.

Do not force the male terminal into the female terminal with your hands. SEL271V 4. While moving the connector, check whether the male terminal can be easily inserted or not. SEL272V + If the male terminal can be easily inserted into the female terminal, replace the female terminal. SEL273V GI-18 HOW TO CHECK TERMINAL Waterproof Connector Inspection If water enters the connector, it can short interior circuits. This may lead to intermittent problems. Check the following items to maintain the original waterproof characteristics. RUBBER SEAL INSPECTION + SEL275V + Most waterproof connectors are provided with a rubber seal between the male and female connectors. If the seal is missing, the waterproof performance may not meet specifications. The rubber seal may come off when connectors are disconnected. Whenever connectors are reconnected, make sure the rubber seal is properly installed on either side of male or female connector. WIRE SEAL INSPECTION The wire seal must be installed on the wire insertion area of a waterproof connector.

Be sure that the seal is installed properly. Terminal Lock Inspection Check for unlocked terminals by pulling wire at the end of connector. An unlocked terminal may create intermittent signals in the circuit. SEL330V GI-19 HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT Work Flow SGI838 STEP STEP 1 DESCRIPTION Get detailed information about the conditions and the environment when the incident occurred. The following are key pieces of information required to make a good analysis: WHAT Vehicle Model, Engine, Transmission and the System (i.e. Radio). WHEN Date, Time of Day, Weather Conditions, Frequency. WHERE Road Conditions, Altitude and Traffic Situation. HOW System Symptoms, Operating Conditions (Other Components Interaction). Service History and if any After Market Accessories have been installed. STEP 2 Operate the system, road test if necessary. Verify the parameter of the incident. If the problem can not be duplicated, refer to ''Incident Simulation Tests'' next page. STEP 3 Get the proper diagnosis materials together including: POWER SUPPLY ROUTING System Operation Descriptions Applicable Service Manual Sections Check for any Service Bulletin. Identify where to begin diagnosis based upon your knowledge of the system operation and the customer comments. STEP 4 Inspect the system for mechanical binding, loose connectors or wiring damage. Determine which circuits and components are involved and diagnose using the Power Supply Routing and Harness Layouts. STEP 5 Repair or replace the incident circuit or component. STEP 6 Operate the system in all modes. Verify the system works properly under all conditions. Make sure you have not inadvertently created a new incident during your diagnosis or repair steps. GI-20 HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT Incident Simulation Tests INTRODUCTION Sometimes the symptom is not present when the vehicle is brought in for service. If possible, re-create the conditions present at the time of the incident. Doing so may help avoid a No Trouble Found Diagnosis. The following section illustrates ways to simulate the conditions/environment under which the owner experiences an electrical incident. The section is broken into the six following topics: + Vehicle vibration + Heat sensitive + Freezing + Water intrusion + Electrical load + Cold or hot start up Get a thorough description of the incident from the customer. It is important for simulating the conditions of the problem. VEHICLE VIBRATION The problem may occur or become worse while driving on a rough road or when engine is vibrating (idle with A/C on). In such a case, you will want to check for a vibration related condition. Refer to the illustration below. Connectors & harness Determine which connectors and wiring harness would affect the electrical system you are inspecting. Gently shake each connector and harness while monitoring the system for the incident you are trying to duplicate. This test may indicate a loose or poor electrical connection. Hint Connectors can be exposed to moisture. It is possible to get a thin film of corrosion on the connector terminals. A visual inspection may not reveal this without disconnecting the connector. If the problem occurs intermittently, perhaps the problem is caused by corrosion. It is a good idea to disconnect, inspect and clean the terminals on related connectors in the system. Sensors & relays Gently apply a slight vibration to sensors and relays in the system you are inspecting.

This test may indicate a loose or poorly mounted sensor or relay. SGI839 GI-21 HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT Incident Simulation Tests (Cont'd) Engine compartment There are several reasons a vehicle or engine vibration could cause an electrical complaint. Some of the things to check for are: + + + + + Connectors not fully seated. Wiring harness not long enough and is being stressed due to engine vibrations or rocking. Wires laying across brackets or moving components. Loose, dirty or corroded ground wires.

Wires routed too close to hot components. To inspect components under the hood, start by verifying the integrity of ground connections. (Refer to GROUND INSPECTION described later.) First check that the system is properly grounded. Then check for loose connection by gently shaking the wiring or components as previously explained. Using the wiring diagrams inspect the wiring for continuity.

Behind the instrument panel An improperly routed or improperly clamped harness can become pinched during accessory installation. Vehicle vibration can aggravate a harness which is routed along a bracket or near a screw. Under seating areas An unclamped or loose harness can cause wiring to be pinched by seat components (such as slide guides) during vehicle vibration. If the wiring runs under seating areas, inspect wire routing for possible damage or pinching. HEAT SENSITIVE The owner's problem may occur during hot weather or after car has sat for a short time. In such cases you will want to check for a heat sensitive condition. To determine if an electrical component is heat sensitive, heat the component with a heat gun or equivalent. Do not heat components above 60°C (140°F). If incident occurs while heating the unit, either replace or properly insulate the component.

SGI842 GI-22 HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT Incident Simulation Tests (Cont'd) FREEZING SGI843 The customer may indicate the incident goes away after the car warms up (winter time). The cause could be related to water freezing somewhere in the wiring/electrical system. There are two methods to check for this. The first is to arrange for the owner to leave his car overnight. Make sure it will get cold enough to demonstrate his complaint. Leave the car parked outside overnight. In the morning, do a quick and thorough diagnosis of those electrical components which could be affected. The second method is to put the suspect component into a freezer long enough for any water to freeze. Reinstall the part into the car and check for the reoccurrence of the incident. If it occurs, repair or replace the component.

WATER INTRUSION The incident may occur only during high humidity or in rainy/snowy weather. In such cases the incident could be caused by water intrusion on an electrical part. This can be simulated by soaking the car or running it through a car wash. Do not spray water directly on any electrical components. SGI844 ELECTRICAL LOAD The incident may be electrical load sensitive. Perform diagnosis with all accessories (including A/C, rear window defogger, radio, fog lamps) turned on. COLD OR HOT START UP On some occasions an electrical incident may occur only when the car is started cold. Or it may occur when the car is restarted hot shortly after being turned off. In these cases you may have to keep the car overnight to make a proper diagnosis.

SGI845 GI-23 HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT Circuit Inspection INTRODUCTION In general, testing electrical circuits is an easy task if it is approached in a logical and organized method. Before beginning it is important to have all available information on the system to be tested. Also, get a thorough understanding of system operation. Then you will be able to use the appropriate equipment and follow the correct test procedure. You may have to simulate vehicle vibrations while testing electrical components. Gently shake the wiring harness or electrical component to do this. OPEN A circuit is open when there is no continuity through a section of the circuit. SHORT There are two types of shorts. + SHORT CIRCUIT When a circuit contacts another circuit and causes the normal resistance to change. + SHORT TO GROUND When a circuit contacts a ground source and grounds the circuit. TESTING FOR ''OPENS'' IN THE CIRCUIT Before you begin to diagnose and test the system, you should rough sketch a schematic of the system. This will help you to logically walk through the diagnosis process. Drawing the sketch will also reinforce your working knowledge of the system. SGI846 Continuity check method The continuity check is used to find an open in the circuit. The Digital Multimeter (DMM) set on the resistance function will indicate an open circuit as over limit (OL, no beep tone or no ohms symbol). Make sure to always start with the DMM at the highest resistance level. To help in understanding the diagnosis of open circuits please refer to the schematic above. 1. 2. 3. 4. Disconnect the battery negative cable. Start at one end of the circuit and work your way to the other end. (At the fuse block in this example) Connect one probe of the DMM to the fuse block terminal on the load side. Connect the other probe to the fuse block (power) side of SW1.

Little or no resistance will indicate that portion of the circuit has good continuity. If there were an open in the circuit, the DMM would indicate an over limit or infinite resistance condition. (point A) 5. Connect the probes between SW1 and the relay. Little or no resistance will indicate that portion of the circuit has good continuity. If there were an open in the circuit, the DMM would indicate an over limit or infinite resistance condition. (point B) 6. Connect the probes between the relay and the solenoid. Little or no resistance will indicate that portion of the circuit has good continuity. If there were an open in the circuit, the DMM would indicate an over limit or infinite resistance condition. (point C) Any circuit can be diagnosed using the approach in the above example. GI-24 HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT Circuit Inspection (Cont'd) Voltage check method To help in understanding the diagnosis of open circuits please refer to the previous schematic. In any powered circuit, an open can be found by methodically checking the system for the presence of voltage. This is done by switching the DMM to the voltage function. 1. Connect one probe of the DMM to a known good ground. 2. Begin probing at one end of the circuit and work your way to the other end. 3. With SW1 open, probe at SW1 to check for voltage. voltage; open is further down the circuit than SW1. no voltage; open is between fuse block and SW1 (point A). 4. Close SW1 and probe at relay. voltage; open is further down the circuit than the relay. no voltage; open is between SW1 and relay (point B). 5. Close the relay and probe at the solenoid. voltage; open is further down the circuit than the solenoid.

no voltage; open is between relay and solenoid (point C). Any powered circuit can be diagnosed using the approach in the above example.

TESTING FOR ''SHORTS'' IN THE CIRCUIT To simplify the discussion of shorts in the system please refer to the schematic below. SGI847 Resistance check method 1. Disconnect the battery negative cable and remove the blown fuse. 2. Disconnect all loads (SW1 open, relay disconnected and solenoid disconnected) powered through the fuse. 3. Connect one probe of the ohmmeter to the load side of the fuse terminal. Connect the other probe to a known good ground. 4.

With SW1 open, check for continuity. continuity; short is between fuse terminal and SW1 (point A). no continuity; short is further down the circuit than SW1. 5. Close SW1 and disconnect the relay. Put probes at the load side of fuse terminal and a known good ground.

Then, check for continuity. continuity; short is between SW1 and the relay (point B). no continuity; short is further down the circuit than the relay. 6. Close SW1 and jump the relay contacts with jumper wire. Put probes at the load side of fuse terminal and a known good ground. Then, check for continuity. continuity; short is between relay and solenoid (point C). no continuity; check solenoid, retrace steps. GI-25 HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT Circuit Inspection (Cont'd) Voltage check method 1. Remove the blown fuse and disconnect all loads (i.e. SW1 open, relay disconnected and solenoid disconnected) powered through the fuse. 2. Turn the ignition key to the ON or START position. Verify battery voltage at the B + side of the fuse terminal (one lead on the B + terminal side of the fuse block and one lead on a known good ground). 3. With SW1 open and the DMM leads across both fuse terminals, check for voltage. voltage; short is between fuse block and SW1 (point A). no voltage; short is further down the circuit than SW1. 4.

With SW1 closed, relay and solenoid disconnected and the DMM leads across both fuse terminals, check for voltage. voltage; short is between SW1 and the relay (point B). no voltage; short is further down the circuit than the relay. 5.

With SW1 closed, relay contacts jumped with fused jumper wire check for voltage. voltage; short is down the circuit of the relay or between the relay and the disconnected solenoid (point C). no voltage; retrace steps and check power to fuse block. GROUND INSPECTION Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works. Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface. When inspecting a ground connection follow these rules: 1. Remove the ground bolt screw or clip.

2. Inspect all mating surfaces for tarnish, dirt, rust, etc. 3. Clean as required to assure good contact. 4. Reinstall bolt or screw securely. 5. Inspect for ''add-on'' accessories which may be interfering with the ground circuit. 6. If several wires are crimped into one ground eyelet terminal, check for proper crimps.

Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation. SGI853 GI-26 HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT Circuit Inspection (Cont'd) VOLTAGE DROP TESTS Voltage drop tests are often used to find components or circuits which have excessive resistance. A voltage drop in a circuit is caused by a resistance when the circuit is in operation. Check the wire in the illustration. When measuring resistance with ohmmeter, contact by a single strand of wire will give reading of 0 ohms. This would indicate a good circuit.

When the circuit operates, this single strand of wire is not able to carry the current. The single strand will have a high resistance to the current. This will be picked up as a slight voltage drop. Unwanted resistance can be caused by many situations as follows: Undersized wiring (single strand example) Corrosion on switch contacts Loose wire connections or splices. If repairs are needed always use wire that is of the same or larger gauge. Measuring voltage drop — Accumulated method 1. Connect the voltmeter across the connector or part of the circuit you want to check. The positive lead of the voltmeter should be closer to power and the negative lead closer to ground. 2. Operate the circuit. 3. The voltmeter will indicate how many volts are being used to ''push'' current through that part of the circuit. Note in the illustration that there is an excessive 4.1 volt drop between the battery and the bulb. SGI974 Measuring voltage drop — Step by step The step by step method is most useful for isolating excessive drops in low voltage systems (such as those in ''Computer Controlled Systems''). Circuits in the ''Computer Controlled System'' operate on very low amperage. The (Computer Controlled) system operations can be adversely affected by any variation in resistance in the system. Such resistance variation may be caused by poor connection, improper installation, improper wire gauge or corrosion. The step by step voltage drop test can identify a component or wire with too much resistance. GI-27 HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT Circuit Inspection (Cont'd) SGI854 GI-28 HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT Circuit Inspection (Cont'd) CONTROL UNIT CIRCUIT TEST System Description: When the switch is ON, the control unit lights up the lamp.

AGI059 GI-29 HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES NOTICE: The flow chart indicates work procedures required to diagnose problems effectively. Observe the following instructions before diagnosing.

1) Use the flow chart after locating probable causes of a problem following the ''Preliminary Check'', the ''Symptom Chart'' or the ''Work Flow''. 2) After repairs, re-check that the problem has been completely eliminated. 3) Refer to Component Parts and Harness Connector Location for the Systems described in each section for identification/location of components and harness connectors. 4) Refer to the Circuit Diagram for Quick Pinpoint Check. If you must check circuit continuity between harness connectors in more detail, such as when a sub-harness is used, refer to Wiring Diagram in each individual section and Harness Layout in EL section for identification of harness connectors. 5) When checking circuit continuity, ignition switch should be ''OFF''. 6) Before checking voltage at connectors, check battery voltage. 7) After accomplishing the Diagnostic Procedures and Electrical Components Inspection, make sure that all harness connectors are reconnected as they were. Example AGI056 GI-30 HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES How to Follow This Flow Chart Work and diagnostic procedure Start to diagnose a problem using procedures indicated in enclosed blocks, as shown in the following example. b CHECK POWER SUPPLY. 1) Turn ignition switch ''ON''. 2) Check voltage between terminal and ground. Battery voltage should exist. 1 V Check item being performed. Procedure, steps or measurement results Measurement results Required results are indicated in bold type in the corresponding block, as shown below: These have the following meanings: Battery voltage → 11 - 14V or approximately 12V Voltage: Approximately 0V → Less than 1V Cross reference of work symbols in the text and illustrations Illustrations are provided as visual aids for work procedures. indicated in the left upper portion of For example, symbol each illustration corresponds with the symbol in the flow chart for easy identification. More precisely, the procedure under the ''CHECK POWER SUPPLY'' outlined previously is indicated by illustration . Symbols used in illustrations Symbols included in illustrations refer to measurements or procedures. Before diagnosing a problem, familiarize yourself with each symbol.

DIRECTION MARK Refer to ''CONNECTOR SYMBOLS'' on GI-12. GI-31 HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES How to Follow This Flow Chart (Cont'd) KEY TO SYMBOLS SIGNIFYING MEASUREMENTS OR PROCEDURES Symbol Symbol explanation Symbol Symbol explanation Check after disconnecting the connector to be measured. Procedure with CONSULT Check after connecting the connector to be measured. Procedure without CONSULT Insert key into ignition switch. A/C switch is ''OFF''. Remove key from ignition switch.

A/C switch is ''ON''. Turn ignition switch to ''OFF'' position. REC switch is ''ON''.

Turn ignition switch to ''ON'' position. REC switch is ''OFF''. Turn ignition switch to ''START'' position.

DEF switch is ''ON''. Turn ignition switch from ''OFF'' to ''ACC'' position. Apply positive voltage from battery with fuse directly to components. Turn ignition switch from ''ACC'' to ''OFF'' position. Drive vehicle. Turn ignition switch from ''OFF'' to ''ON'' position. Disconnect battery negative cable. Turn ignition switch from ''ON'' to ''OFF'' position. Depress brake pedal. Do not start engine, or check with engine stopped. Release brake pedal. Start engine, or check with engine running. Depress accelerator pedal. Apply parking brake. Release accelerator pedal. Release parking brake. Check after engine is warmed up sufficiently. Voltage should be measured with a voltmeter. Circuit resistance should be measured with an ohmmeter.

Current should be measured with an ammeter. GI-32 Pin terminal check for SMJ type ECM and TCM connectors.

For details regarding the terminal arrangement, refer to the foldout page. CONSULT CHECKING SYSTEM Function and System Application Diagnostic test mode Function ECCS Air bag ABS* Work support This mode enables a technician to adjust some devices faster and more accurately by following the indications on CONSULT. x — — Self-diagnostic results Self-diagnostic results can be read and erased quickly. x x x Trouble diagnostic record Current self-diagnostic results and all trouble diagnostic records previously stored can be read. — x — ECU discriminated No. Classification number of a replacement ECU can be read to prevent an incorrect ECU from being installed. — x — Data monitor Input/Output data in the ECM can be read. x — x Active test Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range. x — x ECM part number ECM part number can be read. x — x Function test Conducted by CONSULT instead of a technician to determine whether each system is ''OK'' or ''NG''. x — — x: Applicable *: EE960 program card is not applicable to ABS. Use on board diagnostic system with ABS warning lamp until the next program card will be introduced. Lithium Battery Replacement CONSULT contains a lithium battery.

When replacing the battery obey the following: WARNING: Replace the lithium battery with SANYO Electric Co., Ltd., CR2032 only. Use of another battery may present a risk of fire or explosion. The battery may present a fire or chemical burn hazard if mistreated. Do not recharge, disassemble of dispose of in fire. Keep the battery out of reach of children and discard used battery conforming to the local regulations. Checking Equipment When ordering the below equipment, contact your NISSAN distributor. Tool name Description NISSAN CONSULT 1 CONSULT unit V and accessories 2 V Program card EE960 NT004 GI-33 CONSULT CHECKING SYSTEM Loading Procedure SGI983 CONSULT Data Link Connector (DLC) Circuit SGI984 INSPECTION PROCEDURE If the CONSULT cannot diagnose the system properly, check the following items. Symptom CONSULT cannot access any system. Check item + CONSULT DLC power supply circuit (Terminal 7) and ground circuit (Terminal 8) (For detailed circuit, refer to ''MIL & Data Link Connectors Wiring Diagram'' in EC section.) + CONSULT DDL cable + CONSULT program card (Check the appropriate CONSULT program card for the system. Refer CONSULT cannot access to GI-33.) individual system.

(Other sys+ Power supply and ground circuit for the control unit of the system tems can be accessed.) (For detailed circuit, refer to wiring diagram for each system.) + Open or short circuit between the system and CONSULT DLC (For detailed circuit, refer to wiring diagram for each system.) GI-34 IDENTIFICATION INFORMATION Model Variation Model Hardtop Station Wagon 2nd center split bench seat Rear seat arrangement Destination Steering position Forward facing Seatless 3rd seat Seatless Engine Front differential Forward facing Side facing — H233B Rear differential Transmission Transfer RHD Europe RD28ETi FS5R30A H233B Grade TX12A S KWBSREFY61UEA — — TWBSREFY61UEA SE KWBSRFFY61UEA — — TWBSRFFY61UEA — SE — — — TWBSRHFY61UEA — S SE LHD KWBSLEFY61UGA KWBSLEFY61USP TWBSLEFY61USP TWBSLEFY61UGA — KWBSLFFY61UGA — TWBSLFFY61USP TWBSLFFY61UGA — — — — TWBSLFFY61USA — — — — TWBSLHFY61UGA — — — — TWBSLHFY61USA — SE Prefix and suffix designations T WB S L E F Y61 U G A A: 3rd seat forward facing P: without 3rd seat E: RHD for Europe G: Central/South Europe S: North Europe U: Turbocharger engine F: 5-speed floor shift manual transmission E: S F: SE H: SE L: LH drive R: RH drive S: Long wheelbase (4WD) WB: RD28ETi engine T: Station Wagon K: Hardtop GI-35 IDENTIFICATION INFORMATION Identification Number Vehicle identification plate Front Vehicle identification number SGI037A VEHICLE IDENTIFICATION NUMBER (Chassis number) Prefix and suffix designations JN1 T D S Y61 U 0 XXXXXX Vehicle serial number 0: Stopgap (no meaning) U: For Europe S: Long wheelbase D: RD28ETi engine T: Station Wagon K: Hardtop JN1: Japan produced vehicle GI-36 IDENTIFICATION INFORMATION Identification Number (Cont'd) IDENTIFICATION PLATE SGI851 ENGINE SERIAL NUMBER SGI028A MANUAL TRANSMISSION SERIAL NUMBER SGI018A TRANSFER SERIAL NUMBER SGI020A GI-37 IDENTIFICATION INFORMATION Dimensions Wagon Hardtop Overall length mm (in) 4,965 (195.5) 5,010 (197.2)* 4,395 (173.0) 4,440 (174.8)* Overall width mm (in) 1,840 (72.4) 1,930 (76.0)* 1,840 (72.4) 1,930 (76.0)* Overall height mm (in) 1,855 (73.0) 1,840 (72.4) Front tread mm (in) 1,555 (61.2) 1,605 (63.2)* 1,555 (61.2) 1,605 (63.2)* Rear tread mm (in) 1,575 (62.0) 1,625 (64.0)* 1,575 (62.0) 1,625 (64.0)* Wheelbase mm (in) 2,970 (116.9) 2,400 (94.5) *: For models equipped with 265/70R16 tires Wheels & Tires Road wheel Size 6JJ-16*1 8JJ-16*1 Offset mm (in) 35 (1.38) 10 (0.39) 235/80R16 109S 265/70R16 112S Tire size *1: Steel wheel and Aluminum wheel GI-38 LIFTING POINTS AND TOW TRUCK TOWING WARNING: + Never get under the vehicle while it is supported only by the jack. Always use safety stands to support the frame when you have to get under the vehicle. + Place wheel chocks at both front and back of the wheel which is diagonally opposite the jack position. Example: If the jack is positioned at the LH front wheel, place wheel chocks at RH rear wheel. Screw Jack SGI016A Garage Jack and Safety Stand CAUTION: + Place a wooden or rubber block between safety stand and vehicle body when the supporting body is flat. SGI021A GI-39 LIFTING POINTS AND TOW TRUCK TOWING 2-pole Lift WARNING: When lifting the vehicle, open the lift arms as wide as possible and ensure that the front and rear of the vehicle are well balanced. When setting the lift arm, do not allow the arm to contact the brake tubes and fuel lines. Put the attachment in the slit of the lift pad to prevent the frame from slipping. SGI531 Use suitable stands at the correct places as illustrated, to prevent the vehicle from becoming unbalanced. SGI022A SGI526 GI-40 LIFTING POINTS AND TOW TRUCK TOWING Tow Truck Towing CAUTION: + All applicable local laws regarding the towing operation must be obeyed. + It is necessary to use proper towing equipment to avoid possible damage to the vehicle during a towing operation. + Attach safety chains for all towing. + When towing, make sure that the transmission, steering system and power train are in good order.

If any unit is damaged, a dolly must be used. + When towing with the front wheels on the ground: Turn the ignition key to the ''OFF'' position and secure the steering wheel in a straight-ahead position with a rope or similar device.

Never place the ignition key in the ''LOCK'' position.

This will result in damage to the steering lock mechanism. + When towing manual transmission models with the rear wheels on the ground: Release the parking brake and move the gearshift lever to neutral (''N'' position). + For 4-wheel drive models: Set the manual-lock free-running hubs to the free position and 2-way lock free-running hubs to the auto position. (See '' Transfer case shifting procedures for 4-wheel drive vehicles'' in ''Starting and driving'' section.) Move the transfer case shift lever into the ''2H'' position and the transmission shift lever into the neutral (''N'') position. Do not shift the transfer lever to the ''4L'' position. This will cause damage to the transmission. NISSAN recommends that a dolly be used as illustrated. SGI023A If you have to tow a manual transmission model with front wheels raised (with rear wheels on ground) Observe the following restricted raising heights. + Do not raise the front end over !. Wagon ! = 600 mm (23.62 in) Hardtop ! = 500 mm (19.69 in) SGI024A GI-41 LIFTING POINTS AND TOW TRUCK TOWING Tow Truck Towing (Cont'd) If you have to tow an automatic transmission model with four wheels on ground or tow an automatic transmission model with front wheels raised (with rear wheels on ground) Observe the following restricted towing speeds, distances and raising heights. + Speed: Below 50 km/h (30 MPH) + Distance: Less than 65 km (40 miles) + Do not raise the front end over !. Wagon ! = 600 mm (23.62 in) Hardtop ! = 500 mm (19.69 in) If the speed, distance or height must necessarily be greater, remove the propeller shaft beforehand to prevent damage to the transmission. CAUTION: + Never tow your vehicle from the rear (i.e., backward) with four wheels on the ground as this may cause serious and expensive damage to the transmission. + Be sure to place the transfer case shift lever into the ''2H'' position and the transmission shift lever into the neutral (''N'') position if the vehicle is to be towed. TOWING HOOKS The towing hooks are provided only for emergency. + Use the towing hooks only, not other parts of the vehicle. Otherwise, the vehicle body will be damaged.

+ Use the towing hooks only to free a vehicle stuck in sand, snow, mud, etc. Never tow the vehicle for long distances using only the towing hooks. + The towing hook is under tremendous force when used to free a stuck vehicle. Always pull the cable straight out from the front or rear of the vehicle. Never pull on the hook at a sideways angle. SGI025A GI-42 SAE J1930 TERMINOLOGY LIST SAE J1930 Terminology List All emission related terms used in this publication in accordance with SAE J1930 are listed. Accordingly, new terms, new acronyms/abbreviations and old terms are listed in the following chart. ***: Not applicable NEW ACRONYM / ABBREVIATION NEW TERM OLD TERM Air cleaner ACL Air cleaner Barometric pressure BARO *** Barometric pressure sensor-BCDD BAROS-BCDD BCDD Camshaft position CMP *** Camshaft position sensor CMPS Crank angle sensor Canister *** Canister Carburetor CARB Carburetor Charge air cooler CAC Intercooler Closed loop CL Closed loop Closed throttle position switch CTP switch Idle switch Clutch pedal position switch CPP switch Clutch switch Continuous fuel injection system CFI system *** Continuous trap oxidizer system CTOX system *** Crankshaft position CKP *** Crankshaft position sensor CKPS *** Data link connector DLC *** Data link connector for CONSULT DLC for CONSULT Diagnostic connector for CONSULT Diagnostic test mode DTM Diagnostic mode Diagnostic test mode selector DTM selector Diagnostic mode selector Diagnostic test mode I DTM I Mode I Diagnostic test mode II DTM II Mode II Diagnostic trouble code DTC Malfunction code Direct fuel injection system DFI system *** Distributor ignition system DI system Ignition timing control Early fuel evaporation-mixture heater EFE-mixture heater Mixture heater Early fuel evaporation system EFE system Mixture heater control Electrically erasable programmable read only memory EEPROM *** Electronic ignition system EI system Ignition timing control Engine control EC *** Engine control module ECM ECCS control unit Engine coolant temperature ECT Engine temperature Engine coolant temperature sensor ECTS Engine temperature sensor Engine modification EM *** Engine speed RPM Engine speed Erasable programmable read only memory EPROM *** Evaporative emission canister EVAP canister Canister GI-43 SAE J1930 TERMINOLOGY LIST SAE J1930 Terminology List (Cont'd) ***: Not applicable NEW ACRONYM / ABBREVIATION NEW TERM OLD TERM Evaporative emission system EVAP system Evaporative emission control system Exhaust gas recirculation valve EGR valve EGR valve Exhaust gas recirculation control-BPT valve EGRC-BPT valve BPT valve Exhaust gas recirculation control-solenoid valve EGRC-solenoid valve EGR control solenoid valve EGRT sensor Exhaust gas temperature sensor Flash electrically erasable programmable read only memory FEEPROM *** Flash erasable programmable read only memory FEPROM *** Flexible fuel sensor FFS *** Flexible fuel system FF system *** Fuel pressure regulator *** Pressure regulator Fuel pressure regulator control solenoid valve *** PRVR control solenoid valve Fuel trim FT *** Heated Oxygen sensor HO2S Exhaust gas sensor Idle air control system IAC system Idle speed control Idle air control valve-air regulator IACV-air regulator Air regulator Idle air control valve-auxiliary air control valve IACV-AAC valve Auxiliary air control (AAC) valve Idle air control valve-FICD solenoid valve IACV-FICD solenoid valve FICD solenoid valve Idle air control valve-idle up control solenoid valve IACV-idle up control solenoid valve Idle up control solenoid valve Idle speed control-FI pot ISC-FI pot FI pot Idle speed control system ISC system *** Ignition control IC *** Ignition control module ICM *** Indirect fuel injection system IFI system *** Intake air IA Air Intake air temperature sensor IAT sensor Air temperature sensor Knock *** Detonation Knock sensor KS Detonation sensor Malfunction indicator lamp MIL Check engine light Manifold absolute pressure MAP *** Manifold absolute pressure sensor MAPS *** Manifold differential pressure MDP *** Manifold differential pressure sensor MDPS *** Exhaust gas recirculation temperature sensor EGR temperature sensor GI-44 SAE J1930 TERMINOLOGY LIST SAE J1930 Terminology List (Cont'd) ***: Not applicable NEW ACRONYM / ABBREVIATION NEW TERM OLD TERM Manifold surface temperature MST *** Manifold surface temperature sensor MSTS *** Manifold vacuum zone MVZ *** Manifold vacuum zone sensor MVZS *** Mass air flow sensor MAFS Air flow meter Mixture control solenoid valve MC solenoid valve Air-fuel ratio control solenoid valve Multiport fuel injection System MFI system Fuel injection control Neutral position switch *** Neutral switch Nonvolatile random access memory NVRAM *** On board diagnostic system OBD system Self-diagnosis Open loop OL Open loop Oxidation catalyst OC Catalyst Oxidation catalytic converter system OC system *** Oxygen sensor O2S Exhaust gas sensor Park position switch *** Park switch Park/neutral position switch PNP switch Park/neutral switch Periodic trap oxidizer system PTOX system *** Positive crankcase ventilation PCV Positive crankcase ventilation Positive crankcase ventilation valve PCV valve PCV valve Powertrain control module PCM *** Programmable read only memory PROM *** Pulsed secondary air injection control solenoid valve PAIRC solenoid valve AIV control solenoid valve Pulsed secondary air injection system PAIR system Air induction valve (AIV) control Pulsed secondary air injection valve PAIR valve Air induction valve Random access memory RAM *** Read only memory ROM *** Scan tool ST *** Secondary air injection pump AIR pump *** Secondary air injection system AIR system *** Sequential multiport fuel injection system SFI system Sequential fuel injection Service reminder indicator SRI *** Simultaneous multiport fuel injection system *** Simultaneous fuel injection Smoke puff limiter system SPL system *** Supercharger SC *** Supercharger bypass SCB *** System readiness test SRT *** Thermal vacuum valve TVV Thermal vacuum valve Three way catalyst TWC Catalyst Three way catalytic converter system TWC system *** Three way + oxidation catalyst TWC + OC Catalyst GI-45 SAE J1930 TERMINOLOGY LIST SAE J1930 Terminology List (Cont'd) ***: Not applicable NEW ACRONYM / ABBREVIATION NEW TERM OLD TERM Three way + oxidation catalytic converter system TWC + OC system *** Throttle body Throttle chamber TB SPI body Throttle body fuel injection system TBI system Fuel injection control Throttle position TP Throttle position Throttle position sensor TPS Throttle sensor Throttle position switch TP switch Throttle switch Torque converter clutch solenoid valve TCC solenoid valve Lock-up cancel solenoid Lock-up solenoid Transmission control module TCM A/T control unit Turbocharger TC Turbocharger Vehicle speed sensor VSS Vehicle speed sensor Volume air flow sensor VAFS Air flow meter Warm up oxidation catalyst WU-OC Catalyst Warm up oxidation catalytic converter system WU-OC system *** Warm up three way catalyst WU-TWC Catalyst Warm up three way catalytic converter system WU-TWC system *** Wide open throttle position switch WOTP switch Full switch GI-46 HEATER & AIR CONDITIONER SECTION HA CONTENTS
MANUAL AND AUTO PRECAUTIONS AND PREPARATION..........1 Supplemental Restraint System (SRS) ''AIR BAG'' and ''SEAT BELT PRE-TENSIONER''..........1 Precautions for Working with HFC-134a (R-134a) .....1 General Refrigerant Precautions ....2 Precautions for Refrigerant Connection ....2 Precautions for Servicing Compressor..........6 Special Service Tools ....6 HFC-134a (R-134a) Service Tools and Equipment..........7 Precautions for Service Equipment ....9 DESCRIPTION ....11 Refrigeration Cycle ....11 Component Layout ....12 Discharge Air Flow..........13 REAR HEATER TROUBLE DIAGNOSES ....14 Wiring Diagram — R/HEAT —/LHD Models ....14 Wiring Diagram — R/HEAT —/RHD Models..........15 MANUAL DESCRIPTION ....16 System Description..........16 Control Operation ....16 TROUBLE DIAGNOSES ....17 Component Location..........17 Wiring Diagram — A/C, M — ....19 How to Perform Trouble Diagnoses for Quick and Accurate Repair ....21 Operational Check ....22 Intake Door Motor..........24 Blower Motor..........28 Insufficient Cooling ....32 Trouble Diagnoses for Abnormal Pressure ....36 Insufficient Heating ....39 Air Outlet..........41 Magnet Clutch..........43 Noise..........48 AUTO DESCRIPTION ....49 Introduction ....49 Features..........49 Overview of Control System..........52 Control Operation ....53 TROUBLE DIAGNOSES ....55 Component Location..........55 Circuit Diagram ....57 Wiring Diagram — A/C, A — ....58 Auto Amp. Terminals and Reference Value..........61 Self-diagnosis ....63 How to Perform Trouble Diagnoses for Quick and Accurate Repair ....69 Operational Check ....70 A/C System..........73 Mode Door Motor..........75 Air Mix Door Motor ....79 Intake Door Motor..........82 Blower Motor..........86 Magnet Clutch..........92 Insufficient Cooling ....98 Insufficient Heating ....99 Noise..........100 Self-diagnosis ....101 Memory Function ....102 Ambient Sensor ....103 In-vehicle Sensor ....105 Sunload Sensor ....107 Intake Sensor..........110 HA MANUAL AND AUTO SERVICE PROCEDURES ....112 HFC-134a (R-134a) Service Procedure ....112 Maintenance of Lubricant Quantity in Compressor ....114 Ventilation Air Filter..........116 Refrigerant Lines ....117 Checking Refrigerant Leaks ....119 Compressor Mounting ....122 Compressor — DKS-17CH..........123 Compressor Clutch ....123 SERVICE DATA AND SPECIFICATIONS ....126 General Specifications..........126 Inspection and Adjustment 126
When you read wiring diagrams: + Read GI section, ''HOW TO READ WIRING DIAGRAMS''. + See EL section, ''POWER SUPPLY ROUTING'' for power distribution circuit. When you perform trouble diagnoses, read GI section, ''HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES'' and ''HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT''. PRECAUTIONS AND PREPARATION MANUAL AND AUTO Supplemental Restraint System (SRS) ''AIR BAG'' and ''SEAT BELT PRE-TENSIONER'' The Supplemental Restraint System such as ''AIR BAG'' and ''SEAT BELT PRE-TENSIONER'' used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The SRS system composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination.): Driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioner, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the RS section of this Service Manual. WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation either just before the harness connectors or for the complete harness are related to the SRS. Precautions for Working with HFC-134a (R-134a) WARNING: + CFC-12 (R-12) refrigerant and HFC-134a (R-134a) refrigerant are not compatible. These refrigerants must never be mixed, even in the smallest amounts. If the refrigerants are mixed, compressor failure is likely to occur. + Use only specified lubricant for the HFC-134a (R-134a) A/C system and HFC-134a (R-134a) components. If lubricant other than that specified is used, compressor failure is likely to occur. + The specified HFC-134a (R-134a) lubricant rapidly absorbs moisture from the atmosphere. The following handling precautions must be observed: a: When removing refrigerant components from a vehicle, immediately cap (seal) the component to minimize the entry of moisture from the atmosphere. b: When installing refrigerant components to a vehicle, do not remove the caps (unseal) until just before connecting the components. Connect all refrigerant loop components as quickly as possible to minimize the entry of moisture into system. c: Only use the specified lubricant from a sealed container. Immediately reseal containers of lubricant. Without proper sealing, lubricant will become moisture saturated and should not be used. d: Avoid breathing A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat. Use only approved recovery/recycling equipment to discharge HFC-134a (R-134a) refrigerant.

If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers. e: Do not allow lubricant (Nissan A/C System Oil Type S) to come in contact with styrofoam parts. Damage may result. HA-1 PRECAUTIONS AND PREPARATION MANUAL AND AUTO General Refrigerant Precautions WARNING: + Do not release refrigerant into the air. Use approved recovery/recycling equipment to capture the refrigerant every time an air conditioning system is discharged. + Always wear eye and hand protection (goggles and gloves) when working with any refrigerant or air conditioning system. + Do not store or heat refrigerant containers above 52°C. + Do not heat a refrigerant container with an open flame; if container warming is required, place the bottom of the container in a warm pail of water. + Do not intentionally drop, puncture, or incinerate refrigerant containers. + Keep refrigerant away from open flames: poisonous gas will be produced if refrigerant burns. + Refrigerant will displace oxygen, therefore be certain to work in well ventilated areas to prevent suffocation. + Do not introduce compressed air to any refrigerant container or refrigerant component. Precautions for Refrigerant Connection A new type refrigerant connection has been introduced to all refrigerant lines except the following location. + Expansion valve to cooling unit + A part of high-pressure line FEATURES OF NEW TYPE REFRIGERANT CONNECTION + + The O-ring has been relocated. It has also been provided with a groove for proper installation. This eliminates the chance of the O-ring being caught in, or damaged by, the mating part. The sealing direction of the O-ring is now set vertically in relation to the contacting surface of the mating part to improve sealing characteristics. The reaction force of the O-ring will not occur in the direction that causes the joint to pull out, thereby facilitating piping connections. SHA815E CAUTION: The new and former refrigerant connections use different O-ring configurations. Do not confuse O-rings since they are not interchangeable. If a wrong O-ring is installed, refrigerant will leak at, or around, the connection. HA-2 MANUAL AND AUTO PRECAUTIONS AND PREPARATION Precautions for Refrigerant Connection (Cont'd) O-ring part numbers and specifications Connection type O-ring size New Former New Former SHA814E New Former New Former HA-3 8 12 16 19 Part number D mm (in) W mm (in) 92471 N8210 6.8 (0.268) 1.85 (0.0728) 92470 N8200 6.07 (0.2390) 1.78 (0.0701) 92472 N8210 10.9 (0.429) 2.43 (0.0957) 92475 71L00 11.0 (0.433) 2.4 (0.094) 92473 N8210 13.6 (0.535) 2.43 (0.0957) 92475 72L00 14.3 (0.563) 2.3 (0.091) 92474 N8210 16.5 (0.650) 2.43 (0.0957) 92477 N8200 17.12 (0.6740) 1.78 (0.0701) MANUAL AND AUTO PRECAUTIONS AND PREPARATION Precautions for Refrigerant Connection (Cont'd) O-RING AND REFRIGERANT CONNECTION LHD models SHA029F HA-4 MANUAL AND AUTO PRECAUTIONS AND PREPARATION Precautions for Refrigerant Connection (Cont'd) WARNING: Make sure all refrigerant is discharged into the recycling equipment and the pressure in the system is less than atmospheric pressure.

Then gradually loosen the discharge side hose fitting and remove it. CAUTION: When replacing or cleaning refrigerant cycle components, observe the following. + When the compressor is removed, store it in the same position as it is when mounted on the car. Failure to do so will cause lubricant to enter the low pressure chamber.

+ When connecting tubes, always use a torque wrench and a back-up wrench. + After disconnecting tubes, immediately plug all openings to prevent entry of dirt and moisture.

+ When installing an air conditioner in the vehicle, connect the pipes as the final stage of the operation. Do not remove the seal caps of pipes and other components until just before required for connection. + Allow components stored in cool areas to warm to working area temperature before removing seal caps. This prevents condensation from forming inside A/C components. + Thoroughly remove moisture from the refrigeration system before charging the refrigerant. + Always replace used O-rings. + When connecting tube, apply lubricant to portions shown in illustration. Be careful not to apply lubricant to threaded portion. Lubricant name: Nissan A/C System Oil Type S Part number: KLH00-PAGS0 + O-ring must be closely attached to inflated portion of tube. + After inserting tube into union until O-ring is no longer visible, tighten nut to specified torque. + After connecting line, conduct leak test and make sure that there is no leakage from connections. When the gas leaking point is found, disconnect that line and replace the O-ring. Then tighten connections of seal seat to the specified torque. RHA861F HA-5 PRECAUTIONS AND PREPARATION MANUAL AND AUTO Precautions for Servicing Compressor + + + + + + Plug all openings to prevent moisture and foreign matter from entering. When the compressor is removed, store it in the same position as it is when mounted on the car. When replacing or repairing compressor, follow ''Maintenance of Lubricant Quantity in Compressor'' exactly. Refer to HA-114. Keep friction surfaces between clutch and pulley clean. If the surface is contaminated, with lubricant, wipe it off by using a clean waste cloth moistened with thinner. After compressor service operation, turn the compressor shaft by hand more than five turns in both directions. This will equally distribute lubricant inside the compressor. After the compressor is installed, let the engine idle and operate the compressor for one hour. After replacing the compressor magnet clutch, apply voltage to the new one and check for normal operation. Special Service Tools Tool number Tool name Description KV99231260 Clutch disc wrench Removing shaft nut and clutch disc NT204 KV992T0001 Clutch disc puller Removing clutch disc NT206 KV992T0002 Pulley installer Installing pulley NT207 HA-6 PRECAUTIONS AND PREPARATION MANUAL AND AUTO HFC-134a (R-134a) Service Tools and Equipment Never mix HFC-134a refrigerant and/or its specified lubricant with CFC-12 (R-12) refrigerant and/or its lubricant.

Separate and non-interchangeable service equipment must be used for each type of refrigerant/lubricant. Refrigerant container fittings, service hose fittings and service equipment fittings (equipment which handles refrigerant and/or lubricant) are different between CFC-12 (R-12) and HFC-134a (R-134a). This is to avoid mixed use of the refrigerants/lubricant.

Adapters that convert one size fitting to another must never be used: refrigerant/lubricant contamination will occur and compressor failure will result. Tool name Description Note HFC-134a (R-134a) refrigerant Container color: Light blue Container marking: HFC-134a (R-134a) Fitting size: Thread size + large container 1/2″-16 ACME NT196 Nissan A/C System Oil Type S Type: Poly alkylene glycol oil (PAG), type S Application: HFC-134a (R-134a) swash plate (piston) compressors (Nissan only) Lubricity: 40 m! (1.4 Imp fl oz) NT197 Recovery/Recycling/ Recharging equipment Function: Refrigerant Recovery and Recycling and Recharging NT195 Electrical leak detector Power supply: + DC 12V (Cigarette lighter) NT198 Manifold gauge set (with hoses and couplers) Identification: + The gauge face indicates R-134a. Fitting size: Thread size + 1/2″-16 ACME NT199 HA-7 MANUAL AND AUTO PRECAUTIONS AND PREPARATION HFC-134a (R-134a) Service Tools and Equipment (Cont'd) Tool name Description Note Hose color: + Low hose: Blue with black stripe + High hose: Red with black stripe + Utility hose: Yellow with black stripe or green with black stripe Hose fitting to gauge: + 1/2″-16 ACME Service hoses + High side hose + Low side hose + Utility hose NT201 Service couplers + High side coupler + Low side coupler Hose fitting to service hose: + M14 x 1.5 fitting is optional or permanently attached. NT202 Refrigerant weight scale For measuring of refrigerant Fitting size: Thread size + 1/2″-16 ACME NT200 Vacuum pump (Including the isolator valve) Capacity: + Air displacement: 4 CFM + Micron rating: 20 microns + Oil capacity: 482 g (17 oz) Fitting size: Thread size + 1/2″-16 ACME NT203 HA-8 PRECAUTIONS AND PREPARATION MANUAL AND AUTO Precautions for Service Equipment RECOVERY/RECYCLING EQUIPMENT Follow the manufacturer's instructions for machine operation and machine maintenance. Never introduce any refrigerant other than that specified into the machine. ELECTRONIC LEAK DETECTOR Follow the manufacture's instructions for tester operation and tester maintenance. VACUUM PUMP The lubricant contained inside the vacuum pump is not compatible with the specified lubricant for HFC-134a (R-134a) A/C systems. The vent side of the vacuum pump is exposed to atmospheric pressure. So the vacuum pump lubricant may migrate out of the pump into the service hose. This is possible when the pump is switched off after evacuation (vacuuming) and hose is connected to it. To prevent this migration, use a manual valve situated near the hose-to-pump connection, as follows. + Usually vacuum pumps have a manual isolator valve as part of the pump. Close this valve to isolate the service hose from the pump.

+ For pumps without an isolator, use a hose equipped with a manual shut-off valve near the pump end.

Close the valve to isolate the hose from the pump. + If the hose has an automatic shut off valve, disconnect the hose from the pump: as long as the hose is connected, the valve is open and lubricating oil may migrate. Some one-way valves open when vacuum is applied and close under a no vacuum condition. Such valves may restrict the pump's ability to pull a deep vacuum and are not recommended.

RHA270D MANIFOLD GAUGE SET Be certain that the gauge face indicates R-134a or 134a. Make sure the gauge set has 1/2″-16 ACME threaded connections for service hoses. Confirm the set has been used only with refrigerant HFC-134a (R-134a) along with specified lubricant.

SHA533D SERVICE HOSES Be certain that the service hoses display the markings described (colored hose with black stripe).

All hoses must include positive shut off devices (either manual or automatic) near the end of the hoses opposite the manifold gauge.

RHA272D HA-9 MANUAL AND AUTO PRECAUTIONS AND PREPARATION Precautions for Service Equipment (Cont'd) SERVICE COUPLERS Never attempt to connect HFC-134a (R-134a) service couplers to an CFC-12 (R-12) A/C system. The HFC-134a (R-134a) couplers will not properly connect to the CFC-12 (R-12) system. However, if an improper connection is attempted, discharging and contamination may occur.

Shut-off valve rotation A/C service valve Clockwise Open Counterclockwise Close RHA273D REFRIGERANT WEIGHT SCALE Verify that no refrigerant other than HFC-134a (R-134a) and specified lubricants have been used with the scale. If the scale controls refrigerant flow electronically, the hose fitting must be 1/2″-16 ACME. RHA274D CHARGING CYLINDER Using a charging cylinder is not recommended. Refrigerant may be vented into air from cylinder's top valve when filling the cylinder with refrigerant. Also, the accuracy of the cylinder is generally less than that of an electronic scale or of quality recycle/recharge equipment. HA-10 DESCRIPTION MANUAL AND AUTO Refrigeration Cycle REFRIGERANT FLOW The refrigerant flow is in the standard pattern. Refrigerant flows through the compressor, condenser, liquid tank, evaporator and back to the compressor. The refrigerant evaporation through the evaporator coil is controlled by an externally equalized expansion valve, located inside the evaporator case. FREEZE PROTECTION The compressor cycles on and off to maintain the evaporator temperature within a specified range. When the evaporator coil temperature falls below a specified point, the thermo control amplifier interrupts the compressor operation. When the evaporator coil temperature rises above the specification, the thermo control amplifier allows compressor operation. REFRIGERANT SYSTEM PROTECTION Dual-pressure switch The dual-pressure switch is located on the liquid tank. If the system pressure rises or falls out of specifications, the switch opens to interrupt compressor clutch operation. RHA735G HA-11 DESCRIPTION MANUAL AND AUTO Component Layout RHA699G HA-12 DESCRIPTION MANUAL AND AUTO Discharge Air Flow RHA700G HA-13 TROUBLE DIAGNOSES REAR HEATER Wiring Diagram — R/HEAT —/LHD Models THA165 HA-14 TROUBLE DIAGNOSES REAR HEATER Wiring Diagram — R/HEAT —/RHD Models THA166 HA-15 MANUAL DESCRIPTION System Description SWITCH AND THEIR CONTROL FUNCTIONS Knob/Switch position Knob/Switch Air outlet Intake air Compressor — — ON* VENT — — B/L — — FOOT — — D/F FRE — DEF FRE ON* — — — A/C A/C j j j Mode j j j j *: Compressor is operated by dual-pressure switch. Control Operation RHA582G FAN CONTROL KNOB This knob turns the fan ON and OFF, and controls fan speed. MODE CONTROL KNOB This knob controls the outlet air flow.

TEMPERATURE CONTROL KNOB This knob allows adjustment of the temperature of the outlet air. RECIRCULATION (REC) SWITCH OFF position: Outside air is drawn into the passenger compartment. ON position: Interior air is recirculated inside the vehicle. The indicator lamp will also light. AIR CONDITIONER SWITCH The air conditioner switch controls the A/C system. When the switch is depressed with the fan ON, the compressor will turn ON. The indicator lamp will also light. The air conditioner cooling function operates only when the engine is running. HA-16 TROUBLE DIAGNOSES MANUAL Component Location ENGINE COMPARTMENT RHA641G HA-17 TROUBLE DIAGNOSES Component Location (Cont'd) MANUAL PASSENGER COMPARTMENT SHA063F HA-18 TROUBLE DIAGNOSES MANUAL Wiring Diagram — A/C, M — YHA157 HA-19 TROUBLE DIAGNOSES Wiring Diagram — A/C, M — (Cont'd) MANUAL YHA158 HA-20 MANUAL TROUBLE DIAGNOSES How to Perform Trouble Diagnoses for Quick and Accurate Repair WORK FLOW SHA900E *1: HA-22 SYMPTOM TABLE Symptom Reference page + Intake door does not change.

+ Go to Trouble Diagnosis Procedure for Intake Door Motor Circuit. HA-24 + Blower motor does not rotate at all. + Go to Trouble Diagnosis Procedure for Blower Motor Circuit. HA-28 + Insufficient cooling. + Go to Trouble Diagnosis Procedure for Insufficient Cooling. HA-32 + Insufficient heating. + Go to Trouble Diagnosis Procedure for Insufficient Heating. HA-32 + Air outlet does not change. + Go to Trouble Diagnosis Procedure for Air Outlet. HA-41 + Magnet clutch does not engage when A/C switch and fan switch are ON. + Go to Trouble Diagnosis Procedure for Magnet Clutch Circuit. HA-43 + Noise + Go to Trouble Diagnosis Procedure for Noise. HA-48 HA-21 TROUBLE DIAGNOSES MANUAL Operational Check The purpose of the operational check is to confirm that the system operates properly.

CONDITIONS Engine running at normal operating temperature. PROCEDURE 1. Check blower a. Turn fan control knob to 1-speed. Blower should operate on 1-speed. b. Then turn fan control knob to 2-speed. c. Continue checking blower speed until all four speeds are checked. d. Leave blower on 4-speed. RHA583G 2. Check discharge air a. Turn

mode control knob. RHA584G b. Confirm that discharge air comes out according to the air distribution table at left. Refer to ‘‘Discharge Air Flow’’ in ‘‘DESCRIPTION’’ (HA-13).

RHA654F HA-22 TROUBLE DIAGNOSES Operational Check (Cont’d) MANUAL 3. Check recirculation a.

Press recirculation switch. Recirculation indicator should light. b. Listen for intake door position change (you should hear blower sound change slightly). RHA585G 4. Check temperature decrease a. Turn temperature control knob to full cold. b. Check for cold air at discharge air outlets.

RHA586G 5. Check temperature increase a.

Turn temperature control knob to full hot. b. Check for hot air at discharge air outlets. RHA587G 6. Check air conditioner switch Turn fan control knob to the desired (1 to 4-speed) position and push the air conditioner switch to turn ON the air conditioner. The indicator light should come on when air conditioner is ON. RHA588G HA-23 MANUAL TROUBLE DIAGNOSES Intake Door Motor TROUBLE DIAGNOSIS PROCEDURE FOR INTAKE DOOR SYMPTOM: + Intake door does not change. Inspection flow RHA592G *1: HA-26 *2: HA-22 *3: HA-21 HA-24 TROUBLE DIAGNOSES Intake Door Motor (Cont’d) MANUAL SYSTEM DESCRIPTION Intake door motor RHA589G The intake door motor is installed on the intake unit. Using a link it opens and closes the intake door. When RECIRCULATION switch is at REC, the ground line of the motor is switched from terminal j 14 to j 13 .

This starts the motor because the position switch contacts built into it make current flow. When RECIRCULATION switch is at FRE, the ground line is switched from terminal j 13 to j 14 . The contacts turn along with the motor. When they reach the non-current flow position, the motor will stop. The motor always turns in the same direction. HA-25 MANUAL TROUBLE DIAGNOSES Intake Door Motor (Cont’d) DIAGNOSTIC PROCEDURE SYMPTOM: Intake door does not change. RHA350FB CHECK POWER SUPPLY FOR INTAKE DOOR MOTOR. Disconnect intake door motor harness connector. Do approx. 12 volts exist between intake door motor harness terminal No. j 1 and body ground? No c Check 10A (No.) fuse at fuse block. (Refer to ‘‘POWER SUPPLY ROUTING’’ in EL section and Wiring Diagram.) Yes . CHECK GROUND CIRCUIT FOR INTAKE DOOR MOTOR.

Check continuity between intake door motor harness terminal and body ground. Recirculation switch condition Terminal j 14 FRE j 13 REC Body ground Continuity should exist. OK NG c Disconnect recirculation switch harness connector. Note . Check continuity between recirculation switch harness terminal No. j 1 (j 2) and intake door motor harness terminal No. j 13 (j 14). Continuity should exist.

If OK, check harness for short. OK . CHECK INTAKE DOOR LINKAGE. Refer to Control Linkage Adjustment. (HA27) OK RHA590G . Replace intake door motor. . j A Note: If the result is NG or No after checking circuit continuity, repair harness or connector.

RHA591G HA-26 MANUAL TROUBLE DIAGNOSES Intake Door Motor (Cont’d) j A Note . CHECK GROUND CIRCUIT FOR RECIRCULATION SWITCH.

Check circuit continuity between recirculation switch harness terminal No. j 4 and body ground. Continuity should exist. If OK, check harness for short. OK . RHA582FB CHECK RECIRCULATION SWITCH. (Refer to Electrical Components Inspection.) (HA-27) NG c Replace recirculation switch. Note: If the result is NG or No after checking circuit continuity, repair harness or connector.

ELECTRICAL COMPONENTS INSPECTION Recirculation switch Check continuity between terminals at each switch position. Terminal No. RHA768F (+) (−) j 1 j 4 j 2 Recirculation switch condition Continuity REC Yes FRE No REC No FRE Yes j 4 CONTROL LINKAGE ADJUSTMENT Intake door motor 1.

Install intake door motor on intake unit. Ensure that the intake door motor lever is fitted into the slit portion of intake door link. 2. Connect the intake door motor harness connector. 3. Turn ignition switch to ON. 4. Check that intake door operates properly when RECIRCULATION switch is turned ON and OFF. RHA593F HA-27 MANUAL TROUBLE DIAGNOSES Blower Motor TROUBLE DIAGNOSIS PROCEDURE FOR BLOWER MOTOR SYMPTOM: + Blower motor does not rotate at all. Inspection flow RHA593G *1: HA-31 *2: HA-22 *3: HA-21 HA-28 MANUAL TROUBLE DIAGNOSES Blower Motor (Cont’d) INCIDENT 1 Fan fails to rotate. 2 Fan does not rotate at 1-speed. 3 Fan does not rotate at 2-speed. 4 Fan does not rotate at 3-speed. 5 Fan does not rotate at 4-speed.

Flow chart No. DIAGNOSTIC PROCEDURE SYMPTOM: Blower motor does not rotate.

+ Perform PRELIMINARY CHECK 1 before referring to the following flow chart. cj E Check if blower motor rotates properly at each fan speed. Conduct checks as per flow chart at left. cj D cj C cj B (Go to next page.) . CHECK POWER SUPPLY FOR BLOWER MOTOR. Disconnect blower motor harness connector. Do approx. 12 volts exist between blower motor harness terminal No. j 2 and body ground? No c Check 15A (No. and No.) fuses at fuse block. (Refer to ‘‘POWER SUPPLY ROUTING’’ in EL section and Wiring Diagram.) Yes . RHA596G NG Reconnect blower motor 1. Turn fan control knob to any position c harness connector. except OFF. 2. Check circuit continuity between blower motor harness terminal No. j 1 and body ground. Continuity should exist. OK . CHECK BLOWER MOTOR.

(Refer to Electrical Components Inspection.) (HA-31) NG . Replace blower motor. RHA597G . No Disconnect blower motor CHECK BLOWER MOTOR CIRCUIT c and resistor harness conBETWEEN BLOWER MOTOR AND nectors. RESISTOR. Do approx. 12 volts exist between resistor harness terminal No. j 4 and body ground? . Yes Disconnect fan switch harness connector. . Note Check circuit continuity between blower motor harness terminal No. j 1 and resistor harness terminal No. j 4 . Continuity should exist. If OK, check harness for short.

RHA598G . j A (Go to next page.) Note: If the result is NG or No after checking circuit continuity, repair harness or connector. RHA599G HA-29 MANUAL TROUBLE DIAGNOSES Blower Motor (Cont’d) j A Note . CHECK GROUND CIRCUIT FOR FAN SWITCH. Check circuit continuity between fan switch harness terminal No. j 5 and body ground. OK . RHA600G CHECK RESISTOR AFTER DISCONNECTING IT. (Refer to Electrical Components Inspection.) (HA-31) OK b j B b j C b j D NG . j E Replace resistor. . Reconnect resistor harness connector. . RHA601G . . . CHECK FAN SWITCH CIRCUIT. Do approx. 12 volts exist between each fan switch harness terminal and body ground? Flow chart No. Terminal No. ⊕ Voltage @ j 1 j 2 Body ground Approx. 12V j 3 j 4 Yes RHA602G No Note .

Check circuit continuity between fan switch harness terminal and resistor harness terminal. Terminal No. Fan switch Resistor j 4 j 4 j 3 j 3 j 2 j 2 j 1 j 1 Continuity Yes If OK, check harness for short. . . CHECK FAN SWITCH AFTER DISCONNECTING IT. (Refer to Electrical Components Inspection.) (HA-31) NG c Replace fan switch. Note: If the result is NG or No after checking circuit continuity, repair harness or connector. HA-30 MANUAL TROUBLE DIAGNOSES Blower Motor (Cont’d) ELECTRICAL COMPONENTS INSPECTION Fan switch Check continuity between terminals at each switch position. KNOB POSITION Continuity between terminals OFF 1 j 1 —j 6 —j 5 2 j 2 —j 6 —j 5 3 j 3 —j 6 —j 5 4 j 4 —j 6 —j 5 RHA594G Blower motor Confirm smooth rotation of the blower motor. + Ensure that there are no foreign particles inside the intake unit. Blower resistor Check resistance between terminals. Terminal No. Resistance (+) (−) Approx. 1.4 - 1.6Ω j 2 j 1 j 3 RHA595G HA-31 j 4 Approx. 2.5 - 2.8Ω Approx. 0.5 - 0.6Ω MANUAL TROUBLE DIAGNOSES Insufficient Cooling TROUBLE DIAGNOSIS PROCEDURE FOR INSUFFICIENT COOLING SYMPTOM: + Insufficient cooling. Inspection flow RHA603G *1: HA-40 *2: HA-35 *3: HA-33 *4: HA-22 *5: HA-21 *6: HA-0 *7: HA-47 HA-32 TROUBLE DIAGNOSES Insufficient Cooling (Cont’d) MANUAL PERFORMANCE TEST DIAGNOSES MHA649A *1: HA-35 *2: HA-35 *3: HA-36 HA-33 TROUBLE DIAGNOSES Insufficient Cooling (Cont’d) MANUAL MHA650A HA-34 MANUAL TROUBLE DIAGNOSES Insufficient Cooling (Cont’d) PERFORMANCE CHART Test condition Testing must be performed as follows: Vehicle location: Indoors or in the shade (in a well-ventilated place) Doors: Closed Door window: Open Hood: Open TEMP.: Max. COLD Discharge Air: Face Vent REC switch: (Recirculation) set FAN speed: High speed Engine speed: Idle speed Operate the air conditioning system to 10 minutes before taking measurements. Rear cooler: ON (For rear cooler equipped model only) Test reading (Single A/C equipped model) Recirculating-to-discharge air temperature table Inside air (Recirculating air) at blower assembly inlet Discharge air temperature at center ventilator °C (°F) Relative humidity % Air temperature °C (°F) 25 (77) 8.0 - 10.0 (46 - 50) 30 (86) 12.0 - 15.0 (54 - 59) 35 (95) 16.0 - 20.0 (61 - 68) 40 (104) 20.5 - 24.5 (69 - 76) 25 (77) 10.4 - 13.0 (51 - 55) 30 (86) 15.0 - 18.0 (59 - 64) 35 (95) 19.5 - 23.4 (67 - 74) 40 (104) 24.5 - 28.5 (76 - 83) 50 - 60 60 - 70 Ambient air temperature-to-operating pressure table Ambient air Relative humidity % High-pressure (Discharge side) kPa (bar, kg/cm2, psi) Low-pressure (Suction side) kPa (bar, kg/cm2, psi) 25 (77) 1,373 - 1,471 (13.73 - 14.71, 14.0 - 15.0, 199 - 213) 196 - 245 (1.96 - 2.45, 2.0 - 2.5, 28 - 36) 30 (86) 1,275 - 1,520 (12.75 - 15.20, 13.0 - 15.5, 185 - 220) 226 - 284 (2.26 - 2.84, 2.3 - 2.9, 33 - 41) 35 (95) 1,412 - 1,716 (14.12 - 17.16, 14.4 - 17.5, 205 - 249) 255 - 314 (2.55 - 3.14, 2.6 - 3.2, 37 - 46) 40 (104) 1,608 - 1,932 (16.08 - 19.32, 16.4 - 19.7, 233 - 280) 294 - 353 (2.94 - 3.53, 3.0 - 3.6, 43 - 51) Air temperature °C (°F) 50 - 70 HA-35 TROUBLE DIAGNOSES MANUAL Trouble Diagnoses for Abnormal Pressure Whenever system’s high or low-pressure side is abnormal, diagnose using a manifold gauge. The marker above the gauge scale in the following table indicates the standard (normal) pressure range. Since the standard (normal) pressure differs from vehicle to vehicle, refer to HA-35 (‘‘Ambient air temperature-to-operating pressure table’’). Gauge indication Refrigerant cycle Both high and low-pressure sides are too high. Probable cause + Pressure is reduced soon after water is splashed on condenser. Excessive refrigerant charge in refrigeration cycle.

Air suction by cooling fan is insufficient.

Insufficient condenser cooling performance. ↓ j 1 Condenser fins are clogged. j 2 Improper fan rotation of cooling fan. + Low-pressure pipe is not Poor heat exchange in concold.

denser. + When compressor is stopped (After compressor operation high-pressure value quickly stops, high pressure decreases drops by approximately 196 too slowly.) 2 kPa (2.0 bar, 2 kg/cm ↓ , 28 AC359A psi). It then decreases gradu- Air in refrigeration cycle. ally thereafter. Engine tends to overheat.

Engine cooling systems malfunction. + An area of the low-pressure + Excessive liquid refrigerant on low-pressure side. pipe is colder than areas + Excessive refrigerant disnear the evaporator outlet. charge flow.

+ Plates are sometimes cov+ Expansion valve is open a ered with frost. little compared with the specification. ↓ j 1 Improper thermal valve installation. j 2 Improper expansion valve adjustment.

High-pressure side is too high High-pressure tube or parts Upper side of condenser and and low-pressure side is too located between compressor high-pressure side are hot, low. and condenser are clogged or however, liquid tank is not so crushed. hot. AC360A HA-36 Corrective action Reduce refrigerant until specified pressure is obtained. + Clean condenser. + Check and repair cooling fan as necessary. Evacuate repeatedly and recharge system. Check and repair each engine cooling system. Replace expansion valve. + Check and repair or replace malfunctioning parts. + Check lubricant for contamination. MANUAL TROUBLE DIAGNOSES Trouble Diagnoses for Abnormal Pressure (Cont’d) Gauge indication Refrigerant cycle High-pressure side is too low and low-pressure side is too high. Probable cause High and low-pressure sides become equal soon after compressor operation stops. Corrective action Compressor pressure operation Replace compressor. is improper. ↓ Damaged inside compressor packings. No temperature difference Compressor pressure operation Replace compressor. between high and low-pressure is improper. sides. ↓ Damaged inside compressor packings. AC356A Both high and low-pressure sides are too low. + There is a big temperature difference between receiver drier outlet and inlet. Outlet temperature is extremely low. + Liquid tank inlet and expansion valve are frosted.

+ Temperature of expansion valve inlet is extremely low as compared with areas near liquid tank. + Expansion valve inlet may be frosted. + Temperature difference occurs somewhere in highpressure side.

AC353A + Expansion valve and liquid tank are warm or only cool when touched. There is a big temperature difference between expansion valve inlet and outlet while the valve itself is frosted. An area of the low-pressure pipe is colder than areas near the evaporator outlet. Air flow volume is not enough or is too low. Liquid tank inside is clogged a little. + Replace liquid tank. + Check lubricant for contamination. + Check and repair malfuncHigh-pressure pipe located tioning parts. between liquid tank and expan+ Check lubricant for contamision valve is clogged. nation. Low refrigerant charge. ↓ Leaking fittings or components. Expansion valve closes a little compared with the specification. ↓ j 1 Improper expansion valve adjustment. j 2 Malfunctioning thermal valve. j 3 Outlet and inlet may be clogged. Low-pressure pipe is clogged or crushed. Check refrigerant for leaks. Refer to ‘‘Checking Refrigerant Leaks’’, HA-119. + Remove foreign particles by using compressed air. + Check lubricant for contamination. + Check and repair malfunctioning parts. + Check lubricant for contamination. Compressor pressure operation Replace compressor.

is improper. HA-37 MANUAL TROUBLE DIAGNOSES Trouble Diagnoses for Abnormal Pressure (Cont’d) Gauge indication Refrigerant cycle Low-pressure side sometimes becomes negative.

Probable cause Corrective action + Air conditioner system does not function and does not cyclically cool the compartment air. + The system constantly functions for a certain period of time after compressor is stopped and restarted. Refrigerant does not discharge + Drain water from refrigerant or replace refrigerant. cyclically.

+ Replace liquid tank.

↓ Moisture is frozen at expansion valve outlet and inlet. ↓ Water is mixed with refrigerant. Liquid tank or front/rear side of expansion valve’s pipe is frosted or dewed. High-pressure side is closed and refrigerant does not flow. ↓ Expansion valve or liquid tank is frosted. AC354A Low-pressure side becomes negative. AC362A HA-38 Leave the system at rest. Start it again to check whether or not the problem is caused by water or foreign particles. + If water is the cause, initially cooling is okay. Then the water freezes, causing a blockage. Drain water from refrigerant or replace refrigerant. + If due to foreign particles, remove expansion valve and remove the particles with dry and compressed air. + If either of the above methods cannot correct the problem, replace expansion valve. + Replace liquid tank. + Check lubricant for contamination.

MANUAL TROUBLE DIAGNOSES Insufficient Heating TROUBLE DIAGNOSIS PROCEDURE FOR INSUFFICIENT HEATING SYMPTOM: + Insufficient heating. Inspection flow RHA604G *1: HA-40 *2: HA-40 *3: HA-22 *4: HA-21 HA-39 TROUBLE DIAGNOSES Insufficient Heating (Cont’d) MANUAL CONTROL LINKAGE ADJUSTMENT Water cock control rod When adjusting water cock control rod, first disconnect temperature control cable from air mix door lever and then adjust control rod.

Reconnect temperature control cable and readjust it. (Refer to TEMPERATURE CONTROL CABLE.) 1. Push air mix door lever in direction of arrow. 2.

Pull control rod of water cock in direction of arrow so as to make clearance of about 2 mm (0.08 in) between ends of rod and link lever and connect the rod to door lever. After connecting control rod, check it operates properly. + SHA522E Temperature control cable 1. Move the temperature control knob to the full hot position. 2. Set the air mix door lever in the full hot position. 3. Pull on the cable cover in the direction of the arrow, then clamp it. After positioning control cable, check that it operates properly. RHA632EA HA-40 MANUAL TROUBLE DIAGNOSES Air Outlet TROUBLE DIAGNOSIS PROCEDURE FOR AIR OUTLET SYMPTOM: + Air does not change. Inspection flow RHA605G *1: HA-42 *2: HA-22 *3: HA-21 *4: HA-13 HA-41 TROUBLE DIAGNOSES Air Outlet (Cont’d) MANUAL CONTROL LINKAGE ADJUSTMENT Mode control cable 1. Turn the mode control knob to the DEF position. 2. Set the side link in the DEF position by hand. 3. Pull on the cable cover in the direction of the arrow, then clamp it. After positioning control cable, check that it operates properly.

RHA630EA HA-42 MANUAL TROUBLE DIAGNOSES Magnet Clutch TROUBLE DIAGNOSIS PROCEDURE FOR MAGNET CLUTCH SYMPTOM: + Magnet clutch does not operate when A/C switch and fan switch are ON. Inspection flow RHA606G *1: HA-119 *2: HA-44 *3: HA-22 *4: HA-21 HA-43 MANUAL TROUBLE DIAGNOSES Magnet Clutch (Cont’d) DIAGNOSTIC PROCEDURE SYMPTOM: Magnet clutch does not engage when A/C switch and fan switch are ON. Yes CHECK POWER SUPPLY FOR COMPRESSOR. Disconnect compressor harness connector. Do approx. 12 volts exist between compressor harness terminal No. j 1 and body ground? RHA747FE . c Check magnet clutch coil. NG . Replace magnet clutch. Refer to HA-123. No Disconnect A/C relay. Note . CHECK CIRCUIT CONTINUITY BETWEEN A/C RELAY HARNESS TERMINAL NO. j 7 AND COMPRESSOR HARNESS TERMINAL NO. j 1 . Continuity should exist. If OK, check harness for short. OK RHA607GA . CHECK POWER SUPPLY FOR A/C RELAY. Disconnect A/C relay. Do approx. 12 volts exist between A/C relay harness terminal Nos. j 1 ,j 6 and body ground? No c Yes . NG CHECK A/C RELAY AFTER DISCONNECTING IT. Refer to HA-47. . RHA608G CHECK POWER SUPPLY CIRCUIT AND 10A (No.) FUSES AT FUSE BLOCK. Refer to EL section (‘‘Wiring Diagram’’, ‘‘POWER SUPPLY ROUTING’’). c Replace A/C relay. OK j A (Go to next page.) Note: If the result is NG or No after checking circuit continuity, repair harness or connector. HA-44 MANUAL TROUBLE DIAGNOSES Magnet Clutch (Cont’d) j A . Reconnect A/C relay. . CHECK COIL SIDE CIRCUIT OF A/C RELAY.

Do approx. 12 volts exist between ECM (ECCS control module) harness terminal No. j 9 and body ground? No c Yes RHA749FA Disconnect A/C relay. Disconnect ECM (ECCS control module) harness connector. Note . CHECK CIRCUIT CONTINUITY BETWEEN A/C RELAY HARNESS TERMINAL NO. j 2 AND ECM (ECCS CONTROL MODULE) HARNESS TERMINAL NO. j 9 . Continuity should exist. If OK, check harness for short. . RHA609G CHECK VOLTAGE FOR ECM (ECCS control module). Do approx. 12 volts exist between ECM (ECCS control module) harness terminal No. j 46 and body ground? . No c CHECK ECM (ECCS control module). Refer to EC section. Yes Disconnect ECM (ECCS control module) harness connector. Disconnect dual-pressure switch harness connector. Note . RHA610G CHECK CIRCUIT CONTINUITY BETWEEN ECM (ECCS CONTROL MODULE) HARNESS TERMINAL NO. j 46 AND DUAL-PRESSURE SWITCH HARNESS TERMINAL NO. j 2 . Continuity should exist. If OK, check harness for short. . OK NG CHECK DUAL-PRESSURE SWITCH. Refer to HA-47. . c OK Check refrigerant charge amount. . Disconnect thermo control amp. switch harness connector. OK Replace dual-pressure switch. RHA611G Note . CHECK CIRCUIT CONTINUITY BETWEEN DUAL-PRESSURE SWITCH HARNESS TERMINAL NO. j 1 AND THERMO CONTROL AMP. HARNESS TERMINAL NO. j 3 . Continuity should exist. If OK, check harness for short. . RHA612G OK j B Note: If the result is NG or No after checking circuit continuity, repair harness or connector. HA-45 MANUAL TROUBLE DIAGNOSES Magnet Clutch (Cont’d) j B . RHA615G CHECK POWER SUPPLY CHECK POWER SUPPLY FOR THERMO No c CIRCUIT AND 10A FUSES CONTROL AMP. AT FUSE BLOCK. Disconnect thermo control amp. harness Refer to EL section (‘‘Wiring connector. Diagram’’, ‘‘POWER SUPDo approx.

12 volts exist between thermo PLY ROUTING’’). control amp.

harness terminal No. j 1 and body ground? Yes . CHECK BODY GROUND CIRCUIT FOR THERMO CONTROL AMP. Turn A/C switch ON. Does continuity exist between thermo control amp. harness terminal j 2 and body ground? No c CHECK THERMO CONTROL AMP. Refer to HA-47. Yes RHA616G . Disconnect A/C switch harness connector. . NG CHECK A/C SWITCH. Refer to HA-47. c Replace A/C switch. c Replace fan switch. OK . Disconnect fan switch harness connector. Note . RHA613G CHECK CIRCUIT CONTINUITY BETWEEN A/C SWITCH HARNESS TERMINAL NO. j 2 AND FAN SWITCH HARNESS TERMINAL NO. j 6 . Continuity should exist. If OK, check harness for short.

OK Note . RHA614G CHECK BODY GROUND CIRCUIT FOR FAN SWITCH.

Does continuity exist between fan switch harness terminal No. j 5 and body ground? Yes . CHECK FAN SWITCH. Refer to HA-31. NG Note: If the result is NG or No after checking circuit continuity, repair harness or connector. HA-46 MANUAL TROUBLE DIAGNOSES Magnet Clutch (Cont’d) ELECTRICAL COMPONENTS INSPECTION A/C switch Check continuity between terminals at each switch position. Switch condition Terminal No. Continuity A/C (+) (−) j 2 j 1 ON Yes OFF No RHA626G A/C relay Check continuity between terminals j 3 and j 5 ,j 6 and j 7 . Condition Continuity 12V direct current supply between terminals j 1 and j 2 Yes No current supply No SEC202B Dual-pressure switch ON kPa (bar, kg/cm2, psi) OFF kPa (bar, kg/cm2, psi) Low-pressure side Increasing to 157 - 216 (1.57 - 2.16, 1.6 - 2.2, 23 - 31) Decreasing to 157 - 196 (1.57 - 1.96, 1.6 - 2.0, 23 - 28) High-pressure side Decreasing to 1,863 2,256 (18.6 - 22.6, 19 - 23, 270 - 327) Increasing to 2,452 2,844 (24.5 - 28.4, 25 - 29, 356 - 412) Thermo amp. operation Tester Decreasing to 0.1 - 0.9 (32 - 34) Turn OFF Approx. 12V Increasing to 2.5 - 3.5 (37 - 38) Turn ON Approx. 0V RHA628G Thermo control amp. Evaporator outlet air temperature °C (°F) RHA736G HA-47 MANUAL TROUBLE DIAGNOSES Noise TROUBLE DIAGNOSIS PROCEDURE FOR NOISE SYMPTOM: + Noise Inspection flow SHA909E *1: HA-123 *2: HA-125 *3: HA-120 HA-48 DESCRIPTION AUTO Introduction AIR CONDITIONER LAN SYSTEM OVERVIEW CONTROL SYSTEM The LAN system consists of auto amp., air mix door motor and mode door motor. A configuration of these components is shown in the diagram below. RHA439G Features SYSTEM CONSTRUCTION (LAN) A small network is constructed between the auto amplifier, air mix door motor and mode door motor. The auto amplifier and motors are connected by data transmission lines and motor power supply lines. The LAN network is built through the ground circuits of the two motors. Addresses, motor opening angle signals, motor stop signals and error checking messages are all transmitted through the data transmission lines connecting the auto amplifier and two motors. The following functions are contained in LCUs built into the air mix door motor and the mode door motor. + Address + Motor opening angle signals + Data transmission + Motor stop and drive decision + Opening angle sensor (PBR function) + Comparison + Decision (Auto amplifier indicated value and motor opening angle comparison) RHA440GA HA-49 DESCRIPTION Features (Cont’d) AUTO Operation The auto amplifier receives data from each of the sensors. The amplifier sends air mix door and mode door opening angle data to the air mix door motor LCU and mode door motor LCU. The air mix door motor and mode door motor read their respective signals according to the address signal. Opening angle indication signals received from the auto amplifier and each of the motor position sensors are compared by the LCUs in each motor with the existing decision and opening angles. Subsequently, HOT/ COLD or DEFROST/VENT operation is selected. The new selection data is returned to the auto amplifier. RHA441GA Transmission data and transmission order Amplifier data is transmitted consecutively to each of the door motors following the form shown in figure below. Start: Initial compulsory signal sent to each of the door motors. Address: Data sent from the auto amplifier is selected according to data-based decisions made by the air mix door motor and mode door motor. If the addresses are identical, the opening angle data and error check signals are received by the door motor LCUs. The LCUs then make the appropriate error decision. If the opening angle data is normal, door control begins. If an error exists, the received data is rejected and corrected data received. Finally, door control is based upon the corrected opening angle data. Opening angle: Data that shows the indicated door opening angle of each door motor.

Error check: Procedure by which sent and received data is checked for errors. Error data is then compiled. The error check prevents corrupted data from being used by the air mix door motor and mode door motor. Error data can be related to the following problems. + Abnormal electrical frequency + Poor electrical connections + Signal leakage from transmission lines + Signal level fluctuation Stop signal: At the end of each transmission, a stop operation, in-operation, or internal problem message is delivered to the auto amplifier. This completes one data transmission and control cycle. HA-50 DESCRIPTION Features (Cont’d) AUTO RHA442G Air mix door control (Automatic temperature control) The air mix door is automatically controlled so that in-vehicle temperature is maintained at a predetermined value by: The temperature setting, ambient temperature, in-vehicle temperature and amount of sunload. Fan speed control Blower speed is automatically controlled based on temperature setting, ambient temperature, in-vehicle temperature, intake temperature, amount of sunload and air mix door position. With FAN switch set to ‘‘AUTO’’, the blower motor starts to gradually increase air flow volume. When engine coolant temperature is low, the blower motor operation is delayed to prevent cool air from flowing. Intake door control The intake doors are automatically controlled by: The temperature setting, ambient temperature, in-vehicle temperature, intake temperature, amount of sunload and ON-OFF operation of the compressor. Outlet door control The outlet door is automatically controlled by: The temperature setting, ambient temperature, in-vehicle temperature, intake temperature and amount of sunload. Magnet clutch control The ECM (ECCS control module) controls compressor operation using input signals from the throttle position sensor and auto amplifier. Self-diagnostic system The self-diagnostic system is built into the auto amplifier (LCU) to quickly locate the cause of problems.

HA-51 DESCRIPTION AUTO Overview of Control System The control system consists of input sensors, switches, the automatic amplifier (microcomputer) and outputs. The relationship of these components is shown in the diagram below: RHA732G HA-52 DESCRIPTION AUTO Control Operation RHA727G Display screen Displays the operational status of the system. AUTO switch The compressor, intake doors, air mix door, outlet doors, and blower speed are automatically controlled so that the in-vehicle temperature will reach, and be maintained at the set temperature selected by the operator. Temperature dial (Potentio Temperature Control) Increases or decreases the set temperature. OFF switch The compressor and blower are OFF, the intake doors are set to the outside air position, and the air outlet doors are set to the foot (80% foot and 20% defrost) position. FAN switch Manual control of the blower speed. Four speeds are available for manual control (as shown on the display screen): low , medium low , medium high , high RECIRCULATION switch OFF position: Automatic control resumes. ON position: Interior air is recirculated inside the vehicle. DEFROSTER switch Positions the air outlet doors to the defrost position. Also positions the intake doors to the outside air position. MODE switch Control the air discharge outlets. HA-53 DESCRIPTION Control Operation (Cont’d) AUTO FRESH switch OFF position: Automatic control resumes. ON position: Outside air is drawn into the passenger compartment. A/C switch Manual control of the compressor operation. When the A/C switch indicator illuminates, compressor operation is being carried out. HA-54 TROUBLE DIAGNOSES AUTO Component Location ENGINE COMPARTMENT RHA697G HA-55 TROUBLE DIAGNOSES Component Location (Cont’d) AUTO PASSENGER COMPARTMENT RHA698G HA-56 TROUBLE DIAGNOSES AUTO Circuit Diagram THA153 HA-57 TROUBLE DIAGNOSES AUTO Wiring Diagram — A/C, A — YHA159 HA-58 TROUBLE DIAGNOSES Wiring Diagram — A/C, A — (Cont’d) AUTO YHA160 HA-59 TROUBLE DIAGNOSES Wiring Diagram — A/C, A — (Cont’d) AUTO YHA161 HA-60 TROUBLE DIAGNOSES AUTO Auto Amp. Terminals and Reference Value INSPECTION OF AUTO AMP. + Measure voltage between each terminal and body ground by following ‘‘AUTO AMP. INSPECTION TABLE’’. + Pin connector terminal layout RHA629G RHA630G HA-61 AUTO TROUBLE DIAGNOSES Auto Amp. Terminals and Reference Value (Cont’d) AUTO AMP. INSPECTION TABLE TERMINAL No. ITEM Voltage V CONDITION 1 Power supply for IGN — Approximately 12 2 Power supply for BAT — Approximately 12 3 Ground 4 Compressor ON signal — — ON Approximately 0 OFF Approximately 12 Compressor 5 Power supply for mode and air mix door motor 8 In-vehicle sensor — — — Approximately 12 9 Ambient sensor — — 10 Sunload sensor — — 11 Ground 12 Power supply for illumination 13 Intake door position switch 14 15 — RECIRCULATION Approximately 0 Approximately 12 FRESH Approximately 0 RECIRCULATION or 20% FRESH Approximately 12 Intake door position switch LAN signal — Approximately 5.5 Low, middle low or middle high Approximately 2.5 - 3.0 High Approximately 9 - 10 Fan control amp. control signal 18 Blower motor feed back 20 Power supply for blower motor 21 Thermal transmitter 23 Intake door position switch 24 Sensor ground — 25 Intake sensor — 35 Approximately 12 FRESH or 20% FRESH 17 28 — Illumination switch ON Fan speed — Approximately 12 — — Approximately 12 — 20% FRESH Approximately 0 RECIRCULATION or FRESH Approximately 12 — — Rear cooler ON Approximately 0 Rear cooler relay Rear cooler OFF Approximately 12 Rear cooler switch ON Approximately 0 Rear cooler switch OFF Approximately 12 Rear cooler switch HA-62 AUTO TROUBLE DIAGNOSES Self-diagnosis INTRODUCTION AND GENERAL DESCRIPTION (Ignition switch OFF → ON) . Within 5 seconds after starting engine (ignition switch is turned ‘‘ON’’), press switch for at least 5 seconds. The self-diagnostic system diagnoses sensors, door motors, blower motor, etc. by system line. Refer to applicable sections (items) for details. Shifting from normal control to the self-diagnostic system is accomplished by starting the engine (turning the ignition switch from ‘‘OFF’’ to ‘‘ON’’) and pressing ‘‘ ’’ switch for at ’’ switch must be pressed within 5 secleast 5 seconds. The ‘‘ onds after starting the engine (ignition switch is turned ‘‘ON’’). This system will be canceled by either pressing (AUTO) switch or turning the ignition switch ‘‘OFF’’. Shifting from one step to another is accomplished by means of turning temperature dial clockwise or counterclockwise, as required. Additionally shifting from STEP 4 to AUXILIARY MECHANISM is accomplished by means of pushing (fan) switch. . STEP 1 — LEDs and LCD are checked. m Left turn Right turn . STEP 2 — Input signals from each sensor are checked. m Left turn Right turn . STEP 3 — Mode and intake door motor position switch is checked. c or m Left turn Ignition switch: OFF Self-diagnostic function is canceled. (AUTO) switch: ON Right turn Note . STEP 4 — Actuators are checked. m . AUXILIARY MECHANISM — Temperature setting trimmer Note: For STEP 4, engine must be running for compressor to operate.

HA-63 AUTO TROUBLE DIAGNOSES Self-diagnosis (Cont’d) RHA526G STEP-BY-STEP PROCEDURE Turn ignition switch ON. . Set in self-diagnostic mode. Within 5 seconds after starting engine (ignition switch is switch for at turned ‘‘ON’’.), press least 5 seconds. RHA527G . STEP 1 - LEDs AND LCD ARE CHECKED. No Malfunctioning c Do all LEDs and LCD illuminate? switch, LED or LCD. Replace A/C auto amp. Yes . Turn temperature dial clockwise. . Advance to self-diagnosis STEP 2? No c Yes Malfunctioning temperature dial. Replace A/C auto amp. . Turn temperature dial counterclockwise. . Return to self-diagnosis STEP 1?

Yes . Turn temperature dial clockwise. . j A (Go to next page.) HA-64 No c Malfunctioning temperature dial. Replace A/C auto amp. AUTO TROUBLE DIAGNOSES Self-diagnosis (Cont’d) j A . STEP 2 - SENSOR CIRCUITS ARE CHECKED FOR OPEN OR SHORT CIRCUIT. Does code No. appear on the display? No Yes RHA970DA .

. Turn temperature dial clockwise. Refer to the following chart for malfunctioning code No. (If two or more sensors malfunction, corresponding code Nos. blink respectively two times.) Code No. A/C LED RHA528G A/C LED Malfunctioning sensor (including circuits) Reference page Ambient sensor HA-103 In-vehicle sensor HA-105 Sunload sensor*1 HA-107 Air mix door motor (LCU) PBR HA-79 . B j (Go to next page.) A/C LED A/C LED *1: Conduct self-diagnosis STEP 2 under sunshine. When conducting indoors, aim a light (more than 60W) at sunload sensor, otherwise Code No. will indicate despite that sunload sensor is functioning properly. RHA501A HA-65 AUTO TROUBLE DIAGNOSES Self-diagnosis (Cont’d) j B . STEP 3 - MODE DOOR POSITIONS ARE CHECKED. Does code No. appear on the display? No Yes RHA869DC .

. Turn temperature dial clockwise. Mode door motor position switch is malfunctioning. (If two or more mode doors are out of order, corresponding code numbers blink respectively two times.) Code No.*1 Mode door position Reference page VENT B/L RHA168DA FOOT HA-75 F/D . j C (Go to next page.) DEF *1: If mode door motor harness connector is disconnected, the following display pattern will appear.

→ → → → → − RHA498A HA-66 AUTO TROUBLE DIAGNOSES Self-diagnosis (Cont’d) j C . STEP 4 - OPERATION OF EACH ACTUATOR IS CHECKED. Engine running. Press DEF switch, code No. of each actuator test is indicated on the display. RHA495A . Refer to the following chart and confirm discharge air flow, air temperature, blower motor voltage and compressor operation. Checks must be made visually, by listening to any noise, or by touching air outlets with your hand, etc. for improper operation. Actuator test pattern Code No. Mode door Intake door Air mix door Blower motor Compressor FICD REC Full Cold 4 - 5V ON ON REC Full Cold 911V ON ON 20% FRE Full Hot 7 - 9V ON OFF FRE Full Hot 7 - 9V OFF OFF FRE Full Hot 10 12V ON OFF VENT B/L B/L FOOT RHA654FF F/D DEF OK . Turn ignition switch OFF or AUTO switch ON. . END HA-67 NG c + Air outlet does not change. Go to HA-75. + Intake door does not change. Go to HA-82. + Discharge air temperature does not change. Go to HA-79. + Magnet clutch does not engage. Go to HA-92.

+ Blower motor operation is malfunctioning. Go to HA-86. TROUBLE DIAGNOSES Self-diagnosis (Cont’d) AUTO AUXILIARY MECHANISM: Temperature setting trimmer The trimmer compensates for differences in range of ±3°C between temperature setting (displayed digitally) and temperature felt by driver. Operating procedures for this trimmer are as follows: + Begin Self-diagnosis STEP 4 mode. + Press (fan) switch to set system in auxiliary mode. + Turn temperature dial clockwise or counterclockwise as desired. Temperature will change at a rate of 1°C each time a switch is pressed. RHA581G When battery cable is disconnected, trimmer operation is canceled. Temperature set becomes that of initial condition, i.e. 0°C. HA-68 TROUBLE DIAGNOSES AUTO How to Perform Trouble Diagnoses for Quick and Accurate Repair WORK FLOW SHA900E *1: Operational Check (HA-70) SYMPTOM TABLE Symptom Reference page + A/C system does not come on. + Go to Trouble Diagnosis Procedure for A/C system. HA-73 + Go to Trouble Diagnosis Procedure for Mode Door Motor. (LAN). HA-75 + Go to Trouble Diagnosis Procedure for Air Mix Door Motor (LAN). HA-79 + Go to Trouble Diagnosis Procedure for Intake Door Motor. HA-82 + Blower motor operation is malfunctioning under out of starting fan speed control. + Go to Trouble Diagnosis Procedure for Blower Motor. HA-86 + Magnet clutch does not engage. + Go to Trouble Diagnosis Procedure for Magnet Clutch. HA-92 + Insufficient cooling. + Go to Trouble Diagnosis Procedure for Insufficient Cooling.

HA-98 + Insufficient heating. + Go to Trouble Diagnosis Procedure for Insufficient Heating.

HA-99 + Noise.

+ Go to Trouble Diagnosis Procedure for Noise.

HA-100 + Self-diagnosis cannot be performed. + Go to Trouble Diagnosis Procedure for Self-diagnosis.

HA-101 + Memory function does not operate. + Go to Trouble Diagnosis Procedure for Memory Function. HA-102 + Air outlet does not change.

+ Mode door motor does not operate normally. + Discharge air temperature does not change. + Air mix door motor does not operate normally. + Intake door does not change. + Intake door motor does not operate normally. + Blower motor operation is malfunctioning. HA-69 TROUBLE DIAGNOSES AUTO Operational Check The purpose of the operational check is to confirm that the system operates properly. CONDITIONS + Engine running and at normal operating temperature. PROCEDURE 1. Check memory function a. b. c. d.

e. f. Set the temperature 25°C. Press OFF switch. Turn the ignition off. Turn the ignition on. Press the AUTO switch. Confirm that the set temperature remains at previous temperature.

g. Press OFF switch.

RHA517G 2. Check blower a. Press fan switch one time. Blower should operate on low speed. The fan symbol should have one blade lit . b. Press fan switch one more time, and continue checking blower speed and fan symbol until all speeds are checked. c. Leave blower on MAX speed . RHA518G 3. Check discharge air a. Press mode switch four times and DEF button. RHA519G RHA520G HA-70 TROUBLE DIAGNOSES Operational Check (Cont’d) AUTO b. Confirm that discharge air comes out according to the air distribution table at left.

Refer to ‘‘Discharge Air Flow’’ (HA-13). NOTE: Confirm that the compressor clutch is engaged (visualinspection) and intake door position is at FRESH when the DEF is selected. Intake door position is checked in the next step. RHA654FD 4. Check recirculation a.

Press REC switch. Recirculation indicator should illuminate. b. Listen for intake door position change (you should hear blower sound change slightly).

RHA521G 5. Check temperature dial a. b. c. d. Turn temperature dial counterclockwise until 18°C is displayed. Check for cold air at discharge air outlets. Turn temperature dial clockwise until 32°C is displayed. Check for hot air at discharge air outlets. RHA522G HA-71 TROUBLE DIAGNOSES Operational Check (Cont’d) AUTO 6. Check AUTO mode a. Press AUTO switch. b. Display should indicate AUTO. Confirm that the compressor clutch engages (audio or visual inspection). (Discharge air and blower speed will depend on ambient, in-vehicle, and set temperatures.) RHA523G 7. Check FRESH switch a. Press FRE switch. FRESH indicator should illuminate. b. Listen for intake door position change. (You should hear a slight change in blower sound.) RHA524G 8. Check A/C switch a. Press A/C switch. A/C indicator should illuminate. b.

Confirm that the compressor clutch is engaged.

RHA525G HA-72 TROUBLE DIAGNOSES AUTO A/C System TROUBLE DIAGNOSIS PROCEDURE FOR A/C SYSTEM SYMPTOM: + A/C system does not come on.

Inspection flow SHA019F *1: HA-74 *2: HA-70 COMPONENT DESCRIPTION Automatic amplifier (Auto amp.) RHA629G The auto amplifier has a built-in microcomputer which processes information sent from various sensors needed for air conditioner operation. The air mix door motor, mode door motor, intake door motor, blower motor and compressor are then controlled. The auto amplifier is unitized with control mechanisms. Signals from various switches and Potentio Temperature Control (PTC) are directly entered into auto amplifier. Self-diagnostic functions are also built into auto amplifier to provide quick check of malfunctions in the auto air conditioner system. Potentio temperature control (PTC) The PTC is built into the A/C auto amp. It can be set at an interval of 1°C in the 18°C to 32°C temperature range by turning the temperature dial. The set temperature is digitally displayed. RHA746G HA-73 AUTO TROUBLE DIAGNOSES A/C System (Cont’d) DIAGNOSTIC PROCEDURE RHA632G Auto amp. check Check power supply circuit for auto amp. with ignition switch ON. Measure voltage across terminal Nos. j 1 ,j 2 ,j 20 and body ground. Voltmeter terminal % @ Voltage j 1 j 2 j 20 RHA633G HA-74 Body ground Approx. 12V AUTO TROUBLE DIAGNOSES Mode Door Motor TROUBLE DIAGNOSIS PROCEDURE FOR MODE DOOR MOTOR (LAN) SYMPTOM: + Air outlet does not change. + Mode door motor does not operate normally. Inspection flow SHA020F *1: *2: *3: *4: *5: HA-13 HA-70 HA-64 HA-65 HA-66 *6: HA-67 *7: HA-103 *8: HA-105 *9: HA-107 *10: HA-110 HA-75 *11: HA-79 *12: HA-65 *13: HA-77 *14: HA-70 *15: HA-69 TROUBLE DIAGNOSES Mode Door Motor (Cont’d) AUTO SYSTEM DESCRIPTION Component parts Mode door control system components are: 1) Auto amp. 2) Mode door motor (LCU) 3) In-vehicle sensor 4) Ambient sensor 5) Sunload sensor 6) Intake sensor System operation The auto amplifier receives data from each of the sensors. The amplifier sends air mix door and mode door opening angle data to the air mix door motor LCU and mode door motor LCU. The air mix door motor and mode door motor read their respective signals according to the address signal. Opening angle indication signals received from the auto amplifier and each of the motor position sensors are compared by the LCUs in each motor with the existing decision and opening angles. Subsequently, HOT/ COLD or DEFROST/VENT operation is selected. The new selection data is returned to the auto amplifier. SHA006FA HA-76 AUTO TROUBLE DIAGNOSES Mode Door Motor (Cont’d) Mode door control specification RHA730G COMPONENT DESCRIPTION The mode door motor is attached to the heater unit. It rotates so that air is discharged from the outlet set by the auto amplifier. Motor rotation is conveyed to a link which activates the mode door. CONTROL LINKAGE ADJUSTMENT Mode door 1. Install mode door motor on heater unit and connect it to main harness. 2. Set up code No. in Self-diagnosis STEP 4. Refer to HA-67. 3. Move side link by hand and hold mode door in DEF mode.

4. Make sure mode door operates properly when changing from code No. to by pushing DEF switch. RHA631G VENT B/L HA-77 B/L FOOT F/D DEF AUTO TROUBLE DIAGNOSES Mode Door Motor (Cont’d) DIAGNOSTIC PROCEDURE SYMPTOM: Mode door motor and/or air mix door motor do not operate normally. CHECK POWER SUPPLY FOR AUTO AMP. (LCU) SIDE. Do approx. 12 volts exist between auto amp. (LCU) terminal j 15 and body ground? No c Replace auto amp. (LCU). Yes RHA636G . CHECK SIGNAL AUTO AMP. (LCU) SIDE.

Do approx. 5.5 volts exist between auto amp. (LCU) terminal j 5 and body ground?

No c Replace auto amp. (LCU). Yes Note . CHECK POWER SUPPLY FOR MOTOR SIDE. Do approx. 12 volts exist between door motor (LCU) harness terminal j 31 and body ground? Yes RHA635G Note . CHECK SIGNAL MOTOR SIDE. Do approx. 5.5 volts exist between door motor (LCU) terminal j 32 and body ground? Yes Note . CHECK MOTOR GROUND CIRCUIT. Check harness continuity between door motor (LCU) harness terminal j 3 and body ground.

OK . RHA638G Disconnect the mode door motor and air mix door motor connector. . CHECK THE MODE DOOR MOTOR OPERATION. Reconnect the mode door motor and confirm the motor operation. Mode door motor operates normally. OK c Replace the air mix door motor. NG . Disconnect the mode door motor. . RHA637G CHECK THE AIR MIX DOOR MOTOR OPERATION. Reconnect the air mix door motor and confirm the motor operation. Air mix door motor operates normally. OK c Replace the mode door motor. NG . Replace the auto amp.

(LCU). Note: If the result is NG or No after checking circuit continuity, repair harness or connector. RHA639G HA-78 AUTO TROUBLE DIAGNOSES Air Mix Door Motor TROUBLE DIAGNOSIS PROCEDURE FOR AIR MIX DOOR (LAN) SYMPTOM: + Discharge air temperature does not change. + Air mix door motor does not operate.

Inspection flow SHA021F *1: *2: *3: *4: HA-64 HA-65 HA-67 HA-103 *5: *6: *7: *8: *9: HA-69 *10: HA-78 *11: HA-81 *12: HA-70 HA-105 HA-107 HA-110 HA-79 HA-79 TROUBLE DIAGNOSES Air Mix Door Motor (Cont’d) AUTO SYSTEM DESCRIPTION Component parts Air 1) 2) 3) 4) 5) 6) mix door control system components are: Auto amp. Air mix door motor (LCU) In-vehicle sensor Ambient sensor Sunload sensor Intake sensor System operation The auto amplifier receives data from each of the sensors. The amplifier sends air mix door and mode door opening angle data to the air mix door motor LCU and mode door motor LCU. The air mix door motor and mode door motor read their respective signals according to the address signal. Opening angle indication signals received from the auto amplifier and each of the motor position sensors are compared by the LCUs in each motor with the existing decision and opening angles. Subsequently, HOT/ COLD or DEFROST/VENT operation is selected. The new selection data is returned to the auto amplifier. RHA424GB HA-80 AUTO TROUBLE DIAGNOSES Air Mix Door Motor (Cont’d) Air mix door control specification RHA690G COMPONENT DESCRIPTION The air mix door motor is attached to the heater unit. It rotates so that the air mix door is opened or closed to a position set by the auto amplifier. Motor rotation is then conveyed through a shaft and the air mix door position is then fed back to the auto amplifier by PBR built-in air mix door motor. CONTROL LINKAGE ADJUSTMENT Air mix door (Water cock) RHA696G 1. Install air mix door motor on heater unit and connect it to main harness. 2. Set up code No. in Self-diagnosis STEP 4. Refer to HA-67. 3. Move air mix door lever by hand and hold it in full cold position. 4.

Attach air mix door lever to rod holder. 5. Make sure air mix door operates properly when changing from code No. to by pushing DEF switch. Full cold SHA522E Full hot 6. Set up code No. in Self-diagnosis STEP 4. 7. Attach water cock cable to air mix door linkage and secure with clip. 8. Rotate and hold water cock lever AND plate in the full cold position (CLOCKWISE completely). 9. Attach water cock cable to plate and secure with clip (white mark on cable housing should be centered under the retaining clip). 10. Check that water cock operates properly when changing from code No. to by pushing DEF switch. (After several cycles, water cock lever should be midpoint of plate opening when code No. is set.) HA-81 AUTO TROUBLE DIAGNOSES Intake Door Motor TROUBLE DIAGNOSIS PROCEDURE FOR INTAKE DOOR SYMPTOM: + Intake door does not change. + Intake door motor does not operate normally. Inspection flow SHA022F *1: *2: *3: *4: HA-64 HA-65 HA-67 HA-103 *5: *6: *7: *8: *9: HA-85 *10: HA-84 *11: HA-70 *12: HA-69 HA-105 HA-107 HA-110 HA-79 HA-82 TROUBLE DIAGNOSES Intake Door Motor (Cont’d) AUTO SYSTEM DESCRIPTION Component parts Intake door control system components are: 1) Auto amp. 2) Intake door motor 3) A/C LAN system (PBR built-in mode motor and air mix door motor) 4) In-vehicle sensor 5) Ambient sensor 6) Sunload sensor 7) Intake sensor System operation The intake door control determines intake door position based on the ambient temperature, the intake air temperature and the in-vehicle temperature. When the A/C, DEFROSTER, or OFF switches are pushed, the auto amplifier sets the intake door at the ‘‘Fresh’’ position. RHA640G HA-83 AUTO TROUBLE DIAGNOSES Intake Door Motor (Cont’d) Intake door control specification RHA692G COMPONENT DESCRIPTION The intake door motor is attached to the intake unit. It rotates so that air is drawn from inlets set by the auto amplifier. Motor rotation is conveyed to a lever which activates the intake door. CONTROL LINKAGE ADJUSTMENT Intake door 1. Install intake door motor on intake unit and connect it to main harness. 2.

Set up code No. in Self-diagnosis STEP 4. Refer to HA-67. 3. Move intake door link by hand and hold it in REC position. 4.

Attach intake door lever to rod holder. 5. Make sure intake door operates properly when changing from code No. to by pushing DEF switch. RHA593F REC HA-84 20% FRE FRE AUTO TROUBLE DIAGNOSES Intake Door Motor (Cont’d) DIAGNOSTIC PROCEDURE SYMPTOM: Intake door motor does not operate normally. + Perform Self-diagnosis STEP 4 before referring to the flow chart.

SHA858EB CHECK POWER SUPPLY FOR INTAKE DOOR MOTOR. Disconnect intake door motor harness connector. Do approx. 12 volts exist between intake door motor harness terminal No. j 1 and body ground? No c Check power supply circuit and 10A fuse (No. 6 , located in the fuse block). Yes Note . CHECK FOR AUTO AMP. OUTPUT. Set up Self-diagnosis STEP 4. Measure voltage across auto amp. harness terminals and body ground. RHA081GB Terminal No. Code No. ⊕ @ Condition 0 j 13 REC j 23 12 12 j 14 j 13 j 23 Voltage V Body ground 20% FRE j 14 NG c Check circuit continuity between each terminal on auto amp. and on intake door motor. Terminal No. ⊕ @ Intake door Auto amp. motor j j 13 13 12 j 23 j 23 0 j 14 j 14 FRE j 23 Yes 12 12 j 13 Continuity OK 12 0 j 14 0V: Approx. 0V 12V: Approx. 12V . Replace auto amp.

RHA642G OK .

Replace intake door motor. Note: If the result is NG or No after checking circuit continuity, repair harness or connector. RHA634G HA-85 AUTO TROUBLE DIAGNOSES Blower Motor TROUBLE DIAGNOSIS PROCEDURE FOR BLOWER MOTOR SYMPTOM: + Blower motor operation is malfunctioning. + Blower motor operation is malfunctioning under out of starting fan speed control. Inspection flow SHA026F *1: *2: *3: *4: HA-64 HA-65 HA-67 HA-89 *5: *6: *7: *8: *9: HA-79 *10: HA-70 *11: HA-69 HA-103 HA-105 HA-107 HA-110 HA-86 TROUBLE DIAGNOSES Blower Motor (Cont’d) AUTO SYSTEM DESCRIPTION Component parts Fan speed control system components are: 1) Auto amp. 2) Fan control amp. 3) A/C LAN system (PBR built in mode door motor and air mix door motor) 4) In-vehicle sensor 5) Ambient sensor 6) Sunload sensor 7) Intake sensor System operation SHA006FB Automatic mode In the automatic mode, the blower motor speed is calculated by the automatic amplifier based on inputs from the PBR, in-vehicle sensor, sunload sensor, intake sensor and ambient sensor. The blower motor applied voltage ranges from approximately 5 volts (lowest speed) to 12 volts (highest speed). The control blower speed (in the range of 5 to 12V), the automatic amplifier supplies a gate voltage to the fan control amplifier. Based on this voltage, the fan control amplifier controls the voltage supplied to the blower motor. Starting fan speed control Start up from ‘‘COLD SOAK’’ condition (Automatic mode) In a cold start up condition where the engine coolant temperature is below 50°C, the blower will not operate for a short period of time (up to 150 seconds). The exact start delay time varies depending on the ambient and engine coolant temperature. In the most extreme case (very low ambient) the blower starting delay will be 150 seconds as described above. After this delay, the blower will operate at low speed until the engine coolant temperature rises above 55°C, at which time the blower speed will increase to the objective speed. Start up from normal or ‘‘HOT SOAK’’ condition (Automatic mode) The blower will begin operation momentarily after the AUTO button is pushed. The blower speed will gradually rise to the objective speed over a time period of 3 seconds or less (actual time depends on the objective blower speed). HA-87 TROUBLE DIAGNOSES Blower Motor (Cont’d) AUTO Blower speed compensation Sunload When the in-vehicle temperature and the set temperature are very close, the blower will be operating at low speed. The low speed will vary depending on the sunload. During conditions of high sunload, the blower low speed is ‘‘normal’’ low speed (approx. 6V). During low or no sunload conditions, the low speed will drop to ‘‘low’’ low speed (approx. 5V).

Ambient When the ambient temperature is in the ‘‘moderate’’ range [10 − 15°C], the computed blower voltage will be compensated (reduced) by up to 3.5V (depending on the blower speed). In the ‘‘extreme’’ ambient ranges [below 0°C and above 20°C] the computed objective blower voltage is not compensated at all. In the ambient temperature ranges between ‘‘moderate’’ and ‘‘extreme’’ [0 - 10°C and 15 - 20°C], the amount of compensation (for a given blower speed) varies depending on the ambient temperature. Fan speed control specification RHA694G COMPONENT DESCRIPTION Fan control amplifier The fan control amplifier is located on the cooling unit. The fan control amp. receives a gate voltage from the auto amp. to steplessly maintain the blower fan motor voltage in the 5 to 12 volt range (approx.). RHA695G HA-88 AUTO TROUBLE DIAGNOSES Blower Motor (Cont’d) DIAGNOSTIC PROCEDURE SYMPTOM: Blower motor operation is malfunctioning under Starting Fan Speed Control. CHECK POWER SUPPLY FOR FAN CONTROL AMP. Disconnect fan control amp. harness connector. Do approx. 12 volts exist between fan control amp. harness terminal No. j 1 and body ground? No c RHA087GB CHECK POWER SUPPLY FOR BLOWER MOTOR. Disconnect blower motor harness connector. Do approx. 12 volts exist between blower motor harness terminal No. j 2 and body ground? Yes No Yes Note . . CHECK BODY GROUND CIRCUIT FOR FAN CONTROL AMP. Does continuity exist between fan control amp. harness terminal No. j 3 and body ground? Check power supply circuit and 15A fuses (No. 1 and 2 , located in the fuse block). Yes RHA643G . Note . Reconnect fan control amp. harness connector. Check circuit continuity between blower motor harness terminal No. j 1 and fan control amp.

harness terminal No. j 1 . OK . RHA644G . CHECK FOR AUTO AMP. OUTPUT. Set up Self-diagnosis STEP 4. Measure voltage across fan control amp. harness terminal No. j 2 and body ground. CHECK BLOWER MOTOR. (Refer to HA-91.) NG Terminal No. Code No. ⊕ @ − Body ground j 2 . Voltage Replace blower motor. Approx. 2.5 - 3V Approx. 9 - 10V NG A cj (Go to next page.) OK . Replace fan control amp. RHA645G Note: If the result is NG or No after checking circuit continuity, repair harness or connector. RHA646G HA-89 AUTO TROUBLE DIAGNOSES Blower Motor (Cont’d) j A . Disconnect auto amp. and fan control amp. harness connector. Note .

RHA647G Does continuity exist between auto amp. harness terminal No. j 17 and fan control amp. harness terminal No. j 2 ? Continuity should exist. If OK, check harness for short.

Yes . CHECK FAN FEED BACK CIRCUIT. Do approx. 12 volts exist between auto amp. harness terminal No. j 20 and body ground? No c Yes RHA648G Note . Do approx. 12 volts exist between auto amp. harness terminal No. j 18 and body ground? Yes RHA649G Check power supply circuit and 15A fuses (No. 1 and 2 , located in the fuse block). Refer to EL section (‘‘Wiring Diagram’’, ‘‘POWER SUPPLY ROUTING’’). No c Check circuit continuity between blower motor harness terminal No. j 1 and auto amp. harness terminal No. j 18 . Continuity should exist. If OK, check harness for short. .

Replace auto amp. Note: If the result is NG or No after checking circuit continuity, repair harness or connector. RHA650G RHA651G HA-90 TROUBLE DIAGNOSES Blower Motor (Cont’d) AUTO COMPONENT INSPECTION Blower motor Confirm smooth rotation of the blower motor. + Ensure that there are no foreign particles inside the intake unit. RHA941F HA-91 AUTO TROUBLE DIAGNOSES Magnet Clutch TROUBLE DIAGNOSIS PROCEDURE FOR MAGNET CLUTCH SYMPTOM: + Magnet clutch does not engage. Inspection flow SHA023F *1: *2: *3: *4: HA-64 HA-65 HA-67 HA-94 *5: *6: *7: *8: *9: HA-79 *10: HA-70 *11: HA-69 *12: HA-35 HA-103 HA-105 HA-107 HA-110 HA-92 TROUBLE DIAGNOSES Magnet Clutch (Cont’d) AUTO SYSTEM DESCRIPTION Auto amplifier controls compressor operation by ambient temperature and signal from ECM (ECCS control module). Low temperature protection control Auto amplifier will turn the compressor ‘‘ON’’ or ‘‘OFF’’ as determined by a signal detected by ambient sensor. When ambient temperatures are greater than 1°C, the compressor turns ‘‘ON’’. The compressor turns ‘‘OFF’’ when ambient temperatures are less than −2°C. RHA094GA HA-93 AUTO TROUBLE DIAGNOSES Magnet Clutch (Cont’d) DIAGNOSTIC PROCEDURE SYMPTOM: Magnet clutch does not engage when A/C switch and fan switch are ON. Yes CHECK POWER SUPPLY FOR COMPRESSOR. Disconnect compressor harness connector. Do approx.

12 volts exist between compressor harness terminal No. j 1 and body ground? . c Check magnet clutch coil. NG . Replace magnet clutch. Refer to HA-123. No Disconnect A/C relay. Note . CHECK CIRCUIT CONTINUITY BETWEEN A/C RELAY HARNESS TERMINAL NO.
j 7 AND COMPRESSOR HARNESS TERMINAL NO.
j 1 . Continuity should exist. If OK, check harness for short. OK RHA652G . CHECK POWER SUPPLY FOR A/C RELAY. Disconnect A/C relay. Do approx. 12 volts exist between A/C relay harness terminal Nos. j 1 ,j 6 and body ground? No c Yes . NG CHECK A/C RELAY AFTER DISCONNECTING IT. Refer to HA-97. ECCS RHA096GA engine models OK . CHECK POWER SUPPLY CIRCUIT AND 10A (No.) FUSE AT FUSE BLOCK.
Refer to EL section (‘‘Wiring Diagram’’, ‘‘POWER SUPPLY ROUTING’’).
Except for ECCS engine models c Replace A/C relay. OK . j A (Go to next page.) B j Note: If the result is NG or No after checking circuit continuity, repair harness or connector. RHA653G RHA654G HA-94 AUTO TROUBLE DIAGNOSES Magnet Clutch (Cont’d) j A . Reconnect A/C relay. . RHA655G CHECK COIL SIDE CIRCUIT OF A/C RELAY. Do approx. 12 volts exist between ECM (ECCS control module) harness terminal No. j 9 and body ground? No c Disconnect A/C relay. Disconnect ECM (ECCS control module) harness connector.
Yes . RHA656G Note CHECK CIRCUIT CONTINUITY BETWEEN A/C RELAY HARNESS TERMI2 AND ECM NAL NO. j (ECCS CONTROL MODULE) HARNESS TERMINAL NO. j 9 . Continuity should exist. If OK, check harness for short. . CHECK VOLTAGE FOR ECM (ECCS control module). Do approx. 12 volts exist between ECM (ECCS control module) harness terminal No. j 46 and body ground? No c CHECK ECM (ECCS control module). Refer to EC section. Yes . Disconnect ECM (ECCS control module) harness connector. Disconnect dual-pressure switch harness connector. RHA657G Note . CHECK CIRCUIT CONTINUITY BETWEEN ECM (ECCS CONTROL MODULE) HARNESS TERMINAL NO. j 46 , j 21 AND DUAL-PRESSURE SWITCH HARNESS TERMINAL NO. j 2 . Continuity should exist. If OK, check harness for short.
OK RHA658G . CHECK DUAL-PRESSURE SWITCH. Refer to HA-97. . NG c Replace dual-pressure switch. OK j C Note: If the result is NG or No after checking circuit continuity, repair harness or connector. HA-95 AUTO TROUBLE DIAGNOSES Magnet Clutch (Cont’d) j B Note . Check circuit continuity between A/C relay harness terminal No. j 2 and dual-pressure switch harness terminal No. j 2 . Continuity should exist.
If OK, check harness for short. Yes RHA659G . NG CHECK DUAL-PRESSURE SWITCH.
Refer to HA-97. c Replace dual-pressure switch. OK j C . RHA660G . CHECK THERMO CONTROL AMP. CIRCUIT. Do approx. 12 volts exist between thermo control amp. harness terminal No. j 3 and body ground? No D cj Yes . CHECK POWER SUPPLY FOR THERMO AMP. Do approx. 12 volts exist between thermo control amp. harness terminal No. j 1 and body ground? No c Check power supply circuit and 10A fuse (No. , located in the fuse block). Yes RHA661G Note . Check circuit continuity between thermo control amp. harness terminal No. j 2 and auto amp. harness terminal No. j 4 . Continuity should exist.
If OK, check harness for short. OK . CHECK THERMO CONTROL AMP. Refer to HA-47. RHA662G NG Replace thermo amp. c OK . Replace auto amp. Note: If the result is NG or No after checking circuit continuity, repair harness or connector.
HA-96 AUTO TROUBLE DIAGNOSES Magnet Clutch (Cont’d) j D Note . Check circuit continuity between dual-pressure switch harness terminal No. j 1 and thermo control amp.
harness terminal No. j 3 . Continuity should exist. If OK, check harness for short. RHA663G Note: If the result is NG or No after checking circuit continuity, repair harness or connector. COMPONENT INSPECTION A/C relay Check continuity between terminal Nos. j 3 and j 5 ,j 6 and j 7 . Conditions Continuity 12V direct current supply between terminal Nos. j 1 and j 2 Yes No current supply No If NG, replace relay.
SEC202B Dual-pressure switch ON kPa (bar, kg/cm2, psi) OFF kPa (bar, kg/cm2, psi) Low-pressure side Increasing to 157 - 216 (1.57 - 2.16, 1.6 - 2.2, 23 - 31) Decreasing to 157 - 196 (1.57 - 1.96, 1.6 - 2.0, 23 - 28) High-pressure side Decreasing to 1,863 - 2,256 (18.6 - 22.6, 19 - 23, 270 - 327) Increasing to 2,452 - 2,844 (24.5 - 28.4, 25 - 29, 356 - 412)
RHA628G HA-97 AUTO TROUBLE DIAGNOSES Insufficient Cooling TROUBLE DIAGNOSIS PROCEDURE FOR INSUFFICIENT COOLING SYMPTOM: + Insufficient cooling. Inspection flow SHA053F *1: *2: *3: *4: HA-64 HA-65 HA-67 HA-78 *5: *6: *7: *8: *9: HA-33 *10: HA-68 *11: HA-70 HA-82 HA-89 HA-94 HA-79 HA-98 AUTO TROUBLE DIAGNOSES Insufficient Heating TROUBLE DIAGNOSIS PROCEDURE FOR INSUFFICIENT HEATING SYMPTOM: + Insufficient heating. Inspection flow SHA024F *1: *2: *3: *4: HA-70 HA-64 HA-65 HA-67 *8: HA-94 *9: HA-79 *10: HA-68 *5: HA-75 *6: HA-85 *7: HA-89 HA-99 AUTO TROUBLE DIAGNOSES Noise TROUBLE DIAGNOSIS PROCEDURE FOR NOISE SYMPTOM: + Noise Inspection flow SHA896EA *1: HA-123 *2: HA-125 *3: HA-114 *4: HA-70 HA-100 AUTO TROUBLE DIAGNOSES Self-diagnosis TROUBLE DIAGNOSIS PROCEDURE FOR SELF-DIAGNOSIS SYMPTOM: + Self-diagnosis cannot be performed. Inspection flow SHA037F *1: HA-74 *2: HA-103 *3: HA-105 *7: HA-70 *8: HA-69 *4: HA-107 *5: HA-110 *6: HA-79 HA-101 AUTO TROUBLE DIAGNOSES Memory Function TROUBLE DIAGNOSIS PROCEDURE FOR MEMORY FUNCTION SYMPTOM: + Memory function does not operate. Inspection flow SHA027F *1: HA-74 *2: HA-70 *3: HA-64 HA-102 TROUBLE DIAGNOSES AUTO Ambient Sensor COMPONENT DESCRIPTION The ambient sensor is attached in front of the driver’s side condenser. It detects ambient temperature and converts it into a resistance value which is then input into the auto amplifier. RHA670G AMBIENT TEMPERATURE INPUT PROCESS The automatic amplifier includes a ‘‘processing circuit’’ for the ambient sensor input. However, when the temperature detected by the ambient sensor increases quickly, the processing circuit retards the auto amp. function. It only allows the auto amp. to recognize an ambient temperature increase of 0.33°C per 100 seconds. As an example, consider stopping for a cup of coffee after high speed driving. Although the actual ambient temperature has not changed, the temperature detected by the ambient sensor will increase. This is because the heat from the engine compartment can radiate to the front grille area, location of the ambient sensor. HA-103 AUTO TROUBLE DIAGNOSES Ambient Sensor (Cont’d) DIAGNOSTIC PROCEDURE SYMPTOM: Ambient sensor circuit is open or shorted. (or A/C LED is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.) RHA051GC CHECK AMBIENT SENSOR CIRCUIT BETWEEN AMBIENT SENSOR AND AUTO AMP. Disconnect ambient sensor harness connector. Do approx.
5 volts exist between ambient sensor harness terminal No. j 9 and body ground? No c Disconnect auto amp. harness connector. Note . Check circuit continuity between ambient sensor harness terminal No. j 9 and auto amp. harness terminal No. j 9 . Yes OK . .
Disconnect auto amp. harness connector. Replace auto amp. RHA671G Note . Check circuit continuity between ambient sensor harness terminal No. j 24 and auto amp. harness terminal No. j 24 . OK . CHECK AMBIENT SENSOR. (Refer to HA-105.) NG c Replace ambient sensor. OK RHA672G . Replace auto amp. Note: If the result is NG or No after checking circuit continuity, repair harness or connector. RHA673G HA-104 AUTO TROUBLE DIAGNOSES Ambient Sensor (Cont’d) COMPONENT INSPECTION Ambient sensor After disconnecting ambient sensor harness connector, measure resistance between terminals j 9 and j 24 at sensor harness side, using the table below. Temperature °C (°F) Resistance kΩ RHA674G −15 (5) 12.73 −10 (14) 9.92 −5 (23) 7.80 0 (32) 6.19 5 (41) 4.95 10 (50) 3.99 15 (59) 3.24 20 (68) 2.65 25 (77) 2.19 30 (86) 1.81 35 (95) 1.51 40 (104) 1.27 45 (113) 1.07 In-vehicle Sensor COMPONENT DESCRIPTION In-vehicle sensor The in-vehicle sensor is located on instrument lower panel. It converts variations in temperature of compartment air drawn from the aspirator into a resistance value. It is then input into the auto amplifier. RHA675G Aspirator The aspirator is located in front of heater unit. It produces vacuum pressure due to air discharged from the heater unit, continuously taking compartment air in the aspirator. RHA636F RHA482A HA-105 AUTO TROUBLE DIAGNOSES In-vehicle Sensor (Cont’d) DIAGNOSTIC PROCEDURE SYMPTOM: In-vehicle sensor circuit is open or shorted. A/C LED (or is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.) RHA056GE CHECK IN-VEHICLE SENSOR CIRCUIT BETWEEN IN-VEHICLE SENSOR AND AUTO AMP. Disconnect in-vehicle sensor harness connector. Do approx. 5 volts exist between in-vehicle sensor harness terminal No. j 8 and body ground?
No c Disconnect auto amp.
harness connector. Note . Check circuit continuity between in-vehicle sensor harness terminal No. j 8 and auto amp. harness terminal No. j 8 . Yes OK . . Disconnect auto amp. harness connector. Replace auto amp.
RHA676G Note . Check circuit continuity between in-vehicle sensor harness terminal No. j 24 and auto amp.
harness terminal No. j 24 . OK . CHECK IN-VEHICLE SENSOR. (Refer to HA-107.) NG c Replace in-vehicle sensor. OK RHA677G . Replace auto amp. Note: If the result is NG or No after checking circuit continuity, repair harness or connector. RHA678G HA-106 AUTO TROUBLE DIAGNOSES In-vehicle Sensor (Cont’d) COMPONENT INSPECTION In-vehicle sensor After disconnecting in-vehicle sensor harness connector, measure resistance between terminals j 8 and j 24 at sensor harness side, using the table below. RHA679G Temperature °C (°F) Resistance kΩ −15 (5) 12.73 −10 (14) 9.92 −5 (23) 7.80 0 (32) 6.19 5 (41) 4.95 10 (50) 3.99 15 (59) 3.24 20 (68) 2.65 25 (77) 2.19 30 (86) 1.81 35 (95) 1.51 40 (104) 1.27 45 (113) 1.07 Sunload Sensor COMPONENT DESCRIPTION The sunload sensor is located on the right defroster grille. It detects sunload entering through windshield by means of a photo diode.
The sensor converts the sunload into a current value which is then input into the auto amplifier. RHA682G SUNLOAD INPUT PROCESS The auto amp. also includes a processing circuit which ‘‘average’’ the variations in detected sunload over a period of time.
This prevents drastic swings in the ATC system operation due to small or quick variations in detected sunload. For example, consider driving along a road bordered by an occasional group of large trees. The sunload detected by the sunload sensor will vary whenever the trees obstruct the sunlight. The processing circuit averages the detected sunload over a period of time, so that the (insignificant) effect of the trees momentarily obstructing the sunlight does not cause any change in the ATC system operation. On the other hand, shortly after entering a long tunnel, the system will recognize the change in sunload, and the system will react accordingly. HA-107 AUTO TROUBLE DIAGNOSES Sunload Sensor (Cont’d) DIAGNOSTIC PROCEDURE SYMPTOM: Sunload sensor circuit is open or shorted. (or A/C LED is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.) RHA061GC CHECK SUNLOAD SENSOR CIRCUIT BETWEEN SUNLOAD SENSOR AND AUTO AMP. Disconnect sunload sensor harness connector. Do approx. 5 volts exist between sunload sensor harness terminal No. j 10 and body ground? No c Disconnect auto amp. harness connector. Note . Check circuit continuity between sunload sensor harness terminal No. j 10 and auto amp. harness terminal No. j 10 . Yes OK . . Disconnect auto amp. harness connector. Replace auto amp. RHA680G Note . Check circuit continuity between sunload sensor harness terminal No. j 24 and auto amp. harness terminal No. j 24 . OK . CHECK SUNLOAD SENSOR. (Refer to HA-109.) NG c Replace sunload sensor. OK RHA681G . Replace auto amp. Note: If the result is NG or No after checking circuit continuity, repair harness or connector. RHA683G HA-108 TROUBLE DIAGNOSES Sunload Sensor (Cont’d) AUTO COMPONENT INSPECTION Sunload sensor Measure voltage between auto amp. terminal j 10 and body ground. + When checking sunload sensor, select a place where sun shines directly on it. RHA684G SHA930E HA-109 AUTO TROUBLE DIAGNOSES Intake Sensor COMPONENT DESCRIPTION The intake sensor is located on the cooling unit. It converts temperature of air after it passes through the evaporator into a resistance value. The value is then input to the auto amplifier.
RHA685G DIAGNOSTIC PROCEDURE SYMPTOM: Intake sensor circuit is open or shorted. RHA957FA CHECK INTAKE SENSOR CIRCUIT BETWEEN INTAKE SENSOR AND AUTO AMP.
Disconnect intake sensor harness connector. Do approx. 5 volts exist between intake sensor harness terminal No. j 25 and body ground? No c Disconnect auto amp. harness connector. Note . Check circuit continuity between intake sensor harness terminal No. j 25 and auto amp. harness terminal No. j 25 . Continuity should exist. If OK, check harness for short.
Yes OK . .
Disconnect auto amp.
harness connector. Replace auto amp. RHA686G Note . Check circuit continuity between intake sensor harness terminal No. j 24 and auto amp.
harness terminal No. j 24 .
Continuity should exist. If OK, check harness for short. OK . RHA687G CHECK INTAKE SENSOR. (Refer to HA-111.) NG c Replace intake sensor.
OK . Replace auto amp. Note: If the result is NG or No after checking circuit continuity, repair harness or connector. RHA688G HA-110 AUTO TROUBLE DIAGNOSES Intake Sensor (Cont’d) COMPONENT INSPECTION Intake sensor After disconnecting intake sensor harness connector, measure resistance between terminals j 25 and j 24 at sensor harness side, using the table below. Temperature °C (°F) Resistance kΩ −20 (−4) 16.2 −10 (14) 9.8 0 (32) 6.0 10 (50) 3.94 20 (68) 2.64 25 (77) 2.12 30 (86) 1.82 40 (104) 1.27 RHA689G HA-111 MANUAL AND AUTO SERVICE PROCEDURES HFC-134a (R-134a) Service Procedure Set the recovery/recycling equipment. . Recovered lubricant. Refer to ‘‘CHECKING AND ADJUSTING’’, HA-114. Discharge refrigerant into recovery/ recycling equipment. . Repair or replace parts. . Evacuate (over 25 minutes). b . Check air tightness. NG OK m *1 . c Repair.
c Partial charging [approx. 200 g (7.05 oz)]. . Preliminary refrigerant leak check.
Refer to ‘‘PRELIMINARY CHECK’’, HA-119. OK . c NG *1 Complete charging (specified amount less partial charge amount) Refer to SDS.
*2 . Check for refrigerant leaks. Refer to ‘‘CHECKING PROCEDURE’’, NG HA-120. OK . Check for A/C operation and A/C cool- .... ing performance Performance Test Diagnoses Refer to HA-33. . Remove service couplers from A/C service valves. . Recover refrigerant in charging hoses. .
Remove service tools. . Reinstall service valve caps. Note: *1 Before charging refrigerant, ensure engine is OFF. *2 Before checking for leaks, start engine to activate air conditioner system then turn engine OFF. Service valve caps must be installed to prevent leakage. HA-112 MANUAL AND AUTO SERVICE PROCEDURES HFC-134a (R-134a) Service Procedure (Cont’d) SETTING OF SERVICE TOOLS AND EQUIPMENT DISCHARGING REFRIGERANT WARNING: Avoid breathing A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat.
Remove HFC-134a (R-134a) from A/C system using certified service equipment meeting requirements of HFC-134a (R-134a) recycling equipment or HFC-134a (R-134a) recovery equipment. If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers. SHA539DC EVACUATING SYSTEM AND CHARGING REFRIGERANT SHA540DC HA-113 MANUAL AND AUTO SERVICE PROCEDURES Maintenance of Lubricant Quantity in Compressor The lubricant used to lubricate the compressor circulates through the system with the refrigerant. Add lubricant to compressor when replacing any component or after a large gas leakage occurred. It is important to maintain the specified amount. If lubricant quantity is not maintained properly, the following malfunctions may result: + Lack of lubricant: May lead to a seized compressor + Excessive lubricant: Inadequate cooling (thermal exchange interference) LUBRICANT Name: Nissan A/C System Oil Type S Part number: KLH00-PAGS0 CHECKING AND ADJUSTING Adjust the lubricant quantity according to the flowchart shown below.
START . Yes Can lubricant return operation be performed? + A/C system works properly. + There is no evidence of a large amount of lubricant leakage. c No . Should the compressor be replaced? No b Yes Perform lubricant return operation, proceeding as follows: --1. Start engine, and set the following conditions: + Test condition Engine speed: Idling to 1,200 rpm A/C or AUTO switch: ON Blower speed: Max. position Temp. control: Optional [Set so that intake air temperature is 25 to 30°C (77 to 86°F).] 2. Perform lubricant return operation for about 10 minutes. 3.
Stop engine. CAUTION: If excessive lubricant leakage is noted, do not perform the lubricant return operation. . j A (Go to next page.) . Is there any part to be replaced? (Evaporator, condenser, liquid tank or in case there is evidence of a large amount of lubricant leakage.) Yes c No After replacing any of the following major components, add the correct amount of lubricant to the system. Amount of lubricant to be added Part replaced Evaporator Condenser . Carry out the A/C performance test. b Lubricant to be added to system Amount of lubricant m! (Imp fl oz) 75 (2.6) 75 (2.6) Liquid tank 5 (0.2) In case of refrigerant leak 30 (1.1) — Remarks — — Add if compressor is not replaced. *1 Large leak Small leak*2 *1: If compressor is replaced, addition of lubricant is included in the flow chart. *2: If refrigerant leak is small, no addition of lubricant is needed.
HA-114 MANUAL AND AUTO SERVICE PROCEDURES Maintenance of Lubricant Quantity in Compressor (Cont’d) j A . 1. Discharge refrigerant into the refrigerant recovery/recycling equipment. Measure lubricant discharged into the recovery/ recycling equipment. 2. Remove the drain plug of the ‘‘old’’ (removed) compressor.
Drain the lubricant into a graduated container and record the amount of drained lubricant. 3. Remove the drain plug and drain the lubricant from the ‘‘new’’ compressor into a separate, clean container. 4. Measure an amount of new lubricant installed equal to amount drained from ‘‘old’’ compressor. Add this lubricant to ‘‘new’’ compressor through the suction port opening. 5. Measure an amount of new lubricant equal to the amount recovered during discharging. Add this lubricant to ‘‘new’’ compressor through the suction port opening. 6. Torque the drain plug. 14 - 16 Nzm (1.4 - 1.6 kg-m, 10 - 12 ft-lb) 7. If the liquid tank also needs to be replaced, add an additional 5 m! (0.2 Imp fl oz) of lubricant at this time. Do not add this 5 m! (0.2 Imp fl oz) of lubricant if only replacing the compressor.
RHA065DE HA-115 SERVICE PROCEDURES MANUAL AND AUTO Ventilation Air Filter FUNCTION Air inside passenger compartment is kept clean at either recirculation or fresh mode by installing ventilation air filter into cooling unit. RHA042G REPLACEMENT TIMING Replace ventilation air filter. Refer to ‘‘PERIODIC MAINTENANCE’’ in MA section. Caution label is fixed inside the glove box. SHA868E REPLACEMENT PROCEDURES + + + + + + Remove glove box. Remove instrument reinforcement from instrument panel. Remove ventilation air filter fixed clip. Take out ventilation air filter from cooling unit. Replace with new one and reinstall on cooling unit. Reinstall instrument reinforcement, glove box and undercover. RHA953F HA-116 SERVICE PROCEDURES FOR LHD MODELS RD engine MANUAL AND AUTO Refrigerant Lines + Refer to page HA-3 regarding ‘‘Precautions for Refrigerant Connection’’. RHA747G HA-117 SERVICE PROCEDURES Refrigerant Lines (Cont’d) MANUAL AND AUTO FOR RHD MODELS RD engine RHA740G HA-118 SERVICE PROCEDURES MANUAL AND AUTO Checking Refrigerant Leaks PRELIMINARY CHECK Perform a visual inspection of all refrigeration parts, fittings, hoses, and components for signs of A/C lubricant leakage, damage and corrosion. PRECAUTIONS FOR HANDLING LEAK DETECTOR SHA705EB When performing a refrigerant leak check, use an A/C leak detector or equivalent. Ensure that the instrument is calibrated and set properly per the operating instructions. The leak detector is a delicate device. In order to use the leak detector properly, read the operating instructions and perform any specified maintenance. Other gases in the work area or substances on the A/C components, for example, anti-freeze, windshield washer fluid, solvents and cleaners, may falsely trigger the leak detector. Make sure the surfaces to be checked are clean. Do not allow the sensor tip of the detector to come into contact with any substance. This can also cause false readings and may damage the detector. 1.
Position probe approximately 5 mm (3/16 in) away from point to be checked. SHA707EA 2. When testing, circle each fitting completely with probe. SHA706E HA-119 MANUAL AND AUTO SERVICE PROCEDURES Checking Refrigerant Leaks (Cont’d) 3. Move probe along component approximately 25 to 50 mm (1 to 2 in)/sec. SHA708EA CHECKING PROCEDURE To prevent inaccurate or false readings, make sure there is no refrigerant vapor or tobacco smoke in the vicinity of the vehicle.
Perform the leak test in calm area (low air/wind movement) so that the leaking refrigerant is not dispersed. 1. Turn engine off.
2. Connect a suitable A/C manifold gauge set to the A/C service ports. 3. Check if the A/C refrigerant pressure is at least 345 kPa (3.452 bar, 3.52 kg/cm2, 50 psi) above 16°C (61°F). If less than specification, evacuate and recharge the system with the specified amount of refrigerant. NOTE: At temperatures below 16°C (61°F), leaks may not be detected since the system may not reach 345 kPa (3.452 bar, 3.52 kg/cm2, 50 psi). 4.
Conduct the leak test from the high side to the low side at points a , j b ......). Refer to HA-117. in alphabetical order (j Perform a leak check for the following areas carefully. Clean the component to be checked and move the leak detector probe completely around the connection/component.
+ Compressor Check the fitting of high and low pressure hoses, relief valve and shaft seal. + Liquid tank Check the pressure switch, tube fitting, weld seams and the fusible plug mounts. + Service valves Check all around the service valves. Ensure service valve caps are secured on the service valves (to prevent leaks). NOTE: After removing A/C manifold gauge set from service valves, wipe any residue from valves to prevent any false readings by leak detector. + Cooling unit (Evaporator) Turn blower fan on ‘‘High’’ for at least 15 seconds to dissipate any refrigerant trace in the cooling unit. Insert the leak detector probe into the drain hose immediately after stopping the engine. (Keep the probe inserted for at least ten seconds.) 5. If a leak detector detects a leak, verify at least once by blowing compressed air into area of suspected leak, then repeat check. 6. Do not stop when one leak is found. Continue to check for additional leaks at all system components. 7. Start engine. 8. Set the heater A/C control as follows: a. A/C switch ON b. Face mode c. Recirculation switch ON d. Max cold temperature e. Fan speed high HA-120 MANUAL AND AUTO SERVICE PROCEDURES Checking Refrigerant Leaks (Cont’d) 9. Run engine at 1,500 rpm for at least 2 minutes. 10. Turn engine off and perform leak check again following steps 4 through 6 above. Refrigerant leaks should be checked immediately after stopping the engine. Begin with the leak detector on the high pressure line. The pressure in the high pressure line will gradually drop after refrigerant circulation stops and pressure in the low pressure line will gradually rise, as shown in the graph. Leaks are more easily detected when pressure is high. SHA839E 11.
Discharge A/C system using approved refrigerant recovery equipment. Repair the leaking fitting or component as necessary. 12. Evacuate and recharge A/C system and perform the leak test to confirm no refrigerant leaks. 13. Conduct A/C performance test to ensure system works properly. HA-121 SERVICE PROCEDURES MANUAL AND AUTO Compressor Mounting RHA842AA HA-122 SERVICE PROCEDURES MANUAL AND AUTO Compressor — DKS-17CH SHA049F Compressor Clutch REMOVAL + When removing center bolt, hold clutch disc with clutch disc wrench. + Remove the drive plate using Tool. Insert holder’s three pins into the drive plate. Rotate the holder clockwise to hook it onto the plate. Then, tighten the center bolt to remove the drive plate. After removing the drive plate, remove the shims from either the drive shaft or the drive plate. + Remove the snap ring using external snap ring pliers. SHA792E SHA793E SHA794E HA-123 MANUAL AND AUTO SERVICE PROCEDURES Compressor Clutch (Cont’d) + Pulley removal Use any commercially available pulley puller and tool. Position the center of it on the end of the tool, and remove the pulley assembly. For pressed pulleys To prevent deformation of the pulley groove, the puller claws should be hooked under the pulley (not into the groove). For machine latched pulleys Align the pulley puller groove with the pulley groove, and then remove the pulley assembly.
+ Remove the three field coil fixing screws and remove the field coil.
SHA050F SHA051F INSPECTION Clutch disc: If the contact surface shows signs of damage due to excessive heat, replace clutch disc and pulley. Pulley: Check the appearance of the pulley assembly. Check the contact surface of the pulley for any sign of excessive grooving due to slippage. If any sign is found, replace both the pulley and clutch disc. The contact surfaces of the pulley assembly should be cleaned with a suitable solvent before reinstallation. Coil: Check coil for loose connection or cracked insulation.
RHA075C INSTALLATION + Install the field coil. Be sure to align the coil’s pin with the hole in the compressor’s front head. SHA051F + Install the pulley assembly using the installer and a hand press, and then install the snap ring using snap ring pliers.
SHA797EA HA-124 MANUAL AND AUTO SERVICE PROCEDURES Compressor Clutch (Cont’d) + Install the drive plate on the drive shaft, together with the original shim(s). Press the drive plate down by hand. SHA798E Using the holder to prevent drive plate rotation, tighten the bolt to 12 to 14 Nzm (1.2 to 1.4 kg-m, 9 to 10 ft-lb) torque. After tightening the bolt, check that the pulley rotates smoothly. + SHA799E + Check clearance around the entire periphery of clutch disc. Disc-to-pulley clearance: 0.3 - 0.6 mm (0.012 - 0.024 in) If the specified clearance is not obtained, replace adjusting shim and readjust. BREAK-IN OPERATION SHA052F When replacing compressor clutch assembly, always conduct the break-in operation. This is done by engaging and disengaging the clutch about thirty times.
Break-in operation raises the level of transmitted torque. HA-125 SERVICE DATA AND SPECIFICATIONS (SDS) MANUAL AND AUTO General Specifications COMPRESSOR LUBRICANT Model Type Displacement 3 cm (cu in)/rev. Cylinder bore x stroke mm (in) Direction of rotation Drive belt ZEXEL make DKS-17CH Model ZEXEL make DKS-17CH Swash plate Type KLH00-PAGS0 168 (10.25) Capacity 37.0 x 25.8 (1.457 x 1.016) Clockwise (Viewed from drive end) m! (lmp fl oz) Total in system 300 (10.6) Compressor (Service parts) charging amount 300 (10.6) A Type Inspection and Adjustment REFRIGERANT COMPRESSOR Front A/C Type Capacity Model HFC-134a (R-134a) kg (lb) Clutch disc-to-pulley clearance mm (in) 0.75 - 0.85 (1.65 - 1.87) ENGINE IDLING SPEED (When A/C is ON.) + Refer to EC section. BELT TENSION + Refer to MA section (‘‘Checking Drive Belts’’, ‘‘ENGINE MAINTENANCE’’). HA-126 DKS-17CH 0.3 - 0.6 (0.012 - 0.024) ALPHABETICAL INDEX SECTION IDX IDX ALPHABETICAL INDEX A A/C HFC134a
(R134a) system service procedure..........HA-112 A/C HFC134a system service equipment precaution..........HA-9 A/C air flow..........HA-13 A/C component layout..........HA-12 A/C compressor precaution..........HA-6 A/C compressor special service tool ....HA-6, 7 A/C control linkage adjustment (auto A/C)..........HA-77 A/C control operation (manual A/C) ....HA-16 A/C harness layout (manual A/C) ....HA-17 A/C lubricant (R134a)..........HA-114 A/C relay..........HA-97 A/C self-diagnoses (auto A/C)..........HA-63 A/CCUT - Wiring diagram ....EC-186 A/T control ....EC-174 ABS sensor rotor ....FA-15 ACC/SW - Wiring diagram ....EC-105 ACL/SW - Wiring diagram..........EC-164 ADJRES - Wiring diagram ....EC-91 APS - Wiring diagram ....EC-138 AT/C - Wiring diagram..........EC-174 AUDIO - Wiring diagram..........EL-168 Accelerator position sensor..........EC-164 Accelerator position switch (F/C)..........EC-105 Adjustment resistor..........EC-91 Air bag disposal..........RS-17 Air bag ....RS-8 Air bleeding (hydraulic clutch) ....CL-6 Air bleeding for brake system ....BR-4 Air cleaner filter replacement..........MA-18 Air conditioner cut control ....EC-19 Air flow meter - See Mass air flow sensor ....EC-73 Air mix door control linkage adjustment..........HA-81 Alternator..........EL-56 Antenna - See Power antenna ....EL-181 Audio and A/C control removal and installation - See Instrument panel ....BT-11 Audio ....EL-168 Auto lock free running hub ....FA-13 Automatic amplifier..........HA-61 Axle housing (rear)..........RA-9 B BACK/L - Wiring diagram..........EL-78 Back door opener - See Back door..........BT-6 Back door trim..........BT-24 Back door window..........BT-45 Back door..........BT-6 Back-up lamp switch (M/T) ....MT-4 Back-up lamp ....EL-78 Battery..........EL-37 Baulk ring (M/T)..........MT-10
Body alignment ....BT-49 Body mounting ....BT-48 Brake booster ....BR-15 Brake fluid change ....BR-3 Brake fluid level and line check ....BR-3 Brake fluid level ....MA-23 Brake hydraulic line..........BR-5 Brake inspection ....MA-24 Brake master cylinder ....BR-12 Brake pedal ....BR-10 Bulb specifications ....EL-314 Bumper, front ....
BT-4 Bumper, rear ....BT-6 C CD/CHG - Wiring diagram ....EL-176 CHIME - Wiring diagram..........EL-136 CIGAR - Wiring diagram..........EL-156 CKPS - Wiring diagram..........EC-143 CLOCK - Wiring diagram..........EL-157 CMPS - Wiring diagram ....EC-68 COMPAS - Wiring diagram ....EL-117 CONSULT for ECCS ....EC-36 CONSULT general information..........GI-33 COOL/F - Wiring diagram ....EC-112 CSPS - Wiring diagram..........EC-86 Cab body..........BT-47 Camshaft inspection ....EM-36 Camshaft position sensor (PUMP)..........EC-68 Center case (Transfer)..........TF-10 Charge air cooler fan control ....EC-177 Charge air temperature sensor ....EC-121 Chassis and body maintenance ....MA-20 Cigarette lighter..........EL-156
Circuit breaker..........EL-14 Clock ....EL-157 Clutch booster..........CL-9 Clutch cover..........CL-14 Clutch damper ....CL-7 Clutch disc ....CL-13 Clutch fluid level..........MA-20 Clutch master cylinder ....CL-7 Clutch operating cylinder ....CL-8 Clutch pedal..........CL-5 Clutch release bearing..........CL-11 Clutch release mechanism ....CL-11 Clutch withdrawal lever..........CL-11
Coil spring (front) ....FA-25 Coil spring (rear) ....RA-14 Collision diagnosis..........RS-45 Combination meter removal and installation - See Instrument panel..........BT-11 IDX-2 ALPHABETICAL INDEX Combination meter..........EL-102 Combination switch..........EL-57 Combustion chamber replacement..........EM-32 Compass ....EL-116 Compression pressure..........EM-10 Compressor special service tool ....HA-6 Connecting rod..........EM-47 Connecting rod..........EM-51
Connector inspection..........GI-17 Console box - See Instrument panel ....BT-11 Control lever (Transfer)..........TF-9 Control sleeve position sensor..........EC-86 Coolant mixture ratio..........MA-11 Coolant replacement..........MA-14 Cooling circuit (engine)..........LC-9 Cooling fan control ....EC-112 Cooling fan motor..........EC-120 Cooling fan relay ....EC-120 Cooling fan..........LC-15 Counter gear (M/T)..........MT-10 Counter gear (Transfer) TF-11
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PRECAUTIONS AND PREPARATION Liquid Gasket Application Procedure SEM164F a. Use a scraper to remove all traces of old liquid gasket from mating surfaces and grooves. Also, completely clean any oil from these areas. b. Apply a continuous bead of liquid gasket to mating surfaces. (Use Genuine Liquid Gasket or equivalent.) + For oil pan, be sure liquid gasket diameter is 3.5 to 4.5 mm (0.138 to 0.177 in). + For areas except oil pan, be sure liquid gasket diameter is 2.0 to 3.0 mm (0.079 to 0.118 in). c.
Apply liquid gasket around the inner side of bolt holes (unless otherwise specified). d. Assembly should be done within 5 minutes after coating. e. Wait at least 30 minutes before refilling engine oil and engine coolant.
AEM080 LC-1 PRECAUTIONS AND PREPARATION Special Service Tools *: Special tool or commercial equivalent Tool number Tool name Description ST25051001* Oil pressure gauge Measuring oil pressure Maximum measuring range: 2,452 kPa (24.5 bar, 25 kg/cm2, 356 psi) NT558 ST25052000* Hose Adapting oil pressure gauge to cylinder block NT559 EG17650301 Radiator cap tester adapter Adapting radiator cap tester to radiator filler neck a: 28 (1.10) dia. b: 31.4 (1.236) dia. c: 41.3 (1.626) dia. Unit: mm (in) NT564 KV99103510 Radiator plate pliers A Installing radiator upper and lower tanks NT224 KV99103520 Radiator plate pliers B Removing radiator upper and lower tanks NT225 WS39930000 Tube presser Pressing the tube of liquid gasket NT052 LC-2 ENGINE LUBRICATION SYSTEM Lubrication Circuit SLC201B Oil Pressure Check WARNING: + Be careful not to burn yourself, as the engine and oil may be hot. + Oil pressure check should be done in ‘‘Neutral’’ gear position. SLC694A 1. Check oil level. 2. Remove oil pressure switch. SLC194B LC-3 ENGINE LUBRICATION SYSTEM Oil Pressure Check (Cont’d) 3. Install pressure gauge. 4. Start engine and warm it up to normal operating temperature. 5. Check oil pressure with engine running under no-load. SLC993 Engine rpm Approximate discharge pressure kPa (bar, kg/cm2, psi) Idle speed 3,000 More than 78 (0.78, 0.8, 11) 318.7 - 424.6 (3.19 - 4.25, 3.25 - 4.33, 46.2 - 61.6) If difference is extreme, check oil passage and oil pump for oil leaks. 6. Install oil pressure switch with sealant. Use proper liquid sealant. Oil pressure switch: : 10 - 16 Nzm (1.0 - 1.6 kg-m, 87 - 139 in-lb) Oil Pump REMOVAL AND INSTALLATION 1. Disconnect battery terminal. 2. Drain engine oil. 3.
Drain coolant from radiator and cylinder block. Refer to MA section (‘‘Changing Engine Coolant’’, ‘‘ENGINE MAINTENANCE’’). 4. Remove radiator shroud. 5. Remove drive belts. Refer to MA section (‘‘Checking Drive Belts’’). 6. Remove crankshaft pulley and front upper and lower belt covers. Refer to EM section (‘‘TIMING BELT’’). 7.
Remove oil pan. Refer to EM section (‘‘OIL PAN’’).
8. Remove oil strainer. 9. Remove oil pump assembly. 10. Installation is in reverse order of removal.
+ Before installing oil pump, remove liquid gasket from mating surface of oil pump using a scraper. Be sure liquid gasket in grooves is also removed. + Remove liquid gasket from mating surface of cylinder block. + Clean all traces of liquid gasket using white gasoline. LC-4 ENGINE LUBRICATION SYSTEM Oil Pump (Cont’d) SLC195B REGULATOR

VALVE INSPECTION 1. Visually inspect components for wear and damage.

2. Check oil pressure regulator valve sliding surface and valve spring.

3. Coat regulator valve with engine oil and check to make sure that it falls smoothly into the valve hole by its own weight. If damaged, replace regulator valve set or oil pump assembly. SLC295 OIL PRESSURE RELIEF VALVE INSPECTION Inspect oil pressure relief valve for movement, cracks and breaks by pushing the ball. If replacement is necessary, remove valve by prying it out with a screwdriver. Install a new valve in place by tapping it. SLC994 LC-5 ENGINE LUBRICATION SYSTEM Oil Pump (Cont’d) OIL PUMP INSPECTION Using a feeler gauge, check the following clearance. Unit: mm (in) Body to outer gear clearance 1 V Inner gear to crescent clearance 2 V Outer gear to crescent clearance V 3 Housing to inner gear clearance V 4 Housing to outer gear clearance V 5 SLC779 Inner gear to brazed portion of housing clearance V 6 =A− B 0.11 - 0.20 (0.0043 - 0.0079) 0.216 - 0.326 (0.0085 - 0.0128) 0.21 - 0.32 (0.0083 - 0.0126) 0.05 - 0.09 (0.0020 - 0.0035) 0.05 - 0.11 (0.0020 - 0.0043) 0.106 - 0.152 (0.0042 - 0.0060) If it exceeds the limit, replace gear set or entire oil pump assembly. SLC780 SLC015A SLC016A LC-6 ENGINE LUBRICATION SYSTEM Oil Cooler REMOVAL AND INSTALLATION SLC196B Install oil cooler as shown in the figure. INSPECTION 1. Check oil cooler element and bracket for cracks. 2. Check coolant inlet of oil cooler for clogging by blowing through it. Replace it if necessary. Oil Jet INSPECTION 1. Push cut-off valve of oil jet bolt with a clean resin or brass rod and make sure that cut-off valve moves smoothly with proper repulsion. 2. Make sure that the oil jet passage is not clogged.

Clean with a wire if necessary. SLC015 LC-7 ENGINE LUBRICATION SYSTEM Oil Jet (Cont’d) When installing oil jet, align oil jet’s boss with hole on cylinder block. Oil jet bolt: : 30 - 40 Nzm (3.1 - 4.1 kg-m, 22 - 30 ft-lb) SLC975 Turbocharger SLC197B + + + Before removing water tube, drain coolant first. Be careful not to deform tubes. After installation, run engine for a few minutes, and check for oil leakage. LC-8 ENGINE COOLING SYSTEM Cooling Circuit SLC226A System Check WARNING: Never remove the radiator cap when the engine is hot; serious burns could be caused by high pressure fluid escaping from the radiator. Wrap a thick cloth around cap and carefully loosen it a quarter turn to release built-up pressure. Then remove the cap completely. CHECKING COOLING SYSTEM HOSES Check hoses for proper attachment, leaks, cracks, damage, loose connections, chafing and deterioration. CHECKING RADIATOR CAP Apply pressure to radiator cap by means of a cap tester to see if it is satisfactory. Radiator cap relief pressure: 78 - 98 kPa (0.78 - 0.98 bar, 0.8 - 1.0 kg/cm2, 11 - 14 psi) SLC613 LC-9 ENGINE COOLING SYSTEM System Check (Cont’d) Pull the negative pressure valve to open it. Check that it closes completely when released. SMA967B CHECKING COOLING SYSTEM FOR LEAKS Apply pressure to the cooling system by means of a tester to check for leakage. Testing pressure: 98 kPa (0.98 bar, 1.0 kg/cm2, 14 psi) CAUTION: Use of pressure higher than the specified value may cause damage to radiator. SMA007D Water Pump CAUTION: + When removing water pump assembly, be careful not to get coolant on drive belts. + Water pump cannot be disassembled and should be replaced as a unit. + After installing water pump, connect hose and clamp securely, then check for leaks using radiator cap tester. REMOVAL SMA003D 1. Drain coolant from radiator and cylinder block. Cylinder block drain plug (Use proper sealant): : 34 - 44 Nzm (3.5 - 4.5 kg-m, 25 - 33 ft-lb) Refer to MA section (‘‘Changing Engine Coolant’’, ‘‘ENGINE MAINTENANCE’’). 2. Remove radiator shroud. 3. Remove drive belts. Refer to MA section (‘‘Checking Drive Belts’’). 4.

Remove fan coupling with fan. 5. Remove water pump. LC-10 ENGINE COOLING SYSTEM Water Pump (Cont’d) SLC997-A INSPECTION 1. Check for rusted or corroded body assembly and vane. 2. Check for excessive end play and rough operation. INSTALLATION Remove liquid gasket from mating surface of pump housing using a scraper. Be sure liquid gasket in grooves is also removed. + Remove liquid gasket from mating surface of cylinder block.

+ Clean all traces of liquid gasket using white gasoline. + SLC998 + + Cut off tip of nozzle of liquid gasket tube at point shown in figure. Use Genuine Liquid Gasket or equivalent. SLC822 LC-11 ENGINE COOLING SYSTEM Water Pump (Cont’d) Apply a continuous bead of liquid gasket to mating surface of pump housing as shown. a. Be sure diameter of liquid gasket is within 2.0 to 3.0 mm (0.079 to 0.118 in) dia. range. b. Attach pump housing to cylinder block within five minutes of applying liquid gasket. c. After installing pump housing, wait at least 30 minutes before starting engine. + SLC001A Thermostat SLC002A INSPECTION 1. Check valve seating condition at ordinary temperatures. It should seat tightly. 2. Check valve opening temperature and maximum valve lift.

Valve opening temperature Maximum valve lift C° (°F) mm/°C (in/°F) 82.0 (180) 10/90 (0.39/194) 3. Then check if valve closes at 5°C (9°F) below valve opening temperature. SLC343 INSTALLATION + + + Remove liquid gasket from mating surface of thermostat using a scraper. Similarly, remove liquid gasket from mating surface of cylinder block. Clean all traces of liquid gasket using white gasoline. Scraper SLC790 LC-12 ENGINE COOLING SYSTEM Thermostat (Cont’d) + + Cut off tip of nozzle of liquid gasket at point shown in figure. Use Genuine Liquid Gasket or equivalent. SLC822 Diameter of liquid gasket: 2.0 - 3.0 mm (0.079 - 0.118 in) Apply a continuous bead of liquid gasket to mating surface of water inlet.

a. Be sure diameter of liquid gasket is within 2.0 to 3.0 mm (0.079 to 0.118 in).

b. Attach water inlet to cylinder block within five minutes after applying liquid gasket. c. After installing water inlet, wait at least 30 minutes before refilling coolant and starting engine. + SLC824 LC-13 ENGINE COOLING SYSTEM Radiator REMOVAL AND INSTALLATION 1. 2. 3. 4. 5. 6. 7.

Remove under cover. Drain coolant from radiator drain plug. Disconnect radiator upper and lower hoses. Remove radiator lower shroud. Disconnect reservoir tank hose. Remove radiator. After repairing or replacing radiator, install any part removed in reverse order of removal. SLC198B Refilling Engine Coolant For details on refilling engine coolant, refer to MA section (‘‘REFILLING ENGINE COOLANT’’, ‘‘Changing Engine Coolant’’). LC-14 ENGINE COOLING SYSTEM Cooling Fan (Crankshaft driven) DISASSEMBLY AND INSTALLATION + + + SLC176B + Do not release the drive belt tension by removing the fan/water pump pulley. Fan coupling cannot be disassembled and should be replaced F is present, install fan so that side as a unit. If front mark j F faces the front. marked j Install the drive belt only after the fan and fan coupling to water pump flange bolts/nuts have been properly torqued. Proper alignment of these components is essential. Improper alignment will cause them to wobble and may eventually cause the fan to separate from the water pump causing extensive damage. INSPECTION Check fan coupling for damage, oil leakage and bent bimetal.

SLC072 Cooling Fan (Motor driven) Cooling fan is controlled by ECM. For details, refer to ‘‘Cooling Fan’’, ‘‘TROUBLE DIAGNOSIS FOR DTC 28’’ in EC section. SLC177B LC-15 ENGINE COOLING SYSTEM Radiator (Aluminum type) SLC882AB Aluminum radiator can be disassembled by using special procedures and special service tools. DISASSEMBLY 1. Remove tank with Tool. SLC903 Grip the crimped edge and bend it upwards so that Tool slips off. Do not bend excessively. + SLC893 LC-16 ENGINE COOLING SYSTEM Radiator (Aluminum type) (Cont’d) In areas where Tool cannot be used, use a screwdriver to bend the edge up.

Be careful not to damage tank. + SLC908A 2. Make sure the edge stands straight up. 3. Remove oil cooler from tank. (A/T model only) SLC931 ASSEMBLY 1. Install oil cooler. Pay attention to direction of conical washer. SLC894 2. Clean contact portion of tank. SLC932 3. Install sealing rubber. Push it in with fingers. Be careful not to twist sealing rubber. SLC917A LC-17 ENGINE COOLING SYSTEM Radiator (Aluminum type) (Cont’d) 4. Caulk tank in specified sequence with Tool. SLC904 SLC896 + Use pliers in the locations where Tool cannot be used. SLC897 5. Make sure that the rim is completely crimped down. Standard height ‘‘H’’: 10.0 - 11.0 mm (0.394 - 0.433 in) 6. Confirm that there is no leakage.

Refer to Inspection. SLC554A LC-18 ENGINE COOLING SYSTEM Radiator (Aluminum type) (Cont’d) INSPECTION 1. Apply pressure with Tool. Specified pressure value: 98 kPa (0.98 bar, 1.0 kg/cm2, 14 psi) WARNING: To prevent the risk of the hose coming undone while under pressure, securely fasten it down with a hose clamp. Attach a hose to the oil cooler as well. SLC933 2. Check for leakage. SLC934 LC-19 ENGINE COOLING SYSTEM Overheating Cause Analysis Symptom Check items Water pump malfunction Worn or loose drive belt Thermostat stuck closed Poor heat transfer — Dust contamination or paper clogging Damaged fins — Mechanical damage Clogged radiator cooling tube Excess foreign material (rust, dirt, sand, etc.) Cooling fan does not operate Fan coupling does not operate Reduced air flow — — High resistance to fan rotation Damaged fan blades Cooling system parts malfunction Damaged radiator shroud — — — Improper coolant mixture ratio — — — Poor coolant quality — — — Loose clamp Cooling hose Cracked hose Water pump Poor sealing Loose Radiator cap Poor sealing Coolant leaks O-ring for damage, deterioration or improper fitting Insufficient coolant Radiator Cracked radiator tank Cracked radiator core Reservoir tank Cracked reservoir tank Cylinder head deterioration Overflowing reservoir tank Exhaust gas leaks into cooling system Cylinder head gasket deterioration High engine rpm under no load Abusive driving Driving in low gear for extended time Driving at extremely high speed — Overload on engine Powertrain system malfunction Installed improper size wheels and tires Except cooling system parts malfunction — Dragging brakes Improper ignition timing Blocked bumper — Installed car brassiere Blocked radiator grille Blocked or restricted air flow Blocked radiator Mud contamination or paper clogging — Blocked condenser — Installed large fog lamp LC-20 — SERVICE DATA AND SPECIFICATIONS (SDS) Engine Lubrication System Oil pressure check Oil pump Engine rpm Approximate discharge pressure kPa (bar, kg/cm2, psi) Idle speed 3,000 More than 78 (0.78, 0.8, 11) 318.7 - 424.6 (3.19 - 4.25, 3.25 - 4.33, 46.2 - 61.6) Body to outer gear clearance 1 V Unit: mm (in) 0.11 - 0.20 (0.0043 - 0.0079) Inner gear to crescent clearance V 2 0.216 - 0.326 (0.0085 - 0.0128) Outer gear to crescent clearance V 3 0.21 - 0.32 (0.0083 - 0.0126) Housing to inner gear clearance V 4 0.05 - 0.09 (0.0020 - 0.0035) Housing to outer gear clearance V 5 0.05 - 0.11 (0.0020 - 0.0043) Inner gear to brazed portion of housing clearance V 6 0.106 - 0.152 (0.0042 - 0.0060) Engine Cooling System Thermostat Valve opening temperature Maximum valve lift Radiator C° (°F) mm/°C (in/°F) 82.0 (180) Cap relief pressure 10/95 (0.39/203) Leakage test pressure LC-21 Unit: kPa (bar, kg/cm2, psi) 78 - 98 (0.78 - 0.98, 0.8 - 1.0, 11 - 14) 157 (1.57, 1.6, 23) MAINTENANCE SECTION MA CONTENTS

PRECAUTIONS AND PREPARATION..........1 Supplemental Restraint System (SRS) ‘‘AIR BAG’’ and ‘‘SEAT BELT PRE-TENSIONER’’..........1 Special Service Tools ....1 PRE-DELIVERY INSPECTION ITEMS..........2 GENERAL MAINTENANCE ....3 PERIODIC MAINTENANCE ....4 Engine Oil & Minor Service ....4 Engine and Emission Control Service..........5 Chassis and Body Services..........6 Maintenance Under Severe Driving Conditions ....8 RECOMMENDED FLUIDS AND LUBRICANTS..........9 Fluids and Lubricants ....9 SAE Viscosity Number ....10 Anti-freeze Coolant Mixture Ratio ....11 ENGINE MAINTENANCE ....12 Checking Tightening Torque ....12 Checking Drive Belt ....12 Changing Engine Oil..........13 Changing Engine Oil Filter ....14 Changing Engine Coolant..........14 Checking Cooling System ....16 Checking and Replacing Fuel Filter and Draining Water ....16 Checking Fuel Lines ....17 Cleaning and Replacing Air Cleaner Filter ....18 Checking Injection Nozzle ....18 Checking Idle Speed ....19 Timing Belt Replacement..........19 CHASSIS AND BODY MAINTENANCE ....20 Checking Exhaust System..........20 Checking Clutch Fluid Level and Leaks..........20 Checking Clutch System ....20 Checking M/T Oil Level and Leaks ....20 Changing M/T Oil..........20 Checking Water Entry..........21 Checking Transfer Fluid Level..........21 Changing Transfer Fluid ....21 Checking Propeller Shaft..........21 Greasing Nipples of Propeller Shafts ....21 Checking Differential Gear Oil..........22 Changing Differential Gear Oil ....22 Checking Front Wheel Bearing Grease ....22 Repacking Front Wheel Bearing and Axle Joint Grease ....23 Checking Free-running Hub Grease ....23 Checking Water Entry in Knuckle Flange..........23 Checking Brake Fluid Level and Leaks..........23 Checking Brake System ....24 Changing Brake Fluid ....24 Checking Brake Booster, Vacuum Hoses, Connections and Check Valve ....24 Checking Disc Brake ....24 Balancing Wheels ....25 Tire Rotation ....25 Checking Power Steering Fluid and Lines ....26 Checking Steering Damper ....26 Checking Steering Gear Box and Linkage..........26 Lubricating Locks, Hinges and Hood Latches..........27 Checking Seat Belts, Buckles, Retractors, Anchors and Adjusters..........27 Checking Body Corrosion..........28 SERVICE DATA AND SPECIFICATIONS (SDS) ....29 Engine Maintenance ....29 Chassis and Body Maintenance..........29

MA PRECAUTIONS AND PREPARATION Supplemental Restraint System (SRS) ‘‘AIR BAG’’ and ‘‘SEAT BELT PRE-TENSIONER’’ The Supplemental Restraint System such as ‘‘AIR BAG’’ and ‘‘SEAT BELT PRE-TENSIONER’’ used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The SRS composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination.): Driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioner, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual.

Spiral cable and wiring harnesses covered with yellow insulation either just before the harness connectors or for the complete harness are related to the SRS. Special Service Tools Tool number Tool name Description EG17650301 Radiator cap tester adapter Adapting radiator cap tester to radiator filler neck a: 28 (1.10) dia. b: 31.4 (1.236) dia. c: 41.3 (1.626) dia. Unit: mm (in) NT564 KV10113600 Fuel filter wrench Oil filter wrench Removing fuel filter Removing oil filter a: Max. 100 mm (3.94 in) dia. NT553 MA-1 PRE-DELIVERY INSPECTION ITEMS Shown below are Pre-delivery Inspection Items required for the new vehicle. It is recommended that necessary items other than those listed here be added, paying due regard to the conditions in each country. Perform applicable items on each model.

Consult text of this section for specifications. UNDER HOOD — engine off UNDER BODY h Radiator coolant level and coolant hose connections for leaks h Battery fluid level, specific gravity and conditions of battery terminals h Drive belts tension h Fuel filter for water or dusts, and fuel lines and connections for leaks h Engine oil level and oil leaks h Clutch and brake reservoir fluid level and fluid lines for leaks h Windshield and rear window washer and headlamp cleaner reservoir fluid level h Power steering reservoir fluid level and hose connections for leaks h Manual transmission/transaxle gear oil, transfer fluid and differential gear oil level h Brake and fuel lines and oil/fluid reservoirs for leaks h Tighten bolts and nuts of steering linkage and gear box, suspension, propeller shafts and drive shafts X h Tighten rear body bolts and nuts (Models with wooden bed only) ON INSIDE AND OUTSIDE X h Remove front spring/strut spacer (If applicable) h Operation of all instruments, gauges, lights and accessories h Operation of horn(s), wiper and washer h Steering lock for operation h Check air conditioner for gas leaks h Front and rear seats, and seat belts for operation h All moldings, trims and fittings for fit and alignment h All windows for operation and alignment h Hood, trunk lid, door panels for fit and alignment h Latches, keys and locks for operation h Weatherstrips for adhesion and fit h Headlamp aiming h Tighten wheel nuts (Inc. inner nuts if applicable) h Tire pressure (Inc. spare tire) h Check front wheels for toe-in h Install clock/voltmeter/room lamp fuse (If applicable) X h Install deodorizing filter to air purifier (If applicable) X h Remove wiper blade protectors (If applicable) ROAD TEST Clutch operation Parking brake operation Service brake operation Automatic transmission/transaxle shift timing and kickdown h Steering control and returnability h Engine performance h Squeaks and rattles h h h h ENGINE OPERATING AND HOT h Adjust idle mixture and speed (and ignition timing*1) h Automatic transmission/transaxle fluid level h Engine idling and stop knob operation (Diesel only) FINAL INSPECTION h Install necessary parts (outside mirror, wheel covers, seat belts, mat, carpet or mud flaps) h Inspect for interior and exterior metal and paint damage h Check for spare tire, jack, tools (wheel chock), and literature h Wash, clean interior and exterior *1: Not required on models with a direct ignition system X h : Not applicable to this model. MA-2 GENERAL MAINTENANCE General maintenance includes those items which should be checked during the normal day-to-day operation of the vehicle. They are essential if the vehicle is to continue operating properly. The owners can perform the checks and inspections themselves or they can have their NISSAN dealers do them. Item Reference pages OUTSIDE THE VEHICLE The maintenance items listed here should be performed from time to time, unless otherwise specified. Tires Check the pressure with a gauge periodically when at a service station, including the spare, and adjust to the specified pressure if necessary. Check carefully for damage, cuts or excessive wear. — Windshield wiper blades Check for cracks or wear if they do not wipe properly. — Doors and engine hood Check that all doors, the engine hood, the trunk lid and back door operate properly. Also ensure that all latches lock securely. Lubricate hinges, latches, rollers and links if necessary. Make sure that the secondary latch keeps the hood from opening when the primary latch is released. When driving in areas using road salt or other corrosive materials, check for lubrication frequently. MA-27 Tire rotation Tires should be rotated every 5,000 km (3,000 miles) for 4WD models. MA-25 INSIDE THE VEHICLE The maintenance items listed here should be checked on a regular basis, such as when performing periodic maintenance, cleaning the vehicle, etc. Lights Make sure that the headlights, stop lights, tail lights, turn signal lights, and other lights are all operating properly and installed securely. Also check headlight aim. — Warning lights and chimes Make sure that all warning lights and chimes are operating properly. — Steering wheel Check for change in the steering conditions, such as excessive free play, hard steering or strange noises. Free play: Less than 35 mm (1.38 in) — Seat belts Check that all parts of the seat belt system (e.g. buckles, anchors, adjusters and retractors) operate properly and smoothly, and are installed securely. Check the belt webbing for cuts, fraying, wear or damage. MA-27 UNDER THE HOOD AND VEHICLE The maintenance items listed here should be checked periodically e.g. each time you check the engine oil or refuel. Windshield washer fluid Check that there is adequate fluid in the tank. — Engine coolant level Check the coolant level when the engine is cold.

MA-14, 15 Engine oil level Check the level after parking the vehicle on a level spot and turning off the engine.

MA-13, 14 Brake and clutch fluid level Make sure that the brake and clutch fluid levels are between the ‘‘MAX’’ and ‘‘MIN’’ lines on the reservoir. MA-20, 23 Battery Check the fluid level in each cell.

It should be between the ‘‘MAX’’ and ‘‘MIN’’ lines. MA-3 — PERIODIC MAINTENANCE The following tables show the normal maintenance schedule. Depending upon weather and atmospheric conditions, varying road surfaces, individual driving habits and vehicle usage, additional or more frequent maintenance may be required. Periodic maintenance beyond the last period shown on the tables requires similar maintenance. Engine Oil & Minor Service Annual driving distance below 30,000 km (18,000 miles) Abbreviations: R = Replace, I = Inspect and correct or replace as necessary. MAINTENANCE OPERATION Perform either at number of kilometers (miles) or months, whichever comes first. km x 1,000 10 20 30 40 50 60 70 80 90 (Miles x 1,000) (6) (12) (18) (24) (30) (36) (42) (48) (54) 6 12 18 24 30 36 42 48 (54) Months Reference page Underhood and under vehicle Engine oil (Use API CD oil). R R R R R R R R R MA-14 Engine oil filter. R R R R R R R R R MA-14 Drive belts I I I I I I I I I MA-12 NOTE: Maintenance items with ‘‘.’’ should be performed more frequently according to ‘‘Maintenance Under Severe Driving Conditions’’. Annual driving distance over 30,000 km (18,000 miles) Abbreviations: R = Replace, I = Inspect and correct or replace as necessary.

MAINTENANCE OPERATION km x 1,000 10 20 30 40 50 60 70 80 90 (Miles x 1,000) (6) (12) (18) (24) (30) (36) (42) (48) (54) Reference page Underhood and under vehicle Engine oil (Use API CD oil). R R R R R R R R R MA-14 Engine oil filter. R R R R R R R R R MA-14 Drive belts I I I I I I I I I MA-12 NOTE: Maintenance items with ‘‘.’’ should be performed more frequently according to ‘‘Maintenance Under Severe Driving Conditions’’. MA-4 PERIODIC MAINTENANCE Engine and Emission Control Service Annual driving distance below 30,000 km (18,000 miles) Abbreviations: I = Inspect and correct or replace as necessary, R = Replace, A = Adjust. MAINTENANCE OPERATION Perform either at number of kilometers (miles) or months, whichever comes first. [ ]: At the specified mileage only MAINTENANCE INTERVAL km x 1,000 10 20 30 40 50 60 70 80 90 (Miles x 1,000) (6) (12) (18) (24) (30) (36) (42) (48) (54) 6 12 18 24 30 36 42 48 54 Months Reference page Underhood and under vehicle Engine anti-freeze coolant (Ethylene glycol base, LLC) See NOTE (2) R Cooling system I I MA-14 I MA-16 Fuel lines I I MA-17 Fuel filter R R MA-16 Air cleaner filter (Viscous paper type). R R MA-18 Intake & exhaust valve clearance Injection nozzles A A A A *1 See NOTE (3) MA-18 Timing belts for camshaft and injection pump [R] *2 NOTE: (1) Maintenance items with ‘‘.’’ should be performed more frequently according to ‘‘Maintenance Under Severe Driving Conditions’’. (2) First replace at 80,000 km (48,000 miles) or 48 months, then every 60,000 km (36,000 miles) or 36 months. (3) If engine power decreases, black smoke is emitted or engine noise increases, check and, if necessary, adjust the fuel injection nozzle’s starting pressure and the fuel spray pattern. *1: ‘‘VALVE CLEARANCE’’, RD in EM section *2: ‘‘TIMING BELT’’ RD in EM section Annual driving distance over 30,000 km (18,000 miles) Abbreviations: I = Inspect and correct or replace as necessary, R = Replace, A = Adjust. MAINTENANCE OPERATION MAINTENANCE INTERVAL km x 1,000 10 20 30 40 50 60 70 80 90 (Miles x 1,000) (6) (12) (18) (24) (30) (36) (42) (48) (54) Reference page Underhood and under vehicle Engine anti-freeze coolant (Ethylene glycol base, LLC) See NOTE (2) Cooling system R I I MA-14 MA-16 Fuel lines I MA-17 Fuel filter R MA-16 Air cleaner filter (Viscous paper type). R Intake & exhaust valve clearance Injection nozzles A A MA-18 A See NOTE (3) Timing belts for camshaft and injection pump *1 MA-18 R *2 NOTE: (1) Maintenance items with ‘‘.’’ should be performed more frequently according to ‘‘Maintenance Under Severe Driving Conditions’’. (2) First replace at 90,000 km (54,000 miles), then every 60,000 km (36,000 miles). (3) If engine power decreases, black smoke is emitted or engine noise increases, check and, if necessary, adjust the fuel injection nozzle’s starting pressure and the fuel spray pattern. *1: ‘‘VALVE CLEARANCE’’, RD in EM section *2: ‘‘TIMING BELT’’, RD in EM section MA-5 PERIODIC MAINTENANCE Chassis and Body Services Annual driving distance below 30,000 km (18,000 miles) Abbreviations: R = Replace, I = Inspect, and correct or replace as necessary, L = Lubricate, T = Tighten. [ ]: At the specified mileage only MAINTENANCE OPERATION Perform either at number of kilometers (miles) or months, whichever comes first. MAINTENANCE INTERVAL km x 1,000 10 20 30 40 50 60 70 80 90 (Miles x 1,000) (6) (12) (18) (24) (30) (36) (42) (48) (54) 6 12 18 24 30 36 42 48 54 Months CHASSIS AND BODY Reference page Underhood and under vehicle Brake & clutch fluid (For level & leaks). I I I I MA-23, 20 Brake fluid. R R MA-24 Brake booster vacuum hoses, connections & check valve I I MA-24 Power steering fluid & lines (For level & leaks) I I I I MA-26 Brake & clutch systems I I I I MA-24, 20 Manual transmission oil (For leaks) I I I Manual transmission oil I MA-20 [R] MA-20 MA-21 Transfer fluid I I R I Limited slip differential (LSD) gear oil (For level & leaks).*1 I I R I MA-22 Steering gear & linkage, axle & suspension parts, propeller shaft & exhaust system. I I I I MA-26, 20 *2 Greasing points of propeller shaft L L L MA-21 Drive shafts & steering damper. I I I I *3 T T T T *4 Body mounting bolts & nuts Outside and Inside Wheel alignment (If necessary, rotate & balance wheels) I I I I MA-25, *5 Brake pads, discs & other brake components. I I I I MA-24 Front wheel bearing grease I R I R MA-22 L MA-23 Axle joint in knuckle flange L Free running hub grease I I I I MA-23 Headlamp aiming I I I I *6 Foot brake, parking brake & clutch (For free play, stroke & operation) I I I I Ventilation air filter R R *7 R *8 Body corrosion Annually MA-28 Air bag system See NOTE (1) *9 NOTE: (1) Inspect after 10 years, then every 2 years. (2) Maintenance items with ‘‘.’’ should be performed more frequently according to ‘‘Maintenance Under Severe Driving Conditions’’.

*1: Including differential gear with differential lock *2: ‘‘Front Axle and Front Suspension Parts’’ in FA section, ‘‘Rear Axle and Rear Suspension Parts’’ in RA section *3: ‘‘FRONT AXLE — Drive Shaft’’ in FA section *4: ‘‘CAB BODY’’ in BT section *5: ‘‘Front Wheel Alignment’’ in FA section *6: ‘‘Aiming Adjustment’’ in EL section *7: ‘‘Brake Pedal and Bracket’’ in BR section, ‘‘Adjusting Clutch Pedal’’ in CL section *8: ‘‘Ventilation air filter’’ in HA section *9: ‘‘Maintenance Items’’ in RS section MA-6 PERIODIC MAINTENANCE Chassis and Body Services (Cont’d) Annual driving distance over 30,000 km (18,000 miles) Abbreviations: R = Replace. I = Inspect, and correct or replace as necessary, L = Lubricate, T = Tighten. MAINTENANCE OPERATION CHASSIS AND BODY MAINTENANCE INTERVAL km x 1,000 10 20 30 40 50 60 70 80 90 (Miles x 1,000) (6) (12) (18) (24) (30) (36) (42) (48) (54) Reference page Underhood and under vehicle Brake & clutch fluid (For level & leaks). I I I MA-23, 20 Brake fluid. R MA-24 Brake booster vacuum hoses, connections & check valve I MA-24 Power steering fluid & lines (For level & leaks) I I I MA-26 Brake & clutch systems I I I MA-24, 20 Manual transmission oil (For leaks) I I Manual transmission oil I MA-20 R MA-20 Transfer fluid I R I MA-21 Limited slip differential (LSD) gear oil (For level & leaks).*1 I R I MA-22 Steering gear & linkage, axle & suspension parts, propeller shaft & exhaust system. I I I MA-26, 20 *2 Geasing points of propeller shaft L L L MA-21 Drive shafts & steering damper. I I I *3 Body mounting bolts & nuts T T T *4 Outside and Inside Wheel alignment (If necessary, rotate & balance wheels) I I I MA-25, *5 Brake pads, discs & other brake components. I I I MA-24 Front wheel bearing grease I R I Axle joint in knuckle flange L MA-22 MA-23 Free running hub grease I I I MA-23 Headlamp aiming I I I *6 Foot brake, parking brake & clutch (For free play, stroke & operation) I I I *7 Ventilation air filter R R R *8 Body corrosion Annually MA-28 Air bag system See NOTE (1) *9 NOTE: (1) Inspect after 10 years, then every 2 years. (2) Maintenance items with ‘‘.’’ should be performed more frequently according to ‘‘Maintenance Under Severe Driving Conditions’’. *1: Including differential gear with differential lock *2: ‘‘Front Axle and Front Suspension Parts’’ in FA section, ‘‘Rear Axle and Rear Suspension Parts’’ in RA section *3: ‘‘FRONT AXLE — Drive Shaft’’ in FA section *4: ‘‘CAB BODY’’ in BT section *5: ‘‘Front Wheel Alignment’’ in FA section *6: ‘‘Aiming Adjustment’’ in EL section *7: ‘‘Brake Pedal and Bracket’’ in BR section, ‘‘Adjusting Clutch Pedal’’ in CL section *8: ‘‘Ventilation air filter’’ in HA section *9: ‘‘Maintenance Items’’ in RS section MA-7 PERIODIC MAINTENANCE Maintenance Under Severe Driving Conditions The maintenance intervals shown on the preceding pages are for normal operating conditions. If the vehicle is mainly operated under severe driving conditions as shown below, more frequent maintenance must be performed on the following items as shown in the table. Severe driving conditions A B C D E — — — — — Driving under dusty conditions Driving repeatedly short distances Towing a trailer or caravan Extensive idling Driving in extremely adverse weather conditions or in areas where ambient temperatures are either extremely low or extremely high F — Driving in high humidity areas or in mountainous areas G — Driving in areas using salt or other corrosive materials H — Driving on rough and/or muddy roads or in the desert I — Driving with frequent use of braking or in mountainous areas J — Frequent driving in water Maintenance operation: Check = Check and correct or replace as necessary. Maintenance interval Driving condition Maintenance item Maintenance operation A B C D . . . . . . Engine oil & oil filter A . . . . Air cleaner filter Annual driving distance below 30,000 km over 30,000 km (18,000 miles) (18,000 miles) Reference page Every 3 months or 5,000 km (3,000 miles) Every 5,000 km (3,000 miles) MA-13, 14 Replace Every 30,000 km (18,000 miles) or 18 months Every 30,000 km (18,000 miles) MA-18 Replace Every 20,000 km (12,000 miles) or 12 months Every 30,000 km (18,000 miles) MA-16 Every 30,000 km (18,000 miles) or 18 months Every 30,000 km (18,000 miles) MA-22 Viscous paper type A . . . E . . . . . Fuel filter Replace . . . . . F . . . . Brake fluid Replace .

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C . . . . H . . Limited slip differential (LSD) gear oil*3 Replace . .

. . . . G H .

. Steering gear & linkage, axle & suspension parts & propeller shaft & exhaust system Check . . . . .

. G H . J Greasing points of propeller shafts Lubricate . . C . . . . H . . Drive shafts & steering damper Check A .

C . . . G H I . Brake pads, discs & other brake components Check MA-24 MA-26, 21, 23 *1 Every 10,000 km (6,000 miles) or 6 months Every 15,000 km (9,000 miles) . .

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. . . . J Front wheel bearing grease & free-running hub grease Check MA-21 *1 MA-24 *2, MA-23 *1: ‘‘Front Axle and Front Suspension Parts’’ in FA section, ‘‘Rear Axle and Rear Suspension’’ in RA section *2: ‘‘Front Wheel Alignment’’ in FA section *3: Including differential gear with differential lock Maintenance for off-road driving Whenever you drive off-road through sand, mud or water as deep as the wheel hub, more frequent maintenance may be required of the following items: m Brake pads and discs m Brake lining and drums m Brake lines and hoses m Wheel bearing grease and free-running hub grease m Differential, transmission and transfer oil m Steering linkage m Propeller shafts and front drive shafts m Air cleaner filter m Clutch housing (Check water entry. Refer to MA-21.) MA-8 RECOMMENDED FLUIDS AND LUBRICANTS Fluids and Lubricants Capacity (Approximate) Recommended Fluids/Lubricants Liter Imp measure With oil filter 6.4 5-5/8 qt Without oil filter 5.8 5-1/8 qt 11.8 10-3/8 qt LHD 11.6 10-1/4 qt RHD 12.9 11-3/8 qt LHD 12.7 11-1/8 qt 5.1 9 pt — — API GL-5*1 — — Gear Oil Hypoid LSD (Part No.: KLD3114002) or equivalent*2 1.9 1-5/8 qt Engine oil (Refill) Cooling system (with reservoir tank) With front heater RHD With rear heater Manual transmission Differential carrier gear oil (without limited slip differential) Differential carrier gear oil (with limited slip differential) FS5R30A Transfer fluid TX12A Power steering fluid Brake and clutch fluid Multi-purpose grease Refill to the proper oil level according to the instructions in the ‘‘Do-it-yourself operations’’ section — — Propeller shaft grease Air conditioning system refrigerant Air conditioning system lubricants Anti-freeze coolant (Ethylene glycol base) API GL-4, Viscosity SAE 75W-90 only Genuine Nissan ATF or equivalent*3 or API GL-4*1 Type DEXRONTMIII or equivalent DOT3 or DOT4*5 (US FMVSS No. 116) NLGI No. 2 (Lithium soap base) NLGI No. 2 (Molybdenum disulphide lithium soap base) — — — HFC-134a (R-134a) — Nissan A/C System Oil Type S or exact equivalent *1: For further details, see ‘‘SAE viscosity number’’.

*2: API GL-5, SAE 140 and 10% volume of LSD Friction Modifier (Part No.: 38469-C6000) is an equivalent. *3: For more information regarding suitable fluids, contact a Nissan dealer for correct brands of DEXRONTMIII ATF. *4: If CCMC oils are not available, API CD may be used.

However, CCMC oils are strongly recommended if at all possible. *5: Never mix different types of fluids (DOT3 and DOT4). MA-9 RECOMMENDED FLUIDS AND LUBRICANTS SAE Viscosity Number TI0003 TI0006 + + For cold areas: 10W-30 is preferable for ambient temperature above −20°C (−4°F). On turbocharger models, 5W-20 is not recommended. Use 5W-30 only below 0°C (32°F). For hot and warm areas: 20W-40 and 20W-50 are suitable. + + MA-10 For cold and warm areas: 75W-90 for transfer and 80W-90 for differential are preferable. For hot areas: 90 is suitable for ambient temperatures below 40°C (104°F). RECOMMENDED FLUIDS AND LUBRICANTS Anti-freeze Coolant Mixture Ratio The engine cooling system is filled at the factory with a high-quality, year-round, anti-freeze coolant solution. The anti-freeze solution contains rust and corrosion inhibitors. Therefore, additional cooling system additives are not necessary. CAUTION: When adding or replacing coolant, be sure to use only an ethylene glycol anti-freeze with the proper mixture ratio. See the following examples: Outside temperature down to Antifreeze Soft water °C °F −15 5 30% 70% −35 −30 50% 50% The use of other types of coolant solutions may damage your cooling system. MA-11 ENGINE MAINTENANCE Checking Tightening Torque Checking should be performed while engine is cold. MANIFOLD BOLTS AND NUTS Intake and exhaust manifolds: M10 : 25 - 29 Nzm (2.6 - 3.0 kg-m, 19 - 22 ft-lb) M8 : 16 - 20 Nzm (1.6 - 2.0 kg-m, 12 - 14 ft-lb) Nut : 16 - 20 Nzm (1.6 - 2.0 kg-m, 12 - 14 ft-lb) Checking Drive Belt SMA997C MA-12 ENGINE MAINTENANCE Checking Drive Belt (Cont’d) 1. Inspect for cracks, fraying, wear or oil adhesion. Replace if necessary. The belts should not touch the bottom of the pulley groove. 2. Check drive belt deflection by pushing on the belt midway between pulleys. Adjust if belt deflections exceed the limit. Unit: mm (in) Alternator Air conditioner compressor Power steering oil pump Applied pushing force Used belt deflection Deflection after Limit adjustment 17 (0.67) 12 - 14 (0.47 - 0.55) Deflection of new belt 9 - 11 (0.35 - 0.43) 11 (0.43) 7 - 9 (0.28 - 0.35) 6 - 8 (0.24 - 0.31) 14 (0.55) 10 - 12 (0.39 - 0.47) 9 - 11 (0.35 - 0.43) 98 N (10 kg, 22 lb) Check drive belt deflections when engine is cold. Changing Engine Oil SMA998C WARNING: + Be careful not to burn yourself, as engine oil is hot. + Prolonged and repeated contact with used engine oil may cause skin cancer; try to avoid direct skin contact with used oil. If skin contact is made, wash thoroughly with soap or hand cleaner as soon as possible. 1. Warm up engine, and check for oil leakage from engine components. 2. Remove oil filler cap and drain plug. 3. Drain oil and fill with new engine oil. Oil grade: CCMC PD1 or PD2 Viscosity: See ‘‘RECOMMENDED FLUIDS AND LUBRICANTS’’, MA-9. Refill oil capacity (approximate): Without oil filter change 6.4 ! (5-5/8 Imp qt) With oil filter change 5.8 ! (5-1/8 Imp qt) CAUTION: + Be sure to clean and install oil pan drain plug with washer. Drain plug: : 29 - 39 Nzm (3.0 - 4.0 kg-m, 22 - 29 ft-lb) + The refill capacity changes depending on the oil temperature and drain time; use these valves as a reference and be certain to check with the dipstick when changing the oil. MA-13 ENGINE MAINTENANCE Changing Engine Oil (Cont’d) 4. Check oil level. 5. Start engine. Check area around drain plug and oil filter for any sign of oil leakage. 6. Run engine for a few minutes, then turn it off.

After several minutes check oil level. SMA999C Changing Engine Oil Filter 1. Remove oil filter with Tool. WARNING: Be careful not to burn yourself, as the engine and engine oil are hot.

SMA001D 2. Clean oil filter mounting surface on cylinder block. Coat rubber seal of new oil filter with engine oil. 3.

Screw in the oil filter until a slight resistance is felt, then tighten an additional 2/3 of a turn. 4. Add engine oil. Refer to Changing Engine Oil. + Clean excess oil from engine. SMA010 Changing Engine Coolant WARNING: To avoid the danger of being scalded, never change the coolant when the engine is hot.

—DRAINING ENGINE COOLANT— 1. Move heater TEMP control knob all the way to HOT. 2. Open radiator drain plug at the bottom of radiator.

SMA972C 3. Remove radiator filler cap. Remove reservoir tank, drain coolant, then clean reservoir tank. Install it temporarily. + Be careful not to allow coolant to contact drive belts. SMA002D MA-14 ENGINE MAINTENANCE Changing Engine Coolant (Cont’d) 4. Remove cylinder block drain plug located at left rear of cylinder block. 5. Drain coolant and install reservoir tank, cylinder block drain plug and radiator drain plug. 6. Fill radiator with water and warm up engine. 7. Stop engine and wait until it cools down. 8. Repeat step 2 through step 7 two or three times. 9. Drain water. SMA003D —REFILLING ENGINE COOLANT— 10. Install reservoir tank, radiator drain plug, and cylinder block drain plugs. + Apply sealant to the thread of cylinder block drain plug. Cylinder block drain plug: : 34 - 44 Nzm (3.5 - 4.5 kg-m, 25 - 33 ft-lb) 11. Fill radiator and reservoir tank with coolant up to the MAX level and install radiator cap. For coolant mixture ratio, refer to MA-11. SMA182B SMA412B SMA004D Coolant capacity (With reservoir tank): ! (Imp qt) RHD models Without rear heater 11.8 (10-3/8) With rear heater 12.9 (11-3/8) LHD models Without rear heater 11.6 (10-1/4) With rear heater 12.7 (11-1/8) Reservoir tank capacity (for MAX level): 1.2 ! (1-1/8 Imp qt) Pour coolant through coolant filler neck slowly to allow air in system to escape. 12. Warm up engine to normal operating temperature. 13. Run engine at 2,000 rpm for 10 seconds and return to idle speed. + Repeat 2 or 3 times. Watch coolant temperature gauge so as not to overheat the engine. 14. Stop engine and cool it down. + Cool down using a fan to reduce the time. 15. Remove the radiator filler cap and check coolant level. + If necessary, refill radiator up to filler neck with coolant. 16. Refill reservoir tank to Max line with coolant. 17. Repeat step 12 through step 16 two or more times. 18. Warm up engine, and check for sound of coolant flow while running engine from idle up to 2,000 rpm with heater temperature control set at several positions between COOL and HOT. + Sound may be noticeable at heater water cock. 19. If sound is heard, bleed air from cooling system by repeating steps 12 through 16 until coolant level no longer drops. + Clean excess coolant from engine. MA-15 ENGINE MAINTENANCE Checking Cooling System CHECKING HOSES AND CLAMPS Check hoses and clamps for proper attachment, leaks, cracks, damage, loose connections, chafing and deterioration. CHECKING RADIATOR CAP Apply pressure to radiator cap with cap tester to see if it is satisfactory. Radiator cap relief pressure: 78 - 98 kPa (0.78 - 0.98 bar, 0.8 - 1.0 kg/cm2, 11 - 14 psi) SLC613 Pull the negative-pressure valve to open it. Check that it closes completely when released. SMA871B CHECKING COOLING SYSTEM FOR LEAKS Apply pressure to the cooling system with cap tester to check for leakage. Testing pressure: 98 kPa (0.98 bar, 1.0 kg/cm2, 14 psi) CAUTION: Use of higher pressure than the specified value may cause damage to radiator. SMA007D Checking and Replacing Fuel Filter and Draining Water Be careful not to spill fuel in engine compartment. Place a rag to absorb fuel. CHECKING FUEL FILTER Check fuel filter for fuel leakage, damage and other abnormal signs. REPLACING FUEL FILTER SMA757B 1. Disconnect harness connector and drain fuel. MA-16 ENGINE MAINTENANCE Checking and Replacing Fuel Filter and Draining Water (Cont’d) 2. Remove fuel filter using band-type filter wrench. Remove fuel filter and fuel filter sensor. CAUTION: Remove fuel filter without spilling fuel. If spilt, wipe off immediately. Be specially careful not to spill fuel on engine mount insulator.

SMA005D 3. Wipe clean fuel filter mounting surface on fuel filter bracket and smear a little fuel on rubber seal of fuel filter. 4. Screw fuel filter on until a slight resistance is felt, then tighten an additional more than 2/3 of a turn. 5.

Install fuel filter sensor to new fuel filter. 6.

Bleed air from fuel line. Refer to Bleeding Fuel System in EC section. 7. Start engine and check for leaks. SMA010 DRAINING WATER 1. Drain water as follows. Loosen drain cock and drain water. Loosening drain cock 4 to 5 turns causes water to start draining.

Do not remove drain cock by loosening it excessively. If water does not drain properly, move the priming pump up and down. SMA825B 2. Bleed air. Checking Fuel Lines Check fuel lines and tank for proper attachment, leaks, cracks, damage, loose connections, chafing and deterioration. CAUTION: Keep clean parts with compressed air when assembling. SMA803A MA-17 ENGINE MAINTENANCE Cleaning and Replacing Air Cleaner Filter SMA006D VISCOUS PAPER TYPE The viscous paper type air cleaner filter does not require any cleaning operation between renewal.

Checking Injection Nozzle EF791A WARNING: When using nozzle tester, be careful not to allow diesel fuel sprayed from nozzle to come into contact with your hand or body, and make sure that your eyes are properly protected. 1. Install nozzle to injection nozzle tester and bleed air from flare nut. 2. Check initial injection pressure by pumping tester handle one full stroke per second.

Initial injection pressure: Used nozzle More than 14,220 kPa (142.2 bar, 145 kg/cm2, 2,062 psi) New nozzle 14,711 - 15,495 kPa (147.1 - 155.0 bar, 150 - 158 kg/cm2, 2,133 - 2,247 psi) + Always check initial injection pressure before installing new nozzle. SEF672A 3.

Check spray pattern by pumping tester handle one full stroke per second.

a. If main spray angle is within 30 degrees as shown, injection nozzle is good. b. It is still normal even if a thin stream of spray deviates from main spray (pattern B). 4. If initial injection pressure or injection nozzle is not normal, adjust or clean injection nozzle. 5. Test again. If it is not corrected, replace nozzle.

Refer to EC section for injection pressure adjustment, cleaning and replacement.

SEF079S MA-18 ENGINE MAINTENANCE Checking Injection Nozzle (Cont’d) 6. Install all injection nozzles with Tool and securely connect fuel spill tube and delivery tubes. 7. Bleed air from fuel system and check for fuel leakage with engine running. Injection nozzle to cylinder head: : 59 - 69 Nzm (6.0 - 7.0 kg-m, 43 - 51 ft-lb) Spill tube nut: : 39 - 49 Nzm (4.0 - 5.0 kg-m, 29 - 36 ft-lb) Injection tube: : 20 - 25 Nzm (2.2 - 2.5 kg-m, 16 - 18 ft-lb) Checking Idle Speed Inspection should be carried out with gears in ‘‘Neutral’’ and with air conditioner and other electrical loads off. 1. Warm up engine until engine coolant temperature indicator points to the middle of gauge. 2. Attach a diesel tachotester’s pick-up to No. 1 fuel injection tube. 3. Race engine two or three times and check idle speed. Idle speed: Unit: rpm 750−+50 0 MT Timing Belt Replacement Refer to EM section. MA-19 CHASSIS AND BODY MAINTENANCE Checking Exhaust System Check exhaust pipes, muffler and mounting for improper attachment, leaks, cracks, damage, loose connections, chafing and deterioration. SMA211A Checking Clutch Fluid Level and Leaks If fluid level is extremely low, check clutch system for leaks. SMA991C Checking Clutch System Check fluid lines and operating cylinder for improper attachment, cracks, damage, loose connections, chafing and deterioration.

SMA992C Checking M/T Oil Level and Leaks Never start engine while checking oil level. 1. Check manual transmission for leakage. 2. Check oil level. Filler plug: : 25 - 34 Nzm (2.5 - 3.5 kg-m, 18 - 25 ft-lb) SMA103 Changing M/T Oil Oil grade: API GL-4. Refer to ‘‘RECOMMENDED FLUIDS AND LUBRICANTS’’, MA-9. Oil capacity: FS5R50B 3.8 liters (6-3/4 Imp pt) Refill 2.9 liters (5-1/8 Imp pt) FS5R30A 5.1 liters (9 Imp pt) Drain plug: : 25 - 34 Nzm (2.5 - 3.5 kg-m, 18 - 25 ft-lb) SMA255A MA-20 CHASSIS AND BODY MAINTENANCE Checking Water Entry Check water entry in the clutch housing by removing the sealing grommet, whenever driving in deep water or mud. SMA369B Checking Transfer Fluid Level Never start engine while checking fluid level. 1. Check transfer for leakage. 2. Check fluid level. Filler plug: : 25 - 34 Nzm (2.5 - 3.5 kg-m, 18 - 25 ft-lb) SMA936B Changing Transfer Fluid Fluid grade: Genuine Nissan ATF or equivalent or API GL-4. Refer to ‘‘RECOMMENDED FLUIDS AND LUBRICANTS’’, MA-9. Fluid capacity: 1.9 liters (1-5/8 Imp qt) Drain plug: : 25 - 34 Nzm (2.5 - 3.5 kg-m, 18 - 25 ft-lb) SMA993C Checking Propeller Shaft Check propeller shaft for damage, looseness or grease leakage. Tightening torque: Refer to PD section. SMA945B Greasing Nipples of Propeller Shafts Front Apply multi-purpose grease to nipples of propeller shafts. Grease nipples SMA043C MA-21 CHASSIS AND BODY MAINTENANCE Rear Grease nipples SMA944B Checking Differential Gear Oil 1.

Check differential carrier for oil leakage. 2.

Check oil level. Filler plug: : 59 - 98 Nzm (6 - 10 kg-m, 43 - 72 ft-lb) Fill to this level Filler plug SMA108-A Changing Differential Gear Oil Oil capacity: Front 5.4 liters (9-1/2 Imp pt) Rear H233B (Without diff. lock) 2.4 liters (4-1/4 Imp pt) H233B (With diff. lock) 3.0 liters (5-1/4 Imp pt) H260 (Without diff. lock) 4.7 liters (8-1/4 Imp pt) H260 (With diff. lock) 3.7 liters (6-1/2 Imp pt) Drain plug: : 59 - 98 Nzm (6 - 10 kg-m, 43 - 72 ft-lb) Drain plug SMA109-A Limited-slip differential gear + Use only approved or recommended limited-slip differential gear oil. + Limited-slip differential identification. (1) Lift both rear wheels off the ground. (2) Turn one rear wheel by hand. (3) If both rear wheels turn in the same direction simultaneously, vehicle is equipped with limited-slip differential. Checking Front Wheel Bearing Grease + + + Check that wheel bearings operate smoothly. Check front wheel bearings for grease leakage and water or dust entry. Replace front wheel bearings or front wheel bearing grease if wheel bearings do not turn smoothly. MA-22 CHASSIS AND BODY MAINTENANCE Repacking Front Wheel Bearing and Axle Joint Grease FRONT WHEEL BEARING GREASE Apply multi-purpose grease sparingly to the following parts: + Threaded portion of spindle + Contact surface between wheel bearing washer and outer wheel bearing + Grease seal lip + Wheel hub (as shown at the left) SFA469A AXLE JOINT GREASE Drain approximately 2 liters (1-3/4 Imp qt) of differential oil.

Remove knuckle spindle. Slightly pull out axle and repack axle joint with recommended grease. Refer to FA section. + + + SFA869B Checking Free-running Hub Grease Check free-running hub grease for leakage and water or dust entry. SMA946B Checking Water Entry in Knuckle Flange + + Check for water entry in knuckle flange by removing one bolt of lower knuckle flange bearing cap and probing with a suitable thin bar. After checking, be sure to reinstall the bolt to a tightening torque of 30 to 40 Nzm (3.1 to 4.1 kg-m, 22 to 30 ft-lb). SMA949B Checking Brake Fluid Level and Leaks If fluid level is extremely low, check brake system for leaks. SBR451D MA-23 CHASSIS AND BODY MAINTENANCE Checking Brake System Check brake fluid lines and parking brake cables for improper attachment, leaks, chafing, abrasion, deterioration, etc. SBR389C Changing Brake Fluid 1. Drain brake fluid from each air bleeder valve. 2.

Refill until new brake fluid comes out from each air bleeder valve. Use same procedure as in bleeding hydraulic system to refill brake fluid. Refer to BR section. + Refill with recommended brake fluid. + Never reuse drained brake fluid. + Be careful not to splash brake fluid on painted areas. SBR419C Checking Brake Booster, Vacuum Hoses, Connections and Check Valve Check vacuum lines, connections and check valve for improper attachment, air tightness, chafing and deterioration. SBR419A Checking Disc Brake ROTOR SMA260A Check condition and thickness. Standard thickness: CL36VE 32.0 mm (1.260 CL18VF 18.0 mm (0.709 Minimum thickness: CL36VE 30.0 mm (1.181 CL18VF 16.0 mm (0.630 MA-24 in) in) in) in) CHASSIS AND BODY MAINTENANCE Checking Disc Brake (Cont’d) CALIPER Check for leakage. SMA922A PAD Check for wear or damage. Standard thickness: Front 12.0 mm (0.472 in) Rear 10.0 mm (0.394 in) Minimum thickness: 2.0 mm (0.079 in) SMA847B Balancing Wheels Adjust wheel balance using the road wheel center. Wheel balance (Maximum allowable unbalance): Refer to SDS, MA-29. Tire Rotation Wheel nuts: : 118 - 147 Nzm (12 - 15 kg-m, 87 - 108 ft-lb) SMA800BB MA-25 CHASSIS AND BODY MAINTENANCE Checking Power Steering Fluid and Lines Check fluid level with engine off.

Check fluid level with dipstick on reservoir cap. Use ‘‘HOT’’ range at fluid temperatures of 50 to 80°C (122 to 176°F). Use ‘‘COLD’’ range at fluid temperatures of 0 to 30°C (32 to 86°F).

CAUTION: + Do not overfill.

+ Recommended fluid is Automatic Transmission Fluid type ‘‘DEXRONTMIII’’ or equivalent. + + SST280B + + Check lines for improper attachment, leaks, cracks, damage, loose connections, chafing or deterioration. Check rack boots for accumulation of power steering fluid. SST757C Checking Steering Damper Check steering damper for damage and oil leakage. SMA938A Checking Steering Gear Box and Linkage STEERING GEAR + + Check gear housing and boots for looseness, damage or grease leakage. Check connection with steering column for looseness. STEERING LINKAGE + Check ball joint, dust cover and other component parts for looseness, wear, damage or grease leakage. MA-26 CHASSIS AND BODY MAINTENANCE Lubricating Locks, Hinges and Hood Latches SMA994C Checking Seat Belts, Buckles, Retractors, Anchors and Adjusters SMA995C MA-27 CHASSIS AND BODY MAINTENANCE Checking Body Corrosion Visually check the body sheet metal panel for corrosion, paint damage (scratches, chipping, rubbing, etc.) or damage to the anti-corrosion materials. In particular, check the following locations.

Hemmed portion Hood front end, door lower end, trunk lid rear end, etc.

Panel joint Side sill of rear fender and center pillar, rear wheel housing of rear fender, around strut tower in engine compartment, etc. Panel edge Trunk lid opening, sunroof opening, fender wheelarch flange, fuel filler lid flange, around holes in panel, etc. Parts contact Waist molding, windshield molding, bumper, etc. Protectors Damage or condition of mudguard, fender protector, chipping protector, etc. Anti-corrosion materials Damage or separation of anti-corrosion materials under the body. Drain holes Condition of drain holes at door and side sill. When repairing corroded areas, refer to the Corrosion Repair Manual. MA-28 SERVICE DATA AND SPECIFICATIONS (SDS) Engine Maintenance INSPECTION AND ADJUSTMENT Engine oil capacity (Refill capacity) Unit: ! (Imp qt) Drive belt deflection Unit: mm (in) Used belt deflection Drive belts Limit Deflection after adjustment Deflection of new belt With air conditioner compressor 17 (0.67) 12 - 14 (0.47 - 0.55) 9 - 11 (0.35 - 0.43) Without air conditioner compressor 11 (0.43) 7-9 (0.28 - 0.35) 6-8 (0.24 - 0.31) 14 (0.55) 10 - 12 (0.39 - 0.47) 9 - 11 (0.35 - 0.43) Applied pushing force 6.4 (5-5/8) Without oil filter change 5.8 (5-1/8) Coolant capacity (Refill capacity) Alternator Power steering oil pump With oil filter change 98 N (10 kg, 22 lb) With reservoir tank Unit: ! (Imp qt) With rear heater Without rear heater RHD 12.9 (11-3/8) 11.8 (10-3/8) LHD 12.7 (11-1/8) Reservoir tank Chassis and Body Maintenance INSPECTION AND ADJUSTMENT Wheel balance Maximum allowable unbalance Dynamic (At rim flange) 10 (0.35) (one side) g (oz) Static g (oz) 20 (0.71) MA-29 11.6 (10-1/4) 2.4 (2-1/8) MANUAL TRANSMISSION SECTION MT CONTENTS

PREPARATION..........1 Special Service Tools ....1 Commercial Service Tools ....2 NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING ....3 NVH Troubleshooting Chart..........3 ON-VEHICLE SERVICE ....4 Replacing Rear Oil Seal ....4 Position Switch Check ....4 REMOVAL AND INSTALLATION ....5 Removal..........5 Installation..........6 DESCRIPTION ....7 Cross-sectional View ....7 AIR BREATHER ....8 Air Breather Piping ....8 MAJOR OVERHAUL ....9 Case Components ....9 Gear Components ....10 Shift Control Components ....12 DISASSEMBLY..........13 Case Components ....13 Shift Control Components ....14 Gear Components ....15 INSPECTION..........19 Shift Control Components ....19 Gear Components ....19 ASSEMBLY..........21 Gear Components ....21 Shift Control Components ....29 Case Components ....29 SERVICE DATA AND SPECIFICATIONS (SDS) ....32 General Specifications..........32 Inspection and Adjustment 33

MT PREPARATION Special Service Tools Tool number Tool name Description ST23540000 Pin punch Removing and installing retaining pin a: 2.3 mm (0.091 in) dia. b: 4 mm (0.16 in) dia. NT442 ST30031000 Puller Removing 1st & 2nd synchronizer assembly Removing counter gear rear thrust bearing Removing main drive gear bearing a: 90 mm (3.54 in) dia. b: 50 mm (1.97 in) dia. NT411 ST33230000 Drift Removing mainshaft and counter gear a: 51 mm (2.01 in) dia. b: 28.5 mm (1.122 in) dia. NT084 ST22350000 Drift Removing and installing mainshaft rear bearing Removing counter gear front bearing (Use with KV38100300) a: 34 mm (1.34 in) dia. b: 28 mm (1.10 in) dia.

NT065 KV38100300 Drift Removing counter gear front bearing (Use with ST22350000) Installing counter gear rear bearing a: 54 mm (2.13 in) dia. b: 32 mm (1.26 in) dia. NT065 ST30720000 Drift Removing mainshaft front bearing Installing mainshaft front bearing a: 77 mm (3.03 in) dia. b: 55.5 mm (2.185 in) dia. NT115 ST33210000 Drift Installing counter gear front bearing Installing front cover oil seal a: 44 mm (1.73 in) dia.

b: 24.5 mm (0.965 in) dia. NT084 ST30613000 Drift Installing main drive gear bearing a: 71.5 mm (2.815 in) dia. b: 47.5 mm (1.870 in) dia. NT073 MT-1 PREPARATION Special Service Tools (Cont’d) Tool number Tool name Description ST37750000 Drift Removing and installing mainshaft rear bearing Removing counter gear rear bearing Installing OD gear bushing Installing reverse cone Installing reverse counter gear Installing counter gear rear end bearing a: 40 mm (1.57 in) dia. b: 31 mm (1.22 in) dia. NT065 ST22452000 Drift Installing reverse hub a: 45 mm (1.77 in) dia. b: 36 mm (1.42 in) dia. NT065 Commercial Service Tools Tool name Description Puller Removing counter gear rear end bearing Removing reverse synchronizer hub Removing reverse counter gear NT077 Drift 1 V 2 V Installing sub-gear snap ring Installing OD main gear 1 V a: b: a: b: 2 V NT065 MT-2 44.5 mm (1.752 in) dia. 38.5 mm (1.516 in) dia. 44.5 mm (1.752 in) dia. 40.5 mm (1.594 in) dia. SUSPECTED PARTS (Possible cause) 1 2 Jumps out of gear MT-3 Symptom MT-12 MT-10 MT-10 MT-10 MT-10 GEAR (Worn or damaged) BEARING (Worn or damaged) BAULK RING (Worn or damaged) INSERT SPRING (Damaged) Refer to MA section (‘‘Checking M/T Oil’’, ‘‘CHASSIS AND BODY MAINTENANCE’’). SHIFT FORK (Worn) 1 MT-12 1 CHECK PLUG RETURN SPRING AND CHECK BALL (Worn or damaged) Hard to shift or will not shift MT-9 1 OIL SEAL (Worn or damaged) 3 MT-9 Oil leakage LIQUID GASKET (Damaged) OIL (Level too high) OIL (Wrong) Noise OIL (Level low) FS5R30A Reference page Transmission model NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING NVH Troubleshooting Chart Use the chart below to help you find the cause of the symptom. The numbers indicate the order of the inspection. If necessary, repair or replace these parts. 3 3 2 2 2 2 1 2 2 ON-VEHICLE SERVICE Replacing Rear Oil Seal REMOVAL 1.

Remove transfer assembly. — Refer to TF section. 2. Pull out rear oil seal. SMT321B INSTALLATION 1. Install rear oil seal. + Before installing apply multi-purpose grease to seal lip. 2.

Install transfer assembly. — Refer to TF section. SMT322B Position Switch Check Switch Gear position Continuity Reverse Yes Except reverse No Neutral Yes Except neutral No Reverse position switch Neutral position switch SMT274D MT-4 REMOVAL AND INSTALLATION Removal SMT321D 1. Remove front and rear propeller shafts. Refer to PD section (‘‘Removal and Installation’’, ‘‘PROPELLER SHAFT’’). 2. Remove clutch operating cylinder. 3. Remove exhaust front and rear tubes. Refer to FE section (‘‘EXHAUST SYSTEM’’). 4. Disconnect vehicle speed sensor, back-up lamp switch, 4WD switch and neutral position switch harness connector. 5. Remove center brake cable. Refer to BR section. 6. Remove shift lever of transmission.

Refer to MT-12 (RS5R30A). 7. Remove transfer control lever. Refer to TF section (‘‘Removal’’, ‘‘REMOVAL AND INSTALLATION’’). 8. Support engine by placing a jack under oil pan. + Do not place jack under the oil pan drain plug.

9. Remove transmission with transfer from engine. WARNING: Support Manual Transmission with transfer, while removing it. MT-5 REMOVAL AND INSTALLATION Installation + Apply sealant as below: SMT550D + SMT322D Tighten bolts securing transmission. Bolt No. Tightening torque Nzm (kg-m, ft-lb) 1 V 2 V 3 V 4 V 5 V 39 - 49 (4.0 - 5.0, 29 - 36) 79 (3.11) 39 - 49 (4.0 - 5.0, 29 - 36) 85 (3.35) 29 - 39 (3.0 - 4.0, 22 - 29) 79 (3.11) 29 - 39 (3.0 - 4.0, 22 - 29) 57 (2.24) 29 - 39 (3.0 - 4.0, 22 - 29) 50 (1.97) Gusset to engine 29 - 39 (3.0 - 4.0, 22 - 29) 35 (1.38) MT-6 ! mm (in) DESCRIPTION Cross-sectional View SMT320D MT-7 AIR BREATHER Air Breather Piping SMT546D MT-8 MAJOR OVERHAUL Case Components SMT544D MT-9 MAJOR OVERHAUL Gear Components SMT797C MT-10 MAJOR OVERHAUL Gear Components (Cont’d) SMT818C MT-11 MAJOR OVERHAUL Shift Control Components SMT370D MT-12 DISASSEMBLY Case Components 1. Remove check ball plug, check spring and check ball. Then remove interlock stopper. + If interlock assembly is removed as a unit, the check ball can fall into transmission case. + Be careful not to lose check ball. SMT366A 2. Remove control housing, return spring and check ball.

+ Be careful not to lose check ball. SMT438B 3. Drive out retaining pin from striking arm. SMT439B 4. Remove OD gear case together with striking arm by tapping lightly. SMT440B SMT444B MT-13 DISASSEMBLY Case Components (Cont’d) 5. Remove front cover and gasket. SMT370A 6. Remove stopper ring and main drive bearing snap ring.

SMT371A 7.

Remove transmission case by tapping lightly. SMT822C 8. Remove front cover oil seal. SMT392A Shift Control Components 1. Mount adapter plate on vise. 2. Remove OD & reverse fork rod. SMT823C MT-14 DISASSEMBLY Shift Control Components (Cont’d) 3. Drive out retaining pin from striking lever. 4. While pulling out striking rod, remove striking lever and striking interlock. Then remove 1st & 2nd, 3rd & 4th and reverse shift fork.

SMT374AA 5. Drive out retaining pin from OD shift fork. 6. Pull out OD fork rod and then remove OD shift fork.

SMT824C Gear Components 1. Before removing gears and shafts, measure each gear end play. Gear end play: Refer to SDS, MT-33. + If not within specification, disassemble and check contact surface of gear to hub, washer, bushing, needle bearing and shaft. SMT376A 2. Remove rear side components on mainshaft and counter gear. a. Remove reverse coupling sleeve. SMT825C b. Remove mainshaft rear snap ring and counter gear rear snap ring. c. Remove C-ring holder and mainshaft C-rings from mainshaft. Use punch and hammer to remove C-rings. SMT826C MT-15 DISASSEMBLY Gear Components (Cont’d) d. Pull out counter gear rear end bearing. e. Remove reverse idler gear and reverse idler thrust washers. SMT827C f. Pull out reverse main gear together with mainshaft spacer and reverse synchronizer hub. Then remove reverse gear needle bearings.

SMT380A g. Pull out reverse counter gear. h. Remove OD coupling sleeve together with OD baulk ring, reverse baulk ring and spring inserts. SMT773A i.

Pull out reverse gear bushing.

j. Pull out OD counter gear together with reverse cone. SMT770A SMT771A MT-16 DISASSEMBLY Gear Components (Cont’d) 3. Press out mainshaft and counter gear alternately. SMT772AA 4. a. b. + Remove front side components on mainshaft. Remove 1st gear washer and steel ball. Remove 1st main gear and 1st gear needle bearing. Be careful not to lose steel ball. SMT383A c. Press out 2nd main gear together with 1st gear bushing and 1st & 2nd synchronizer assembly. d.

Remove mainshaft front snap ring. SMT384A e. Press out 3rd main gear together with 3rd & 4th synchronizer assembly and 3rd gear needle bearing. SMT385A MT-17 DISASSEMBLY Gear Components (Cont’d) 5. Remove front side components on counter gear. a.

Remove counter gear rear thrust bearing. SMT404AA b. Remove sub gear components. SMT470A 6. Remove main drive gear bearing. a.

Remove main drive gear snap ring. b.

Press out main drive gear bearing. SMT420AA 7. Remove bearings from case components. SMT483CB MT-18 INSPECTION Shift Control Components + Check contact surface and sliding surface for wear, scratches, projections or other damage. SMT398A Gear Components GEARS AND SHAFTS + + Check shafts for cracks, wear or bending. Check gears for excessive wear, chips or cracks. SMT386A SMT423A SYNCHRONIZERS + + + + Check spline portion of coupling sleeves, hubs, and gears for wear or cracks. Check baulk rings for cracks or deformation. Check shifting inserts for wear or deformation. Check insert springs for deformation. SMT427C + + Measure wear of main drive, 1st and OD baulk rings. Clearance between baulk ring and gear: Refer to SDS, MT-33.

If the clearance is smaller than the wear limit, replace baulk ring.

SMT140 MT-19 INSPECTION Gear Components (Cont’d) SMT041BC + Measure wear of 2nd and 3rd baulk rings. a. Place baulk rings in position on synchronizer cone. b. While holding baulk rings against synchronizer cone as far as it will go, measure dimensions ‘‘A’’ and ‘‘B’’. Standard: A 0.7 - 0.9 mm (0.028 - 0.035 in) B 0.6 - 1.1 mm (0.024 - 0.043 in) Wear limit: 0.2 mm (0.008 in) + If dimension ‘‘A’’ or ‘‘B’’ is smaller than the wear limit, replace outer baulk ring, inner baulk ring and synchronizer cone as a set. SMT042B + Measure wear of reverse baulk ring. a. Place baulk ring in position on reverse cone. b. While holding baulk ring against reverse cone as far as it will go, measure dimension ‘‘A’’ with dial indicator. Dimension ‘‘A’’: Standard −0.1 to 0.35 mm (−0.0039 to 0.0138 in) Wear limit 0.7 mm (0.028 in) c. If dimension ‘‘A’’ is larger than the wear limit, replace baulk ring.

SMT424A BEARINGS + Make sure bearings roll freely and are free from noise, crack, pitting or wear.

SMT418A MT-20 ASSEMBLY Gear Components SMT484CB 1.

Install bearings into case components. 2. Install main drive gear bearing. a. Press main drive gear bearing. SMT425AA b. Select proper main drive gear snap ring to minimize clearance of groove. Allowable clearance of groove: 0 - 0.1 mm (0 - 0.004 in) Main drive gear snap ring: Refer to SDS, MT-33. c. Install selected snap ring on main drive gear.

SMT426A 3. Install components on counter gear.

a. Install sub-gear components. + When installing sub-gear snap ring, tap sub-gear snap ring into position on counter gear. SMT577AA MT-21 ASSEMBLY Gear Components (Cont’d) b. Install counter gear rear thrust bearing. SMT405A 4. Install front side components on mainshaft. a. Assemble 1st & 2nd synchronizer. SMT614B b. Assemble 3rd & 4th synchronizer. SMT615B c. Press on 3rd & 4th synchronizer assembly together with 3rd main gear and 3rd gear needle bearing. + Pay attention to direction of synchronizer assembly. SMT399A d. Select proper snap ring to minimize clearance of groove. Allowable clearance of groove: 0 - 0.1 mm (0 - 0.004 in) Mainshaft front snap ring: Refer to SDS, MT-33. e. Install selected snap ring on mainshaft. SMT400A MT-22 ASSEMBLY Gear Components (Cont’d) f. Press on 1st & 2nd synchronizer assembly together with 2nd main gear and 2nd gear needle bearing.

SMT401A g. Press on 1st gear bushing using 1st gear washer. h.

Install 1st main gear and needle bearing. SMT402A i. + Install steel ball and 1st gear washer. Apply multi-purpose grease to steel ball and 1st gear washer before installing. SMT403A 5. Select proper counter gear front bearing thrust washer when replacing transmission case, counter gear, counter gear rear thrust bearing or sub-gear components. a. Install counter gear with sub-gear components, counter gear front and rear bearing thrust washer on adapter plate. b. Remove counter gear front bearing thrust washer from transmission case. c. Place adapter plate and counter gear assembly in transmission case (case inverted). SMT427AA MT-23 ASSEMBLY Gear Components (Cont’d) d. Tighten adapter plate to transmission case using 2 bolts. e. Place dial indicator on rear end of counter gear. f. Move counter gear up and down and measure dial indicator deflection.

g. Select proper thrust washer using table below as a guide. Counter gear end play: 0.10 - 0.25 mm (0.0039 - 0.0098 in) Table for selecting proper counter gear front bearing thrust washer: Refer to SDS, MT-34. SMT578A 6. Select proper reverse idler rear thrust washer when replacing OD gear case, reverse idler gear, reverse idler shaft or reverse idler front thrust washer. a. Install reverse idler front gear, reverse idler needle bearings, reverse idler front thrust washers and reverse idler shaft into OD gear case. + When replacing reverse idler rear thrust washer, install either A or B.

Reverse idler rear thrust washer: Refer to SDS, MT-34. SMT442B MT-24 ASSEMBLY Gear Components (Cont’d) b. Place dial indicator on front end of reverse idler shaft. c. Put straightedge on front surface of OD gear case as a stopper of reverse idler shaft. d. Move reverse idler shaft up and down and measure reverse idler gear end play. Reverse idler gear end play: 0.30 - 0.53 mm (0.0118 - 0.0209 in) e. If not within specification, replace reverse idler rear thrust washer with the other (A or B) and check again. SMT433A 7. Install mainshaft and counter gear on adapter plate and main drive gear on mainshaft.

a. Mount adapter plate on vise and apply multi-purpose grease to counter gear rear bearing. SMT438A b. Install mainshaft a little on mainshaft front bearing. + To allow for installation of counter gear, do not install mainshaft completely. SMT440A c. Install counter gear on counter gear rear bearing and install main drive gear, pilot bearing and spacer on mainshaft. SMT441A MT-25 ASSEMBLY Gear Components (Cont’d) + When installing counter gear into counter gear rear bearing, push up on upper roller of counter gear rear bearing with screwdriver. SMT442A d. Install mainshaft and counter gear completely by tapping rear side of adapter plate and pulling mainshaft.

SMT443A 8. Install rear side components on mainshaft and counter gear. a. Install OD gear bushing while pushing on the front of counter gear. SMT444AA b. Install OD main gear.

+ Pay attention to direction of OD main gear. (B is wider than A as shown at left.) c. Install adapter plate with gear assembly onto transmission case. d. Install OD gear needle bearing and then install OD counter gear and reverse idler shaft. SMT580AB e. Install reverse cone. SMT582AA MT-26 ASSEMBLY Gear Components (Cont’d) f. + Install insert springs and reverse baulk ring on OD coupling sleeve. Then install them and OD baulk ring on OD counter gear. Pay attention to direction of OD coupling sleeve. SMT571AA SMT583A g. Install reverse counter gear. h. Install reverse gear needle bearing and then install reverse main gear, reverse idler gear and reverse idler thrust washers.

SMT584AA i. + Install reverse hub and mainshaft spacer. Pay attention to direction of reverse hub. SMT585AA j. Install counter gear rear end bearing. k. Separate adapter plate from transmission case and mount adapter plate on vice again. SMT828C MT-27 ASSEMBLY Gear Components (Cont’d) l. Select proper mainshaft C-ring to minimize clearance of groove. Allowable clearance of groove: 0 - 0.1 mm (0 - 0.004 in) Mainshaft C-ring: Refer to SDS, MT-34. SMT829C m.

Install selected C-ring, C-ring holder and mainshaft rear snap ring. SMT830C n. Select proper counter gear rear snap ring to minimize clearance of groove. Allowable clearance of groove: 0 - 0.1 mm (0 - 0.004 in) Counter gear rear snap ring: Refer to SDS, MT-34. o. Install selected counter gear rear snap ring. SMT831C SMT832C p. Install reverse coupling sleeve. + Pay attention to its direction. q. Measure each gear end play as a final check. Refer to ‘‘DISASSEMBLY’’, MT-15. SMT833C MT-28 ASSEMBLY Shift Control Components 1. Install OD fork rod and OD shift fork.

Then install retaining pin into OD shift fork. 2. Install 1st & 2nd, 3rd & 4th and reverse shift fork onto coupling sleeve. SMT834C 3. Install striking rod into hole of shift forks, striking lever and interlock and then install retaining pin into striking lever. + Make sure that striking rod moves smoothly. SMT374AA Case Components 1. Install front cover oil seal. + Apply multi-purpose grease to seal lip.

2. Install selected counter gear front bearing shim onto transmission case. + Apply multi-purpose grease. 3. Apply sealant to mating surface of transmission case. SMT393AA 4. Install gear assembly onto transmission case. 5. Install check spring and check ball into interlock stopper. + Apply multi-purpose grease to check ball. SMT835C 6. Install interlock stopper assembly and then tighten check ball plug. + Apply sealant to thread of check ball plug. SMT460A MT-29 ASSEMBLY Case Components (Cont’d) 7. Install stopper ring and main drive bearing snap ring. SMT371A 8. Install front cover and gasket. + Apply sealant to thread of 3 bolts shown left. 9.

Apply sealant to mating surface of adapter plate. SMT459A 10. Install OD gear case together with striking arm.

SMT444B 11. Install retaining pin into striking arm. SMT439B 12. Install return spring and check ball and then install control housing. + Apply sealant to mating surface of OD gear case. SMT445B MT-30 ASSEMBLY Case Components (Cont’d) 13. Tighten control housing bolts. Bolt head size: A bolts 12 mm (0.47 in) B bolts 13 mm (0.51 in) SMT446BA MT-31 SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications RD28ETi Applied model 4WD Transmission Number of speed Transmission control FS5R30A 5 Floor direct Shift pattern Synchromesh type Warner Gear ratio 1st 4.061 2nd 2.357 3rd 1.490 4th 1.000 OD 0.862 Reverse 4.125 Number of teeth Mainshaft Drive 20 1st 32 2nd 30 3rd 28 OD 23 Reverse 30 Countershaft Drive 33 1st 13 2nd 21 3rd 31 OD 44 Reverse 12 Reverse idler gear Oil capacity ! (Imp pt) Remarks 22 5.1 (9) 2nd & 3rd double baulk ring type synchronizer Reverse breaking mechanism type MT-32 SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment GEAR END PLAY Gear End play DISTANCE BETWEEN REAR SURFACE OF REVERSE CONE AND REVERSE BAULK RING mm (in) 1st main gear 0.23 - 0.33 (0.0091 - 0.0130) 2nd main gear 0.23 - 0.33 (0.0091 - 0.0130) 3rd main gear 0.06 - 0.16 (0.0024 - 0.0063) OD counter gear 0.23 - 0.33 (0.0091 - 0.0130) Reverse main gear 0.33 - 0.43 (0.0130 - 0.0169) Counter gear 0.10 - 0.25 (0.0039 - 0.0098) Reverse idler gear 0.30 - 0.53 (0.0118 - 0.0209) Unit: mm (in) CLEARANCE BETWEEN BAULK RING AND GEAR Dimension ‘‘A’’ Standard Wear limit −0.1 to 0.35 (−0.0039 to 0.0138) 0.7 (0.028) Unit: mm (in) Standard 1st 1.05 - 1.3 (0.0413 - 0.0512) Main drive 1.05 - 1.3 (0.0413 - 0.0512) OD 1.05 - 1.3 (0.0413 - 0.0512) AVAILABLE SNAP RING Wear limit Main drive gear snap ring 0.7 (0.028) Allowable clearance Thickness 2nd and 3rd baulk ring 0 - 0.1 mm (0 - 0.004 in) mm (in) Part number 1.89 (0.0744) 32204-01G60 1.95 (0.0768) 32204-01G61 1.99 (0.0783) 32204-01G62 2.03 (0.0799) 32204-01G63 2.07 (0.0815) 32204-01G64 2.11 (0.0831) 32204-01G65 Mainshaft front snap ring Allowable clearance Thickness Dimension Standard A 0.7 - 0.9 (0.028 - 0.035) B 0.6 - 1.1 (0.024 - 0.043) mm (in) 0 - 0.1 mm (0 - 0.004 in) Part number SMT742C 1.99 (0.0783) 32204-01G62 Unit: mm (in) 2.03 (0.0799) 32204-01G63 2.07 (0.0815) 32204-01G64 2.11 (0.0831) 32204-01G65 2.15 (0.0846) 32204-01G66 2.19 (0.0862) 32204-01G67 Wear limit 0.2 (0.008) MT-33 SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment (Cont’d) Counter gear rear snap ring Allowable clearance Thickness mm (in) AVAILABLE SHIM AND WASHER 0 - 0.1 mm (0 - 0.004 in) Part number 1.32 (0.0520) 32236-01G00 1.38 (0.0543) 32236-01G01 1.44 (0.0567) 32236-01G02 1.50 (0.0591) 32236-01G03 1.56 (0.0614) 32236-01G04 1.62 (0.0638) 32236-01G05 1.68 (0.0661) 32236-01G06 1.74 (0.0685) 32236-01G07 Table for selecting proper counter gear front bearing thrust washer AVAILABLE C-RING Mainshaft C-ring Allowable clearance Thickness mm (in) Dial indicator deflection mm (in) Thickness of proper washer mm (in) Part number 0.93 - 1.02 (0.0366 - 0.0402) 0.80 (0.0315) 32218-01G00 1.01 - 1.10 (0.0398 - 0.0433) 0.88 (0.0346) 32218-01G11 1.09 - 1.18 (0.0429 - 0.0465) 0.96 (0.0378) 32218-01G12 1.17 - 1.26 (0.0461 - 0.0496) 1.04 (0.0409) 32218-01G13 1.25 - 1.34 (0.0492 - 0.0528) 1.12 (0.0441) 32218-01G14 1.33 - 1.42 (0.0524 - 0.0559) 1.20 (0.0472) 32218-01G04 1.41 - 1.50 (0.0555 - 0.0591) 1.28 (0.0504) 32218-01G15 1.49 - 1.58 (0.0587 - 0.0622) 1.36 (0.0535) 32218-01G16 1.57 - 1.66 (0.0618 - 0.0654) 1.44 (0.0567) 32218-01G17 0 - 0.1 mm (0 - 0.004 in) Part number 2.63 (0.1035) 32348-01G15 2.70 (0.1063) 32348-01G00 2.77 (0.1091) 32348-01G01 2.84 (0.1118) 32348-01G02 2.91 (0.1146) 32348-01G03 2.98 (0.1173) 32348-01G04 3.05 (0.1201) 32348-01G05 3.12 (0.1228) 32348-01G06 3.19 (0.1256) 32348-01G07 3.26 (0.1283) 32348-01G08 3.33 (0.1311) 32348-01G09 3.40 (0.1339) 32348-01G10 3.47 (0.1366) 32348-01G11 3.54 (0.1394) 32348-01G12 3.61 (0.1421) 32348-01G13 3.68 (0.1449) 32348-01G14 Reverse idler rear thrust washer Thickness MT-34 mm (in) Part number A 1.97 (0.0776) 32284-01G10 B 2.07 (0.0815) 32284-01G11 PROPELLER SHAFT & DIFFERENTIAL CARRIER SECTION PD CONTENTS PREPARATION...1 Special Service Tools ....1 NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING ....4 NVH Troubleshooting Chart..4 PROPELLER SHAFT ....5 Front Propeller Shaft ....5 Rear Propeller Shaft ....5 On-vehicle Service...6 Removal and Installation ....7 Inspection...7 Disassembly...7 Assembly ....8 ON-VEHICLE SERVICE (Final Drive) ....10 Front Oil Seal Replacement ....10 REMOVAL AND INSTALLATION ....11 Removal...11 Installation...11 FRONT FINAL DRIVE ....12 REAR FINAL DRIVE ....13 DISASSEMBLY...14 Pre-inspection ....14 Differential Carrier..15 Differential Case ....17 INSPECTION..19 Ring Gear and Drive Pinion ....19 Differential Case Assembly......................................19 Bearing..19 LIMITED SLIP DIFFERENTIAL...................................20 Preparation for Disassembly ....20 Disassembly..21 Inspection...21 Adjustment ....23 Assembly ....24 ADJUSTMENT ....27 Drive Pinion Height..27 Tooth Contact..29 ASSEMBLY...31 Differential Case — 4-pinion type —........................31 Differential Case — 2-pinion type —........................32 Differential Carrier..33 DIFFERENTIAL LOCK ....37 Actuator and Fork ....37 Disassembly..38 Inspection...39 Assembly ....40 System Description...43 Component Parts Location ....44 Wiring Diagram — DIFF/L —/LHD Models ....45 Wiring Diagram — DIFF/L —/RHD Models..............47 Electrical Components Inspection ....49 SERVICE DATA AND SPECIFICATIONS (SDS) ....51 Propeller Shaft ....51 Final Drive..52 PD PREPARATION Special Service Tools *: For front differential carrier only Tool number Tool name Unit application Description H233B ST0501S000 Engine stand 1 ST05011000 V Engine stand 2 ST05012000 V Base Mounting differential attachment X NT042 ST06340000 Differential attachment Mounting final drive X NT140 ST30611000 Drive pinion bearing outer race drift bar Installing pinion rear bearing outer race (Use with ST30621000 or ST30613000) X NT090 ST30613000 Drive pinion front bearing outer race drift Installing pinion front bearing outer race (Use with ST30613000) X a: 71.5 mm (2.815 in) dia. b: 47.5 mm (1.870 in) dia. NT073 ST30621000 Drive pinion rear bearing outer race drift Installing pinion rear bearing outer race (Use with ST30613000) X* a: 79 mm (3.11 in) dia. b: 59 mm (2.32 in) dia. NT073 ST3090S000 Drive pinion rear bearing inner race puller set 1 ST30031000 V Puller 2 ST30911000 V Base Removing and installing drive pinion rear inner race X a: 79 mm (3.11 in) dia. b: 45 mm (1.77 in) dia. c: 35 mm (1.38 in) dia. NT527 PD-1 PREPARATION Special Service Tools (Cont’d) Tool number Tool name ST3127S000 Preload gauge 1 GG91030000 V Torque wrench 2 V HT62900000 Socket adapter (1/2″) 3 HT62940000 V Socket adapter (3/8″) ST3125S000 Drive pinion setting gauge set 1 ST31251000 V Drive pinion height gauge 2 ST31181001 V Dummy shaft Unit application Description H233B Measuring pinion bearing preload and total preload X NT124 Selecting pinion height adjusting washer X NT524 KV40104000 Drive pinion flange wrench Removing and installing propeller shaft lock nut and drive pinion lock nut X NT113 ST0237S000 Differential side bearing puller set 1 ST33051001 V Puller 2 ST02371000 V Adapter Removing and installing side bearing inner race X a: 40 mm (1.57 in) dia. b: 50 mm (1.97 in) dia. NT072 ST33081000 Adapter Installing side bearing inner cone X a: 43 mm (1.69 in) dia. b: 33.5 mm (1.319 in) dia. NT431 ST33190000 Differential side bearing drift Installing side bearing inner cone a: 52 mm (2.05 in) dia. b: 45.5 mm (1.791 in) dia. c: 34 mm (1.34 in) dia. NT085 KV31100300 Fork rod pin punch X Removing pinion mate shaft lock pin X a: 4.5 mm (0.177 in) dia. NT410 PD-2 PREPARATION Special Service Tools (Cont’d) Tool number Tool name Unit application Description H233B KV381025S0 Oil seal fitting tool 1 ST30720000 V Drift bar 2 V KV38102510 Drift Installing front oil seal a: 77 mm (3.03 in) dia. b: 55 mm (2.17 in) dia. c: 71 mm (2.80 in) dia. d: 65 mm (2.56 in) dia. NT525 ST32580000 Differential side bearing adjusting nut wrench X Adjusting side bearing preload and backlash (ring geardrive pinion) X NT141 PD-3 PROPELLER Symptom SHAFT DIFFERENTIAL Vibration Noise PD-6 PD-19 PD-29 PD-19 PD-14 Excessive runout Rough gear tooth Improper gear contact Tooth surfaces worn Incorrect backlash X X X Shake X X X X X X X: Applicable PD-4 X X Refer to MA section. Refer to PROPELLER SHAFT in this chart. Refer to DIFFERENTIAL in this chart. NVH in FA, RA section NVH in FA section NVH in FA section NVH in RA section NVH in BR section NVH in ST section Improper gear oil PROPELLER SHAFT DIFFERENTIAL AXLE AND SUSPENSION TIRES ROAD WHEEL DRIVE SHAFT BRAKES STEERING — PD-6 Rotation imbalance X Companion flange excessive runout — Noise Excessive joint angle Possible cause and SUSPECTED PARTS — Reference page Uneven rotation torque NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING NVH Troubleshooting Chart Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

X X X X X X X X X X X X X X X X X X X X X X X X X X X X X PROPELLER SHAFT Front Propeller Shaft SPD434A Rear Propeller Shaft SPD457A PD-5 PROPELLER SHAFT SPD458A On-vehicle Service PROPELLER SHAFT VIBRATION If vibration is present at high speed, inspect propeller shaft runout first.

1. Raise front and rear wheels. 2.

Measure propeller shaft runout at several points by rotating final drive companion flange with hands. Runout limit: 0.6 mm (0.024 in) SPD728 3. If runout exceeds specifications, disconnect propeller shaft at final drive companion flange; then rotate companion flange 180 degrees and reconnect propeller shaft. 4. Check runout again. If runout still exceeds specifications, replace propeller shaft assembly. 5. Perform road tests. APPEARANCE CHECKING + Inspect propeller shaft tube surface for dents or cracks. If damaged, replace propeller shaft assembly. SPD102 PD-6 PROPELLER SHAFT Removal and Installation + Put matchmarks on flanges and separate propeller shaft from final drive. SPD103 CAUTION: When installing the propeller shaft, make sure it is facing the correct direction. Each model is different. Inspection + Inspect propeller shaft runout. If runout exceeds specifications, replace propeller shaft assembly. Runout limit: 0.6 mm (0.024 in) + Inspect journal axial play. If the play exceeds specifications, replace propeller shaft assembly. Journal axial play: 0.02 mm (0.0008 in) or less + Check flange yoke and sleeve yoke for damage or wear. Replace if necessary. SPD106 SPD874 SPD189 Disassembly JOURNAL 1. Put matchmarks on shaft and flange or yoke. SPD128 PD-7 PROPELLER SHAFT Disassembly (Cont’d) 2. Remove snap ring. SPD731 3. Remove pushed out journal bearing by lightly tapping yoke with a hammer, taking care not to damage journal and yoke hole. SPD732 4. Remove bearing at opposite side in above operation. Put marks on disassembled parts so that they can be reinstalled in their original positions from which they were removed. SPD131 Assembly JOURNAL 1. Assemble journal bearing. Apply recommended multi-purpose grease on bearing inner surface. When assembling, be careful that needle bearing does not fall down. SPD133 2. Select snap ring that will provide specified play in axial direction of journal, and install them. (Refer to SDS.) Select snap rings with a difference in thickness at both sides within 0.06 mm (0.0024 in).

SPD134 PD-8 PROPELLER SHAFT Assembly (Cont’d) 3. Adjust thrust clearance between bearing and snap ring to zero by tapping yoke.

SPD732 4. Check to see that journal moves smoothly and check for axial play.

Axial play: 0.02 mm (0.0008 in) or less SPD874 PD-9 ON-VEHICLE SERVICE (Final Drive) Front Oil Seal Replacement 1. Remove propeller shaft. 2. Loosen drive pinion nut. Tool number: KV40104000 PD237 3. Remove companion flange. SPD737 4. Remove front oil seal. SPD738 5. Apply multi-purpose grease to cavity at sealing lips of oil seal. Press front oil seal into carrier. 6. Install companion flange and drive pinion nut. 7. Install propeller shaft. Tool number: KV381025S0 SPD739 PD-10 REMOVAL AND INSTALLATION Removal Remove propeller shaft. Remove drive shaft. Refer to FA section (‘‘FRONT AXLE — Knuckle Flange’’). + Remove axle shaft. Refer to RA section (‘‘REAR AXLE’’). + Remove front and rear final drive mounting bolts. CAUTION: + Be careful not to damage spline, sleeve yoke and front oil seal when removing propeller shaft. + Before removing the final drive assembly or rear axle assembly, disconnect the ABS sensor harness connector from the assembly and move it away from the final drive/ rear axle assembly area. Failure to do so may result in the sensor wires being damaged and the sensor becoming inoperative. + + SPD103 Installation + Fill final drive with recommended gear oil. + Pay attention to the direction of gasket. SPD123 SPD767 PD-11 FRONT FINAL DRIVE SPD436A PD-12 REAR FINAL DRIVE SPD437A PD-13 DISASSEMBLY Pre-inspection SPD149 Before disassembling final drive, perform the following inspection. + Total preload 1) Turn drive pinion in both directions several times to set bearing rollers.

2) Check total preload with Tool. Tool number: ST3127S000 Total preload (with front oil seal): Drive pinion bearing New parts 1.7 - 2.5 Nzm (17 - 25 kg-cm, 15 - 22 in-lb) Used parts 1.5 - 1.7 Nzm (15 - 17 kg-cm, 13 - 15 in-lb) + Ring gear to drive pinion backlash Check ring gear-to-drive pinion backlash with a dial indicator at several points. Ring gear-to-drive pinion backlash: 0.15 - 0.20 mm (0.0059 - 0.0079 in) + Ring gear runout Check runout of ring gear with a dial indicator. Runout limit: 0.08 mm (0.0031 in) Tooth contact Check tooth contact. Refer to ADJUSTMENT (PD-27).

SPD246 + SPD247 + Side gear to pinion mate gear backlash Measure clearance between side gear thrust washer and differential case with a feeler gauge. Clearance between side gear thrust washer and differential case: 0.15 - 0.20 mm (0.0059 - 0.0079 in) SPD004 PD-14 DISASSEMBLY Differential Carrier 1.

Mount differential carrier on Tools. Tool number: A ST0501S000 j j B ST06340000 SPD139 2. Put matchmarks on one side of side bearing cap with paint or punch to ensure that it is replaced in proper position during reassembly. Bearing caps are line-bored during manufacture and should be put back in their original places. SPD249 3. Remove side lock fingers and side bearing caps. SPD250 4. Remove side bearing adjuster with Tool. Tool number: ST32580000 SPD684 5. Remove differential case assembly with a pry bar. SPD685 PD-15 DISASSEMBLY Differential Carrier (Cont’d) Be careful to keep the side bearing outer races together with their respective inner cones — do not mix them up.

SPD011 6. Loosen drive pinion nut with Tool. Tool number: KV38104700 SPD012 7. Remove companion flange with puller. SPD686 8. Take out drive pinion together with pinion rear bearing inner cone, drive pinion bearing spacer and pinion bearing adjusting shim with soft hammer. SPD687 9.

Remove front oil seal and pinion front bearing inner cone. 10. Remove pinion bearing outer races with a brass drift. SPD563 PD-16 DISASSEMBLY Differential Carrier (Cont’d) 11. Remove pinion rear bearing inner cone and drive pinion height adjusting washer with press and Tool. Tool number: ST30031000 SPD018 Differential Case 1. Remove side bearing inner cones. To prevent damage to bearing, engage puller jaws in groove. Tool number: j A ST33051001 j B ST02371000 SPD207A Be careful not to confuse left and right hand parts. Keep bearing and bearing race for each side together.

SPD022 2. Loosen ring gear bolts in a criss-cross pattern. 3. Tap ring gear off differential case with a soft hammer.

Tap evenly all around to keep ring gear from binding. SPD024 4. Drive out pinion mate shaft lock pin, with punch from ring gear side (2-pinion type differential case). Lock pin is calked at pin hole mouth on differential case. SPD025 PD-17 DISASSEMBLY Differential Case (Cont’d) 5.

Separate differential case LH and RH (4-pinion type differential case). Put matchmarks on both differential case LH and RH sides prior to separating them. SPD716 PD-18 INSPECTION Ring Gear and Drive Pinion Check gear teeth for scoring, cracking or chipping. If any damaged part is evident, replace ring gear and drive pinion as a set (hypoid gear set). Differential Case Assembly Check mating surfaces of differential case, side gears, pinion mate gears, pinion mate shaft, thrust block and thrust washers. SPD530 SPD717 Bearing 1. Thoroughly clean bearing. 2. Check bearings for wear, scratches, pitting or flaking.

Check tapered roller bearing for smooth rotation. If damaged, replace outer race and inner cone as a set. SPD715 PD-19 LIMITED SLIP DIFFERENTIAL SPD439A CAUTION: Do not run engine when one wheel (rear) is off the ground. Preparation for Disassembly CHECKING DIFFERENTIAL TORQUE Measure differential torque with Tool. If it is not within the specifications, inspect components of limited slip differential. Differential torque: 108 - 137 Nzm (11 - 14 kg-m, 80 - 101 ft-lb) Tool number: KV38106400 SPD508 PD-20 LIMITED SLIP DIFFERENTIAL Disassembly 1. Remove side bearing inner cone with Tool. 2. Loosen ring gear bolts in a criss-cross pattern. 3. Tap ring gear off gear case with a soft hammer.

Tap evenly all around to keep ring gear from binding. SPD476 4. Loosen screws on differential cases A and B using a press. 5. Separate differential cases A and B. Draw out component parts (discs and plates, etc.). Put marks on gears, discs and plates so that they can be reinstalled in their original positions from which they were removed. SPD507 Inspection CONTACT SURFACES 1. Clean the disassembled parts in suitable solvent and blow dry with compressed air. 2. If following surfaces are found with burrs or scratches, smooth with oil stone. SPD503 1 V 2 V 3 V Differential case A Differential case B Pressure ring 4 V 5 V 6 V Thrust washer Pinion mate shaft Thrust block PD-21 7 V 8 V Pinion mate gear Side gear LIMITED SLIP DIFFERENTIAL Inspection (Cont’d) DISC AND PLATE 1. Clean the discs and plates in suitable solvent and blow dry with compressed air. 2. Inspect discs and plates for wear, nicks and burrs. SPD478 3. To test if friction disc or plate is not distorted, place it on a surface plate and rotate it by hand with indicating finger of dial gauge resting against disc or plate surface. Allowable warpage: 0.08 mm (0.0031 in) If it exceeds limits, replace with a new plate to eliminate possibility of clutch slippage or sticking. SPD279 4.

Measure frictional surfaces and projected portions of friction disc, friction plate, spring plate, and determine each part’s differences to see if the specified wear limit has been exceeded. If any part has worn beyond the wear limit, and deformed or fatigued, replace it with a new one that is the same thickness as the projected portion. Wear limit: 0.1 mm (0.004 in) or less SPD403 PD-22 LIMITED SLIP DIFFERENTIAL Adjustment FRICTION DISC AND FRICTION PLATE END PLAY SPD761 End play of friction disc and friction plate can be calculated by using following equation and should be adjusted within following range. Adjustment can be made by selecting friction disc having two different thicknesses. End play E: 0.05 - 0.15 mm (0.0020 - 0.0059 in) E = A − (B + C) A: Length of differential case contact surface to differential case inner bottom. B: Total thickness of friction discs, friction plates, spring disc and spring plate in differential case on one side. C: Length of differential case contact surface to back side of side gear. 1. Measure values of ‘‘A’’. Standard length A: 49.50 - 49.55 mm (1.9488 - 1.9508 in) SPD417 2. Measure thickness of each disc and plate. Total thickness ‘‘B’’: 19.24 - 20.26 mm (0.7575 - 0.7976 in) SPD420 3. Measure values of ‘‘C’’. (1) Attach a dial indicator to the base plate. (2) Place differential case B on the base plate, and install a master gauge on case B. Then adjust the dial indicator scale to zero with its tip on the master gauge. SPD418 PD-23 LIMITED SLIP DIFFERENTIAL Adjustment (Cont’d) (3) Install pinion mate gears, side gears and pinion mate shaft in differential case B. (4) Set dial indicator’s tip on the side gear, and read the indication. Example: E = A − D = A − (B + C) = 0.05 to 0.15 mm A = 49.52 mm B = 19.45 mm C = 29.7 mm D=B+C E=A−D B .... 19.45 SPD419 +C .... 29.7 49.15 A ..... 49.52 −D .... 49.15 0.37 From the above equation, end play of 0.37 mm exceeds the specified range of 0.05 to 0.15 mm.

Select suitable discs and plates to adjust correctly. Assembly Assemble differential case in the reverse order of disassembly, observing the following. 1. As an aid to installation, apply sufficient amounts of recommended limited slip differential gear oil (refer to MA section) to the faces of pressure rings, discs and plates to be assembled together.

SPD479 2. Place differential case B on a level surface, then install thrust washer. SPD406 3. Install spring plates, friction plates and friction discs. Pay particular attention to the direction of clutch plates and their assembly sequence. SPD504 PD-24 LIMITED SLIP DIFFERENTIAL Assembly (Cont’d) 4. Install pressure ring. SPD481 5. Install side gear by inserting projected portion of disc. SPD482 6. Install pinion mate gears and shaft. Always attach pinion mate shaft to ‘‘V’’ groove in pressure ring with flat surfaces facing up and down. SPD483 7. Install thrust block.

SPD505 8.

Install differential case A side components in the opposite way of differential case B components. 9. Apply gear oil to differential case A, and attach thrust washer to it. SPD506 PD-25 LIMITED SLIP DIFFERENTIAL Assembly (Cont’d) 10. Install differential case A on differential case B. Align the matching marks on the cases, then install screws while pushing differential case down using a press. Press force: 7,846 N (800 kg, 1,764 lb) SPD507 11. After all parts have been assembled, check and adjust the following: DIFFERENTIAL TORQUE INSPECTION a. Place side gear in a vise with Tool into the gear splines.

b.

Turn side gear several times, then measure the differential torque after side gear begins to rotate in order to determine whether it is within the specified range. If it is not, adjust it by selecting a friction disc.

(Refer to SDS for adjustment parts.) Differential torque: 108 - 137 Nzm (11 - 14 kg-m, 80 - 101 ft-lb) Tool number: KV38106400 SPD508 SIDE GEAR BACKLASH INSPECTION Check backlash of side gear on both sides. Using a feeler gauge, measure clearance between side gear and thrust washer. If it is not within specifications, adjust it by selecting a thrust washer. (Refer to SDS.) Side gear backlash: Differential case A side 0.05 - 0.20 mm (0.0020 - 0.0079 in) Differential case B side 0.05 - 0.20 mm (0.0020 - 0.0079 in) SPD411 12. After checking and adjusting, tighten ring gear bolts in a crisscross fashion.

13. Bend up lock straps to lock bolts in place. 14. Install side bearing inner race with Tool. PD-26 ADJUSTMENT To avoid confusion while calculating bearing shims, it is absolutely necessary to stay with the metric system. If you measure anything in inches, the results must be converted to the metric system. Drive Pinion Height 1. First prepare Tools for pinion height adjustment. :V 1 Height gauge (ST31251000) 2 Dummy shaft (ST31181001) V 3 Spacer [thickness: 2.50 mm (0.0984 in)] V 4 Feeler gauge V 2. To simplify the job, make a chart, like the one below, to organize your calculations. LETTERS SPD758 HUNDREDTHS OF A MILLIMETER H: Head number D′: Figure marked on dummy shaft S: Figure marked on height gauge N: Measuring clearance 3. Write the following numbers down the chart. H: Head number SPD542 D′: Figure marked on dummy shaft. SPD759 PD-27 ADJUSTMENT Drive Pinion Height (Cont’d) S: Figure marked on height gauge. SPD760 4. Place pinion rear bearing inner cone and Tools on gear carrier. Tool number: ST31181001 SPD271-A 5. Attach Tool (Height gauge) to gear carrier, and measure the clearance between the height gauge tip and the dummy shaft face. Tool number: ST31251000 SPD272-A 6. Substitute these values into the equation to calculate the thickness of the washer. If values signifying H, D′ and S are not given, regard them as zero and calculate. T (Thickness of washer) = N − [(H − D′ − S) x 0.01] + 3.05 PD444-A PD029 PD-28 ADJUSTMENT Drive Pinion Height (Cont’d) Example (H233B): N = 0.30 H=2 D′ = −1 S=0 T = N − [(H − D′ − S) x 0.01] + 3.05 = 0.30 − [{2 − (−1) − 0} x 0.01] + 3.05 (1) H .... 2 −D′ .... −(−1) 3 −S .... −0 3 (2) 3 x 0.01 0.03 (3) N .... 0.30 −0.03 0.27 (4) 0.27 +3.05 3.32 ∴T = 3.32 7. Select the proper pinion height washer. Drive pinion height adjusting washer: Refer to SDS (PD-0, 53). If you cannot find the desired thickness of washer, use washer with thickness closest to the calculated value. Example (H233B): Calculated value ... T = 3.32 mm Used washer ... T = 3.33 mm Tooth Contact Gear tooth contact pattern check is necessary to verify correct relationship between ring gear and drive pinion. Hypoid gear sets which are not positioned properly in relation to one another may be noisy, or have short life or both.

With a pattern check, the most desirable contact for low noise level and long life can be assured. 1. Thoroughly clean ring gear and drive pinion teeth. 2. Sparingly apply a mixture of powdered ferric oxide and oil or equivalent to 3 or 4 teeth of ring gear drive side. SPD005 PD-29 ADJUSTMENT Tooth Contact (Cont’d) 3. Hold companion flange steady by hand and rotate the ring gear in both directions. SPD695 SPD007-B PD-30 ASSEMBLY Differential Case — 4-pinion type — 1. Measure clearance between side gear thrust washer and differential case. Clearance between side gear thrust washer and differential case (A — B): 0.15 - 0.20 mm (0.0059 - 0.0079 in) The clearance can be adjusted with side gear thrust washer.

Refer to SDS. 2. Apply oil to gear tooth surfaces and thrust surfaces and check that they turn properly.

SPD656 3. Install differential case LH and RH. SPD643 4. Place differential case on ring gear. 5. Apply locking sealer to ring gear bolts, and install them.

Tighten bolts in a criss-cross fashion, lightly tapping bolt head with a hammer. SPD746 6. Press-fit side bearing inner races on differential case with Tool. Tool number: A ST33190000 j j B ST02371000 PD353 PD-31 ASSEMBLY Differential Case — 2-pinion type — 1. Install side gears, pinion mate gears and thrust washers into differential case.

SPD552 2. Fit pinion mate shaft to differential case so that it meets lock pin holes. 3.

Adjust backlash between side gear and pinion mate gear by selecting side gear thrust washer.

Refer to SDS. Backlash between side gear and pinion mate gear (Clearance between side gear thrust washer and differential case): 0.15 - 0.20 mm (0.0059 - 0.0079 in) SPD258 4. Install pinion mate shaft lock pin with a punch. Make sure lock pin is flush with case.

SPD030 5. Apply gear oil to gear tooth surfaces and thrust surfaces and make sure they turn properly. 6. Install differential case assembly on ring gear. Tighten bolts in a criss-cross pattern, lightly tapping bolt head with a hammer. SPD322 7. Press-fit side bearing inner cones on differential case with Tool. Tool number: A ST33190000 j j B ST02371000 PD353 PD-32 ASSEMBLY Differential Carrier 1. Press-fit front and rear bearing outer races with Tools. Tool number: A ST30611000 j j B ST30621000 (front differential) or suitable pipe C ST30701000 j CAUTION: Do not damage roller side face. SPD580 2. Select drive pinion height adjusting washer.

Refer to ADJUSTMENT (PD-27).

3. Install drive pinion height adjusting washer in drive pinion, and press-fit pinion rear bearing inner cone in it, with press and Tool. Tool number: ST30911000 SPD377 4. Place pinion front bearing inner cone in gear carrier. SPD581 5. Apply multi-purpose grease to cavity at sealing lips of oil seal. Install front oil seal. Tool number: A ST30720000 j B KV38102510 j SPD451A PD-33 ASSEMBLY Differential Carrier (Cont’d) 6. Install drive pinion bearing spacer, pinion bearing adjusting shim and drive pinion in gear carrier. SPD935-A 7. Insert companion flange into drive pinion by tapping the companion flange with a soft hammer. SPD697 8. Tighten pinion nut to the specified torque. The threaded portion of drive pinion and pinion nut should be free from oil or grease. Tool number: KV38104700 SPD040 SPD149 9. Turn drive pinion in both directions several times, and measure pinion bearing preload. Tool number: ST3127S000 Pinion bearing preload (with front oil seal): 1.4 - 1.7 Nzm (14 - 17 kg-cm, 12 - 15 in-lb) If preload is out of specification, adjust the thickness of spacer and shim combination by replacing shim and spacer with thinner one. + Start from the combination of thickest spacer and shim.

+ Combine each spacer and shim thickness one by one until the correct specification are achieved. Drive pinion bearing preload adjusting spacer and shim: Refer to SDS (PD-51). PD-34 ASSEMBLY Differential Carrier (Cont’d) 10. Install differential case assembly with side bearing outer races into gear carrier. PD383 11. Position side bearing adjusters on gear carrier with threads properly engaged; screw in adjusters lightly at this stage of assembly. Tool number: ST32580000 SPD684 12. Align mark on bearing cap with that on gear carrier and install bearing cap on gear carrier. + Do not tighten at this point to allow further tightening of side bearing adjusters. SPD265 13. Tighten both right and left side bearing adjusters alternately and measure ring gear backlash and total preload at the same time. Adjust right and left side bearing adjusters by tightening them alternately so that proper ring gear backlash and total preload can be obtained. Ring gear-to-drive pinion backlash: 0.15 - 0.20 mm (0.0059 - 0.0079 in) SPD246 + When checking preload, turn drive pinion in both directions several times to set bearing rollers. Tool number: ST3127S000 Total preload (with front oil seal): Drive pinion bearing New parts 1.7 - 2.5 Nzm (17 - 25 kg-cm, 15 - 22 in-lb) Used parts 1.5 - 1.7 Nzm (15 - 17 kg-cm, 13 - 15 in-lb) SPD149 PD-35 ASSEMBLY Differential Carrier (Cont’d) 14. Tighten side bearing cap bolts. 15. Install side lock finger in place to prevent rotation during operation. SPD698 16. Check runout of ring gear with a dial indicator. Runout limit: 0.08 mm (0.0031 in) + If backlash varies excessively in different places, the variance may have resulted from foreign matter caught between the ring gear and the differential case. + If the backlash varies greatly when the runout of the ring gear is within a specified range, the hypoid gear set or differential case should be replaced. 17. Check tooth contact. Refer to ADJUSTMENT (PD-27). SPD247 PD-36 DIFFERENTIAL LOCK SPD441A Actuator and Fork SPD835-A PD-37 DIFFERENTIAL LOCK Disassembly 1.

Remove side bearing inner cone with Tool. For removal procedure, refer to ordinary differential case. 2. Loosen ring gear bolts in a criss-cross pattern. 3. Tap ring gear off the gear with a soft hammer. SPD839 4. Put marks on both differential cases.

5. Loosen screws on differential cases A and B using a press. Tool number: ST33081000 6. Separate differential cases A and B. SPD449A 7. Drive out pinion mate shaft lock pin with Tool. Draw out component parts. SPD841 PD-38 DIFFERENTIAL LOCK Inspection SPD842 CONTACT SURFACES 1. Clean the disassembled parts in suitable solvent and blow dry with compressed air. 2. If following surfaces are found with burrs or scratches, smooth with oil stone.

1 Differential case A V 2 Differential case B V 3 Side gear thrust washer V 4 Side gear V 5 Pinion mate thrust washer V 6 Pinion mate gear V 7 Pinion mate shaft V ACTUATOR OPERATION Apply a vacuum pressure of 66.7 kPa (667 mbar, 500 mmHg, 19.69 inHg) and check its operation and leakage within 10 seconds. SPD906 PD-39 DIFFERENTIAL LOCK Assembly DIFFERENTIAL CASE 1. Install side gears, pinion mate gears and thrust washers into differential case B. 2. Fit pinion mate shaft to differential case so that it meets lock pin holes. SPD844 3. Adjust backlash between side gear and pinion mate gear. + Opposite side of ring gear: Select side gear thrust washer by measuring gap with feeler gauge.

Refer to SDS. SPD845 + Ring gear side: Measure height H1. Measure height H2. H2 − H1 = Clearance between the side gear end face and differential case B Select side gear thrust washer. Refer to SDS. Backlash between side gear and pinion mate gear (Clearance between side gear thrust washer and differential case): 0.10 - 0.20 mm (0.0039 - 0.0079 in) SPD846 4. Install pinion mate shaft lock pin with a punch. Make sure lock pin is flush with case. 5. Install differential case A. 6. Place ring gear on differential case and install it by tightening bolt. Use locking sealant. 7. Install side bearing inner cone. SPD847 PD-40 DIFFERENTIAL LOCK Assembly (Cont’d) ACTUATOR + If same differential carrier is used again, reuse actuator shim or use a shim of the same thickness when used shim is damaged. + When differential carrier is replaced with a new one, select actuator shim to keep differential lock mechanism functioning. When installing the differential lock fork, make sure it is facing the correct direction.

+ SPD848 1. Standard length ‘‘A’’ is between specified mounting surface of actuator and differential case B surface ‘‘P’’. Refer to SDS. SPD930 2. Install differential carrier on axle case. 3. Rotate ring gear until surface ‘‘P’’ is seen through actuator mounting hole in axle case. Measure dimension ‘‘L’’ between actual mounting surface of actuator on axle case and surface ‘‘P’’, using suitable gauge tool. + Put gauge as shown on drawing. + Put mark on gauge at actuator mounting surface. + Measure dimension ‘‘L’’. SPD931 PD-41 DIFFERENTIAL LOCK Assembly (Cont’d) 4. If shim thickness determined by equation is assumed as ‘‘T’’, ‘‘T’’ will be expressed by equation ‘‘A’’ - ‘‘L’’.

Select a combination of shims from those shown in SDS so that shim thickness is within ‘‘T’’ range. Install actuator using selected shims. SPD932 PD-42 DIFFERENTIAL LOCK System Description The differential lock operates only in 4WD. The differential lock control unit interrupts current flowing through differential lock solenoid-2 when vehicle speed exceeds 7 km/h (4 MPH). If the differential lock switch is accidentally turned on when vehicle speed is greater than 7 km/h (4 MPH), the control unit will prevent the differential lock from sustaining impact damage.

A warning buzzer will sound when the vehicle is driven over 20 km/h (12 MPH) with the differential lock engaged. SPD446A PD-43 DIFFERENTIAL LOCK Component Parts Location SPD442A PD-44 DIFFERENTIAL LOCK Wiring Diagram — DIFF/L —/LHD Models TPD013 PD-45 DIFFERENTIAL LOCK Wiring Diagram — DIFF/L —/LHD Models (Cont’d) TPD014 PD-46 DIFFERENTIAL LOCK Wiring Diagram — DIFF/L —/RHD Models TPD016 PD-47 DIFFERENTIAL LOCK Wiring Diagram — DIFF/L —/RHD Models (Cont’d) TPD017 PD-48 DIFFERENTIAL LOCK Electrical Components Inspection DIFFERENTIAL LOCK INDICATOR SWITCH CHECK + Check switch function by checking continuity. Continuity: ON Continuity should exist. OFF Continuity should not exist. If NG, replace differential lock indicator switch. SPD443A DIFFERENTIAL LOCK SOLENOID CHECK 1. Disconnect differential lock solenoid 4-pin connector. 2. Check continuity between terminals V 1 and V 3 , V 2 and Continuity should exist. If NG, replace differential lock solenoid. SPD444A SPEED SENSOR CHECK Refer to EL section. PD-49 4 . V DIFFERENTIAL LOCK Electrical Components Inspection (Cont’d) DIFFERENTIAL LOCK CONTROL UNIT CHECK On-vehicle check Be sure that vehicle is in 4WD. . Operate vehicle at a speed less than 7 km/h (4 MPH) or when stopping. . Turn differential lock switch ON. .

No Ensure differential lock indicator lamp is on.

c Malfunction is in system other than differential lock control unit, speed sensor. Check and correct. c When speed sensor functions, differential lock control unit functions improperly. Yes . Turn differential lock switch OFF while driving vehicle at speed less than 7 km/h (4 MPH) or when stopping. . Drive vehicle at speed greater than 7 km/h (4 MPH) and turn differential lock switch ON. . Yes Ensure differential lock indicator lamp is on. No . . Differential lock control unit is functioning properly. Check differential lock control unit. Unit check 1. Ensure that wiring to differential lock control unit is correct and that the unit is properly connected to power supply. 2. Place vehicle on a safety stand properly. Ensure that the front and rear wheels rotate freely. 3. Check output voltage of differential lock at solenoid-2 connector. + Vehicle speed less than 7 km/h (4 MPH) on speedometer Power supply: Approximately 12V + Vehicle speed greater than 7 km/h (4 MPH) on speedometer Output voltage: Approximately 0V SPD445A PD-50 SERVICE DATA AND SPECIFICATIONS (SDS) Propeller Shaft GENERAL SPECIFICATIONS Front propeller shaft Applied model RD28 Engine MT models Propeller shaft model 2F80B Number of joints 2 Type of journal bearing Solid (Disassembly type) Coupling type with transmission Flange type Distance between yokes mm (in) 73 (2.87) Shaft length (Spider-tospider) mm (in) 832 (32.76) Shaft outer diameter mm (in) 50.8 (2.000) Rear propeller shaft Applied model Engine RD28 Transmission Body Propeller shaft model M/T Hardtop Wagon 2F100H 2F80B Number of joints 2 Type of journal bearing Solid (Disassembly type) Coupling type with transmission Flange type Distance between yokes mm (in) 94 (3.70) 73 (2.87) Shaft length (Spider-tospider) mm (in) 440 (17.32) 1,033 (40.67) Shaft outer diameter mm (in) 57 (2.24) 89.6 (3.528) INSPECTION AND ADJUSTMENT Available snap rings Service data 2F80B Propeller shaft model 2F80B, 2F100H Propeller shaft runout limit mm (in) Journal axial play mm (in) 0.6 (0.024) 0.02 (0.0008) PD-51 Thickness mm (in) Color Part number 1.99 (0.0783) White 37146-C9400 2.02 (0.0795) Yellow 37147-C9400 2.05 (0.0807) Red 37148-C9400 2.08 (0.0819) Green 37149-C9400 2.11 (0.0831) Blue 37150-C9400 2.14 (0.0843) Light brown 37151-C9400 2.17 (0.0854) Black 37152-C9400 2.20 (0.0866) Black 37153-C9400 SERVICE DATA AND SPECIFICATIONS (SDS) Propeller Shaft (Cont’d) 2F100H Thickness mm (in) Color Part number 1.95 (0.0768) White 37146-61502 1.98 (0.0780) Yellow 37147-61502 2.01 (0.0791) Red 37148-61502 2.04 (0.0803) Green 37149-61502 2.07 (0.0815) Blue 37150-61502 2.10 (0.0827) Light Brown 37151-61502 2.13 (0.0839) Pink 37146-61503 2.16 (0.0850) Gold 37147-61503 2.19 (0.0862) Black 37148-61503 2.22 (0.0874) Color less 37149-61503 Final Drive GENERAL SPECIFICATIONS Body type Wagon Hardtop Engine RD28ETi Transmission M/T Standard Front final drive [All] H233B 2-pinion Gear ratio 4.625 4.625 Number of teeth (Ring gear/drive pinion) 37/8 37/8 Oil capacity (Approx.) ! (Imp pt) 5.4 (9-1/2) Optional Rear final drive [Grade] Standard Standard Optional H233B Diff. lock H233B 4 pinion 4 pinion Diff. lock Gear ratio 4.625 4.625 Number of teeth (Ring gear/drive pinion) 37/8 37/8 Without diff. lock 2.4 (4-1/4) 2.4 (4-1/4) With diff. lock 3.0 (5-1/4) 3.0 (5-1/4) Oil capacity (Approx.) ! (Imp pt) With LSD model Body type INSPECTION AND ADJUSTMENT Wagon Engine Transmission Hardtop RD28ETi All Ring gear runout limit mm (in) 0.08 (0.0031) M/T Rear final drive [Grade] H233B Gear ratio 4,625 Number of teeth (ring gear/drive pinion) 37/8 Oil capacity (Approx.) ! (Imp pt) Ring gear runout LSD Side gear adjustment (without LSD) Side gear backlash (Clearance between side gear to differential case) mm (in) 0.15 - 0.20 (0.0059 - 0.0079) Available side gear thrust washers Thickness 2.1 (3-3/4) 1.75 (0.0689) 1.80 (0.0709) 1.85 (0.0728) PD-52 mm (in) Part number 38424-T5000 38424-T5001 38424-T5002 SERVICE DATA AND SPECIFICATIONS (SDS) Final Drive (Cont’d) — Additional service for LSD model — Differential torque adjustment Differential torque Drive pinion bearing preload adjusting method 108 - 137 (11 - 14, 80 - 101) Nzm (kg-m, ft-lb) Drive pinion preload adjustment Number of discs and plates Drive pinion preload Nzm (kg-cm, in-lb) 4 4 4 Friction disc Friction plate Spring plate Wear limit of plate and disc 0.1 (0.004) mm (in) Allowable warpage of friction disc and plate mm (in) Adjusting shim and spacer With front oil seal 1.4 - 1.7 (14 - 17, 12 - 15) Without front oil seal 1.2 - 1.5 (12 - 15, 10 - 13) Available drive pinion preload adjusting shims 0.08 (0.0031) Thickness mm (in) Part number Available discs and plates Part name Thickness mm (in) 1.48 - 1.52 (0.0583 - 0.0598) 38433-C6000 (Standard type) 1.58 - 1.62 (0.0622 - 0.0638) 38433-C6001 (Adjusting type) Friction plate 1.48 - 1.52 (0.0583 - 0.0598) 38432-C6000 Spring disc 1.48 - 1.52 (0.0583 - 0.0598) 38436-C6000 Spring plate 1.48 - 1.52 (0.0583 - 0.0598) 38435-C6010 Friction disc 2.31 2.33 2.35 2.37 2.39 2.41 2.43 2.45 2.47 2.49 2.51 2.53 2.55 2.57 2.59 Part number Drive pinion height adjustment mm (in) 2.58 (0.1016) 2.61 (0.1028) 2.64 (0.1039) 2.67 (0.1051) 2.70 (0.1063) 2.73 (0.1075) 2.76 (0.1087) 2.79 (0.1098) 2.82 (0.1110) 2.85 (0.1122) 2.88 (0.1134) 2.91 (0.1146) 2.94 (0.1157) 2.97 (0.1169) 3.00 (0.1181) 3.03 (0.1193) 3.06 (0.1205) 3.09 (0.1217) 3.12 (0.1228) 3.15 (0.1240) 3.18 (0.1252) 3.21 (0.1264) 3.24 (0.1276) 3.27 (0.1287) 3.30 (0.1299) 3.33 (0.1311) 3.36 (0.1323) 3.39 (0.1335) 3.42 (0.1346) 3.45 (0.1358) 3.48 (0.1370) 3.51 (0.1382) 3.54 (0.1394) 3.57 (0.1406) 3.60 (0.1417) 3.63 (0.1429) 3.66 (0.1441) 38125-82100 38126-82100 38127-82100 38128-82100 38129-82100 38130-82100 38131-82100 38132-82100 38133-82100 38134-82100 38135-82100 38136-82100 38137-82100 38138-82100 38139-82100 Available drive pinion preload adjusting spacers Available pinion height adjusting washers Thickness (0.0909) (0.0917) (0.0925) (0.0933) (0.0941) (0.0949) (0.0957) (0.0965) (0.0972) (0.0980) (0.0988) (0.0996) (0.1004) (0.1012) (0.1020) Length Part number 38151-01J00 38151-01J01 38151-01J02 38151-01J03 38151-01J04 38151-01J05 38151-01J06 38151-01J07 38151-01J08 38151-01J09 38151-01J10 38151-01J11 38151-01J12 38151-01J13 38151-01J14 38151-01J15 38151-01J16 38151-01J17 38151-01J18 38151-01J19 38151-01J60 38151-01J61 38151-01J62 38151-01J63 38151-01J64 38151-01J65 38151-01J66 38151-01J67 38151-01J68 38151-01J69 38151-01J70 38151-01J71 38151-01J72 38151-01J73 38151-01J74 38151-01J75 38151-01J76 mm (in) 4.50 4.75 5.00 5.25 5.50 Part number (0.1772) (0.1870) (0.1969) (0.2067) (0.2165) 38165-76000 38166-76000 38167-76000 38166-01J00 38166-01J10 Total preload adjustment Total preload Drive pinion Nzm (kg-cm, in-lb) bearing With front oil seal Ring gear backlash Side bearing adjusting method PD-53 New 1.7 - 2.5 (17 - 25, 15 - 22) Old 1.5 - 1.7 (15 - 17, 13 - 15) mm (in) 0.15 - 0.20 (0.0059 - 0.0079) Side adjuster REAR AXLE & REAR SUSPENSION SECTION RA CONTENTS PRECAUTIONS AND PREPARATION...........................1 Precautions ....1 Special Service Tools ....1 Commercial Service Tools ....2 NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING ....3 NVH Troubleshooting Chart.......................................3 REAR AXLE AND REAR SUSPENSION.......................4 ON-VEHICLE SERVICE ....5 Rear Axle and Rear Suspension Parts ....5 Rear Wheel Bearing ....5 REAR AXLE...6 Components..6 Removal...7 Inspection..9 Installation..9 REAR SUSPENSION..12 Removal and Installation ....13 Coil Spring and Shock Absorber ....14 Upper Link, Lower Link and Panhard Rod...............14 Stabilizer Bar ....15 STABILIZER RELEASE DEVICE................................16 System Components ....16 System Description..16 Removal and Installation ....17 Wiring Diagram ....18 Trouble Diagnoses...20 SERVICE DATA AND SPECIFICATIONS (SDS) ....25 General Specifications..25 Inspection and Adjustment ....25 RA PRECAUTIONS AND PREPARATION Precautions + + + + When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground. *: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions. Use flare nut wrench when removing and installing brake tubes. After installing removed suspension parts, check wheel alignment and adjust if necessary.

Always torque brake lines when installing. SBR820BA Special Service Tools Tool number Tool name Description KV40101000 Axle stand Removing rear axle shaft NT159 ST36230000 Sliding hammer Removing rear axle shaft NT126 ST38080001 Bearing lock nut wrench Removing wheel bearing lock nut a: 58 mm (2.28 in) NT507 KV40106500 Wheel bearing puller Removing wheel bearing NT724 GG94310000 Flare nut torque wrench Removing and installing brake piping a: 10 mm (0.39 in) NT406 RA-1 PRECAUTIONS AND PREPARATION Commercial Service Tools Tool name Description Equivalent to GG94310000 j 1 Flare nut crowfoot j 2 Torque wrench Removing and installing each brake piping a: 10 mm (0.39 in) NT360 Rear axle oil seal drift Installing oil seal a: 74 mm (2.91 in) dia. b: 68 mm (2.68 in) dia. c: 10 mm (0.39 in) NT163 RA-2 Symptom X X Vibration X X X Shimmy X X X X Judder X X X Poor quality ride or handling X X X X: Applicable RA-3 X X X NVH in FA section NVH in FA section NVH in FA section NVH in BR section NVH in ST section TIRES ROAD WHEEL AXLE SHAFT BRAKES STEERING X Refer to REAR AXLE AND REAR SUSPENSION in this chart. X REAR AXLE AND REAR SUSPENSION X NVH in FA section X FRONT AXLE AND FRONT SUSPENSION X NVH in PD section X DIFFERENTIAL NVH in PD section X PROPELLER SHAFT X RA-5 Shake Wheel bearing damage X RA-15 X Stabilizer bar fatigue — X RA-12 — Parts interference X Suspension looseness — Bushing or mounting deterioration Noise Spring fatigue RA-14 REAR AXLE AND REAR SUSPENSION Shock absorber deformation, damage or deflection Possible cause and SUSPECTED PARTS RA-4 Reference page Improper installation, looseness NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING NVH Troubleshooting Chart Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts. X X X X

Touch ''BACK'' key of CONSULT until ''SELECT SYSTEM'' appears, then turn off CONSULT. 13. Turn ignition switch ''OFF'', then disconnect CONSULT and both battery cables. 14. Repair the system as outlined by the ''Repair order'' in ''INTERMITTENT PROBLEM DIAGNOSTIC CODE CHART'', that corresponds to the problem code. For replacement procedure of component parts, refer to RS-12. 15.

Go to DIAGNOSTIC PROCEDURE 3, page RS-34, for final checking. INTERMITTENT PROBLEM DIAGNOSTIC CODE CHART (''SELF-DIAG [PAST]'' or ''TROUBLE DIAG RECORD'') Diagnostic item NO SELF DIAGNOSTIC FAILURE INDICATED. Explanation When malfunction is indicated by the ''AIR BAG'' warning lamp in User mode Repair order + Low battery voltage (Less than 9V) + Go to DIAGNOSTIC PROCEDURE 3 (RS-34) after charging battery. + No malfunction is detected. + Go to DIAGNOSTIC PROCEDURE 3 (RS-34). AIRBAG MODULE [OPEN] + Driver's air bag module circuit is open. (including the spiral cable) AIRBAG MODULE [VB-SHORT] + Driver's air bag module circuit is shorted to some power supply circuit. (including the spiral cable) 1. Visually check the wiring harness connection.

2. Replace the harness if it has visible damage. 3. If the harness check result is OK, replace driver's air bag module (Before disposal of it, it must be deployed.), diagnosis sensor unit and spiral cable. AIRBAG MODULE [GND-SHORT] + Driver's air bag module circuit is shorted to ground. (including the spiral cable) AIRBAG MODULE [SHORT] + Driver's air bag module circuits are shorted to each other. ASSIST A/B MODULE [VB-SHORT] + Front passenger air bag module circuit is shorted to some power supply circuit. ASSIST A/B MODULE [OPEN] + Front passenger air bag module circuit is open. ASSIST A/B MODULE [GND-SHORT] + Front passenger air bag module circuit is shorted to ground. ASSIST A/B MODULE [SHORT] + Front passenger air bag module circuits are shorted to each other.

CONTROL UNIT + Diagnosis sensor unit is malfunctioning.

1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check result is OK, replace front air bag module (Before disposal of it, it must be deployed.), and diagnosis sensor unit. 1.

Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check result is OK, replace diagnosis sensor unit. *Intermittent problem areas cannot be easily located. For this reason, perform the procedures outlined under the repair order, then make the final system check. RS-38 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Trouble Diagnoses without CONSULT DIAGNOSTIC PROCEDURE 6 SRS465 No. Inspecting SRS malfunctioning parts by using ''AIR BAG'' warning lamp — Diagnosis mode NOTE: SRS will not enter Diagnosis mode if no malfunction is detected in User mode. 1. Open driver's door. 2. Turn ignition switch from ''OFF'' to ''ON''. 3. Press driver's door switch at least 5 times within 7 seconds after turning ignition switch ''ON''. SRS is now in Diagnosis mode. 4. ''AIR BAG'' warning lamp operates in Diagnosis mode as follows: NOTE: If SRS does not enter Diagnosis mode even though malfunction is detected in User mode, go to DIAGNOSTIC PROCEDURE 11, page RS-44.

''AIR BAG'' warning lamp operation — Diagnosis mode — j a through j b are repeated. 1 MRS100A j a through j b are repeated. NOTE: j a — Interval I j b — Start signal (Start signal identifies display modes) j c — Interval II j d — Indicates malfunctioning part (0.5 sec. ON and 0.5 sec. OFF MRS099A is counted as one flash.) 2 SRS condition + Diagnosis results (previously stored in the memory) might not be erased after repair. + Intermittent problem has been detected in the past. Go to DIAGNOSTIC PROCEDURE 8 (RS-42). The system has a problem and needs to be repaired. 5. Malfunctioning part is indicated by the number of flashes (part j d). Compare the number of flashes to ''AIR BAG WARNING LAMP FLASH CODE CHART'', page RS-40, and locate malfunctioning part. 6. Turn ignition switch ''OFF'', and disconnect both battery cables. 7. Repair the system as outlined by the ''Repair order'' in ''AIR BAG WARNING LAMP FLASH CODE CHART'' that corresponds to the flash code. For replacement procedure of component parts, refer to RS-12. 8. After repairing the system, go to DIAGNOSTIC PROCEDURE 7, page RS-40. RS-39 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Trouble Diagnoses without CONSULT (Cont'd) AIR BAG WARNING LAMP FLASH CODE CHART ''AIR BAG'' warning lamp Warning lamp d Flash code j (# of flashes) Repair order ''Recheck SRS at each replacement.'' Explanation 0 + Diagnosis results (previously stored in the memory) might not be erased after repair. + Intermittent problem has been detected in the past. Go to DIAGNOSTIC PROCEDURE 8 (RS-42). 2 The driver's air bag module circuit is malfunction- 1. ing. 2.

3. 4. 7 The diagnosis sensor unit is malfunctioning.

1. 2. 3.

4. 8 The front passenger air bag module circuit is malfunctioning. 1. Visually check the wiring harness connections. 2. Replace the harness if it has visible damage. 3. Replace the front passenger air bag module. (Before disposing of it, it must be deployed.) 4.

Replace the diagnosis sensor unit. 5.

Replace the harness. Visually check the wiring harness connections. Replace the harness if it has visible damage. Replace the spiral cable. Replace the driver's air bag module. (Before disposing of it, it must be deployed.) 5. Replace the diagnosis sensor unit. 6. Replace the harness. Visually check the wiring harness connections. Replace the harness if it has visible damage. Replace the diagnosis sensor unit. Replace the harness. * Follow the procedures in numerical order when repairing malfunctioning parts. Confirm whether malfunction is eliminated using the air bag warning lamp or CONSULT each time repair is finished. If malfunction is still observed, proceed to the next step. When malfunction is eliminated, further repair work is not required. DIAGNOSTIC PROCEDURE 7 Final checking after repairing SRS by using ''AIR BAG'' warning lamp — Diagnosis mode and User mode 1. After repairing SRS connect both battery cables. 2. Open driver's door. 3. Turn ignition switch from ''OFF'' to ''ON''. 4. ''AIR BAG'' warning lamp operates in Diagnosis mode as follows: SRS465 RS-40 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Trouble Diagnoses without CONSULT (Cont'd) No. ''AIR BAG'' warning lamp operation — Diagnosis mode — SRS condition j a through j b are repeated. No malfunction is detected or repair is completed. No further action is necessary. 1 MRS100A j a through j d are repeated. NOTE: j a — Interval I j b — Start signal (Start signal identifies display modes) j c — Interval II j d — Indicates malfunctioning part (0.5 sec. ON and 0.5 sec. OFF is counted as one MRS099A flash.) 2 The system has a problem and needs to be repaired. NOTE: When diagnosis sensor unit is replaced with new one, ''AIR BAG'' warning lamp will operate in User mode. Checking ''AIR BAG'' warning lamp operation in Diagnosis mode is not required. Go to step 6. 5. If ''AIR BAG'' warning lamp operates as shown in No. 1 in chart above, turn ignition switch ''OFF'' to reset from Diagnosis mode to User mode and to erase the memory of the malfunction. Then go to step 6. If ''AIR BAG'' warning lamp operates as shown in No. 2 in chart above, the malfunctioning part is not repaired completely, or another malfunctioning part is detected. Go to DIAGNOSTIC PROCEDURE 6, page RS-39, and repair malfunctioning part completely. 6.

Turn ignition switch ''ON''. ''AIR BAG'' warning lamp operates in User mode. Compare ''AIR BAG'' warning lamp operation to the chart below. NOTE: If switching Diagnosis mode to User mode is required while malfunction is being detected, turn ignition switch from ''OFF'' to ''ON''. Then press driver's door switch at least 5 times within 7 seconds after turning ignition switch ''ON''. SRS is now in User mode. ''AIR BAG'' warning lamp operation — User mode — SRS condition No malfunction is detected. No further action is necessary. MRS095A RS-41 Reference item — TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Trouble Diagnoses without CONSULT (Cont'd) ''AIR BAG'' warning lamp operation — User mode — SRS condition Reference item The system has a problem Go to DIAGNOSTIC PROCEDURE 2 or 6 (RS-32 or and needs to be repaired RS-39). as indicated. MRS096A Air bag is deployed. Go to COLLISION DIAGNOSIS (RS-45). Air bag fuse, diagnosis sensor unit or harness is malfunctioning and needs to be repaired. Go to DIAGNOSTIC PROCEDURE 9 (RS-43). MRS097A One of the following has occurred and needs to be repaired. + Meter fuse is blown. + ''AIR BAG'' warning lamp circuit has open or short. + Diagnosis sensor unit is MRS098A malfunctioning. Go to DIAGNOSTIC PROCEDURE 10 (RS-43). DIAGNOSTIC PROCEDURE 8 (Continued from without CONSULT) DIAGNOSTIC PROCEDURE 6) (Inspecting SRS malfunctioning record Is it the first time for maintenance of SRS? Yes . GO TO DIAGNOSTIC PROCEDURE 5 (RS-36). Further inspection cannot be performed without CONSULT. RS-42 No c Diagnosis results (previously stored in the memory) might not be erased after repair. Go to DIAGNOSTIC PROCEDURE 7, step 5 (RS40). TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Trouble Diagnoses: ''AIR BAG'' Warning Lamp Does Not Turn Off DIAGNOSTIC PROCEDURE 9 Yes Is air bag deployed? c No Refer to COLLISION DIAGNOSIS (RS-45). . Is SRS ''Air Bag'' fuse OK? No Replace fuse. c Yes SRS307 . Connect CONSULT and touch ''START''. + Is ''AIRBAG'' displayed on CONSULT?

No c Yes Visually check the wiring harness connection of diagnosis sensor unit. If the harness connection check is OK, replace diagnosis sensor unit. . Is harness connection between warning lamp and diagnosis sensor unit OK? No c Yes SRS180 Connect warning lamp and diagnosis sensor unit connector properly.

If warning lamp still does not go off, replace harness. .

Replace diagnosis sensor unit. Trouble Diagnoses: ''AIR BAG'' Warning Lamp Does Not Turn On DIAGNOSTIC PROCEDURE 10 No Is meter fuse OK? Replace fuse. c Yes .

Is warning lamp LED OK? No Replace warning lamp LED. c Yes . SRS469 1. Disconnect diagnosis sensor unit connector. 2.

Turn the ignition key to ON position.

+ Does warning lamp turn on? Yes . Replace diagnosis sensor unit. RS-43 No c Check the ground circuit of ''AIR BAG'' warning lamp. TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Trouble Diagnoses: SRS Does Not Enter Diagnosis Mode Using Door Switch DIAGNOSTIC PROCEDURE 11 Disconnect both battery cables and check battery voltage using circuit tester. + Is battery voltage more than 9V? No Charge battery. c Yes .

SRS263 Remove driver's door switch and check continuity between driver's door switch connector terminals V 1 and V 3 under the following conditions.

Condition No c Replace driver's door switch. Continuity Door switch is depressed (Door is closed). NO Door switch is released (Door is open). YES SRS470 Yes . Check harness continuity between driver's door switch connector terminal V 3 and body ground. + Does continuity exist? Yes . Replace diagnosis sensor unit. . SRS265-D Go to SRS Operation Check (RS-30). RS-44 No Replace or repair harness.

c COLLISION DIAGNOSIS To repair the SRS for a frontal collision, perform the following steps. When SRS (except the side air bag) is activated in a collision: 1 Replace the diagnosis sensor unit. V 2 Remove the air bag modules. V 3 Check the SRS components using the table shown below: V + Replace any SRS components showing visible signs of damage (dents, cracks, deformation). 4 Install new air bag modules. V 5 Conduct self-diagnosis using CONSULT and ''AIR BAG'' warning lamp. Refer to ''SRS Operation Check'' V for details (RS-30). Ensure entire SRS operates properly. When SRS is not activated in a collision: 1 Check the SRS components using the table shown below: V + Replace any SRS components showing visible signs of damage (dents, cracks, deformation). 2 Conduct self-diagnosis using CONSULT and ''AIR BAG'' warning lamp. Refer to ''SRS Operation Check'' V for details (RS-30). Ensure entire SRS operates properly.

SRS inspection Part SRS (except the side air bag) is activated SRS is NOT activated Air bag module (driver and passenger side) REPLACE Install air bag module with new bolts coated with bonding agent. 1. Remove air bag module. Check harness cover and connectors for damage, terminals for deformities, and harness for binding. 2-1. Install driver air bag module into the steering wheel to check fit and alignment with the wheel. 2-2. Install passenger air bag module into the instrument panel to check fit with the instrument panel. 3. No damage found, reinstall with new bolts coated with bonding agent. 4. If damaged—REPLACE. Air bag must be deployed before discarding.

Diagnosis sensor unit REPLACE Install diagnosis sensor unit with new bolts coated with bonding agent. 1. 2. 3. 4.

Seat belt pre-tensioner assembly REPLACE Install seat belt pretensioner with new bolts coated with bonding agent. 1. Remove seat belt pre-tensioners.

Check harness cover and connectors for damage, terminals for deformities, and harness for binding. 2.

Check belts for damage and anchors for loose mounting. 3. Check retractor for smooth operation. 4. If no damage is found, reinstall with new bolts coated with bonding agent.

5. If damaged—REPLACE. Install the seat belt pre-tensioners with new bolts coated with bonding agent. Seat belt pre-tensioners must be deployed before discarding. Steering wheel 1.

2. 3. 4. 5. 6. Visually check steering wheel for deformities. Check harness (built into steering wheel) and connectors for damage, and terminals for deformities. Install air bag module to check fit or alignment with steering wheel. Check steering wheel for excessive free play. If no damage is found, reinstall the steering wheel. If damaged—REPLACE.

Spiral cable 1. 2. 3. 4.

5. Visually check spiral cable and combination switch for damage. Check connectors, flat cable and protective tape for damage. Check steering wheel for noise, binding or heavy operation. If no damage is found, reinstall the spiral cable. If damaged—REPLACE. Harness and Connectors 1. 2.

3. 4. Check connectors for poor connection, damage, and terminals for deformities. Check harness for binding, chafing, cuts, or deformities. If no damage is found, reinstall harness and connectors. Damaged—REPLACE damaged section of harness. Do not attempt to repair, splice or modify any SRS harness. Instrument panel Refer to the table on the next page. Check case and bracket for dents, cracks or deformities. Check connectors for damage, and terminals for deformities. If no damage is found, reinstall with new bolts coated with bonding agent. If damaged—REPLACE. Install diagnosis sensor unit with new bolts coated with bonding agent. RS-45 COLLISION DIAGNOSIS Part Instrument panel SRS is NOT activated SRS (except the side air bag) is activated 1. When passenger air bag inflates, check the following points for bending, deformities or cracks. + Opening portion for passenger air bag SRS472 + Passenger air bag module brackets SRS473 + The portions securing the instrument panel SRS474 2. If no damage is found, reinstall the instrument panel. 3. If damaged—REPLACE the instrument panel with bolts. RS-46 STEERING SYSTEM SECTION ST CONTENTS

PRECAUTIONS AND PREPARATION...........................1 Supplemental Restraint System (SRS) ''AIR BAG'' and ''SEAT BELT PRE-TENSIONER''..............1 Precautions for Steering System...............................1 Special Service Tools ....1 NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING ....3 NVH Troubleshooting Chart.......................................3 ON-VEHICLE SERVICE ....4 Checking Steering Wheel Play..................................4 Checking Neutral Position on Steering Wheel ....4 Front Wheel Turning Angle.......................................4 Checking and Adjusting Drive Belts ....5 Checking Fluid Level ....5 Checking Fluid Leakage ....5 Bleeding Hydraulic System.......................................6 Checking Steering Wheel Turning Force ....6 Checking Hydraulic System.......................................6 STEERING WHEEL AND STEERING COLUMN...........8 Removal and Installation ....8 Disassembly and Assembly.....................................10 Inspection...11 POWER STEERING SYSTEM (Model: PB69K) ....12 Description ....12 POWER STEERING GEAR (Model: PB69K)..............13 Removal and Installation ....13 Inspection...13 POWER STEERING OIL PUMP..................................15 Removal and Installation ....15 Disassembly and Assembly.....................................16 Pre-disassembly Inspection....................................16 Inspection...17 Disassembly...17 Assembly ....18 STEERING LINKAGE..19 Removal and Installation ....19 Disassembly...20 Inspection...20 SERVICE DATA AND SPECIFICATIONS (SDS) ....22 General Specifications...22 Inspection and Adjustment 22

ST PRECAUTIONS AND PREPARATION Supplemental Restraint System (SRS) ''AIR BAG'' and ''SEAT BELT PRE-TENSIONER'' The Supplemental Restraint System such as ''AIR BAG'' and ''SEAT BELT PRE-TENSIONER'' used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The SRS system composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination.): Driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioner, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the RS section of this Service Manual. WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.

+ Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation either just before the harness connectors or for the complete harness are related to the SRS. Precautions for Steering System + + + + + + + Before disassembly, thoroughly clean the outside of the unit. Disassembly should be done in a clean work area. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter. Place disassembled parts in order, on a parts rack, for easier and proper assembly. Use nylon cloths or paper towels to clean the parts; common shop rags can leave lint that might interfere with their operation. Before inspection or reassembly, carefully clean all parts with a general purpose, non-flammable solvent. Before assembly, apply a coat of recommended ATF* to hydraulic parts. Vaseline may be applied to O-rings and seals.

Do not use any grease. Replace all gaskets, seals and O-rings. Avoid damaging O-rings, seals and gaskets during installation. Perform functional tests whenever designated. *: Automatic Transmission Fluid type DEXRONTMIII or equivalent Special Service Tools Tool number Tool name Description KV48100700 Torque adapter Measuring turning torque NT169 ST27180001 Steering wheel puller Removing steering wheel NT544 ST-1 PRECAUTIONS AND PREPARATION Special Service Tools (Cont'd) Tool number Tool name Description ST29020001 Ball joint remover Removing ball joint a: 34 mm (1.34 in) b: 6.5 mm (0.256 in) c: 61.5 mm (2.421 in) NT551 ST27091000 Pressure gauge Measuring oil pressure NT547 KV48102500 Pressure gauge adapter Measuring oil pressure NT542 ST3127S000 GG91030000 Torque wrench 2 HT62940000 V Socket adapter 3 V HT62900000 Socket adapter Measuring turning torque 1 V NT541 KV48100301 Strut and steering gear box attachment Disassembling and assembling steering gear a: 162 mm (6.38 in) b: 110 mm (4.33 in) c: 190 mm (7.48 in) d: 9 mm (0.35 in) NT688 ST-2 Symptom ST-20 ST-20 ST-5 ST-4 ST-6 Tie-rod ball joint rotating torque Tie-rod ball joint end play Steering gear fluid leakage Steering wheel play Steering wheel turning force Drive belt looseness X X X X X X X X Shake STEERING Vibration Shimmy Judder X: Applicable ST-3 X X X X X X X X NVH in PD section NVH in FA, RA section NVH in FA section NVH in FA section NVH in FA section NVH in BR section AXLE AND SUSPENSION TIRES ROAD WHEEL AXLE SHAFT BRAKES ST-19 Steering linkage looseness DIFFERENTIAL ST-10 Improper installation or looseness of steering column NVH in PD section ST-11 Steering column deformation PROPELLER SHAFT ST-11 — Improper installation or looseness of tilt lock lever Improper steering wheel or damage ST-20 Tie-rod ball joint swinging force X Refer to MA section. ST-6 Noise Air in hydraulic system Possible cause and SUSPECTED PARTS ST-5 Reference page Fluid level NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING NVH Troubleshooting Chart Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts. X X X X X X X X X X X X X X X X X X X X X X X X X X X ON-VEHICLE SERVICE Checking Steering Wheel Play + + SST489B With wheels in a straight-ahead position, check steering wheel play. Steering wheel play: 35 mm (1.38 in) or less If it is not within specification, check the following for loose and worn components. Steering gear assembly Steering linkage Steering column Front suspension and axle Checking Neutral Position on Steering Wheel Pre-checking + + Make sure that wheel alignment is correct. Wheel alignment: Refer to SDS in FA section. Verify that the steering gear is centered before removing the steering wheel. Checking SST490BA 1. Check that the steering wheel is in the neutral position when driving straight ahead. 2. If it is not in the neutral position, remove the steering wheel and reinstall it correctly. 3. If the neutral position is between two teeth, loosen drag link lock nuts. Adjust neutral position by turning drag link adjuster. SST756C Front Wheel Turning Angle 1. Rotate steering wheel all the way right and left; measure turning angle. Turning angle of full turns: Refer to SDS in FA section. SMA127 2. If not within specification, adjust using stopper bolt. SST773C ST-4 ON-VEHICLE SERVICE Checking and Adjusting Drive Belts Refer to MA section (''Checking Drive Belts'', ''ENGINE MAINTENANCE''). Checking Fluid Level Check fluid level. Use the correct range of the dipstick depending on the fluid temperature.

Use the ''HOT'' range at 50 to 80°C (122 to 176°F), or the ''COLD'' range at 0 to 30°C (32 to 86°F).

CAUTION: + Do not overfill.

+ Recommended fluid is Automatic Transmission Fluid type DEXRONTMIII or equivalent.

SST280BA Checking Fluid Leakage SST757C Check the lines for improper attachment and for leaks, cracks, damage, loose connections, chafing and deterioration. 1. Run engine between idle speed and 1,000 rpm.

Make sure temperature of fluid in oil tank rises to 60 to 80°C (140 to 176°F). 2. Turn steering wheel right-to-left several times. 3. Hold steering wheel at each ''lock'' position for five seconds and carefully check for fluid leakage. CAUTION: Do not hold the steering wheel in a locked position for more than 15 seconds. 4.

If fluid leakage at connectors is noticed, loosen flare nut and then retighten. Do not overtighten connector as this can damage O-ring, washer and connector. ST-5 ON-VEHICLE SERVICE Bleeding Hydraulic System 1. Raise front end of vehicle until wheels are clear of the ground. 2. Add fluid into oil tank to specified level. Then, quickly turn steering wheel fully to right and left and lightly touch steering stoppers. Repeat steering wheel operation until fluid level no longer decreases. 3. Start engine. Repeat step 2 above.

+ Incomplete air bleeding will cause the following to occur. When this happens, bleed air again. a. Air bubbles in reservoir tank b. Clicking noise in oil pump c. Excessive buzzing in oil pump Fluid noise may occur in the valve or oil pump. This is common when the vehicle is stationary or while turning steering wheel slowly. This does not affect performance or durability of the system. Checking Steering Wheel Turning Force SST491B 1. Park vehicle on a level, dry surface and set parking brake. 2. Start engine. 3. Bring power steering fluid up to adequate operating temperature. [Make sure temperature of fluid is approximately 60 to 80°C (140 to 176°F).] Tires need to be inflated to normal pressure.

4. Check steering wheel turning force when steering wheel has been turned 360° from the neutral position. Steering wheel turning force: 39 N (4 kg, 9 lb) or less Checking Hydraulic System SST834-E Before starting, check belt tension, driving pulley and tire pressure. 1. Set Tool. Open shut-off valve. Then bleed air. Refer to ''Bleeding Hydraulic System'', ST-6. 2. Run engine at idle speed or 1,000 rpm. Make sure fluid temperature in reservoir tank rises to 60 to 80°C (140 to 176°F). WARNING: Warm up engine with shut-off valve fully opened. If engine is started with shut-off valve closed, fluid pressure in the power steering pump increases to maximum. This will raise fluid temperature abnormally. 3. Check pressure with steering wheel fully turned to left and right positions with engine idling at 1,000 rpm. CAUTION: Do not hold the steering wheel in a locked position for more than 15 seconds. Power steering pump maximum operating pressure: 8,140 - 8,728 kPa (81.4 - 87.3 bar, 83 - 89 kg/cm2, 1,180 - 1,266 psi) + If pressure reaches maximum operating pressure, system is OK. + If pressure increases above maximum operating pressure, check power steering pump flow control valve. Refer to ST-16. ST-6 ON-VEHICLE SERVICE Checking Hydraulic System (Cont'd) 4. If power steering pressure is below the maximum operating pressure, slowly close shut-off valve and check pressure again. CAUTION: Do not close shut-off valve for more than 15 seconds. + If pressure increases to maximum operating pressure, gear is damaged. Refer to ''Removal and Installation'', ST-13. + If pressure remains below maximum operating pressure, pump is damaged.

Refer to ''Disassembly'', ST-17. 5.

After checking hydraulic system, remove Tool and add fluid as necessary. Then completely bleed air out of system. Refer to ST-6. ST-7 STEERING WHEEL AND STEERING COLUMN Removal and Installation SST758C 1 V 2 V 3 V Air bag module Steering wheel Spiral cable 4 V 5 V 6 V Combination switch Steering column assembly Column cover 7 V 8 V Lower shaft Coupling CAUTION: + The rotation of the spiral cable (SRS ''Air bag'' component part) is limited. If the steering gear must be removed, set the front wheels in the straight-ahead direction. Do not rotate the steering column while the steering gear is removed. + Remove the steering wheel before removing the steering lower joint to avoid damaging the SRS spiral cable. STEERING WHEEL + Remove air bag module and spiral cable. Refer to RS section (''Removal — Air Bag Module and Spiral Cable'', ''SUPPLEMENTAL RESTRAINT SYSTEM''). SBF812E ST-8 STEERING WHEEL AND STEERING COLUMN Removal and Installation (Cont'd) + Align spiral cable correctly when installing steering wheel. a. Set the front wheels in the straight-ahead position. b.

Make sure that the spiral cable is in the neutral position. The neutral position is detected by turning left 2.5 revolutions from the right end position. Align the two marks (, m). CAUTION: The spiral cable may snap due to steering operation if the cable is installed in an improper position. Also, with the steering linkage disconnected, the cable may snap by turning the steering wheel beyond the limited number of turns. (The spiral cable can be turned up to 2.5 turns from the neutral position to both the right and left.) SRS276 + Remove steering wheel with Tool. SST777C STEERING COLUMN + + When installing steering column, fingertighten all lower bracket and clamp retaining bolts; then tighten them securely. Do not apply undue stress to steering column. When attaching coupling joint, be sure tightening bolt faces cutout portion. SST759C ST-9 STEERING WHEEL AND STEERING COLUMN Disassembly and Assembly SST760C 1 V 2 V 3 V Combination switch Lock nut Jacket tube assembly 4 V 5 V 6 V Tilt lever Tilt spring Steering column shaft assembly + + 7 V 8 V 9 V Band Column cover Coupling When disassembling and assembling, unlock steering lock with key. Install lock nut on steering column shaft and tighten the nut to specification.

: 25 - 34 Nzm (2.5 - 3.5 kg-m, 18 - 25 ft-lb) SST490C + Steering lock a. Break self-shear type screws with a drill or other appropriate tool. b. Install new self-shear type screws and then cut off self-shear type screw heads. SST742A ST-10 STEERING WHEEL AND STEERING COLUMN Inspection When steering wheel does not turn smoothly, check the steering column as follows and replace damaged parts. a. Check column bearings for damage and unevenness. Lubricate with recommended multi-purpose grease or replace steering column as an assembly, if necessary.

b. Check steering column lower shaft for deformation and breakage. Replace if necessary. + When the vehicle comes into a light collision, check length ''L1'' and ''L2''. Steering column length ''L1'': 679.9 - 681.5 mm (26.77 - 26.83 in) Steering column lower shaft length ''L2'': 489.3 - 493.3 mm (19.26 - 19.42 in) If out of the specifications, replace steering column shaft or steering column as an assembly. + SST761C Tilt mechanism After installing steering column, check tilt mechanism operation.

SST582BD ST-11 POWER STEERING SYSTEM (Model: PB69K) Description SST762C CAUTION: + Parts which can be disassembled are strictly limited. Never disassemble parts other than those specified. + Disassemble in as clean a place as possible. + Clean your hands before disassembly. + Do not use rags; use nylon cloths or paper towels. + Follow the procedures and cautions indicated in the Service Manual. ST-12 POWER STEERING GEAR (Model: PB69K) Removal and Installation Before removal, clean gear housing and oil pump exteriors using a steam cleaner. Then dry with compressed air. SST774C + + + Plug openings of gear housing, and securely locate hose connectors at a position higher than oil pump and cover with paper towels. Be extremely careful to prevent entry of foreign matter into hoses through connectors. When installing pitman arm, align four grooves of pitman arm serrations with four projections of sector shaft serrations, and install and tighten lock washer and nut. Inspection Do not disassemble for power steering gear assembly. TURNING TORQUE MEASUREMENT 1. Measure turning torque at 360° position.

a. Install steering gear on Tool.

SST040-A ST-13 POWER STEERING GEAR (Model: PB69K) Inspection (Cont'd) SST652AA b. Turn stub shaft all the way to right and left several times. c. Measure turning torque at 360° position from straight-ahead position with Tools. Turning torque at 360° 0.15 - 0.78 Nzm (1.5 - 8.0 kg-cm, 1.3 - 6.9 in-lb) 2. Measure turning torque at straight-ahead position. Straight-ahead position is a position where stub shaft is turned 2.14 turns (two full turns and 50°) from lock position. Turning torque at straight-ahead position: 0.2 - 0.5 Nzm (2 - 5 kg-cm, 1.7 - 4.3 in-lb) higher than turning torque at 360° Maximum turning torque: 0.44 - 1.18 Nzm (4.5 - 12 kg-cm, 3.9 - 10.4 in-lb) 3.

Check sector shaft end play in neutral position. End play: Less than 0.1 mm (0.004 in) If turning torque and end play are not within specifications, replace power steering gear assembly. ST-14 POWER STEERING OIL PUMP Removal and Installation YST001 ST-15 POWER STEERING OIL PUMP Disassembly and Assembly YST002 Pre-disassembly Inspection Disassemble the power steering oil pump only if the following items are found. + Oil leak from any point shown in the figure. + Deformed or damaged pulley. + Poor performance. SST984A ST-16 POWER STEERING OIL PUMP Inspection PULLEY AND PULLEY SHAFT + + If pulley is cracked or deformed, replace it. If fluid leak is found around the pulley shaft, replace the oil seal. Disassembly CAUTION: + Parts which can be disassembled are strictly limited. Never disassemble parts other than those specified.

+ Disassemble in as clean a place as possible. + Clean your hands before disassembly. + Do not use rags; use nylon cloths or paper towels. + When disassembling and reassembling, do not let foreign matter enter or contact the parts. + + Remove snap ring, then draw drive shaft out. Be careful not to drop drive shaft. + + Remove oil seal. Be careful not to damage front housing. + + Remove connector.

Be careful not to drop control valve. SST010B SST034A SST036AA ST-17 POWER STEERING OIL PUMP Assembly Assemble oil pump, noting the following instructions. + Make sure O-rings and oil seal are properly installed. + Always install new O-rings and oil seal.

+ Be careful of oil seal direction. + Cam ring, rotor and vanes must be replaced as a set if necessary. + When assembling, coat each part with ATF.

SST038A + Pay attention to the direction of rotor. + When assembling vanes to rotor, rounded surfaces of vanes must face cam ring side. + 2 into pin groove V 1 of front housing and front side Insert pin V plate.

Then install cam ring V 3 as shown at left.

Cam ring: D1 is less than D2 SST289A SST843A SST497A ST-18 STEERING LINKAGE Removal and Installation SST766C + + Remove pitman arm with tool. Remove steering damper. + Remove tie-rod and drag link with Tool. SST100-B SST767C ST-19 STEERING LINKAGE Disassembly TIE-ROD SST768C When tie-rod ball joints and tie-rod bar are separated, adjust tie-rod length correctly. Adjustment should be done between ball stud centers. L: Standard 1,302 mm (51.26 in) CAUTION: + Make sure that tie-rod ball joints are the same length as to the left and right. + The toe-in must be adjusted to within dimension ''L''±5 mm (0.20 in). DRAG LINK SST769C When drag link ball joints and drag link bar are separated, adjust drag link length correctly. Adjustment should be done between ball stud centers. L: Standard 1,123.4 mm (44.23 in) CAUTION: + Make sure that drag link ball joint and adjuster are turned to the same length. + The neutral position must be adjusted to within dimension ''L''±1 mm (0.04 in). Inspection BALL JOINT SST827CA 1. Check joints for play. If ball is worn and play in axial direction is excessive or joint is hard to swing, replace as a complete unit. Swinging force (Measure point: Cotter pin hole) ''A'': 4.9 - 49.0 N (0.5 - 5.0 kg, 1.1 - 11.0 lb) Rotating torque ''B'': 0.3 - 2.9 Nzm (3 - 30 kg-cm, 2.6 - 26.0 in-lb) Axial end play ''C'': 0 mm (0 in) 2. Check condition of dust cover. If it is cracked excessively, replace as a complete unit. CAUTION: Be careful not to apply grease or oil to taper of joint. ST-20 STEERING LINKAGE Inspection (Cont'd) TIE-ROD AND DRAG LINK Check tie-rod and drag link for breakage, bends and cracks, and replace with a new one if necessary.

FIXING LOCATION + + + Check fixing location (nuts and cotter pins) for looseness, play and breakage. When looseness or play is found, check for wear and tapered portion of ball joints, pitman arm and knuckle arms. When reassembling each joint, use new cotter pins. STEERING DAMPER Check for oil leakage and measure damping force. Replace if necessary. Damping force: at 0.3 m (1.0 ft)/sec 4,443 N (453 kg, 999 lb) ... Extended direction 3,315 N (338 kg, 745 lb) ... Compressed direction ST-21 SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications Power steering Steering gear type Steering wheel axial play mm (in) PB69K Steering wheel play Turns of steering wheel on the vehicle (Lock-to-lock) 3.4 Steering gear ratio 17.0 mm (in) Steering damper [at 0.3 m (1.0 ft)/sec.] N (kg, lb) 0 (0) 35 (1.38) or less 4,443 (453, 999) ... Extended direction 3,315 (338, 745) ... Compressed direction Inspection and Adjustment STEERING COLUMN STEERING LINKAGE Unit: mm (in) Steering column (L1) 679.9 - 681.5 (26.77 - 26.83) Steering column lower shaft (L2) 489.3 - 493.3 (19.26 - 19.42) Tie-rod & drag link ball joint Swinging force at cotter pin hole N (kg, lb) Rotating torque Nzm (kg-cm, in-lb) Axial end play mm (in) Tie-rod standard length (L) mm (in) Drag link standard length (L) mm (in) 4.9 - 49.0 (0.5 - 5.0, 1.1 - 11.0) 0.3 - 2.9 (3 - 30, 2.6 - 26.0) 0 (0) 1,302 (51.26) 1,123.4 (44.23) SST761C SST768C SST769C ST-22 SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment (Cont'd) POWER STEERING SYSTEM (Model: PB69K) Steering wheel turning force (at 360° from neutral position and circumference of steering wheel) N (kg, lb) Oil pump pressure kPa (bar, kg/cm2, psi) Fluid capacity m! (Imp fl oz) Normal operating temperature °C (°F) 39 (4, 9) or less 8,140 - 8,728 (81.4 - 87.3, 83 - 89, 1,180 - 1,266) at idling Approximately 1,000 (35.2) 60 - 80 (140 - 176) Steering gear turning torque Nzm (kg-cm, in-lb) 360° position from straight-ahead position 0.15 - 0.78 (1.5 - 8.0, 1.3 - 6.9) Straight-ahead position (As compared with steering wheel turned 360°) 0.2 - 0.5 (2 - 5, 1.7 - 4.3) higher Maximum turning torque 0.44 - 1.18 (4.5 - 12, 3.9 - 10.4) Backlash at pitman arm top end (in a straightahead position) mm (in) 0 - 0.1 (0 - 0.004) End play (at sector shaft end in neutral position) mm (in) 0.1 (0.004) or less ST-23 TRANSFER SECTION TF CONTENTS

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TF PREPARATION Special Service Tools *: Special tool or commercial equivalent Tool number Tool name KV38104700* Flange wrench Description Removing front companion flange nut Installing front companion flange nut NT428 ST30021000* Puller Removing counter gear front bearing NT411 ST30031000* Puller Removing counter gear rear bearing NT411 ST33290001* Puller Removing center case oil seal Removing rear oil seal NT414 ST22452000* Drift Installing mainshaft rear bearing a: 45 mm (1.77 in) dia. b: 36 mm (1.42 in) dia. NT065 ST33061000* Drift Removing main gear bearing a: 28.5 mm (1.122 in) dia. b: 38 mm (1.50 in) dia. NT116 ST30613000* Drift Installing counter gear rear bearing Installing main gear bearing Installing cover oil seal a: 72 mm (2.83 in) dia. b: 48 mm (1.89 in) dia. NT073 ST33200000* Drift Installing counter gear front bearing Removing cover oil seal a: 60 mm (2.36 in) dia. b: 44.5 mm (1.752 in) dia.

NT091 ST30720000* Drift Installing counter case oil seal a: 77 mm (3.03 in) dia. b: 55.5 mm (2.185 in) dia.

NT115 TF-1 PREPARATION Commercial Service Tools Tool name Puller Description Removing front and rear companion flanges Removing mainshaft rear bearing and clutch gear Removing L & H hub Removing front drive shaft front bearing Removing front drive shaft rear bearing Removing main gear bearing Installing shift shaft oil seal NT077 Drift a: 26 mm (1.02 in) dia. b: 20 mm (0.79 in) dia. c: 40 mm (1.57 in) NT117 Drift Installing L & H hub a: 60 mm (2.36 in) dia. b: 50 mm (1.97 in) dia. c: 60 mm (2.36 in) NT117 Drift Installing clutch gear a: 55 mm (2.17 in) dia. b: 45 mm (1.77 in) dia. c: 160 mm (6.30 in) NT117 Drift Installing rear oil seal a: 75 mm (2.95 in) dia. b: 67 mm (2.64 in) dia. c: 60 mm (2.36 in) NT117 TF-2 1 2 Symptom Fluid leakage 3 1 Hard to shift or will not shift Jumps out of gear 1 1 TF-3 2 1 TF-12 TF-11 TF-11 TF-11 TF-11 GEAR (Worn or damaged) BEARING (Worn or damaged) BAULK RING (Worn or damaged) SHIFTING INSERT (Damaged) 2 SHIFT FORK (Worn) TF-10, TF-12 TF-10 OIL SEAL (Worn or damaged) CHECK SPRING AND CHECK BALL (Worn or damaged) TF-10 SUSPECTED PARTS (Possible cause) LIQUID GASKET (Damaged) Refer to MA section (''Checking Transfer Fluid'', ''CHASSIS AND BODY MAINTENANCE''). Reference page FLUID (Level too high) FLUID (Wrong) Noise FLUID (Level low) NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING NVH Troubleshooting Chart Use the chart below to help you find the cause of the problem. The numbers indicate the order of the inspection. If necessary, repair or replace these parts. TRANSFER 3 3 2 2 2 2 DESCRIPTION Cross-sectional View SMT248D TF-4 ON-VEHICLE SERVICE Replacing Oil Seal CENTER CASE OIL SEAL 1.

Remove front propeller shaft. Refer to PD section (''Removal and Installation'', ''PROPELLER SHAFT''). 2. Remove companion flange nut. SMT091B 3. Remove front companion flange.

SMT092B 4. Remove center case oil seal. SMT093B 5. Install center case oil seal. + Before installing, apply multi-purpose grease to seal lip. 6. Reinstall any part removed. SMT094B SHIFT SHAFT OIL SEAL 1. Remove transfer control lever from transfer cross shaft. SMT251D TF-5 ON-VEHICLE SERVICE Replacing Oil Seal (Cont'd) 2. Remove shift shaft oil seal. + Be careful not to damage inner shift lever. SMT097B 3. Install shift shaft oil seal. + Before installing, apply multi-purpose grease to seal lip. 4. Install transfer control lever. SMT096B REAR OIL SEAL 1. Remove rear propeller shaft. Refer to PD section (''Removal and Installation'', ''PROPELLER SHAFT''). 2. Remove brake drum. 3. Remove companion flange nut.

4. Remove rear companion flange. 5. Remove center brake assembly. SMT323B 6. Remove rear oil seal. SMT324B 7. Install rear oil seal. + Before installing, apply multi-purpose grease to seal lip. 8. Reinstall any part removed. SMT325B TF-6 ON-VEHICLE SERVICE Checking Position Switch 4WD SWITCH Transfer control lever position Continuity 4H, 4L Yes Except above No SMT252D NEUTRAL POSITION SWITCH Transfer control lever position Continuity Between 4H and 4L (''PUSH'' position) Yes Except above No SMT253D TF-7 REMOVAL AND INSTALLATION Removal SMT251D 1. Drain fluid and oil from transfer and transmission (M/T model only). 2. Remove exhaust front and rear tubes. Refer to FE section (''EXHAUST SYSTEM''). 3. Remove front and rear propeller shaft. Refer to PD section (''Removal and Installation'', ''PROPELLER SHAFT''). 4. Disconnect neutral position switch and 4WD switch harness connectors. 5. Remove transfer control lever from transfer cross shaft. 6. Remove transfer from transmission. WARNING: Support transfer while removing it. SMT268D Installation + + Apply recommended sealant to mating surface to transmission. (M/T models only) Recommended sealant: Genuine anaerobic liquid gasket, Three Bond TB1215, Loctite Part No. 51813 or equivalent Tighten transfer bolts.

Transfer fixing bolts: : 32 - 42 Nzm (3.3 - 4.3 kg-m, 24 - 31 ft-lb) SMT176BA TF-8 TRANSFER GEAR CONTROL SMT254D TF-9 MAJOR OVERHAUL Case Components SMT255D TF-10 MAJOR OVERHAUL Gear Components SMT256D TF-11 MAJOR OVERHAUL Shift Control Components SMT257D TF-12 DISASSEMBLY 1. Remove nut of front companion flange. SMT101B 2. Remove center brake components. a.

Remove rear companion flange nut. b. Remove brake drum. SMT258D c. Remove rear companion flange. d. Remove center brake components.

SMT103B 3. Remove rear case. + Be careful not to damage the mating surface. SMT104B 4. Remove front companion flange. SMT105B TF-13 DISASSEMBLY 5. Remove speedometer drive gear and oil gutter. SMT106B 6. Remove snap ring from 2-4 shift rod. SMT107B 7. Check front drive sprocket end play. a. While holding front drive sprocket forward as far as it will go, measure distance ''A'' between rear surface of front drive sprocket and front surface of 2-4 coupling sleeve. b. While holding front drive sprocket back as far as it will go, measure distance ''B'' as same as step a.

c. Determine front drive sprocket end play to be used by the following equation. Front drive sprocket end play = A − B Standard: 0.20 - 0.35 mm (0.0079 - 0.0138 in) + If not within specification, disassemble and check contact surface of gear to hub, washer, bushing, needle bearing and shaft. SMT108B 8. Shift 2-4 coupling sleeve to 2WD position.

SMT110B TF-14 DISASSEMBLY 9. Pull out clutch gear and mainshaft rear bearing. SMT111B 10. Remove 2-4 coupling sleeve with 2-4 shift fork. SMT112B 11. Remove front drive shaft assembly, drive chain and front drive sprocket by tapping front end of front drive shaft. SMT113B 12. Remove bolts securing bearing retainer and then remove bearing retainer. SMT115B TF-15 DISASSEMBLY 13. Remove bolts securing center case to front case and then separate center case and front case. SMT116B 14. Measure end play of low gear. Standard: 0.20 - 0.35 mm (0.0079 - 0.0138 in) Refer to SDS, TF-33. + If end play is beyond the maximum value, check low gear and L & H hub for wear.

SMT117B 15. Disassemble center case assembly. a. Remove snap ring from mainshaft. SMT118B b. Pull out low gear with L & H hub. SMT119B c. Remove mainshaft by tapping front end of mainshaft. SMT120B TF-16 DISASSEMBLY 16. a. + + + + + + Disassemble front case assembly. Remove the following parts. 4WD switch Neutral position switch Check plugs Check springs Check balls Be careful not to lose the check balls. SMT259D b. Remove 2-4 shift rod.

SMT122B c. Remove L & H shift rod and fork assembly with coupling sleeve. SMT260D d. Remove needle bearing from main gear. SMT124B e. Remove bolts securing front case cover and then remove it. SMT125B TF-17 DISASSEMBLY f. Remove counter gear by tapping it lightly with a soft hammer.

SMT261D g. Remove main gear by tapping it lightly with a soft hammer. SMT262D TF-18 REPAIR FOR COMPONENT PARTS Mainshaft DISASSEMBLY 1. Remove snap ring and spacer. SMT129B 2. Press out mainshaft front bearing from mainshaft.

SMT130B INSPECTION Gear and shaft + + + Check gears for excessive wear, chips or cracks. Check shaft for cracks, wear or bending.

Check coupling sleeve for wear or damage. SMT180B Baulk ring + Check baulk ring for cracks or deformation. SMT349A + Measure clearance between baulk ring and gear. Baulk ring to gear clearance: Unit: mm (in) + Standard Wear limit 1.0 - 1.5 (0.039 - 0.059) 0.5 (0.020) If not within wear limit, replace baulk ring. SMT350A TF-19 REPAIR FOR COMPONENT PARTS Mainshaft (Cont'd) Bearing + Make sure bearings roll freely and are free from noise, crack, pitting or wear. SMT351A ASSEMBLY 1. Press mainshaft front bearing onto mainshaft. + Pay special attention to its direction. SMT294A 2. Install spacer. 3. Select mainshaft front bearing snap ring with proper thickness and install it. Allowable clearance between mainshaft front bearing snap ring and groove: 0 - 0.15 mm (0 - 0.0059 in) Mainshaft front bearing snap ring: Refer to SDS, TF-33. SMT295A Front Drive Shaft DISASSEMBLY + Front drive shaft front bearing + Front drive shaft rear bearing SMT296A SMT297A TF-20 REPAIR FOR COMPONENT PARTS Front Drive Shaft (Cont'd) INSPECTION Sprocket and shaft + + Check sprocket for excessive wear, chips or cracks. Check shaft for cracks or wear. Bearing + Make sure bearings roll freely and are free from noise, crack, pitting or wear. SMT357A ASSEMBLY + Press front drive shaft front bearing. + Press front drive shaft rear bearing. SMT298A SMT299A Counter Gear DISASSEMBLY 1. Press out counter gear front bearing and then remove front sub-gear, spacer and dish spring. SMT134B 2. Press out counter gear rear bearing and then remove rear sub-gear, spacer and dish spring. SMT135B TF-21 REPAIR FOR COMPONENT PARTS Counter Gear (Cont'd) INSPECTION Gear and shaft + + Check gears for excessive wear, chips or cracks. Check shaft for cracks or wear. Bearing + Make sure bearings roll freely and are free from noise, crack, pitting or wear. SMT266D ASSEMBLY 1. Press on counter gear rear bearing. SMT267D 2. Install front sub-gear, dish spring and spacer, and then press on counter gear front bearing. + Pay attention to direction of dish spring. SMT137B Main Gear DISASSEMBLY Main gear bearing 1.

Remove snap ring and spacer. SMT304A 2. Pull out main gear bearing. SMT305AA TF-22 REPAIR FOR COMPONENT PARTS Main Gear (Cont'd) Plug + Always replace it with new one whenever it is removed. SMT306A INSPECTION Gear and shaft + + Check gears for excessive wear, chips or cracks. Check shaft for cracks or wear. Bearing + Make sure bearings roll freely and are free from noise, crack, pitting or wear. SMT359A ASSEMBLY Main gear bearing 1.

Press on main gear bearing. + Pay attention to its direction. 2. Install spacer.

SMT307AA 3. Select snap ring with proper thickness and install it. Allowable clearance between snap ring and groove: 0 - 0.15 mm (0 - 0.0059 in) Snap ring (main gear bearing): Refer to SDS, TF-33.

SMT308A Plug + Apply sealant to plug and install it. SMT309A TF-23 REPAIR FOR COMPONENT PARTS Front Case SHIFT SHAFT OIL SEAL Removal + + + Use a screwdriver to pry out old seal.

Be careful not to damage case. Always replace with a new one whenever it has been removed. SMT138B Installation + + Install new shift shaft oil seal until flush with case.

Before installing, apply multi-purpose grease to seal lip. SMT139B Front Case Cover Removal + + Take out old seal from inside of front case cover. Be careful not to damage front case cover. SMT263D Installation + + Install new front case cover oil seal until it stops. Before installing, apply multi-purpose grease to seal lip. SMT141B Center Case CENTER CASE OIL SEAL Removal + Remove center case oil seal.

SMT146B TF-24 REPAIR FOR COMPONENT PARTS Installation + Install center case oil seal. SMT147B Bearing Retainer OIL CATCHER Removal + + Drive out oil catcher from inside of bearing retainer. Be careful not to damage bearing retainer. SMT142B Installation + + + Install oil catcher until it stops. Be careful not to damage or distort oil catcher or bearing retainer.

Before installing, apply multi-purpose grease to seal lip. SMT143B Rear Case REAR OIL SEAL Removal + Pull out rear oil seal. SMT144B Installation + + Install new rear oil seal until it stops. Before installing, apply multi-purpose grease to seal lip. SMT145B TF-25 REPAIR FOR COMPONENT PARTS AIR BREATHER + Install as shown in illustration. Thread locker: Refer to TF-10. SMT148B Shift Control Components INSPECTION + Check contact surface and sliding surface for wear, scratches, projections or other faulty conditions. SMT360A L & H SHIFT ROD & FORK + Assemble as shown in illustration. * This pin is the same size as the one for 2-4 shift rod. SMT149B 2-4 SHIFT ROD & FORK + Assemble as shown in illustration. * These pins are the same size. SMT150B + Pay attention to the direction of fork guide collar.

SMT033B TF-26 ASSEMBLY 1. Install cross shaft. SMT151B 2. Assemble front case. a.

Install main gear assembly by tapping it lightly with a soft hammer.

SMT152B b. Apply sealant to the mating surface and bolts of front case cover and install it on front case. + Apply recommended sealant to these ten bolts. + Tightening torque A: : 16 - 21 Nzm (1.6 - 2.1 kg-m, 12 - 15 ft-lb) B: : 19 - 24 Nzm (1.9 - 2.4 kg-m, 14 - 17 ft-lb) SMT153B c. Apply gear oil to needle bearing and install it into main gear. SMT326A d. Install counter gear assembly by tapping it lightly with a soft hammer. SMT264D TF-27 ASSEMBLY e. Insert interlock plunger into front case. SMT090B f. Install L & H shift rod and fork assembly with coupling sleeve. SMT155B g. Install 2-4 shift rod. SMT265D h. Install switches, check balls, check springs and plugs. + Apply sealant to switches and plugs. SMT259D 3. Select counter gear rear bearing shim. Counter gear end play: 0 - 0.2 mm (0 - 0.008 in) a.

Measure distance ''A'' between upper surface of counter gear rear bearing and mating surface of front case. SMT335A TF-28 ASSEMBLY b. Select suitable shim using SDS table as a guide. Counter gear rear bearing shim: Refer to SDS, TF-33. SMT157B 4. Place suitable shim on counter gear rear bearing with grease. 5. Apply gear oil to each part in front case. SMT158B 6. Install mainshaft on center case. a. Install mainshaft on center case by tapping it lightly. + Apply gear oil to mainshaft front bearing.

SMT159B b. Install bearing retainer. SMT407A c. Install low gear and its bearing to mainshaft. + Apply gear oil to needle bearing. SMT160B TF-29 ASSEMBLY d. Install L & H hub and snap ring to mainshaft. + Pay attention to direction of L & H hub. SMT161B e. Measure end play of low gear. Standard: 0.20 - 0.35 mm (0.0079 - 0.0138 in) SMT117B 7. Apply sealant to mating surface and put center case assembly onto front case and tighten bolts.

SMT163B 8. Assemble center case assembly. a. Put drive chain onto front drive sprocket and front drive shaft, and then put them in center case. SMT164B b.

Install front drive shaft by tapping it lightly with a soft hammer. + Make sure shafts are lined up in case. SMT165B TF-30 ASSEMBLY c. Apply gear oil to needle bearings and install them into front drive sprocket. + These needle bearings can be easily installed if front drive sprocket is rotated during their installation. SMT166B d. Install 2-4 coupling sleeve with 2-4 shift fork. + Pay attention to direction of coupling sleeve. SMT167B e. Install shifting inserts and spread spring. + Pay attention to direction of shifting inserts. SMT168B f. Install baulk ring and then install clutch gear. SMT169B g. Install mainshaft rear bearing. + Pay attention to its direction.

SMT170B TF-31 ASSEMBLY h. Install snap ring to 2-4 shift rod. SMT107B i. j. Install speedometer drive gear and oil gutter. Apply gear oil to each part in center case. SMT106B 9. Apply sealant to mating surface. Set center case assembly onto front case, then tighten bolts. 10. Install front and rear companion flanges and center brake components.

SMT171B TF-32 SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications Transfer model TX12A High 1.000 Low 2.020 Gear ratio Number of teeth Main gear 29 Low gear 37 Counter gear High 38 Low 24 Front drive sprocket 41 Front drive shaft 41 Fluid capacity liters (Imp qt) 1.9 (1-5/8) Inspection and Adjustment GEAR END PLAY

AVAILABLE SHIM Unit: mm (in) Front drive sprocket 0.20 - 0.35 (0.0079 - 0.0138) Low gear 0.20 - 0.35 (0.0079 - 0.0138) Counter gear Counter gear rear bearing Distance ‘‘A’’ mm (in) 0 - 0.2 (0 - 0.008) CLEARANCE BETWEEN BAULK RING AND CLUTCH GEAR 40.6 - 40.5 (1.598 - 1.594) Shim(s) Thickness mm (in) Part number Not necessary 40.5 -
40.4 (1.594 - 1.591) 0.1 (0.004) 33112-C6900 40.4 - 40.3 (1.591 - 1.587) 0.2 (0.008) 33112-C6901 40.3 - 40.2 (1.587 - 1.583) 0.3 (0.012) 33112-C6902 AVAILABLE SNAP RING 40.2 - 40.1 (1.583 - 1.579) 0.4 (0.016) 33112-C6903 Mainshaft front bearing 40.1 - 40.0 (1.579 - 1.575) 0.5 (0.020) 33112-33G00 40.0 - 39.9 (1.575 - 1.571) 0.6 (0.024) 33112-
33G01 Unit: mm (in) Standard Wear limit 1.0 - 1.5 (0.039 - 0.059) 0.5 (0.020) Unit: mm (in) Allowable clearance 0 - 0.15 (0 - 0.0059) Thickness Part number 3.0 (0.118) 3.1 (0.122) 3.2 (0.126) 33138-73P10 33138-73P11 33138-73P12 Main gear bearing Unit: mm (in) Allowable clearance 0 - 0.15 (0 - 0.0059) Thickness Part number 2.6 (0.102) 2.7
(0.106) 2.8 (0.110) 33114-73P00 33114-73P01 33114-73P02 SMT335A TF-33 AUTOMATIC TRANSMISSION SECTION AT CONTENTS PREPARATION AND PRECAUTIONS .... 1003 Special Service Tools .... 1003 Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER” ... 1004 Precautions
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distribution circuit. When you perform trouble diagnoses, read GI section, “HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES”. AT-1002 PREPARATION AND PRECAUTIONS Special Service Tools Tool number Tool name Description ST2505S001 Oil pressure gauge set 1 ST25051001 V Oil pressure gauge 2 ST25052000 V Hose 3
ST25053000 V Joint pipe 4 ST25054000 V Adapter 5 ST25055000 V Adapter Measuring line pressure NT097 KV31101201 Oil pressure gauge adapter Measuring line pressure NT093 ST07870000 Transmission case stand Disassembling and assembling A/T a: 182 mm (7.17 in) b: 282 mm (11.10 in) c: 230 mm (9.06 in) d: 100 mm (3.94 in) NT421
KV31102100 Torque converter oneway clutch check tool Checking one-way clutch in torque converter NT098 ST25850000 Sliding hammer Removing oil pump assembly a: 179 mm (7.05 in) b: 70 mm (2.76 in) c: 40 mm (1.57 in) dia. d: M12 x 1.75P NT422 ST33200000 Drift Installing oil pump housing oil seal a: 60 mm (2.36 in) dia.
b: 44.5 mm (1.752 in) dia. NT091 ST30720000 Drift Installing rear oil seal a: 77 mm (3.03 in) dia. b: 55.5 mm (2.185 in) dia. NT115 AT-1003 PREPARATION AND PRECAUTIONS Special Service Tools (Cont’d) Tool number Tool name Description KV31102400 Clutch spring compressor Removing and installing clutch return springs a: 320 mm (12.60
in) b: 174 mm (6.85 in) NT423 Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER” The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The
SRS system composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination and optional equipment.): + For a frontal collision The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the
instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. + For a side collision The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal
collision), wiring harness, warning lamp (one of components of air bags for a frontal collision). Information necessary to service the system safely is included in the RS section of this Service Manual. WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would
result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical
test equipment on any circuit related to the SRS unless instructed to in this Service Manual.
Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS. Precautions +Before proceeding with disassembly, thoroughly clean the outside of the transmission. It is important to prevent the internal parts from becoming contaminated by dirt or
other foreign matter. + Disassembly should be done in a clean work area. + Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the transmission. + Place disassembled parts in order for easier and proper assembly. + All parts should be carefully cleaned with a general
purpose, non-flammable solvent before inspection or reassembly. + Gaskets, seals and O-rings should be replaced any time the transmission is disassembled. + It is very important to perform functional tests whenever they are indicated.
+ The valve body contains precision parts and requires extreme care when parts are removed and serviced. Place removed parts in a parts rack in order to replace them in correct positions and sequences. Care will also prevent springs and small parts from becoming scattered or lost. + Properly installed valves, sleeves, plugs, etc. will slide along
bores in valve body under their own weight. + Before assembly, apply a coat of recommended ATF to all parts. Apply petroleum jelly to protect O-rings and seals, and to hold bearings and washers in place during assembly.
Do not use grease.
AT-1004 PREPARATION AND PRECAUTIONS Precautions (Cont’d) + + + Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling. After overhaul, refill the transmission with new ATF. When the A/T drain plug is removed, only some of the fluid is drained. Old A/T fluid will remain in torque converter and ATF
cooling system. Always follow the procedures under “Changing A/T Fluid” in the MA section when changing A/T fluid. AT-1005 PREPARATION AND PRECAUTIONS Service Notice or Precautions FAIL-SAFE The TCM has an electronic Fail-Safe (limp home mode). This allows the vehicle to be driven even if a major electrical input/output device circuit
is damaged. Under Fail-Safe, the vehicle always runs in third gear even with a shift lever position of “1”, “2” or “D”. Customer may complain of “sluggish or poor acceleration”. When the Fail-Safe operation occurs the next time the key is turned to the “ON” position, the SPORT indicator lamp will blink for about 8 seconds. (For diagnosis, refer to AT-
1029.) The blinking of the SPORT indicator lamp for about 8 seconds will appear only once and be cleared. The customer may resume normal driving conditions by chance.
Always follow the “WORK FLOW” (Refer to AT-1040). The SELF-DIAGNOSIS results will be as follows: The first SELF-DIAGNOSIS will indicate the damage of the vehicle speed sensor or the revolution sensor. During the next SELF-DIAGNOSIS performed after checking the sensor, no damages will be indicated. AT-1006 OVERALL SYSTEM A/T
Electrical Parts Location SAT164KA AT-1007 OVERALL SYSTEM Circuit Diagram TAT012M AT-1008 OVERALL SYSTEM Wiring Diagram — A/T — TAT013M AT-1009 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) TAT014M AT-1010 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) TAT015M AT-1011 OVERALL SYSTEM Wiring Diagram
— A/T — (Cont’d) TAT026M AT-1012 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) TAT016M AT-1013 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) TAT017M AT-1014 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) TAT018M AT-1015 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) TAT019M AT-1016 OVERALL SYSTEM
Wiring Diagram — A/T — (Cont’d) TAT020M AT-1017 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) TAT021M AT-1018 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) TAT022M AT-1019 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) TAT023M AT-1020 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) TAT024M AT-1021
OVERALL SYSTEM Cross-sectional View SAT750HA AT-1022 OVERALL SYSTEM Hydraulic Control Circuits SAT208J AT-1023 OVERALL SYSTEM Shift Mechanism The automatic transmission uses compact, dual planetary gear systems to improve power-transmission efficiency, simplify construction and reduce weight. It also employs an optimum
shift control and superwide gear ratios. They improve starting performance and acceleration during medium and high-speed operation. Two one-way clutches are also employed: one is used for the forward clutch and the other for the low clutch. These one-way clutches, combined with four accumulators, reduce shifting shock to a minimum.
CONSTRUCTION SAT509I 1 V 2 V 3 V 4 V 5 V 6 V 7 V 8 V 9 V 10 V 11 V 12 V 13 V 14 V 15 V 16 V Torque converter clutch piston Torque converter Oil pump Input shaft Brake band Reverse clutch High clutch Front pinion gear Front sun gear Front internal gear Front planetary carrier Rear sun gear Rear pinion gear Rear internal gear Rear planetary
carrier Forward clutch 17 V 18 V 19 V 20 V 21 V 22 V 23 V Forward one-way clutch Overrun clutch Low one-way clutch Low & reverse brake Parking pawl Parking gear Output shaft FUNCTION OF CLUTCH AND BRAKE Control members 6 Reverse clutch V 7 High clutch V 16 Forward clutch V 18 Overrun clutch V 5 Brake band V Abbr. Function R/C
9 . To transmit input power to front sun gear V H/C To transmit input power to front planetary carrier V 11 . F/C To connect front planetary carrier V 11 with forward one-way clutch V 17 . O/C To connect front planetary carrier V 11 with rear internal gear V 14 . B/B 9 . To lock front sun gear V 17 Forward one-way clutch V F/O.C When forward clutch
is engaged, to stop rear internal gear V 14 from rotating in opposite direction. 19 Low one-way clutch V L/O.C At D1 position, to prevent rear internal gear V 14 from rotating in opposite direction. 20 Low & reverse brake V L & R/B To lock rear internal gear V 14 (2, 12 and 11), to lock front planetary carrier V 11 (R position). AT-1024 OVERALL
SYSTEM Shift Mechanism (Cont’d) CLUTCH AND BAND CHART Shift position 6 V 7 V Reverse clutch High clutch 16 V Band servo 18 V Forward Overrun clutch clutch 2nd apply 3rd release 4th apply 17 V 19 V Forward oneway clutch Low oneway clutch 20 V Low & reverse brake Lock-up Remarks PARK POSITION P R j REVERSE POSITION j
NEUTRAL POSITION N 1st j 2nd j D*4 3rd j j 4th j ^ j *1j V *1j V 1st j 2nd j X V j *1j V 1st j j 2nd j j 2 + + + X *1 V j ^ *3^ *2 ^ ^ + Automatic shift 1↔2↔3↔4 j j 1 j j + + + + + Automatic shift 1↔2 j Locks (held stationary) in 1st speed 1←2 *1: Operates when overdrive control or A/T mode switch is being set in “OFF” or “SPORT” position.
*2: Oil pressure is applied to both 2nd “apply” side and 3rd “release” side of band servo piston.
However, brake band does not contract because oil pressure area on the “release” side is greater than that on the “apply” side. *3: Oil pressure is applied to 4th “apply” side in condition *2 above, and brake band contracts. *4: A/T will not shift to 4th when overdrive control or A/T mode switch is set in “OFF” or “SPORT” position. j: V : j *: ^ Operates
Operates when throttle opening is less than 5.5/16, activating engine brake. Operates during “progressive” acceleration. : Operates but does not affect power transmission. : X V j Operates when throttle opening is less than 5.5/16, but does not affect engine brake. AT-1025 OVERALL SYSTEM Control System OUTLINE The automatic transmission
senses vehicle operating conditions through various sensors. It always controls the optimum shaft position and reduces shifting and lock-up shocks. SENSORS TCM PNP switch Accelerator position sensor Accelerator position switch (Full accel, off accel position switch) Engine speed signal A/T fluid temperature sensor Revolution sensor Vehicle speed
sensor Overdrive control switch A/T mode switch Shift control Line pressure control Lock-up control Overrun clutch control Timing control Fail-safe control Self-diagnosis Duet-EU control CONSULT-II communication line control c ACTUATORS c Shift solenoid valve A Shift solenoid valve B Overrun clutch solenoid valve Torque converter clutch
solenoid valve Line pressure solenoid valve SPORT indicator lamp CONTROL SYSTEM SAT207K AT-1026 OVERALL SYSTEM Control System (Cont’d) TCM FUNCTION The function of the TCM is to: + Receive input signals sent from various switches and sensors. + Determine required line pressure, shifting point, lock-up operation, and engine brake
operation. + Send required output signals to the respective solenoids. INPUT/OUTPUT SIGNAL OF TCM Sensors and solenoid valves Input Function PNP switch Detects select lever position and sends a signal to TCM. Accelerator position sensor Detects throttle valve position and sends a signal to TCM. Accelerator position switch (Off accel) Detects
throttle valve’s fully-closed position and sends a signal to TCM. Accelerator position switch (Full accel) Detects a throttle valve position of greater than 1/2 of full throttle and sends a signal to TCM. Engine speed signal From ECM. A/T fluid temperature sensor Detects transmission fluid temperature and sends a signal to TCM. Revolution sensor
Detects output shaft rpm and sends a signal to TCM. Vehicle speed sensor Used as an auxiliary vehicle speed sensor. Sends a signal when revolution sensor (installed on transmission) malfunctions. Overdrive control switch A/T mode switch Sends a signal, which prohibits a shift to “D4” (overdrive) position, to the TCM. Shift solenoid valve A/B Selects
shifting point suited to driving conditions in relation to a signal sent from TCM. Line pressure solenoid valve Regulates (or decreases) line pressure suited to driving conditions in relation to a signal sent from TCM. Output Torque converter clutch solenoid valve Regulates (or decreases) lock-up pressure suited to driving conditions in relation to a
signal sent from TCM. Overrun clutch solenoid valve Controls an “engine brake” effect suited to driving conditions in relation to a signal sent from TCM. O/D OFF indicator lamp SPORT indicator lamp Shows TCM faults, when A/T control components malfunction.
AT-1027 ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION Self-diagnosis After performing this procedure, place check marks for results on the “DIAGNOSTIC WORKSHEET”, AT-1038. Reference pages are provided following the items.
SELF-DIAGNOSTIC PROCEDURE (With CONSULT-II) SAT014K 1. Turn on CONSULT-II and touch “A/T”. If A/T is not displayed, check TCM power supply and ground circuit. Refer to AT-1060. If result is NG, refer to EL section (“POWER SUPPLY ROUTING”). 2. Touch “SELF-DIAG RESULTS”.
Display shows malfunction experienced since the last erasing operation. CONSULT-II performs REAL-TIME SELF-DIAGNOSIS. Also, any malfunction detected while in this mode will be displayed at real time. SAT987J Item No failure Display Description Remarks ****NO FAILURE**** + No failure has been detected. Initial start *INITIAL START* +
This is NOT a malfunction message. Whenever shutting off a power supply to the TCM, this message appears on the screen. Vehicle speed sensorzA/T (Revolution sensor) VHCL SPEED SENzA/T + No signal input from vehicle speed sensorzA/T (revolution sensor) during traveling due to disconnection, or input of abnormal signal.
Vehicle speed sensorzMTR (Meter) VHCL SPEED SENzMTR + No signal input from vehicle speed sensorzMTR during traveling due to disconnection, or input of abnormal signal. [ ] Accelerator position sensor THROTTLE POSI SEN + Accelerator position sensor signal voltage is abnormally high.
+ Throttle (accelerator) position sensor signal voltage is abnormally low with closed throttle position switch “OFF” or wide open throttle position switch “ON”. Shift solenoid valve A SHIFT SOLENOID/V A + Specified voltage is not applied to solenoid valve due to disconnection or shortcircuit. Shift solenoid valve B SHIFT SOLENOID/V B + Specified
voltage is not applied to solenoid valve due to disconnection or shortcircuit.
Overrun clutch solenoid valve OVERRUN CLUTCH S/V + Specified voltage is not applied to solenoid valve due to disconnection or shortcircuit. T/C clutch solenoid valve T/C CLUTCH SOL/V + Specified voltage is not applied to solenoid valve due to disconnection or shortcircuit. A/T fluid temperature sensor/TCM power source BATT/FLUID TEMP SEN
+ Supply voltage to TCM is abnormally low during traveling. + Fluid temperature signal voltage is abnormally high (fluid temperature is low) during traveling. Engine speed signal ENGINE SPEED SIG + Engine RPM is abnormally low during traveling. Line pressure solenoid valve LINE PRESSURE S/V + Specified voltage is not applied to solenoid
valve due to disconnection or shortcircuit. TCM (ROM) CONTROL UNIT (ROM) + TCM memory (ROM) is malfunctioning. TCM (RAM) CONTROL UNIT (RAM) + TCM memory (RAM) is malfunctioning. TCM (EEP ROM) CONTROL UNIT (EEP ROM) + TCM memory (EEP ROM) is malfunctioning.
AT-1028 To be displayed in case of abnormality and no recording is made ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION Self-diagnosis (Cont’d) SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II) DIAGNOSIS START . 1. Start engine and warm it up to normal engine operating temperature. 2. Turn ignition switch to “OFF” position. Wait at
least 5 seconds. SAT211JA . 1. Set A/T mode switch to “AUTO” position. 2. Set overdrive control switch in “ON” position. 3. Move selector lever to “P” position. 4. Turn ignition switch to “ON” position. (Do not start engine.) 5. Does SPORT indicator lamp come on for about 2 seconds?
SAT879E Yes . 1. Turn ignition switch to “ACC” position. 2. Move selector lever to “D” position. . SAT244I 1. Set overdrive control switch in “OFF” position.
2. Depress accelerator pedal fully and release it.
3. Turn ignition switch “ON”. (Do not start engine.) . 1. Move selector lever to “2” position. 2. Set overdrive control switch in “ON” position. SAT881E .
A V SAT245I AT-1029 No c Go to 1. SPORT Indicator Lamp Does Not Come On, AT-1097. ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION Self-diagnosis (Cont’d) A V . 1. Move selector lever to “1” position. 2. Set overdrive control switch in “OFF” position. SAT246I . Depress accelerator pedal fully and release it.
. Check SPORT indicator lamp. Refer to JUDGEMENT OF SELF-DIAGNOSIS CODE, AT-1031. SAT981F . DIAGNOSIS END SAT211JA AT-1030 ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION Self-diagnosis (Cont’d) JUDGEMENT OF SELF-DIAGNOSIS CODE All judgement flickers are same. SPORT indicator lamps:*1 4th judgement flicker is longer
than others. SAT819H SAT797H All circuits that can be confirmed by self-diagnosis are OK. Shift solenoid valve A circuit is short-circuited or disconnected. Go to SHIFT SOLENOID VALVE A, AT-1070. 1st judgement flicker is longer than others. 5th judgement flicker is longer than others. SAT798H SAT794H Revolution sensor circuit is short-circuited
or disconnected. Go to VEHICLE SPEED SENSORzA/T (REVOLUTION SENSOR), AT-1064.
Shift solenoid valve B circuit is short-circuited or disconnected. Go to SHIFT SOLENOID VALVE B, AT-1072.
2nd judgement flicker is longer than others.
6th judgement flicker is longer than others. SAT795H SAT799H Vehicle speed sensor circuit is short-circuited or disconnected.
Go to VEHICLE SPEED SENSORzMTR, AT-1066.
Overrun clutch solenoid valve circuit is short-circuited or disconnected. Go to OVERRUN CLUTCH SOLENOID VALVE, AT-1074. 3rd judgement flicker is longer than others. 7th judgement flicker is longer than others. SAT800H SAT796H Throttle (accelerator) position sensor circuit is short-circuited or disconnected. Go to ACCELERATOR POSITION
SENSOR, AT-1068. Torque converter clutch solenoid valve circuit is short-circuited or disconnected. Go to TORQUE CONVERTER CLUTCH SOLENOID VALVE, AT-1076. t1 = 2.5 seconds t2 = 2.0 seconds t3 = 1.0 second *1: Refer to applicable indicator lamps for specified areas on next page. AT-1031 ON BOARD DIAGNOSTIC SYSTEM
DESCRIPTION Self-diagnosis (Cont’d) SPORT indicator lamps: 8th judgement flicker is longer than others. Flickers as shown below. SAT801H SAT804H A/T fluid temperature sensor is disconnected or TCM power source circuit is damaged. Go to A/T FLUID TEMPERATURE SENSOR AND TCM POWER SOURCE, AT-1079. Battery power is low.
Battery has been disconnected for a long time. Battery is connected conversely. (When reconnecting TCM connectors. — This is not a problem.) 9th judgement flicker is longer than others.
Does not come on. SAT805H SAT802H PNP, overdrive control, A/T mode or accelerator position Engine speed signal circuit is short-circuited or disconnected. switches circuit is disconnected or TCM is damaged. Go to PNP, OVERDRIVE CONTROL, A/T MODE AND Go to ENGINE SPEED SIGNAL, AT-1082. ACCELERATOR POSITION SWITCHES, AT-
1091. 10th judgement flicker is longer than others. SAT803H Line pressure solenoid valve circuit is short-circuited or disconnected. Go to LINE PRESSURE SOLENOID VALVE, AT-1084. t4 = 1.0 second AT-1032 ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION Self-diagnosis (Cont’d) HOW TO ERASE SELF-DIAGNOSTIC RESULTS (With CONSULT-
II) 1. If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once. Wait for at least 5 seconds and then turn it “ON” again.
2. Turn CONSULT-II “ON”, and touch “A/T”. SAT014K 3. Touch “SELF-DIAG RESULTS”.
SAT971J 4. Touch “ERASE”. (The self-diagnostic results will be erased.) SAT970J HOW TO ERASE SELF-DIAGNOSTIC RESULTS (Without CONSULT-II) 1. If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once. Wait for at least 5 seconds and then turn it “ON” again.
2. Perform “SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)”.
Refer to AT-1029. 3. Turn ignition switch “OFF”. (The self-diagnostic results will be erased.) AT-1033 ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION Diagnosis by CONSULT-II NOTICE 1.The CONSULT-II electrically displays shift timing and lock-up timing (that is, operation timing of each solenoid). Check for time difference between actual shift
timing and the CONSULT-II display. If the difference is noticeable, mechanical parts (except solenoids, sensors, etc.) may be malfunctioning. Check mechanical parts using applicable diagnostic procedures. 2. Shift schedule (which implies gear position) displayed on CONSULT-II and that indicated in Service Manual may differ slightly. This occurs
because of the following reasons: + Actual shift schedule has more or less tolerance or allowance, + Shift schedule indicated in Service Manual refers to the point where shifts start. Gear position displayed on CONSULT-II indicates the point where shifts are completed.
3. Shift solenoid valve “A” or “B” is displayed on CONSULT-II at the start of shifting. Gear position is displayed upon completion of shifting (which is computed by TCM). 4. Additional CONSULT-II information can be found in the Operation Manual supplied with the CONSULT-II unit. SELF-DIAGNOSTIC RESULT TEST MODE Refer to AT-1028. DATA
MONITOR DIAGNOSTIC TEST MODE Monitor item Item Display Vehicle speed sensor 1 (A/T) (Revolution sensor) VHCL/S SEzA/T [km/h] or [mph] Vehicle speed sensor 2 (Meter) VHCL/S SEzMTR [km/h] or [mph] + Vehicle speed computed from signal of vehicle speed sensor is displayed. Vehicle speed display may not be accurate under approx. 10
km/h (6 MPH). It may not indicate 0 km/h (0 MPH) when vehicle is stationary. X — + A/T fluid temperature sensor signal voltage is displayed. + Signal voltage lowers as fluid temperature rises. X — + Source voltage of TCM is displayed. X X OVERDRIVE SW [ON/OFF] X — + ON/OFF state computed from signal of overdrive control SW is displayed.
PN POSI SW [ON/OFF] X — + ON/OFF state computed from signal of PN position SW is displayed. R POSITION SW [ON/OFF] X — + ON/OFF state computed from signal of R position SW is displayed.
D POSITION SW [ON/OFF] X — + ON/OFF state computed from signal of D position SW is displayed. 2 POSITION SW [ON/OFF] X — + ON/OFF status, computed from signal of 2 position SW, is displayed. BATTERY VOLT [V] Engine speed ENGINE SPEED [rpm] 2 position switch When racing engine in “N” or “P” position with vehicle stationary,
CONSULT data may not indicate 0 km/h (0 MPH). + Accelerator position sensor signal voltage is displayed. Battery voltage Remarks + Vehicle speed computed from signal of revolution sensor is displayed.
— FLUID TEMP SE [V] D position switch — X A/T fluid temperature sensor R position switch X Description — THRTL POS SEN [V] P/N position switch Main signals X Accelerator position sensor Overdrive control switch TCM input signals + Engine speed, computed from engine speed signal, is displayed. AT-1034 Engine speed display may not be
accurate under approx. 800 rpm. It may not indicate 0 rpm even when engine is not running. ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION Diagnosis by CONSULT-II (Cont’d) Monitor item TCM input signals Main signals X — + ON/OFF status, computed from signal of 1 position SW, is displayed.
X — + Status of ASCD cruise signal is displayed. ON ... Cruising state OFF ... Normal running state + This is displayed even when no ASCD is mounted. X — + Status of ASCDzOD release signal is displayed. ON ... OD released OFF ... OD not released + This is displayed even when no ASCD is mounted. KICKDOWN SW [ON/OFF] X — + ON/OFF
status, computed from signal of kickdown SW, is displayed. + This is displayed even when no kickdown switch is equipped. POWER SHIFT SW [ON/OFF] X — + ON/OFF state computed from signal of POWER shift SW is displayed. X — + ON/OFF status, computed from signal of closed throttle (accelerator) position SW, is displayed. X — + ON/OFF
status, computed from signal of wide open throttle (accelerator) position SW, is displayed. X — + ON/OFF status, computed from signal of HOLD shift SW, is displayed. — X + Gear position data used for computation by TCM, is displayed. — X + Selector lever position data, used for computation by TCM, is displayed. VEHICLE SPEED [km/h] or [mph]
— X + Vehicle speed data, used for computation by TCM, is displayed. THROTTLE POSI [/8] — X + Throttle (accelerator) position data, used for computation by TCM, is displayed. — X + Control value of line pressure solenoid valve, computed by TCM from each input signal, is displayed. — X + Control value of torque converter clutch solenoid valve,
computed by TCM from each input signal, is displayed.
— X + Control value of shift solenoid valve A, computed by TCM from each input signal, is displayed. — X + Control value of shift solenoid valve B, computed by TCM from each input signal, is displayed.
— X + Control value of overrun clutch solenoid valve computed by TCM from each input signal is displayed.
— X + Control status of SPORT indicator lamp is displayed. Item 1 position switch ASCD-cruise signal ASCD-OD cut signal Kickdown switch A/T mode switch Closed throttle position switch Wide open throttle position switch A/T mode switch Gear position Selector lever position Vehicle speed Accelerator position Line pressure duty Display 1
POSITION SW [ON/OFF] ASCD-CRUISE [ON/OFF] ASCD-OD CUT [ON/OFF] CLOSED THL/SW [ON/OFF] W/O THRL/P-SW [ON/OFF] HOLD SW [ON/OFF] GEAR SLCT LVR POSI LINE PRES DTY [%] Torque converter clutch solenoid valve duty TCC S/V DUTY [%] Shift solenoid valve A SHIFT S/V A [ON/OFF] Shift solenoid valve B Overrun clutch
solenoid valve Self-diagnosis display lamp (SPORT indicator lamp) SHIFT S/V B [ON/OFF] OVERRUN/C S/V [ON/OFF] SELF-D DP LMP [ON/OFF] Description X: Applicable —: Not applicable AT-1035 Remarks + A specific value used for control is displayed if fail-safe is activated due to error. + A specific value used for control is displayed if fail-safe is
activated due to error.
Control value of solenoid is displayed even if solenoid circuit is disconnected.
The “OFF” signal is displayed if solenoid circuit is shorted. TROUBLE DIAGNOSIS — Introduction Introduction SAT631IA SAT632I The TCM receives a signal from the vehicle-speed sensor, accelerator position sensor or PNP switch and provides shift control or lock-up control via solenoid valves. Input and output signals must always be correct and
stable in the operation of the A/T system.
The A/T system must be in good operating condition and be free of valve seizure, solenoid valve malfunction, etc. It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits
may help prevent the replacement of good parts. A visual check only may not find the cause of the problems. A road test with CONSULT-II or a circuit tester connected should be performed. Follow the “Work Flow”. Refer to AT-1040. Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability
complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur.
A “Diagnostic Worksheet” like the example (AT-1038) should be used. Start your diagnosis by looking for “conventional” problems first. This will help troubleshoot driveability problems on an electronically controlled engine vehicle. SEF234G AT-1036 TROUBLE DIAGNOSIS — Introduction Diagnostic Worksheet INFORMATION FROM CUSTOMER
KEY POINTS WHAT ....
WHEN .... WHERE .... HOW .... Customer name MR/MS Vehicle & A/T model Date, Frequencies Road conditions Operating conditions, Symptoms Model & Year VIN Trans. model Engine Mileage Incident Date Manuf.
Date In Service Date Frequency N Continuous Symptoms N Vehicle does not move. N No up-shift N Intermittent times a day) (N Any position (N 1st → 2nd N No down-shift (N 2nd → 3rd (N O/D → 3rd N Particular position) N 3rd → O/D) N 3rd → 2nd N 2nd → 1st) N Lockup malfunction N Shift point too high or too low. N Shift shock or slip (N N → D N
Lockup N Any drive position) N Noise or vibration N No kickdown N No pattern select N Others (SPORT indicator lamp Malfunction indicator (MI)) Blinks for about 8 seconds. N Continuously lit N Not lit N Continuously lit N Not lit AT-1037 TROUBLE DIAGNOSIS — Introduction Diagnostic Worksheet (Cont’d) DIAGNOSTIC WORKSHEET 1.
2. 3. 4. N Read the Fail-safe and listen to customer complaints. N A/T FLUID CHECK N Leakage (Follow specified procedure) N Fluid condition N Fluid level N Perform STALL TEST and LINE PRESSURE TEST. N Stall test — Mark possible damaged components/others. N Torque converter one-way clutch N Low & reverse brake N Reverse clutch N
Low one-way clutch N Forward clutch N Engine N Overrun clutch N Line pressure is low N Forward one-way clutch N Clutches and brakes except high clutch and brake band are OK N Line pressure test — Suspected parts: N Perform all ROAD TEST and mark required procedures. 4-1. Check before engine is started. N SELF-DIAGNOSTIC
PROCEDURE — Mark detected items.
N Vehicle speed sensorzA/T (Revolution sensor), AT-1064. N Vehicle speed sensorzMTR, AT-1066. N Accelerator position sensor, AT-1068. N Shift solenoid valve A, AT-1070.
N Shift solenoid valve B, AT-1072.
N Overrun clutch solenoid valve, AT-1074. N Torque converter clutch solenoid valve, AT-1076. N A/T fluid temperature sensor and TCM power source, AT-1079. N Engine speed signal, AT-1082. N Line pressure solenoid valve, AT-1084. N PNP, overdrive control, A/T mode and accelerator position switches, AT-1091. N Battery N Others 4-2. Check at
idle N 1. SPORT Indicator Lamp Does Not Come On, AT-1097. N 2. SPORT Indicator Lamp Does Not Come On, AT-1098. N 3. O/D OFF Indicator Lamp Does Not Come On, AT-1098. N 4. SPORT Indicator Lamp Does Not Come On AT-1099. N 5.
Engine Cannot Be Started In “P” And “N” Position, AT-1100. N 6. In “P” Position, Vehicle Moves Forward Or Backward When Pushed, AT-1100. N 7. In “N” Position, Vehicle Moves, AT-1101. N 8. Large Shock. “N” → “R” Position, AT-1102. N 9. Vehicle Does Not Creep Backward In “R” Position, AT-1103. N 10. Vehicle Does Not Creep Forward In “D”,
“2” Or “1” Position, AT-1104.
4-3. Cruise test Part-1 N 11.
Vehicle Cannot Be Started From D1, AT-1105. N 12. A/T Does Not Shift: D1 → D2 Or Does Not Kickdown: D4 → D2, AT-1106. N 13. A/T Does Not Shift: D2 → D3, AT-1107. N 14. A/T Does Not Shift: D3 → D4, AT-1108. N 15. A/T Does Not Perform Lock-up, AT-1109. N 16. A/T Does Not Hold Lock-up Condition, AT-1110. N 17. Lock-up Is Not Released,
AT-1110. N 18. Engine Speed Does Not Return To Idle (Light Braking D4 → D3), AT-1111. AT-1038 AT-1006 AT-1041 AT-1041, AT-1044 AT-1046 AT-1047 AT-1049 AT-1050, AT-1053 TROUBLE DIAGNOSIS — Introduction Diagnostic Worksheet (Cont’d) 4. 5. N 6. 7. N N 8. N Part-2 N 19. Vehicle Does Not Start From D1, AT-1112. N 12. A/T Does Not
Shift: D1 → D2 Or Does Not Kickdown: D4 → D2, AT-1106. N 13. A/T Does Not Shift: D2 → D3, AT-1107. N 14. A/T Does Not Shift: D3 → D4, AT-1108. Part-3 N 20. A/T Does Not Shift: D2 → D1 When Depressing Accelerator Pedal, AT-1113 N 21. A/T Does Not Shift: D4 → D3 When Overdrive Control Switch “ON” → “OFF”, AT-1114 N 18. Engine Speed
Does Not Return To Idle (Engine Brake In D3), AT-1111. N 22. A/T Does Not Shift: D3 → 22, When Selector Lever “D” → “2” Position, AT-1114.
N 18. Engine Speed Does Not Return To Idle (Engine Brake In 22), AT-1111. N 23. A/T Does Not Shift: 22 → 11, When Selector Lever “2” → “1” Position, AT-1115.
N 24. Vehicle Does Not Decelerate By Engine Brake, AT-1115. N SELF-DIAGNOSTIC PROCEDURE — Mark detected items. N Vehicle speed sensorzA/T (Revolution sensor), AT-1064. N Vehicle speed sensorzMTR, AT-1066. N Accelerator position sensor, AT-1068. N Shift solenoid valve A, AT-1070. N Shift solenoid valve B, AT-1072. N Overrun clutch
solenoid valve, AT-1074. N Torque converter clutch solenoid valve, AT-1076.
N A/T fluid temperature sensor and TCM power source, AT-1079. N Engine speed signal, AT-1082. N Line pressure solenoid valve, AT-1084. N PNP, overdrive control, A/T mode and accelerator position switches, AT-1091. N Battery N Others For self-diagnosis NG items, inspect each component. Repair or replace the damaged parts. Perform all ROAD
TEST and re-mark required procedures. Perform the Diagnostic Procedures for all remaining items marked NG. Repair or replace the damaged parts. Refer to the Symptom Chart when you perform the procedures. (The chart also shows some other possible symptoms and the component inspection orders.) Erase self-diagnosis code from TCM
memories. AT-1039 AT-1055 AT-1056 AT-1028 AT-1046 AT-1060 AT-1057 AT-1033 TROUBLE DIAGNOSIS — Introduction Work Flow HOW TO PERFORM TROUBLE DIAGNOSES FOR QUICK AND ACCURATE REPAIR A good understanding of the malfunction conditions can make troubleshooting faster and more accurate. In general, each customer
feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.
Make good use of the two sheets provided, “INFORMATION FROM CUSTOMER” and “DIAGNOSTIC WORKSHEET”, to perform the best troubleshooting possible. CHECK IN . LISTEN TO CUSTOMER COMPLAINTS AND FILL OUT “INFORMATION FROM CUSTOMER”, AT-1037. Check for any Service Bulletins. b Refer to FAIL-SAFE Service Notice
or Precautions, AT-1006. . CHECK A/T FLUID LEVEL AND CONDITION. IF NG, PLACE CHECK ON THE DIAGNOSTIC WORKSHEET, AT-1038.
b Refer to A/T Fluid Check, AT-1041. .
PERFORM STALL TEST AND LINE PRESSURE TEST. b Refer to Stall Test and Line Pressure Test, AT-1041, 1044. . PERFORM ROAD TEST WITH SELF-DIAGNOSIS AND PLACE CHECKS FOR NG ITEMS ON THE DIAGNOSTIC WORKSHEET. b Follow ROAD TEST procedure, AT-1046. NG items including self-diagnostic item . + FOR SELF-
DIAGNOSIS NG ITEMS: −INSPECT EACH COMPONENT. −REPAIR/REPLACE. + PERFORM ROAD TEST AND PLACE CHECKS FOR NG ITEMS ON THE DIAGNOSTIC WORKSHEET AGAIN. b + Refer to self-diagnosis, AT-1028.
+ Perform ROAD TEST for all items. . + FOR ALL REMAINING MALFUNCTIONS: −INSPECT EACH COMPONENT. −REPAIR/REPLACE. + PERFORM ROAD TEST AND CONFIRM ALL MALFUNCTIONS ARE ELIMINATED. b Refer to + ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION, AT-1028 - AT-1034. + TROUBLE DIAGNOSIS FOR SELF-
DIAGNOSIS CODE, AT-1064 - AT-1091. + DIAGNOSTIC PROCEDURES FOR SYMPTOMS, AT-1097 - AT-1115. + Symptom Chart, AT-1057. . ERASE SELF-DIAGNOSIS CODE FROM TCM MEMORIES. b Refer to HOW TO ERASE SELF-DIAGNOSIS RESULTS, AT-1033. b Refer to SELF-DIAGNOSIS CONFIRMATION PROCEDURE, AT-1064 - AT-1089. .
PERFORM FINAL CHECK . OK CHECK OUT AT-1040 TROUBLE DIAGNOSIS — Basic Inspection A/T Fluid Check FLUID LEAKAGE CHECK 1. Clean area suspected of leaking.
— for example, mating surface of converter housing and transmission case. 2. Start engine, apply foot brake, place selector lever in “D” position and wait a few minutes. 3. Stop engine.
4. Check for fresh leakage. SAT801A FLUID CONDITION CHECK Fluid color Dark or black with burned odor Milky pink Varnished fluid, light to dark brown and tacky Suspected problem Wear of frictional material Water contamination — Road water entering through filler tube or breather Oxidation — Over or under filling, — Overheating FLUID
LEVEL CHECK SAT638A Refer to MA section (“Checking A/T Fluid”, “CHASSIS AND BODY MAINTENANCE”). Stall Test STALL TEST PROCEDURE 1. Check A/T and engine fluid levels. If necessary, add. 2.
Drive vehicle for approx. 10 minutes or until engine oil and ATF reach operating temperature. ATF operating temperature: 50 - 80°C (122 - 176°F) SAT647B 3. Set parking brake and block wheels. 4. Install a tachometer where it can be seen by driver during test. + It is good practice to put a mark on point of specified engine rpm on indicator.
SAT513G 5. Start engine, apply foot brake, and place selector lever in “D” position. 6. Accelerate to wide open throttle gradually while applying foot brake. 7.
Quickly note the engine stall revolution and immediately release throttle. + During test, never hold throttle wide open for more than 5 seconds. Stall revolution: 2,480 - 2,680 rpm SAT514G AT-1041 TROUBLE DIAGNOSIS — Basic Inspection Stall Test (Cont’d) 8. Move selector lever to “N” position. 9. Cool off ATF. + Run engine at idle for at least one
minute. 10. Repeat steps 5 through 9 with selector lever in “2”, “1” and “R” positions. SAT771B JUDGEMENT OF STALL TEST The test result and possible damaged components relating to each result are shown in the illustration. In order to pinpoint the possible damaged components, follow the WORK FLOW shown in AT-1040. Note Stall revolution
is too high in “D” or “2” position: +Slippage occurs in 1st gear but not in 2nd and 3rd gears. ..... Low one-way clutch slippage + Slippage occurs at the following gears: 1st through 3rd gears in “D” position and engine brake functions. 1st and 2nd gears in “2” position and engine brake functions with accelerator pedal released (fully closed throttle).
..... Forward clutch or forward one-way clutch slippage Stall revolution is too high in “R” position: +Engine brake does not function in “1” position.
..... Low & reverse brake slippage + Engine brake functions in “1” position. ..... Reverse clutch slippage Stall revolution within specifications: +Vehicle does not achieve speed of more than 80 km/h (50 MPH). ..... One-way clutch seizure in torque converter housing CAUTION: Be careful since automatic fluid temperature increases abnormally.
+Slippage occurs in 3rd and 4th gears in “D” position. ..... High clutch slippage + Slippage occurs in 2nd and 4th gear in “D” position.
..... Brake band slippage Stall revolution less than specifications: +Poor acceleration during starts. ..... One-way clutch seizure in torque converter AT-1042 TROUBLE DIAGNOSIS — Basic Inspection Stall Test (Cont’d) JUDGEMENT OF STALL TEST SAT392H AT-1043 TROUBLE DIAGNOSIS — Basic Inspection Line Pressure Test LINE PRESSURE
TEST PORTS + Location of line pressure test ports. + Always replace line pressure plugs as they are self-sealing bolts. SAT889HC LINE PRESSURE TEST PROCEDURE 1. Check A/T and engine fluid levels. If necessary, add fluid. 2. Drive vehicle for approx. 10 minutes or until engine oil and ATF reach operating temperature. ATF operating
temperature: 50 - 80°C (122 - 176°F) SAT647B 3. Install pressure gauge to corresponding line pressure port. SAT890HC SAT519GA AT-1044 TROUBLE DIAGNOSIS — Basic Inspection Line Pressure Test (Cont’d) 4. Set parking brake and block wheels.
+ Continue to depress brake pedal fully while line pressure test is being performed at stall speed. SAT513G 5. Start engine and measure line pressure at idle and stall speed. + When measuring line pressure at stall speed, follow the stall test procedure. Line pressure: Refer to SDS, AT-1207. SAT493G JUDGEMENT OF LINE PRESSURE TEST
Judgement + + + + + + Line pressure is low in particular position. + Fluid pressure leakage between manual valve and particular clutch + For example, line pressure is: — Low in “R” and “1” positions, but — Normal in “D” and “2” positions. Then, fluid leakage exists at or around low and reverse brake circuit. Refer to “CLUTCH AND BAND
CHART”, AT-1025. Line pressure is high. + + + + + + + Mal-adjustment of throttle position sensor A/T fluid temperature sensor damaged Line pressure solenoid valve sticking Short circuit of line pressure solenoid valve circuit Pressure modifier valve sticking Pressure regulator valve or plug sticking Open in dropping resistor circuit Line pressure is
low. + + + + + + Mal-adjustment of throttle position sensor Line pressure solenoid valve sticking Short circuit of line pressure solenoid valve circuit Pressure regulator valve or plug sticking Pressure modifier valve sticking Pilot valve sticking At idle At stall speed Suspected parts Line pressure is low in all positions. Oil pump wear Control piston
damage Pressure regulator valve or plug sticking Spring for pressure regulator valve damaged A/T fluid pressure leakage between oil strainer and pressure regulator valve Clogged strainer AT-1045 TROUBLE DIAGNOSIS — Basic Inspection Road Test DESCRIPTION + The purpose of the test is to determine overall performance of A/T and analyze
causes of problems. + The road test consists of the following three parts: 1. Check before engine is started 2. Check at idle 3. Cruise test SAT786A + Before road test, familiarize yourself with all test procedures and items to check. + Conduct tests on all items until specified symptom is found. Troubleshoot items which check out No Good after road
test. Refer to “ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION” and “DIAGNOSTIC PROCEDURES FOR SYMPTOMS”, AT-1028 - AT-1034 and AT-1097 - AT-1115. SAT496G AT-1046 TROUBLE DIAGNOSIS — Basic Inspection Road Test (Cont’d) 1. CHECK BEFORE ENGINE IS STARTED 1. Park vehicle on flat surface. 2. Turn ignition switch to “OFF”
position. . SAT211JA 1.
Set A/T mode switch to “AUTO” position. 2. Move selector lever to “P” position. 3. Turn ignition switch to “ON” position. (Do not start engine.) 4. Does SPORT indicator lamp come on for about 2 seconds? No c Go to 1. SPORT Indicator Lamp Does Not Come On, AT-1097. Yes . Does SPORT indicator lamp flicker for about 8 seconds? Yes c No Perform
self-diagnosis. Refer to SELF-DIAGNOSIS PROCEDURE, AT-1028. SAT853E . 1. Set A/T mode switch to “SPORT” position. 2. Does SPORT indicator lamp come on? No c Go to 2. SPORT Indicator Lamp Does Not Come On, AT-1098. Yes . Set overdrive control switch to “OFF” position. SAT211JA . Does O/D OFF indicator lamp come on? Yes . A V (Go to
next page) SAT857E SAT210J AT-1047 No c Go to 3. O/D OFF Indicator Lamp Does Not Come On, AT-1098. TROUBLE DIAGNOSIS — Basic Inspection Road Test (Cont’d) A V . Depress brake pedal and move selector lever to “D” position.
SAT869E . 1. Set A/T mode switch to “AUTO” position. 2. Depress and release accelerator pedal quickly. . Does SPORT indicator lamp come on for about 3 seconds after accelerator pedal is depressed?
Yes SAT754A . Turn ignition switch to “OFF” position. . Perform self-diagnosis and note NG items: Refer to SELF-DIAGNOSIS PROCEDURE, AT-1028.
. SAT211JA Go to “2. Check at idle”, AT-1049. AT-1048 No c Go to 4. SPORT Indicator Lamp Does Not Come On, AT-1099.
TROUBLE DIAGNOSIS — Basic Inspection Road Test (Cont’d) 2. CHECK AT IDLE 1. Park vehicle on flat surface. 2. Turn ignition switch to “OFF” position. 3. Move selector lever to “P” or “N” position. 4. Turn ignition switch to start position. 5. Is engine started? No c Go to “5. Engine Cannot Be Started In “P” and “N” Position”, AT-1100. Yes .
SAT796A 1. Turn ignition switch to “OFF” position. 2. Move selector lever to “D”, “1”, “2” or “R” position. 3. Turn ignition switch to start position. 4. Is engine started? Yes c Go to “5. Engine Cannot Be Started In “P” and “N” Position”, AT-1100. No . SAT797A 1. 2. 3. 4. 5.
Turn ignition switch to “OFF” position. Move selector lever to “P” position.
Release parking brake. Push vehicle forward or backward. Does vehicle move when it is pushed forward or backward? Yes c Go to “6. In “P” Position, Vehicle Moves Forward Or Backward When Pushed”, AT-1100. No . 1. Apply parking brake. 2. Move selector lever to “N” position. 3. Turn ignition switch to “START” position and start engine. 4.
Release parking brake.
5. Does vehicle move forward or backward? Yes c Go to “7. In “N” Position, Vehicle Moves”, AT-1101. c Go to “8. Large Shock. “N” → “R” Position”, AT-1102. No . 1. Apply foot brake. 2. Move selector lever to “R” position. 3. Is there large shock when changing from “N” to “R” position? Yes No .
1. Release foot brake for several seconds. 2. Does vehicle creep backward when foot brake is released?
No c Go to “9. Vehicle Does Not Creep Backward In “R” Position”, AT-1103. Yes . 1. Move selector lever to “D”, “1” and “2” position and check if vehicle creeps forward.
2. Does vehicle creep forward in all three positions? Yes . Go to “3. Cruise test”, AT-1050. AT-1049 No c Go to “10.
Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position”, AT-1104. TROUBLE DIAGNOSIS — Basic Inspection Road Test (Cont’d) 3. CRUISE TEST + Check all items listed in Parts 1 through 3. With CONSULT-II + Using CONSULT-II, conduct a cruise test and record the result. + Print the result and ensure that shifts and lock-ups take place as
per Shift Schedule. SAT601J CONSULT-II Setting Procedure 1. Turn ignition switch OFF. 2. Connect CONSULT-II to data link connector, which is located in instrument lower panel on driver side. SAT165K 3. Turn ignition switch ON.
4. Touch “START”. SAT586J 5. Touch “A/T”. SAT014K 6. Touch “DATA MONITOR”. SAT971J AT-1050 TROUBLE DIAGNOSIS — Basic Inspection Road Test (Cont’d) 7. Touch “MAIN SIGNALS” or “TCM INPUT SIGNALS”. 8.
See “Numerical Display”, “Barchart Display” or “Line Graph Display”. SAT175K 9. Touch “SETTING” to set recording condition (“AUTO TRIG” or “MANU TRIG”) and touch “BACK”. 10. Touch “Start”. SAT973J 11. When performing cruise test, touch “Store Data”. SAT985J 12. After finishing cruise test part 1, touch “STOP”. SAT986J 13. Touch
“STORE” and touch “BACK”. SAT987J AT-1051 TROUBLE DIAGNOSIS — Basic Inspection Road Test (Cont’d) 14. Touch “DISPLAY”. 15.
Touch “PRINT”. 16. Check the monitor data printed out. 17. Continue cruise test part 2 and 3. SAT974J SAT975J Without CONSULT-II + Throttle position can be checked by voltage across terminals 41 and V 42 of TCM. V SAT215J AT-1052 TROUBLE DIAGNOSIS — Basic Inspection Road Test (Cont’d) CRUISE TEST — Part 1 Drive vehicle for approx.
10 minutes to warm engine oil and ATF up to operating temperature. ATF operating temperature: 50 - 80°C (122 - 176°F) . SAT774B 1. Park vehicle on flat surface. 2. Set overdrive control switch to “ON” position. 3.
Move selector lever to “P” position. 4. Start engine. . Move selector lever to “D” position. SAT775B . Accelerate vehicle by constantly depressing accelerator pedal halfway. . Does vehicle start from D1? Read gear position.

No c Go to “11. Vehicle Cannot Be Started From D1”, AT-1105. Yes .
SAT495G Does A/T shift from D1 to D2 at the specified speed?
Read gear position, throttle opening and vehicle speed.
Specified speed when shifting from D1 to D2: Refer to Shift schedule, AT-1206. No c Go to “12. A/T Does Not Shift: D1 → D2 Or Does Not Kickdown: D4 → D2”, AT-1106. Yes . SAT401H Does A/T shift from D2 to D3 at the specified speed? Read gear position, throttle position and vehicle speed. Specified speed when shifting from D2 to D3: Refer to Shift schedule, AT-1206. Yes . A V (Go to next page.) AT-1053 No c Go to “13. A/T Does Not Shift: D2 → D3”, AT-1107. TROUBLE DIAGNOSIS — Basic Inspection Road Test (Cont’d) A V . SAT402H Does A/T shift from D3 to D4 at the specified speed?
Read gear position, throttle position and vehicle speed. Specified speed when shifting from D3 to D4: Refer to Shift schedule, AT-1206. No c Go to “14. A/T Does Not Shift: D3 → D4”, AT-1108. Yes . Does A/T perform lock-up at the specified speed? Read vehicle speed, throttle position when lock-up duty becomes 94%.
Specified speed when lock-up occurs: Refer to Shift schedule, AT-1206.
SAT403H No c Go to “15. A/T Does Not Perform Lock-up“, AT-1109. Yes . Does A/T hold lock-up condition for more than 30 seconds? No c Yes .
1. Release accelerator pedal. 2. Is lock-up released when accelerator pedal is released? No c Go to “16. A/T Does Not Hold Lock-up Condition”, AT-1110. Go to “17. Lock-up Is Not Released”, AT-1110. Yes . 1. Decelerate vehicle by applying foot brake lightly. 2. Does engine speed return to idle smoothly when A/T is shifted from D4 to D3?
Read gear position and engine speed. Yes . 1. Stop vehicle. 2. Go to “Cruise test — Part 2”, AT-1055. AT-1054 No c Go to “18.
Engine Speed Does Not Return To Idle (Light Braking D4 → D3)”, AT-1111. TROUBLE DIAGNOSIS — Basic Inspection Road Test (Cont’d) CRUISE TEST — Part 2 1. Confirm overdrive control switch is in “ON” position. 2.
Confirm selector lever is in “D” position.
3.
Accelerate vehicle by half throttle again. 4. Does vehicle start from D1? Read gear position. SAT495G No c Go to “19. Vehicle Does Not Start From D1”, AT-1112. Yes . 1. Accelerate vehicle to 80 km/h (50 MPH) as shown in illustration. 2. Release accelerator pedal and then quickly depress it fully. 3. Does A/T shift from D4 to D2 as soon as accelerator pedal is depressed fully? Read gear position and throttle position. No c Go to “12.
A/T Does Not Shift: D1 → D2 Or Does Not Kickdown: D4 → D2”, AT-1106. SAT404H Yes . Does A/T shift from D2 to D3 at the specified speed? Read gear position, throttle position and vehicle speed. Specified speed when shifting from D2 to D3: Refer to Shift schedule, AT-1206. SAT405H No c Go to “13. A/T Does Not Shift: D2 → D3”, AT-1107. c Go to “14. A/T Does Not Shift: D3 → D4”, AT-1108. Yes . 1. Release accelerator pedal after shifting from D2 to D3. 2.
Does A/T shift from D3 to D4 and does vehicle decelerate by engine brake? Read gear position, throttle position and vehicle speed. No Yes SAT124I . 1. Decelerate to 10 km/h (6 MPH) with accelerator pedal released and then quickly depress it fully. 2. Does A/T shift from D2 to D1 as soon as accelerator pedal is depressed fully? Yes . 1. Stop vehicle. 2. Go to “Cruise test — Part 3”, AT-1056. AT-1055 No c Go to “20. A/T Does Not Shift: D2 → D1 When Depressing Accelerator Pedal”, AT-1113. TROUBLE DIAGNOSIS — Basic Inspection Road Test (Cont’d) CRUISE TEST — Part 3 1. Confirm overdrive control switch is in “ON” position. 2. Confirm selector lever is in “D” position. . Accelerate vehicle using half-throttle to D4. . SAT812A Release accelerator pedal. . Set overdrive control switch to “OFF” position while driving in D4.
. Does A/T shift from D4 to D3 (O/D OFF)? Read gear position and vehicle speed. No c Yes . SAT813A Does vehicle decelerate by engine brake? No c Yes Go to “21. A/T Does Not Shift: D4 → D3, When Overdrive Control Switch “ON” → “OFF””, AT-1114. Go to “18. Engine Speed Does Not Return To Idle (Light Braking D4 → D3)”, AT-1111. . Move selector lever from “D” to “2” position while driving in D3 (O/D OFF). . Does A/T shift from D3 (O/D OFF) to 22? Read gear position. SAT776BA No c Yes . Does vehicle decelerate by engine brake? No c Yes . 1. Move selector lever from “2” to “1” position while driving in 22. 2. Does A/T shift from 22 to 11 position?
Read gear position. SAT791GA No c Go to “22. A/T Does Not Shift: D3 → 22, When Selector Lever “D” → “2” Position”, AT-1114. Go to “18. Engine Speed Does Not Return To Idle (Light Braking D4 → D3)”, AT-1111. Go to “23. A/T Does Not Shift: 22 → 11, When Selector Lever “2” → “1” Position”, AT-1115. Yes . Does vehicle decelerate by engine brake? Yes . 1.
Stop vehicle. 2. Perform self-diagnosis. Refer to SELFDIAGNOSTIC PROCEDURE, AT-1028. SAT778B AT-1056 No c Go to “24. Vehicle Does Not Decelerate By Engine Brake”, AT-1115. TROUBLE DIAGNOSIS — General Description Symptom Chart b Accumulator 3-4 (N-R) Ignition switch and starter Low & reverse brake Brake band Parking pawl components 3 . . . . . .
. . . . . 1 . . . . . 2 . . . .
. . . . . Transmission noise in “P” and “N” positions. 1 . . 3 4 5 . 2 . . . . . .
.
.
. 7 6 . . . . . .
. 1100 Vehicle moves when changing into “P” position or parking gear does not disengage when .
shifted out of “P” position. 1 . . . . . .
. . . . .
. . . . . .
. 2 V 1101 Vehicle runs in “N” position. . 1 . . . . . 2 . . . 4 V 3 V . 5 V . . . . 1103 Vehicle will not run in “R” position (but runs in “D”, “2” and “1” positions). Clutch slips.
.
Very poor acceleration. 1 . .
. . . 2 4 . . 3 . . . . . 5 V 6 V 7 V . 8 V . . .
6 V 8 V 10 . V . 9 V . . . . . 2 V . .
. . 10 . . . Fluid level Control linkage Reference page (AT— VV .
Overrun clutch Low one-way clutch Accumulator 1-2 Accumulator 2-3 2 1 Forward clutch Forward one-way clutch A/T fluid temperature sensor Accumulator N-D . Engine starts in position other than “N” and “P”. . Reverse clutch High clutch Torque converter clutch solenoid valve Overrun clutch solenoid valve Engine does not start in “N”, “P” positions. 1100 Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transmission must be removed from the vehicle. Torque converter Oil pump Shift solenoid valve B Line pressure solenoid valve 1100) Control valve assembly Shift solenoid valve A 1133, 1161, 1167, 1167, 1171, 1184 1144 1165 1177 1175 1137 Engine idling speed Line pressure 1124 c OFF vehicle Revolution sensor and vehicle speed sensor Engine speed signal) 1064, 1041, 1070, 1072, 1076, 1079, 1125 1066 1044 1124 1126 1148 1084 1074 1124 1082 PNP switch Accelerator position sensor (Adjustment) Reference page (AT- c b ON vehicle 9 V 7 V . — Vehicle braked when shifting into “R” position. 1 2 . . . . . 3 5 . . 4 . . . . . .
. . — Sharp shock in shifting from “N” to “D” position. .
. . 2 . 5 1 3 7 .
. 6 . .
4 8 . . . . . — Vehicle will not run in “D” and “2” positions (but . runs in “1” and “R” position). 1 . . . . . .
. . . . 1104 Vehicle will not run in “D”, “1” and “2” positions (but runs in “R” position). Clutch slips. 1 Very poor acceleration. . . . . 2 4 . . 3 . . . 5 . . . . . — Clutches or brakes slip somewhat in starting. 1 2 .
3 . . . 4 6 . . 5 . . . 7 . . 8 . 13 12 10 . . . . 11 V . . — Excessive creep. . . . . 1 . .
. . . . . .
. . . . .
. . .
. . . . . 6 5 . 4 . . . . . 1103 No creep at all. 1104 1 . . . . . 2 3 . . . . . — Failure to change gear from “D1” to “D2”. . 2 1 . 5 .
. . 4 3 . . . . . — Failure to change gear from “D2” to “D3”. . 2 1 . 5 . . . 4 . 3 . . . . . — Failure to change gear from “D3” to “D4”. . 2 1 . 4 . . .
. 3 .
. . . 5 . . . . . 1106 Too high a gear change point from “D1” to “D2”, . 1107, from “D2” to “D3”, from “D3” to “D4”. 1108 . .
1 2 . .
. . 3 4 . . . . . — Gear change directly from “D1” to “D3” occurs.
1 . . . . . .
. . . .
. . . 2 . . . . — Engine stops when shifting lever into “R”, “D”, . “2” and “1”. . . . . 1 . 3 . . . 2 . . . . . .
. 4 V . . .
V 6 V 7 V 6 V . . . . . .
. . .
. . . . . .
. . . . . 6 . — Too sharp a shock in change from “D1” to “D2”.
. . . 1 . . . 2 4 . . . . . 5 . 3 . . . . . Too sharp a shock in change from “D2” to “D3”.
. . . 1 . . . 2 4 .
. . .
. . . . 3 . . . . . 9 V V . — AT-1057 . . 6 V 7 V 8 V 9 V VVV VV . . 6 V . 5 V . . . . . 3 V V 6 V .
.
. . . . TROUBLE DIAGNOSIS — General Description Symptom Chart (Cont’d) b A/T fluid temperature sensor Accumulator N-D Accumulator 1-2 Accumulator 2-3 Accumulator 3-4 (N-R) Ignition switch and starter Torque converter Oil pump Reverse clutch High clutch Forward clutch Forward one-way clutch . . 1 . . . 2 4 . . . . . 3 . . . .
. . .
6 V . . 5 V . — Almost no shock or clutches slipping in change from “D1” to “D2”. 1 . . 2 . . . 3 5 . . . . . 4 . . . . . 6 V . — Almost no shock or slipping in change from “D2” to “D3”. 1 . . 2 . . . 3 5 .
. . .
. .
4 . . . . .
6 V . . . . 7 V . — Almost no shock or slipping in change from “D3” to “D4”.
1 . . 2 . . . 3 5 . . . . . 4 . . . . 6 V . . . . . 7 V . — Vehicle braked by gear change from “D1” to “D2”. 1 . . . . . 2 V 4 V . . . . . — Vehicle braked by gear change from “D2” to “D3”. 1 . . . . . .
. . . .
. . . . . .
. . . — Vehicle braked by gear change from “D3” to “D4”. 1 . . . . . .
. . . . . 4 V . . — Maximum speed not attained. Acceleration poor. 1 . 2 . . . . . 5 3 4 . . . . . — Failure to change gear from “D4” to “D3”. 1 . . 2 . . . . 6 4 . 5 . 3 . . . . . — Failure to change gear from “D3” to “D2” or from “D4” to “D2”. 1 . . 2 . . . . 5 3 4 . .
. . . .
. . . — Failure to change gear from “D2” to “D1” or from “D3” to “D1”. 1 . .
2 .
. . . 5 3 4 . . . . . — Gear change shock felt during deceleration by releasing accelerator pedal. . .
. 1 . . . 2 4 . .
. . 3 . . . . . — Too high a change point from “D4” to “D3”, from “D3” to “D2”, from “D2” to “D1”. . . . 1 2 . . . .
. . .
.
.
. .
. . — Kickdown does not operate when depressing pedal in “D4” within kickdown vehicle speed. . . .
1 2 . . .
. 3 4 . . .
. . . — Kickdown operates or engine overruns when depressing pedal in “D4” beyond kickdown vehicle speed limit. . . . 2 1 . . . . 3 4 . . . .
. — Races extremely fast or slips in changing from “D4” to “D3” when depressing pedal. 1 . . 2 . . . 3 5 . . 4 . . . — Races extremely fast or slips in changing from “D4” to “D2” when depressing pedal. 1 . . 2 .
. . 3 6 5 . 4 . . — Races extremely fast or slips in changing from “D3” to “D2” when depressing pedal. 1 . . 2 . . .
3 5 . . 4 .
— Races extremely fast or slips in changing from “D4” or “D3” to “D1” when depressing pedal. 1 . . 2 . . . 3 5 . . 4 — Vehicle will not run in any position. 1 2 . . . . . 3 . . . — Transmission noise in “D”, “2”, “1” and “R” positions. 1 . .
. . . . .
. . . AT-1058 6 V 7 11 V 10 V V .
. 3 V 2 V 5 V 3 V Reference page (AT- Parking pawl components Torque converter clutch solenoid valve Overrun clutch solenoid valve . Low & reverse brake Brake band Shift solenoid valve B Line pressure solenoid valve Too sharp a shock in change from “D3” to “D4”. Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transmission must be removed from the vehicle. Overrun clutch Low one-way clutch Control valve assembly Shift solenoid valve A —) Engine idling speed Line pressure 1133, 1161, 1167, 1167, 1171, 1184 1144 1165 1177 1175 1137 Revolution sensor and vehicle speed sensor Engine speed signal 1124 PNP switch Throttle (accelerator) position sensor (Adjustment)) c OFF vehicle Fluid level Control linkage Reference page (AT- cb ON vehicle 1064, 1041, 1070, 1072, 1076, 1079, 1125 1066 1044 1124 1126 1148 1084 1074 1124 1082 . .
2 V . . . . . .
. . 9 V 8 V . . .
8 V .
7 V . . 7 . .
. . 6 V . . . . . V .
. . . 7 V . . . 6 V . 8 V . . .
. . . . . .
. . . . . .
. . . . . .
. . .
. . . . . .
. .
. .
6 V 7 V .
. . . . . 8 V . . .
. 7 V . . 6 . . 7 .
. . . . 9 10 V V . . . . 8 V . . . . . 8 V . . . 4 . . . . . 9 V 5 V . 6 V . . . . . .
2 V . .
. . . . . 6 V 7 V 8 V 7 10 V V . . .
TROUBLE DIAGNOSIS — General Description Symptom Chart (Cont’d) b Shift solenoid valve B Line pressure solenoid valve Torque converter clutch solenoid valve Overrun clutch solenoid valve A/T fluid temperature sensor Accumulator N-D Accumulator 1-2 Accumulator 2-3 Accumulator 3-4 (N-R) Ignition switch and starter Torque converter Oil pump Reverse clutch High clutch Forward clutch Forward one-way clutch 1 . . 6 4 . . . . . 7 2 . . 5 .
3 . . . . . 9 V . . 8 V Parking pawl components Control valve assembly Shift solenoid valve A . Low & reverse brake Brake band Engine idling speed Line pressure Reference page (AT1111 Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transmission must be removed from the vehicle. Overrun clutch Low one-way clutch Revolution sensor and vehicle speed sensor Engine speed signal Failure to change from “D3” to “2” when changing lever into “2” position.) PNP switch Throttle (accelerator) position sensor (Adjustment)) c OFF vehicle Fluid level Control linkage Reference page (AT- cb ON vehicle 1064, 1041, 1070, 1072, 1076, 1079, 1133, 1161, 1167, 1167, 1171, 1125 1066 1044 1124 1124 1184 1126 1148 1084 1074 1124 1144 1165 1177 1175 1137 1082 . — Gear change from “21” to “22” in “2” position. . . 1 .
.
. . . . . .
. .
. . . . . 1112 Engine brake does not operate in “1” position. . 2 1 3 4 . .
. 6 5 . . . 7 . . . . . 8 V . 9 . . — Gear change from “11” to “12” in “1” position. . 2 1 . . . . . .
. .
. . . . . .
. . . .
.
. . . . . — Does not change from “12” to “11” in “1” position. . . 1 . 2 . . . 4 3 . . . 5 . . . . . 6 V . 7 V . . — Large shock changing from “12” to “11” in “1” position. . . . . 1 . . . . . .
. . . . . 2 V . . 7 8 9 14 V V V V 11 V . 12 V . 13 V 10 V . 2 V 3 V 5 V . 6 V . 7 V 4 V . 2 V 3 V 4 V 5 V 7 V 9 . . . . V 7 . . . . V . 8 V . 9 V 6 V . . . . . .
. . . .
V — Transmission overheats. 1 . . 3 . . 2 4 6 . . 5 . . . . . — ATF shoots out during operation. White smoke emitted from exhaust pipe during operation. 1 . . . .
. . . . .
. . . . . — Offensive smell at fluid charging pipe. 1 . . . . . .
. . . . . .
. — Torque converter is not locked up. . . 3 1 2 4 .
6 8 . . . 7 .
5 . . . .
. — Torque converter clutch piston slip 1 . . 2 . . . 3 6 . . 5 4 . . . .
. .
.
Lock-up point is extremely high or low. . . . 1 2 . . . 4 . . . 3 . . .
. . . . . — A/T does not shift to “D4” when driving with overdrive control switch “ON”. . . 2 1 3 . . 8 6 4 . . . 5 7 . . . . . 10 V . . 9 V . — Engine is stopped at “R”, “D”, “2” and “1” positions. 1 . . . . . .
5 4 3 . 2 . . . . . .
. . . . 1109 AT-1059 . . TROUBLE DIAGNOSIS — General Description TCM Terminals and Reference Value PREPARATION + Measure voltage between each terminal and terminal V 25 or 48 by following “TCM INSPECTION TABLE”. V SAT216J TCM HARNESS CONNECTOR TERMINAL LAYOUT SAT217J TCM INSPECTION TABLE (Data are reference values.) Terminal Wire color No. 1 2 G/Y BR/Y Item Judgement standard (Approx.) Condition When releasing accelerator pedal after warming up engine. When depressing accelerator pedal fully after warming up engine.
When releasing accelerator pedal after warming up engine. When depressing accelerator pedal fully after warming up engine. Line pressure solenoid valve Line pressure solenoid valve (with dropping resistor) When A/T performs lock-up. 3 G/OR Torque converter clutch solenoid valve 4 — — 5* 6* 7* 8 9* PU/W P/B P — L/OR DT1 DT2 DT3 — DT4 10 G/OR 1.5 - 3.0V 0V 5 - 14V 0V 8 - 15V When A/T does not perform lock0V up. — — Refer to EC section. — Refer to EC section. When turning ignition switch to “ON”.
When turning ignition switch to “OFF”. Power source *: These terminals are connected to the ECM.
AT-1060 — Battery voltage 0V TROUBLE DIAGNOSIS — General Description TCM Terminals and Reference Value (Cont’d) Terminal No. 11 Wire color L/W Item L/R 13 R/W SPORT indicator lamp 14*1 15 P/B — 12 16 17 R/L W/G 18 — 19 G/OR When shift solenoid valve A operates. (When driving in “D1” or “D4”.) Shift solenoid valve A Shift solenoid valve B Battery voltage When shift solenoid valve A does not operate. 0V (When driving in “D2” or “D3”.) When shift solenoid valve B operates.
(When driving in “D1” or “D2”.) Battery voltage When shift solenoid valve B does not operate. 0V (When driving in “D3” or “D4”.) When setting A/T mode switch in 0V “SPORT” position. When setting A/T mode switch in Battery voltage other positions. Refer to EC section. — — N position signal — Closed throttle position switch (in throttle (accelerator) position switch) Wide open throttle position switch (in throttle (accelerator) position switch) — Judgement standard (Approx.) Condition — When releasing accelerator pedal after warming up engine. Battery voltage When depressing accelerator pedal after warming up engine. 0V When depressing accelerator pedal more than half-way after warming up engine. When releasing accelerator pedal after warming up engine. — Battery voltage 0V Same as No. 10 Power source *1: These terminals are connected to the ECM. AT-1061 — TROUBLE DIAGNOSIS — General Description TCM Terminals and Reference Value (Cont’d) Terminal No. 20 21 22 Wire color L/B Item Overrun clutch solenoid valve — GY — — — B 26 G PNP “1” position switch G/W PNP “2” position switch 27 28 R/Y — — — Ground Power source (Back-up) W 30*1 Y/G (RX) 31*1 Y/R 32 G/R 33 — (TX) Accelerator position sensor (Power source) — Battery voltage When overrun clutch solenoid valve does not operate. 0V When setting overdrive control switch in “ON” position When setting overdrive control switch in “OFF” position — — — Battery voltage 0V — — — — When setting selector lever to “1” Battery voltage position. When setting selector lever to 0V other positions. When setting selector lever to “2” Battery voltage position. When setting selector lever to other positions. When turning ignition switch to “OFF”. When turning ignition switch to “ON”. or When vehicle cruises at 30 km/h (19 MPH). Revolution sensor (Measure in AC range) 29 When overrun clutch solenoid valve operates. — Overdrive control switch 23 24 25 Judgement standard (Approx.) Condition When vehicle parks. 0V Battery voltage Battery voltage 1V or more Voltage rises gradually in response to vehicle speed. 0V — — *1: These terminals are connected to the data link connector. AT-1062 — — Turn ignition switch to “ON”. 4.5 - 5.5V Turn ignition switch to “OFF”. 0V TROUBLE DIAGNOSIS — General Description TCM Terminals and Reference Value (Cont’d) Terminal Wire color No. 34 35 36 P Y W Item Judgement standard (Approx.) Condition When setting selector lever to “D” position. When setting selector lever to other positions. PNP “D” position switch When setting selector “R” position. When setting selector other positions.
When setting selector “N” or “P” position. When setting selector other positions. — — PNP “R” position switch PNP “N” or “P” position switch lever to lever to lever to Battery voltage 0V Battery voltage 0V Battery voltage 0V 37 38 — — — — 39 Y/B Engine speed signal Refer to EC section. 40 L/OR Vehicle speed sensor When moving vehicle at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more. Voltage varies between less than 0V and more than 4.5V.
41 B/W Accelerator position sensor When depressing accelerator pedal slowly after warming up engine.
(Voltage rises gradually in response to throttle position.) Fully-closed throttle: 0.5 - 0.7V Fully-open throttle: 4V 42 B Accelerator position sensor (Ground) W/G A/T mode switch (“SPORT”) 44 Y/R A/T mode switch (“ ”) 45 46 — — — — R A/T fluid temperature sensor 43 47 48 B — — — 0V When setting A/T mode switch in Battery voltage “SPORT” position. When setting A/T mode switch in 0V other positions. When setting A/T mode switch in Battery voltage “ position. “ When setting A/T mode switch in 0V other positions. — — When ATF temperature is 20°C (68°F). When ATF temperature is 80°C (176°F). — Ground AT-1063 — — 1.5V 0.5V 0V TROUBLE DIAGNOSIS FOR VHCL SPEED SENzA/T Vehicle Speed SensorzA/T (Revolution sensor) DESCRIPTION The revolution sensor detects the revolution of the out put shaft parking pawl lock gear and emits a pulse signal.
The pulse signal is sent to the TCM which converts it into vehicle speed. SAT218JA ON BOARD DIAGNOSIS LOGIC Diagnostic trouble code Malfunction is detected when ... : VHCL SPEED SENzA/T : TCM does not receive the proper voltage signal from the sensor. 1st judgement flicker Check items (Possible cause) + Harness or connectors (The sensor circuit is open or shorted.) + Revolution sensor SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE SAT014K SAT806H After the repair, perform the following procedure to confirm the malfunction is eliminated.
1) Start engine. 2) Select “SELF-DIAG RESULTS” mode for A/T with CONSULT-II. 3) Drive vehicle under the following conditions: Selector lever in “D” position, vehicle speed higher than 30 km/h (19 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 5 seconds. ---------- OR ----------1) Start engine. 2) Drive vehicle under the following conditions: Selector lever in “D” position, vehicle speed higher than 30 km/h (19 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 5 seconds. 3) Perform self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II), AT-1029. AT-1064 TROUBLE DIAGNOSIS FOR VHCL SPEED SENzA/T Vehicle Speed SensorzA/T (Revolution sensor) (Cont’d) DIAGNOSTIC PROCEDURE NG CHECK REVOLUTION SENSOR. Refer to “COMPONENT INSPECTION” below. c Repair or replace revolution sensor. OK . SAT738J SAT235J NG CHECK INPUT SIGNAL. Check the following items: c + Harness for short or 1. Start engine. open between TCM and 2. Select “TCM INPUT SIGNALS” revolution sensor (Main in Data Monitor. harness) 3. Read out the value of “VHCL/S + Harness for short or SEzA/T” while driving.
open between revolution Check the value changes sensor and ECM (Main according to driving speed. harness) ---------- OR ----------+ Ground circuit for ECM 1. Start engine. Refer to EC section 2.
Check voltage between TCM (“TROUBLE DIAGNOterminal V 29 and ground while SIS FOR POWER SUPdriving. PLY”). (Measure in AC range.) Voltage: At 0 km/h (0 MPH): 0V At 30 km/h (19 MPH): 1V or more (Voltage rises gradually in response to vehicle speed.) OK .
Perform “SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE”, AT-1064. OK . INSPECTION END NG c 1. Perform TCM input/ output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. COMPONENT INSPECTION Revolution sensor + For removal, refer to AT-1124. 1 ,V 2 and V 3 . + Check resistance between terminals V Terminal No. 1 V 2 V 1 V SAT236J AT-1065 Resistance 2 V 3 V 3 V 500 - 650Ω No continuity No continuity TROUBLE DIAGNOSIS FOR VHCL SPEED SENzMTR Vehicle Speed SensorzMTR DESCRIPTION The vehicle speed sensorzMTR is built into the speedometer assembly. The sensor functions as an auxiliary device to the revolution sensor when it is malfunctioning. The TCM will then use a signal sent from the vehicle speed sensorzMTR. SAT237J ON BOARD DIAGNOSIS LOGIC Diagnostic trouble code Malfunction is detected when ... : VHCL SPEED SENzMTR : TCM does not receive the proper voltage signal from the sensor. 2nd judgement flicker Check items (Possible cause) + Harness or connectors (The sensor circuit is open or shorted.) + Vehicle speed sensor SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE SAT014K After the repair, perform the following procedure to confirm the malfunction is eliminated. 1) Start engine. 2) Select “SELF-DIAG RESULTS” mode for A/T with CONSULT-II. 3) Drive vehicle under the following conditions: Selector lever in “D” position and vehicle speed higher than 20 km/h (12 MPH). ---------- OR ----------1) Start engine. 2) Drive vehicle under the following conditions: Selector lever in “D” position and vehicle speed higher than 20 km/h (12 MPH). 3) Perform self-diagnosis.
Refer to SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II), AT-1029. SAT807H AT-1066 TROUBLE DIAGNOSIS FOR VHCL SPEED SENzMTR Vehicle Speed SensorzMTR (Cont’d) DIAGNOSTIC PROCEDURE SAT738J NG CHECK INPUT SIGNAL. Check the following items: c + Vehicle speed sensor 1. Start engine. and ground circuit for 2. Select “TCM INPUT SIGNALS” vehicle speed sensor in Data Monitor. Refer to EL section 3. Read out the value of “VHCL/S (“METERS AND SEzMTR” while driving. GAUGES”). Check the value changes + Harness for short or according to driving speed. open between TCM and ---------- OR ----------vehicle speed sensor 1. Start engine. (Main harness) 2.
Check voltage between TCM terminal V 40 and ground while driving at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more. Voltage: Voltage varies between less than 1V and more than 4.5V. OK SAT238J . Perform “SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE”, AT-1066. OK . INSPECTION END AT-1067 NG c 1. Perform TCM input/ output signal inspection. 2.
If NG, recheck TCM pin terminals for damage or loose connection with harness connector. TROUBLE DIAGNOSIS FOR THROTTLE POSI SEN Accelerator Position Sensor DESCRIPTION The accelerator position sensor detects the throttle valve position and sends a signal to the TCM. SAT222JA ON BOARD DIAGNOSIS LOGIC Diagnostic trouble code Malfunction is detected when ... : THROTTLE POSI SEN TCM receives an excessively low or high voltage from the sensor. : 3rd judgement flicker Check items (Possible cause) + Harness or connectors (The sensor circuit is open or shorted.) + Accelerator position sensor CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE Remarks: Specification data are reference values. Monitor item Condition Specification Fully-closed throttle Approximately 0.5V Fully-open throttle Approximately 4V Accelerator position sensor SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE SAT014K SAT808H After the repair, perform the following procedure to confirm the malfunction is eliminated.
1) Start engine. 2) Select “SELF-DIAG RESULTS” mode for A/T with CONSULT-II. 3) Drive vehicle under the following conditions: Selector lever in “D” position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 3 seconds. ---------- OR ----------1) Start engine. 2) Drive vehicle under the following conditions: Selector lever in “D” position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 3 seconds. 3) Perform self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II), AT-1029. AT-1068 TROUBLE DIAGNOSIS FOR THROTTLE POSI SEN Accelerator Position Sensor (Cont’d) DIAGNOSTIC PROCEDURE Perform diagnostic test mode II (selfdiagnostic results) for engine control. Refer to EC section [“Malfunction Indicator (MI)”, “ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION”]. NG c OK . SAT738J SAT239J CHECK INPUT SIGNAL. 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Select “TCM INPUT SIGNALS” in Data Monitor. 3. Read out the value of “THRTL POS SEN”. Voltage: Fully-closed throttle: Approximately 0.5V Fully-open throttle: Approximately 4V ---------- OR ----------1. Turn ignition switch to “ON” position.
(Do not start engine.) 2.
Check voltage between TCM terminals V 41 and V 42 while accelerator pedal is depressed slowly. Voltage: Fully-closed throttle valve: Approximately 0.5 - 0.7V Fully-open throttle valve: Approximately 4V (Voltage rises gradually in response to throttle position) NG c Check accelerator position sensor circuit for engine control. Refer to EC section [“TROUBLE DIAGNOSIS FOR “THRTL (ACCEL) POSI SEN” (DTC 43)]. Check harness for short or open between ECM and TCM regarding accelerator position sensor circuit. (Main harness) OK . CHECK ACCELERATOR POSITION SWITCH. Refer to “CHECK ACCELERATOR POSITION SWITCH”, AT-1091. NG c Repair or replace damaged parts. OK . Perform “SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE”, AT-1068. OK . INSPECTION END AT-1069 NG c 1. Perform TCM input/ output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. TROUBLE DIAGNOSIS FOR SHIFT SOLENOID/V A Shift Solenoid Valve A DESCRIPTION Shift solenoid valves A and B are turned “ON” or “OFF” by the TCM in response to signals sent from the inhibitor switch, vehicle speed and throttle position sensors. Gears will then be shifted to the optimum position. SAT341H Gear position 1 2 3 4 Shift solenoid valve A ON OFF OFF ON Shift solenoid valve B ON ON OFF OFF ON BOARD DIAGNOSIS LOGIC Diagnostic trouble code Malfunction is detected when ...
: SHIFT SOLENOID/V A TCM detects an improper voltage drop when it tires to operate the solenoid valve. : 4th judgement flicker Check items (Possible cause) + Harness or connectors (The solenoid circuit is open or shorted.) + Shift solenoid valve A SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE SAT014K After the repair, perform the following procedure to confirm the malfunction is eliminated. 1) Start engine. 2) Select “SELF-DIAG RESULTS” mode for A/T with CONSULT-II. 3) Drive vehicle in D1 → D2 position. ---------- OR ----------1) Start engine. 2) Drive vehicle in D1 → D2 position. 3) Perform self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II), AT-1029. SAT809H AT-1070 TROUBLE DIAGNOSIS FOR SHIFT SOLENOID/V A Shift Solenoid Valve A (Cont’d) DIAGNOSTIC PROCEDURE CHECK GROUND CIRCUIT. 1. Turn ignition switch to “OFF”

position. 2. Disconnect terminal cord assembly connector in engine compartment. 3 3. Check resistance between terminal V and ground. Resistance: 20 - 40Ω NG c OK SAT240J . CHECK POWER SOURCE CIRCUIT. 1. Turn ignition switch to “OFF” position. 2.
Disconnect TCM harness connector. 3 3. Check resistance between terminal V and TCM harness connector terminal 11 . V Resistance: Approximately 0Ω If OK, check harness for short to ground and short to power. 4. Reinstall any part removed. NG c 1. Remove control valve assembly. Refer to AT-1124. 2. Check the following items: + Shift solenoid
valve A Refer to “COMPONENT INSPECTION” below. + Harness of terminal cord assembly for short or open Repair open circuit or short to ground or short to power in harness or connector. OK .
Perform “SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE”, AT-1070. NG c OK . INSPECTION END 1. Perform TCM input/ output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. SAT241J COMPONENT INSPECTION Shift solenoid valve A + For removal, refer to AT-1124.
Resistance check 3 and ground. + Check resistance between terminal V Solenoid valve Shift solenoid valve A Terminal No. 3 V Ground Resistance (Approx.) 20 - 40Ω SAT537IA Operation check + Check solenoid valve by listening for its operating sound 3 and ground. while applying battery voltage to the terminal V SAT536IA AT-1071 TROUBLE
DIAGNOSIS FOR SHIFT SOLENOID/V B Shift Solenoid Valve B DESCRIPTION Shift solenoid valves A and B are turned “ON” or “OFF” by the TCM in response to signals sent from the inhibitor switch, vehicle speed and throttle position sensors. Gears will then be shifted to the optimum position. SAT341H Gear position 1 2 3 4 Shift solenoid valve A
ON OFF OFF ON Shift solenoid valve B ON ON OFF OFF ON BOARD DIAGNOSIS LOGIC Diagnostic trouble code Malfunction is detected when ... : SHIFT SOLENOID/V B TCM detects an improper voltage drop when it tires to operate the solenoid valve.
: 5th judgement flicker Check items (Possible cause) + Harness or connectors (The solenoid circuit is open or shorted.) + Shift solenoid valve B SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE SAT014K After the repair, perform the following procedure to confirm the malfunction is eliminated. 1) Start engine. 2) Select “SELF-DIAG
RESULTS” mode for A/T with CONSULT-II.
3) Drive vehicle in D1 → D2 → D3 position. -- OR --1) Start engine. 2) Drive vehicle in D1 → D2 → D3 position.
3) Perform self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II), AT-1029. SAT812H AT-1072 TROUBLE DIAGNOSIS FOR SHIFT SOLENOID/V B Shift Solenoid Valve B (Cont’d) DIAGNOSTIC PROCEDURE CHECK GROUND CIRCUIT. 1.
Turn ignition switch to “OFF” position. 2. Disconnect terminal cord assembly connector in engine compartment. 2 3. Check resistance between terminal V and ground. Resistance: 20 - 40Ω NG c OK SAT242J . CHECK POWER SOURCE CIRCUIT. 1. Turn ignition switch to “OFF” position. 2. Disconnect TCM harness connector.
2 3. Check resistance between terminal V and TCM harness connector terminal 12 . V Resistance: Approximately 0Ω If OK, check harness for short to ground and short to power.
4. Reinstall any part removed.
NG c 1. Remove control valve assembly.
Refer to AT-1124. 2. Check the following items: + Shift solenoid valve B Refer to “COMPONENT INSPECTION” below. + Harness of terminal cord assembly for short or open Repair open circuit or short to ground or short to power in harness or connector. OK . Perform “SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE”, AT-1072. NG c OK .
INSPECTION END 1. Perform TCM input/ output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. SAT243J COMPONENT INSPECTION Shift solenoid valve B + For removal, refer to AT-1124. Resistance check 2 and ground. + Check resistance between terminal V Solenoid valve Shift
solenoid valve B Terminal No. 2 V Ground Resistance (Approx.) 20 - 40Ω SAT535IA Operation check + Check solenoid valve by listening for its operating sound 2 and ground. while applying battery voltage to the terminal V SAT534IA AT-1073 TROUBLE DIAGNOSIS FOR OVERRUN CLUTCH S/V Overrun Clutch Solenoid Valve DESCRIPTION The
overrun clutch solenoid valve is activated by the TCM in response to signals sent from the inhibitor switch, overdrive control switch, vehicle speed and throttle position sensors. The overrun clutch operation will then be controlled. SAT341H ON BOARD DIAGNOSIS LOGIC Diagnostic trouble code Malfunction is detected when ... : OVERRUN CLUTCH
S/V TCM detects an improper voltage drop when it tires to operate the solenoid valve. : 6th judgement flicker Check items (Possible cause) + Harness or connectors (The solenoid circuit is open or shorted.) + Overrun clutch solenoid valve SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE SAT014K After the repair, perform the following
procedure to confirm the malfunction is eliminated. 1) Start engine. 2) Select “SELF-DIAG RESULTS” mode for A/T with CONSULT-II. 3) Drive vehicle under the following conditions: Selector lever in “D” position, overdrive control switch in “OFF” position and vehicle speed higher than 10 km/h (6 MPH). --
-- OR --1) Start engine. 2) Drive vehicle under the following conditions: Selector lever in “D” position, overdrive control switch in “OFF” position and vehicle speed higher than 10 km/h (6 MPH). 3) Perform self-diagnosis. Refer to SELF-
DIAGNOSTIC PROCEDURE (Without CONSULT-II), AT-1029. SAT815H AT-1074 TROUBLE DIAGNOSIS FOR OVERRUN CLUTCH S/V Overrun Clutch Solenoid Valve (Cont’d) DIAGNOSTIC PROCEDURE CHECK GROUND CIRCUIT. 1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector in engine compartment. 4 3. Check resistance between terminal V and ground. Resistance: 20 - 40Ω NG c OK SAT244J . CHECK POWER SOURCE CIRCUIT. 1. Turn ignition switch to “OFF” position. 2. Disconnect TCM harness connector. 4 3. Check resistance between terminal V and TCM harness
connector terminal 20 .
V Resistance: Approximately 0Ω If OK, check harness for short to ground and short to power. 4. Reinstall any part removed. NG c 1. Remove control valve assembly. Refer to AT-1124. 2. Check the following items: + Overrun clutch solenoid valve Refer to “COMPONENT INSPECTION” below. + Harness of terminal cord assembly for short or open
Repair open circuit or short to ground or short to power in harness or connector. OK . Perform “SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE”, AT-1074. NG c OK . INSPECTION END 1. Perform TCM input/ output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. SAT245J
COMPONENT INSPECTION Overrun clutch solenoid valve + For removal, refer to AT-1124. Resistance check 4 and ground. + Check resistance between terminal V Solenoid valve Overrun clutch solenoid valve Terminal No. 4 V Ground Resistance (Approx.) 20 - 40Ω SAT392JC Operation check + Check solenoid valve by listening for its operating
sound 4 and ground. while applying battery voltage to the terminal V SAT567IB AT-1075 TROUBLE DIAGNOSIS FOR T/C CLUTCH SOL/V Torque Converter Clutch Solenoid Valve DESCRIPTION The torque converter clutch solenoid valve is activated, with the gear in D4, by the TCM in response to signals sent from the vehicle speed and throttle
(accelerator) position sensors.
Torque converter clutch piston operation will then be controlled. Lock-up operation, however, is prohibited when A/T fluid temperature is too low. SAT342HA ON BOARD DIAGNOSIS LOGIC Diagnostic trouble code Malfunction is detected when ...
: T/C CLUTCH SOL/V TCM detects an improper voltage drop when it tires to operate the solenoid valve. : 7th judgement flicker Check items (Possible cause) + Harness or connectors (The solenoid circuit is open or shorted.) + T/C clutch solenoid valve CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE Remarks: Specification data are
reference values. Monitor item Torque converter clutch solenoid valve duty Condition Specification Lock-up “OFF” ↓ Lock-up “ON” Approximately 4% ↓ Approximately 94% SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE SAT014K After the repair, perform the following procedure to confirm the malfunction is eliminated. 1) Start engine. 2)
Select “SELF-DIAG RESULTS” mode for A/T with CONSULT-II. 3) Drive vehicle in D1 → D2 → D3 → D4 → D4 lock-up position. -- OR --1) Start engine. 2) Drive vehicle in D1 → D2 → D3 → D4 → D4
lock-up position. 3) Perform self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II), AT-1029. SAT818H AT-1076 TROUBLE DIAGNOSIS FOR T/C CLUTCH SOL/V Torque Converter Clutch Solenoid Valve (Cont’d) DIAGNOSTIC PROCEDURE SAT246J CHECK GROUND CIRCUIT. 1. Turn ignition switch to “OFF” position. 2.
Disconnect terminal cord assembly connector in engine compartment. 7 3. Check resistance between terminal V and ground. Resistance: 10 - 20Ω NG c OK . CHECK POWER SOURCE CIRCUIT. 1. Turn ignition switch to “OFF” position. 2. Disconnect TCM harness connector. 7 3. Check resistance between terminal V and TCM harness connector
terminal 3 . V Resistance: Approximately 0Ω If OK, check harness for short to ground and short to power.
4. Reinstall any part removed. NG c 1. Remove oil pan. Refer to AT-1124. 2. Check the following items: + Torque converter clutch solenoid valve Refer to “COMPONENT INSPECTION” on next page. + Harness of terminal cord assembly for short or open Repair open circuit or short to ground or short to power in harness or connector. OK . Perform
“SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE”, AT-1076. SAT247J OK . INSPECTION END AT-1077 NG c 1. Perform TCM input/ output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. TROUBLE DIAGNOSIS FOR T/C CLUTCH SOL/V Torque Converter Clutch Solenoid Valve
(Cont’d) COMPONENT INSPECTION Torque converter clutch solenoid valve + For removal, refer to AT-1124. Resistance check 7 and ground. + Check resistance between terminal V Solenoid valve SAT543I Torque converter clutch solenoid valve Terminal No. 7 V Ground Resistance (Approx.) 10 - 20Ω Operation check + Check solenoid valve by
listening for its operating sound 7 and ground. while applying battery voltage to the terminal V SAT544I AT-1078 TROUBLE DIAGNOSIS FOR BATT/FLUID TEMP SEN A/T Fluid Temperature Sensor and TCM Power Source DESCRIPTION The A/T fluid temperature sensor detects the A/T fluid temperature and sends a signal to the TCM. SAT342HA
ON BOARD DIAGNOSIS LOGIC Diagnostic trouble code Malfunction is detected when ... : BATT/FLUID TEMP SEN TCM receives an excessively low or high voltage from the sensor.
: 8th judgement flicker Check items (Possible cause) + Harness or connectors (The sensor circuit is open or shorted.) + A/T fluid temperature sensor CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE Remarks: Specification data are reference values. Monitor item A/T fluid temperature sensor Condition Specification Cold [20°C (68°F)] ↓
Hot [80°C (176°F)] Approximately 1.5V ↓ Approximately 0.5V SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE SAT014K SAT821H After the repair, perform the following procedure to confirm the malfunction is eliminated.
1) Start engine. 2) Select “SELF-DIAG RESULTS” mode for A/T with CONSULT-II.
3) Drive vehicle under the following conditions: Selector lever in “D” position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full open position, engine speed higher than 450 rpm and driving for more than 10 minutes. -- OR ------------------
--1) Start engine. 2) Drive vehicle under the following conditions: Selector lever in “D” position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full open position, engine speed higher than 450 rpm and driving for more than 10 minutes. 3) Perform
self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II), AT-1029. AT-1079 TROUBLE DIAGNOSIS FOR BATT/FLUID TEMP SEN A/T Fluid Temperature Sensor and TCM Power Source (Cont’d) DIAGNOSTIC PROCEDURE CHECK TCM POWER SOURCE. 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Check
voltage between TCM terminals 10 , V 19 and ground. V Battery voltage should exist. SAT248J c OK . SAT249J NG CHECK A/T FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY. 1. Turn ignition switch to “OFF” position. 2. Disconnect terminal cord assembly connector in engine compartment. 3.
Check resistance between terminals 8 and V 9 when A/T is cold.
V Resistance: Cold [20°C (68°F)] Approximately 2.5 kΩ 4.
Reinstall any part removed. OK . A V (Go to next page.) AT-1080 NG c Check the following items: + Harness for short or open between ignition switch and TCM (Main harness) + Ignition switch and fuse Refer to EL section (“POWER SUPPLY ROUTING”). 1. Remove oil pan. 2. Check the following items: + A/T fluid temperature sensor Refer to
“COMPONENT INSPECTION” on next page. + Harness of terminal cord assembly for short or open TROUBLE DIAGNOSIS FOR BATT/FLUID TEMP SEN A/T Fluid Temperature Sensor and TCM Power Source (Cont’d) A V . SAT738J SAT250J NG Check the following item: CHECK INPUT SIGNAL OF A/T FLUID c + Harness for short or TEMPERATURE
SENSOR.
open between TCM and 1. Start engine. terminal cord assembly 2. Select “TCM INPUT SIGNALS” (Main harness) in Data Monitor. 3. Read out the value of “FLUID TEMP SE”. Voltage: Cold [20°C (68°F)] → Hot [80°C (176°F)]: Approximately 1.5V → 0.5V -- OR --1.
Start engine. 2. Check voltage between TCM terminal V 47 and ground while warming up A/T. Voltage: Cold [20°C (68°F)] → Hot [80°C (176°F)]: Approximately 1.5V → 0.5V OK . Perform “SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE”, AT-1079.
OK . INSPECTION END NG c 1. Perform TCM input/ output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. COMPONENT INSPECTION A/T fluid temperature sensor + For removal, refer to AT-1124.
8 and V 9 while chang+ Check resistance between terminals V ing temperature as shown at left. Temperature °C (°F) Resistance 20 (68) Approximately 2.5 kΩ 80 (176) Approximately 0.3 kΩ SAT252J AT-1081 TROUBLE DIAGNOSIS FOR ENGINE SPEED SIG Engine Speed Signal DESCRIPTION The engine speed signal is sent from the ECM to the
TCM. ON BOARD DIAGNOSIS LOGIC Diagnostic trouble code Malfunction is detected when ... : ENGINE SPEED SIG TCM does not receive the proper voltage signal from ECM. : 9th judgement flicker Check items (Possible cause) + Harness or connectors (The sensor circuit is open or shorted.) SELF-DIAGNOSIS CODE CONFIRMATION
PROCEDURE SAT014K SAT823H After the repair, perform the following procedure to confirm the malfunction is eliminated. 1) Start engine. 2) Select “SELF-DIAG RESULTS” mode for A/T with CONSULT-II. 3) Drive vehicle under the following conditions: Selector lever in “D” position, vehicle speed higher than 10 km/h (6 MPH), throttle opening
greater than 1/8 of the full throttle position and driving for more than 10 seconds. -- OR --1) Start engine. 2) Drive vehicle under the following conditions: Selector lever in “D” position, vehicle
speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 10 seconds. 3) Perform self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II), AT-1029. AT-1082 TROUBLE DIAGNOSIS FOR ENGINE SPEED SIG Engine Speed Signal (Cont’d) DIAGNOSTIC
PROCEDURE Perform diagnostic test mode II (selfdiagnostic results) for engine control. Check ignition signal circuit condition. NG c OK Check ignition signal circuit for engine control. Refer to EC section [TROUBLE DIAGNOSIS FOR “IGN SIGNAL-PRIMARY” (DTC 21)]. . SAT740J SAT253J NG CHECK INPUT SIGNAL. Check the following items: c 1.
Start engine. + Harness for short or 2. Select “TCM INPUT SIGNALS” open between TCM and in Data Monitor. ECM 3.
Read out the value of “ENGINE + Resistor SPEED”. + Ignition coil Check engine speed changes Refer to EC section according to throttle position. [TROUBLE DIAGNOSIS -- OR --FOR “IGN SIGNAL-PRIMARY” (DTC 21)]. 1. Start engine. 2. Check voltage between TCM
terminal V 39 and ground.
Voltage: Refer to EC section. OK . Perform “SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE”, AT-1082. OK . INSPECTION END AT-1083 NG c 1. Perform TCM input/ output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.
TROUBLE DIAGNOSIS FOR LINE PRESSURE S/V Line Pressure Solenoid Valve DESCRIPTION The line pressure solenoid valve regulates the oil pump discharge pressure to suit the driving condition in response to a signal sent from the TCM. SAT341H ON BOARD DIAGNOSIS LOGIC Diagnostic trouble code Malfunction is detected when ... : LINE
PRESSURE S/V TCM detects an improper voltage drop when it tries to operate the solenoid valve. : 10th judgement flicker Check items (Possible cause) + Harness or connectors (The solenoid circuit is open or shorted.) + Line pressure solenoid valve CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE Remarks: Specification data are
reference values. Monitor item Line pressure solenoid valve duty Condition Specification Low line-pressure (Small throttle opening) ↓ High line-pressure (Large throttle opening) Approximately 0% ↓ Approximately 95% SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE SAT014K After the repair, perform the following procedure to confirm the
malfunction is eliminated. 1) Start engine. 2) Select “SELF-DIAG RESULTS” mode for A/T with CONSULT-II. 3) With brake pedal depressed, shift the lever from “P” → “N” → “D” → “N” → “P” positions. -- OR --
-------------------1) Start engine. 2) With brake pedal depressed, shift the lever from “P” → “N” → “D” → “N” → “P” positions.
3) Perform self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II), AT-1029. SAT824H AT-1084 TROUBLE DIAGNOSIS FOR LINE PRESSURE S/V Line Pressure Solenoid Valve (Cont’d) DIAGNOSTIC PROCEDURE CHECK GROUND CIRCUIT. 1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector in engine compartment. 6 3. Check resistance between terminal V and ground. Resistance: 2.5 - 5Ω NG c OK SAT254J . CHECK POWER SOURCE CIRCUIT. 1. Turn ignition switch to “OFF” position. 2. Disconnect TCM harness connector.
6 3. Check resistance between terminal V and TCM harness connector terminal 2 . V Resistance: 11.2 - 12.8Ω NG c OK . SAT255J CHECK POWER SOURCE CIRCUIT. 1. Turn ignition switch to “OFF” position. 6 2. Check resistance between terminal V and TCM harness connector terminal 1 . V Resistance: Approximately 0Ω If OK, check harness for
short to ground and short to power. 3. Reinstall any part removed. NG c 1. Remove control valve assembly.
Refer to AT-1124. 2. Check the following items: + Line pressure solenoid valve Refer to “COMPONENT INSPECTION” on next page.
+ Harness of terminal cord assembly for short or open Check the following items: + Dropping resistor Refer to “COMPONENT INSPECTION” on next page.
+ Harness for short or open between TCM ter2 and terminal minal V cord assembly (Main harness) Repair open circuit or short to ground or short to power in harness or connector. OK . Perform “SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE”, AT-1084. OK . INSPECTION END AT-1085 NG c 1. Perform TCM input/ output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. TROUBLE DIAGNOSIS FOR LINE PRESSURE S/V Line Pressure Solenoid Valve (Cont’d) COMPONENT INSPECTION Line pressure solenoid valve + For removal, refer to AT-1124. Resistance check 6 and ground. + Check resistance between terminal V
Solenoid valve Line pressure solenoid valve Terminal No. 6 V Ground Resistance (Approx.) 2.5 - 5Ω SAT548IA Operation check + Check solenoid valve by listening for its operating sound 6 and ground. while applying battery voltage to the terminal V SAT549IA Dropping resistor 1 and V 2 .
+ Check resistance between terminals V Resistance: 11.2 - 12.8Ω SAT550IC AT-1086 TROUBLE DIAGNOSIS FOR CONTROL UNIT (RAM), CONTROL UNIT (ROM) Description The TCM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the A/T. SAT574J ON BOARD DIAGNOSIS LOGIC
Diagnostic trouble code Check item (Possible cause) Malfunction is detected when ... : CONTROL UNIT (RAM) TCM memory (RAM) or (ROM) is malfunctioning. : CONTROL UNIT (ROM) TCM SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE NOTE: If “SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE” has been previously conducted,
always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test. WITH CONSULT-II SAT014K 1) Turn ignition switch “ON” and select “DATA MONITOR” mode for A/T with CONSULT-II. 2) Start engine. 3) Run engine for at least 2 seconds at idle speed. SAT971J AT-1087 TROUBLE DIAGNOSIS FOR CONTROL UNIT
(RAM), CONTROL UNIT (ROM) Diagnostic Procedure 1 CHECK DTC WITH CONSULT-II 1. Turn ignition switch “ON” and select “SELF DIAG RESULTS” mode for A/T with CONSULT-II. 2. Touch “ERASE”. Perform Self-diagnosis Code confirmation procedure. See previous page. Is the “CONTROL UNIT (RAM) or CONTROL UNIT (ROM)” displayed
again? Yes c Replace TCM. No c INSPECTION END AT-1088 TROUBLE DIAGNOSIS FOR CONTROL UNIT (EFP ROM) Description The TCM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the A/T. SAT574J ON BOARD DIAGNOSIS LOGIC Diagnostic trouble code Malfunction is detected
when ... TCM memory (EEP ROM) is malfunctioning. : CONT UNIT (EEP ROM) Check item (Possible cause) TCM SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE NOTE: If “SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before
conducting the next test. WITH CONSULT-II SAT014K 1) Turn ignition switch “ON” and select “DATA MONITOR” mode for A/T with CONSULT-II. 2) Start engine. 3) Run engine for at least 2 seconds at idle speed. SAT971J AT-1089 TROUBLE DIAGNOSIS FOR CONTROL UNIT (EFP ROM) Diagnostic Procedure 1 CHECK DTC WITH CONSULT-II 1.
Turn ignition switch “ON” and select “SELF DIAG RESULTS” mode for A/T with CONSULT-II. 2. Move selector lever to “R” position. 3. Depress accelerator pedal (Full throttle position). 4.
Touch “ERASE”. 5.
Turn ignition switch “OFF” position for 10 seconds. Perform Self-diagnosis Code confirmation procedure. See previous page. Is the “CONT UNIT (EEP ROM)” displayed again? Yes c Replace TCM. No c INSPECTION END AT-1090 TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS PNP, Overdrive Control, A/T Mode or Accelerator Position
Switches DESCRIPTION SAT218JA + PNP switch Detects the selector lever position and sends a signal to the TCM. + Overdrive control switch, A/T mode switch Detects the overdrive control switch position (ON or OFF) and sends a signal to the TCM. + Accelerator position switch Consists of a wide open throttle position switch and a closed
Accelerator position switch.
The wide open throttle position switch sends a signal to the TCM when the throttle valve is open at least 1/2 of the full throttle position.
The closed throttle position switch sends a signal to the TCM when the throttle valve is fully closed. SAT220JA SAT222JA AT-1091 TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS PNP, Overdrive Control, A/T Mode or Accelerator Position Switches (Cont’d) DIAGNOSTIC PROCEDURE SAT738J SAT227J NG Check the following items: CHECK
PNP SWITCH CIRCUIT. c + PNP switch 1. Turn ignition switch to “ON” Refer to “COMPONENT position. INSPECTION”, (Do not start engine.) AT-1095. 2. Select “TCM INPUT SIGNALS” + Harness for short or in Data Monitor. open between ignition 3. Read out “R, N, D, 2 and 1 switch and PNP switch position switches” moving (Main harness)
selector lever to each position. + Harness for short or Check the signal of the selector open between PNP lever position is indicated propswitch and TCM (Main erly. harness) -- OR --+ Diode 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Check
voltage between TCM terminals V 26 , V 27 , V 34 , V 35 , V 36 and ground while moving selector lever through each position. Voltage: B: Battery voltage 0: 0V Terminal No. Lever position 36 35 34 27 26 V V V V V P, N B 0 0 0 0 R 0 B 0 0 0 D 0 0 B 0 0 2 0 0 0 B 0 1 0 0 0 0 B OK . A V (Go to next page.) AT-1092 TROUBLE DIAGNOSIS FOR NON-
DETECTABLE ITEMS PNP, Overdrive Control, A/T Mode or Accelerator Position Switches (Cont’d) A V . SAT740J SAT224J CHECK OVERDRIVE CONTROL SWITCH CIRCUIT. — Except for the Middle East — 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Select “TCM INPUT SIGNALS” in Data Monitor. 3. Read out “OVERDRIVE
SWITCH”. Check the signal of the overdrive control switch is indicated properly. (Overdrive control switch “ON” displayed on CONSULT-II means overdrive “OFF”.) -- OR --1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Check voltage between TCM
terminal V 22 and ground when overdrive control switch is “ON” and “OFF”.
Switch position Voltage ON Battery voltage OFF 1V or less . OK B V (Go to next page.) AT-1093 NG c Check the following items. + Overdrive control switch Refer to “COMPONENT INSPECTION”, AT-1095. + Harness for short or open between TCM and overdrive control switch (Main harness) + Harness for short or open of ground circuit for
overdrive control switch (Main harness) TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS PNP, Overdrive Control, A/T Mode or Accelerator Position Switches (Cont’d) B V . CHECK ACCELERATOR POSITION SWITCH CIRCUIT. 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Select “TCM INPUT SIGNALS” in Data Monitor. 3.
Read out “CLOSED THL/SW” and “W/O THRL/P-SW” depressing and releasing accelerator pedal. Check the signal of accelerator position switch is indicated properly. c Check the following items: + Accelerator position switch Refer to “COMPONENT INSPECTION”, AT-1096. + Harness for short or open between ignition switch and accelerator
position switch (Main harness) + Harness for short or open between accelerator position switch and TCM (Main harness) Data monitor Accelerator pedal condition CLOSED THL/SW W/O THRL/ P-SW Released ON OFF Fully depressed OFF ON SAT739J NG -- OR --1.
Turn ignition switch to “ON” position. (Do not start engine.) 2. Check voltage between TCM terminals V 16 , V 17 and ground while depressing, and releasing accelerator pedal slowly. (after warming up engine) Accelerator pedal condition Voltage Terminal No. V 16 Terminal No. 17 V Released Battery voltage 1V or less Fully depressed 1V or less
Battery voltage OK . SAT226J Perform “DIAGNOSTIC PROCEDURE”, AT-1092. OK . INSPECTION END AT-1094 NG c 1.
Perform TCM input/ output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS PNP, Overdrive Control, A/T Mode or Accelerator Position Switches (Cont’d) COMPONENT INSPECTION Overdrive control switch 1 and V 2 .
+ Check continuity between terminals V Switch position Continuity ON No OFF Yes SAT228J A/T mode switch 1 , (V 3) and V 2 . + Check continuity between terminals V Switch position Terminal No. ON SPORT OFF ON OFF 2 V 3 —V 1 V 2 —V Continuity Yes No Yes No SAT208K PNP switch 1 and V 2 and between 1. Check continuity between
terminals V 3 and V 4 , V 5 , V 6 , V 7 , V 8 , V 9 while moving terminals V manual shaft through each position. Lever position P R SAT517GB N D 2 1 Terminal No. 1 — 2 V 3 V 1 V 3 V 3 V 3 V V 8 —V 2 —V 6 —V 5 —V 4 —V 3 V 7 —V 3 V 9 —V 2. If NG, check again with manual control linkage disconnected from manual shaft of A/T assembly. Refer to
step 1. 3. If OK on step 2, adjust manual control linkage. Refer to AT-1126. SAT231JA 4.
If NG on step 2, remove PNP switch from A/T and check continuity of PNP switch terminals.
Refer to step 1. 5. If OK on step 4, adjust PNP switch. Refer to AT-1125. 6. If NG on step 4, replace PNP switch. SAT232JA AT-1095 TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS PNP, Overdrive Control, A/T Mode or Accelerator Position Switches (Cont’d) Accelerator position switch Accelerator position switch (Off accel) 5 and V 6 . + Check
continuity between terminals V SAT209K Accelerator pedal condition Continuity Released Yes Depressed No + To adjust closed throttle (accelerator) position switch, refer to EC section (“Basic Inspection”, “TROUBLE DIAGNOSIS — Basic Inspection”). Accelerator position switch (Full accel) 4 and V 5 . + Check continuity between terminals V
Accelerator pedal condition Continuity Released No Depressed Yes SAT210K A/T fluid temperature switch 1. Make sure the A/T fluid warning lamp lights when the key is inserted and turned to “ON”. 2. Make sure the A/T fluid warning lamp goes off when turning the ignition switch to “ON”. 3. For removal, refer to AT-1124. 4. Check resistance
between terminal V 10 and ground while changing temperature as shown at left. SAT251J Temperature °C (°F) Resistance 140 (284) or more Yes 140 (284) or less No AT-1096 DIAGNOSTIC PROCEDURES FOR SYMPTOMS 1. SPORT Indicator Lamp Does Not Come On SYMPTOM: SPORT indicator lamp does not come on for about 2 seconds when
turning ignition switch to “ON”. SAT211JA CHECK TCM POWER SOURCE. 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Check voltage between TCM terminals 10 , V 19 and ground. V Battery voltage should exist. NG c OK . SAT256J CHECK TCM GROUND CIRCUIT. 1.
Turn ignition switch to “OFF” position.
2. Disconnect TCM harness connector. 3. Check resistance between TCM terminals V 25 , V 48 and ground. Resistance: Approximately 0Ω If OK, check harness for short to ground and short to power. NG c Check the following items: + Harness for short or open between ignition switch and TCM (Main harness) + Ignition switch and fuse Refer to EL
section (“POWER SUPPLY ROUTING”). Repair open circuit or short to ground or short to power in harness or connector. OK . SAT257J CHECK LAMP CIRCUIT. 1. Turn ignition switch to “ON” position. 2. Set A/T mode switch to “SPORT” position. 3. Check voltage between TCM terminal 13 and ground. V Voltage: Battery voltage 4. Reinstall any part
removed. NG c OK . NG Check again. c OK SAT258J . INSPECTION END AT-1097 Check the following items: + Fuse (7.5A) + SPORT indicator lamp Refer to EL section (“WARNING LAMPS”). + Harness for short or open between ignition switch and SPORT indicator lamp (Main harness) Refer to EL section (“POWER SUPPLY ROUTING”). + Harness
for short or open between SPORT indicator lamp and TCM 1. Perform TCM input/ output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.
DIAGNOSTIC PROCEDURES FOR SYMPTOMS 2. SPORT Indicator Lamp Does Not Come On SYMPTOM: SPORT indicator lamp does not come on when turning A/T mode switch to the appropriate position. Is 1. SPORT Indicator Lamp Does Not Come On OK? No c Yes . SAT211JA Check the following items: + A/T mode switch Refer to AT-1095. +
Harness continuity between ignition switch and A/T mode switch + Harness continuity between A/T mode switch and TCM NG c Go to 1. SPORT Indicator Lamp Does Not Come On, AT-1097. Repair or replace damaged parts. 3. O/D OFF Indicator Lamp Does Not Come On SYMPTOM: O/D OFF indicator lamp does not come on when setting overdrive
control switch to “OFF” position. SAT210J Check the following items: + Overdrive control switch Refer to AT-1095. + O/D OFF indicator lamp + Harness continuity between ignition switch and O/D OFF indicator lamp AT-1098 NG c Repair or replace damaged parts. DIAGNOSTIC PROCEDURES FOR SYMPTOMS 4. SPORT Indicator Lamp Does Not
Come On SYMPTOM: SPORT indicator lamp does not come on for about 3 seconds when depressing and releasing accelerator pedal fully. Does self-diagnosis show damage to accelerator position sensor circuit? No c Check accelerator position sensor. Refer to AT-1068. c Repair or replace accelerator position sensor. Yes SAT211JA . Check accelerator
position sensor. — Refer to EC section [TROUBLE DIAGNOSIS FOR “THROTTLE (ACCEL) POSI SEN” (DTC 43)]. OK . SAT831HA 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. SAT222JA AT-1099 NG DIAGNOSTIC PROCEDURES FOR SYMPTOMS 5. Engine
Cannot Be Started In “P” and “N” Position SYMPTOM: + Engine cannot be started with selector lever in “P” or “N” position. + Engine can be started with selector lever in “D”, “2”, “1” or “R” position. SAT146BA Yes Does “TCM INPUT SIGNALS” in Check PNP switch. Refer c Data Monitor show damage to to AT-1091. PNP switch circuit? -------------------
-- OR --Does self-diagnosis show damage to PNP switch circuit? No . Check for short or open of PNP switch 2-pin connector. Refer to AT-1095. NG c Repair or replace PNP switch. c Repair or replace damaged parts. OK SAT259JA .
Check starting system. Refer to EL section (“System Description”, “STARTING SYSTEM”). NG OK . INSPECTION END 6. In “P” Position, Vehicle Moves Forward Or Backward When Pushed SYMPTOM: Vehicle moves when it is pushed forward or backward with selector lever in “P” position. Check parking pawl components. Refer to AT-1184.
OK SAT133B . INSPECTION END AT-1100 NG c Repair or replace damaged parts. DIAGNOSTIC PROCEDURES FOR SYMPTOMS 7.
In “N” Position, Vehicle Moves SYMPTOM: Vehicle moves forward or backward when selecting “N” position. Yes Does “TCM INPUT SIGNALS” in Check PNP switch. c Data Monitor show damage to Refer to AT-1091. PNP switch circuit? -- OR --SAT146BA Does self-
diagnosis show damage to PNP switch circuit? No . Check control linkage. Refer to AT-1126. NG c OK . Check A/T fluid level again. SAT262J NG c Adjust control linkage. Refer to AT-1126. Refill ATF. OK . 1. Remove oil pan. 2. Check A/T fluid condition. NG c OK SAT638A . NG Check again. c OK .
INSPECTION END SAT171B AT-1101 1. Disassemble A/T. 2. Check the following items: + Forward clutch assembly + Overrun clutch assembly + Reverse clutch assembly 1. Perform TCM input/ output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. DIAGNOSTIC PROCEDURES FOR SYMPTOMS 8. Large Shock. “N” → “R” Position SYMPTOM: There is large shock when changing from “N” to “R” position. Does self-diagnosis show damage to line pressure solenoid valve or accelerator position sensor, A/T
fluid temperature sensor circuit? Yes c Check damaged circuit.
Refer to AT-1068, 1079 or 1084. SAT831HA No . Check accelerator position sensor. Refer to EC section [TROUBLE DIAGNOSIS FOR “THROTTLE (ACCEL) POSI SEN” (DTC 43)]. NG c Repair or replace throttle position sensor. OK . SAT222JA Check line pressure at idle with selector lever in “D” position. Refer to “Line Pressure Test”, AT-1044. NG c
OK 1. Remove control valve assembly. Refer to AT-1124. 2. Check the following items: + Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) + Line pressure solenoid valve SAT494G . NG Check again. c OK . INSPECTION END AT-1102 1. Perform TCM input/ output signal inspection. 2. If NG,
recheck TCM pin terminals for damage or loose connection with harness connector. DIAGNOSTIC PROCEDURES FOR SYMPTOMS 9. Vehicle Does Not Creep Backward In “R” Position SYMPTOM: Vehicle does not creep backward when selecting “R” position. NG Check A/T fluid level again.
c Refill ATF. OK A V SAT638A NG in both “1” and “R” positions . . Check stall revolution with selector lever in “1” and “R” positions. OK c OK in “1” position NG in “R” position . 1. Remove control valve assembly. Refer to AT-1124.
2. Check the following items: + Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) + Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: + Oil pump assembly + Torque converter + Reverse clutch assembly + High clutch assembly SAT493G 1. Remove control valve
assembly. Refer to AT-1124.
2. Check the following items: + Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) + Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: + Oil pump assembly + Torque converter + Reverse clutch assembly + High clutch assembly + Low & reverse brake assembly +
Low one-way clutch SAT494G NG . c Check line pressure at idle with selector lever in “R” position. Refer to “Line Pressure Test”, AT-1044. OK . 1. Remove oil pan. 2. Check A/T fluid condition. SAT171B NG OK . A V . Check again. NG c OK .
INSPECTION END AT-1103 1. Remove control valve assembly. Refer to AT-1124. 2.
Check the following items: + Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) + Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following item: + Oil pump assembly 1. Perform TCM input/ output signal inspection. 2.
If NG, recheck TCM pin terminals for damage or loose connection with harness connector. DIAGNOSTIC PROCEDURES FOR SYMPTOMS 10. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position SYMPTOM: Vehicle does not creep forward when selecting “D”, “2” or “1” position.
Check A/T fluid level again. NG c Refill ATF. OK SAT638A A V . Check stall revolution with selector lever in “D” position. Refer to “STALL TEST”, AT-1041. NG OK . SAT493G Check line pressure at idle with selector lever in “D” position. Refer to “Line Pressure Test”, AT-1044. OK NG . 1. Remove control valve assembly. Refer to AT-1124. 2. Check the
following items: + Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) + Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following item: + Oil pump assembly SAT494G NG . . 1. Remove control c valve assembly. Refer to AT-1124. 2. Check the following items: + Valves to control
line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) + Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: + Oil pump assembly + Forward clutch assembly + Forward one-way clutch + Low one-way clutch + Low & reverse brake assembly + Torque converter c A V 1. Remove oil pan.
2. Check A/T fluid condition. OK . NG Check again. c OK SAT171B . INSPECTION END AT-1104 1. Perform TCM input/ output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. DIAGNOSTIC PROCEDURES FOR SYMPTOMS 11. Vehicle Cannot Be Started From D1 SYMPTOM: Vehicle
cannot be started from D1 on Cruise test — Part 1. Is 9. Vehicle Does Not Creep Backward In “R” Position OK? No c Go to 9. Vehicle Does Not Creep Backward In “R” Position, AT-1103. Yes . SAT832H Does self-diagnosis show damage to vehicle speed sensorzA/T (revolution sensor), shift solenoid valve A, B or vehicle speed sensorzMTR after cruise
test? Yes c Check damaged circuit. Refer to AT-1064, 1066, 1070 or 1072. No . Check accelerator position sensor. Refer to EC section [TROUBLE DIAGNOSIS FOR “THROTTLE (ACCEL) POSI SEN” (DTC 43)]. NG c Repair or replace throttle position sensor. OK .
SAT222JA Check line pressure at stall point with selector lever in “D” position.
Refer to “Line Pressure Test”, AT-1044.
OK . 1. Remove oil pan. 2. Check A/T fluid condition. OK . SAT494G 1. Remove control valve assembly. Refer to AT-1124. 2. Check the following items: + Shift valve A + Shift valve B + Shift solenoid valve A + Shift solenoid valve B + Pilot valve + Pilot filter OK NG c 1.
Remove control valve assembly. Refer to AT-1124. 2. Check the following items: NG c + Shift valve A + Shift valve B + Shift solenoid valve A + Shift solenoid valve B + Pilot valve + Pilot filter 3. Disassemble A/T. 4. Check the following items: + Forward clutch assembly + Forward one-way clutch + Low one-way clutch + High clutch assembly +
Torque converter + Oil pump assembly OK b . NG Check again. c OK SAT171B . INSPECTION END AT-1105 1. Perform TCM input/ output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. DIAGNOSTIC PROCEDURES FOR SYMPTOMS 12. A/T Does Not Shift: D1 → D2 Or Does Not
Kickdown: D4 → D2 SYMPTOM: A/T does not shift from D1 to D2 at the specified speed. A/T does not shift from D4 to D2 when depressing accelerator pedal fully at the specified speed. Are 10. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position and 11. Vehicle Cannot Be Started From D1 OK? No c SAT146BA Yes . Does “TCM INPUT
SIGNALS” in Data Monitor show damage to PNP switch circuit? -- OR -- Yes c Go to 10.
Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position and 11.
Vehicle Cannot Be Started From D1, AT-1104, 1105. Check PNP switch. Refer to AT-1091. Does self-diagnosis show damage to PNP switch circuit? No . SAT222JA Check vehicle speed sensorzA/T (revolution sensor) and vehicle speed sensorzMTR. Refer to AT-1064, 1066. NG c OK . Check accelerator position sensor. Refer to EC section [TROUBLE
DIAGNOSIS FOR “THROTTLE (ACCEL) POSI SEN” (DTC 43)]. NG c Repair or replace vehicle speed sensorzA/T (revolution sensor) and vehicle speed sensorzMTR. Refer to AT-1064, 1066. Repair or replace throttle position sensor. OK SAT171B . 1.
Remove oil pan.
2. Check A/T fluid condition. OK . 1. Remove control valve. Refer to AT-1124. 2. Check the following items: + Shift valve A + Shift solenoid valve A + Pilot valve + Pilot filter OK NG 1. Remove control valve.
Refer to AT-1124. 2. Check the following items: + Shift valve A + Shift solenoid valve A + Pilot valve + Pilot filter 3. Disassemble A/T. 4. Check the following items: + Servo piston assembly + Brake band OK + Oil pump assembly c b . NG Check again. c OK . INSPECTION END AT-1106 1. Perform TCM input/ output signal inspection. 2. If NG, recheck
TCM pin terminals for damage or loose connection with harness connector. DIAGNOSTIC PROCEDURES FOR SYMPTOMS 13. A/T Does Not Shift: D2 → D3 SYMPTOM: A/T does not shift from D2 to D3 at the specified speed. Are 10. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position and 11.
Vehicle Cannot Be Started From D1 OK? No c Yes Go to 10. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position and 11. Vehicle Cannot Be Started From D1, AT-1104, 1105. . SAT146BA Yes Does “TCM INPUT SIGNALS” in Check PNP switch.
Refer c Data Monitor show damage to to AT-1091.
PNP switch circuit? -- OR --Does self-diagnosis show damage to PNP switch circuit? No . SAT222JA Check accelerator position sensor. Refer to EC section [TROUBLE DIAGNOSIS FOR “THROTTLE (ACCEL) POSI SEN” (DTC 43)].
NG c Repair or replace throttle position sensor. OK . 1. Remove oil pan. 2. Check A/T fluid condition. OK . SAT171B 1. Remove control valve assembly. Refer to AT-1124. 2. Check the following items: + Shift valve B + Shift solenoid valve B + Pilot valve + Pilot filter OK b .
NG 1. Remove control valve assembly. Refer to AT-1124. 2. Check the following items: + Shift valve B + Shift solenoid valve B + Pilot valve + Pilot filter 3.
Disassemble A/T. 4. Check the following items: + Servo piston assembly OK + High clutch assembly + Oil pump assembly c NG Check again. c OK . INSPECTION END AT-1107 1. Perform TCM input/ output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. DIAGNOSTIC PROCEDURES FOR SYMPTOMS 14. A/T Does Not Shift: D3 → D4 SYMPTOM: + A/T does not shift from D3 to D4 at the specified speed.
+ A/T must be warm before D3 to D4 shift will occur. Are 10. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position and 11. Vehicle Cannot Be Started From D1 OK? No c Yes Go to 10. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position and 11. Vehicle Cannot Be Started From D1, AT-1104, 1105. SAT833HA . Does self-diagnosis, after
cruise test, show damage to any of the following circuits? + PNP switch + Overdrive control switch + A/T fluid temperature sensor + Vehicle speed sensorzA/T (Revolution sensor) + Shift solenoid valve A or B + Vehicle speed sensorzMTR Yes c Check damaged circuit.
Refer to AT-1064, 1066, 1070, 1072 or 1091. No SAT222JA . Check accelerator position sensor. Refer to EC section [TROUBLE DIAGNOSIS FOR “THROTTLE (ACCEL) POSI SEN” (DTC 43)]. NG c Repair or replace throttle position sensor. OK . 1. Remove oil pan. 2. Check A/T fluid condition. OK . SAT171B 1. Remove control valve assembly. Refer to
AT-1124. 2. Check the following items: + Shift valve B + Overrun clutch control valve + Shift solenoid valve B + Pilot valve + Pilot filter OK b . NG 1. Remove control valve assembly. Refer to AT-1124. 2. Check the following items: + Shift valve B + Overrun clutch control valve + Shift solenoid valve B + Pilot valve + Pilot filter 3. Disassemble A/T. 4.
Check the following items: + Servo piston assembly OK + Brake band + Torque converter + Oil pump assembly c NG Check again. c OK .
INSPECTION END AT-1108 1. Perform TCM input/ output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. DIAGNOSTIC PROCEDURES FOR SYMPTOMS 15. A/T Does Not Perform Lock-up SYMPTOM: A/T does not perform lock-up at the specified speed. Does self-diagnosis show damage
to torque converter clutch solenoid valve after cruise test? Yes c Check torque converter clutch solenoid valve. Refer to AT-1076. No SAT844H . Check accelerator position sensor. Refer to EC section [TROUBLE DIAGNOSIS FOR “THROTTLE (ACCEL) POSI SEN” (DTC 43)]. NG c Repair or replace throttle position sensor.
c Repair or replace damaged parts.
OK . SAT222JA 1. Remove control valve. Refer to AT-1124. 2. Check following items: + Torque converter clutch control valve + Torque converter relief valve + Torque converter clutch solenoid valve + Pilot valve + Pilot filter NG OK .
NG Check again. c OK . INSPECTION END AT-1109 1. Perform TCM input/ output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. DIAGNOSTIC PROCEDURES FOR SYMPTOMS 16. A/T Does Not Hold Lock-up Condition SYMPTOM: A/T does not hold lock-up condition for more than 30
seconds. Does self-diagnosis show damage to engine speed signal circuit after cruise test? Yes c Check engine speed signal. Refer to AT-1082. No . SAT835H 1. Remove oil pan. 2. Check A/T fluid condition. OK . 1. Remove control valve assembly. Refer to AT-1124. 2. Check the following items: + Torque converter clutch control valve + Pilot valve +
Pilot filter OK NG c 1. Remove control valve assembly.
Refer to AT-1124. 2. Check the following items: + Torque converter clutch control valve + Pilot valve + Pilot filter 3. Disassemble A/T.
4. Check torque converter and oil pump assembly. OK b SAT171B . NG Check again. c OK . INSPECTION END 1. Perform TCM input/ output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. 17. Lock-up Is Not Released SYMPTOM: Lock-up is not released when accelerator pedal is
released. Does “TCM INPUT SIGNALS” in Data Monitor show damage to closed throttle position switch circuit? -- OR -- SAT146BA Yes c Check closed throttle position switch.
Refer to AT-1091. Does self-diagnosis show damage to closed throttle position switch circuit? No . NG Check again. c OK . INSPECTION END AT-1110 1. Perform TCM input/ output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. DIAGNOSTIC PROCEDURES FOR SYMPTOMS 18. Engine
Speed Does Not Return To Idle (Light Braking D4 → D3) SYMPTOM: + Engine speed does not smoothly return to idle when A/T shifts from D4 to D3. + Vehicle does not decelerate by engine brake when turning overdrive control switch OFF. + Vehicle does not decelerate by engine brake when shifting A/T from “D” to “2” position. SAT836H Does self-
diagnosis show damage to overrun clutch solenoid valve circuit after cruise test?
Yes c Check overrun clutch solenoid valve. Refer to AT-1074. No . Check accelerator position sensor. Refer to EC section [TROUBLE DIAGNOSIS FOR “THROTTLE (ACCEL) POSI SEN” (DTC 43)]. NG c Repair or replace throttle position sensor. OK SAT222JA .
1. Remove oil pan.
2. Check A/T fluid condition. OK . 1. Remove control valve assembly. Refer to AT-1124. 2. Check the following items: + Overrun clutch control valve + Overrun clutch reducing valve + Overrun clutch solenoid valve OK SAT171B b . NG 1. Remove control valve assembly.
Refer to AT-1124. 2. Check the following items: + Overrun clutch control valve + Overrun clutch reducing valve + Overrun clutch solenoid valve 3. Disassemble A/T. 4. Check the following items: OK + Overrun clutch assembly + Oil pump assembly c NG Check again. c OK . INSPECTION END AT-1111 1. Perform TCM input/ output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. DIAGNOSTIC PROCEDURES FOR SYMPTOMS 19. Vehicle Does Not Start From D1 SYMPTOM: Vehicle does not start from D1 on Cruise test — Part 2. Does self-diagnosis show damage to vehicle speed sensorzA/T (revolution sensor), shift solenoid valve A, B
or vehicle speed sensorzMTR after cruise test? Yes c Check damaged circuit. Refer to AT-1064, 1066, 1070 or 1072. SAT832H No . NG Check again. c OK . Go to 8. Vehicle Cannot Be Started From D1, AT-1102. AT-1112 1. Perform TCM input/ output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness
connector. DIAGNOSTIC PROCEDURES FOR SYMPTOMS 20.
A/T Does Not Shift: D2 → D1 When Depressing Accelerator Pedal SYMPTOM: A/T does not shift from D2 to D1 when depressing accelerator pedal fully at the specified speed. Are 9. Vehicle Does Not Creep Backward In “R” Position and 10. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position OK? SAT146BA No c Yes Go to 9. Vehicle Does Not
Creep Backward In “R” Position and 10. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position, AT-1103, 1104. . Check PNP switch. Does “TCM INPUT SIGNAL” show Yes c Refer to AT-1091. damage to PNP switch circuit? -- OR --Does self-diagnosis show
damage to PNP switch circuit? No . SAT222JA Check vehicle speed sensorzA/T (revolution sensor) and vehicle speed sensorzMTR. Refer to AT-1064, 1066. NG c OK . Check accelerator position sensor. Refer to EC section [TROUBLE DIAGNOSIS FOR “THROTTLE (ACCEL) POSI SEN” (DTC 43)]. NG c Repair or replace vehicle speed sensorzA/T
(revolution sensor) and vehicle speed sensorzMTR. Repair or replace throttle position sensor. OK . 1. Remove oil pan.
2. Check A/T fluid condition. NG c OK SAT171B . 1. Remove control valve. Refer to AT-1124.
2. Check the following items: + Shift valve A + Shift solenoid valve A + Pilot valve + Pilot filter OK OK 1. Remove control valve. Refer to AT-1124.
2. Check the following items: + Shift valve A + Shift solenoid valve A + Pilot valve + Pilot filter 3. Disassemble A/T. 4. Check the following items: + Servo piston assembly + Brake band + Oil pump assembly b . NG Check again. c OK . INSPECTION END AT-1113 1. Perform TCM input/ output signal inspection. 2. If NG, recheck TCM pin terminals for
damage or loose connection with harness connector. DIAGNOSTIC PROCEDURES FOR SYMPTOMS 21.
A/T Does Not Shift: D4 → D3, When Overdrive Control Switch “ON” → “OFF” SYMPTOM: A/T does not shift from D4 to D3 when changing overdrive control switch to “OFF” position. Yes Does “TCM INPUT SIGNALS” in Check overdrive control c Data Monitor show damage to switch circuit. Refer to overdrive control switch circuit?
AT-1091. -- OR --SAT146BA Does self-diagnosis show damage to overdrive control switch circuit? No . Go to 10. A/T Does Not Shift: D2 → D3, AT-1104.
22.
A/T Does Not Shift: D3 → 22, When Selector Lever “D” → “2” Position SYMPTOM: A/T does not shift from D3 to 22 when changing selector lever from “D” to “2” position. Yes Does “TCM INPUT SIGNALS” in Check PNP switch circuit. c Data Monitor show damage to Refer to AT-1091. PNP switch circuit?
-- OR --SAT146BA Does self-diagnosis show damage to PNP switch circuit? No .
Go to 12. A/T Does Not Shift: D1 → D2 Or Does Not Kickdown: D4 → D2, AT-1106. AT-1114 DIAGNOSTIC PROCEDURES FOR SYMPTOMS 23.
A/T Does Not Shift: 22 → 11, When Selector Lever “2” → “1” Position SYMPTOM: A/T does not shift from 22 to 11 when changing selector lever from “2” to “1” position. Does “TCM INPUT SIGNALS” in Data Monitor show damage to PNP switch circuit? -- OR -- Yes c
Check PNP switch circuit. Refer to AT-1091. SAT146BA Does self-diagnosis show damage to PNP switch circuit? No NG . c Check again.

OK . INSPECTION END 1. Perform TCM input/ output signal inspection. 2.

If NG, recheck TCM pin terminals for damage or loose connection with harness connector. SAT778B 24. Vehicle Does Not Decelerate By Engine Brake SYMPTOM: Vehicle does not decelerate by engine brake when shifting from 22 (12) to 11. Is 9. Vehicle Does Not Creep Backward In “R” Position OK? Yes . Go to 18. Engine Speed Does Not Return To Idle (Light Braking D4 → D3), AT-1111. AT-1115 No c Go to 9. Vehicle Does Not Creep Backward In “R” Position, AT-1103. TROUBLE DIAGNOSES — A/T Shift Lock System Description + The mechanical key interlock mechanism also operates as a shift lock: With the key switch turned to “ON”, the selector lever cannot be shifted from “P” (parking) to any other position unless the brake pedal is depressed. With the key removed, the selector lever cannot be shifted from “P” to any other position. The key cannot be removed unless the selector lever is placed in “P”. + The shift lock and key interlock mechanisms are controlled by the ON-OFF operation of the shift lock solenoid and by the operation of the rotator and slider located inside the key cylinder, respectively. SAT914J AT-1116 TROUBLE DIAGNOSES — A/T Shift Lock System Wiring Diagram — SHIFT — TAT025M AT-1117 TROUBLE DIAGNOSES — A/T Shift Lock System Diagnostic Procedure SYMPTOM 1: + Selector lever cannot be moved from “P” position with key in “ON” position and brake pedal applied. + Selector lever can be moved from “P” position with key in “ON” position and brake pedal released. + Selector lever can be moved from “P” position when key is removed from key cylinder. SYMPTOM 2: Ignition key cannot be removed when selector lever is set to “P” position. It can be removed when selector lever is set to any position except “P”. Check key interlock cable for damage.

NG c OK . Check selector lever position for damage. NG c OK .

CHECK POWER SOURCE. 1. Turn ignition switch to “OFF” position. (Do not start engine.) 2. Check voltage between stop lamp 1 and switch harness terminal V ground.

Voltage: Battery voltage NG c Repair key interlock cable. Refer to “Key Interlock Cable”, AT-1121. Check selector lever. Refer to “ON-VEHICLE SERVICE — PNP Switch and Manual Control Linkage Adjustment”. Check the following items: 1. Harness for short or open between battery and stop lamp switch 1 harness terminal V 2. 10A fuse OK SAT915J . CHECK INPUT SIGNAL (STOP LAMP SWITCH). Turn ignition switch to “OFF” position. (Do not start engine.) + Check voltage between shift lock relay 2 and ground. harness terminal V Brake pedal Voltage Released 0V Depressed Battery voltage SAT916J OK . A V AT-1118 NG c Check the following items: 1. Harness for short or open between shift lock relay harness connector 2 and stop lamp V switch harness connec2 tor V 2. Stop lamp switch (Refer to “Component Check”, AT-1123.) TROUBLE DIAGNOSES — A/T Shift Lock System Diagnostic Procedure (Cont’d) A V . SAT926J CHECK POWER SOURCE. 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Check voltage between shift lock relay 4 and ground. harness terminal V Voltage: Battery voltage NG c OK . CHECK INPUT SIGNAL-1 (SHIFT LOCK RELAY). Turn ignition switch to “ON” position. (Do not start engine.) + Check voltage between A/T device har5 and ground. ness terminal V SAT927J Brake pedal Voltage Released Battery voltage Depressed 0V NG c Check the following items: 1. Harness for short or open between battery and shift lock relay har4 ness terminal V 2. 7.5A fuse 3. Ignition switch (Refer to EL section.) Check the following items: 1. Harness for short or open between A/T device harness connec5 and shift lock tor V relay harness connector 3 V 2. Shift lock relay Refer to EL section, “STANDARDIZED RELAY”. OK . CHECK INPUT SIGNAL-2 (SHIFT LOCK RELAY). Turn ignition switch to “OFF” position. + Check voltage between A/T device har7 and ground. ness terminal V SAT928J Brake pedal Voltage Released 0V Depressed Battery voltage NG c 1 V 2. Shift lock relay Refer to EL section, “STANDARDIZED RELAY”. 3. Diode-1 OK . SAT929J CHECK INPUT SIGNAL (DIODE-2). Turn ignition switch to “OFF” position. (Do not start engine.) + Check continuity between A/T device 6 and V 7 . harness terminals V OK . B V AT-1119 Check the following items: 1. Harness for short or open between A/T device harness connec7 and shift lock tor V relay harness connector NG c Check the following item: 1. Diode-2 TROUBLE DIAGNOSES — A/T Shift Lock System Diagnostic Procedure (Cont’d) B V . CHECK GROUND CIRCUIT. 1. Turn ignition switch to “OFF” position. 2. Disconnect A/T device harness connector.

3. Check continuity between A/T device 8 and ground. harness terminal V NG c Repair harness or connector.

c Replace park position switch. c Replace shift lock solenoid.

SAT917J OK . CHECK PARK POSITION SWITCH.

(Refer to “Component Check”, AT-1122.) NG OK . CHECK SHIFT LOCK SOLENOID. (Refer to “Component Check”, AT-1122.) NG OK . Reconnect shift lock harness connector. . Turn ignition switch from “OFF” to “ON” position.

(Do not start engine.) . Recheck shift lock operation. OK . INSPECTION END AT-1120 NG c 1. Perform A/T device input/output signal inspection test. 2. If NG, recheck harness connector connection. TROUBLE DIAGNOSES — A/T Shift Lock System Key Interlock Cable SAT918J CAUTION: + Install key interlock cable in such a way that it will not be damaged by sharp bends, twists or interference with adjacent parts. + After installing key interlock cable to control device, make sure that casing cap and bracket are firmly secured in their positions. If casing cap can be removed with an external load of less than 39.2 N (4.0 kg, 8.8 lb), replace key interlock cable with new one. REMOVAL Unlock slider from adjuster holder and remove rod from cable. SAT919J AT-1121 TROUBLE DIAGNOSES — A/T Shift Lock System Key Interlock Cable (Cont’d) INSTALLATION 1. Set key interlock cable to steering lock assembly and install lock plate. 2. Clamp cable to steering column and fix to control cable with band. 3.

Set selector lever to P position. SAT920J 4. Insert interlock rod into adjuster holder. SAT921J 5.

Install casing cap to bracket. 6. Move slider in order to fix adjuster holder to interlock rod. SAT922J Component Check SHIFT LOCK SOLENOID + Check operation by applying battery voltage between A/T 5 and V 6 . device harness connector terminals V SAT923J PARK POSITION SWITCH + Check continuity between A/T device harness connector ter7 and V 8 . minals V Condition Continuity When selector lever is set in “P” position and selector lever button is released Yes Except above No SAT924J AT-1122 TROUBLE DIAGNOSES — A/T Shift Lock System Component Check (Cont’d) STOP LAMP SWITCH + Check continuity between stop lamp switch harness connec1 and V 2 . tor terminals V Condition SAT925J Continuity When brake pedal is released No When brake pedal is depressed Yes Check stop lamp switch after adjusting brake pedal — refer to BR section. AT-1123 ON-VEHICLE SERVICE Control Valve Assembly and Accumulators REMOVAL 1. Drain ATF. 2. Remove oil pan and gasket. SAT260J 3.

Remove A/T fluid temperature sensor if necessary. 4. Remove oil strainer.

SAT073BA 5. Remove control valve assembly by removing fixing bolts and disconnecting harness connector. Bolt length and location Bolt symbol A V B V ! mm (in) 33 (1.30) 45 (1.77) 6. Remove solenoids and valves from valve body if necessary. 7. Remove terminal cord assembly if necessary. SAT353B A , V B , V C and V D by applying com8. Remove accumulator V pressed air if necessary.

+ Hold each piston with rag. 9. Reinstall any part removed. + Always use new sealing parts. SAT074BA AT-1124 ON-VEHICLE SERVICE Revolution Sensor Replacement 1. Remove revolution sensor from A/T. 2. Reinstall any part removed. + Always use new sealing parts. SAT261J Rear Oil Seal Replacement 1. Remove transfer case from vehicle. Refer to TF section (“Removal”, “REMOVAL AND INSTALLATION”). 2. Remove rear oil seal. 3. Install rear oil seal. + Apply ATF before installing. 4. Reinstall any part removed. SAT035EB Parking Pawl Components Inspection 1. Remove front and rear propeller shafts. Refer to PD section (“Removal”, “PROPELLER SHAFT”). 2. Remove transfer case from vehicle. Refer to TF section (“Removal”, “REMOVAL AND INSTALLATION”). 3. Remove select rod. SAT262J 4. Support A/T assembly with a jack. 5. Remove rear engine mounting member from body. Refer to EM section (“ENGINE REMOVAL”). 6. Remove adapter case from transmission case. 7. Replace parking pawl components if necessary. 8. Reinstall any part removed. + Always use new sealing parts.

SAT228B PNP Switch Adjustment 1. Remove manual control linkage from manual shaft of A/T assembly. 2. Set manual shaft of A/T assembly in “N” position.

3. Loosen PNP switch fixing bolts. 4. Insert pin into adjustment holes in both PNP switch and manual shaft of A/T assembly as near vertical as possible. 5. Reinstall any part removed. 6. Check continuity of PNP switch. Refer to AT-1095. SAT081B AT-1125 ON-VEHICLE SERVICE Manual Control Linkage Adjustment Move selector lever from “P” position to “1” position. You should be able to feel the detents in each position.

If the detents cannot be felt or the pointer indicating the position is improperly aligned, the linkage needs adjustment. 1. Place selector lever in “P” position. SAT768B 2. 3. 4. 5. Loosen lock nuts. Place manual shaft in “P” position. Tighten lock nuts to the specified torque. Move selector lever from “P” position to “1” position. Make sure that selector lever can move smoothly. SAT262J AT-1126 REMOVAL AND INSTALLATION SAT263J Removal 1. 2. 3. 4. 5. 6. 7. Remove battery negative terminal. Remove air breather hose. Remove heat insulator and exhaust front tube. Remove fluid charging pipe from A/T assembly. Remove oil cooler pipe from A/T assembly. Plug up openings such as the fluid charging pipe hole, etc. Remove front and rear propeller shafts. Refer to PD section (“Removal”, “PROPELLER SHAFT”). 8. Remove center brake control cable from center brake. Refer to BR section (“PARKING BRAKE CONTROL”). 9.

Remove transfer control linkage and transfer harness connectors from transfer.

Refer to TF section (“Removal”, “REMOVAL AND INSTALLATION”). 10. Remove A/T control linkage from A/T assembly. 11. Disconnect A/T solenoid, PNP switch and revolution sensor harness connectors. 12. Remove starter motor. Refer to EL section (“STARTING SYSTEM”). SAT166K 13. Remove bolts securing torque converter to drive plate. + Remove the bolts by turning crankshaft. SAT167K AT-1127 REMOVAL AND INSTALLATION Removal (Cont’d) 14. Support A/T and transfer assembly with a jack. 15. Remove engine rear mounting member from body and A/T assembly.

Refer to EM section (“ENGINE REMOVAL”). 16. Remove bolts securing A/T assembly to engine.

+ Secure torque converter to prevent it from dropping. + Secure A/T assembly with transfer to a jack. 17. Lower A/T assembly with transfer. SAT801C Installation + Drive plate runout CAUTION: Do not allow any magnetic materials to contact the ring gear teeth. Maximum allowable runout: Refer to EM section (“Inspection”, CYLINDER BLOCK”). If this runout is out of specification, replace drive plate with ring gear. SAT977H + When connecting torque converter to transmission, measure distance “A” to be certain that they are correctly assembled. Distance “A”: Refer to SDS, AT-1210. + Install converter to drive plate. + After converter is installed to drive plate, rotate crankshaft several turns and check to be sure that transmission rotates freely without binding. + Tighten bolts securing transmission. SAT017B Bolt No. 1 V 2 V 3 V Tightening torque Nzm (kg-m, ft-lb) Bolt length “!” mm (in) 83 - 113 (8.4 - 11.6, 61 - 83) 65 (2.56) 29 - 39 (2.9 - 4.0, 21 - 28) 63 (2.48) 29 - 39 (3.0 - 4.0, 22 - 29) 43 (1.69) + Reinstall any part removed. SAT266JB + Check fluid level in transmission. + Move selector lever through all positions to be sure that transmission operates correctly. With parking brake applied, rotate engine at idling. Move selector lever through “N” to “D”, to “2”, to “1” and to “R” positions. A slight shock should be felt by hand gripping selector each time transmission is shifted. + Perform road test. Refer to “ROAD TEST”, AT-1046. SAT638A AT-1128 MAJOR OVERHAUL SAT267J AT-1129 MAJOR OVERHAUL SAT268J AT-1130 MAJOR OVERHAUL Oil Channel SAT185B AT-1131 MAJOR OVERHAUL Locations of Needle Bearings, Thrust Washers and Snap Rings SAT269J AT-1132 DISASSEMBLY 1. Drain ATF through drain plug. 2. Remove torque converter by holding it firmly and turning while pulling straight out. SAT018B 3. Check torque converter one-way clutch. a. Insert Tool into spline of one-way clutch inner race. b. Hook bearing support unitized with one-way clutch outer race with suitable wire. c. Check that one-way clutch inner race rotates only clockwise with Tool while holding bearing support with wire.

SAT303B 4.

Remove PNP switch from transmission case. SAT021BC 5. Remove oil pan. + Always place oil pan straight down so that foreign particles inside will not move. SAT754I AT-1133 DISASSEMBLY 6.

Place transmission into Tool with the control valve facing up. SAT522GA 7. Check foreign materials in oil pan to help determine cause of malfunction. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that will not wipe clean indicates varnish build up. Varnish can cause valves, servo, and clutches to stick and may inhibit pump pressure. + If frictional material is detected, replace radiator after repair of A/T. Refer to LC section (“Radiator”, “ENGINE COOLING SYSTEM”). SAT171B 8.

Remove torque converter clutch solenoid valve and A/T fluid temperature sensor connectors. + Be careful not to damage connector. SAT024BA 9. Remove oil strainer. a. Remove oil strainer from control valve assembly. Then remove O-ring from oil strainer. SAT008B b. Check oil strainer screen for damage. SAT025B AT-1134 DISASSEMBLY 10. Remove control valve assembly. a. Straighten terminal clips to free terminal cords then remove terminal clips. SAT009B A and V B , and remove control valve assemb. Remove bolts V bly from transmission. Bolt symbol Length mm (in) A 33 (1.30) V B V 45 (1.77) SAT353B c. Remove solenoid connector.

+ Be careful not to damage connector. SAT026B d. Remove manual valve from control valve assembly. SAT127B AT-1135 DISASSEMBLY 11. Remove terminal cord assembly from transmission case while pushing on stopper. + Be careful not to damage cord. + Do not remove terminal cord assembly unless it is damaged. SAT128B 12. Remove converter housing from transmission case. + Be careful not to scratch converter housing. SAT307B 13. Remove O-ring from input shaft. SAT995A 14.

Remove oil pump assembly. a.

Attach Tool to oil pump assembly and extract it evenly from transmission case. SAT027BA b. Remove O-ring from oil pump assembly.

c. Remove traces of sealant from oil pump housing. + Be careful not to scratch pump housing. SAT028B AT-1136 DISASSEMBLY d. Remove needle bearing and thrust washer from oil pump assembly.

SAT108B 15. Remove input shaft and oil pump gasket. SAT988A 16. Remove brake band and band strut. a. Loosen lock nut and remove band servo anchor end pin from transmission case. SAT029B b.

Remove brake band and band strut from transmission case. SAT986A c. Hold brake band in a circular shape with clip.

SAT655 AT-1137 DISASSEMBLY 17. Remove front side clutch and gear components. a. Remove clutch pack (reverse clutch, high clutch and front sun gear) from transmission case. SAT030B b.

Remove front bearing race from clutch pack. c. Remove rear bearing race from clutch pack. SAT113B d. Remove front planetary carrier from transmission case. SAT031B e. Remove front needle bearing from front planetary carrier. f. Remove rear bearing from front planetary carrier. SAT968A g. Remove rear sun gear from transmission case.

SAT974A AT-1138 DISASSEMBLY 18. Remove adapter case. a.

Remove adapter case from transmission case.

b. Remove adapter case gasket from transmission case. SAT755I c. Remove oil seal from adapter case. + Do not remove oil seal unless it is to be replaced. SAT756I d. Remove revolution sensor from adapter case. e. Remove O-ring from revolution sensor. SAT305B 19. Remove output shaft and parking gear. a.

Remove rear snap ring from output shaft. SAT960A b. Slowly push output shaft all the way forward. + Do not use excessive force. c.

Remove snap ring from output shaft. SAT957A AT-1139 DISASSEMBLY d. Remove output shaft and parking gear as a unit from transmission case. e. Remove parking gear from output shaft. SAT109B f. Remove needle bearing from transmission case. SAT033B 20. Remove rear side clutch and gear components. a. Remove front internal gear. SAT954A b. Remove bearing race from front internal gear. SAT110B c. Remove needle bearing from rear internal gear. SAT111B AT-1140 DISASSEMBLY d.

Remove rear internal gear, forward clutch hub and overrun clutch hub as a set from transmission case. SAT951A e. Remove needle bearing from overrun clutch hub. f. Remove overrun clutch hub from rear internal gear and forward clutch hub. SAT148G g. Remove thrust washer from overrun clutch hub. SAT036B h. Remove forward clutch assembly from transmission case. SAT037B 21. Remove band servo and accumulator components. a.

Remove band servo retainer from transmission case.

SAT038B AT-1141 DISASSEMBLY b. Apply compressed air to oil hole until band servo piston comes out of transmission case. + Hold piston with a rag and gradually direct air to oil hole. c. Remove return springs. SAT039B B ,V C and V D . d. Remove springs from accumulator pistons V e.Apply compressed air to each oil hole until piston comes out. + Hold piston with a rag and gradually direct air to oil hole. Identification of accumulator pistons Identification of oil holes A V a V B V b V C V c V D V d V SAT040BA f. Remove O-ring from each piston. SAT523GA 22. Remove manual shaft components, if necessary. a. Hold width across flats of manual shaft (outside the transmission case) and remove lock nut from shaft. SAT041B b. Remove retaining pin from transmission case. SAT042B AT-1142 DISASSEMBLY c.

While pushing detent spring down, remove manual plate and parking rod from transmission case.

SAT935A d. Remove manual shaft from transmission case. SAT043B e. Remove spacer and detent spring from transmission case. SAT934A f. Remove oil seal from transmission case. SAT044B AT-1143 REPAIR FOR COMPONENT PARTS Oil Pump SAT648AB DISASSEMBLY 1. Loosen bolts in numerical order and remove oil pump cover. SAT649A 2. Remove rotor, vane rings and vanes. + Inscribe a mark on back of rotor for identification of fore-aft direction when reassembling rotor. Then remove rotor. SAT650A 3. While pushing on cam ring remove pivot pin. + Be careful not to scratch oil pump housing. SAT651A AT-1144 REPAIR FOR COMPONENT PARTS Oil Pump (Cont’d) 4. While holding cam ring and spring lift out cam ring spring. + Be careful not to damage oil pump housing. + Hold cam ring spring to prevent it from jumping.

SAT652A 5. Remove cam ring and cam ring spring from oil pump housing. SAT653A 6. Remove pivot pin from control piston and remove control piston assembly.

SAT654A 7. Remove oil seal from oil pump housing. + Be careful not to scratch oil pump housing. SAT655A INSPECTION Oil pump cover, rotor, vanes, control piston, side seals, cam ring and friction ring + Check for wear or damage. SAT656A AT-1145 REPAIR FOR COMPONENT PARTS Oil Pump (Cont’d) Side clearances SAT657A + Measure side clearances between end of oil pump housing and cam ring, rotor, vanes and control piston. Measure in at least four places along their circumferences. Maximum measured values should be within specified positions. + Before measurement, check that friction rings, O-ring, control piston side seals and cam ring spring are removed. Standard clearance (Cam ring, rotor, vanes and control piston): Refer to SDS, AT-1210.

+ If not within standard clearance, replace oil pump assembly except oil pump cover assembly. Seal ring clearance + Measure clearance between seal ring and ring groove. Standard clearance: 0.10 - 0.25 mm (0.0039 - 0.0098 in) Wear limit: 0.25 mm (0.0098 in) + If not within wear limit, replace oil pump cover assembly. SAT658A ASSEMBLY 1. Drive oil seal into oil pump housing. + Apply ATF to outer periphery and lip surface. SAT081EA 2. Install cam ring in oil pump housing by the following steps. a. Install side seal on control piston. + Pay attention to its direction — Black surface goes toward control piston. + Apply petroleum jelly to side seal. b. Install control piston on oil pump. SAT654A c. Install O-ring and friction ring on cam ring. + Apply petroleum jelly to O-ring. SAT660A AT-1146 REPAIR FOR COMPONENT PARTS Oil Pump (Cont’d) d. Assemble cam ring, cam ring spring and spring seat. Install spring by pushing it against pump housing. SAT661A e. While pushing on cam ring install pivot pin. SAT651A 3. Install rotor, vanes and vane rings. + Pay attention to direction of rotor. SAT662A 4. Install oil pump housing and oil pump cover. a. Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly in oil pump housing assembly, then remove masking tape.

b. Tighten bolts in a criss-cross pattern. SAT649A 5. Install new seal rings carefully after packing ring grooves with petroleum jelly. Press rings down into jelly to a close fit. + Seal rings come in two different diameters.

Check fit carefully in each groove. Small dia. seal ring: No mark Large dia. seal ring: Yellow mark in area shown by arrow + Do not spread gap of seal ring excessively while installing. It may deform ring. SAT663A AT-1147 REPAIR FOR COMPONENT PARTS Control Valve Assembly SAT141J AT-1148 REPAIR FOR COMPONENT PARTS Control Valve Assembly (Cont’d) DISASSEMBLY 1. Remove solenoids.

a. Remove torque converter clutch solenoid valve and side plate from lower body. b. Remove O-ring from solenoid. SAT194B c. Remove line pressure solenoid valve from upper body. d. Remove O-ring from solenoid. SAT667A e. Remove 3-unit solenoid assembly from upper body. f. Remove O-rings from solenoids. SAT043G 2. Disassemble upper and lower bodies. a. Place upper body facedown, and remove bolts, reamer bolts and support plates. b. Remove lower body, separator plate and separate gasket as a unit from upper body. + Be careful not to drop pilot filter, orifice check valve, spring and steel balls. SAT195B c. Place lower body facedown, and remove separate gasket and separator plate.

d. Remove pilot filter, orifice check valve and orifice check spring.

SAT670A AT-1149 REPAIR FOR COMPONENT PARTS Control Valve Assembly (Cont’d) e. Check to see that steel balls are properly positioned in upper body. Then remove them from upper body. SAT671A INSPECTION Lower and upper bodies + Check to see that there are pins and retainer plates in lower body. SAT672A + Check to see that there are pins and retainer plates in upper body. + Be careful not to lose these parts. SAT673A + Check to make sure that oil circuits are clean and free from damage. + Check tube brackets and tube connectors for damage. SAT674A Separator plates + Make sure that separator plate is free of damage and not deformed and oil holes are clean. SAT675A AT-1150 REPAIR FOR COMPONENT PARTS Control Valve Assembly (Cont’d) Pilot filter + Check to make sure that filter is not clogged or damaged. SAT676A Torque converter clutch solenoid valve + Check that filter is not clogged or damaged.

+ Measure resistance. Refer to “COMPONENT INSPECTION”, AT-1078. Line pressure solenoid valve + Check that filter is not clogged or damaged. + Measure resistance. Refer to “COMPONENT INSPECTION”, AT-1086. SAT149G 3-unit solenoid assembly (Shift solenoid valves A and B and overrun clutch solenoid valve) + Measure resistance of each solenoid. Refer to “COMPONENT INSPECTION”, AT-1071, 1073, 1075. SAT095B A/T fluid temperature sensor and A/T fluid temperature switch + Measure resistance. INSPECTION”, AT-1081. Refer to “COMPONENT SAT096BA ASSEMBLY 1. Install upper and lower bodies. a. Place oil circuit of upper body face up. Install steel balls in their proper positions. SAT671A AT-1151 REPAIR FOR COMPONENT PARTS Control Valve Assembly (Cont’d) b. Install reamer bolts from bottom of upper body and install separate gaskets. SAT681A c. Place oil circuit of lower body face up. Install orifice check spring, orifice check valve and pilot filter. SAT682A d. Install lower separate gaskets and separator plates on lower body.

e. Install and temporarily tighten support plates, fluid temperature sensor and tube brackets. SAT197B f. Temporarily assemble lower and upper bodies, using reamer bolt as a guide.

+ Be careful not to dislocate or drop steel balls, orifice check spring, orifice check valve and pilot filter. SAT198B AT-1152 REPAIR FOR COMPONENT PARTS Control Valve Assembly (Cont’d) g. Install and temporarily tighten bolts and tube brackets in their proper locations. Bolt length and location: Bolt symbol Bolt length mm (in) a V b V c V d V 70 (2.76) 50 (1.97) 33 (1.30) 27 (1.06) SAT199BA 2. Install solenoids. a.

Attach O-ring and install torque converter clutch solenoid valve and side plates onto lower body. SAT200B b. Attach O-rings and install 3-unit solenoids assembly onto upper body. c. Attach O-ring and install line pressure solenoid valve onto upper body. 3. Tighten all bolts. SAT150G AT-1153 REPAIR FOR COMPONENT PARTS Control Valve Upper Body Apply ATF to all components before their installation. Numbers preceding valve springs correspond with those shown in SDS on page AT-1208. AT-1154 SAT270J REPAIR FOR COMPONENT PARTS Control Valve Upper Body (Cont’d) DISASSEMBLY 1.

Remove valves at parallel pins. + Do not use a magnetic hand. SAT834A a. Use a wire paper clip to push out parallel pins. SAT822A b. Remove parallel pins while pressing their corresponding plugs and sleeves. + Remove plug slowly to prevent internal parts from jumping out. SAT823A c. Place mating surface of valve facedown, and remove internal parts. + If a valve is hard to remove, place valve body facedown and lightly tap it with a soft hammer. + Be careful not to drop or damage valves and sleeves. SAT824A 2. Remove valves at retainer plates. a. Pry out retainer plate with wire paper clip. SAT825A AT-1155 REPAIR FOR COMPONENT PARTS Control Valve Upper Body (Cont’d) b. Remove retainer plates while holding spring. SAT826A c. Place mating surface of valve facedown, and remove internal parts. + If a valve is hard to remove, lightly tap valve body with a soft hammer. + Be careful not to drop or damage valves, sleeves, etc. SAT827A + 4-2 sequence valve and relay valve are located far back in upper body.

If they are hard to remove, carefully push them out using stiff wire.

+ Be careful not to scratch sliding surface of valve with wire. SAT828A INSPECTION Valve springs + Measure free length and outer diameter of each valve spring. Also check for damage or deformation. Inspection standard: Refer to SDS, AT-1208. + Replace valve springs if deformed or fatigued. Control valves + Check sliding surfaces of valves, sleeves and plugs. SAT829A ASSEMBLY 1.

Lubricate the control valve body and all valves with ATF. Install control valves by sliding them carefully into their bores. + Be careful not to scratch or damage valve body. SAT830A AT-1156 REPAIR FOR COMPONENT PARTS Control Valve Upper Body (Cont’d) + Wrap a small screwdriver with vinyl tape and use it to insert the valves into proper position. SAT831A Pressure regulator valve + If pressure regulator plug is not centered properly, sleeve cannot be inserted into bore in upper body. If this happens, use vinyl tape wrapped screwdriver to center sleeve until it can be inserted. + Turn sleeve slightly while installing. SAT832A Accumulator control plug + Align protrusion of accumulator control sleeve with notch in plug. + Align parallel pin groove in plug with parallel pin, and install accumulator control valve. SAT833A 2. Install parallel pins and retainer plates. SAT834A + While pushing plug, install parallel pin. SAT823A AT-1157 REPAIR FOR COMPONENT PARTS Control Valve Upper Body (Cont’d) 4-2 sequence valve and relay valve + Push 4-2 sequence valve and relay valve with wire wrapped in vinyl tape to prevent scratching valve body. Install parallel pins. SAT835A + Insert retainer plate while pushing spring. SAT836A AT-1158 REPAIR FOR COMPONENT PARTS Control Valve Lower Body Apply ATF to all components before their installation. Numbers preceding valve springs correspond with those shown in SDS on page AT-1208. AT-1159 SAT271J REPAIR FOR COMPONENT PARTS Control Valve Lower Body (Cont’d) DISASSEMBLY 1. Remove valves at parallel pins. 2. Remove valves at retainer plates. For removal procedures, refer to “DISASSEMBLY” of Control Valve Upper Body, AT-1155. SAT838A INSPECTION Valve springs + Check each valve spring for damage or deformation. Also measure free length and outer diameter. Inspection standard: Refer to SDS, AT-1208. + Replace valve springs if deformed or fatigued. Control valves SAT829A + Check sliding surfaces of control valves, sleeves and plugs for damage. ASSEMBLY + Install control valves.

For installation procedures, refer to “ASSEMBLY” of Control Valve Upper Body, AT-1156. SAT838A AT-1160 REPAIR FOR COMPONENT PARTS Reverse Clutch SAT211K DISASSEMBLY 1.

Check operation of reverse clutch. a.

Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole. b. Check to see that retaining plate moves to snap ring. c. If retaining plate does not contact snap ring, + D-ring might be damaged. + Oil seal might be damaged. + Fluid might be leaking past piston check ball. SAT841A 2. Remove drive plates, driven plates, retaining plate, dish plate and snap ring. SAT842A AT-1161 REPAIR FOR COMPONENT PARTS Reverse Clutch (Cont’d) 3. Remove snap ring from clutch drum while compressing clutch springs.

+ Do not expand snap ring excessively. 4. Remove spring retainer and return spring.

SAT487GA 5. Install seal ring onto oil pump cover and install reverse clutch drum. While holding piston, gradually apply compressed air to oil hole until piston is removed. + Do not apply compressed air abruptly. 6. Remove D-ring and oil seal from piston. SAT844A INSPECTION Reverse clutch snap ring and spring retainer + Check for deformation, fatigue or damage. Reverse clutch return springs + Check for deformation or damage. Also measure free length and outside diameter. Inspection standard: Refer to SDS, AT-1208. SAT829A Reverse clutch drive plates + Check facing for burns, cracks or damage. + Measure thickness of facing. Thickness of drive plate: Standard value 1.90 - 2.05 mm (0.0748 - 0.0807 in) Wear limit 1.8 mm (0.071 in) + If not within wear limit, replace. Reverse clutch dish plate + Check for deformation or damage. SAT845A AT-1162 REPAIR FOR COMPONENT PARTS Reverse Clutch (Cont’d) Reverse clutch piston + Shake piston to assure that balls are not seized. + Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage. + Also apply compressed air to oil hole on return spring side to assure that air leaks past ball. SAT846A ASSEMBLY 1. Install D-ring and oil seal on piston. + Apply ATF to both parts. SAT847A 2. Install piston assembly by turning it slowly and evenly. + Apply ATF to inner surface of drum. SAT848A 3. Install return springs and spring retainer. SAT849A 4. Install snap ring while compressing clutch springs. SAT487GA AT-1163 REPAIR FOR COMPONENT PARTS Reverse Clutch (Cont’d) + Do not align snap ring gap with spring retainer stopper. SAT850A 5. Install drive plates, driven plates, retaining plate and dish plate. 6. Install snap ring. SAT842A 7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate. Specified clearance: Standard 0.5 - 0.8 mm (0.020 - 0.031 in) Allowable limit 1.4 mm (0.055 in) Retaining plate: Refer to SDS, AT-1209. SAT852A 8. Check operation of reverse clutch. Refer to “DISASSEMBLY” AT-1161. SAT841A AT-1164 REPAIR FOR COMPONENT PARTS High Clutch SAT212K DISASSEMBLY AND ASSEMBLY Service procedures for high clutch are essentially the same as those for reverse clutch, with the following exception: SAT853A + Check of high clutch operation SAT854A AT-1165 REPAIR FOR COMPONENT PARTS High Clutch (Cont’d) + Removal and installation of return spring SAT488GA + Inspection of high clutch return springs Inspection standard: Refer to SDS, AT-1208. SAT829A + Inspection of high clutch drive plate Thickness of drive plate: Standard 1.52 - 1.67 mm (0.0598 - 0.0657 in) Wear limit 1.4 mm (0.055 in) SAT845A + Measurement of clearance between retaining plate and snap ring Specified clearance: Standard 1.8 - 2.2 mm (0.071 - 0.087 in) Allowable limit 3.6 mm (0.142 in) Retaining plate: Refer to SDS, AT-1209. SAT858A AT-1166 REPAIR FOR COMPONENT PARTS Forward and Overrun Clutches SAT213K AT-1167 REPAIR FOR COMPONENT PARTS Forward and Overrun Clutches (Cont’d) DISASSEMBLY AND ASSEMBLY Forward and overrun clutches are serviced essentially the same way as reverse clutch is serviced. However, note the following exceptions. + Check of forward clutch operation SAT860A + Check of overrun clutch operation SAT861A + Removal of forward clutch drum Remove forward clutch drum from transmission case by holding snap ring. SAT865A + Removal of forward clutch and overrun clutch pistons 1. While holding overrun clutch piston, gradually apply compressed air to oil hole. SAT862A 2. Remove overrun clutch from forward clutch. SAT863A AT-1168 REPAIR FOR COMPONENT PARTS Forward and Overrun Clutches (Cont’d) + Removal and installation of return springs SAT492GA + Inspection of forward clutch and overrun clutch return springs Inspection standard: Refer to SDS, AT-1208.

SAT829A + Inspection of forward clutch drive plates Thickness of drive plate: Standard 1.90 - 2.05 mm (0.0748 - 0.0807 in) Wear limit 1.8 mm (0.071 in) SAT845A + Inspection of overrun clutch drive plates Thickness of drive plate: Standard 1.52 - 1.67 mm (0.0598 - 0.0657 in) Wear limit 1.4 mm (0.055 in) SAT845A + Installation of forward clutch piston and overrun clutch piston 1. Install forward clutch piston by turning it slowly and evenly. + Apply ATF to inner surface of clutch drum. SAT866A AT-1169 REPAIR FOR COMPONENT PARTS Forward and Overrun Clutches (Cont’d) + Align notch in forward clutch piston with groove in forward clutch drum.

SAT867A 2. Install overrun clutch by turning it slowly and evenly. + Apply ATF to inner surface of forward clutch piston. SAT868A + Measurement of clearance between retaining plate and snap ring of overrun clutch Specified clearance: Standard 1.0 - 1.4 mm (0.039 - 0.055 in) Allowable limit 2.4 mm (0.094 in) Retaining plate: Refer to SDS, AT-1209. SAT869A + Measurement of clearance between retaining plate and snap ring of forward clutch Specified clearance: Standard 0.35 - 0.75 mm (0.0138 - 0.0295 in) Allowable limit 2.55 mm (0.1004 in) Retaining plate: Refer to SDS, AT-1209. SAT870A AT-1170 REPAIR FOR COMPONENT PARTS Low & Reverse Brake SAT214K DISASSEMBLY 1. Check operation of low and reverse brake. a. Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.

b. Check to see that retaining plate moves to snap ring. c.

If retaining plate does not contact snap ring, + D-ring might be damaged. + Oil seal might be damaged. + Fluid might be leaking past piston check ball. SAT872A 2. Remove snap ring, low and reverse brake drive plates, driven plates and dish plate. SAT873A AT-1171 REPAIR FOR COMPONENT PARTS Low & Reverse Brake (Cont’d) 3. Remove low one-way clutch inner race, spring retainer and return spring from transmission case. 4. Remove seal rings from low one-way clutch inner race. 5. Remove needle bearing from low one-way clutch inner race. SAT382I 6. Remove low and reverse brake piston using compressed air. 7. Remove oil seal and D-ring from piston. SAT876A INSPECTION Low and reverse brake snap ring and spring retainer + Check for deformation, or damage. Low and reverse brake return springs + Check for deformation or damage. Also measure free length and outside diameter. Inspection standard: Refer to SDS, AT-1208. SAT829A Low and reverse brake drive plates + Check facing for burns, cracks or damage. + Measure thickness of facing. Thickness of drive plate: Standard value 1.52 - 1.67 mm (0.0598 - 0.0657 in) Wear limit 1.4 mm (0.055 in) + If not within wear limit, replace. SAT845A AT-1172 REPAIR FOR COMPONENT PARTS Low & Reverse Brake (Cont’d) Low one-way clutch inner race + Check frictional surface of inner race for wear or damage. SAT877A + Install a new seal rings onto low one-way clutch inner race. + Be careful not to expand seal ring gap excessively. + Measure seal ring-to-groove clearance. Inspection standard: Standard value 0.10 - 0.25 mm (0.0039 - 0.0098 in) Allowable limit 0.25 mm (0.0098 in) + If not within allowable limit, replace low one-way clutch inner race. SAT878A ASSEMBLY 1. Install needle bearing onto one-way clutch inner race. + Pay attention to its direction — Black surface goes to rear side. + Apply petroleum jelly to needle bearing. SAT112B 2. Install oil seal and D-ring onto piston. + Apply ATF to oil seal and D-ring. SAT879A 3. Install piston by rotating it slowly and evenly. + Apply ATF to inner surface of transmission case. SAT880A AT-1173 REPAIR FOR COMPONENT PARTS Low & Reverse Brake (Cont’d) 4. Install return springs, spring retainer and low one-way clutch inner race onto transmission case. 5. Install dish plate, low and reverse brake drive plates, driven plates and retaining plate. 6. Install snap ring on transmission case. SAT881A 7. Check operation of low and reverse brake clutch piston. Refer to “DISASSEMBLY”, AT-1171. SAT872A 8. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate. Specified clearance: Standard 0.5 - 0.8 mm (0.020 - 0.031 in) Allowable limit 2.4 mm (0.094 in) Retaining plate: Refer to SDS, AT-1210. SAT885A 9. Install low one-way clutch inner race seal ring. + Apply petroleum jelly to seal ring. + Make sure seal rings are pressed firmly into place and held by petroleum jelly. SAT884A AT-1174 REPAIR FOR COMPONENT PARTS Forward Clutch Drum Assembly SAT211GA DISASSEMBLY 1. Remove snap ring from forward clutch drum.

2.

Remove side plate from forward clutch drum. SAT212G 3. Remove low one-way clutch from forward clutch drum.

4. Remove snap ring from forward clutch drum. SAT213G 5. Remove needle bearing from forward clutch drum.

SAT891A AT-1175 REPAIR FOR COMPONENT PARTS Forward Clutch Drum Assembly (Cont’d) INSPECTION Forward clutch drum + Check spline portion for wear or damage. + Check frictional surfaces of low one-way clutch and needle bearing for wear or damage. SAT892A Needle bearing and low one-way clutch + Check frictional surface for wear or damage. SAT893A ASSEMBLY 1. Install needle bearing in forward clutch drum. 2. Install snap ring onto forward clutch drum.

SAT214G 3.

Install low one-way clutch onto forward clutch drum by pushing the roller in evenly.

SAT894A + Install low one-way clutch with flange facing rearward. SAT895A AT-1176 REPAIR FOR COMPONENT PARTS Forward Clutch Drum Assembly (Cont’d) 4. Install side plate onto forward clutch drum. 5. Install snap ring onto forward clutch drum. SAT887A Rear Internal Gear and Forward Clutch Hub SAT896AA DISASSEMBLY 1. Remove rear internal gear by pushing forward clutch hub forward.

SAT897A 2. Remove thrust washer from rear internal gear. SAT898A AT-1177 REPAIR FOR COMPONENT PARTS Rear Internal Gear and Forward Clutch Hub (Cont’d) 3. Remove snap ring from forward clutch hub. SAT899A 4. Remove end bearing. SAT900A 5. Remove forward one-way clutch and end bearing as a unit from forward clutch hub. SAT955A 6. Remove snap ring from forward clutch hub. SAT901A INSPECTION Rear internal gear and forward clutch hub + Check gear for excessive wear, chips or cracks. + Check frictional surfaces of forward one-way clutch and thrust washer for wear or damage. + Check spline for wear or damage. SAT902A AT-1178 REPAIR FOR COMPONENT PARTS Rear Internal Gear and Forward Clutch Hub (Cont’d) Snap ring and end bearing + Check for deformation or damage. SAT903A ASSEMBLY 1. Install snap ring onto forward clutch hub. 2. Install end bearing. SAT901A 3. Install forward one-way clutch onto clutch hub. + Install forward one-way clutch with flange facing rearward. 4. Install end bearing. 5. Install snap ring onto forward clutch hub. SAT904A 6. Install thrust washer onto rear internal gear. + Apply petroleum jelly to thrust washer. + Securely insert pawls of thrust washer into holes in rear internal gear. SAT906A 7. Position forward clutch hub in rear internal gear. SAT907A AT-1179 REPAIR FOR COMPONENT PARTS Rear Internal Gear and Forward Clutch Hub (Cont’d) 8. After installing, check to assure that forward clutch hub rotates clockwise. SAT905A Band Servo Piston Assembly SAT908AD DISASSEMBLY 1. Block one oil hole in OD servo piston retainer and the center hole in OD band servo piston. 2.

Apply compressed air to the other oil hole in piston retainer to remove OD band servo piston from retainer. 3. Remove D-ring from OD band servo piston. SAT909A 4. Remove band servo piston assembly from servo piston retainer by pushing it forward. SAT910A AT-1180 REPAIR FOR COMPONENT PARTS Band Servo Piston Assembly (Cont’d) 5. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring. SAT911A 6. Remove servo piston spring retainer, return spring C and piston stem from band servo piston. SAT912A 7. Remove E-ring from band servo piston. SAT913A 8. Remove servo cushion spring retainer from band servo piston. 9. Remove D-rings from band servo piston.

10. Remove O-rings from servo piston retainer. SAT914A INSPECTION Pistons, retainers and piston stem + Check frictional surfaces for abnormal wear or damage. SAT915A AT-1181 REPAIR FOR COMPONENT PARTS Band Servo Piston Assembly (Cont’d) Return springs + Check for deformation or damage. Measure free length and outer diameter. Inspection standard: Refer to SDS, AT-1208. SAT916AB ASSEMBLY 1. Install O-rings onto servo piston retainer. + Apply ATF to O-rings. + Pay attention to position of each O-ring. SAT917A 2. Install servo cushion spring retainer onto band servo piston. SAT918A 3. Install E-ring onto servo cushion spring retainer. SAT919A 4. Install D-rings onto band servo piston.

+ Apply ATF to D-rings. SAT920A AT-1182 REPAIR FOR COMPONENT PARTS Band Servo Piston Assembly (Cont’d) 5. Install servo piston spring retainer, return spring C and piston stem onto band servo piston. SAT912A 6.

Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring. SAT921A 7.

Install band servo piston assembly onto servo piston retainer by pushing it inward. SAT922A 8. Install D-ring on OD band servo piston. + Apply ATF to D-ring. SAT923A 9. Install OD band servo piston onto servo piston retainer by pushing it inward. SAT924A AT-1183 REPAIR FOR COMPONENT PARTS Parking Pawl Components SAT276J DISASSEMBLY 1. Slide return spring to the front of adapter case flange. SAT505B 2. Remove return spring, pawl spacer and parking pawl from adapter case. 3. Remove parking pawl shaft from adapter case. SAT202E 4. Remove parking actuator support from adapter case. 5. Remove rear oil seal. SAT203E AT-1184 REPAIR FOR COMPONENT PARTS Parking Pawl Components (Cont’d) INSPECTION Parking pawl and parking actuator support + Check contact surface of parking rod for wear. SAT511B ASSEMBLY 1. Install rear oil seal. SAT513B 2. Install parking actuator support onto adapter case. 3. Install parking pawl shaft into adapter case. SAT204E 4. Install return spring, pawl spacer and parking pawl onto parking pawl shaft.

SAT202E 5. Bend return spring upward and install it onto adapter case.

SAT505B AT-1185 ASSEMBLY Assembly (1) 1. a. + + b. Install manual shaft components. Install oil seal onto manual shaft. Apply ATF to oil seal.

Wrap threads of manual shaft with masking tape.

Insert manual shaft and oil seal as a unit into transmission case. c. Remove masking tape.

SAT931A d.

Push oil seal evenly and install it onto transmission case. SAT932A e. Align groove in shaft with drive pin hole, then drive pin into position as shown in figure at left. SAT933A f. Install detent spring and spacer. g. While pushing detent spring down, install manual plate onto manual shaft. SAT901E h. Install lock nuts onto manual shaft. SAT936A AT-1186 ASSEMBLY Assembly (1) (Cont’d) 2. Install accumulator piston. a. Install O-rings onto accumulator piston.

+ Apply ATF to O-rings. Accumulator piston O-rings Unit: mm (in) Accumulator A V B V C V D V Small diameter end 29 (1.14) 32 (1.26) 45 (1.77) 29 (1.14) Large diameter end 45 (1.77) 50 (1.97) 50 (1.97) 45 (1.77) SAT523GA b. Install return spring for accumulator A onto transmission case. Free length of return spring: Refer to SDS, AT-1208.

SAT938A A ,V B ,V C and V D . c. Install accumulator pistons V + Apply ATF to transmission case. SAT939AA 3.

Install band servo piston. a. Install return springs onto servo piston. SAT298J b. Install band servo piston onto transmission case. + Apply ATF to O-ring of band servo piston and transmission case. c. Install gasket for band servo onto transmission case. SAT942A AT-1187 ASSEMBLY Assembly (1) (Cont’d) d. Install band servo retainer onto transmission case. SAT940A 4. Install rear side clutch and gear components. a. Place transmission case in vertical position. SAT943AA b. Slightly lift forward clutch drum assembly. Then slowly rotate it clockwise until its hub passes fully over clutch inner race inside transmission case. SAT944A c. Check to be sure that rotation direction of forward clutch assembly is correct. SAT945A d. Install thrust washer onto front of overrun clutch hub. + Apply petroleum jelly to the thrust washer. + Insert pawls of thrust washer securely into holes in overrun clutch hub. SAT946A AT-1188 ASSEMBLY Assembly (1) (Cont’d) e. Install overrun clutch hub onto rear internal gear assembly. SAT947A f. Install needle bearing onto rear of overrun clutch hub. + Apply petroleum jelly to needle bearing. SAT948A g. Check that overrun clutch hub rotates as shown while holding forward clutch hub. h. Place transmission case into horizontal position. SAT949A i.

Install rear internal gear, forward clutch hub and overrun clutch hub as a unit onto transmission case. SAT951A j. Install needle bearing onto rear internal gear. + Apply petroleum jelly to needle bearing. SAT952A AT-1189 ASSEMBLY Assembly (1) (Cont’d) k. Install bearing race onto rear of front internal gear. + Apply petroleum jelly to bearing race. + Securely engage pawls of bearing race with holes in front internal gear. SAT953A l. Install front internal gear on transmission case. SAT954A Adjustment When any parts listed in the following table are replaced, total end play or reverse clutch end play must be adjusted. Total end play Reverse clutch end play Transmission case + + Low one-way clutch inner race + + Overrun clutch hub + + Rear internal gear + + Rear planetary carrier + + Rear sun gear + + Front planetary carrier + + Front sun gear + + High clutch hub + + High clutch drum + + Oil pump cover + + Reverse clutch drum — + Part name 1. Install front side clutch and gear components. a. Install rear sun gear on transmission case. + Pay attention to its direction. SAT974A AT-1190 ASSEMBLY Adjustment (Cont’d) b. + c. + + Install needle bearing on front of front planetary carrier. Apply petroleum jelly to needle bearing.

Install needle bearing on rear of front planetary carrier. Apply petroleum jelly to bearing. Pay attention to its direction — Black side goes to front. SAT967A d. While rotating forward clutch drum clockwise, install front planetary carrier on forward clutch drum. SAT969A + Check that portion A of front planetary carrier protrudes approximately 2 mm (0.08 in) beyond portion B of forward clutch assembly. SAT970A e. Install bearing races on rear of clutch pack. + Apply petroleum jelly to bearing races. + Securely engage pawls of bearing race with hole in clutch pack.

SAT204B f. Place transmission case in vertical position. SAT972A AT-1191 ASSEMBLY Adjustment (Cont’d) g. Install clutch pack into transmission case. SAT973A 2. Adjust total end play. a. Install new oil pump gasket on transmission case. SAT206B b. Install pump cover bearing race on clutch pack. SAT207B c. Measure distance “B” between front end of transmission case and oil pump cover bearing race.

SAT208B d. Measure distance “C” between front end of transmission case and oil pump gasket. SAT209B AT-1192 ASSEMBLY Adjustment (Cont’d) e. Determine dimension “A” by using the following equation. A=B−C SAT210B f. Install needle bearing on oil pump assembly. g. Measure distance “D” between needle bearing and machined surface of oil pump cover assembly. SAT211B h. Determine total end play “T1” by using the following equation. T1 = A − D − 0.1 Total end play “T1”: 0.25 - 0.55 mm (0.0098 - 0.0217 in) + If end play is out of specification, decrease or increase thickness of oil pump cover bearing race as necessary. Available oil pump cover bearing race: Refer to SDS, AT-1210. SAT975A 3. Adjust reverse clutch drum end play. a. Install oil pump thrust washer on clutch pack. SAT212B AT-1193 ASSEMBLY Adjustment (Cont’d) b. Measure distance “F” between front end of transmission case and oil pump thrust washer. c. Measure distance “G” between front end of transmission case and gasket. SAT213B d. Determine dimension “E” by using the following equation. E=F−G SAT214B e. Measure distance “H”. SAT215B f. Determine reverse clutch drum end play “T2” by using the following equation. T2 = E − H − 0.1 Reverse clutch drum end play “T2”: 0.55 - 0.90 mm (0.0217 - 0.0354 in) + If end play is out of specification, decrease or increase thickness of oil pump thrust washer as necessary. Available oil pump thrust washer: Refer to SDS, AT-1210. 4. Remove any part installed to adjust end plays. SAT980A AT-1194 ASSEMBLY Assembly (2) 1. Install output shaft and parking gear. a. Insert output shaft from rear of transmission case while slightly lifting front internal gear. + Do not force output shaft against front of transmission case. SAT216B b. Carefully push output shaft against front of transmission case. Install snap ring on front of output shaft.

+ Check to be sure output shaft cannot be removed in rear direction. SAT957A c. Install needle bearing on transmission case. + Pay attention to its direction — Black side goes to rear. + Apply petroleum jelly to needle bearing. SAT217B d. Install parking gear on transmission case. SAT218B e. Install snap ring on rear of output shaft. + Check to be sure output shaft cannot be removed in forward direction. SAT960A AT-1195 ASSEMBLY Assembly (2) (Cont’d) 2. Install adapter case.

a. Install oil seal on adapter case. + Apply ATF to oil seal. SAT513B b. Install O-ring on revolution sensor. + Apply ATF to O-ring. c. Install revolution sensor on adapter case.

SAT602B d. Install adapter case gasket on transmission case. SAT963A e. Install parking rod on transmission case. SAT964A f. Install adapter case on transmission case. SAT580B AT-1196 ASSEMBLY Assembly (2) (Cont’d) 3.

Install front side clutch and gear components.

a. Install rear sun gear on transmission case. + Pay attention to its direction. SAT974A b.

Make sure needle bearing is on front of front planetary carrier. + Apply petroleum jelly to needle bearing. c. Make sure needle bearing is on rear of front planetary carrier. + Apply petroleum jelly to bearing. + Pay attention to its direction — Black side goes to front. SAT967A d. While rotating forward clutch drum clockwise, install front planetary

carrier on forward clutch drum. SAT969A + Check that portion A of front planetary carrier protrudes approximately 2 mm (0.08 in) beyond portion B of forward clutch assembly. SAT970A e.

Make sure bearing races are on front and rear of clutch pack. + Apply petroleum jelly to bearing races. + Securely engage pawls of bearing races with holes in clutch pack. SAT971A AT-1197 ASSEMBLY Assembly (2) (Cont'd) f. Install clutch pack into transmission case. SAT220B 4. Install brake band and band strut.

a. Install band strut on brake band. + Apply petroleum jelly to band strut. SAT985A b. Place brake band on periphery of reverse clutch drum, and insert band strut into end of band servo piston stem. SAT986A c. Install anchor end pin on transmission case. Then, tighten anchor end pin just enough so that reverse clutch drum (clutch pack) will not tilt forward. SAT987A 5. Install input shaft on transmission case. + Pay attention to its direction — O-ring groove side is front. 6. Install gasket on transmission case. SAT988A AT-1198 ASSEMBLY Assembly (2) (Cont'd) 7. a. + b. + Install oil pump assembly. Install needle bearing on oil pump assembly.

Apply petroleum jelly to the needle bearing. Install selected thrust washer on oil pump assembly. Apply petroleum jelly to thrust washer. SAT989A c. Carefully install seal rings into grooves and press them into the petroleum jelly so that they are a tight fit. SAT990A d. Install O-ring on oil pump assembly. + Apply petroleum jelly to O-ring. SAT991A e. Apply petroleum jelly to mating surface of transmission case and oil pump assembly. SAT992A f. Install oil pump assembly. + Install two converter housing securing bolts in bolt holes in oil pump assembly as guides. SAT993A AT-1199 ASSEMBLY Assembly (2) (Cont'd) + Insert oil pump assembly to the specified position in transmission, as shown at left. SAT994A 8. Install O-ring on input shaft. + Apply ATF to O-rings. SAT114B 9. Install converter housing. a. Apply recommended sealant (Nissan genuine part: KP61000250 or equivalent) to outer periphery of bolt holes in converter housing. + Do not apply too much sealant. SAT279J b. Apply recommended sealant (Nissan genuine part: KP61000250 or equivalent) to seating surfaces of bolts that secure front of converter housing.

c. Install converter housing on transmission case. SAT280J 10. Adjust brake band. a. Tighten anchor end pin to specified torque. Anchor end pin: : 3.9 - 5.9 Nzm (0.4 - 0.6 kg-m, 35 - 52 in-lb) b. Back off anchor end pin two and a half turns. SAT001B AT-1200 ASSEMBLY Assembly (2) (Cont'd) c. While holding anchor end pin, tighten lock nut. SAT002B 11. Install terminal cord assembly. a. Install O-ring on terminal cord assembly. + Apply petroleum jelly to O-ring. b. Compress terminal cord assembly stopper and install terminal cord assembly on transmission case.

SAT115B 12. Install control valve assembly. B ,V C and V D . a.

Install accumulator piston return springs V Free length of return springs: Refer to SDS, AT-1208. SAT004BA b. Install manual valve on control valve. + Apply ATF to manual valve.

SAT005B c. Place control valve assembly on transmission case. Connect solenoid connector for upper body. d. Install connector clip. SAT006B AT-1201 ASSEMBLY Assembly (2) (Cont'd) e. Install control valve assembly on transmission case. A and V B . f. Install connector tube brackets and tighten bolts V + Check that terminal assembly does not catch. Bolt symbol A V B V ! mm (in) 33 (1.30) 45 (1.77) SAT353B g. Install O-ring on oil strainer. + Apply petroleum jelly to O-ring. h. Install oil strainer on control valve. SAT221B i. Securely fasten terminal harness with clips.

j. Install torque converter clutch solenoid valve and A/T fluid temperature sensor connectors. SAT009B SAT010B AT-1202 ASSEMBLY Assembly (2) (Cont'd) 13. Install oil pan. a. Attach a magnet to oil pan. SAT011B b. Install new oil pan gasket on transmission case. c. Install oil pan and bracket on transmission case. + Always replace oil pan bolts as they are self-sealing bolts. + Before installing bolts, remove traces of sealant and oil from mating surface and thread holes. + Tighten four bolts in a criss-cross pattern to prevent dislocation of gasket.

d. Tighten drain plug. SAT601B 14. Install PNP switch.

a.

Check that manual shaft is in "1" position. b. Temporarily install PNP switch on manual shaft. c. Move manual shaft to "N". SAT299I d. Tighten bolts while inserting 4.0 mm (0.157 in) dia.

pin vertically into locating holes in PNP switch and manual shaft. SAT014B 15. Install torque converter. a. Pour ATF into torque converter. + Approximately 2 liters (1-3/4 Imp qt) of fluid are required for a new torque converter. + When reusing old torque converter, add the same amount of fluid as was drained. SAT428DA AT-1203 ASSEMBLY Assembly (2) (Cont'd) b. Install torque converter while aligning notches and oil pump. SAT016B c. Measure distance A to check that torque converter is in proper position. Distance "A": Refer to SDS, AT-1210. SAT017B AT-1204 A/T FLUID COOLER SYSTEM A/T Fluid Cooler SAT959J REMOVAL AND INSTALLATION 1. Remove front radiator grill. Refer to BT section ("BODY END").

2. Disconnect fluid hoses from A/T fluid cooler unit. 3. Remove A/T fluid cooler unit.

4.

Remove A/T fluid cooler upper and lower brackets. 5. Remove clips securing fluid hose (A/T fluid cooler unit to radiator) and loosen hose clamps, then remove the fluid hose. 6.

Loosen clamps securing fluid hose (A/T assembly to A/T fluid cooler unit), then remove the fluid hose. 7. Remove bolts securing A/T fluid cooler tube bracket. 8. Remove fluid hose with bracket. + Reverse the removal procedure to install the A/T fluid cooler unit. Refer to the component drawing and specified tightening torque. + Check A/T fluid level and refill if necessary. Refer to MA section ("CHASSIS AND BODY MAINTENANCE"). AT-1205 SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications Engine ZD30DDTi Automatic transmission model RE4R03A Transmission model code number 57X17 Stall torque ratio 2.0 : 1 Transmission gear ratio 1st 2.784 2nd 1.544 Top 1.000 OD 0.694 Reverse 2.275 Recommended fluid Genuine Nissan ATF or equivalent* Fluid capacity ! (Imp qt) 11.8 (10-3/8) *: Refer to MA section ("Fluids and Lubricants", "RECOMMENDED FLUIDS AND LUBRICANTS"). Specifications and Adjustment SHIFT SCHEDULE Vehicle speed when shifting gears Throttle position Vehicle speed km/h (MPH) Shift pattern D 1 → D2 D2 → D 3 D3 → D 4 D4 → D 3 D3 → D 2 D2 → D 1 12 → 1 1 Standard 36 - 46 (22 - 29) 72 - 80 (45 - 50) 117 - 127 (73 - 79) 113 - 123 (70 - 76) 65 - 73 (40 - 45) 33 - 37 (21 - 23) 36 - 46 (22 - 29) Power 36 - 46 (22 - 29) 72 - 80 (45 - 50) 117 - 127 (73 - 79) 113 - 123 (70 - 76) 65 - 73 (40 - 45) 33 - 37 (21 - 23) 36 - 46 (22 - 29) Standard 36 - 46 (22 - 29) 72 - 80 (45 - 50) 117 - 127 (73 - 79) 113 - 123 (70 - 76) 65 - 73 (40 - 45) 33 - 37 (21 - 23) 36 - 46 (22 - 29) Full throttle Half throttle AT-1206 SERVICE DATA AND SPECIFICATIONS (SDS) Specifications and Adjustment (Cont'd) Vehicle speed when performing and releasing lock-up STALL REVOLUTION Stall revolution rpm 2,480 - 2,680 D4 Throttle position Shift pattern Vehicle speed km/h (MPH) Lock-up "ON" Lock-up "OFF" Standard 118 - 126 (73 - 78) 114 - 122 (71 - 76) Power 118 - 126 (73 - 78) 114 - 122 (71 - 76) Standard 118 - 126 (73 - 78) 114 - 122 (71 - 76) Power 118 - 126 (73 - 78) 114 - 122 (71 - 76) LINE PRESSURE Engine speed rpm Full throttle Idle Stall Half throttle AT-1207 Line pressure kPa (bar, kg/cm2, psi) D, 2 and 1 positions R position 450 - 490 670 - 700 (4.50 - 4.90, 4.59 - 5.00, (6.70 - 7.00, 6.83 - 7.14, 65.3 - 71.1) 97.1 - 101.5) 1,020 - 1,098 (10.20 - 10.98, 10.4 - 11.2, 148 - 159) 1,422 - 1,500 (14.22 - 15.00, 14.5 - 15.3, 206 - 218) SERVICE DATA AND SPECIFICATIONS (SDS) Specifications and Adjustment (Cont'd) RETURN SPRINGS Unit: mm (in) Item Parts Upper body Control valve Lower body Part No.* Free length Outer diameter 1 V Torque converter relief valve spring 31742-41X23 38.0 (1.496) 9.0 (0.354) 2 V Pressure regulator valve spring 31742-41X24 44.02 (1.7331) 14.0 (0.551) 3 V Pressure modifier valve spring 31742-41X19 31.95 (1.2579) 6.8 (0.268) 4 V Shuttle shift valve D spring 31762-41X01 25.0 (0.984) 7.0 (0.276) 4-2 sequence valve sprig 31756-41X00 29.1 (1.146) 6.95 (0.2736) Shift valve B spring 31762-41X01 25.0 (0.984) 7.0 (0.276) 4-2 relay valve spring 31756-41X00 29.1 (1.146) 6.95 (0.2736) Shift valve A spring 31762-41X01 25.0 (0.984) 7.0 (0.276) 9 V Overrun clutch control valve spring 31762-41X03 23.6 (0.929) 7.0 (0.276) 10 V Overrun clutch reducing valve spring 31742-41X20 32.5 (1.280) 7.0 (0.276) 11 V Shuttle shift valve S spring 31762-41X01 25.0 (0.984) 7.0 (0.276) 12 V Pilot valve spring 31742-41X13 25.7 (1.012) 9.0 (0.354) 13 V Torque converter clutch control valve spring 31742-41X22 18.5 (0.728) 13.0 (0.512) 1 V Modifier accumulator piston spring 31742-27X70 31.4 (1.236) 9.8 (0.386) 1st reducing valve spring 31756-41X05 25.4 (1.000) 6.75 (0.266) 3-2 timing valve spring 31742-41X06 23.0 (0.906) 6.7 (0.264) Servo charger valve spring 31742-41X06 23.0 (0.906) 6.7 (0.264) 5 V 6 V 7 V 8 V 2 V 3 V 4 V Reverse clutch 12 pcs 31521-51X02 (Assembly) 40.0 (1.575) 14.8 (0.583) High clutch 10 pcs 31521-51X03 (Assembly) 24.2 (0.953) 11.6 (0.457) Forward clutch (Overrun clutch) 20 pcs 32521-51X01 (Assembly) 36.8 (1.449) 10.7 (0.421) Inner spring 16 pcs 31505-51X06 20.43 (0.8043) 10.3 (0.406) Outer spring 16 pcs 31505-51X05 20.35 (0.8012) 13.0 (0.512) B Spring V 31605-41X18 47.6 (1.874) 26.3 (1.035) C Spring V 31605-41X01 29.7 (1.169) 27.6 (1.087) Accumulator A V 31605-41X02 43.0 (1.693) 20.0 (0.787) B Accumulator V 31605-41X10 66.0 (2.598) 20.0 (0.787) C Accumulator V 31605-41X09 45.0 (1.772) 29.3 (1.154) D Accumulator V 31605-41X06 58.4 (2.299) 17.3 (0.681) Low & reverse brake Band servo Accumulator *: Always check with the Parts Department for the latest parts information. AT-1208 SERVICE DATA AND SPECIFICATIONS (SDS) Specifications and Adjustment (Cont'd) ACCUMULATOR O-RING Forward clutch Diameter mm (in) Accumulator A V B V C V D V Small diameter end 29 (1.14) 32 (1.26) 45 (1.77) 29 (1.14) Large diameter end 45 (1.77) 50 (1.97) 50 (1.97) 45 (1.77) Number of drive plates 3 Number of driven plates 3 8 Standard 1.90 - 2.05 (0.0748 - 0.0807) Wear limit 1.8 (0.071) mm (in) Standard 0.35 - 0.75 (0.0138 - 0.0295) Allowable limit Thickness of drive plate mm (in) 2.55 (0.1004) Thickness of retaining plate 1.90 - 2.05 (0.0748 - 0.0807) Wear limit Clearance Number of driven plates Clearance 57X17 Standard 8 Thickness of drive plate mm (in) CLUTCHES AND BRAKES Reverse clutch 57X17 Number of drive plates 1.8 (0.071) mm (in) Standard 1.4 (0.055) Thickness of retaining plate Thickness mm (in) Part number* 4.4 4.6 4.8 5.0 5.2 31537-51X61 31537-51X00 31537-51X01 31537-51X02 31537-51X03 High clutch (0.173) (0.181) (0.189) (0.197) (0.205) 6 Number of driven plates 6 Number of drive plates 4 Number of driven plates 7 Standard 1.52 - 1.67 (0.0598 - 0.0657) Wear limit Clearance 1.4 (0.055) mm (in) Standard 1.52 - 1.67 (0.0598 - 0.0657) Wear limit 1.4 (0.055) Thickness of retaining plate mm (in) 1.8 - 2.2 (0.071 - 0.087) Allowable limit Thickness of retaining plate 2.4 (0.094) Thickness mm (in) Part number* 3.8 4.0 4.2 4.4 4.6 4.8 31537-51X11 31537-51X12 31537-51X13 31537-51X14 31537-51X15 31537-51X64 (0.150) (0.157) (0.165) (0.173) (0.181) (0.189) *: Always check with the Parts Department for the latest parts information. 3.6 (0.142) Thickness mm (in) Part number* 4.4 4.6 4.8 5.0 5.2 5.4 31537-51X61 31537-51X00 31537-51X01 31537-51X02 31537-51X03 31537-51X04 (0.173) (0.181) (0.189) (0.197) (0.205) (0.213) 1.0 - 1.4 (0.039 - 0.055) Allowable limit Standard Standard 31537-51X06 31537-51X07 31537-51X08 31537-51X09 31537-51X10 31537-51X69 (0.181) (0.189) (0.197) (0.205) (0.213) (0.220) 57X17 Thickness of drive plate mm (in) Clearance 4.6 4.8 5.0 5.2 5.4 5.6 Thickness of drive plate mm (in) 57X17 Number of drive plates Part number* Overrun clutch 0.5 - 0.8 (0.020 - 0.031) Allowable limit Thickness mm (in) *: Always check with the Parts Department for the latest parts information. AT-1209 SERVICE DATA AND SPECIFICATIONS (SDS) Specifications and Adjustment (Cont'd) Low & reverse brake TOTAL END PLAY 57X17 Number of drive plates 7 Number of driven plates 7 Thickness of drive plate mm (in) Standard 1.52 - 1.67 (0.0598 - 0.0657) Wear limit Clearance Thickness of oil pump cover bearing race 1.4 (0.055) mm (in) Standard 0.5 - 0.8 (0.020 - 0.031) Allowable limit 2.4 (0.094) Thickness of retaining plate Thickness mm (in) Part number* 3.6 (0.142) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189) 5.0 (0.197) 5.2 (0.205) 5.4 (0.213) 5.6 (0.220) 5.8 (0.228) 6.0 (0.236)* 6.2 (0.244)* 31667-51X12 31667-51X11 31667-51X10 31667-51X00 31667-51X01 31667-51X02 31667-51X03 31667-51X04 31667-51X05 31667-51X06 31667-51X07 31667-51X08 31667-51X09 Brake band Anchor end pin tightening torque Nzm (kg-m, in-lb) 3.9 - 5.9 (0.4 - 0.6, 35 - 52) Number of returning revolutions for anchor end pin 2.5 Thickness of oil pump thrust washer Allowable limit 0.55 - 0.90 mm (0.0217 - 0.0354 in) Thickness mm (in) Part number* 0.9 1.1 1.3 1.5 1.7 1.9 31528-21X01 31528-21X02 31528-21X03 31528-21X04 31528-21X05 31528-21X06 (0.035) (0.043) (0.051) (0.059) (0.067) (0.075) REMOVAL AND INSTALLATION MODEL Manual control linkage Number of returning revolutions for lock nut 1 Lock nut tightening torque 25.5 - 32.4 Nzm (2.6 - 3.3 kg-m, 19 - 24 ft-lb) Distance between end of converter housing and torque converter 0.01 - 0.024 (0.0004 - 0.0009) Rotor, vanes and control piston — oil pump housing Standard 31435-41X01 31435-41X02 31435-41X03 31435-41X04 31435-41X05 31435-41X06 31435-41X07 (0.031) (0.039) (0.047) (0.055) (0.063) (0.071) (0.079) *: Always check with the Parts Department for the latest parts information. Cam ring — oil pump housing Seal ring clearance 0.8 1.0 1.2 1.4 1.6 1.8 2.0 Reverse clutch drum end play "T2" mm (in) 0.03 - 0.044 (0.0012 - 0.0017) Standard Part number* REVERSE CLUTCH DRUM END PLAY OIL PUMP AND LOW ONE-WAY CLUTCH Standard Thickness mm (in) *: Always check with the Parts Department for the latest parts information. *: Always check with the Parts Department for the latest parts information. Oil pump clearance 0.25 - 0.55 mm (0.0098 - 0.0217 in) Total end play "T1" mm (in) 0.10 - 0.25 (0.0039 - 0.0098) 0.25 (0.0098) AT-1210 57X17 18.1 mm (0.713 in) or more BRAKE SYSTEM SECTION BR MODIFICATION NOTICE: + CONSULT-II is available for all models. + Service Data and Specifications (SDS) have been changed. + Wiring Diagrams have been changed.

CONTENTS TROUBLE DIAGNOSES ...... 1002 Schematic ...... 1002 Wiring Diagram — ABS — ...... 1003 Self-diagnosis...... 1008 SERVICE DATA AND SPECIFICATIONS (SDS)1010 General Specifications ...... 1010 BR TROUBLE DIAGNOSES Schematic TBR014M BR-1002 TROUBLE DIAGNOSES Wiring Diagram — ABS — TBR015M BR-1003 TROUBLE DIAGNOSES Wiring Diagram — ABS — (Cont'd) TBR016M BR-1004 TROUBLE DIAGNOSES Wiring Diagram — ABS — (Cont'd) TBR017M BR-1005 TROUBLE DIAGNOSES Wiring Diagram — ABS — (Cont'd) TBR018M BR-1006 TROUBLE DIAGNOSES Wiring Diagram — ABS — (Cont'd) TBR019M BR-1007 TROUBLE DIAGNOSES Self-diagnosis FUNCTION + When a problem occurs in the ABS, the warning lamp on the instrument panel comes on. To start the self-diagnostic results mode, ground the self-diagnostic (check) terminal located on "Data Link Connector". The location of the malfunction is indicated by the warning lamp flashing. + While DIFF-LOCK is on, anti-lock warning light flashes. SELF-DIAGNOSIS PROCEDURE Turn off DIFF-LOCK switch. Drive vehicle over 30 km/h (19 MPH) for at least one minute. . Turn ignition switch "OFF". . SBR679E Ground terminal "9" of "Data link connector" with a suitable harness. . Turn ignition switch "ON" while grounding terminal "9".

Do not depress brake pedal. . After 3.0 seconds, the warning lamp starts flashing to indicate the malfunction code No. (See NOTE.) SBR186E . Verify the location of the malfunction with the malfunction code chart. Refer to the original Service Manual. Then make the necessary repairs following the diagnostic procedures. . After the malfunctions are repaired, erase the malfunction codes stored in the control unit. Refer to the original Service Manual.

SBR679E . Rerun the self-diagnostic results mode to verify that the malfunction codes have been erased. . Disconnect the check terminal from the ground. The self-diagnostic results mode is now complete. . A V BR-1008 NOTE: The indication terminates after five minutes. However, when the ignition switch is turned from "OFF" to "ON", the indication starts flashing again. TROUBLE DIAGNOSES Self-diagnosis (Cont'd) A V . Check warning lamp for deactivation after driving vehicle over 30 km/h (19 MPH) for at least one minute. . After making certain that warning lamp does not come on, test the ABS in a safe area to verify that it functions properly. BR-1009 SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications Europe Body Hardtop Wagon Front brake Type CL36VE disc brake Cylinder bore diameter mm (in) Pad dimension Length x width x thickness mm (in) 48.1 (1.894) x 2 147 x 56.5 x 12 (5.79 x 2.224 x 0.47) Rotor outer diameter x thickness mm (in) 306 x 32 (12.05 x 1.26) Rear brake Type CL18VF disc brake Cylinder bore diameter mm (in) 48.1 (1.894) Lining or pad dimension Length x width x thickness mm (in) 111 x 41.8 x 10 (4.37 x 1.646 x 0.39) Drum inner diameter mm (in) — Rotor outer diameter x thickness mm (in) 316 x 18 (12.44 x 0.71) Brake booster Model 235T Diaphragm diameter Primary: 252 (9.92) Secondary: 230 (9.06) mm (in) Master cylinder bore diameter 25.4 (1.00) mm (in) Control valve Type Split point x reducing ratio kPa (bar, kg/cm2, psi) LSV (Variable) x 0.3 Recommended brake fluid (Variable) x 0.1 DOT 3 or DOT 4 BR-1010 BODY & TRIM SECTION BT MODIFICATION NOTICE: + The door trim has been changed. + The front seat with side air bag has been added. + An auto reverse function has been added to the driver's door window. CONTENTS PRECAUTIONS ...... 1002 Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" ... 1002 DOOR...... 1003 Front Door Limit Switch Reset (Driver side only) ...... 1003 INTERIOR TRIM ...... 1004 Door Trim ...... 1004 SEAT ...... 1006 Front Seat ...... 1006 MIRROR ...... 1007 Door Mirror...... 1007 BT PRECAUTIONS Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER" used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination and optional equipment.): + For a frontal collision The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.

+ For a side collision The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

Information necessary to service the system safely is included in the RS section of this Service Manual. WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by intentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS. BT-1002 DOOR Front Door Limit Switch Reset (Driver side only) RESET CONDITIONS After each of the following operations are performed, reset the limit switch (with built-in motor). + Regulator removal and installation + Removal of motor from regulator + Operation of regulator as a single unit + Door glass removal and installation + Glass run removal and installation RESET PROCEDURES SBT846 After installing parts, proceed as follows: 1. Close the door window completely. 2. Press the reset switch and open the door window completely. 3. Release the reset switch. After making sure the reset switch has returned to the original position, close the door window completely. 4.

The limit switch is now reset. CAUTION: Be sure to manually open or close the door window. (Do not use the automatic open-close procedures.) BT-1003 INTERIOR TRIM Door Trim REMOVAL — Door trim 1 V 2 V 3 V 4 V 5 V 6 V 7 V Remove inner cover from front corner of door. Refer to "Door Mirror" for details, BT-1007. Remove inside handle escutcheon. Remove door armrest. Remove cover and screw securing power window switches, then disconnect the connector. Remove screw securing door trim. Remove clips securing door trim. Lift out door trim. SBT847 BT-1004 INTERIOR TRIM Door Trim (Cont'd) SBT566 BT-1005 SEAT Front Seat +When removing or installing the seat trim, carefully handle it to keep dirt out and avoid damage. POWER SEAT SBT848 BT-1006 MIRROR Door Mirror CAUTION: Be careful not to scratch door rearview mirror body. ★ For Wiring Diagram, refer to "POWER DOOR MIRROR" in EL section.

REMOVAL — Door mirror 1 V 2 V 3 V 4 V 5 V Remove clip securing inner cover, then remove inner cover. Remove door trim. Refer to "Door Trim" for details, BT-1004. Roll back sealing screen and remove door mirror harness connector.

Remove door mirror harness clip. Remove bolts securing door mirror, then remove door mirror assembly. SBT849 BT-1007 CLUTCH SECTION CL MODIFICATION NOTICE: + The ZD30DDTi engine model has been added. CONTENTS CLUTCH SYSTEM...... 1002 HYDRAULIC CLUTCH CONTROL ...... 1003 Clutch Operating Cylinder...... 1003 SERVICE DATA AND SPECIFICATIONS (SDS)...... 1004 General Specifications ...... 1004 Inspection and Adjustment ...... 1004 CL CLUTCH SYSTEM SCL824 CL-1002 HYDRAULIC CLUTCH CONTROL Clutch Operating Cylinder SCL771-C CL-1003 SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications CLUTCH DISC CLUTCH COVER Model 275 Body Engine ZD30DDTi Model 275 Engine ZD30DDTi Facing size (Outer dia. x inner dia. x thickness) mm (in) 275 x 180 x 3.5 (10.83 x 7.09 x 0.138) Thickness of disc assembly with load mm (in)/N (kg, lb) 7.7 - 8.3 (0.303 - 0.327)/ 7,846 (800, 1,764) Full load Hardtop N (kg, lb) 6,473 - 7,257 (660 - 740, 1,455 - 1,632) Inspection and Adjustment CLUTCH PEDAL Unit: mm (in) ZD30DDTi Pedal height "H*" Pedal free play "A" (at pedal pad) 195 - 205 (7.68 - 8.07) 1.0 - 3.0 (0.039 - 0.118) *: Measured from surface of melt sheet to pedal pad CL-1004 Except Hardtop 7,355 - 8,336 (750 - 850, 1,654 - 1,874) ENGINE CONTROL SYSTEM SECTION EC MODIFICATION NOTICE: + The RD28ETi engine has been replaced by the ZD30DDTi engine. EC CONTENTS ZD30DDTi PRECAUTIONS AND PREPARATION ...... 1005 Special Service Tool ...... 1005 Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" ... 1005 TROUBLE DIAGNOSIS — INDEX...... 1006 Alphabetical & Numerical Index for DTC......

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1277 Crankshaft Position Sensor (TDC) ...... 1277 Glow Plug...... 1277 Accelerator Position Sensor ...... 1277 EGR Volume Control Valve ...... 1277 EC-1004 PRECAUTIONS AND PREPARATION ZD30DDTi Special Service Tool Tool number Tool name Description KV10109300 Puller holder a = 68 mm (2.68 in) b = 8 mm (0.31 in) dia. NT628 Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER" used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination and optional equipment.): + For a frontal collision The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. + For a side collision The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision). Information necessary to service the system safely is included in the RS section of this Service Manual. WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS. EC-1005 TROUBLE DIAGNOSIS — INDEX ZD30DDTi Alphabetical & Numerical Index for DTC ALPHABETICAL INDEX FOR DTC X: Applicable —: Not applicable Items (CONSULT-II screen terms) DTC MI illumination Reference page ACCEL POS SENSOR 0403 X EC-1125 ACCEL POS SW (F/C) 0203 X EC-1100 A/T COMM LINE 0504 — EC-1148 COOLANT TEMP SEN 0103 X EC-1092 CRANK POS SEN (TDC) 0407 X EC-1140 ECM 2 0301 X EC-1117 ECM 10 0802 X EC-1187 ECM 11 0804 — EC-1189 ECM 14 0807 X EC-1191 ECM 15 0903 — EC-1200 ECM RLY 0902 X EC-1196 EGR VOLUME CONT/V 1003 X EC-1207 FUEL CUT SYSTEM1 1004 X EC-1215 INT/AIR VOLUME 0406 — EC-1138 MASS AIR FLOW SEN 0102 X EC-1086 NATS MALFUNCTION 1401 - 1408 — EL section NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED. 0505 — — OVER HEAT 0208 X EC-1105 P1zCAM POS SEN 0701 X EC-1153 P2zTDC PULSE SIG 0702 X EC-1159 P3zPUMP COMM LINE 0703 X EC-1165 P4zSPILL/V CIRC 0704 X EC-1171 P5zPUMP C/MODULE 0705 X EC-1177 P6zSPILL VALVE 0706 X EC-1171 P7zF/INJ TIMG FB 0707 X EC-1180 P9zFUEL TEMP SEN 0402 X EC-1119 TURBO PRESSURE 0905 X EC-1202 VEHICLE SPEED SEN 0104 X EC-1096 EC-1006 ZD30DDTi TROUBLE DIAGNOSIS — INDEX Alphabetical & Numerical Index for DTC (Cont'd) NUMERICAL INDEX FOR DTC X: Applicable —: Not applicable DTC Items (CONSULT-II screen terms) MI illumination Reference page 0102 MASS AIR FLOW SEN X EC-1086 0103 COOLANT TEMP SEN X EC-1092 0104 VEHICLE SPEED SEN X EC-1096 0203 ACCEL POS SW (F/C) X EC-1100 0208 OVER HEAT X EC-1105 0301 ECM 2 X EC-1117 0402 P9zFUEL TEMP SEN X EC-1119 0403 ACCEL POS SENSOR X EC-1125 0406 INT/AIR VOLUME — EC-1138 0407 CRANK POS SEN (TDC) X EC-1140 0504 A/T COMM LINE — EC-1148 0505 NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED. — — 0701 P1zCAM POS SEN X EC-1153 0702 P2zTDC PULSE SIG X EC-1159 0703 P3zPUMP COMM LINE X EC-1165 0704 P4zSPILL/V CIRC X EC-1171 0705 P5zPUMP C/MODULE X EC-1177 0706 P6zSPILL VALVE X EC-1171 0707 P7zF/INJ TIMG FB X EC-1180 0802 ECM 10 X EC-1187 0804 ECM 11 — EC-1189 0807 ECM 14 X EC-1191 0902 ECM RLY X EC-1196 0903 ECM 15 — EC-1200 0905 TURBO PRESSURE X EC-1202 1003 EGR VOLUME CONT/V X EC-1207 1004 FUEL CUT SYSTEM1 X EC-1215 1401 - 1408 NATS MALFUNCTION — EL section EC-1007 PRECAUTIONS ZD30DDTi Precautions SEF706Y + Always use a 12 volt battery as power source. + Do not attempt to disconnect battery cable while engine is running. + Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned off. + Before removing parts, turn off ignition switch and then disconnect battery ground cable. + Do not disassemble ECM. + If a battery terminal is disconnected, the memory will return to the ECM value. The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a problem. Do not replace parts because of a slight variation. SEC220B + When ECM is removed for inspection, make sure to ground the ECM mainframe. SEF665S + When connecting ECM harness connector, tighten securing bolt until the gap between the orange indicators disappears. : 3.0 - 5.0 Nzm (0.3 - 0.5 kg-m, 26 - 43 in-lb) SEF308Q SEF291H + When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break). Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors. + Securely connect ECM harness connectors. A poor connection can cause an extremely high (surge) voltage to develop in the circuit, thus resulting in damage to ICs. + Keep ECM harness at least 10 cm (3.9 in) away from adjacent harnesses, to prevent an ECM system malfunc- EC-1008 PRECAUTIONS Precautions (Cont'd) ZD30DDTi tion due to receiving external noise, degraded operation of ICs, etc. + Keep ECM parts and harnesses dry. + Before replacing ECM, perform Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-1068. MEF040D SAT652J + If MI illuminates or blinks irregularly when engine is running, water may have accumulated in fuel filter. Drain water from fuel filter. If this does not correct the problem, perform specified trouble diagnostic procedures. + After performing each TROUBLE DIAGNOSIS, perform "DTC Confirmation Procedure" or "Overall Function Check". The DTC should not be displayed in the " DTC Confirmation Procedure" if the repair is completed. The "Overall Function Check" should be a good result if the repair is completed. + When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor. + Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

SEF348N EC-1009 PRECAUTIONS Precautions (Cont'd) ZD30DDTi + Do not disconnect pump harness connector with engine running.

+ Do not disassemble electronic fuel injection pump. If NG, take proper action. + Do not disassemble injection nozzle. If NG, replace injection nozzle. + Even a slight leak in the air intake system can cause serious problems. + Do not shock or jar the crankshaft position sensor (TDC). SEF437Y + Do not depress accelerator pedal when starting. + Immediately after starting, do not rev up engine unnecessarily. + Do not rev up engine just prior to shutdown. SEF709Y SEF708Y + When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on its installation location. 1) Keep the antenna as far as possible away from the ECM. 2) Keep the antenna feeder line more than 20 cm (7.9 in) away from the harness of electronic controls. Do not let them run parallel for a long distance. 3) Adjust the antenna and feeder line so that the standingwave ratio can be kept smaller. 4) Be sure to ground the radio to vehicle body. EC-1010 ENGINE AND EMISSION CONTROL OVERALL SYSTEM ZD30DDTi ECCS-D Component Parts Location SEF219Z EC-1011 ENGINE AND EMISSION CONTROL OVERALL SYSTEM ZD30DDTi ECCS-D Component Parts Location (Cont'd) SEF220Z EC-1012 ENGINE AND EMISSION CONTROL OVERALL SYSTEM ZD30DDTi ECCS-D Component Parts Location (Cont'd) SEF221Z EC-1013 ENGINE AND EMISSION CONTROL OVERALL SYSTEM ZD30DDTi ECCS-D Component Parts Location (Cont'd) SEF286Z EC-1014 ENGINE AND EMISSION CONTROL OVERALL SYSTEM ZD30DDTi Circuit Diagram TEC095M EC-1015 ENGINE AND EMISSION CONTROL OVERALL SYSTEM ZD30DDTi System Diagram SEF222Z EC-1016 ENGINE AND EMISSION CONTROL OVERALL SYSTEM ZD30DDTi Vacuum Hose Drawing JEF223Z 1. 2. 3. 4. Swirl control valve control solenoid valve to 3-way connector Swirl control valve control solenoid valve to swirl control valve actuator Vacuum gallery to 3-way connector Intake air control valve control solenoid valve to intake air control valve actuator 5. 6. 7. 8. 9. Intake air control valve control solenoid valve to 3-way connector Variable nozzle turbocharger control solenoid valve to vacuum tank Vacuum tank to vacuum gallery Variable nozzle turbocharger control actuator to vacuum damper Variable nozzle turbocharger control solenoid valve to vacuum damper Refer to "System Diagram", EC-1016 for vacuum control system. EC-1017 10. Variable nozzle turbocharger control solenoid valve to resonator 11.

Vacuum pump to vacuum gallery 12. Exhaust gas control valve control solenoid valve to 3-way connector 13. Exhaust gas control valve control solenoid valve to exhaust gas control valve actuator ENGINE AND EMISSION CONTROL OVERALL SYSTEM ZD30DDTi System Chart Input (Sensor) + + + + + + + + + + + + + + + Electronic control fuel injection pump Crankshaft position sensor (TDC) Engine coolant temperature sensor Accelerator position sensor Accelerator position switch Accelerator switch (F/C) Park/Neutral position (PNP) switch Ignition switch Battery voltage Vehicle speed sensor Air conditioner switch Mass air flow sensor Stop lamp switch Heat up switch Charge air pressure sensor*1 ECM Function Output (Actuator) Fuel injection control Electronic control fuel injection pump Fuel injection timing control Electronic control fuel injection pump Fuel cut control Electronic control fuel injection pump Glow control system Glow relay & glow lamp On board diagnostic system MIL (On the instrument panel) EGR volume control EGR volume control valve Cooling fan control Cooling fan relay Air conditioning cut control Air conditioner relay Variable nozzle turbocharger control Variable nozzle turbocharger control solenoid valve Swirl control valve control Swirl control valve control solenoid valve Intake air control valve control Intake air control valve control solenoid valve Exhaust gas control valve control*2 Exhaust gas control valve control solenoid valve*2 *1: This sensor is not used to control the engine system under normal conditions. *2: For models for cold areas EC-1018 ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION ZD30DDTi Fuel Injection Control System DESCRIPTION System description Three types of fuel injection control are provided to accommodate engine operating conditions; normal control, idle control and start control. The ECM determines the appropriate fuel injection control. Under each control, the amount of fuel injected is compensated to improve engine performance. Pulse signals are exchanged between ECM and electronic control fuel injection pump (control unit is builtin). The fuel injection pump control unit performs duty control on the spill valve (built into the fuel injection pump) according to the input signals to compensate the amount of fuel injected to the preset value. Start control Input/output signal chart Sensor Input Signal to ECM Engine coolant temperature sensor Engine coolant temperature Crankshaft position sensor (TDC) Engine speed Ignition switch Start signal ECM Function Actuator Fuel injection con- Electronic control fuel injectrol (start control) tion pump When the ECM receives a start signal from the ignition switch, the ECM adapts the fuel injection system for the start control. The amount of fuel injected at engine starting is a preset program value in the ECM. The program is determined by the engine speed and engine coolant temperature. For better startability under cool engine conditions, the lower the coolant temperature becomes, the greater the amount of fuel injected. The ECM ends the start control when the engine speed reaches the specific value, and shifts the control to the normal or idle control. SEF648S Idle control Input/output signal chart Sensor Input Signal to ECM Engine coolant temperature sensor Engine coolant temperature Crankshaft position sensor (TDC) Engine speed Park/Neutral position (PNP) switch Gear position Battery Battery voltage Accelerator position switch Idle position Vehicle speed sensor Vehicle speed Air conditioner switch Air conditioner signal Heat up switch Heat up switch signal ECM Function Actuator Fuel injection con- Electronic control fuel injectrol (Idle control) tion pump When the ECM determines that the engine speed is at idle, the fuel injection system is adapted for the idle control. The ECM regulates the amount of fuel injected corresponding to changes in load applied to the engine to keep engine speed constant. The ECM also provides the system with a fast idle control in response to the engine coolant temperature and heat up switch signal.

EC-1019 ENGINE AND EMISSION BASIC CONTROL SYSTEM ZD30DDTi DESCRIPTION Fuel Injection Control System (Cont'd) Normal control Input/output signal chart Sensor Input Signal to ECM Crankshaft position sensor (TDC) Engine speed Accelerator position sensor Accelerator position Vehicle speed sensor Vehicle speed ECM Function Actuator Fuel injection conElectronic control fuel injectrol (Normal contion pump trol) The amount of fuel injected under normal driving conditions is determined according to sensor signals. The crankshaft position sensor (TDC) detects engine speed and the accelerator position sensor detects accelerator position. These sensors send signals to the ECM. The fuel injection data, predetermined by correlation between various engine speeds and accelerator positions, are stored in the ECM memory, forming a map. The ECM determines the optimal amount of fuel to be injected using the sensor signals in comparison with the map. SEF649S Maximum amount control Input/output signal chart Sensor Input Signal to ECM Mass air flow sensor Amount of intake air Engine coolant temperature sensor Engine coolant temperature Crankshaft position sensor (TDC) Engine speed Accelerator position sensor Accelerator position ECM Function Actuator Fuel injection conElectronic control fuel injectrol (Maximum tion pump amount control) The maximum injection amount is controlled to an optimum by the engine speed, intake air amount, engine coolant temperature, and accelerator opening in accordance with the driving conditions. This prevents the oversupply of the injection amount caused by decreased air density at a high altitude or during a system failure. Deceleration control Input/output signal chart Sensor Input Signal to ECM Accelerator switch (F/C) Accelerator position Crankshaft position sensor (TDC) Engine speed ECM Function Actuator Fuel injection conElectronic control fuel injectrol (Deceleration tion pump control) The ECM sends a fuel cut signal to the electronic control fuel injection pump during deceleration for better fuel efficiency. The ECM determines the time of deceleration according to signals from the accelerator switch (F/C) and crankshaft position sensor (TDC). EC-1020 ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION ZD30DDTi Fuel Injection Timing Control System DESCRIPTION The target fuel injection timing in accordance with the engine speed and the fuel injection amount are recorded as a map in the ECM beforehand. The ECM and the injection pump control unit exchange signals and perform feedback control for optimum injection timing in accordance with the map. Air Conditioning Cut Control DESCRIPTION Input/output signal chart Sensor Input Signal to ECM Air conditioner switch Air conditioner "ON" signal Accelerator position sensor Accelerator valve opening angle Vehicle speed sensor Vehicle speed Engine coolant temperature sensor Engine coolant temperature ECM Function Actuator Air conditioner cut Air conditioner relay control System description This system improves acceleration when the air conditioner is used. When the accelerator pedal is fully depressed, the air conditioner is turned off for a few seconds. When engine coolant temperature becomes excessively high, the air conditioner is turned off. This continues until the engine coolant temperature returns to normal. Fuel Cut Control (at no load & high engine speed) DESCRIPTION Input/output signal chart Sensor Input Signal to ECM Vehicle speed sensor Vehicle speed Park/Neutral position (PNP) switch Neutral position Accelerator position switch or Accelerator switch (F/C) Accelerator position Engine coolant temperature sensor Engine coolant temperature Crankshaft position sensor (TDC) Engine speed ECM Function Fuel cut control Actuator Electronic control fuel injection pump If the engine speed is above 2,700 rpm with no load (for example, in neutral and engine speed over 2,700 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 1,500 rpm, then fuel cut is cancelled. NOTE: This function is different from deceleration control listed under "Fuel Injection Control System", EC-1019. EC-1021 ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION ZD30DDTi Crankcase Ventilation System DESCRIPTION In this system, blow-by gas is sucked into the air inlet pipe after oil separation by oil separator in the rocker cover. JEF224Z INSPECTION Ventilation hose 1.

Check hoses and hose connections for leaks. 2. Disconnect all hoses and clean with compressed air.

If any hose cannot be freed of obstructions, replace. SEC692 EC-1022 BASIC SERVICE PROCEDURE ZD30DDTi Injection Tube and Injection Nozzle REMOVAL AND INSTALLATION CAUTION: + Do not disassemble injection nozzle assembly. If NG, replace injection nozzle assembly. + Plug flare nut with a cap or rag so that no dust enters the nozzle. Cover nozzle tip for protection of needle. JEF237Z Injection tube JEF238Z Removal 1. Mark the cylinder Nos. to the injection tubes, then disconnect them. + Marking should be made at proper locations and by the proper method, so that they are not erased by fuel, etc. 2. Remove the clamps, then disconnect the tubes one by one. + Avoid letting leaked fuel get on the interior walls of the engine compartment. Take special care to prevent fuel from getting on the engine mount insulator. EC-1023 ZD30DDTi BASIC SERVICE PROCEDURE Injection Tube and Injection Nozzle (Cont'd) Installation + Install the injection tubes, referring to the markings made during removal. + Install the injection tubes in the order of No. 3, No. 4, No. 1, and No. 2. Injection nozzle oil seal JEF248Z Removal Using a tool such as a flat-bladed screwdriver, pry the flange of the seal, then remove it. Installation After the injection nozzle assembly is installed, push the seal from the cylinder head side until it contacts the flange. + Replace the oil seal with new one when the injection nozzle assembly is removed. (It is not necessary to replace the oil seal when only injection tubes are removed.) Spill tube Installation + After the spill tube is installed, check the airtightness of the spill tube. + After the bolts are tightened, the joint of the spill tube gasket might be broken. However, this will not affect function. Injection nozzle assembly JEF249Z Removal 1. Remove the nozzle support, then pull out the injection nozzle assembly by turning it clockwise/counterclockwise. 2.

Using a tool such as a flat-head screwdriver, remove the copper washer inside the cylinder head. CAUTION: Do not disassemble the injection nozzle. Installation 1. Insert the nozzle gasket to the cylinder head hole. 2.

Attach the O-ring to the mounting groove of the nozzle side, then insert it in the cylinder head. TEST AND ADJUSTMENT WARNING: When using nozzle tester, be careful not to allow diesel fuel sprayed from nozzle to contact your hands or body, and make sure your eyes are properly protected with goggles. EC-1024 ZD30DDTi BASIC SERVICE PROCEDURE Injection Tube and Injection Nozzle (Cont'd) Inspection for spill tube airtightness Before the rocker cover is installed, perform the inspection as follows. 1. Connect the handy vacuum pump to the spill hose. 2. Check that the airtightness is maintained after the negative pressure shown below is applied. Standard: −53.3 to −66.7 kPa (−533 to −667 mbar, −400 to −500 mmHg, −15.75 to −19.69 inHg) JEF250Z Air bleeding of fuel piping After the repair, bleed air in the piping by pumping the priming pump up and down until it becomes heavy. SEF251Z Injection pressure test 1.

Install injection nozzle assembly to injection nozzle tester and bleed air from flare nut. JEF348Y 2. Pump the tester handle slowly (one time per second) and watch the pressure gauge. 3. Read the pressure gauge when the injection pressure just starts dropping. Initial injection pressure: Used 19,026 kPa (190.3 bar, 194 kg/cm2, 2,759 psi) New 19,516 - 20,497 kPa (195.2 - 205.0 bar, 199 - 209 kg/cm2, 2,830 - 2,972 psi) Limit 16,182 kPa (161.8 bar, 165 kg/cm2, 2,346 psi) + The injection nozzle assembly has a 2-stage pressure injection function. However, the judgement should be made at the first stage of the valve opening pressure. EC-1025 ZD30DDTi BASIC SERVICE PROCEDURE Injection Tube and Injection Nozzle (Cont'd) Spray pattern test 1.

Check spray pattern by pumping tester handle one full stroke per second. NG spray pattern: Does not inject straight and strong (B in the figure). Fuel drips (C in the figure). Does not inject evenly (D in the figure). 2. If the spray pattern is not correct, replace injection nozzle assembly. JEF349Y Electronic Control Fuel Injection Pump REMOVAL AND INSTALLATION CAUTION: When removing or installing the timing chain as incidental work of the fuel injection pump removal/ installation, always secure the internal mechanism of the idler gear with bolts before removing or installing the fuel injection pump sprocket. Do not refer to the procedure for “TIMING CHAIN” in EM section based on No. 1 cylinder compression top dead center. (Unless otherwise specified.) JEF259Z EC-1026 ZD30DDTi BASIC SERVICE PROCEDURE Electronic Control Fuel Injection Pump (Cont'd) REMOVAL 1. + + + + + + + + + + + + + + + + + 2. Remove the following: Engine coolant draining Charge air cooler Air inlet pipe Throttle body Rocker cover Oil level gauge guide EGR guide tube EGR volume control solenoid valve Fuel hose Injection tube Radiator upper hose Radiator shroud Cooling fan Drive belt Vacuum pipe Vacuum pump Move the power steering pump. 3. Remove the harness connector from the fuel injection pump. + After pulling the connector stopper all the way back, remove the connector. + When the stopper is pulled all the way back, the interlockedconnector will come off. As for installation, when the connector is pushed all the way forward until the stopper locks, the interlocked-connector is inserted. 4. Remove the fuel injection pump rear bracket. JEF260Z 5. Remove the chain cover.

+ Remove the installation bolts A, B, and C shown in the figure (left). CAUTION: During chain cover removal, seal the opening to prevent foreign objects from getting into the engine. JEF261Z 6. Fix the internal mechanism of the idler gear (scissors gear structure). a. Remove the plug on the front side of the gear case. b. While turning the crankshaft pulley clockwise, check the tightening bolt hole of the idler gear internal mechanism through the plug hole. + Conduct the visual check using a mirror. + When checking, note that there are 2 other holes (with no thread) beside the tightening bolt hole on the idler gear. JEF262Z EC-1027 ZD30DDTi BASIC SERVICE PROCEDURE Electronic Control Fuel Injection Pump (Cont'd) JEF263Z c. Install the tightening bolt [Part No.: 81-20620-28, thread diameter: M6, under head: 20 mm (0.79 in), pitch: 1.0 mm (0.039 in)] to the idler gear tightening bolt hole, and tighten to the specified torque: : 2.5 - 3.4 Nzm (0.25 - 0.35 kg-m, 22 - 30 in-lb) CAUTION: + To protect the idler gear from damage, do not use the substitute part for the tightening bolt. + Hereafter, do not turn the crankshaft to avoid hitting tightening bolt head against the gear case. + Do not remove the idler gear tightening bolt before installations of the timing chain and related parts are completed. 7. Make mating marks on the cam sprocket, fuel injection pump sprocket, and timing chain with paint. 8. Make mating marks on the fuel injection pump gear and idler gear with paint. JEF264Z 9.

Remove the chain tensioner. (1) Loosen the upper and lower installation bolts. (2) While holding the chain tensioner by hand, remove the upper installation bolt to release the spring tension. (3) Remove the lower installation bolt first, and then the chain tensioner. + Since the chain tensioner does not have a mechanism to prevent the plunger pop-out, watch out for the fall of the plunger and spring. (Return prevention mechanism is available.) JEF265Z 10. Remove the timing chain slack guide. 11. Remove the cam sprocket and timing chain at the same time. + Make mating marks on each sprocket and timing chain. + Hold the hexagon head of the camshaft on the exhaust manifold side, and loosen the cam sprocket installation bolt. CAUTION: Do not loosen the installation bolt using a chain tension. JEF266Z 12. Remove the fuel injection pump sprocket and gear as an assembly. + Fix the fuel injection pump gear with the pulley holder (SST), and loosen the installation bolt for removal.

+ Try not to move the pump shaft when removing. + Connect the sprocket and gear with a dowel pin, and tighten them together with the installation bolt. JEF267Z EC-1028 ZD30DDTi BASIC SERVICE PROCEDURE Electronic Control Fuel Injection Pump (Cont'd) 13. Make the mating marks on the fuel injection pump flange and front plate with paint. 14. Remove installation bolts first, and then fuel injection pump toward the rear side of the engine. + When the fuel injection pump is stationary, it can still be retained by the dowel without all bolts. CAUTION: Do not disassemble or adjust the fuel injection pump. JEF268Z INSTALLATION + The injection timing adjustment to correct the installation angle deviation is not necessary. Install the pump in the proper position according to the dowel and installation bolts. 1. Install the fuel injection pump from the rear side of the engine. + Match the dowel of the spacer to the dowel hole of the pump side for installation.

+ Replace the seal washer of the installation bolt with a new one. JEF269Z 2. Align the mating marks of the fuel injection pump flange and front plate, and then adjust the approximate flange position. + Each hole [6 mm (0.24 in) dia.] is used as a reference point for the fuel injection pump flange, fuel injection pump gear, and fuel injection pump sprocket. + Only during removal/installation at No. 1 cylinder compression top dead center, can the hole [6 mm (0.24 in) dia.] of the pump body be aligned. JEF270Z 3. Install the fuel injection pump sprocket and gear as an assembly. + Align the mating marks of the idler gear and fuel injection pump gear properly. JEF271Z 4. Tighten the installation bolt of the fuel injection pump sprocket. + Fix the fuel injection pump gear with the pulley holder (SST), and tighten the installation bolt. CAUTION: Before tightening the installation bolt, check again that the mating marks of the idler gear and fuel injection pump gear are aligned. JEF267Z EC-1029 ZD30DDTi BASIC SERVICE PROCEDURE Electronic Control Fuel Injection Pump (Cont'd) 5. Install the cam sprocket and timing chain at the same time. + Align the mating marks of the fuel injection pump sprocket and cam sprocket, and install the timing chain. + Holding the hexagon head of the camshaft with a wrench, tighten the cam sprocket installation bolt. CAUTION: Do not tighten the installation bolt using a chain tension. 6. Install the timing chain, related parts, and the chain cover.

Refer to EM section, “TIMING CHAIN”. JEF264Z 7. Remove the tightening bolt of the idler gear internal mechanism. 8. Apply the liquid gasket to the screw of the plug, and tighten the plug. : 7.9 - 9.8 Nzm (0.8 - 1.0 kg-m, 70 - 86 in-lb) + Use Genuine Liquid Gasket or equivalent. JEF272Z 9. Install the fuel injection pump rear bracket. + Tighten all the installation bolts temporarily, and then tighten them firmly with both surfaces of the fuel injection pump and cylinder block attached to the installation surface.

JEF273Z 10. Connect the harness connector of the fuel injection pump. + Insert the harness connector until the stopper is completely locked. + When the connector is pushed fully to lock the stopper, the interlocked-connector is inserted.

JEF260Z 11. Installation is in the reverse order of removal. EC-1030 BASIC SERVICE PROCEDURE ZD30DDTi Air Bleeding SEF251Z Pump the priming pump to bleed air. + When air is bled completely, the pumping of the priming pump suddenly becomes heavy. Stop operation at that time. + If it is difficult to bleed air by the pumping of the priming pump (the pumping of the priming pump does not become heavy), disconnect the fuel supply hose between the fuel filter and the injection pump. Then, perform the operation described above, and make sure that fuel comes out. (Use a pan, etc. so as not to spill fuel. Do not let fuel get on engine and other parts.) After that, connect the hose, and then bleed air again. EC-1031 ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION ZD30DDTi DTC and MI Detection Logic When a malfunction is detected, the malfunction (DTC) is stored in the ECM memory. The MI will light up each time the ECM detects malfunction. For diagnostic items causing the MI to light up, refer to “TROUBLE DIAGNOSIS — INDEX”, EC-1006. Diagnostic Trouble Code (DTC) HOW TO READ DTC The DTC can be read by the following methods. Without CONSULT-II ECM displays the DTC by a set of four digit numbers with MI illumination in the diagnostic test mode II (Self-diagnostic results). Example: 0102, 0407, 1004, etc. With CONSULT-II CONSULT-II displays the DTC in “SELF-DIAG RESULTS” mode. Examples: “CRANK POS SEN (TDC)”, etc. + Output of the trouble code means that the indicated circuit has a malfunction. However, in the Mode II it does not indicate whether the malfunction is still occurring or occurred in the past and returned to normal.

CONSULT-II can identify them. Therefore, using CONSULT-II (if available) is recommended. HOW TO ERASE DTC How to erase DTC (With CONSULT-II) 1.If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once. Wait at least 5 seconds and then turn it “ON” (engine stopped) again. 2. Touch “ENGINE”. 3. Touch “SELF-DIAG RESULTS”. 4. Touch “ERASE”. (The DTC in the ECM will be erased.) SEF371Y The emission related diagnostic information in the ECM can be erased by selecting “ERASE” in the “SELFDIAG RESULTS” mode with CONSULT-II. How to erase DTC (Without CONSULT-II) 1.If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once. Wait at least 5 seconds and then turn it “ON” (engine stopped) again. EC-1032 ZD30DDTi ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION Diagnostic Trouble Code (DTC) (Cont'd) 2. Change the diagnostic test mode from Mode II to Mode I by using the data link connector.

(See EC-1035.) The emission related diagnostic information in the ECM can be erased by changing the diagnostic test mode.

+ If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours. + Erasing the emission-related diagnostic information using CONSULT-II is easier and quicker than switching the diagnostic test mode using the data link connector. NATS (Nissan Anti-Theft System) SEF252Z + If the security indicator lights up with the ignition switch in the “ON” position or “NATS MALFUNCTION” is displayed on “SELF-DIAG RESULTS” screen, perform selfdiagnostic results mode with CONSULT-II using NATS program card. Refer to “NATS (Nissan Anti-Theft System)” in EL section. + Confirm no self-diagnostic results of NATS is displayed before touching “ERASE” in “SELF-DIAG RESULTS” mode with CONSULT-II. + When replacing ECM, initialization of NATS system and registration of all NATS ignition key IDs must be carried out with CONSULT-II using NATS program card. Therefore, be sure to receive all keys from vehicle owner. Regarding the procedures of NATS initialization and NATS ignition key ID registration, refer to CONSULT-II operation manual, NATS.

Malfunction Indicator (MI) DESCRIPTION SAT652J The MI is located on the instrument panel. 1. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check. + If the MI does not light up, refer to EL section (“WARNING LAMPS AND CHIME”) or see EC-1276. 2. When the engine is started, the MI should go off. If the MI remains on, the on board diagnostic system has detected an engine system malfunction. If MI illuminates or blinks irregularly after starting engine, water may have accumulated in fuel filter. Drain water from fuel filter. Refer to MA section. EC-1033 ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION Malfunction Indicator (MI) (Cont'd) ZD30DDTi On board diagnostic system function The on board diagnostic system has the following three functions. Diagnostic Test Mode KEY and ENG. Status Function Explanation of Function Mode I Ignition switch in ON position BULB CHECK This function checks the MI bulb for damage (blown, open circuit, etc.). If the MI does not come on, check MI circuit. (See EC-1276.) Engine running MALFUNCTION WARNING This is a usual driving condition. When ECM detects a malfunction, the MI will light up to inform the driver that a malfunction has been detected. Ignition switch in ON position SELF-DIAGNOSTIC RESULTS This function allows DTCs to be read. Engine stopped Mode II Engine stopped EC-1034 ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION Malfunction Indicator (MI) (Cont'd) ZD30DDTi How to switch diagnostic test modes SEF372YB *1: EC-1276 *2: EC-1034 EC-1035 *3: EC-1276 ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION Malfunction Indicator (MI) (Cont'd) ZD30DDTi Diagnostic test mode I — Bulb check In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to EL section, “WARNING LAMPS AND CHIME” or see EC-1276. Diagnostic test mode I — Malfunction warning MI Condition ON When the malfunction is detected or the ECM's CPU is malfunctioning. OFF No malfunction. Diagnostic test mode II — Self-diagnostic results In this mode, DTC is indicated by the number of blinks of the MI as shown below.

SEF298QA SEF162PB Long (0.6 second) blinking indicates the two LH digits of number and short (0.3 second) blinking indicates the two RH digits of number. For example, the MI blinks 10 times for 6 seconds (0.6 sec x 10 times) and then it blinks three times for about 1 second (0.3 sec x 3 times). This indicates the DTC “1003”. In this way, all the detected malfunctions are classified by their DTC numbers.

The DTC “0505” refers to no malfunction.

(See TROUBLE DIAGNOSIS — INDEX, EC-1006.) How to erase diagnostic test mode II (Self-diagnostic results) The DTC can be erased from the backup memory in the ECM when the diagnostic test mode is changed from Diagnostic Test Mode II to Diagnostic Test Mode I. (Refer to “How to Switch Diagnostic Test Modes”, EC-1035.) + If the battery terminal is disconnected, the DTC will be lost from the backup memory within 24 hours. + Be careful not to erase the stored memory before starting trouble diagnoses. EC-1036 ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION Malfunction Indicator (MI) (Cont'd) ZD30DDTi Relationship between MI, DTC, CONSULT-II and driving patterns

SEF659SC *1: When a malfunction is detected, MI will light up. *2: When the same malfunction is detected in two consecutive driving patterns, MI will stay lit up. *3: MI will go off after vehicle is driven three times without any malfunctions. *4: When a malfunction is detected for the first time, the DTC will be stored in ECM. *5: The DTC will not be displayed any longer after vehicle is driven 40 times without the same malfunction. (The DTC still remain in ECM.) EC-1037 *6: Other screens except SELF-DIAGNOSTIC RESULTS & DATA MONITOR (AUTO TRIG) cannot display the malfunction.

DATA MONITOR (AUTO TRIG) can display the malfunction at the moment it is detected. ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION ZD30DDTi CONSULT-II CONSULT-II INSPECTION PROCEDURE 1. Turn ignition switch OFF. 2. Connect CONSULT-II to data link connector, which is located under the driver side dash panel. SAT165K 3. 4. 5. 6. Turn ignition switch ON. Touch “START”. Touch “ENGINE”. Perform each diagnostic test mode according to each service procedure. For further information, see the CONSULT-II Operation Manual. SEF995X SEF320Y EC-1038 ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION CONSULT-II (Cont'd) ZD30DDTi ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION DIAGNOSTIC TEST MODE ENGINE CONTROL COMPONENT PARTS Item SELF-DIAG RESULTS DATA MONITOR Engine coolant temperature sensor X X Vehicle speed sensor X X Accelerator position sensor X X Accelerator position switch X X Accelerator switch (F/C) X X Crankshaft position sensor (TDC) X X Ignition switch (start signal) X Park/Neutral position (PNP) switch X Battery voltage X Air conditioner switch X ACTIVE TEST X INPUT Mass air flow sensor X X Stop lamp switch X X Heat up switch X Charge air pressure sensor X Glow relay OUTPUT X X EGR volume control valve X X X Cooling fan relay X X X Air conditioner relay X Variable nozzle turbocharger control solenoid valve X Swirl control valve control solenoid valve X Exhaust gas control valve control solenoid valve X X X: Applicable SELF-DIAGNOSTIC MODE Regarding items detected in “SELF-DIAG RESULTS” mode, refer to “TROUBLE DIAGNOSIS — INDEX”, EC-1006.

DATA MONITOR MODE Monitored item [Unit] ECM input signals Main signals CKPSzRPM (TDC) [rpm] j j + The engine speed computed from the crankshaft position sensor (TDC) signal is displayed. CMPSzRPMzPUMP [rpm] j j + The engine speed computed from the pulse signal sent from electronic control fuel injection pump is displayed.

COOLAN TEMP/S [°C] or [°F] j j j Description + The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed. EC-1039 Remarks + When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed. ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION CONSULT-II (Cont'd) Monitored item [Unit] ECM input signals Main signals Description j j + The vehicle speed computed from the vehicle speed sensor signal is displayed. j j + The fuel temperature (sent from electronic control fuel injection pump) is displayed. j j + The accelerator position sensor signal voltage is displayed. FULL ACCEL SW [ON/OFF] j j + Indicates [ON/OFF] condition from the accelerator position switch signal.

ACCEL SW (FC) [OPEN/CLOSE] j j + Indicates [OPEN/CLOSE] condition from the accelerator switch (FC) signal. OFF ACCEL SW [ON/OFF] j j + Indicates [ON/OFF] condition from the accelerator position switch signal. j + The control position of spill valve (sent from electronic control fuel injection pump) is displayed. j j + The power supply voltage of ECM is displayed. P/N POSI SW [ON/OFF] j j + Indicates [ON/OFF] condition from the park/neutral position switch signal. START SIGNAL [ON/OFF] j j + Indicates [ON/OFF] condition from the starter signal. j j + Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal. j j + Indicates [ON/OFF] condition from the stop lamp switch signal. IGN SW [ON/OFF] j j + Indicates [ON/OFF] condition from ignition switch signal. WARM UP SW [ON/OFF] j VHCL SPEED SE [km/h] or [mph] FUEL TEMP SEN [°C] or [°F] ACCEL POS SEN [V] SPILL/V [°CA] BATTERY VOLT [V] AIR COND SIG [ON/OFF] BRAKE SW [ON/OFF] DECELER F/CUT [ON/OFF] j + The signal voltage of the mass air flow sensor is displayed. j + The [ON/OFF] condition from deceleration fuel cut signal (sent from electronic control fuel injection pump) is displayed. j + The duty ratio of fuel injection timing control valve (sent from electronic control fuel injection pump) is displayed. j + Indicates the control condition of the air conditioner relay (determined by ECM according to the input signals). j + The glow relay control condition (determined by ECM according to the input signal) is displayed. INJ TIMG C/V [%] AIR COND RLY [ON/OFF] Remarks + After starting the engine, [OFF] is displayed regardless of the starter signal. + Indicates [ON/OFF] condition from the heat up switch signal. MAS AIR/FL SE [V] j ZD30DDTi GLOW RLY [ON/OFF] EC-1040 + When the engine is stopped, a certain value is indicated. ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION CONSULT-II (Cont'd) Monitored item [Unit] ECM input signals Main signals Description j + Indicates the control condition of the cooling fans (determined by ECM according to the input signal). + ON ...

Operates. OFF ... Stopped. j + Indicates the EGR volume control value computed by the ECM according to the input signals.

+ The opening becomes larger as the value increases.

COOLING FAN [ON/OFF] EGR VOL CON/V [step] VNT S/V 1 [%] + Indicates the variable nozzle turbocharger control solenoid valve control value computed by the ECM according to the input signals. BARO SEN [kPa] + The barometric pressure (determined by the signal voltage from the barometric pressure sensor built into the ECM) is displayed. j SWRL CON S/V 1 [ON/OFF] j EXH/GAS REG V [ON/OFF] ZD30DDTi Remarks + The control condition of the swirl control valve control solenoid valve (determined by ECM according to the input signals) is indicated.

+ ON ... Swirl control valve is closed. + OFF ... Swirl control valve is opened. + The control condition of the exhaust gas control valve control solenoid valve (computed by ECM according to the input signals) is indicated. + ON ... Exhaust gas control valve is closed. + OFF ... Exhaust gas control valve is opened. + This item is applicable for cold area models. On other models, “OFF” is always displayed. NOTE: Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically. EC-1041 ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION CONSULT-II (Cont'd) ZD30DDTi ACTIVE TEST MODE TEST ITEM CONDITION JUDGEMENT CHECK ITEM (REMEDY) COOLING FAN + Ignition switch: ON + Operate the cooling fan at “LOW”, “HI” speed and turn “OFF” using CONSULT-II. OFF ACCEL PO SIG + Clears the self-learning fully closed accelerator position, detected by accelerator position sensor, from the ECM. GLOW RLY + Ignition switch: ON (Engine stopped) + Turn the glow relay “ON” and “OFF” using CONSULT-II and listen to operating sound. Glow relay makes the operating sound.

INJ TIMING* + Engine: Return to the original trouble condition + Retard the injection timing using CONSULT-II. If trouble symptom disappears, see + Electronic control fuel injection CHECK ITEM. pump + Ignition switch: ON + Turn solenoid valve “ON” and SWIRL CONT S/V1 “OFF” with the CONSULT-II and listen to operating sound.

EGR VOL CONT/V + Ignition switch: ON + Change EGR volume control valve opening step using CONSULT-II.

Cooling fan moves at “LOW”, “HI” speed and stops. + Harness and connector + Cooling fan motor + Cooling fan relay + Harness and connector + Glow relay Solenoid valve makes an operating + Harness and connector sound. + Solenoid valve EGR volume control valve makes an operating sound. + Harness and connector + EGR volume control valve *: When using this item, DTC 0707 “P7zF/INJ TIMG FB” may be detected. If so, erase it because it is not a malfunction. EC-1042 ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION CONSULT-II (Cont'd) ZD30DDTi REAL TIME DIAGNOSIS IN DATA MONITOR MODE SEF373Y SEF707X CONSULT-II has two kinds of triggers and they can be selected by touching “SETTING” in “DATA MONITOR” mode. 1) “AUTO TRIG” (Automatic trigger): + The malfunction will be identified on the CONSULT-II screen in real time. In other words, DTC will be displayed if the malfunction is detected by ECM. At the moment a malfunction is detected by ECM, “MONITOR” in “DATA MONITOR” screen is changed to “Recording Data ... xx%” as shown at left, and the data after the malfunction detection is recorded.

Then when the percentage reached 100%, “REAL-TIME DIAG” screen is displayed. If “STOP” is touched on the screen during “ Recording Data ... xx%”, “REAL-TIME DIAG” screen is also displayed. The recording time after the malfunction detection and the recording speed can be changed by “TRIGGER POINT” and “Recording Speed”. Refer to CONSULT-II OPERATION MANUAL. 2) “MANU TRIG” (Manual trigger): + DTC will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM. DATA MONITOR can be performed continuously even though a malfunction is detected. Use these triggers as follows: 1) “AUTO TRIG” + While trying to detect the DTC by performing the “DTC Confirmation Procedure”, be sure to select to “DATA MONITOR (AUTO TRIG)” mode. You can confirm the malfunction at the moment it is detected. + While narrowing down the possible causes, CONSULT-II should be set in “DATA MONITOR (AUTO TRIG)” mode, especially in case the incident is intermittent. When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the “DTC Confirmation Procedure”, the moment a malfunction is found the DTC will be displayed. (Refer to GI section, “Incident Simulation Tests” in “HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT”.) 2) “MANU TRIG” + If the malfunction is displayed as soon as “DATA MONITOR” is selected, reset CONSULT-II to “MANU TRIG”. By selecting “MANU TRIG” you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition. EC-1043 ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION CONSULT-II (Cont'd) ZD30DDTi SEF720X EC-1044 TROUBLE DIAGNOSIS — INTRODUCTION ZD30DDTi Introduction SEF858S SEF233G The engine has an ECM to control major systems such as fuel injection control, fuel injection timing control, glow control system, etc. The ECM accepts input signals from sensors and instantly drives electronic control fuel injection pump.

It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no problems such as vacuum leaks, or other problems with the engine. It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts. A visual check only may not find the cause of the problems. A road test with CONSULT-II or a circuit tester connected should be performed. Follow the “Work Flow”, EC-1047. Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A “Diagnostic Worksheet” like the example on next page should be used. Start your diagnosis by looking for “conventional” problems first. This will help troubleshoot driveability problems on an electronically controlled engine vehicle. SEF234G DIAGNOSTIC WORKSHEET There are many operating conditions that lead to the malfunction of engine components.

A good grasp of such conditions can make troubleshooting faster and more accurate. In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint. Utilize a diagnostic worksheet like the one shown below in order to organize all the information for troubleshooting.

SEF907L EC-1045 TROUBLE DIAGNOSIS — INTRODUCTION Introduction (Cont'd) ZD30DDTi Worksheet sample MTBL0397 EC-1046 TROUBLE DIAGNOSIS — INTRODUCTION ZD30DDTi Work Flow SEF374YB *1 *2 Refer to MA section (“Checking and Replacing Fuel Filter and Draining Water”, “ENGINE MAINTENANCE”). If time data of “SELF-DIAG RESULTS” is other than “0”, perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-1076. *3 *4 If the incident cannot be verified, perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-1076. If the on board diagnostic system cannot be performed, check main power supply and ground circuit. EC-1047 *5 Refer to “TROUBLE DIAGNOSIS FOR POWER SUPPLY”, EC-1077. If malfunctioning part cannot be detected, perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-1076.

TROUBLE DIAGNOSIS — INTRODUCTION Work Flow (Cont'd) ZD30DDTi DESCRIPTION FOR WORK FLOW STEP DESCRIPTION STEP I Get detailed information about the conditions and the environment when the incident/symptom occurred using the “DIAGNOSTIC WORKSHEET”, EC-1045. STEP II Before confirming the concern, check and write down (print out using CONSULT-II) the DTC, then erase the DTC. Refer to EC-1032. If the incident cannot be verified, perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-1076. Study the relationship between the cause, specified by DTC, and the symptom described by the customer. (The “Symptom Matrix Chart” will be useful. Refer to EC-1055.) Also check related service bulletins for information. STEP III Try to confirm the symptom and under what conditions the incident occurs. The “DIAGNOSTIC WORK SHEET” is useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-1076. If the malfunction code is detected, skip STEP IV and perform STEP V. STEP IV Try to detect the DTC by driving in (or performing) the “DTC Confirmation Procedure”. Check and read the DTC by using CONSULT-II. During the DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-1076. In case the “DTC Confirmation Procedure” is not available, perform the “Overall Function Check” instead. The DTC cannot be displayed by this check, however, this simplified “check” is an effective alternative. The “NG” result of the “Overall Function Check” is the same as the DTC detection. STEP V Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC XXXX. If the normal code is indicated, proceed to the Basic Inspection, EC-1049.

Then perform inspections according to the Symptom Matrix Chart.

Refer to EC-1055. STEP VI Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) “Harness Layouts”. Gently shake the related connectors, components or wiring harness with CONSULT-II set in “DATA MONITOR (AUTO TRIG)” mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-1068 or EC-1065. The “Diagnostic Procedure” in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to GI section (“Circuit Inspection”, “HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT”). Repair or replace the malfunction parts. If the malfunctioning part cannot be detected, perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-1076. STEP VII Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the “DTC Confirmation Procedure” and confirm the normal code (DTC No. 0505) is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) DTC in ECM. (Refer to EC-1032.) EC-1048 TROUBLE DIAGNOSIS — BASIC INSPECTION ZD30DDTi Basic Inspection Precaution: Perform Basic Inspection without electrical or mechanical loads applied; + Shift lever is in neutral position, + Heat up switch is OFF, + Headlamp switch is OFF, + Air conditioner switch is OFF, + Rear defogger switch is OFF, + Steering wheel is in the straight-ahead position, etc. 1 INSPECTION START 1. Check service records for any recent repairs that may indicate a related problem. 2. Check the current need for scheduled maintenance, especially for fuel filter and air cleaner filter. Refer to MA section. 3. Open engine hood and check the following: + Harness connectors for improper connections + Vacuum hoses for splits, kinks, or improper connections + Wiring for improper connections, pinches, or cuts SEF142I 4. Start engine and warm it up to the normal operating temperature. c GO TO 2. 2 PREPARATION FOR CHECKING IDLE SPEED With CONSULT-II Connect CONSULT-II to the data link connector.

Without CONSULT-II Install diesel tacho tester to the vehicle. c GO TO 3. EC-1049 TROUBLE DIAGNOSIS — BASIC INSPECTION Basic Inspection (Cont'd) 3 CHECK IDLE SPEED With CONSULT-II 1. Select “CKPSzRPM (TDC)” in “DATA MONITOR” mode with CONSULT-II. 2. Read idle speed. SEF817Y Without CONSULT-II Check idle speed.

750±25 rpm OK or NG OK c INSPECTION END NG c GO TO 4. 4 CHECK FOR INTAKE AIR LEAK Listen for an intake air leak after the mass air flow sensor.

OK or NG OK c GO TO 5. NG c Repair or replace. 5 BLEED AIR FROM FUEL SYSTEM 1. Stop engine. 2.

Using priming pump, bleed air from fuel system. Refer to “Air Bleeding”, EC-1031. c GO TO 6.

EC-1050 ZD30DDTi TROUBLE DIAGNOSIS — BASIC INSPECTION Basic Inspection (Cont'd) 6 ZD30DDTi CHECK IDLE SPEED AGAIN With CONSULT-II 1. Start engine and let it idle. 2. Select “CKPSzRPM (TDC)” in “DATA MONITOR” mode with CONSULT-II. 3. Read idle speed. SEF817Y Without CONSULT-II 1. Start engine and let it idle. 2. Check idle speed.

750±25 rpm OK or NG OK c INSPECTION END NG c GO TO 7. 7 DRIN WATER FROM FUEL FILTER Drain water from fuel filter. Refer to MA section (“Checking and Replacing Fuel Filter and Draining Water”, “ENGINE MAINTENANCE”). c GO TO 8. EC-1051 TROUBLE DIAGNOSIS — BASIC INSPECTION Basic Inspection (Cont'd) 8 CHECK IDLE SPEED AGAIN With CONSULT-II 1. Start engine and let it idle. 2. Select “CKPSzRPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.

3. Read idle speed.

SEF817Y Without CONSULT-II 1. Start engine and let it idle.

2. Check idle speed. 750±25 rpm OK or NG OK c INSPECTION END NG c GO TO 9. EC-1052 ZD30DDTi TROUBLE DIAGNOSIS — BASIC INSPECTION Basic Inspection (Cont'd) 9 CHECK AIR CLEANER FILTER Check air cleaner filter for clogging or breaks. OK or NG OK c GO TO 10. NG c Replace air cleaner filter.

10 CHECK FUEL INJECTION NOZZLE Check fuel injection nozzle opening pressure. Refer to “Injection pressure test”, EC-1025. OK or NG OK c GO TO 11. NG c Replace fuel injection nozzle assembly.

11 CHECK IDLE SPEED AGAIN With CONSULT-II 1. Start engine and let it idle. 2. Select “CKPSzRPM (TDC)” in “DATA MONITOR” mode with CONSULT-II. 3. Read idle speed. SEF817Y Without CONSULT-II 1. Start engine and let it idle. 2. Check idle speed. 750±25 rpm OK or NG OK c INSPECTION END NG c GO TO 12. 12 CHECK COMPRESSION PRESSURE Check compression pressure. Refer to EM section, “MEASUREMENT OF COMPRESSION PRESSURE”. OK or NG OK c GO TO 13. NG c Follow the instruction of “MEASUREMENT OF COMPRESSION PRESSURE”. EC-1053 ZD30DDTi TROUBLE DIAGNOSIS — BASIC INSPECTION Basic Inspection (Cont'd) 13 CHECK IDLE SPEED AGAIN With CONSULT-II 1. Start engine and let it idle. 2. Select “CKPSzRPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.

3. Read idle speed. SEF817Y Without CONSULT-II 1. Start engine and let it idle. 2. Check idle speed. 750±25 rpm OK or NG OK c INSPECTION END NG c Replace electronic control fuel injection pump. EC-1054 ZD30DDTi TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ZD30DDTi Symptom Matrix Chart Feature of symptom, Check point AE Reference page HI IDLE POOR ACCELERATION AD LACK OF POWER AC LOW IDLE AB KNOCK/DETONATION WHEN DECELERATING DURING DRIVING ENGINE STALL AA HESITATION/SURGING/FLAT SPOT Warranty symptom code AT IDLE NO START (without first firing) NO START (with first firing) SYSTEM — Basic engine control system HARD TO START WHEN ENGINE IS HOT HARD TO START WHEN ENGINE IS COLD HARD/NO START/RESTART (EXCP. HA) SYMPTOM 4 — *1 3 EC-1023 *2 AF Electronic control fuel injection pump mainframe 4 4 4 4 4 4 4 4 4 4 5 5 Injection nozzle 3 3 3 3 3 3 3 3 3 3 4 4 Glow system 1 1 1 1 Engine body 3 3 3 3 3 EC-1221 3 3 3 3 4 4 EGR system 3 3 EC-1207 Air cleaner and ducts 3 3 MA section 1 - 5: The numbers refer to the order of inspection. (continued on next page) *1: Fuel injection system malfunction or fuel injection timing control system malfunction may be the cause. *2: Depends on open-valve pressure and spray pattern.

*3: Caused mainly by insufficient compression pressure. *4: Symptom varies depending on off-position of air duct, etc. EC-1055 3 EM section *3 *4 TROUBLE DIAGNOSIS — GENERAL DESCRIPTION Symptom Matrix Chart (Cont'd) ZD30DDTi 4 3 Injection nozzle 3 3 4 5 3 3 3 3 3 — *1 4 Glow system Engine body 4 Feature of symptom, Check point 4 HA Reference page Electronic control fuel injection pump mainframe AP Fuel cut AM Can be detected by CONSULT-II? EXCESSIVE OIL CONSUMPTION AL Malfunction indicator lamp illuminates. EXCESSIVE FUEL CONSUMPTION AK DEAD BATTERY (UNDER CHARGE) OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE AJ ABNORMAL SMOKE COLOR SLOW/NO RETURN TO IDLE AH Warranty symptom code WHITE SMOKE IDLING VIBRATION AG SYSTEM — Basic engine control system BLACK SMOKE ROUGH IDLE/HUNTING SYMPTOM 3 3 3 EGR system 3 Air cleaner and ducts 3 *2 1 EC-1221 3 EM section *3 EC-1207 3 1 - 5: The numbers refer to the order of inspection.

(continued on next page) *1: Fuel injection system malfunction or fuel injection timing control system malfunction may be the cause. *2: Depends on open-valve pressure and spray pattern. *3: Caused mainly by insufficient compression pressure. *4: Symptom varies depending on off-position of air duct, etc. EC-1056 EC-1023 MA section *4 ZD30DDTi TROUBLE DIAGNOSIS — GENERAL DESCRIPTION Symptom Matrix Chart (Cont'd) ENGINE CONTROL Electronic control fuel injection pump circuit *a, *b 1 1 1 1 1 1 AE 1 LOW IDLE HI IDLE POOR ACCELERATION LACK OF POWER KNOCK/DETONATION AC AD AF 1 1 Feature of symptom, Check point AB HESITATION/SURGING/FLAT SPOT WHEN DECELERATING ENGINE STALL DURING DRIVING AT IDLE AA Reference page Warranty symptom code HARD TO START WHEN ENGINE IS HOT NO START (without first firing) NO START (with first firing) Malfunction SYSTEM — ENGINE CONTROL system HARD TO START WHEN ENGINE IS COLD HARD/NO START/RESTART (EXCP. HA) SYMPTOM 1 1 — *c, *d *a, *c 1 Mass air flow sensor circuit 1 1 EC-1086 *b Engine coolant temperature sensor circuit *a, *b Vehicle speed sensor circuit *a, *b 1 1 1 1 1 1 - 5: The numbers refer to the order of inspection. (continued on next page) *a: Open *b: Short *c: Ground short *d: Noise *1: Compensation according to engine coolant temperature does not function. EC-1057 EC-1092 EC-1096 *1 TROUBLE DIAGNOSIS — GENERAL DESCRIPTION Symptom Matrix Chart (Cont'd) ZD30DDTi *a, *b 1 *c, *d — 1 EC-1086 1 EC-1092 1 EC-1096 Feature of symptom, Check point 1 1 Reference page HA Fuel cut DEAD BATTERY (UNDER CHARGE) ABNORMAL SMOKE COLOR WHITE SMOKE EXCESSIVE OIL CONSUMPTION EXCESSIVE FUEL CONSUMPTION OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE SLOW/NO RETURN TO IDLE BLACK SMOKE AP Can be detected by CONSULT-II?

Electronic control fuel injection pump circuit AG AH AJ AK AL AM Malfunction indicator lamp illuminates. ENGINE CONTROL Warranty symptom code IDLING VIBRATION ROUGH IDLE/HUNTING SYSTEM — ENGINE CONTROL system Malfunction SYMPTOM 1 1 *a, *c Mass air flow sensor circuit *b Engine coolant temperature sensor circuit *a, *b Vehicle speed sensor circuit *a, *b 1 1 1 1 - 5: The numbers refer to the order of inspection. (continued on next page) *a: Open *b: Short *c: Ground short *d: Noise *1: Compensation according to engine coolant temperature does not function. EC-1058 1 *1 TROUBLE DIAGNOSIS — GENERAL DESCRIPTION Symptom Matrix Chart (Cont'd) ZD30DDTi *a, *b AE AF LOW IDLE HI IDLE POOR ACCELERATION LACK OF POWER KNOCK/DETONATION AC AD Feature of symptom, Check point AB HESITATION/SURGING/FLAT SPOT WHEN DECELERATING ENGINE STALL DURING DRIVING AT IDLE AA Reference page Warranty symptom code HARD TO START WHEN ENGINE IS HOT NO START (without first firing) NO START (with first firing) Malfunction SYSTEM — ENGINE CONTROL system HARD TO START WHEN ENGINE IS COLD HARD/NO START/RESTART (EXCP. HA) SYMPTOM 1 Accelerator switch (FC) circuit EC-1100 *c *a, *c Fuel cut system line EC-1215 ENGINE CONTROL *b Accelerator position sensor circuit *a, *b Crankshaft position sensor (TDC) circuit *a, *b Charge air pressure sensor circuit 1 1 1 1 *2 1 1 1 *d 1 1 *a, *b, *c 1 1 1 1 EC-1125 EC-1140 Swirl control valve control solenoid valve circuit *a, *b Variable nozzle turbocharger control solenoid valve circuit *a, *b 1 1 *c 1 1 EC-1202 EC-1246 *c 1 1 EC-1261 Intake air control valve control solenoid valve circuit *c Exhaust gas control valve control solenoid valve circuit *c 1 1 1 1 1 - 5: The numbers refer to the order of inspection. (continued on next page) *a: Open *b: Short *c: Ground short *d: Noise *2: Engine runs on after turning ignition switch OFF. EC-1059 1 1 1 1 1 1 1 EC-1254 1 1 EC-1269 TROUBLE DIAGNOSIS — GENERAL DESCRIPTION Symptom Matrix Chart (Cont'd) ZD30DDTi 1 1 Feature of symptom, Check point 1 Reference page 1 Fuel cut HA Can be detected by CONSULT-II? AP DEAD BATTERY (UNDER CHARGE) ABNORMAL SMOKE COLOR WHITE SMOKE BLACK SMOKE EXCESSIVE OIL CONSUMPTION EXCESSIVE FUEL CONSUMPTION OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE IDLING VIBRATION AG AH AJ AK AL AM Malfunction indicator lamp illuminates. Warranty symptom code ROUGH IDLE/HUNTING Malfunction SYSTEM — ENGINE CONTROL system SLOW/NO RETURN TO IDLE SYMPTOM *a, *b Accelerator switch (FC) circuit EC-1100 *c *a, *c Fuel cut system line EC-1215 ENGINE CONTROL *b Accelerator position sensor circuit *a, *b Crankshaft position sensor (TDC) circuit *a, *b 1 1 *2 1 1 EC-1125 1 1 EC-1140 1 1 EC-1202 1 *d Charge air pressure sensor circuit *a, *b, *c Swirl control valve control solenoid valve circuit *a, *b *c 1 1 Variable nozzle turbocharger control solenoid valve circuit *a, *b 1 1 *c 1 1 EC-1246 1 EC-1261 Intake air control valve control solenoid valve circuit *c Exhaust gas control valve control solenoid valve circuit *c 1 EC-1254 1 1 1 - 5: The numbers refer to the order of inspection. (continued on next page) *a: Open *b: Short *c: Ground short *d: Noise *2: Engine runs on after turning ignition switch OFF. EC-1060 1 1 1 1 EC-1269 ZD30DDTi TROUBLE DIAGNOSIS — GENERAL DESCRIPTION Symptom Matrix Chart (Cont'd) *a, *b 1 AC AD AE LOW IDLE HI IDLE POOR ACCELERATION LACK OF POWER KNOCK/DETONATION HESITATION/SURGING/FLAT SPOT WHEN DECELERATING ENGINE STALL DURING DRIVING AT IDLE AB AF 1 *a, *b Feature of symptom, Check point Start signal circuit AA Reference page Warranty symptom code HARD TO START WHEN ENGINE IS HOT NO START (without first firing) NO START (with first firing) Malfunction SYSTEM — ENGINE CONTROL system HARD TO START WHEN ENGINE IS COLD HARD/NO START/RESTART (EXCP. HA) SYMPTOM EC-1230 *3 1 PNP switch circuit EC-1233 ENGINE CONTROL *c Accelerator position switch (Idle) circuit Accelerator position switch (Full) circuit *a, *c 1 1 1 EC-1125 *b 1 1 1 *a, *b 1 1 1 *a 1 Ignition switch circuit 1 1 *4 EC-1125 1 EC-1077 *b *5 *a Power supply for ECM circuit EC-1077 *b 1 - 5: The numbers refer to the order of inspection. (continued on next page) *a: Open *b: Short *c: Ground short *d: Noise *3: Start control does not function. *4: Accelerator position sensor NG signal is output. *5: Engine does not stop.

EC-1061 TROUBLE DIAGNOSIS — GENERAL DESCRIPTION Symptom Matrix Chart (Cont'd) ZD30DDTi *a, *b Feature of symptom, Check point Fuel cut HA Can be detected by CONSULT-II? DEAD BATTERY (UNDER CHARGE) ABNORMAL SMOKE COLOR WHITE SMOKE EXCESSIVE OIL CONSUMPTION EXCESSIVE FUEL CONSUMPTION OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE IDLING VIBRATION BLACK SMOKE AP Reference page Start signal circuit AG AH AJ AK AL AM Malfunction indicator lamp illuminates. Warranty symptom code ROUGH IDLE/HUNTING Malfunction SYSTEM — ENGINE CONTROL system SLOW/NO RETURN TO IDLE SYMPTOM EC-1230 *3 *a, *b PNP switch circuit 1 1 EC-1233 ENGINE CONTROL *c Accelerator position switch (Idle) circuit Accelerator position switch (Full) circuit *a, *c EC-1125 *b 1 1 *a, *b 1 1 *4 EC-1125 *a Ignition switch circuit EC-1077 *b *5 *a 1 Power supply for ECM circuit 1 *b 1 - 5: The numbers refer to the order of inspection. (continued on next page) *a: Open *b: Short *c: Ground short *d: Noise *3: Start control does not function. *4: Accelerator position sensor NG signal is output. *5: Engine does not stop. EC-1062 1 EC-1077 ZD30DDTi TROUBLE DIAGNOSIS — GENERAL DESCRIPTION Symptom Matrix Chart (Cont'd) AE LOW IDLE HI IDLE POOR ACCELERATION LACK OF POWER KNOCK/DETONATION AC AD AF Feature of symptom, Check point AB HESITATION/SURGING/FLAT SPOT WHEN DECELERATING ENGINE STALL DURING DRIVING AT IDLE AA Reference page Warranty symptom code HARD TO START WHEN ENGINE IS HOT NO START (without first firing) NO START (with first firing) Malfunction SYSTEM — ENGINE CONTROL system HARD TO START WHEN ENGINE IS COLD HARD/NO START/RESTART (EXCP. HA) SYMPTOM *a, *b EGR volume control valve circuit EC-1207 *c *a *8 1 1 1 1 1 *9 ENGINE CONTROL Glow relay circuit EC-1221 *b *10 *a 1 1 1 ECM relay (Self-shutoff) circuit EC-1077 *b ECM, Connector circuit *a, *b *11 2 2 2 2 2 2 2 2 2 2 2 2 2 2 EC-1117, 1187, 1200 *a *12 Air conditioner relay circuit EC-1275 *b *13 *a, *c *13 Air conditioner switch circuit EC-1275 *b *14 1 - 5: The numbers refer to the order of inspection. (continued on next page) *a: Open *b: Short *c: Ground short *d: Noise *8: Does not stop operating. *9: Glow lamp does not turn on. *10: Glow lamp does not turn off.

*11: Ground short makes engine unable to stop. *12: Air conditioner does not operate. *13: Air conditioner does not stop operating.

*14: Air conditioner does not work. EC-1063 TROUBLE DIAGNOSIS — GENERAL DESCRIPTION Symptom Matrix Chart (Cont'd) ZD30DDTi Feature of symptom, Check point Reference page Fuel cut HA Can be detected by CONSULT-II?

AP DEAD BATTERY (UNDER CHARGE) ABNORMAL SMOKE COLOR WHITE SMOKE BLACK SMOKE EXCESSIVE OIL CONSUMPTION EXCESSIVE FUEL CONSUMPTION OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE IDLING VIBRATION AG AH AJ AK AL AM Malfunction indicator lamp illuminates.

Warranty symptom code ROUGH IDLE/HUNTING Malfunction SYSTEM — ENGINE CONTROL system SLOW/NO RETURN TO IDLE SYMPTOM *a, *b EGR volume control valve circuit EC-1207 *c 1 *a *8 1 *9 ENGINE CONTROL Glow relay circuit EC-1221 *b *10 *a 1 ECM relay (Self-shutoff) circuit ECM, Connector circuit EC-1077 *b 1 1 *a, *b 2 2 *11 2 2 2 2 2 2 2 2 2 2 EC-1117, 1187, 1200 *a *12 Air conditioner relay circuit EC-1275 *b *13 *a, *c *13 Air conditioner switch circuit EC-1275 *b *14 1 - 5: The numbers refer to the order of inspection. *a: Open *b: Short *c: Ground short *d: Noise *8: Does not stop operating. *9: Glow lamp does not turn on. *10: Glow lamp does not turn off. *11: Ground short makes engine unable to stop. *12: Air conditioner does not operate. *13: Air conditioner does not stop operating.

*14: Air conditioner does not work. EC-1064 TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ZD30DDTi CONSULT-II Reference Value in Data Monitor Mode Remarks: + Specification data are reference values.

+ Specification data are output/input values which are detected or supplied by the ECM at the connector. * Specification data may not be directly related to their components signals/values/operations. MONITOR ITEM CKPSzRPM (TDC) CONDITION SPECIFICATION CMPSzRPM-PUMP + Tachometer: Connect + Run engine and compare tachometer indication with the CONSULT-II value.

Almost the same speed as the CONSULT-II value. COOLAN TEMP/S + Engine: After warming up More than 70°C (158°F) VHCL SPEED SE + Turn drive wheels and compare speedometer indication with the CONSULT-II value Almost the same speed as the CONSULT-II value FUEL TEMP SEN + Engine: After warming up More than 40°C (104°F) + Ignition switch: ON (Engine stopped) Accelerator pedal: fully released 0.40 - 0.60V ACCEL POS SEN Accelerator pedal: fully depressed Approx. 4.5V + Ignition switch: ON (Engine stopped) Accelerator pedal: fully depressed ON Except above OFF + Ignition switch: ON (Engine stopped) Accelerator pedal: fully released CLOSE Accelerator pedal: slightly open OPEN + Ignition switch: ON (Engine stopped) Accelerator pedal: fully released ON OFF ACCEL SW Accelerator pedal: slightly open OFF SPILL/V + Engine: After warming up Approx. 13°CA BATTERY VOLT + Ignition switch: ON (Engine stopped) 11 - 14V P/N POSI SW + Ignition switch: ON START SIGNAL + Ignition switch: ON → START → ON AIR COND SIG + Engine: After warming up, idle the engine FULL ACCEL SW ACCEL SW (FC) BRAKE SW + Ignition switch: ON IGN SW + Ignition switch: ON → OFF WARM UP SW + Ignition switch: ON Shift lever: Park/Neutral ON Except above OFF OFF → ON → OFF Air conditioner switch: OFF OFF Air conditioner switch: ON (Compressor operates.) ON Brake pedal: depressed ON Brake pedal: released Engine: After warming up Air conditioner switch: OFF Shift lever: Neutral position No-load Heat up switch: ON ON Heat up switch: OFF OFF Idle 1.6 - 2.0V Idle OFF MAS AIR/FL SE + + + + DECELER F/CUT + Engine: After warming up INJ TIMG C/V + Engine: After warming up, idle the engine. AIR COND RLY + Engine: After warming up, idle the engine GLOW RLY OFF ON → OFF Approx. 50 - 70% Air conditioner switch: OFF OFF Air conditioner switch: ON (Compressor operates.) ON + Refer to EC-1221. + When cooling fan is stopped. OFF + When cooling fan operates. ON COOLING FAN EC-1065 ZD30DDTi TROUBLE DIAGNOSIS — GENERAL DESCRIPTION CONSULT-II Reference Value in Data Monitor Mode (Cont'd) MONITOR ITEM EGR VOL CON/V VNT S/V 1 CONDITION + + + + Engine: After warming up Air conditioner switch: “OFF” Shift lever: Neutral position No-load After 1 minute of idling More than 10 steps Revving engine from idle to 3,200 rpm 0 step + + + + Engine: After warming up Air conditioner switch: “OFF” Shift lever: Neutral position No-load Idle Approx. 56% 2,000 rpm Approx. 20% BARO SEN + Ignition switch: ON SWRL CON S/V 1 + Lift up the vehicle + Engine: After warming up let it idle for more than 1 second.

+ Air conditioner switch: “OFF” + No-load EXH/GAS REG V* SPECIFICATION + + + + Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm2, 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm2, 12.90 psi) Approx. 1,500 m (4,922 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm2, 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm2, 11.36 psi) Shift lever: Except “P” and “Neutral” positions ON Shift lever: Neutral position OFF Vehicle: Stopped Engine speed: Below 1,200 rpm Engine coolant temperature: Below 87°C (189°F) Heat up switch: ON Except above ON OFF *: This item is applicable for cold area models.

On other models, “OFF” is always displayed.

EC-1066 TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ZD30DDTi Major Sensor Reference Graph in Data Monitor Mode The following are the major sensor reference graphs in “DATA MONITOR” mode. ACCEL POS SEN, “CKPSzRPM (TDC)”, “MAS AIR/FL SE” Below is the data for “ACCEL POS SEN”, “CKPSzRPM (TDC)” and “MAS AIR/FL SE” when revving engine quickly up to 3,000 rpm under no load after warming up engine to the normal operating temperature. Each value is for reference, the exact value may vary. SEF321Y EC-1067 TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ZD30DDTi ECM Terminals and Reference Value PREPARATION 1. ECM is located behind the instrument lower panel.

For this inspection, remove the driver's side instrument lower cover. SEF519VA 2. Remove ECM harness protector. AEC913 3. Perform all voltage measurements with the connector connected. Extend tester probe as shown to perform tests easily. + Open harness securing clip to make testing easier. + Use extreme care not to touch 2 pins at one time. + Data is for comparison and may not be exact. SEF367I Be sure ECM unit is properly grounded before checking. SEF665S EC-1068 ZD30DDTi TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ECM Terminals and Reference Value (Cont'd) ECM HARNESS CONNECTOR TERMINAL LAYOUT SEF064P ECM INSPECTION TABLE Remarks: Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION Engine is running. 2 R/W Intake air control valve control solenoid valve DATA (DC Voltage and Pulse Signal) BATTERY VOLTAGE (11 - 14V) Ignition switch “OFF” For a few seconds after turning ignition switch “OFF” Approximately 0.1V Ignition switch “ON” Ignition switch “OFF” 4 B/Y ECM relay (Self-shutoff) Approximately 0.25V For a few seconds after turning ignition switch “OFF” Ignition switch “OFF” A few seconds passed after turning ignition switch “OFF” EC-1069 BATTERY VOLTAGE (11 - 14V) ZD30DDTi TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ECM Terminals and Reference Value (Cont'd) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage and Pulse Signal) Approximately 5.7V Engine is running. Warm-up condition Idle speed SEF255Z 5 Y/B Tachometer Approximately 6V Engine is running. Warm-up condition Engine speed is 2,000 rpm SEF256Z Engine is running.

11 BR/Y Exhaust gas control valve control solenoid valve Engine speed is below 1,200 rpm Engine coolant temperature is below 87°C (189°F) Stop the vehicle Heat up switch is “ON” Engine is running.

Except the above condition Engine is running. Cooling fan is not operating 14 L Approximately 0.1V BATTERY VOLTAGE (11 - 14V) BATTERY VOLTAGE (11 - 14V) Cooling fan relay Engine is running. Cooling fan is operating Engine is running. Air conditioner switch is “OFF” 15 Y/L Air conditioner relay BATTERY VOLTAGE (11 - 14V) Engine is running. Both air conditioner switch and blower fan switch are “ON” (Compressor is operating) Approximately 0.1V Ignition switch “ON” Approximately 1V Glow lamp is “ON” 16 L/W Glow lamp Ignition switch “ON” Glow lamp is “OFF” EC-1070 BATTERY VOLTAGE (11 - 14V) ZD30DDTi TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ECM Terminals and Reference Value (Cont'd) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage and Pulse Signal) Ignition switch “ON” Approximately 0V Brake pedal fully released 17 G/Y Stop lamp switch Ignition switch “ON” Brake pedal depressed 18 G Malfunction indicator lamp Ignition switch “ON” Approximately 1V Engine is running. BATTERY VOLTAGE (11 - 14V) Idle speed 19 20 LG/R R/W Engine coolant temperature sensor Engine is running. Approximately 0 - 4.8V Output voltage varies with engine coolant temperature Ignition switch “ON” Approximately 0V Ignition switch “START” BATTERY VOLTAGE (11 - 14V) Start signal Engine is running. Air conditioner switch is “OFF” 21 LG/B Air conditioner switch BATTERY VOLTAGE (11 - 14V) BATTERY VOLTAGE (11 - 14V) Engine is running. Both air conditioner switch and blower fan switch are “ON” (Compressor is operating) Approximately 0.1V Ignition switch “ON” 22 P/B Park/Neutral position switch Gear position is “Neutral” (M/T models) Gear position is “P” or “N” (A/T models) Ignition switch “ON” Except the above gear position Approximately 0V BATTERY VOLTAGE (11 - 14V) Ignition switch “ON” 0.4 - 0.6V 23 W Accelerator position sensor Accelerator pedal fully released Ignition switch “ON” Approximately 4.5V Accelerator pedal fully depressed Voltage goes high up once in a few seconds Engine is running. 24 PU/W A/T signal No. 1 Warm-up condition Idle speed SEF448Z EC-1071 ZD30DDTi TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ECM Terminals and Reference Value (Cont'd) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage and Pulse Signal) 0 - Approximately 4.8V Engine is running. Lift up the vehicle In 1st gear position Vehicle speed is 10 km/h (6 MPH) SEF257Z 26 L/OR Vehicle speed sensor Approximately 2.2V Engine is running. Lift up the vehicle In 2nd gear position Vehicle speed is 30 km/h (19 MPH) SEF258Z Ignition switch “ON” Accelerator pedal fully released 29 R/L BATTERY VOLTAGE (11 - 14V) Accelerator switch (F/C) Ignition switch “ON” Approximately 0V Accelerator pedal depressed Engine is running. Warm-up condition Idle speed 30 P Approximately 0V A/T signal No. 3 Engine is running. Warm-up condition Engine speed is 2,000 rpm Ignition switch “ON” 31 R/L Accelerator position switch (Idle) Accelerator pedal fully released Approximately 7.7V BATTERY VOLTAGE (11 - 14V) Ignition switch “ON” Approximately 0V Accelerator pedal depressed Ignition switch “ON” Approximately 0V 32 W/G Accelerator position switch (Full) Accelerator pedal released Ignition switch “ON” Accelerator pedal fully depressed BATTERY VOLTAGE (11 - 14V) Engine is running. 33 G/Y Electronic control fuel injection pump Warm-up condition Idle speed EC-1072 Approximately 2.5V ZD30DDTi TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ECM Terminals and Reference Value (Cont'd) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage and Pulse Signal) Engine is running. 35 R Mass air flow sensor Warm-up condition Idle speed 1.6 - 2.0V Voltage goes high up once in a few seconds Engine is running. 37 P/B A/T signal No. 2 Warm-up condition Idle speed SEF448Z 38 B/Y Ignition switch “OFF” 0V Ignition switch “ON” BATTERY VOLTAGE (11 - 14V) Ignition switch Engine is running. 39 43 B B ECM ground 40 R/B Electronic control fuel injection pump 42 L/G 64 Y/G 65 Y/R Approximately 0V Idle speed Engine is running. Warm-up condition Idle speed Engine is running. Data link connector Idle speed (CONSULT-II is connected and turned on) Approximately 2.5V Approximately 0V Approximately 0V Less than 9V Approximately 0V Engine is running. Warm-up condition Idle speed 44 L SEF333Y Crankshaft position sensor (TDC) Approximately 0V Engine is running.

Warm-up condition Engine speed is 2,000 rpm SEF334Y EC-1073 ZD30DDTi TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ECM Terminals and Reference Value (Cont'd) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage and Pulse Signal) Engine is running. 46 L Charge air pressure sensor 47 B/W Crankshaft position sensor (TDC) ground 48 G/R Accelerator position sensor power supply Ignition switch “ON” Approximately 5V 49 W Sensor's power supply Ignition switch “ON” Approximately 5V Warm-up condition Idle speed Approximately 2.0V Engine is running. Warm-up condition Idle speed Approximately 0V Engine is running. 50 B Sensors' ground 51 L/W Accelerator position sensor ground L/B Electronic control fuel injection pump Engine is running. 52 Electronic control fuel injection pump Engine is running. Warm-up condition Idle speed Approximately 0V Engine is running. 53 L/R Warm-up condition Idle speed Approximately 0V Approximately 0.1V Idle speed Approximately 1.0V Idle speed Engine is running.

54 L/B Swirl control valve control solenoid valve Warm-up condition At idle speed for more than 1 second Lift up the vehicle Gear position is in positions other than “P” and “Neutral” Approximately 0.1V Engine is running. Idle speed Lift up the vehicle Gear position is in “P” or “Neutral” 56 61 116 W W W Power supply for ECM Ignition switch “ON” BATTERY VOLTAGE (11 - 14V) BATTERY VOLTAGE (11 - 14V) Voltage goes high up once in a few seconds Engine is running. 58 L/OR A/T signal No. 4 Warm-up condition Idle speed SEF448Z EC-1074 ZD30DDTi TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ECM Terminals and Reference Value (Cont'd) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage and Pulse Signal) Ignition switch “ON” Approximately 0V Heat up switch is “ON” 59 BR/W Heat up switch Ignition switch “ON” Heat up switch is “OFF” BATTERY VOLTAGE (11 - 14V) Ignition switch “ON” 0.4 - 0.6V 68 B/W Accelerator position sensor signal output Accelerator pedal fully released Ignition switch “ON” Approximately 4.5V Accelerator pedal fully depressed Approximately 6.8V Engine is running. Warm-up condition Idle speed 101 R/B Variable nozzle turbocharger control solenoid valve SEF253Z Approximately 11V Engine is running. Warm-up condition Engine speed is 2,000 rpm SEF254Z Engine is running. 102 G/R Current return Idle speed 103

105 109 115 L/Y L/W L R/L EGR volume control valve 106 112 118 B B B ECM ground 111 LG/B Glow relay BATTERY VOLTAGE (11 - 14V) Engine is running. Warm-up condition Idle speed 0.1 - 14V Engine is running. Approximately 0V Idle speed Refer to "GLOW CONTROL SYSTEM", EC-1221. EC-1075 TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT ZD30DDTi Description Intermittent incidents (I/I) may occur. In many cases, the problem resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on DTC visits. Realize also that the most frequent cause of I/I occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific problem area.

COMMON I/I REPORT SITUATIONS STEP in Work Flow Situation II The CONSULT-II is used.

The SELF-DIAG RESULTS screen shows time data other than "0". III The symptom described by the customer does not recur. IV DTC does not appear during the DTC Confirmation Procedure. VI The Diagnostic Procedure for XXXX does not indicate the problem area. Diagnostic Procedure 1 INSPECTION START Erase DTCs. Refer to "HOW TO ERASE DTC", EC-1032. c GO TO 2. 2 CHECK GROUND TERMINALS Check ground terminals for corroding or loose connection. Refer to GI section ("GROUND INSPECTION", "Circuit Inspection"). OK or NG OK c GO TO 3. NG c Repair or replace.

3 SEARCH FOR ELECTRICAL INCIDENT Perform GI section, "Incident Simulation Tests". OK or NG OK c INSPECTION END NG c Repair or replace. EC-1076 TROUBLE DIAGNOSIS FOR POWER SUPPLY ZD30DDTi Main Power Supply and Ground Circuit ECM TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Ignition switch "ON" Ignition switch "OFF" 4 B/Y ECM relay (Self-shutoff) Approximately 0.25V For a few seconds after turning ignition switch "OFF" Ignition switch "OFF" A few seconds passed after turning ignition switch "OFF" 38 B/Y Ignition switch "OFF" 0V Ignition switch "ON" BATTERY VOLTAGE (11 - 14V) Ignition switch Engine is running. 39 43 B B ECM ground 56 61 116 W W W Power supply for ECM 102 G/R Current return Approximately 0V Idle speed Ignition switch "ON" Engine is running. Idle speed 106 112 118 B B B BATTERY VOLTAGE (11 - 14V) BATTERY VOLTAGE (11 - 14V) BATTERY VOLTAGE (11 - 14V) Engine is running. ECM ground Approximately 0V Idle speed EC-1077 ZD30DDTi TROUBLE DIAGNOSIS FOR POWER SUPPLY Main Power Supply and Ground Circuit (Cont'd) WIRING DIAGRAM TEC096M EC-1078 ZD30DDTi TROUBLE DIAGNOSIS FOR POWER SUPPLY Main Power Supply and Ground Circuit (Cont'd) TEC097M EC-1079 ZD30DDTi TROUBLE DIAGNOSIS FOR POWER SUPPLY Main Power Supply and Ground Circuit (Cont'd) DIAGNOSTIC PROCEDURE 1 INSPECTION START Start engine. Is engine running? Yes or No Yes c GO TO 14. No c GO TO 2. 2 CHECK ECM POWER SUPPLY CIRCUIT-I 1. Turn ignition switch "ON". 2.

Check voltage between ECM terminal 38 and ground with CONSULT-II or tester. SEF397Y OK or NG OK c GO TO 4. NG c GO TO 3. 3 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M51, F6 + Fuse block (J/B) connector M2 + 10A fuse + Harness for open or short between ECM and fuse c Repair open circuit or short to ground or short to power in harness or connectors. 4 CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals 39, 43, 106, 112, 118 and engine ground. Refer to Wiring Diagram. Continuity should exist.

4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 6.

NG c GO TO 5. EC-1080 ZD30DDTi TROUBLE DIAGNOSIS FOR POWER SUPPLY Main Power Supply and Ground Circuit (Cont'd) 5 DETECT MALFUNCTIONING PART Check the following. + Joint connector-3 + Harness for open or short between ECM and engine ground c Repair open circuit or short to ground or short to power in harness or connectors. 6 CHECK ECM POWER SUPPLY CIRCUIT-II 1. Reconnect ECM harness connector.

2. Turn ignition switch "ON" and then "OFF". 3. Check voltage between ECM terminals 56, 61, 116 and ground with CONSULT-II or tester. SEF288Z OK or NG OK c Check electronic control fuel injection pump power supply circuit. Refer to "Diagnostic Procedure", EC-1169. NG (Battery voltage does not exist.) c GO TO 7. NG (Battery voltage exists for more than a few seconds.) c GO TO 13. EC-1081 ZD30DDTi TROUBLE DIAGNOSIS FOR POWER SUPPLY Main Power Supply and Ground Circuit (Cont'd) 7 CHECK ECM POWER SUPPLY CIRCUIT-III 1. Disconnect ECM relay.

SEF225Z 2. Check voltage between relay terminals 1, 3 and ground with CONSULT-II or tester. SEF289Z OK or NG OK c GO TO 9. NG c GO TO 8.

8 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E104, M86 or E127, M21 + 20A fuse + Harness for open or short between ECM relay and battery c Repair open circuit or short to ground or short to power in harness or connectors. 9 CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 4 and ECM relay terminal 2. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 11. NG c GO TO 10. EC-1082 ZD30DDTi TROUBLE DIAGNOSIS FOR POWER SUPPLY Main Power Supply and Ground Circuit (Cont'd) 10 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M52, F7 + Harness for open or short between ECM and ECM relay c Repair open circuit or short to ground or short to power in harness or connectors. 11 CHECK ECM POWER SUPPLY CIRCUIT-IV 1.

Check harness continuity between ECM terminals 56, 61, 116 and ECM relay terminal 5.

Refer to Wiring Diagram. Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 13. NG c GO TO 12. 12 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M50, F5 + Harness for open or short between ECM and ECM relay c Repair open circuit or short to ground or short to power in harness or connectors. 13 CHECK ECM RELAY 1.

Apply 12V direct current between ECM relay terminals 1 and 2. 2. Check continuity between ECM relay terminals 3 and 5, 7 and 6. SEF296X OK or NG OK c GO TO 14. NG c Replace ECM relay. EC-1083 ZD30DDTi TROUBLE DIAGNOSIS FOR POWER SUPPLY Main Power Supply and Ground Circuit (Cont'd) 14 CHECK ECM POWER SUPPLY CIRCUIT-V 1.

Reconnect all harness connectors disconnected.

2. Turn ignition switch "ON". 3.

Check voltage between ECM terminal 102 and ground with CONSULT-II or tester. SEF290Z OK or NG OK c GO TO 16. NG c GO TO 15. 15 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M52, F7 + Fuse block (J/B) connector M2 + 10A fuse + Harness for open or short between ECM and fuse c Repair open circuit or short to ground or short to power in harness or connectors. 16 CHECK ECM POWER SUPPLY CIRCUIT-VI 1. Turn ignition switch "OFF". 2. Disconnect ECM relay. SEF225Z 3. Disconnect ECM harness connector. 4. Check harness continuity between ECM terminals 56, 61, 116 and ECM relay terminal 5. Refer to Wiring Diagram. Continuity should exist. 5. Also check harness for short to ground and short to power. OK or NG OK c GO TO 18. NG c GO TO 17. EC-1084 ZD30DDTi TROUBLE DIAGNOSIS FOR POWER SUPPLY Main Power Supply and Ground Circuit (Cont'd) 17 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M50, F5 + Harness for open or short between ECM and ECM relay c Repair open circuit or short to ground or short to power in harness or connectors. 18 CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT 1. Check harness continuity between ECM terminals 39, 43, 106, 112, 118 and engine ground. Refer to Wiring Diagram. Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 20.

NG c GO TO 19. 19 DETECT MALFUNCTIONING PART Check the following. + Joint connector-3 + Harness for open or short between ECM and engine ground c Repair open circuit or short to ground or short to power in harness or connectors.

20 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. c INSPECTION END EC-1085 ZD30DDTi DTC 0102 MASS AIR FLOW SEN Component Description SEF987W The mass air flow sensor (MAFS) is placed in the stream of intake air. It measures the intake air flow rate by measuring a part of the entire intake air flow. It consists of a hot wire that is supplied with electric current from the ECM. The temperature of the hot wire is controlled by the ECM a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss. Therefore, the ECM must supply more electric current to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change. CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM CONDITION + + + + MAS AIR/FL SE Engine: After warming up Air conditioner switch: "OFF" Shift lever: Neutral position No-load SPECIFICATION Idle 1.6 - 2.0V ECM Terminals and Reference Value Specification data are reference values, and are measured between each terminal and ground.

CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor.

Use a ground other than ECM terminals, such as the ground. TERMINAL NO.

WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 35 R Mass air flow sensor 49 W Sensor's power supply 1.6 - 2.0V Warm-up condition Idle speed Ignition switch "ON" Approximately 5V Engine is running. 50 B Sensor's ground Approximately 0V Warm-up condition Idle speed On Board Diagnosis Logic Malfunction is detected when ... Check Items (Possible Cause) + An excessively high or low voltage from the sensor is sent to ECM. + Harness or connectors (The sensor circuit is open or shorted.) + Mass air flow sensor EC-1086 DTC 0102 MASS AIR FLOW SEN ZD30DDTi DTC Confirmation Procedure WITH CONSULT-II 1) 2) 3) 4) Turn ignition switch "ON", and wait at least 6 seconds. Select "DATA MONITOR" mode with CONSULT-II. Start engine and wait at least 3 seconds. If DTC is detected, go to "Diagnostic Procedure", EC-1089. WITHOUT CONSULT-II SEF817Y 1) Turn ignition switch "ON", and wait at least 6 seconds. 2) Start engine and wait at least 3 seconds. 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. 5) If DTC is detected, go to "Diagnostic Procedure", EC-1089.

EC-1087 DTC 0102 MASS AIR FLOW SEN ZD30DDTi Wiring Diagram TEC098M EC-1088 DTC 0102 MASS AIR FLOW SEN ZD30DDTi Diagnostic Procedure 1 CHECK MAFS POWER SUPPLY CIRCUIT 1.

Turn ignition switch "OFF". 2. Disconnect mass air flow sensor harness connector. SEF226Z 3. Turn ignition switch "ON". 4. Check voltage between mass air flow sensor terminals 2, 4 and gund with CONSULT-II or tester. SEF297X OK or NG OK c GO TO 3. NG c GO TO 2. 2 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E230, F12 + Harness connectors M50, F5 + Harness for open or short between mass air flow sensor and ECM + Harness for open or short between mass air flow sensor and ECM relay c Repair open circuit or short to ground or short to power in harness or connector. EC-1089 DTC 0102 MASS AIR FLOW SEN Diagnostic Procedure (Cont'd) 3 ZD30DDTi CHECK MAFS GROUND CIRCUIT FOR OPEN AND SHORT 1.

Turn ignition switch "OFF". 2.

Loosen and retighten engine ground screws. SEF227Z 3. Check harness continuity between mass air flow sensor terminal 3 and engine ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c GO TO 4. 4 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E230, F12 + Harness connectors M51, F6 + Harness connectors E106, M88 + Harness for open or short between mass air flow sensor and ECM + Harness for open or short between mass air flow sensor and TCM (Transmission control module) c Repair open circuit or short to ground or short to power in harness or connectors. 5 CHECK MAFS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Disconnect ECM harness connector. 2. Check harness continuity between mass air flow sensor terminal 1 and ECM terminal 35. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 7.

NG c GO TO 6. 6 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E230, F12 + Harness for open or short between mass air flow sensor and ECM c Repair open circuit or short to ground or short to power in harness or connectors. EC-1090 DTC 0102 MASS AIR FLOW SEN Diagnostic Procedure (Cont'd) 7 CHECK MASS AIR FLOW SENSOR 1. Reconnect harness connectors disconnected. 2. Start engine and warm it up to normal operating temperature. 3. Check voltage between ECM terminal 35 (Mass air flow sensor signal) and ground. SEF400Y 4. If the voltage is out of specification, disconnect MAFS harness connector and connect it again. Then repeat above check.

OK or NG OK c GO TO 8. NG c Replace mass air flow sensor. 8 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. c INSPECTION END EC-1091 ZD30DDTi ZD30DDTi DTC 0103 COOLANT TEMP SEN Description The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases. SEF594K SEF012P Engine coolant temperature °C (°F) Voltage* (V) Resistance (kΩ) −10 (14) 4.4 7.0 - 11.4 20 (68) 3.5 2.1 - 2.9 50 (122) 2.3 0.68 - 1.00 90 (194) 1.0 0.236 - 0.260 *: These data are reference values and measured between ECM terminal 19 (Engine coolant temperature sensor) and ground. CAUTION: Do not use ECM ground terminals when measuring input/ output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. On Board Diagnosis Logic Malfunction is detected when ... Check Items (Possible Cause) + An excessively high or low voltage from the sensor is entered to ECM. + Harness or connectors (The sensor circuit is open or shorted.) + Engine coolant temperature sensor DTC Confirmation Procedure WITH CONSULT-II 1) 2) 3) 4) Turn ignition switch "ON". Select "DATA MONITOR" mode with CONSULT-II.

Wait at least 5 seconds. If DTC is detected, go to "Diagnostic Procedure", EC-1094. WITHOUT CONSULT-II SEF817Y 1) Turn ignition switch "ON" and wait at least 5 seconds. 2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. 4) If DTC is detected, go to "Diagnostic Procedure", EC-1094. EC-1092 DTC 0103 COOLANT TEMP SEN ZD30DDTi Wiring Diagram TEC099M EC-1093 DTC 0103 COOLANT TEMP SEN ZD30DDTi Diagnostic Procedure 1 CHECK ECTS POWER SUPPLY CIRCUIT 1. Turn ignition switch "OFF". 2. Disconnect engine coolant temperature sensor harness connector. SEF228Z 3. Turn ignition switch "ON". 4. Check voltage between ECTS terminal 2 and ground with CONSULT-II or tester. SEF401Y OK or NG OK c GO TO 3. NG c GO TO 2. 2 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E230, F12 + Harness for open or short between engine control temperature sensor and ECM c Repair open circuit or short to ground or short to power in harness or connectors.

3 CHECK ECTS GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Check harness continuity between ECTS terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c GO TO 4. EC-1094 DTC 0103 COOLANT TEMP SEN Diagnostic Procedure (Cont'd) 4 ZD30DDTi DETECT MALFUNCTIONING PART Check the following. + Harness connectors E230, F12 + Harness connectors F6, M51 + Harness connectors M88, E106 + Harness for open or short between engine coolant temperature sensor and ECM + Harness for open or short between engine coolant temperature sensor and TCM (Transmission control module) c Repair open circuit or short to ground or short to power in harness or connectors. 5 CHECK ENGINE COOLANT TEMPERATURE SENSOR 1.

Remove engine coolant temperature sensor from the engine. 2. Check resistance between ECTS terminals 1 and 2 as shown in the figure. SEF304X OK or NG OK c GO TO 6. NG c Replace engine coolant temperature sensor. 6 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. c INSPECTION END EC-1095 ZD30DDTi DTC 0104 VEHICLE SPEED SEN Description The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM.

AEC110 ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO.

WIRE COLOR ITEM DATA (DC Voltage and Pulse Signal) CONDITION 0 - Approximately 4.8V Engine is running. Lift up the vehicle In 1st gear position Vehicle speed is 10 km/h (6 MPH) SEF257Z 26 L/OR Vehicle speed sensor Approximately 2.2V Engine is running. Lift up the vehicle In 2nd gear position Vehicle speed is 30 km/h (19 MPH) SEF258Z On Board Diagnosis Logic Malfunction is detected when .... Check Items (Possible Cause) + The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven. + Harness or connector (The vehicle speed sensor circuit is open or shorted.) + Vehicle speed sensor EC-1096 DTC 0104 VEHICLE SPEED SEN ZD30DDTi Overall Function Check Use this procedure to check the overall function of the vehicle speed sensor circuit. During this check, a DTC might not be confirmed. WITH CONSULT-II SEF864Y 1) Lift up the vehicle. 2) Start engine. 3) Read vehicle speed sensor signal in "DATA MONITOR" mode with CONSULT-II. The vehicle speed on CONSULT-II should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position. 4) If NG, go to "Diagnostic Procedure", EC-1099. WITHOUT CONSULT-II 1) 2) 3) 4) SEF811R Lift up the vehicle. Start engine. Rotate drive wheel by hand. Check voltage between ECM terminal 26 and ground with tester. Voltage should vary between 0 - 4.8V. 5) If NG, go to "Diagnostic Procedure", EC-1099. EC-1097 DTC 0104 VEHICLE SPEED SEN ZD30DDTi Wiring Diagram TEC100M EC-1098 DTC 0104 VEHICLE SPEED SEN ZD30DDTi Diagnostic Procedure 1 CHECK VEHICLE SPEED SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector and combination meter harness connector. 3. Check harness continuity between ECM terminal 26 and combination meter terminal 26.

Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 3. NG c GO TO 2. 2 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M52, F7 + Joint connector-1 + Harness for open or short between ECM and combination meter c Repair open circuit or short to ground or short to power in harness or connectors. 3 CHECK SPEEDOMETER FUNCTION Make sure that speedometer functions properly. OK or NG OK c GO TO 5. NG c GO TO 4.

4 CHECK SPEEDOMETER CIRCUIT FOR OPEN AND SHORT Check the following. + Harness connectors E70, E201 + Harness connectors M86, E104 or M21, E127 + Harness for open or short between combination meter and vehicle speed sensor OK or NG OK c Check vehicle speed sensor and combination meter. Refer to EL section. NG c Repair open circuit or short to ground or short to power in harness or connectors. 5 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. c INSPECTION END EC-1099 ZD30DDTi DTC 0203 ACCEL POS SW (F/C) Description The accelerator switch is installed to the accelerator pedal assembly. The switch senses accelerator position and sends an ON-OFF signal to the ECM. The ECM uses the signal to control the fuel cut operation at deceleration for better fuel efficiency. SEF687V CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM ACCEL SW (FC) DECELER F/CUT CONDITION SPECIFICATION + Ignition switch: ON (Engine stopped) Accelerator pedal: fully released CLOSE Accelerator pedal: slightly open OPEN + Engine: After warming up Idle OFF ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Ignition switch "ON" Accelerator pedal fully released 29 R/L BATTERY VOLTAGE (11 - 14V) Accelerator switch (F/C) Ignition switch "ON" Approximately 0V Accelerator pedal depressed On Board Diagnosis Logic Malfunction is detected when .... Check Items (Possible Cause) + The OFF signal (short) is sent to the ECM for a certain period of time even when the accelerator pedal is not being depressed. + Harness or connectors (The switch circuit is shorted.) + Accelerator switch (F/C) EC-1100 DTC 0203 ACCEL POS SW (F/C) ZD30DDTi DTC Confirmation Procedure WITH CONSULT-II 1) Turn ignition switch "ON". 2) Select "DATA MONITOR" mode with CONSULT-II. 3) Fully depress and fully release accelerator pedal, and wait 15 seconds. 4) Repeat step 3 at least 29 times. 5) If DTC is detected, go to "Diagnostic Procedure", EC-1103. WITHOUT CONSULT-II SEF817Y 1) Turn ignition switch "ON". 2) Fully depress and fully release accelerator pedal, and then wait 15 seconds. 3) Repeat step 2 at least 29 times. 4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. 6) If DTC is detected, go to "Diagnostic Procedure", EC-1103. EC-1101 DTC 0203 ACCEL POS SW (F/C) ZD30DDTi Wiring Diagram TEC101M EC-1102 DTC 0203 ACCEL POS SW (F/C) ZD30DDTi Diagnostic Procedure 1 CHECK ACCELERATOR SWITCH (F/C) GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screws. 3. Disconnect accelerator switch (F/C) harness connector. SEF688V 4. Check harness continuity between accelerator switch (F/C) terminal 3 and engine ground. Refer to Wiring Diagram. Continuity should exist.

5. Also check harness for short to ground and short to power. OK or NG OK c GO TO 3. NG c GO TO 2. 2 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M51, F6 (RHD models) + Joint connector-3 + Harness for open or short between accelerator switch (F/C) and engine ground c Repair open circuit or short to ground or short to power in harness or connectors. 3 CHECK ACCELERATOR SWITCH (F/C) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 29 and accelerator switch (F/C) terminal 1. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c GO TO 4. 4 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M51, F6 (RHD models) + Harness for open or short between ECM and accelerator switch (F/C) c Repair open circuit or short to ground or short to power in harness or connectors. EC-1103 DTC 0203 ACCEL POS SW (F/C) Diagnostic Procedure (Cont'd) 5 CHECK ACCELERATOR SWITCH (F/C) Check continuity between accelerator switch (F/C) connector terminals 1 and 3 under the following conditions. SEF274Z OK or NG OK c GO TO 6. NG c Replace accelerator pedal assembly. 6 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. c INSPECTION END EC-1104 ZD30DDTi ZD30DDTi DTC 0208 OVER HEAT Description SYSTEM DESCRIPTION Sensor Input signal to ECM Vehicle speed sensor Vehicle speed Engine coolant temperature sensor Engine coolant temperature Air conditioner switch Air conditioner "ON" signal ECM function Cooling fan control Actuator Cooling fan relay The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, air conditioner ON signal. The control system has 2-step control [ON/OFF]. OPERATION SEF450Z CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM AIR COND SIG COOLING FAN CONDITION + Engine: After warming up, idle the engine SPECIFICATION Air conditioner switch: OFF OFF Air conditioner switch: ON (Compressor operates.) ON + When cooling fan is stopped. OFF + When cooling fan operates. ON EC-1105 ZD30DDTi DTC 0208 OVER HEAT ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. BATTERY VOLTAGE (11 - 14V) Cooling fan is not operating 14 L Cooling fan relay Engine is running. Approximately 0.1V Cooling fan is operating On Board Diagnosis Logic This diagnosis continuously monitors the engine coolant temperature. If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise. When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated. Malfunction is detected when ... Check Items (Possible Cause) + Cooling fan does not operate properly (Overheat). + Cooling fan system does not operate properly (Overheat). + Engine coolant was not added to the system using the proper filling method. + Harness or connectors (The cooling fan circuit is open or shorted.) + Cooling fan + Radiator hose + Radiator + Radiator cap + Water pump + Thermostat + Fan belt + Engine coolant temperature sensor For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-1116. CAUTION: When a malfunction is indicated, be sure to replace the coolant following the procedure in the MA section ("Changing Engine Coolant", "ENGINE MAINTENANCE"). Also, replace the engine oil. 1) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA section ("Anti-freeze Coolant Mixture Ratio", "RECOMMENDED LUBRICANTS AND FLUIDS"). 2) After refilling coolant, run engine to ensure that no water-flow noise is emitted. EC-1106 DTC 0208 OVER HEAT ZD30DDTi Overall Function Check AEC640 Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed. WARNING: Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator. Wrap a thick cloth around the cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off. WITH CONSULT-II SEF111X 1) Check the coolant level in the reservoir tank and radiator. Allow engine to cool before checking coolant level. If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-1109. 2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-1109. 3) Turn ignition switch "ON". 4) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II and make sure that cooling fans operate when touching "HIGH" or "LOW". If NG, go to "Diagnostic Procedure", EC-1109. WITHOUT CONSULT-II MEC475B 1) Check the coolant level in the reservoir tank and radiator. Allow engine to cool before checking coolant level. If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-1109. 2) Confirm whether customer filled the coolant or not.

If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-1109. 3) Disconnect engine coolant temperature sensor harness connector. 4) Connect 150Ω resistor to engine coolant temperature sensor harness connector. 5) Start engine and make sure that cooling fan operates. Be careful not to overheat engine. 6) If NG, go to "Diagnostic Procedure", EC-1109. EC-1107 DTC 0208 OVER HEAT ZD30DDTi Wiring Diagram TEC102M EC-1108 DTC 0208 OVER HEAT Diagnostic Procedure 1 INSPECTION START Do you have CONSULT-II? Yes or No Yes c GO TO 2. No c GO TO 3. 2 CHECK COOLING FAN OPERATION With CONSULT-II 1. Turn ignition switch "ON". 2. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II. SEF646X 3. Make sure that cooling fan-1 operates. OK or NG OK c GO TO 12. NG c GO TO 4. EC-1109 ZD30DDTi DTC 0208 OVER HEAT Diagnostic Procedure (Cont'd) 3 CHECK COOLING FAN OPERATION Without CONSULT-II 1. Turn ignition switch "OFF". 2. Disconnect engine coolant temperature sensor harness connector.

3. Connect 150Ω resistor to engine coolant temperature sensor harness connector.

4. Restart engine and make sure that cooling fan operates. MEC475B OK or NG OK c GO TO 12. NG c GO TO 4. EC-1110 ZD30DDTi DTC 0208 OVER HEAT Diagnostic Procedure (Cont'd) 4 ZD30DDTi CHECK COOLING FAN POWER SUPPLY CIRCUIT 1. Turn ignition switch "OFF". 2. Disconnect cooling fan relay-1. SEF690V 3. Turn ignition switch "ON". 4. Check voltage between cooling fan relay-1 terminals 2, 5 and ground with CONSULT-II or tester. SEF291Z OK or NG OK c GO TO 6. NG c GO TO 5.

5 DETECT MALFUNCTIONING PART Check the following. + Fuse block (J/B) connector E112 + 10A fuse or 20A fuse + 30A fusible links + Harness for open or short between cooling fan relay-1 and fuse + Harness for open or short between cooling fan relay-1 and battery c Repair open circuit or short to ground or short to power in harness or connectors. EC-1111 DTC 0208 OVER HEAT Diagnostic Procedure (Cont'd) 6 ZD30DDTi CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Disconnect cooling fan motor-1 harness connector. SEF691V 3. Check harness continuity between cooling fan relay-1 terminal 3 and cooling fan motor-1 terminals 1, 3, cooling fan motor-1 terminals 2, 4 and body ground.

Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 7. NG c Repair open circuit or short to ground or short to power in harness or connectors. 7 CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 14 and cooling fan relay-1 terminal 1. Refer to Wiring Diagram. Continuity should exist.

3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 9. NG c GO TO 8. 8 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + Harness connectors M52, F7 + Harness for open or short between cooling fan relay-1 and ECM c Repair open circuit or short to ground or short to power in harness or connectors. EC-1112 DTC 0208 OVER HEAT Diagnostic Procedure (Cont'd) 9 CHECK COOLING FAN RELAY-1 Check continuity between cooling fan relay-1 terminals 3 and 5 under the following conditions. SEF608X OK or NG OK c GO TO 10. NG c Replace cooling fan relay. 10 CHECK COOLING FAN MOTOR-1 Supply battery voltage between the following terminals and check operation. SEF292Z OK or NG OK c GO TO 11.

NG c Replace cooling fan motor. 11 CHECK INTERMITTENT INCIDENT Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. c INSPECTION END EC-1113 ZD30DDTi DTC 0208 OVER HEAT Diagnostic Procedure (Cont'd) 12 CHECK COOLING SYSTEM FOR LEAK Apply pressure to the cooling system with a tester, and check if the pressure drops. Testing pressure: 157 kPa (1.57 bar, 1.6 kg/cm2, 23 psi) CAUTION: Higher than the specified pressure may cause radiator damage. SLC754A Pressure should not drop.

OK or NG OK c GO TO 14. NG c GO TO 13. 13 DETECT MALFUNCTIONING PART Check the following for leak. + Hose + Radiator + Water pump (Refer to LC section, "Water Pump".) c Repair or replace. 14 CHECK RADIATOR CAP Apply pressure to cap with a tester and check radiator cap relief pressure.

SLC755A Radiator cap relief pressure: 79 - 98 kPa (0.78 - 0.98 bar, 0.8 - 1.0 kg/cm2, 11 - 14 psi) OK or NG OK c GO TO 15.

NG c Replace radiator cap.

EC-1114 ZD30DDTi DTC 0208 OVER HEAT Diagnostic Procedure (Cont'd) 15 ZD30DDTi CHECK THERMOSTAT 1. Remove thermostat.

2. Check valve seating condition at normal room temperatures. It should seat tightly. 3. Check valve opening temperature and valve lift. SLC343 Valve opening temperature: 82°C (180°F) [standard] (Models for cold areas) 76.5°C (170°F) [standard] (Models for except cold areas) Valve lift: More than 10 mm/95°C (0.394 in/203°F) 4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to LC section, "Thermostat". OK or NG OK c GO TO 16. NG c Replace thermostat.

16 CHECK ENGINE COOLANT TEMPERATURE SENSOR 1. Remove engine coolant temperature sensor. 2. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure. SEF304X OK or NG OK c GO TO 17. NG c Replace engine coolant temperature sensor.

EC-1115 DTC 0208 OVER HEAT Diagnostic Procedure (Cont'd) 17 ZD30DDTi CHECK MAIN 12 CAUSES If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-1116. c INSPECTION END Main 12 Causes of Overheating Engine Step Inspection item OFF 1 + + + + 2 Equipment Standard Reference page + Visual No blocking + Coolant mixture + Coolant tester 30 - 50% coolant mixture See "RECOMMENDED FLUIDS AND LUBRICANTS" in MA section. 3 + Coolant level + Visual Coolant up to MAX level in reservoir tank and radiator filler neck See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA section. 4 + Radiator cap + Pressure tester 78 - 98 kPa (0.78 - 0.98 bar, 0.8 - 1.0 kg/cm2, 11 - 14 psi) 59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm2, 9 - 14 psi) (Limit) See "System Check", "ENGINE COOLING SYSTEM" in LC section. ON*2 5 + Coolant leaks + Visual No leaks See "System Check", "ENGINE COOLING SYSTEM" in LC section. ON*2 6 + Thermostat + Touch the upper and lower radiator hoses Both hoses should be hot. See "Thermostat" and "Radiator", "ENGINE COOLING SYSTEM" in LC section. ON*1 7 + Cooling fan + Visual Operating OFF 8 + Combustion gas leak + Color checker chemical Negative tester 4 gas analyzer — ON*3 9 + Coolant temperature gauge + Visual — Blocked Blocked Blocked Blocked radiator condenser radiator grille bumper Gauge less than 3/4 when driving — See "DTC 0208 OVER HEAT", EC-1105. + Coolant overflow to res- + Visual ervoir tank No overflow during driving See "Changing Engine and idling Coolant", "ENGINE MAINTENANCE" in MA section. OFF*4 10 + Coolant return from res- + Visual ervoir tank to radiator Should be initial level in reservoir tank See "ENGINE MAINTENANCE" in MA section. OFF 11 + Cylinder head + Straight gauge feeler gauge 0.1 mm (0.004 in) Maximum distortion (warping) See "Inspection", "CYLINDER HEAD" in EM section. 12 + Cylinder block and pistons + Visual No scuffing on cylinder walls or piston See "Inspection", "CYLINDER BLOCK" in EM section. *1: Engine running at idle. *2: Engine running at 3,000 rpm for 10 minutes. *3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes. *4: After 60 minutes of cool down time. For more information, refer to "OVERHEATING CAUSE ANALYSIS" in LC section. EC-1116 DTC 0301 ECM 2, DTC 0901 ECM 12 ZD30DDTi Description The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the engine. SEC220B On Board Diagnosis Logic Malfunction is detected when ... Check Items (Possible Cause) + ECM (ECCS-D control module) + ECM calculation function is malfunctioning. DTC Confirmation Procedure WITH CONSULT-II 1) 2) 3) 4) Turn ignition switch "ON". Select "DATA MONITOR" mode with CONSULT-II. Start engine and wait at least 2 seconds. If DTC is detected, go to "Diagnostic Procedure", EC-1118. WITHOUT CONSULT-II SEF817Y 1) Turn ignition switch "ON" and wait at least 2 seconds. 2) Start engine and wait at least 2 seconds. 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

5) If DTC is detected, go to "Diagnostic Procedure", EC-1118. EC-1117 DTC 0301 ECM 2, DTC 0901 ECM 12 Diagnostic Procedure 1 INSPECTION START With CONSULT-II 1. Turn ignition switch "ON". 2. Select "SELF DIAG RESULTS" mode with CONSULT-II. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure", EC-1117, again. 5. Is the malfunction displayed again? Without CONSULT-II 1. Turn ignition switch "ON". 2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. 3. Perform "DTC Confirmation Procedure", EC-1117, again. 4. Perform "Diagnostic Test Mode II (Self-diagnostic results)". 5. Is the DTC 0301 or 0901 displayed again? Yes or No Yes c Replace ECM. No c INSPECTION END EC-1118 ZD30DDTi DTC 0402 P9zFUEL TEMP SEN ZD30DDTi Description SYSTEM DESCRIPTION SEF437Y The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange). The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit. By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve. Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators builtinto electronic control fuel injection pump.

These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM. FUEL INJECTION AMOUNT CONTROL In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time. FUEL INJECTION TIMING CONTROL Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber. FUEL TEMPERATURE SENSOR The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature. CAM RING POSITION SENSOR The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor.

The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor. EC-1119 ZD30DDTi DTC 0402 P9zFUEL TEMP SEN CONSULT-II Reference Value in Data Monitor Mode Remarks: Specification data are reference values. MONITOR ITEM CONDITION SPECIFICATION FUEL TEMP SEN + Engine: After warming up More than 40°C (104°F) SPILL/V + Engine: After warming up Approx. 13°CA INJ TIMG C/V + Engine: After warming up, idle the engine. Approx. 50 - 70% DECELER F/CUT + Engine: After warmIdle ing up OFF + Ignition switch: ON Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm2, 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm2, 12.90 psi) Approx. 1,500 m (4,992 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm2, 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm2, 11.36 psi) BARO SEN ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 33 G/Y Electronic control fuel injection pump 40 R/B Electronic control fuel injection pump L/B Electronic control fuel injection pump Engine is running. 52 Electronic control fuel injection pump Engine is running. Approximately 2.5V Warm-up condition Idle speed Engine is running. 53 L/R Approximately 2.5V Warm-up condition Idle speed Approximately 0.1V Idle speed Approximately 0.35V Idle speed On Board Diagnosis Logic Malfunction is detected when .... Check Items (Possible cause) + An improper voltage signal from fuel temperature sensor (Built-into electronic control fuel injection pump) is sent to injection pump control unit. + Harness or connectors (Electronic control fuel injection pump circuit is open or shorted.) + Electronic control fuel injection pump EC-1120 DTC 0402 P9zFUEL TEMP SEN ZD30DDTi DTC Confirmation Procedure WITH CONSULT-II 1) Turn ignition switch "ON" and wait at least 2 seconds. 2) Select "DATA MONITOR" mode with CONSULT-II. 3) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.) 4) If DTC is detected, go to "Diagnostic Procedure", EC-1123. SEF817Y WITHOUT CONSULT-II 1) Turn ignition switch "ON" and wait at least 2 seconds. 2) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.) 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. 5) If DTC is detected, go to "Diagnostic Procedure", EC-1123. EC-1121 DTC 0402 P9zFUEL TEMP SEN ZD30DDTi Wiring Diagram TEC113M EC-1122 DTC 0402 P9zFUEL TEMP SEN ZD30DDTi Diagnostic Procedure 1 CHECK ELECTRONIC CONTROL FUEL INJECTION PUMP POWER SUPPLY CIRCUIT 1. Turn ignition switch "OFF". 2. Disconnect electronic control fuel injection pump harness connector. SEF229Z 3. Turn ignition switch "ON". 4. Check voltage between electronic control fuel injection pump terminal 7 and ground. SEF438Y OK or NG OK c GO TO 3. NG c GO TO 2. 2 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M50, F5 + Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and ECM + Harness for open or short between electronic control fuel injection pump and ECM relay c Repair open circuit or short to ground or short to power in harness or connectors.

3 CHECK ELECTRONIC CONTROL FUEL INJECTION PUMP GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Check harness continuity between electronic control fuel injection pump terminal 6 and ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c GO TO 4. EC-1123 DTC 0402 P9zFUEL TEMP SEN Diagnostic Procedure (Cont'd) 4 ZD30DDTi DETECT MALFUNCTIONING PART Check the following. + Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and engine ground c Repair open circuit or short to ground or short to power in harness or connectors. 5 CHECK COMMUNICATION LINE FOR OPEN AND SHORT 1. Check continuity between the following terminals. Refer to Wiring Diagram.

MTBL0444 Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 7. NG c GO TO 6. 6 DETECT MALFUNCTIONING PART Check the following. + Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and ECM c Repair open circuit or short to ground or short to power in harness or connectors. 7 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. OK or NG OK c Replace electronic control fuel injection pump. NG c Repair open circuit or short to ground or short to power in harness or connectors.

EC-1124 ZD30DDTi DTC 0403 ACCEL POS SENSOR Description The accelerator position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected. The accelerator position switch detects Off-accelerator switch signal and Full-accelerator switch signal and send these signals to the ECM. The ECM will then determine engine idle conditions. These signals are also used for diagnosing the accelerator position sensor. SEF861SA CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM ACCEL POS SEN FULL ACCEL SW OFF ACCEL SW CONDITION SPECIFICATION + Ignition switch: ON (Engine stopped) Accelerator pedal: released 0.40 - 0.60V Accelerator pedal: depressed Approx. 4.5V + Ignition switch: ON (Engine stopped) Accelerator pedal: fully depressed ON Except above OFF + Ignition switch: ON (Engine stopped) Accelerator pedal: fully released ON Accelerator pedal: slightly open OFF EC-1125 ZD30DDTi DTC 0403 ACCEL POS SENSOR ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Ignition switch "ON" 0.4 - 0.6V 23 W Accelerator position sensor Accelerator pedal fully released Ignition switch "ON" Approximately 4.5V Accelerator pedal fully depressed Ignition switch "ON" 31 R/L Accelerator position switch (Idle) Accelerator pedal fully released BATTERY VOLTAGE (11 - 14V) Ignition switch "ON" Approximately 0V Accelerator pedal depressed Ignition switch "ON" Approximately 0V 32 W/G Accelerator position switch (Full) Accelerator pedal released Ignition switch "ON" Accelerator pedal fully depressed 48 G/R Accelerator position sensor power supply L/W Accelerator position sensor ground Ignition switch "ON" BATTERY VOLTAGE (11 - 14V) Approximately 5V Engine is running. 51 Approximately 0V Warm-up condition Idle speed On Board Diagnosis Logic Malfunction is detected when ... Check Items (Possible Cause) + The relation between sensor and switch signal is not in the normal range during the specified accelerator position. + Harness or connectors (The sensor circuit is open or shorted.) + Accelerator position sensor + Accelerator position switch + Accelerator switch (F/C) EC-1126 DTC 0403 ACCEL POS SENSOR ZD30DDTi DTC Confirmation Procedure WITH CONSULT-II 1) 2) 3) 4) Turn ignition switch "ON". Select "DATA MONITOR" mode with CONSULT-II. Depress and release fully accelerator pedal slowly. If DTC is detected, go to "Diagnostic Procedure", EC-1130. WITHOUT CONSULT-II SEF817Y 1) Turn ignition switch "ON". 2) Depress and release fully accelerator pedal slowly.

3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. 5) If DTC is detected, go to "Diagnostic Procedure", EC-1130. EC-1127 DTC 0403 ACCEL POS SENSOR ZD30DDTi Wiring Diagram TEC103M EC-1128 DTC 0403 ACCEL POS SENSOR Wiring Diagram (Cont'd) ZD30DDTi TEC107M EC-1129 DTC 0403 ACCEL POS SENSOR Diagnostic Procedure 1 CHECK OVERALL FUNCTION-I With CONSULT-II 1.

Turn ignition switch "ON". 2. Select "ACCEL POS SEN" in "DATA MONITOR" mode with CONSULT-II. 3. Check "ACCEL POS SEN" signal under the following conditions. SEF278Z Without CONSULT-II 1.

Turn ignition switch "ON". 2. Check voltage between ECM terminal 23 and ground under the following conditions. SEF279Z OK or NG OK c GO TO 2. NG c GO TO 3. EC-1130 ZD30DDTi DTC 0403 ACCEL POS SENSOR Diagnostic Procedure (Cont'd) 2 CHECK OVERALL FUNCTION With CONSULT-II 1. Turn ignition switch "ON". 2. Select "FULL ACCEL SW" and "OFF ACCEL SW" in "DATA MONITOR" mode with CONSULT-II. 3. Check "FULL ACCEL SW" and "OFF ACCEL SW" signal under the following conditions. SEF416Y Without CONSULT-II 1.

Turn ignition switch "ON". 2. Check voltage between ECM terminals 31, 32 and ground under the following conditions. SEF417Y OK or NG OK c INSPECTION END NG c GO TO 14. EC-1131 ZD30DDTi DTC 0403 ACCEL POS SENSOR Diagnostic Procedure (Cont'd) 3 CHECK ACCELERATOR POSITION SENSOR POWER SUPPLY CIRCUIT 1.

Turn ignition switch "OFF". 2. Disconnect accelerator position sensor harness connector. SEF694V 3. Turn ignition switch "ON". 4. Check voltage between accelerator position sensor terminal 1 and ground with CONSULT-II or tester. SEF816Y OK or NG OK c GO TO 5. NG c GO TO 4. 4 DETECT MALFUNCTIONING PART Check the following. + Harness connectors F7, M52 (RHD models) + Harness for open or short between ECM and accelerator position sensor c Repair harness or connectors. EC-1132 ZD30DDTi DTC 0403 ACCEL POS SENSOR Diagnostic Procedure (Cont'd) 5 ZD30DDTi CHECK ACCELERATOR POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screw. SEF227Z 3. Check harness continuity between accelerator position sensor terminal 3 and engine ground.

Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 7. NG c GO TO 6. 6 DETECT MALFUNCTIONING PART Check the following. + Harness connectors F7, M52 (RHD models) + Harness for open or short between ECM and accelerator position sensor c Repair open circuit or short to ground or short to power in harness or connectors. 7 CHECK ACCELERATOR POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 23 and accelerator position sensor terminal 2. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 9. NG c GO TO 8. 8 DETECT MALFUNCTIONING PART Check the following. + Harness connectors F7, M52 (RHD models) + Harness for open or short between ECM and accelerator position sensor c Repair open circuit or short to ground or short to power in harness or connectors. EC-1133 DTC 0403 ACCEL POS SENSOR Diagnostic Procedure (Cont'd) 9 CHECK ACCELERATOR POSITION SENSOR With CONSULT-II 1. Reconnect all disconnected harness connectors. 2. Turn ignition switch "ON". 3. Select "DATA MONITOR" mode with CONSULT-II. 4. Check the indication of "ACCEL POS SEN" under the following conditions. SEF818Y OK or NG OK c GO TO 11. NG c Replace accelerator pedal assembly.

10 CHECK ACCELERATOR POSITION SENSOR Without CONSULT-II 1. Reconnect all disconnected harness connectors. 2. Turn ignition switch "ON". 3. Check voltage between ECM terminal 23 and ground under the following conditions. SEF407Y OK or NG OK c GO TO 12. NG c Replace accelerator pedal assembly. 11 RESET ACCELERATOR POSITION SENSOR IDLE POSITION MEMORY With CONSULT-II 1.

Turn ignition switch "ON". 2. Select "OFF ACCEL PO SIG" in "ACTIVE TEST" mode with CONSULT-II. 3.

Touch "CLEAR". c GO TO 13. EC-1134 ZD30DDTi DTC 0403 ACCEL POS SENSOR Diagnostic Procedure (Cont'd) 12 RESET ACCELERATOR POSITION SENSOR IDLE POSITION MEMORY Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2.

Let engine idle for 10 minutes. c GO TO 13. 13 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. c INSPECTION END 14 CHECK ACCELERATOR POSITION SWITCH POWER SUPPLY CIRCUIT 1. Turn ignition switch "OFF". 2.

Disconnect accelerator position switch harness connector.

SEF708V 3. Turn ignition switch "ON". 4. Check voltage between accelerator position switch terminal 5 and ground with CONSULT-II or tester. SEF346X OK or NG OK c GO TO 16. NG c GO TO 15. 15 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M50, F5 (LHD models) + Harness for open or short between accelerator position switch and ECM relay + Harness for open or short between accelerator position switch and ECM c Repair harness or connectors. EC-1135 ZD30DDTi DTC 0403 ACCEL POS SENSOR Diagnostic Procedure (Cont'd) 16 ZD30DDTi CHECK ACCELERATOR POSITION SWITCH INPUT SIGNAL CIRCUIT-I FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between accelerator position switch terminal 6 and ECM terminal 31. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 18. NG c GO TO 17. 17 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M52, F7 (RHD models) + Harness for open or short between ECM and accelerator position switch c Repair open circuit or short to ground or short to power in harness or connectors. 18 CHECK ACCELERATOR POSITION SWITCH INPUT SIGNAL CIRCUIT-II FOR OPEN AND SHORT 1. Check harness continuity between accelerator position switch terminal 4 and ECM terminal 32.

Refer to Wiring Diagram. Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 20. NG c GO TO 19. 19 DETECT MALFUNCTIONING PART Check the following.

+ Harness connectors M52, F7 (RHD models) + Harness for open or short between ECM and accelerator position switch c Repair open circuit or short to ground or short to power in harness or connectors. 20 CHECK ACCELERATOR POSITION SWITCH Check continuity between accelerator position switch terminals 4 and 5, 5 and 6 under the following conditions. SEF418Y OK or NG OK (With CONSULT-II) c GO TO 21. OK (Without CONSULT-II) c GO TO 22. NG c Replace accelerator pedal assembly. EC-1136 DTC 0403 ACCEL POS SENSOR Diagnostic Procedure (Cont'd) 21 RESET ACCELERATOR POSITION SENSOR IDLE POSITION MEMORY With CONSULT-II 1. Turn ignition switch "ON". 2. Select "OFF ACCEL PO SIG" in "ACTIVE TEST" mode with CONSULT-II. 3. Touch "CLEAR". c GO TO 23. 22 RESET ACCELERATOR POSITION SENSOR IDLE POSITION MEMORY Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Let engine idle for 10 minutes. c GO TO 23. 23 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. c INSPECTION END EC-1137 ZD30DDTi DTC 0406 INT AIR VOL ZD30DDTi On Board Diagnosis Logic Malfunction is detected when ... Check Items (Possible Cause) + An excessively high voltage from the mass air flow sensor is sent to ECM when engine is running. + + + + + + Air duct Charge air cooler Variable nozzle turbocharger control system Variable nozzle turbocharger Mass air flow sensor Harness or connectors (The mass air flow sensor circuit is shorted.) DTC Confirmation Procedure NOTE: If DTC 0406 "INT AIR VOL" displayed with DTC 0102 "MASS AIR FLOW SEN", perform trouble diagnosis for DTC 0102 "MASS AIR FLOW SEN" first. (See EC-1086.) WITH CONSULT-II 1) 2) 3) 4) 5) Turn ignition switch "ON".

Select "DATA MONITOR" mode with CONSULT-II.

Start engine and warm it up to normal operating temperature. Drive vehicle. Maintain the engine speed more than 4,000 rpm for at least 10 seconds. 6) If DTC is detected, go to "Diagnostic Procedure", EC-1139. WITHOUT CONSULT-II SEF817Y 1) Start engine and warm it up to normal operating temperature. 2) Drive vehicle. 3) Maintain the engine speed more than 4,000 rpm for at least 10 seconds. 4) Stop vehicle. 5) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 6) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. 7) If DTC is detected, go to "Diagnostic Procedure", EC-1139. EC-1138 DTC 0406 INT AIR VOL ZD30DDTi Diagnostic Procedure 1 CHECK INTAKE AIR LEAK Listen for an intake air leak after the mass air flow sensor. OK or NG OK c GO TO 2. NG c Repair or replace.

2 CHECK VARIABLE NOZZLE TURBOCHARGER OVERALL FUNCTION 1. Start engine and let it idle. 2. Make sure that variable nozzle turbocharger control actuator rod moves when revving engine up to 3,000 rpm and returning to idle. SEF320Z OK or NG OK c GO TO 3. NG c Go to "Diagnostic Procedure" in "VARIABLE NOZZLE TURBOCHARGER CONTROL SOLENOID VALVE", EC-1264. 3 CHECK MASS AIR FLOW SENSOR 1. Start engine and warm it up to normal operating temperature. 2. Check voltage between ECM terminal 35 (Mass air flow sensor signal) and ground. SEF400Y 3. If the voltage is out of specification, disconnect MAFS harness connector and connect it again. Then repeat above check. OK or NG OK c GO TO 4. NG c Replace mass air flow sensor. 4 CHECK INTERMIT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. c INSPECTION END EC-1139 DTC 0407 CRANK POS SEN (TDC) ZD30DDTi Description The crankshaft position sensor (TDC) monitors engine speed by means of

signals from the sensing plate (with three protrusions) installed to the crankshaft pulley. The data signal output is detected at ATDC 70° and sent to the ECM. The sensor signal is used for fuel injection control and fuel injection timing control. SEF231Z CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values.
MONITOR ITEM CONDITION SPECIFICATION + Tachometer: Connect CKPSzRPM (TDC) + Run engine and compare tachometer indication with the CONSULT-II value. Almost the same speed as the CONSULT-II value. ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground.
CAUTION: Do not use ECM ground terminals when measuring input/output voltage.
Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.
TERMINAL NO.
WIRE COLOR ITEM CONDITION DATA (DC Voltage and Pulse Signal) Approximately 0V Engine is running. Warm-up condition Idle speed 44 L SEF333Y Crankshaft position sensor (TDC) Approximately 0V Engine is running. Warm-up condition Engine speed is 2,000 rpm SEF334Y Engine is running.
47 B/W Crankshaft position sensor (TDC) ground Warm-up condition Idle speed EC-1140 Approximately 0V DTC 0407 CRANK POS SEN (TDC) ZD30DDTi On Board Diagnosis Logic Malfunction is detected when ... Check Items (Possible Cause) + An improper signal from the sensor is sent to ECM during engine running and cranking. + Harness or connectors (The sensor circuit is open.) + Crankshaft position sensor (TDC) DTC Confirmation Procedure Before performing the following procedure, confirm that battery voltage is more than 10V. WITH CONSULT-II 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II. 2) Crank engine for at least 1 second. 3) Start engine and run it for at least 2 seconds at idle speed. 4) If DTC is detected, go to "Diagnostic Procedure", EC-1143. SEF817Y WITHOUT CONSULT-II 1) Crank engine for at least 1 second. 2) Start engine and run it for at least 2 seconds at idle speed. 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. 5) If DTC is detected, go to "Diagnostic Procedure", EC-1143. EC-1141 DTC 0407 CRANK POS SEN (TDC) ZD30DDTi Wiring Diagram TEC104M EC-1142 DTC 0407 CRANK POS SEN (TDC) ZD30DDTi Diagnostic Procedure 1 CHECK CRANKSHAFT POSITION SENSOR (TDC) GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screws. SEF227Z 3. Disconnect crankshaft position sensor (TDC) harness connector and ECM harness connector. SEF230Z 4. Check harness continuity between ECM terminal 47 and terminal 2. Refer to Wiring Diagram. Continuity should exist. 5. Also check harness for short to ground and short to power. OK or NG OK c GO TO 2. NG c Repair open circuit or short to ground or short to power in harness or connectors. 2 CHECK CRANKSHAFT POSITION SENSOR (TDC) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Check harness continuity between terminal 1 and ECM terminal 44. Refer to Wiring Diagram. Continuity should exist. 2. Also check harness for short to ground and short to power.
OK or NG OK c GO TO 3. NG c Repair open circuit or short to ground or short to power in harness or connectors. 3 CHECK CRANKSHAFT POSITION SENSOR SHIELD CIRCUIT 1. Check harness continuity between crankshaft position sensor (TDC) terminal 3 and engine ground. Refer to Wiring Diagram. Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c GO TO 4. EC-1143 DTC 0407 CRANK POS SEN (TDC) Diagnostic Procedure (Cont'd) 4 ZD30DDTi DETECT MALFUNCTIONING PART Check the following. + Joint connector-4 + Harness for open or short between crankshaft position sensor (TDC) and engine ground c 5 Repair open circuit or short to ground or short to power in harness or connectors. CHECK CRANKSHAFT POSITION SENSOR (TDC) INSTALLATION Check the clearance between crankshaft position sensor (TDC) and protrusion on the crankshaft pulley. JEF293Z OK or NG OK c GO TO 6. NG c GO TO 7. 6 REINSTALL CRANKSHAFT POSITION SENSOR (TDC) 1. Remove crankshaft position sensor (TDC). 2. Install crankshaft position sensor (TDC) properly. JEF294Z c INSPECTION END EC-1144 DTC 0407 CRANK POS SEN (TDC) Diagnostic Procedure (Cont'd) 7 CHECK CRANKSHAFT POSITION SENSOR (TDC)-I 1. Loosen the fixing bolt and remove the crankshaft position sensor (TDC). 2. Visually check the sensor for chipping. SEF232Z OK or NG OK c GO TO 8.
NG c Replace crankshaft position sensor (TDC). 8 CHECK CRANKSHAFT POSITION SENSOR (TDC)-II 1. Disconnect crankshaft position sensor (TDC) harness connector. 2. Check resistance between crankshaft position sensor (TDC) terminals 1 and 2. SEF295Z OK or NG OK c GO TO 9. NG c Replace crankshaft position sensor (TDC). 9 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.
c INSPECTION END EC-1145 ZD30DDTi DTC 0502 BATTERY VOLTAGE ZD30DDTi On Board Diagnosis Logic The ECM checks if battery voltage is within the tolerance range for the engine control system. Malfunction is detected when ... Check Items (Possible Cause) + An abnormally high voltage from the battery is sent to ECM. + + + + Incorrect jump starting Battery Alternator ECM DTC Confirmation Procedure With CONSULT-II 1) Check the following. + Jumper cables are connected for jump starting.
+ Battery or alternator has been replaced. If the result is "Yes" for one item or more, skip the following steps and go to "Diagnostic Procedure", EC-1146. 2) Check that the positive battery terminal is connected to battery properly. If NG, reconnect it properly. 3) Check that the alternator functions properly. Refer to EL section ("CHARGING SYSTEM"). 4) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II. 5) Wait one minute. 6) If DTC is detected, go to "Diagnostic Procedure", EC-1146. If DTC is not detected, go to next step. 7) Start engine and wait one minute at idle. 8) If DTC is detected, go to "Diagnostic Procedure", EC-1146. Without CONSULT-II 1) Check the following. + Jumper cables are connected for jump starting. + Battery or alternator has been replaced. If the result is "Yes" for one item or more, skip the following steps and go to "Diagnostic Procedure", EC-1146. 2) Check that the positive battery terminal is connected to battery properly. If NG, reconnect it properly. 3) Check that the alternator functions properly. Refer to EL section ("CHARGING SYSTEM"). 4) Turn ignition switch "ON" and wait one minute. 5) Turn ignition switch "OFF", wait 5 seconds and then turn "ON". 6) Perform "Diagnostic Test Mode II (Self-diagnostic result)" with ECM. 7) If DTC is detected, go to "Diagnostic Procedure", EC-1146. If DTC is not detected, go to next step. 8) Start engine and wait one minute at idle.
9) Turn ignition switch "OFF", wait 5 seconds and then turn "ON".
10) Perform "Diagnostic Test Mode II (Self-diagnostic result)" with ECM. 11) If DTC is detected, go to "Diagnostic Procedure", EC-1146. Diagnostic Procedure 1 INSPECTION START Are jumper cables connected for the jump starting? Yes or No Yes c GO TO 3. No c GO TO 2. EC-1146 DTC 0502 BATTERY VOLTAGE Diagnostic Procedure (Cont'd) 2 CHECK BATTERY AND ALTERNATOR Check that the proper type of battery and alternator is installed. Refer to EL section ("BATTERY" and "CHARGING SYSTEM"). OK or NG OK c GO TO 5. NG c Replace with a proper one. 3 CHECK JUMPER CABLES INSTALLATION Check that the jumper cables are connected in the correct sequence. SEF488Z OK or NG OK c GO TO 4. NG c Reconnect jumper cables properly. 4 CHECK BATTERY FOR BOOSTER Check that the battery for the booster is a 12V battery. OK or NG OK c GO TO 5. NG c Change the vehicle for booster. 5 PERFORM DTC CONFIRMATION PROCEDURE AGAIN Perform "DTC Confirmation Procedure", EC-1146, again. OK or NG OK c GO TO 6. NG c Replace ECM. 6 CHECK ELECTRICAL PARTS DAMAGE Check the following for damage. + Wiring harness and harness connectors for burn + Fuses for short OK or NG OK c INSPECTION END NG c Repair or replace malfunctioning part. EC-1147 ZD30DDTi ZD30DDTi DTC 0504 A/T COMM LINE System Description These circuit lines are used to control the smooth shifting up and down of A/T during the hard acceleration/ deceleration. Voltage signals are exchanged between ECM and TCM (Transmission control module). ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Voltage goes high up once in a few seconds 24 37 58 PU/W P/B L/OR A/T signal No. 1 A/T signal No. 2 A/T signal No. 4 Engine is running. Warm-up condition Idle speed SEF448Z Engine is running. Approximately 0V Warm-up condition Idle speed 30 P A/T signal No. 3 Engine is running. Approximately 7.7V Warm-up condition Engine speed is 2,000 rpm On Board Diagnosis Logic Malfunction is detected when ... Check Items (Possible Cause) + ECM receives incorrect voltage from TCM (Transmission control module) continuously. + Harness or connectors [The circuit between ECM and TCM (Transmission control module) is open or shorted.] EC-1148 DTC 0504 A/T COMM LINE ZD30DDTi DTC Confirmation Procedure NOTE: If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test. With CONSULT-II SEF817Y 1) 2) 3) 4) Start engine. Select "DATA MONITOR" mode with CONSULT-II. Set selector lever to "D" position. Accelerate up to 60 km/h (37 MPH) gradually on the accelerator pedal. Do not accelerate with shift down. 5) Stop the vehicle with engine running. 6) If DTC is detected, go to "Diagnostic Procedure", EC-1151. Overall Function Check Use this procedure to check the overall function of the A/T control circuit.
During this check, a DTC might not be confirmed.
Without CONSULT-II SEF301Z 1) Start engine. 2) Read the voltage signal between ECM terminals 24, 30, 37, 58 and ground with an oscilloscope. 3) Verify that the oscilloscope screen shows the signal wave as shown under "ECM Terminals and Reference Value" on the previous page. 4) If NG, go to "Diagnostic Procedure", EC-1151. EC-1149 DTC 0504 A/T COMM LINE ZD30DDTi Wiring Diagram TEC109M EC-1150 DTC 0504 A/T COMM LINE Diagnostic Procedure 1 CHECK INPUT SIGNAL CIRCUIT 1. Turn ignition switch "OFF". 2.
Disconnect ECM harness connector and TCM (Transmission control module) harness connector. SEF519VA SEF792V 3. Check harness continuity between the following terminals. Refer to Wiring Diagram. MTBL0532 Continuity should exist. OK or NG OK c GO TO 3. NG c GO TO 2. 2 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E106, M88 + Harness connectors M51, F6 + Harness connectors E104, M86 (RHD models) + Harness for open or short between ECM and TCM (Transmission control module) c Repair harness or connectors. EC-1151 ZD30DDTi DTC 0504 A/T COMM LINE Diagnostic Procedure (Cont'd) 3 ZD30DDTi CHECK INPUT SIGNAL CIRCUIT 1.
Check harness continuity between ECM terminal 24 and ground, ECM terminal 30 and ground, ECM terminal 37 and ground, ECM terminal 58 and ground.
Refer to Wiring Diagram. Continuity should not exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c GO TO 4.
4 DETECT MALFUNCTIONING PART Check the harness for open or short between ECM and TCM (Transmission control module).
c Repair open circuit short to ground or short to power in harness. 5 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. c INSPECTION END EC-1152 DTC 0701 P1zCAM POS SEN ZD30DDTi Description SYSTEM DESCRIPTION SEF437Y The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange). The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit. By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve. Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators builtinto electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM. FUEL INJECTION AMOUNT CONTROL In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time. FUEL INJECTION TIMING CONTROL Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber.
FUEL TEMPERATURE SENSOR The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature. CAM RING POSITION SENSOR The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor. EC-1153 ZD30DDTi DTC 0701 P1zCAM POS SEN CONSULT-II Reference Value in Data Monitor Mode Remarks: Specification data are reference values. MONITOR ITEM CONDITION SPECIFICATION FUEL TEMP SEN + Engine: After warming up More than 40°C (104°F) SPILL/V + Engine: After warming up Approx. 13°CA INJ TIMG C/V + Engine: After warming up, idle the engine. Approx. 50 - 70% DECELER F/CUT + Engine: After warmIdle ing up OFF + Ignition switch: ON Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm2, 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm2, 12.90 psi) Approx. 1,500 m (4,992 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm2, 12.06 psi) Approx.
2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm2, 11.36 psi) BARO SEN ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor.
Use a ground other than ECM terminals, such as the ground. TERMINAL NO.
WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. G/Y Electronic control fuel injection pump 40 R/B Electronic control fuel injection pump L/B Electronic control fuel injection pump Engine is running. 52 Electronic control fuel injection pump Engine is running. 33 Approximately 2.5V Warm-up condition Idle speed Engine is running. 53 L/R Approximately 2.5V Warm-up condition Idle speed Approximately 0.1V Idle speed Approximately 0.35V Idle speed On Board Diagnosis Logic Malfunction is detected when .... Check Items (Possible cause) + An improper voltage signal from cam position sensor (Builtinto electronic control fuel injection pump) is sent to injection pump control unit. + Harness or connectors (Electronic control fuel injection pump circuit is open or shorted.) + Electronic control fuel injection pump EC-1154 DTC 0701 P1zCAM POS SEN ZD30DDTi DTC Confirmation Procedure WITH CONSULT-II 1) Turn ignition switch "ON" and wait at least 2 seconds. 2) Select "DATA MONITOR" mode with CONSULT-II. 3) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.) 4) If DTC is detected, go to "Diagnostic Procedure", EC-1157. SEF817Y WITHOUT CONSULT-II 1) Turn ignition switch "ON" and wait at least 2 seconds. 2) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.) 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
5) If DTC is detected, go to "Diagnostic Procedure", EC-1157. EC-1155 DTC 0701 P1zCAM POS SEN ZD30DDTi Wiring Diagram TEC113M EC-1156 DTC 0701 P1zCAM POS SEN ZD30DDTi Diagnostic Procedure 1 CHECK ELECTRONIC CONTROL FUEL INJECTION PUMP POWER SUPPLY CIRCUIT 1. Turn ignition switch "OFF". 2. Disconnect electronic control fuel injection pump harness connector. SEF229Z 3. Turn ignition switch "ON". 4. Check voltage between electronic control fuel injection pump terminal 7 and ground. SEF438Y OK or NG OK c GO TO 3. NG c GO TO 2. 2 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M50, F5 + Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and ECM + Harness for open or short between electronic control fuel injection pump and ECM relay c Repair open circuit or short to ground or short to power in harness or connectors. 3 CHECK ELECTRONIC CONTROL FUEL INJECTION PUMP GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Check harness continuity between electronic control fuel injection pump terminal 6 and ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c GO TO 4. EC-1157 DTC 0701 P1zCAM POS SEN Diagnostic Procedure (Cont'd) 4 ZD30DDTi DETECT MALFUNCTIONING PART Check the following.
+ Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and engine ground c Repair open circuit or short to ground or short to power in harness or connectors. 5 CHECK COMMUNICATION LINE FOR OPEN AND SHORT 1. Check continuity between the following terminals. Refer to Wiring Diagram. MTBL0444 Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 7. NG c GO TO 6. 6 DETECT MALFUNCTIONING PART Check the following. + Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and ECM c Repair open circuit or short to ground or short to power in harness or connectors. 7 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. OK or NG OK c Replace electronic control fuel injection pump. NG c Repair open circuit or short to ground or short to power in harness or connectors. EC-1158 DTC 0702 P2zTDC PULSE SIG ZD30DDTi Description SYSTEM DESCRIPTION SEF437Y The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange). The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit. By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve. Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators builtinto electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM. FUEL INJECTION AMOUNT CONTROL In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time. FUEL INJECTION TIMING CONTROL Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber. FUEL TEMPERATURE SENSOR The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature. CAM RING POSITION SENSOR The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor. EC-1159 ZD30DDTi DTC 0702 P2zTDC PULSE SIG CONSULT-II Reference Value in Data Monitor Mode Remarks: Specification data are reference values. MONITOR ITEM CONDITION SPECIFICATION FUEL TEMP SEN + Engine: After warming up More than 40°C (104°F) SPILL/V + Engine: After warming up Approx. 13°CA INJ TIMG C/V + Engine: After warming up, idle the engine. Approx. 50 - 70% DECELER F/CUT + Engine: After warmIdle ing up OFF + Ignition switch: ON Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm2, 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm2, 12.90 psi) Approx. 1,500 m (4,992 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm2, 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm2, 11.36 psi) BARO SEN ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor.
Use a ground other than ECM terminals, such as the ground. TERMINAL NO.
WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 33 G/Y Electronic control fuel injection pump 40 R/B Electronic control fuel injection pump L/B Electronic control fuel injection pump Engine is running. 52 Electronic control fuel injection pump Engine is running. Approximately 2.5V Warm-up condition Idle speed Engine is running. 53 L/R Approximately 2.5V Warm-up condition Idle speed Approximately 0.1V Idle speed Approximately 0.35V Idle speed On Board Diagnosis Logic Malfunction is detected when .... Check Items (Possible cause) + Injection pump control unit input signal [Crankshaft position sensor (TDC) signal] processing function is malfunctioning. + Harness or connectors (Electronic control fuel injection pump circuit is open or shorted.) + Electronic control fuel injection pump EC-1160 DTC 0702 P2zTDC PULSE SIG ZD30DDTi DTC Confirmation Procedure WITH CONSULT-II SEF817Y 1) Turn ignition switch "ON" and wait at least 2 seconds. 2) Select "DATA MONITOR" mode with CONSULT-II. 3) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.) 4) If DTC 0407 is detected, go to "Diagnostic procedure", EC-1143. If DTC 0702 is detected, go to "Diagnostic Procedure", EC-1163. WITHOUT CONSULT-II 1) Turn ignition switch "ON" and wait at least 2 seconds. 2) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.) 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. 5) If DTC 0407 is detected, go to "Diagnostic Procedure", EC-1143. If DTC 0702 is detected, go to "Diagnostic Procedure", EC-1163.
EC-1161 DTC 0702 P2zTDC PULSE SIG ZD30DDTi Wiring Diagram TEC113M EC-1162 DTC 0702 P2zTDC PULSE SIG ZD30DDTi Diagnostic Procedure 1 CHECK ELECTRONIC CONTROL FUEL INJECTION PUMP POWER SUPPLY CIRCUIT 1. Turn ignition switch "OFF".
2. Disconnect electronic control fuel injection pump harness connector. SEF229Z 3. Turn ignition switch "ON". 4. Check voltage between electronic control fuel injection pump terminal 7 and ground. SEF438Y OK or NG OK c GO TO 3. NG c GO TO 2. 2 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M50, F5 + Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and ECM + Harness for open or short between electronic control fuel injection pump and ECM relay c Repair open circuit or short to ground or short to power in harness or connectors. 3 CHECK ELECTRONIC CONTROL FUEL INJECTION PUMP GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Check harness continuity between electronic control fuel injection pump terminal 6 and ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c GO TO 4. EC-1163 DTC 0702 P2zTDC PULSE SIG Diagnostic Procedure (Cont'd) 4 ZD30DDTi DETECT MALFUNCTIONING PART Check the following. + Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and engine ground c Repair open circuit or short to ground or short to power in harness or connectors. 5 CHECK COMMUNICATION LINE FOR OPEN AND SHORT 1. Check continuity between the following terminals. Refer to Wiring Diagram. MTBL0444 Continuity should exist.
2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 7. NG c GO TO 6. 6 DETECT MALFUNCTIONING PART Check the following. + Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and ECM c Repair open circuit or short to ground or short to power in harness or connectors. 7 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. OK or NG OK c Replace electronic control fuel injection pump. NG c Repair open circuit or short to ground or short to power in harness or connectors. EC-1164 DTC 0703 P3zPUMP COMM LINE ZD30DDTi Description SYSTEM DESCRIPTION SEF437Y The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange). The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit. By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve. Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators builtinto electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM. FUEL INJECTION AMOUNT CONTROL In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time. FUEL INJECTION TIMING CONTROL Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber. FUEL TEMPERATURE SENSOR The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature. CAM RING POSITION SENSOR The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor.
EC-1165 ZD30DDTi DTC 0703 P3zPUMP COMM LINE CONSULT-II Reference Value in Data Monitor Mode Remarks: Specification data are reference values. MONITOR ITEM CONDITION SPECIFICATION FUEL TEMP SEN + Engine: After warming up More than 40°C (104°F) SPILL/V + Engine: After warming up Approx. 13°CA INJ TIMG C/V + Engine: After warming up, idle the engine.
Approx. 50 - 70% DECELER F/CUT + Engine: After warmIdle ing up OFF + Ignition switch: ON Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm2, 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm2, 12.90 psi) Approx. 1,500 m (4,992 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm2, 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm2, 11.36 psi) BARO SEN ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. G/Y Electronic control fuel injection pump 40 R/B Electronic control fuel injection pump L/B Electronic control fuel injection pump Engine is running. 52 Electronic control fuel injection pump Engine is running. 33 Approximately 2.5V Warm-up condition Idle speed Engine is running.
53 L/R Approximately 2.5V Warm-up condition Idle speed Approximately 0.1V Idle speed Approximately 0.35V Idle speed On Board Diagnosis Logic Malfunction is detected when .... Check Items (Possible cause) + Injection pump control unit receives incorrect voltage signal from ECM continuously. + Harness or connectors (Electronic control fuel injection pump circuit is open or shorted.) + Electronic control fuel injection pump EC-1166 DTC 0703 P3zPUMP COMM LINE ZD30DDTi DTC Confirmation Procedure WITH CONSULT-II 1) Turn ignition switch "ON" and wait at least 2 seconds. 2) Select "DATA MONITOR" mode with CONSULT-II. 3) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.) 4) If DTC is detected, go to "Diagnostic Procedure", EC-1169. SEF817Y WITHOUT CONSULT-II 1) Turn ignition switch "ON" and wait at least 2 seconds. 2) Start engine and run it for at least 2 seconds at idle speed.
(If engine does not run, turn ignition switch to "START" for at least 2 seconds.) 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. 5) If DTC is detected, go to "Diagnostic Procedure", EC-1169. EC-1167 DTC 0703 P3zPUMP COMM LINE ZD30DDTi Wiring Diagram TEC113M EC-1168 DTC 0703 P3zPUMP COMM LINE ZD30DDTi Diagnostic Procedure 1 CHECK ELECTRONIC CONTROL FUEL INJECTION PUMP POWER SUPPLY CIRCUIT 1.
Turn ignition switch "OFF". 2. Disconnect electronic control fuel injection pump harness connector. SEF229Z 3. Turn ignition switch "ON". 4. Check voltage between electronic control fuel injection pump terminal 7 and ground. SEF438Y OK or NG OK c GO TO 3. NG c GO TO 2. 2 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M50, F5 + Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and ECM + Harness for open or short between electronic control fuel injection pump and ECM relay c Repair open circuit or short to ground or short to power in harness or connectors. 3 CHECK ELECTRONIC CONTROL FUEL INJECTION PUMP GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Check harness continuity between electronic control fuel injection pump terminal 6 and ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c GO TO 4. EC-1169 DTC 0703 P3zPUMP COMM LINE Diagnostic Procedure (Cont'd) 4 ZD30DDTi DETECT MALFUNCTIONING PART Check the following. + Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and engine ground c Repair open circuit or short to ground or short to power in harness or connectors. 5 CHECK COMMUNICATION LINE FOR OPEN AND SHORT 1. Check continuity between the following terminals. Refer to Wiring Diagram. MTBL0444 Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 7. NG c GO TO 6. 6 DETECT MALFUNCTIONING PART Check the following.
+ Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and ECM c Repair open circuit or short to ground or short to power in harness or connectors. 7 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.
OK or NG OK c Replace electronic control fuel injection pump. NG c Repair open circuit or short to ground or short to power in harness or connectors. EC-1170 DTC 0704 P4zSPILL/V CIRC, DTC 0706 P6zSPILL VALVE ZD30DDTi Description SYSTEM DESCRIPTION SEF437Y The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange). The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit. By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve. Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators builtinto electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM. FUEL INJECTION AMOUNT CONTROL In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time. FUEL INJECTION TIMING CONTROL Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber. FUEL TEMPERATURE SENSOR The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature. CAM RING POSITION SENSOR The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount.
The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor. EC-1171 DTC 0704 P4zSPILL/V CIRC, DTC 0706 P6zSPILL VALVE ZD30DDTi CONSULT-II Reference Value in Data Monitor Mode Remarks: Specification data are reference values. MONITOR ITEM CONDITION SPECIFICATION FUEL TEMP SEN + Engine: After warming up More than 40°C (104°F) SPILL/V + Engine: After warming up Approx.
13°CA INJ TIMG C/V + Engine: After warming up, idle the engine. Approx. 50 - 70% DECELER F/CUT + Engine: After warmIdle ing up OFF + Ignition switch: ON Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm2, 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm2, 12.90 psi) Approx. 1,500 m (4,992 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm2, 12.06 psi) Approx. 2,000 m (6,562 ft): Approx.
78.36 kPa (0.7836 bar, 0.799 kg/cm2, 11.36 psi) BARO SEN ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage.
Doing so may damage the ECM's transistor.
Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. G/Y Electronic control fuel injection pump 40 R/B Electronic control fuel injection pump L/B Electronic control fuel injection pump Engine is running. 52 Electronic control fuel injection pump Engine is running. 33 Approximately 2.5V Warm-up condition Idle speed Engine is running. 53 L/R Approximately 2.5V Warm-up condition Idle speed Approximately 0.1V Idle speed Approximately 0.35V Idle speed On Board Diagnosis Logic Malfunction is detected when .... Check Items (Possible cause) + Spill valve (Built-into electronic control fuel injection pump) does not function properly. + Harness or connectors (Electronic control fuel injection pump circuit is open or shorted.) + Electronic control fuel injection pump EC-1172 DTC 0704 P4zSPILL/V CIRC, DTC 0706 P6zSPILL VALVE ZD30DDTi DTC Confirmation Procedure WITH CONSULT-II 1) Turn ignition switch "ON" and wait at least 2 seconds. 2) Select "DATA MONITOR" mode with CONSULT-II. 3) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.) 4) If DTC is detected, go to "Diagnostic Procedure", EC-1175. SEF817Y WITHOUT CONSULT-II 1) Turn ignition switch "ON" and wait at least 2 seconds. 2) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.) 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
5) If DTC is detected, go to "Diagnostic Procedure", EC-1175. EC-1173 DTC 0704 P4zSPILL/V CIRC, DTC 0706 P6zSPILL VALVE ZD30DDTi Wiring Diagram TEC113M EC-1174 DTC 0704 P4zSPILL/V CIRC, DTC 0706 P6zSPILL VALVE ZD30DDTi Diagnostic Procedure 1 CHECK ELECTRONIC CONTROL FUEL INJECTION PUMP POWER SUPPLY CIRCUIT 1. Turn ignition switch "OFF". 2.
Disconnect electronic control fuel injection pump harness connector. SEF229Z 3. Turn ignition switch "ON". 4. Check voltage between electronic control fuel injection pump terminal 7 and ground. SEF438Y OK or NG OK c GO TO 3. NG c GO TO 2. 2 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M50, F5 + Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and ECM + Harness for open or short between electronic control fuel injection pump and ECM relay c Repair open circuit or short to ground or short to power in harness or connectors. 3 CHECK ELECTRONIC CONTROL FUEL INJECTION PUMP GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2.
Check harness continuity between electronic control fuel injection pump terminal 6 and ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c GO TO 4. EC-1175 DTC 0704 P4zSPILL/V CIRC, DTC 0706 P6zSPILL VALVE Diagnostic Procedure (Cont'd) 4 ZD30DDTi DETECT MALFUNCTIONING PART Check the following. + Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and engine ground c Repair open circuit or short to ground or short to power in harness or connectors. 5 CHECK COMMUNICATION LINE FOR OPEN AND SHORT 1. Check continuity between the following terminals. Refer to Wiring Diagram. MTBL0444 Continuity should exist. 2. Also check harness for short to ground and short to power.
OK or NG OK c GO TO 7. NG c GO TO 6. 6 DETECT MALFUNCTIONING PART Check the following. + Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and ECM c Repair open circuit or short to ground or short to power in harness or connectors. 7 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. OK or NG OK c Replace electronic control fuel injection pump. NG c Repair open circuit or short to ground or short to power in harness or connectors. EC-1176 DTC 0705 P5zPUMP C/MODULE ZD30DDTi Description SYSTEM DESCRIPTION SEF437Y The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange). The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit. By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve. Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators builtinto electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM. FUEL INJECTION AMOUNT CONTROL In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time. FUEL INJECTION TIMING CONTROL Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber. FUEL TEMPERATURE SENSOR The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature. CAM RING POSITION SENSOR The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor. EC-1177 ZD30DDTi DTC 0705 P5zPUMP C/MODULE CONSULT-II Reference Value in Data Monitor Mode Remarks: Specification data are reference values.
MONITOR ITEM CONDITION SPECIFICATION FUEL TEMP SEN + Engine: After warming up More than 40°C (104°F) SPILL/V + Engine: After warming up Approx. 13°CA INJ TIMG C/V + Engine: After warming up, idle the engine. Approx.
50 - 70% DECELER F/CUT + Engine: After warmIdle ing up OFF + Ignition switch: ON Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm2, 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm2, 12.90 psi) Approx. 1,500 m (4,992 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm2, 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm2, 11.36 psi) BARO SEN ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor.
Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. G/Y Electronic control fuel injection pump 40 R/B Electronic control fuel injection pump L/B Electronic control fuel injection pump Engine is running. 52 Electronic control fuel injection pump Engine is running. 33 Approximately 2.5V Warm-up condition Idle speed Engine is running. 53 L/R Approximately 2.5V Warm-up condition Idle speed Approximately 0.1V Idle speed Approximately 0.35V Idle speed On Board Diagnosis Logic Malfunction is detected when .... + Injection pump control unit does not function properly. Check Items (Possible cause) + Electronic control fuel injection pump EC-1178 DTC 0705 P5zPUMP C/MODULE ZD30DDTi DTC Confirmation Procedure WITH CONSULT-II 1) Turn ignition switch "ON" and wait at least 2 seconds. 2) Select "DATA MONITOR" mode with CONSULT-II. 3) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.) 4) If DTC is detected, go to "Diagnostic Procedure", EC-1179. WITHOUT CONSULT-II SEF817Y 1) Turn ignition switch "ON" and wait at least 2 seconds. 2) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.) 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. 5) If DTC is detected, go to "Diagnostic Procedure", EC-1179. Diagnostic Procedure 1 INSPECTION START With CONSULT-II 1. Turn ignition switch "ON". 2. Select "SELF DIAG RESULTS" mode with CONSULT-II.
3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure", EC-1179, again. 5. Is the malfunction displayed again? Without CONSULT-II 1. Turn ignition switch "ON". 2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. 3. Perform "DTC Confirmation Procedure", EC-1179, again. 4. Perform "Diagnostic Test Mode II (Self-diagnostic results)". 5. Is the DTC 0705 displayed again? Yes or No Yes c Replace electronic control fuel injection pump. No c INSPECTION END EC-1179 DTC 0707 P7zF/INJ TIMG FB ZD30DDTi Description SYSTEM DESCRIPTION SEF437Y The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange). The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit. By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve. Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators builtinto electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM. FUEL INJECTION AMOUNT CONTROL In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time. FUEL INJECTION TIMING CONTROL Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber. FUEL TEMPERATURE SENSOR The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature. CAM RING POSITION SENSOR The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount.
The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor.
EC-1180 ZD30DDTi DTC 0707 P7zF/INJ TIMG FB CONSULT-II Reference Value in Data Monitor Mode Remarks: Specification data are reference values. MONITOR ITEM CONDITION SPECIFICATION FUEL TEMP SEN + Engine: After warming up More than 40°C (104°F) SPILL/V + Engine: After warming up Approx. 13°CA INJ TIMG C/V + Engine: After warming up, idle the engine. Approx. 50 - 70% DECELER F/CUT + Engine: After warmIdle ing up OFF + Ignition switch: ON Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm2, 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm2, 12.90 psi) Approx. 1,500 m (4,992 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm2, 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm2, 11.36 psi) BARO SEN ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. G/Y Electronic control fuel injection pump 40 R/B Electronic control fuel injection pump L/B Electronic control fuel injection pump Engine is running. 52 Electronic control fuel injection pump Engine is running. 33 Approximately 2.5V Warm-up condition Idle speed Engine is running. 53 L/R Approximately 2.5V Warm-up condition Idle speed Approximately 0.1V Idle speed Approximately 0.35V Idle speed On Board Diagnosis Logic Malfunction is detected when .... Check Items (Possible cause) + Fuel injection timing control system does not function properly. + Harness or connectors (Electronic control fuel injection pump circuit is open or shorted.) + Electronic control fuel injection pump + Improper fuel quality + "INJ TIMING" in "ACTIVE TEST" mode with CONSULT-II.* *: When using this item, DTC may be detected.
If so, erase it because it is not a malfunction. EC-1181 DTC 0707 P7zF/INJ TIMG FB ZD30DDTi DTC Confirmation Procedure WITH CONSULT-II SEF817Y 1) Turn ignition switch "ON" and wait at least 2 seconds. 2) Select "DATA MONITOR" mode with CONSULT-II. 3) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.) 4) Keep engine speed at more than 2,000 rpm for at least 10 seconds. 5) If DTC is detected, go to "Diagnostic Procedure", EC-1184. WITHOUT CONSULT-II 1) Turn ignition switch "ON" and wait at least 2 seconds.
2) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.) 3) Keep engine speed at more than 2,000 rpm for at least 10 seconds. 4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. 6) If DTC is detected, go to "Diagnostic Procedure", EC-1184.
EC-1182 DTC 0707 P7zF/INJ TIMG FB ZD30DDTi Wiring Diagram TEC113M EC-1183 DTC 0707 P7zF/INJ TIMG FB Diagnostic Procedure 1 INSPECTION START 1. Turn ignition switch "OFF". 2. Perform "Air Bleeding", EC-1031, and "DRAINING WATER" in MA section. c GO TO 2.
2 PERFORM DTC CONFIRMATION PROCEDURE AGAIN Perform "DTC Confirmation Procedure", EC-1182 again. OK or NG OK c INSPECTION END NG c GO TO 3. 3 CHECK ELECTRONIC CONTROL FUEL INJECTION PUMP POWER SUPPLY CIRCUIT 1. Turn ignition switch "OFF". 2. Disconnect electronic control fuel injection pump harness connector. SEF229Z 3. Turn ignition switch "ON". 4. Check voltage between electronic control fuel injection pump terminal 7 and ground. SEF438Y OK or NG OK c GO TO 5.
NG c GO TO 4. EC-1184 ZD30DDTi DTC 0707 P7zF/INJ TIMG FB Diagnostic Procedure (Cont'd) 4 ZD30DDTi DETECT MALFUNCTIONING PART Check the following. + Harness connectors M50, F5 + Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and ECM + Harness for open or short between electronic control fuel injection pump and ECM relay c Repair open circuit or short to ground or short to power in harness or connectors. 5 CHECK ELECTRONIC CONTROL FUEL INJECTION PUMP GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Check harness continuity between electronic control fuel injection pump terminal 6 and ground.
Refer to Wiring Diagram. Continuity should exist. 3.
Also check harness for short to ground and short to power. OK or NG OK c GO TO 7. NG c GO TO 6. 6 DETECT MALFUNCTIONING PART Check the following. + Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and engine ground c Repair open circuit or short to ground or short to power in harness or connectors. 7 CHECK COMMUNICATION LINE FOR OPEN AND SHORT 1. Check continuity between the following terminals.
Refer to Wiring Diagram. MTBL0444 Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 9. NG c GO TO 8. 8 DETECT MALFUNCTIONING PART Check the following. + Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and ECM c Repair open circuit or short to ground or short to power in harness or connectors. EC-1185 DTC 0707 P7zF/INJ TIMG FB Diagnostic Procedure (Cont'd) 9 ZD30DDTi CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. OK or NG OK c Replace electronic control fuel injection pump. NG c Repair open circuit or short to ground or short to power in harness or connectors. EC-1186 ZD30DDTi DTC 0802 ECM 10 Description The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the engine. SEC220B On Board Diagnosis Logic Malfunction is detected when ... Check Items (Possible Cause) + An excessively high or low voltage from the absolute pressure sensor (built-into ECM) is sent to ECM. + ECM (ECCS-D control module) DTC Confirmation Procedure WITH CONSULT-II 1) 2) 3) 4) Turn ignition switch "ON". Select "DATA MONITOR" mode with CONSULT-II. Start engine and wait at least 2 seconds. If DTC is detected, go to "Diagnostic Procedure", EC-1188. WITHOUT CONSULT-II SEF817Y 1) Turn ignition switch "ON" and wait at least 2 seconds. 2) Start engine and wait at least 2 seconds. 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. 5) If DTC is detected, go to "Diagnostic Procedure", EC-1188. EC-1187 DTC 0802 ECM 10 Diagnostic Procedure 1 INSPECTION START With CONSULT-II 1. Turn ignition switch "ON". 2. Select "SELF DIAG RESULTS" mode with CONSULT-II.
3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure", EC-1187, again. 5.
Is the malfunction displayed again?
Without CONSULT-II 1. Turn ignition switch "ON". 2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. 3. Perform "DTC Confirmation Procedure", EC-1187, again. 4. Perform "Diagnostic Test Mode II (Self-diagnostic results)". 5. Is the DTC 0802 displayed again? Yes or No Yes c Replace ECM. No c INSPECTION END EC-1188 ZD30DDTi ZD30DDTi DTC 0804 ECM 11 Description The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the engine.
SEC220B On Board Diagnosis Logic Malfunction is detected when ... Check Items (Possible Cause) + ECM input signal processing function is malfunctioning. + ECM (ECCS-D control module) DTC Confirmation Procedure WITH CONSULT-II 1) 2) 3) 4) Turn ignition switch "ON". Select "DATA MONITOR" mode with CONSULT-II. Wait at least 1 second. If DTC is detected, go to "Diagnostic Procedure", EC-1190. WITHOUT CONSULT-II SEF817Y 1) Turn ignition switch "ON" and wait at least 1 second. 2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. 4) If DTC is detected, go to "Diagnostic Procedure", EC-1190. EC-1189 DTC 0804 ECM 11 Diagnostic Procedure 1 INSPECTION START With CONSULT-II 1. Turn ignition switch "ON". 2. Select "SELF DIAG RESULTS" mode with CONSULT-II. 3. Touch "ERASE". 4.
Perform "DTC Confirmation Procedure", EC-1189, again. 5. Is the malfunction displayed again? Without CONSULT-II 1.
Turn ignition switch "ON". 2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. 3. Perform "DTC Confirmation Procedure", EC-1189, again. 4. Perform "Diagnostic Test Mode II (Self-diagnostic results)". 5. Is the DTC 0802 displayed again? Yes or No Yes c Replace ECM. No c INSPECTION END EC-1190 ZD30DDTi ZD30DDTi DTC 0807 ECM 14 Description The stop lamp switch is installed to brake pedal bracket. The switch senses brake pedal position and sends an ON-OFF signal to the ECM. The ECM uses the signal to control the fuel injection control system. SEF275Z ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Ignition switch "ON" Approximately 0V Brake pedal fully released 17 G/Y Stop lamp switch Ignition switch "ON" BATTERY VOLTAGE (11 - 14V) Brake pedal depressed On Board Diagnosis Logic Malfunction is detected when ... Check Items (Possible Cause) + An irregular voltage signal from the switch is sent to ECM. + Harness or connectors (The stop lamp switch circuit is open or shorted.) + Stop lamp switch DTC Confirmation Procedure WITH CONSULT-II 1) 2) 3) 4) Turn ignition switch "ON". Select "DATA MONITOR" mode with CONSULT-II. Depress and release brake pedal more than 10 times. If DTC is detected, go to "Diagnostic Procedure", EC-1193. WITHOUT CONSULT-II SEF817Y 1) Turn ignition switch "ON". 2) Depress and release brake pedal more than 10 times. 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. 5) If DTC is detected, go to "Diagnostic Procedure", EC-1193. EC-1191 DTC 0807 ECM 14 ZD30DDTi Wiring Diagram TEC121M EC-1192 DTC 0807 ECM 14 Diagnostic Procedure 1 CHECK STOP LAMP SWITCH CIRCUIT 1. Turn ignition switch "ON". 2. Check the stop lamp when depressing and releasing the stop lamp switch. MTBL0443 OK or NG OK c GO TO 4.
NG c GO TO 2. 2 CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT 1. Turn ignition switch "OFF". 2. Disconnect stop lamp switch harness connector. SEF275Z 3.
Turn ignition switch "ON". 4. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester. SEF435Y OK or NG OK c GO TO 4. NG c GO TO 3. EC-1193 ZD30DDTi DTC 0807 ECM 14 Diagnostic Procedure (Cont'd) 3 ZD30DDTi DETECT MALFUNCTIONING PART Check the following. + Fuse block (J/B) connector M3 + 10A fuse + Harness for open and short between stop lamp switch and fuse c Repair open circuit or short to ground or short to power in harness or connectors.
4 CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Disconnect stop lamp switch harness connector. SEF275Z 4. Check harness continuity between ECM terminal 17 and stop lamp switch terminal 2. Refer to Wiring Diagram. Continuity should exist. 5. Also check harness for short to ground and short to power. OK or NG OK c GO TO 6. NG c GO TO 5. 5 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M52, F7 + Harness for open or short between ECM and stop lamp switch c Repair open circuit or short to ground or short to power in harness or connectors.

EC-1194 DTC 0807 ECM 14 Diagnostic Procedure (Cont'd) 6 CHECK STOP LAMP SWITCH Check continuity between stop lamp switch terminals 1 and 2 under the following conditions. SEF276Z OK or NG OK c GO TO 7. NG c Replace stop lamp switch.
7 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. c INSPECTION END EC-1195 ZD30DDTi ZD30DDTi DTC 0902 ECM RLY ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Ignition switch "ON" Ignition switch "OFF" 4 B/Y ECM relay (Self-shutoff) Approximately 0.25V For a few seconds after turning ignition switch "OFF" Ignition switch "OFF" A few seconds passed after turning ignition switch "OFF" 38 56 61 116 B/Y W W W Ignition switch "OFF" 0V Ignition switch "ON" BATTERY VOLTAGE (11 - 14V) Ignition switch "ON" BATTERY VOLTAGE (11 - 14V) Ignition switch Power supply for ECM BATTERY VOLTAGE (11 - 14V) On Board Diagnosis Logic Malfunction is detected when .... Check Items (Possible Cause) + An irregular voltage signal from the ECM relay is sent to ECM. + Harness or connectors (ECM relay circuit is open or shorted.) + ECM relay DTC Confirmation Procedure WITH CONSULT-II 1) Turn ignition switch "ON". 2) Select "DATA MONITOR" mode with CONSULT-II. 3) Turn ignition switch "OFF", wait at least 20 seconds and then turn "ON". 4) If DTC is detected, go to "Diagnostic Procedure", EC-1198. WITHOUT CONSULT-II SEF817Y 1) Turn ignition switch "ON". 2) Turn ignition switch "OFF", wait at least 20 seconds and then turn "ON". 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. 4) If DTC is detected, go to "Diagnostic Procedure", EC-1198. EC-1196 DTC 0902 ECM RLY ZD30DDTi Wiring Diagram TEC123M EC-1197 DTC 0902 ECM RLY ZD30DDTi Diagnostic Procedure 1 CHECK ECM POWER SUPPLY CIRCUIT 1. Turn ignition switch "OFF". 2. Disconnect ECM relay. SEF225Z 3. Check voltage between ECM terminals 1, 3 and ground with CONSULT-II or tester. SEF289Z OK or NG OK c GO TO 3. NG c GO TO 2. 2 DETECT MALFUNCTIONING PART Check the following. 1. Harness connectors E104, M86 or E127, M21 2. 20A fuse 3. Harness for open and short between ECM relay and battery c Repair open circuit or short to ground or short to power in harness or connectors.

3 CHECK ECM INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals 56, 61, 116 and ECM relay terminal 5. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c GO TO 4. EC-1198 DTC 0902 ECM RLY Diagnostic Procedure (Cont'd) 4 ZD30DDTi DETECT MALFUNCTIONING PART Check the following. + Harness connectors M50, F5 + Harness for open or short between ECM and ECM relay c Repair open circuit or short to ground or short to power in harness or connectors. 5 CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Check harness continuity between ECM terminal 4 and ECM relay terminal 2. Refer to Wiring Diagram. Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 7. NG c GO TO 6. 6 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M52, F7 + Harness for open or short between ECM and ECM relay c Repair open circuit or short to ground or short to power in harness or connectors. 7 CHECK ECM RELAY 1. Apply 12V direct current between ECM relay terminals 1 and 2. 2. Check continuity between ECM relay terminals 3 and 5, 6 and 7. SEF296X OK or NG OK c GO TO 8.

NG c Replace ECM relay. 8 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. c INSPECTION END EC-1199 ZD30DDTi DTC 0903 ECM 15 Description The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the engine. SEC220B On Board Diagnosis Logic Malfunction is detected when ... Check Items (Possible Cause) + ECM input signal processing function is malfunctioning. + ECM (ECCS-D control module) DTC Confirmation Procedure WITH CONSULT-II 1) Turn ignition switch "ON". 2) Select "DATA MONITOR" mode with CONSULT-II. 3) Turn ignition switch "OFF", wait at least 20 seconds and then turn "ON". 4) If DTC is detected, go to "Diagnostic Procedure", EC-1201. WITHOUT CONSULT-II SEF817Y 1) Turn ignition switch "ON" and wait at least 2 seconds.

2) Turn ignition switch "OFF", wait at least 20 seconds and then turn "ON". 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. 4) If DTC is detected, go to "Diagnostic Procedure", EC-1201. EC-1200 DTC 0903 ECM 15 Diagnostic Procedure 1 INSPECTION START With CONSULT-II 1. Turn ignition switch "ON". 2. Select "SELF DIAG RESULTS" mode with CONSULT-II. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure", EC-1200, again. 5.

Is the malfunction displayed again? Without CONSULT-II 1. Turn ignition switch "ON". 2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. 3. Perform "DTC Confirmation Procedure", EC-1200, again. 4. Perform "Diagnostic Test Mode II (Self-diagnostic results)". 5. Is the DTC 0903 displayed again?

Yes or No Yes c Replace ECM. No c INSPECTION END EC-1201 ZD30DDTi ZD30DDTi DTC 0905 TURBO PRESSURE Component Description The charge air pressure sensor detects pressure in the exit side of the charge air cooler.

The sensor output voltage to the ECM increases as pressure increases. The charge air pressure sensor is not used to control the engine system under normal conditions. SEF340VA SEF627RA ECM Terminals and Reference Value Specification data are reference values, and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 46 L Charge air pressure sensor Approximately 2.0V Warm-up condition Idle speed On Board Diagnosis Logic Malfunction is detected when ... Check Items (Possible Cause) + An excessively high or low voltage from the sensor is sent to ECM. + Harness or connectors (The sensor circuit is open or shorted.) + Charge air pressure sensor EC-1202 DTC 0905 TURBO PRESSURE ZD30DDTi DTC Confirmation Procedure WITH CONSULT-II 1) 2) 3) 4) Turn ignition switch "ON". Select "DATA MONITOR" mode with CONSULT-II. Wait at least 1 second. If DTC is detected, go to "Diagnostic Procedure", EC-1205. WITHOUT CONSULT-II SEF817Y 1) Turn ignition switch "ON" and wait at least 1 second. 2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. 4) If DTC is detected, go to "Diagnostic Procedure", EC-1205. EC-1203 DTC 0905 TURBO PRESSURE ZD30DDTi Wiring Diagram TEC119M EC-1204 DTC 0905 TURBO PRESSURE ZD30DDTi Diagnostic Procedure 1 CHECK CHARGE AIR PRESSURE SENSOR POWER SUPPLY CIRCUIT 1. Stop engine. 2. Disconnect charge air pressure sensor harness connector. SEF283Z 3. Turn ignition switch "ON". 4.

Check voltage between charge air pressure sensor terminal 1 and ground with CONSULT-II or tester. SEF306Z OK or NG OK c GO TO 2.

NG c Repair harness or connectors. 2 CHECK CHARGE AIR PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT 1.

Turn ignition switch "OFF". 2. Check harness continuity between charge air pressure sensor terminal 3 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.

OK or NG OK c GO TO 4. NG c GO TO 3. 3 DETECT MALFUNCTIONING PART Check the following. + Harness connectors F6, M51 (A/T models) + Harness connectors M88, E106 (A/T models) + Harness for open or short between ECM and charge air pressure sensor + Harness for open or short between TCM (Transmission control module) and charge air pressure sensor c Repair open circuit or short to ground or short to power in harness or connectors. EC-1205 DTC 0905 TURBO PRESSURE Diagnostic Procedure (Cont'd) 4 ZD30DDTi CHECK CHARGE AIR PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1.

Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 46 and charge air pressure sensor terminal 2. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5.

NG c Repair open circuit or short to ground or short to power in harness or connectors. 5 CHECK CHARGE AIR PRESSURE SENSOR 1.

Remove charge air pressure sensor with its harness connector connected.

2. Turn ignition switch "ON".

3.

Use pump to apply pressure to charge air pressure sensor as shown in the figure. CAUTION: + Always calibrate the pressure pump gauge when using it. + Inspection should be done at room temperature [10 - 30°C (50 - 86°F)]. 4. Check the output voltage between charge air pressure sensor terminal 2 and engine ground. SEF449Z OK or NG OK c GO TO 6. NG c Replace charge air pressure sensor. 6 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.

c INSPECTION END EC-1206 DTC 1003 EGR VOLUME CONT/V ZD30DDTi Description SYSTEM DESCRIPTION Sensor Input Signal to ECM Electronic controlled fuel injection pump Fuel injection signal Crankshaft position sensor (TDC) Engine speed Vehicle speed sensor Vehicle speed Engine coolant temperature sensor Engine coolant temperature Ignition switch Start signal Throttle position sensor Throttle position Battery Battery voltage Mass air flow sensor Amount of intake air Air conditioner switch Air conditioner operation Electrical load Electrical load signal PNP switch Park/Neutral position signal ECM Function EGR volume control Actuator EGR volume control valve This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR by-pass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions.

The EGR volume control valve remains close under the following conditions. + Engine stopped + Engine starting + Low engine coolant temperature + Excessively high engine coolant temperature + High engine speed + Wide open throttle + Low battery voltage SEF908Y EC-1207 ZD30DDTi DTC 1003 EGR VOLUME CONT/V Description (Cont'd) COMPONENT DESCRIPTION EGR volume control valve The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening. SEF411Y CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM EGR VOL CON/V CONDITION + + + + Engine: After warming up Air conditioner switch: "OFF" Shift lever: Neutral position No-load SPECIFICATION After 1 minute at idle More than 10 steps Revving engine up to 3,200 rpm quickly 0 step ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground.

CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. 103 105 109 115 WIRE COLOR L/Y L/W L R/L ITEM CONDITION DATA (DC Voltage) Engine is running. EGR volume control valve Warm-up condition Idle speed 0.1 - 14V DTC Confirmation Procedure WITH CONSULT-II 1) Start engine and warm it up to normal operating temperature. 2) Select "DATA MONITOR" mode with CONSULT-II. 3) Turn ignition switch "OFF", and immediately turn "ON" within 1 second. 4) Start engine and let it idle. 5) If DTC is detected, go to "Diagnostic Procedure", EC-1210.

SEF817Y WITHOUT CONSULT-II 1) Start engine and warm it up to normal operating temperature. 2) Turn ignition switch "OFF", and immediately turn "ON" within 1 second.

3) Start engine and let it idle. 4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".

5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. 6) If DTC is detected, go to "Diagnostic Procedure", EC-1210. EC-1208 DTC 1003 EGR VOLUME CONT/V ZD30DDTi Wiring Diagram TEC116M EC-1209 DTC 1003 EGR VOLUME CONT/V Diagnostic Procedure 1 CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT-I 1. Turn ignition switch "OFF". 2. Disconnect EGR volume control valve harness connector. SEF277Z 3. Turn ignition switch "ON". 4. Check voltage between EGR volume control valve terminals 2, 5 and ground with CONSULT-II or tester. SEF412Y OK or NG OK c GO TO 7. NG c GO TO 2. EC-1210 ZD30DDTi DTC 1003 EGR VOLUME CONT/V Diagnostic Procedure (Cont'd) 2 ZD30DDTi CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT-II 1. Turn ignition switch "OFF". 2. Disconnect ECM relay.

SEF225Z 3. Check harness continuity between ECM relay terminal 7 and EGR volume control valve terminals 2 and 5. Refer to Wiring Diagram. Continuity should exist. OK or NG OK c GO TO 4. NG c GO TO 3. 3 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M50, F5 + Harness for open or short between EGR volume control valve and ECM relay c Repair open circuit or short to ground or short to power in harness or connectors. 4 CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT-III Check voltage between ECM relay terminal 6 and ground with CONSULT-II or tester. SEF297Z OK or NG OK c GO TO 6. NG c GO TO 5. 5 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + 10A fuse + Harness for open or short between ECM relay and battery c Repair open circuit or short to ground or short to power in harness or connectors. EC-1211 DTC 1003 EGR VOLUME CONT/V Diagnostic Procedure (Cont'd) 6 ZD30DDTi CHECK ECM RELAY 1. Apply 12V direct current between ECM relay terminals 1 and 2. 2. Check continuity between ECM relay terminals 3 and 5, 6 and 7. SEF296X OK or NG OK c GO TO 7. NG c Replace ECM relay. 7 CHECK EGR VOLUME CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector.

3. Check harness continuity between ECM terminals and EGR volume control valve terminals as follows. Refer to Wiring Diagram. MTBL0442 Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 8. NG c Repair open circuit or short to ground or short to power in harness or connectors. EC-1212 DTC 1003 EGR VOLUME CONT/V Diagnostic Procedure (Cont'd) 8 ZD30DDTi CHECK EGR VOLUME CONTROL VALVE-I Check resistance between EGR volume control valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6. SEF414Y OK or NG OK (With CONSULT-II) c GO TO 9. OK (Without CONSULT-II) c GO TO 10. NG c Replace EGR volume control valve. 9 CHECK EGR VOLUME CONTROL VALVE-II With CONSULT-II 1. Remove EGR volume control valve. 2. Reconnect ECM harness connector and EGR volume control valve harness connector. 3. Turn ignition switch "ON". 4. Perform "EGR VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. 5. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening steps. SEF819Y OK or NG OK c GO TO 11. NG c Replace EGR volume control valve. EC-1213 DTC 1003 EGR VOLUME CONT/V Diagnostic Procedure (Cont'd) 10 ZD30DDTi CHECK EGR VOLUME CONTROL VALVE-II Without CONSULT-II 1. Remove EGR volume control valve. 2. Reconnect ECM harness connector and EGR volume control valve harness connector. 3. Turn ignition switch "ON" and "OFF". 4. Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.

SEF560W OK or NG OK c GO TO 11. NG c Replace EGR volume control valve. 11 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.

c INSPECTION END EC-1214 DTC 1004 FUEL CUT SYSTEM1 ZD30DDTi Description SYSTEM DESCRIPTION SEF437Y The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange). The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit. By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve. Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators builtinto electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM. FUEL INJECTION AMOUNT CONTROL In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time. FUEL INJECTION TIMING CONTROL Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber. FUEL TEMPERATURE SENSOR The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature. CAM RING POSITION SENSOR The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor. EC-1215 ZD30DDTi DTC 1004 FUEL CUT SYSTEM1 CONSULT-II Reference Value in Data Monitor Mode Remarks: Specification data are reference values.

MONITOR ITEM CONDITION SPECIFICATION FUEL TEMP SEN + Engine: After warming up More than 40°C (104°F) SPILL/V + Engine: After warming up Approx. 13°CA INJ TIMG C/V + Engine: After warming up, idle the engine. Approx. 50 - 70% DECELER F/CUT + Engine: After warmIdle ing up OFF + Ignition switch: ON Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm2, 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm2, 12.90 psi) Approx. 1,500 m (4,992 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm2, 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm2, 11.36 psi) BARO SEN ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. G/Y Electronic control fuel injection pump 40 R/B Electronic control fuel injection pump L/B Electronic control fuel injection pump Engine is running. 52 Electronic control fuel injection pump Engine is running. 33 Approximately 2.5V Warm-up condition Idle speed Engine is running. 53 L/R Approximately 2.5V Warm-up condition Idle speed Approximately 0.1V Idle speed Approximately 0.35V Idle speed On Board Diagnosis Logic Malfunction is detected when .... + Fuel cut control system does not function properly. Check Items (Possible cause) + Harness or connectors (Electronic control fuel circuit is open or shorted.) + Electronic control fuel EC-1216 DTC 1004 FUEL CUT SYSTEM1 ZD30DDTi DTC Confirmation Procedure WITH CONSULT-II SEF817Y 1) Turn ignition switch "ON" and wait at least 2 seconds. 2) Select "DATA MONITOR" mode with CONSULT-II. 3) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.) 4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 5) If DTC is detected, go to "Diagnostic Procedure", EC-1219. WITHOUT CONSULT-II 1) Turn ignition switch "ON" and wait at least 2 seconds. 2) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.) 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

5) If DTC is detected, go to "Diagnostic Procedure", EC-1219. EC-1217 DTC 1004 FUEL CUT SYSTEM1 ZD30DDTi Wiring Diagram TEC113M EC-1218 DTC 1004 FUEL CUT SYSTEM1 ZD30DDTi Diagnostic Procedure 1 CHECK ELECTRONIC CONTROL FUEL INJECTION PUMP POWER SUPPLY CIRCUIT 1. Turn ignition switch "OFF". 2. Disconnect electronic control fuel injection pump harness connector.

SEF229Z 3. Turn ignition switch "ON". 4. Check voltage between electronic control fuel injection pump terminal 7 and ground. SEF438Y OK or NG OK c GO TO 3. NG c GO TO 2. 2 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M50, F5 + Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and ECM + Harness for open or short between electronic control fuel injection pump and ECM relay c Repair open circuit or short to ground or short to power in harness or connectors. 3 CHECK ELECTRONIC CONTROL FUEL INJECTION PUMP GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Check harness continuity between electronic control fuel injection pump terminal 6 and ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c GO TO 4. EC-1219 DTC 1004 FUEL CUT SYSTEM1 Diagnostic Procedure (Cont'd) 4 ZD30DDTi DETECT MALFUNCTIONING PART Check the following. + Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and engine ground c Repair open circuit or short to ground or short to power in harness or connectors. 5 CHECK COMMUNICATION LINE FOR OPEN AND SHORT 1. Check continuity between the following terminals.

Refer to Wiring Diagram. MTBL0444 Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 7. NG c GO TO 6. 6 DETECT MALFUNCTIONING PART Check the following. + Harness connectors F4, EC4 + Harness for open or short between electronic control fuel injection pump and ECM c Repair open circuit or short to ground or short to power in harness or connectors. 7 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.

OK or NG OK c Replace electronic control fuel injection pump. NG c Repair open circuit or short to ground or short to power in harness or connectors.

EC-1220 ZD30DDTi GLOW CONTROL SYSTEM Description SYSTEM DESCRIPTION Sensor Input Signal to ECM Crankshaft position sensor (TDC) Engine speed Engine coolant temperature sensor Engine coolant temperature ECM Function Actuator Glow control Glow lamp, Glow relay ↓ Glow plugs When engine coolant temperature is more than approximately 75°C (167°F), the glow relay turns off, inactivating the quick-glow control until coolant temperature drops below approximately 55°C (131°F). When coolant temperature is lower than approximately 75°C (167°F): + Ignition switch ON After ignition switch has turned to ON, the glow relay turns ON for a certain period of time in relation to engine coolant temperature, allowing current to flow through glow plug.

+ Cranking The glow relay turns ON, allowing current to flow through glow plug. + Starting After engine has started, current continues to flow through glow plug (after-glow mode) for a certain period in relation to engine coolant temperature. When engine speed exceeds approximately 4,800 rpm, current flow through glow plug is interrupted. The glow indicator lamp turns ON for a certain period of time in relation to engine coolant temperature at the time glow relay is turned ON. COMPONENT DESCRIPTION Glow plug + The glow plug is provided with a ceramic heating element to obtain a high-temperature resistance. It glows in response to a signal sent from the ECM, allowing current to flow through the glow plug via the glow relay.

SEF376Y + This engine uses two types of glow plugs. Type A has a blue or yellow paint mark. Type B has no paint mark. The location of the paint mark is shown in the figure. WARNING: Do not use two types of glow plugs at the same time. SEF280Z EC-1221 GLOW CONTROL SYSTEM ZD30DDTi ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Ignition switch "ON" Approximately 1V Glow indicator lamp is "ON" 16 L/W Glow indicator lamp Ignition switch "ON" Glow indicator lamp is "OFF" 111 LG/B Glow relay Refer to "SYSTEM DESCRIPTION", EC-1221. EC-1222 BATTERY VOLTAGE (11 - 14V) GLOW CONTROL SYSTEM ZD30DDTi Wiring Diagram TEC105M EC-1223 GLOW CONTROL SYSTEM ZD30DDTi Diagnostic Procedure 1 INSPECTION START Check fuel level, fuel supplying system, starter motor, etc. OK or NG OK c GO TO 2. NG c Correct. 2 CHECK INSTALLATION Check that all glow plug connecting plate nuts are installed properly. SEF233Z OK or NG OK (With CONSULT-II) c GO TO 3. OK (Without CONSULT-II) c GO TO 4. NG c Install properly.

3 CHECK GLOW INDICATOR LAMP OPERATION With CONSULT-II 1. Turn ignition switch "ON". 2. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II. 3. Confirm that "COOLAN TEMP/S" indicates below 75°C (167°F). If it indicates above 75°C (167°F), cool down engine. SEF013Y 4. Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 5. Make sure that glow indicator lamp is turned "ON" for 1.5 seconds or more after turning ignition switch "ON", and then turned "OFF". OK or NG OK c GO TO 5. NG c GO TO 6. EC-1224 GLOW CONTROL SYSTEM Diagnostic Procedure (Cont'd) 4 ZD30DDTi CHECK GLOW INDICATOR LAMP OPERATION Without CONSULT-II 1. Turn ignition switch "ON". 2. Confirm that the voltage between ECM terminal 19 and ground is above 1.36V. If it is below 1.36V, cool down engine. SEF430Y 3. Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON". 4. Make sure that glow indicator lamp is turned "ON" for 1.5 seconds or more after turning ignition switch "ON", and then turned "OFF". OK or NG OK c GO TO 5. NG c GO TO 6. 5 1.

2. 3. 4.

CHECK GLOW CONTROL SYSTEM OVERALL FUNCTION Turn ignition switch "OFF". Set voltmeter probe between glow plug and engine body. Turn ignition switch "ON". Check the voltage between glow plug and engine body under the following conditions. SEF234Z OK or NG OK c INSPECTION END NG c GO TO 11. EC-1225 GLOW CONTROL SYSTEM Diagnostic Procedure (Cont'd) 6 1. 2. 3. 4.

ZD30DDTi CHECK GLOW INDICATOR LAMP POWER SUPPLY CIRCUIT Turn ignition switch "OFF". Disconnect combination meter harness connector M32. Turn ignition switch "ON". Check voltage between combination meter terminal 9 and ground with CONSULT-II or tester. SEF296Z OK or NG OK c GO TO 8. NG c GO TO 7. 7 DETECT MALFUNCTIONING PART Check the following. 1. Fuse block (J/B) connector M3 2. 10A fuse 3. Harness for open or short between combination meter and fuse c Repair open circuit or short to ground or short to power in harness or connectors. 8 CHECK GLOW INDICATOR LAMP OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. 2. 3. 4. Turn ignition switch "OFF". Disconnect ECM harness connector. Disconnect combination meter harness connector M34.

Check harness continuity between ECM terminal 16 and combination meter terminal 30. Refer to Wiring Diagram. Continuity should exist. 5. Also check harness for short to ground and short to power. OK or NG OK c GO TO 10. NG c GO TO 9. 9 DETECT MALFUNCTIONING PART Check the following. 1. Harness connectors M51, F6 2. Harness for open or short between combination meter and ECM c Repair open circuit or short to ground or short to power in harness or connectors. 10 CHECK COMBINATION METER Check combination meter and glow indicator lamp. Refer to EL section ("METER AND GAUGES"). OK or NG OK c GO TO 18. NG c Repair or replace combination meter or glow indicator lamp. EC-1226 GLOW CONTROL SYSTEM Diagnostic Procedure (Cont'd) 11 CHECK GLOW RELAY POWER SUPPLY CIRCUIT 1. Turn ignition switch "OFF". 2. Disconnect glow relay. SEF235Z 3. Check voltage between glow relay terminals 1, 3 and ground with CONSULT-II or tester. SEF451Z OK or NG OK c GO TO 13. NG c GO TO 12. 12 DETECT MALFUNCTIONING PART Check the following. + 100A fusible link + Harness for open or short between glow relay and battery c Repair harness or connectors. 13 CHECK GLOW RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 111 and glow relay terminal 2. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 15. NG c GO TO 14. EC-1227 ZD30DDTi GLOW CONTROL SYSTEM Diagnostic Procedure (Cont'd) 14 ZD30DDTi DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + Harness connectors M51, F6 + Harness for open or short between glow relay and ECM c Repair open circuit or short to ground or short to power in harness or connectors. 15 CHECK HARNESS CONTINUITY BETWEEN GLOW RELAY AND GLOW PLUG FOR OPEN AND SHORT 1. Disconnect glow plug harness connector. 2. Check harness continuity between glow relay terminal 5 and glow plug harness connector. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 16. NG c Repair open circuit or short to ground or short to power in harness or connectors. 16 DETECT MALFUNCTIONING PART Check the following.

+ Harness connectors E67, E223 + Harness connectors E225, E241 + Harness for open or short between glow relay and glow plug c Repair open circuit or short to ground or short to power in harness or connectors. 17 CHECK GLOW RELAY Check continuity between glow relay terminals 3 and 5 under the following conditions. SEF433Y OK or NG OK c GO TO 18. NG c Replace glow relay. EC-1228 GLOW CONTROL SYSTEM Diagnostic Procedure (Cont'd) 18 CHECK GLOW PLUG 1. Remove glow plug connecting plate. 2. Check glow plug resistance. SEF236Z NOTE: + Do not bump glow plug heating element. If it is bumped, replace glow plug with a new one. + If glow plug is dropped from a height of 10 cm (3.94 in) or higher, replace with a new one. + If glow plug installation hole is contaminated with carbon, remove it with a reamer or suitable tool. + Hand-tighten glow plug by turning it two or three times, then tighten using a tool to specified torque. : 15 - 20 Nzm (1.5 - 2.1 kg-m, 11 - 15 ft-lb) OK or NG OK c GO TO 19. NG c Replace glow plug. 19 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. c INSPECTION END EC-1229 ZD30DDTi START SIGNAL ZD30DDTi Wiring Diagram TEC106M EC-1230 START SIGNAL ZD30DDTi Diagnostic Procedure 1 CHECK START SIGNAL OVERALL FUNCTION With CONSULT-II 1.

Turn ignition switch "ON". 2. Check "START SIGNAL" in "DATA MONITOR" mode with CONSULT-II under the following conditions. SEF604X Without CONSULT-II Check voltage between ECM terminal 20 and ground under the following conditions. SEF415Y OK or NG OK c INSPECTION END NG c GO TO 2. 2 CHECK START SIGNAL INPUT SIGNAL CIRCUIT 1. Turn ignition switch "OFF".

2.

Disconnect ECM harness connector and ignition switch harness connector. 3. Check harness continuity between ECM terminal 20 and ignition switch terminal 6. Refer to Wiring Diagram. Continuity should exist.

4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 4. NG c GO TO 3. 3 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M52, F7 + 7.5A fuse + Fuse block (J/B) connectors M3, E112 + Harness for open or short between ECM and ignition switch c Repair open circuit or short to ground or short to power in harness or connectors. EC-1231 START SIGNAL Diagnostic Procedure (Cont'd) 4 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.

c INSPECTION END EC-1232 ZD30DDTi PARK/NEUTRAL POSITION (PNP) SWITCH ZD30DDTi Description When the gear position is in "Neutral", neutral position is "ON". ECM detects the position because the continuity of the line (the "ON" signal) exists. CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM P/N POSI SW CONDITION + Ignition switch: ON SPECIFICATION Shift lever: Park/Neutral ON Except above OFF ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Ignition switch "ON" 22 P/B Park/Neutral position switch Gear position is "Neutral" (M/T models) Gear position is "P" or "N" (A/T models) Ignition switch "ON" Except the above gear position EC-1233 Approximately 0V BATTERY VOLTAGE (11 - 14V) PARK/NEUTRAL POSITION (PNP) SWITCH ZD30DDTi Wiring Diagram TEC108M EC-1234 PARK/NEUTRAL POSITION (PNP) SWITCH Diagnostic Procedure FOR M/T MODELS 1 CHECK OVERALL FUNCTION With CONSULT-II 1. Turn ignition switch "ON". 2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II. 3. Check "P/N POSI SW" signal under the following conditions. SEF049Y Without CONSULT-II 1. Turn ignition switch "ON". 2. Check voltage between ECM terminal 22 and ground under the following conditions. SEF419Y OK or NG OK c INSPECTION END NG c GO TO 2. EC-1235 ZD30DDTi PARK/NEUTRAL POSITION (PNP) SWITCH Diagnostic Procedure (Cont'd) 2 ZD30DDTi CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT 1.

Turn ignition switch "OFF". 2. Disconnect park/neutral position (PNP) switch harness connector. SEF281Z 3. Check harness continuity between PNP switch terminal 2 and body ground. Refer to Wiring Diagram. Continuity should exist.

4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 4. NG c GO TO 3. 3 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E202, E69 + Harness for open or short between PNP switch and body ground c Repair open circuit or short to ground or short to power in harness or connectors. 4 CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 22 and PNP switch terminal 1. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 6. NG c GO TO 5. 5 DETECT MALFUNCTIONING PART Check the following. + Harness connectors F7, M52 + Harness connectors M21, E127 + Harness connectors E70, E201 + Harness for open or short between PNP switch and ECM c Repair open circuit or short to ground or short to power in harness or connectors. 6 CHECK PARK/NEUTRAL POSITION SWITCH Refer to MT section ("POSITION SWITCH CHECK"). OK or NG OK c GO TO 7. NG c Replace park/neutral position switch. EC-1236 PARK/NEUTRAL POSITION (PNP) SWITCH Diagnostic Procedure (Cont'd) 7 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. c INSPECTION END FOR A/T MODELS 1 CHECK OVERALL FUNCTION With CONSULT-II 1. Turn ignition switch "ON". 2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II. 3. Check "P/N POSI SW" signal under the following conditions. SEF049Y Without CONSULT-II 1.

Turn ignition switch "ON". 2.

Check voltage between ECM terminal 22 and ground under the following conditions. SEF419Y OK or NG OK c INSPECTION END NG c GO TO 2. EC-1237 ZD30DDTi PARK/NEUTRAL POSITION (PNP) SWITCH Diagnostic Procedure (Cont'd) 2 CHECK PNP SWITCH CIRCUIT With CONSULT-II 1. Select "A/T" and then select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II. 2. Check "P/N POSI SW" signal under the following conditions. SEF049Y OK or NG OK c GO TO 9. NG c GO TO 4. 3 CHECK PNP SWITCH CIRCUIT Without CONSULT-II 1. Turn ignition switch "OFF". 2. Disconnect TCM (Transmission control module) harness connector. SEF792V 3. Turn ignition switch "ON". 4. Check voltage between TCM terminal 36 and ground under the following conditions. SEF298Z OK or NG OK c GO TO 9. NG c GO TO 4. EC-1238 ZD30DDTi PARK/NEUTRAL POSITION (PNP) SWITCH Diagnostic Procedure (Cont'd) 4 1. 2. 3. 4. ZD30DDTi CHECK PNP SWITCH POWER SUPPLY CIRCUIT Turn ignition switch "OFF". Disconnect PNP switch harness connector. Turn ignition switch "ON".

Check voltage between PNP switch terminal 3 and ground with CONSULT-II or tester. SEF299Z OK or NG OK c GO TO 6. NG c GO TO 5. 5 DETECT MALFUNCTIONING PART Check the following. + Fuse block (J/B) connector E112 + 7.5A fuse + Harness for open or short between PNP switch and fuse c Repair open circuit or short to ground or short to power in harness or connectors. 6 CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT-I 1. Turn ignition switch "OFF". 2. Disconnect TCM (Transmission control module) harness connector.

3. Check harness continuity between TCM terminal 36 and PNP switch terminals 7, 9 under the following conditions. SEF300Z 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 8. NG c GO TO 7. EC-1239 PARK/NEUTRAL POSITION (PNP) SWITCH Diagnostic Procedure (Cont'd) 7 ZD30DDTi DETECT MALFUNCTIONING PART Check the following. + Diode E103 + Harness for open or short between PNP switch and TCM (Transmission control module) c Repair open circuit or short to ground or short to power in harness or connectors. 8 CHECK PARK/NEUTRAL POSITION (PNP) SWITCH Refer to "TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS" in AT section. OK or NG OK c GO TO 9. NG c Replace park/neutral position (PNP) switch.

9 CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT-II 1. Turn ignition switch "OFF".

2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 22 and TCM terminal 14. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 11. NG c GO TO 10. 10 DETECT MALFUNCTIONING PART Check the following. + Harness connectors F7, M52 + Harness connectors M21, E127 + Harness for open or short between ECM and TCM (Transmission control module) c Repair open circuit or short to ground or short to power in harness or connectors. 11 CHECK INTERMITTENT INCIDENT Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. c INSPECTION END EC-1240 ZD30DDTi HEAT UP SWITCH Component Description The heat up switch is located on the lower side of the instrument panel. This switch is used to speed up the heater's operation when the engine is cold. When the ECM received the heat up switch "ON" signal, the ECM increases the engine idle speed to 1,100 to 1,200 rpm to warm up engine quickly. This system works when all conditions listed below are met. SEF803V Heat up switch ON Engine coolant temperature Below 105°C (221°F) Shift lever "P" or "N" Accelerator pedal Fully released CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM WARM UP SW CONDITION + Ignition switch: ON SPECIFICATION Heat up switch: ON ON Heat up switch: OFF OFF ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage and Pulse Signal) Ignition switch "ON" 0V Heat up switch is "OFF".

59 BR/W Heat up switch Ignition switch "ON" Heat up switch is "ON". EC-1241 BATTERY VOLTAGE (11 - 14V) HEAT UP SWITCH ZD30DDTi Wiring Diagram TEC110M EC-1242 HEAT UP SWITCH Diagnostic Procedure 1 INSPECTION START Do you have CONSULT-II? Yes or No Yes c GO TO 2. No c GO TO 3. 2 CHECK OVERALL FUNCTION With CONSULT-II 1. Turn ignition switch "ON". 2. Check "WARM UP SW" in "DATA MONITOR" mode with CONSULT-II under the following conditions.

SEF302Z OK or NG OK c INSPECTION END NG c GO TO 4. 3 CHECK OVERALL FUNCTION Without CONSULT-II 1. Turn ignition switch "ON". 2. Check voltage between ECM terminal 59 and ground under the following conditions. SEF303Z OK or NG OK c INSPECTION END NG c GO TO 4. EC-1243 ZD30DDTi HEAT UP SWITCH Diagnostic Procedure (Cont'd) 4 1. 2. 3. 4.

5. ZD30DDTi CHECK HEAT UP SWITCH POWER SUPPLY CIRCUIT Turn heat up switch "OFF". Turn ignition switch "OFF". Disconnect heat up switch harness connector. Turn ignition switch "ON". Check voltage between heat up switch terminal 6 and ground with CONSULT-II or tester. SEF304Z OK or NG OK c GO TO 6. NG c GO TO 5. 5 DETECT MALFUNCTIONING PART Check the following. + Fuse block (J/B) connector M3 + 10A fuse + Harness for open or short between heat up switch and fuse c Repair open circuit or short to ground or short to power in harness or connectors. 6 CHECK HEAT UP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 59 and heat up switch terminal 5. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 8. NG c GO TO 7. 7 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M51, F6 + Harness for open or short between heat up switch and ECM c Repair open circuit or short to ground or short to power in harness or connectors. EC-1244 HEAT UP SWITCH Diagnostic Procedure (Cont'd) 8 CHECK HEAT UP SWITCH Check continuity between heat up switch terminals 5 and 6 under the following conditions. SEF305Z OK or NG OK c GO TO 9. NG c Replace heat up switch. 9 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. c INSPECTION END EC-1245 ZD30DDTi SWIRL CONTROL VALVE CONTROL SOLENOID VALVE ZD30DDTi Description SYSTEM DESCRIPTION Sensor Input Signal to ECM Ignition switch Start signal Crankshaft position sensor (TDC) Engine speed PNP switch Park/Neutral position signal Engine coolant temperature sensor Engine coolant temperature ECM Function Actuator Swirl control valve control Swirl control valve control solenoid valve ↓ Vacuum signal Swirl control valve actuator ↓ Swirl control valve This system has a swirl control valve in the throttle body. While idling and during low engine speed operation, the swirl control valve closes. Thus the velocity of the air in the intake passage increases, promoting the vaporization of the fuel and producing a swirl in the combustion chamber. Because of this operation, this system tends to increase the burning speed of the gas mixture, improve fuel consumption, and increase the stability in running conditions. Also, except when idling and during low engine speed operation, this system opens the swirl control valve.

In this condition, this system tends to increase power by improving intake efficiency via reduction of intake flow resistance, intake flow. The solenoid valve controls swirl control valve's shut/open condition. This solenoid valve is operated by the ECM. PNP switch Engine speed Less than 1,250 rpm Engine coolant temperature Swirl control valve control solenoid valve Swirl control valve Less than 50°C (122°F) OFF Open More than 50°C (122°F) ON Closed Less than 50°C (122°F) OFF Open More than 50°C (122°F) OFF Open — OFF Open OFF More than 1,250 rpm ON — SEF452Z EC-1246 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE Description (Cont'd) ZD30DDTi COMPONENT DESCRIPTION Swirl control valve control solenoid valve The swirl control valve control solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the solenoid valve is bypassed to apply vacuum pump vacuum to the swirl control valve actuator. This operation closes the swirl control valve. When the ECM sends an OFF signal, the vacuum signal is cut and the swirl control valve opens. SEF284Z CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM SWRL CONT S/V CONDITION + Lift up the vehicle + Engine: After warming up, let it idle for more than 1 second. + Air conditioner switch: OFF + No-load SPECIFICATION Shift lever: Except "P" and "Neutral" ON position Shift lever: "Neutral" position OFF ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor.

Use a ground other than ECM terminals, such as the ground.

TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage and Pulse Signal) Engine is running.

54 L/B Swirl control valve control solenoid valve Warm-up condition At idle speed for more than 1 second. Lift up the vehicle Gear position is except "P" and "Neutral" Approximately 0.1V Engine is running. Idle speed Lift up the vehicle Gear position is "P" or "Neutral" EC-1247 BATTERY VOLTAGE (11 - 14V) SWIRL CONTROL VALVE CONTROL SOLENOID VALVE ZD30DDTi Wiring Diagram TEC117M EC-1248 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE ZD30DDTi Diagnostic Procedure 1 INSPECTION START Do you have CONSULT-II?

Yes or No Yes c GO TO 2. No c GO TO 3.

2 CHECK OVERALL FUNCTION With CONSULT-II 1. Start engine and let it idle. 2. Select "SWIRL CONT S/V 1" in "ACTIVE TEST" mode with CONSULT-II.

3. Touch "ON" and "OFF" alternately on CONSULT-II screen.

4. Make sure that swirl control valve actuator rod moves according to "SWIRL CONT S/V 1" indication. SEF307Z OK or NG OK c INSPECTION END NG c GO TO 4. 3 CHECK OVERALL FUNCTION Without CONSULT-II 1. Lift up the vehicle. 2. Start engine and warm it up to normal operating temperature. 3. Run engine at idle speed. 4. Make sure that swirl control valve actuator rod moves when shifting the shift lever to "P" or "Neutral" position and then to positions other than "P" and "Neutral". SEF308Z OK or NG OK c INSPECTION END NG c GO TO 5.

EC-1249 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE Diagnostic Procedure (Cont'd) 4 ZD30DDTi CHECK VACUUM SOURCE With CONSULT-II 1. Turn ignition switch "OFF". 2. Disconnect vacuum hose connected to swirl control valve actuator. 3. Start engine and let it idle.

4. Select "SWIRL CONT S/V 1" in "ACTIVE TEST" mode with CONSULT-II. 5. Touch "ON" and "OFF" alternately on CONSULT-II screen. 6. Check vacuum hose for vacuum existence under the following conditions. SWIRL CONT S/V 1 Vacuum Should exist Should not exist SEF309Z OK or NG OK c GO TO 7. NG c GO TO 6. 5 CHECK VACUUM SOURCE Without CONSULT-II 1. Turn ignition switch "OFF". 2. Disconnect vacuum hose connected to swirl control valve actuator. 3. Lift up the vehicle. 4.

Start engine and warm it up to normal operating temperature. 5. Run engine at idle speed 6. Check vacuum hose for vacuum existence under the following conditions. SEF310Z OK or NG OK c GO TO 7. NG c GO TO 6. EC-1250 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE Diagnostic Procedure (Cont'd) 6 ZD30DDTi CHECK SWIRL CONTROL VALVE ACTUATOR 1. Turn ignition switch "OFF". 2. Install a vacuum pump to swirl control valve actuator. 3. Make sure that the swirl control valve actuator rod moves smoothly when applying vacuum of −93.3 kPa (−933 mbar, −700 mmHg, −27.6 inHg) and releasing it. SEF311Z OK or NG OK c Repair or replace vacuum hoses and vacuum gallery. NG c Replace swirl control valve actuator.

7 CHECK VACUUM HOSE 1. Turn ignition switch "OFF".

2. Check vacuum hoses and vacuum gallery for clogging, cracks or improper connection. SEF109L OK or NG OK c GO TO 8. NG c Repair or replace vacuum hoses and vacuum gallery. EC-1251 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE Diagnostic Procedure (Cont'd) 8 ZD30DDTi CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT 1.

Turn ignition switch "OFF". 2. Disconnect swirl control valve control solenoid valve harness connector. SEF284Z 3. Turn ignition switch "ON". 4. Check voltage between swirl control valve control solenoid valve terminal 2 and ground with CONSULT-II or tester. SEF312Z OK or NG OK c GO TO 10. NG c GO TO 9. 9 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M52, F7 + Fuse block (J/B) connector M2 + 10A fuse + Harness for open or short between swirl control valve control solenoid valve and fuse c Repair open circuit or short to ground or short to power in harness or connectors. 10 CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 54 and swirl control valve control solenoid valve terminal 1. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 11.

NG c Repair open circuit or short to ground or short to power in harness or connectors. EC-1252 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE Diagnostic Procedure (Cont'd) 11 CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE With CONSULT-II 1.

Reconnect all disconnected harness connectors. 2. Turn ignition switch "ON". 3. Select "SWIRL CONT S/V 1" in "ACTIVE TEST" mode with CONSULT-II. 4. Check air passage continuity of swirl control valve control solenoid valve under the following conditions. SEF313Z Without CONSULT-II 1. Apply 12V direct current between swirl control valve control solenoid valve terminals. 2. Check air passage continuity of swirl control valve control solenoid valve under the following conditions. SEF335X OK or NG 12 OK c GO TO 12. NG c Replace swirl control valve control solenoid valve. CHECK INTERMITTENT INCIDENT Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. c INSPECTION END EC-1253 ZD30DDTi INTAKE AIR CONTROL VALVE CONTROL SOLENOID VALVE ZD30DDTi Description Vibration when stopping the engine can be controlled by cutting intake air right before the fuel is cut. The intake air control valve control solenoid valve controls the ON-OFF load of the intake air control valve actuator. As a result, the intake air control valve control solenoid valve will be turned ON when the ignition switch is turned OFF with the engine running and when the engine stalls. After the engine has stopped, the intake air control valve control solenoid valve will return to fully open. SEF284Z ECM Terminals and Reference Value Specification data are reference values, and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION Engine is running. 2 R/W Intake air control valve control solenoid valve DATA (DC Voltage) BATTERY VOLTAGE (11 - 14V) Ignition switch "OFF" Approximately 0.1V For a few seconds after engine stops EC-1254 INTAKE AIR CONTROL VALVE CONTROL SOLENOID VALVE ZD30DDTi Wiring Diagram TEC122M EC-1255 INTAKE AIR CONTROL VALVE CONTROL SOLENOID VALVE Diagnostic Procedure 1 CHECK OVERALL FUNCTION 1.

Start engine and let it idle. 2. Make sure that intake air control valve actuator rod moves when turning ignition switch "OFF". SEF315Z OK or NG OK c INSPECTION END NG c GO TO 2. 2 1. 2. 3. 4. CHECK VACUUM SOURCE Turn ignition switch "OFF". Disconnect vacuum hose connected to intake air control valve actuator. Start engine and let it idle. Check vacuum hose for vacuum existence under the following conditions. SEF316Z OK or NG OK c GO TO 3. NG c GO TO 4. EC-1256 ZD30DDTi INTAKE AIR CONTROL VALVE CONTROL SOLENOID VALVE Diagnostic Procedure (Cont'd) 3 ZD30DDTi CHECK INTAKE AIR CONTROL VALVE ACTUATOR 4. Turn ignition switch "OFF". 5. Install a vacuum pump to intake air control valve actuator. 6. Make sure that the intake air control valve actuator rod moves smoothly when applying vacuum of −93.3 kPa (−933 mbar, −700 mmHg, −27.56 psi) and releasing it. SEF317Z OK or NG OK c Repair or replace vacuum hoses and vacuum gallery. NG c Replace intake air control valve actuator. 4 CHECK VACUUM HOSE 3. Turn ignition switch "OFF". 4. Check vacuum hoses and vacuum gallery for clogging, cracks or improper connection. SEF109L OK or NG OK c GO TO 5. NG c Repair or replace vacuum hoses and vacuum gallery. EC-1257 INTAKE AIR CONTROL VALVE CONTROL SOLENOID VALVE Diagnostic Procedure (Cont'd) 5 ZD30DDTi CHECK INTAKE AIR CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT-I 1. Turn ignition switch "OFF". 2. Disconnect intake air control valve control solenoid valve harness connector. SEF284Z 3. Turn ignition switch "ON". 4. Check voltage between intake air control valve control

solenoid valve terminal 2 and ground with CONSULT-II or tester. SEF312Z OK or NG OK c GO TO 11. NG c GO TO 6. EC-1258 INTAKE AIR CONTROL VALVE CONTROL SOLENOID VALVE Diagnostic Procedure (Cont'd) 6 ZD30DDTi CHECK INTAKE AIR CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT-II 1. Turn ignition switch "OFF". 2. Disconnect ECM relay. SEF225Z 3. Check harness continuity between intake air control valve control solenoid valve terminal 2 and ECM relay terminal 7. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 8. NG c GO TO 7. 7 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M50, F5 + Harness for open or short between intake air control valve control solenoid valve and ECM relay c Repair open circuit or short to ground or short to power in harness or connectors. 8 CHECK INTAKE AIR CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT-III Check voltage between ECM relay terminal 6 and ground with CONSULT-II or tester. SEF297Z OK or NG OK c GO TO 10. NG c GO TO 9. 9 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M21, E127 + 10A fuse + Harness for open or short between ECM relay and battery c Repair open circuit or short to ground or short to power in harness or connectors. EC-1259 INTAKE AIR CONTROL VALVE CONTROL SOLENOID VALVE Diagnostic Procedure (Cont'd) 10 ZD30DDTi CHECK ECM RELAY 1.

Apply 12V direct current between ECM relay terminals 1 and 2. 2. Check continuity between ECM relay terminals 3 and 5, 6 and 7.

SEF296X OK or NG OK c GO TO 13. NG c Replace ECM relay. 11 CHECK INTAKE AIR CONTROL VALVE CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 2 and intake air control valve control solenoid valve terminal 1. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 12. NG c Repair open circuit or short to ground or short to power in harness or connectors. 12 CHECK INTAKE AIR CONTROL VALVE CONTROL SOLENOID VALVE 1. Apply 12V direct current between intake air control valve control solenoid valve terminals. 2. Check air passage continuity of intake air control valve control solenoid valve under the following conditions. SEF335X OK or NG 13 OK c GO TO 13. NG c Replace intake control valve control solenoid valve. CHECK INTERMITTENT INCIDENT Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.

c INSPECTION END EC-1260 VARIABLE NOZZLE TURBOCHARGER CONTROL SOLENOID VALVE ZD30DDTi Description The load from the variable nozzle turbocharger control solenoid valve controls the actuator. By changing the variable nozzle vane opening through the rods, the intake air volume is adjusted. SEF453Z The variable nozzle turbocharger control solenoid valve is moved by ON/OFF pulse from the ECM. The longer the ON pulse, the charge air pressure rises. SEF287Z CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM VNT S/V 1 CONDITION + + + + Engine: After warming up Air conditioner switch: "OFF" Shift lever: Neutral position No-load SPECIFICATION Idle Approx. 56% 2,000 rpm Approx. 20% EC-1261 VARIABLE NOZZLE TURBOCHARGER CONTROL SOLENOID VALVE ZD30DDTi ECM Terminals and Reference Value Specification data are reference values, and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Approximately 6.8V Engine is running. Warm-up condition Idle speed 101 R/B Variable nozzle turbocharger control solenoid valve SEF253Z Approximately 11V Engine is running. Warm-up condition Engine speed is 2,000 rpm SEF254Z EC-1262 VARIABLE NOZZLE TURBOCHARGER CONTROL SOLENOID VALVE ZD30DDTi Wiring Diagram TEC120M EC-1263 VARIABLE NOZZLE TURBOCHARGER CONTROL SOLENOID VALVE ZD30DDTi Diagnostic Procedure 1 CHECK OVERALL FUNCTION 1. Start engine and let it idle. 2. Make sure that variable nozzle turbocharger control actuator rod moves when revving engine up to 3,000 rpm and returning to idle. SEF320Z OK or NG OK c INSPECTION END NG c GO TO 2. 2 1.

2.

3. 4. CHECK VACUUM SOURCE Turn ignition switch "OFF". Disconnect vacuum hose connected to variable nozzle turbocharger control actuator. Start engine and let it idle. Check vacuum hose for vacuum existence. SEF321Z OK or NG OK c GO TO 3. NG c GO TO 5. EC-1264 VARIABLE NOZZLE TURBOCHARGER CONTROL SOLENOID VALVE Diagnostic Procedure (Cont'd) 3 ZD30DDTi CHECK VARIABLE NOZZLE TURBOCHARGER CONTROL ACTUATOR 1.

Turn ignition switch "OFF". 2. Install a vacuum pump to variable nozzle turbocharger control actuator. 3. Make sure that the variable nozzle turbocharger control actuator rod moves smoothly when applying vacuum of −53.3 kPa (−533 mbar, −400 mmHg, −15.75 inHg) and releasing it. SEF322Z OK or NG OK c GO TO 4. NG c Replace turbocharger assembly. 4 CHECK VACUUM HOSE 1. Turn ignition switch "OFF". 2. Check vacuum hoses and vacuum gallery for clogging, cracks or improper connection.

SEF109L OK or NG OK c GO TO 9. NG c Repair or replace vacuum hoses and vacuum gallery. EC-1265 VARIABLE NOZZLE TURBOCHARGER CONTROL SOLENOID VALVE Diagnostic Procedure (Cont'd) 5 ZD30DDTi CHECK VACUUM HOSE 1. Turn ignition switch "OFF". 2. Check vacuum hoses and vacuum gallery for clogging, cracks or improper connection. SEF109L OK or NG OK c GO TO 6. NG c Repair or replace vacuum hoses and vacuum gallery. 6 CHECK VARIABLE NOZZLE TURBOCHARGER CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT 1. Turn ignition switch "OFF". 2. Disconnect variable nozzle turbocharger control solenoid valve harness connector. SEF287Z 3. Turn ignition switch "ON". 4. Check voltage between variable nozzle turbocharger control solenoid valve terminal 2 and ground with CONSULT-II or tester. SEF314Z OK or NG OK c GO TO 8.

NG c GO TO 7. EC-1266 VARIABLE NOZZLE TURBOCHARGER CONTROL SOLENOID VALVE Diagnostic Procedure (Cont'd) 7 ZD30DDTi DETECT MALFUNCTIONING PART Check the following. + Harness connectors M21, E127 + Harness connectors E69, E202 + Fuse block (J/B) connector M2 + 10A fuse + Harness for open or short between variable nozzle turbocharger control solenoid valve and fuse c Repair open circuit or short to ground or short to power in harness or connectors. 8 CHECK VARIABLE NOZZLE TURBOCHARGER CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 101 and variable nozzle turbocharger control solenoid valve terminal 1. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 10. NG c GO TO 9. 9 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E230, F12 + Harness for open or short between variable nozzle turbocharger control solenoid valve and ECM c Repair open circuit or short to ground or short to power in harness or connectors. EC-1267 VARIABLE NOZZLE TURBOCHARGER CONTROL SOLENOID VALVE Diagnostic Procedure (Cont'd) 10 ZD30DDTi CHECK VARIABLE NOZZLE TURBOCHARGER CONTROL SOLENOID VALVE 1. Disconnect variable nozzle turbocharger control solenoid valve harness connector. SEF287Z 2. Apply 12V direct current between variable nozzle turbocharger control solenoid valve terminals. 3. Check air passage continuity of variable nozzle turbocharger control solenoid valve under the following conditions. SEF454Z OK or NG OK c GO TO 11. NG c Replace variable nozzle turbocharger control solenoid valve. 11 CHECK INTERMITTENT INCIDENT Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. c INSPECTION END EC-1268 EXHAUST GAS CONTROL VALVE CONTROL SOLENOID VALVE ZD30DDTi Description SEF285Z With the heat up switch ON, engine speed is increased and the exhaust gas control valve is closed, which helps to promote heating and improve heating performance. The exhaust gas control valve control solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the solenoid valve is bypassed to apply vacuum pump vacuum to the exhaust gas control valve actuator.

This operation closes the exhaust gas control valve. When the ECM sends an OFF signal, the vacuum signal is cut and the exhaust gas control valve opens. CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM EXH/GAS REG V CONDITION + + + + SPECIFICATION Vehicle: Stopped Engine speed: Below 1,200 rpm Engine coolant temperature: Below 87°C (189°F) Heat up switch: ON Except above ON OFF ECM Terminals and Reference Value Specification data are reference values, and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 11 BR/Y Exhaust gas control valve control solenoid valve Engine speed is below 1,200 rpm Engine coolant temperature is below 87°C (189°F) Stop the vehicle Heat up switch is "ON" Engine is running. Except the above condition EC-1269 Approximately 0.1V BATTERY VOLTAGE (11 - 14V) EXHAUST GAS CONTROL VALVE CONTROL SOLENOID VALVE ZD30DDTi Wiring Diagram TEC118M EC-1270 EXHAUST GAS CONTROL VALVE CONTROL SOLENOID VALVE Diagnostic Procedure 1 INSPECTION START Do you have CONSULT-II?

Yes or No Yes c GO TO 2. No c GO TO 3. 2 CHECK OVERALL FUNCTION-I With CONSULT-II 1. Turn ignition switch "ON". 2. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II. 3. Make sure that "COOLAN TEMP/S" indication is below 60°C (140°F). If out of range, cool down the engine. NOTE: The following procedure should be performed before the engine coolant temperature reaches 87°C (189°F). 4. Disconnect vacuum hose connected to exhaust gas control valve actuator. 5. Start engine and let it idle. 6. Check vacuum hose for vacuum existence under the following conditions. SEF318Z OK or NG OK c GO TO 4. NG c GO TO 5. EC-1271 ZD30DDTi EXHAUST GAS CONTROL VALVE CONTROL SOLENOID VALVE Diagnostic Procedure (Cont'd) 3 ZD30DDTi CHECK OVERALL FUNCTION-I Without CONSULT-II 7. Turn ignition switch "ON". 8. Make sure that voltage between ECM terminal 19 and ground is more than 1.88V. If out of range, cool down the engine. NOTE: The following procedure should be performed before the voltage becomes less than 1.06V. 9. Disconnect vacuum hose connected to exhaust gas control valve actuator. 10. Start engine and let it idle. 11. Check vacuum hose for vacuum existence under the following conditions. SEF318Z OK or NG OK c GO TO 4. NG c GO TO 5. 4 1. 2. 3. 4. CHECK OVERALL FUNCTION-II Turn ignition switch "OFF". Remove exhaust gas control valve actuator from exhaust tube. Install a vacuum pump to exhaust gas control valve actuator. Make sure that the exhaust gas control valve moves smoothly when applying vacuum of −86.6 to −93.3 kPa (−866 to −933 mbar, −650 to −700 mmHg, −25.59 to −27.56 inHg) and releasing it. SEF319Z OK or NG OK c INSPECTION END NG c Replace exhaust gas control valve assembly. EC-1272 EXHAUST GAS CONTROL VALVE CONTROL SOLENOID VALVE Diagnostic Procedure (Cont'd) 5 ZD30DDTi CHECK VACUUM HOSE 1. Turn ignition switch "OFF".

2.

Check vacuum hoses and vacuum gallery for clogging, cracks or improper connection. SEF109L OK or NG OK c GO TO 6. NG c Repair or replace vacuum hoses and vacuum gallery. 6 CHECK EXHAUST GAS CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT 1. Turn ignition switch "OFF". 2. Disconnect exhaust gas control valve control solenoid valve harness connector. SEF285Z 3. Turn ignition switch "ON". 4. Check voltage between exhaust gas control valve control solenoid valve terminal 2 and ground with CONSULT-II or tester. SEF312Z OK or NG OK c GO TO 8. NG c GO TO 7. EC-1273 EXHAUST GAS CONTROL VALVE CONTROL SOLENOID VALVE Diagnostic Procedure (Cont'd) 7 ZD30DDTi DETECT MALFUNCTIONING PART Check the following. + Harness connectors M21, E127 + Fuse block (J/B) connector M2 + 10A fuse + Harness for open or short between exhaust gas control valve control solenoid valve and fuse c Repair open circuit or short to ground or short to power in harness or connectors. 8 CHECK EXHAUST GAS CONTROL VALVE CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 11 and exhaust gas control valve control solenoid valve terminal 1. Refer to Wiring Diagram. Continuity should exist. 4.

Also check harness for short to ground and short to power. OK or NG OK c GO TO 10. NG c GO TO 9. 9 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M21, E127 + Harness connectors M50, F5 + Harness for open or short between exhaust gas control valve control solenoid valve and ECM c Repair open circuit or short to ground or short to power in harness or connectors. 10 CHECK EXHAUST GAS CONTROL VALVE CONTROL SOLENOID VALVE 1. Apply 12V direct current between exhaust gas control valve control solenoid valve terminals. 2. Check air passage continuity of exhaust gas control valve control solenoid valve under the following conditions. SEF335X OK or NG OK c GO TO 11. NG c Replace exhaust gas control valve control solenoid valve. 11 CHECK INTERMITTENT INCIDENT Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. c INSPECTION END EC-1274 AIR CONDITIONER CONTROL ZD30DDTi Wiring Diagram TEC111M EC-1275 MI & DATA LINK CONNECTORS ZD30DDTi Wiring Diagram TEC112M EC-1276 ZD30DDTi SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications Unit: rpm Engine ZD30DDTi Idle speed 750±25 Maximum engine speed 4,300 Injection Pump Numbers Engine Part number Pump assembly number ZD30DDTi 16700 VG100 109342-4023 Injection Nozzle Unit: kPa (bar, kg/cm2, psi) Initial injection pressure Used 19,026 (190.3, 194, 2,759) New 19,516 - 20,497 (195.2 - 205.0, 199 - 209, 2,830 - 2,972) Limit 16,182 (161.8, 165, 2,346) Engine Coolant Temperature Sensor Temperature °C (°F) Resistance kΩ 20 (68) 2.1 - 2.9 50 (122) 0.68 - 1.00 90 (194) 0.236 - 0.260 Crankshaft Position Sensor (TDC) Resistance [at 20°C (68°F)] Ω 1,287 - 1,573 Glow Plug Resistance [at 20°C (68°F)] Ω Approximately 0.5 Accelerator Position Sensor Throttle valve conditions Resistance between terminals 2 and 3 kΩ [at 25°C (77°F)] Completely closed Approximately 0.5 Partially open 0.5 - 4 Completely open Approximately 4 EGR Volume Control Valve Resistance [at 25°C (77°F)] Ω 13 - 17 EC-1277 ELECTRICAL SYSTEM SECTION EL When you read wiring diagrams: + Read GI section, "HOW TO READ WIRING DIAGRAMS". When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES" and "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT". + Check for any service bulletins before servicing the vehicle. MODIFICATION NOTICE: + Power window (driver's side only) with an interruption detection function has been adopted. + ID code entry procedure of multi-remote control system has been changed.

+ NATS (Nissan Anti-Theft System) has been adopted on ZD engine model. CONTENTS PRECAUTIONS AND PREPARATION .... 1003 Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" ... 1003 POWER SUPPLY ROUTING............................. 1004 Schematic .... 1004 Wiring Diagram — POWER —...................... 1005 GROUND DISTRIBUTION/LHD MODELS......... 1013 Engine Room Harness.......... 1013 Engine Control Harness.......... 1016 Main Harness.......... 1017 Body Harness .... 1020 Body No. 2 Harness ....
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+ Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS. EL-1003 POWER SUPPLY ROUTING Schematic TEL201M EL-1004 POWER SUPPLY ROUTING Wiring Diagram — POWER — BATTERY POWER SUPPLY — IGNITION SW. IN ANY POSITION TEL202M EL-1005 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) TEL480A EL-1006 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) TEL203M EL-1007 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) TEL204M EL-1008 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) ACCESSORY POWER SUPPLY — IGNITION SW. IN "ACC" OR "ON" TEL606B EL-1009 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) IGNITION POWER SUPPLY — IGNITION SW. 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Power is supplied at all times + to lighting switch terminal V 11 + through 10A fuse [No. 15 , located in the fuse block (J/B)]. Lighting operation by lighting switch When lighting switch is in 1ST (or 2ND) position, power is supplied 3 + to cornering lamp relay unit terminal V + through lighting switch terminal V 12 . With the ignition switch in the ON or START position, power is supplied to cornering lamp relay unit termi2 nal V + through 7.5A fuse [No. 11 , located in the fuse block (J/B)].

RH turn When the turn signal lever is moved to the RH position, ground is supplied 6 + to cornering lamp relay unit terminal V 2 and V 1 + through turn signal lamp switch terminals V + through body grounds E25 and E40 . Power is supplied 5 of the cornering lamp relay unit + from terminal V 3 . + to front combination lamp RH terminal V 4 of front combination lamp RH through body grounds E25 and E40 . Ground is supplied to terminal V The RH cornering lamp illuminates until the turn signal lever returns to NEUTRAL position. LH turn When the turn signal lever is moved to the LH position, ground is supplied 8 + to cornering lamp relay unit terminal V 3 and V 1 + through turn signal lamp switch terminals V + through body grounds E25 and E40 . Power is supplied + from terminal V 10 of the cornering lamp relay unit 3 . + to front combination lamp LH terminal V 4 of front combination lamp LH through body grounds E25 and E40 . Ground is supplied to terminal V The LH cornering lamp illuminates until the turn signal lever returns to NEUTRAL position. EL-1055 CORNERING LAMP Wiring Diagram — CORNER —/RHD Models TEL222M EL-1056 CORNERING LAMP Trouble Diagnoses/RHD Models Symptom Possible cause Cornering lamps do not operate but 1. 10A fuse turn signal lamps operate. 2. Lighting switch circuit 3. Lighting switch 4. Cornering lamp relay unit Repair order 1. Chack 10A fuse [No. 15 , located in fuse block (J/B).] Verify battery voltage is present at terminal V 11 of lighting switch. 2. Check harness for open or short between lighting switch and cornering lamp relay unit. 3. Check lighting switch. 4. Replace the cornering lamp relay unit. LH cornering lamp does not operate 1. Bulb but RH cornering operates.

2. Cornering lamp LH circuit 1. Check bulb 2. Check harness for open or short between cornering lamp LH and cornering lamp relay unit. 3. Cornering lamp ground LH circuit 3. Check harness for open or short between cornering lamp LH and ground. RH cornering lamp does not operate 1. Bulb but LH cornering operates. 2. Cornering lamp RH circuit 1. Check bulb 2.

Check harness for open or short between cornering lamp RH and cornering lamp relay unit. 3. Cornering lamp ground RH circuit 3.

Check harness for open or short between cornering lamp RH and ground. EL-1057 TURN SIGNAL AND HAZARD WARNING LAMPS Wiring Diagram — TURN — TEL223M EL-1058 TURN SIGNAL AND HAZARD WARNING LAMPS Wiring Diagram — TURN — (Cont'd) TEL224M EL-1059 ILLUMINATION Schematic TEL287M EL-1060 ILLUMINATION Wiring Diagram — ILL — TEL418A EL-1061 ILLUMINATION Wiring Diagram — ILL — (Cont'd) TEL419A EL-1062 ILLUMINATION Wiring Diagram — ILL — (Cont'd) TEL288M EL-1063 ILLUMINATION Wiring Diagram — ILL — (Cont'd) TEL600B EL-1064 ILLUMINATION Wiring Diagram — ILL — (Cont'd) TEL422A EL-1065 ILLUMINATION Wiring Diagram — ILL — (Cont'd) TEL601B EL-1066 INTERIOR ROOM LAMP System Description POWER SUPPLY AND GROUND Power is supplied at all times: + through 10A fuse [No. 20 , located in the fuse block (J/B)] 1 + to front and rear interior room lamp terminal V + through 7.5A fuse [No. 24 , located in the fuse block (J/B)] 2 and + to key switch terminal V 1 . + to super lock control unit terminal V When the key is removed from ignition key cylinder, power is interrupted: 1 + through key switch terminal V + to super lock control unit terminal V 18 . With the ignition key switch in the ON or START position, power is supplied: + through 10A fuse [No. 25 , located in the fuse block (J/B)] + to super lock control unit terminal V 17 . Ground is supplied: + to super lock control unit terminal V 16 + through body grounds terminals M30 and M19 (LHD models) or M98 (RHD models).

When the front driver side door is opened, ground is supplied: + through body grounds B23 and M19 (LHD models) or M98 (RHD models).

3 + to front door switch (driver side) terminal V 1 + from front door switch (driver side) terminal V + to super lock control unit terminal V 30 . When any other door is opened, ground is supplied to super lock control unit terminal V 31 in the same manner as the driver door switch. When the front driver side door is unlocked, the super lock control unit receives a ground signal: + through body grounds terminals M30 and M19 (LHD models) or M98 (RHD models). 5 + to front door lock actuator (driver side) (door unlock sensor) terminal V 2 + from front door lock actuator (driver side) (door unlock sensor) terminal V + to super lock control unit terminal V 28 . When a signal, or combination of signals is received by the super lock control unit, ground is supplied: + through super lock control unit terminal V 26 2 . + to front interior room lamp terminal V With power and ground supplied, the front interior room lamp illuminates.

INTERIOR ROOM LAMP TIMER OPERATION When front interior room lamp switch is in the "DOOR" position, the super lock control unit keeps the front interior room lamp illuminated for about 30 seconds when: + unlock signal is supplied from driver's door unlock sensor while all doors are closed and key is out of ignition key cylinder + key is removed from ignition key cylinder while all doors are closed + driver's door is opened and then closed while key is out of the ignition key cylinder. (However, if the driver's door is closed with the key inserted in the ignition key cylinder after the driver's door is opened with the key removed, the timer is operated.) The timer is canceled when: + driver's door is locked or + ignition switch is turned ON. ON-OFF CONTROL When the driver side door, front passenger door, rear LH or RH door, back door LH or RH is opened, the interior room lamp turns on while the interior room lamp switch is in the "DOOR" position. EL-1067 INTERIOR ROOM LAMP Wiring Diagram — ROOM/L —/LHD Models TEL230M EL-1068 INTERIOR ROOM LAMP Wiring Diagram — ROOM/L —/LHD Models (Cont'd) TEL231M EL-1069 INTERIOR ROOM LAMP Wiring Diagram — ROOM/L —/RHD Models TEL232M EL-1070 INTERIOR ROOM LAMP Wiring Diagram — ROOM/L —/RHD Models (Cont'd) TEL233M EL-1071 INTERIOR ROOM LAMP Trouble Diagnoses DIAGNOSTIC PROCEDURE SYMPTOM: Front interior room lamp does not turn on when any door is opened, or timer does not operate properly. Does room lamp turn on when room lamp switch is in "ON" position? No c + Bulb + 10A fuse [No. 20 , located in the fuse block (J/B)] + Harness for open or short between fuse and front interior room lamp + Front interior room lamp ground condition Yes SEL120X . Does key warning chime operate properly? No c Yes SEL121X . CHECK ROOM LAMP OUTPUT SIGNAL. 1. Turn front interior room lamp switch to "DOOR" position. 2. Disconnect super lock control unit connector. 3. Check voltage between super lock control unit terminal V 26 and ground. Battery voltage should exist. Check the following. NG c Check "WARNING CHIME" system. (Refer to EL-1094.) Check harness for open or short between front interior room lamp and super lock control unit. OK . CHECK DOOR SWITCH INPUT SIGNAL. 1. Connect super lock control unit connector. 2. Check voltage between super lock control unit terminals V 30 , V 31 and ground. Terminals ⊕ 30 V 31 V Condition Voltage [V] Driver side door is opened. 0 Driver side door is closed. Approx. 5 At least one door is opened. 0 @ Ground Ground All doors are closed.

OK . Replace control unit. EL-1072 Approx. 5 NG c Check the following. + Door switch + Door switch ground condition + Harness for open or short between super lock control unit and door switch METER AND GAUGES Wiring Diagram — METER —/LHD Models TEL236M EL-1073 METER AND GAUGES Wiring Diagram — METER —/LHD Models (Cont'd) TEL237M EL-1074 METER AND GAUGES Wiring Diagram — METER —/RHD Models TEL238M EL-1075 METER AND GAUGES Wiring Diagram — METER —/RHD Models (Cont'd) TEL239M EL-1076 METER AND GAUGES NOTE EL-1077 WARNING LAMPS Schematic TEL240M EL-1078 WARNING LAMPS Schematic (Cont'd) TEL241M EL-1079 WARNING LAMPS Wiring Diagram — WARN — TEL566B EL-1080 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL567B EL-1081 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL242M EL-1082 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL702A EL-1083 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL243M EL-1084 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL570B EL-1085 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL571B EL-1086 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL706A EL-1087 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL573B EL-1088 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) LHD MODELS TEL244M EL-1089 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) RHD MODELS TEL245M EL-1090 WARNING CHIME System Description The warning chime is combined with the super lock control unit. Both the ignition key and light warning chime will not sound, when ignition switch in the ON or START position (when power supply exists at super lock control unit terminal V 17). IGNITION KEY WARNING CHIME With the key in the ignition key cylinder, the ignition switch in the OFF or ACC position, and the driver's door open and locked, the warning chime will sound. Power is supplied 1 + from key switch terminal V + to super lock control unit terminal V 18 . Ground is supplied 1 + through driver front door switch terminal V + to super lock control unit terminal V 30 , and 2 + through front door lock actuator assembly (driver side) (unlock sensor) terminal V + to super lock control unit terminal V 28 . LIGHT WARNING CHIME With ignition switch in the OFF or ACC position, driver's door open, and lighting switch in 1ST or 2ND position, warning chime will sound. Power is supplied + from combination switch terminal V 12 + to super lock control unit terminal V 19 . Ground is supplied 1 + through driver front door switch terminal V + to super lock control unit terminal V 30 . EL-1091 WARNING CHIME Wiring Diagram — CHIME —/LHD Models TEL247M EL-1092 WARNING CHIME Wiring Diagram — CHIME —/RHD Models TEL248M EL-1093 WARNING CHIME Trouble Diagnoses EL-1094 EL-1095 EL-1095 EL-1096 DIAGNOSTIC PROCEDURE 2 (Key switch input signal check) DIAGNOSTIC PROCEDURE 3 (Door unlock sensor check) DIAGNOSTIC PROCEDURE 4 REFERENCE PAGE DIAGNOSTIC PROCEDURE 1 (Lighting switch input signal check) SYMPTOM CHART SYMPTOM Light warning chime does not activate.

X X Ignition key warning chime does not activate. X X X All warning chimes do not activate. X DIAGNOSTIC PROCEDURE 1 (Lighting switch input signal check) CHECK LIGHTING SWITCH INPUT SIGNAL. Check voltage between super lock control unit terminal V 19 and ground.

SEL122X Condition of lighting switch Voltage [V] 1ST or 2ND Approx. 12 OFF 0 OK . Go to DIAGNOSTIC PROCEDURE 4. EL-1094 NG c Check the following. + Harness for open or short between super lock control unit and combination switch (RHD models) + Harness for open or short between super lock control unit and 7.5A fuse (LHD models)

WARNING CHIME Trouble Diagnoses (Cont'd) DIAGNOSTIC PROCEDURE 2 (Key switch input signal check) CHECK KEY SWITCH INPUT SIGNAL.

Check voltage between super lock control unit terminal V 18 and ground. SEL123X Condition of key switch Voltage [V] Key is inserted. Approx. 12 Key is withdrawn. 0 NG c OK . Go to DIAGNOSTIC PROCEDURE 4. Check the following. + Key switch Refer to "Electrical Components Inspection" (EL1097). + 7.5A fuse [No. 24 , located in fuse block (J/B)] + Harness for open or short between key switch and fuse + Harness for open or short between super lock control unit and key switch DIAGNOSTIC PROCEDURE 3 (Door unlock sensor check) CHECK DOOR UNLOCK SENSOR INPUT SIGNAL. Check voltage between super lock control unit terminal V 28 and ground. Terminals SEL175X ⊕ @ 28 V Ground Condition Voltage [V] Locked Approx. 5 Unlocked 0 OK . Go to DIAGNOSTIC PROCEDURE 4. EL-1095 NG c Check the following. + Door unlock sensor Refer to "Electrical Components Inspection" (EL1097). + Harness for open or short between super lock control unit and door unlock sensor WARNING CHIME Trouble Diagnoses (Cont'd) DIAGNOSTIC PROCEDURE 4 CHECK POWER SUPPLY CIRCUIT FOR SUPER LOCK CONTROL UNIT. Check voltage between super lock control 1 ,V unit terminals V 17 and ground. Terminals ⊕ @ 1 V 17 V Ground Ground NG c Ignition switch position OFF ACC ON Approx.

12V 0V 0V Approx. 12V Check the following. + 10A fuse [No. 25 , located in the fuse block (J/B)] + 7.5A fuse [No. 24 , located in the fuse block (J/B)] + Harness for open or short between super lock control unit and fuse OK . CHECK GROUND CIRCUIT FOR SUPER LOCK CONTROL UNIT.

Check continuity between super lock control unit terminal V 16 and ground. Continuity should exist. NG c Repair harness or connectors. OK .

SEL124X CHECK DOOR SWITCH INPUT SIGNAL.

Check voltage between super lock control unit terminal V 30 and ground. Condition of driver's door Voltage [V] Driver side door is closed. Approx. 12 Driver side door is open. OK . Replace super lock control unit. SEL125X SEL126X EL-1096 0 NG c Check the following. + Driver side door switch Refer to "Electrical Components Inspection" (EL1097). + Door switch ground circuit + Harness for open or short between super lock control unit and door switch WARNING CHIME Electrical Components Inspection KEY SWITCH (insert) Check continuity between terminals when key is inserted in ignition key cylinder and key is removed from ignition key cylinder. Terminal No. 1 -V 2 V Condition Continuity Key is inserted. Yes Key is removed. No SEL015WB DRIVER SIDE DOOR SWITCH Check continuity between terminals when door switch is pushed and released. Terminal No. 1 -V 3 V Condition Continuity Door switch is pushed. No Door switch is released. Yes SEL039X DRIVER SIDE DOOR UNLOCK SENSOR Check continuity between door unlock sensor terminals with the door locked and unlocked. Terminal No. 2 -V 5 V SEL814UD EL-1097 Condition Continuity Locked No Unlocked Yes FRONT WIPER AND WASHER Wiring Diagram — WIPER — TEL575B EL-1098 HEADLAMP WIPER AND WASHER Wiring Diagram — HLC — TEL289M EL-1099 HORN Wiring Diagram — HORN — TEL577B EL-1100 REAR WINDOW DEFOGGER System Description The rear window defogger system is controlled by the super lock control unit. The rear window defogger operates only for approximately 15 minutes. Power is supplied at all times 3 + to rear window defogger relay terminal V + through 15A fuse (No. 43 , located in the fuse and fusible link box), 6 + to rear window defogger relay terminal V + through 20A fuse (No. 44 , located in the fuse and fusible link box) and 1 + to super lock control unit terminal V + through 7.5A fuse [No. 24 , located in the fuse block (J/B)]. With the ignition switch in the ON or START position, power is supplied 1 + to the rear window defogger relay terminal V + through 7.5A fuse [No. 8 , located in the fuse block (J/B)] and + to super lock control unit terminal V 17 + through 10A fuse [No. 25 , located in the fuse block (J/B)]. 2 of the rear window defogger switch through body grounds. Ground is supplied to terminal V When the rear window defogger switch is turned ON, ground is supplied 1 of the rear window defogger switch + through terminal V + to super lock control unit terminal V 35 . 27 of the super lock control unit then supplies ground to the rear window defogger relay terminal Terminal V 2 .

V With power and ground supplied, the rear window defogger relay is energized. Power is supplied 5 and V 7 of the rear window defogger relay + through terminals V + to the rear window defogger and door mirror defogger (with door mirror defogger). The rear window defogger has an independent ground. With power and ground supplied, the rear window defogger filaments heat and defog the rear window. When the system is activated, the rear window defogger indicator illuminates in the rear window defogger switch.

Power is supplied 3 of the rear window defogger switch + to terminal V 5 of the rear window defogger relay.

+ from terminal V 4 of the rear window defogger switch is grounded through body grounds. Terminal V EL-1101 REAR WINDOW DEFOGGER Wiring Diagram — DEF —/LHD Models TEL249M EL-1102 REAR WINDOW DEFOGGER Wiring Diagram — DEF —/LHD Models (Cont'd) TEL674B EL-1103 REAR WINDOW DEFOGGER Wiring Diagram — DEF —/RHD Models TEL251M EL-1104 REAR WINDOW DEFOGGER Wiring Diagram — DEF —/RHD Models (Cont'd) TEL252M EL-1105 REAR WINDOW DEFOGGER Trouble Diagnoses SYMPTOM: Rear window defogger does not activate, or does not go off after activating. CHECK REAR WINDOW DEFOGGER OUTPUT SIGNAL. 1. Turn ignition switch to ON position. 2. Check voltage between super lock control unit harness terminal V 27 and ground. SEL127X Condition OK c Check the following. + Rear window defogger relay (Refer to EL-1107.) + Rear window defogger circuit + Rear window defogger filament [Refer to "Filament Check" in Service Manual (SM7E2Y61G1).] c Check the following. + 7.5A fuse [No. 8 , located in the fuse block (J/B)] + Rear window defogger relay + Harness for open or short between rear window defogger relay and fuse c Check the following. + Rear window defogger switch (Refer to EL-1107.) + Harness for open or short between super lock control unit and rear window defogger relay + Harness for open or short between super lock control unit and rear window defogger switch + Rear window defogger switch ground circuit c Check the following. + 10A fuse [No. 25 located in the fuse block (J/B)] + Harness for open or short between super lock control unit and fuse c Repair harness or connectors. Voltage [V] Rear window defogger switch is released. Approx. 12 Rear window defogger switch is pushed. 0 NG .

1. Disconnect super lock control unit connector.

2. Turn ignition switch to ON position. 3. Check voltage between super lock control unit terminal V 27 and ground. Battery voltage should exist. OK SEL128X . CHECK REAR WINDOW DEFOGGER SWITCH INPUT SIGNAL. Check continuity between super lock control unit terminal V 35 and ground. SEL129X NG Condition of defogger switch NG Continuity Rear window defogger switch is pushed. Yes Rear window defogger switch is released. No OK .

CHECK IGNITION INPUT SIGNAL. Check voltage between super lock control unit terminal V 17 and ground. Condition SEL130X NG Voltage [V] Ignition switch is "ON". Approx. 12 Ignition switch is "OFF". 0 OK . CHECK SUPER LOCK CONTROL UNIT GROUND CIRCUIT. Check continuity between super lock control unit terminal V 16 and ground. Continuity should exist. OK . Replace super lock control unit. SEL131X EL-1106 NG REAR WINDOW DEFOGGER Electrical Components Inspection REAR WINDOW DEFOGGER RELAY 3 and V 5 ,V 6 and V 7 .

Check continuity between terminals V Condition Continuity 12V direct current supply between 1 and V 2 terminals V Yes No current supply No SEC202B REAR WINDOW DEFOGGER SWITCH Check continuity between terminals when rear window defogger switch is pushed and released. Terminals 1 - 2 V V SEL430TG EL-1107 Condition Continuity Rear window defogger switch is pushed Yes Rear window defogger switch is released No AUDIO Wiring Diagram — REMOTE — TEL581B EL-1108 AUDIO ANTENNA Wiring Diagram — P/ANT —/RHD Models TEL290M EL-1109 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Schematic TEL582B EL-1110 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Wiring Diagram — ASCD — TEL464A EL-1111 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Wiring Diagram — ASCD — (Cont'd) TEL583B EL-1112 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Wiring Diagram — ASCD — (Cont'd) TEL584B EL-1113 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Wiring Diagram — ASCD — (Cont'd) TEL467A EL-1114 POWER WINDOW System Description OUTLINE Power window system consists of + CPU (combined with power window main switch) + four power window regulators When ignition switch is in the "ON" position, power window can be operated depending on power window sub/main switch condition. OPERATIVE CONDITION +Power windows can be raised or lowered with each sub-switch or the power window main switch located on the driver's door trim when ignition switch is in the "ON" position and power window lock switch on the driver's door trim is unlocked. + When power window lock switch is locked, no windows can be raised or lowered except for driver's side window. + When ignition switch is in the "ON" position, to fully open/close the driver's side window, press down/ pull up completely on the automatic switch (main switch) and release it; it needs not be held. The window will automatically open/close all the way. To stop the window, pull up/press down then release the switch. + After turning ignition switch to OFF, the driver's side window can be raised or lowered for 15 minutes. The timer control for supplying power after turning ignition switch to OFF will be canceled when the driver's side door is open and then closed. INTERRUPTION DETECTION FUNCTION CPU (combined with power window main switch) monitors the power window regulator motor operation and the power window position (full closed or other) for driver's power window by the signals from encoder and limit switch in front power window regulator (driver's side). When CPU (combined with power window main switch) detects interruption during the following close operation in the driver's side door, + automatic close operation when ignition switch is in the "ON" position + automatic close operation during power window timer operation + manual close operation during power window timer operation CPU (combined with power window main switch) controls driver's power window regulator motor for open and the power window will be lowered about 150 mm (5.91 in). EL-1115 POWER WINDOW Schematic TEL585B EL-1116 POWER WINDOW Wiring Diagram — WINDOW — TEL254M EL-1117 POWER WINDOW Wiring Diagram — WINDOW — (Cont'd) TEL255M EL-1118 POWER WINDOW Wiring Diagram — WINDOW — (Cont'd) TEL256M EL-1119 POWER WINDOW Wiring Diagram — WINDOW — (Cont'd) LHD WAGON MODELS TEL257M EL-1120 POWER WINDOW Wiring Diagram — WINDOW — (Cont'd) RHD WAGON MODELS TEL258M EL-1121 POWER WINDOW Trouble Diagnoses Symptom Possible cause Repair order 1. Check 7.5A fuse [No. 8 , located in fuse block (J/B)], 40A fusible link (letter e , located in fuse and fusible link box) and M123 circuit breaker. Turn ignition switch "ON" and verify battery positive voltage is present at 5 and V terminals V 13 of power window main switch. switch 2. Check ground circuit of power window main switch. None of the power windows can be 1. 7.5A fuse, 40A fusible link and M123 circuit breaker operated using any switch. 2. Power window main ground circuit 3. Power window main switch 3. Check power window main switch. Driver side power window cannot be 1.

Driver side power window regula- 1. Check harness between power window main switch and power window regulator for open or short circuit. tor circuit operated but other windows can be 2. Driver side power window regula- 2. Check driver side power window regulator. operated.

tor 3. Check power window main switch. 3.

Power window main switch Passenger power window cannot be 1. M92 circuit breaker operated. 2. Power supply of power window relay 3. Power window relay ground circuit 4. Power window relay 5. Power window sub-switches 6. Passenger side power window regulators 7. Power window main switch 8. Power window circuit 1. Check M92 circuit breaker.

Verify battery positive volt3 of power window relay. age is present at terminal V 2. Check harness between 7.5A fuse and power window relay. 3. Check power window ground circuit. Passenger power window cannot be 1.

Power window main switch operated using power window main switch but can be operated by power window sub-switch. 1. Check power window main switch. Driver side power window auto func- 1. Power window main switch tion cannot be operated properly. 2.

Encoder and limit switch 1. Check power window main switch. 2. Check encoder and limit switch. (EL-1123) Timer control for supplying power 1. Driver side door switch circuit. after turning ignition switch to OFF does not operate properly. 2. Driver side door switch 3. Ignition switch ON signal circuit 1-1. Check harness between driver side door switch and power window main switch. 1-2. Check ground circuit of driver side door switch. 2. Check driver side door switch. 3.

Check ignition switch ON signal circuit to power window main switch.

4. Check power window main switch. 4.

Power window main switch EL-1122 4. Check power window relay. 5. Check power window sub-switch. 6.

Check passenger side power window regulator.

7. Check power window main switch. 8-1. Check harness between power window relay and power window sub-switch. 8-2. Check harnesses between power window main switch and power window sub-switch for open/ short circuit. 8-3. Check harnesses between power window subswitch and power window regulator for open/ short circuit. POWER WINDOW Trouble Diagnoses (Cont'd) ENCODER AND LIMIT SWITCH CHECK CHECK DRIVER SIDE DOOR WINDOW SLIDE MECHANISM Check the following. + Obstacles in window, glass molding, etc. + Worn or deformed glass molding + Door sash tilted too far inward or outward + Door window regulator NG c Remove obstacles or repair door window slide mechanism. OK SEL641W . CHECK POWER SUPPLY TO LIMIT SWITCH 1. Disconnect driver side power window regulator connector. 2.

Turn ignition switch ON. 3. Check voltage between power window 9 and ground. main switch terminal V Approx. 5V should exist. NG c Replace power window main switch.

OK . CHECK LIMIT SWITCH OPERATION 1. Turn ignition switch OFF. 2. Connect driver side power window regulator connector. 3. Turn ignition switch ON. 4. Check voltage between power window 9 and ground main switch terminal V during power window closing operation. Terminal No. 9 V Condition Voltage (DCV) Approx. 15 mm (0.59 in) below the full closed position to full closed position Approx.

5 Other positions Approx. 0 SEL642W OK c CHECK ENCODER Measure voltage between power window main switch terminal V 16 and ground with oscilloscope when power window is in automatic closing operation. If result is NG, replace power window regulator motor (front driver side). If result is OK, replace power window main switch. NG . RESET LIMIT SWITCH Reset limit switch. Refer to BT section. Then check voltage between power win9 and ground dow main switch terminal V during power window closing operation at least ten times. Terminal No. 9 V Condition Voltage (DCV) Approx. 15 mm (0.59 in) below the full closed position to full closed position Approx. 5 Other positions Approx.

0 NG c Replace power window regulator (front driver side). c Replace power window regulator (front driver side). OK . CHECK ENCODER Measure voltage between power window main switch terminal V 16 and ground with oscilloscope when power window is in automatic closing operation. OK . Replace power window main switch. EL-1123 NG POWER DOOR LOCK — Super Lock — Component Parts and Harness Connector Location SEL625X EL-1124 POWER DOOR LOCK — Super Lock — System Description OUTLINE Power door lock system with super lock and key reminder is controlled by super lock control unit. Super lock has a higher anti-theft performance than conventional power door lock systems. When super lock is in released condition, lock knob operation locks or unlocks door. When super lock is in set condition, lock knob operation cannot lock nor unlock door. NOTE: Super lock function is not applied to back door. (Power door lock only) SEL831U OPERATION Power door lock/unlock and super lock set/release operation by door key cylinder +With the key inserted into front door key cylinder, turning it to LOCK will lock all doors and set super lock. (Super lock will not be set while key is inserted in the ignition key cylinder.) + With the key inserted into front door key cylinder, turning it to UNLOCK will unlock all doors and release super lock. Power door lock/unlock and super lock set/release operation by multi-remote controller +Pressing multi-remote controller LOCK button will lock all doors and set super lock. (Super lock will not be set while key is inserted in the ignition key cylinder.) + Pressing multi-remote controller UNLOCK button once will unlock the driver door and release super lock. If an unlock signal is sent from the remote controller again within 5 seconds, all other doors will be unlocked. Power door lock and super lock release operation (by NATS IMMU signal) +When the super lock is set, turning ignition key switch to ON will release super lock, and all doors will unlock once, but then immediately lock again.

Power door lock/unlock operation using the lock and unlock switch + With lock and unlock switch set to LOCK, all doors will lock.

+ With lock and unlock switch set to UNLOCK, all doors will unlock. Lock and unlock switch operation cannot control the super lock. EL-1125 POWER DOOR LOCK — Super Lock — System Description (Cont’d) Key reminder system +If the ignition key is in the ignition key cylinder and the driver door is open, setting lock knob on driver door, key or multi-remote controller to “LOCK” locks the door once but then immediately unlocks all doors.

(Signal from unlock sensor driver side) System initialization +System initialization is required when battery cables are reconnected. Conduct one of the followings to release super lock once; — insert the key into ignition key cylinder and turn it to ON. — LOCK/UNLOCK operation using door key cylinder or multi-remote controller. EL-1126 POWER DOOR LOCK — Super Lock — Schematic TEL261M EL-1127 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/LHD Models TEL262M EL-1128 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/LHD Models (Cont’d) TEL263M EL-1129 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/LHD Models (Cont’d) TEL264M EL-1130 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/LHD Models (Cont’d) TEL265M EL-1131 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/LHD Models (Cont’d) TEL266M EL-1132 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/RHD Models TEL267M EL-1133 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/RHD Models (Cont’d) TEL268M EL-1134 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/RHD Models (Cont’d) TEL269M EL-1135 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/RHD Models (Cont’d) TEL270M EL-1136 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/RHD Models (Cont’d) TEL271M EL-1137 POWER DOOR LOCK — Super Lock — Trouble Diagnoses PRELIMINARY CHECK CHECK-IN . Open all windows and remove key from ignition key cylinder. . No (All doors) Does power door lock operate properly? c Power door lock does not operate by using: — any switch.

.... — both door key cylinders. .... — door lock and unlock switch. Yes c SYMPTOM 1 c SYMPTOM 2 c SYMPTOM 3 c SYMPTOM 4 c SYMPTOM 5 c SYMPTOM 6 c SYMPTOM 9 c SYMPTOM 7 c SYMPTOM 8 c SYMPTOM 9 No (Specific door) . No (All doors) Does super lock set by using door key cylinder? c Super lock does not set by using: — both door key cylinders.

.... — one of door key cylinders. Yes No (Specific door) . Does super lock release by using door key cylinder or IGN key switch? No (All doors) c Super lock does not release by using: — one or both door key cylinders. .... — IGN key switch. Yes No (Specific door) . Does super lock set/release by using multi-remote controller? (If equipped) No c Check “MULTIREMOTE CONTROL” system. Yes .

Insert key to ignition key cylinder, open driver’s door and lock the door using door lock and unlock switch. . Does key reminder system operate properly? No c Yes . INSPECTION END After performing preliminary check, go to symptom chart on the next page. EL-1138 SYMPTOM 10 POWER DOOR LOCK — Super Lock — Trouble Diagnoses (Cont’d) Before starting trouble diagnoses below, perform preliminary check, EL-1138. Symptom numbers in the symptom chart correspond with those of Preliminary check. SYMPTOM CHART 2 Power door lock does not operate with both door key cylinders. 3 Power door lock does not operate with door lock and unlock switch. 4 Specific door lock actuator does not operate. 5 Super lock cannot be set by both door key cylinders. 6 Super lock cannot be set by one of door key cylinders. X 7 *Super lock cannot be released by one or both door key cylinders. X 8 *Super lock cannot be released by ignition key switch. (Signal from NATS IMMU and ignition switch) 9 Specific super lock actuator does not operate. 10 *Key reminder system does not operate. X Procedure 7 (NATS release signal check) Procedure 6 (Driver’s door switch check) Procedure 5 (Super lock actuator check) Procedure 4 (Door lock actuator check) Procedure 9 (Ignition switch “ON” circuit check) Power door lock does not operate using any switch. Procedure 8 (Key switch check) 1 Procedure 3 (Door lock and unlock switch check) Procedure 2 (Door key cylinder switch check) Procedure 1 (Door unlock sensor check) SYMPTOM EL-1140 EL-1141 EL-1142 EL-1143 EL-1144 EL-1145 EL-1146 EL-1147 EL-1148 EL-1148 Power supply and ground circuit check REFERENCE PAGE X X X X X X X X X X X X X X X X X X: Applicable *: Make sure the power door lock system operates properly. EL-1139 X POWER DOOR LOCK — Super Lock — Trouble Diagnoses (Cont’d) POWER SUPPLY AND GROUND CIRCUIT CHECK Main power supply circuit check Terminals Ignition switch position ⊕ @ OFF ACC ON 1 Ground Battery voltage Battery voltage Battery voltage V 10 V Ground SEL132X Ground circuit check Terminals Continuity 16 - Ground V Yes SEL133X EL-1140 POWER DOOR LOCK — Super Lock — Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 1 (Door unlock sensor check) CHECK DOOR UNLOCK SENSOR INPUT SIGNAL. Check voltage between super lock control unit terminals V 28 or V 29 and ground. Terminals Condition ⊕ @ Driver side 28 V Ground Passenger side 29 V SEL134X OK c Door unlock sensor is OK. Voltage [V] Approx. 5 Unlocked 0 Approx. Locked 5 Ground Unlocked 0 Locked Refer to wiring diagram in EL-1130 (LHD), EL-1135 (RHD). NG . SEL814UB CHECK DOOR UNLOCK SENSOR.

1. Disconnect door unlock sensor connector. 2. Check continuity between door unlock sensor terminals.

Terminals 2 -V 5 V Condition Locked Unlocked Continuity No Yes OK . Check the following. + Door unlock sensor ground circuit + Harness for open or short between control unit and door unlock sensor EL-1141 NG c Replace door lock actuator assembly. POWER DOOR LOCK — Super Lock — Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 2 (Door key cylinder switch check) CHECK DOOR KEY CYLINDER SWITCH INPUT SIGNAL (LOCK/UNLOCK SIGNAL). Check voltage between super lock control unit terminal V 24 or V 25 and ground. Terminals @ ⊕ Key position 24 V Ground 25 V Ground OK c Door key cylinder switch is OK. c Replace door key cylinder switch. Voltage [V] Between neutral 0 and lock Other Approx. 5 positions Between neutral 0 and unlock Other Approx. 5 positions SEL135X NG . CHECK DOOR KEY CYLINDER SWITCH. 1. Disconnect door key cylinder switch connector. 2. Check continuity between door key cylinder switch terminals.

Terminals Front LH: 1 -V 2 V Front RH: 3 -V 2 V Front LH: 3 -V 2 V Front RH: 1 -V 2 V Key position Neutral Between neutral and lock Neutral Between neutral and unlock Continuity No Yes No Yes OK . SEL875WA Check the following. + Door key cylinder switch ground circuit + Harness for open or short between super lock control unit and door key cylinder switch EL-1142 NG POWER DOOR LOCK — Super Lock — Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 3 (Door lock and unlock switch check) CHECK DOOR LOCK AND UNLOCK SWITCH INPUT SIGNAL. Check voltage between control unit terminal V 20 or V 23 and ground. Terminals SEL626X 20 - Ground V Door lock and unlock switch condition Lock N and Unlock Unlock 23 - Ground V N and Lock OK c Door lock and unlock switch is OK. Voltage (V) 0 Battery voltage 0 Battery voltage NG . CHECK DOOR LOCK AND UNLOCK SWITCH. 1. Disconnect door lock and unlock switch connector. 2. Check continuity between each door lock and unlock switch terminals. Power window main switch [Door lock and unlock switch (with power window)] Condition SEL627X Unlock N Lock Terminals 18 17 j No continuity j 19 j j Door lock and unlock switch (without power window) Condition Lock N Unlock Terminals 2 j No continuity 1 j 3 j j OK . SEL628X Check the following. + Ground circuit for power window main switch [Door lock and unlock switch (with power window)] or door lock and unlock switch (without power window) + Harness for open or short between power window main switch [Door lock and unlock switch (with power window)] or door lock and unlock switch (without power window) and control unit connector EL-1143 NG c Replace power window main switch (with power window) or door lock and unlock switch (without power window). POWER DOOR LOCK — Super Lock — Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 4 (Door lock actuator check) CHECK OUTPUT SIGNAL FOR DOOR LOCK ACTUATOR. Check voltage for door lock actuator. Door lock actuator driver Door lock/unlock switch condition SEL137X Unlock → Lock Lock → Unlock Terminals ⊕ @ 14 Ground V 11 Ground V NG c Door lock actuator is OK. Voltage (V) Battery voltage Door lock actuator passenger, rear and back Door lock/unlock switch condition Unlock → Lock Lock → Unlock SEL138X Terminals ⊕ @ 14 Ground V 4 Ground V Voltage (V) Battery voltage Refer to wiring diagram in EL-1132 (LHD), EL-1137 (RHD). OK . CHECK DOOR LOCK ACTUATOR. 1. Disconnect door lock actuator connector. 2. Apply 12V direct current to door lock actuator and check operation. Door lock actuator operation SEL818UB Door lock actuator operation Terminals ⊕ @ Unlocked → Locked Locked → Unlocked 6 3 V V 3 6 V V Back door lock actuator operation Back door lock actuator operation Terminals ⊕ @ Unlocked → Locked Locked → Unlocked 3 1 V V 1 3 V V NG SEL827UB . Replace door lock actuator assembly. SEL434VA EL-1144 OK c Check harness between control unit and door lock actuator. POWER DOOR LOCK — Super Lock — Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 5 [Super lock actuator (in door lock actuator assembly) check] CHECK OUTPUT SIGNAL FOR SUPER LOCK ACTUATOR. Check voltage for super lock actuator. SEL139X Door key cylinder switch condition Lock (Set) Unlock (Released) Terminals NG c Super lock actuator is OK. Voltage (V) ⊕ @ 6 V 3 V Ground Ground Approx. 12 Put the system in set condition before checking release signal. Refer to wiring diagram in EL-1131 (LHD), EL-1136 (RHD).

OK . CHECK SUPER LOCK ACTUATOR.

1. Disconnect door lock actuator assembly connector. 2.

Set lever A in Lock position. 3. Apply 12V direct current to door lock actuator assembly and check operation. Super lock actuator operation Terminals ⊕ @ Connection from lever B to lever A Released → Set Set → Released 1 4 V V 4 1 V V Disconnect Connect SEL820UB NG . Replace door lock actuator assembly. EL-1145 OK c Check harness between control unit and door lock actuator assembly. POWER DOOR LOCK — Super Lock — Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 6 (Driver’s door switch check) CHECK DOOR SWITCH INPUT SIGNAL. Check voltage between super lock control unit terminal V 30 and ground. SEL140X Condition Any door is opened. Driver’s door is closed. OK c Door switch is OK. Voltage [V] 0 Approx. 12 Refer to wiring diagram in EL-1129 (LHD), EL-1134 (RHD). NG . CHECK DOOR SWITCH. 1. Disconnect door switch connector. 2. Check continuity between door switch terminals. SEL141X Terminals Condition Continuity Driver side door switch 1 V ground Closed No Open Yes OK . Check the following.

+ Driver side door switch ground condition + Harness for open or short between control unit and door switch EL-1146 NG c Replace door switch. POWER DOOR LOCK — Super Lock — Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 7 (NATS release signal check) No Does engine start properly? c Check NATS system. Yes . SEL142X CHECK NATS SIGNAL CIRCUIT.

1. Disconnect super lock control unit connector and NATS IMMU connector. 2. Check continuity between super lock control unit terminal V 34 and NATS 3 . IMMU terminal V Continuity should exist. 3. Check continuity between super lock control unit terminal V 34 and ground. Continuity should not exist. Refer to wiring diagram in EL-1128 (LHD), EL-1133 (RHD). NG c Repair harness. OK . CHECK NATS RELEASE SIGNAL. 1. Connect super lock control unit connector and NATS IMMU connector. 2. Check voltage between super lock control unit terminal V 34 and ground. Ignition switch condition SEL143X OFF More than 20 seconds after ignition switch turned ON For 20 seconds after ignition switch turned ON OK . Replace super lock control unit. EL-1147 Voltage [V] 5 Pulse NG c Check NATS system. POWER DOOR LOCK — Super Lock — Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 8 (Key switch check) CHECK KEY SWITCH INPUT SIGNAL. Check voltage between super lock control unit terminal V 18 and ground. SEL144X Condition of key switch Voltage [V] Key is inserted. Approx. 12 Key is withdrawn. 0 OK c Key switch is OK. Refer to wiring diagram in EL-1128 (LHD), EL-1133 (RHD).

NG .

CHECK KEY SWITCH POWER SUPPLY. 1. Disconnect key switch connector.

2. Check voltage between key switch har2 and ground.

ness terminal V Battery voltage should exist.

NG c SEL197X OK . CHECK KEY SWITCH. Check continuity between key switch terminals. Terminals SEL015WB 1 V 2 -V Condition Continuity Key is inserted. Yes Key is withdrawn. No NG c Check the following. + 7.5A fuse [No. 24 , located in fuse block (J/B)] + Harness for open or short between key switch and fuse Replace key switch. OK . Check harness for open or short between control unit and key switch. DIAGNOSTIC PROCEDURE 9 (Ignition switch “ON” circuit check) Terminals SEL145X Ignition switch position ⊕ @ OFF ACC ON 17 V Ground 0V 0V Battery voltage If NG, check the following. + 10A fuse [No. 25 , located in the fuse block (J/B)] + Harness for open or short EL-1148 MULTI-REMOTE CONTROL SYSTEM System Description FUNCTION Multi-remote control system has the following function.

+ Door lock + Door unlock + Hazard reminder LOCK OPERATION When the LOCK signal is input to multi-remote control unit (the antenna of the system is combined with multi-remote control unit), ground is supplied 5 + through multi-remote control unit terminal V + to super lock control unit terminal V 32 . Then super lock control unit locks all doors and set super lock. (Super lock will not be set while key is inserted in the ignition key cylinder.) UNLOCK OPERATION When the UNLOCK signal is input to multi-remote control unit (the antenna of the system is combined with multi-remote control unit) once, ground is supplied 6 + through multi-remote control unit terminal V + to super lock control unit terminal V 33 . Then super lock control unit unlocks driver’s door and release super lock on all doors.

If the UNLOCK signal is sent to the multi-remote control unit again within 5 seconds, all other doors will be unlocked. HAZARD REMINDER When the doors are locked or unlocked (signal from front door unlock sensor LH) by multi-remote controller, power is supplied 3 and V 8 + through multi-remote control unit terminals V + to the hazard warning lamps Then hazard warning lamp flashes as follows. + Lock operation: Flash once + Unlock operation: Flash twice MULTI-REMOTE CONTROLLER ID CODE ENTRY A maximum of four remote controllers can be entered. Any attempt to enter a remote controller will erase all ID codes previously entered. Therefore, be sure to receive all remote controllers from the vehicle owner when any ID code entry is performed. To enter ID code entry, the following signals must be input to the multi-remote control unit. + Ignition switch ON signal + Battery power supply + Signal from remote controller For detailed procedure, refer to “ID Code Entry Procedure” in EL-1156. EL-1149 MULTI-REMOTE CONTROL SYSTEM Wiring Diagram — MULTI —/LHD Models TEL274M EL-1150 MULTI-REMOTE CONTROL SYSTEM Wiring Diagram — MULTI —/LHD Models (Cont’d) TEL275M EL-1151 MULTI-REMOTE CONTROL SYSTEM Wiring Diagram — MULTI —/RHD Models TEL278M EL-1152 MULTI-REMOTE CONTROL SYSTEM Wiring Diagram — MULTI —/RHD Models (Cont’d) TEL279M EL-1153 MULTI-REMOTE CONTROL SYSTEM Trouble Diagnoses SYMPTOM CHART Symptom No doors can be locked or unlocked by remote control operation.

(See NOTE.) Possible cause Diagnoses/service order 1. Check power door lock operation. 2.

Check remote controller battery.

Refer to “Remote controller battery check” in EL section of Service Manual (SM7E-2Y61G1). Ignition power supply circuit for 3. Check harness for open or short between multi-remote control unit and super lock control unit. multi-remote control unit 4 of 4. Make sure battery voltage is present at terminal V Power supply circuit for multi-remulti-remote control unit while ignition switch is in IGN mote control unit position. Ground circuit for multi-remote 5. Make sure battery voltage is present at terminal 2 of multi-remote control unit. control unit V 1 of multi-remote Remote controller 6. Check continuity between terminal V control unit and ground. 7. Replace remote controller. Refer to EL-1156. 1. Power door lock system 2. Remote controller battery 3. Door lock/unlock circuit 4. 5.

6. 7. Hazard reminder does not operate 1.

Hazard reminder output to haz- 1. Check hazard reminder output to hazard warning 3 and V 8 of multi-remote control properly. ard warning lamps lamps at terminals V unit. 2. Hazard reminder circuit 2. Check the harness for open or short between hazard warning lamps and multi-remote control unit. 3. Driver’s door unlock sensor 3. Check driver’s door unlock sensor signal at terminal 7 of multi-remote control unit. V The new ID of remote controller cannot be entered. 1. Remote controller battery 2. Ignition power supply circuit for multi-remote control unit 3. Driver’s door unlock sensor 4. Remote controller 1. Check remote controller battery. Refer to “Remote controller battery check” in EL section of Service Manual (SM7E-2Y61G1). 4 of 2. Make sure battery voltage is present at terminal V multi-remote control unit while ignition switch is in IGN position. 3. Check driver’s door unlock sensor signal at terminal 7 of multi-remote control unit. V 4. Replace remote controller. Refer to EL-1156. Refer to “MULTI-REMOTE CONTROL UNIT INSPECTION TABLE” on next page to check the control unit signals. NOTE: + The lock operation of multi-remote control system does not activate with the ignition key ON position. EL-1154 MULTI-REMOTE CONTROL SYSTEM Trouble Diagnoses (Cont’d) MULTI-REMOTE CONTROL UNIT INSPECTION TABLE Terminal No. Connections 1 Ground 2 Power source (BAT) 3 4 5 6 7 8 Hazard warning lamp RH Ignition power supply Condition Voltage (V) (approximate values) — — — 12 Remote controller LOCK/UNLOCK button is pushed (All doors are closed and key is not in ignition key cylinder.) 12 Other than above condition 0 OFF 0 ON or START 12 Ignition switch Lock signal (to super lock control unit) Unlock signal (to super lock control unit) Driver side door unlock sensor Hazard warning lamp LH Remote controller LOCK button is pushed (All doors are closed and key is not in ignition key cylinder.) 0 Other than above condition 5 Remote controller UNLOCK button is pushed (Key is not in ignition key cylinder.) 0 Other than above condition 5 Locked 5 Unlocked 0 Driver side door Remote controller LOCK/UNLOCK button is pushed (All doors are closed and key is not in ignition key cylinder.) 12 Other than above condition 0 SEL147X EL-1155 MULTI-REMOTE CONTROL SYSTEM ID Code Entry Procedure Activation of the registration mode: The vehicle must have been unlocked by either the multi-remote controller or a transponder OK signal (TPOK) from the vehicle’s immobilizer. Preparation: - Make sure all doors unlock. - Make sure all multi-remote controllers to be registered are available. - Make sure the batteries of all multi-remote controllers are in a good condition. - Make sure all transmitting sources are out of the neighbourhood of the vehicle. - Make sure the battery of the vehicle is in a good condition. b . Switch ignition-switch exactly six times from the “LOCK” to the “ON” position within 10 seconds and return the ignition switch to the “LOCK” position (leaving the key in the ignition switch). . b NG After 2 seconds the registration mode is activated. The turn signal lamps will flash twice. OK . Proceed with the registration mode. NOTE The registration mode is operated when: + The ignition-switch is turned to the “ON” position. + 4 multi remote controllers have been learned. + No multi-remote controller or ignition switch input is received within 120 seconds. Registration mode Press and hold the “UNLOCK” button of the multi-remote controller. b . Press the “LOCK” button 3 times. . Release the “UNLOCK” button. c . Do you want to register another multi-remote controller? (max.

4) No OK If the multi-remote controller code is registered correctly, the turn signal lamp will flash once. b Yes . After registration of the requested No. of multi-remote controller(s), confirm the ID-code(s) by switching the ignition switch to the “ON” position. Take the ignition key out of the ignition switch and confirm the functioning of all multi-remote controllers by locking and unlocking the vehicle with each of the multi-remote controllers. . End EL-1156 c If the multi-remote controller registration is performed correctly, the turn signal lamp will flash twice. b OK NG NG c m MULTI-REMOTE CONTROL SYSTEM Remote Controller Battery Replacement SEL241X EL-1157 MULTI-REMOTE CONTROL SYSTEM NOTE EL-1158 SUPER LOCK CONTROL UNIT Description The following systems are controlled by the super lock control unit. + Warning chime + Rear window defogger timer + Power door lock (super lock) + Interior room lamp timer For detailed description and wiring diagrams, refer to the relevant pages for the each system. The control unit receives data from the switches, control units and sensors to control their corresponding system relays and actuators. System Input Output Power door lock (super lock) Door switches Key switch (Insert) Door key cylinder switch (lock/unlock) Ignition switch (ON) Door unlock sensors Multi-remote control signals (lock/unlock) NATS IMMU signal (Anti-theft cancel) Door lock actuator Super lock actuator Warning chime Key switch (Insert) Ignition switch (ON) Lighting switch (1st and 2nd) Front door switch (Driver side) Door unlock sensor (Driver side) Warning chime Rear window defogger timer Ignition switch (ON) Rear window defogger switch Rear window defogger relay Interior room lamp timer Door switches Door unlock sensor (Driver side) Ignition switch (ON) Key switch (Insert) Interior lamp EL-1159 SUPER LOCK CONTROL UNIT Schematic TEL285M EL-1160 SUPER LOCK CONTROL UNIT Schematic (Cont’d) TEL286M EL-1161 SUPER LOCK CONTROL UNIT Input/Output Operation Signal SUPER LOCK CONTROL UNIT INSPECTION TABLE Operated condition Voltage (Approximate values) — 12V Terminal No. Wire color 1 R Power source (Fuse) 3 L/Y Super lock actuators Key inserted into front door key cylinder, turning it to UNLOCK (Key is not in ignition key cylinder.) 5V 4 L/R Passenger door lock actuator Door lock & unlock switch 12V 6 L/W Super lock actuators Key inserted into front door key cylinder, turning it to LOCK (When super lock is in release condition) 10 W/R Power source (C/B) 11 L/R Driver door lock actuator Door lock & unlock switch 14 L Door lock actuators Door lock & unlock switch Connections Unlocked — Ground 12V 12V Free 0V Free 0V Locked 12V 16 B — — 17 B/W Ignition switch (ON) Ignition key is in “ON” position 18 BR Ignition key switch (Insert) key inserted → key removed from IGN key cylinder 12V → 0V 19 L/B Lighting switch (1ST) 1ST, 2ND positions: ON → OFF 12V → 0V 20 P Door lock/unlock switches Neutral → Locked 5V → 0V 23 LG Door lock/unlock switches Neutral → Unlocked 5V → 0V 24 R/Y Door key cylinder lock switch OFF (Neutral) → ON (Locked) 5V → 0V 25 Y/G Door key cylinder unlock switch OFF (Neutral) → ON (Unlocked) 5V → 0V 26 R/W Interior room lamp When interior lamp is operated with driver’s door is unlocked. (Lamp switch in “DOOR” position) 12V Locked 12V Unlocked 0V 27 B/W Rear window defogger relay OFF → ON (Ignition key is in “ON” position) 12V → 0V 28 L/W Driver door unlock sensor Driver door: Locked → Unlocked 12V → 0V 29 PU Passenger door unlock sensor Passenger and back door: Locked → Unlocked 5V → 0V 30 R/Y Driver door switch OFF (Closed) → ON (Open) 12V → 0V 31 R/B All door switches OFF (Closed) → ON (Open) 12V → 0V 32 B/R Lock signal (from multi-remote control unit) 33 B/Y 34 R 35 SB Remove controller LOCK button is pushed (Key is not in ignition key cylinder.) 0V Other than above condition 5V Remove controller UNLOCK button is pushed (When super lock is in release condition) 0V Other than above condition 12V Anti-theft cancel signal When super lock is in set condition with driver and passenger door is locked, insert the key into ignition key cylinder and turn it to ON. 5V Rear window defogger switch OFF → ON Unlock signal (from multi-remote control unit) EL-1162 5V → 0V NATS (Nissan Anti-Theft System) Component Parts and Harness Connector Location SEL168X NOTE: If customer reports a “No Start” condition, request ALL KEYS to be brought to the Dealer is case of a NATS malfunction. EL-1163 NATS (Nissan Anti-Theft System) System Description NATS has the following immobilizer functions: + Since only NATS ignition keys, whose ID nos. have been registered into the ECM and IMMU of NATS, allow the engine to run, operation of a stolen vehicle without a NATS registered key is prevented by NATS. That is to say, NATS will immobilize the engine if someone tries to start it without the registered key of NATS. + This version of NATS has dongle unit to improve its anti-theft performance (RHD models). Dongle unit has its own ID which is registered into NATS IMMU.

So it dongle unit is replaced, initialization must be carried out. + When malfunction of dongle unit is detected: — The security indicator lamp illuminates for about 15 minutes after ignition switch is turned to ON. — When dongle unit has a malfunction and the indicator lamp is illuminated, engine can not be started. However, engine can be started only one time when security indicator turns off in about 15 minutes after ignition switch is turned to ON. + Both of the originally supplied ignition key IDs have been NATS registered. If requested by the vehicle owner, a maximum of five key IDs can be registered into the NATS components. + The NATS security indicator (NATS security ind.) blinks when the ignition switch is in “OFF” or “ACC” position. Therefore, NATS warns outsiders that the vehicle is equipped with the anti-theft system. + When NATS detects trouble, the security indicator lamp lights up as follows. Condition IGN ON and With Dongle Without Dongle MIL Security Indicator MIL Security Indicator NATS malfunction (except dongle unit) is detected — 1. 6 times blinking 2. Staying ON after ignition switch is turned ON — Staying ON Only malfunction of dongle unit is detected. — Staying ON for about 15 minutes after ignition switch is turned ON. — — Malfunction of NATS and engine related parts are detected Staying ON 1. 6 times blinking 2. Staying ON after ignition switch is turned ON Staying ON Staying ON Only engine related part malfunction is detected Staying ON — Staying ON — Just after initialization of NATS — — — + + 6 times blinking NATS trouble diagnoses, system initialization and additional registration of other NATS ignition key IDs must be carried out using CONSULT-II hardware and CONSULT-II NATS software. Regarding the procedures of NATS initialization and NATS ignition key ID registration, refer to CONSULT-II operation manual, NATS. When servicing a malfunction of the NATS (indicated by lighting up of security Indicator Lamp) or registering another NATS ignition key ID no., it is necessary to re-register original key identification. Therefore, be sure to receive ALL KEYS from vehicle owner. EL-1164 NATS (Nissan Anti-Theft System) System Composition The immobilizer function of the NATS consists of the following: + NATS ignition key + NATS immobilizer control unit (NATS IMMU), located in the ignition key cylinder + Engine control module (ECM) + Dongle unit (RHD models) + NATS security indicator SEL148XA EL-1165 NATS (Nissan Anti-Theft System) Wiring Diagram — NATS — TEL280M EL-1166 NATS (Nissan Anti-Theft System) Wiring Diagram — NATS —/LHD Models TEL281M EL-1167 NATS (Nissan Anti-Theft System) Wiring Diagram — NATS —/RHD Models TEL294M EL-1168 NATS (Nissan Anti-Theft System) CONSULT-II CONSULT-II INSPECTION PROCEDURE 1. Turn ignition switch OFF. 2. Insert NATS program card into CONSULT-II. Program card EEN99A 3. Connect CONSULT-II to Data link connector which is located behind the fuse box cover.

4. Turn ignition switch ON. 5. Touch “START”. SEL149X 6. Perform each diagnostic test mode according to each service procedure. For further information, see the CONSULT-II Operation Manual, NATS. SEL150X EL-1169 NATS (Nissan Anti-Theft System) CONSULT-II (Cont’d) CONSULT-II DIAGNOSTIC TEST MODE FUNCTION CONSULT-II DIAGNOSTIC TEST MODE Description C/U INITIALIZATION When replacing any of the following components, C/U initialization is necessary. [NATS ignition key/IMMU/ECM/Dongle unit] SELF-DIAG RESULTS Detected items (screen terms) are as shown in the chart below. NOTE: When any initialization is performed, all ID previously registered will be erased. So all NATS ignition keys must be registered again. The engine cannot be started with an unregistered key. In this case, the system may show “DIFFERENCE OF KEY” or “LOCK MODE” as a self-diagnostic result on the CONSULT-II screen. When initialization is performed (for RHD models), security indicator will flash six times to demonstrate recognition of dongle unit ID. HOW TO READ SELF-DIAGNOSTIC RESULTS SEL151X EL-1170 NATS (Nissan Anti-Theft System) CONSULT-II (Cont’d) SELF-DIAGNOSTIC RESULTS ITEM CHART Detected items (Screen terms) Description Reference page ECM INT CIRC-IMMU The malfunction of ECM internal circuit of IMMU communication line is detected. EL-1175 CHAIN OF ECM-IMMU Communication impossible between ECM and IMMU. (In rare case, “CHAIN OF ECM-IMMU” might be stored during key registration procedure, even if the system is not malfunctioning.) EL-1176 DIFFERENCE OF KEY IMMU can receive the key ID signal but the result of ID verification between key ID and IMMU is NG. EL-1178 CHAIN OF IMMU-KEY IMMU cannot receive the key ID signal. Otherwise, the registered ID signal from dongle unit cannot be received when the IMMU requests the ID.

EL-1179 ID DISCORD, IMM-ECM The result of ID verification between IMMU and ECM is NG. System initialization is required. EL-1180 DON’T ERASE BEFORE CHECKING ENG DIAG Engine trouble data and NATS trouble data have been detected in ECM. EL-1172 LOCK MODE When the starting operation is carried out 5 or more times consecutively under the following conditions, NATS will shift the mode to one which prevents the engine from being started. + unregistered ignition key is used + IMMU or ECM malfunctioning EL-1181 EL-1171 NATS (Nissan Anti-Theft System) Trouble Diagnoses WORK FLOW *NOTE: In rare case, “CHAIN OF ECM-IMMU” might be stored as a selfdiagnostic result during key registration procedure, even if the system is not malfunctioning. CHECK IN . Listen to customer complaints or request.

(Get symptoms) NOTE: If customer reports a “No start” condition, request ALL KEYS to be brought to the Dealer in case of a NATS malfunction. KEY SERVICE REQUEST (Additional key ID registration) TROUBLE . . Verify the security indicator. INITIALIZATION (Refer to CONSULT-II operation manual NATS.) . Using the CONSULT-II program card for NATS check the c “SELF-DIAG RESULTS” with CONSULT-II. b . . Self-diagnostic results referring to NATS, but no information about engine self-diagnostic results is displayed on CONSULTII. .

Self-diagnostic results referring to NATS and “DON’T ERASE BEFORE CHECKING ENG DIAG” are displayed on CONSULTII. (This means that engine trouble data has been detected in ECM.) Turn ignition switch “OFF”. . .

Repair NATS. (If necessary, carry out “C/U INITIALIZATION” with CONSULTII.*) Turn ignition switch “OFF”. . . Turn ignition switch “ON”. Repair NATS according to self-diagnostic results referring to NATS. (If necessary, carry out “C/U INITIALIZATION” with CONSULTII.*) . .

Erase the NATS “SELF-DIAG RESULTS” by using CONSULT-II. (Touch “ERASE”) Do not erase the NATS “SELF-DIAG RESULTS” by using CONSULT-II. . . Start the engine. NG Check the engine “SELF-DIAG RESULTS” with CONSULT-II by using the CONSULT-II generic program card. b (Engine diagnostic software included) . . Verify no lighting up of the security indicator.

Repair engine control system (Refer to EC section.) when selfdiagnostic results except “NATS MALFUNCTION” are detected.

When only “NATS MALFUNCTION” is detected, erase the selfdiagnostic results and go to the next step. OK . . CHECK OUT Start the engine. Does the engine start properly? OK .

. Perform running test with CONSULT-II in engine “SELF-DIAG RESULTS” mode. Erase the NATS and engine “SELF-DIAG RESULTS” by using the CONSULT-II program card for NATS and generic program card. . .

NG Verify “NO DTC” displayed on the CONSULT-II screen. Start the engine. OK . CHECK OUT EL-1172 NG NATS (Nissan Anti-Theft System) Trouble Diagnoses (Cont’d) SYMPTOM MATRIX CHART 1 (Self-diagnosis related item) SYMPTOM Displayed “SELF-DIAG RESULTS” on CONSULT-II screen. ECM INT CIRC-IMMU CHAIN OF ECM-IMMU DIAGNOSTIC PROCEDURE (Reference page) PROCEDURE 1 (EL-1175) PROCEDURE 2 (EL-1176) + Security indicator lighting up* + Engine does not start SYSTEM (Malfunctioning part or mode) ECM B In rare case, “CHAIN OF ECM-IMMU might be stored during key registration procedure, even if the system is not malfunctioning.

— Open circuit in battery voltage line of IMMU circuit C1 Open circuit in ignition line of IMMU circuit C2 Open circuit in ground line of IMMU circuit C3 Open circuit in communication line between IMMU and ECM C4 Short circuit between IMMU and ECM communication line and battery voltage line C4 Short circuit between IMMU and ECM communication line and ground line C4 ECM DIFFERENCE OF KEY CHAIN OF IMMU-KEY + Security indicator lighting up* + Engine hard to start ID DISCORD, IMM-ECM LOCK MODE + MIL staying ON + Security indicator lighting up* DON’T ERASE BEFORE CHECKING ENG DIAG PROCEDURE 3 (EL-1178) PROCEDURE 4 (EL-1179) PROCEDURE 5 (EL-1180) PROCEDURE 6 (EL-1181) WORK FLOW (EL-1172) REFERENCE PART NO. OF ILLUSTRATION ON DIAGNOSTIC SYSTEM DIAGRAM B IMMU A Unregistered key D IMMU A Malfunction of key ID chip E IMMU A Open circuit in ground line of dongle unit circuit C6 Open or short circuit in communication line between IMMU and dongle unit C5 Dongle unit G System initialization has not yet been completed. F ECM B LOCK MODE D Engine trouble data and NATS trouble data have been detected in ECM — *: When NATS detects trouble, the security indicator lights up while ignition key is in the “ON” position. *: When the vehicle is equipped with dongle unit, the security indicator blinks 6 times just after ignition switch is turned to ON. Then the security indicator will light up while ignition key is in the ON position. EL-1173 NATS (Nissan Anti-Theft System) Trouble Diagnoses (Cont’d) SYMPTOM MATRIX CHART 2 (Non self-diagnosis related item) SYMPTOM Security ind. does not light up. DIAGNOSTIC PROCEDURE (Reference page) PROCEDURE 7 (EL-1182) Security ind. does not blink just after initialization even if the vehicle is equipped with dongle unit.

Security ind. does not blink just after ignition switch is turned to ON when some malfunction related to NATS is detected even if the vehicle is equipped with dongle unit. PROCEDURE 8 (EL-1183) SYSTEM (Malfunctioning part or mode) REFERENCE PART NO. OF ILLUSTRATION ON DIAGNOSTIC SYSTEM DIAGRAM Security ind. — Open circuit between Fuse and NATS IMMU — Continuation of initialization mode — NATS IMMU A NATS might be initialized without connecting dongle unit properly. — Open circuit in ground line of dongle unit circuit C6 Open or short circuit in communication line between IMMU and dongle unit C5 Dongle unit G DIAGNOSTIC SYSTEM DIAGRAM SEL028X EL-1174 NATS (Nissan Anti-Theft System) Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 1 Self-diagnostic results: “ECM INT CIRC-IMMU” displayed on CONSULT-II screen Confirm SELF-DIAGNOSTIC RESULTS “ECM INT CIRC-IMMU” displayed on CONSULT-II screen. Ref. part No. B. . SEL152X Replace ECM. . Perform initialization with CONSULT-II.

For the operation of initialization, refer to “CONSULT-II operation manual NATS”. EL-1175 NATS (Nissan Anti-Theft System) Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 2 Self-diagnostic results: “CHAIN OF ECM-IMMU” displayed on CONSULT-II screen *: In rare case, “CHAIN OF ECM-IMMU” might be stored during key registration procedure, even if the system is not malfunctioning.

Confirm SELF-DIAGNOSTIC RESULTS “CHAIN OF ECMIMMU”* displayed on CONSULT-II screen. OK SEL153X . CHECK POWER SUPPLY CIRCUIT FOR IMMU.

8 of Check voltage between terminal V IMMU and ground. Voltage: Battery voltage NG c OK . SEL154X CHECK IGN SW. ON SIGNAL. 7 of Check voltage between terminal V IMMU and ground while ignition switch is in the “ON” position. Voltage: Battery voltage NG c OK . SEL155X CHECK GROUND CIRCUIT FOR IMMU. Check harness continuity between IMMU 4 and ground. terminal V Continuity should exist. NG Check the following: + 20A fuse (No. 50 , located in the fuse and fusible link box) + Harness for open or short between fuse and IMMU connector Ref. part No. C1 Check the following: + 10A fuse [No. 25 , located in the fuse block (J/B)] + Harness for open or short between fuse and IMMU connector Ref. part No. C2 c Repair harness.

Ref. part No. C3 c Repair harness. Ref. part No. C4 OK . CHECK COMMUNICATION ON OPEN CIRCUIT. Check harness continuity between the following ECM terminal and IMMU terminal. ECM terminal V 55 or IMMU terminal 1 V Continuity should exist. SEL156X OK . A V SEL157X EL-1176 NG NATS (Nissan Anti-Theft System) Trouble Diagnoses (Cont’d) A V .

CHECK COMMUNICATION LINE BATTERY SHORT CIRCUIT. 1. Disconnect ECM connector and IMMU connector. 2.

Turn ignition switch to ON.

3.

Check voltage between ECM terminal 1 and ground. 55 or IMMU terminal V V No voltage should exist. NG c Repair harness. Ref. part No. C4 c Repair harness. Ref.

part No. C4 SEL158X OK . CHECK COMMUNICATION LINE GROUND SHORT CIRCUIT. 1. Disconnect ECM connector and IMMU connector. 2. Turn ignition switch OFF. 3. Check continuity between ECM termi1 and nal V 55 or IMMU terminal V ground. Continuity should not exist. NG OK SEL159X . SIGNAL FROM ECM TO IMMU CHECK 1. Check the signal between ECM terminal V 55 and ground with CONSULT-II or oscilloscope when ignition switch is turned “ON”. 2. Make sure signals which are shown in the figure below can be detected during 750 msec. just after ignition switch is turned “ON”. OK . SEL193X + IMMU is malfunctioning. 1. Replace IMMU. Ref. part No. A 2. Perform initialization with CONSULTII. For the initialization procedure, refer to “CONSULT-II operation manual NATS”. EL-1177 NG c + ECM is malfunctioning. 1. Replace ECM. Ref. part No. B 2. Perform initialization with CONSULT-II. For the initialization procedure, refer to “CONSULT-II operation manual NATS”. NATS (Nissan Anti-Theft System) Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 3 Self-diagnostic results: “DIFFERENCE OF KEY” displayed on CONSULT-II screen Confirm SELF-DIAGNOSTIC RESULTS “DIFFERENCE OF KEY” displayed on CONSULT-II screen.

OK SEL163X . PERFORM INITIALIZATION. Perform initialization with CONSULT-II. Re-register all NATS ignition key IDs. For the initialization procedure, refer to “CONSULT-II operation manual NATS”. Initialization completed SEL566W . Start engine. . END. (The ignition key was unregistered.) Ref. part No. D EL-1178 Initialization with CONSULT-II incomplete or failed + IMMU is malfunctioning. c 1.

Replace IMMU. Ref. part No. A 2. Perform initialization with CONSULT-II. For the initialization procedure, refer to “CONSULT-II operation manual NATS”. NATS (Nissan Anti-Theft System) Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 4 Self-diagnostic results: “CHAIN OF IMMU-KEY” displayed on CONSULT-II screen Confirm SELF-DIAGNOSTIC RESULTS “CHAIN OF IMMUKEY” displayed on CONSULT-II screen. OK SEL165X . CHECK NATS IGNITION KEY ID CHIP. Start engine with another registered NATS ignition key. Does the engine start? Yes c No . Is this vehicle equipped with dongle unit (RHD models)? No c SEL160X yes . CHECK HARNESS CONNECTOR CONNECTION. Check the following harness connector connection. M29 , M121 Does the engine start? Yes c + Ignition key ID chip is malfunctioning. 1. Replace the ignition key. Ref. part No. E 2. Perform initialization with CONSULT-II. For the initialization procedure, refer to “CONSULT-II operation manual NATS”. + IMMU is malfunctioning. 1.

Replace IMMU. Ref part No. A 2. Perform initialization with CONSULT-II.

For the initialization procedure, refer to “CONSULT-II operation manual NATS”. System is OK.

(The malfunction is caused by improper connector connection.) No SEL161X . CHECK GROUND CIRCUIT FOR DONGLE UNIT. Check continuity between dongle unit ter1 and ground. minal V Continuity should exist. No c Repair harness.

Ref.

part No. C6 c Repair harness.

Ref. part No. C5 Yes .

SEL162X CHECK INTERFACE CIRCUIT.

1. Check continuity between IMMU termi2 and dongle unit terminal V 7 nal V (Open circuit check) Continuity should exist. 2. Check continuity between IMMU termi2 and ground.

(Short circuit nal V check) Continuity should not exist. Yes . Dongle unit is malfunctioning. 1. Replace dongle unit. Ref. part No. G 2. Perform initialization with CONSULT-II. For the initialization procedure, refer to “CONSULT-II operation manual NATS”. EL-1179 No NATS (Nissan Anti-Theft System) Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 5 Self-diagnostic results: “ID DISCORD, IMM-ECM” displayed on CONSULT-II screen Confirm SELF-DIAGNOSTIC RESULTS “ID DISCORD, IMMECM*” displayed on CONSULT-II screen. SEL166X . PERFORM INITIALIZATION. Perform initialization with CONSULT-II. Re-register all NATS ignition key IDs. For the initialization procedure, refer to “CONSULT-II operation manual NATS”. Initialization completed SEL566W . Start engine. (END) (System initialization was not completed. Ref. part No. F) EL-1180 * “ID DISCORD, IMM-ECM”: Registered ID of IMMU is in discord with that of ECM. Initialization with CONSULT-II incomplete or failed + ECM is malfunctioning. c 1.

Replace ECM. Ref. part No. B 2. Perform initialization with CONSULT-II. For the initialization procedure, refer to “CONSULT-II operation manual NATS”.

NATS (Nissan Anti-Theft System) Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 6 Self-diagnostic results: “LOCK MODE” displayed on CONSULT-II screen Confirm SELF-DIAGNOSTIC RESULTS “LOCK MODE” is displayed on CONSULT-II screen.

. SEL167X 1. Turn the ignition switch to OFF position. 2. Turn the ignition key switch to ON position with a registered key. (Do not start engine.) Wait 5 seconds. 3. Return the key to the OFF position. 4.

Repeat steps 2 and 3 twice (total of three cycles). 5. Start the engine. Does the engine start?

Yes c System is OK. (Now the system is escaped from “LOCK MODE”.) No . SEL566W CHECK NATS IMMU INSTALLATION. Refer to “How to Replace NATS IMMU” in EL-1183. NG c Reinstall NATS IMMU correctly. OK . PERFORM INITIALIZATION. Perform initialization with CONSULT-II.

For the initialization procedure, refer to “CONSULT-II operation manual NATS”. Can the system be initialized? Note: If the initialization is incompleted or failed, CONSULT-II shows message on the screen. No . Go to DIAGNOSTIC PROCEDURE 4, EL-1179 to check “CHAIN OF IMMUKEY”.

EL-1181 Yes c System is OK. NATS (Nissan Anti-Theft System) Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 7 “SECURITY IND. DOES NOT LIGHT UP” Check 7.5A fuse [No. 24 , located in the fuse block (J/B)]. NG c Replace fuse. OK . NATS INITIALIZATION 1) Install the 7.5A fuse. 2) Perform initialization with CONSULT-II. For the operation of initialization, refer to “CONSULT-II operation manual NATS”. . Turn ignition switch “OFF”.

. Start engine and turn ignition switch “OFF”. . Check the security ind. lighting. OK c END NG . Check voltage between security ind. con1 and ground. nector terminal V Voltage: Battery voltage NG c Check harness for open or short between fuse and security ind.

OK . SEL931UA CHECK INDICATOR LAMP.

NG c Repair harness. OK . CHECK NATS IMMU FUNCTION. 1. Connect NATS IMMU connector. 2. Disconnect security ind. connector. 3. Check continuity between NATS IMMU 6 and ground. terminal V Continuity should exist intermittently. OK SEL164X . Check harness for open or short between security indicator and NATS IMMU. EL-1182 NG c NATS IMMU is malfunctioning.

Replace IMMU. . Perform initialization with CONSULT-II. For the operation of initialization, refer to “CONSULT-II operation manual NATS”. NATS (Nissan Anti-Theft System) Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 8 CHECK GROUND CIRCUIT FOR DONGLE UNIT. Check continuity between dongle unit ter1 and ground. minal V Continuity should exist. No c Repair harness. Ref. part No. C6 c Repair harness. Ref. part No. C5 Yes . SEL160X CHECK INTERFACE CIRCUIT. 1. Check continuity between IMMU termi2 and dongle unit terminal V 7 . nal V (Open circuit check) Continuity should exist. 2. Check continuity between IMMU termi2 and ground. (Short circuit nal V check) Continuity should exist. No Yes . SEL161X Dongle unit is malfunctioning. 1. Replace dongle unit. Ref.

part No. G 2. Perform initialization with CONSULT-II. For the initialization procedure, refer to “CONSULT-II operation manual NATS”. SEL162X How to Replace NATS IMMU NOTE: + If NATS IMMU is not installed correctly, NATS system will not operate properly and SELF-DIAG RESULTS on CONSULT-II screen will show “LOCK MODE”. SEL096WD EL-1183 NATS (Nissan Anti-Theft System) NOTE EL-1184 LOCATION OF ELECTRICAL UNITS Engine Compartment CEL101M EL-1185 LOCATION OF ELECTRICAL UNITS Passenger Compartment — LHD Models CEL102M EL-1186 LOCATION OF ELECTRICAL UNITS Passenger Compartment — LHD Models (Cont’d) CEL103M EL-1187 LOCATION OF ELECTRICAL UNITS Passenger Compartment — RHD Models CEL104M EL-1188 LOCATION OF ELECTRICAL UNITS Passenger Compartment — RHD Models (Cont’d) CEL105M EL-1189 LOCATION OF ELECTRICAL UNITS NOTE EL-1190 HARNESS LAYOUT How to Read Harness Layout Example: G2 E1 B/6 : ASCD ACTUATOR Connector color / Cavity Connector number Grid reference The following Harness Layouts use a map style grid to help locate connectors on the drawings: + Main Harness + Engine Room Harness (Engine Compartment) To use the grid reference 1)Find the desired connector number on the connector list. 2) Find the grid reference. 3) On the drawing, find the crossing of the grid reference letter column and number row. 4) Find the connector number in the crossing zone. 5) Follow the line (if used) to the connector. CONNECTOR SYMBOL Main symbols of connector (in Harness Layout) are indicated in the below. Water proof type Standard type Connector type Male Female — — Male + Cavity: Less than 4 + Relay connector + Cavity: From 5 to 8 + Cavity: More than 9 + Ground terminal etc. — EL-1191 Female HARNESS LAYOUT Main Harness/LHD Models CEL106M EL-1192 HARNESS LAYOUT Main Harness/LHD Models (Cont’d) CEL107M EL-1193 HARNESS LAYOUT Main Harness/LHD Models (Cont’d) CEL108M EL-1194 HARNESS LAYOUT NOTE EL-1195 HARNESS LAYOUT Main Harness/RHD Models CEL109M EL-1196 HARNESS LAYOUT Main Harness/RHD Models (Cont’d) CEL110M EL-1197 HARNESS LAYOUT Main Harness/RHD Models (Cont’d) CEL111M EL-1198 HARNESS LAYOUT NOTE EL-1199 HARNESS LAYOUT Engine Room Harness/LHD Models CEL112M EL-1200 HARNESS LAYOUT Engine Room Harness/LHD Models (Cont’d) CEL113M EL-1201 HARNESS LAYOUT Engine Room Harness/LHD Models (Cont’d) PASSENGER COMPARTMENT CEL114M EL-1202 HARNESS LAYOUT Engine Room Harness/LHD Models (Cont’d) CEL115M EL-1203 HARNESS LAYOUT Engine Room Harness/RHD Models CEL118M EL-1204 HARNESS LAYOUT Engine Room Harness/RHD Models (Cont’d) CEL119M EL-1205 HARNESS LAYOUT Engine Room Harness/RHD Models (Cont’d) PASSENGER COMPARTMENT CEL120M EL-1206 HARNESS LAYOUT Engine Room Harness/RHD Models (Cont’d) CEL121M EL-1207 HARNESS LAYOUT Engine Harness CEL123M EL-1208 HARNESS LAYOUT Engine Control Harness CEL125M EL-1209 HARNESS LAYOUT Body Harness/LHD Models WAGON CEL126M EL-1210 HARNESS LAYOUT Body Harness/LHD Models (Cont’d) CEL127M EL-1211 HARNESS LAYOUT Body Harness/LHD Models (Cont’d) HARDTOP CEL128M EL-1212 HARNESS LAYOUT Body Harness/LHD Models (Cont’d) CEL129M EL-1213 HARNESS LAYOUT Body Harness/RHD Models WAGON CEL130M EL-1214 HARNESS LAYOUT Body Harness/RHD Models (Cont’d) CEL131M EL-1215 HARNESS LAYOUT Body Harness/RHD Models (Cont’d) HARDTOP CEL132M EL-1216 HARNESS LAYOUT Body Harness/RHD Models (Cont’d) CEL133M EL-1217 HARNESS LAYOUT Body No. 2 Harness/LHD Models WAGON CEL226A EL-1218 HARNESS LAYOUT Body No. 2 Harness/LHD Models (Cont’d) HARDTOP CEL134M EL-1219 HARNESS LAYOUT Body No. 2 Harness/RHD Models WAGON CEL135M EL-1220 HARNESS LAYOUT Body No. 2 Harness/RHD Models (Cont’d) HARDTOP CEL136M EL-1221 HARNESS LAYOUT Chassis Harness CEL250A EL-1222 HARNESS LAYOUT Room Lamp Harness CEL137M EL-1223 HARNESS LAYOUT Front Door Harness (Driver side) LHD MODELS CEL245A RHD MODELS CEL138M EL-1224 HARNESS LAYOUT LHD MODELS Front Door Harness (Passenger side) CEL246A RHD MODELS CEL139M EL-1225 HARNESS LAYOUT Back Door Harness and Rear Window Defogger Harness CEL251A EL-1226 WIRING DIAGRAM CODES (CELL CODES) Wiring Diagram Codes (Cell Codes) Use the chart below to find out what each wiring diagram code stands for. Refer to the wiring diagram code in the alphabetical index to find the location (Page number) of each wiring diagram. Code Section Wiring Diagram Name Code Section Wiring Diagram Name A/C,A HA Auto Air Conditioner HLC EL Headlamp Wiper and Washer A/C,M HA Manual Air Conditioner HORN EL Horn A/CCUT EC Air Conditioner Control IGN EC Ignition Control System A/T AT A/T ILL EL Illumination ABS BR Anti-lock Brake System INJPMP EC ACC/SW EC Accelerator Switch (FC) Electronic Control Fuel Injection Pump ACL/SW EC Accelerator Position Switch INT/V EC Intake Air Control Valve Control Solenoid Valve APS EC Accelerator Position Sensor MAFS EC Mass Air Flow Sensor ASCD EL Automatic Speed Control Device AT/C EC A/T Control MAIN EC Main Power Supply and Ground Circuit BACK/L EL Back-up Lamp BCDD EC BCDD System METER EL Speedometer, Tachometer, Temp., Oil and Fuel Gauges BOOST EC Turbo Charger Boost Sensor MIL/DL EC Mil and Data Link Connectors BRK/SW EC Brake Switch Signal MULTI EL Multi-remote Control System CHARGE EL Charging System NATS EL Nissan Anti-Theft System CHIME EL Warning Chime P/ANT EL Power Antenna CHOKE EC Automatic Choke PNP/SW EC Park/Neutral Position Switch EL Power Supply Routing CKPS EC Crankshaft Position Sensor (OBD) POWER COOL/B HA Cool Box R/COOL HA Rear Cooler System COOL/F EC Cooling Fan Control R/FOG EL Rear Fog Lamp CORNER EL Cornering Lamp R/HEAT HA Rear Heater System DEF EL Rear Window Defogger REMOTE EL Audio (Remote Control Switch) DIFF/L PD Differential Lock Control System ROOM/L EL Interior Room Lamp DTRL EL Headlamp — With Daytime Light System S/LOCK EL Power Door Lock — Super Lock S/SIG EC Start Signal ECMRLY EC ECM Relay S/TANK FE Sub Fuel Tank Control System ECTS EC Engine Coolant Temperature Sensor SHIFT AT A/T Shift Lock System EGVC/V EC EGR Volume Control Valve SRS RS Supplemental Restraint System EXH EC Exhaust Gas Control Valve Control Solenoid Valve STAB RA Stabilizer Release Device START EL Starting System F/FOG EL Front Fog Lamp STOP/L EL Stop Lamp F/PUMP EC Fuel Pump FCUT EC Fuel Cut System SWL/V EC Swirl Control Valve Control Solenoid Valve FICD EC IACV-FICD Solenoid Valve TAIL/L EL Parking, License and Tail Lamps FIPOT EC ISC-FI POT FPCM EC Fuel Pump Control Module TURN EL Turn Signal and Hazard Warning Lamps GLOW EC Quick Glow System VSS EC Vehicle Speed Sensor HEATER HA Heater System WARN EL Warning Lamps HEATUP EC Heat up Switch EL-1227 WIRING DIAGRAM CODES (CELL CODES) Wiring Diagram Codes (Cell Codes) (Cont’d) Code Section Wiring Diagram Name VNT EC Variable Nozzle Turbocharger Control Solenoid Valve WINCH SE Electrical Winch WINDOW EL Power Window WIPER EL Front Wiper and Washer EL-1228 ENGINE MECHANICAL SECTION EM MODIFICATION NOTICE: ZD engine + ZD30DDTi engine has newly been added. 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1091 Connecting Rod .... 1092 Crankshaft........ 1093 Available Main Bearing .... 1093 Available Connecting Rod Bearing........ 1094 Miscellaneous Components........ 1095 EM-1002 PRECAUTIONS ZD Parts Requiring Angular Tightening + Use an angle wrench for the final tightening of the cylinder head bolts. + Do not use a torque value for final tightening. + The torque value for these parts are for a preliminary step. + Ensure thread and seat surfaces are clean and coated with engine oil. Liquid Gasket Application Procedure 1. Use a scraper to remove old liquid gasket from mating surfaces and grooves. Also, completely clean any oil from these areas. 2. Apply a continuous bead of liquid gasket to mating surfaces. (Use Genuine Liquid Gasket or equivalent.) + Be sure liquid gasket diameter is as specified. SEM164F 3. Apply liquid gasket around the inner side of bolt holes (unless otherwise specified). 4. Assembly should be done within 5 minutes after coating. 5. Wait at least 30 minutes before refilling engine oil and engine coolant. AEM080 EM-1003 ZD PREPARATION Special Service Tools Tool number Tool name Description ST0501S000 Engine stand assembly 1 ST05011000 V Engine stand 2 ST05012000 V Base Disassembling and assembling NT042 KV10106500 Engine stand shaft NT028 KV11106101 Engine sub-attachment NT819 KV10115600 Valve oil seal drift Installing valve oil seal Use side A. Side A a: 20 (0.79) dia. b: 13 (0.51) dia.
c: 10.3 (0.406) dia. d: 8 (0.31) dia. e: 10.7 (0.421) f: 5 (0.20) Unit: mm (in) NT603 KV10107902 Valve oil seal puller 1 KV10116100 V Valve oil seal puller adapter Removing valve oil seal NT605 KV101056S0 Ring gear stopper 1 KV10105630 V Adapter 2 KV10105610 V Plate Preventing crankshaft from rotating a: 3 (0.12) b: 6.4 (0.252) c: 2.8 (0.110) d: 6.6 (0.260) e: 107 (4.21) f: 14 (0.55) g: 20 (0.79) h: 14 (0.55) dia. Unit: mm (in) NT617 EM-1004 PREPARATION Special Service Tools (Cont'd) Tool number Tool name ZD Description KV101151S0 Lifter stopper set 1 KV10115110 V Camshaft pliers 2 KV10115120 V Lifter stopper Changing shims NT041 KV101092S0 Valve spring compressor 1 KV10109210 V Compressor 2 KV10109220 V Adapter Disassembling and assembling valve components NT718 ED19600620 Compression gauge adapter Checking compression pressure NT820 ST16610000 Pilot bushing puller Removing crankshaft pilot bushing NT045 KV10111100 Seal cutter Removing steel oil pan and rear timing chain case NT046 WS39930000 Tube presser Pressing the tube of liquid gasket NT052 KV10112100 Angle wrench Tightening bolts for bearing cap, cylinder head, etc. NT014 EM-1005 PREPARATION Special Service Tools (Cont'd) Tool number Tool name ZD Description KV10109300 Pulley holder a: 68 mm (2.68 in) b: 8 mm (0.31 in) dia. NT628 KV111045S1 Balancer shaft bearing replacer set 1 KV11104510 V Replacer bar 2 KV11104521 V Guide plate 3 KV11104530 V Adapter (Front bearing) 4 ST15243000 V Drift Removing and installing balancer shaft bearing NT258 Commercial Service Tools Tool name Description Valve seat cutter set Finishing valve seat dimensions NT048 Piston ring compressor Installing piston assembly into cylinder bore NT044 Piston ring expander Removing and installing piston ring NT030 Standard Universal Removing and installing transmission mount NT808 EM-1006 PREPARATION Commercial Service Tools (Cont'd) Tool name Description Deep socket (12 mm) Removing and installing glow plugs NT821 EM-1007 ZD NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING ZD SEM290G EM-1008 NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING ZD NVH Troubleshooting Chart — Engine Noise Use the chart below to help you find the cause of the symptom. 1. Locate the area where noise occurs. 2. Confirm the type of noise. 3. Specify the operating condition of engine. 4. Check specified noise source. If necessary, repair or replace these parts. Operating condition of engine Location of noise Top of engine Rocker cover Cylinder head Crankshaft pulley Cylinder block (Side of engine) Oil pan Front of engine Timing gear cover Type of noise Before After warm-up warm-up When starting When idling When racing While driving Source of noise Check item Reference page Ticking or clicking C A — A B — Tappet noise Valve clearance MA section ("Adjusting Intake & Exhaust Valve Clearance", "ENGINE MAINTENANCE") Rattle C A — A B C Camshaft bearing noise Camshaft bushing clearance Camshaft runout EM-1032, 1032 Slap or knock — A — B B — Piston pin noise Piston and piston pin clearance Connecting rod bushing clearance EM-1072, 1074 A Piston slap noise Piston-to-bore clearance Piston ring side clearance Piston ring end gap Connecting rod bend and torsion EM-1076, 1073, 1073, 1074 Connecting rod bushing clearance (Small end) Connecting rod bearing clearance (Big end) EM-1074, 1078 Slap or rap A — — B B Knock A B C B B B Connecting rod bearing noise Knock A B — A B C Main bearing noise Main bearing oil clearance Crankshaft runout EM-1079, 1077 Tapping or ticking A A — B B B Timing gear noise Timing gear backlash EM-1042 Squeaking or fizzing A B — B — C Other drive belts (Sticking or slipping) Creaking A B A B A B Other drive belts (Slipping) Front of engine Squall Creak A: Closely related A B: Related B — C: Sometimes related B A —: Not related EM-1009 B MA section ("Checking Drive Belts", "ENGINE MAINTEIdler pulley bearing operation NANCE") Drive belts deflection Water pump Water pump bearing operabearing tion noise LC section ("Water Pump Inspection", "ENGINE COOLING SYSTEM") MEASUREMENT OF COMPRESSION PRESSURE TROUBLESHOOTING SEM318G ZD 1. Warm up engine.
2.
Turn ignition switch OFF. 3. Using CONSULT-II, make sure no error codes are indicated for self-diagnosis items. Refer to EC section, "Fuel Presure Release". + Do not disconnect CONSULT-II until the end of this operation; it will be used to check engine rpm and for error detection at the end of this operation. 4. Disconnect the negative battery terminal. 5.
Remove the following parts. + Intercooler cover + Intercooler + Throttle body + Rocker cover 6. To prevent fuel from being injected during inspection, remove fuel injection pump fuse [ENG CONT (20A)] from fuse box on the right side of engine compartment. 7. Remove glow plugs from all the cylinders. + Before removal, clean the surrounding area to prevent entry of any foreign materials into the engine. + Carefully remove glow plugs to prevent any damage or breakage. + Handle with care to avoid applying any shock to glow plugs. 8. Install adapter (SST) to installation holes of glow plugs and connect compression gauge for diesel engine. : 15 - 19 Nzm (1.5 - 2.0 kg-m, 11 - 14 ft-lb) 9. Connect battery negative terminal.
10. Set the ignition switch to "START" and crank. When gauge pointer stabilizes, read compression pressure and engine rpm. Repeat the above steps for each cylinder. + Always use a fully-charged battery to obtain specified engine speed. Unit: kPa (bar, kg/cm2, psi)/rpm SEM334G Standard Minimum 2,942 (29.42, 30.0, 427)/ 2,452 (24.52, 25.0, 356)/ 200 200 Difference limit between cylinders 294 (2.94, 3.0, 43)/200 + When engine rpm is out of the specified range, check the specific gravity of battery liquid. Measure again under corrected conditions. + If engine rpm exceeds the limit, check valve clearance and combustion chamber components (valves, valve seats, cylinder head gaskets, piston rings, pistons, cylinder bores, cylinder block upper and lower surfaces) and measure again. 11. Complete this operation as follows: a. Turn the ignition switch to "OFF". b. Disconnect battery negative terminal. c. Replace glow plug oil seals and install glow plugs. d. Install fuel injection pump fuse [ENG CONT (20A)]. e. Connect battery negative terminal.
f. Using CONSULT-II make sure no error code is indicated for items of self-diagnosis. Refer to EC section, "Trouble Diagnosis — Index". EM-1010 INTERCOOLER ZD Removal and Installation SEM291G CAUTION: To avoid damaging intercooler core when flushing intercooler with high pressure water, apply water straight to the core face.
EM-1011 INTAKE MANIFOLD ZD Removal and Installation SEM292G REMOVAL 1. Remove the following parts. + Drain engine coolant. Refer to MA section, "Changing Engine Coolant". + Remove engine cover. Refer to the figure at left. + Remove intercooler. + Remove air hose (on throttle body side). + Remove injection tube. + Remove or relocate wires/harnesses and tubes/pipes. EM-1012 INTAKE MANIFOLD Removal and Installation (Cont'd) ZD 2. Remove intake manifold in the reverse order of that shown in the figure. SEM293G Inspection Clean surface of intake manifold. Use a reliable straightedge and feeler gauge to check the flatness of intake manifold surface. Intake manifold surface flatness: Limit 0.2 mm (0.008 in) SEM294G INSTALLATION 1. Tighten intake manifold in the numerical order shown in the figure. : 25 - 28 Nzm (2.5 - 2.9 kg-m, 18 - 20 ft-lb) 2. Install in the reverse order of removal.
EM-1013 CATALYST AND TURBOCHARGER ZD Removal and Installation SEM295G REMOVAL 1. + + + SEM296G Remove the following parts. Undercover Under guard Engine coolant (drain) Refer to MA section, "Changing Engine Coolant". + Battery (on left side) (for cold areas) + Exhaust front tube Refer to FE section, "Removal and Installation", "EXHAUST SYSTEM". + Remove wires, harnesses, tubes and pipes. EM-1014 CATALYST AND TURBOCHARGER Removal and Installation (Cont'd) ZD 2. Remove catalyst. CAUTION: Do not disassemble catalyst. Inspection TURBOCHARGER SEM297G CAUTION: When the compressor wheel, turbine wheel, or rotor shaft is damaged, remove all the fragments and foreign matter left in the following passages in order to prevent a secondary failure: Suction side: Between turbocharger and intercooler Exhaust side: Between turbocharger and catalytic converter Rotor shaft + Check that the rotor shaft rotates smoothly without any resistance when it is rotated by your fingertips. + Check that the rotor shaft is not loose when it is moved vertically or horizontally. Standard value for rotor shaft oil clearance: 0.086 - 0.177 mm (0.0034 - 0.0070 in) SEM298G EM-1015 CATALYST AND TURBOCHARGER Inspection (Cont'd) ZD Rotor shaft end play Place a dial gauge at the rotor shaft end in the axial direction to measure the end play. Standard: 0.044 - 0.083 mm (0.0017 - 0.0033 in) SEM299G Turbine wheel + Check that there is no oil adhesion. + Check that there is no carbon accumulation. + Check that blades of the turbine wheel are not bent or broken. + Check that the turbine wheel does not interfere with the turbine housing. SEM300G Compressor wheel + Check that there is no oil adhesion inside the air inlet. + Check that the compressor wheel does not interfere with the compressor housing. + Check that the wheel is not bent or broken. SEM310G VNT control actuator SEM311G + Connect the handy pump to the actuator, and check that the rod strokes smoothly in compliance with the following pressure. + First, apply the inspection negative pressure of about −66.7 kPa (−667 mbar, −500 mmHg, 19.69 inHg), and then measure the values while reducing the negative pressure to 0. Standard (Vacuum pressure/rod stroke amount): −46.9±1.3 kPa (−469±13 mbar, −352±10 mmHg, −13.86±0.39 inHg)/0.2 mm (0.008 in) −30.8±0.7 kPa (−308±7 mbar, −231±5 mmHg, −9.09±0.20 inHg)/5.0 mm (0.197 in) Approximately −22.7 kPa (−227 mbar, −170 mmHg, −6.69 inHg)/Rod stroke end EM-1016 ZD CATALYST AND TURBOCHARGER Inspection (Cont'd) Trouble diagnosis of turbocharger Preliminary check: Check that the VNT control valve system has no malfunction. Refer to EC section, "ECM Terminals and Reference Value" in "TROUBLE DIAGNOSIS — GENERAL DESCRIPTION". + Check that the engine oil level is between MIN and MAX of the dipstick. (When the engine oil amount is more than MAX, the oil flows into the inlet duct through the blow-by gas passage, and the turbocharger is misjudged failure.) + Ask the customer if he/she always runs the vehicle in idle engine speed to cool the oil down after driving. + Replace the turbocharger assembly when any malfunction is found after unit inspections specified in the table below. + If no malfunction is found after the unit inspections, judge that the turbocharger body has no failure. Check the other parts again. Symptom (when each inspection item meets each inspection result) Inspection item Inspection result Oil leakage Smoke Noise Insufficient power/ acceleration failure Oil leaks. n n n Carbon is accumulated.
n j j Friction with housing. n j Inside the air inlet is seriously contaminated by oil. j j Friction with housing. n j Turbine wheel j Blades are bent or broken. Compressor wheel j Blades are bent or broken. There is resistance when the rotor shaft is rotated by your fingertips. After checking both turbine and compressor, inspect rotor shaft end play. n j n j n n n The rotor shaft sometimes does not rotate by your fingertips. There is too much play in the bearing. n Oil return port Carbon or sludge is accumulated in the waste oil hole. n Operation of VNT control actuator + The actuator does not operate smoothly when vacuum pressure is gradually applied. + Stroke amount is not in compliance with the vacuum pressure. : Large possibility j: Medium possibility n: Small possibility n j INSTALLATION 1. Install catalyst. : 29 - 39 Nzm (2.9 - 3.3 kg-m, 21 - 23 ft-lb) Place the protruding area of the gasket between the turbocharger and the exhaust outlet upwards, and install the lipped side to the turbocharger side. Refer to the figure, EM-1014. 2. Install in the reverse order of removal. EM-1017 EXHAUST MANIFOLD ZD Removal and Installation SEM312G REMOVAL 1.
Remove the following parts. + Refer to "PREPARATIVE WORK" in "CATALYST AND TURBOCHARGER", EM-1014. + Remove catalytic converter. + Remove turbocharger. 2. Loosen nuts holding the exhaust manifold in the reverse order of that shown in the figure. SEM313G EM-1018 EXHAUST MANIFOLD ZD Inspection EXHAUST MANIFOLD Check distortion on mounting surface with straightedge and feeler gauge. Limit: 0.2 mm (0.008 in) FEM034 INSTALLATION 1. Tighten exhaust manifold holding nuts in the numerical order shown in the figure. : 40 - 44 Nzm (4.0 - 4.5 kg-m, 29 - 32 ft-lb) NOTE: Install gasket so that the protruding tab (mark for correct installation) is positioned on the side of No. 1 port (front side). Refer to component structure diagram on the previous page. 2.
Install in the reverse order of removal. EM-1019 ROCKER COVER ZD Removal and Installation SEM315G REMOVAL 1.
+ + + + + Remove the following parts. Engine cover Intercooler Air inlet pipe Throttle body Wires, harnesses, tubes and pipes 2. Loosen holding bolts in the reverse order of that shown in the figure and remove. 3. Remove rocker cover to the direction of glow plug tilt. 4. Remove glow plug oil seals. SEM316G EM-1020 ROCKER COVER Removal and Installation (Cont'd) ZD INSTALLATION 1. Temporarily tighten holding bolts in the numerical order shown in the figure. SEM317G 2. Apply Three Bond 1207C (KP510 00150) to the area shown in the figure. 3. Use a scraper to remove old liquid gasket. 4. Apply once more. 5. Apply engine oil to glow plug oil seals and install them. FEM001 6. Tighten holding bolts in the numerical order shown in the figure. 7. Re-tighten to the same torque in the same order as above. SEM316G 8. Install in the reverse order of removal. EM-1021 OIL PAN & OIL STRAINER ZD Removal and Installation SEM319G REMOVAL [OIL PAN (LOWER)] 1. Remove the following parts. + Remove undercover. + Extract the engine oil. 2. Loosen the installation bolts in the reverse order of that shown in the figure and then remove. 3. Using a seal cutter (SST), cut the liquid gasket to separate it. SEM341G EM-1022 OIL PAN & OIL STRAINER Removal and Installation (Cont'd) ZD INSTALLATION [OIL PAN (LOWER)] SEM159F 1. Install oil pan (Lower). a. Use a scraper to remove all traces of liquid gasket from mating surfaces.
+ Also remove traces of liquid gasket from mating surface of oil pan (Upper). + Remove old liquid gasket from the bolt hole and thread. b. Apply a continuous bead of liquid gasket to mating surface of oil pan (Lower). + Use Genuine Liquid Gasket or equivalent. + Apply liquid gasket to the groove on the mating surface. + Allow 7 mm (0.28 in) clearance around bolt holes. c. Apply liquid gasket to inner sealing surface as shown in figure. + Be sure liquid gasket is 3.5 to 4.5 mm (0.138 to 0.177 in). + Attaching should be done within 5 minutes after coating. 2. Tighten the installation bolts in the order shown in the figure.
3. Install in the reverse order of removal. SEM345GA REMOVAL [OIL PAN (UPPER) AND OIL STRAINER] 1. + + + + SEM346G Remove the following parts. Engine cover Under covers Stabilizer; Refer to FA section in original Service Manual. Exhaust front tube and its bracket; Refer to FE section in original Service Manual.
+ Front propeller shaft and rear propeller shaft; Refer to PD section in original Service Manual. + Starter motor; Refer to EL section in original Service Manual. + A/T or M/T assembly with transfer; Refer to AT section or MT section in original Service Manual. NOTE: As there is a converter/clutch housing side oil pan (upper) installation bolt as well, the transmission will also need to be removed. 2. Loosen the installation bolts in the reverse order of that shown in the figure and then remove.
3. Using a seal cutter (SST), cut the liquid gasket to separate it. 4. Remove oil strainer SEM159F INSTALLATION [OIL PAN (UPPER) AND OIL STRAINER] SEM347GA 1. Clean oil strainer if any object is attached, and install oil strainer. 2. Install oil pan (Upper). a. Use a scraper to remove all traces of liquid gasket from mating surfaces. + Also remove traces of liquid gasket from mating surface of cylinder block, front cover and oil pan (Lower). + Remove old liquid gasket from the bolt hole and thread. b. Apply a continuous bead of liquid gasket to mating surface of oil pan (Upper). EM-1023 OIL PAN & OIL STRAINER Removal and Installation (Cont'd) + + + c. + + 3. 4. 5. ZD Use Genuine Liquid Gasket or equivalent.
Apply liquid gasket to the groove on the mating surface. Allow 7 mm (0.28 in) clearance around bolt holes. Apply liquid gasket to inner sealing surface as shown in figure.
Be sure liquid gasket is 3.5 to 4.5 mm (0.138 to 0.177 in).
Attaching should be done within 5 minutes after coating. Tighten the installation bolts in the order shown in the figure. Then tighten in the same order to the torque stated. The torque of the installation bolts will differ depending on position. Measurement below the neck of the installation bolt: 40 mm (1.57 in) (Bolt No. 15, 17 in the figure) 50 mm (1.97 in) (Bolt No. 21 in the figure) 20 mm (Others) Install in the reverse order of removal. EM-1024 VACUUM PUMP ZD Removal and Installation SEM320G REMOVAL 1. + + + + + + + 2. SEM321G Remove the following parts.
Radiator under side Radiator shroud Cooling fan Chain cover front side A/T cooler hose (Disconnect) Vacuum hose Intercooler cover (When removing vacuum tank) Remove the installation bolts and pull the vacuum pump from the engine front directly. 3. If it is difficult to remove from the spline shaft connection, tap lightly with a plastic hammer. EM-1025 VACUUM PUMP Removal and Installation (Cont'd) ZD INSPECTION SEM322G 1. Remove the vacuum hose. Connect the vacuum gauge through the 3-way connector. Otherwise, remove the welch valve of the vacuum pipe and attach the vacuum gauge directly. (The illustration shows the second method.) + Remove an appropriate part to measure the vacuum pump load pressure directly and install the vacuum gauge. Refer to the figure. 2. Start the engine, and measure the load pressure with the engine idling.
Vacuum pressure: Standard −93.3 to −101.3 kPa (−933 to −1,013 mbar, −700 to −760 mmHg, −27.56 to −29.92 inHg) 3. If outside the standard value, make sure that there is no intake of air within the circuit and measure again. 4. Replace the vacuum pump if still outside the standard value. INSTALLATION + Install in the reverse order of removal.
EM-1026 TIMING CHAIN ZD Removal and Installation FEM003 CAUTION: As the internal mechanism of the idler gear must first of all, and always, be set by a bolt when removing the timing chain before removing the fuel injection pump and timing gear, follow the procedures on EM-1039, "Removal of timing chain after setting idler gear", "Electronic controlled fuel injection pump". + This chapter will deal with the summary of removing the timing chain before removing the camshaft and cylinder head. Removal 1. + + + + + + + + + + + + Remove the following parts.
Engine cover Intercooler Air inlet pipe Throttle body Rocker cover Spill tube Coolant (Drain) Radiator upper hose Water outlet Radiator shroud Cooling fan Auxilary belt EM-1027 TIMING CHAIN Removal (Cont'd) + + 2.
+ + ZD Vacuum pipe Vacuum pump Move the following parts. TDC sensor harness Power steering oil pump 3. Remove the chain cover. + Remove the holding bolts A to C shown in the figure. CAUTION: While the chain cover is removed, be careful not to allow entry of dust or foreign objects. FEM004 4. Set the No. 1 cylinder to the TDC. 1) Turn the crankshaft pulley clockwise, and match the timing indicator of the gear case to the timing mark of the crankshaft pulley. SEM342G 2) Make sure that the cam sprocket match mark is in the position shown in the figure. + If the match mark is not in position, turn the crankshaft pulley once more and position it. + When removing at No. 1 cylinder TDC, each sprocket and chain is fitted using the match mark, therefore there is no need to apply any match marks beforehand. FEM005 FEM006 5. Remove the chain tensioner. 1) Loosen upper and lower holding bolts. 2) Holding the chain tensioner in your hand, remove the upper holding bolt and release the spring tension. 3) Remove the lower holding bolt, then remove the chain tensioner. + The chain tensioner does not have a mechanism which prevents the ejection of the plunger. (It does have a mechanism which prevents the plunger from returning.) CAUTION: Be careful not to drop the plunger and spring. EM-1028 TIMING CHAIN Removal (Cont'd) SEM335G ZD 6. Remove the timing chain slack guide. 7. Remove the timing chain with cam sprocket. + Loosen the cam sprocket holding bolt by fixing the hexagonal portion of the intake manifold side camshaft with a spanner, etc. + If the spill tube is not removed, fix the hexagonal portion of the exhaust manifold side camshaft. CAUTION: Do not loosen the holding bolt by using the tension of the chain. 8.
Remove the timing chain tension guide. Installation 1. Install the timing chain tension guide. 2. Install the cam sprocket and the timing chain together. + Install by aligning the sprocket and timing chain match marks. + Tighten the cam sprocket holding bolt by fixing the hexagonal portion of the camshaft.
CAUTION: Do not tighten in the holding bolt using the tension of the chain. 3. Install the timing chain slack guide. CAUTION: When the holding bolt is tightened to the specified torque, there is a gap between the guide and bolt. Do not overtighten. FEM007 4. Install the chain tensioner. 1) With the chain tensioner in the position shown in the figure (with the plunger on the outer side), temporarily tighten the holding bolt. 2) Press the plunger into the tensioner body while pressing on the clips which prevent the plunger from returning. 3) Install the upper side holding bolt while holding the plunger down with your finger and rotating it 180 degrees. 4) Tighten the holding bolt to the specified torque.
FEM008 FEM009 5. Install the chain cover.
1) Before installing chain cover, remove all traces of liquid gasket from mating surface using a scraper. 2) Apply a continuous bead of liquid gasket to chain cover. + Use Genuine Liquid Gasket or equivalent.
a. Coat of liquid gasket should be maintained within 2.0 to 3.0 mm (0.079 to 0.118 in) dia.
range. b. Attach chain cover to gear case within 5 minutes after coating. c.
Wait at least 30 minutes before refilling engine oil or starting engine. EM-1029 TIMING CHAIN Installation (Cont'd) ZD 3) Install the chain cover. + The dimension below the neck of the holding bolt will vary depending on the part. Dimension below the neck: A: 20 mm (0.79 in) B: 50 mm (1.97 in) C: 60 mm (2.36 in) FEM004 6. Install by following all removal procedures in reverse. CAUTION: + Arrange the TDC sensor harness in the position shown in the figure. + Make sure that the harness has no deflection around the vicinity of the crankshaft pulley when installing the clamp. SEM349G EM-1030 CAMSHAFT ZD Removal and Installation SEM350G + This engine will have a different valve arrangement from normal DOHC 4-valve type engines.
As both camshafts on this engine have intake and exhaust cams, in this chapter they are named as follows: Camshaft (Right side): Intake manifold side camshaft Camshaft (Left side): Exhaust manifold side camshaft + The same parts are used for the right and left sides. + Refer to the figure for intake and exhaust valve arrangement. (The camshafts have, alternately, either an intake valve or an exhaust valve.) FEM010 Removal 1. Set the No. 1 cylinder at TDC, then remove the chain case, timing chain and other parts in connection. Refer to "TIMING CHAIN", EM-1027. 2. Remove the cam gear. + Loosen the cam gear installation bolt by fixing the hexagonal portion of the camshaft. + The idler gear cannot be removed at this point as the gear case is in the way. (The cylinder head can be removed as a single unit.) FEM011 EM-1031 CAMSHAFT Removal (Cont'd) FEM012 ZD 3. Remove injection tube and injection nozzle assembly. Refer to EC section, "Injection Tube and Injection Nozzle" in "BASIC SERVICE PROCEDURE". 4. Remove the camshaft. + Place distinguishing marks on the right and left sides with paint. + Loosen and remove the installation bolt in reverse order shown in the figure. 5. Remove the adjusting shim and valve lifter. + Remove by taking notice of the installation position, and place outside engine in order to prevent confusion. Inspection VISUAL CHECK OF CAMSHAFT + Check the camshaft for one sided wear or scratches. + Replace the camshaft if there are abnormalities. CAMSHAFT RUNOUT + Prepare V-block on a flat surface and secure camshaft journals No. 1 and No. 5. + Set the dial gauge vertically on journal No. 3. + Rotate camshaft in one direction by hand, then read needle movement on dial indicator. Camshaft bend value is 1/2 of needle movement. Limit: 0.02 mm (0.0008 in) FEM013 HEIGHT OF CAM NOSE Measure by using a micrometer. Standard: Intake 40.488±0.02 mm (1.5940±0.0008 in) Exhaust 40.850±0.02 mm (1.6083±0.0008 in) FEM014 CAMSHAFT OIL CLEARANCE Measure by using a micrometer. Cam journal outer diameter: Standard 29.931 - 29.955 mm (1.1784 - 1.1793 in) dia. FEM015 EM-1032 CAMSHAFT Inspection (Cont'd) ZD CAMSHAFT BRACKET INNER DIAMETER + Install camshaft bracket and tighten bolts to the specified torque. + Measure inner diameter of camshaft bracket using an inside micrometer. Standard: 30.000 - 30.021 mm (1.1811 - 1.1819 in) dia. CAMSHAFT OIL CLEARANCE CALCULATIONS FEM016 Oil clearance = Cam bracket inner diameter − Cam journal outer diameter Standard: 0.045 - 0.090 mm (0.0018 - 0.0035 in) dia. + If it exceeds the standard value, refer to the standard value of each unit, then replace the camshaft and/or cylinder head. + As the camshaft bracket is manufactured with the cylinder head, it is impossible to replace only the camshaft bracket. CAMSHAFT END PLAY + Set the dial gauge to the front end of the camshaft. Measure the end play by moving the camshaft in the direction of the axle.
Standard: 0.065 - 0.169 mm (0.0026 - 0.0067 in) Limit: 0.2 mm (0.0079 in) + If end play exceeds the limit, replace camshaft and measure camshaft end play again.
+ If end play still exceeds the limit after replacing camshaft, replace cylinder head. FEM017 VISUAL INSPECTION OF VALVE LIFTER Check lifter side for any signs of wear or damage. Replace if there are any abnormalities. VISUAL INSPECTION OF ADJUSTING SHIM Check cam nose contact and sliding surfaces for wear and scratches.
Replace if there are any abnormalities.
VALVE LIFTER CLEARANCE Measure the outer diameter of the valve lifter with a micrometer. Standard: 34.450 - 34.465 mm (1.3563 - 1.3569 in) dia. FEM018 EM-1033 CAMSHAFT Inspection (Cont'd) ZD VALVE LIFTER BORE DIAMETER Measure the bore diameter of the cylinder head valve lifter with an inside micrometer. Standard: 34.495 - 34.515 mm (1.3581 - 1.3589 in) dia. FEM019 VALVE LIFTER CLEARANCE CALCULATIONS Clearance = Valve lifter bore diameter − Valve lifter outer diameter Standard: 0.030 - 0.065 mm (0.0012 - 0.0026 in) If it exceeds the standard value, refer to the outer diameter and bore diameter standard values and replace valve lifter and/or cylinder head. Installation 1. Install the valve lifter and adjusting shim. + Make sure that these are installed in the same position as before the removal process. 2. Install the camshaft. + Follow the distinguishing marks that were placed on in the removal process. + Face the key in the direction shown in the figure. FEM020 3. Install the camshaft bracket. + Refer to the camshaft bracket upper side journal No. and install.
+ Looking from the exhaust manifold side (left side of engine), install in the direction that the journal number can be read correctly. + Place baffle plate onto upper face of No. 1 camshaft bracket, and tighten together. FEM021 4. Tighten the installation bolts in numerical order in the figure.
1) Tighten to 10 to 14 Nzm (1.0 to 1.5 kg-m, 8 to 10 ft-lb). + Make sure that the thrust portion of the camshaft is fitted properly in the head installation side. 2) Tighten to 20 to 23 Nzm (2.0 to 2.4 kg-m, 15 to 17 ft-lb). FEM012 EM-1034 CAMSHAFT Installation (Cont'd) ZD 5. Install the cam gear. + Align the match marks, and install the idler gear and each cam gear to the position shown in the figure. + Tighten the cam gear installation bolt by fixing the hexagonal portion of the camshaft. FEM023 6. Install the timing chain, all other related parts and chain cover. Refer to "TIMING CHAIN", EM-1027. 7. After installing the timing chain, check and adjust the valve clearance before installing the spill tube. Refer to "VALVE CLEARANCE", EM-1036. 8. Install in the reverse order of removal. EM-1035 ZD VALVE CLEARANCE INSPECTIONS AND ADJUSTMENTS Inspection FEM010 + When the camshaft or parts in connection with valves are removed or replaced, and a fault has occurred (poor starting, idling, or other faults) due to the misadjustment of the valve clearance, inspect as follows. + Inspect and adjust when the engine is cool (at normal temperature). + Be careful of the intake and exhaust valve arrangement. (The valve arrangement is different from that in a normal engine.) (The camshafts have, alternately, either an intake valve or an exhaust valve.) 1. Remove the following parts.
+ Intercooler cover + Intercooler + Rocker cover 2. Set the No. 1 cylinder at TDC. 1) Rotate the crankshaft pulley clockwise, and align the TDC mark of the crankshaft pulley with the timing indicator of the TDC sensor bracket. SEM342G 2) Confirm that the cam nose of the No. 1 cylinder and the knock pin of the cam sprocket is in the position shown in the figure. + Rotate the crankshaft pulley again if not in the position shown in the figure. FEM024 3. While referring to the figure, measure the valve clearance in the circled area of the table below. No. 1 No. 2 No. 3 No. 4 Measuring point When the No. 1 cylinder is in the TDC INT EXH INT j j j EXH INT EXH INT EXH j + The injection order is 1-3-4-2. FEM025 + Measure the valve clearance using a JIS high grade feeler gauge when the engine is cool (at normal temperature). Standard: Intake and exhaust 0.35±0.05 mm (0.0138±0.0020 in) 4.
Set the No. 4 cylinder at TDC by rotating the crankshaft clockwise once. FEM026 EM-1036 ZD VALVE CLEARANCE INSPECTIONS AND ADJUSTMENTS Inspection (Cont'd) 5. While referring to the figure, measure the valve clearance in the circled area of the table below. No. 1 No. 2 No. 3 No. 4 Measuring point INT When the No. 4 cylinder is in the TDC EXH INT EXH INT j j EXH INT EXH j j 6. If the valve clearance is outside the specification, adjust as follows.
FEM027 Adjustments FEM028 + Remove the adjusting shim for parts which are outside the specified valve clearance. 1. Remove the spill tube.
2. Extract the engine oil on the upper side of the cylinder head (for the air gun used in step 7). 3. Rotate the crankshaft to face the cam for adjusting shims that are to be removed upward. 4.
Grip the camshaft with camshaft pliers (SST), the using the camshaft as a support point, push the adjusting shim downward to compress the valve spring.
CAUTION: Do not damage the camshaft, cylinder head, or the outer circumference of the valve lifter. 5. With the valve spring in a compressed state, remove the camshaft pliers (SST) by securely setting the outer circumference of the valve lifter with the end of the lifter stopper (SST). + Hold the lifter stopper by hand until the shim is removed.
CAUTION: Do not retrieve the camshaft pliers forcefully, as the camshaft will be damaged. FEM029 6. Move the rounded hole of the adjusting shim to the front with a very thin screwdriver. + When the adjusting shim on the valve lifter will not rotate smoothly, restart from step 4 with the end of the lifter stopper (SST) touching the adjusting shim. 7. Remove the adjusting shim from the valve lifter by blowing air through the rounded hole of the shim with an air gun. CAUTION: To prevent any remaining oil from being blown around, thoroughly wipe the area clean and wear protective goggles. FEM030 EM-1037 ZD VALVE CLEARANCE INSPECTIONS AND ADJUSTMENTS Adjustments (Cont'd) 8. Remove the adjusting shim by using a magnetic hand. FEM031 FEM032 9. Measure the thickness of the adjusting shim using a micrometer. + Measure near the center of the shim (the part that touches the cam).
10. Select the new adjusting shim from the following methods. Calculation method of the adjusting shim thickness: t = t1 + (C1 − C2) t = Adjusting shim thickness t1 = Thickness of the removed shim C1 = Measured valve clearance C2 = Specified valve clearance [when the engine is cool (at normal temperature)] 0.35 mm (0.0138 in) + New adjusting shims have the thickness stamped on the rear side. FEM033 Stamped Shim thickness 2.35 2.40 . . . 3.05 2.35 (0.0925) 2.40 (0.0945) . . . 3.05 (0.1201) mm (in) + The thickness of the adjusting shim ranges from 2.35 to 3.05 mm (0.0925 to 0.1201 in), where in the space of 0.05 mm (0.0020 in). There are 15 types of shims available. 11. Fix the selected adjusting shim to the valve lifter. CAUTION: Place the stamped side of the adjusting shim to the valve lifter. 12. Compress the valve spring using the camshaft pliers and remove the lifter stopper (SST). 13.
Rotate the crankshaft 2 to 3 times by hand. 14. Confirm that the valve clearance is within the specification. EM-1038 ZD TIMING GEAR Removal and Installation 2 idler gears are shown in this chapter. Idler gear (A) has scissors gear, and idler gear (B) does not. SEM314GA EM-1039 TIMING GEAR ZD Removal 1. + + + + + + + + + + + + + + + + + + + 2. 3. SEM376G Remove the following parts.
Undercover Engine oil (Drain) Engine coolant (Drain) Engine cover Intercooler Air inlet pipe Air cleaner case Throttle body Swirl and intake air control valve control solenoid valve and bracket Vacuum tank Glow plate Rocker cover Spill tube Radiator shrouds (Rear and Lower) Cooling fan Radiator hose (Upper and Lower) Auxiliary belt and auto tensioner. Remove the alternator. Remove the A/C compressor and bracket with piping connected. Move and support it at the LH side of engine bay with a rope to avoid putting load on piping. Refer to HA section in Nissan Service Manual (Supplement I: Publication No. SM0E-Y61AE0E.) 4. Remove the chain cover, timing chain and other parts in connection. Before removing timing chain, remove injection pump sprocket with No.1 cylinder being positioned at TDC. Refer to the figure. Refer to "TIMING CHAIN", EM-1027. CAUTION: After removing timing chain, never rotate crankshaft, or the piston will push the valve up and damage the valve. + Do not paint the match mark on the timing chain beforehand as the No. 1 cylinder is set at the TDC during assembly. 5. Remove the TDC sensor.
CAUTION: + Do not drop or hit the sensor.
+ Store in a clean place free of iron filings, etc. + Do not place near any magnetic equipment. 6.
Remove the water pump and its stud bolts. Refer to "WATER PUMP" in LC section. 7. Remove the water inlet. EM-1040 TIMING GEAR Removal (Cont'd) ZD 8. Remove the crankshaft pulley. + To fix the crankshaft, remove the starter motor and set ring gear stopper (SST). CAUTION: + Do not damage or magnetize the signal detection protrusions of the crankshaft pulley. + After removing timing chain, never rotate crankshaft, or the piston will push the valve up and damage the valve. FEM051 9. Remove the gear case. + Using the grooved places shown in the figure, remove the gear case by using a screwdriver and a seal cutter (SST). 10. Remove the front oil seal from the gear case by using a screwdriver.
CAUTION: Do not damage the gear case. FEM052 SEM377G 11. Fix the internal mechanism setting bolt [part No.: 81-2062028, screw dia.: M6, dimension below neck: 20 mm (0.79 in)] to the bolt hole of the idler gear (A) and tighten to the specification. : 2.5 - 3.4 Nzm (0.25 - 0.35 kg-m, 22 - 30 in-lb) CAUTION: + Only use the genuine setting bolt, or the idler gear (A) will be damaged. + Do not rotate the crankshaft as the head of the setting bolts interferes with the gear case. + Do not remove the setting bolt from the idler gear (A) until the timing chain and all of the parts in connection have been installed. + If these bolts are not installed, internal mechanism will disengage after the idler gear is removed. This will prohibit the idler gear from being reusable.
EM-1041 TIMING GEAR Removal (Cont'd) ZD 12. Remove the idler gears (A) and (B). + Check the backlash of each gear before removing. Refer to "BACKLASH OF EACH GEAR", "Inspection". CAUTION: + Do not loosen the internal mechanism setting bolt of the idler gear (A). (The idler gear cannot be reused when the internal mechanism is released.) + During removal of the idler gears (A) and (B), do not face the rear side downward as the idler shaft will drop. SEM348G 13. Set the fuel injection timing gear with the pulley holder (SST). 14. Remove injection pump timing gear. SEM378G 15. Extract the balancer shaft taking care not to damage the inner bushes of the cylinder block. 16. Remove the fuel injection pump. 17. Remove the front plate. SEM352G Inspection BACKLASH OF EACH GEAR Method using a fuse wire + Tighten the holding bolts of each gear to specification.
+ Place a wire in the biting area of the teeth between the gears to be checked, rotate the crankshaft in the operating direction so that the wire is taken inwards. + Measure the crushed area of the wire with a micrometer. FEM035 Method using dial gauge FEM036 + Tighten the holding bolts of each gear to specification. + Place the dial gauge on the tooth surface area of the gear to be checked. + With the other gear in a set position, measure the dial gauge value while moving the gear left and right. Standard: 0.07 - 0.11 mm (0.0028 - 0.0043 in) Limit: 0.20 mm (0.0079 in) + If it exceeds the limit, replace the gear and measure again. + If it exceeds the limit again, check for the installation condition of the gear driving parts, wear of shaft and gear, and oil clearance. EM-1042 ZD TIMING GEAR Inspection (Cont'd) IDLER GEAR END PLAY + Tighten the holding bolts to the specification. + Measure the clearance between the gear plate and idler gear using a feeler gauge. Unit: mm (in) Idler gear (A) Idler gear (B) Standard Limit 0.06 - 0.12 (0.0024 - 0.0047) 0.15 (0.0059) + If it exceeds the limit, replace the idler gear, shaft, and gear plate.
IDLER GEAR OIL CLEARANCE FEM037 + Measure the inner diameter (d1) of the idler gear shaft.
Standard: Idler gear (A) 43.000 - 43.020 mm (1.6929 - 1.6937 in) dia. Idler gear (B) 28.600 - 28.620 mm (1.1260 - 1.1268 in) dia. + Measure the outer diameter (d2) of the idler shaft. Standard: Idler gear (A) 42.959 - 42.975 mm (1.6913 - 1.6919 in) dia. Idler gear (B) 28.567 - 28.580 mm (1.1247 - 1.1252 in) dia. + Calculate the oil clearance. Clearance = d1 − d2 Unit: mm (in) Standard Idler gear (A) 0.025 - 0.061 (0.0010 - 0.0024) Idler gear (B) 0.020 - 0.053 (0.0008 - 0.0021) Limit 0.2 (0.0079) + If it exceeds the limit, refer to each standard specification and replace the idler gear and/or shaft. BALANCER SHAFT END PLAY + Measure the clearance between the plate and gear using a feeler gauge. Standard: 0.07 - 0.22 mm (0.0028 - 0.0087 in) + If it exceeds the specification, replace the balancer shaft assembly. + As the gears are press-fitted, there are no setting for individual parts. FEM038 EM-1043 TIMING GEAR Inspection (Cont'd) ZD BALANCER SHAFT OIL CLEARANCE Outer diameter of balancer shaft journal Measure the outer diameter of the balancer shaft journal with a micrometer. Standard: Front side 50.875 - 50.895 mm (2.0029 - 2.0037 in) dia. Rear side 50.675 - 50.695 mm (1.9951 - 1.9959 in) dia. FEM039 Inner diameter of balancer shaft bearing Measure the inner diameter of the balancer shaft bearing using a bore gauge. Standard: Front side 50.940 - 51.010 mm (2.0055 - 2.0083 in) dia. Rear side 50.740 - 50.810 mm (1.9976 - 2.0004 in) dia. Oil clearance calculations FEM040 Oil clearance = Bearing inner diameter − Journal outer diameter Standard: 0.045 - 0.135 mm (0.0018 - 0.0053 in) Limit: 0.180 mm (0.0071 in) BALANCER SHAFT BEARING REMOVAL AND INSTALLATION SEM993BA 1. Remove balancer shaft front bearing. SEM380G EM-1044 TIMING GEAR Inspection (Cont'd) ZD 2. Using Tool, remove balancer shaft rear bearing from engine. SEM381G 3. Install the rear and front balancer shaft bearings. + Install from the cylinder block hole to the rear journal and then the front journal. + Install the groove of the balancer shaft bearing facing the front and the under right direction. (Align the guide plate and bar knock pin and then force in the balancer shaft bearing.) SEM382G + Align the balancer shaft bearing groove with the knock pin of the bar (SST) and install the balancer shaft bearing.) SEM383G + On rear journals, so the bearing does not get out of position, wrap tape around the bar. EMV0514D EM-1045 TIMING GEAR Inspection (Cont'd) ZD + Make an alignment mark 11.0±0.8 mm (0.433±0.031 in) from the bar No. 2 engraved line with a marker pen. This alignB will be the point to where the rear bearing is ment mark V pushed. SEM385G + Insert the bar with the bearing installed into the cylinder block and install the guide plate (SST). + Align the guide plate with the ZD engraving and install the bolts. CAUTION: Use a washer of the same thickness used on the front plate to prevent the guide plate from bending.
SEM384G B to the same posi+ Push the engraved bar alignment mark V A . tion of the guide plate tip V + After all the journals have been installed, make sure that all the journal and cylinder block oil holes are aligned.
SEM386G 4. Install the front balancer shaft bearing. + Align the journal and cylinder block oil holes.
+ Use a drift (SST) to force in the tip of the journal to 8.0±0.3 mm (0.315±0.012 in) inside the cylinder block. + After installing the journal, make sure that the journal and cylinder block oil holes are aligned. SEM380G EM-1046 TIMING GEAR ZD SEM387G Installation SEM206H 1. Install the front plate. 1) Install the O-ring and gasket to the cylinder block. + Apply liquid gasket uniformly and thinly to the front and reverse sides of gasket. Use Genuine Liquid Gasket or equivalent. 2) Install the front plate. + Before installing, apply liquid gasket to the mating surfaces of the cylinder block and the oil pan (upper).
Use Genuine Liquid Gasket or equivalent. + Lightly tap with a hammer if the dowel pin cannot be inserted easily. CAUTION: Make sure that the O-ring does not pop out. SEM207H 2. Install the fuel injection pump. + After installing the front plate, align the 6 mm (0.24 in) dia. hole of the pump flange and the 6 mm (0.24 in) dia. hole position of the pump body. 3.
Install each timing gear. + Align the match marks of the timing gears by referring to the figure below. 1 ,V 2) shown + When installing timing gear, follow the order (V in the dotted box in the figure below to facilitate installation. FEM042 EM-1047 TIMING GEAR Installation (Cont'd) ZD FEM043 4. Install the front oil seal to the gear case. + Apply engine oil to the fitting side. + Evenly insert the front oil seal using a drift [outer dia.: approx. 64 mm (2.52 in)] completely. CAUTION: Make sure the oil seal does not spill off the end side of the gear case. FEM044 5. Install the gear case. 1) Before installing gear case, remove all traces of liquid gasket from mating surface using a scraper. 2) Align gasket with dowel and install.
SEM353G FEM045 3) Install the O-rings to the gear case. + The O-ring at the top position shown in the figure can be installed in during cylinder head installation. 4) Apply a continuous bead of liquid gasket to gear case and oil pan (upper). + Use Genuine Liquid Gasket or equivalent. a. Coat of liquid gasket should be maintained within the specified range as shown in the figure. b. Attach gear case to cylinder block within 5 minutes after coating. c. Wait at least 30 minutes before refilling engine oil or starting engine. EM-1048 TIMING GEAR Installation (Cont'd) ZD CAUTION: Apply the liquid gasket around the bolt holes shown by the arrows in the figure. SEM208H 5) Install the gear case. + Insert the gear case diagonally to prevent it from dragging over the liquid gasket applied on the timing gear case and the oil pan (upper). + Align the dowel pin at the lower position of cylinder block with the hole on the gear case side. + Tap the area around the dowel pin with a plastic hammer if it cannot be inserted easily. CAUTION: Do not pop out the O-rings. SEM209H 6) Install the holding bolt referring to the figure. Dimension below neck: A: 25 mm (0.98 in) B: 30 mm (1.18 in) C: 50 mm (1.97 in) D: 80 mm (3.15 in) E: 20 mm (0.79 in) 7) Install the holding bolts from the rear side of the front plate. FEM046 6. Install the crankshaft pulley. + Insert by aligning the 2 sides of the oil pump with the 2 sides of the shaft on the rear side of the crankshaft pulley. CAUTION: Do not damage the oil seal lip when inserting. + Refer to EM-1041, "Removal" for the crankshaft setting procedures when tightening the holding nut. 7. Install the water pump. + Install it before installing the TDC sensor. Refer to "Water Pump" in LC section. SEM349G 8. Install the TDC sensor. + Align the bracket knock pin with the hole on the gear case side and tighten the holding bolt. + Confirm that the clearance between the end of the sensor and the signal detection protrusion of the crankshaft pulley is within the specification. Standard: 1±0.8 mm (0.039±0.031 in) + Arrange the TDC sensor harness to the position shown in the figure. CAUTION: Confirm that the harness has no deflection around the crankshaft pulley when installing the clamp. EM-1049 TIMING GEAR Installation (Cont'd) ZD 9. Install the timing chain, other parts in connection with the timing chain, and the chain cover. Refer to EM-1027, "TIMING CHAIN". 10. Remove the internal mechanism setting bolt of the idler gear (A). 11.
Apply liquid gasket to the plug thread. 12. Install in the reverse order of removal. FEM047 EM-1050 OIL SEAL REPLACEMENT ZD VALVE OIL SEAL 1. Remove timing chain. Refer to EM-1027, "TIMING CHAIN". 2. Remove injection nozzle assembly. Refer to "Injection Tube and Injection Nozzle" in "BASIC SERVICE PROCEDURE" in EC section. 3. Remove camshaft. Refer to EM-1031, "CAMSHAFT". SEM354G 4. Remove valve lifters and mark order No. on each lifter.
5.
Replace valve oil seal according to the following procedure.
When replacing valve oil seal, set the corresponding piston at TDC. Failure to do so causes the valve to drop into the cylinder. 1) Set No. 1 cylinder at TDC. SEM355G 2) Remove valve springs and valve oil seals for No. 1 and No. 4 cylinders. Valve spring seats should not be removed. SEM356G 3) Install new valve oil seals for No. 1 and No. 4 cylinders as illustrated. Reinstall valve springs.
(pink paint side toward cylinder head) 4) Install valve spring retainers on intake valves and valve rotators on exhaust valves, and remount valve assembly. 5) Set No. 2 cylinder at TDC. 6) Replace valve oil seals for No. 2 and No. 3 cylinders according to steps 2) and 3). 7) Install valve lifters in original positions. SEM357G CRANKSHAFT OIL SEAL INSTALLING DIRECTION AND MANNER + When installing crankshaft oil seals, be careful to install them correctly, as shown in the figure. + Wipe off excess oil after installing oil seal. SEM715A EM-1051 OIL SEAL REPLACEMENT ZD CRANKSHAFT FRONT OIL SEAL 1. Remove the front cover. Refer to "TIMING GEAR". 2. Remove front oil seal with a suitable tool. SEM358G 3. Apply engine oil to new oil seal and install oil seal using a suitable tool. FEM044 CRANKSHAFT REAR OIL SEAL 1. 2. 3. 4. Remove Remove Remove Remove oil pan assembly. Refer to EM-1022, "OIL PAN". clutch cover assembly. flywheel and rear plate. oil seal retainer assembly. 5. Apply a continuous bead of liquid gasket to rear oil seal retainer. a.
Coat of liquid gasket should be maintained within 2.0 to 3.0 mm (0.079 to 0.118 in) dia. range.
b. Attach oil seal retainer to cylinder block within five minutes after coating. c. Wait at least 30 minutes before refilling engine oil or starting engine. d.
Use Genuine Liquid Gasket or equivalent. SLC822 FEM053 EM-1052 CYLINDER HEAD ZD Removal and Installation SEM359G Removal FEM054 1. Remove the following. (Refer to corresponding chapter for detailed auxiliary work.) + Drain coolant + Rocker cover + Injection tube + Spill tube + High pressure injection nozzle assembly + Timing chain + Camshaft + Catalytic converter + Turbocharger assembly + Exhaust manifold 2. Remove mounting bolts of the gear case and water pump as shown by arrows in the figure. 3.
Remove oil return pipe from the rear side of cylinder head. 4. Remove intake manifold. EM-1053 CYLINDER HEAD Removal (Cont'd) FEM055 SEM379G ZD 5.
Remove cylinder head assembly. + Loosen and remove mounting bolts in the reverse order shown in the figure. + Lift up the cylinder head assembly to avoid interference with dowel pins located between the block and head, and remove cylinder head assembly. CAUTION: + Do not drop the O-ring located between the front of cylinder head and the rear of gear case into the engine. + Remove glow plug in advance to avoid damage as the tip of the glow plug projects from the bottom of the cylinder head, or, place wood blocks beneath both ends of the cylinder head to keep the cylinder bottom from any contact. + For glow plug removal, the following shall be noted. CAUTION: + To avoid breakage, do not remove glow plug unless necessary. + Perform continuity test with glow plug installed. + Keep glow plug from any impact. (Replace if dropped from a height 10 cm (3.94 in) or higher.) + Do not use air impact wrench. 6. Remove idler gear. CAUTION: While removing idler gear, keep the rear of idler gear facing up to prevent idler shaft from falling. Inspection CYLINDER HEAD BOLT DEFORMATION (ELONGATION) + Using micrometer, measure the outer diameters d1 and d2 of bolt thread as shown in the figure. + If the necking point can be identified, set it as measuring point d2. + Calculate the difference between d1 and d2. Limit: 0.15 mm (0.0059 in) FEM056 IDLER GEAR END PLAY + Tighten mounting bolts to the specified torque. + Using feeler gauge, measure the clearance between gear plate and idler gear. Standard: 0.07 - 0.14 mm (0.0028 - 0.0055 in) Limit: 0.2 mm (0.0079 in) + If the measured value exceeds the limit value, replace idler gear, shaft, and gear plate. EM-1054 ZD CYLINDER HEAD Inspection (Cont'd) IDLER GEAR OIL CLEARANCE + Measure the inner diameter (d1) of idler gear shaft hole.
Standard: 26.000 - 26.020 mm (1.0236 - 1.0244 in) + Measure the outer diameter (d2) of idler shaft. Standard: 25.967 - 25.980 mm (1.0223 - 1.0228 in) + Calculate gear clearance.
Clearance = d1 − d2 Standard: 0.023 - 0.053 mm (0.0009 - 0.0021 in) FEM057 Installation 1. Install cylinder head gasket. + Cylinder head gasket to be installed is selected by its thickness through the following procedure. When replacing gasket only + Install gasket with same thickness as the one removed. + Gasket thickness is identified by the number of notches located on rear-left side. FEM058 Grade Gasket thickness* mm (in) No. of notches 1 0.65 (0.0256) 1 2 0.70 (0.0276) 2 *: Thickness of gasket tightened with head bolts + The number of notches can be checked at the position shown in the figure before cylinder head is removed. (It is necessary to remove exhaust manifold.) When

repairing/replacing the following FEM059 + When the top of cylinder block or crankshaft pin/journal is ground, or + When cylinder block, piston, connecting rod, or crankshaft is replaced 1) Move piston toward TDC. 2) Position dial indicator on cylinder block as shown in the figure, and adjust the needle to “0”. 3) Move dial indicator stand aside, and position the dial indicator to the measuring point as shown in the figure. 4) Rotate crankshaft slowly, and read the value on dial indicator at piston’s maximum height. 5) Repeat above procedure at 2 positions of each cylinder (8 positions in total for 4 cylinders), and select the appropriate gasket by comparing the maximum crown depression with the table.

FEM060 EM-1055 ZD CYLINDER HEAD Installation (Cont’d) Grade Piston crown depression Gasket thickness*1 No. of notches 1 Less than −0.078 (−0.0031)*2 0.65 (0.0256) 1 2 More than −0.078 (−0.0031)*3 0.70 (0.0276) 2 *1: Thickness of gasket tightened with head bolts *2: Indicates values such as −0.080 mm (−0.0031 in). *3: Indicates values such as −0.075 mm (−0.0030 in).

2. Install idler gear and idler shaft.

+ Check that the counter marks with cam gear, “AA” and “BB”, are located on the front side of the engine. Refer to EM- 1053. CAUTION: Since idler gear cannot be installed or removed with cylinder head assembly mounted on the engine because of interference with gear case, make sure that there are no reverse installations or uninstalled parts. 3. 1) 2) 3) Install cylinder head assembly. Attach gasket onto the rear of gear case. Install O-ring to the rear of gear case. Align cylinder head assembly with dowel pin of cylinder block and install. CAUTION: + Make sure the O-ring does not fall off. Be careful not to drop the O-ring. + Do not damage gasket located at the front. FEM061 4. Position cylinder head assembly close to the rear of the gear case. 1) Install cylinder head bolts to the front and rear of cylinder head respectively, and tighten to the specified torque. : 40 - 49 Nzm (4.0 - 5.0 kg-m, 29 - 36 ft-lb) 2) Loosen cylinder head bolts completely. 3) Install gear case mounting bolts to 2 positions shown by arrows in the figure, and tighten to the specified torque. : Less than 9.8 Nzm (1.0 kg-m, 7 in-lb) FEM062 FEM055 5. Tighten cylinder head bolts in the order indicated in the figure. 1) Apply engine oil to installation bolt threads and washers. 2) Tighten bolts to 98 to 102 Nzm (10.0 to 10.5 kg-m, 73 to 75 ft-lb). 3) Loosen bolts completely until the torque becomes 0 Nzm (0 kg-m, 0 in-lb). CAUTION: For procedure 3), loosen bolts in the reverse order as indicated in the figure. 4) Tighten bolts to 40 to 44 Nzm (4.0 to 4.5 kg-m, 29 to 32 ftlb). EM-1056 CYLINDER HEAD Installation (Cont’d) ZD 5)Tighten bolts at the angle of 90 to 95° (target is 95°). (Angle tightening) 6) Once again, tighten bolts at the angle of 90 to 95° (target is 95°). (Angle tightening) CAUTION: Perform the following procedure to check turning angle of angle tightening, and do not judge by visual check. ANGLE TIGHTENING PROCEDURE With protractor + Make counter marks on the bolt head of cylinder head and cylinder head surface with paint, and check the turning angle. With angle wrench (SST) + Check the turning angle using angle indicator of angle wrench. 6. Loosen gear case mounting bolts which were tightened in 3) of procedure 4, retighten them to the specified torque. FEM063 7. Install glow plug. + 2 different types (manufacturers) of glow plugs are provided in parallel. (Refer to the figure for identification.) + Do not install 2 different types of glow plugs in the engine. Make sure that the same glow plugs are installed. + Using reamer, remove the carbon adhering to the installation hole of glow plug, and install glow plug. FEM064 EM-1057 CYLINDER HEAD Installation (Cont’d) ZD 8. Install oil return pipe to the rear side of the cylinder head. + When reinstalling a stud bolt, apply Three Bond 1207C (KP510 00150) to the thread of the bolt. FEM081 Disassembly 1. Remove adjusting shims and valve lifters. Check the installation positions, and keep them to avoid being confused. 2. Using valve spring compressor (SST), compress valve spring. Using magnetic hand, remove valve collets.

3. Remove valve spring retainers and valve springs. 4. Remove valves as pressing valve stems toward combustion chamber. SEM361G + Before removing the valve, check the valve guide clearance. (Refer to next page.) + Check installation positions, and keep them to avoid being confused. + Refer to the figure for intake/exhaust valve positions. (Intake and exhaust valve driving cams are provided alternately for each camshaft.) FEM010 EM-1058 ZD CYLINDER HEAD Disassembly (Cont’d) 5. Remove valve oil seals using valve oil seal puller (SST). 6. Remove valve spring seats. 7. Before removing valve spring seats, perform valve seat contact check. (Refer to EM-1061.) 8. Before removing valve guides, perform valve guide clearance check. (Refer to below.) FEM065 Inspection CYLINDER HEAD DISTORTION Using straightedge and feeler gauge, check the bottom of the cylinder head for distortion. Limit: 0.2 mm (0.008 in) FEM066 VALVE DIMENSION Using micrometer, measure the dimensions of each part. Standard Unit: mm (in) Intake valve Exhaust valve L 113.5 (4.4685) 113.5 (4.4685) T 1.5 (0.0591) 1.5 (0.0591) φd 6.962 - 6.977 (0.2741 - 0.2747) 6.945 - 6.960 (0.2734 - 0.2740) φD 31.9 - 32.1 (1.2559 - 1.2638) 29.9 - 30.1 (1.1772 - 1.1850) 45°00′ - 45°30′ 45°00′ - 45°30′ FEM067 α (degree) VALVE GUIDE CLEARANCE + Perform the inspection before removing valve guides. + Check that the valve stem diameter is within specifications. + Push valve approximately 25 mm (0.98 in) toward combustion chamber, move valve toward dial indicator to measure valve movement. + Valve guide clearance is 1/2 of movement on dial indicator. FEM068 EM-1059 ZD CYLINDER HEAD Inspection (Cont’d) Unit: mm (in) Standard Limit Intake 0.023 - 0.053 (0.0009 - 0.0021) 0.18 (0.0071) Exhaust 0.040 - 0.070 (0.0016 - 0.0028) 0.10 (0.0039) + If the measured value exceeds the limit, replace valve guide. VALVE GUIDE REPLACEMENT + There is no setup for oversized valve guide. 1. Heat cylinder head to 110 to 130°C (230 to 266°F) in oil bath. FEM069 2. Using valve guide drift (multi-purpose tool: for 7.0 mm dia.), tap valve guides out from the combustion chamber side. FEM070 3. Heat cylinder head to 110 to 130°C (230 to 266°F) in oil bath. 4.

Using valve guide drift (multi-purpose tool: for 7.0 mm dia.), press fit valve guides from camshaft side, referring to the dimension shown in the figure. FEM071 5. Using valve guide reamer (multi-purpose tool), perform reaming to the press-fitted valve guides. Reaming specifications: Intake/Exhaust 7.000 - 7.015 mm (0.2756 - 0.2762 in) FEM072 EM-1060 CYLINDER HEAD Inspection (Cont’d) ZD VALVE SEAT CONTACT Check valve for any evidence of pitting at valve contact surface, and reseat or replace if worn out excessively.

+ When repairing valve seats, check valve and valve guide for wear beforehand. If worn, replace them. Then correct valve seat. + The cutting should be done with both hands for uniform cutting. FEM073 VALVE SEAT REPLACEMENT + When removing valve seat, replace it with oversized [0.5 mm (0.0020 in)] valve seat. 1. Cut valve seat to make it thin, and pull it out.

FEM074 2. Machine cylinder head inner diameter at valve seat installation position. Machining dimension: Intake 33.500 - 33.515 mm (1.3189 - 1.3195 in) dia. Exhaust 31.995 - 32.010 mm (1.2596 - 1.2602 in) dia. 3. Heat cylinder head to approximately 110 to 130°C (230 to 266°F) in oil bath. 4. After cooling valve seats sufficiently with dry ice, press fit it to cylinder head. CAUTION: Do not touch the cooled valve seats directly by hand. 5. Using valve seat cutter (multi-purpose tool), finish processing referring to the dimensions shown in the figure. CAUTION: When using valve seat cutter, grasp cutter handle with both hands, press cutter onto contacting face all around, and cut thoroughly. If cutter is pressed unevenly or repeatedly, the valve seat surface may be damaged. 6. Using compound, perform valve fitting. 7. Check again to make sure that contacting status is satisfactory. FEM075 EM-1061 CYLINDER HEAD Inspection (Cont’d) ZD For details, Refer to EM-1088, “Valve Seat” in “SERVICE DATA AND SPECIFICATIONS (SDS)”. FEM076 VALVE SPRING RIGHT ANGLE Position a straightedge to valve spring, turn the spring, and measure the maximum clearance value between top surface of spring and the straightedge Limit: 2.4 mm (0.0945 in) FEM077 VALVE SPRING FREE LENGTH AND COMPRESSIVE LOAD Using valve spring tester, check the following. Free length: 55.43 mm (2.1823 in) Installation height: 40.8 mm (1.6063 in) Installation load: 180 - 206 N (18.4 - 21.0 kg, 40.6 46.3 lb) Height at valve open: 32.3 mm (1.2717 in) Load at valve open: 336 - 372 N (34.3 - 37.9 kg, 75.6 83.6 lb) FEM078 Assembly 1. Install valve guides, referring to EM-1061, “VALVE SEAT REPLACEMENT”.

2. Install valve seats, referring to EM-1061, “VALVE SEAT CONTACT”. 3. Using valve oil seal drift (SST), install valve oil seals referring to the dimension shown in the figure. + The figure shows the dimension before valve spring seats are installed. 4. Install valve spring seats. 5. Install valves. + Install the valves with bigger openings to intake valve side. + Note that valve layout here is different from that of conventional the engine. FEM079 EM-1062 CYLINDER HEAD Assembly (Cont’d) FEM080 ZD 6. Install valve spring. + When installing valve spring, make sure that a smaller pitch side (identification paint-applied side) faces the cylinder head. Identification color: pink 7. Install valve spring retainers. 8. Using valve spring compressor (SST), compress valve springs. Using magnetic hand, install valve collets. + After installing valve collets, tap the stem end using a plastic hammer, and check the installation status. 9. Install valve lifters and adjusting shims to the same positions as before. EM-1063 ZD ENGINE REMOVAL Precautions + Do not perform operation unless it is perfectly safe. + Do not start operation unless the exhaust system and coolant are cooled down. + Lift the engine at the designated support points only. + Perform operations for the items other than the engine body, referring to the applicable sections. SEM362G + Refer to MT section and AT section for rear mount. Removal + After removing transmission, hoist the engine and remove it. Preparation 1. 2. + + + + + + + + + + Drain coolant from radiator drain plugs. Remove the following parts. Engine hood Undercover Under protector Battery Intercooler cover Intercooler Radiator shroud Radiator Accessory belt Cooling fan Exhaust front tube Engine room (Left) 3. Remove air duct and air cleaner case. 4. Disconnect vacuum hose to the vehicle on the engine. EM-1064 ENGINE REMOVAL Removal (Cont’d) ZD 5. Disconnect harness connectors from alternator and air compressor. 6. Remove alternator. 7. After removing refrigerant, remove pipes of air compressor and inlet/outlet. 8. Disconnect heating hose, install blank cap to hose to prevent coolant from leaking.

9. Remove heating pipe. 10. Remove heat insulator. 11. Remove catalytic converter. Engine room (Right) 12. Remove power steering reservoir tank from bracket, and fix it to the vehicle with a rope. CAUTION: Keep the reservoir tank level when fixing to prevent oil leak. 13. Remove fuel feed and return hoses.

CAUTION: Install blank caps immediately to avoid fuel leakage. 14.

Remove all harness connectors on the engine, and move harnesses to the side of the vehicle. Vehicle underfloor 15. Remove starter motor. 16. Detach A/T oil cooler pipes from oil pan. (A/T model) 17. Remove rear propeller shaft. 18. Remove mounting bolts to secure the engine to transmission. 1) Remove torque converter installation bolt. (A/T model) 2) Lift transmission bottom with transmission jack, and remove rear mount members from the vehicle. 3) Lower transmission with the jack, and remove upper mounting bolts securing the engine to transmission. 4) Lift transmission with the jack, and reinstall rear mount members to the vehicle. 5) Position the jack to the front side of transmission. 6) Remove remaining mounting bolts securing the engine to transmission. Removal operation 19. Remove air conditioner high pressure pipes at the rear of the engine room. + This is due to some inconvenience in the rear slinger installation. 20. Install the engine slingers (standard service part) to front-left and rear-right. : 25 - 28 Nzm (2.5 - 2.9 kg-m, 18 - 20 ft-lb) FEM082 WARNING: For engines without engine slingers, attach proper slingers and bolts described in the PARTS CATALOG. EM-1065 ENGINE REMOVAL Removal (Cont’d) ZD 21. Hook hoists to slingers to secure the position. 22. Remove installation nuts for left and right engine mount insulators. 23. While adjusting position frequently, hoist and remove the engine. CAUTION: + While performing operation, check that all necessary wires and pipes are disconnected. + Avoid interference with parts on the vehicle. SEM363G Installation Install the engine in the reverse order of the removal procedure. + Keep each mount insulator from oil adherence and damage. + As for identification and installation direction of left and right insulators, refer to stamping on the top surface. Refer to EM-1064.

+ As for a location with positioning pin, insert the pin correctly to the hole of mating part. + While keeping each mount insulator free from twisting, tighten mounting bolts and nuts for the engine mount. Inspection + Before starting the engine, check coolant level and grease amount, and if necessary, refill them to the specified level. + Start the engine, and check that there is no abnormal noise or vibration. + Warm up the engine to the sufficient temperature, and check that there is no leakage of coolant, greases, fuel, or exhaust gas. EM-1066 CYLINDER BLOCK ZD SEM360G EM-1067 ZD CYLINDER BLOCK Selection Procedure for Selective Part Combination Location Selective part combination Item Method Cylinder block - piston Piston and piston assembly (Part No. is given to a piston and piston pin as a set.) Piston grade (Piston outer diameter) Refer to “Selective combination chart”.

+ Identification grade stamped on each part represents initial dimension of new part. This grade will not be applied to a reused part.

+ Measure correct dimensions of a reused or modified part, then refer to “Selective combination chart” in this manual to identify the grade. + Refer to the applicable pages for measurement method for each part, standards for reuse, and selecting method for selective part combination. Disassembly 1. Remove engine assembly from vehicle. Refer to EM-1064, “ENGINE REMOVAL”. 2. Remove pilot bushing from flywheel using pilot bearing puller (SST), if necessary (M/T model). 3. Install engine to engine stand (SST).

SEM364G 1) Remove flywheel (M/T model) or drive plate (A/T model).

+ Using ring gear stopper (SST), secure ring gear, and remove mounting bolts. CAUTION: Do not disassemble flywheel.

+ Flywheel has a two-piece structure. When being pressed forward/backward, or twisted in rotating direction, transmission-side mass will be moved with audible sound. This is not a problem. 2) Remove pilot converter (A/T model) and rear plate. SEM365G EM-1068 CYLINDER BLOCK Disassembly (Cont’d) ZD 3) Install engine sub-attachment (SST) to the rear side of cylinder block. + Align knock pin on cylinder block with pin hole on attachment to install engine sub-attachment.

+ Mounting bolts are provided with engine sub-attachment.

4) Install engine attachment (SST). + Use commercially available M12 mounting bolts and nuts (4 sets) with strength grade of 9T (minimum). FEM083 FEM084 5) Hoist engine and install it to the engine stand (SST). + Engine attachment and engine sub-attachment can be installed to engine stand before engine installation. 4. Drain engine oil and coolant from engine. 5. Remove the following parts and related parts.

(Only major parts are listed.) + Accessory belt + Catalytic converter + Turbocharger + Exhaust manifold + Injection tube + Intake manifold + Rocker cover + Oil pan (upper/lower) + Water pump + Thermostat and water pipes + Vacuum pump + Injection tube + Timing chain + Electronic high pressure fuel injection pump + Timing gear + High pressure injection nozzle assembly + Camshaft + Cylinder head + Oil cooler + Accessory and accessory brackets 6. Remove rear oil seal and retainer assembly. + Insert flat-bladed screwdriver between lower cylinder block and rear oil seal retainer to remove the assembly. + No part No. is given to oil seal. EM-1069 CYLINDER BLOCK Disassembly (Cont’d) ZD 7. Remove piston and connecting rod assembly. + Before removing piston and connecting rod assembly, check connecting rod side clearance. Refer to EM-1072,“CONNECTING ROD SIDE CLEARANCE”. 1) Move crankshaft pin to be removed to approximately BDC. 2) Remove connecting rod caps. 3) Using the grip of a hammer, press the piston and connecting rod assembly out to cylinder head side. FEM085 CAUTION: When removing the piston and connecting rod assembly, prevent the big end of the connecting rod from interfering with the oil jet. 8. Remove connecting rod bearings from connecting rods and caps. + Keep them by cylinder to avoid confusion. FEM086 9. Remove piston rings from pistons using piston ring expander (multi-purpose tool). CAUTION: + When removing, prevent pistons from being damaged. + Do not expand piston rings excessively.

This may damage the piston rings. FEM087 10. Remove pistons from connecting rods. 1) Using long nose pliers, remove snap rings. FEM088 2) Using industrial dryer, heat pistons up to 60 to 70°C (140 to 158°F). FEM089 EM-1070 CYLINDER BLOCK Disassembly (Cont’d) ZD 3) Using rod with outer diameter of 30 mm (1.18 in), press piston pins out.

FEM090 11.

Remove lower cylinder block. + The lower cylinder block is the lower part of the cylinder block, which works as the main bearing cap (beam) and oil pan mounting face. 1) Remove mounting bolts for engine sub-attachment shown by arrows in the figure. FEM091 2) Loosen and remove mounting bolts in the reverse order shown in the figure. FEM092 3) Insert flat-bladed screwdriver into 5 locations shown by arrows in the figure. Lift lower cylinder block evenly, and remove liquid gasket. CAUTION: Prevent mating faces from being damaged. 4) When removing lower cylinder block, use slot to prevent dowel pin from interfering with engine sub-attachment. + No part No. is given to lower cylinder block, because it is machined with the cylinder block. FEM093 12. Remove crankshaft.

13.

Remove main bearings and thrust bearings from cylinder block and lower cylinder block. CAUTION: Check mounting positions.

Keep them to avoid confusion. EM-1071 ZD CYLINDER BLOCK Inspection CRANKSHAFT END PLAY + Using dial indicator, measure crankshaft travel amount by moving the crankshaft forward or backward, or + Using feeler gauge, measure crankshaft travel amount with the lower cylinder block removed. Standard: 0.055 - 0.140 mm (0.0022 - 0.0055 in) Limit: 0.250 mm (0.0098 in) FEM094 + If measured value exceeds the limit, select appropriate thrust bearings. Unit: mm (in) FEM095 Grade symbol Thickness of thrust bearing A 2.275 - 2.325 (0.0896 - 0.0915) B 2.300 - 2.350 (0.0906 - 0.0925) C 2.325 - 2.375 (0.0915 - 0.0935) OS 020 2.475 - 2.525 (0.0974 - 0.0994) + OS 020 has part No. of 12280 2W215 and OS 0.20 marked on bearing surface. CONNECTING ROD SIDE CLEARANCE + Using feeler gauge, measure side clearance between connecting rod and crank arm. Standard: 0.10 - 0.22 (0.0039 - 0.0087 in) Limit: 0.22 mm (0.0087 in) + If measured value exceeds the limit, replace connecting rod and repeat measurement. If measured value still exceeds the limit, replace crankshaft. FEM096 PISTON TO PISTON PIN CLEARANCE Piston pin hole inner diameter Using inside micrometer, measure piston pin hole inner diameter. Standard: 32.997 - 33.005 mm (1.2991 - 1.2994 in) dia. FEM097 Piston pin outer diameter Using micrometer, measure piston pin outer diameter. Standard: 32.993 - 33.000 mm (1.2989 - 1.2992 in) dia. FEM098 EM-1072 ZD CYLINDER BLOCK Inspection (Cont’d) Calculation of piston to piston pin clearance Piston pin clearance = Piston pin hole inner diameter − Piston pin outer diameter Standard: −0.003 (Tightening clearance) to 0.012 mm (−0.0001 to 0.0005 in) If out of specifications, replace piston and piston pin assembly. PISTON RING SIDE CLEARANCE + Using feeler gauge, measure clearance between piston ring and piston ring groove. Unit: mm (in) Standard Limit Top ring 0.05 - 0.07 (0.0020 - 0.0028) 0.5 (0.020) Second ring 0.04 - 0.08 (0.0016 - 0.0031) 0.3 (0.012) Oil ring 0.02 - 0.06 (0.0008 - 0.0024) 0.15 (0.0059) FEM099 + Align top ring and external surface of piston. Measure lower side clearance of top ring with top ring pressed onto upper side of ring groove. + If side clearance exceeds the limit, replace piston ring. + Check clearance again. If side clearance still exceeds the limit, replace piston. FEM100 PISTON RING END GAP + Check that cylinder bore diameter is within specifications. Refer to EM-1075, “PISTON TO CYLINDER BORE CLEARANCE”. + Using piston, press piston ring to cylinder mid point, and measure end gap. Unit: mm (in) Standard Top ring FEM101 Second ring 0.5 - 0.65 (0.0197 - 0.0256) Oil ring 0.25 - 0.45 (0.0098 - 0.0177) EM-1073 Limit 0.3 - 0.45 (0.0118 - 0.0177) 1.5 (0.059) CYLINDER BLOCK Inspection (Cont’d) ZD CONNECTING ROD BEND AND TORSION Use connecting rod aligner to check bend and torsion. Bend limit: 0.05 mm (0.0020 in)/100 mm (3.94 in) Torsion limit: 0.05 mm (0.0020 in)/100 mm (3.94 in) FEM102 Connecting rod big end inner diameter Install connecting rod caps without connecting rod bearings and tighten connecting rod nuts to the specified torque. Using inside micrometer, measure connecting rod big end inner diameter. Standard: 59.987 - 60.000 mm (2.3617 - 2.3622 in) dia. FEM103 CONNECTING ROD BUSHING OIL CLEARANCE (SMALL END) Connecting rod small end inner diameter Use inside micrometer to measure small end inner diameter. Standard: 33.025 - 33.038 mm (1.3002 - 1.3007 in) dia. FEM104 Piston pin outer diameter Use micrometer to measure piston pin outer diameter. Standard: 32.993 - 33.000 mm (1.2989 - 1.2992 in) dia. FEM098 Calculation of connecting rod bushing clearance Connecting rod small end bushing clearance = Connecting rod small end inner diameter − Piston pin outer diameter Standard: 0.025 - 0.045 mm (0.0010 - 0.0018 in) + If out of specifications, replace connecting rod and/or piston and piston pin assembly. EM-1074 ZD CYLINDER BLOCK Inspection (Cont’d) + New connecting rods are classified into 8 weight classes at factory.

The same class connecting rods are used on a engine. FEM106 Weight grade symbol Weight class g (oz) H 1,261 - 1,264 (44.5 - 44.6) I 1,264 - 1,267 (44.6 - 44.7) K 1,267 - 1,270 (44.7 - 44.8) L 1,270 - 1,273 (44.8 - 44.9) M 1,273 - 1,276 (44.9 - 45.0) O 1,276 - 1,279 (45.0 - 45.1) P 1,279 - 1,282 (45.1 - 45.2) S 1,282 - 1,285 (45.2 - 45.3) CYLINDER BLOCK TOP SURFACE DISTORTION + Using scraper, remove gasket installed onto cylinder block surface. Remove contamination such as oil, scale, and carbon. CAUTION: Keep broken pieces of gasket clear of oil and coolant passages. + Use straightedge and feeler gauge to check block upper surface for distortion. Limit: 0.1 mm (0.004 in) FEM107 MAIN BEARING HOUSING INNER DIAMETER + Install main bearing caps without main bearings. Tighten mounting bolts to the specified torque. + Use bore gauge to measure main bearing housing inner diameter. Standard: 74.981 - 75.000 mm (2.9520 - 2.9528 in) dia. + If out of specification, replace cylinder block and lower cylinder block. FEM108 PISTON TO CYLINDER BORE CLEARANCE Cylinder bore inner diameter FEM109 + Using bore gauge, measure cylinder inner diameters at 6 positions; top, middle, and bottom (A, B, C) in 2 directions (X, Y). Cylinder inner diameter (Standard): 96.000 - 96.030 mm (3.7795 - 3.7807 in) dia. Wear limit: 0.2 mm (0.008 in) Out-of-round limit (X - Y): 0.02 mm (0.0008 in) Taper limit (A - C): 0.02 mm (0.0008 in) EM-1075 CYLINDER BLOCK Inspection (Cont’d) ZD + If clearance exceeds the limit, or any flaws or seizures are found on inner surface of cylinder, horn or bore the applicable cylinder. FEM110 Piston outer diameter Use micrometer to measure piston skirt outer diameter. Measurement position: 10 mm (0.39 in) upper from the lower end of piston Standard: 95.950 - 95.980 mm (3.7776 - 3.7787 in) dia. FEM111 Calculation of piston to piston bore clearance + Calculate using piston skirt outer diameter and cylinder inner diameter (direction X, position B).

Clearance = Cylinder inner diameter − Piston skirt outer diameter Specifications at room temperature [20°C (68°F)]: 0.040 - 0.060 mm (0.0016 - 0.0024 in) + If out of specification, replace piston and piston pin assembly. SELECTIVE PISTON COMBINATION When using new cylinder block + Confirm cylinder bore grade (1, 2, 3) on left upper surface of cylinder block, and refer to “Selective combination chart” below to select appropriate piston. + Part No. is given to a piston and piston pin as a set. FEM112 When re-using an old cylinder block 1. Measure cylinder block bore inner diameter. 2. Referring to “Cylinder block bore inner diameter” in “Selective combination chart”, select appropriate piston according to cylinder bore grade. FEM113 EM-1076 ZD CYLINDER BLOCK Inspection (Cont’d) Selective combination chart Unit: mm (in) Piston grade j: Preferable combination n: Allowable combination X: NG combination Cylinder bore grade (Cylinder block bore inner diameter) 1 2 95.950 - 95.960 (3.7776 - 3.7779) 95.960 - 95.970 (3.7779 - 3.7783) 1 96.000 - 96.010 (3.7795 - 3.7799) j X 2 96.010 - 96.020 (3.7799 - 3.7803) n j 3 96.020 - 96.030 (3.7803 - 3.7807) n j + Piston grade 3 (95.980/95.970) is applicable at factory only. + New pistons are classified into 4 weight classes at factory. The same class pistons are used on a engine. Weight grade symbol Weight class g (oz) E 600 - 605 (21.2 - 21.3) F 605 - 610 (21.3 - 21.5) G 610 - 615 (21.5 - 21.7) H 615 - 620 (21.7 - 21.9) CRANKSHAFT JOURNAL OUTER DIAMETER Use micrometer to measure journal outer diameter. Standard: 70.907 - 70.920 mm (2.7916 - 2.7921 in) dia. CRANKSHAFT PIN OUTER DIAMETER Use micrometer to measure pin outer diameter. Standard: 56.913 - 56.926 mm (2.2407 - 2.2412 in) dia. FEM114 CRANKSHAFT OUT-OF-ROUND AND TAPER + Using micrometer, measure each journal and pin at 4 points shown in the figure. + Out-of-round value is indicated by difference in dimensions between directions A and B at points 1 and 2. + Taper value is indicated by difference in dimensions between points 1 and 2 in directions A and B. Out-of-round limit: 0.01 mm (0.0004 in) Taper limit: 0.01 mm (0.0004 in) FEM115 CRANKSHAFT RUNOUT + Place V-block onto surface plate to support journals at both ends of crankshaft. + Position dial indicator vertically onto No. 3 journal. + Rotate crankshaft to read needle movement on dial indicator. + Crankshaft bend value is 1/2 of needle movement. Limit: 0.03 mm (0.0012 in) FEM116 EM-1077 CYLINDER BLOCK Inspection (Cont’d) ZD CONNECTING ROD BEARING OIL CLEARANCE Method by measurement FEM103 + Install connecting rod bearings to connecting rods and caps, and tighten connecting nuts to the specified torque. Use inside micrometer to measure connecting rod bearing inner diameter. Bearing clearance = Connecting rod bearing inner diameter − Crankshaft pin outer diameter Standard: 0.035 - 0.077 mm (0.0014 - 0.0030 in) + If out of specifications, check connecting rod big end inner diameter and crankshaft pin outer diameter, and select appropriate connecting rod bearing to adjust clearance to specifications. Refer to “Connecting rod bearing undersize list” on the next page. Method using plastigage FEM118 + Remove contamination such as oil, dust completely from crankshaft pins and each bearing surface. + Cut plastigage slightly shorter than bearing width, place it in crankshaft direction, avoiding oil holes. + Install connecting rod bearings to caps, and tighten connecting rod nuts to the specified torque.

CAUTION: Never rotate crankshaft. + Remove connecting rod caps and bearings, and measure plastigage width using scale on plastigage bag. CAUTION: If out of specification, take same action mentioned in “Method by measurement”. Undersize bearing usage + If bearing clearance is out of specifications for connecting rod bearings in standard size, use undersize bearings. + When using undersize bearings, measure bearing inner diameter with bearing installed, and grind pins to adjust clearance to specification. EM-1078 ZD CYLINDER BLOCK Inspection (Cont’d) Connecting rod bearing undersize list Unit: mm (in) FEM119 Size Thickness US 025 1.630 - 1.638 (0.0642 - 0.0645) US 050 1.755 - 1.763 (0.0691 - 0.0694) US 075 1.880 - 1.888 (0.0740 - 0.0743) US 100 2.005 - 2.013 (0.0789 - 0.0793) CAUTION: When grinding crank pins to use undersize bearings, avoid damaging corners of fillet. Corner dimension (Standard): Pin 3.3 - 3.7 mm (0.130 - 0.146 in) Journal 2.8 - 3.2 mm (0.110 - 0.126 in) MAIN BEARING OIL CLEARANCE Method by measurement + Install main bearings to cylinder block and bearing caps, and tighten bearing cap bolts to the specified torque. Measure main bearing inner diameter. Bearing clearance = Bearing inner diameter − Crankshaft journal outer diameter Standard: 0.035 - 0.083 mm (0.0014 - 0.0033 in) + If out of specification, check main bearing housing inner diameter and crankshaft journal outer diameter, and select appropriate main bearing to adjust clearance to specifications. Refer to “Main bearing undersize list” on the next page. Method using plastigage FEM120 + Remove contamination such as oil, dust completely from crankshaft journals and each bearing surface.

+ Cut plastigage slightly shorter than bearing width, place it in crankshaft direction, avoiding oil holes. + Install main bearings to caps, and tighten connecting rod nuts to the specified torque. CAUTION: Never rotate crankshaft. + Remove bearing caps and bearings, and measure plastigage width using scale on plastigage bag. EM-1079 ZD CYLINDER BLOCK Inspection (Cont’d) CAUTION: If out of specification, take same action mentioned in “Method by measurement”. Undersize bearing usage + If bearing clearance is out of specifications for main bearings in standard size, use undersize bearings. + When using undersize bearings, measure bearing inner diameter with bearing installed, and grind crank journals to adjust clearance to specification. Main bearing undersize list Unit: mm (in) FEM119 Size Thickness US 025 2.130 - 2.138 (0.0839 - 0.0842) US 050 2.255 - 2.263 (0.0888 - 0.0891) US 075 2.380 - 2.388 (0.0937 - 0.0940) US 100 2.505 - 2.513 (0.0986 - 0.0989) CAUTION: When grinding crank journals to use undersize bearings, avoid damaging corners of fillet. Corner dimension (Standard): Pin 3.3 - 3.7 mm (0.130 - 0.146 in) Journal 2.8 - 3.2 mm (0.110 - 0.126 in) MAIN BEARING CRUSH HEIGHT + Tighten bearing caps to the specified torque with main bearings installed, and remove caps. The bearing end must then be higher than the flat surface. Standard: Crush height must exist. + If out of specification, replace main bearings.

FEM122 EM-1080 ZD CYLINDER BLOCK Assembly 1. Blow air sufficiently to inside coolant passage, oil passage, crankcase, and cylinder bore to remove foreign matter. 2. Install main bearings and thrust bearings. 1) Remove contamination, dust and oil from bearing mounting positions on cylinder block and main bearing caps. 2) Install thrust bearings on both sides of No. 4 housing on cylinder block. + Install thrust bearings with oil groove facing to crankshaft arm (outside). FEM126 3) Being careful with the direction, install main bearings. + Install main bearings with the oil holes and grooves onto the cylinder block side, and those without oil holes and grooves onto the lower cylinder block side. + While installing bearings, apply engine oil to bearing surfaces (inside). Do not apply oil to rear surfaces, but clean them completely. + Align stopper notches on bearings to install them. + Check that the oil holes on the cylinder block body are mated with the oil hole positions on the bearings. FEM127 3. + 4. + Install crankshaft to cylinder block. While rotating crankshaft by hand, check for smooth rotation. Install lower cylinder block. Apply a continuous bead of liquid gasket to lower cylinder block as shown in the figure.

+ Using slots on engine sub-attachment, install the lower cylinder block to the cylinder block, avoiding interference of dowel pins. FEM128 5. Tighten lower cylinder mounting bolts to the torque shown below in 3 consecutive steps in the order shown in the figure. Unit: Nzm (kg-m, ft-lb) FEM092 Main bolt (Nos.

1 - 10) Sub-bolt (Nos.

11 - 20) 1st 20 (2.0, 14) 98 (10, 72) 2nd 98 (10, 72) 20 (2.0, 14) 3rd 167 - 176 (17 - 18, 123 - 130) 40 - 46 (4.0 - 4.7, 29 - 33) + Sub-bolt No. 17 has shorter length than that of other subbolts. EM-1081 CYLINDER BLOCK Assembly (Cont’d) ZD 6. Install mounting bolts for engine sub-attachment shown by arrows in the figure. + After tightening bolts to the specified torque, check crankshaft for smooth rotation. + Check crankshaft end play. Refer to EM-1072, “CRANKSHAFT END PLAY”. FEM091 7. Install pistons to connecting rod. 1) Using long nose pliers, install snap rings to grooves on piston rear side. + Fit snap rings correctly into grooves. 2) Install pistons to connecting rods. + Using industrial dryer, heat pistons up to approx. 60 to 70°C (140 to 158°F) until piston pin can be pressed down by finger touch. Then insert piston pins into piston and connecting rod from front side of piston toward rear. FEM131 + Assemble piston and connecting rod with front mark of piston crown and cylinder No. stamped on connecting rod being positioned as shown in the figure. 3) Install snap rings to front side of pistons. + Refer to above 1) for precaution on snap ring installation. + After installation, check connecting rods for smooth movement. 8. Use piston ring expander (multi-purpose tool) to install piston rings. CAUTION: When installing, prevent piston from being damaged. + Install top ring and second ring with stamped surfaces facing upward. Identification stamp: Top ring: R Second ring: RN FEM132 9. Install connecting rod bearings to connecting rods and caps. + While installing connecting rod bearings, apply engine oil to bearing surfaces (inside). Do not apply oil to rear surfaces, but clean them completely. + Align stoppers on connecting rod bearings with connecting rod stopper notches to install connecting rod bearings. FEM133 EM-1082 CYLINDER BLOCK Assembly (Cont’d) FEM134 ZD 10. Install piston and connecting rod assembly to crankshaft. + Move crankshaft pin to be removed to BDC. + Align cylinder position with cylinder No. on connecting rod to install piston and connecting rod assembly. + Using piston ring compressor (multi-purpose tool), install piston and connecting rod assembly with front mark on piston crown facing toward the front side of engine. CAUTION: When installing piston and connecting rod assembly, prevent the big end of connecting rod from interfering with oil jet. 11. Install connecting rod caps and mounting nuts. + Align cylinder No. stamped on connecting rod with that on cap to install connecting rod cap. + After tightening nuts, check crankshaft for smooth rotation. + Check connecting rod side clearance. Refer to EM-1072, “CONNECTING ROD SIDE CLEARANCE”. FEM131 12. Install rear oil seal and retainer assembly. + Apply a continuous bead of liquid gasket to rear oil seal and retainer assembly as shown in the figure. FEM053 13. Press fit pilot bushing into flywheel (M/T model). 1) Using drift with outer diameter of 35 mm, press fit spacer until it is in contact with the flywheel to prevent displacement at removal. 2) Using drift with outer diameter of 20 mm, press fit pilot bushing by the length shown in the figure. SEM366G 14. Install rear plate. + Refer to the figure for gasket installation direction.

SEM367G EM-1083 CYLINDER BLOCK Assembly (Cont’d) ZD 15. Install removed parts to engine in the reverse order of disassembly. 16. Remove engine from engine stand. 17. Install flywheel (M/T model) or drive plate (A/T model). + Install pilot converter, drive plate, and reinforcing plate in direction shown in the figure. + Using the same method as disassembly, secure crankshaft and tighten mounting bolts. FEM137 + Tighten mounting bolts for flywheel or drive plate in order shown in the figure. FEM138 EM-1084 ZD SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications Cylinder arrangement In-line 4 3 Displacement cm (cu in) Bore and stroke mm (in) 2,953 (180.19) 96 x 102 (3.78 x 4.02) Valve arrangement DOHC Firing order 1-3-4-2 Compression 2 Oil 1 Number of piston rings Number of main bearings 5 Compression ratio 17.9 Compression Pressure Unit: kPa (bar, kg/cm2, psi)/200 rpm Compression pressure Standard 2,942 (29.4, 30.0, 427) Minimum 2,452 (24.5, 25.0, 356) Differential limit between cylinders 294 (2.94, 3.0, 43) Cylinder Head Unit: mm (in) Head surface distortion Standard Limit Less than 0.03 (0.0012) 0.2 (0.008) SEM368G Valve VALVE Unit: mm (in) FEM067 EM-1085 ZD SERVICE DATA AND SPECIFICATIONS (SDS) Valve (Cont’d) Intake 31.9 - 32.1 (1.256 - 1.264) Exhaust 29.9 - 30.1 (1.177 - 1.185) Valve head diameter “D” Intake 113.5 (4.4685) Exhaust 113.5 (4.4685) Valve length “L” Intake 6.962 - 6.977 (0.2741 - 0.2747) Exhaust 6.945 - 6.960 (0.2734 - 0.2740) Valve stem diameter “d” Intake Valve seat angle “α” 45°00′ - 45°30′ Exhaust Intake 1.5 (0.059) Exhaust 1.5 (0.059) Valve margin “T” Valve stem end surface grinding limit Less than 0.2 (0.008) VALVE CLEARANCE Unit: mm (in) Cold Intake 0.30 - 0.40 (0.0118 - 0.0157) Exhaust 0.30 - 0.40 (0.0118 - 0.0157) *: Approximately 80°C (176°F) AVAILABLE SHIMS Thickness mm (in) Identification mark 2.35 (0.0925) 2.35 2.40 (0.0945) 2.40 2.45 (0.0965) 2.45 2.50 (0.0984) 2.50 2.55 (0.1004) 2.55 2.60 (0.1024) 2.60 2.65 (0.1043) 2.65 2.70 (0.1063) 2.70 2.75 (0.1083) 2.75 2.80 (0.1102) 2.80 2.85 (0.1122) 2.85 2.90 (0.1142) 2.90 2.95 (0.1161) 2.95 3.00 (0.1181) 3.00 3.05 (0.1201) 3.05 SEM252G EM-1086 ZD SERVICE DATA AND SPECIFICATIONS (SDS) Valve (Cont’d) VALVE SPRING Free height Pressure mm (in) N (kg, lb) at height mm (in) Out-of-square mm (in) 55.43 (2.1823) 354 (36.1, 79.6) at 32.3 (1.2717) 2.4 (0.094) VALVE LIFTER Unit: mm (in) Valve lifter outer diameter 34.450 - 34.465 (1.3563 - 1.3569) Lifter guide inner diameter 34.495 - 34.515 (1.3581 - 1.3589) Clearance between lifter and lifter guide 0.030 - 0.065 (0.0012 - 0.0026) VALVE GUIDE Unit: mm (in) FEM071 Standard Outer diameter 11.023 - 11.034 (0.4340 - 0.4344) Valve guide Inner diameter (Finished size) Cylinder head valve guide hole diameter 7.000 - 7.015 (0.2756 - 0.2762) 10.996 - 10.975 (0.4329 - 0.4321) Interference fit of valve guide 0.027 - 0.059 (0.0011 - 0.0023) Standard Intake 0.023 - 0.053 (0.0009 - 0.0021) Exhaust 0.040 - 0.070 (0.0016 - 0.0028) Stem to guide clearance Valve deflection limit 0.2 (0.0079) Projection length 12.8 - 13.2 (0.5309 - 0.5197) EM-1087 ZD SERVICE DATA AND SPECIFICATIONS (SDS) Valve Seat Unit: mm (in) SEM374G SEM373G SEM375G Cylinder head seat recess diameter (D) Standard Service Intake 33.000 - 33.015 (1.2992 - 1.2998) 33.500 - 33.515 (1.3189 - 1.3195) Exhaust 31.495 - 31.510 (1.2400 - 1.2405) 31.995 - 32.010 (1.2596 - 1.2602) Intake 0.050 - 0.078 (0.0020 - 0.0031) Exhaust 0.040 - 0.066 (0.0016 - 0.0026) Valve seat interference fit EM-1088 SERVICE DATA AND SPECIFICATIONS (SDS) Valve Seat (Cont’d) ZD Intake 33.065 - 33.078 (1.3018 - 1.3023) 33.565 - 33.578 (1.3215 - 1.3220) Exhaust 31.550 - 31.561 (1.2421 - 1.2426) 32.050 - 32.061 (1.2618 - 1.2622) Intake 6.75 - 6.85 (0.2657 - 0.2697) 6.75 - 6.85 (0.2657 - 0.2697) Exhaust 7.35 - 7.45 (0.2894 - 0.2933) 7.35 - 7.45 (0.2894 - 0.2933) Valve seat outer diameter (d) Height (h) Intake 43.65 - 44.35 (1.7185 - 1.7461) Exhaust 43.65 - 44.35 (1.7185 - 1.7461) Depth (L) EM-1089 ZD SERVICE DATA AND SPECIFICATIONS (SDS) Camshaft and Camshaft Bearing Unit: mm (in) Standard Limit 0.045 - 0.090 (0.0018 - 0.0035) 0.09 (0.0035) Inner diameter of camshaft bearing 30.000 - 30.021 (1.1811 - 1.1819) — Outer diameter of camshaft journal 29.931 - 29.955 (1.1784 - 1.1793) — — 0.02 (0.0008) Less than 0.15 (0.0059) — 0.065 - 0.169 (0.0026 - 0.0067) 0.2 (0.008) Camshaft journal to bearing clearance Camshaft runout [TIR*] Camshaft sprocket runout [TIR*] Camshaft end play *: Total indicator reading EM671 Intake 40.468 - 40.508 (1.5932 - 1.5948) Exhaust 40.830 - 40.870 (1.6075 - 1.6091) Cam height “A” Wear limit of cam height 0.15 (0.0059) Valve timing SEM372G Unit: degree a b c d e 234 220 10 34 50 EM-1090 ZD SERVICE DATA AND SPECIFICATIONS (SDS) Cylinder Block Unit: mm (in) SEM370G Standard Less than 0.03 (0.0012) Surface flatness Limit 0.10 (0.0039) Standard Cylinder bore Grade No. 1 96.000 - 96.010 (3.7795 - 3.7799) Grade No. 2 96.010 - 96.020 (3.7799 - 3.7803) Grade No. 3 96.020 - 96.030 (3.7803 - 3.7807) Inner diameter Wear limit 0.20 (0.0079) Out-of-round (X − Y) Less than 0.02 (0.0008) Taper (A − B − C) Less than 0.02 (0.0008) Main journal inner diameter (Without bearing) 74.981 - 75.000 (2.9520 - 2.9528) Difference in inner diamLimit eter between cylinders Less than 0.05 (0.0020) Piston, Piston Ring and Piston Pin AVAILABLE PISTON Unit: mm (in) SEM369G Piston skirt diameter “A” Standard Grade No. 1 95.950 - 95.960 (3.7776 - 3.7779) Grade No. 2 95.960 - 95.970 (3.7779 - 3.7783) Grade No. 3 95.970 - 95.980 (3.7783 - 3.7787) “a” dimension 10 (0.39) Piston pin hole diameter 32.997 - 33.005 (1.2991 - 1.2994) Piston clearance to cylinder block 0.040 - 0.060 (0.0016 - 0.0024) EM-1091 ZD SERVICE DATA AND SPECIFICATIONS (SDS) Piston, Piston Ring and Piston Pin (Cont’d) PISTON RING Unit: mm (in) Side clearance End gap Standard Limit Top 0.05 - 0.07 (0.0020 - 0.0028) 0.5 (0.020) 2nd 0.04 - 0.08 (0.0016 - 0.0031) 0.3 (0.012) Oil ring 0.02 - 0.06 (0.0008 - 0.0024) 0.15 (0.0059) Top 0.30 - 0.45 (0.0118 - 0.0177) 1.5 (0.059) 2nd 0.50 - 0.65 (0.0197 - 0.0256) 1.5 (0.059) Oil (rail ring) 0.25 - 0.45 (0.0098 - 0.0177) 1.5 (0.059) PISTON PIN Unit: mm (in) Piston pin outer diameter 32.993 - 33.000 (1.2989 - 1.2992) Interference fit of piston pin to piston −0.003 to 0.012 (−0.0001 to 0.0005) Standard 0.025 - 0.045 (0.0010 - 0.0018) Piston pin to connecting rod bushing clearance Limit 0.045 (0.0018) *: Values measured at ambient temperature of 20°C (68°F) Connecting Rod Unit: mm (in) Center distance 154.5 (6.083) Bend [per 100 (3.94)] Limit Torsion [per 100 (3.94)] Limit 0.05 (0.0020) 0.05 (0.0020) Connecting rod small end inner diameter 35.087 - 36.000 (1.3814 - 1.4173) Piston pin bushing inner diameter* 33.025 - 33.038 (1.3002 - 1.3007) Connecting rod big end inner diameter 59.987 - 60.000 (2.3617 - 2.3622) Crankshaft journal bearing inner diameter* 70.955 - 70.990 (2.7935 - 2.7949) Standard 0.10 - 0.22 (0.0039 - 0.0087) Side clearance Limit 0.22 (0.0087) *: After installing in connecting rod EM-1092 ZD SERVICE DATA AND SPECIFICATIONS (SDS) Crankshaft Unit: mm (in) Main journal dia. “Dm” Pin journal dia. “Dp” 70.907 - 70.920 (2.7916 - 2.7921) Grade No. 0 56.913 - 56.926 (2.2407 - 2.2412) Center distance “r” 50.95 - 51.05 (2.0059 - 2.0098) Out-of-round (X − Y) Standard Less than 0.01 (0.0004) Taper (A − B) Standard Less than 0.01 (0.0004) Standard Less than 0.01 (0.0004) Limit Less than 0.03 (0.0012) Runout [TIR*] Standard 0.055 - 0.140 (0.0022 - 0.0055) Free end play Limit 0.25 (0.0098) EM715 SEM645 *: Total indicator reading Available Main Bearing UNDERSIZE FEM127 Size Thickness “T” mm (in) Standard 2.005 - 2.013 (0.0789 - 0.0793) US 025 2.130 - 2.138 (0.0839 - 0.0842) US 050 2.255 - 2.263 (0.0888 - 0.0891) US 075 2.380 - 2.388 (0.0937 - 0.0940) US 100 2.505 - 2.513 (0.0986 - 0.0989) Width “W” mm (in) 25.74 - 26.00 (1.0134 - 1.0236) EM-1093 Main journal diameter “Dm” Grind so that bearing clearance is the specified value. ZD SERVICE DATA AND SPECIFICATIONS (SDS) Available Connecting Rod Bearing CONNECTING ROD BEARING Grade number Thickness “T” mm (in) Standard 1.505 - 1.513 (0.0593 - 0.0596) US 025 1.630 - 1.638 (0.0642 - 0.0645) US 050 1.755 - 1.763 (0.0691 - 0.0694) US 075 1.880 - 1.888 (0.0740 - 0.0743) US 100 2.005 - 2.013 (0.0789 - 0.0793) Width “W” mm (in) 25.9 - 26.1 (1.020 - 1.028) BALANCER SHAFT BUSH Unit: mm (in) SEM371G Front 50.940 - 51.010 (2.0055 - 2.0083) Rear 50.740 - 50.810 (1.9976 - 2.0004) Front 53.980 - 54.010 (2.1252 - 2.1264) Rear 53.780 - 53.810 (2.1173 - 2.1185) Balancer shaft bearing journal diameter Balancer shaft journal outer diameter Standard 0.045 - 0.135 (0.0018 - 0.0053) Balancer shaft journal oil clearance Limit 0.180 (0.0071) Front 54.090 - 54.130 (2.1295 - 2.1311) Rear 53.890 - 53.930 (2.1216 - 2.1232) Front 0.2 - 0.4 (0.008 - 0.016) Rear 0.2 - 0.4 (0.008 - 0.016) Balancer shaft bush outer diameter (d) Thickness (t) EM-1094 ZD SERVICE DATA AND SPECIFICATIONS (SDS) Miscellaneous Components Unit: mm (in) Flywheel runout [TIR]* Less than 0.15 (0.0059) Drive plate runout [TIR]* Less than 0.1 (0.0039) *: Total indicator reading BEARING CLEARANCE Unit: mm (in) Main bearing clearance Standard 0.035 - 0.083 (0.0014 - 0.0033) Connecting rod bearing clearance Standard 0.035 - 0.077 (0.0014 - 0.0030) EM-1095 FRONT AXLE & FRONT SUSPENSION SECTION FA MODIFICATION NOTICE: Tightening torque of brake rotor bolt has been changed. CONTENTS FRONT

AXLE — Drive Flange and Free-running Hub .... 1002 FA FRONT AXLE — Drive Flange and Free-running Hub SFA859BA FA-1002 ACCELERATOR CONTROL, FUEL & EXHAUST SYSTEMS SECTION FE MODIFICATION NOTICE: + The circuit diagram and wiring diagram have been changed. + ZD30DDTi engine has been added. + The accelerator control system for ZD30DDTi engine models is the same as for RD28ETi engine models. Refer to FE-3 in Service Manual [SM7E-1Y61G0 (01)].

+ The fuel tank and sub-fuel tank for ZD30DDTi engine models are the same as for TD42 engine models. Refer to FE-22 and FE-25 in Service Manual [SM7E-1Y61G0 (01)]. CONTENTS TROUBLE DIAGNOSES .... 1002 Circuit Diagram .... 1002 Wiring Diagram — S/TANK — .... 1003 ZD EXHAUST SYSTEM .... 1007 FE TROUBLE DIAGNOSES Circuit Diagram TFE004M FE-1002 TROUBLE DIAGNOSES Wiring Diagram — S/TANK — TFE005M FE-1003 TROUBLE DIAGNOSES Wiring Diagram — S/TANK — (Cont’d) TFE014 FE-1004 TROUBLE DIAGNOSES Wiring Diagram — S/TANK — (Cont’d) TFE019 FE-1005 TROUBLE DIAGNOSES Wiring Diagram — S/TANK — (Cont’d) TFE006M FE-1006 EXHAUST SYSTEM JFE660A FE-1007 FUSE BLOCK — Junction Box (J/B) Terminal Arrangement CEL140M FUSE AND FUSIBLE LINK BOX Terminal Arrangement CEL141M ELECTRICAL UNITS Terminal Arrangement CEL142M Edition: February 2000 Release: February 2000 (01) Publication No.: SM0E-Y61AE0E Reference No.: 7711346024 QUICK REFERENCE INDEX GENERAL INFORMATION GI MAINTENANCE MA ENGINE MECHANICAL EM PATROL GR ENGINE LUBRICATION & COOLING SYSTEMS LC MODEL Y61 SERIES ENGINE CONTROL SYSTEM EC ACCELERATOR CONTROL, FUEL & EXHAUST SYSTEM FE CLUTCH CL MANUAL TRANSMISSION MT AUTOMATIC TRANSMISSION AT TRANSFER TF PROPELLER SHAFT & DIFFERENTIAL CARRIER PD FRONT AXLE & FRONT SUSPENSION FA REAR AXLE & REAR SUSPENSION RA BRAKE SYSTEM BR STEERING SYSTEM ST RESTRAINT SYSTEM RS BODY & TRIM BT HEATER & AIR CONDITIONER HA ELECTRICAL SYSTEM EL ALPHABETICAL INDEX IDX NISSAN EUROPE S.A.S. © 2000 NISSAN EUROPE S.A.S. Produced in The Netherlands Not to be reproduced in whole or in part without the prior written permission of Nissan Europe S.A.S., Paris, France. FOREWORD This manual contains maintenance and repair procedures for NISSAN PATROL GR, model Y61 series. In order to assure your safety and the efficient functioning of the vehicle, this manual should be read thoroughly. It is especially important that the PRECAUTIONS in the GI section be completely understood before starting any repair task. All information in this manual is based on the latest product information at the time of publication. The right is reserved to make changes in specifications and methods at any time without notice. IMPORTANT SAFETY NOTICE The proper performance of service is essential for both the safety of the technician and the efficient functioning of the vehicle.

The service methods in this Service Manual are described in such a manner that the service may be performed safely and accurately. Service varies with the procedures used, the skills of the technician and the tools and parts available.

Accordingly, anyone using service procedures, tools or parts which are not specifically recommended by NISSAN must first completely satisfy himself that neither his safety nor the vehicle’s safety will be jeopardized by the service method selected. NISSAN EUROPE S.A.S. Service Engineering Section Paris, France GENERAL INFORMATION SECTION GI OUTLINE OF MODIFICATIONS: + Side air bag has been adopted. + Power window (driver’s side only) with an interruption detection function has been adopted. + ZD30DDTi engine has been adopted in place of RD28ETi engine. + CONSULT-II has been adopted. + ID code entry procedure of multi-remote control system has been changed. APPLIED FROM: For Europe: JN1TESY61U0000001 JN1KESY61U0000001 For Israel: JN1TESY611X800001 JN1KESY611X800001 CONTENTS PRECAUTIONS AND PREPARATION .... 1002 Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER” ... 1002 Precautions for Fuel....................................... 1002 CONSULT-II CHECKING SYSTEM.................... 1003 Function and System Application .... 1003 Nickel Metal Hydride Battery Replacement..... 1003 Checking Equipment......................................

1004 CONSULT-II Data Link Connector (DLC) Circuit .... 1004 IDENTIFICATION INFORMATION .... 1005 Model Variation .... 1005 Identification Number .... 1007 LIFTING POINTS AND TOW TRUCK TOWING. 1009 Screw Jack.. 1009 Tow Truck Towing .... 1010 GI PRECAUTIONS AND PREPARATION Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER” The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision.

The SRS system composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination and optional equipment.): + For a frontal collision The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. + For a side collision The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision). Information necessary to service the system safely is included in the RS section of this Service Manual.

WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual.

Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS. Precautions for Fuel DIESEL ENGINE*: Diesel fuel of at least 50 cetane for ZD30DDTi engine * If two types of diesel fuel are available, use summer or winter fuel properly according to the following temperature conditions.

+ Above −7°C (20°F) ... Summer type diesel fuel. + Below −7°C (20°F) ...

Winter type diesel fuel. CAUTION: + Do not use home heating oil, gasoline, or other alternate fuels in your diesel engine.

The use of those can cause engine damage. + Do not use summer fuel at temperature below −7°C (20°F). The cold temperature will cause wax to form in the fuel. As a result, it may prevent the engine from running smoothly. + Do not add gasoline or other alternate fuels to diesel fuel.

GI-1002 CONSULT-II CHECKING SYSTEM Function and System Application Diagnostic test mode Function ENGINE A/T ABS AIR BAG NATS* SMART ENTRANCE Self-diagnostic results Self-diagnostic results can be read and erased quickly.

x x x x x — Trouble diagnostic record Current self-diagnostic results and all trouble diagnostic records previously stored can be read. — — — x — — ECU discriminated No. Classification number of a replacement ECU can be read to prevent an incorrect ECU from being installed. — — — x — — Data monitor Input/Output data in the ECU (ECM) can be read. x x x — — — DTC work support This mode enables a technician to set operating conditions to confirm self-diagnosis status/results. — x — — — — Active test Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range. x — x — — — x x x — — — All registered ignition key IDs in NATS components can be initialized and new IDs can be registered. — — — — x — A maximum of four IDs (identifications) can REMO CONT ID SET be registered in the memory using the remote controller. These IDs can be also be UP confirmed and erased as required.

— — — — — x ECU (ECM) part numECU (ECM) part number can be read. ber Control unit initialization x: Applicable *: NATS (Nissan Anti-Theft System) Nickel Metal Hydride Battery Replacement CONSULT-II contains a nickel metal hydride battery. When replacing the battery obey the following: WARNING: Replace the nickel metal hydride battery with Genuine CONSULT-II battery only. Use of another battery may present a risk of fire or explosion. The battery may present a fire or chemical burn hazard if mistreated. Do not recharge, disassemble or dispose of in fire. Keep the battery out of reach of children and discard used battery conforming to the local regulations. GI-1003 CONSULT-II CHECKING SYSTEM Checking Equipment When ordering the below equipment, contact your NISSAN distributor. Tool name Description NISSAN CONSULT-II 1 CONSULT-II unit (Tester V internal software: Resident version 3.2.0) and accessories 2 Program card AED99C V (Version 3.0) and EEN99A (For NATS) To confirm the best combination of those softwares, refer SGI100A to CONSULT-II Operation Manual. NOTE: + The CONSULT-II must be used in conjunction with a program card. CONSULT-II does not require loading (Initialization) procedure. + Be sure the CONSULT-II is turned off before installing or removing a program card. CONSULT-II Data Link Connector (DLC) Circuit SOM397 INSPECTION PROCEDURE If the CONSULT-II cannot diagnose the system properly, check the following items. Symptom Check item CONSULT-II cannot access any system. + CONSULT-II DLC power supply circuit (Terminal 8) and ground circuit (Terminal 4) (For detailed circuit, refer to EC section, “MIL & DATA LINK CONNECTORS”.) + CONSULT-II (DDL) cable CONSULT-II cannot access individual system. (Other systems can be accessed.) + CONSULT-II program card (Check the appropriate CONSULT-II program card for the system. Refer to “Checking Equipment” above.) + Power supply and ground circuit for the control unit of the system (For detailed circuit, refer to wiring diagram for each system.) + Open or short circuit between the system and CONSULT-II DLC (For detailed circuit, refer to wiring diagram for each system.) GI-1004 IDENTIFICATION INFORMATION Model Variation Model Rear seat arrangement Destination Steering position Hardtop Station Wagon 2nd seat 2nd center split bench seat Forward facing 3rd seat Seatless Seatless Engine Front differential Forward facing H233B Rear differential Transmission Transfer FS5R50B S RE4R03A FS5R50B RHD SE RE4R03A FS5R50B SE RE4R03A FS5R50B Europe ZD30DDTi RE4R03A S TX12A FS5R50B SE LHD RE4R03A FS5R50B SE RE4R03A H233B/H260 Grade KWSSREFY61UEA — — TWSSREFY61UEA — — — TWSSREAY61UEA KWSSRFFY61UEA — — TWSSRFFY61UEA KWSSRFAY61UEA — — TWSSRFAY61UEA — — — TWSSRHFY61UEA — — — TWSSRHAY61UEA KWSSLFFY61UGA KWSSLEFY61USP TWSSLEFY61USP TWSSLEFY61UGA — — — TWSSLEAY61UGA KWSSLFFY61UGA — TWSSLFFY61USP TWSSLFFY61UGA — — — TWSSLFFY61USA KWSSLFAY61UGA — — TWSSLFAY61UGA — — — TWSSLFAY61USA — — — TWSSLHFY61UGA — — — TWSSLHFY61USA — — — TWSSLHAY61UGA — — — TWSSLHAY61USA GI-1005 IDENTIFICATION INFORMATION Model Variation (Cont’d) Prefix and suffix designations T WS S L E F Y61 U E A A: 3rd seat forward facing P: 3rd seat/Rear seat seatless E: RHD for Europe G: Central/South Europe S: North Europe U: Turbocharger engine F: 5-speed floor shift manual transmission A: 4-speed floor shift automatic transmission E: S F: SE H: SE L: LH drive R: RH drive S: Long wheelbase (4WD) WS: ZD30DDTi engine T: Station Wagon K: Hardtop GI-1006 IDENTIFICATION INFORMATION Identification Number VEHICLE IDENTIFICATION NUMBER (Chassis number) Prefix and suffix designations For Israel JN1 T E S Y61 1 X XXXXXX Vehicle serial number Manufacturing plant X: Hiratuka Model year 1: 2001 model year S: Long wheelbase (4WD) E: ZD30DDTi engine T: Station Wagon K: Hardtop JN1: Japan produced vehicle For Europe (except for Israel) JN1 T E S Y61 U 0 XXXXXX Vehicle serial number 0: Stopgap (no meaning) U: Europe S: Long wheelbase (4WD) E: ZD30DDTi engine T: Station Wagon K: Hardtop JN1: Japan produced vehicle GI-1007 IDENTIFICATION INFORMATION Identification Number (Cont’d) IDENTIFICATION PLATE SGI126AA ENGINE SERIAL NUMBER SGI137A GI-1008 LIFTING POINTS AND TOW TRUCK TOWING WARNING: + Never get under the vehicle while it is supported only by the jack. Always use safety stands to support the frame when you have to get under the vehicle. + Place wheel chocks at both front and back of the wheel which is diagonally opposite the jack position. Example: If the jack is positioned at the LH front wheel, place wheel chocks at RH rear wheel. + A 2-pole lift is not recommended because it may become unbalance when the vehicle is on it. + Jack up the vehicle only under no load conditions. Screw Jack SGI016AA GI-1009 LIFTING POINTS AND TOW TRUCK TOWING Tow Truck Towing TOWING HOOKS The towing hooks are provided only for emergency. + Use the towing hooks only, not other parts of the vehicle. Otherwise, the vehicle body will be damaged. + Use the towing hooks only to free a vehicle stuck in sand, snow, mud, etc. Never tow the vehicle for long distances using only the towing hooks.

+ The towing hook is under tremendous force when used to free a stuck vehicle.

Always pull the cable straight out from the front or rear of the vehicle. Never pull on the hook at a sideways angle. SGI025AA GI-1010 HEATER & AIR CONDITIONER SECTION HA MODIFICATION NOTICE: + Wiring diagrams have been changed. + Cooler cycle for ZD30DDTi engine has been added. CONTENTS PRECAUTIONS AND PREPARATION .... 1002 Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER” ... 1002 Precautions for Refrigerant Connection .... 1002 REAR COOLER TROUBLE DIAGNOSES .... 1005 Wiring Diagram — HEATER —....................... 1005 Wiring Diagram — R/HEAT —/LHD Models ... 1006 Wiring Diagram — A/C, M —/ZD Engine .... 1007 TROUBLE DIAGNOSES .... 1013 Wiring Diagram — R/COOL —/LHD Models with Front Auto A/C .... 1013 Wiring Diagram — R/COOL —/LHD Models with Front Manual A/C .... 1015 Wiring Diagram — R/COOL —/RHD Models with Front Auto A/C .... 1017 Wiring Diagram — R/COOL —/RHD Models with Front Manual A/C .... 1019 AUTO MANUAL AND AUTO TROUBLE DIAGNOSES .... 1009 Circuit Diagram .... 1009 Wiring Diagram — A/C, A —/ZD Engine......... 1010 SERVICE PROCEDURES .... 1021 Refrigerant Lines... 1021 Compressor Mounting..................................... 1023 MANUAL HA PRECAUTIONS AND PREPARATION Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER” The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination and optional equipment.): + For a frontal collision The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. + For a side collision The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision). Information necessary to service the system safely is included in the RS section of this Service Manual. WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS. Precautions for Refrigerant Connection A new type refrigerant connection has been introduced to all refrigerant lines except the following location. +Expansion valve to cooling unit FEATURES OF NEW TYPE REFRIGERANT CONNECTION +The O-ring has been relocated. It has also been provided with a groove for proper installation. This eliminates the chance of the O-ring being caught in, or damaged by, the mating part. The sealing direction of the O-ring is now set vertically in relation to the contacting surface of the mating part to improve sealing characteristics. + The reaction force of the O-ring will not occur in the

direction that causes the joint to pull out, thereby facilitating piping connections. SHA815E HA-1002 PRECAUTIONS AND PREPARATION Precautions for Refrigerant Connection (Cont'd) O-RING AND REFRIGERANT CONNECTION RHA840H O-Ring Part Numbers and Specifications Connection type O-ring size New Part number D mm (in) W mm (in) 92471 N8210 6.8 (0.268) 1.85 (0.0728) 92470 N8200 6.07 (0.2390) 1.78 (0.0701) 92472 N8210 10.9 (0.429) 2.43 (0.0957) 92475 71L00 11.0 (0.433) 2.4 (0.094) 92473 N8210 13.6 (0.535) 2.43 (0.0957) 92475 72L00 14.3 (0.563) 2.3 (0.0906) 92474 N8210 16.5 (0.650) 2.43 (0.0957) 92477 N8200 17.12 (0.6740) 1.78 (0.0701) 8 Former New 12 Former New 16 Former New SHA814E 19 Former WARNING: Make sure all refrigerant is discharged into the recycling equipment and the pressure in the system is less than atmospheric pressure.
Then gradually loosen the discharge side hose fitting and remove it.
CAUTION When replacing or cleaning refrigerant cycle components, observe the following. + When the compressor is removed, store it in the same position as it is when mounted on the car. Failure to do so will cause lubricant to enter the low pressure chamber. + When connecting tubes, always use a torque wrench and a back-up wrench. + After disconnecting tubes, immediately plug all openings to prevent entry of dirt and moisture. + When installing an air conditioner in the vehicle, connect the pipes as the final stage of the operation.
Do not remove the seal caps of pipes and other components until just before required for connection. HA-1003 PRECAUTIONS AND PREPARATION Precautions for Refrigerant Connection (Cont'd) + + + + + + + + Allow components stored in cool areas to warm to working area temperature before removing seal caps. This prevents condensation from forming inside A/C components. Thoroughly remove moisture from the refrigeration system before charging the refrigerant. Always replace used O-rings. When connecting tube, apply lubricant to circle of the O-rings shown in illustration.
Be careful not to apply lubricant to threaded portion. Lubricant name: Nissan A/C System Oil Type S Part number: KLH00-PAGS0 O-ring must be closely attached to dented portion of tube. When replacing the O-ring, be careful not to damage O-ring and tube. Connect tube until you hear it click, then tighten the nut or bolt by hand until snug. Make sure that the O-ring is installed to tube correctly.
After connecting line, conduct leak test and make sure that there is no leakage from connections. When the gas leaking point is found, disconnect that line and replace the O-ring. Then tighten connections of seal seat to the specified torque. HA-1004 TROUBLE DIAGNOSES MANUAL Wiring Diagram — HEATER — THA021M HA-1005 TROUBLE DIAGNOSES MANUAL Wiring Diagram — R/HEAT —/LHD Models THA022M HA-1006 TROUBLE DIAGNOSES MANUAL Wiring Diagram — A/C, M —/ZD Engine THA027M HA-1007 MANUAL TROUBLE DIAGNOSES Wiring Diagram — A/C, M —/ZD Engine (Cont'd) THA028M HA-1008 TROUBLE DIAGNOSES AUTO Circuit Diagram LHD MODELS THA029M HA-1009 TROUBLE DIAGNOSES AUTO Wiring Diagram — A/C, A —/ZD Engine THA039M HA-1010 AUTO TROUBLE DIAGNOSES Wiring Diagram — A/C, A —/ZD Engine (Cont'd) THA040M HA-1011 AUTO TROUBLE DIAGNOSES Wiring Diagram — A/C, A —/ZD Engine (Cont'd) THA041M HA-1012 TROUBLE DIAGNOSES REAR COOLER Wiring Diagram — R/COOL —/LHD Models with Front Auto A/C THA270 HA-1013 REAR COOLER TROUBLE DIAGNOSES Wiring Diagram — R/COOL —/LHD Models with Front Auto A/C (Cont'd) THA271 HA-1014 TROUBLE DIAGNOSES REAR COOLER Wiring Diagram — R/COOL —/LHD Models with Front Manual A/C THA272 HA-1015 REAR COOLER TROUBLE DIAGNOSES Wiring Diagram — R/COOL —/LHD Models with Front Manual A/C (Cont'd) THA273 HA-1016 TROUBLE DIAGNOSES REAR COOLER Wiring Diagram — R/COOL —/RHD Models with Front Auto A/C THA042M HA-1017 REAR COOLER TROUBLE DIAGNOSES Wiring Diagram — R/COOL —/RHD Models with Front Auto A/C (Cont'd) THA043M HA-1018 TROUBLE DIAGNOSES REAR COOLER Wiring Diagram — R/COOL —/RHD Models with Front Manual A/C THA044M HA-1019 REAR COOLER TROUBLE DIAGNOSES Wiring Diagram — R/COOL —/RHD Models with Front Manual A/C (Cont'd) THA045M HA-1020 SERVICE PROCEDURES MANUAL AND AUTO Refrigerant Lines RHD MODELS WITH ZD ENGINE RHA841H HA-1021 SERVICE PROCEDURES Refrigerant Lines (Cont'd) MANUAL AND AUTO LHD MODELS WITH ZD ENGINE RHA842H HA-1022 SERVICE PROCEDURES MANUAL AND AUTO Compressor Mounting RHA893H HA-1023 ALPHABETICAL INDEX SECTION IDX IDX ALPHABETICAL INDEX A A/T - Wiring diagram .... AT-1009 A/T control .... EC-1148 A/T fluid temperature sensor .... AT-1081 A/T mode switch .... AT-1095 A/T self-diagnoses .... AT-1028 A/T shift lock system - Wiring diagram .... AT-1117 A/T shift lock system .... AT-1116 A/T trouble diagnoses .... AT-1036 APS - Wiring diagram .... EC-1125 ASCD (automatic speed control device) .... EL-1110 ASCD - Wiring diagram .... EL-1111 AT/C - Wiring diagram .... EC-1150 Accelerator control system .... FE-1007 Accelerator position sensor .... EC-1125 Air bag disposal .... RS-1015 Air bag precautions .... GI-1002 Air bag .... RS-1003 Air cleaner filter replacement .... MA-1019 Air conditioner cut control .... EC-1021 Air flow meter - See Mass air flow sensor .... EC-1086 Alternator .... EL-1041 Angular tightening application .... EM-1003 Anti-lock brake system - Wiring diagram .... BR-1002 Audio .... EL-1108 Automatic speed control system - See ASCD .... EL-1110 Automatic transmission fluid replacement .... MA-1021 B BACK/L - Wiring diagram .... EL-1051 BOOST - Wiring diagram .... EC-1204 Back-up lamp .... EL-1051 Basic inspection .... EC-1049 Battery .... EL-1035 Boring/horning cylinder block .... EM-1075 C CHARGE - Wiring diagram .... EL-1040 CKPS - Wiring diagram .... EC-1140 CONSULT for engine .... EC-1038 CONSULT general information .... GI-1003 COOL/F - Wiring diagram .... EC-1105 CORNER - Wiring diagram .... EL-1054 Camshaft inspection .... EM-1032 Charging system .... EL-1040 Chassis and body maintenance .... MA-1020 Clutch operating cylinder .... CL-1003 Collision diagnosis .... RS-1052 Combination meter .... EL-1073 Combination switch .... EL-1042 Compression pressure .... EM-1010 Compressor mounting .... HA-1023 Connecting rod bearing clearance .... EM-1078 Connecting rod bushing clearance .... EM-1074 Connecting rod .... EM-1074 Control valve (A/T) .... AT-1148 Converter housing installation .... AT-1128 Coolant mixture ratio .... MA-1010 Coolant replacement .... MA-1014 Cooling fan control .... EC-1105 Cornering lamp .... EL-1054 Crankcase emission control system See Positive crankcase ventilation ... EC-1022 Crankcase ventilation system - See Positive crankcase ventilation .... EC-1022 Crankshaft position sensor (TDC) .... EC-1140 Crankshaft .... EM-1077 Cruise control - See ASCD .... EL-1110 Cylinder block boring .... EM-1020 Cylinder block .... EM-1067 Cylinder head bolt tightening .... EM-1034 Cylinder head .... EM-1053 D DEF - Wiring diagram .... EL-1102 DTRL - Wiring diagram .... EL-1044 Data link connector for Consult .... EC-1038 Daytime light system ....
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Washer, front .... Water temperature gauge .... Wiper, front .... IDX-1005 EL-1080 EL-1117 EL-1098 EL-1091 EL-1078 EL-1098 EL-1073 EL-1098 ENGINE LUBRICATION & COOLING SYSTEMS SECTION LC MODIFICATION NOTICE: LC +The ZD30DDTi engine has been added. CONTENTS ZD ENGINE LUBRICATION SYSTEM........ 1002 Lubricating Circuit .... 1002 Oil Pressure Check........ 1003 Oil Pump .... 1004 Oil Jet........ 1006 Oil Cooler .... 1007 ENGINE COOLING SYSTEM........ 1008 Cooling Circuit........ 1008 System Check........ 1009 Water Pump .... 1010 Thermostat .... 1011 Water Outlet........ 1012 Radiator........
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3. Coat regulator valve with engine oil. Check that it falls smoothly into the valve hole by its own weight.
If damaged, replace regulator valve set or oil pump cover. 4. Check regulator valve to oil pump cover clearance. Clearance: 6 : 0.040 - 0.097 mm (0.0016 - 0.0038 in) V If it exceeds the limit, replace oil pump cover. SLC369B LC-1005 ENGINE LUBRICATION SYSTEM Oil Pump (Cont'd) ZD OIL PRESSURE RELIEF VALVE AND BYPASS VALVE INSPECTION (For oil cooler) 1. Inspect oil pressure relief valve for movement, cracks and breaks by pushing the ball. If replacement is necessary, remove valve by prying it out with suitable tool. Install a new valve in place by tapping it.
2. Check oil pressure relief valve to oil cooler housing clearance. Clearance: C : 0.032 - 0.068 mm (0.0013 - 0.0027 in) V If it exceeds the limit, replace oil cooler housing. SLC371B Oil Jet INSPECTION (For timing chain) Make sure that the holes are not clogged. Clean them with a wire if necessary. Drive oil jet into place after positioning alignment mark on. SLC385B INSPECTION (For piston) 1. Push cut-off valve of oil jet bolt with a clean resin or brass rod and make sure that cut-off valve moves smoothly with proper repulsion. 2.
Make sure that the oil jet passage is not clogged. Clean with a wire if necessary. FEM124 When installing oil jet, align oil jet's boss with hole on cylinder block. Oil jet: : 30 - 39 Nzm (3.0 - 4.0 kg-m, 22 - 28 ft-lb) FEM125 LC-1006 ENGINE LUBRICATION SYSTEM Oil Jet (Cont'd) ZD OIL FILTER The oil filter is an element type. Refer to "Changing Oil Filter" in MA section. Oil Cooler JLC370B REMOVAL AND INSTALLATION JLC381B 1. Drain engine oil and coolant. Remove catalyst and turbocharger.
Refer to "CATALYST AND TURBOCHARGER" in EM section. 2. Remove bolts A to C then remove oil cooler assembly. + Do not remove "D" nuts when removing oil cooler assembly. Bolt length: A: 20 mm (0.79 in) B: 45 mm (1.77 in) C: 65 mm (2.56 in) 3. Installation is in reverse order of removal. + Do not spill coolant on the drive belt. INSPECTION 1. Check oil cooler for cracks. 2. Check oil cooler for clogging by blowing through coolant inlet. If necessary, replace oil cooler assembly. LC-1007 ENGINE COOLING SYSTEM ZD Cooling Circuit JLC372B LC-1008 ENGINE COOLING SYSTEM ZD System Check WARNING: Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure coolant escaping from the radiator. Wrap a thick cloth around the cap. Slowly turn it a quarter turn to allow built-up pressure to escape. Carefully remove the cap by turning it all the way. CHECKING COOLING SYSTEM HOSES Check hoses for the following: + Improper attachment + Leaks + Cracks + Damage + Chafing + Deterioration CHECKING COOLING SYSTEM FOR LEAKS To check for leakage, apply pressure to the cooling system with a tester. Testing pressure: 98 kPa (0.98 bar, 1.0 kg/cm2, 14 psi) CAUTION: Higher pressure than specified may cause radiator damage. SLC134B CHECKING RADIATOR CAP To check radiator cap, apply pressure to cap with a tester. Radiator cap relief pressure: Standard 59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm2, 9 - 14 psi) SLC135B Pull the negative pressure valve to open it. Check that it closes completely when released. SMA967B LC-1009 ENGINE COOLING SYSTEM ZD Water Pump CAUTION: + When removing water pump assembly, be careful not to get coolant on drive belt. + Water pump cannot be disassembled and should be replaced as a unit. + Always replace with new gasket. + After installing water pump, connect hose and clamp securely, then check for leaks using radiator cap tester. Refer to MA section. JLC373B REMOVAL AND INSTALLATION 1. Drain coolant from radiator and cylinder block.
Refer to MA section ("Changing Engine Coolant", "ENGINE MAINTENANCE"). 2. Remove radiator upper hose. 3. Remove radiator shroud.
4. Remove cooling fan. 5. Remove drive belt. Refer to MA section, "Checking Drive Belt". 6. Remove insulator. 7. Remove vacuum pipe. 8. Remove TDC sensor. Refer to TDC sensor removal and installation in "TIMING GEAR". 9. Remove fan coupling with water pump. 10. Install in the reverse order of removal. LC-1010 ENGINE COOLING SYSTEM Water Pump (Cont'd) ZD INSPECTION 1. Check for badly rusted or corroded body assembly and vane. 2. Check for rough operation due to excessive end play. CAUTION: Do not disassemble water pump coupling assembly. SLC374B Thermostat JLC380B REMOVAL AND INSTALLATION JLC384B 1. Drain engine coolant. Refer to MA section, "Changing Engine Coolant".
2. Remove left side battery. (If so equipped) 3. Remove radiator upper hose. 4. Remove radiator shroud. 5. Remove intake air duct, inlet pipe. 6.
Remove harness and connectors. 7. Install in reverse order of removal. + After installation, run engine for a few minutes and check for leaks. + Be careful not to spill coolant in engine compartment. Use a rag to absorb coolant. LC-1011 ZD ENGINE COOLING SYSTEM Thermostat (Cont'd) INSPECTION 1. Check valve seating condition at ordinary temperatures. It should seat tightly.
2. Check valve opening temperature and maximum valve lift. SLC695A Tropical type and Gulf standard model Standard type and Australia model Frigid type Valve opening temperature °C (°F) 76.5 (170) 82 (180) 88 (190) Maximum valve lift mm/°C (in/°F) 10/90 (0.39/194) 10/95 (0.39/203) 10/100 (0.39/212) 3. Then check if valve closes at 5°C (9°F) below valve opening temperature.
Water Outlet INSPECTION Visual inspection for water leaks. If there is leakage, replace gasket.
SLC377B LC-1012 ENGINE COOLING SYSTEM ZD Radiator JLC378B REMOVAL AND INSTALLATION 1. Remove under cover. 2. Drain engine coolant.
Refer to MA section, "Changing Engine Coolant". 3.
Remove air cleaner case, air duct and resonator. 4. Remove battery (right side). 5. Move window washer tank. 6. Remove radiator shroud (lower). 7.
Remove radiator shroud (front). 8. Disconnect radiator hose (upper and lower). 9. Disconnect reservoir tank hose. 10. Disconnect A/T oil cooler hose (Only A/T models). LC-1013 ENGINE COOLING SYSTEM Radiator (Cont'd) ZD 11. Remove radiator. 12. After repairing or replacing radiator, install all removed parts in reverse order of removal. Cooling Fan (Crankshaft driven) DISASSEMBLY AND INSTALLATION JLC379B + Do not release the drive belt tension by removing the fan/ water pump pulley. + Fan coupling cannot be disassembled and should be F is present, install fan so replaced as a unit. If front mark j F that side marked j faces the front. + Proper alignment of these components is essential. Improper alignment will cause them to wobble and may eventually cause the fan to separate from the water pump causing extensive damage.
LC-1014 ZD SERVICE DATA AND SPECIFICATIONS (SDS) Engine Lubrication System Oil pressure check Oil pump Unit: mm (in) Engine speed rpm Approximate discharge pressure kPa (bar, kg/cm2, psi) Idle speed More than 147 (1.47, 1.5, 21) 2,000 More than 539 (5.39, 5.5, 78) 4,000 More than 736 (7.36, 7.5, 107) 1 Body to outer gear radial clearance V 2 Inner gear to outer gear tip clearance V 0.114 - 0.200 (0.0045 - 0.0079) Less than 0.180 (0.0071) 3 Body to inner gear axial clearance V 0.05 - 0.09 (0.0020 - 0.0035) 4 Body to outer gear axial clearance V 0.050 - 0.105 (0.0020 - 0.0041) Inner gear to brazed portion of housing 5 clearance V 0.045 - 0.091 (0.0018 - 0.0036) Regulator valve to oil pump cover clear6 ance V 0.040 - 0.097 (0.0016 - 0.0038) Engine Cooling System Radiator Thermostat Unit: kPa (bar, kg/cm2, psi) Cap relief pressure Leakage test pressure 78 - 98 (0.78 - 0.98, 0.8 - 1.0, 11 - 14) 157 (1.57, 1.6, 23) Tropical type Standard type Valve opening temperature °C (°F) 76.5 (170) 82 (180) Valve lift mm/°C (in/°F) More than 10/95 (0.39/203) More than 10/95 (0.39/203) LC-1015 MAINTENANCE SECTION MA MODIFICATION NOTICE: + The ZD30DDTi engine has been replaced with the RD28ETi engine. + Descriptions for the engine coolant mixture ratio have been modified. CONTENTS PERIODIC MAINTENANCE .... 1002 Maintenance Schedule for Diesel Engines (Annual Mileage < 30,000 km/year) .... 1002 Chassis and Body Maintenance .... 1003 Maintenance Under Severe Driving Conditions (Annual Driving Distance < 30,000 km/year)... 1004 Maintenance Schedule for Diesel Engines (Annual Mileage > 30,000 km/year) .... 1005 Chassis and Body Maintenance .... 1006 Maintenance Under Severe Driving Conditions (Annual Driving Distance > 30,000 km/year)... 1007 RECOMMENDED FLUIDS AND LUBRICANTS .... 1008 Fluids and Lubricants........ 1008 SAE Viscosity Number........ 1009 Engine Coolant Mixture Ratio........ 1010 ZD ENGINE MAINTENANCE .... 1011 Checking Tightening Torque........ 1011 Adjusting Intake and Exhaust Valve Clearance........
1011 Checking Drive Belt .... 1011 Removal .... 1012 Installation .... 1012 Changing Engine Oil........ 1012 Changing Engine Oil Filter........ 1013 Changing Engine Coolant........ 1014 Checking Cooling System........ 1016 Checking and Replacing Fuel Filter and Draining Water .... 1017 Checking Fuel Lines .... 1018 Cleaning and Replacing Air Cleaner Filter ...... 1019 CHASSIS AND BODY MAINTENANCE .... 1020 Checking A/T Fluid .... 1020 Changing A/T Fluid .... 1021 SERVICE DATA AND SPECIFICATIONS (SDS)........ 1022 Engine Maintenance (ZD)........
1022 MA PERIODIC MAINTENANCE The following tables show the normal maintenance schedule. Depending upon weather and atmospheric conditions, varying road surfaces, individual driving habits and vehicle usage, additional or more frequent maintenance may be required. Periodic maintenance beyond the last period shown on the tables requires similar maintenance. Maintenance Schedule for Diesel Engines (Annual Mileage < 30,000 km/year) ZD30DDTi engine Abbreviations: R = Replace, I = Inspect: Correct or replace if necessary, C = Clean. MAINTENANCE OPERATION MAINTENANCE INTERVAL Perform on a kilometer basis, but on an annual basis when driving less than 15,000 km (9,000 miles) per year.
km x 1,000 15 30 45 60 75 90 (miles x 1,000) (9) (18) (27) (36) (45) (54) Months 12 24 36 48 60 72 Reference pages Engine compartment and under vehicle Engine oil (Use recommended oil)★ R R R R R R MA-1012 R R R R R R MA-1013 Drive belts I I I I I I MA-1011 Cooling system I I I I I I Engine oil filter (Use Eco filter or equivalent)★ Engine anti-freeze coolant (Use genuine NISSAN Antifreeze Coolant (L2N) or equivalent) See NOTE (1) See NOTE (2) I Air cleaner filter★ R Fuel lines I MA-1016 MA-1010, 1014 I MA-1019 I MA-1018 Injection nozzles See NOTE (3) *1 Intake & exhaust valve clearance See NOTE (4) MA-1011 Fuel filter★ R R MA-1017 NOTE: (1) Oil filter element assembly and O-ring seal are replacement parts. (2) First replace at 90,000 km (54,000 miles)/60 months, then every 60,000 km (36,000 miles)/48 months. Perform "I" (Checking the mixture ratio and correcting the mixture ratio if necessary) at the middle of replacement interval. (3) If engine power decreases, black exhaust smoke is emitted or engine noise increases, check injection nozzles and, if necessary, replace injection nozzle assembly. (4) If valve noise increases, check valve clearance. ★ Maintenance items with "★" should be performed more frequently according to "Maintenance under severe driving conditions". *1: "Injection Tube and Injection Nozzle" in EC section MA-1002 PERIODIC MAINTENANCE Chassis and Body Maintenance Abbreviations: R = Replace, I = Inspect: Correct or replace if necessary, L = Lubricate, T = Tighten, [ ] = At the specified mileage only MAINTENANCE OPERATION MAINTENANCE INTERVAL Perform on a kilometer basis, but on an annual basis when driving less than 15,000 km (9,000 miles) per year. km x 1,000 15 30 45 60 75 90 (miles x 1,000) (9) (18) (27) (36) (45) (54) Months 12 24 36 48 60 72 Reference pages Underhood and under vehicle Headlamp aiming I I I I I I — When alignment (if necessary, balance & rotate wheels) I I I I I I — Brake pads, rotors & other brake components★ I I I I I I — Foot brake, parking brake & clutch (for free play, stroke & operation) I I I I I I — Brake booster vacuum hoses, connections & check valve I Brake & clutch, systems and fluid (for level and leaks) I Brake fluid★ I R Power steering fluid and lines (for level and leaks) Supplemental air bag systems I I I I I I R I I I I — I — R — I — See NOTE (1) RS-1007 Ventilation air filter★ R Manual transmission oil (Inspect for leaks. Replace if leaks are found.) I Automatic transmission fluid (for level and leaks)★ I R I I I R — [R] — I I I I I I — Greasing point of propeller shaft See NOTE (2) L L L L L L — Transfer fluid and limited-slip differential (LSD) gear oil (for level & leaks or replace)★ See NOTE (3) I I I R I I — Drive shafts & steering damper★ I I I I I I — Front wheel bearing grease★ I R I R I R — Front axle joint in knuckle flange L L L — Free-running hub grease★ I I I I I I — Body mounting bolts & nuts T T T T T T — Steering gear & linkage, axle & suspension parts, propeller shaft & exhaust system★ I I I I I I Body corrosion See NOTE (4) — — NOTE: (1) Inspect after 10 years, then every 2 years. (2) The propeller shaft should be re-greased after being immersed in water. (3) Including differential gear with differential lock. (4) Inspect once per year. ★ Maintenance items with "★" should be performed more frequently according to "Maintenance under severe driving conditions". MA-1003 PERIODIC MAINTENANCE Maintenance Under Severe Driving Conditions (Annual Driving Distance < 30,000 km/year) The maintenance intervals shown on the preceding pages are for normal operating conditions. If the vehicle is mainly operated under severe driving conditions as shown below, more frequent maintenance must be performed on the following items as shown in the table. A B C D E — — — — — Driving under dusty conditions Driving repeatedly short distances Towing a trailer or caravan Extensive idling Driving in extremely adverse weather conditions or in areas where ambient temperatures are either extremely low or extremely high F — Driving in high humidity areas or in mountainous areas Driving condition G — Driving in areas using salt or other corrosive materials H — Driving on rough and/or muddy roads or in the desert I — Driving with frequent use of braking or in mountainous areas J — Frequent off road use or driving in water Maintenance operation Maintenance item A B C D . . . . . . Engine oil & engine oil filter A . . . . .
. . .
.
Air cleaner filter A . . . E . . . . . Fuel filter A . C . . . G H I . Brake pads, rotors & other brake components . . .
.
. F .
. . . Brake fluid A . .
.
. . .
. . . Ventilation air filter . . C . . . . H . . Automatic transmission fluid . . C . . . . H . . Transfer fluid and limited-slip differential (LSD) gear oil . . C . . . . H . . Drive shafts & steering damper . . . . .
. . . . J Front wheel bearing grease .
. . . . J Free-running hub grease . . . . . . G H . .
Steering gear & linkage, axle & suspension parts, propeller shaft & exhaust system Maintenance interval Replace Every 7,500 km (4,500 miles) or 6 months Replace Every 30,000 km (18,000 miles) or 24 months Replace Every 22,500 km (13,500 miles) or 18 months Inspect Every 7,500 km (4,500 miles) or 6 months Replace Every 15,000 km (9,000 miles) or 12 months Replace Every 15,000 km (9,000 miles) or 12 months Replace Every 30,000 km (18,000 miles) or 24 months Replace Every 30,000 km (18,000 miles) or 24 months Inspect Every 7,500 km (4,500 miles) or 6 months Inspect Every 7,500 km (4,500 miles) or 6 months Inspect Every 7,500 km (4,500 miles) or 6 months Inspect Every 7,500 km (4,500 miles) or 6 months MA-1004 PERIODIC MAINTENANCE Maintenance Schedule for Diesel Engines (Annual Mileage > 30,000 km/year) ZD30DDTi engine Abbreviations: R = Replace, I = Inspect: Correct or replace if necessary. MAINTENANCE OPERATION MAINTENANCE INTERVAL Perform on a kilometer basis only. km x 1,000 15 30 45 60 75 90 (miles x 1,000) (9) (18) (27) (36) (45) (54) Reference pages Engine compartment and under vehicle Engine oil (Use recommended oil)★ Engine oil filter (Use Eco filter or equivalent)★ See NOTE (1) Drive belts Cooling system Engine anti-freeze coolant (Use genuine NISSAN Antifreeze Coolant (L2N) or equivalent) R R R R R R MA-1012 R R R R R R MA-1013 I I I I I I MA-1011 I See NOTE (2) I I I MA-1016 R MA-1010, 1014 Air cleaner filter★ R MA-1019 Fuel lines I MA-1018 Injection nozzles See NOTE (3) *1 Intake & exhaust valve clearance See NOTE (4) MA-1011 Fuel filter★ R MA-1017 NOTE: (1) Oil filter element assembly and O-ring seal are replacement parts. (2) First replace at 90,000 km (54,000 miles), then every 60,000 km (36,000 miles). Perform "I" (Checking the mixture ratio and correcting the mixture ratio if necessary) at the middle of replacement interval. (3) If engine power decreases, black exhaust smoke is emitted or engine noise increases, check injection nozzles and, if necessary, replace injection nozzle assembly. (4) If valve noise increases, check valve clearance.
★ Maintenance items with "★" should be performed more frequently according to "Maintenance under severe driving conditions". *1: "Injection Tube and Injection Nozzle" in EC section MA-1005 PERIODIC MAINTENANCE Chassis and Body Maintenance Abbreviations: R = Replace, I = Inspect: Correct or replace if necessary, L = Lubricate, T = Tighten MAINTENANCE OPERATION Perform on a kilometer basis only MAINTENANCE INTERVAL km x 1,000 10 (miles x 1,000) (6) 20 30 40 50 60 70 80 90 100 110 120 (12) (18) (24) (30) (36) (42) (48) (54) (60) (66) (72) Reference pages Underhood and under vehicle Headlamp aiming I I I I — When alignment (if necessary, balance & rotate wheels) I I I I — Brake pads, rotors & other brake components★ I I I I — Foot brake, parking brake & clutch (for free play, stroke & operation) I I I I — Brake booster vacuum hoses, connections & check valve I Brake & clutch, systems and fluid (for level and leaks) I Brake fluid★ I R Power steering fluid and lines (for level and leaks) Supplemental air bag systems I I I I — I — R — I See NOTE (1) — RS-1007 Ventilation air filter★ R R R R Manual transmission oil (Inspect for leaks.
Replace if leaks are found.) I I R I — — Automatic transmission fluid (for level and leaks)★ I I I I — Greasing point of propeller shaft See NOTE (2) L L L L — Transfer fluid and limited-slip differential (LSD) gear oil (for level & leaks or replace)★ See NOTE (3) I R I R — Drive shafts & steering damper★ I I I I — Front wheel bearing grease★ I R I R — L — Front axle joint in knuckle flange L Free-running hub grease★ I I I I — Body mounting bolts & nuts T T T T — I I I I Steering gear & linkage, axle & suspension parts, propeller shaft & exhaust system★ Body corrosion See NOTE (4) — — NOTE: (1) Inspect after 10 years, then every 2 years.
(2) The propeller shaft should be re-greased after being immersed in water.
(3) Including differential gear with differential lock. (4) Inspect once per year.
★ Maintenance items with "★" should be performed more frequently according to "Maintenance under severe driving conditions". MA-1006 PERIODIC MAINTENANCE Maintenance Under Severe Driving Conditions (Annual Driving Distance > 30,000 km/year) The maintenance intervals shown on the preceding pages are for normal operating conditions. If the vehicle is mainly operated under severe driving conditions as shown below, more frequent maintenance must be performed on the following items as shown in the table. A B C D E — — — — — Driving under dusty conditions Driving repeatedly short distances Towing a trailer or caravan Extensive idling Driving in extremely adverse weather conditions or in areas where ambient temperatures are either extremely low or extremely high F — Driving in high humidity areas or in mountainous areas Driving condition G — Driving in areas using salt or other corrosive materials H — Driving on rough and/or muddy roads or in the desert I — Driving with frequent use of braking or in mountainous areas J — Frequent off road use or driving in water Maintenance item A B C D . . . . . . Engine oil & engine oil filter A . . . .
. . . . . Air cleaner filter A . .
. E . . .
. . Fuel filter A . C . .
. G H I . Brake pads, rotors & other brake components . . .
. . F . . . . Brake fluid A . . . .
Ventilation air filter . . C . . . . H . . Automatic transmission fluid . . C . . .
. H . . Transfer fluid and limited-slip differential (LSD) gear oil . . C . . . . H .
. Drive shafts & steering damper .
. . . . J Front wheel bearing grease . . . . J Free-running hub grease . . . . . .
G H . . Steering gear & linkage, axle & suspension parts, propeller shaft & exhaust system MA-1007 Maintenance operation Maintenance interval Replace Every 7,500 km (4,500 miles) Replace Every 30,000 km (18,000 miles) Replace Every 30,000 km (18,000 miles) Inspect Every 15,000 km (9,000 miles) Replace Every 30,000 km (18,000 miles) Replace Every 15,000 km (9,000 miles) Replace Every 60,000 km (36,000 miles) Replace Every 30,000 km (18,000 miles) Inspect Every 15,000 km (9,000 miles) Inspect Every 15,000 km (9,000 miles) Inspect Every 15,000 km (9,000 miles) RECOMMENDED FLUIDS AND LUBRICANTS Fluids and Lubricants Capacity (Approximate) Liter Imp measure Recommended Fluids/Lubricants Engine oil (Refill) With oil filter ZD30DDTi 5.7 5 qt Diesel engine: API CF4 or ACEA B3-96.98 or ACEA B3/E396.98*3 for ZD30DDTi Without oil filter ZD30DDTi 5.2 4-5/8 qt RHD 12.7 11-1/8 qt LHD 12.9 11-3/8 qt RHD 12.0 10-5/8 qt LHD 12.2 10-3/4 qt RHD LHD 13.8 14.0 12-1/8 qt 12-3/8 qt Manual transmission — — Differential carrier gear oil (without limited slip differential) — — API GL-5*1 — — Genuine Nissan ATF or equivalent*2 or API GL-4*1 11.8 10-3/8 qt Cooling system (with reservoir tank) With front heater Without front heater With rear heater ZD30DDTi M/T, A/T ZD30DDTi M/T, A/T ZD30DDTi M/T, A/T Transfer fluid Automatic transmission fluid Power steering fluid Brake and clutch fluid Multi-purpose grease Refill to the proper oil level according to the instructions in "Do-it-yourself operations" section of the owner's manual. — — Propeller shaft grease Air conditioning system refrigerant Air conditioning system lubricants Genuine Nissan Anti-freeze Coolant (L2N) or equivalent*4 API GL-4, Viscosity SAE 75W-90 only Genuine Nissan ATF or equivalent*2 Type DEXRONTMIII or equivalent DOT 3 or DOT 4 (U.S. FMVSS No. 116)*5 NLGI No. 2 (Lithium soap base) NLGI No. 2 (Molybdenum disulphide lithium soap base) — — HFC-134a (R-134a) — — Nissan A/C System Oil Type S or exact equivalent *1: For further details, see "SAE viscosity number". *2: For more information regarding suitable fluids, contact a Nissan dealer for correct brands of DEXRONTMIII/MERCONTM Automatic Transmission Fluid. *3: Never use API CG-4. *4: Use Genuine Nissan Anti-freeze Coolant (L2N) or equivalent in its quality, in order to avoid possible aluminum corrosion within the engine cooling system caused by the use of non-genuine engine coolant. Note that any repairs for the incidents within the engine cooling system while using non-genuine engine coolant may not be covered by the warranty even if such incidents occurred during the warranty period. *5: Never mix DOT 3 & DOT 4. MA-1008 RECOMMENDED FLUIDS AND LUBRICANTS SAE Viscosity Number TI0006 + + For cold areas: 10W-30 is preferable. On turbocharger models, 5W-20 is not recommended, and 5W-30 should be used only below 0°C (32°F). For hot and warm areas: 20W-40 and 20W-50 are suitable. TI0003 + + MA-1009 For cold and warm areas: 75W-90 for transfer and 80W-90 for differential are preferable. For hot areas: 90 is suitable for ambient temperatures below 40°C (104°F). RECOMMENDED FLUIDS AND LUBRICANTS Engine Coolant Mixture Ratio The engine cooling system is filled at the factory with a highquality, year-round and extended life engine coolant. The high quality engine coolant contains the specific solutions effective for the anti-corrosion and the anti-freeze function. Therefore, additional cooling system additives are not necessary. CAUTION: + When adding or replacing coolant, be sure to use only Genuine Nissan Anti-freeze Coolant (L2N) or equivalent. Because L2N is premixed type coolant (Mixture ratio 50%). The use of other types of engine coolant may damage your cooling system. + When checking the engine coolant mixture ratio by the coolant hydrometer, use the chart below to correct your hydrometer reading (specific gravity) according to coolant temperature. Mixed coolant specific gravity Unit: Specific gravity Coolant temperature °C (°F) Engine coolant mixture ratio 15 (59) 25 (77) 35 (95) 45 (113) 30% 1.046 - 1.050 1.042 - 1.046 1.038 - 1.042 1.033 - 1.038 50% 1.076 - 1.080 1.070 - 1.076 1.065 - 1.071 1.059 - 1.065 WARNING: Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator. Wait until the engine and radiator cool down. MA-1010 ZD ENGINE MAINTENANCE Checking Tightening Torque Checking should be performed while engine is cold. MANIFOLD BOLTS AND NUTS Intake and exhaust manifolds: Intake : 25 - 28 Nzm (2.5 - 2.9 kg-m, 18 - 20 ft-lb) Exhaust : 40 - 49 Nzm (4.0 - 4.5 kg-m, 29 - 36 ft-lb) Adjusting Intake and Exhaust Valve Clearance Refer to EM section. Checking Drive Belt + Because an auto tensioner adjustment mechanism is provided, it is not necessary to check or adjust the tension of accessory belt. 1. Inspect for cracks, fraying, wear or oil adhesion. Replace if necessary. The belts should not touch the bottom of the pulley groove. 2. Check the damper unit of the auto tensioner for oil leaks. JMA088D Part Water pump, alternator, air conditioner compressor belt Belt specifications Tension Belt deflection V-ribbed belt (7 ribs) Automatic adjustment by auto tensioner Automatic adjustment by auto tensioner MA-1011 ENGINE MAINTENANCE ZD Removal WATER PUMP, ALTERNATOR AND AIR CONDITIONER BELT 1. Remove radiator shroud.
2. Contract and hold the auto tensioner using the following procedure. a. Securely hold the 19 mm (0.75 in) hexagonal portion A of auto tensioner with a closed wrench. + Preferably use a tool with a handhold of 500 mm (19.69 in) or more in length. + No bolts or nuts are required to be loosened during the operation. b. Turn the hexagonal portion A in the direction shown by the arrow to contract the damper unit of the auto tensioner. CAUTION: + Because the tensioner has a high tension, it shall be securely held and turned with a closed wrench. + Because the hexagonal portion A of the tensioner is made of aluminum and may be damaged by sudden input, turn it slowly according to the contraction of the damper unit. 3. Remove the belt from the alternator pulley first, and then remove it from the other pulleys. + If the tensioner is not held firmly, your finger may get caught between the belt and the pulleys. Confirm the holding of the tensioner, and then hold the belt side in the place away from the pulleys to attach or remove the belt, paying attention to prevent your finger from being caught. CAUTION: + When handling the belt, pay attention to prevent the oil or coolant from adhering to the belt. + Do not distort or bend the belt intensively.
Installation + Install the belt in the reverse order of removal. + After installation of the belt, confirm that the belt engages the pulleys securely. + Depending on the engagement between the belt and the idler pulley, noise (belt noise) may be heard when the engine is started just after installation. This noise will stop with time. Changing Engine Oil WARNING: + Be careful not to burn yourself, as engine oil is hot. + Prolonged and repeated contact with used engine oil may cause skin cancer; try to avoid direct skin contact with used oil. If skin contact is made, wash thoroughly with soap or hand cleaner as soon as possible.
1. Warm up engine, and check for oil leakage from engine components. 2. Remove drain plug and oil filler cap. SMA101D MA-1012 ENGINE MAINTENANCE Changing Engine Oil (Cont'd) ZD 3. Drain oil and fill with new engine oil.
Oil grade: API CF4 or ACEA B3-96.98 or ACEA B3/E396.98 Viscosity: See "RECOMMENDED FLUIDS AND LUBRICANTS", MA-1009. Refill oil capacity (approximate): Without oil filter change 5.2! (4-5/8 Imp qt) With oil filter change 5.7! (5 Imp qt) CAUTION: + Be sure to clean and install oil pan drain plug with washer. Drain plug: : 54 - 58 Nzm (5.5 - 6.0 kg-m, 40 - 43 ft-lb) + The refill capacity changes depending on the oil temperature and drain time; use these valves as a reference and be certain to check with the dipstick when changing the oil.
4. Check oil level. 5.
Start engine. Check area around drain plug and oil filter for any sign of oil leakage. 6.
Run engine for a few minutes, then turn it off. After 10 minutes check oil level.
SMA102D JMA103D Changing Engine Oil Filter REMOVAL 1. Insert a suitable tool with a 12.7 mm square (1/2 inch square) such as an extension bar and ratchet handle into the filter body, and loosen the body by approximately 4 turns. WARNING: Be careful not to burn yourself, as the engine and engine oil are hot. JMA104D MA-1013 ENGINE MAINTENANCE Changing Engine Oil Filter (Cont'd) JMA105D ZD 2. Set the m mark of the filter body to the top position and discharge the oil. + Receive the oil discharged from the drain hose in a tray. + About 500 cc (17.6 Imp fl oz) of oil will be discharged in about 3 minutes.
+ The oil is discharged from the oil catcher to under the vehicle through the drain hose. 3. Remove the filter body, and then remove the oil filter element. CAUTION: + If the engine oil gets on the engine or vehicle, thoroughly wipe it off.
+ Thoroughly wipe off the oil remaining in the oil catcher. (This is to prevent misidentifying oil leaking from the oil catcher as oil leaking from the engine.) 4. Remove the O-ring from the filter body.
+ Press the O-ring in any direction with your finger, and pull on the portion of the O-ring separated from the filter body to remove it. CAUTION: Because wire and screwdrivers may cause damage to the filter body, do not use such tools. JMA106D INSTALLATION 1. Thoroughly remove foreign matter adhering to the inside of filter body and O-ring mounting areas (of the body and oil cooler).
2. Install the oil filter element and O-ring to the filter body. + Securely press the oil filter element into the filter body.
3. Install the filter body. : 20 - 24 Nzm (2.0 - 2.5 kg-m, 15 - 18 ft-lb) 4. After warming up the engine, check that no engine oil leaks. Changing Engine Coolant WARNING: To avoid the danger of being scalded, never change the coolant when the engine is hot. —DRAINING ENGINE COOLANT— 1. Move heater TEMP control knob all the way to HOT. 2. Remove undercover and open radiator drain plug at the bottom of radiator. SMA972C 3. Remove radiator filler cap (side with pressure valve). SMA117D MA-1014 ENGINE MAINTENANCE Changing Engine Coolant (Cont'd) ZD 4. Remove water inlet and cylinder block drain plug located at left center of cylinder block. 5. Remove reservoir tank (sides with pressure valve and without pressure valve) and drain coolant. JMA107D SMA108D —REFILLING ENGINE COOLANT— SMA182B 6. Install reservoir tank, radiator drain plug, and cylinder block drain plugs. + Apply sealant to the thread of cylinder block drain plug. Cylinder block drain plug: : 24 - 26 Nzm (2.4 - 2.7 kg-m, 18 - 19 ft-lb) Water inlet drain plug: Height (H) mm (in): 5.0 - 7.8 (0.197 - 0.307) 7. Move heater TEMP control knob all the way to HOT. 8. Fill radiator with coolant up to the filler neck and install radiator cap. For coolant mixture ratio, refer to MA-1010. 9. Fill reservoir tank (with pressure valve) with coolant up to the filler neck. 10. Fill reservoir tank with coolant up to the

MAX level. MA-1015 ENGINE MAINTENANCE Changing Engine Coolant (Cont'd) SMA412B JMA109D ZD Coolant capacity (With reservoir tank): ! (Imp qt) RHD models Without rear heater 11.8 (10-3/8) With rear heater 12.9 (11-3/8) LHD models Without rear heater 11.6 (10-1/4) With rear heater 12.7 (11-1/8) Reservoir tank capacity (for MAX level): 1.2 ! (1-1/8 Imp qt) Pour coolant through coolant filler neck slowly to allow air in system to escape. 11. Install radiator cap (side with pressure valve). 12. Warm up engine to normal operating temperature. 13. Run engine at 2,000 rpm for 10 seconds and return to idle speed. + Repeat 2 or 3 times.
Watch coolant temperature gauge so as not to overheat the engine. 14. Stop engine and cool it down. + Cool down using a fan to reduce the time. 15. Remove the reservoir tank filler cap (side with pressure valve) and check coolant level. + If necessary, refill reservoir tank (side with pressure valve) up to filler neck with coolant. 16. Refill reservoir tank to Max line with coolant. 17. Repeat step 10 through step 16 two or more times. 18. Warm up engine, and check for sound of coolant flow while running engine from idle up to 2,000 rpm with heater temperature control set at several positions between COOL and HOT. + Sound may be noticeable at heater water cock. 19.
If sound is heard, bleed air from cooling system by repeating steps 12 through 18 until coolant level no longer drops. + Clean excess coolant from engine. Checking Cooling System CHECKING HOSES AND CLAMPS Check hoses and clamps for proper attachment, leaks, cracks, damage, loose connections, chafing and deterioration. CHECKING RADIATOR CAP Apply pressure to radiator cap (side with pressure valve) with cap tester to see if it is satisfactory. Radiator cap relief pressure: 59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm2, 9 - 14 psi) SLC613 MA-1016 ENGINE MAINTENANCE Checking Cooling System (Cont'd) ZD Pull the negative-pressure valve to open it. Check that it closes completely when released. SMA871B CHECKING COOLING SYSTEM FOR LEAKS Apply pressure to the cooling system with cap tester to check for leakage. Testing pressure: 98 kPa (0.98 bar, 1.0 kg/cm2, 14 psi) CAUTION: Use of higher pressure than the specified value may cause damage to radiator. JMA109D JMA110D Checking and Replacing Fuel Filter and Draining Water Be careful not to spill fuel in engine compartment. Place a rag to absorb fuel. CHECKING FUEL FILTER Check fuel filter for fuel leakage, damage and other abnormal signs. DMA011 REPLACING FUEL FILTER 1.
Disconnect harness connector and drain fuel. 2. Remove fuel filter using band-type filter wrench. 3. Remove fuel filter and fuel filter sensor. CAUTION: Remove fuel filter without spilling fuel. If spilt, wipe off immediately. Be specially careful not to spill fuel on engine mount insulator. SMA111D MA-1017 ENGINE MAINTENANCE Checking and Replacing Fuel Filter and Draining Water (Cont'd) ZD 4. Wipe clean fuel filter mounting surface on fuel filter bracket and smear a little fuel on rubber seal of fuel filter. 5. Screw fuel filter on until a slight resistance is felt, then tighten an additional more than 2/3 of a turn. 6. Install fuel filter sensor to new fuel filter. (Type A) 7. Bleed air from fuel filter. Refer to "Air Bleeding" in EC section. 8. Start engine and check for leaks. SMA010 DRAINING WATER 1. Drain water as follows. Type A Loosen drain cock and drain water. Loosening drain cock four to five turns causes water to start draining. Do not remove drain cock by loosening it excessively. If water does not drain properly, move the priming pump up and down. SMA825B Type B Loosen air bleeder screw from the sedimentor cover and then loosen drain cock and drain water. Loosening drain cock four to five turns causes water to start draining. Do not remove drain cock by loosening it excessively. SMA281C 2. Bleed air.
Refer to "Air Bleeding" in EC section. Checking Fuel Lines Check fuel lines and tank for proper attachment, leaks, cracks, damage, loose connections, chafing and deterioration. CAUTION: Keep clean parts with compressed air when assembling. SMA803A MA-1018 ENGINE MAINTENANCE ZD Cleaning and Replacing Air Cleaner Filter SMA114D VISCOUS PAPER TYPE The viscous paper type air cleaner filter does not require any cleaning operation between renewal. MA-1019 CHASSIS AND BODY MAINTENANCE Checking A/T Fluid SMA515C 1. Warm up engine. 2. Check for fluid leakage. 3. Before driving, fluid level can be checked at fluid temperatures of 30 to 50°C (86 to 122°F) using "COLD" range on dipstick. a. Park vehicle on level surface and set parking brake. b. Start engine and move selector lever through each gear position. Leave selector lever in "P" position.
c.
Check fluid level with engine idling.
d.
Remove dipstick and note reading. If level is at low side of either range, and fluid to the charging pipe. e. Re-insert dipstick into charging pipe as far as it will go.
f. Remove dipstick and note reading. If reading is at low side of range, add fluid to the charging pipe. Do not overfill. 4. Drive vehicle for approximately 5 minutes in urban areas. 5. Re-check fluid level at fluid temperatures of 50 to 80°C (122 to 176°F) using "HOT" range on dipstick. CAUTION: Securely install A/T fluid level gauge. SMA070D 6. Check fluid condition. + If fluid is very dark or smells burned, refer to AT section for checking operation of A/T. Flush cooling system after repair of A/T. + If A/T fluid contains frictional material (clutches, bands, etc.), replace radiator and flush cooler line using cleaning solvent and compressed air after repair of A/T. Refer to LC section ("Radiator", "ENGINE COOLING SYSTEM"). SMA107 MA-1020 CHASSIS AND BODY MAINTENANCE Changing A/T Fluid SMA515C 1. Warm up A/T fluid. 2. Stop engine. 3. Drain A/T fluid from drain plug and refill with new A/T fluid.
Always refill same volume with drained fluid. Fluid grade: Genuine Nissan ATF or equivalent. Refer to "RECOMMENDED FLUIDS AND LUBRICANTS", MA-1008.
Fluid capacity (With torque converter): 11.8 ! (10-3/8 Imp qt) Drain plug: : 29 - 39 Nzm (3.0 - 4.0 kg-m, 22 - 29 ft-lb) 4. Run engine at idle speed for five minutes. 5. Check fluid level and condition. Refer to "Checking A/T Fluid". If fluid is still dirty, repeat steps 2 through 5. MA-1021 SERVICE DATA AND SPECIFICATIONS (SDS) Engine Maintenance (ZD) INSPECTION AND ADJUSTMENT Cooling system check Unit: kPa (bar, kg/cm2, psi) Oil capacity (Refill capacity) Unit: ! (Imp qt) With oil filter change Without oil filter change 5.7 (5) Cooling system testing pressure Radiator cap relief pressure 5.2 (4-5/8) MA-1022 98 (0.98, 1.0, 14) 59 - 98 (0.59 - 0.98, 0.6 - 1.0, 9 - 14) MANUAL TRANSAXLE SECTION MT CONTENTS
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FS5R50B PREPARATION Special Service Tools Tool number Tool name Description KV321022S1 Bushing hook set 1 KV32102211 V Bushing hook 2 V KV32102221 Spacer 3 V KV32102240 Spacer 4 V KV32102231 Bolt (M12) 5 V KV32102250 Bolt (M8) Removing OD gear bushing Removing 3rd gear bushing a: 75 (2.95) dia. b: 59 (2.32) dia. c: 15 (0.59) d: 55 (2.17) dia. e: 42.2 (1.661) dia. f: 55 (2.17) dia. g: 40.2 (1.583) dia. Unit: mm (in) NT730 KV32102400 Counter gear stopper Installing OD gear bushing a: 48 (1.89) b: 48 (1.89) c: 12 (0.47) d: 15 (0.59) e: 49 (1.93) f: 40 (1.57) g: 5 (0.20) Unit: mm (in) NT731 KV32102501 Mainshaft stopper Installing mainshaft bearing Installing OD main gear Installing mainshaft rear end bearing a: 2 (0.08) b: 212 (8.35) c: 2 (0.08) d: 85 (3.35) e: 75 (2.95) f: 16 (0.63) g: 38 (1.50) h: 115 (4.53) i: 140 (5.51) j: 110 (4.33) Unit: mm (in) NT732 KV31100300 Pin punch Removing and installing retaining pin for reverse check assembly, reverse shift fork, reverse fork rod bracket, striking lever, and shift lever bracket a: 4.5 (0.177) dia.
b: 12 (0.47) dia. Unit: mm (in) NT442 MT-1002 PREPARATION Special Service Tools (Cont'd) Tool number Tool name FS5R50B Description ST25420001 Clutch spring compressor Installing sub-gear components a: 157 mm (6.18 in) NT443 ST30031000 Puller Removing OD main gear Removing main drive gear bearing a: 90 (3.54) dia. b: 50 (1.97) dia.
Unit: mm (in) NT411 ST30613000 Drift Installing main drive gear bearing Installing OD synchronizer cone a: 71.5 (2.815) dia. b: 47.5 (1.870) dia.
Unit: mm (in) NT073 ST33200000 Drift Installing 3rd gear bushing Installing 3rd & 4th synchronizer assembly Installing counter gear front bearing Installing counter gear rear bearing (Use with KV40100630) a: 60 (2.36) dia. b: 44.5 (1.752) dia. Unit: mm (in) NT091 KV40100630 Drift Installing counter gear rear bearing (Use with ST33200000) a: 67.5 (2.657) dia. b: 44 (1.73) dia. c: 38.5 (1.516) dia. Unit: mm (in) NT107 KV38102100 Drift Installing front cover oil seal a: 44 (1.73) dia. b: 24.5 (0.965) dia. Unit: mm (in) NT084 ST22452000 Drift Installing OD gear bushing Installing OD main gear Installing mainshaft rear end bearing a: 45 (1.77) dia.
b: 36 (1.42) dia.
Unit: mm (in) NT065 ST30720000 Drift Installing rear oil seal a: 77 (3.03) dia. b: 55.5 (2.185) dia. Unit: mm (in) NT086 MT-1003 FS5R50B PREPARATION Commercial Service Tools Tool name Description Removing Removing Removing Removing Removing Removing Removing Removing Removing Puller companion flange mainshaft rear end bearing OD synchronizer assembly OD gear bushing OD main gear mainshaft bearing reverse synchronizer hub 3rd & 4th synchronizer hub 3rd gear bushing NT077 Puller Removing mainshaft low gear bearing Removing counter low & high gear front bearing Removing counter gear front and rear bearing NT726 Puller Installing reverse synchronizer hub Installing 1st & 2nd synchronizer hub Installing mainshaft bearing a: 48.6 (1.913) dia. b: 41.6 (1.638) dia.
c: 410 (16.14) Unit: mm (in) NT733 Drift Removing slide ball bearing Installing slide ball bearing a: 16 (0.63) dia. b: 18 (0.71) dia. c: 30 (1.18) d: 300 (11.81) Unit: mm (in) NT734 MT-1004 Symptom SUSPECTED PARTS (Possible cause) 1 2 Jumps out of gear MT-1005 MT-1014 MT-1012 MT-1012 MT-1012 MT-1012 GEAR (Worn or damaged) BEARING (Worn or damaged) BAULK RING (Worn or damaged) INSERT SPRING (Damaged) Refer to MA section (''Checking M/T Oil'', ''CHASSIS AND BODY MAINTENANCE''). SHIFT FORK (Worn) 1 MT-1014 1 CHECK PLUG RETURN SPRING AND CHECK BALL (Worn or damaged) Hard to shift or will not shift MT-1011 1 OIL SEAL (Worn or damaged) 3 MT-1011 Oil leakage LIQUID GASKET (Damaged) OIL (Level too high) OIL (Wrong) Noise OIL (Level low) FS5R50B Reference page Transmission model NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING 3 3 2 2 2 1 2 FS5R50B NVH Troubleshooting Chart Use the chart below to help you find the cause of the symptom.
The numbers indicate the order of the inspection. If necessary, repair or replace these parts. 2 2 FS5R50B ON-VEHICLE SERVICE Replacing Rear Oil Seal REMOVAL 1. Remove transfer assembly. — Refer to TF section. 2. Pull out rear oil seal. SMT321B INSTALLATION 1. Install rear oil seal. ● Before installing apply multi-purpose grease to seal lip.
2. Install transfer assembly. — Refer to TF section. SMT322B Position Switch Check Switch Reverse position switch Neutral position switch Reverse position switch Neutral position switch SMT274D MT-1006 Gear position Continuity Reverse Yes Except reverse No Neutral Yes Except neutral No REMOVAL AND INSTALLATION FS5R50B Removal Exhaust front tube Front Exhaust rear tube Clutch operating cylinder Rear propeller tube Front propeller tube SMT321D 1.
Remove front and rear propeller shafts. Refer to PD section (''Removal and Installation'', ''PROPELLER SHAFT''). 2. Remove clutch operating cylinder. 3. Remove exhaust front and rear tubes. Refer to FE section (''EXHAUST SYSTEM''). 4. Disconnect vehicle speed sensor, back-up lamp switch, 4WD switch and neutral position switch harness connector. 5. Remove center brake cable. Refer to BR section. 6.
Remove shift lever of transmission. Refer to MT-1014 (FS5R50B). 7. Remove transfer control lever. Refer to TF section (''Removal'', ''REMOVAL AND INSTALLATION''). 8. Support engine by placing a jack under oil pan. ● Do not place jack under the oil pan drain plug. 9. Remove transmission with transfer from engine. WARNING: Support Manual Transmission with transfer, while removing it. MT-1007 FS5R50B REMOVAL AND INSTALLATION Installation ● Engine rear plate Apply sealant as below: Transmission case Engine block 23.6 (0.929) 23.6 (0.929) 1) Place : Sticked out portion for engine rear plate from transmission case. Do not apply sealant in this range. Sealant : Mating surface of transmission case and rear plate. 2) Sealant Rear plate : Apply genuine anaerobic liquid gasket, Three Bond TB1207B or TB1207D. : Apply genuine anaerobic liquid gasket, Three Bond TB1215 or TB1207D. Transmission case Grommet Engine rear plate Starter Unit: mm (in) SMT280D ● ZD30DDTi engine Tighten bolts securing transmission. Dowel hole For starter Engine Dowel hole ZD30DDTi M/T to engine Engine to M/T (Not used) Bolts Tightening torque N·m (kg-m, ft-lb) ! mm (in) 1 V M/T to engine block 83 - 113 (8.5 - 11.5, 61 - 83) 100 (3.94) 2 V M/T to engine oil pan 29 - 39 (3.0 - 4.0, 22 - 29) 100 (3.94) 3 V Engine oil pan to M/T 29 - 39 (3.0 - 4.0, 22 - 29) 70 (2.76) SMT324DB MT-1008 MT-1009 Mainshaft Release sleeve Front Main drive gear ball bearing Clutch housing Filler plug Drain plug Reverse idler gear shaft Reverse idler gear Reverse coupling sleeve Reverse main gear Slide ball bearing 1st main gear 1st & 2nd coupling sleeve Transmission case Counter gear Sub-gear Counter gear front bearing Front cover Main drive gear 3rd & 4th coupling sleeve Gear shift housing 3rd main gear 2nd main gear Mainshaft rear end bearing OD main gear Slide ball bearing Mainshaft bearing Shift lever Counter gear Counter gear rear end bearing OD counter gear OD gear case OD coupling sleeve OD synchronizer cone Control housing Striking rod DESCRIPTION FS5R50B Cross-sectional View SMT269D FS5R50B AIR BREATHER Air Breather Piping Remarks: 1. Route rubber hoses so that they are not bent pinched. 2. Hose insertion • Insert the tube bulge spool into the spool. • Insert the tube bulge into the right-angle bend section of the tube. • Insert unit bulge until the hose connot go in any further. Front Place hose clamp at the hose joint (made of resin) as illustrated so as not to pinch the rubber hose. Breather hose Breather tube White paint mark Details at A Make two paint marks on the breather hose facing up.
White paint mark Transmission case 10.8 - 14.7 (1.1 - 1.5, 8 - 11) OD case Install so that the white paint marks are facing to the left hand side of the vehicle. Yellow paint mark Yellow paint mark Transfer (front case) Transfer (center case) Transfer (rear case) Breather hose Pink paint mark Hose clamp (4 places marked with .) Tube to side member Clamp-hose tab here must be placed facing up.
: N·m (kg-m, ft-lb) SMT547D MT-1010 FS5R50B MAJOR OVERHAUL Case Components 16 - 21 (1.6 - 2.1, 12 - 15) 16 - 21 (1.6 - 2.1, 12 - 15) Gear shift housing Control housing Mating surfaces to gear shift housing cover Liquid gasket 16 - 21 (1.6 - 2.1, 12 - 15) 57 - 75 (5.8 - 7.6, 42 - 55)) (Self-sealing bolt Mating surface D) (Self-sealing bolt 2 - 6 (0.08 - 0.24) 19 - 24 (1.9 - 2.4, 14 - 17) Gear shift housing Mating surface D Rear oil seal Seal lip OD gear case 16 - 21 (1.6 - 2.1, 12 - 15) Transmission case Filler plug 25 - 34 (2.5 - 3.5, 18 - 25) Thread of bolt Liquid gasket Mating surface B 2 - 6 (0.08 - 0.24) Mating surface C OD gear case Mating surface C 54 - 72 (5.5 - 7.3, 40 - 53) Transmission case 16 - 21 (1.6 - 2.1, 12 - 15) 2-6 (0.08 - 0.24) Bearing retainer Drain plug 25 - 34 (2.5 - 3.5, 18 - 25) 54 - 72 (5.5 - 7.3, 40 - 53) Thread of bolt Front Front cover oil seal Seal lip Liquid gasket Mating surface B Mating surface A Clutch housing Front cover To cylinder block Front cover Liquid gasket Gusset RH 2 - 6 (0.08 - 0.24) To cylinder block Mating surface A Sealing grommet 54 - 72 (5.5 - 7.3, 40 - 53) Gusset LH To clutch housing 32 - 42 (3.3 - 4.3, 24 - 31) 19 - 24 (1.9 - 2.4, 14 - 17) (Self-sealing bolt) Illustration for TB42S engine model 29 - 39 (3.0 - 4.0, 22 - 29) Unit: mm (in) : N·m (kg-m, ft-lb) 29 - 39 (3.0 - 4.0, 22 - 29) : Apply genuine anaerobic liquid gasket, Three Bond TB1215, Loctite Part No. 51813 or equivalent. SMT270D MT-1011 FS5R50B MAJOR OVERHAUL Gear Components 3rd gear bushing 3rd gear needle bearing 3rd main gear 3rd inner baulk ring Synchronizer cone 3rd outer baulk ring 3rd & 4th coupling sleeve Shifting insert Shifting insert spring > 4th baulk ring Main drive gear Shifting insert spring > Main drive bearing snap ring 3rd & 4th synchronizer hub > 3rd & 4th hub snap ring . Pilot bearing 1st gear needle bearing 1st main gear Main drive bearing > 1st inner baulk ring Main drive gear snap ring . Synchronizer cone 1st outer baulk ring Mainshaft Shifting insert 2nd main gear 2nd gear needle bearing 1st & 2nd coupling sleeve Shifting insert spring 1st & 2nd synchronizer hub > Shifting insert spring 1st & 2nd hub snap ring . 2nd outer baulk ring Synchronizer cone Counter gear 2nd inner baulk ring Sub-gear washer 16 - 21 N·m (1.6 - 2.1 kg-m, 12 - 15 ft-lb) Sub-gear snap ring Lock plate (Inner race) (Outer race) Sub-gear Sub-gear spring > Counter gear front bearing > Reverse idler shaft Reverse idler needle bearing Reverse idler gear > SMT271D MT-1012 FS5R50B MAJOR OVERHAUL Gear Components (Cont'd) OD main gear > Mainshaft bearing snap ring Mainshaft bearing > Reverse coupling sleeve > Mainshaft spacer Shifting insert > Mainshaft rear end bearing Shifting insert spring Mainshaft rear snap ring Shifting insert spring Reverse synchronizer hub > Reverse baulk ring Reverse gear needle bearing Reverse main gear Counter gear rear snap ring OD synchronizer cone Shifting insert spring > OD gear needle bearing OD counter gear bushing OD baulk ring Thrust washer OD coupling sleeve > Shifting insert > OD counter gear Snap ring (Inner race) (Outer race) Counter gear rear bearing > Transmission case Apply gear oil to gears, shafts, synchronizers and bearings when assembling. . : Select with proper thickness. > : Pay attention to its direction. SMT272D MT-1013 FS5R50B MAJOR OVERHAUL Shift Control Components Bushing Boot band Shift knob Select check plunger Contact surface to shift lever bracket Boot Select check spring (Color: white) Shift lever Boot band Resin seat Select check plug Snap ring 20 - 29 (2.0 - 3.0, 14 - 22) Snap ring Socket Spring Plug 16 - 21 (1.6 - 2.1, 12 - 15) Cam pin 16 - 21 (1.6 - 2.1, 12 - 15) Bracket Control housing Contact surface to shift lever bracket Select check plunger Select check spring (Color: black) 16 - 21 (1.6 - 2.1, 12 - 15) Air breather Select check plug Neutral position switch Check plunger Spacer Reverse check spring 20 - 29 (2.0 - 3.0, 14 - 22) Plunger Reverse position switch 20 - 29 (2.0 - 3.0, 14 - 22) Thrust washer 20 - 29 (2.0 - 3.0, 14 - 22) Fork rod cap E-ring Slide ball bearing Striking rod cap Striking rod cap Plug Fork rod cap Check ball 20 - 29 (2.0 - 3.0, 14 - 22) Interlock plunger Interlock pin Check ball Reverse fork rod Check ball spring Retaining pin Check ball Reverse shift fork Retaining pin Gear shift housing 16 - 21 (1.6 - 2.1, 12 - 15) Clip Shift lever bracket Striking rod Fork rod cap Retaining pin 16 - 21 (1.6 - 2.1, 12 - 15) Retaining pin 3rd & 4th rod bracket 1st & 2nd rod bracket Striking lever Retaining pin Interlock pin Retaining pin 3rd & 4th fork rod OD fork rod OD shift fork 1st & 2nd fork rod Retaining pin 3rd & 4th shift fork : N·m (kg-m, ft-lb) 1st & 2nd shift fork Retaining pin : Apply genuine anaerobic liquid gasket, Three Bond TB1215, Loctite Part No. 51813 or equivalent. SMT273D MT-1014 DISASSEMBLY FS5R50B Case Components Control housing Gear shift housing 1. Remove transmission case outer parts. ● Control housing ● Gear shift housing ● Clutch housing ● OD gear case ● Front cover OD gear case Transmission case Clutch housing Front cover SMT276D 2. Remove front cover oil seal. Front cover SMT305D 3. Remove rear oil seal. SMT551D Shift Control Components Control housing ● Remove and disassemble gear shift housing and control housing parts. Gear shift housing SMT290D MT-1015 DISASSEMBLY Shift Control Components (Cont'd) Select check spring (Color: white) Plug Select check plug Select check plunger FS5R50B CONTROL HOUSING Cam pin Control housing Select check plunger 1. Remove select check plugs, springs and select check plungers. Select check plug Air breather Select check spring (Color: black) Spacer Reverse check spring Thrust washer E-ring SMT548D Check plunger Reverse check assembly 2. Remove E-ring, thrust washer, reverse check spring, spacer, check plunger and cam pin. 3. Remove plug. Cam pin E-ring SMT298D GEAR SHIFT HOUSING Reverse position switch Interlock plunger Neutral position switch Plug 1.
Remove reverse and neutral position switch. ● Do not lose check balls and plungers. 2. Remove plug, check balls, interlock pin and interlock plunger. ● Do not lose check balls. Interlock pin Check ball SMT295D Shift lever bracket 3. Drive out retaining pin from shift lever bracket. SMT292D Gear shift housing Striking lever 4.
Remove retaining pin and plug. a. Drive out retaining pin from striking lever through plug on gear shift housing. SMT293D MT-1016 DISASSEMBLY Shift Control Components (Cont'd) FS5R50B Mating surface Striking lever Gear shift housing Striking rod Retaining pin Striking rod cap SMT549D 3rd & 4th rod bracket 1st & 2nd shift fork 1st & 2nd rod bracket Alignment portion 1st & 2nd fork rod b.
Drive out retaining pin from reverse shift fork, then drive out reverse fork rod and fork rod cap with brass bar. c. Remove interlocking parts. d. Drive out retaining pins from 3rd & 4th shift fork and 3rd & 4th rod bracket, then drive out 3rd & 4th fork rod and fork rod cap with brass bar. e. Drive out retaining pins from 1st & 2nd shift fork and 1st & 2nd rod bracket, then drive out 1st & 2nd fork rod and fork rod cap with brass bar. Front Gear shift housing Reverse shift fork 3rd & 4th fork rod Striking lever 3rd & 4th shift fork Striking rod Reverse fork rod SMT296D Check ball Check ball spring Plug Interlock plunger Interlock pin SMT545D 5.
Drive out striking rod with brass bar through control rod plug on gear shift housing. SMT294D MT-1017 DISASSEMBLY Shift Control Components (Cont'd) FS5R50B 6. Drive out slide ball bearing using SST. Slide ball bearing Slide ball bearing Tool Gear shift housing SMT328D 7. Remove caps.
SMT291D Gear Components Mainshaft rear end bearing TRANSMISSION CASE Snap ring 1. Remove snap ring for mainshaft rear end bearing. Rear SMT277D 2. Pull out mainshaft rear end bearing, then remove mainshaft spacer. Mainshaft spacer Puller SMT278D 3. Check OD counter gear end play. Gear end play Gear OD counter gear ● Feeler gauge End play mm (in) 0.20 - 0.47 (0.0079 - 0.0185) If not within specification, disassemble and check contact surface of gear to hub, washer, bushing, needle bearing and shaft. SMT264B MT-1018 DISASSEMBLY Gear Components (Cont'd) FS5R50B 4. Remove counter gear rear snap ring. SMT265B 5.
Remove lock plate of reverse idler shaft and then remove reverse idler gear, washers, reverse idler needle bearings and reverse idler shaft. SMT863A 6. Pull out the following parts. ● OD counter gear ● OD synchronizer assembly with OD shift fork and OD fork rod Puller SMT266B 7. Pull out OD gear bushing and thrust washer. 8. Remove bolts securing bearing retainer and then remove bearing retainer. Mainshaft OD gear bushing Bearing retainer Rear SMT279D 9. Pull out OD main gear. Puller SMT268B MT-1019 DISASSEMBLY Gear Components (Cont'd) FS5R50B 10. Remove mainshaft bearing snap ring. 11. Pull out mainshaft bearing. Mainshaft bearing Rear Puller SMT281D 12. Support mainshaft with hoist. 13. Remove bolts securing front cover and then remove front cover. Rear SMT319D 14. Remove counter gear front bearing outer race. ● Tap rear end of counter gear lightly before removing bearing. SMT282D 15. Remove counter gear rear bearing outer race. ● Tap front end of counter gear lightly before removing bearing. 16. Settle counter gear assembly down on bottom of transmission case. (Outer race) Counter gear rear bearing (Inner race) SMT283D 17.
Remove main drive gear assembly. ● Set cutting portion of clutch gear on main drive gear to upper side. Upper Rear view Front SMT284D MT-1020 FS5R50B DISASSEMBLY Gear Components (Cont'd) 18. Remove mainshaft assembly. Mainshaft assembly Rear SMT285D 19. Remove counter gear assembly. Counter gear Rear SMT286D MAIN DRIVE GEAR 1. Remove main drive gear snap ring and main drive bearing snap ring. 2. Press out main drive gear bearing. SMT420AA MAINSHAFT AND GEARS 2nd main gear 1. Before disassembly, check 1st, 2nd, 3rd and reverse main gear end play. Gear end play: 3rd main gear Front Unit: mm (in) Gears Reverse main gear 1st main gear Feeler gauge Main drive gear 3rd main gear SMT287D Dial indicator End play 1st main gear 0.20 - 0.48 (0.0079 - 0.0189) 2nd main gear 0.20 - 0.60 (0.0079 - 0.0236) 3rd main gear 0.20 - 0.45 (0.0079 - 0.0177) OD counter gear 0.20 - 0.47 (0.0079 - 0.0185) Reverse main gear 0.20 - 0.44 (0.0079 - 0.0173) ● If not within specification, disassemble and check contact surface of gears to hub, washer, bushing, needle bearing and shaft. Puller SMT907A MT-1021 DISASSEMBLY Gear Components (Cont'd) FS5R50B 2. Remove 3rd & 4th hub snap ring. 3. Pull out 3rd main gear together with 3rd & 4th synchronizer assembly and 3rd gear needle bearing. Puller SMT908A 4. Pull out 3rd gear bushing.
5. Remove 2nd main gear and 2nd gear needle bearing. Puller SMT839A 6. Pull out reverse synchronizer assembly. 7. Remove reverse main gear and reverse gear needle bearing. 8. Remove 1st & 2nd hub snap ring. Puller SMT274B 9. Press out 1st main gear together with 1st & 2nd synchronizer assembly. SMT911A COUNTER GEAR 1. Remove sub-gear components. a. Remove sub-gear snap ring. b. Remove sub-gear, sub-gear washer and sub-gear spring. SMT333D MT-1022 DISASSEMBLY Gear Components (Cont'd) Counter gear rear bearing outer race Counter gear front bearing inner race Puller FS5R50B 2.
Pull out counter gear front and rear bearing inner race. Puller SMT924A MT-1023 INSPECTION FS5R50B Shift Control Components ● Check contact surface and sliding surface for wear, scratches, projections or other damage. SMT301D Gear Components GEAR AND SHAFT ● ● Check for cracks, wear or bending. Check gears for excessive wear, chips or cracks. SMT276B SMT946A SMT925A shifting insert SYNCHRONIZER Spline portion ● ● ● Check spline portion of coupling sleeves, hubs and gears for wear or cracks. Check baulk rings for cracks or deformation. Check shifting inserts for wear or deformation. SMT387A MT-1024 INSPECTION Gear Components (Cont'd) FS5R50B ● Measure clearance between baulk ring and gear. Clearance between baulk rings and main gears: Baulk ring to gear clearance Unit: mm (in) Gears Standard Main drive gear 1.00 - 1.45 (0.0394 - 0.0571) OD counter gear 1.00 - 1.45 (0.0394 - 0.0571) Reverse main gear 1.00 - 1.45 (0.0394 - 0.0571) Wear limit 0.7 (0.028) SMT140 Inner baulk ring Inner baulk ring Synchronizer cone Dial indicator SMT041BA Outer baulk ring Outer baulk ring ● Measure wear of 1st, 2nd and 3rd baulk rings. a. Place inner baulk ring in position on synchronizer cone. b. Hold baulk ring evenly against synchronizer cone and measure distance ''A''. c. Place outer baulk ring in position on synchronizer cone. d. Hold baulk ring evenly against synchronizer cone and measure distance ''B''. Standard: Inner-A 0.7 - 0.9 mm (0.028 - 0.035 in) Outer-B 1.4 - 1.6 mm (0.055 - 0.063 in) Wear Limit: 0.2 mm (0.008 in) e. If distance ''A'' or ''B'' is smaller than the wear limit, replace outer baulk ring, inner baulk ring and synchronizer cone as a set. Synchronizer cone SMT330D BEARING ● Make sure bearings roll freely and are free from noise, cracks, pitting or wear. SMT552D MT-1025 ASSEMBLY Select check spring (Color: white) Plug Select check plug Select check plunger FS5R50B Shift Control Components Cam pin Control housing Select check plunger Select check plug Air breather Select check spring (Color: black) Spacer Reverse check spring Thrust washer E-ring SMT548D CONTROL HOUSING 1.
Install check 2.
Install a. Install select check plunger, select check spring and select plug. reverse check parts. cam pin. Check plunger b. Install check plunger, spacer, reverse check spring and thrust washer.
Reverse check assembly SMT299D c. Install E-ring. Reverse check assembly E-ring SMT300D 3. Assemble control housing parts as shown on left. SMT304D GEAR SHIFT HOUSING Slide ball bearing 1. Assemble gear shift housing. 2. Install slide ball bearing into gear shift housing using SST. Press in 4 mm (0.16 in) Press in 35 mm (1.38 in) SMT329D MT-1026 ASSEMBLY Shift Control Components (Cont'd) 3rd & 4th rod bracket 1st & 2nd shift fork 1st & 2nd rod bracket Alignment portion 1st & 2nd fork rod Front FS5R50B 3. Install striking rod through striking lever and shift lever bracket. ● Pay attention to direction of each part. ● Pay attention to direction of each part. ● Align cutout portion of striking lever, 1st & 2nd rod bracket, 3rd & 4th rod bracket and reverse shift fork. 4. Install 1st & 2nd shift fork, 1st & 2nd rod bracket and 1st & 2nd fork rod.
5.
Install 3rd & 4th rod bracket, 1st & 2nd and 3rd & 4th shift forks and 3rd & 4th fork rod. 6. Insert interlock plunger and check ball for interlock part, then install reverse shift fork and reverse fork rod. Gear shift housing Reverse shift fork 3rd & 4th fork rod Striking lever 3rd & 4th shift fork Striking rod Reverse fork rod SMT296D Check ball Check ball spring Plug Interlock plunger Interlock pin SMT545D 7.
Drive in retaining pins into striking lever, each shift fork and bracket. Reverse fork rod Striking lever SMT302D Shift lever bracket 8. Install retaining pin into shift lever bracket. SMT292D MT-1027 ASSEMBLY Shift Control Components (Cont'd) FS5R50B 9. Install fork rod caps by tapping lightly.
Striking rod cap Fork rod cap Striking lever cap Fork rod cap Gear shift housing Shift rod cap SMT303D 10. Install reverse and neutral position switches. Reverse position switch Interlock plunger Neutral position switch Plug Interlock pin Check ball SMT295D Gear Components MAIN DRIVE GEAR 1. Press main drive gear bearing. SMT425AA 2. Select proper main drive gear snap ring to minimize clearance of groove, then install it. Allowable clearance of groove: 0 - 0.15 mm (0 - 0.0059 in) Main drive gear snap ring: Refer to SDS, MT-1038. SMT426A MAIN SHAFT Coupling sleeve 1. Assemble synchronizers. Synchronizer hub 1st & 2nd synchronizer ● Opening of shifting insert springs must not be aligned with each other. Shifting insert Shifting insert Shifting insert spring SMT914A MT-1028 ASSEMBLY Gear Components (Cont'd) FS5R50B 3rd & 4th synchronizer Shifting insert spring Shifting insert spring Coupling sleeve Shifting insert SMT288D Synchronizer hub Stopper Shifting insert Reverse synchronizer ● Coupling sleeve ● Pay attention to direction of synchronizer hub, shifting inserts and coupling sleeve. Openings of shift insert springs must not be aligned with each other. Front SMT331D 2. Press reverse synchronizer assembly together with reverse main gear and reverse gear needle bearing. ● Pay attention to direction of reverse synchronizer hub assembly. 3. Install 1st main gear and 1st gear needle bearing. Drift SMT278B MT-1029 ASSEMBLY Gear Components (Cont'd) FS5R50B 4. Press 1st & 2nd synchronizer assembly. ● 1st baulk ring and 2nd baulk ring are different.
Drift This groove is only on front side. SMT289D 1st & 2nd hub snap ring 5. Select proper 1st & 2nd hub snap ring to minimize clearance of groove, then install it. Allowable clearance of groove: 0 - 0.13 mm (0 - 0.0051 in) 1st & 2nd hub snap ring: Refer to SDS, MT-1038.
SMT280B 6. Install 2nd main gear and 2nd gear needle bearing. 7. Press 3rd gear bushing. 8. Install 3rd main gear and 3rd gear needle bearing. SMT281B 9. Press 3rd & 4th synchronizer assembly.
● Pay attention to direction of synchronizer assembly. Front SMT282B MT-1030 ASSEMBLY Gear Components (Cont'd) FS5R50B 10. Select proper 3rd & 4th hub snap ring to minimize clearance of groove, then install it. Allowable clearance of groove: 0 - 0.1 mm (0 - 0.004 in) 3rd & 4th hub snap ring: Refer to SDS, MT-1038. 11. Measure 1st, 2nd, 3rd and reverse main gear end plays as the final check. — Refer to ''Disassembly''. SMT332D Counter gear front bearing inner race Counter gear rear bearing outer race COUNTER GEAR 1. Press on counter gear front and rear bearing inner race. SMT924A 2. Install sub-gear, sub-gear spring, sub-gear washer, and snap ring, while compressing sub-gear spring. ● Pay attention to direction of sub-gear spring. Front Sub-gear spring SMT334D TRANSMISSION CASE Reverse idler gear 1. Install reverse idler shaft, thrust washers, needle bearings and gear. ● Pay attention to direction of reverse idler gear and washers. 2. Install lock plate of reverse idler shaft. Front Transmission case SMT306D 3. Settle counter gear assembly on bottom of transmission case. Counter gear Front SMT307D MT-1031 ASSEMBLY Gear Components (Cont'd) FS5R50B 4. Place mainshaft assembly on top of counter gear assembly and then support it with hoist. Mainshaft assembly Front SMT308D ● Align matching portion of counter gear and sub-gear tooth to upper side. SMT309D 5. Install main drive gear assembly by tapping front end of it lightly. ● Set cutting portion of clutch gear on main drive gear to the upper side. Upper Rear view Soft hammer SMT310D 6. Install counter gear front bearing outer race by tapping it lightly while holding counter gear assembly. ● Pay attention to direction. Front Soft hammer SMT311D 7. Install counter gear rear bearing outer race by tapping it lightly while holding counter gear assembly.
● Pay attention to direction.
8. Take off hoist from mainshaft. Front Tool SMT312D MT-1032 ASSEMBLY Gear Components (Cont'd) FS5R50B 9.
Install Tool onto transmission case. SMT313D 10. Install OD gear bushing. 11.
Remove KV32102400 (Counter gear stopper). SMT308B 12. Install front cover oil seal. ● Apply multi-purpose grease to lip of oil seal before installing. SMT942AA 13. Install front cover. ● Always use new bolts at portion V A as they are selfsealing bolts. Tightening torque: Refer to Case Components, MT-1011.
SMT295B 14. Install clutch housing. Tightening torque: Refer to Case Components, MT-1011. SMT319B MT-1033 ASSEMBLY Gear Components (Cont'd) FS5R50B 15. Install Tool onto transmission case. Adjusting bolt SMT314D 16. Stand transmission case assembly on two wooden blocks placed under clutch housing. 17. Install mainshaft bearing without snap ring to prevent it from damaging transmission case. ● Pay attention to direction. 18.
Put snap ring back in place. Drift Front SMT309B 19. Install OD main gear. ● Pay attention to direction. 20. Remove KV32102500 (Mainshaft stopper). Front SMT872A 21. Install bearing retainer and then stake 4 torx bolts at two points. ● Install thrust washer and OD counter gear bushing.
SMT310B MT-1034 ASSEMBLY Gear Components (Cont'd) FS5R50B 22. Install the following parts. a. Assemble OD synchronizer onto OD counter gear. ● Pay attention to direction of shifting inserts and OD coupling sleeve. Rear side OD coupling sleeve OD shifting insert Front OD synchronizer assembly (with OD counter gear) SMT315D b. Install OD counter gear with OD synchronizer assembly, OD shift fork and rod. SMT311B 23. Install OD synchronizer cone. 24. Install OD synchronizer cone washer.
SMT312B 25. Select proper counter gear rear snap ring to minimize clearance of groove, then install it. Allowable clearance of groove: 0 - 0.15 mm (0 - 0.0059 in) Counter gear rear snap ring: Refer to SDS, MT-1038. ● Measure OD counter gear end play as the final check — Refer to ''SDS'', MT-1038. SMT313B MT-1035 ASSEMBLY Gear Components (Cont'd) FS5R50B 26. Install mainshaft spacer and mainshaft rear end bearing. SMT985A 27. Select proper set of mainshaft rear end bearing snap ring to minimize clearance of groove, then install it. Allowable clearance of groove: 0 - 0.15 mm (0 - 0.0059 in) Mainshaft rear end bearing snap ring: Refer to SDS, MT-1038. Mainshaft rear end bearing Snap ring SMT318D 28. Install rear oil seal. ● Apply multi-purpose grease to lip of oil seal on OD gear case before installing. SMT304B 29. Install OD gear case and then tighten fixing bolts. ● Always use new bolts at portion V A as they are selfsealing bolts. Tightening torque: Refer to Case Components, MT-1011. OD gear case SMT316D
30.
Install gear shift housing and control housing onto transmission case. ● Always use new bolts at portion V A as they are selfsealing bolts.
Gear shift housing Front Control housing SMT317D MT-1036 SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications ZD30DDTi Applied model Hardtop & Wagon Transmission FS5R50B 4WD Number of speed 5 Transmission control Floor direct Shift pattern Synchromesh type Warner Gear ratio 1st 4.262 2nd 2.456 3rd 1.488 4th 1.000 OD 0.851 Reverse 3.972 Number of teeth Mainshaft Drive 27 1st 44 2nd 39 3rd 39 OD 25 Reverse 41 Countershaft Drive 34 1st 13 2nd 20 3rd 33 OD 37 Reverse 13 Reverse idler gear Oil capacity 27 ! (Imp pt) 3.8 (6-3/4) 1st, 2nd and 3rd double baulk ring type synchronizer Remarks Reverse synchronizer type MT-1037 FS5R50B FS5R50B SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment GEAR END PLAY 1st & 2nd hub snap ring Unit: mm (in) Gear End play 1st main gear 2nd main gear 3rd main gear OD counter gear Reverse main gear 0.20 0.20 0.20 0.20 0.20 - 0.48 0.60 0.45 0.47 0.44 Unit: mm (in) Allowable clearance (0.0079 (0.0079 (0.0079 (0.0079 (0.0079 - 0.0189) 0.0236) 0.0177) 0.0185) 0.0173) 0 - 0.13 (0 - 0.0051) Thickness Part number 2.05 (0.0807) 32348-0T200 2.15 (0.0846) 32348-0T201 3rd & 4th hub snap ring Unit: mm (in) CLEARANCE BETWEEN BAULK RING AND GEAR Allowable clearance Main drive, OD and reverse baulk ring 1.95 2.00 2.05 2.10 2.15 2.20 Unit: mm (in) Gear Standard Main drive gear OD counter gear Reverse gear 1.00 (0.0394 1.00 (0.0394 1.00 (0.0394 - Wear limit 1.45 0.0571) 1.45 0.0571) 1.45 0.0571) 0 - 0.10 (0 - 0.0039) Thickness 0.7 (0.028) (0.0768) (0.0787) (0.0807) (0.0827) (0.0846) (0.0866) Part number 32348-0T210 32348-0T211 32348-0T212 32348-0T213 32348-0T214 32348-0T215 Counter gear rear snap ring Unit: mm (in) 1st, 2nd and 3rd baulk ring (double baulk ring) Allowable clearance Thickness 1.35 1.45 1.55 1.65 1.75 1.85 Outer baulk ring (0.0531) (0.0571) (0.0610) (0.0650) (0.0689) (0.0728) 0 - 0.15 (0 - 0.0059) Part number 32204-VB000 32204-VB001 32204-VB002 32204-VB003 32204-VB004 32204-VB005 Mainshaft rear end bearing snap ring Unit: mm (in) Inner baulk ring Allowable clearance Synchronizer cone SMT327D Unit: mm (in) Dimension Standard Wear limit A 0.7 - 0.9 (0.028 - 0.035) 0.2 (0.008) B 1.4 - 1.6 (0.055 - 0.063) 0.2 (0.008) AVAILABLE SNAP RING Main drive gear snap ring Unit: mm (in) Allowable clearance 0 - 0.15 (0 - 0.0059) Thickness Part number 2.05 (0.0807) 32348-0T200 2.15 (0.0846) 32348-0T201 2.25 (0.0886) 32348-0T202 MT-1038 0 - 0.15 (0 - 0.0059) Thickness Part number 1.8 1.9 2.0 2.1 2.2 2.3 2.4 32204-VB010 32204-VB011 32204-VB012 32204-VB013 32204-VB014 32204-VB015 32204-VB016 (0.071) (0.075) (0.079) (0.083) (0.087) (0.091) (0.094) PROPELLER SHAFT & DIFFERENTIAL CARRIER SECTION PD MODIFICATION NOTICE: + ZD30ETi engine has been adopted. CONTENTS
PROPELLER SHAFT .... 1002 On-vehicle Service.. 1003 FRONT FINAL DRIVE .... 1004 REAR FINAL DRIVE .... 1005 DIFFERENTIAL LOCK .... 1006 Wiring Diagram — DIFF/L —/LHD Models ..... 1006 Wiring Diagram — DIFF/L —/RHD Models..... 1008 SERVICE DATA AND SPECIFICATIONS (SDS).. 1010 Propeller Shaft .... 1010 Final Drive.. 1011
PD PROPELLER SHAFT JPD521D PD-1002 PROPELLER SHAFT On-vehicle Service PROPELLER SHAFT VIBRATION If vibration is present at high speed, inspect propeller shaft runout first. 1. Raise front and rear wheels. 2. Measure propeller shaft runout at several points by rotating final drive companion flange with hands. Runout limit: 0.6 mm (0.024 in) SPD728 Unit: mm (in) Distance Applied model A Front propeller shaft C ZD30ETi M/T 273 (10.75) ZD30ETi A/T 257.5 (10.14) ZD30ETi (Hardtop) A/T 160 (6.30) 410 (16.14) — ZD30ETi (Wagon) M/T 190 (7.48) 445 (17.52) 606 (23.86) ZD30ETi (Wagon) A/T 190 (7.48) 445 (17.52) 649.5 (25.57) ZD30ETi (Hardtop) M/T — — — I II Rear propeller shaft B III IV SPD520D 3. If runout exceeds specifications, disconnect propeller shaft at final drive companion flange; then rotate companion flange 180 degrees and reconnect propeller shaft. 4. Check runout again. If runout still exceeds specifications, replace propeller shaft assembly. 5. Perform road tests. APPEARANCE CHECKING + Inspect propeller shaft tube surface for dents or cracks. If damaged, replace propeller shaft assembly. SPD102 PD-1003 FRONT FINAL DRIVE SPD436AA PD-1004 REAR FINAL DRIVE SPD437AA PD-1005 DIFFERENTIAL LOCK Wiring Diagram — DIFF/L —/LHD Models TPD013 PD-1006 DIFFERENTIAL LOCK Wiring Diagram — DIFF/L —/LHD Models (Cont'd) TPD018 PD-1007 DIFFERENTIAL LOCK Wiring Diagram — DIFF/L —/RHD Models TPD016 PD-1008 DIFFERENTIAL LOCK Wiring Diagram — DIFF/L —/RHD Models (Cont'd) TPD001M PD-1009 SERVICE DATA AND SPECIFICATIONS (SDS) Propeller Shaft GENERAL SPECIFICATIONS Front propeller shaft ZD30ETi engine Applied model M/T A/T Propeller shaft model 2F80B Number of joints 2 Type of journal bearing Solid (Disassembly type) Coupling type with transmission Flange type Distance between yokes mm (in) 73 (2.87) Shaft length (Spider-tospider) mm (in) 832 (32.76) Shaft outer diameter mm (in) 796 (31.34) 50.8 (2.000) Rear propeller shaft Applied model Engine ZD30ETi Transmission Body M/T A/T Hardtop Wagon Propeller shaft model A/T M/T Hardtop Wagon 2F100H Number of joints 2 Type of journal bearing Solid (Disassembly type) Coupling type with transmission Flange type Distance between yokes mm (in) 94 (3.70) 94 (3.70) 94 (3.70) 94 (3.70) Shaft length (Spider-tospider) mm (in) 440 (17.32) 1,044 (41.10) 480 (18.90) 957 (37.68) Shaft outer diameter mm (in) 57 (2.24) 89.6 (3.528) 75.2 (2.961) 89.6 (3.528) Available snap rings 2F100H 2F80B Thickness mm (in) Color Part number Thickness mm (in) Color Part number 1.95 (0.0768) White 37146-61502 1.99 (0.0783) White 37146-C9400 1.98 (0.0780) Yellow 37147-61502 Red 37148-61502 2.02 (0.0795) Yellow 37147-C9400 2.01 (0.0791) 2.05 (0.0807) Red 37148-C9400 2.04 (0.0803) Green 37149-61502 2.08 (0.0819) Green 37149-C9400 2.07 (0.0815) Blue 37150-61502 2.11 (0.0831) Blue 37150-C9400 2.10 (0.0827) Light brown 37151-61502 Pink 37146-61503 2.14 (0.0843) Light brown 37151-C9400 2.13 (0.0839) 2.17 (0.0854) Black 37152-C9400 2.16 (0.0850) Gold 37147-61503 2.20 (0.0866) Colorless 37153-C9400 2.19 (0.0862) Black 37148-61503 2.22 (0.0874) Colorless 37149-61503 PD-1010 SERVICE DATA AND SPECIFICATIONS (SDS) Final Drive GENERAL SPECIFICATIONS Body type Wagon Transmission Hardtop M/T A/T M/T A/T 2-pinion 4-pinion Optional Standard Diff. lock LSD Standard Front final drive H233B 2-pinion Gear ratio 4.375 Number of teeth (Ring gear/drive pinion) 35/8 Oil capacity (Approx.) 5.4 (9-1/2) ! (Imp pt) Optional Standard Rear final drive [Grade] Optional Standard H260 Diff.
lock H233B LSD Diff. lock LSD Gear ratio 4.375 Number of teeth (Ring gear/drive pinion) 35/8 Oil capacity Without diff. lock (Approx.) With diff. lock ! (Imp pt) 4.7 (8-1/4) 2.4 (4-1/4) 3.7 (6-1/2) 3.0 (5-1/4) INSPECTION AND ADJUSTMENT (H233B) Drive pinion preload adjustment Drive pinion bearing preload adjusting method Adjusting shim and spacer Total preload adjustment Total preload Nzm (kg-cm, in-lb) Drive pinion bearing With front oil seal Ring gear backlash Drive pinion preload [P1] Nzm (kg-cm, in-lb) Side bearing adjusting method With front oil seal 1.4 - 2.2 (14 - 22, 12 - 19) Without front oil seal 1.2 - 2.0 (12 - 20, 10 - 17) P1: Drive pinion preload Available drive pinion preload adjusting washer Thickness 2.31 2.33 2.35 2.37 2.39 2.41 2.43 2.45 2.47 2.49 2.51 2.53 2.55 2.57 2.59 mm (in) (0.0909) (0.0917) (0.0925) (0.0933) (0.0941) (0.0949) (0.0957) (0.0965) (0.0972) (0.0980) (0.0988) (0.0996) (0.1004) (0.1012) (0.1020) Part number* 38125-82100 38126-82100 38127-82100 38128-82100 38129-82100 38130-82100 38131-82100 38132-82100 38133-82100 38134-82100 38135-82100 38136-82100 38137-82100 38138-82100 38139-82100 Available drive pinion preload adjusting spacers Length mm (in) 4.50 4.75 5.00 5.25 5.50 (0.1772) (0.1870) (0.1969) (0.2067) (0.2165) Part number 38165-76000 38166-76000 38167-76000 38166-01J00 38166-01J10 * Always check with the Parts Department for the latest parts information. PD-1011 mm (in) P1 + [0.3 to 0.4 (3 to 4, 2.6 to 3.5)] 0.15 - 0.20 (0.0059 - 0.0079) Side adjuster REAR AXLE & REAR SUSPENSION SECTION RA MODIFICATION NOTICE: + Wiring diagram connector colors have been changed. CONTENTS
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RA STABILIZER RELEASE DEVICE Wiring Diagram TRA001 RA-1002 STABILIZER RELEASE DEVICE Wiring Diagram (Cont'd) TRA001M RA-1003 RESTRAINT SYSTEM SECTION RS MODIFICATION NOTICE: + Side air bag has been adopted as optional equipment. + Diagnosis sensor unit has been changed. + Seat belt pre-tensioner with load limiter has been added. + Deployment procedure of seat belt pre-tensioner has been changed. CONTENTS
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1006 Removal and Installation — Diagnosis Sensor Unit, Seat Belt Pre-tensioner with Load Limiter and Satellite Sensor....................................... 1008 Removal — Driver Air Bag Module and Spiral Cable... 1009 Installation — Driver Air Bag Module and Spiral Cable .... 1011 Removal — Side Air Bag Module.................... 1012 Installation — Side Air Bag Module................
1013 Disposal of Air Bag Module and Seat Belt Pre-tensioner.. 1015 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) .... 1019 Trouble Diagnoses Introduction...................... 1019 How to Perform Trouble Diagnoses for Quick and Accurate Repair .... 1021 Schematic .... 1023 Wiring Diagram — SRS —/LHD Models .... 1024 Wiring Diagram — SRS —/RHD Models .... 1028 Self-diagnosis.. 1032 Trouble Diagnoses for Air Bag Warning Lamp1050 COLLISION DIAGNOSIS...................................
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RS PRECAUTION Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER" used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination and optional equipment.): + For a frontal collision The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. + For a side collision The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision). WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS. RS-1002 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Precautions for SRS "AIR BAG" and "SEAT BELT PRE-TENSIONER" Service +Do not use electrical test equipment to check SRS circuits unless instructed to in this Service Manual. +Before servicing the SRS, turn ignition switch "OFF", disconnect both battery cables and wait at least 3 minutes.
For approximately 3 minutes after the cables are removed, it is still possible for the air bag and seat belt pretensioner to deploy. Therefore, do not work on any SRS connectors or wires until at least 3 minutes have passed.
+ Diagnosis sensor unit must always be installed with their arrow marks "S" pointing towards the front of the vehicle for proper operation. Also check diagnosis sensor unit for cracks, deformities or rust before installation and replace as required. + The spiral cable must be aligned with the neutral position since its rotations are limited. Do not attempt to turn steering wheel or column after removal of steering gear. + Handle air bag module carefully.
Always place driver and passenger air bag modules with the pad side facing upward and front side air bag modules (built-in type) with the stud bolt side facing down. + Conduct self-diagnosis to check entire SRS for proper function after replacing any components. + After air bag inflates, the front instrument panel assembly should be replaced if damaged. Special Service Tools Tool number Tool name Description KV99106400 Deployment tool Disposing of air bag module NT357 KV99105300 Air bag module bracket Anchoring air bag module NT354 HT61961000 and HT62152000 combined *Special torx bit Use for special bolts [TAMPER RESISTANT TORX (Size T50)] a: 3.5 (0.138) dia. b: 8.5 - 8.6 (0.335 - 0.339) dia.
c: approx. 10 (0.39) sq. Unit: mm (in) NT361 KV99108300 Deployment tool adapters for built-in type side air bag and passenger air bag modules NT780 KV99108200 (KV999R0020) Deployment tool adapters for seat belt pre-tensioner NT721 *: Special tool or commercial equivalent RS-1003 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Description The air bag deploys if the diagnosis sensor unit activates while the ignition switch is in the "ON" or "START" position. SRS585-A The collision modes for which supplemental restraint systems are activated are different among the SRS systems. For example, the driver air bag module and passenger air bag module are activated in a frontal collision but not in a side collision. SRS configurations which are activated for some collision modes are as follows; SRS configuration Frontal collision Left side collision Right side collision Driver air bag module j — — Passenger air bag module j — — Seat belt pre-tensioner (Driver side) j — — Seat belt pre-tensioner (Passenger side) j — — Side air bag module (LH) — j — Side air bag module (RH) — — j Built-in Type Side Air Bag Front side air bag is built-in type. The front seat backs with built-in type side air bag have the labels shown in figures at left. SRS755 RS-1004 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Seat Belt Pre-tensioner with Load Limiter The seat belt pre-tensioner system with load limiter is installed to both the driver's seat and the front passenger's seat. It operates simultaneously with the SRS air bag system in the event of a frontal collision with an impact exceeding a specified level. When a frontal collision with an impact exceeding a specified level occurs, seat belt slack resulting from clothing or other factors is immediately taken up by the pre-tensioner. Vehicle passengers are securely restrained. When passengers in a vehicle are thrown forward in a collision and the restraining force of the seat belt exceeds a specified level, the stopper-A pin will break, allowing the ring gear to rotate. At this point, resistance force from the belt housing is applied to the wire attached to the ring gear so that the wire keeps a constant level of tension (resistance against further rotation of the ring gear in the normal direction).
As the ring gear stopper-A rotates and reaches the stopper-B position, it will cease its rotation, causing the seat belt webbing to stop extending. By the mechanism previously described, the load limiter permits the specified extension of the seat belt and a relaxation of the chest-area seat belt web tension while maintaining force. SRS501 SRS Component Parts Location SRS756 RS-1005 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Maintenance Items SRS222-B CAUTION: Do not use electrical test equipment to check SRS circuit.
1. Check operation of "AIR BAG" and "SEAT BELT" warning lamps ("SEAT BELT" warning lamp can be used for checking seat belt pre-tensioner on models except for Europe.). After turning ignition key to "ON" position, both warning lamps illuminate. The "AIR BAG" warning lamp will go off after about 7 seconds if no malfunction is detected. The "SEAT BELT" warning lamp will also go off after about 7 seconds after seat belt has been fastened and no malfunction is detected. (When seat belt has not been fastened, the warning lamp continues to illuminate until seat belt is fastened.) If any of the following warning lamp conditions occur, immediately check the air bag or seat belt pre-tensioner system. Refer to RS-1032 for details.
+ The "AIR BAG" or "SEAT BELT" warning lamp does not illuminate when the ignition switch is turned "ON". + The "AIR BAG" or "SEAT BELT" (with seat belt fastened) warning lamp does not go off about 7 seconds after the ignition switch is turned "ON". + The "AIR BAG" or "SEAT BELT" (with seat belt fastened) warning lamp blinks after about 7 seconds after the ignition switch is turned "ON". 2. Visually check SRS components (1) Diagnosis sensor unit + Check diagnosis sensor unit and bracket for dents, cracks or deformities. + Check connectors for damage, and terminals for deformities.
(2) Air bag module and steering wheel + Remove air bag module from steering wheel, instrument panel or seat back. Check harness cover and connectors for damage, terminals for deformities, and harness for binding. + Install driver air bag module to steering wheel to check fit or alignment with the wheel. + Check steering wheel for excessive free play. + Install passenger air bag module to instrument panel to check fit or alignment with the instrument panel. + Install side air bag module to seat back to check fit and alignment with the seat. (3) + + + Spiral cable Check spiral cable for dents, cracks, or deformities. Check connectors and protective tape for damage. Check steering wheel for noise, binding or heavy operation. (4) Main harness and body harness + Check connectors for poor connections, damage, and terminals for deformities. + Check harnesses for binding, chafing or cut. (5) Seat belt pre-tensioner + Check harness cover and connectors for damage, terminals for deformities, and harness for binding. + Check belts for damage and anchors for loose mounting. + Check retractor for smooth operation. RS-1006 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Maintenance Items (Cont'd) + Perform self-diagnosis for seat belt pre-tensioner using seat belt warning lamp or CONSULT-II. Refer to "Self-diagnosis" for details. (6) Satellite sensor + Check satellite sensor (including bracket portion) for dents, cracks or deformities. + Check connectors for damage, and terminals for deformities. CAUTION: Replace previously used special bolts, ground bolt and nuts coated with bonding agent. RS-1007 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Removal and Installation — Diagnosis Sensor Unit, Seat Belt Pre-tensioner with Load Limiter and Satellite Sensor CAUTION: + Before servicing SRS, turn the ignition switch off, disconnect both battery cables and wait at least 3 minutes. + Do not use old bolts and nuts coated with bonding agent after removal; replace with new ones. + Check diagnosis sensor unit, seat belt pre-tensioner with load limiter and satellite sensor for proper installation. + Check diagnosis sensor unit and satellite sensor to ensure they are free of deformities, dents, cracks or rust. If they show any visible signs of damage, replace them with new ones. + Check diagnosis sensor unit brackets to ensure they are free of deformities and rust. + After replacement of diagnosis sensor unit, seat belt pre-tensioner and satellite sensor, check SRS function and perform self-diagnosis for SRS. Refer to "Self-diagnosis" for details. (RS-1032) + Do not attempt to disassemble diagnosis sensor unit, seat belt pre-tensioner with load limiter and satellite sensor. + Replace diagnosis sensor unit, seat belt pre-tensioner and satellite sensor if it has been dropped or sustained an impact. + Do not expose seat belt pre-tensioner to temperatures exceeding 80°C (176°F). REMOVAL OF DIAGNOSIS SENSOR UNIT SRS757 1. Disconnect driver, passenger and side air bag module connectors. Also, disconnect seat belt pre-tensioner connector. 2. Remove console finisher, console box assembly and instrument panel stay cover. Refer to "INSTRUMENT PANEL" in BT section. 3.
Disconnect diagnosis sensor unit connector. 4. Remove bolt and also remove special bolts using the TAMPER RESISTANT TORX (Size T50), from diagnosis sensor unit. Then remove the diagnosis sensor unit. NOTE: + To install, reverse the removal procedure sequence.
+ After replacement, perform self-diagnosis for SRS. Refer to "Self-diagnosis" for details (RS-1032). CAUTION: + Do not use old special bolts coated with bonding agent; replace with new coated special bolts. RS-1008 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Removal and Installation — Diagnosis Sensor Unit, Seat Belt Pre-tensioner with Load Limiter and Satellite Sensor (Cont'd) REMOVAL OF SATELLITE SENSOR 1.

Remove seat belt pre-tensioner with load limiter or seat belt retractor. Refer to “REMOVAL OF SEAT BELT PRE-TENSIONER WITH LOAD LIMITER” or “Front seat belt” in RS section of Service Manual (Pub. No. SM7E-2Y61G0 or SM7E-2Y61G1) for details.
2. Disconnect satellite sensor connector. 3. Remove bolt and nuts coated with bonding agent from satellite sensor unit. Then remove the satellite sensor. NOTE: + To install, reverse the removal procedure sequence. CAUTION: + Do not use old nuts coated with bonding agent after removal; replace with new coated nuts. SRS758 Removal — Driver Air Bag Module and Spiral Cable SRS759-A RS-1009 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Removal — Driver Air Bag Module and Spiral Cable (Cont’d) CAUTION: + Before servicing SRS, turn the ignition switch OFF, disconnect both battery cables and wait at least 3 minutes. + Always work from the side of air bag module. 1. Remove lower lid from steering wheel, and disconnect air bag module connector. SBF811E 2. Remove side lid, ASCD steering switch and audio steering switch (only on models for the Middle East). Using the TAMPER RESISTANT TORX (Size T50), remove left and right special bolts.
Air bag module can then be removed. SBF812E CAUTION: + Always place air bag module with pad side facing upward. + Do not attempt to disassemble air bag module. + The special bolts are coated with bonding agent. Do not use old bolts after removal; replace with new ones. + Do not insert any foreign objects (screwdriver, etc.) into air bag module connector. SRS161 + Replace air bag module if it has been dropped or sustained an impact. + Do not expose the air bag module to temperatures exceeding 90°C (194°F). + Do not allow oil, grease or water to come in contact with the air bag module. SBF814E 3. Set steering wheel in the neutral position.
4. Disconnect horn connector and remove nuts. 5. Remove dynamic damper.
Then using steering wheel puller, remove steering wheel. Be careful not to over-tighten puller bolt on steering wheel. CAUTION: + Do not tap or bump the steering wheel. 6.
Remove steering column cover. SBF239F RS-1010 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Removal — Driver Air Bag Module and Spiral Cable (Cont’d) 7. Remove the four screws. Then unlock the spiral cable connector and disconnect connector. The spiral cable can then be removed. CAUTION: + Do not attempt to disassemble spiral cable. + Do not apply lubricant to the spiral cable. SRS384 Installation — Driver Air Bag Module and Spiral Cable 1. Set the front wheels in the straight-ahead position. 2. Connect spiral cable connector. Then, lock the connector and tighten with screws. Install steering column cover. SRS384 3. Make sure that the spiral cable is in the neutral position. The neutral position is detected by turning left about 2.5 revolutions from the right end position. Align the two marks ,). (m CAUTION: + The spiral cable may snap due to steering operation if the cable is installed in an improper position. Also, with the steering linkage disconnected, the cable may snap by turning the steering wheel beyond the limited number of turns. The spiral cable can be turned up to about 2.5 turns from the neutral position to both the right and left. 4. Connect spiral cable connector and tighten with screws. Install steering column cover. SRS165 5. Install steering wheel, setting spiral cable pin guide, and pull spiral cable through. 6. Connect horn connector and engage spiral cable with pawls in steering wheel. Move air bag module connector away from steering wheel lower lid opening. 7. Tighten nut. : 29 - 39 Nzm (3.0 - 4.0 kg-m, 22 - 29 ft-lb) 8. Install dynamic damper. SRS231 RS-1011 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Installation — Driver Air Bag Module and Spiral Cable (Cont’d) SBF812EG 9. Position air bag module and tighten with new special bolts. + Always service the air bag module from the side. 10.
Connect air bag module connector. 11. Install steering switches and lids. 12.
Perform self-diagnosis to ensure entire SRS operates properly. (Use CONSULT-II or warning lamp check.) Refer to RS-1032. Before performing self-diagnosis, connect both battery cables. 13. Turn steering wheel to the left end and then to the right end fully to make sure that spiral cable is set in the neutral position. If air bag warning lamp blinks or stays ON (at the User mode), it shows the spiral cable may be snapped due to its improper position. Perform self-diagnosis again (use CONSULT-II or warning lamp). If a malfunction is detected, replace the spiral cable with a new one. 14. Perform self-diagnosis again to check that no malfunction is detected. Removal — Side Air Bag Module CAUTION: + Before servicing SRS, turn the ignition switch OFF, disconnect both battery cables and wait at least 3 minutes. + Always work from the rear of the air bag module. 1.
Remove seatback board. + When using a clip removal tool to remove the seatback board, take care not to damage the air bag harness. 2. Disconnect side air bag module connector. SRS760 3. Remove the nuts securing the inner cloth with seatback frame.
Then pull up the inner cloth. SRS761-A RS-1012 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Removal — Side Air Bag Module (Cont’d) 4. Remove screws securing seatback finisher and pull up the seatback trim with seatback finisher. SRS762-A 5.
Remove the torx nuts coated with bonding agent from the side air bag module. 6. Remove side air bag connector. Side air bag module can then be removed. SRS763 CAUTION: + Always place the air bag module with the stud bolt side facing down. + Do not attempt to disassemble air bag module.
+ The torx nuts are coated with bonding agent. Do not use old nuts after removal; replace with new coated nuts. + Do not insert any foreign objects (screwdriver, etc.) into air bag module connector. SRS483 + Replace air bag module if it has been dropped or sustained an impact.
+ Do not expose the air bag module to temperatures exceeding 90°C (194°F). + Do not allow oil, grease or water to come in contact with the air bag module. + After air bag inflates, all parts of front seatback (including front seatback frame) should be replaced. SBF814E Installation — Side Air Bag Module 1. Install side air bag module on seatback frame with new torx nuts coated with bonding agent. 2. Install side air bag connector. 3. Install seatback trim and seatback finisher with screw. SRS763 RS-1013 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Installation — Side Air Bag Module (Cont’d) 4. Secure the inner cloth which covers the side air bag module with nuts. SRS764-A 5. 6. 7. 8. Connect side air bag module connector. Install seatback board with new clips. Connect both battery cables. Go to “Self-diagnosis”, RS-1032 and perform self-diagnosis to ensure entire SRS operates properly. (Use CONSULT-II or air bag warning lamp.) SRS765 RS-1014 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Disposal of Air Bag Module and Seat Belt Pre-tensioner + Before disposing of air bag module and seat belt pre-tensioner, or vehicles equipped with such systems, deploy the systems. If such systems have already been deployed due to an accident, dispose of them as indicated in “DISPOSING OF AIR BAG MODULE AND SEAT BELT PRE-TENSIONER” (RS-1018).
+ When deploying the air bag module and seat belt pre-tensioner, always use the Special Service Tool; Deployment tool KV99106400. + When deploying the air bag module and seat belt pre-tensioner, stand at least 5 m (16 ft) away from the deployment component. + When deploying air bag module and seat belt pre-tensioner, a fairly loud noise is made, followed by smoke being released. The smoke is not poisonous, however, be careful not to inhale smoke since it irritates the throat and can cause choking. + Always activate one air bag module at a time. + Due to heat, leave air bag module unattended for more than 30 minutes after deployment. Also leave seat belt pre-tensioner unattended for move than 10 minutes after deployment. + Be sure to wear gloves when handling a deployed air bag module and seat belt pre-tensioner. + Never apply water to the deployed air bag module and seat belt pre-tensioner. + Wash your hands clean after finishing work. + Place the vehicle outdoors with an open space of at least 6 m (20 ft) on all sides when deploying air bag module and seat belt pre-tensioner while mounted in vehicle. + Use a voltmeter to make sure the vehicle battery is fully charged. + Do not dispose of the air bag module and seat belt pre-tensioner un-deployed. CHECKING DEPLOYMENT TOOL Connecting to battery SRS005-B CAUTION: The battery must show voltage of 9.6V or more. Remove the battery from the vehicle and place it on dry wood blocks approximately 5 m (16 ft) away from the vehicle. + Wait 3 minutes after the vehicle battery is disconnected before proceeding. + Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal. Make sure the polarity is correct. The right side lamp in the tool, marked “deployment tool power”, should glow with a green light. If the right side lamp glows red, reverse the connections to the battery. RS-1015 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Disposal of Air Bag Module and Seat Belt Pre-tensioner (Cont’d) Deployment tool check Press the deployment tool switch to the “ON” position. The left side lamp in the tool, marked “air bag connector voltage” should illuminate. If it does not illuminate, replace the tool. Air bag deployment tool lamp illumination chart (Battery connected) SBF266H Switch operation Left side lamp, green* “AIR BAG CONNECTOR VOLTAGE” Right side lamp, green* “DEPLOYMENT TOOL POWER” OFF OFF ON ON ON ON *: If this lamp glows red, the tool is connected to the battery incorrectly. Reverse the connections and make sure the lamp glows green. Deployment of side air bag module (outside of vehicle) 1. Make 6.5 mm (0.256 in) diameter holes in air bag module bracket [SST: KV99105300] at the position shown in figure at left. SRS490 2. Firmly secure air bag module bracket [SST: KV99105300] in a vise. 3. Insert the stud bolts of side air bag module into the two holes in air bag module bracket (held in vise) and fix them with two M6 nuts. CAUTION: Side air bag module should be secured to air bag module bracket [SST: KV99105300] in a vise with metal portion facing down. SRS491 4. Connect deployment tool adapter [SST: KV99108300] to deployment tool [SST: KV99106400] connector and connector on air bag module.
SRS492 RS-1016 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Disposal of Air Bag Module and Seat Belt Pre-tensioner (Cont’d) SRS020-A 5. Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal.
6. The lamp on the right side of the tool, marked “deployment tool power”, should glow green, not red. 7. Press the button on the deployment tool. The left side lamp on the tool, marked “air bag connector voltage”, will illuminate and the air bag module will deploy. CAUTION: When deploying the air bag module, stand at least 5 m (16 ft) away from the air bag module. Deployment of seat belt pre-tensioner (outside of vehicle) 1. Firmly grip pre-tensioner in a vise and cut the webbing off.
SRS662 2. Connect deployment tool adapter [SST: KV99108200 (KV999R0020)] to deployment tool [SST: KV99106400] connector and seat belt pre-tensioner connector.
SRS663-B SRS242-A 3. Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal. 4. The lamp on the right side of the tool, marked “deployment tool power”, should glow green, not red. 5.
Press the button on the deployment tool. The left side lamp on the tool, marked “seat belt pre-tensioner connector voltage”, will illuminate and the seat belt pre-tensioner will deploy. CAUTION: When deploying the seat belt pre-tensioner, stand at least 5 m (16 ft) away from the seat belt pre-tensioner. RS-1017 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Disposal of Air Bag Module and Seat Belt Pre-tensioner (Cont’d) DEPLOYMENT OF AIR BAG MODULE AND SEAT BELT PRE-TENSIONER WHILE MOUNTED IN VEHICLE SRS006 When disposing of a vehicle, deploy air bag modules and seat belt pre-tensioners while they are mounted in vehicle. CAUTION: When deploying air bag module or seat belt pre-tensioner, ensure vehicle is empty. 1. Disconnect both the vehicle battery cables and wait 3 minutes. 2. Disconnect air bag modules and seat belt pre-tensioners connector. 3. Connect deployment tool [SST: KV99106400] to air bag module or seat belt pre-tensioner. For front passenger air bag module and side air bag module, attach deployment tool adapter [SST: KV99108300] to the tool connector. For seat belt pre-tensioner, attach deployment tool adapter [SST: KV99108200 (KV999R0020)] to the tool connector. 4. Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal. 5. The lamp on the right side of the tool, marked “deployment tool power”, should glow green, not red. 6. Press the button on the deployment tool. The left side lamp on the tool, marked “air bag connector voltage”, will illuminate and the air bag module or seat belt pre-tensioner will deploy. CAUTION: Activate only one air bag module or seat belt pre-tensioner at a time.
DISPOSING OF AIR BAG MODULE AND SEAT BELT PRE-TENSIONER SBF276H Deployed air bag modules and seat belt pre-tensioners are very hot. Before disposing of air bag module, and seat belt pretensioner, wait at least 30 minutes, and 10 minutes, respectively. Seal them in a plastic bag before disposal. CAUTION: + Never apply water to a deployed air bag module and seat belt pre-tensioner. + Be sure to wear gloves when handling a deployed air bag module and seat belt pre-tensioner.
+ No poisonous gas is produced upon air bag module deployment. However, be careful not to inhale gas since it irritates throat and can cause choking.
+ Do not attempt to disassemble air bag module and seat belt pre-tensioner. + Air bag module and seat belt pre-tensioner can not be re-used. + Wash your hands clean after finishing work. RS-1018 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Trouble Diagnoses Introduction CAUTION: + Do not use electrical test equipment to check SRS harness connectors unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow harness protector or yellow insulation tape before the harness connectors. + Do not attempt to repair, splice or modify the SRS wiring harness. If the harness is damaged, replace it with a new one. + Keep ground portion clean. DIAGNOSIS FUNCTION The SRS self-diagnosis results can be read by using “AIR BAG” warning lamp, “SEAT BELT” warning lamp (Models except for Europe) and/or CONSULT-II. The reading of these results is accomplished using one of two modes — “User mode” and “Diagnosis mode”. The User mode is exclusively prepared for the customer (driver). This mode warns the driver of a system malfunction through the operation of the “AIR BAG” warning lamp and/or “SEAT BELT” warning lamp (Models except for Europe). The Diagnosis mode allows the technician to locate and inspect the malfunctioning part. The mode applications for the “AIR BAG” warning lamp, “SEAT BELT” warning lamp (Models except for Europe) and CONSULT-II are as follows: User mode Diagnosis mode Display type “AIR BAG” warning lamp X X ON-OFF operation “SEAT BELT” warning lamp (Models except for Europe) X — ON-OFF operation CONSULT-II — X Monitoring DIAGNOSIS MODE FOR CONSULT-II + “SELF-DIAG [CURRENT]” A current Self-diagnosis result (also indicated by the warning lamp flashes in the Diagnosis mode) is displayed on the CONSULT-II screen in real time. This refers to a malfunctioning part requiring repairs. + “SELF-DIAG [PAST]” Diagnosis results previously stored in the memory are displayed on the CONSULT-II screen. The stored results are not erased until memory erasing is executed. + “TROUBLE DIAG RECORD” With TROUBLE DIAG RECORD, diagnosis results previously erased by a reset operation can be displayed on the CONSULT-II screen. + “ECU DISCRIMINATED NO.” The diagnosis sensor unit for each vehicle model is assigned with its own, individual classification number. This number will be displayed on the CONSULT-II screen, as shown at left. When replacing the diagnosis sensor unit, refer to the part number for the compatibility. After installation, replacement with a correct unit can be checked by confirming this classification number on the CONSULT-II screen. The diagnosis sensor unit classification number varies depending on SRS configuration.
For NISSAN MODEL Y61, the diagnosis sensor unit classification numbers are as follows. Wagon Hardtop MODEL ECU DISCRIMINATED NO. Model with dual air bags and side air bag 5A0F Model with dual air bags 5A11 Model with single air bag 5A13 Model with side air bag 5A15 Model with dual air bags 5A17 Model with single air bag 5A19 RS-1019 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Trouble Diagnoses Introduction (Cont’d) HOW TO CHANGE SELF-DIAGNOSIS MODE With CONSULT-II From User mode to Diagnosis mode After selecting AIR BAG on the “SELECT SYSTEM” screen, User mode automatically changes to Diagnosis mode. SRS769 From Diagnosis mode to User mode To return to User mode from Diagnosis mode, touch “BACK” key of CONSULT-II until “SELECT SYSTEM” appears, Diagnosis mode automatically changes to User mode. SRS770 Without CONSULT-II From User mode to Diagnosis mode Diagnosis mode activates only when a malfunction is detected, by pressing the driver’s door switch at least 5 times within 7 seconds after turning the ignition “ON”. SRS will not enter Diagnosis mode if no malfunction is detected. SRS168 From Diagnosis mode to User mode After a malfunction is repaired, switch the ignition “OFF” for at least 1 second, then back “ON”. Diagnosis mode returns to User mode. If switching from Diagnosis mode to User mode is required while malfunction is being detected, switch the ignition “OFF”, then back “ON” and press the driver’s door switch at least 5 times within 7 seconds. RS-1020 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Trouble Diagnoses Introduction (Cont’d) HOW TO ERASE SELF-DIAGNOSIS RESULTS With CONSULT-II + “SELF-DIAG [CURRENT]” A current Self-diagnosis result is displayed on the CONSULT-II screen in real time. After the malfunction is repaired completely, no malfunction is detected on “SELF-DIAG [CURRENT]”. + “SELF-DIAG [PAST]” Return to the “SELF-DIAG [CURRENT]” CONSULT-II screen by pushing “BACK” key of CONSULT-II and select “SELFDIAG [CURRENT]” in “SELECT DIAG MODE”. Touch “ERASE” in “SELF-DIAG [CURRENT]” mode. NOTE: If the memory of the malfunction in “SELF-DIAG [PAST]” is not erased, the User mode shows the system malfunction by the operation of the warning lamp even if the malfunction is repaired completely. SRS701 + “TROUBLE DIAG RECORD” The memory of “TROUBLE DIAG RECORD” cannot be erased. Without CONSULT-II After a malfunction is repaired, return Diagnosis mode to User mode by switching the ignition “OFF” for at least 1 second, then back “ON”. At that time, the self-diagnostic result is cleared. How to Perform Trouble Diagnoses for Quick and Accurate Repair A good understanding of the malfunction conditions can make troubleshooting faster and more accurate. In general, each customer feels differently about a malfunction. It is important to fully understand the symptoms or conditions for a customer complaint. INFORMATION FROM CUSTOMER WHAT ..... Vehicle model WHEN ..... WHERE ..... Date, Frequencies Road conditions HOW ..... Operating conditions, Symptoms PRELIMINARY CHECK Check that the following parts are in good order. + Battery [Refer to EL section (“BATTERY”) of Service Manual.] + Fuse [Refer to EL section (“Fuse”, “POWER SUPPLY ROUTING”) of Service Manual.] + System component-to-harness connections RS-1021 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) How to Perform Trouble Diagnoses for Quick and Accurate Repair (Cont’d) WORK FLOW ACTION ITEM REFERENCE ITEM Check in . Listen to customer complaints and requests. . Perform preliminary check. b Preliminary check (RS-1021) b DIAGNOSTIC PROCEDURE 1 (RS-1032) . Check for any Service Bulletin. . Check air bag system operation by using “AIR BAG” warning lamp. Check seat belt pre-tensioner system operation by using a bulb. . c Inspect malfunctioning part. — Diagnosis mode b Perform self-diagnosis using CONSULT-II. ---------- OR ----------Perform self-diagnosis using “AIR BAG” warning lamp. DIAGNOSTIC PROCEDURE 2: Using CONSULT-II (RS-1034) DIAGNOSTIC PROCEDURE 6: Using “AIR BAG” warning lamp (RS-1044) . Repair/Replace NG .
Final check — Diagnosis mode and User mode OK . Check out RS-1022 b DIAGNOSTIC PROCEDURE 3: Using CONSULT-II (RS-1038) DIAGNOSTIC PROCEDURE 7: Using “AIR BAG” warning lamp (RS-1048) TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Schematic TRS005M RS-1023 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS —/LHD Models TRS006M RS-1024 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS —/LHD Models (Cont’d) TRS007M RS-1025 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS —/LHD Models (Cont’d) WITH CONSULT-II (Except for China and for the Middle East with TB and TD engines) TRS009M RS-1026 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS —/LHD Models (Cont’d) TRS010M RS-1027 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS —/RHD Models TRS011M RS-1028 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS —/RHD Models (Cont’d) TRS012M RS-1029 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS —/RHD Models (Cont’d) WITH CONSULT-II (Except for Australia with TD engine) TRS014M RS-1030 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS —/RHD Models (Cont’d) TRS015M RS-1031 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Self-diagnosis DIAGNOSTIC PROCEDURE 1 (CONSULT-II) without Checking SRS operation by using “AIR BAG” warning lamp — User mode 1. After turning ignition switch from “OFF” to “ON”, “AIR BAG” warning lamp operates. 2. Compare “AIR BAG” warning lamp operation to the chart below. SRS465 “AIR BAG” warning lamp operation — User mode — SRS condition Reference item No malfunction is detected. No further action is necessary. — MRS095A The system is malfunction- Go to DIAGNOSTIC PROCEDURE 2, or 6 (RS-1034 ing and needs to be or 1044). repaired as indicated. MRS096A Air bag is deployed. Go to COLLISION DIAGNOSIS (RS-1052). Air bag fuse, diagnosis sensor unit or harness is malfunctioning and needs to be repaired. Go to DIAGNOSTIC PROCEDURE 9 (RS-1050). MRS097A Go to DIAGNOSTIC PROOne of the following has occurred and needs to be CEDURE 10 (RS-1051). repaired. + Meter fuse is blown. + “AIR BAG” warning lamp circuit has open or short. + Diagnosis sensor unit is malfunctioning. MRS098A NOTE: If “AIR BAG” warning lamp operates differently from the operations shown above, refer to “AIR BAG” warning lamp operation — Diagnosis mode —, DIAGNOSTIC PROCEDURE 6 (step 4), RS-1044. RS-1032 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Self-diagnosis (Cont’d) Checking seat belt pre-tensioner system operation Check seat belt pre-tensioner system operation using a bulb as follows: 1. Connect a bulb of less than 3.4W between data link connec3 and V 8 . tor terminals V 2.After turning ignition switch from “OFF” to “ON”, the bulb operates. 3.Compare the bulb operation to the chart below. SRS848 Lighting condition of the bulb SRS condition Reference item No malfunction is detected. No further action is necessary. — MRS095A + Seat belt pre-tensioner circuit is opened, or + Seat belt pre-tensioner power supply or ground circuit is shorted. + If CONSULT-II is available, go to DIAGNOSTIC PROCEDURE 2 (RS-1034). + If CONSULT-II is not available, repair the system as follows.* 1. Visually check the wiring harness connections. 2. Replace the harness if it has visible damage.
3. Replace driver’s and front passenger seat belt assemblies. (Before disposing, they must be deactivated.) 4. Replace diagnosis sensor unit. Seat belt pre-tensioner (and air bag) is deployed. Go to COLLISION DIAGNOSIS (RS-1052). MRS096A MRS097A * Follow the procedures in numerical order when repairing malfunctioning parts.
Confirm whether malfunction is eliminated using a bulb or CONSULT-II each time repair is finished. If malfunction is still observed, proceed to the next step. When malfunction is eliminated, further repair work is not required.
RS-1033 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Self-diagnosis (Cont’d) DIAGNOSTIC PROCEDURE 2 (with CONSULT-II) Inspecting SRS malfunctioning parts by using CONSULT-II — Diagnosis mode 1. Turn ignition switch “OFF”. 2. Connect CONSULT-II to data link connector. SRS468-A 3. Turn ignition switch “ON”. 4. Touch “START”. SRS695 5. Touch “AIR BAG”. SRS771 6. Touch “SELF-DIAG [CURRENT]”. SRS697 7. Diagnostic codes are displayed on “SELF-DIAG [CURRENT]”. SRS772 RS-1034 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Self-diagnosis (Cont’d) If no malfunction is detected on “SELF-DIAG [CURRENT]” even though malfunction is detected by the “AIR BAG” warning lamp, go to DIAGNOSTIC PROCEDURE 4, page RS-1040 to diagnose the following cases: + Self-diagnostic result “SELF-DIAG [PAST] (previously stored in the memory) might not be erased after repair. + The SRS system malfunctions intermittently.
SRS701 8. Touch “PRINT”. 9. Compare diagnostic codes to the CONSULT-II DIAGNOSTIC CODE CHART, page RS-1036. 10. Touch “BACK” key of CONSULT-II until SELECT SYSTEM appears in order to return to User mode from Diagnosis mode. 11. Turn ignition switch “OFF”, then turn of and disconnect CONSULT-II and both battery cables. 12. Repair the system as outlined by the “Repair order” in CONSULT-II DIAGNOSTIC CODE CHART, that corresponds to the self-diagnostic result. For replacement procedure of component parts, refer to RS-1008 and “Removal and Installation” in RS section of Service Manual (Pub. No. SM7E2Y61G0 or SM7E-2Y61G1). 13. After repairing the system, go to DIAGNOSTIC PROCEDURE 3 for final checking, page RS-1038. RS-1035 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Self-diagnosis (Cont’d) CONSULT-II DIAGNOSTIC CODE CHART (“SELF-DIAG [CURRENT]”) Diagnostic item NO DTC IS DETECTED Explanation When malfunction is indicated by the “AIR BAG” warning lamp in User mode + Self-diagnostic result “SELFDIAG [PAST]” (previously stored in the memory) might not be erased after repair. + Intemittent malfunction has been detected in the past. Repair order Recheck SRS at each replacement.
+ Go to DIAGNOSTIC PROCEDURE 4 (RS-1040). + No malfunction is detected. + Go to DIAGNOSTIC PROCEDURE 3 (RS-1038). AIRBAG MODULE [OPEN] + Driver’s air bag module circuit is open. (including the spiral cable) AIRBAG MODULE [VB-SHORT] + Driver’s air bag module circuit is shorted to some power supply circuit. (including the spiral cable) AIRBAG MODULE [GND-SHORT] + Driver’s air bag module circuit is shorted to ground. (including the spiral cable) AIRBAG MODULE [SHORT] + Driver’s air bag module circuits are shorted to each other. 1.
Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace the spiral cable. 4. Replace driver’s air bag module. (Before disposal of it, it must be deployed.) 5. Replace the diagnosis sensor unit. 6.
Replace the related harness. ASSIST A/B MODULE [VB-SHORT] + Front passenger air bag module circuit is shorted to some power supply circuit. ASSIST A/B MODULE [OPEN] + Front passenger air bag module circuit is open. ASSIST A/B MODULE [GND-SHORT] + Front passenger air bag module circuit is shorted to ground. ASSIST A/B MODULE [SHORT] + Front passenger air bag module circuits are shorted to each other. SIDE MODULE LH [OPEN] + Side air bag module (LH) circuit is open. SIDE MODULE LH [VB-SHORT] + Side air bag module (LH) circuit is shorted to some power supply circuits. SIDE MODULE LH [GND-SHORT] + Side air bag module (LH) circuit is shorted to ground. SIDE MODULE LH [SHORT] + Side air bag module (LH) circuits are shorted to each other. SIDE MODULE RH [OPEN] + Side air bag module (RH) circuit is open. SIDE MODULE RH [VB-SHORT] + Side air bag module (RH) circuit is shorted to some power supply circuits. SIDE MODULE RH [GND-SHORT] + Side air bag module (RH) circuit is shorted to ground. SIDE MODULE RH [SHORT] + Side air bag module (RH) circuits are shorted to each other. RS-1036 1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace front passenger air bag module. (Before disposal of it, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness. 1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3.
Replace side air bag module (LH).
(Before disposal, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness. 1.
Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace side air bag module (RH). (Before disposal, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness. TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Self-diagnosis (Cont’d) Diagnostic item Explanation Repair order Recheck SRS at each replacement. SATELLITE SENS LH [UNIT FAIL] SATELLITE SENS LH [COMM FAIL] + Satellite sensor (LH) 1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace the satellite sensor (LH). 4. Replace the diagnosis sensor unit. 5. Replace the related harness. SATELLITE SENS RH [UNIT FAIL] SATELLITE SENS RH [COMM FAIL] + Satellite sensor (RH) 1. Visually check the wiring harness connection. 2.
Replace the harness if it has visible damage. 3. Replace the satellite sensor (RH). 4. Replace the diagnosis sensor unit. 5. Replace the related harness. PRE-TEN FRONT LH [OPEN/VB-SHORT] + The circuit for front LH pre-tensioner is open or shorted to some power supply circuit. PRE-TEN FRONT LH [GND-SHORT] + The circuit for front LH pre-tensioner is shorted to ground. 1. Visually check the wiring harness connections. 2. Replace the harness if it has visible damage. 3. Replace front LH seat belt. (Before disposing, it must be deactivated.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness. PRE-TEN FRONT RH [OPEN/VB-SHORT] + The circuit for front RH pre-tensioner is open or shorted to some power supply circuit. PRE-TEN FRONT RH [GND-SHORT] + The circuit for front RH pre-tensioner is shorted to ground. CONTROL UNIT + Low battery voltage (Less than 9V) + Go to DIAGNOSTIC PROCEDURE 3 (RS-1038) after charging battery. + Diagnosis sensor unit is malfunctioning. 1. Visually check the wiring harness connections. 2. Replace the harness if it has visible damage. 3. Replace the diagnosis sensor unit. 4. Replace the air bag harness. 1. Visually check the wiring harness connections.
2. Replace the harness if it has visible damage. 3. Replace front RH seat belt. (Before disposing, it must be deactivated.) 4. Replace the diagnosis sensor unit.
5. Replace the related harness. * Follow the procedures in numerical order when repairing malfunctioning parts. Confirm whether malfunction is eliminated using the air bag warning lamp or CONSULT-II each time repair is finished. If malfunction is still observed, proceed to the next step. When malfunction is eliminated, further repair work is not required.
RS-1037 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Self-diagnosis (Cont’d) DIAGNOSTIC PROCEDURE 3 (with CONSULT-II) Final checking after repairing SRS by using CONSULT-II — Diagnosis mode 1. After repairing SRS, connect both battery cables. 2. Connect CONSULT-II to data link connector. 3. Turn ignition switch from “OFF” to “ON”. SRS468-A 4. Touch “START”. SRS695 5.
Touch “AIR BAG”. SRS771 6. Touch “SELF-DIAG [CURRENT]”. SRS697 7. If no malfunction is detected on “SELF-DIAG [CURRENT]”, repair of SRS is completed. Go to step 8. (When the malfunction was only in seat belt pre-tensioner system, go to step 11.) If any malfunction is detected on “SELF-DIAG [CURRENT]”, the malfunctioning part is not repaired completely or another malfunctioning part is detected. Go to DIAGNOSTIC PROCEDURE 2, page RS-1034, and repair malfunctioning part completely. SRS701 RS-1038 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Self-diagnosis (Cont’d) 8. Touch “ERASE”.
NOTE: Touch “ERASE” to clear the memory of the malfunction (“SELF-DIAG [PAST]”). If the memory of the malfunction is “SELF-DIAG [PAST]” is not erased, the User mode shows the system malfunction by the operation of the warning lamp even if the malfunction is repaired completely. SRS773 9. Touch “BACK” key of CONSULT-II to select “SELF-DIAG [PAST]” in the “SELECT DIAG MODE” screen. Touch “SELFDIAG [PAST]”.
SRS697 10. Check that no malfunction is detected on “SELF-DIAG [PAST]”. NOTE: Past malfunction for seat belt pre-tensioner system will not be displayed on “SELF-DIAG [PAST]”. SRS702 11.
Touch “BACK” key of CONSULT-II until SELECT SYSTEM appears. 12. Turn ignition switch “OFF”, then turn off and disconnect CONSULT-II. 13. Go to DIAGNOSTIC PROCEDURE 1, page RS-1032 to checkSRS operation by using “AIR BAG” warning lamp with User mode. RS-1039 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Self-diagnosis (Cont’d) DIAGNOSTIC PROCEDURE 4 (Continued from DIAGNOSTIC PROCEDURE 2) Inspecting SRS malfunctioning record Is it the first time for maintenance of SRS? No Yes c “SELF-DIAG [PAST]” (which was previously entered) is still retained in memory. Go to DIAGNOSTIC PROCEDURE 3 (RS-1038). . Go to DIAGNOSTIC PROCEDURE 5 (RS-1040). DIAGNOSTIC PROCEDURE 5 (with CONSULT-II) Inspecting SRS intermittent malfunction by using CONSULT-II — Diagnosis mode 1. Turn ignition switch “OFF”. 2. Connect CONSULT-II to data link connector.
SRS468-A 3. Turn ignition switch “ON”. 4. Touch “START”. SRS695 5. Touch “AIR BAG”. SRS771 RS-1040 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Self-diagnosis (Cont’d) 6. Touch “SELF-DIAG [PAST]”. SRS697 7. If diagnostic codes are displayed on “SELF-DIAG [PAST]”, go to step 10. SRS700 If no malfunction is detected on “SELF-DIAG [PAST]”, touch “BACK” and go back to “SELECT DIAG MODE”. NOTE: Past malfunction for seat belt pre-tensioner system will not be displayed on “SELF-DIAG [PAST]”. SRS702 8. Touch “TROUBLE DIAG RECORD”. NOTE: With “TROUBLE DIAG RECORD”, diagnosis results previously erased by a reset operation can be displayed.
SRS697 9. Diagnostic code RECORD”.
SRS704 RS-1041 is displayed on “TROUBLE DIAG TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Self-diagnosis (Cont’d) 10. Touch “PRINT”. 11. Compare diagnostic codes to the INTERMITTENT MALFUNCTION DIAGNOSTIC CODE CHART, page RS-1043. 12.
Touch “BACK” key of CONSULT-II until SELECT SYSTEM appears. 13. Turn ignition switch “OFF”, then turn off and disconnect CONSULT-II and both battery cables. 14. Repair the system as outlined by the “Repair order” in INTERMITTENT MALFUNCTION DIAGNOSTIC CODE CHART, that corresponds to the self-diagnosis result. For replacement procedure of component parts, refer to RS-1008 and “Removal and Installation” in RS section of Service Manual (Pub. No. SM7E-2Y61G0 or SM7E-2Y61G1). 15. Go to DIAGNOSTIC PROCEDURE 3, page RS-1038. RS-1042 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Self-diagnosis (Cont’d) INTERMITTENT MALFUNCTION DIAGNOSTIC CODE CHART (“SELF-DIAG [PAST]” or “TROUBLE DIAG RECORD”) Diagnostic item Explanation Repair order NO DTC IS DETECTED + No malfunction is detected. + Go to DIAGNOSTIC PROCEDURE 3 (RS1038). AIRBAG MODULE [OPEN] + Driver’s air bag module circuit is open. (including the spiral cable) AIRBAG MODULE [VB-SHORT] + Driver’s air bag module circuit is shorted to some power supply circuit. (including the spiral cable) 1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage.
3. If the harness check is OK, replace the spiral cable, diagnosis sensor unit and driver air bag module. (Before disposing the driver air bag module, it must be deployed.) AIRBAG MODULE [GND-SHORT] + Driver’s air bag module circuit is shorted to ground. (including the spiral cable) AIRBAG MODULE [SHORT] + Driver’s air bag module circuits are shorted to each other. ASSIST A/B MODULE [VB-SHORT] + Front passenger air bag module circuit is shorted to some power supply circuit. ASSIST A/B MODULE [OPEN] + Front passenger air bag module circuit is open. ASSIST A/B MODULE [GND-SHORT] + Front passenger air bag module circuit is shorted to ground. ASSIST A/B MODULE [SHORT] + Front passenger air bag module circuits are shorted to each other.
SIDE MODULE LH [OPEN] + Side air bag module (LH) circuit is open. SIDE MODULE LH [VB-SHORT] + Side air bag module (LH

In the case of the side collision Part Side air bag is activated SRS is NOT activated Built-in side air bags module (LH or RH) REPLACE all parts of front seatback with deployed side air bag module. 1. Check for visible signs of damage (dents, tears, deformation) of the seatback on the collision side. 2. If damaged—REPLACE the damaged seat parts with new bolts and remove the side air bag module.

3. Check for visible signs of damage (tears etc.) of the side air bag module. 4. Check harness and connectors for damage, and terminals for deformities. 5. If no damage is found, reinstall the side air bag module with new torx nuts coated with bonding agent. 6. If damaged—REPLACE the side air bag module with new torx nuts coated with bonding agent. Air bag must be deployed before disposing of it. Satellite sensor (LH or RH) REPLACE the satellite sensor on the collision side with new nuts.

(Repair the center pillar inner, etc. before installing new one if damaged.) 1. Remove the satellite sensor on the collision side.

Check harness connectors for damage, terminals for deformities, and harness for binding. 2. Check for visible signs of damage (dents, cracks, deformation) of the satellite sensor. 3.

Install the satellite sensor to check fit. 4. If no damage is found, reinstall the satellite sensor with new nuts coated with bonding agent. 5.

If damaged—REPLACE the satellite sensor with new nuts coated with bonding agent. Diagnosis sensor unit REPLACE the diagnosis sensor unit with the new bolts. 1. Check case and bracket for dents, cracks or deformities. 2. Check connectors for damage, and terminals for deformities. 3. If no damage is found, reinstall the diagnosis sensor unit with new special bolts and ground bolt coated with bonding agent. 4. If damaged—REPLACE the diagnosis sensor unit with new special bolts and ground bolt coated with bonding agent. Seat belt pre-tensioner assembly 1. Check if the seat belt can be extended smoothly. If the seat belt cannot be extended smoothly. - Check for deformities of the center pillar inner. - If the center pillar inner has no damage, REPLACE the seat belt pre-tensioner assembly. 2. Remove the seat belt pre-tensioner assembly on the collision side. Check harness cover and connectors for damage, terminals for deformities, and harness for binding. 3. Check for visible signs of damage (dents, cracks, deformation) of the seat belt pre-tensioner assembly. 4. If no damage is found, reinstall the seat belt pre-tensioner assembly with new bolts coated with bonding agent. 5. If damaged—REPLACE the seat belt pre-tensioner assembly with new bolts coated with bonding agent. The seat belt pre-tensioner assembly must be deployed before disposing of it.

RS-1054 COLLISION DIAGNOSIS Part Side air bag is activated SRS is NOT activated Seat with built-in side air bag REPLACE all parts of front seatback (including front seatback frame) 1. Visually check the seat on the collision side. 2. Remove the seat on the collision side and check the following for damage and deformities. + Harness, connectors and terminals + Frame and recliner (for front seat), and also adjuster and slides (for front seat) 3. If no damage is found, reinstall the seat. 4. If damaged—REPLACE the damaged seat parts with new bolts.

Center pillar inner 1. Check the center pillar inner on the collision side for damage (dents, cracks, deformation). 2. If damaged—REPAIR the center pillar inner.

Trim 1. Check for visible signs of damage (dents, cracks, deformation) of the interior trim on the collision side. 2. If damaged—REPLACE the damaged trim parts. RS-1055 STEERING SYSTEM SECTION ST MODIFICATION NOTICE: + Power steering oil pump for ZD30ETi engine has been adopted. CONTENTS POWER STEERING OIL PUMP......................... 1002 Removal and Installation .... 1002 Disassembly and Assembly............................ 1003 SERVICE DATA AND SPECIFICATIONS (SDS)...

1004 Inspection and Adjustment .... 1004 ST POWER STEERING OIL PUMP Removal and Installation SST921C ST-1002 POWER STEERING OIL PUMP Disassembly and Assembly SST922C 1 V 2 V 3 V 4 V 5 V 6 V 7 V Rear body Pin Gasket Cam ring Vane Rotor Front side plate 8 V 9 V 10 V 11 V 12 V 13 V O-ring (Outer) O-ring (Inner) Blacket Suction pipe O-ring O-ring ST-1003 14 V 15 V 16 V 17 V 18 V 19 V Connector bolt O-ring Spool valve Spring Snap ring Plug SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment POWER STEERING SYSTEM (Model: PB69K) Steering wheel turning force (at 360° from neutral position and circumference of steering wheel) N (kg, lb) Oil pump pressure kPa (bar, kg/cm2, psi) 39 (4, 9) or less 8,140 - 8,728 (81.4 - 87.3, 83 - 89, 1,180 - 1,266) at idling Fluid capacity liter m (Imp fl oz) Approximately 1,000 (35.2) Normal operating temperature °C (°F) 60 - 80 (140 - 176) Steering gear turning torque Nzm (kg-cm, in-lb) 360° position from straight-ahead position 0.15 - 0.69 (1.5 - 7.0, 1.3 - 6.1) Straight-ahead position (As compared with steering wheel turned 360°) 0.2 (2, 1.7) higher Maximum turning torque 0.7 - 1.0 (7 - 10, 6.1 - 8.7) Backlash at pitman arm top end (in a straightahead position) mm (in) 0 - 0.1 (0 - 0.004) End play (at sector shaft end in neutral position) mm (in) 0.1 (0.004) or less ST-1004 TRANSFER SECTION TF MODIFICATION NOTICE: Mainshaft front bearing snap rings have been changed. CONTENTS SERVICE DATA AND SPECIFICATIONS (SDS)............................ 1002 Inspection and Adjustment .... 1002 TF SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment AVAILABLE SNAP RING Mainshaft front bearing Unit: mm (in) Allowable clearance 0 - 0.15 (0 - 0.0059) Thickness Part number 3.10 (0.1220) 3.19 (0.1256) 3.28 (0.1291) 33138-73P10 33138-73P11 33138-73P12 TF-1002 AUTOMATIC TRANSMISSION SECTION AT MODIFICATION NOTICE: + Wiring diagrams have been changed. + Service Data and Specifications (SDS) have been changed. CONTENTS OVERALL SYSTEM .... 2002 Circuit Diagram .... 2002 Wiring Diagram — A/T —........................ 2003 TROUBLE DIAGNOSES — A/T Shift Lock System...

2013 Wiring Diagram — SHIFT — .... 2013 SERVICE DATA AND SPECIFICATIONS (SDS).. 2014 General Specifications .... 2014 Specifications and Adjustment........................ 2014 AT OVERALL SYSTEM Circuit Diagram TAT012M AT-2002 OVERALL SYSTEM Wiring Diagram — A/T — TAT036M AT-2003 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) TAT037M AT-2004 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) TAT038M AT-2005 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) TAT039M AT-2006 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) TAT040M AT-2007 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) TAT042M AT-2008 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) TAT043M AT-2009 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) TAT044M AT-2010 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) TAT045M AT-2011 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) TAT046M AT-2012 TROUBLE DIAGNOSES — A/T Shift Lock System Wiring Diagram — SHIFT — TAT047M AT-2013 SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications Automatic transmission model RE4R03A Transmission model code number 57X17 Stall torque ratio 2.0 : 1 Transmission gear ratio 1st 2.784 2nd 1.544 Top 1.000 OD 0.694 Reverse 2.275 Recommended fluid Genuine Nissan ATF or equivalent Fluid capacity ! (Imp qt) 11.8 (10-3/8) Specifications and Adjustment SHIFT SCHEDULE Vehicle speed when shifting gears Throttle position Vehicle speed km/h (MPH) Shift pattern D 1 → D2 D2 → D 3 D3 → D 4 D4 → D 3 D3 → D 2 D2 → D 1 12 → 1 1 Standard 36 - 40 (22 - 25) 72 - 80 (45 - 50) 117 - 127 (73 - 79) 113 - 123 (70 - 76) 59 - 67 (37 - 42) 29 - 33 (18 - 21) 29 - 33 (18 - 21) Power 36 - 40 (22 - 25) 72 - 80 (45 - 50) 117 - 127 (73 - 79) 113 - 123 (70 - 76) 59 - 67 (37 - 42) 29 - 33 (18 - 21) 29 - 33 (18 - 21) Standard 32 - 36 (20 - 22) 63 - 69 (39 - 43) 101 - 109 (63 - 68) 49 - 59 (30 - 37) 28 - 34 (17 - 21) 7 - 11 (4 - 7) 7 - 11 (4 - 7) Power 32 - 36 (20 - 22) 63 - 69 (39 - 43) 101 - 109 (63 - 68) 78 - 86 (48 - 53) 48 - 54 (30 - 34) 7 - 11 (4 - 7) 7 - 11 (4 - 7) Full throttle Half throttle AT-2014 BRAKE SYSTEM SECTION BR MODIFICATION NOTICE: + Wiring Diagrams have been changed. CONTENTS TROUBLE DIAGNOSES .... 2002 Schematic .... 2002 Wiring Diagram — ABS — .... 2003 BR TROUBLE DIAGNOSES Schematic TBR021M BR-2002 TROUBLE DIAGNOSES Wiring Diagram — ABS — TBR022M BR-2003 TROUBLE DIAGNOSES Wiring Diagram — ABS — (Cont’d) TBR023M BR-2004 TROUBLE DIAGNOSES Wiring Diagram — ABS — (Cont’d) TBR024M BR-2005 TROUBLE DIAGNOSES Wiring Diagram — ABS — (Cont’d) TBR025M BR-2006 TROUBLE DIAGNOSES Wiring Diagram — ABS — (Cont’d) TBR026M BR-2007 TROUBLE DIAGNOSES Wiring Diagram — ABS — (Cont’d) TBR027M BR-2008 BODY & TRIM SECTION BT MODIFICATION NOTICE: + Front grille and bumper assembly have been changed. + Front grille guard has been added. CONTENTS PRECAUTIONS ....

2002 Service Notice..

2002 Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER” ... 2002 BODY END .... 2003 Body Front End.. 2003 EXTERIOR .... 2006 ★ For seat belt, refer to MA and RS section. ★ For wiring diagrams of body electrical systems, refer to EL section. BT PRECAUTIONS Service Notice + + + + + When removing or installing various parts, place a cloth or padding onto the vehicle body to prevent scratches. Handle trim, molding, instruments, grille, etc. carefully during removing or installing. Be careful not to soil or damage them. Apply sealing compound where necessary when installing parts. When applying sealing compound, be careful that the sealing compound does not protrude from parts. When replacing any metal parts (for example body outer panel, members, etc.), be sure to take rust prevention measures. Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER” The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination and optional equipment.): + For a frontal collision The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. + For a side collision The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision). Information necessary to service the system safely is included in the RS section of this Service Manual. WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.

For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified with yellow harness connector. BT-2002 BODY END Body Front End + + + + + When removing or installing hood, place a cloth or other padding on front fender panel and cowl top. This prevents vehicle body from being scratched. Bumper fascia is made of plastic. Do not use excessive force and be sure to keep oil away from it. Hood adjustment: Adjust at hinge portion. Hood lock adjustment: After adjusting, check hood lock control operation. Apply a coat of grease to hood locks engaging mechanism. Hood opener: Do not attempt to bend cable forcibly. Doing so increases effort required to unlock hood. REMOVAL — Front bumper assembly 1 V 2 V 3 V 4 V 5 V 6 V 7 V 8 V Remove front guard bar. Refer to “EXTERIOR” for details, BT-2005. Remove left and right headlamp wipers (on models with headlamp wipers). Remove clips securing front grille and remove the front grille. Remove screws and bolts securing left and right front bumper side bracket. Remove bolts securing bumper lower to engine under cover. Remove bolts securing left and right front bumper stay upper (without winch). Remove bolts securing left and right front bumper stay side. Extract bumper assembly. SBT243A BT-2003 BODY END Body Front End (Cont’d) SBT244A BT-2004 BODY END Body Front End (Cont’d) SBT245A BT-2005 EXTERIOR Front grille guard SBT246A BT-2006 CLUTCH SECTION CL MODIFICATION NOTICE: + Service Data and Specifications (SDS) have been changed. CONTENTS CLUTCH SYSTEM.. 2002 HYDRAULIC CLUTCH CONTROL .... 2003 Clutch Operating Cylinder.............................. 2003 Clutch Master Cylinder .... 2004 CLUTCH DISC AND CLUTCH COVER .... 2005 Clutch Cover ....

2005 SERVICE DATA AND SPECIFICATIONS (SDS)... 2006 General Specifications ....

2006 Inspection and Adjustment .... 2006 CL CLUTCH SYSTEM SCL906 CL-2002 HYDRAULIC CLUTCH CONTROL Clutch Operating Cylinder SCL907 CL-2003 HYDRAULIC CLUTCH CONTROL Clutch Master Cylinder SCL908 CL-2004 CLUTCH DISC AND CLUTCH COVER Clutch Cover INSTALLATION Model 300 + Apply recommended grease to contact surface of splines. + Too much lubricant may damage clutch disc facing. + Insert Tool into clutch disc hub when installing clutch cover and disc. + Be careful not to allow grease to contaminate clutch facing. + Tighten bolts in numerical order, in two steps. First step: : 10 - 20 Nzm (1.0 - 2.0 kg-m, 7 - 14 ft-lb) Final step: : 29 - 39 Nzm (2.9 - 4.0 kg-m, 21 - 28 ft-lb) SCL909 CL-2005 SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications CLUTCH CONTROL SYSTEM Type of clutch control CLUTCH DISC ZD30DDTi Hydraulic Applied model CLUTCH MASTER CYLINDER (with clutch damper) H/T and Wagon Unit: mm (in) Inner diameter 275 17.46 (11/16) CLUTCH OPERATING CYLINDER Facing size (Outer dia.

x inner dia. x thickness) mm (in) 275 x 180 x 3.5 (10.83 x 7.09 x 0.14) Thickness of disc assembly with load mm (in)/N (kg, lb) 7.8 - 8.4 (0.31 - 0.33) /7,846 (800, 1,764) Unit: mm (in) Inner diameter CLUTCH COVER 20.64 (13/16) ZD30DDTi CLUTCH BOOSTER Applied model Unit: mm (in) Type H/T Wagon 6,473 - 7,257 (660 - 740, 1,455 - 1,632) 7,355 - 8,366 (750 - 850, 1.654 - 1,874) M45 Diaphragm diameter Check valve type 275 Full load 114.3 (4.50) N (kg, lb) Built-in hose type Inspection and Adjustment CLUTCH PEDAL Unit: mm (in) ZD30DDTi Applied model Pedal height “H*” H/T Wagon 195 - 205 (7.68 - 8.07) 200 - 210 (7.87 - 8.27) Pedal free play “A” (at pedal pad) 1.0 - 3.0 (0.039 - 0.118) *: Measured from surface of melt sheet to pedal pad CLUTCH BOOSTER Unit: mm (in) Output rod length “A” 1.30 - 1.55 (0.0512 - 0.0610) Input rod length “B” 130 (5.12) CLUTCH DISC Unit: mm (in) ZD30DDTi Applied model 275 H/T and Wagon Wear limit of facing surface to rivet head 0.3 (0.012) Runout limit of facing 1.3 (0.051) Distance of runout check point (from the hub center) 132.5 (5.22) Maximum backlash of spline (at outer edge of disc) 1.0 (0.039) CL-2006 SERVICE DATA AND SPECIFICATIONS (SDS) CLUTCH COVER Unit: mm (in) ZD30DDTi Applied model 275 H/T and Wagon Diaphragm spring height “A” 44 - 46 (1.732 - 1.811) Uneven limit of diaphragm spring toe height 0.7 (0.028) CL-2007 ENGINE CONTROL SYSTEM SECTION EC EC CONTENTS ENGINE AND EMISSION CONTROL OVERALL SYSTEM.............................. 2003 Circuit Diagram .... 2003 TROUBLE DIAGNOSIS FOR POWER SUPPLY .... 2004 Main Power Supply and Ground Circuit .... 2004 DTC 0102 MASS AIR FLOW SEN..................... 2006 Wiring Diagram .... 2006 DTC 0103 COOLANT TEMP SEN .... 2007 Wiring Diagram .... 2007 DTC 0104 VEHICLE SPEED SEN .... 2008 Wiring Diagram .... 2008 DTC 0203 ACCEL POS SW (F/C) .... 2009 Wiring Diagram .... 2009 DTC 0208 OVER HEAT....................................

2010 Wiring Diagram .... 2010 Diagnostic Procedure.................................... 2011 Component Inspection .... 2016 Main 12 Causes of Overheating..................... 2017 DTC 0402 P9zFUEL TEMP SEN .... 2018 Wiring Diagram .... 2018 DTC 0403 ACCEL POS SENSOR .... 2019 Wiring Diagram .... 2019 DTC 0504 A/T COMM LINE .... 2021 Wiring Diagram .... 2021 DTC 0701 P1zCAM POS SEN .... 2022 Wiring Diagram .... 2022 DTC 0702 P2zTDC PULSE SIG......................... 2023 Wiring Diagram .... 2023 DTC 0703 P3zPUMP COMM LINE .... 2024 Wiring Diagram ....

2024 DTC 0704 P4zSPILL/V CIRC, DTC 0706 P6zSPILL VALVE .... 2025 Wiring Diagram .... 2025 DTC 0707 P7zF/INJ TIMG FB............................ 2026 Wiring Diagram .... 2026 DTC 0807 ECM 14.. 2027 Wiring Diagram .... 2027 DTC 0902 ECM RLY .... 2028 Wiring Diagram .... 2028 DTC 0905 TURBO PRESSURE .... 2029 Wiring Diagram .... 2029 DTC 1003 EGR VOLUME CONT/V.................... 2030 Wiring Diagram ....

2030 DTC 1004 FUEL CUT SYSTEM1....................... 2031 Wiring Diagram .... 2031 GLOW CONTROL SYSTEM .... 2032 Wiring Diagram .... 2032 START SIGNAL.. 2033 Wiring Diagram .... 2033 PARK/NEUTRAL POSITION (PNP) SWITCH ....

2034 Wiring Diagram ....

2034 HEAT UP SWITCH .... 2035 Wiring Diagram .... 2035 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE........................... 2036 Wiring Diagram .... 2036 INTAKE AIR CONTROL VALVE CONTROL SOLENOID VALVE..

2037 Wiring Diagram .... 2037 AIR CONDITIONER CONTROL .... 2038 Wiring Diagram .... 2038 MI (MIL) & DATA LINK CONNECTORS .... 2039 Wiring Diagram .... 2039 When you read wiring diagrams: + Read GI section, “HOW TO READ WIRING DIAGRAMS”. + See EL section, “POWER SUPPLY ROUTING” for power distribution circuit. When you perform trouble diagnoses, read GI section, “HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES” and “HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT”. EC-2002 ENGINE AND EMISSION CONTROL OVERALL SYSTEM Circuit Diagram TEC095M EC-2003 TROUBLE DIAGNOSIS FOR POWER SUPPLY Main Power Supply and Ground Circuit WIRING DIAGRAM TEC181M EC-2004 TROUBLE DIAGNOSIS FOR POWER SUPPLY Main Power Supply and Ground Circuit (Cont’d) TEC097M EC-2005 DTC 0102 MASS AIR FLOW SEN Wiring Diagram TEC182M EC-2006 DTC 0103 COOLANT TEMP SEN Wiring Diagram TEC183M EC-2007 DTC 0104 VEHICLE SPEED SEN Wiring Diagram TEC184M EC-2008 DTC 0203 ACCEL POS SW (F/C) Wiring Diagram TEC185M EC-2009 DTC 0208 OVER HEAT Wiring Diagram TEC186M EC-2010 DTC 0208 OVER HEAT Diagnostic Procedure 1 INSPECTION START Do you have CONSULT-II? Yes or No Yes c GO TO 2. No c GO TO 3. 2 CHECK COOLING FAN OPERATION With CONSULT-II 1. Turn ignition switch “ON”. 2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.

SEF646X 3. Make sure that cooling fan-1 operates. OK or NG OK c GO TO 12.

NG c GO TO 4. 3 CHECK COOLING FAN OPERATION Without CONSULT-II 1. Turn ignition switch “OFF”.

2. Disconnect engine coolant temperature sensor harness connector. 3. Connect 150Ω resistor to engine coolant temperature sensor harness connector. 4. Restart engine and make sure that cooling fan operates. MEC475B OK or NG OK c GO TO 12. NG c GO TO 4. EC-2011 DTC 0208 OVER HEAT Diagnostic Procedure (Cont’d) 4 CHECK COOLING FAN POWER SUPPLY CIRCUIT 1. Turn ignition switch “OFF”.

2. Disconnect cooling fan relay-1. SEF690V 3. Turn ignition switch “ON”. 4. Check voltage between cooling fan relay-1 terminals 1, 5 and ground with CONSULT-II or tester. SEF607X OK or NG OK c GO TO 6. NG c GO TO 5. 5 DETECT MALFUNCTIONING PART Check the following. + Fuse block (J/B) connector E112 + 10A fuse or 20A fuse + 30A fusible links + Harness for open or short between cooling fan relay-1 and fuse + Harness for open or short between cooling fan relay-1 and battery c Repair open circuit or short to ground or short to power in harness or connectors. EC-2012 DTC 0208 OVER HEAT Diagnostic Procedure (Cont’d) 6 CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Disconnect cooling fan motor-1 harness connector. SEF691V 3. Check harness continuity between cooling fan relay-1 terminal 3 and cooling fan motor-1 terminals 1, 3, cooling fan motor-1 terminals 2, 4 and body ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 7. NG c Repair open circuit or short to ground or short to power in harness or connectors. 7 CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 14 and cooling fan relay-1 terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 9. NG c GO TO 8. 8 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + Harness connectors M52, F7 + Harness for open or short between cooling fan relay-1 and ECM c Repair open circuit or short to ground or short to power in harness or connectors. 9 CHECK COOLING FAN RELAY-1 Refer to “Component Inspection”, EC-2016.

OK or NG OK c GO TO 10.

NG c Replace cooling fan relay. EC-2013 DTC 0208 OVER HEAT Diagnostic Procedure (Cont’d) 10 CHECK COOLING FAN MOTOR-1 Supply battery voltage between the following terminals and check operation. SEF292Z OK or NG OK c GO TO 11. NG c Replace cooling fan motor. 11 CHECK INTERMITTENT INCIDENT Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END 12 CHECK COOLING SYSTEM FOR LEAK Apply pressure to the cooling system with a tester, and check if the pressure drops. Testing pressure: 157 kPa (1.57 bar, 1.6 kg/cm2, 23 psi) CAUTION: Higher than the specified pressure may cause radiator damage. SLC754A Pressure should not drop. OK or NG OK c GO TO 14. NG c GO TO 13. 13 DETECT MALFUNCTIONING PART Check the following for leak. + Hose + Radiator + Water pump (Refer to LC section, “Water Pump”.) c Repair or replace. EC-2014 DTC 0208 OVER HEAT Diagnostic Procedure (Cont’d) 14 CHECK RADIATOR CAP Apply pressure to cap with a tester and check radiator cap relief pressure. SLC755A Radiator cap relief pressure: 79 - 98 kPa (0.78 - 0.98 bar, 0.8 - 1.0 kg/cm2, 11 - 14 psi) OK or NG OK c GO TO 15. NG c Replace radiator cap.

15 CHECK THERMOSTAT 1. Remove thermostat. 2. Check valve seating condition at normal room temperatures. It should seat tightly. 3. Check valve opening temperature and valve lift. SLC343 Valve opening temperature: 82°C (180°F) [standard] (Models for cold areas) 76.5°C (170°F) [standard] (Models for except cold areas) Valve lift: More than 10 mm/95°C (0.394 in/203°F) 4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to LC section, “Thermostat”. OK or NG OK c GO TO 16.

NG c Replace thermostat. EC-2015 DTC 0208 OVER HEAT Diagnostic Procedure (Cont’d) 16 CHECK ENGINE COOLANT TEMPERATURE SENSOR 1. Remove engine coolant temperature sensor.

2. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure. SEF304X OK or NG OK c GO TO 17.

NG c Replace engine coolant temperature sensor. 17 CHECK MAIN 12 CAUSES If the cause cannot be isolated, go to “MAIN 12 CAUSES OF OVERHEATING”, EC-2017. c INSPECTION END Component Inspection FUEL PUMP RELAY Check continuity between terminals 3 and 5.

Conditions SEF145X Continuity 12V direct current supply between terminals 1 and 2 Yes No current supply No If NG, replace relay. EC-2016 DTC 0208 OVER HEAT Main 12 Causes of Overheating Engine Step Inspection item OFF 1 + + + + 2 Equipment Standard Reference page + Visual No blocking + Coolant mixture + Coolant tester 30 - 50% coolant mixture See “RECOMMENDED FLUIDS AND LUBRICANTS” in MA section. 3 + Coolant level + Visual Coolant up to MAX level in reservoir tank and radiator filler neck See “Changing Engine Coolant”, “ENGINE MAINTENANCE” in MA section. 4 + Radiator cap + Pressure tester 78 - 98 kPa (0.78 - 0.98 bar, 0.8 - 1.0 kg/cm2, 11 - 14 psi) 59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm2, 9 - 14 psi) (Limit) See “System Check”, “ENGINE COOLING SYSTEM” in LC section. ON*2 5 + Coolant leaks + Visual No leaks See “System Check”, “ENGINE COOLING SYSTEM” in LC section. ON*2 6 + Thermostat + Touch the upper and lower radiator hoses Both hoses should be hot. See “Thermostat” and “Radiator”, “ENGINE COOLING SYSTEM” in LC section. ON*1 7 + Cooling fan + Visual Operating OFF 8 + Combustion gas leak + Color checker chemical Negative tester 4 gas analyzer — ON*3 9 + Coolant temperature gauge + Visual — Blocked Blocked Blocked Blocked radiator condenser radiator grille bumper Gauge less than 3/4 when driving — See “DTC 0208 OVER HEAT”.

+ Coolant overflow to res- + Visual ervoir tank No overflow during driving See “Changing Engine and idling Coolant”, “ENGINE MAINTENANCE” in MA section. OFF*4 10 + Coolant return from res- + Visual ervoir tank to radiator Should be initial level in reservoir tank See “ENGINE MAINTENANCE” in MA section. OFF 11 + Cylinder head + Straight gauge feeler gauge 0.1 mm (0.004 in) Maximum distortion (warping) See “Inspection”, “CYLINDER HEAD” in EM section. 12 + Cylinder block and pistons + Visual No scuffing on cylinder walls or piston See “Inspection”, “CYLINDER BLOCK” in EM section. *1: Engine running at idle. *2: Engine running at 3,000 rpm for 10 minutes. *3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time. For more information, refer to “OVERHEATING CAUSE ANALYSIS” in LC section. EC-2017 DTC 0402 P9zFUEL TEMP SEN Wiring Diagram TEC187M EC-2018 DTC 0403 ACCEL POS SENSOR Wiring Diagram TEC188M EC-2019 DTC 0403 ACCEL POS SENSOR Wiring Diagram (Cont’d) TEC189M EC-2020 DTC 0504 A/T COMM LINE Wiring Diagram TEC190M EC-2021 DTC 0701 P1zCAM POS SEN Wiring Diagram TEC187M EC-2022 DTC 0702 P2zTDC PULSE SIG Wiring Diagram TEC187M EC-2023 DTC 0703 P3zPUMP COMM LINE Wiring Diagram TEC187M EC-2024 DTC 0704 P4zSPILL/V CIRC, DTC 0706 P6zSPILL VALVE Wiring Diagram TEC187M EC-2025 DTC 0707 P7zF/INJ TIMG FB Wiring Diagram TEC187M EC-2026 DTC 0807 ECM 14 Wiring Diagram TEC191M EC-2027 DTC 0902 ECM RLY Wiring Diagram TEC451 EC-2028 DTC 0905 TURBO PRESSURE Wiring Diagram TEC193M EC-2029 DTC 1003 EGR VOLUME CONT/V Wiring Diagram TEC194M EC-2030 DTC 1004 FUEL CUT SYSTEM1 Wiring Diagram TEC187M EC-2031 GLOW CONTROL SYSTEM Wiring Diagram TEC195M EC-2032 START SIGNAL Wiring Diagram TEC196M EC-2033 PARK/NEUTRAL POSITION (PNP) SWITCH Wiring Diagram TEC197M EC-2034 HEAT UP SWITCH Wiring Diagram TEC198M EC-2035 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE Wiring Diagram TEC199M EC-2036 INTAKE AIR CONTROL VALVE CONTROL SOLENOID VALVE Wiring Diagram TEC200M EC-2037 AIR CONDITIONER CONTROL Wiring Diagram TEC201M EC-2038 MI (MIL) & DATA LINK CONNECTORS Wiring Diagram TEC202M EC-2039 MI (MIL) & DATA LINK CONNECTORS EC-2040 ELECTRICAL SYSTEM SECTION EL When you read wiring diagrams: + Read GI section, “HOW TO READ WIRING DIAGRAMS”. When you perform trouble diagnoses, read GI section, “HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES” and “HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT”. + Check for any service bulletins before servicing the vehicle. MODIFICATION NOTICE: + Wiring Diagram has been changed. CONTENTS PRECAUTIONS AND PREPARATION .... 2003 Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER” ... 2003 POWER SUPPLY ROUTING............................. 2004 Schematic .... 2004 POWER SUPPLY ROUTING/WAGON AND HARDTOP MODELS .... 2005 Wiring Diagram — POWER —....................... 2005 GROUND DISTRIBUTION/WAGON AND HARDTOP MODELS .... 2014 Engine Room Harness/LHD Models............... 2014 Engine Control Harness/LHD Models............. 2017 Main Harness/LHD Models............................

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The SRS system composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination and optional equipment.): + For a frontal collision The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. + For a side collision The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision). Information necessary to service the system safely is included in the RS section of this Service Manual. WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by intentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow harness connector. EL-2003 POWER SUPPLY ROUTING Schematic TEL371M EL-2004 POWER SUPPLY ROUTING/WAGON AND HARDTOP MODELS Wiring Diagram — POWER — BATTERY POWER SUPPLY — IGNITION SW. 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The bulb can be replaced from the engine compartment side without removing the headlamp body. + Grasp only the plastic base when handling the bulb. Never touch the glass envelope. 1. Disconnect the battery cable. 2. Turn the bulb retaining ring counterclockwise until it is free from the headlamp reflector, and then remove it.

3. Disconnect the harness connector from the back side of the bulb. 4. Remove the headlamp bulb carefully. Do not shake or rotate the bulb when removing it. 5. Install in the reverse order of removal. CAUTION: Do not leave headlamp reflector without bulb for a long period of time. Dust, moisture, smoke, etc. entering headlamp body may affect the performance of the headlamp. Remove headlamp bulb from the headlamp reflector just before a replacement bulb is installed. SEL995K Aiming Adjustment When performing headlamp aiming adjustment, use an aiming machine, aiming wall screen or headlamp tester. Aimers should be in good repair, calibrated and operated in accordance with respective operation manuals. If any aimer is not available, aiming adjustment can be done as follows: For details, refer to the regulations in your own country.

a. Keep all tires inflated to correct pressures.

b. Place vehicle and tester on one and same flat surface. c. See that there is no-load in vehicle (coolant, engine oil filled up to correct level and full fuel tank) other than the driver (or equivalent weight placed in driver’s position). CAUTION: Be sure aiming switch is set to “0” when performing aiming adjustment on vehicles equipped with headlamp aiming control. SEL466V EL-2035 HEADLAMP/WAGON AND HARDTOP MODELS — Conventional Type — Aiming Adjustment (Cont’d) LOW BEAM 1. Turn headlamp low beam on. 2. Use adjusting screws to perform aiming adjustment.

+ First tighten the adjusting screw all the way and then make adjustment by loosening the screw. CEL735 + Adjust headlamps so that main axis of light is parallel to center line of body and is aligned with point P shown in illustration. + Figure to the left shows headlamp aiming pattern for driving on right side of road; for driving on left side of road, aiming pattern is reversed. + Dotted lines in illustration show center of headlamp. “H”: Horizontal center line of headlamps “WL”: Distance between each headlamp center “L”: 5,000 mm (196.85 in) “C”: 63 mm (2.48 in) SEL254I EL-2036 HEADLAMP/WAGON AND HARDTOP MODELS — Headlamp Aiming Control — Wiring Diagram — H/AIM — TEL389M EL-2037 HEADLAMP/WAGON AND HARDTOP MODELS — Headlamp Aiming Control — Wiring Diagram — H/AIM — (Cont’d) TEL390M EL-2038 HEADLAMP/WAGON AND HARDTOP MODELS — Daytime Light System — Wiring Diagram — DTRL — TEL675B EL-2039 HEADLAMP/WAGON AND HARDTOP MODELS — Daytime Light System — Wiring Diagram — DTRL — (Cont’d) TEL484M EL-2040 PARKING, LICENSE AND TAIL LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — TAIL/L —/Type A Rear combination lamps are not located on rear bumper. TEL391M EL-2041 PARKING, LICENSE AND TAIL LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — TAIL/L —/Type A (Cont’d) TEL212M EL-2042 PARKING, LICENSE AND TAIL LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — TAIL/L —/Type B LHD MODELS Rear combination lamps are located on rear bumper.

TEL392M EL-2043 PARKING, LICENSE AND TAIL LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — TAIL/L —/Type B (Cont’d) TEL213M EL-2044 PARKING, LICENSE AND TAIL LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — TAIL/L —/Type C RHD MODELS Rear combination lamps are located on rear bumper.

TEL393M EL-2045 PARKING, LICENSE AND TAIL LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — TAIL/L —/Type C (Cont’d) TEL394M EL-2046 BACK-UP LAMP/WAGON AND HARDTOP MODELS Wiring Diagram — BACK/L —/LHD Models TEL395M EL-2047 FRONT FOG LAMP/WAGON AND HARDTOP MODELS Wiring Diagram — F/FOG — TEL397M EL-2048 REAR FOG LAMP/WAGON AND HARDTOP MODELS Wiring Diagram —R/FOG— TEL485M EL-2049 TURN SIGNAL AND HAZARD WARNING LAMPS/ WAGON AND HARDTOP MODELS Wiring Diagram — TURN —/Type A Rear combination lamps are not located on rear bumper. TEL399M EL-2050 TURN SIGNAL AND HAZARD WARNING LAMPS/ WAGON AND HARDTOP MODELS Wiring Diagram — TURN —/Type A (Cont’d) TEL400M EL-2051 TURN SIGNAL AND HAZARD WARNING LAMPS/ WAGON AND HARDTOP MODELS Wiring Diagram — TURN —/Type C Rear combination lamps are located on rear bumper. TEL401M EL-2052 TURN SIGNAL AND HAZARD WARNING LAMPS/ WAGON AND HARDTOP MODELS Wiring Diagram — TURN —/Type C (Cont’d) TEL402M EL-2053 ILLUMINATION/WAGON AND HARDTOP MODELS Schematic TEL403M EL-2054 ILLUMINATION/WAGON AND HARDTOP MODELS Wiring Diagram — ILL — TEL404M EL-2055 ILLUMINATION/WAGON AND HARDTOP MODELS Wiring Diagram — ILL — (Cont’d) TEL405M EL-2056 ILLUMINATION/WAGON AND HARDTOP MODELS Wiring Diagram — ILL — (Cont’d) TEL406M EL-2057 ILLUMINATION/WAGON AND HARDTOP MODELS Wiring Diagram — ILL — (Cont’d) TEL407M EL-2058 ILLUMINATION/WAGON AND HARDTOP MODELS Wiring Diagram — ILL — (Cont’d) TEL408M EL-2059 ILLUMINATION/WAGON AND HARDTOP MODELS Wiring Diagram — ILL — (Cont’d) TEL409M EL-2060 ILLUMINATION/WAGON AND HARDTOP MODELS Wiring Diagram — ILL — (Cont’d) TEL410M EL-2061 METER AND GAUGES/WAGON AND HARDTOP MODELS Combination Meter CEL231M EL-2062 METER AND GAUGES/WAGON AND HARDTOP MODELS Schematic TEL481M EL-2063 METER AND GAUGES/WAGON AND HARDTOP MODELS Wiring Diagram — METER — TEL415M EL-2064 METER AND GAUGES/WAGON AND HARDTOP MODELS Wiring Diagram — METER — (Cont’d) TEL416M EL-2065 COMPASS AND THERMOMETER Wiring Diagram — COMPAS — TEL486M EL-2066 WARNING LAMPS/WAGON AND HARDTOP MODELS Schematic TEL421M EL-2067 WARNING LAMPS/WAGON AND HARDTOP MODELS Schematic (Cont’d) TEL422M EL-2068 WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — WARN — TEL425M EL-2069 WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — WARN — (Cont’d) TEL426M EL-2070 WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — WARN — (Cont’d) TEL427M EL-2071 WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — WARN — (Cont’d) TEL428M EL-2072 WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — WARN — (Cont’d) TEL429M EL-2073 WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — WARN — (Cont’d) TEL430M EL-2074 WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — WARN — (Cont’d) TEL431M EL-2075 WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — WARN — (Cont’d) TEL432M EL-2076 WARNING CHIME/WAGON AND HARDTOP MODELS Electrical Components Inspection KEY SWITCH (insert) Check continuity between terminals when key is inserted in ignition key cylinder and key is removed from ignition key cylinder. Terminal No. 1 -V 2 V Condition Continuity Key is inserted. Yes Key is removed. No SEL015WB DRIVER SIDE DOOR SWITCH Check continuity between terminals when door switch is pushed and released. Terminal No. 1 -V 3 V SEL039X EL-2077 Condition Continuity Door switch is pushed. No Door switch is released.

Yes REAR WIPER AND WASHER/WAGON AND HARDTOP MODELS System Description WIPER OPERATION The rear wiper switch is controlled by a ring built into the combination switch. There are two wiper switch positions: + ON (LO speed) + INT (Intermittent) With the ignition switch in the ON position, power is supplied + through 10A fuse (No. 18 , located in the fuse block) 4 , and + to rear wiper motor terminal V 5 . + to rear wiper amplifier terminal V Low speed wiper operation Ground is supplied to rear wiper switch terminal V 24 through body grounds. When the rear wiper is placed in the ON position, ground is supplied + through rear wiper switch terminal V 22 6 . + to rear wiper relay terminal V Then ground is supplied 1 + to rear wiper motor terminal V 2 and V 3 . + through rear wiper amplifier terminals V With power and ground supplied, the wiper motor operates. Auto stop operation With the rear wiper switch turned OFF, rear wiper motor will continue to operate until wiper arm reaches rear window base. When wiper arm is not located at base of rear window with rear wiper switch OFF, ground is supplied 1 + to rear wiper motor terminal V 2 ,V 7 and + through rear wiper amplifier terminals V 3 , in order to continue rear wiper motor operation at low speed. + through rear wiper motor terminal V Ground is also supplied 2 + to rear wiper motor terminal V + through body grounds. 3 and V 4 are connected instead When wiper arm reaches base of rear window, rear wiper motor terminals V 2 and V 3 . Rear wiper motor will then stop wiper arm at the PARK position. of terminals V Intermittent operation The rear wiper motor operates the wiper arm one time at low speed at an interval of approximately 7 seconds. When the rear wiper switch is placed in the INT position, ground is supplied 1 + to rear wiper amplifier terminal V + through rear wiper switch terminal V 21 . Then the rear wiper motor operates intermittently in the same manner as the low speed wiper operation. WASHER OPERATION With the ignition switch in the ACC or ON position, power is supplied + through 10A fuse (No. 18 , located in the fuse block) 2 . + to rear washer motor terminal V When the ring is turned WASH position, ground is supplied 1 , and + to rear washer motor terminal V 4 + to rear wiper amplifier terminal V + through terminal V 23 of rear wiper switch. With power and ground is supplied, the rear washer motor operates. The rear wiper motor operates when the ring is turned to WASH position for one second or more and for approximately 3 seconds after the ring is released. This feature is controlled by the rear wiper amplifier in the same manner as the low speed wiper operation. 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Check continuity between terminals V Condition Continuity 12V direct current supply between 1 and V 2 terminals V Yes No current supply No SEC202B REAR WINDOW DEFOGGER SWITCH Check continuity between terminals when rear window defogger switch is pushed and released. 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3) On the drawing, find the crossing of the grid reference letter column and number row. 4) Find the connector number in the crossing zone. 5) Follow the line (if used) to the connector. CONNECTOR SYMBOL Main symbols of connector (in Harness Layout) are indicated in the below. Water proof type Standard type Connector type Male Female — — Male + Cavity: Less than 4 + Relay connector + Cavity: From 5 to 8 + Cavity: More than 9 + Ground terminal etc. — EL-2106 Female HARNESS LAYOUT How to Read Harness Layout (Cont’d) NOTE EL-2107 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Main Harness/LHD Models CEL236M EL-2108 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Main Harness/LHD Models (Cont’d) CEL237M EL-2109 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Main Harness/LHD Models (Cont’d) CEL238M EL-2110 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Main Harness/LHD Models (Cont’d) NOTE EL-2111 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Main Harness/RHD Models CEL239M EL-2112 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Main Harness/RHD Models (Cont’d) CEL240M EL-2113 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Main Harness/RHD Models (Cont’d) CEL241M EL-2114 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Main Harness/RHD Models (Cont’d) NOTE EL-2115 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Engine Room Harness/LHD Models CEL244M EL-2116 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Engine Room Harness/LHD Models (Cont’d) CEL245M EL-2117 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Engine Room Harness/LHD Models (Cont’d) PASSENGER COMPARTMENT CEL246M EL-2118 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Engine Room Harness/LHD Models (Cont’d) CEL247M EL-2119 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Body Harness/LHD Models WAGON CEL254M EL-2120 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Body Harness/LHD Models (Cont’d) CEL255M EL-2121 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Body Harness/LHD Models (Cont’d) HARDTOP CEL256M EL-2122 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Body Harness/LHD Models (Cont’d) CEL257M EL-2123 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Body Harness/RHD Models WAGON CEL258M EL-2124 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Body Harness/RHD Models (Cont’d) CEL259M EL-2125 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Body Harness/RHD Models (Cont’d) HARDTOP CEL260M EL-2126 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Body Harness/RHD Models (Cont’d) CEL261M EL-2127 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Body No. 2 Harness/LHD Models WAGON CEL262M EL-2128 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Body No. 2 Harness/LHD Models (Cont’d) HARDTOP CEL263M EL-2129 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Body No. 2 Harness/RHD Models WAGON CEL264M EL-2130 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Body No. 2 Harness/RHD Models (Cont’d) HARDTOP CEL265M EL-2131 WIRING DIAGRAM CODES (CELL CODES) Wiring Diagram Codes (Cell Codes) Use the chart below to find out what each wiring diagram code stands for. Refer to the wiring diagram code in the alphabetical index to find the location (Page number) of each wiring diagram. Code Section Wiring Diagram Name Code Section Wiring Diagram Name A/C, A HA Auto Air Conditioner FICD EC IACV-FICD Solenoid Valve A/C, M HA Manual Air Conditioner FPCM EC Fuel Pump Control Module A/CCUT EC Air Conditioner Control GLOW EC Quick Glow System A/T AT A/T H/AIM EL Headlamp Aiming Control System AAC/V EC IACV-AAC Valve H/LAMP EL Headlamp ABS BR Anti-lock Brake System HEATUP EC Heat up Switch ACC/SW EC Accelerator Switch (F/C) HLC EL Headlamp Cleaner APS EC Accelerator Position Sensor HORN EL Horn ASCD EL Automatic Speed Control Device IGN EC Ignition System AT/C EC A/T Control IGNSYS EC Ignition Signal AUDIO EL Audio ILL EL Illumination BACK/L EL Back-up Lamp INJECT EC Injector BCDD EC BCDD System INJPMP EC BOOST EC Turbo Charger Boost Sensor Electronic Control Fuel Injection Pump BRK/SW EC Brake Switch Signal INT/V EC Intake Air Control Valve Control Solenoid Valve CD/CHG EL CD Auto Changer CHARGE EL Charging System IVC EC Intake Valve Timing Control Solenoid Valve CHIME EL Warning Chime KS EC Knock Sensor CHOKE EC Automatic Choke LOAD EC Load Signal CIGAR EL Cigarette Lighter MAFS EC Mass Air Flow Sensor CMPS EC Camshaft Position Sensor COMPAS EL Compass and Thermometer MAIN EC Main Power Supply and Ground Circuit COOL/B HA Cool Box METER EL COOL/F EC Cooling Fan Control Speedometer, Tachometer, Temp., Oil and Fuel Gauges CORNER EL Cornering Lamp MIL/DL EC Mil and Data Link Connectors D/LOCK EL Power Door Lock MIRROR EL Door Mirror DEICER EL Wiper Deicer MULTI EL Multi-remote Control System DEF EL Rear Window Defogger NATS EL Nissan Anti-Theft System DIFF/L PD Differential Lock Control System P/ANT EL Power Antenna DTRL EL Headlamp — With Daytime Light System PGC/V EC EVAP Canister Purge Volume Control Solenoid Valve ECMRLY EC ECM Relay PNP/SW EC Park/Neutral Position Switch ECTS EC Engine Coolant Temperature Sensor POWER EL Power Supply Routing EGVC/V EC EGR Volume Control Valve PST/SW EC Power Steering Oil Pressure Switch HA Rear Cooler System ST Electric Controlled Power Steering system R/COOL EPS R/FOG EL Rear Fog Lamp F/FOG EL Front Fog Lamp R/HEAT HA Rear Heater System F/PUMP EC Fuel Pump REMOTE EL Audio (Remote Control Switch) FCUT EC Fuel Cut System ROOM/L EL Interior Room Lamp EL-2132 WIRING DIAGRAM CODES (CELL CODES) Wiring Diagram Codes (Cell Codes) (Cont’d) Code Section Wiring Diagram Name S/SIG EC Start Signal S/TANK FE Sub Fuel Tank Control System SHIFT AT A/T Shift Lock System SRS RS Supplemental Restraint System STAB RA Rear Stabilizer Release Device Control System START EL Starting System SWL/V EC Swirl Control Valve Control Solenoid Valve TAIL/L EL Parking, License and Tail Lamps TP/SW EC Throttle Position Switch TPS EC Throttle Position Sensor

TRQ/SG EC Engine Torque Control Signal TURN EL Turn Signal and Hazard Warning Lamps VIAS/V EC Variable Air Induction Control System VSS EC Vehicle Speed Sensor WARN EL Warning Lamps WIP/R EL Rear Wiper and Washer EL-2133 FUSE BLOCK — Junction Box (J/B) Terminal Arrangement CEL271M FUSE AND FUSIBLE LINK BOX
Terminal Arrangement CEL272M ELECTRICAL UNITS Terminal Arrangement CEL273M ELECTRICAL UNITS Terminal Arrangement (Cont’d) CEL274M JOINT CONNECTOR (J/C) Terminal Arrangement CEL275M Edition: July 2001 Release: September 2001 (01) Publication No.: SM1E-Y61BE0E Reference No.: 7711345090 QUICK REFERENCE
INDEX GENERAL INFORMATION GI MAINTENANCE MA ENGINE MECHANICAL EM PATROL GR ENGINE LUBRICATION & COOLING SYSTEMS LC MODEL Y61 SERIES ENGINE CONTROL SYSTEM EC ACCELERATOR CONTROL, FUEL & EXHAUST SYSTEM FE CLUTCH CL MANUAL TRANSMISSION MT AUTOMATIC TRANSMISSION AT
TRANSFER TF PROPELLER SHAFT & DIFFERENTIAL CARRIER PD FRONT AXLE & FRONT SUSPENSION FA REAR AXLE & REAR SUSPENSION RA BRAKE SYSTEM BR STEERING SYSTEM ST RESTRAINT SYSTEM RS BODY & TRIM BT HEATER & AIR CONDITIONER HA ELECTRICAL SYSTEM EL ALPHABETICAL INDEX IDX NISSAN EUROPE
S.A.S. © 2001 NISSAN EUROPE S.A.S. Produced in The Netherlands Not to be reproduced in whole or in part without the prior written permission of Nissan Europe S.A.S., Paris, France. FOREWORD This manual contains maintenance and repair procedures for NISSAN PATROL GR, model Y61 series. In order to assure your safety and the efficient
functioning of the vehicle, this manual should be read thoroughly. It is especially important that the PRECAUTIONS in the GI section be completely understood before starting any repair task. All information in this manual is based on the latest product information at the time of publication. The right is reserved to make changes in specifications and
methods at any time without notice.

IMPORTANT SAFETY NOTICE The proper performance of service is essential for both the safety of the technician and the efficient functioning of the vehicle. The service methods in this Service Manual are described in such a manner that the service may be performed safely and accurately. Service varies with the procedures used, the skills of the
technician and the tools and parts available. Accordingly, anyone using service procedures, tools or parts which are not specifically recommended by NISSAN must first completely satisfy himself that neither his safety nor the vehicle’s safety will be jeopardized by the service method selected. NISSAN EUROPE S.A.S. Service Engineering Section
Paris, France GENERAL INFORMATION SECTION GI OUTLINE OF MODIFICATIONS: +EGR cooler has been adopted to ZD30DDTi engine. APPLIED FROM: JN1TESY61U0100001 JN1KESY61U0100001 CONTENTS IDENTIFICATION INFORMATION .... 2002 Model Variation .... 2002 Identification Number
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— — — TWSSLHFY61USA — — — — TWSSLHAY61UGA — — — — TWSSLHAY61USA — SE RE4R03A Prefix and suffix designations GN S L A — — KWSSLFAY61UGA FS5R50B T — — F Y61 E K A A: 3rd seat forward facing Q: 3rd seat side facing P: 3rd seat/Rear seat seatless K: Middle East E: RHD for Europe G: Central/South Europe S: North
Europe E: Multiport fuel injection system engine N: Diesel engine U: Turbocharger engine F: 5-speed floor shift manual transmission A: 4-speed floor shift automatic transmission A: S E: GL (SGL), S F: SAFARI, SE H: S-SAFARI, SE L: LH drive R: RH drive S: Long wheelbase (4WD) GN: TB45E engine VT: TD42 engine WS: ZD30DDTi engine GP:
TB48DE engine T: Station Wagon K: Hardtop GI-2002 IDENTIFICATION INFORMATION Identification Number VEHICLE IDENTIFICATION NUMBER (Chassis number) Prefix and suffix designations JN1 T E S Y61 U 0 XXXXXX Vehicle serial number 0: Stopgap (no meaning) U: Europe S: Long wheelbase (4WD) E: ZD30DDTi engine T: Station Wagon
K: Hardtop JN1: Japan produced vehicle GI-2003 IDENTIFICATION INFORMATION GI-2004 HEATER & AIR CONDITIONER SECTION HA MODIFICATION NOTICE: + Wiring diagram has been changed. CONTENTS PRECAUTIONS AND PREPARATION .... 2002 Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-
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System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER” The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN
MODEL Y61 is as follows (The composition varies according to the destination and optional equipment.): + For a frontal collision The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-
tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. + For a side collision The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of
components of air bags for a frontal collision). Information necessary to service the system safely is included in the RS section of this Service Manual. WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should
be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS
unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS. HA-2002 TROUBLE DIAGNOSES Wiring Diagram — R/HEAT —/LHD Models THA055M HA-2003 TROUBLE DIAGNOSES Wiring Diagram —
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transmission oil FS5R50B Differential carrier gear oil (without limited slip differential) Without diff. lock With diff. lock Transfer fluid TX12A Automatic transmission fluid RE4R03A Power steering fluid Brake and clutch fluid Multi-purpose grease Propeller shaft grease Air conditioning system refrigerant Air conditioning system lubricants
Recommended Fluids/Lubricants Diesel engine: API CF4 or ACEA B3-96.98 or ACEA B3/E396.98*4 8.2 7.7 7-1/4 qt 6-3/4 qt 13.0 13.2 11-1/2 qt 11-5/8 qt 12.0 10-5/8 qt 14.1 14.3 12-3/8 qt 12-5/8 qt 3.5 6-1/8 qt API GL-4, Viscosity SAE 75W-90 only 2.4 3.0 4-1/4 qt 5-1/4 qt API GL-5*1 1.9 1-5/8 qt 11.8 10-3/8 qt Refill to the proper oil level according to
the instructions in the “Do-it-yourself operations” section of the owner’s manual. — — — — — — + Genuine Nissan Anti-freeze Coolant (L2N) or equivalent*5 Genuine Nissan ATF or equivalent*3 or API GL-4*1 Genuine Nissan ATF or equivalent*3 Type DEXRONTMIII or equivalent DOT 3 or DOT 4 *6 NLGI No. 2 (Lithium soap base) NLGI No. 2
(Molybdenum disulphide lithium soap base) HFC-134a (R-134a) Nissan A/C System Oil Type S or exact equivalent *1: For further details, see “SAE viscosity number”. *2: For more information regarding suitable fluids, contact a Nissan dealer for correct brands of DEXRONTMIII/MERCONTM Automatic Transmission Fluid.
*3: Never use API CG-4. *4: Use Genuine Nissan Anti-freeze Coolant (L2N) or equivalent in its quality, in order to avoid possible aluminum corrosion within the engine cooling system caused by the use of non-genuine engine coolant. Note that any repairs for the incidents within the engine cooling system while using non-genuine engine coolant may
not be covered by the warranty even if such incidents occurred during the warranty period.
*5: Never mix DOT 3 & DOT 4. MA-2002 ENGINE MAINTENANCE Changing Engine Coolant Coolant capacity (With reservoir tank): ! (Imp qt) RHD models With front heater 13.0 (11-1/2) With rear heater 14.1 (12-3/8) LHD models With front heater 13.2 (11-5/8) With rear heater 14.3 (12-5/8) MA-2003 ENGINE MAINTENANCE MA-2004 PROPELLER
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2004 SRS Component Parts Location..................... 2004 Removal and Installation — Diagnosis Sensor Unit, Seat Belt Pre-tensioner with Load Limiter2005 Removal — Driver Air Bag Module and Spiral Cable...
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2021 RS PRECAUTION Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER” The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS
composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination and optional equipment.): + For a frontal collision The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel
on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. + For a side collision The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring
harness, warning lamp (one of components of air bags for a frontal collision). WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer. + Improper maintenance,
including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow harness connector. RS-2002 SUPPLEMENTAL
RESTRAINT SYSTEM (SRS) Precautions for SRS “AIR BAG” and “SEAT BELT PRE-TENSIONER” Service + + + + + + Do not use electrical test equipment to check SRS circuits unless instructed to in this Service Manual. Before servicing the SRS, turn ignition switch “OFF”, disconnect both battery cables and wait at least 3 minutes. For
approximately 3 minutes after the cables are removed, it is still possible for the air bag and seat belt pre-tensioner to deploy. Therefore, do not work on any SRS connectors or wires until at least 3 minutes have passed. Diagnosis sensor unit must always be installed with their arrow marks “S” pointing towards the front of the vehicle for proper
operation. Also check diagnosis sensor unit for cracks, deformities or rust before installation and replace as required. The spiral cable must be aligned with the neutral position since its rotations are limited. Do not attempt to turn steering wheel or column after removal of steering gear. Handle air bag module carefully. Always place driver and
passenger air bag modules with the pad side facing upward and front side air bag modules (built-in type) with the stud bolt side facing down. Conduct self-diagnosis to check entire SRS for proper function after replacing any components. After air bag inflates, the front instrument panel assembly should be replaced if damaged. Special Service Tools
Tool number Tool name Description KV99106400 Deployment tool Disposing of air bag module NT357 KV99105300 Air bag module bracket Anchoring air bag module NT354 HT61961000 and HT62152000 combined *Special torx bit Use for special bolts [TAMPER RESISTANT TORX (Size T50)] a: 3.5 (0.138) dia. b: 8.5 - 8.6 (0.335 - 0.339) dia. c:
approx.
10 (0.39) sq. Unit: mm (in) NT361 KV99108300 Deployment tool adapters for built-in type side air bag and passenger air bag modules NT780 KV99109800 Deployment tool adapters for seat belt pre-tensioner NT846 *: Special tool or commercial equivalent RS-2003 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Commercial Service Tool Tool name
Description Tamper resistant torx socket Size: T30 NT757 SRS Component Parts Location SRS972 RS-2004 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Removal and Installation — Diagnosis Sensor Unit, Seat Belt Pre-tensioner with Load Limiter CAUTION: + Before servicing SRS, turn the ignition switch off, disconnect both battery cables and
wait at least 3 minutes. + Do not use old bolts and nuts coated with bonding agent after removal; replace with new ones. + Check diagnosis sensor unit, seat belt pre-tensioner with load limiter and satellite sensor for proper installation. + Check diagnosis sensor unit and satellite sensor to ensure they are free of deformities, dents, cracks or rust. If
they show any visible signs of damage, replace them with new ones. + Check diagnosis sensor unit brackets to ensure they are free of deformities and rust. + After replacement of diagnosis sensor unit, seat belt pre-tensioner and satellite sensor, check SRS function and perform self-diagnosis for SRS. Refer to “Self-diagnosis” for details. + Do not
attempt to disassemble diagnosis sensor unit, seat belt pre-tensioner with load limiter and satellite sensor.
+ Replace diagnosis sensor unit, seat belt pre-tensioner and satellite sensor if it has been dropped or sustained an impact. + Do not expose seat belt pre-tensioner to temperatures exceeding 80°C (176°F). REMOVAL OF DIAGNOSIS SENSOR UNIT SRS973 1. Disconnect driver, passenger and side air bag module connectors.
Also, disconnect seat belt pre-tensioner connector. 2. Remove console finisher, console box assembly and instrument panel stay cover. Refer to “INSTRUMENT PANEL” in BT section. 3. Disconnect diagnosis sensor unit connector. 4. Remove bolt and diagnosis sensor unit fixing bolts. Then remove the diagnosis sensor unit. NOTE: + To install, reverse
the removal procedure sequence. + After replacement, perform self-diagnosis for SRS. Refer to “Self-diagnosis” for details. CAUTION: Do not use old special bolts coated with bonding agent; replace with new coated special bolts. RS-2005 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Removal — Driver Air Bag Module and Spiral Cable SRS904
CAUTION: + Before servicing SRS, turn the ignition switch OFF, disconnect both battery cables and wait at least 3 minutes. + Always work from the side of air bag module.
1. Remove lower lid from steering wheel, and disconnect air bag module connector. SBF811E 2. Remove side lid, ASCD steering switch and audio steering switch. Using the TAMPER RESISTANT TORX (Size T30), remove left and right special bolts. Air bag module can then be removed. SRS908 CAUTION: + Always place air bag module with pad side
facing upward. + Do not attempt to disassemble air bag module. + The special bolts are coated with bonding agent. Do not use old bolts after removal; replace with new ones. + Do not insert any foreign objects (screwdriver, etc.) into air bag module connector. SRS161 RS-2006 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Removal — Driver Air Bag
Module and Spiral Cable (Cont’d) + Replace air bag module if it has been dropped or sustained an impact.
+ Do not expose the air bag module to temperatures exceeding 90°C (194°F). + Do not allow oil, grease or water to come in contact with the air bag module. SBF814E 3. Set steering wheel in the neutral position. 4. Disconnect horn connector and remove nuts. 5. Remove dynamic damper. Then using steering wheel puller, remove steering wheel. Be
careful not to over-tighten puller bolt on steering wheel. CAUTION: Do not tap or bump the steering wheel. 6. Remove steering column cover. SRS676 7. Remove the four screws. Then unlock the spiral cable connector and disconnect connector. The spiral cable can then be removed. CAUTION: + Do not attempt to disassemble spiral cable. + Do not
apply lubricant to the spiral cable. SRS384 Installation — Driver Air Bag Module and Spiral Cable 1. Set the front wheels in the straight-ahead position. 2. Connect spiral cable connector. Then, lock the connector and tighten with screws. Install steering column cover. SRS384 RS-2007 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Installation —
Driver Air Bag Module and Spiral Cable (Cont’d) 3. Make sure that the spiral cable is in the neutral position. The neutral position is detected by turning left about 2.5 revolutions from the right end position. Align the two marks ,). (m CAUTION: The spiral cable may snap due to steering operation if the cable is installed in an improper position. Also,
with the steering linkage disconnected, the cable may snap by turning the steering wheel beyond the limited number of turns. The spiral cable can be turned up to about 2.5 turns from the neutral position to both the right and left. 4. Connect spiral cable connector and tighten with screws. Install steering column cover. SRS165 5.
Install steering wheel, setting spiral cable pin guide, and pull spiral cable through. 6. Connect horn connector and engage spiral cable with pawls in steering wheel. Move air bag module connector away from steering wheel lower lid opening. 7. Tighten nut. : 29 - 39 Nzm (3.0 - 4.0 kg-m, 22 - 29 ft-lb) 8. Install dynamic damper.
SRS231 SRS908 9. Position air bag module and tighten with new special bolts. + Always service the air bag module from the side. 10. Connect air bag module connector. 11. Install steering switches and lids.
12.
Perform self-diagnosis to ensure entire SRS operates properly. (Use CONSULT-II or warning lamp check.) Before performing self-diagnosis, connect both battery cables. 13. Turn steering wheel to the left end and then to the right end fully to make sure that spiral cable is set in the neutral position. If air bag warning lamp blinks or stays ON (at the
User mode), it shows the spiral cable may be snapped due to its improper position.
Perform self-diagnosis again (use CONSULT-II or warning lamp). If a malfunction is detected, replace the spiral cable with a new one. 14.
Perform self-diagnosis again to check that no malfunction is detected. RS-2008 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Disposal of Air Bag Module and Seat Belt Pre-tensioner + + + + + + + + + + + + Before disposing of air bag module and seat belt pre-tensioner, or vehicles equipped with such systems, deploy the systems. If such systems
have already been deployed due to an accident, dispose of them as indicated in “DISPOSING OF AIR BAG MODULE AND SEAT BELT PRE-TENSIONER” (RS-2013). When deploying the air bag module and seat belt pre-tensioner, always use the Special Service Tool; Deployment tool KV99106400. When deploying the air bag module and seat belt pre-
tensioner, stand at least 5 m (16 ft) away from the deployment component. When deploying air bag module and seat belt pre-tensioner, a fairly loud noise is made, followed by smoke being released. The smoke is not poisonous, however, be careful not to inhale smoke since it irritates the throat and can cause choking. Always activate one air bag
module at a time. Due to heat, leave air bag module unattended for more than 30 minutes after deployment.
Also leave seat belt pre-tensioner unattended for move than 10 minutes after deployment. Be sure to wear gloves when handling a deployed air bag module and seat belt pre-tensioner. Never apply water to the deployed air bag module and seat belt pre-tensioner. Wash your hands clean after finishing work. Place the vehicle outdoors with an open
space of at least 6 m (20 ft) on all sides when deploying air bag module and seat belt pre-tensioner while mounted in vehicle. Use a voltmeter to make sure the vehicle battery is fully charged. Do not dispose of the air bag module and seat belt pre-tensioner un-deployed. CHECKING DEPLOYMENT TOOL Connecting to battery SRS005-B CAUTION: The
battery must show voltage of 9.6V or more. Remove the battery from the vehicle and place it on dry wood blocks approximately 5 m (16 ft) away from the vehicle. + Wait 3 minutes after the vehicle battery is disconnected before proceeding. + Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal. Make
sure the polarity is correct. The right side lamp in the tool, marked “deployment tool power”, should glow with a green light. If the right side lamp glows red, reverse the connections to the battery. RS-2009 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Disposal of Air Bag Module and Seat Belt Pre-tensioner (Cont’d) Deployment tool check Press the
deployment tool switch to the “ON” position. The left side lamp in the tool, marked “air bag connector voltage” should illuminate. If it does not illuminate, replace the tool. Air bag deployment tool lamp illumination chart (Battery connected) SBF266H Switch operation Left side lamp, green* “AIR BAG CONNECTOR VOLTAGE” Right side lamp, green*
“DEPLOYMENT TOOL POWER” OFF OFF ON ON ON ON *: If this lamp glows red, the tool is connected to the battery incorrectly. Reverse the connections and make sure the lamp glows green. Deployment of passenger air bag module (outside of vehicle) 1. Make an 8.5 mm (0.335 in) diameter hole in air bag module bracket (SST: KV99105300) at
the position shown in figure at left. SRS236-F 2. Firmly secure air bag module bracket (SST: KV99105300) in a vise. SRS310 3. Match the two holes in air bag module bracket (held in vise) and passenger air bag module and fix them with two bolts [M8 x 25 - 30 mm (0.98 - 1.18 in)]. CAUTION: If a gap exists between passenger air bag module and air
bag module bracket, use a piece of wood inserted in the gap to stabilize the air bag module. SRS311 RS-2010 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Disposal of Air Bag Module and Seat Belt Pre-tensioner (Cont’d) SRS313-A 4. Connect deployment tool adapter (SST: KV99108300) to deployment tool (SST: KV99106400) connector and
connector on either side of air bag module. 5. Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal. 6. The lamp on the right side of the tool, marked “deployment tool power”, should glow green, not red.
7. Press the button on the deployment tool. The left side lamp on the tool, marked “air bag connector voltage”, will illuminate and the air bag module will deploy. CAUTION: + When deploying the air bag module, do not stand on the deploying side. + Stand at least 5 m (16 ft) away from the air bag module. SRS020-A Deployment of seat belt pre-
tensioner (outside of vehicle) 1.
Firmly grip pre-tensioner in a vise. SRS974 2. Cut the webbing off. SRS975 3. Connect deployment tool adapter (SST: KV99109800) to deployment tool (SST: KV99106400) connector and seat belt pre-tensioner. SRS976 RS-2011 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Disposal of Air Bag Module and Seat Belt Pre-tensioner (Cont’d) SRS242-E
4.
Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal. 5. The lamp on the right side of the tool, marked “deployment tool power”, should glow green, not red. 6. Press the button on the deployment tool. The left side lamp on the tool, marked “seat belt pre-tensioner connector voltage”, will illuminate and
the seat belt pre-tensioner will deploy. CAUTION: When deploying the seat belt pre-tensioner, stand at least 5 m (16 ft) away from the seat belt pre-tensioner. DEPLOYMENT OF AIR BAG MODULE AND SEAT BELT PRE-TENSIONER WHILE MOUNTED IN VEHICLE SRS006 When disposing of a vehicle, deploy air bag modules and seat belt pre-
tensioners while they are mounted in vehicle. CAUTION: When deploying air bag module or seat belt pre-tensioner, ensure vehicle is empty. 1. Disconnect both the vehicle battery cables and wait 3 minutes. 2. Disconnect air bag modules and seat belt pre-tensioners connector. 3. Connect deployment tool [SST: KV99106400] to air bag module or seat
belt pre-tensioner. For front passenger air bag module and side air bag module, attach deployment tool adapter [SST: KV99108300] to the tool connector. For seat belt pre-tensioner, attach deployment tool adapter (SST: KV99109800) to the tool connector. 4. Connect red clip of deployment tool to battery positive terminal and black clip to negative
terminal. 5. The lamp on the right side of the tool, marked “deployment tool power”, should glow green, not red. 6. Press the button on the deployment tool. The left side lamp on the tool, marked “air bag connector voltage”, will illuminate and the air bag module or seat belt pre-tensioner will deploy. CAUTION: Activate only one air bag module or seat
belt pre-tensioner at a time. RS-2012 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) Disposal of Air Bag Module and Seat Belt Pre-tensioner (Cont’d) DISPOSING OF AIR BAG MODULE AND SEAT BELT PRE-TENSIONER SBF276H Deployed air bag modules and seat belt pre-tensioners are very hot. Before disposing of air bag module, and seat belt
pretensioner, wait at least 30 minutes, and 10 minutes, respectively. Seal them in a plastic bag before disposal. CAUTION: + Never apply water to a deployed air bag module and seat belt pre-tensioner. + Be sure to wear gloves when handling a deployed air bag module and seat belt pre-tensioner.
+ No poisonous gas is produced upon air bag module deployment. However, be careful not to inhale gas since it irritates throat and can cause choking. + Do not attempt to disassemble air bag module and seat belt pre-tensioner. + Air bag module and seat belt pre-tensioner can not be re-used.
+ Wash your hands clean after finishing work. RS-2013 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Trouble Diagnoses Introduction CAUTION: + Do not use electrical test equipment to check SRS harness connectors unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow harness connector.
+ Do not attempt to repair, splice or modify the SRS wiring harness. If the harness is damaged, replace it with a new one. + Keep ground portion clean. DIAGNOSIS FUNCTION The SRS self-diagnosis results can be read by using “AIR BAG” warning lamp and/or CONSULT-II. The reading of these results is accomplished using one of two modes —
“User mode” and “Diagnosis mode”. The User mode is exclusively prepared for the customer (driver). This mode warns the driver of a system malfunction through the operation of the “AIR BAG” warning lamp. The Diagnosis mode allows the technician to locate and inspect the malfunctioning part. The mode applications for the “AIR BAG” warning
lamp and CONSULT-II are as follows: User mode Diagnosis mode Display type “AIR BAG” warning lamp X X ON-OFF operation CONSULT-II — X Monitoring DIAGNOSIS MODE FOR CONSULT-II “SELF-DIAG [CURRENT]” A current Self-diagnosis result (also indicated by the warning lamp flashes in the Diagnosis mode) is displayed on the CONSULT-
II screen in real time. This refers to a malfunctioning part requiring repairs. + “SELF-DIAG [PAST]” Diagnosis results previously stored in the memory are displayed on the CONSULT-II screen. The stored results are not erased until memory erasing is executed. + “TROUBLE DIAG RECORD” With TROUBLE DIAG RECORD, diagnosis results
previously erased by a reset operation can be displayed on the CONSULT-II screen. + “ECU DISCRIMINATED NO.” The diagnosis sensor unit for each vehicle model is assigned with its own, individual classification number. This number will be displayed on the CONSULT-II screen, as shown at left. When replacing the diagnosis sensor unit, refer to
the part number for the compatibility. After installation, replacement with a correct unit can be checked by confirming this classification number on the CONSULT-II screen. The diagnosis sensor unit classification number varies depending on SRS configuration. For NISSAN MODEL Y61, the diagnosis sensor unit classification numbers are as follows.
+ MODEL ECU DISCRIMINATED NO.
Model with dual air bags, side air bag and seat belt pre-tensioner 5A35 Model with dual air bags and side air bag 5A34 Model with dual air bags and seat belt pre-tensioner 5A33 Model with dual air bag 5A32 Model with single air bag and pre-tensioner 5A31 Model with single air bag 5A30 RS-2014 TROUBLE DIAGNOSES — Supplemental Restraint
System (SRS) Trouble Diagnoses Introduction (Cont’d) HOW TO CHANGE SELF-DIAGNOSIS MODE With CONSULT-II From User mode to Diagnosis mode After selecting AIR BAG on the “SELECT SYSTEM” screen, User mode automatically changes to Diagnosis mode. SRS803 From Diagnosis mode to User mode To return to User mode from
Diagnosis mode, touch “BACK” key of CONSULT-II until “SELECT SYSTEM” appears, Diagnosis mode automatically changes to User mode. SRS804 RS-2015 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Trouble Diagnoses Introduction (Cont’d) Without CONSULT-II SRS800 From User mode to Diagnosis mode Diagnosis mode
activates only when a malfunction is detected, by turning ignition switch as follows: 1) Turn ignition switch “ON”. 2) After “AIR BAG” warning lamp lights for 7 seconds, turn ignition switch “OFF” within 1 second. 3) Wait more than 3 seconds. 4) Repeat steps 1 to 3 three times. 5) Turn ignition switch “ON”. SRS will not enter Diagnosis mode, if no
malfunction is detected. From Diagnosis mode to User mode After a malfunction is repaired, switch the ignition “OFF” for at least one second, then back “ON”. Diagnosis mode is returned to User mode. If switching Diagnosis mode to User mode is required while malfunction is being detected, by turning ignition switch as follows: 1) Turn ignition
switch “ON”. 2) After “AIR BAG” warning lamp lights for 7 seconds, turn ignition switch “OFF” within 1 second. 3) Wait more than 3 seconds. 4) Repeat steps 1 to 3 three times. 5) Turn ignition switch “ON”. RS-2016 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Trouble Diagnoses Introduction (Cont’d) HOW TO ERASE SELF-
DIAGNOSIS RESULTS With CONSULT-II SRS701 + “SELF-DIAG [CURRENT]” A current Self-diagnosis result is displayed on the CONSULT-II screen in real time. After the malfunction is repaired completely, no malfunction is detected on “SELF-DIAG [CURRENT]”. + “SELF-DIAG [PAST]” Return to the “SELF-DIAG [CURRENT]” CONSULT-II screen
by pushing “BACK” key of CONSULT-II and select “SELFDIAG [CURRENT]” in “SELECT DIAG MODE”. Touch “ERASE” in “SELF-DIAG [CURRENT]” mode. NOTE: If the memory of the malfunction in “SELF-DIAG [PAST]” is not erased, the User mode shows the system malfunction by the operation of the warning lamp even if the malfunction is
repaired completely. + “TROUBLE DIAG RECORD” The memory of “TROUBLE DIAG RECORD” cannot be erased. Without CONSULT-II After a malfunction is repaired, return Diagnosis mode to User mode by switching the ignition “OFF” for at least 1 second, then back “ON”. At that time, the self-diagnostic result is cleared. How to Perform Trouble
Diagnoses for Quick and Accurate Repair A good understanding of the malfunction conditions can make troubleshooting faster and more accurate. In general, each customer feels differently about a malfunction. It is important to fully understand the symptoms or conditions for a customer complaint. INFORMATION FROM CUSTOMER WHAT ....
WHEN .... WHERE ..... HOW .... Vehicle model Date, Frequencies Road conditions Operating conditions, Symptoms PRELIMINARY CHECK Check that the following parts are in good order. + Battery [Refer to EL section (“BATTERY”) of Service Manual.] + Fuse [Refer to EL section (“Fuse”, “POWER SUPPLY ROUTING”) of Service Manual.] +
System component-to-harness connections RS-2017 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) How to Perform Trouble Diagnoses for Quick and Accurate Repair (Cont’d) WORK FLOW NOTE: Seat belt pre-tensioner malfunction is indicated by “AIR BAG” warning lamp. ACTION ITEM REFERENCE ITEM Check in . Listen to
customer complaints and requests. . Perform preliminary check. b Preliminary check (RS-2017) . Check for any Service Bulletin. . Check air bag system operation by using “AIR BAG” warning lamp — User mode. b DIAGNOSTIC PROCEDURE 1 .
c Inspect malfunctioning part. — Diagnosis mode b Perform self-diagnosis using CONSULT-II.
-- OR --Perform self-diagnosis using “AIR BAG” warning lamp. DIAGNOSTIC PROCEDURE 2: Using CONSULT-II DIAGNOSTIC PROCEDURE 6: Using “AIR BAG” warning lamp . Repair/Replace NG . Final
check — Diagnosis mode and User mode OK . Check out RS-2018 b DIAGNOSTIC PROCEDURE 3: Using CONSULT-II DIAGNOSTIC PROCEDURE 7: Using “AIR BAG” warning lamp TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Schematic TRS037M RS-2019 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring
Diagram — SRS —/LHD Models LHD MODELS TRS038M RS-2020 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS —/RHD Models RHD MODELS TRS044M RS-2021 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) RS-2022 AUTOMATIC TRANSMISSION SECTION AT MODIFICATION NOTICE:
+ Wiring diagrams have been changed. CONTENTS PRECAUTIONS .... 3002 Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER” ... 3002 RE4R03A OVERALL SYSTEM .... 3003 Circuit Diagram ....
3003 Wiring Diagram — A/T —................................
3004 AT PRECAUTIONS Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER” The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS
system composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination and optional equipment.): + For a frontal collision The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the
instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. + For a side collision The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal
collision), wiring harness, warning lamp (one of components of air bags for a frontal collision). Information necessary to service the system safely is included in the RS section of this Service Manual. WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would
result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer.
+ Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS
wiring harnesses can be identified by yellow harness connector. AT-3002 OVERALL SYSTEM RE4R03A Circuit Diagram TAT059M AT-3003 OVERALL SYSTEM RE4R03A Wiring Diagram — A/T — TAT061M AT-3004 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) RE4R03A TAT108M AT-3005 OVERALL SYSTEM Wiring Diagram — A/T —
(Cont’d) RE4R03A TAT109M AT-3006 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) RE4R03A TAT122M AT-3007 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) RE4R03A TAT111M AT-3008 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) RE4R03A TAT112M AT-3009 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d)
RE4R03A TAT128M AT-3010 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) RE4R03A TAT114M AT-3011 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) AT-3012 RE4R03A BRAKE SYSTEM SECTION BR MODIFICATION NOTICE: + + + + Front disc brake and rear disc brake have been changed. Parking brake has been changed.
Wiring Diagrams have been changed. Service data and specification (SDS) have been changed. CONTENTS FRONT DISC BRAKE .... 3002 REAR DISC BRAKE... 3003 PARKING BRAKE CONTROL .... 3004 TROUBLE DIAGNOSES .... 3005 Schematic
.... 3005 Wiring Diagram — ABS — .... 3006 SERVICE DATA AND SPECIFICATIONS (SDS).. 3011 General Specifications .... 3011 BR FRONT DISC BRAKE SBR235F 1 V 2 V 3 V 4 V 5 V 6 V Main pin Pin boot Shim cover Inner shim Inner pad
Torque member fixing bolt 7 V 8 V 9 V 10 V 11 V 12 V Washer Torque member Outer pad Outer shim Pad retainer Connecting bolt BR-3002 13 V 14 V 15 V 16 V 17 V 18 V Copper washer Main pin bolt Cylinder body Piston seal Piston Piston boot REAR DISC BRAKE SBR236F 1 V 2 V 3 V 4 V 5 V 6 V Main pin Pin boot Shim cover Inner shim Inner pad
Torque member fixing bolt 7 V 8 V 9 V 10 V 11 V 12 V Washer Torque member Outer pad Outer shim Pad retainer Connecting bolt BR-3003 13 V 14 V 15 V 16 V 17 V 18 V Copper washer Main pin bolt Cylinder body Piston seal Piston Piston boot PARKING BRAKE CONTROL SBR241F BR-3004 TROUBLE DIAGNOSES Schematic TBR041M BR-3005
TROUBLE DIAGNOSES Wiring Diagram — ABS — TBR042M BR-3006 TROUBLE DIAGNOSES Wiring Diagram — ABS — (Cont’d) TBR043M BR-3007 TROUBLE DIAGNOSES Wiring Diagram — ABS — (Cont’d) TBR044M BR-3008 TROUBLE DIAGNOSES Wiring Diagram — ABS — (Cont’d) TBR045M BR-3009 TROUBLE DIAGNOSES Wiring Diagram —
ABS — (Cont’d) TBR046M BR-3010 SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications Body Wagon/Hardtop ZD30 engine Applied model Standard Option* Front brake Type CL36VE disc brake Cylinder bore diameter 48.1 (1.894) x 2 mm (in) Pad dimension Length x width x thickness 147 x 56.5 x 12 (5.79 x 2.224 x 0.47) mm (in)
Rotor outer diameter x thickness mm (in) 306 x 32 (12.05 x 1.26) Rear brake Type CL18VF disc brake LT30 drum brake 48.1 (1.894) 25.4 (1.00) 111 x 41.8 x 10 (4.37 x 1.646 x 0.39) 296 x 50 x 6.1 (11.65 x 1.97 x 0.240) — 295 (11.61) 316 x 18 (12.44 x 0.71) — Cylinder bore diameter mm (in) Lining or pad dimension Length x width x thickness mm (in)
Drum inner diameter mm (in) Rotor outer diameter x thickness mm (in) Brake booster Model 235T Diaphragm diameter Primary: 252 (9.92) Secondary: 230 (9.06) mm (in) Master cylinder bore diameter 26.9 (17/16) mm (in) Control valve Type Split point x reducing ratio kPa (bar, kg/cm2, psi) LSV (Variable) x 0.3 Recommended brake fluid (Variable)
x 0.15 DOT 3 or DOT 4 *: When ABS, diff. lock or rear disc brake is fitted as an option.
BR-3011 SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications (Cont’d) BR-3012 ENGINE CONTROL SYSTEM SECTION EC MODIFICATION NOTICE: + Wiring diagrams have been modified. EC CONTENTS ZD30DDTi ENGINE AND EMISSION CONTROL OVERALL SYSTEM.. 3002 Circuit
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Procedure....................................... 3007 Component Inspection ....
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When you perform trouble diagnoses, read GI section, “HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES” and “HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT”. ENGINE AND EMISSION CONTROL OVERALL SYSTEM ZD30DDTi Circuit Diagram TEC395M EC-3002 TROUBLE DIAGNOSIS FOR POWER
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Procedure 1 INSPECTION START Do you have CONSULT-II? Yes or No Yes c GO TO 2. No c GO TO 3. 2 CHECK COOLING FAN OPERATION With CONSULT-II 1. Turn ignition switch “ON”. 2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II. SEF646X 3. Make sure that cooling fan-1 operates.
OK or NG OK c GO TO 12. NG c GO TO 4. 3 CHECK COOLING FAN OPERATION Without CONSULT-II 1. Turn ignition switch “OFF”. 2. Disconnect engine coolant temperature sensor harness connector. 3.
Connect 150Ω resistor to engine coolant temperature sensor harness connector. 4. Restart engine and make sure that cooling fan operates. MEC475B OK or NG OK c GO TO 12. NG c GO TO 4. EC-3007 ZD30DDTi DTC 0208 OVER HEAT Diagnostic Procedure (Cont’d) 4 ZD30DDTi CHECK COOLING FAN POWER SUPPLY CIRCUIT 1. Turn ignition
switch “OFF”. 2. Disconnect cooling fan relay-1. SEF690V 3. Turn ignition switch “ON”. 4. Check voltage between cooling fan relay-1 terminals 1, 3, 6 and ground with CONSULT-II or tester.
SEC533D OK or NG OK c GO TO 6. NG c GO TO 5.
5 DETECT MALFUNCTIONING PART Check the following. + Fuse block (J/B) connector E112 + 10A fuse or 20A fuse + 40A fusible links + Harness for open or short between cooling fan relay-1 and fuse + Harness for open or short between cooling fan relay-1 and battery c Repair open circuit or short to ground or short to power in harness or
connectors. EC-3008 DTC 0208 OVER HEAT Diagnostic Procedure (Cont’d) 6 ZD30DDTi CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Disconnect cooling fan motor-1 harness connector. SEF691V 3. Check harness continuity between cooling fan relay-1 terminal 5 and cooling fan motor-1
terminal 1, cooling fan relay-1 terminal 7 and cooling fan motor-1 terminal 3, cooling fan motor-1 terminals 2, 4 and body ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 7.
NG c Repair open circuit or short to ground or short to power in harness or connectors. 7 CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 14 and cooling fan relay-1 terminal 2. Refer to Wiring Diagram. Continuity should exist. 3.
Also check harness for short to ground and short to power.
OK or NG OK c GO TO 9. NG c GO TO 8. 8 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + Harness connectors M52, F7 + Harness for open or short between cooling fan relay-1 and ECM c Repair open circuit or short to ground or short to power in harness or connectors. 9 CHECK COOLING FAN RELAY-1
Refer to “Component Inspection”, EC-3013. OK or NG OK c GO TO 10. NG c Replace cooling fan relay.
EC-3009 DTC 0208 OVER HEAT Diagnostic Procedure (Cont’d) 10 CHECK COOLING FAN MOTOR-1 Supply battery voltage between the following terminals and check operation. SEF645V MTBL1304 OK or NG OK c GO TO 11. NG c Replace cooling fan motor. 11 CHECK INTERMITTENT INCIDENT Perform “TROUBLE DIAGNOSIS FOR
INTERMITTENT INCIDENT”. c INSPECTION END 12 CHECK COOLING SYSTEM FOR LEAK Apply pressure to the cooling system with a tester, and check if the pressure drops. Testing pressure: 98 kPa (0.98 bar, 1.0 kg/cm2, 14 psi) CAUTION: Higher than the specified pressure may cause radiator damage. SLC754A Pressure should not drop. OK or
NG OK c GO TO 14. NG c GO TO 13. EC-3010 ZD30DDTi DTC 0208 OVER HEAT Diagnostic Procedure (Cont’d) 13 DETECT MALFUNCTIONING PART Check the following for leak. + Hose + Radiator + Water pump (Refer to LC section, “Water Pump”.) c Repair or replace. 14 CHECK RADIATOR CAP Apply pressure to cap with a tester and check
radiator cap relief pressure. SLC755A Radiator cap relief pressure: 59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm2, 9 - 14 psi) OK or NG OK c GO TO 15. NG c Replace radiator cap. EC-3011 ZD30DDTi DTC 0208 OVER HEAT Diagnostic Procedure (Cont’d) 15 ZD30DDTi CHECK THERMOSTAT 1. Remove thermostat. 2. Check valve seating condition at
normal room temperatures. It should seat tightly. 3. Check valve opening temperature and valve lift. SLC343 Valve opening temperature: 82°C (180°F) [standard] (Models for cold areas) 76.5°C (170°F) [standard] (Models for except cold areas) Valve lift: More than 10 mm/95°C (0.394 in/203°F) 4. Check if valve is closed at 5°C (9°F) below valve
opening temperature. For details, refer to LC section, “Thermostat”. OK or NG OK c GO TO 16. NG c Replace thermostat. 16 CHECK ENGINE COOLANT TEMPERATURE SENSOR 1. Remove engine coolant temperature sensor.
2. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure. SEF304X OK or NG OK c GO TO 17. NG c Replace engine coolant temperature sensor. EC-3012 ZD30DDTi DTC 0208 OVER HEAT Diagnostic Procedure (Cont’d) 17 CHECK MAIN 12 CAUSES If the cause cannot be isolated, go to “MAIN 12
CAUSES OF OVERHEATING”, EC-3014.
c INSPECTION END Component Inspection COOLING FAN RELAY-1 3 and V 5 ,V 6 and V 7 . Check continuity between terminals V Conditions SEC202B Continuity 12V direct current supply between terminals 1 and 2 Yes No current supply No If NG, replace relay. EC-3013 ZD30DDTi DTC 0208 OVER HEAT Main 12 Causes of Overheating Engine
Step Inspection item OFF 1 + + + + 2 Equipment Standard Reference page + Visual No blocking + Coolant mixture + Coolant tester 30 - 50% coolant mixture See “RECOMMENDED FLUIDS AND LUBRICANTS” in MA section. 3 + Coolant level + Visual Coolant up to MAX level in reservoir tank and radiator filler neck See “Changing Engine
Coolant”, “ENGINE MAINTENANCE” in MA section. 4 + Radiator cap + Pressure tester 59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm2, 9 - 14 psi) (Limit) See “System Check”, “ENGINE COOLING SYSTEM” in LC section. ON*2 5 + Coolant leaks + Visual No leaks See “System Check”, “ENGINE COOLING SYSTEM” in LC section. ON*2 6 + Thermostat

+ Touch the upper and lower radiator hoses Both hoses should be hot. See "Thermostat" and "Radiator", "ENGINE COOLING SYSTEM" in LC section. ON*1 7 + Cooling fan + Visual Operating OFF 8 + Combustion gas leak + Color checker chemical Negative tester 4 gas analyzer — ON*3 9 + Coolant temperature gauge + Visual — Blocked Blocked Blocked Blocked radiator condenser radiator grille bumper Gauge less than 3/4 when driving — See "DTC 0208 OVER HEAT". + Coolant overflow to res- + Visual ervoir tank No overflow during driving See "Changing Engine and idling Coolant", "ENGINE MAINTENANCE" in MA section. OFF*4 10 + Coolant return from res- + Visual ervoir tank to radiator Should be initial level in reservoir tank See "ENGINE MAINTENANCE" in MA section. OFF 11 + Cylinder head + Straight gauge feeler gauge 0.1 mm (0.004 in) Maximum distortion (warping) See "Inspection", "CYLINDER HEAD" in EM section.

12 + Cylinder block and pistons + Visual No scuffing on cylinder walls or piston See "Inspection", "CYLINDER BLOCK" in EM section. *1: Engine running at idle. *2: Engine running at 3,000 rpm for 10 minutes. *3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes. *4: After 60 minutes of cool down time. For more information, refer to "OVERHEATING CAUSE ANALYSIS" in LC section. EC-3014 DTC 0402 P9zFUEL TEMP SEN ZD30DDTi Wiring Diagram TEC356M EC-3015 DTC 0403 ACCEL POS SENSOR ZD30DDTi Wiring Diagram TEC357M EC-3016 DTC 0902 ECM RLY ZD30DDTi Wiring Diagram TEC358M EC-3017 DTC 1003 EGR VOLUME CONT/V ZD30DDTi Wiring Diagram TEC359M EC-3018 MI (MIL) & DATA LINK CONNECTORS ZD30DDTi Wiring Diagram TEC396M EC-3019 MI (MIL) & DATA LINK CONNECTORS Wiring Diagram (Cont'd) EC-3020 ZD30DDTi ELECTRICAL SYSTEM SECTION EL When you read wiring diagrams: + Read GI section, "HOW TO READ WIRING DIAGRAMS". When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES" and "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT". + Check for any service bulletins before servicing the vehicle. MODIFICATION NOTICE: + Combination meter has been changed. + Wiring Diagram has been changed. CONTENTS PRECAUTIONS AND PREPARATION .... 3004 Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" ... 3004 Precautions for Trouble Diagnoses .... 3004 Precautions for Harness Repair .... 3004 POWER SUPPLY ROUTING............................. 3006 Schematic .... 3006 Wiring Diagram — POWER —...................... 3007 GROUND DISTRIBUTION................................ 3017 Engine Room Harness/LHD Models............... 3017 Engine Room Harness/RHD Models .... 3019 Main Harness/LHD Models............................ 3021 Main Harness/RHD Models ....

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For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow harness connector. Precautions for Trouble Diagnoses CAN SYSTEM + Do not apply voltage of 7.0V or higher to the measurement terminals. + Use the tester with its open terminal voltage being 7.0V or less.

Precautions for Harness Repair CAN SYSTEM + Solder the repaired parts, and wrap with tape. [Frays of twisted line must be within 110 mm (4.33 in)] PKIA0306E EL-3004 PRECAUTIONS AND PREPARATION Precautions for Harness Repair (Cont'd) + Do not perform bypass wire connections for the repair parts. (The spliced wire will become separated and the characteristics of twisted line will be lost.) PKIA0307E EL-3005 POWER SUPPLY ROUTING Schematic TEL745M EL-3006 POWER SUPPLY ROUTING Wiring Diagram — POWER — BATTERY POWER SUPPLY — IGNITION SW. IN ANY POSITION TEL809M EL-3007 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) TEL810M EL-3008 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) TEL746M EL-3009 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) TEL747M EL-3010 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) TEL748M EL-3011 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) ACCESSORY POWER SUPPLY — IGNITION SW. IN "ACC" OR "ON" TEL647M EL-3012 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) IGNITION POWER SUPPLY — IGNITION SW. 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TEL752M EL-3046 PARKING, LICENSE AND TAIL LAMPS Wiring Diagram — TAIL/L —/Type A (Cont'd) TEL212M EL-3047 PARKING, LICENSE AND TAIL LAMPS Wiring Diagram — TAIL/L —/Type B LHD MODELS FOR EUROPE Rear combination lamps are located on rear bumper. TEL658M EL-3048 PARKING, LICENSE AND TAIL LAMPS Wiring Diagram — TAIL/L —/Type B (Cont'd) TEL213M EL-3049 PARKING, LICENSE AND TAIL LAMPS Wiring Diagram — TAIL/L —/Type C RHD MODELS FOR EUROPE Rear combination lamps are located on rear bumper. TEL753M EL-3050 PARKING, LICENSE AND TAIL LAMPS Wiring Diagram — TAIL/L —/Type C (Cont'd) TEL394M EL-3051 FRONT FOG LAMP Wiring Diagram — F/FOG —/For Israel TEL754M EL-3052 FRONT FOG LAMP Wiring Diagram — F/FOG —/RHD Models for Europe TEL755M EL-3053 FRONT FOG LAMP Wiring Diagram — F/FOG —/LHD Models for Europe TEL813M EL-3054 REAR FOG LAMP Wiring Diagram — R/FOG —/For Europe WITH FRONT FOG LAMP TEL814M EL-3055 REAR FOG LAMP Wiring Diagram — R/FOG —/For Europe (Cont'd) TEL756M EL-3056 REAR FOG LAMP Wiring Diagram — R/FOG —/For Europe (Cont'd) WITHOUT FRONT FOG LAMP TEL757M EL-3057 TURN SIGNAL AND HAZARD WARNING LAMPS Wiring Diagram — TURN —/Type A RHD MODELS FOR ISRAEL Rear combination lamps are not located on rear bumper.

TEL817M EL-3058 TURN SIGNAL AND HAZARD WARNING LAMPS Wiring Diagram — TURN —/Type A (Cont'd) TEL818M EL-3059 TURN SIGNAL AND HAZARD WARNING LAMPS Wiring Diagram — TURN —/Type C FOR EUROPE Rear combination lamps are located on rear bumper. 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CONNECTOR SYMBOL Main symbols of connector (in Harness Layout) are indicated in the below. Water proof type Standard type Connector type Male Female — — Male + Cavity: Less than 4 + Relay connector + Cavity: From 5 to 8 + Cavity: More than 9 + Ground terminal etc. — EL-3179 Female HARNESS LAYOUT Main Harness/LHD Models CEL455M EL-3180 HARNESS LAYOUT Main Harness/LHD Models (Cont'd) CEL456M EL-3181 HARNESS LAYOUT Main Harness/LHD Models (Cont'd) CEL457M EL-3182 HARNESS LAYOUT NOTE EL-3183 HARNESS LAYOUT Main Harness/RHD Models CEL458M EL-3184 HARNESS LAYOUT Main Harness/RHD Models (Cont'd) CEL459M EL-3185 HARNESS LAYOUT Main Harness/RHD Models (Cont'd) CEL460M EL-3186 HARNESS LAYOUT Main Harness/RHD Models (Cont'd) CEL461M EL-3187 HARNESS LAYOUT DIESEL ENGINE MODELS Engine Room Harness/LHD Models CEL464M EL-3188 HARNESS LAYOUT Engine Room Harness/LHD Models (Cont'd) CEL465M EL-3189 HARNESS LAYOUT Engine Room Harness/LHD Models (Cont'd) PASSENGER COMPARTMENT CEL466M EL-3190 HARNESS LAYOUT Engine Room Harness/LHD Models (Cont'd) CEL467M EL-3191 HARNESS LAYOUT DIESEL ENGINE MODELS Engine Room Harness/RHD Models CEL470M EL-3192 HARNESS LAYOUT Engine Room Harness/RHD Models (Cont'd) CEL471M EL-3193 HARNESS LAYOUT Engine Room Harness/RHD Models (Cont'd) PASSENGER COMPARTMENT CEL472M EL-3194 HARNESS LAYOUT Engine Room Harness/RHD Models (Cont'd) CEL473M EL-3195 HARNESS LAYOUT ZD ENGINE Engine Harness CEL475M EL-3196 HARNESS LAYOUT NOTE EL-3197 HARNESS LAYOUT Body Harness/LHD Models WAGON CEL478M EL-3198 HARNESS LAYOUT Body Harness/LHD Models (Cont'd) CEL479M EL-3199 HARNESS LAYOUT Body Harness/LHD Models (Cont'd) HARDTOP CEL487M EL-3200 HARNESS LAYOUT Body Harness/LHD Models (Cont'd) CEL488M EL-3201 HARNESS LAYOUT Body Harness/RHD Models WAGON CEL480M EL-3202 HARNESS LAYOUT Body Harness/RHD Models (Cont'd) CEL481M EL-3203 HARNESS LAYOUT Body No. 2 Harness/LHD Models WAGON CEL418M EL-3204 HARNESS LAYOUT Body No. 2 Harness/LHD Models (Cont'd) HARDTOP CEL419M EL-3205 HARNESS LAYOUT Body No. 2 Harness/RHD Models WAGON CEL482M EL-3206 HARNESS LAYOUT Body No. 2 Harness/RHD Models (Cont'd) HARDTOP CEL483M EL-3207 HARNESS LAYOUT Chassis Harness CEL489M EL-3208 HARNESS LAYOUT Back Door Harness and Rear Window Defogger Harness CEL420M EL-3209 WIRING DIAGRAM CODES (CELL CODES) Wiring Diagram Codes (Cell Codes) Use the chart below to find out what each wiring diagram code stands for. Refer to the wiring diagram code in the alphabetical index to find the location (Page number) of each wiring diagram. Code Section Wiring Diagram Name Code Section Wiring Diagram Name A/C, A HA Auto Air Conditioner EGVC/V EC EGR Volume Control Valve A/C, M HA Manual Air Conditioner ETC1 EC Throttle Control Motor A/T AT ETC2 EC Throttle Control Motor ABS BR Anti-lock Brake System ETC3 EC Throttle Control Motor APPS1 EC Accelerator Pedal Position Sensor F/FOG EL Front Fog Lamp APPS2 EC Accelerator Pedal Position Sensor F/PUMP EC Fuel Pump APPS3 EC Accelerator Pedal Position Sensor FCUT EC Fuel Cut System APS EC Accelerator Position Sensor FICD EC IACV-FICD Solenoid Valve ASCD EL Automatic Speed Control Device FPSW1 AT ATF Pressure Switch 1 AT/IND EL A/T Indicator Lamp FPSW3 AT ATF Pressure Switch 3 AUDIO EL Audio FPSW5 AT ATF Pressure Switch 5 BACK/L EL Back-up Lamp FPSW6 AT ATF Pressure Switch 6 BRK/SW EC Brake Switch Signal FR/B AT Front Brake Solenoid Valve CAN AT CAN Communication Line FR/BF AT Front Brake Solenoid Valve CAN EC CAN Communication Line FTS AT CAN EL CAN Communication Line A/T Fluid Temperature Sensor Circuit CD/CHG EL CD Auto Changer FUELB1 EC Fuel Injection System Function (Bank 1) CHARGE EL Charging System CHIME EL Warning Chime FUELB2 EC Fuel Injection System Function (Bank 2) CIGAR EL Cigarette Lighter GLOW EC Quick Glow System CKPS EC Crankshaft Position Sensor H/AIM EL Headlamp Aiming Control System CLOCK EL Clock H/LAMP EL Headlamp CMPS EC Camshaft Position Sensor HLC EL Headlamp Washer COMPAS EL Compass and Thermometer COOL/F EC Cooling Fan Control HLR/C AT High and Low Reverse Clutch Solenoid Valve D/C AT Direct Clutch Solenoid Valve HLR/CF AT D/CF AT Direct Clutch Solenoid Valve High and Low Reverse Clutch Solenoid Valve D/LOCK EL Power Door Lock I/C AT Input Clutch Solenoid Valve DEF EL Rear Window Defogger I/CF AT Input Clutch Solenoid Valve DEICER EL Wiper Deicer I/LOCK AT A/T Interlock IATS EC Intake Air Temperature Sensor IGNSYS EC Ignition Signal ILL EL Illumination INJECT EC Injector INJPMP EC Electronic Control Fuel Injection Pump INT/V EC Intake Air Control Valve Control Solenoid Valve DIFF/L PD Differential Lock DLC EC Data Link Connector DTRL EL Headlamp — Daytime Light System E/BRE AT A/T 1st Engine Braking ECMRLY EC ECM Relay ECTS EC Engine Coolant Temperature Sensor EC EGRC-Solenoid Valve and Throttle Control Solenoid Valve EGRC/V EL-3210 WIRING DIAGRAM CODES (CELL CODES) Wiring Diagram Codes (Cell Codes) (Cont'd) Code Section Wiring Diagram Name IVC EC Intake Valve Timing Control Solenoid Valve ROOM/L EL Interior Room Lamp RP/SEN EC Refrigerant Pressure Sensor KS EC Knock Sensor S/LOCK EL Power Door Lock - Super Lock - LC/B AT Low Coast Brake Solenoid Valve S/SIG EC Start Signal LC/BF AT Low Coast Brake Solenoid Valve S/TANK FE Sub Fuel Tank Control System LOAD EC Electrical Load Signal SEN/PW EC Sensor Power Supply LPSV AT Line Pressure Solenoid Valve SHIFT AT A/T Shift Lock System MAFS EC Mass Air Flow Sensor SRS RS Supplemental Restraint System MAIN EC Main Power Supply and Ground Circuit STAB RA Stabilizer Release Device METER EL Meter and Gauges START EL Starting System MIL EC Mulfunction Indicator Lamp STSIG AT Start Signal Circuit MMSW AT Manual Mode Switch TAIL/L EL Parking, License and Tail Lamps MULTI EL Multi-remote Control System TCCSIG AT A/T TCC Signal (Lock Up) NATS EL Nissan Anti-Theft System TCV AT Torque Converter Clutch Solenoid Valve NLS EC Needle Lift Sensor TCV EC Injection Timing Control Valve NONDTC AT Non-detective Items THEFT EL Theft Warning System EC Heated Oxygen Sensor 1 Heater (B1) (Front) TPS1 EC Throttle Position Sensor TPS2 EC Throttle Position Sensor TPS3 EC Throttle Position Sensor TRQ/SG EC Engine Torque Control Signal TRSA/T AT Turbine Revolution Sensor O2H1B1 Code Section Wiring Diagram Name O2H1B2 EC Heated Oxygen Sensor 1 Heater (B2) (Front) O2H2B1 EC Heated Oxygen Sensor 2 Heater (B1) (Rear) O2H2B2 EC Heated Oxygen Sensor 2 Heater (B2) (Rear) TURN EL Turn Signal and Hazard Warning Lamps O2S1B1 EC Heated Oxygen Sensor 1 (B1) (Front) VIAS/V EC Variable Induction Air Control System O2S1B2 EC Heated Oxygen Sensor 1 (B2) (Front) VSS EC Vehicle Speed Sensor VSSA/T AT Vehicle Speed Sensor A/T O2S2B1 EC Heated Oxygen Sensor 2 (B1) (Rear) WARN EL Warning Lamps EL Front Wiper and Washer EC Heated Oxygen Sensor 2 (B2) (Rear) WIPER O2S2B2 OILP/W EC Engine Oil Pressure Warning System PGC/V EC EVAP Canister Purge Volume Control Solenoid Valve PNP/SW AT Park/Neutral Position Switch PNP/SW EC Park/Neutral Position Switch POWER AT Transmission Control Module (Power Supply) POWER EC ECM Power Supply For Back-up POWER EL Power Supply Routing PS/SEN EC Power Steering Pressure Sensor R/COOL HA Rear Cooler System R/FOG EL Rear Fog Lamp EL-3211 WIRING DIAGRAM CODES (CELL CODES) Wiring Diagram Codes (Cell Codes) (Cont'd) EL-3212 ACCELERATOR CONTROL, FUEL & EXHAUST SYSTEMS SECTION FE MODIFICATION NOTICE: + Wiring diagram of sub fuel tank control system has been modified.

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APPLIED FROM: For Europe: JN1TESY61U0120001 JN1KESY61U0120001 For Israel: JN1TESY613X803501 JN1KESY613X803501 CONTENTS CONSULT-II CHECKING SYSTEM...... 3002 Function and System Application ...... 3002 Nickel Metal Hydride Battery Replacement..... 3002 Checking Equipment......

3003 CONSULT-II Data Link Connector (DLC) Circuit ...... 3003 IDENTIFICATION INFORMATION ...... 3004 Model Variation ...... 3004 Identification Number ...... 3006 Dimensions ...... 3007 GI CONSULT-II CHECKING SYSTEM

Function and System Application Diagnostic test mode Function ENGINE A/T ABS AIR BAG NATS*1 SMART ENTRANCE x*2 — — — — — Work support This mode enables a technician to adjust some devices faster and more accurate by following the indications on CONSULT-II. Self-diagnostic results Self-diagnostic results can be read and erased quickly. x x x x x — Trouble diagnostic record Current self-diagnostic results and all trouble diagnostic records previously stored can be read. — — — x — — ECU discriminated No. Classification number of a replacement ECU can be read to prevent an incorrect ECU from being installed. — — — x — — Data monitor Input/Output data in the ECU (ECM) can be read. x x x — — — DTC work support This mode enables a technician to set operating conditions to confirm self-diagnosis status/results. — x — — — — Active test Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range. x — x — — — x x x — — — ECU (ECM) part numECU (ECM) part number can be read.

ber Control unit initialization All registered ignition key IDs in NATS components can be initialized and new IDs can be registered. — — — — x — Self-function check ECM checks its own NATS communication interface. — — — — x*3 — DTC confirmation The results of SRT (System Readiness Test) and the self-diagnosis status/results can be confirmed. x*2 — — — — — — — — — — x x x x x — — A maximum of four IDs (identifications) can REMO CONT ID SET be registered in the memory using the remote controller. These IDs can be also be UP confirmed and erased as required. Function test Conducted by CONSULT-II instead of a technician to determine whether each system is "OK" or "NG" (No Good). x: Applicable *1: NATS (Nissan Anti-Theft System) *2: Not available for diesel engine models. *3: Except for ZD30DDTi engine models. Nickel Metal Hydride Battery Replacement CONSULT-II contains a nickel metal hydride battery. When replacing the battery obey the following: WARNING: Replace the nickel metal hydride battery with Genuine CONSULT-II battery only. Use of another battery may present a risk of fire or explosion. The battery may present a fire or chemical burn hazard if mistreated. Do not recharge, disassemble or dispose of in fire. Keep the battery out of reach of children and discard used battery conforming to the local regulations. GI-3002 CONSULT-II CHECKING SYSTEM Checking Equipment When ordering the below equipment, contact your NISSAN distributor. Tool name Description NISSAN CONSULT-II 1 CONSULT-II unit (Tester V internal software: Resident version 3.3.0) and accessories 2 Program card AED01C V and AEN00B (For NATS) To confirm the best combination of those softwares, refer to CONSULT-II Operation SGI100A Manual. NOTE: + The CONSULT-II must be used in conjunction with a program card. CONSULT-II does not require loading (Initialization) procedure. + Be sure the CONSULT-II is turned off before installing or removing a program card. CONSULT-II Data Link Connector (DLC) Circuit SOM397 INSPECTION PROCEDURE If the CONSULT-II cannot diagnose the system properly, check the following items. Symptom Check item CONSULT-II cannot access any system. + CONSULT-II DLC power supply circuit (Terminal 8) and ground circuit (Terminal 4) (For detailed circuit, refer to EC section, "MIL & DATA LINK CONNECTORS".) + CONSULT-II (DDL) cable CONSULT-II cannot access individual system. (Other systems can be accessed.) + CONSULT-II program card (Check the appropriate CONSULT-II program card for the system. Refer to "Checking Equipment" above.) + Power supply and ground circuit for the control unit of the system (For detailed circuit, refer to wiring diagram for each system.) + Open or short circuit between the system and CONSULT-II DLC (For detailed circuit, refer to wiring diagram for each system.) GI-3003 IDENTIFICATION INFORMATION Model Variation WAGON AND HARDTOP MODELS Model Rear seat arrangement Destination Steering position Hardtop Station Wagon 2nd seat 2nd center split bench seat Forward facing Engine Side facing or Seatless Front differential 3rd seat Seatless Forward facing Side facing H233B Rear differential Transmission Transfer FS5R50B S RE4R03A FS5R50B RHD SE RE4R03A FS5R50B SE RE4R03A FS5R50B Europe (Except for Israel) ZD30DDTi RE4R03A S TX12A FS5R50B SE LHD RE4R03A — TWSSREFY61UEA — — — TWSSREAY61UEA — KWSSRFFY61UEA — — TWSSRFFY61UEA — KWSSRFAY61UEA — — TWSSRFAY61UEA — — — — TWSSRHFY61UEA — — — — TWSSRHAY61UEA — KWSSLEFY61UGA KWSSLEFY61USP TWSSLEFY61USP TWSSLEFY61UGA — — — TWSSLEAY61UGA — — KWSSLFFY61UGA — — TWSSLFFY61UGA — — — TWSSLFFY61USA — — — TWSSLFAY61UGA — — — TWSSLFAY61USA — — — — TWSSLHFY61UGA — — — TWSSLHFY61USA — — — — TWSSLHAY61UGA — — — — TWSSLHAY61USA — STD — — — — TWSSLAFY61URQ GL KWSSLEFY61URA — — TWSSLEFY61URA — KWSSLFFY61URA — — TWSSLFFY61URA TWSSLFFY61URQ KWSSLFAY61URA — — TWSSLFAY61URA SE FS5R05B — — — RE4R03A ZD30DDTi KWSSREFY61UEA KWSSLFAY61UGA RE4R03A FS5R50B For Israel H233B/H260 Grade SGL GI-3004 — IDENTIFICATION INFORMATION Model Variation (Cont'd) Prefix and suffix designations T GN S L A F Y61 S R A A: 3rd/2nd seat forward facing Q: 3rd/2nd seat side facing P: 3rd/2nd seat seatless R: Except for the Middle East and Europe K: Middle East E: RHD for Europe G: Central/South Europe S: North Europe S: Carburetor engine E: Multiport fuel injection system engine N: Diesel engine U: Turbocharger engine F: 5-speed floor shift manual transmission A: 4-speed floor shift automatic transmission N: 5-speed floor shift automatic transmission A: S, STD, DX E: GL (SGL), ST, S F: SGL, TI, SAFARI, SE H: GRX, S-SAFARI, SE L: LH drive R: RH drive S: Long wheelbase (4WD) WS: ZD30DDTi engine T: Station Wagon K: Hardtop GI-3005 IDENTIFICATION INFORMATION Identification Number VEHICLE IDENTIFICATION NUMBER (Chassis number) Prefix and suffix designations For Europe (Except for Israel) JN1 T E S Y61 U 0 XXXXXX Vehicle serial number 0: Stopgap (no meaning) U: Europe S: Long wheelbase (4WD) Engine type E: ZD30DDTi F: TB48DE Body type T: Station Wagon K: Hardtop Manufacturer JN1: Japan produced vehicle For Israel JN1 T E S Y61 3 X XXXXXX Vehicle serial number Manufacturing plant X: Hiratuka Model year 3: 2003 model year 4: 2004 model year S: Long wheelbase (4WD) Engine type E: ZD30DDTi F: TB48DE C: TD42 Body type T: Station Wagon K: Hardtop Manufacturer JN1: Japan produced vehicle GI-3006 IDENTIFICATION INFORMATION Dimensions FOR ISRAEL Wagon (199.0)*2 (197.6)*3 (197.2)*4 (199.2)*5 Hardtop Overall length*1 mm (in) 5,055 5,020 5,010 5,060 Overall width mm (in) 1,840 (72.4)*3, *4 1,930 (76.0)*2, *5 1,840 (72.4)*4 1,930 (76.0)*2 Overall height mm (in) 1,855 (73.0)*2, *4, *5 1,875 (73.8)*3 1,840 (72.4) Front tread mm (in) 1,555 (61.2)*4 1,605 (63.2)*2, *5 1,595 (62.8)*3 1,555 (61.2)*4 1,605 (63.2)*2 Rear tread*6 mm (in) 1,575 (62.0)*4 1,625 (64.0)*2, *5 1,615 (63.6)*3 1,575 (62.0)*4 1,625 (64.0)*2 Wheelbase mm (in) 2,970 (116.9) 2,400 (94.5) 4,485 (176.6)*2 4,440 (174.8)*4 *1: On front guard bar equipped Wagon or Hardtop models, the resin guard bar adds 65 mm (2.56 in) or the steel guard bar adds 80 mm (3.15 in) to the overall length. With winch, 35 mm (1.38 in) is added to the overall length. *2: For models equipped with 265/70R16 tires *3: For models equipped with 7.50R16 tires *4: For models equipped with 235/80R16 tires *5: For models equipped with 275/70R16 tires *6: On drum brake equipped models, 5 mm (0.20 in) is subtracted from the rear tread. FOR EUROPE Wagon Hardtop Overall length mm (in) 5,070 (199.6)*1 5,065 (199.4)*2 5,020 (197.6)*3 4,495 (177.0)*2 4,450 (175.2)*3 Overall width mm (in) 1,930 (76.0)*1, *2 1,840 (72.4)*3 1,930 (76.0)*2 1,840 (72.4)*3 Overall height mm (in) 1,855 (73.0) 1,840 (72.4) Front tread mm (in) 1,605 (63.2)*1, *2 1,555 (61.2)*3 1,605 (63.2)*2 1,555 (61.2)*3 Rear tread mm (in) 1,625 (64.0)*1, *2 1,575 (62.0)*3 1,625 (64.0)*2 1,575 (62.0)*3 Wheelbase mm (in) 2,970 (116.9) 2,400 (94.5) *1: For models equipped with 275/70R16 tires *2: For models equipped with 265/70R16 tires *3: For models equipped with 235/80R16 tires GI-3007 IDENTIFICATION INFORMATION Dimensions (Cont'd) GI-3008 HEATER & AIR CONDITIONER SECTION HA MODIFICATION NOTICE: + Wiring diagram has been changed. + Relief valve to compressor has been added. + Rear thermo amp. and rear solenoid valve relay have been eliminated.

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3008 DESCRIPTION ...... 3004 HA PRECAUTIONS AND PREPARATION MANUAL AND AUTO Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER" used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination and optional equipment.): + For a frontal collision The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. + For a side collision The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision). Information necessary to service the system safely is included in the RS section of this Service Manual. WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.

For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS. HA-3002 DESCRIPTION MANUAL AND AUTO Refrigeration Cycle REFRIGERANT SYSTEM PROTECTION Pressure Relief Valve The refrigerant system is also protected by a pressure relief valve, located in the rear head of the compressor. When the pressure of refrigerant in the system increases to an unusual level [more than 3,727 kPa (38 kg/cm2, 540 psi)], the release port on the pressure relief valve automatically opens and releases refrigerant into the atmosphere. SHA652FA HA-3003 DESCRIPTION AUTO Control Operation RHA210I AUTO SWITCH The compressor, air intake doors, air mix door, mode doors, and blower speed are automatically controlled so that the in-vehicle temperature will reach, and be maintained at the set temperature selected by the operator. The air conditioning cooling function operates only when the engine is running. ECON SWITCH Fully automatic control with the compressor off. With the compressor off, the system will not remove heat (cool) or de-humidify.

The system will maintain the in-vehicle temperature at the set temperature when the set temperature is above the ambient (outside) temperature. TEMPERATURE SWITCH (Potentio Temperature Control) Increases or decreases the set temperature. OFF SWITCH The compressor and blower are off, the air intake doors are set to the outside air position. Then, the mode doors are set to the foot (80% foot and 20% defrost) position. In the off position, the A/C system uses the vehicle's "flow through" ventilation. It tries to maintain the interior temperature based on the last set temperature of the system.

FAN SWITCH Manual control of the blower speed. Four speeds are available for manual control (as shown on the display screen): low , medium low , medium high , high MODE SWITCH Manual control of the air discharge outlets. Four selections are available (as shown on the display screen): face , bi-level , foot , defrost/foot HA-3004 DESCRIPTION Control Operation (Cont'd) AUTO RECIRCULATION (REC) SWITCH ON position: Interior air is recirculated inside the vehicle.

OFF position: Automatic control resumes. Recirculation is canceled when AUTO, DEF or ECON is selected. Recirculation resumes when another mode is chosen. DEFROSTER (DEF) SWITCH Positions the mode doors to the defrost position. Also positions the air intake doors to the outside air position. HA-3005 TROUBLE DIAGNOSIS AUTO Auto Amp. Terminals and Reference Value INSPECTION OF AUTO AMP. + Measure voltage between each terminal and body ground by following "AUTO AMP. INSPECTION TABLE". SHA758F + Pin connector terminal layout RHA501GF HA-3006 AUTO TROUBLE DIAGNOSIS Auto Amp. Terminals and Reference Value (Cont'd) AUTO AMP. INSPECTION TABLE TERMINAL No. (Wire color) ITEM VOLTAGE V CONDITION 1 (RY) Power supply for IGN — Approximately 12 2 (Y) Power supply for BAT — Approximately 12 3 (B) Ground — — 4 (Y)*2 (LG)*4 5 (L) 8 (GY/R) Compressor ON signal ON Approximately 0 OFF Approximately 12 Compressor LAN signal — Approximately 5.5 In-vehicle sensor — — 9 (PU) Ambient sensor — — 10 (R) Sunload sensor — 11 (B) Ground 12 (L/B) Power supply for illumination 13 (OR/B) Intake door position switch 14 (P) Intake door position switch 15 (G/Y) Power supply for mode and air mix door motor 17 (GY/L) Fan control amp. control signal 18 (L/W) Blower motor feed back 19*1 (Y/L) Fan ON signal — — — Illumination switch ON Approximately 12 RECIRCULATION Approximately 0 FRESH or 20% FRESH Approximately 12 FRESH Approximately 0 RECIRCULATION or 20% FRESH Approximately 12 — Approximately 12 Low, middle low or middle high Approximately 2.5 - 3.0 High Approximately 9 - 10 Low Approximately 7 - 10 ON Approximately 0 Fan speed Blower fan OFF Power supply for blower motor 21 (Y/R) Thermal transmitter 23 (OR) Intake door position switch 24 (G/Y) Sensor ground — — 25 (G/W) Intake sensor — — 27*2 (Y/B) FICD ON signal 28 (LG/B) Rear cooler relay 35 (Y/L)*5 (OR/L)*6 Rear cooler switch 36*3 (Y) *1: *2: *3: *4: *5: *6: Front solenoid valve relay — Approximately 5 20 (L/R) — Approximately 12 — 20% FRESH Approximately 0 RECIRCULATION or FRESH Approximately 12 Compressor ON Ambient temperature 20.5°C or less Approximately 0 Ambient temperature 23.5°C or more Approximately 12 Rear cooler ON Approximately 0 Rear cooler OFF Approximately 12 Rear cooler switch ON Approximately 0 Rear cooler switch OFF Approximately 12 Cool box switch ON Approximately 0 Cool box switch OFF Approximately 12 A/T models Except for Europe For the Middle East with cool box Except for the Middle East With rear cooler front switch and without cool box Without rear cooler front switch HA-3007 TROUBLE DIAGNOSES REAR COOLER Wiring Diagram — R/COOL —/With Front Auto A/C THA138M HA-3008 REAR COOLER TROUBLE DIAGNOSES Wiring Diagram — R/COOL —/With Front Auto A/C (Cont'd) THA070M HA-3009 REAR COOLER TROUBLE DIAGNOSES Wiring Diagram — R/COOL —/With Front Auto A/C (Cont'd) HA-3010 ALPHABETICAL INDEX SECTION IDX IDX ALPHABETICAL INDEX

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(Imp pt) Standard Optional Rear final drive [Grade] H233B 4-pinion LSD Diff. lock Gear ratio 4.375 Number of teeth (Ring gear/drive pinion) 35/8 Oil capacity (Approx.) ! (Imp pt) 2.4 (4-1/4) 2.1 (3-3/4) 3.0 (5-1/4) LSD Diff. lock 2.1 (3-3/4) 3.0 (5-1/4) Hardtop Engine ZD30DDTi Transmission 5M/T 4A/T Standard Front final drive H233B 2-pinion Gear ratio 4.375 Number of teeth (Ring gear/drive pinion) 35/8 Oil capacity (Approx.) 5.4 (9-1/2) ! (Imp pt) Standard Optional Rear final drive [Grade] Standard Optional H233B 4-pinion LSD Diff. lock LSD Diff. lock Gear ratio 4.375 Number of teeth (Ring gear/drive pinion) 35/8 Oil capacity (Approx.) ! (Imp pt) 2.4 (4-1/4) 2.1 (3-3/4) 3.0 (5-1/4) 2.1 (3-3/4) PD-3005 3.0 (5-1/4) 4-pinion Diff. lock LSD Diff. lock 2.4 (4-1/4) 3.0 (5-1/4) 2.1 (3-3/4) 3.0 (5-1/4) SERVICE DATA AND SPECIFICATIONS (SDS) Final Drive (Cont'd) Differential actuator mounting adjusting shim Thickness mm (in) Part number 0.4 (0.016) 38154 06J00 1.0 (0.039) 38154 06J01 0.9 (0.035) 38154 06J02 1.5 (0.059) 38154 06J03 Diff. lock actuator adjustment Standard length A PD-3006 mm (in) 80.9 - 84.8 (3.185 - 3.340) REAR AXLE & REAR SUSPENSION SECTION RA MODIFICATION NOTICE: + Tightening torque for bearing cage has been changed. + Wiring diagrams have been changed. 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+ For a side collision The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision). Information necessary to service the system safely is included in the RS section of this Service Manual. WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow harness connector. AT-5 OVERALL SYSTEM RE4R03A Circuit Diagram TAT059M AT-6 OVERALL SYSTEM RE4R03A Wiring Diagram — A/T — TAT061M AT-7 OVERALL SYSTEM Wiring Diagram — A/T — (Cont'd) RE4R03A TAT108M AT-8 OVERALL SYSTEM Wiring Diagram — A/T — (Cont'd) RE4R03A TAT109M AT-9 OVERALL SYSTEM Wiring Diagram — A/T — (Cont'd) RE4R03A TAT122M AT-10 OVERALL SYSTEM Wiring Diagram — A/T — (Cont'd) RE4R03A TAT111M AT-11 OVERALL SYSTEM Wiring Diagram — A/T — (Cont'd) RE4R03A TAT112M AT-12 OVERALL SYSTEM Wiring Diagram — A/T — (Cont'd) RE4R03A TAT128M AT-13 OVERALL SYSTEM Wiring Diagram — A/T — (Cont'd) RE4R03A TAT114M AT-14 RE5R05A PRECAUTIONS Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER” The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination and optional equipment.): + For a frontal collision The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. + For a side collision The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision). Information necessary to service the system safely is included in the RS section of this Service Manual. WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow harness connector. Precautions for A/T Assembly Replacement REPLACEMENT CAUTION: + Check data (Unit ID) in TCM with data monitor of CONSULT-II before replacing A/T assembly.
+ Check if new data (Unit ID) are entered correctly after replacing A/T assembly and erasing data in TCM.
+ When replacing A/T assembly or TCM, refer to the pattern table below and erase the EEPROM in the TCM if necessary. EEPROM erasing patterns A/T assembly TCM Erasing EEPROM in TCM Remarks Replaced Replaced Not required Not required because the EEPROM in the TCM is in the default state. Not replaced Replaced Not required Not required because the EEPROM in the TCM is in the default state. Replaced Not replaced Required Required because data has been written in the EEPROM in the TCM and because the TCM cannot write data from the ROM assembly in the transmission. Method for erasing the EEPROM in the TCM 1. 2. 3. 4. 5. Move selector lever in “R” position. Set the closed throttle position switch to “OFF”. (Depressed accelerator pedal at half throttle) Ignition switch to “ON” position. Select “SELF-DIAG RESULTS” mode for A/T with CONSULT-II.
Touch “ERASE” the EEPROM memory. AT-15 RE5R05A PRECAUTIONS Precautions for A/T Assembly Replacement (Cont'd) Method for writing data from the ROM assembly in the transmission With the EEPROM in the TCM erased, the selector lever in “P” position, and the ignition switch “ON” position. In this state, the TCM reads data from the ROM assembly and writes it to the EEPROM in the TCM. Check method Normal: About 2 seconds after the ignition switch to “ON” position, the A/T CHECK indicator lamp lights up for 2 seconds. + Abnormal: Even after the ignition switch to “ON” position, the A/T CHECK indicator lamp does not light up. — Replace the A/T assembly. — Replace the TCM. + Precautions NOTE: If any problems occur in the RE5R05A model transmission, replace the entire transmission assembly. + Before connecting or disconnecting the TCM harness connector, turn ignition switch to “OFF” position and disconnect negative battery terminal. Because battery voltage is applied to TCM even if ignition switch is turned to “OFF” position. SEF289H + When connecting or disconnecting pin connectors into or from TCM, take care not to damage pin terminals (bend or break). Make sure that there are not any bends or breaks on TCM pin terminal, when connecting pin connectors. SEF291H + Before replacing TCM, perform TCM input/output signal inspection and make sure whether TCM functions properly or not. Refer to AT-64, “TCM INSPECTION TABLE”. + Always use the specified brand of A/T fluid. Refer to MA section, “Changing A/T Fluid”. + Use paper rags not cloth rags during work. + After replacing the A/T fluid, dispose of the waste oil using the methods prescribed by law, ordinance, etc. MEF040DA AT-16 PRECAUTIONS RE5R05A Wiring Diagrams and Trouble Diagnosis When you read wiring diagrams, refer to the following: + Read GI section, “HOW TO READ WIRING DIAGRAMS”. + See EL section, “POWER SUPPLY ROUTING” for power distribution circuit. When you perform trouble diagnosis, refer to the following: + Read GI section, “HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES”. AT-17 RE5R05A PREPARATION Special Service Tools Tool number Tool name Description ST2505S001 Oil pressure gauge set 1 ST25051001 Oil pressure gauge 2 ST25052000 Hose 3 ST25053000 Joint pipe 4 ST25054000 Adapter 5 ST25055000 Adapter Measuring line pressure ZZA0600D KV31103600 Joint pipe adapter (With ST25054000) Measuring line pressure ZZA1227D AT-18 RE5R05A A/T CONTROL SYSTEM Cross-Sectional View SAT620K 1 V 2 V 3 V 4 V 5 V 6 V Front planetary gear Mid planetary gear Rear planetary gear Direct clutch High & low reverse clutch Reverse brake 7 V 8 V 9 V 10 V 11 V 12 V Forward brake Low coast brake Input shaft Torque converter Oil pump Front brake AT-19 13 V 14 V 15 V 16 V 17 V 18 V 3rd one-way clutch Input clutch 1st one-way clutch Control valve Forward one-way clutch Output shaft A/T CONTROL SYSTEM RE5R05A Hydraulic Control Circuit PCIA0001E AT-20 RE5R05A A/T CONTROL SYSTEM Shift Mechanism The automatic transmission uses compact, dual planetary gear systems to improve power-transmission efficiency, simplify construction and reduce weight. It also employs an optimum shift control and super wide gear ratios. They improve starting performance and acceleration during medium and high-speed operation. CONSTRUCTION PCIA0002J 1 V 2 V 3 V 4 V 5 V 6 V 7 V 8 V Front brake Input clutch Direct clutch High and low reverse clutch Reverse brake Forward brake Low coast brake 1st one-way clutch 9 V 10 V 11 V 12 V 13 V 14 V 15 V 16 V Forward one-way clutch 3rd one-way clutch Front sun gear Input shaft Mid internal gear Front internal gear Rear carrier Rear sun gear 17 V 18 V 19 V 20 V 21 V 22 V 23 V Mid sun gear Rear sun gear Mid carrier Rear internal gear Output shaft Parking gear Parking pole FUNCTION OF CLUTCH AND BRAKE Name of the Part Abbreviation Function Front brake (1) Fr/B Input clutch (2) I/C Connects the input shaft (12), the mid internal gear (13), and the front internal gear (14). Direct clutch (3) D/C Connects the rear carrier (15) and the rear sun gear (16). High and low reverse clutch (4) H & LR/C Fastens the front sun gear (11) Connects the mid sun gear (17) and the rear sun gear (16). Reverse brake (5) R/B Fastens the rear carrier (15). Forward brake (6) F/B Fastens the mid sun gear (17). LC/B Fastens the mid sun gear (17). Low coast brake (7) 1st one-way clutch (8) Forward one-way clutch (9) 3rd one-way clutch (10) 1st/O.C Allows the rear sun gear (16) to turn freely forward relative to the mid sun gear (17) but fastens it for reverse rotation. F/O.C Allows the mid sun gear (17) to turn freely in the forward direction but fastens it for reverse rotation 3rd/O.C Allows the front sun gear (11) to turn freely in the forward direction but fastens it for reverse rotation AT-21 A/T CONTROL SYSTEM Shift Mechanism (Cont'd) RE5R05A CLUTCH AND BAND CHART SCIA0492E AT-22 A/T CONTROL SYSTEM Shift Mechanism (Cont'd) RE5R05A POWER TRANSMISSION “N” position Since both the forward brake and the reverse brake are released, torque from the input shaft drive is not transmitted to the output shaft. “P” position + + The same as for the “N” position, both the forward brake and the reverse brake are released, so torque from the input shaft drive is not transmitted to the output shaft.
The parking pole linked with the select lever meshes with the parking gear and fastens the output shaft mechanically. PCIA0003J AT-23 A/T CONTROL SYSTEM Shift Mechanism (Cont'd) RE5R05A “D”, “M2”, “M3”, “M4”, “M5” POSITIONS 1ST SPEED + + + + + The front brake is fastened.
The forward brake and the forward one-way clutch regulate reverse rotation of the mid sun gear. The first one-way clutch regulates reverse rotation of the rear sun gear. The third one-way clutch regulates reverse rotation of the front sun gear. During deceleration, the mid sun gear turns forward, so the forward one-way clutch idles and the engine brake is not activated.
PCIA0004E AT-24 A/T CONTROL SYSTEM Shift Mechanism (Cont'd) RE5R05A “M1” POSITION 1ST SPEED + + + + + + + The front brake is applied. The forward brake and the forward one-way clutch regulate reverse rotation of the mid sun gear. The first one-way clutch regulates reverse rotation of the rear sun gear. The third one-way clutch regulates reverse rotation of the front sun gear. During deceleration, the mid sun gear turns forward, so the forward one-way clutch idles and the engine brake is not activated. The low coast brake fastens the mid sun gear. During deceleration, the low coast brake regulates forward rotation of the mid sun gear and the engine brake functions.
PCIA0004E AT-25 A/T CONTROL SYSTEM Shift Mechanism (Cont'd) RE5R05A “D”, “M3”, “M4”, “M5” POSITIONS 2ND SPEED + + + + The The The The front brake is applied. forward brake and the forward one-way clutch regulate reverse rotation of the mid sun gear. third one-way clutch regulates reverse rotation of the front sun gear. direct clutch is coupled and the rear carrier and rear sun gear are connected. PCIA0004E AT-26 A/T CONTROL SYSTEM Shift Mechanism (Cont'd) RE5R05A “M2” POSITION 2ND SPEED + + + + + + The front brake is applied. The forward brake and the forward one-way clutch regulate reverse rotation of the mid sun gear. The third one-way clutch regulates reverse rotation of the front sun gear. The direct clutch is coupled, and the rear carrier and rear sun gear are connected. The low coast brake functions. Engine brake function. PCIA0004E AT-27 A/T CONTROL SYSTEM Shift Mechanism (Cont'd) RE5R05A “D”, “M3”, “M4”, “M5” POSITIONS 3RD SPEED + + + The front brake is applied. The third one-way clutch regulates reverse rotation of the front sun gear.
The high and low reverse clutch is coupled and the mid sun gear and rear sun gear are connected. PCIA0004E AT-28 A/T CONTROL SYSTEM Shift Mechanism (Cont'd) RE5R05A “D”, “M4”, “M5” POSITIONS 4TH SPEED + + + The front brake is released and the sun gears rotate forward. The input clutch is coupled and the front internal gear and mid internal gear are connected. The drive power is conveyed to the front internal gear, mid internal gear, and rear carrier and the three planetary gears rotate as one unit.
PCIA0004E AT-29 A/T CONTROL SYSTEM Shift Mechanism (Cont'd) RE5R05A “D”, “M5” POSITIONS 5TH SPEED + + The front brake fastens the front sun gear. The direct clutch is released and the connection between the rear carrier and the rear sun gear is released. PCIA0005E AT-30 A/T CONTROL SYSTEM Shift Mechanism (Cont'd) RE5R05A “R” POSITION + + + The front brake fastens the front sun gear. The high and low reverse clutch is coupled and the mid sun gear and rear sun gear are connected. The reverse brake fastens the rear carrier. PCIA0006E TCM Function The function of the TCM is to: + Receive input signals sent from various switches and sensors. + Determine required line pressure, shifting point, lock-up operation, and engine brake operation. + Send required output signals to the respective solenoids and sensors. CONTROL SYSTEM OUTLINE The automatic transmission senses vehicle operating conditions through various sensors. It always controls the optimum shift position and reduces shifting and lock-up shocks. SENSORS PNP switch Throttle position sensor Closed throttle position switch Wide open throttle position switch Engine speed signal A/T fluid temperature sensor Revolution sensor Vehicle speed sensor Manual mode switch Stop lamp switch Turbine revolution sensor TCM → Shift control Line pressure control Lock-up control Engine brake control Timing control Fail-safe control Self-diagnosis CONSULT-II communication line Duet-EA control CAN system AT-31 ACTUATORS → Input clutch solenoid valve Direct clutch solenoid valve Front brake solenoid valve High & low reverse clutch solenoid valve Low coast brake solenoid valve Torque converter clutch solenoid valve Line pressure solenoid valve A/T CHECK indicator lamp RE5R05A A/T CONTROL SYSTEM CONTROL SYSTEM DIAGRAM SAT621K CAN Communication SYSTEM DESCRIPTION CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only. System diagramË SEL599Y INPUT/OUTPUT SIGNAL CHART T: Transmit Signals R: Receive Combination meter TCM ECM Engine speed signal R R T Engine coolant temperature signal R R T Accelerator pedal position signal R T Closed throttle position signal R T Wide open throttle position signal R T T R A/T fluid temperature warning lamp signal R AT-32 A/T CONTROL SYSTEM CAN Communication (Cont'd) Signals Current gear position signal RE5R05A Combination meter TCM ECM R T R T R Shift change signal Air conditioner switch signal T R Headlamp switch signal T R Rear window defogger switch signal T Brake switch signal T R Vehicle speed signal T R R T R A/T self diagnosis signal Manual mode signal T R R Line Pressure Control + + When an input torque signal equivalent to the engine drive force is sent from the ECM to the TCM, the TCM controls the line pressure solenoid. This line pressure solenoid controls the pressure regulator valve as the signal pressure and adjusts the pressure of the operating oil discharged from the oil pump to the line pressure most appropriate to the driving state. PCIA0007E LINE PRESSURE CONTROL IS BASED ON THE TCM LINE PRESSURE CHARACTERISTIC PATTERN + + The TCM has stored in memory a number of patterns for the optimum line pressure characteristic for the driving state.
In order to obtain the line pressure characteristic that the TCM has selected as being the most appropriate characteristic in the current driving state, the TCM controls the line pressure solenoid current value and thus controls the line pressure. AT-33 A/T CONTROL SYSTEM Line Pressure Control (Cont'd) RE5R05A Normal Control Each clutch is adjusted to the necessary pressure to match the engine drive force.
PCIA0008E Back-up Control (Engine Brake) When the select operation is executed during driving and the transmission is shifted down, the line pressure is set according to the vehicle speed. PCIA0009E During Shift Change The necessary and adequate line pressure for speed change is set. Therefore, the line pressure characteristic is set according to the input torque and speed change type. PCIA0010E At Low Fluid Temperature When the A/T fluid temperature drops below the prescribed temperature, in order to speed up the action of each friction element, the line pressure is set higher than the normal line pressure characteristic.
PCIA0011E AT-34 RE5R05A A/T CONTROL SYSTEM Shift Control The clutch pressure control solenoid is driven by the signals from the switches and sensors. Thus, as the clutch pressure is adjusted to be appropriate to the engine load state and vehicle driving state. It becomes possible to finely control the clutch hydraulic pressure with high precision and a smoother speed change characteristic is attained. PCIA0012E SHIFT CHANGE The clutch is controlled with the optimum timing and oil pressure for the engine speed, engine torque information, etc. Shift Change System Diagram PCIA0013E *1: Full phase real-time feedback control monitors movement of gear ratio at gear change, and controls oil pressure at real-time to achieve the best gear ratio. Lock-Up Control Lock-up control means that torque converter sliding is eliminated and coupling the lock-up piston in the torque converter raises the power transmission efficiency. The lock-up solenoid is controlled by a signal from the TCM, the lock-up control valve operation is controlled, and the torque converter lock-up piston is coupled or released. Lock-Up Operation Condition Table Select lever D position M position Gear position 5 4 4 Lock-up X — X AT-35 A/T CONTROL SYSTEM Lock-Up Control (Cont'd) RE5R05A TORQUE CONVERTER CLUTCH CONTROL VALVE CONTROL + + The circuit that supplies operating oil pressure to the lock-up piston chamber is connected to the lock-up control valve. This valve is switched by the lock-up solenoid with signals from the TCM. In this way, the circuit that supplies operating oil pressure to the lock-up piston chamber is controlled to the released side or the coupled side. Lock-Up Control System Diagram PCIA0014E Lock-Up Released + In the lock-up released state, the lock-up control valve is set into the un-locked state by the lock-up solenoid and the lock-up apply pressure is drained. In this way, the lock-up piston is not coupled. Lock-Up Applied + In the lock-up coupled state, the lock-up control valve is set into the locked state by the lock-up solenoid and lock-up apply pressure is generated. In this way, the lock-up piston is pressed and coupled. SMOOTH LOCK-UP CONTROL When shifting from the lock-up release state to the lock-up coupled state, the current output to the lock-up solenoid is controlled with the TCM. In this way, when shifting to the lock-up coupled state, the lock-up clutch is temporarily set to the half-clutched state to reduce the shock. Half Clutched State + The current output from the TCM to the lock-up solenoid is varied to steadily increase the lock-up solenoid pressure. In this way, the lock-up apply pressure steadily rises and while the lock-up piston is put into half-clutched status, the force pressing on the lock-up piston is increased and the coupling is completed smoothly. Engine Brake Control + The forward one-way clutch transmits the drive force from the engine to the rear wheels. But the reverse drive from the rear wheels is not transmitted to the engine because the one-way clutch is idling. Therefore, the low coast brake solenoid is operated to prevent the forward one-way clutch from idling and the engine brake is operated in the same manner as conventionally. AT-36 A/T CONTROL SYSTEM Engine Brake Control (Cont'd) RE5R05A PCIA0015E + The operation of the low coast brake solenoid switches the low coast brake switch valve and controls the coupling and releasing of the low coast brake. The low coast brake reducing valve controls the low coast brake coupling force. Control Valve FUNCTION OF CONTROL VALVE Name Function Torque converter regulator valve In order to prevent the pressure supplied to the torque converter from being excessive, the line pressure is adjusted to the optimum pressure (torque converter operating pressure). Pressure regulator valve Pressure regulator plug Pressure regulator sleeve Adjusts the oil discharged from the oil pump to the optimum pressure (line pressure) for the driving state. Front brake control valve When the front brake is coupled, adjusts the line pressure to the optimum pressure (front brake pressure) and supplies it to the front brake.
Accumulator control valve Adjusts the pressure (accumulator control pressure) acting on the accumulator piston and low coast reducing valve to the pressure appropriate to the driving state (adjusts the clutch pressure for 1st, 2nd, 3rd, and 5th speeds). Pilot valve A Adjusts the line pressure and produces the constant pressure (pilot pressure) required for line pressure control, speed change control, and lock-up control.
Pilot valve B Adjusts the line pressure and produces the constant pressure (pilot pressure) required for speed change control. Low coast brake switching valve During engine braking, supplies the line pressure to the low coast brake reducing valve. Low coast brake reducing valve When the low coast brake is coupled, adjusts the line pressure to the optimum pressure (low coast brake pressure) and supplies it to the low coast brake. N-R accumulator Produces the stabilizing pressure for when N-R is selected.
Direct clutch piston switching valve Operates in 4th speed and switches the direct clutch coupling capacity. High and low reverse clutch control valve When the high and low reverse clutch is coupled, adjusts the line pressure to the optimum pressure (high and low reverse clutch pressure) and supplies it to the high and low reverse clutch. (In 1st, 2nd, 3rd, and 5th speeds, adjusts the clutch pressure.) AT-37 A/T CONTROL SYSTEM Control Valve (Cont'd) Name RE5R05A Function Input clutch control valve When the input clutch is coupled, adjusts the line pressure to the optimum pressure (input clutch pressure) and supplies it to the input clutch. (In 4th and 5th speeds, adjusts the clutch pressure.) Direct clutch control valve When the direct clutch is coupled, adjusts the line pressure to the optimum pressure (direct clutch pressure) and supplies it to the direct clutch.
(In 2nd, 3rd, and 4th speeds, adjusts the clutch pressure.) TCC control valve TCC control plug TCC control sleeve Switches the lock-up to operating or released. Also, by executing the lock-up operation transiently, lock-up smoothly. Torque converter lubrication valve Operated during lock-up to switch the torque converter, cooling, and lubrication system oil path. Cool bypass valve Set for securing oil lubrication flow at low temperatures. Line pressure relief valve Set for securing line pressure. N-D accumulator Produces the stabilizing pressure for when N-D is selected. Manual valve Sends line pressure to each circuit according to the select position. The circuits to which the line pressure is not sent drain. FUNCTION OF PRESSURE SWITCH Name Function Pressure switch 1 (FR/B) Detects any abnormality in the front brake hydraulic pressure. When it detects any abnormality, it puts the system into fail-safe mode. Pressure switch 2 (LC/B) Detects any abnormality in the low coast brake hydraulic pressure. When it detects any abnormality, it puts the system into fail-safe mode. Pressure switch 3 (I/C) Detects any abnormality in the input clutch hydraulic pressure. When it detects any abnormality, it puts the system into fail-safe mode. Pressure switch 5 (D/C) Detects any abnormality in the direct clutch hydraulic pressure. When it detects any abnormality, it puts the system into fail-safe mode. Pressure switch 6 (H & LR/C) Detects any abnormality in the high & low reverse clutch hydraulic pressure. When it detects any abnormality, it puts the system into fail-safe mode. AT-38 RE5R05A TROUBLE DIAGNOSIS DTC Inspection Priority Chart If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart. NOTE: If DTC U1000 is displayed with other DTCs, first perform the trouble diagnosis for DTC U1000.
Refer to AT-75, “DTC U1000 CAN COMMUNICATION LINE”. Priority Detected items (DTC) 1 U1000 CAN communication line 2 Except above Fail-Safe The TCM has an electrical fail safe mode. This mode makes it possible to operate even if there is a breakdown in a main electronic control input/output signal path.
In fail-safe mode, even if the select lever is “D” or “M” mode, the transmission is fixed in 2nd, 4th, or 5th (depending on the breakdown position), so the customer should feel “slipping” or “detective acceleration”. When fail-safe mode is triggered, when the ignition switch is switched “ON”, the A/T malfunction CHECK indicator lamp flashes for about 8 seconds. (Refer to AT-73, “SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)”). Even when the electronic circuits are normal, under special conditions (for example, when slamming on the brake with the wheels spinning drastically and stopping the tire rotation), the transmission can go into fail-safe mode. If this happens, switch “OFF” the ignition switch for 10 seconds, then switch it “ON” again to return to the normal shift pattern. Also, the A/T CHECK indicator lamp flashes for about 8 seconds once, then is cleared. Therefore, the customer's vehicle has returned to normal, so handle according to the “diagnostics flow” (Refer to AT-43, “WORK FLOW”). FAIL-SAFE FUNCTION If any abnormality occurs in a sensor or solenoid, this function controls the A/T without interfering with drivability. Fail-Safe Chart Control item Line pressure control Vehicle speed control Shift control Lock-up control Engine brake control Fail-safe function (*3) Self-diagnostics function Throttle position sensor X X X X X X X Vehicle speed sensor A/T (revolution sensor) X X X X X X Vehicle speed sensor MTR (*1) X X X X Closed throttle position switch (*2) X (*2) X (*4) X Wide open throttle position switch (*2) X (*2) X (*4) X Turbine revolution sensor 1 X X X X Turbine revolution sensor 2 (for 4th or 5th speed only) X X X X X Input Engine speed signals PNP switch X X Brake switch X X X X Fluid temperature sensors 1 or 2 X X TCM power supply voltage signal X X AT-39 X X X X X (*4) X (*4) X X X X X X X X X RE5R05A TROUBLE DIAGNOSIS Fail-Safe (Cont'd) Line pressure control Vehicle speed control Shift control Lock-up control Fail-safe function (*3) Self-diagnostics function Direct clutch solenoid (oil pressure switch 5) X X X X X X Input clutch solenoid (oil pressure switch 3) X X X X X X High & low reverse clutch solenoid (oil pressure switch 6) X X X X X X Front brake solenoid (oil pressure switch 1) X X X X X X Low coast brake solenoid (oil pressure switch 2) X X X X X X X Line pressure solenoid X X X X X X X X X Control item Output TCC solenoid X Engine brake control Self-diagnostics table *1: *2: *3: *4: X Spare for vehicle speed sensorzA/T (revolution sensor) Spare for throttle position sensor If these input and output signals are different, the TCM triggers the fail-safe function. Used as a condition for starting self-diagnostics; if self-diagnostics are not started, it is judged that there is some kind of error. VEHICLE SPEED SENSOR A/T (REVOLUTION SENSOR) Signals are input from two systems — from vehicle speed sensor A/T (revolution sensor) installed on the transmission and from COMBINATION METER so normal driving is possible even if there is an error in one of the systems. ACCELERATOR PEDAL POSITION SENSOR If an error occurs in the accelerator sensor signal, the accelerator degree of opening is detected from the wide open throttle position switch signal (input by CAN communications) and the closed throttle position switch signal transmitted from the ECM and the line pressure is controlled according to the table below to make driving possible. Closed throttle position switch Wide open throttle position switch OFF ON Line pressure Remarks Accelerator degree of opening 4/8 Maximum hydraulic pressure OFF OFF ON OFF Accelerator degree of opening 2/8 Minimum hydraulic pressure Accelerator degree of opening 0/8 PNP SWITCH In the unlikely event that an error signal enters the TCM, the position indicator is switched “OFF”, the PNP relay is switched “OFF” (starter starting disabled), and the position is fixed to the “D” speed to make driving possible. PNP RELAY The PNP relay is switched “OFF”. (Starter starting is disabled.) A/T INTERLOCK If there is an A/T interlock judgment error, the transmission is fixed in 2nd speed, 4th speed, or 5th speed to make driving possible.
NOTE: When the vehicle is driven fixed in 2nd speed or 5th speed, a turbine revolution sensor error is displayed but this is not a turbine revolution sensor error. When the coupling pattern below is detected, the fail-safe action corresponding to the pattern is executed. AT-40 RE5R05A TROUBLE DIAGNOSIS Fail-Safe (Cont'd) A/T interlock coupling pattern table +: NG, X: OK Clutch pressure output pattern after fail-safe function Hydraulic pressure switch output Gear position SW3 (I/C) + SW6 SW5 (H & LR (D/C) /C) X Fail-safe function SW1 SW2 (Fr/B) (LC/B) X I/C H& LR/C D/C Fr/B LC/B L/U X Held in 4th speed ON ON ON OFF OFF OFF 1st X + X Held in 4th speed ON ON ON OFF OFF OFF + X X Held in 4th speed ON ON ON OFF OFF OFF Held in 4th speed ON ON ON OFF OFF OFF Held in 2nd speed OFF OFF ON OFF OFF OFF Held in 4th speed ON ON ON OFF OFF OFF Held in 2nd speed OFF OFF ON OFF OFF OFF Held in 5th speed ON ON OFF ON OFF OFF Held in 2nd speed OFF OFF ON OFF OFF OFF Held in 4th speed ON ON ON OFF OFF OFF 2nd X + X A/T interlock coupling pattern X X + 3rd X + X X X + 4th X X X X + X + 5th X + X A/T 1ST ENGINE BRAKING When there is an A/T first speed engine brake judgment error, the low coast brake solenoid is switched “OFF” to avoid switching on the engine brake. LINE PRESSURE SOLENOID The solenoid is switched “OFF” and the line pressure is set to the maximum hydraulic pressure to make driving possible. TORQUE CONVERTER CLUTCH SOLENOID The solenoid is switched “OFF” to release the lock-up. LOW COAST BRAKE SOLENOID When an electrical error occurs, in order to make driving possible, if the solenoid is “ON”, the transmission is held in 2nd speed; if the solenoid is “OFF”, the transmission is held in 4th speed. INPUT CLUTCH SOLENOID If an electrical error occurs with the solenoid either “ON” or “OFF”, the transmission is held in 4th speed to make driving possible. DIRECT CLUTCH SOLENOID If an electrical error occurs with the solenoid either “ON” or “OFF”, the transmission is held in 4th speed to make driving possible. AT-41 TROUBLE DIAGNOSIS Fail-Safe (Cont'd) RE5R05A FRONT BRAKE SOLENOID If an electrical error occurs with the solenoid “ON”, in order to make driving possible, the A/T is held in 5th speed; if the solenoid is “OFF”, 4th speed.
HIGH & LOW REVERSE CLUTCH SOLENOID If an electrical error occurs with the solenoid either “ON” or “OFF”, the transmission is held in 4th speed to make driving possible. TURBINE REVOLUTION SENSOR 1 OR 2 The control is the same as if there were no turbine revolution sensors and control is from vehicle speed sensorzA/T. How To Perform Trouble Diagnosis For Quick and Accurate Repair INTRODUCTION SAT631IB The TCM receives a signal from the vehicle speed sensor, throttle position sensor or PNP switch and provides shift control or lock-up control via A/T solenoid valves.
The TCM also communicates with the ECM by means of a signal sent from sensing elements used with the OBD-related parts of the A/T system for malfunction-diagnostic purposes. The TCM is capable of diagnosing malfunctioning parts while the ECM can store malfunctions in its memory. Input and output signals must always be correct and stable in the operation of the A/T system. The A/T system must be in good operating condition and be free of valve seizure, solenoid valve malfunction, etc. It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts. A visual check only may not find the cause of the problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the AT-43, “WORK FLOW”. SAT632I SEF234G Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A “Diagnostic Worksheet” as shown on the example (Refer to AT-45, “DIAGNOSTIC WORKSHEET”) should be used. Start your diagnosis by looking for “conventional” problems first. This will help troubleshoot driveability problems on an electronically controlled engine vehicle. Also check related Service bulletins. AT-42 RE5R05A TROUBLE DIAGNOSIS How To Perform Trouble Diagnosis For Quick and Accurate Repair (Cont'd) WORK FLOW A good understanding of the malfunction conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint. Make good use of the two sheets provided, “Information From Customer” (Refer to AT-45, “Information From Customer”) and “Diagnostic Worksheet” (Refer to AT-45, “Diagnostic Worksheet Chart”), to perform the best troubleshooting possible. AT-43 RE5R05A TROUBLE DIAGNOSIS How To Perform Trouble Diagnosis For Quick and Accurate Repair (Cont'd) Work Flow Chart SCIA0573E *1 *2 *3 *4 *5 *6 AT-45 AT-45 AT-39 MA section AT-50 AT-52 *13 *14 *15 *16 *17 *7 AT-53 *8 AT-68 *9 AT-75 *10 AT-164 *11 AT-166 *12 AT-187 AT-44 AT-59 AT-73 AT-73 AT-75 AT-160 RE5R05A TROUBLE DIAGNOSIS How To Perform Trouble Diagnosis For Quick and Accurate Repair (Cont'd) DIAGNOSTIC WORKSHEET Information From Customer KEY POINTS + WHAT ... Vehicle & A/T model + WHEN ... Date, Frequencies + WHERE ... Road conditions + HOW ... Operating conditions, Symptoms Customer name MR/MS Model & Year VIN Trans. model Engine Mileage Incident Date Manuf. Date In Service Date Frequency N Continuous N Intermittent N Vehicle does not move. N No up-shift times a day) (N Any position (N 1st → 2nd N No down-shift (N 2nd → 3rd (N 5th → 4th N 4th → 3rd N Particular position) N 3rd → 4th N 3rd → 2nd N 4th → 5th) N 2nd → 1st) N Lock-up malfunction N Shift point too high or too low. Symptoms N Shift shock or slip (N N → D N Lock-up N Any drive position) N Noise or vibration N No kickdown N No pattern select N Others ( ) Blinks for about 8 seconds. A/T CHECK indicator lamp Malfunction indicator lamp (MIL) N Continuously lit N Not lit Diagnostic Worksheet Chart 1 N Read the item on “cautions concerning fail-safe” and understand the customer's complaint.
AT-39 2 N A/T FLUID CHECK MA section, “Checking A/T Fluid”. N Leak (Repair leak location.) N State N Amount 3 N Stall test and line pressure test AT-50, 52 N Stall test N N N N N N N N Torque converter one-way clutch Input clutch Front brake Direct clutch High & low reverse clutch Low coast brake Forward brake Forward one-way clutch N

Line pressure inspection — Suspected part: AT-45 N 1st one-way clutch N 3rd one-way clutch N Engine N Line pressure low N Except for input clutch and front brake, clutches and brakes OK RE5R05A TROUBLE DIAGNOSIS How To Perform Trouble Diagnosis For Quick and Accurate Repair (Cont'd) 4 N Execute all road tests and enter checks in required inspection items.

AT-53 4-1. AT-54 Check before engine is started N Execute self-diagnostics N N N N N N N N N N N N N N N N N N N N N N N 4-2.

Vehicle speed sensorzA/T, AT-86. Vehicle speed sensorzMTR, AT-120. Direct clutch solenoid valve, AT-137. TCC solenoid valve, AT-94. Line pressure solenoid valve, AT-97. Input clutch solenoid valve, AT-131. Front brake solenoid valve, AT-134. Low coast brake solenoid valve, AT-143. High & low reverse clutch solenoid valve, AT-140.

PNP switch, AT-82. A/T Fluid temperature sensors 1, 2, AT-110. Turbine revolution sensors 1, 2, AT-115. A/T interlock, AT-122. A/T 1st engine braking, AT-128.

Start signal, AT-78. Throttle position sensor, AT-108. Engine speed signal, AT-91. CAN communication, AT-75. TCM power supply, AT-100. Battery Other Check at idle N N N N N N N N 4-3. Enter checks for detected items. AT-54 The A/T CHECK Indicator Lamp does come on, AT-168. Engine Cannot Be Started in "P" and "N" Position, AT-169. In "P" Position, Vehicle Moves When Pushed, AT-170. In "N" Position Vehicle Moves, AT-171. Large Shock "N" to "D" Position, AT-172. Vehicle Does Not Creep Backward In "R" Position, AT-173. Vehicle Does Not Creep Forward In "D" Position, AT-174. Cruise test AT-55 Part 1 N N N N N N N N N Vehicle Cannot Be Started From D1, AT-175. A/T Does Not Shift: D1 → D2 Or Does Not Kick Down D4 → D2, AT-176. A/T Does Not Shift: D2 → D3, AT-177. A/T Does Not Shift: D3 → D4, AT-178. A/T Does Not Shift: D4 → D5, AT-179. A/T Does Not Perform Lock-up, AT-180.

A/T Does Not Hold Lock-up Condition, AT-181. Lock-up Is Not Released, AT-181. Engine Speed Does Not Return To Idle, AT-182. AT-46 RE5R05A TROUBLE DIAGNOSIS How To Perform Trouble Diagnosis For Quick and Accurate Repair (Cont'd) 4 4-3 Part 2 N N N N N AT-57 Vehicle Cannot Be Started From D1, AT-175. A/T Does Not Shift: D1 → D2 Or Does Not Kick Down D4 → D2, AT-176.

A/T Does Not Shift: D2 → D3, AT-177. A/T Does Not Shift: D3 → D4, AT-178. A/T Does Not Shift: D4 → D5, AT-179. Part 3 N N N N N N N AT-58 Engine rotation does not drop to idle rotation, AT-182. A/T Does Not Shift: D5 → D4, AT-183. A/T Does Not Shift: D4 → D3, AT-184. A/T Does Not Shift: D3 → D2, AT-185. A/T Does Not Shift: D2 → D1, AT-186. Vehicle Does Not Decelerate By Engine Brake, AT-187. Execute self-diagnostics Enter checks for detected items. N N N N N N N N N N N N N N N N N N N N N N N Vehicle speed sensorzA/T, AT-86. Vehicle speed sensorzMTR, AT-120. Direct clutch solenoid valve, AT-137. TCC solenoid valve, AT-94. Line pressure solenoid valve, AT-97. Input clutch solenoid valve, AT-131. Front brake solenoid valve, AT-134. Low coast brake solenoid valve, AT-143. High & low reverse clutch solenoid valve, AT-140. PNP switch, AT-82.

A/T fluid temperature sensors 1, 2, AT-110. Turbine revolution sensors 1, 2, AT-115. A/T interlock, AT-122. A/T 1st engine braking, AT-128.

Start signal, AT-78. Throttle position sensor, AT-108. Engine speed signal, AT-91. CAN communication, AT-75. TCM power supply, AT-100. Battery Other 5 N Inspect each system for items found to be NG in the self-diagnostics and repair or replace the malfunction parts.

6 N Execute all road tests and enter the checks again for the required items. AT-53 7 N For any remaining NG items, execute the "diagnostics procedure" and repair or replace the malfunction parts. See the chart for breakdown diagnostics by symptoms. (This chart also contains other symptoms and inspection procedures.) AT-59 8 N Erase the results of the self-diagnostics from the TCM. AT-73, AT-74 AT-47 TROUBLE DIAGNOSIS RE5R05A A/T Electrical Parts Location SAT649K AT-48 TROUBLE DIAGNOSIS RE5R05A Circuit Diagram TAT060M AT-49 RE5R05A TROUBLE DIAGNOSIS Inspections Before Trouble Diagnosis A/T FLUID CHECK Fluid Leakage and Fluid Level Check Inspect for fluid leakage and check the fluid level. Refer to MA section, "Checking A/T Fluid". Inspect the amount of A/T fluid under the hot conditions 50 to 80°C (122 to 176°F) according to the instructions below. 1. After engine warm-up is complete, drive around the city for about 10 minutes.

The automatic fluid temperature rises to 50 to 80°C (122 to 176°F) during 10 minutes of driving. 2. Place the vehicle on a level location. 3. Brake securely with the parking brake. 4. Put the engine in idle and while pressing the brake pedal, shift the selector lever from "P" to "D" position.

5. Check that when the selector lever is in the "P" or "N" position, then the amount of transmission fluid is in the position of the oil level gauge (hot side). CAUTION: + If it is necessary to check the amount of A/T fluid with the A/T fluid at low temperature 30 to 50°C (86 to 122°F), after adjusting within the cold level of the level gauge, then always check the amount of A/T fluid under the above hot condition. + When wiping away the oil level gauge, always use a paper rag, not a cloth one. + Always secure the oil level gauge in the charging pipe with the stopper. + Fluid Condition Check Inspect the fluid status. Fluid status SAT638A Conceivable Cause Required Operation Varnished (viscous Clutch, parking varnish state) brake scorched Replace the A/T fluid and check the A/T main unit and the vehicle for problems (wire harnesses, cooler pipes, etc.) Milky white or cloudy Water in the fluid Replace the A/T fluid and check for places where water is getting in. Large amount of metal powder mixed in Abnormal wear of sliding parts within A/T Replace the A/T fluid and check for improper operation of the A/T. STALL TEST Stall Test Procedure 1. Inspect the amount of engine oil. Replenish the engine oil if necessary.

2. Drive for about 10 minutes to warm-up the vehicle so that the A/T fluid temperature is 50 to 80°C (122 to 176°F). Inspect the amount of A/T fluid. Replenish if necessary. SAT647B AT-50 RE5R05A TROUBLE DIAGNOSIS Inspections Before Trouble Diagnosis (Cont'd) 3. Securely engage the parking brake so that the tires do not turn. SAT513G SAT514G 4. Engine start, apply foot brake, and place selector lever in "P" position.

5.

While holding down the foot brake, gradually press down the accelerator pedal. 6.

Quickly read off the stall speed, then quickly remove your foot from the accelerator pedal. CAUTION: Do not hold down the accelerator pedal for more than 5 seconds during this test. 7. Move the selector lever to the "N" position. 8. Cool down the A/T fluid. CAUTION: Run the engine at idle for at least one minute. Stall revolution: 1,900 - 2,200 rpm Judgement Stall Test Selector lever position Expected problem location D, M Stall rotation R Forward brake Forward one-way clutch 1st one-way clutch 3rd one-way clutch H O + + + + O H + Front brake front brake + Reverse clutch + 1st one-way clutch L L + Engine and torque converter one-way clutch H H + Line pressure low O O + One-way clutch in torque converter stuck or check with individual item tests O: Stall speed within standard value position H: Stall speed higher than standard value L: Stall speed lower than standard value Stall test standard value position Does not shift up D, M position 1 → 2 Slipping in 2nd, 3rd, 4th speeds Direct clutch slippage Does not shift up D, M position 2 → 3 Slipping in 3rd, 4th, 5th speeds High & low reverse clutch slippage Does not shift up D, M position 3 → 4 Slipping in 4th, 5th speeds Input clutch slippage Does not shift up D, M position 4 → 5 Slipping in 5th speeds Front brake slippage AT-51 RE5R05A TROUBLE DIAGNOSIS Inspections Before Trouble Diagnosis (Cont'd) LINE PRESSURE TEST Line Pressure Test Port PCIA0017E Line Pressure Test Procedure 1. Inspect the amount of engine oil and replenish if necessary.

2. Drive the car for about 10 minutes to warm it up so that the A/T fluid reaches in range of 50 to 80°C (122 to 176°F), then inspect the amount of A/T fluid and replenish if necessary. NOTE: The automatic fluid temperature rises in range of 50 to 80°C (122 to 176°F) during 10 minutes of driving.

3.

After warming up your A/T, remove the oil pressure detection plug and install the oil pressure gauge. CAUTION: When using the oil pressure gauge, be sure to use the O-ring attached to the oil pressure detection plug. SCIA0574E 4. Securely engage the parking brake so that the tires do not turn. SAT513G SAT493G 5. Start the engine, then measure the line pressure at both idle and the stall speed. CAUTION: + Keep the brake pedal pressed all the way down during measurement. + When measuring the line pressure at the stall speed, refer to AT-50, "Stall Test". 6. After the measurements are complete, install the oil pressure detection plug and tighten to the regulation torque below. Plug: 4.8 - 9.8 Nzm (0.45 - 0.99 kg-m, 39 - 86 in-lb) CAUTION: Do not reuse the O-ring. AT-52 Line Pressure RE5R05A TROUBLE DIAGNOSIS Inspections Before Trouble Diagnosis (Cont'd) Line Pressure kPa (bar, kg/cm2, psi) Engine speed rpm Idling Revolution "R" position "D", "M" positions 392 - 441 (3.9 - 4.4, 4.0 - 4.5, 57 - 64) 373 - 422 (3.7 - 4.2, 3.8 - 4.3, 54 - 61) Stall Revolution 1,310 - 1,500 (13.1 - 15.0, 13.4 - 15.3, 191 - 218) Judgement of Line Pressure Test Judgement Low for all positions (P, R, N, D, M) Idle speed Stall speed Possible cause Possible causes include problems in the pressure supply system and low oil pump output. For example + Oil pump wear + Pressure regulator valve or plug sticking or spring fatigue + Oil strainer → oil pump → pressure regulator valve path oil leak + Engine idle speed too low Only low for a specific Possible causes include an oil pressure leak in a path or device related to the position after position the pressure is distributed by the manual valve. High Possible causes include a sensor problem or problem in the pressure adjustment function. For example + Accelerator sensor malfunction + ATF temperature sensor breakdown + Line pressure solenoid malfunction (sticking in "OFF" state, filter clog, cut line) + Pressure regulator valve or plug sticking Oil pressure does not rise higher than the oil pressure for idle. Possible causes include a sensor problem or problem in the pressure adjustment function. For example + Accelerator sensor malfunction + TCM breakdown + Line pressure solenoid malfunction (shorting, sticking in "ON" state) + Pressure regulator valve or plug sticking + Pilot valve sticking or pilot filter clogged Possible causes include problems in the pressure supply system and problems in the pressure adjustment function. For example The pressure rises, but does not enter the + Accelerator pedal position sensor malfunction + Line pressure solenoid malfunction (sticking, filter clog) standard position. + Pressure regulator valve or plug sticking + Pilot valve sticking or pilot filter clogged Only low for a specific Possible causes include an oil pressure leak in a path or device related to the position after position the pressure is distributed by the manual valve. ROAD TEST Description + + 1. 2. 3. + + The road test inspects overall performance of the A/T and analyzes possible breakdown causes. The road test is carried out in the following three stages. Check before engine is started. Refer to AT-54, "Check Before Engine is Started". Check at idle. Refer to AT-54, "Check at Idle". Cruise test. + Inspect all the items from Part 1 to Part 3. Refer to AT-55, "Cruise Test — Part 1", AT-57, "Cruise Test — Part 2", AT-58, "Cruise Test — Part 3".

Before beginning the road test, check the test procedure and inspection items.

Test all inspection items until the symptom is uncovered. Diagnose NG items when all road tests are complete. AT-53 TROUBLE DIAGNOSIS RE5R05A Check Before Engine is Started 1.CHECK A/T CHECK INDICATOR LAMP STEP 1 1. Park vehicle on level surface. 2. Move selector lever to "P" position. 3. Turn ignition switch to "OFF" position and wait at least 10 seconds. 4. Turn ignition switch to "ON" position. (Do not start engine.) Does A/T CHECK indicator lamp light up for about 2 seconds? YES >> GO TO 2. NO >> Stop the road test and go to AT-168, "A/T CHECK Indicator Lamp does not come on". 2.CHECK A/T CHECK INDICATOR LAMP STEP 2 Does A/T CHECK indicator lamp flash for about 8 seconds? YES >> Carry out the self-diagnostics and record all NG items on the diagnostics sheet. Refer to AT-73, "SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)".

NO >> 1. Turn ignition switch to "OFF" position. 2. Carry out the self-diagnostics and record all NG items on the diagnostics sheet. Refer to AT-73, "SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)". 3. GO TO "Check at Idle". Refer to AT-54. Check at Idle 1.CHECK STARTING THE ENGINE 1. Park vehicle on level surface. 2. Move selector lever to "P" position. 3. Turn ignition switch to "OFF" position. 4. Turn ignition switch to "START" position. Does the engine start? YES >> GO TO 2. NO >> Stop the road test and go to AT-169, "Engine Cannot Be Started In "P" and "N" Position". 2.CHECK STARTING THE ENGINE 1.

Turn ignition switch to "ACC" position. 2. Move selector lever in "D" or "R" position. 3. Turn ignition switch to "START" position.

Does the engine start in either position? YES >> Stop the road test and go to AT-169, "Engine Cannot Be Started In "P" and "N" Position". NO >> GO TO 3. 3.CHECK "P" POSITION FUNCTIONS 1. Move selector lever to "P" position. 2.

Turn ignition switch to "OFF" position. 3. Disengage the parking brake. 4. Push the vehicle forward or backward. 5. Engage the parking brake. When you push the vehicle, does it move? YES >> Stop the road test and go to AT-170, "In "P" Position, Vehicle Moves When Pushed". NO >> GO TO 4. AT-54 TROUBLE DIAGNOSIS Check at Idle (Cont'd) RE5R05A 4.CHECK "N" POSITION FUNCTIONS 1. Start the engine. 2. Move selector lever to "N" position. 3.

Disengage the parking brake. Does the vehicle move? YES >> Stop the road test and go to AT-171, "In "N" Position, Vehicle Moves". NO >> GO TO 5. 5.CHECK SHIFT SHOCK 1. Engage the brake. 2. Move selector lever to "D" position. When the transmission is shifted from "N" to "D", is there an excessive shock? YES >> Stop the road test and go to AT-172, "Large Shock "N" to "D" Position". NO >> GO TO 6. 6.CHECK "R" POSITION FUNCTIONS Disengage the brake for 4 to 5 seconds. Does the vehicle creep backward? YES >> GO TO 7. NO >> Stop the road test and go to AT-173, "Vehicle Does Not Creep Backward In "R" Position".

7.CHECK "D", "M" POSITION FUNCTIONS Inspect whether the vehicle moves forward when the transmission is put into the "D" or "M" position. Does the vehicle move forward in the "D" and "M" positions? YES >> GO TO "Cruise test - Part 1" (Refer to AT-55), "Cruise Test - Part 2" (Refer to AT-57), and Cruise test - Part 3 (Refer to AT-58). NO >> Stop the road test and go to AT-174, "Vehicle Does Not Creep Forward In "D" Position". Cruise Test — Part 1 Cruise test Part 1 1.CHECK STARTING OUT FROM D1 1. Drive the car for about 10 minutes to warm up the engine oil and A/T fluid. Appropriate temperature for the A/T fluid: (50 - 80°F) 2. Park the vehicle on a level surface. 3. Move selector lever to "P" position. 4. Engage the engine. 5. Move selector lever to "D" position. 6. Press the accelerator pedal about half way down to accelerate the vehicle. With CONSULT-II Read off the gear positions. Starts from D1? YES >> GO TO 2. NO >> Stop the road test and go to AT-175, "Vehicle Cannot Be Started From D1". AT-55 2.CHECK SHIFT UP D1 → D2 TROUBLE DIAGNOSIS Cruise Test — Part 1 (Cont'd) RE5R05A Press down the accelerator pedal about half way and inspect if the vehicle shifts up (D1 → D2) at the appropriate speed. + See AT-58, "Vehicle Speed When Shifting Gears Throttle Position". With CONSULT-II Read the gear position, throttle degree of opening, and vehicle speed. Does the A/t shift up D1 → D2 at the correct speed? YES >> GO TO 3. NO >> Stop the road test and go to AT-176, "A/T Does Not Shift: D1 → D2 Or Does Not Kick down: D4 → D2". 3.CHECK SHIFT UP D2 → D3 Press down the accelerator pedal about half way and inspect if the vehicle shifts up (D2 → D3) at the appropriate speed. + See AT-58, "Vehicle Speed When Shifting Gears Throttle Position". With CONSULT-II Read the gear position, throttle degree of opening, and vehicle speed. Does the A/t shift up D2 → D3 at the correct speed? YES >> GO TO 4. NO >> Stop the road test and go to AT-177, "A/T Does Not Shift: D2 → D3". 4.CHECK SHIFT UP D3 → D4 Press down the accelerator pedal about half way and inspect if the vehicle shifts up (D3 → D4) at the appropriate speed. + See AT-58, "Vehicle Speed When Shifting Gears Throttle Position". With CONSULT-II Read the gear position, throttle degree of opening, and vehicle speed. Does the A/t shift up D3 → D4 at the correct speed? YES >> GO TO 5. NO >> Stop the road test and go to AT-178, "A/T Does Not Shift: D3 → D4". 5.CHECK SHIFT UP D4 → D5 Press down the accelerator pedal about half way and inspect if the vehicle shifts up (D4 → D5) at the appropriate speed. + See AT-58, "Vehicle Speed When Shifting Gears Throttle Position". With CONSULT-II Read the gear position, throttle degree of opening, and vehicle speed. Does the A/T shift up D4 → D5 at the correct speed? YES >> GO TO 6.

NO >> Stop the road test and go to AT-179, "A/T Does Not Shift: D4 → D5". 6.CHECK LOCK-UP Press down the accelerator pedal about half way and inspect if the vehicle lock-up (D5 → L/U) at the appropriate speed. + See AT-58, "Vehicle Speed When Shifting Gears Throttle Position".

With CONSULT-II Select "TCC SOL 0.00A" with the "MAIN SIGNAL" mode for A/T. Does the A/T lock-up at the correct speed? YES >> GO TO 7. NO >> Stop the road test and go to AT-180, "A/T Does Not Perform Lock-up". AT-56 7.CHECK LOCK-UP HOLD TROUBLE DIAGNOSIS Cruise Test — Part 1 (Cont'd) RE5R05A Is the lock-up held for at least 30 seconds? YES >> GO TO 8. NO >> Stop the road test and go to AT-181, "A/T Does Not Hold Lock-up Condition". 8.CHECK LOCK-UP RELEASE Release the accelerator pedal. When you release the accelerator pedal, is the lock-up released? YES >> GO TO 9. NO >> Stop the road test and go to AT-181, Lock-up Is Not Released. 9.CHECK SHIFT DOWN D5 → D4 Decelerate by pressing lightly on the brake pedal. With CONSULT-II Read the gear position and engine speed. When the A/T shift down D5 → D4, does the engine speed drop smoothly back to idle? YES >> 1. Stop the car. 2. GO TO "Cruise test — Part 2" (Refer to AT-57). NO >> Stop the road test and go to AT-183, "A/T Does Not Shift: D5 → D4". Cruise Test — Part 2 Cruise Test Part 2 1.CHECK STARTING FROM D1 1. Move selector lever the "D" position. 2. Accelerate at half throttle. With CONSULT-II Read the gear position. Does it start from D1? YES >> GO TO 2. NO >> Stop the road test and go to AT-175, "Vehicle Cannot Be Started From D1". 2.CHECK SHIFT UP D3 → D4 AND SHIFT DOWN D4 → D3 1.

Accelerate to 80 km/h (50 MPH). 2. Release the accelerator pedal once, then quickly press it down again all the way.

With CONSULT-II Read the gear position and throttle position. When you press the accelerator pedal, does the transmission immediately shift down D4 → D2? YES >> GO TO 3. NO >> Stop the road test and go to AT-176, "A/T Does Not Shift: D1 → D2 Or Does Not Kick Down D4 → D2". AT-57 3.CHECK SHIFT UP D2 → D3 RE5R05A TROUBLE DIAGNOSIS Cruise Test — Part 2 (Cont'd) Press the accelerator pedal down all the way and inspect whether or not the transmission shifts up (D2 → D3) at the correct speed.

+ See AT-177, "Vehicle Speed When Shifting Gears Throttle Position". With CONSULT-II Read the gear position, throttle position and vehicle speed.

Does the A/T shift up D2 → D3 at the correct speed? YES >> GO TO 4. NO >> Stop the road test and go to AT-177, "A/T Does Not Shift: D2 → D3". 4.CHECK SHIFT UP D3 → D4 AND ENGINE BRAKE When the transmission changes speed D3 → D4, return the accelerator pedal. Does the A/T shift up D3 → D4 and apply the engine brake? YES >> 1. Stop the vehicle. 2.

GO TO "Cruise Test — part 3" (Refer to AT-58). NO >> Stop the road test and go to AT-178, "A/T Does Not Shift: D3 → D4". Cruise Test — part 3 Driving test part 3 1.CHECK SHIFT DOWN Shift down one while driving in each position. With CONSULT-II Read the gear position. Shift down?

YES >> GO TO 2. NO >> Stop the road test and go to AT-183, "A/T Does Not Shift: D5 → D4", AT-184, "A/T Does Not Shift: D4 → D3", AT-185, "A/T Does Not Shift: D3 → D2", AT-186, "A/T Does Not Shift: D2 → D1". 2.CHECK ENGINE BRAKE Does the engine brake work to decelerate the vehicle? YES >> 1. Stop the vehicle. 2. Perform self-diagnostics. Refer to AT-73, "SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)". NO >> Stop the road test and go to AT-187, "Vehicle Does Not Decelerate By Engine Brake". Vehicle Speed When Shifting Gears Throttle Position Vehicle Speed km/h (MPH) Throttle position D 1 → D2 D2 → D3 D3 → D4 D4 → D5 D5 → D4 D4 → D3 D3 → D2 D2 → D1 Full throttle 52 - 56 (32 - 35) 81 - 89 (50 - 55) 126 - 136 (78 - 85) 188 - 198 (117 - 123) 184 - 194 (114 - 121) 116 - 126 (72 - 78) 70 - 78 (43 - 48) 36 - 40 (22 - 25) Half throttle 32 - 36 (20 - 22) 62 - 68 (39 - 42) 104 - 112 (65 - 70) 126 - 134 (78 - 83) 100 - 108 (62 - 67) 61 - 69 (38 - 43) 37 - 43 (23 - 27) 10 - 14 (6 - 9) + At half throttle, the accelerator opening is 4/8 of the full opening. AT-58 RE5R05A TROUBLE DIAGNOSIS Vehicle Speed When Performing and Releasing Lock-up Vehicle speed km/h (MPH) Throttle position Closed throttle Half throttle Lock-up "ON" Lock-up "OFF" 64 - 72 (39 - 45) 61 - 69 (38 - 43) 164 - 172 (102 - 107) 130 - 138 (81 - 86) +When throttle is closed, the accelerator opening is 1/8 or lower of the full opening, and the closed throttle position switch is turned "OFF". + At half throttle, the accelerator opening is 4/8 of the full opening. Symptom Chart The diagnostics item numbers show the sequence for inspection. Inspect in order from Item 1. CAUTION: + If a problem occurs in the RE5R05A transmission, replace the transmission assembly. + Condition for "on vehicle" only Symptom Engine does not start in "N", "P" position. Engine starts in positions other than "N" or "P". Diagnostic Item 1. Ignition switch and starter — 2. Control linkage adjustment AT-196 3. PNP switch AT-82 1. Control linkage adjustment AT-196 2. PNP switch AT-82 1. Fluid level Strange noise in "P" or "N" position Vehicle not parked when transmission in "P" position or vehicle is parked even when transmission put into position other than P Reference page MA section 2. Line pressure inspection AT-52 3. Accelerator pedal position sensor AT-108 4.

Vehicle speed sensor A/T and vehicle speed sensor MTR AT-120 5. Engine speed signal AT-91 1. Control linkage adjustment AT-196 2. PNP switch AT-82 1. Control linkage adjustment AT-196 2. PNP switch AT-82 1. Control linkage adjustment AT-196 2. Line pressure inspection AT-52 3. Line pressure solenoid valve AT-97 4. PNP switch AT-82 Vehicle runs with transmission in "P" position Vehicle runs with transmission in "N" position Vehicle cannot run in "R" position AT-59 TROUBLE DIAGNOSIS Symptom Chart (Cont'd) Symptom Diagnostic Item 1. Engine idle speed 2. Accelerator pedal position sensor 3. Throttle position sensor adjustment Large shock ("N" → "D" position) 4.

Line pressure test 5.

ATF temperature sensor 6. ATF pressure switch 1 and front brake solenoid Extremely large creep EC section AT-108 EC section AT-52 AT-110 AT-150, AT-134 AT-91 8. Line pressure solenoid valve AT-97 MA section 2. Line pressure test AT-52 3. Line pressure solenoid valve AT-97 4. PNP switch AT-82 1. Fluid level and state When vehicle starts out, clutch and brake slip Reference page 7. Engine speed signal 1. Fluid level and state Vehicle cannot run in "D" position. Clutch slips Extreme acceleration malfunction RE5R05A MA section 2. Control linkage adjustment AT-196 3. Accelerator pedal position sensor AT-108 4. Line pressure test AT-52 5.

Line pressure solenoid valve AT-97 Engine idle speed EC section 1. Fluid level and state MA section 2. Line pressure test AT-52 3. Engine speed signal AT-91 No creep at all 4. ATF pressure switch 5 and direct clutch solenoid 1 → 2 vehicle speed change malfunction 1. PNP switch AT-82 2. Control linkage adjustment AT-196 3. Vehicle speed sensor A/T and vehicle speed sensor MTR AT-86, AT-120 4. ATF pressure switch 5 and direct clutch solenoid AT-157, AT-137 1.

Control linkage adjustment 2 → 3 vehicle speed change malfunction AT-86, AT-120 3. ATF pressure switch 6 and high & low reverse clutch solenoid AT-160, AT-140 "D" position vehicle speed change point is too high "D" position vehicle speed change point is too low AT-196 2. Vehicle speed sensor A/T and vehicle speed sensor MTR AT-86, AT-120 3. ATF pressure switch 3 and input clutch solenoid AT-154, AT-131 1.

Control linkage adjustment 4 → 5 vehicle speed change malfunction AT-196 2. Vehicle speed sensor A/T and vehicle speed sensor MTR 1. Control linkage adjustment 3 → 4 vehicle speed change malfunction AT-157, AT-137 AT-196 2. Vehicle speed sensor A/T and vehicle speed sensor MTR AT-86, AT-120 3. ATF pressure switch 1 and front brake solenoid AT-150, AT-134 1. Vehicle speed sensor A/T and vehicle speed sensor MTR AT-86, AT-120 2. Accelerator pedal position sensor AT-108 3. ATF temperature sensor AT-110 1. Vehicle speed sensor A/T and vehicle speed sensor MTR 2. Accelerator sensor adjustment AT-60 AT-86, AT-120 EC section TROUBLE DIAGNOSIS Symptom Chart (Cont'd) Symptom Shock is too large when changing 1 → 2. Diagnostic Item AT-108 2. Line pressure test AT-52 AT-108 2. Line pressure test AT-52 AT-108 2. Line pressure test AT-52 AT-108 2. Line pressure test AT-52 1. Fluid level and state AT-150, AT-134 MA section 2. Accelerator pedal position sensor AT-108 3. Line pressure test AT-52 4. Engine speed AT-91 5. Turbine revolution sensor 1. Fluid level and state Shock is too large for upshift when brake pedal is released. AT-154, AT-131 1. Accelerator pedal position sensor 3. ATF pressure switch 1 and front brake solenoid Shock is too large for downshift when brake pedal is pressed. AT-160, AT-140 1. Accelerator pedal position sensor 3.

ATF pressure switch 3 and input clutch solenoid Shock is too large when changing 4 → 5. AT-157, AT-137 1. Accelerator pedal position sensor 3. ATF pressure switch 6 and high & low reverse clutch solenoid Shock is too large when changing 3 → 4. Reference page 1. Accelerator pedal position sensor 3. ATF pressure switch 5 and direct clutch solenoid Shock is too large when changing 2 → 3. RE5R05A AT-115 MA section 2. Accelerator pedal position sensor AT-108 3. Line pressure test AT-52 4. Engine speed AT-91 5. Turbine revolution sensor 1. Fluid level and state MA section 2. Accelerator sensor adjustment AT-108 3. Line pressure test AT-52 4. Engine speed AT-91 5. Turbine revolution sensor AT-115 6. TCC solenoid valve AT-94 1.

Fluid level and state MA section Shock is too large for lock-up. Shock is too large when engine brake is selected. 2. Accelerator pedal position sensor 3. Line pressure inspection 1. Fluid level and state No shock at all or the clutch slips when vehicle changes speed 1 → 2. AT-86, AT-120 3. ATF pressure switch 5 and direct clutch solenoid AT-157, AT-137 MA section 2. Vehicle speed sensor A/T and vehicle speed sensor MTR AT-86, AT-120 3. ATF pressure switch 6 and high & low reverse clutch solenoid AT-160, AT-140 1. Fluid level and state No shock at all or the clutch slips when vehicle changes speed 3 → 4. AT-52 MA section 2. Vehicle speed sensor A/T and vehicle speed sensor MTR 1. Fluid level and state No shock at all or the clutch slips when vehicle changes speed 2 → 3. AT-108 MA section 2. Vehicle speed sensor A/T and vehicle speed sensor MTR AT-86, AT-120 3. ATF pressure switch 3 and input clutch solenoid AT-154, AT-131 AT-61 TROUBLE DIAGNOSIS Symptom Chart (Cont'd) Symptom Diagnostic Item 1. Fluid level and state No shock at all or the clutch slips when vehicle changes speed 4 → 5. RE5R05A Reference page MA section 2. Vehicle speed sensor A/T and vehicle speed sensor MTR AT-86, AT-120 3. ATF pressure switch 1 and front brake solenoid AT-150, AT-134 1. Fluid level and state MA section 2. Line pressure test AT-52 3. Accelerator pedal position sensor AT-108 Maximum speed low 4. ATF pressure switch 5 and direct clutch solenoid 1. Fluid level and state Does not change 5 → 4. AT-86, AT-120 3. ATF pressure switch 3 and input clutch solenoid AT-154, AT-131 Does not change 4, 3, 2 → 1. When you press the accelerator pedal and shift speed 5 → 4, the engine idles or the transmission slips.

AT-86, AT-120 3. ATF pressure switch 6 and high & low reverse clutch solenoid AT-160, AT-140 MA section 2. Vehicle speed sensor A/T and vehicle speed sensor MTR AT-86, AT-120 3. ATF pressure switch 5 and direct clutch solenoid AT-157, AT-137 1. Fluid level and state 2. Vehicle speed sensor A/T and vehicle speed sensor MTR 1. Fluid level and state MA section AT-86, AT-120 MA section 2. Vehicle speed sensor A/T and vehicle speed sensor MTR AT-86, AT-120 3. ATF pressure switch 3 and input clutch solenoid AT-154, AT-131 1. Fluid level and state When you press the accelerator pedal and shift speed 5, 4 → 3, the engine idles or the transmission slips. MA section 2. Vehicle speed sensor A/T and vehicle speed sensor MTR 1. Fluid level and state Does not change 5, 4, 3 → 2. MA section 2. Vehicle speed sensor A/T and vehicle speed sensor MTR 1. Fluid level and state Does not change 5, 4 → 3. AT-157, AT-137 MA section 2. PNP switch AT-82 3. Control linkage adjustment AT-196 4. Manual mode switch AT-146 5. ATF pressure switch 3 and input clutch solenoid AT-154, AT-131 6. ATF pressure switch 1 and front brake solenoid AT-150, AT-134 1. Fluid level and state 2. When you press the accelerator pedal and 3. shift speed 5, 4, 3 → 2, the engine idles or the 4. transmission slips. 5.

MA section Control linkage adjustment AT-196 PNP switch AT-82 Manual mode switch AT-146 ATF pressure switch 3 and input clutch solenoid AT-154, AT-134 6. ATF pressure switch 1 and front brake solenoid AT-150, AT-134 1.

Fluid level and state 2. Control linkage adjustment 3. PNP switch When you press the accelerator pedal and shift speed 4, 3, 2 → 1, the engine idles or the 4. Manual mode switch transmission slips. 5. ATF pressure switch 3 and input clutch solenoid 6. ATF pressure switch 6 and high & low reverse clutch solenoid AT-62 MA section AT-196 AT-82 AT-146 AT-154, AT-131 AT-134, AT-140 TROUBLE DIAGNOSIS Symptom Chart (Cont'd) Symptom Diagnostic Item 1. Fluid level and state RE5R05A Reference page MA section 2. Control linkage adjustment AT-196 3. Line pressure test AT-52 4. PNP switch AT-82 Vehicle runs in all positions. Loud, strange noise in "D", "R" position 1. Fluid level and state 1. PNP switch Engine brake does not work 5 → 4. 2. Fluid level and state 4. Manual mode switch AT-146 1. PNP switch AT-82 AT-196 4. Manual mode switch AT-146 5. ATF pressure switch 3 and input clutch solenoid AT-160, AT-131 6.

ATF pressure switch 1 and front brake solenoid AT-150, AT-134 3. Control linkage adjustment 4. Manual mode switch AT-82 MA section AT-196 AT-146 5. ATF pressure switch 3 and input clutch solenoid AT-154, AT-131 6. ATF pressure switch 1 and front brake solenoid AT-150, AT-134 1. PNP switch 2. Fluid level and state Engine stalls when select lever shifted "N" → "D", "R" MA section 3. Control linkage adjustment 2. Fluid level and state Engine brake does not work 4, 3, 2 → 1.

MA section AT-196 1.

PNP switch Engine brake does not work 5, 4, 3 → 2. AT-82 3. Control linkage adjustment 2. Fluid level and state Engine brake does not work 5, 4 → 3. MA section AT-82 MA section 3. Control linkage adjustment AT-196 4. Manual mode switch AT-146 5. ATF pressure switch 3 and input clutch solenoid AT-160, AT-131 6. ATF pressure switch 6 and high & low reverse clutch solenoid AT-160, AT-140 1. Fluid level and state MA section 2.

Engine speed signal AT-91 3. TCC solenoid valve AT-94 4. Turbine revolution sensor AT-115 AT-63 RE5R05A TROUBLE DIAGNOSIS TCM Input/Output Signal Reference Values TCM TERMINAL CONNECTOR LAYOUT SCIA0495E TCM INSPECTION TABLE Data are reference value. Terminal No. 1 Wire color L/B Item Condition Line pressure solenoid valve Data (Approx.) After warming up the engine, release your foot from the accelerator pedal. 2V After warming up the engine, press the accelerator pedal all the way down. 0.7V — 2 LG/R Power supply Measure 3 seconds after switching "OFF" the ignition switch. — 3 LG/R Power supply Measure 3 seconds after switching "OFF" the ignition switch. Battery voltage 0V Battery voltage 0V SEL3 (pressure switches 2, 3, 5) — — — B Ground — — — 6 G/B CAN-H — — — 7 W/R CAN-L — — — 4 G/R 5 8 9 SB R/Y Fluid temperature sensor 1 Power supply (Memory back-up) When ATF temperature 0°C (32°F) 3.3V When ATF temperature 20°C (68°F) 2.7V When ATF temperature 80°C (176°F) 0.9V — AT-64 Battery voltage RE5R05A TROUBLE DIAGNOSIS TCM Input/Output Signal Reference Values (Cont'd) Terminal No. 10 Wire color W/B Item Condition When the solenoid valve operating (in 1st speed, 2nd More than 2V speed, or 3rd speed) Input clutch solenoid valve When the solenoid valve is not operating (4th speed or 5th 0V speed) When vehicle starts 11 12 13 P/B Y W/L Data (Approx.) High & low reverse clutch solenoid valve When the solenoid valve operating [6 km/h (4 MPH) or More than 2V faster in 1st speed or 2nd speed] When the solenoid valve is not operating [6 km/h (4 MPH) or 0V slower in 1st speed or 3rd, 4th, or 5th speed] — Battery voltage — 0V Power supply (out) Low coast brake solenoid valve When vehicle starts When the solenoid valve is operating (when running in M1-1st speed or M2-2nd speed) Battery voltage When the solenoid valve is not operating (when running in 0V "D") 14 B 15 B/W 16 W 17 19 LG R Ground — — — SEL4 — — — SEL1 (pressure switches 2, 3, 5) — — — Fluid temperature sensor 2 Front brake solenoid valve When ATF temperature about 0°C (32°F) 3.3V When ATF temperature about 20°C (68°F) 2.5V When ATF temperature about 80°C (176°F) 0.7V When the solenoid valve is operating (other than 4th speed) More than 2V When the solenoid valve is not 0V operating (4th speed) 20 21 BR G TCC solenoid valve When vehicle starts Direct clutch solenoid valve When lock-up More than 2V When not lock-up 0V When the solenoid valve is operating (1st speed or 5th speed) More than 2V When the solenoid valve is not operating (2nd speed, 3rd 0V speed, or 4th speed) AT-65 RE5R05A TROUBLE DIAGNOSIS TCM Input/Output Signal Reference Values (Cont'd) Terminal No. Wire color 22 P 23 PU 24 B 26 G/Y Item SEL2 K-line (CONSULT-II signal) Ground Condition — R/L Vehicle speed sensor A/T (revolution sensor) 30 R/W PNP switch 1 32 33 35 R/G G/OR B/Y — Transfer 4LO switch Turbine revolution sensor 1 38 LG PNP switch 3 L When high & low reverse clutch solenoid valve "OFF". Battery voltage When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function. 149 (Hz) CAUTION: Connect the diagnosis data link connector to the vehicle diagnosis connector. Selector lever in "P" position. Battery voltage Selector lever in "N" position. Less than 2.5V Selector lever in "P" position. Battery voltage Selector lever in "D" position. Less than 2.5V When shifting transfer lever to the "4LO" position. When vehicle starts 0V When shifting transfer lever to other positions. Battery voltage — Battery voltage — 0V When front brake solenoid valve "OFF". Battery voltage When front brake solenoid valve "ON". 0V PSB2 (pressure switch 1) L/Y 40 — Power supply 36 BR/W — PNP switch 2 When vehicle starts 39 — PSC2 (pressure switch 6) 27 OR — The terminal is connected to the data link connector for CONSULT-II When vehicle starts 31 Data (Approx.) When moving at 20 km/h (12 MPH) in 1st speed with the closed throttle position switch "OFF", use the CONSULT-II pulse frequency measuring 1.1 (kHz) function. CAUTION: Connect the diagnosis data link connector to the vehicle diagnosis connector. Selector lever in "D" position. Battery voltage Selector lever in "R" position. Less than 2.5V Selector lever in "D" position. More than 2.5V Selector lever in "R" position. Less than 2.5V PNP switch 4 DATA BIT1 — AT-66 — — RE5R05A TROUBLE DIAGNOSIS TCM Input/Output Signal Reference Values (Cont'd) Terminal No. 41 42 Wire color LG/R G/OR 45 PU 46 B 47 48 G/W GY/L Item Condition Back-up lamp relay Data (Approx.) Selector lever in "R" position. Battery voltage Selector lever in other position. Less than 2V — Battery voltage — 0V Power supply Turbine revolution sensor 2 Ground When vehicle starts — When running at 50 km/h (31 MPH) in 4th speed with the closed throttle position switch "OFF", use the CONSULT-II pulse frequency measuring 1.1 (kHz) function. CAUTION: Connect the diagnosis data link connector to the vehicle diagnosis connector. — — Selector lever in "D" position. Battery voltage Selector lever in "R" position.

Less than 2.5V Selector lever in "N", "P" position. Battery voltage Selector lever in other position. 0V PNP switch 3 (monitor) PNP relay (Starter relay) AT-67 RE5R05A TROUBLE DIAGNOSIS CONSULT-II After performing refer to AT-68, "SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)", place check marks for results on the AT-45, "DIAGNOSTIC WORKSHEET". Reference pages are provided following the items. NOTICE: 1. The CONSULT-II electrically displays shift timing and lock-up timing (that is, operation timing of each solenoid). Check for time difference between actual shift timing and the CONSULT-II display. If the difference is noticeable, mechanical parts (except solenoids, sensors, etc.) may be malfunctioning.

Check mechanical parts using applicable diagnostic procedures. 2. Shift schedule (which implies gear position) displayed on CONSULT-II and that indicated in Service Manual may differ slightly.

This occurs because of the following reasons: — Actual shift schedule has more or less tolerance or allowance, — Shift schedule indicated in Service Manual refers to the point where shifts start, and — Gear position displayed on CONSULT-II indicates the point where shifts are completed. 3. Display of solenoid valves on CONSULT-II changes at the start of shifting, while gear position is displayed upon completion of shifting (which is computed by TCM). 4. Additional CONSULT-II information can be found in the Operation Manual supplied with the CONSULT-II unit. CAUTION: In CONSULT-II diagnostic mode "WORK SUPPORT" and "DTC WORK SUPPORT" can be selected, but they are not used. CONSULT-II REFERENCE VALUE Item name Condition Display value (Approx.) (V) Fluid temperature sensor 1 3.3 - 2.7 - 0.9 0°C (32°F) - 20°C (68°F) - 80°C (176°F) Fluid temperature sensor 2 3.3 - 2.5 - 0.7 SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II) CONSULT-II Setting Procedure + For details, refer to the separate "CONSULT-II Operations Manual". 1. Turn ignition switch to "OFF" position. 2. Connect CONSULT-II to data link connector, which is located in instrument lower panel on driver side. SAT619K 3. Turn ignition switch to "ON" position. 4. Touch "START". SAT586J AT-68 RE5R05A TROUBLE DIAGNOSIS CONSULT-II (Cont'd) 5. Touch "A/T" and on the CONSULT-II screen in that order. 6. Turn on CONSULT-II and touch "A/T" for TCM self-diagnosis.

If A/T is not displayed, check TCM power supply and ground circuit. Refer to AT-64. If result is NG, refer to EL section "POWER SUPPLY ROUTING". SAT014K 7. Touch "SELF-DIAG RESULTS".

Display shows malfunction experienced since the last erasing operation. CONSULT-II performs "REAL-TIME DIAG". Also, any malfunction detected while in this mode will be displayed at real time. SAT987J Self-Diagnostic Result Test Mode X: Applicable, —: Not applicable TCM self-diagnosis Items (CONSULT-II screen terms) Malfunction is detected when... A/T CHECK indicator lamp "A/T" with CONSULT-II CAN COMM CIRCUIT + When an abnormality is detected in CAN communications X U1000 STARTER RELAY/CIRC (PNP relay) + If this signal is "ON" other than in "P" or "N" position, this is judged to be an abnormality. (And if it is "OFF" in "P" or "N" position, this too is judged to be an abnormality.) X P0615 PNP SW/CIRC + PNP switch 1-4 signals input with impossible pattern + PNP switch 3 monitor terminal cut line + "P" position is detected from "3" position or "N" position without any other position being detected in between X P0705 VEH SPD SEN/CIR AT (Revolution sensor) + Signal from vehicle sensor 1 not input due to cut line or the like + Abnormal signal input during running + After ignition switch is turned "ON", abnormal signal input from vehicle sensor MTR before the vehicle starts moving X P0720 ENGINE SPEED SIG + TCM does not receive the proper voltage signal from the ECM. X P0725 TCC SOLENOID/CIRC + Normal voltage not applied to solenoid due to functional problem, cut line, short, or the like X P0740 L/PRESS SOL/CIRC + Normal voltage not applied to solenoid due to functional problem, cut line, short, or the like X P0745 TCM-POWER SUPPLY + When the power supply to the TCM is cut "OFF", for example because the battery is removed, and the self-diagnostics memory function stops + This is not a malfunction message (Whenever shutting "OFF" a power supply to the TCM, this message appears on the screen.) — P1701 TCMzRAM + TCM memory (RAM) is malfunctioning. — P1702 AT-69 RE5R05A TROUBLE DIAGNOSIS CONSULT-II (Cont'd) TCM self-diagnosis Items (CONSULT-II screen terms) Malfunction is detected when... A/T CHECK indicator lamp "A/T" with CONSULT-II TCMzROM + TCM memory (ROM) is malfunctioning. — P1703 TCMzEEPROM + TCM memory (EEPROM) is malfunctioning. — P1704 TP SEN/CIRC A/T + Voltage for accelerator sensor signal abnormally high + Voltage for accelerator sensor signal abnormally low when idle signal OFF or full switch signal ON X P1705 ATF TEMP SEN/CIRC + During running, the ATF temperature sensor signal voltage is abnormally high or low X P1710 TURBINE REV S/CIRC + TCM does not receive the proper voltage signal from the sensor. X P1716 VEH SPD SE/CIRzMTR + Signal from vehicle sensor MTR not input due to cut line or the like + Abnormal signal input during running — P1721 A/T INTERLOCK + Except during speed change, the gear position and hydraulic switch states are monitored and comparative judgement made. X P1730 A/T 1ST E/BRAKING Each hydraulic switch and solenoid current is monitored and if a pattern is detected having engine braking other than in the 1 position, this is judged to be an abnormality.

X P1731 I/C SOLENOID/CIRC Normal voltage not applied to solenoid due to functional problem, cut line, short, or the like X P1752 FR/B SOLENOID/CIRC Normal voltage not applied to solenoid due to functional problem, cut line, short, or the like X P1757 D/C SOLENOID/CIRC Normal voltage not applied to solenoid due to functional problem, cut line, short, or the like X P1762 HLR/C SOL/CIRC Normal voltage not applied to solenoid due to functional problem, cut line, short, or the like X P1767 LC/B SOLENOID/CIRC Normal voltage not applied to solenoid due to functional problem, cut line, short, or the like X P1772 MANU MODE SW/CIRC When an impossible pattern of switch signals is detected, this is judged to be an abnormality. — P1815 — P1841 — P1843 — P1845 — P1846 — X ATF PRES SW 1/CIRC ATF PRES SW 3/CIRC ATF PRES SW 5/CIRC When there is a difference found in the comparison between a pressure switch state and the electrical current monitor value, (Other than during speed change) ATF PRES SW 6/CIRC NO DTC IS DETECTED FURTHER TESTING MAY BE REQUIRED No NG item has been detected. AT-70 RE5R05A TROUBLE DIAGNOSIS CONSULT-II (Cont'd) Data Monitor Mode (A/T) X: Standard, —: Not applicable Monitor Item Selection Monitored item (Unit) TCM INPUT SIGNALS MAIN SIGNALS CAN COMM SIGNALS SELECTION FROM MENU Remarks VHCL/S SEzA/T (km/h) X X — X VHCL/S SEzMTR (km/h) X — — X ACCELE POSI (0.0/8) X — — X Accelerator pedal position sensor signal THROTTLE POS (0.0/8) X X — X Throttle position is recognized by the TCM. For fail-safe operation, the specific value used for control is displayed. BATTERY BOLT (V) X — — X ENGINE SPEED (rpm) X X — X TURBINE REV (rpm) X — — X ATF TEMP 1 (V) — X — X ATF TEMP 2 (V) — X — X OUTPUT REV (rpm) X X — X ATF TEMP SE 1 (V) X — — X ATF TEMP SE 2 (V) X — — X ATF PRES SW 1 (ON-OFF display) X X — X (for FR/B solenoid) ATF PRES SW 2 (ON-OFF display) X X — X (for LC/B solenoid) ATF PRES SW 3 (ON-OFF display) X X — X (for I/C solenoid) ATF PRES SW 5 (ON-OFF display) X X — X (for D/C solenoid) ATF PRES SW 6 (ON-OFF display) X X — X (for HLR/C solenoid) PNP SW 1 (ON-OFF display) X — — X PNP SW 2 (ON-OFF display) X — — X PNP SW 3 (ON-OFF display) X — — X PNP SW 4 (ON-OFF display) X — — X 1 POSITION SW (ON-OFF display) X — — X ASCDzCRUISE (ON-OFF display) X — — X ASCDzOD CUT (ON-OFF display) X — — X OD CONT SW (ON-OFF display) X — — X MANU MODE SW (ON-OFF display) X — — X NON M-MODE SW (ON-OFF display) X — — X UP SW LEVER (ON-OFF display) X — — X DOWN SE LEVER (ON-OFF display) X — — X POWER SHIFT SW (ON-OFF display) X — — X Not mounted but displayed CLSO THL POS (ON-OFF display) X — — X Signal input with CAN communications W/O THL POS (ON-OFF display) X — — X Signal input with CAN communications TCC SOLENOID (A) — X — X LINE PRES SOL (A) — X — X I/C SOLENOID (A) — X — X FR/B SOLENOID (A) — X — X AT-71 Revolution sensor Not mounted but displayed.

RE5R05A TROUBLE DIAGNOSIS CONSULT-II (Cont'd) Monitor Item Selection Monitored item (Unit) D/C SOLENOID (A) TCM INPUT SIGNALS MAIN SIGNALS CAN COMM SIGNALS SELECTION FROM MENU — X — X X — X HLR/C SOL (A) Remarks HOLD SW (ON-OFF display) X — — X Not mounted but displayed BRAKE SW (ON-OFF display) X — — X Stop lamp switch GEAR — X — X Gear position recognized by the TCM updated after gear-shifting GEAR RATIO — X — X SLCTLVR POSI — X — X Selector lever position is recognized by the TCM. For fail-safe operation, the specific value used for control is displayed. VEHICLE SPEED (km/h) — X — X Vehicle speed recognized by the TCM. TC SLIP SPEED (rpm) — X — X Difference between engine speed and torque converter input shaft speed CAN COMM (OK-NG) — X — — CAN CIRC 1 (OK-UNKWN) — — X — CAN CIRC 2 (OK-UNKWN) — — X — CAN CIRC 3 (OK-UNKWN) — — X — CAN CIRC 4 (OK-UNKWN) — — X — CAN CIRC 5 (OK-UNKWN) — — X — X — CAN CIRC 6 (OK-UNKWN) Voltage (V) — — — X F SUN GW REV (rpm) — — — X F CARR GR REV (rpm) — — — X SFT UP ST SW — — — X SFT DWN ST SW — — — X ABS SIGNAL — — — X ACC OD CUT — — — X ACC SIGNAL — — — X TCS GR/P KEEP — — — X TCS SIGNAL 2 — — — X TCS SIGNAL 1 — — — X ON OFF SOL (ON-OFF display) — — — X TCC SOL MON — — — X L/P SOL MON — — — X I/C SL MON — — — X FR/B SOL MON — — — X D/C SOL MON — — — X HLR/C SOL MON — — — X ONOFF SOL MON — — — X Displays the value measured by the voltage probe. Not mounted but displayed AT-72 LC/B solenoid LC/B solenoid RE5R05A TROUBLE DIAGNOSIS CONSULT-II (Cont'd) Monitor Item Selection TCM INPUT SIGNALS MAIN SIGNALS CAN COMM SIGNALS SELECTION FROM MENU P POSI IND — — — X R POSI IND — — — X Monitored item (Unit) Remarks HOW TO ERASE SELF-DIAGNOSTIC RESULTS (WITH CONSULT-II) 1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 10 seconds and then turn it "ON" (engine stopped) again. 2. Turn CONSULT-II "ON" and touch "A/T". SAT014K 3. Touch "SELF-DIAG RESULTS". 4. Touch "ERASE". (The self-diagnostic results will be erased.) SCIA0511E Diagnostic Procedure Without CONSULT-II SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II) Description In the unlikely event of an abnormality in the electrical system, when the ignition switch to "ON" position, the A/T CHECK indicator lamp lights up for 2 seconds, then flashes for 8 seconds. If there is no abnormality, when the ignition switch to "ON" position, the indicator lamp lights up for 2 seconds. As a method for locating the problem position, when the self-diagnostics start signal is input, the memory for the breakdown location is output and the A/T CHECK indicator lamp flashes to display the problem position. Diagnostic Procedure 1.CHECK A/T CHECK INDICATOR LAMP 1.

Start the engine with selector lever in "P" position.

Warm engine to normal operating temperature. 2. Ignition switch to "ON" and "OFF" position at least twice, then leave it in the "OFF" position. 3. Wait 10 seconds. 4. Turn ignition switch to "ON" position.

(Do not start engine.) 5. Does A/T CHECK indicator lamp come on for about 2 seconds? Yes or No? Yes >> GO TO 2. No >> GO TO AT-168, "A/T CHECK Indicator Lamp does not come on". AT-73 RE5R05A TROUBLE DIAGNOSIS Diagnostic Procedure Without CONSULT-II (Cont'd) 2.JUDGEMENT PROCEDURE STEP 1 1. Turn ignition switch to "OFF" position. 2. Push shift lock release button. 3. Move selector lever from "P" to "D" position. 4. Set the closed throttle position switch to "OFF". (Depressed accelerator pedal at half throttle) 5. Depressed brake pedal.

(Brake switch to "ON" position.) 6. Turn ignition switch to "ON" position. 7. Wait 3 seconds.

8. Manual mode switch to "ON" position. (Move the selector lever to "M" position.) 9. Released brake pedal. (Brake switch to "OFF" position.) 10. Manual mode switch to "OFF" position. (Move the selector lever to "D" position.) 11. Depressed brake pedal. (Brake switch to "ON" position.) 12. Released brake pedal. (Brake switch to "OFF" position.) 13. Depress accelerator pedal fully and release it. >> GO TO 3. 3.CHECK SELF-DIAGNOSIS CODE Check A/T CHECK indicator lamp. Refer to AT-74, "Judgement Self-Diagnosis Code". If the system does not go into self-diagnostics. Refer to AT-164, "PARK/NEUTRAL POSITION, MANUAL MODE, BRAKE AND THROTTLE POSITION SWITCH CIRCUIT".

>> DIAGNOSIS END Judgement Self-Diagnosis Code If there is an abnormality, the lamp lights up for the time corresponding to the problem path.

SCIA0497E HOW TO ERASE SELF-DIAGNOSTIC RESULTS (WITHOUT CONSULT-II) The A/T CHECK indicator lamp is located on the instrument panel. 1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 10 seconds and then turn it "ON" (engine stopped) again. 2. Perform self-diagnostic procedure. Refer to AT-73, "SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)". (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.) 3. Turn ignition switch to "OFF" position. (The self-diagnostic results will be erased.) AT-74 DTC U1000 CAN COMMUNICATION LINE RE5R05A Description CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only. On Board Diagnosis Logic + + This is a self-diagnostic item. Diagnostic trouble code "CAN COMM CIRCUIT" with CONSULT-II or "17th judgment flicker" without CONSULT-II is detected when TCM cannot communicate to other control unit. Possible Cause Harness or connectors (CAN communication line is open or shorted.) DTC Confirmation Procedure NOTE: If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II 1. 2. 3.

4. Turn ignition switch to "ON" position. (Do not start engine.) Select "DATA MONITOR" mode for "A/T" with CONSULT-II. Start engine and wait for at least 6 seconds. If DTC is detected, go to AT-77, "Diagnostic Procedure". SAT014K WITHOUT CONSULT-II 1. Start engine and wait for at least 6 seconds. 2. Perform self-diagnosis. Refer to AT-73, "SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)". 3. If DTC is detected, go to AT-77, "Diagnostic Procedure". AT-75 DTC U1000 CAN COMMUNICATION LINE RE5R05A Wiring Diagram — AT — CAN TAT082M AT-76 DTC U1000 CAN COMMUNICATION LINE RE5R05A Diagnostic Procedure 1.CHECK CAN COMMUNICATION CIRCUIT (WITH CONSULT-II) With CONSULT-II 1.

Turn ignition switch to "ON" position. (Do not start engine.) 2.

Select "DATA MONITOR" mode for "A/T" with CONSULT-II. 3. The "CAN COMM CIRCUIT" is detected.

Yes or No? Yes >> Print out CONSULT-II screen, go to 3. No >> INSPECTION END PCIA0061E 2.CHECK CAN COMMUNICATION CIRCUIT (WITHOUT CONSULT-II) Without CONSULT-II 1. Turn ignition switch to "ON" position. (Do not start engine.) 2.

Perform self-diagnosis.

Refer to AT-73, "SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)". 3. The DTC is detected. Yes or No? Yes >> GO TO "CAN SYSTEM". No >> INSPECTION END 3.CHECK CAN COMMUNICATION SIGNALS (WITH CONSULT-II) With CONSULT-II 1.

Turn ignition switch to "ON" position. (Do not start engine.) 2. Select "CAN COMM SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II. >> Print out CONSULT-II screen, go to "CAN SYSTEM".

SCIA0511E CAN Communication Signals Normal conditions Abnormal conditions (examples) CAN COMM: OK CAN COMM: OK CAN CIRC 1: OK CAN CIRC 1: UNKWN CAN CIRC 2: OK CAN CIRC 2: UNKWN CAN CIRC 3: OK CAN CIRC 3: UNKWN CAN CIRC 4: OK CAN CIRC 4: UNKWN CAN CIRC 5: UNKWN CAN CIRC 5: UNKWN CAN CIRC 6: UNKWN CAN CIRC 6: UNKWN AT-77 DTC P0615 START SIGNAL CIRCUIT RE5R05A Description Prohibits cranking other at "P" or "N" position. On Board Diagnosis Logic + + This is a self-diagnosis item. Diagnostic trouble code "STARTER RELAY/CIRC" with CONSULT-II or "14th judgement flicker" without CONSULT-II is detected when detects as abnormal when switched "ON" other than at "P" or "N" position. (Or when switched "OFF" at "P" or "N" position). Possible Cause Check the following items. + Harness or connectors (PNP relay and TCM circuit is open or shorted.) + PNP relay DTC Confirmation Procedure NOTE: If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II 1. 2. 3. 4. 5. Turn ignition switch to "ON" position. (Do not start engine.) Select "DATA MONITOR" mode for "A/T" with CONSULT-II. Start engine. Drive vehicle for at least 2 consecutive seconds. If DTC is detected, go to AT-80, "Diagnostic Procedure". SAT014K WITHOUT CONSULT-II 1. Start engine. 2. Drive vehicle for at least 2 consecutive seconds. 3. Perform self-diagnosis. Refer to AT-73, "SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)". 4. If DTC is detected, go to AT-80, "Diagnostic Procedure". AT-78 DTC P0615 START SIGNAL CIRCUIT RE5R05A Wiring Diagram — AT — STSIG TAT083M AT-79 RE5R05A DTC P0615 START SIGNAL CIRCUIT Diagnostic Procedure 1.CHECK PNP RELAY (WITH CONSULT-II) With CONSULT-II 1. Turn ignition switch to "ON" position.

(Do not start engine.) 2. Select "SELECTION FROM MENU" in "DATA MONITOR" mode for "A/T" with CONSULT-II and check monitor "STARTER RELAY" (PNP relay) ON/OFF.

OK or NG? OK >> GO TO 4. NG >> GO TO 3. PCIA0056E 2.CHECK PNP RELAY (WITHOUT CONSULT-II) Without CONSULT-II 1. Turn ignition switch to "ON" position. (Do not start engine.) 2. Check the voltage between the TCM connector and ground. Connector No. Item PNP relay (Starter relay) PCIA0060E E124 Terminal No. 48 Shift position Voltage (Approx.) N and P Battery voltage R and D 0V Ground OK or NG? OK >> GO TO 4. NG >> GO TO 3. 3.DETECT MALFUNCTIONING ITEM Check the following items. 1. PNP relay. 2. Disconnections or short-circuits in the main harness between TCM and the PNP relay. 3. Ground circuit for the PNP relay. OK or NG? OK >> GO TO 4. NG >> Repair or replace damaged parts. 4.CHECK DTC Perform DTC confirmation procedure. OK or NG? OK >> INSPECTION END NG >> GO TO 5. 5.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection.

2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG? OK >> INSPECTION END NG >> Repair or replace damaged parts. AT-80 DTC P0615 START SIGNAL CIRCUIT RE5R05A Component Inspection PNP RELAY Check continuity between PNP relay harness connector terminals. Refer to AT-79, "Wiring Diagram — AT — STSIG". Item Shift position Ignition switch Connector No. Terminal No. Continuity E52 1-2 Yes 3-5 No OFF PNP relay P and N E51 ON No 3-5 Yes AT-81 DTC P0705 PARK/NEUTRAL POSITION SWITCH RE5R05A Description + + The park/neutral position (PNP) switch includes a transmission position switch. The transmission range switch detects the selector lever position and sends a signal to the TCM. On Board Diagnosis Logic + + + This is a self-diagnostic item. Diagnostic trouble code "PNP SW/CIRC" with CONSULT-II or "9th judgment flicker" without CONSULT-II is detected when TCM does not receive the correct voltage signal from the PNP switch 1, 2, 3, 4 based on the gear position. When monitor terminal of PNP switch 3 is disconnected. When no other position but "P" position is detected from "3" or "N" positions. Possible Cause Check the following items. + Harness or connectors (PNP switch 1, 2, 3, 4 and TCM circuit is open or shorted.) + PNP switch 1, 2, 3, 4 + PNP switch 3 monitor terminal disconnected DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed. NOTE: If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II 1. Turn ignition switch to "ON" position. (Do not start engine.) 2. Select "DATA MONITOR" mode for "ENGINE" with CONSULT-II. 3.

Start engine. 4. Vehicle start and maintain the following conditions for at least 2 consecutive seconds. THRTL POS SEN: More than 1.2V 5. If DTC is detected, go to AT-84, “Diagnostic Procedure”. SAT014K WITHOUT CONSULT-II 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Perform self-diagnosis. Refer to AT-73, “SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)”. 3. If DTC is detected, go to AT-84, “Diagnostic Procedure”. AT-82 DTC P0705 PARK/NEUTRAL POSITION SWITCH RE5R05A Wiring Diagram — AT — PNP/SW TAT084M AT-83 RE5R05A DTC P0705 PARK/NEUTRAL POSITION SWITCH Diagnostic Procedure 1.CHECK PNP SW CIRCUIT (WITH CONSULT-II) With CONSULT-II 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Select “MAIN SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II. 3. Read out “NzP”, “R” and “D” position switches moving selector lever to each position. OK or NG? OK >> GO TO 4. NG >> GO TO 3.
PCIA0034E 2.CHECK PNP SW CIRCUIT (WITHOUT CONSULT-II) Without CONSULT-II 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Selector lever to “P”, “R”, “N”, or “D” position to check the voltage between the TCM connector terminals and ground. Connector No. E124 Shift position PCIA0035E Terminal No. 30 - Ground 31 - Ground 38 - Ground 39 - Ground P Battery voltage Battery voltage — — R — — Less than 2.5V Less than 2.5V N Less than 2.5V — — — D — Less than 2.5V Battery voltage More than 2.5V OK or NG? OK >> GO TO 4. NG >> GO TO 3. 3.DETECT MALFUNCTIONING ITEM Check the following items.
+ Disconnection or short-circuit in the main harness between TCM and PNP switch 1, 2, 3, 4. + Disconnection or short-circuit in the main harness between the PNP switch 3 monitor and TCM. + PNP switch. OK or NG?
OK >> GO TO 4. NG >> Repair or replace damaged parts. 4.CHECK DTC Perform DTC confirmation procedure. OK or NG? OK >> INSPECTION END NG >> GO TO 5. AT-84 DTC P0705 PARK/NEUTRAL POSITION SWITCH Diagnostic Procedure (Cont’d) RE5R05A 5.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. Component Inspection PNP SWITCH 1. Selector lever to various positions to check the continuity between terminals on the PNP switch and ground. PNP SW Shift position Connector No. Terminal No. Continuity 19 - Ground SW 1 P SW 2 SAT622K 20 - Ground SW 3 E240 No 21 - Ground D SW 4 22 - Ground Yes SW 3 Monitor P, R, N, D 21 - 23 2. If NG, check the continuity with the control cable disconnected. (Refer to Step 1 above.) 3. If OK with the control cable disconnected, adjust the control cable. 4. If NG even when the control cable is disconnected, replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-85 DTC P0720 VEHICLE SPEED SENSOR A/T (REVOLUTION SENSOR) RE5R05A Description The revolution sensor detects the revolution of the out put shaft parking pawl lock gear and emits a pulse signal. The pulse signal is sent to the TCM which converts it into vehicle speed. On Board Diagnosis Logic + + + This is a self-diagnostic item. Diagnostic trouble code “VEH SPD SEN/CIR AT” with CONSULT-II or “1st judgement flicker” without CONSULT-II is detected when TCM does not receive the proper voltage signal from the sensor. After ignition switch is turned “ON”, abnormal signal input from vehicle sensor MTR before the vehicle starts moving. Possible Cause Check the following items. + Harness or connectors (The sensor circuit is open or shorted.) + Revolution sensor DTC Confirmation Procedure CAUTION: + Always drive vehicle at a safe speed. + Be careful not to rev engine into the red zone on the tachometer. NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II 1. 2. 3. 4. SAT014K Turn ignition switch to “ON” position.
(Do not start engine.) Select “DATA MONITOR” mode for “A/T” with CONSULT-II. Start engine. Drive vehicle and check for an increase of “VHCL/S SEzMTR” value. If the check result is NG, go to AT-120, “DTC P1721 VEHICLE SPEED SENSOR MTR”. If the check result is OK, go to following step. 5. Turn ignition switch to “OFF” position and wait at least 10 seconds. 6. Turn ignition switch to “ON” position. (Do not start engine.) 7. Select “DATA MONITOR” mode for “A/T” with CONSULT-II. 8. Start engine. 9. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds. VHCL SPEED SE: 30 km/h (19 MPH) or more THRTL POS SEN: More than 1.0/8 Selector lever: “D” position Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test. If the check result is NG, go to AT-89, “Diagnostic Procedure”. If the check result is OK, go to following step. 10. Turn ignition switch to “OFF” position and wait at least 10 seconds. 11. Turn ignition switch to “ON” position. (Do not start engine.) 12. Select “DATA MONITOR” mode for “A/T” with CONSULT-II.
AT-86 DTC P0720 VEHICLE SPEED SENSOR A/T RE5R05A (REVOLUTION SENSOR) DTC Confirmation Procedure (Cont’d) 13. Start engine.
14. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds. ENGINE SPEED: 3,500 rpm or more THRTL POS SEN: More than 1.0/8 Selector lever: “D” position Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test. If the check result is NG, go to AT-89, “Diagnostic Procedure”.
WITHOUT CONSULT-II 1. Start engine. 2. Drive vehicle under the following conditions: Selector lever “D” position, vehicle speed higher than 30 km/h (19 MPH), throttle opening greater than 1/8 of the full throttle position and driving for at least 5 consecutive seconds. 3. Perform self-diagnosis. Refer to AT-73, “SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)”.
4. If DTC is detected, go to AT-89, “Diagnostic Procedure”. AT-87 DTC P0720 VEHICLE SPEED SENSOR A/T (REVOLUTION SENSOR) RE5R05A Wiring Diagram — AT — VSSA/T TAT085M AT-88 DTC P0720 VEHICLE SPEED SENSOR A/T (REVOLUTION SENSOR) RE5R05A Diagnostic Procedure 1.CHECK INPUT SIGNALS (WITH CONSULT-II) With CONSULT-II 1.
Turn ignition switch to “ON” position. (Do not start engine.) 2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Start the engine.
4. Read out the value of “VHCL/S SEzA/T” while driving. Check the value changes according to driving speed. OK or NG? OK >> GO TO 4. NG >> GO TO 3. PCIA0033E 2.CHECK INPUT SIGNALS (WITHOUT CONSULT-II) Without CONSULT-II 1. Turn ignition switch to “ON” position. (Do not start engine.) 2.
Perform self-diagnosis. Refer to AT-73, “SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULTII)”. OK or NG? OK >> GO TO 4. NG >> + Harness for short or open between TCM and revolution sensor (Main harness) + Repair or replace damaged parts. 3.CHECK REVOLUTION SENSOR (WITH CONSULT-II) With CONSULT-II 1. Start the engine. Condition Connector No. Terminal No. Data (Approx.) When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function. CAUTION: Connect the data link connector to the vehicle-side diagnosis connector. E124 27 149 (Hz) PCIA0018E OK or NG? OK >> GO TO 4. NG >> + Harness for short or open between TCM and revolution sensor (Main harness) + Repair or replace damaged parts. 4.CHECK DTC Perform DTC confirmation procedure. Refer to AT-89, “DTC Confirmation Procedure”. OK or NG? OK >> INSPECTION END NG >> GO TO 5. AT-89 DTC P0720 VEHICLE SPEED SENSOR A/T (REVOLUTION SENSOR) Diagnostic Procedure (Cont’d) RE5R05A
5.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> + Repair or replace damaged parts.
+ Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-90 DTC P0725 ENGINE SPEED SIGNAL RE5R05A Description The engine speed signal is sent from the ECM to the TCM. On Board Diagnosis Logic + + This is a self-diagnostic item. Diagnostic trouble code “ENGINE SPEED SIG” with CONSULT-II or “16th judgement flicker” without CONSULT-II is detected when TCM does not receive the ignition signal in the primary circuit is not sent to ECM during engine cranking or running.
Possible Cause Check harness or connectors. (The ECM to the TCM circuit is open or shorted.) DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed. NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the malfunction is eliminated.
WITH CONSULT-II 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Select “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Start engine and maintain the following conditions for at least 10 consecutive seconds. VHCL SPEED SE: 10 km/h (6 MPH) or more ACCELE POSI: More than 1.0/8 Selector lever: “D” position 4. If DTC is detected, go to AT-92, “Diagnostic Procedure”. SAT014K WITHOUT CONSULT-II 1. Start engine. 2.
Drive vehicle under the following condition: Selector lever “D” position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full throttle position and driving for at least 10 consecutive seconds. 3.
Perform self-diagnosis. Refer to AT-73, “SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)”. 4. If DTC is detected, go to AT-92, “Diagnostic Procedure”. AT-91 DTC P0725 ENGINE SPEED SIGNAL RE5R05A Diagnostic Procedure 1.CHECK DTC WITH ECM (WITH CONSULT-II) SAT014K With CONSULT-II 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Select “SELF-DIAG RESULTS” mode for “ENGINE” with CONSULT-II. Refer to CONSULT-II Function. OK or NG?
OK >> GO TO 3.
NG >> Check the DTC detected item, go to CONSULT-II Function. + If CAN communication line is detected, go to AT-75, “DTC U1000 CAN COMMUNICATION LINE”. 2.CHECK DTC WITH ECM (WITHOUT CONSULT-II) Without CONSULT-II 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Perform self-diagnosis.
OK or NG? OK >> GO TO 4. NG >> Check the DTC detected item, go to CONSULT-II Function. + If CAN communication line is detected, go to AT-75, “DTC U1000 CAN COMMUNICATION LINE”. 3.CHECK DTC WITH TCM (WITH CONSULT-II) With CONSULT-II 1. Start engine. 2. Select “SELF-DIAG RESULTS” mode for “A/T” with CONSULT-II. OK or NG? OK >> GO TO 5. NG >> Check the ignition signal circuit. + Refer to DTC P1320 IGNITION SIGNAL. SAT014K 4.CHECK DTC WITH TCM (WITHOUT CONSULT-II) Without CONSULT-II 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Perform self-diagnosis. Refer to AT-73, “SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULTII)”. OK or NG? OK >> GO TO 5. NG >> Check the ignition signal circuit. + Refer to DTC P1320 IGNITION SIGNAL. AT-92 5.CHECK DTC DTC P0725 ENGINE SPEED SIGNAL Diagnostic Procedure (Cont’d) Perform DTC confirmation procedure. OK or NG?
OK >> INSPECTION END NG >> Repair or replace damaged parts. AT-93 RE5R05A DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE RE5R05A Description + + + The torque converter clutch solenoid valve is activated, with the gear in D4, D5, by the TCM in response to signals sent from the vehicle speed and throttle position sensors. Lock-up piston operation will then be controlled. Lock-up operation, however, is prohibited when A/T fluid temperature is too low. When the accelerator pedal is depressed (less than 1/8) in lock-up condition, the engine speed should not change abruptly. If there is a big jump in engine speed, there is no lock-up. On Board Diagnosis Logic + + + This is a self-diagnosis item. Diagnostic trouble code “TCC SOLENOID/CIRC” with CONSULT-II or “3rd judgement flicker” without CONSULT-II is detected when TCM detects an improper voltage drop when it tries to operate the solenoid valve. Detects as abnormal by comparing target value with monitor value. Possible Cause Check the following items. + Torque converter clutch solenoid valve + Harness or connectors (The solenoid circuit is open or shorted.) DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed. NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II 1. 2. 3. 4. SAT014K Turn ignition switch to “ON” position.
(Do not start engine.) Select “DATA MONITOR” mode for “A/T” with CONSULT-II. Start engine. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds. VHCL SPEED SE: 80 km/h (50 MPH) or more ACCELE POS: 0.5/8 - 1.0/8 Selector lever: “D” position Gear position: Lock-up position Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test. 5. If DTC is detected go to AT-96 “Diagnostic Procedure”. WITHOUT CONSULT-II 1. Start engine. 2. Drive vehicle under the following conditions: Selector lever “D” position, vehicle speed higher than 80 km/h (50 MPH) (Lock-up position), throttle opening greater than 1/8 of the full throttle position and driving for at least 5 consecutive seconds. Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test. 3. Perform self-diagnosis. Refer to AT-73, “SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)”.
4. If DTC is detected, go to AT-96, “Diagnostic Procedure”.
AT-94 DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE RE5R05A Wiring Diagram — AT — TCV TAT086M AT-95 DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE RE5R05A Diagnostic Procedure 1.CHECK VALVE RESISTANCE 1. Turn ignition switch to “OFF” position. 2. Disconnect A/T solenoid valve harness connector 2 at the transmission right side. 3.
Check the resistance between terminal and ground. Solenoid Valve Torque converter clutch solenoid valve Connector No. Terminal No. Resistance (Approx.) E239 18 - Ground 3 - 9Ω OK or NG? OK >> GO TO 2. NG >> Repair or replace damaged parts. SAT623K 2.CHECK POWER SOURCE CIRCUIT 1. Turn ignition switch to “OFF” position.
2. Disconnect TCM connector. 3. Check continuity between A/T solenoid valve harness connector 2 and TCM connector. Item SAT624K Connector No. Terminal No. TCM E123 20 A/T solenoid valve harness connector 2 E239 18 Continuity Yes 4.
If OK, check harness for short to ground and short to power. 5.
Reinstall any part removed. OK or NG?
OK >> GO TO 3. NG >> Repair open circuit or short to ground or short to power in harness or connectors. 3.CHECK DTC Perform DTC confirmation procedure. OK or NG? OK >> INSPECTION END NG >> GO TO 4. 4.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG?
OK >> INSPECTION END NG >> 1. Repair or replace damaged parts.
2. Replace the transmission assembly.
Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-96 DTC P0745 LINE PRESSURE SOLENOID VALVE RE5R05A Description The line pressure solenoid valve regulates the oil pump discharge pressure to suit the driving condition in response to a signal sent from the TCM.
The line pressure duty cycle value is not consistent when the closed throttle position switch is “ON”. To confirm the line pressure duty cycle at low pressure, the accelerator (throttle) should be open until the closed throttle position switch is “OFF”. On Board Diagnosis Logic + + + This is a self-diagnosis item. Diagnostic trouble code “L/PRESS SOL/CIRC” with CONSULT-II or “4th judgement flicker” without CONSULT-II is detected when TCM detects an improper voltage drop when it tries to operate the solenoid valve. Detects as abnormal by comparing target value with monitor value. Possible Cause Check the following items. + Harness or connectors (The solenoid circuit is open or shorted.) + Line pressure solenoid valve DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II 1. 2. 3. 4. Turn ignition switch to “ON” position. (Do not start engine.) Select “DATA MONITOR” mode for “A/T” with CONSULT-II. Start engine and wait at least 5 consecutive seconds. If DTC is detected, go to AT-99, “Diagnostic Procedure”. SAT014K WITHOUT CONSULT-II 1. Start engine and wait at least 5 consecutive seconds. 2. Perform self-diagnosis. Refer to AT-73, “SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)”. 3. If DTC is detected, go to AT-99, “Diagnostic Procedure”. AT-97 DTC P0745 LINE PRESSURE SOLENOID VALVE RE5R05A Wiring Diagram — AT — LPSV TAT087M AT-98 DTC P0745 LINE PRESSURE SOLENOID VALVE RE5R05A Diagnostic Procedure 1.CHECK VALVE RESISTANCE 1. Turn ignition switch to “OFF” position. 2. Disconnect A/T solenoid valve harness connector 2 at the transmission right side. 3. Check the resistance between terminal and ground. SAT625K Solenoid Valve Connector No. Terminal No Resistance (Approx.) Line pressure solenoid valve E239 17 - Ground 3 - 9Ω OK or NG? OK >> GO TO 2.
NG >> Repair or replace damaged parts. 2.CHECK POWER SOURCE CIRCUIT 1. Turn ignition switch to “OFF” position. 2. Disconnect TCM connector. 3. Check continuity between A/T solenoid valve harness connector 2 and TCM connector. SAT626K Item Connector No. Terminal No. TCM E123 1 A/T solenoid valve harness connector 2 E239 17 Continuity Yes 4. If OK, check harness for short to ground and short to power. 5. Reinstall any part removed. OK or NG? OK >> GO TO 3. NG >> Repair open circuit or short to ground or short to power in harness or connectors. 3.CHECK DTC Perform DTC confirmation procedure. OK or NG? OK >> INSPECTION END NG >> GO TO 4. 4.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly.
Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-99 DTC P1701 TRANSMISSION CONTROL MODULE (POWER SUPPLY) RE5R05A Description When the power supply to the TCM is cut “OFF”, for example because the battery is removed, and the selfdiagnostics memory function stops. On Board Diagnosis Logic + + + + This is not a self-diagnosis item. Diagnostic trouble code “TCM-POWER SUPPLY” with CONSULT-II is detected. TCM does not receive the voltage signal from the battery power supply. This is not a malfunction message. (Whenever shutting “OFF” a power supply to the TCM, this message appears on the screen.) Possible Cause Check harness or connectors. (Battery or ignition switch and TCM circuit is open or shorted.) DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II 1. 2. 3. 4. Turn ignition switch “ON” position. (Do not start engine.) Select “DATA MONITOR” mode for “A/T” with CONSULT-II. Wait for at least 2 consecutive seconds. If DTC is detected, go to AT-103, “Diagnostic Procedure”. SAT014K AT-100 DTC P1701 TRANSMISSION CONTROL MODULE (POWER SUPPLY) RE5R05A Wiring Diagram — AT — POWER TAT088M AT-101 DTC P1701 TRANSMISSION CONTROL MODULE RE5R05A (POWER SUPPLY) Wiring Diagram — AT — POWER (Cont’d) TAT115M AT-102 DTC P1701 TRANSMISSION CONTROL MODULE (POWER SUPPLY) RE5R05A Diagnostic Procedure 1.CHECK TCM POWER SOURCE STEP 1 1.
Turn ignition switch to “OFF” position. (Do not start engine.) 2. Check voltage between TCM terminal and ground.
Item Connector No. Terminal No. Voltage TCM E123 9 - Ground Battery voltage OK or NG? OK >> GO TO 2. NG >> GO TO 3. PCIA0063E 2.CHECK TCM POWER SOURCE STEP 2 1.
Turn ignition switch to “ON” position. 2. Check voltage between TCM terminal and ground. Item Connector No. E123 TCM E124 PCIA0063E Terminal No. 2 - Ground 3 - Ground 9 - Ground 12 - Ground Voltage Battery voltage 33 - Ground 42 - Ground OK or NG? OK >> GO TO 4. NG >> GO TO 3. 3.DETECT MALFUNCTIONING ITEM Check the following items: + Harness for short or open between battery and TCM terminal 9 (Main harness) + Harness for short or open between ignition switch and TCM terminals 2, 3, 12, 33 and 42 (Main harness) + 7.5A fuse [No. 12 located in the fuse block (J/B)], 10A fuse (No. 45 fuse and fusible link box), 10A fuse (No. 50 fuse and fusible link box) and 15A fuse (No. 49 fuse and fusible link box). + Ignition switch + A/T PV IGN relay. + ECM relay, Refer to EC section. OK or NG? OK >> GO TO 4. NG >> Repair or replace damaged parts.
4.CHECK TCM GROUND CIRCUIT 1. Turn ignition switch to “OFF” position. 2.
Disconnect TCM harness connector. 3. Check continuity between TCM terminals 5, 14, 24, 46 and ground. Continuity should exist. If OK, check harness for short to ground and short to power. OK or NG? OK >> GO TO 5. NG >> Repair open circuit or short to ground or short to power in harness or connectors. AT-103 DTC P1701 TRANSMISSION CONTROL MODULE (POWER SUPPLY) Diagnostic Procedure (Cont’d) RE5R05A 5.CHECK DTC Perform DTC confirmation procedure. OK or NG? OK >> INSPECTION END NG >> GO TO 6.
6.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> Repair or replace damaged parts. Component Inspection A/T PV IGN RELAY Check continuity between A/T PV IGN relay harness connector terminals. Refer to AT-101, “Wiring Diagram — AT — POWER”. Item Ignition switch Connector No. Terminal No. Continuity 1-2 Yes 3-5 No 3-5 Yes OFF A/T PV IGN relay E150 ON AT-104 DTC P1702 TRANSMISSION CONTROL MODULE (RAM) RE5R05A Description The TCM consists of a microcomputer and connectors for signal input and output and for power supply. The TCM controls the A/T. SAT574J On Board Diagnosis Logic + + This is not a self-diagnosis item. Diagnostic trouble code “TCMzRAM” with CONSULT-II is detected when TCM memory RAM is malfunctioning Possible Cause Check TCM. DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II 1.
2. 3.
4. 5. Turn ignition switch to “ON” position. (Do not start engine.) Select “DATA MONITOR” mode for A/T with CONSULT-II. Start engine. Run engine for at least 2 consecutive seconds at idle speed. If DTC is detected, go to AT-105, “Diagnostic Procedure”. SAT014K Diagnostic Procedure 1.CHECK DTC SCIA0511E With CONSULT-II 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Select “SELF DIAG RESULTS” mode for “A/T” with CONSULT-II. 3. Touch “ERASE”. 4. Turn ignition switch to “OFF” position and wait at least 10 seconds. 5. Perform DTC confirmation procedure. Is the “TCMzRAM” displayed again? Yes >> Replace TCM. No >> INSPECTION END AT-105 DTC P1703 TRANSMISSION CONTROL MODULE (ROM) RE5R05A Description The TCM consists of a microcomputer and connectors for signal input and output and for power supply. The TCM controls the A/T. SAT574J On Board Diagnosis Logic + + This is not a self-diagnosis item. Diagnostic trouble code “TCMzROM” with CONSULT-II is detected when TCM memory ROM is malfunctioning. Possible Cause Check TCM. DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the malfunction is eliminated.
WITH CONSULT-II 1. 2. 3. 4. 5.
Turn ignition switch to “ON” position. (Do not start engine.) Select “DATA MONITOR” mode for A/T with CONSULT-II. Start engine. Run engine for at least 2 consecutive seconds at idle speed. If DTC is detected, go to AT-106, “Diagnostic Procedure”. SAT014K Diagnostic Procedure 1.CHECK DTC SCIA0511E With CONSULT-II 1. Turn ignition switch to “ON” position.
(Do not start engine.) 2. Select “SELF DIAG RESULTS” mode for “A/T” with CONSULT-II. 3. Touch “ERASE”. 4. Turn ignition switch to “OFF” position and wait at least 10 seconds. 5. Perform DTC confirmation procedure. Is the “TCMzROM” displayed again?
Yes >> Replace TCM. No >> INSPECTION END AT-106 DTC P1704 TRANSMISSION CONTROL MODULE (EEPROM) RE5R05A Description The TCM consists of a microcomputer and connectors for signal input and output and for power supply.
The TCM controls the A/T. SAT574J On Board Diagnosis Logic + + This is not a self-diagnosis item. Diagnostic trouble code “TCMzEEPROM” with CONSULT-II is detected when TCM memory EEPROM is malfunctioning. Possible Cause Check TCM. DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II 1. 2. 3.
4. 5.
Turn ignition switch to “ON” position. (Do not start engine.) Select “DATA MONITOR” mode for A/T with CONSULT-II. Start engine. Run engine for at least 2 consecutive seconds at idle speed. If DTC is detected, go to AT-107, “Diagnostic Procedure”.
SAT014K Diagnostic Procedure 1.CHECK DTC SCIA0511E With CONSULT-II 1. Turn ignition switch to “ON” position and select “SELF DIAGNOSIS” mode for “A/T” with CONSULT-II. 2. Move selector lever to “R” position. 3. Depress accelerator pedal (Full throttle position). 4. Touch “ERASE”. 5. Turn ignition switch to “OFF” position and wait at least 10 seconds. 6. Perform DTC Confirmation Procedure. Is the “TCMzEEPROM” displayed again? Yes >> Replace TCM.
No >> INSPECTION END AT-107 DTC P1705 THROTTLE POSITION SENSOR RE5R05A Description Electric throttle control actuator consists of throttle control motor, acceleration pedal position sensor, throttle position sensor, etc. The actuator sends a signal to the TCM.
On Board Diagnosis Logic + + This is not a self-diagnosis item. Diagnostic trouble code “TP SEN/CIRC A/T” with CONSULT-II or “15th judgement flicker” without CONSULT-II is detected when TCM receives an excessively low or high voltage from the sensor. Possible Cause Harness or connectors (The sensor circuit is open or shorted.) DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. WITH CONSULT-II 1. 2. 3. 4. Turn ignition switch to “ON” position. (Do not start engine.) Select “DATA MONITOR” mode for “A/T” with CONSULT-II.
Start engine and let it idle for 1 second. If DTC is detected go to AT-108, “Diagnostic Procedure”. WITHOUT CONSULT-II SAT014K 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Start engine and let it idle for 1 second. 3. Perform self-diagnosis. Refer to AT-73, “SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)”. 4. If DTC is detected, go to AT-108, “Diagnostic Procedure”. Diagnostic Procedure 1.CHECK DTC WITH ECM (WITH CONSULT-II) With CONSULT-II 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Select “SELF-DIAG RESULTS” mode for “ENGINE” with CONSULT-II. OK or NG? OK >> GO TO 3. NG >> Check the DTC detected item. + If CAN communication line is detected, go to AT-75, “DTC U1000 CAN COMMUNICATION LINE”. SAT014K AT-108 DTC P1705 THROTTLE POSITION SENSOR Diagnostic Procedure (Cont’d) RE5R05A 2.CHECK DTC WITH ECM (WITHOUT CONSULT-II) Without CONSULT-II 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Perform self-diagnosis. Refer to AT-73, SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II). OK or NG? OK >> GO TO 4. NG >> Check the DTC detected item. + If CAN communication line is detected, go to AT-75, “DTC U1000 CAN COMMUNICATION LINE”. 3.CHECK DTC WITH TCM (WITH CONSULT-II) WITH CONSULT-II PCIA0070E 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II. 3. Depressed accelerator pedal and read out the value of “ACCLE POS SEN” and “THROTTLE POSI”. Check engine speed changes according to throttle position.
4. Select “SELF-DIAG RESULTS” mode for “ENGINE” with CONSULT-II. OK or NG? OK >> GO TO 5. NG >> Check the accelerator pedal position sensor circuit. 4.CHECK DTC WITH TCM (WITHOUT CONSULT-II) Without CONSULT-II 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Perform self-diagnosis. Refer to AT-73, “SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)”. OK or NG?
OK >> GO TO 5. NG >> Check the accelerator pedal position sensor circuit. 5.CHECK DTC Perform DTC confirmation procedure. OK or NG? OK >> INSPECTION END NG >> Repair or replace damaged parts. AT-109 DTC P1710 A/T FLUID TEMPERATURE SENSOR CIRCUIT RE5R05A Description The A/T fluid temperature sensor detects the A/T fluid temperature and sends a signal to the TCM. CONSULT-II Reference Value Item name Condition Display value (Approx.) (V) Fluid temperature sensor 1 3.3 - 2.7 - 0.9 0°C (32°F) - 20°C (68°F) - 80°C (176°F) Fluid temperature sensor 2 3.3 - 2.5 - 0.7 On Board Diagnosis Logic + + This is a self-diagnosis item. Diagnostic trouble code “ATF TEMP SEN/CIRC” with CONSULT-II or “10th judgement flicker” without CONSULT-II is detected when TCM receives an excessively low or high voltage from the sensor. Possible Cause Check the following items. + Harness or connectors (The sensor circuit is open or shorted.) + A/T fluid temperature sensors 1, 2 DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed. NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Select “DATA MONITOR” mode for “A/T” with CONSULT-II. 3. Start engine and maintain the following conditions for at least 10 minutes (Total). (It is not necessary to maintain continuously.) VHCL SPEED SE: 10 km/h (6 MPH) or more THRTL POS SEN: More than 1.0/8 Selector lever: “D” position 4. If DTC is detected, go to AT-112, “Diagnostic Procedure”. SAT014K WITHOUT CONSULT-II 1. Start engine. 2. Selector lever “D” position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full throttle position and driving for at least 10 minutes (Total). 3.
Perform self-diagnosis. Refer to AT-73, “SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)”. 4. If DTC is detected, go to AT-112, “Diagnostic Procedure”. AT-110 DTC P1710 A/T FLUID TEMPERATURE SENSOR CIRCUIT RE5R05A Wiring Diagram — AT — FTS TAT090M AT-111 DTC P1710 A/T FLUID TEMPERATURE SENSOR CIRCUIT RE5R05A Diagnostic Procedure 1.CHECK FLUID TEMPERATURE SENSOR (WITH CONSULT-II) With CONSULT-II 1. Start engine. 2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II. 3. Read out the value of “ATF TEMP SE 1” or “ATF TEMP SE 2”.
PCIA0039E Display value (Approx.) V Item name Condition °C (°F) Fluid temperature sensor 1 0 (32) - 20 (68) - 80 (176) Fluid temperature sensor 2 3.3 - 2.7 - 0.9 3.3 - 2.5 - 0.7 OK or NG?
OK >> GO TO 4.
NG >> Check the fluid temperature sensor. 2.CHECK FLUID TEMPERATURE SENSOR (WITHOUT CONSULT-II) Without CONSULT-II 1. Turn ignition switch to “OFF” position. 2. Disconnect A/T solenoid valve harness connector 1, 2 at the transmission right side. 3. Check the resistance between terminals and ground. SAT627K Name Connector No. Fluid temperature sensor 1 E238 A/T solenoid valve harness connector 1 Fluid temperature sensor 2 E239 A/T solenoid valve harness connector 2 Terminal No. 9 - Ground 11 - Ground Temperature °C (°F) Resistance (kΩ) (Approx.) 0 (32) 15 20 (68) 6.5 80 (176) 0.9 0 (32) 10.5 20 (68) 4.3 80 (176) 0.5 4.
Reinstall any part removed. OK or NG?
OK >> GO TO 3. NG >> Repair or replace damaged parts. AT-112 DTC P1710 A/T FLUID TEMPERATURE SENSOR CIRCUIT Diagnostic Procedure (Cont’d) RE5R05A 3.INPUT SIGNALS FROM THE OIL TEMPERATURE SENSOR (WITHOUT CONSULT-II) Without CONSULT-II 1. Start engine.
2. Check voltage between TCM connector and ground while warming up A/T. Name Connector No. Fluid temperature sensor 1 Terminal No. 8 - 24 or 46 (ground) Temperature °C (°F) Voltage (V) (Approx.) 0 (32) 3.3V 20 (68) 2.7V 80 (176) 0.9V 0 (32) 3.3V 20 (68) 2.5V 80 (176) 0.7V E123 Fluid temperature sensor 2 17 - 24 or 46 (ground) 3. Turn ignition switch to “OFF” position. 4. Disconnect the TCM connector. 5.
Check if there is continuity between the connector terminals and ground. OK or NG?
OK >> GO TO 4. NG >> Repair open circuit or short to ground or short to power in harness or connectors. 4.DETECT MALFUNCTIONING ITEM Check the following item: Harness for short to ground or short to power or open between TCM and A/T solenoid valve harness connector 1, 2 (Main harness). OK or NG? OK >> GO TO 5. NG >> Repair or replace damaged parts. 5.CHECK DTC Perform DTC confirmation procedure. OK or NG? OK >> INSPECTION END NG >> GO TO 6. 6.CHECK TCM INSPECTION 1.
Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1.
Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-113 DTC P1710 A/T FLUID TEMPERATURE SENSOR CIRCUIT RE5R05A Component Inspection FLUID TEMPERATURE SENSOR Check the resistance between terminals and ground. Name Connector No. Fluid temperature sensor 1 E238 A/T solenoid valve harness connector 1 Fluid temperature sensor 2 E239 A/T solenoid valve harness connector 2 SAT627K AT-114 Terminal No. 9 - Ground 11 - Ground Temperature °C (°F) Resistance (kΩ) (Approx.) 0 (32) 15 20 (68) 6.5 80 (176) 0.9 0 (32) 10.5 20 (68) 4.3 80 (176) 0.5 DTC P1716 TURBINE REVOLUTION SENSOR RE5R05A Description The turbine revolution sensor detects input shaft rpm (revolutions per minute). It is located on the input side of the automatic transmission. Display revolution of sensor 1 and sensor 2 abnormality.
On Board Diagnosis Logic + + + This is a self-diagnosis item. Diagnostic trouble code “TURBINE REV S/CIRC” with CONSULT-II or “11th judgement flicker” without CONSULT-II is detected when TCM does not receive the proper voltage signal from the sensor. Detects abnormality only at position of 4th gear for turbine revolution sensor 2. Possible Cause Check the following items.
+ Harness or connectors (The sensor circuit is open or shorted.) + Turbine revolution sensor 1, 2 DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed. NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II SAT014K 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Select “DATA MONITOR” mode for “A/T” with CONSULT-II. 3. Start engine and maintain the following conditions for at least 5 consecutive seconds. VHCL SPEED SE: 40 km/h (25 MPH) or more ENGINE SPEED: 1,500 rpm or more Selector lever: “D” position Gear position (Turbine revolution sensor 1): All position Gear position (Turbine revolution sensor 2): 4th or 5th position Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test. 4. If DTC is detected, go to AT-118, “Diagnostic Procedure”. WITHOUT CONSULT-II 1.
Start engine. 2. Drive vehicle under the following condition: Selector lever “D” position, vehicle speed higher than 40 km/h (25 MPH), engine speed more than 1,500 rpm and driving for at least 5 consecutive seconds. Gear position (Turbine revolution sensor 1): All position Gear position (Turbine revolution sensor 2): 4th or 5th position Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test. AT-115 RE5R05A DTC P1716 TURBINE REVOLUTION SENSOR DTC Confirmation Procedure (Cont’d) 3. Perform self-diagnosis. Refer to AT-73, “SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)”.
4. If DTC is detected, go to AT-118, “Diagnostic Procedure”.
AT-116 DTC P1716 TURBINE REVOLUTION SENSOR RE5R05A Wiring Diagram — AT — TRSA/T TAT091M AT-117 DTC P1716 TURBINE REVOLUTION SENSOR RE5R05A Diagnostic Procedure 1.CHECK INPUT SIGNALS (WITH CONSULT-II) With CONSULT-II 1. Start engine. 2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II. 3. Vehicle start and read out the value of “TURBINE REV”. OK or NG? OK >> GO TO 4. NG >> GO TO 3. PCIA0041E 2.CHECK INPUT SIGNALS (WITHOUT CONSULT-II) Without CONSULT-II 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Perform self-diagnosis. Refer to AT-73, “SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)”. OK or NG? OK >> GO TO 4. NG >> + Harness for short or open between TCM and turbine revolution sensor (Main harness). + Repair or replace damaged parts. 3.CHECK TURBINE REVOLUTION SENSOR (WITH CONSULT-II) With CONSULT-II 1. Turn ignition switch to “OFF” position. 2. Start engine. 3. Check the frequency. Name Condition Turbine revolution sensor 1 When moving at 20 km/h (12 MPH) in 1st speed with the closed throttle position switch “OFF”, use the CONSULT-II pulse frequency measuring function. CAUTION: Connect the diagnosis data link connector to the vehicle diagnosis connector. Turbine revolution sensor 2 When running at 50 km/h (31 MPH) in 4th speed with the closed throttle position switch “OFF”, use the CONSULT-II pulse frequency measuring function. CAUTION: Connect the diagnosis data link connector to the vehicle diagnosis connector. PCIA0042E Item Connector No. TCM Terminal No. Name 36 Turbine revolution sensor 1 45 Turbine revolution sensor 2 E124 Data (Approx.) 1.1 (kHz) OK or NG? OK >> GO TO 4. NG >> Repair open circuit or short to ground or short to power in harness or connectors. AT-118 DTC P1716 TURBINE REVOLUTION SENSOR Diagnostic Procedure (Cont’d) RE5R05A 4.CHECK DTC Perform DTC confirmation procedure.
OK or NG? OK >> INSPECTION END NG >> GO TO 5. 5.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG?
OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-119 DTC P1721 VEHICLE SPEED SENSOR MTR RE5R05A Description The vehicle speed sensorzMTR is built into the speedometer assembly. The sensor functions as an auxiliary device to the revolution sensor when it is malfunctioning. The TCM will then use a signal sent from the vehicle speed sensorzMTR. On Board Diagnosis Logic + + This is not a self-diagnosis item. Diagnostic trouble code “VHE SPD SEzMTR” with CONSULT-II is detected when TCM does not receive the proper voltage signal from the sensor. Possible Cause Check the following items. + Harness or connectors (The sensor circuit is open or shorted.) DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Select “DATA MONITOR” mode for “A/T” with CONSULT-II. 3. Start engine and maintain the following conditions for at least 5 consecutive seconds. ACCELE POS: 1/8 or less VHCL SPEED SE: 30 km/h (17 MPH) or more 4. If DTC is detected, go to AT-120, “Diagnostic Procedure”. SAT014K Diagnostic Procedure 1.CHECK INPUT SIGNALS (WITH CONSULT-II) With CONSULT-II 1. Start engine. 2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II. 3.
Vehicle start and read out the value of “VHCL/S SEzMTR”. OK or NG? OK >> GO TO 3. NG >> GO TO 2.
PCIA0033E AT-120 DTC P1721 VEHICLE SPEED SENSOR MTR Diagnostic Procedure (Cont’d) RE5R05A 2.CHECK DTC STEP 1 Check following items. 1. Refer to AT-75, “DTC U1000 CAN COMMUNICATION LINE”. 2. Wheel sensors. 3. Combination meter.
OK or NG?
OK >> INSPECTION END NG >> If NG, recheck pin terminals for damage or loose connection with harness connector. 3.CHECK DTC STEP 2 Perform DTC confirmation procedure. OK or NG? OK >> INSPECTION END NG >> If NG, recheck pin terminals for damage or loose connection with harness connector. AT-121 DTC P1730 A/T INTERLOCK RE5R05A Description + + Fail-safe function to detect interlock conditions. Fail-safe function to the transmission range switch detects the selector position and sends a signal to the TCM. On Board Diagnosis Logic + + + This is a self-diagnosis item. Diagnostic trouble code “A/T INTERLOCK” with CONSULT-II or “12th judgement flicker” without CONSULT-II is detected when TCM does not receive the proper voltage signal from the sensor and switch. Monitors and compares gear position and conditions of each pressure switch when gear is steady. Possible Cause Check the following items. + Harness or connectors (The solenoid and switch circuit is open or shorted.) + Input clutch, direct clutch, high & low reverse clutch, front brake, low coast brake solenoid valves + Pressure switch 1, 3, 5 and 6 DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II 1. 2. 3. 4. Turn ignition switch to “ON” position. (Do not start engine.) Select “DATA MONITOR” mode for “A/T” with CONSULT-II. Start engine. Drive vehicle and maintain the following conditions for at least 2 consecutive seconds. Selector lever: “D” position 5. If DTC is detected, go to AT-126, “Diagnostic Procedure”. SAT014K WITHOUT CONSULT-II 1. Start engine. 2. Drive vehicle for at least 2 consecutive seconds. 3. Perform self-diagnosis. Refer to AT-73, “SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)”. 4. If DTC is detected, go to AT-126, “Diagnostic Procedure”. AT-122 DTC P1730 A/T INTERLOCK RE5R05A Wiring Diagram — AT — I/LOCK TAT092M AT-123 RE5R05A DTC P1730 A/T INTERLOCK Wiring Diagram — AT — I/LOCK (Cont’d) TAT093M AT-124 RE5R05A DTC P1730 A/T INTERLOCK Wiring Diagram — AT — I/LOCK (Cont’d) TAT094M AT-125 RE5R05A DTC P1730 A/T INTERLOCK Judgement of A/T Interlock When A/T Interlock is judged to be abnormal, the vehicle should be fixed in 2nd, 4th, or 5th gear, and should be set in a condition in which it can travel. When one of the following fastening patterns is detected, the fail-safe function in correspondence with the individual pattern should be executed. A/T interlock coupling pattern table +: NG, X: OK Clutch pressure output pattern after fail-safe function Hydraulic pressure switch output Gear position 1st SW3 (I/C) SW6 (H & LR/C) + X 2nd SW1 SW2 (Fr/B) (LC/B) X D/C Fr/B LC/B L/U X Held in 4th speed ON ON ON OFF OFF OFF X Held in 4th speed ON ON ON OFF OFF OFF + X X Held in 4th speed ON ON ON OFF OFF OFF Held in 4th speed ON ON ON OFF OFF OFF Held in 2nd speed OFF OFF ON OFF OFF OFF Held in 4th speed ON ON ON OFF OFF OFF Held in 2nd speed OFF OFF ON OFF OFF OFF Held in 5th speed ON ON OFF ON OFF OFF Held in 2nd speed OFF OFF ON OFF OFF OFF Held in 4th speed ON ON ON OFF OFF OFF X X X X X + + X X X + 4th X X X + X + 5th X H& LR/C + 3rd X I/C X + A/T interlock coupling patterns Fail-safe function SW5 (D/C) + X Diagnostic Procedure 1.SELF-DIAGNOSIS (WITH CONSULT-II) SAT014K With CONSULT-II 1.
Start engine. 2. Select “SELF-DIAG RESULTS” mode for “A/T” with CONSULT-II. 3. Drive vehicle. OK or NG? OK >> GO TO 3. NG >> + Check pressure switch, Refer to AT-150, “DTC P1841 ATF PRESSURE SWITCH 1”, AT-154, “DTC P1843 ATF PRESSURE SWITCH 3”, AT-157, “DTC P1845 ATF PRESSURE SWITCH 5”, AT-160, “DTC P1846 ATF PRESSURE SWITCH 6”. + Check each solenoid valves, Refer to AT-131, “DTC P1752 INPUT CLUTCH SOLENOID VALVE”, AT-134, “DTC P1757 FRONT BRAKE SOLENOID VALVE”, AT-137, “DTC P1762 DIRECT CLUTCH SOLENOID VALVE”, AT-140, “DTC P1767 HIGH AND LOW REVERSE CLUTCH SOLENOID VALVE”, AT-143, “DTC P1772 LOW COAST BRAKE SOLENOID VALVE”. AT-126 DTC P1730 A/T INTERLOCK Diagnostic Procedure (Cont’d) RE5R05A 2.SELF-DIAGNOSIS (WITHOUT CONSULT-II) Without CONSULT-II SAT014K 1. Start engine. 2. Perform self-diagnosis. 3. Drive vehicle. OK or NG?
OK >> GO TO 3. NG >> + Check pressure switch, Refer to AT-150, “DTC P1841 ATF PRESSURE SWITCH 1”, AT-154, “DTC P1843 ATF PRESSURE SWITCH 3”, AT-157, “DTC P1845 ATF PRESSURE SWITCH 5”, AT-160, “DTC P1846 ATF PRESSURE SWITCH 6”. + Check each solenoid valves, Refer to AT-131, “DTC P1752 INPUT CLUTCH SOLENOID VALVE”, AT-134, “DTC P1757 FRONT BRAKE SOLENOID VALVE”, AT-137, “DTC P1762 DIRECT CLUTCH SOLENOID VALVE”, AT-143, “DTC P1767 HIGH AND LOW REVERSE CLUTCH SOLENOID VALVE”, AT-143, “DTC P1772 LOW COAST BRAKE SOLENOID VALVE”.
3.CHECK DTC Perform DTC confirmation procedure. OK or NG? OK >> INSPECTION END NG >> GO TO 4. 4.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG?
OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-127 DTC P1731 A/T 1ST ENGINE BRAKING RE5R05A Description Fail-safe function to prevent sudden decrease in speed by engine brake other than at 1st position or at 1st gear. On Board Diagnosis Logic + + + This is a self-diagnostic item. Diagnostic trouble code “A/T 1ST E/BRAKING” with CONSULT-II or “13th judgement flicker” without CONSULT-II is detected when TCM does not receive the proper voltage signal from the sensor. Monitors each pressure switch and solenoid monitor value, and detects as abnormal when engine brake acts other than at 1st position. Possible Cause Check the following items. + Harness or connectors (The sensor circuit is open or shorted.) + Low coast brake solenoid valve + Pressure switch 2 DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II 1. 2. 3. 4. Turn ignition switch to “ON” position.
(Do not start engine.) Select “DATA MONITOR” mode for “A/T” with CONSULT-II. Start engine. Drive vehicle and maintain the following conditions for at least 2 consecutive seconds. ENGINE SPEED: 1,200 rpm Selector lever: “M” position Gear position: “M1-1st” or “M2-2nd” gear position 5. If DTC is detected, go to AT-130, “Diagnostic Procedure”.
SAT014K WITHOUT CONSULT-II 1. Start engine.
2. Drive vehicle under the following conditions: Selector lever “M” position, gear position “M1-1st” or “M22nd”, engine speed more than 1,200 rpm and driving for at least 2 consecutive seconds. 3. Perform self-diagnosis. Refer to AT-73, “SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)”. 4. If DTC is detected, go to AT-130, “Diagnostic Procedure”. AT-128 DTC P1731 A/T 1ST ENGINE BRAKING RE5R05A Wiring Diagram — AT — E/BRE TAT095M AT-129 DTC P1731 A/T 1ST ENGINE BRAKING RE5R05A Diagnostic Procedure 1.CHECK SELF-DIAGNOSIS (WITH CONSULT-II) SAT014K With CONSULT-II 1. Turn ignition switch to “ON” position.
(Do not start engine.) 2. Select “SELF-DIAG RESULTS” mode for “A/T” with CONSULT-II. 3. Start engine and drive vehicle. OK or NG? OK >> GO TO 3. NG >> + Check the pressure switch. Refer to AT-150, “DTC P1841 ATF PRESSURE SWITCH 1”, AT-154, “DTC P1843 ATF PRESSURE SWITCH 3”, AT-157, “DTC P1845 ATF PRESSURE SWITCH 5”, AT-160, “DTC P1846 ATF PRESSURE SWITCH 6”. + Check the low coast brake solenoid. Refer to AT-143, “DTC P1772 LOW COAST BRAKE SOLENOID VALVE”. 2.CHECK SELF-DIAGNOSIS (WITHOUT CONSULT-II) WITHOUT CONSULT-II 1. Start engine. 2. Drive vehicle.
3. Perform self-diagnosis. OK or NG? OK >> GO TO 3. NG >> + Check the pressure switch. Refer to AT-150, “DTC P1841 ATF PRESSURE SWITCH 1”, AT-154, “DTC P1843 ATF PRESSURE SWITCH 3”, AT-157, “DTC P1845 ATF PRESSURE SWITCH 5”, AT-160, “DTC P1846 ATF PRESSURE SWITCH 6”. + Check the low coast brake solenoid. Refer to AT-143, DTC P1772 LOW COAST BRAKE SOLENOID VALVE.
3.CHECK DTC Perform DTC confirmation procedure. OK or NG? OK >> INSPECTION END NG >> GO TO 4. 4.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-130 DTC P1752 INPUT CLUTCH SOLENOID VALVE RE5R05A Description Input clutch solenoid valve operation by the TCM in response to signals sent from the PNP switch, vehicle speed and accelerator pedal position sensors. Gears will then be shifted to the optimum position. On Board Diagnosis Logic + + + This is a self-diagnosis item. Diagnostic trouble code “I/C SOLENOID/CIRC” with CONSULT-II or “5th judgement flicker” without CONSULT-II is detected when TCM detects an improper voltage drop when it tries to operate the solenoid valve. Detects as abnormal by comparing target value with monitor value. Possible Cause Check the following items. + Harness or connectors (The solenoid circuit is open or shorted.) + Input clutch solenoid valve DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed.
NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II 1. 2. 3. 4. SAT014K Turn ignition switch to “ON” position. (Do not start engine.) Select “DATA MONITOR” mode for “A/T” with CONSULT-II. Start engine. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds.
ACCELE POS: 1.5/8 - 2.0/8 Selector lever: “D” position Gear position: 3rd → 4th Gear (I/C ON/OFF) Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test. 5. If DTC is detected go to AT-133, “Diagnostic Procedure”. WITHOUT CONSULT-II 1. Start engine. 2. Drive vehicle under the following conditions: Selector lever “D” position, gear position 3rd → 4th, throttle opening greater than 1.5/8 - 2/8 of the full throttle position and driving for at least 5 consecutive seconds. Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test. 3. Perform self-diagnosis. Refer to AT-73, “SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)”. 4. If DTC is detected, go to AT-133, “Diagnostic Procedure”. AT-131 DTC P1752 INPUT CLUTCH SOLENOID VALVE RE5R05A Wiring Diagram — AT — I/C TAT096M AT-132 DTC P1752 INPUT CLUTCH SOLENOID VALVE RE5R05A Diagnostic Procedure 1.CHECK VALVE RESISTANCE 1. Turn ignition switch to “OFF” position. 2. Disconnect A/T solenoid valve harness connector 2 at the transmission right side. 3. Check the resistance between terminal and ground. Solenoid Valve Connector No. Terminal No. Resistance (Approx.) Input clutch solenoid valve E239 16 - Ground 3 - 9Ω OK or NG? OK >> GO TO 2. NG >> Repair or replace damaged parts. SAT628K 2.CHECK POWER SOURCE CIRCUIT 1. Turn ignition switch to “OFF” position. 2. Disconnect TCM connector. 3. Check continuity between A/T solenoid valve harness connector 2 and TCM connector. SAT629K Item Connector No. Terminal No. TCM E123 10 A/T solenoid valve harness connector 2 E239 16 Continuity Yes 4. If OK, check harness for short to ground and short to power. 5. Reinstall any part removed. OK or NG? OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors. 3.CHECK DTC Perform DTC confirmation procedure. OK or NG? OK >> INSPECTION END NG >> GO TO 4. 4.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-133 DTC P1757 FRONT BRAKE SOLENOID VALVE RE5R05A Description Front brake solenoid valve operation by the TCM in response to signals sent from the PNP switch, vehicle speed and throttle position sensors. Gears will then be shifted to the optimum position. On Board Diagnosis Logic + + + This is a self-diagnosis item.
Diagnostic trouble code “FR/B SOLENOID/CIRC” with CONSULT-II or “6th judgement flicker” without CONSULT-II is detected when TCM detects an improper voltage drop when it tries to operate the solenoid valve. Detects as abnormal by comparing target value with monitor value. Possible Cause Check the following items. + Harness or connectors (The solenoid circuit is open or shorted.) + Front brake solenoid valve DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed.
NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II 1. 2. 3. 4. SAT014K Turn ignition switch to “ON” position. (Do not start engine.) Select “DATA MONITOR” mode for “A/T” with CONSULT-II. Start engine. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds.
ACCELE POS: 1.5/8 - 2.0/8 Selector lever: “D” position Gear position: 1st → 3rd Gear (FR/B ON/OFF) Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test. 5. If DTC is detected go to AT-136, “Diagnostic Procedure”. WITHOUT CONSULT-II 1. Start engine. 2.

Drive vehicle under the following conditions: Selector lever “D” position, gear position 1st → 3rd, throttle opening greater than 1.5/8 - 2/8 of the full throttle position and driving for at least 5 consecutive seconds. Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test. 3.
Perform self-diagnosis. Refer to AT-73, “SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)”. 4. If DTC is detected, go to AT-136, “Diagnostic Procedure”. AT-134 DTC P1757 FRONT BRAKE SOLENOID VALVE RE5R05A Wiring Diagram — AT — FR/B TAT097M AT-135 DTC P1757 FRONT BRAKE SOLENOID VALVE RE5R05A Diagnostic
Procedure 1.CHECK VALVE RESISTANCE 1. Turn ignition switch to “OFF” position. 2. Disconnect A/T solenoid valve harness connector 2 at the transmission right side. 3. Check the resistance between terminal and ground. SAT630K Solenoid Valve Connector No. Terminal No. Resistance (Approx.) Front brake solenoid valve E239 15 - Ground 3 - 9Ω
OK or NG? OK >> GO TO 2. NG >> Repair or replace damaged parts.
2.CHECK POWER SOURCE CIRCUIT 1. Turn ignition switch to “OFF” position. 2. Disconnect TCM connector. 3. Check continuity between A/T solenoid valve harness connector 2 and TCM connector.
SAT631K Item Connector No. Terminal No. TCM E123 19 A/T solenoid valve harness connector 2 E239 15 Continuity Yes 4. If OK, check harness for short to ground and short to power. 5. Reinstall any part removed.
OK or NG? OK >> GO TO 3. NG >> Repair open circuit or short to ground or short to power in harness or connectors. 3.CHECK DTC Perform DTC confirmation procedure. OK or NG? OK >> INSPECTION END NG >> GO TO 4.
4.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.
OK or NG? OK >> INSPECTION END NG >> 1.
Repair or replace damaged parts. 2. Replace the transmission assembly.
Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-136 DTC P1762 DIRECT CLUTCH SOLENOID VALVE RE5R05A Description Direct clutch solenoid valve operation by the TCM in response to signals sent from the PNP switch, vehicle speed and throttle position sensors. Gears will then be shifted to the optimum position. On Board
Diagnosis Logic + + + This is a self-diagnosis item. Diagnostic trouble code “D/C SOLENOID/CIRC” with CONSULT-II or “2nd judgement flicker” without CONSULT-II is detected when TCM detects an improper voltage drop when it tries to operate the solenoid valve. Detects as abnormal by comparing target value with monitor value. Possible Cause
Check the following items. + Harness or connectors (The solenoid circuit is open or shorted.) + Direct clutch solenoid valve DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. After the repair, perform the
following procedure to confirm the malfunction is eliminated. WITH CONSULT-II 1. 2.
3. 4.
SAT014K Turn ignition switch to “ON” position. (Do not start engine.) Select “DATA MONITOR” mode for “A/T” with CONSULT-II. Start engine. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds. ACCELE POS: 1.5/8 - 2.0/8 Selector lever: “D” position Gear position: 1st → 2nd Gear (D/C ON/OFF) Driving location:
Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test. 5. If DTC is detected, go to AT-139, “Diagnostic Procedure”. WITHOUT CONSULT-II 1. Start engine. 2. Drive vehicle under the following conditions: Selector lever “D” position, gear position 1st → 2nd, throttle opening greater than 1.5/8 -
2/8 of the full throttle position and driving for at least 5 consecutive seconds. Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test. 3. Perform self-diagnosis.
Refer to AT-73, “SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)”. 4. If DTC is detected, go to AT-139, “Diagnostic Procedure”.
AT-137 DTC P1762 DIRECT CLUTCH SOLENOID VALVE RE5R05A Wiring Diagram — AT — D/C TAT098M AT-138 DTC P1762 DIRECT CLUTCH SOLENOID VALVE RE5R05A Diagnostic Procedure 1.CHECK VALVE RESISTANCE 1. Turn ignition switch to “OFF” position. 2.
Disconnect A/T solenoid valve harness connector 2 at the transmission right side.
3. Check the resistance between terminal and ground.
SAT632K Solenoid Valve Connector No. Terminal No. Resistance (Approx.) Direct clutch solenoid valve E239 14 - Ground 3 - 9Ω OK or NG?
OK >> GO TO 2. NG >> Repair or replace damaged parts. 2.CHECK POWER SOURCE CIRCUIT 1. Turn ignition switch to “OFF” position. 2. Disconnect TCM connector. 3. Check continuity between A/T solenoid valve harness connector 2 and TCM connector. SAT633K Item Connector No. Terminal No. TCM E123 21 A/T solenoid valve harness
connector 2 E239 14 Continuity Yes 4. If OK, check harness for short to ground and short to power. 5. Reinstall any part removed. OK or NG? OK >> GO TO 3. NG >> Repair open circuit or short to ground or short to power in harness or connectors. 3.CHECK DTC Perform DTC confirmation procedure. OK or NG? OK >> INSPECTION END NG >>
GO TO 4. 4.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG?
OK >> INSPECTION END NG >> 1.
Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”.
AT-139 DTC P1767 HIGH AND LOW REVERSE CLUTCH SOLENOID VALVE RE5R05A Description High & low reverse clutch solenoid valve operation by the TCM in response to signals sent from the PNP switch, vehicle speed and throttle position sensors. Gears will then be shifted to the optimum position. On Board Diagnosis Logic + + + This is a
self-diagnosis item.
Diagnostic trouble code “HLR/C SOL/CIRC” with CONSULT-II or “8th judgement flicker” without CONSULT-II is detected when TCM detects an improper voltage drop when it tries to operate the solenoid valve. Detects as abnormal by comparing target value with monitor value. Possible Cause Check the following items. + Harness or connectors (The
solenoid circuit is open or shorted.) + High & low reverse clutch solenoid valve DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed. NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. After the repair, perform
the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II 1. 2. 3. 4. SAT014K Turn ignition switch to “ON” position.
(Do not start engine.) Select “DATA MONITOR” mode for “A/T” with CONSULT-II. Start engine. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds. ACCELE POS: 1.5/8 - 2.0/8 Selector lever: “D” position Gear position: 1st → 3rd Gear (HLR/C ON/OFF) Driving location: Driving the vehicle uphill (increased engine
load) will help maintain the driving conditions required for this test. 5. If DTC is detected, go to AT-142, “Diagnostic Procedure”. WITHOUT CONSULT-II 1. Start engine.
2. Drive vehicle under the following conditions: Selector lever “D” position, gear position 1st → 3rd, throttle opening greater than 1.5/8 - 2/8 of the full throttle position and driving for at least 5 consecutive seconds. Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.
3. Perform self-diagnosis. Refer to AT-73, “SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)”. 4. If DTC is detected, go to AT-142, “Diagnostic Procedure”. AT-140 DTC P1767 HIGH AND LOW REVERSE CLUTCH SOLENOID VALVE RE5R05A Wiring Diagram — AT — HLR/C TAT099M AT-141 DTC P1767 HIGH AND LOW REVERSE CLUTCH
SOLENOID VALVE RE5R05A Diagnostic Procedure 1.CHECK VALVE RESISTANCE 1. Turn ignition switch to “OFF” position. 2. Disconnect A/T solenoid valve harness connector 2 at the transmission right side. 3.
Check the resistance between terminal and ground. SAT634K Solenoid Valve Connector No. Terminal No. Resistance (Approx.) High & low reverse clutch solenoid valve E239 13 - Ground 13 - 9Ω OK or NG? OK >> GO TO 2. NG >> Repair or replace damaged parts. 2.CHECK POWER SOURCE CIRCUIT 1. Turn ignition switch to “OFF” position.
2. Disconnect TCM connector. 3. Check continuity between A/T solenoid valve harness connector 2 and TCM connector. SAT635K Item Connector No. Terminal No. TCM E123 11 A/T solenoid valve harness connector 2 E239 13 Continuity Yes 4. If OK, check harness for short to ground and short to power. 5. Reinstall any part removed. OK or NG? OK
>> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors. 3.CHECK DTC Perform DTC confirmation procedure. OK or NG? OK >> INSPECTION END NG >> GO TO 4. 4.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with
harness connector. OK or NG?
OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement.” AT-142 DTC P1772 LOW COAST BRAKE SOLENOID VALVE RE5R05A Description Low coast brake solenoid valve a turned “ON” or “OFF” by the TCM in response to signals sent
from the PNP switch, vehicle speed and throttle position sensors.
Gears will then be shifted to the optimum position. On Board Diagnosis Logic + + This is a self-diagnosis item. Diagnostic trouble code “LC/B SOLENOID/CIRC” with CONSULT-II or “7th judgement flicker” without CONSULT-II is detected when TCM detects an improper voltage drop when it tries to operate the solenoid valve. Possible Cause Check
the following items.
+ Harness or connectors (The solenoid circuit is open or shorted.) + Low coast brake solenoid valve DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II 1. 2. 3. 4. Turn ignition switch to “ON” position. (Do not start engine.) Select “DATA MONITOR” mode for “A/T ” with CONSULT-II. Start engine. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds. Selector
lever: “M” position Gear position: “M1-1st” or “M2-2nd” gear (LC/B ON/OFF) 5. If DTC is detected, go to AT-145, “Diagnostic Procedure”. SAT014K WITHOUT CONSULT-II 1. Start engine. 2. Drive vehicle under the following conditions: Selector lever “M” position, gear position “M1-1st” or “M22nd”, throttle opening greater than 1.5/8 - 2/8 of the full
throttle position and driving for at least 5 consecutive seconds. Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test. 3. Perform self-diagnosis.
Refer to AT-73, “SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT-II)”. 4. If DTC is detected, go to AT-145, “Diagnostic Procedure”. AT-143 DTC P1772 LOW COAST BRAKE SOLENOID VALVE RE5R05A Wiring Diagram — AT — LC/B TAT100M AT-144 DTC P1772 LOW COAST BRAKE SOLENOID VALVE RE5R05A Diagnostic Procedure
1.CHECK VALVE RESISTANCE 1. Turn ignition switch to “OFF” position.
2.
Disconnect A/T solenoid valve harness connector 2 at the transmission right side. 3. Check the resistance between terminal and ground. SAT636K Solenoid Valve Connector No. Terminal No. Resistance (Approx.) Low coast brake solenoid valve E239 12 - Ground 20 - 40Ω OK or NG? OK >> GO TO 2. NG >> Repair or replace damaged parts. 2.CHECK
POWER SOURCE CIRCUIT 1. Turn ignition switch to “OFF” position.
2. Disconnect TCM connector. 3. Check continuity between A/T solenoid valve harness connector 2 and TCM connector. SAT637K Item Connector No. Terminal No. TCM E123 13 A/T solenoid valve harness connector 2 E239 12 Continuity Yes 4. If OK, check harness for short to ground and short to power. 5. Reinstall any part removed. OK or NG? OK
>> GO TO 3. NG >> Repair open circuit or short to ground or short to power in harness or connectors. 3.CHECK DTC Perform DTC confirmation procedure. OK or NG? OK >> INSPECTION END NG >> GO TO 4. 4.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose
connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-145 RE5R05A DTC P1815 MANUAL MODE SWITCH Description When an impossible pattern of switch signals is detected, this
is judged to be an abnormality.
CONSULT-II Reference Value in Data Monitor Mode Monitor Item Condition Reference Value Manual shift gate position (neutral) MANU MODE SW NON M-MODE SW UP SW LEVER DOWN SW LEVER ON [ON - OFF] Other than the above OFF Manual shift gate position OFF Other than the above ON Select lever: + side ON Other than the above
OFF Select lever: − side ON Other than the above OFF [ON - OFF] [ON - OFF] [ON - OFF] On Board Diagnosis Logic + + This is not a self-diagnosis item. Diagnostic trouble code “MANU MODE SW/CIR” with CONSULT-II is detected when monitors Manual mode, Non manual mode, Up or Down switch signal and detects as abnormal when impossible
input pattern occurs 1 second or more. Possible Cause Check the following items. + Harness or connectors (These switches circuit is open or shorted.) + Manual mode switch + Non manual mode switch + Up switch + Down switch DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn
ignition switch “OFF” and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II 1. 2. 3. 4. Turn ignition switch to “ON” position. (Do not start engine.) Select “DATA MONITOR” mode for “A/T” with CONSULT-II. Move selector lever to
“M” position. Start engine and vehicle start for at least 2 consecutive seconds. 5. If DTC is detected, go to AT-148, “Diagnostic Procedure”.
SAT014K AT-146 DTC P1815 MANUAL MODE SWITCH RE5R05A Wiring Diagram — AT — MMSW TAT118M AT-147 DTC P1815 MANUAL MODE SWITCH RE5R05A Diagnostic Procedure 1.CHECK MANUAL MODE SWITCH CIRCUIT (WITH CONSULT-II) With CONSULT-II 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Select
“TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II. 3. Read out ON/OFF switching action of the “MANU MODE SW”, “NON M-MODE SW”, “UP SW LEVER”, “DOWN SW LEVER”. OK or NG? OK >> GO TO 4. NG >> GO TO 3. PCIA0064E 2.CHECK MANUAL MODE SWITCH CIRCUIT (WITHOUT CONSULT-II) Without
CONSULT-II Drive the vehicle in the manual mode, and confirm that the actual gear position and the meter’s indication of the position mutually coincide when the selector lever is shifted to the “+ (up)” or “− (down)” side (1st ↔ 5th gear). OK or NG? OK >> GO TO 4. NG >> GO TO 3. 3.DETECT MALFUNCTIONING ITEM Check the following items.
+ Combination meter. + Manual mode switch. + Check pin terminals for damage or loose connection with harness connector.
OK or NG? OK >> GO TO 4.
NG >> Repair or replace damaged parts. 4.CHECK DTC Perform DTC confirmation procedure. OK or NG? OK >> INSPECTION END NG >> Replace the control device assembly. Component Inspection MANUAL MODE SWITCH Check continuity between terminals. Refer to AT-147, “Wiring Diagram — AT — MMSW”.
Item Position Connector No. Terminal No. (Unit side) Auto 11 - 12 Manual 8 - 11 Continuity Manual mode (select) SW Neutral UP SW 8 - 11 B25 Yes Up 10 - 11 Neutral 8 - 11 Down 9 - 11 DOWN SW AT-148 DTC P1815 MANUAL MODE SWITCH RE5R05A Position Indicator Lamp DIAGNOSTIC PROCEDURE 1.CHECK INPUT SIGNALS (WITH
CONSULT-II) PCIA0065E With CONSULT-II 1. Start the engine. 2.
Select “MAIN SIGNALS” in “DATA MONITOR” mode for A/T with CONSULT-II and read out the value of “GEAR”. 3. Drive the vehicle in the manual mode, and confirm that the actual gear position and the meter’s indication of the position mutually coincide when the select lever is shifted to the “+ (up)” or “− (down)” side (1st ↔ 5th gear).
OK or NG? OK >> INSPECTION END NG >> Check the following items. Position Indicator Lamp Symptom Chart Items Presumed Location of Trouble The actual gear position does not change, or shifting into the manual mode is not possible (no gear shifting in the manual mode possible). The position indicator lamp is not indicated. Manual mode SW
Refer to AT-146, “DTC P1815 MANUAL MODE SWITCH”. A/T main system (Fail-safe function actuated) + Refer to AT-68, “SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)”.
Execute the self-diagnosis function. The actual gear position changes, but the position indicator lamp + Refer to AT-68, “SELF-DIAGNOSTIC PROCEDURE (WITH is not indicated. CONSULT-II)”. The actual gear position and the indication on the position indicator lamp do not coincide. Execute the self-diagnosis function. + Refer to AT-68, “SELF-
DIAGNOSTIC PROCEDURE (WITH CONSULT-II)”. Only a specific position or positions is/are not indicated on the position indicator lamp. Check the meter Control unit. AT-149 DTC P1841 ATF PRESSURE SWITCH 1 RE5R05A Description Fail-safe function to detect front brake clutch solenoid valve condition. On Board Diagnosis Logic + + + This is
not a self-diagnostic item. Diagnostic trouble code “ATF PRES SW 1/CIRC” with CONSULT-II is detected. When condition of pressure switch 1 is different from monitor value, and relation between gear position and actual gear ratio is abnormal. (Other than during speed change) Possible Cause + + Pressure switch 1 Harness or connectors (The
switch circuit is open or shorted.) DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed. NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the
malfunction is eliminated. WITH CONSULT-II SAT014K 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Select “DATA MONITOR” mode for “A/T” with CONSULT-II. 3. Start engine and maintain the following conditions for at least 4 consecutive seconds. (Other than during speed change). ACCELE POS: 1.5/8 - 2.0/8 Selector lever: “D”
position Gear position: 1st → 3rd Gear (FR/B ON/OFF) Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test. 4. If P1841 is detected, go to AT-152, “Diagnostic Procedure”. If P1757 is detected, go to AT-136, “Diagnostic Procedure”. AT-150 DTC P1841 ATF PRESSURE
SWITCH 1 RE5R05A Wiring Diagram — AT — FPSW1 TAT102M AT-151 RE5R05A DTC P1841 ATF PRESSURE SWITCH 1 Diagnostic Procedure 1.INPUT SIGNALS (WITH CONSULT-II) With CONSULT-II 1. Start engine. 2. Select “TCM INPUT SIGNALS” or “MAIN SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II. 3. Drive vehicle in
the “D” position (1st → 3rd gear), and confirm the ON/OFF actuation of the “ATF PRES SW 1”. OK or NG? OK >> GO TO 4. NG >> GO TO 3. PCIA0067E 2.INPUT SIGNALS (WITHOUT CONSULT-II) Without CONSULT-II 1. Start engine. 2. Drive the vehicle in the “D” position (1st → 3rd gear). Solenoid Valve Front brake solenoid valve Terminal No.
Voltage E124 35 - Ground Battery voltage OFF ON PCIA0066E Connector No. Approx. 0V OK or NG? OK >> GO TO 4. NG >> GO TO 3. 3.DETECT MALFUNCTIONING ITEM Check the following items. 1. Check disconnection or short-circuit in the main harness between pressure switch 1 (FR/B) (PSB2) and TCM. 2. Check the connector housing for
missing, loosening, bending or falling down of any terminal. OK or NG? OK >> GO TO 4. NG >> Repair or replace damaged parts. 4.CHECK DTC Perform DTC confirmation procedure. OK or NG?
OK >> INSPECTION END NG >> GO TO 5. 5.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.
OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. AT-152 DTC P1841 ATF PRESSURE SWITCH 1 Diagnostic Procedure (Cont’d) RE5R05A 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-153 DTC P1843 ATF PRESSURE SWITCH 3 RE5R05A Description Fail-safe
function to detect input clutch solenoid valve condition. On Board Diagnosis Logic + + + This is not a self-diagnostic item. Diagnostic trouble code “ATF PRES SW 3/CIRC” with CONSULT-II is detected. When condition of pressure switch 3 is different from monitor value, and relation between gear position and actual gear ratio is abnormal. (Other
than during speed change) Possible Cause Check the following items. + Pressure switch 3 + Harness or connectors (The switch circuit is open or shorted.) DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed. NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait
at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II SAT014K 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Select “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Start engine and maintain the following conditions for at least 4 consecutive seconds. (Other than during speed change). ACCELE POS: 1.5/8 - 2.0/8 Selector lever: “D” position Gear position: 3rd → 4th Gear (I/C ON/OFF) Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this
test. 4. If P1843 is detected, go to AT-156, “Diagnostic Procedure”. If P1752 is detected, go to AT-133, “Diagnostic Procedure”. AT-154 DTC P1843 ATF PRESSURE SWITCH 3 RE5R05A Wiring Diagram — AT — FPSW3 TAT103M AT-155 DTC P1843 ATF PRESSURE SWITCH 3 RE5R05A Diagnostic Procedure 1.INPUT SIGNALS (WITH CONSULT-II)
With CONSULT-II 1. Start engine.
2. Select “TCM INPUT SIGNALS” or “MAIN SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Drive the vehicle in the “D” position (3rd → 4th gear), and confirm the ON/OFF actuation of the “ATF PRES SW 3”. OK or NG? OK >> GO TO 3.
NG >> GO TO 2. PCIA0067E 2.DETECT MALFUNCTIONING ITEM Check the following items. 1.
Check disconnection or short-circuit in the main harness between pressure switch 3 (I/C) (SEL 3 or DATA BIT 1) and TCM. 2.
Check the connector housing for missing, loosening, bending or falling down of any terminal. OK or NG? OK >> GO TO 3. NG >> Repair or replace damaged parts. 3.CHECK DTC Perform DTC confirmation procedure. OK or NG?
OK >> INSPECTION END NG >> Replace the transmission assembly.
Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-156 DTC P1845 ATF PRESSURE SWITCH 5 RE5R05A Description Fail-safe function to detect direct clutch solenoid valve condition. On Board Diagnosis Logic + + + This is not a self-diagnosis item. Diagnostic trouble code “ATF PRES SW 5/CIRC” with CONSULT-II is detected. When
condition of pressure switch 1 is different from monitor value, and relation between gear position and actual gear ratio is abnormal.
(Other than during speed change) Possible Cause Check the following items. + Pressure switch 5 + Harness or connectors (The switch circuit is open or shorted.) DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed.
NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the malfunction is eliminated. WITH CONSULT-II SAT014K 1.
Turn ignition switch to “ON” position.
(Do not start engine.) 2. Select “DATA MONITOR” mode for “A/T” with CONSULT-II. 3. Start engine and maintain the following conditions for at least 4 consecutive seconds.
(Other than during speed change). ACCELE POS: 1.5/8 - 2.0/8 Selector lever: “D” position Gear position: 1st → 2nd Gear (D/C ON/OFF) Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test. 4. If P1845 is detected, go to AT-159, “Diagnostic Procedure”. If P1762 is detected, go
to AT-139, “Diagnostic Procedure”. AT-157 DTC P1845 ATF PRESSURE SWITCH 5 RE5R05A Wiring Diagram — AT — FPSW5 TAT104M AT-158 DTC P1845 ATF PRESSURE SWITCH 5 RE5R05A Diagnostic Procedure 1.INPUT SIGNALS (WITH CONSULT-II) With CONSULT-II 1. Start engine.
2. Select “TCM INPUT SIGNALS” or “MAIN SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II. 3. Drive vehicle in the “D” position (1st → 2nd gear), and confirm the ON/OFF actuation of the “ATF PRES SW 5”. OK or NG? OK >> GO TO 3.
NG >> GO TO 2. PCIA0067E 2.DETECT MALFUNCTIONING ITEM Check the following items. 1. Check disconnection or short-circuit in the main harness between pressure switch 5 (D/C) (SEL 2 or DATA BIT 1) and TCM. 2. Check the connector housing for missing, loosening, bending or falling down of any terminal. OK or NG? OK >> GO TO 3. NG
>> Repair or replace damaged parts. 3.CHECK DTC Perform DTC confirmation procedure.
OK or NG? OK >> INSPECTION END NG >> Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-159 DTC P1846 ATF PRESSURE SWITCH 6 RE5R05A Description Fail-safe function to detect high & low reverse clutch solenoid valve condition.
On Board Diagnosis Logic + + + This is not a self-diagnosis item.
Diagnostic trouble code “ATF PRES SW 6/CIRC” with CONSULT-II is detected. When condition of pressure switch 6 is different from monitor value, and relation between gear position and actual gear ratio is abnormal. (Other than during speed change) Possible Cause Check the following items. + Pressure switch 6 + Harness or connectors (The
switch circuit is open or shorted.) DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed. NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. After the repair, perform the following procedure to confirm the
malfunction is eliminated. WITH CONSULT-II SAT014K 1.
Turn ignition switch to “ON” position. (Do not start engine.) 2. Select “DATA MONITOR” mode for “A/T” with CONSULT-II. 3. Start engine and maintain the following conditions for at least 4 consecutive seconds. (Other than during speed change). ACCELE POS: 1.5/8 - 2.0/8 Selector lever: “D” position Gear position: 1st → 3rd Gear (HLR/C ON/OFF)
Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test. 4. If P1846 is detected, go to AT-162, “Diagnostic Procedure”. If P1767 is detected, go to AT-142, “Diagnostic Procedure”. AT-160 DTC P1846 ATF PRESSURE SWITCH 6 RE5R05A Wiring Diagram — AT — FPSW6
TAT105M AT-161 RE5R05A DTC P1846 ATF PRESSURE SWITCH 6 Diagnostic Procedure 1.INPUT SIGNALS (WITH CONSULT-II) With CONSULT-II 1. Start engine. 2. Select “TCM INPUT SIGNALS” or “MAIN SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II. 3. Drive vehicle in the “D” position (1st → 3rd gear), and confirm the
ON/OFF actuation of the “ATF PRES SW 6”. OK or NG? OK >> GO TO 4. NG >> GO TO 3. PCIA0067E 2.INPUT SIGNALS (WITHOUT CONSULT-II) Without CONSULT-II 1. Start engine. 2. Drive vehicle in the “D” position (1st → 3rd gear).
Solenoid Valve High & low reverse clutch solenoid valve PCIA0068E Connector No. Terminal No. Voltage E124 26 - Ground Battery voltage OFF ON Approx. 0V OK or NG? OK >> GO TO 4. NG >> GO TO 3. 3.DETECT MALFUNCTIONING ITEM Check the following items.
1. Check disconnection or short-circuit in the main harness between pressure switch 6 (HLR/C) (PSC 2) and TCM. 2. Check the connector housing for missing, loosening, bending or falling down of any terminal. OK or NG? OK >> GO TO 4. NG >> Repair or replace damaged parts. 4.CHECK DTC Perform DTC confirmation procedure. OK or NG? OK
>> INSPECTION END NG >> GO TO 5. 5.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. AT-162 DTC P1846 ATF PRESSURE SWITCH 6 Diagnostic Procedure (Cont’d) RE5R05A 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly
Replacement”.
AT-163 PARK/NEUTRAL POSITION, MANUAL MODE, BRAKE AND THROTTLE POSITION SWITCH CIRCUIT RE5R05A Diagnostic Procedure 1.CHECK PNP SW CIRCUIT (WITH CONSULT-II) With CONSULT-II 1.
Turn ignition switch to “ON” position. (Do not start engine.) 2. Select “MAIN SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II. 3. Read out “PzN”, “R” and “D” position switches moving selector lever to each position. OK or NG? OK >> GO TO 3. NG >> GO TO 2. PCIA0034E 2.DETECT MALFUNCTIONING ITEM Check the following
items. + Disconnection or short-circuit in the main harness between TCM and PNP switch 1, 2, 3, 4. + Disconnection or short-circuit in the main harness between PNP switch 3 monitor and TCM. + PNP switch. Refer to AT-82, “DTC P0705 PARK/NEUTRAL POSITION SWITCH”. OK or NG? OK >> GO TO 3. NG >> Repair or replace damaged parts.
3.CHECK MANUAL MODE SWITCH CIRCUIT (WITH CONSULT-II) With CONSULT-II 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II. 3. Read out ON/OFF switching action of the “MANU MODE SW”, “NON M-MODE SW”, “UP SW LEVER”,
“DOWN SW LEVER”. OK or NG? OK >> GO TO 5. NG >> GO TO 4. PCIA0064E 4.DETECT MALFUNCTIONING ITEM Check the following items. + Manual mode switch. Refer to AT-146, “DTC P1815 MANUAL MODE SWITCH”. + Check the connector housing for missing, loosening, bending or falling down of any terminal. OK or NG? OK >> GO TO
5. NG >> Repair or replace damaged parts. AT-164 PARK/NEUTRAL POSITION, MANUAL MODE, BRAKE AND THROTTLE POSITION SWITCH CIRCUIT Diagnostic Procedure (Cont’d) RE5R05A 5.CHECK BRAKE SWITCH CIRCUIT (WITH CONSULT-II) With CONSULT-II 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Select “TCM
INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II. 3. Read out ON/OFF switching action of the “BRAKE SW”. OK or NG? OK >> GO TO 6. NG >> Refer to BR section. PCIA0070E 6.CHECK CLOSED THROTTLE POSITION SWITCH CIRCUIT (WITH CONSULT-II) With CONSULT-II 1. Turn ignition switch to “ON” position. (Do
not start engine.) 2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II. 3. Depressed accelerator pedal and read out the value of “CLSO THL POS” and “W/O THL POS”. PCIA0070E Monitor Item Accelerator Pedal Operation CLSD THL POS W/O THL POS Released ON OFF Fully depressed OFF ON 4. Select “SELF-
DIAG RESULTS” mode for “ENGINE” with CONSULT-II.
5.
If P0121 is detected, go to EC section, “DTC P0121 ACCELERATOR PEDAL POSITION (APP) SENSOR”. OK or NG? OK >> GO TO 7. NG >> Repair or replace damaged parts. 7.CHECK DTC Perform DTC confirmation procedure. + Refer to AT-75, “CONSULT-II”. + CAN Communication Line. Refer to AT-75, “DTC U1000 CAN COMMUNICATION
LINE”. OK or NG? OK >> INSPECTION END NG >> GO TO 8. 8.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission
assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-165 TROUBLE DIAGNOSES FOR SYMPTOMS RE5R05A Wiring Diagram — AT — NONDTC TAT106M AT-166 RE5R05A TROUBLE DIAGNOSES FOR SYMPTOMS Wiring Diagram — AT — NONDTC (Cont’d) TAT116M AT-167 TROUBLE DIAGNOSES FOR SYMPTOMS RE5R05A
A/T CHECK Indicator Lamp Does not Come on SYMPTOM A/T CHECK indicator lamp does not come on for about 2 seconds when turning ignition switch to “ON”. DIAGNOSTIC PROCEDURE 1.CHECK TCM POWER SOURCE STEP 1 1. Turn ignition switch to “OFF” position. 2. Check the voltage between TCM connector and ground.
Refer to AT-101, “Wiring Diagram — AT — POWER”. Item Connector No. Terminal No. Voltage TCM E123 9 - Ground Battery voltage OK or NG? OK >> GO TO 2. NG >> GO TO 3. 2.CHECK TCM POWER SOURCE STEP 2 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Check the voltage between TCM connector terminals 33, 42 and
ground. Refer to AT-101, “Wiring Diagram — AT — POWER”. Item Connector No. TCM E124 Terminal No. Voltage 33 - Ground Battery voltage 42 - Ground OK or NG?
OK >> GO TO 4. NG >> GO TO 3. 3.DETECT MALFUNCTIONING ITEM Check the following items: + Harness for short or open between battery and TCM terminal 9 (Main harness) + Harness for short or open between ignition switch and TCM terminals 33 and 42 (Main harness) + 10A fuse [No. 45] or 7.5A fuse [No. 12, located in the fuse block
(J/B)] + Ignition switch OK or NG? OK >> GO TO 4. NG >> Repair or replace damaged parts. 4.CHECK TCM GROUND CIRCUIT 1. Turn ignition switch to “OFF” position. 2. Disconnect the TCM connector.
3. Check continuity between terminals 5, 14, 24, 46 and ground. Refer to AT-101, “Wiring Diagram — AT — POWER”. 4. If OK, check the harness for short-circuit to ground or the power source. OK or NG? OK >> GO TO 5. NG >> Repair the short-circuit(s) in the harness or connector to ground or the power source. AT-168 RE5R05A TROUBLE
DIAGNOSES FOR SYMPTOMS A/T CHECK Indicator Lamp Does not Come on (Cont’d) 5.CHECK A/T CHECK INDICATOR LAMP CIRCUIT 1. Turn ignition switch to “OFF” position. 2. Check the combination meter. OK or NG? OK >> GO TO 6. NG >> Check the following item. + Refer to AT-75, “DTC U1000 CAN COMMUNICATION LINE”.
6.CHECK SYMPTOM Check again. OK or NG? OK >> INSPECTION END NG >> GO TO 7. 7.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. Refer to AT-101. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace
damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. Engine Cannot Be Started In “P” and “N” Position SYMPTOM + + Engine cannot be started with selector lever in “P” or “N” position.
Engine can be started with selector lever in “D” or “R” position. DIAGNOSTIC PROCEDURE 1.CHECK PNP SWITCH CIRCUIT With CONSULT-II Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to PNP switch circuit? Without CONSULT-II Does self-diagnosis show damage to PNP switch circuit? Yes or No? Yes >> Check PNP switch
circuit. Refer to AT-82, “DTC P0705 PARK/NEUTRAL POSITION SWITCH”. No >> GO TO 2.
2.CHECK STARTING SYSTEM Check starting system.
OK or NG? OK >> INSPECTION END NG >> Repair or replace damaged parts. AT-169 TROUBLE DIAGNOSES FOR SYMPTOMS RE5R05A In “P” Position, Vehicle Moves When Pushed SYMPTOM Even though the selector lever is set in the “P” position, the parking mechanism is not actuated, allowing the vehicle to be moved when it is pushed.
DIAGNOSTIC PROCEDURE 1.CHECK PNP SW CIRCUIT With CONSULT-II Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to PNP switch circuit? Without CONSULT-II Does self-diagnosis show damage to PNP switch circuit? Yes or No? Yes >> Check PNP switch circuit. Refer to AT-82, “DTC P0705 PARK/NEUTRAL POSITION
SWITCH”. No >> GO TO 2. 2.CHECK CONTROL CABLE Check control linkage. Refer to AT-196, “Control Linkage Adjustment”. OK or NG? OK >> GO TO 3. NG >> + Adjust control linkage. Refer to AT-196, “Control Linkage Adjustment”.
+ Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. 3.CHECK SYMPTOM Check again. OK or NG? OK >> INSPECTION END NG >> GO TO 4. 4.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2.
If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2.
Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-170 TROUBLE DIAGNOSES FOR SYMPTOMS RE5R05A In “N” Position, Vehicle Moves SYMPTOM Vehicle moves forward or backward when selecting “N” position. DIAGNOSTIC PROCEDURE 1.CHECK PNP SWITCH CIRCUIT With CONSULT-II
Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to PNP switch circuit? Without CONSULT-II Does self-diagnosis show damage to PNP switch circuit? Yes or No? Yes >> Check PNP switch circuit. Refer to AT-82, “DTC P0705 PARK/NEUTRAL POSITION SWITCH”. No >> GO TO 2. 2.CHECK CONTROL CABLE Check control linkage.
Refer to AT-196, “Control Linkage Adjustment”. OK or NG? OK >> GO TO 3. NG >> + Adjust control linkage. Refer to AT-196, “Control Linkage Adjustment”. + Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. 3.CHECK SYMPTOM Check again. OK or NG? OK >> INSPECTION END NG >> GO TO 4.
4.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2.
If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >>1. Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-171 TROUBLE DIAGNOSES FOR SYMPTOMS RE5R05A Large Shock “N”
to “D” Position SYMPTOM A noticeable shock occurs when the selector lever is shifted from the “N” to “D” position. DIAGNOSTIC PROCEDURE 1.CHECK SELF-DIAGNOSIS RESULTS Execute self-diagnosis. Do the self-diagnosis results indicate A/T fluid temperature sensor, line pressure solenoid valve, or throttle position sensor? Yes >> Check the
malfunctioning system. Refer to AT-97, “DTC P0745 LINE PRESSURE SOLENOID VALVE”, AT-108, “DTC P1705 THROTTLE POSITION SENSOR”, AT-110, “DTC P1710 A/T FLUID TEMPERATURE SENSOR CIRCUIT”. No >> GO TO 2. 2.CHECK ACCELERATOR PEDAL POSITION SENSOR Check the accelerator pedal position sensor. Refer to EC
section, “DTC P0121 ACCELERATOR PEDAL POSITION (APP) SENSOR”. OK or NG? OK >> GO TO 3. NG >> Repair or replace the accelerator pedal position sensor. 3.CHECK LINE PRESSURE Check the line pressure with the engine idling in the “D” position. Refer to AT-52, “LINE PRESSURE TEST”. OK or NG? OK >> GO TO 4. NG >> Check line
pressure solenoid valve. Refer to AT-97, “DTC P0745 LINE PRESSURE SOLENOID VALVE”. 4.CHECK SYMPTOM Check again. OK or NG?
OK >> INSPECTION END NG >> GO TO 5. 5.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-
15, “Precautions for A/T Assembly Replacement”. AT-172 TROUBLE DIAGNOSES FOR SYMPTOMS RE5R05A Vehicle Does Not Creep Backward In “R” Position SYMPTOM The vehicle does not creep in the “R” position. Or an extreme lack of acceleration is observed. DIAGNOSTIC PROCEDURE 1.CHECK A/T FLUID LEVER Check A/T fluid level again.
Refer to MA section, “Checking A/T Fluid”. OK or NG? OK >> GO TO 2.
NG >> Refill ATF.
2.CHECK STALL TEST Check the number of revolutions when the engine is stalled. Refer to AT-50, “STALL TEST”. OK or NG? OK >> GO TO 3.
NG >> GO TO 4. 3.CHECK LINE PRESSURE Check the line pressure with the engine idling. Refer to AT-52, “LINE PRESSURE TEST”. OK or NG? OK >> GO TO 4. NG >> Check line pressure solenoid valve.
Refer to AT-97, “DTC P0745 LINE PRESSURE SOLENOID VALVE”. 4.CHECK PNP SWITCH CIRCUIT With CONSULT-II Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to PNP switch circuit? Without CONSULT-II Does self-diagnosis show damage to PNP switch circuit? Yes or No? Yes >> Check PNP switch circuit.
Refer to AT-82, “DTC P0705 PARK/NEUTRAL POSITION SWITCH”. No >> GO TO 5. 5.CHECK SYMPTOM Check again. OK or NG? OK >> INSPECTION END NG >> GO TO 6. 6.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK
or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-173 TROUBLE DIAGNOSES FOR SYMPTOMS RE5R05A Vehicle Does Not Creep Forward In “D” Position SYMPTOM Vehicle does not creep forward when selecting “D”
position. DIAGNOSTIC PROCEDURE 1.CHECK A/T FLUID LEVEL Check A/T fluid level again. Refer to MA section, “Checking A/T Fluid”. OK or NG? OK >> GO TO 2.
NG >> Refill ATF. 2.CHECK STALL TEST Check stall revolution with selector lever in “D” position. Refer to AT-50, “STALL TEST”. OK or NG? OK >> GO TO 3. NG >> GO TO 4.
3.CHECK LINE PRESSURE Check line pressure at idle with selector lever in “R” position. Refer to AT-52, “LINE PRESSURE TEST”.
OK or NG?
OK >> GO TO 4. NG >> Check line pressure solenoid valve. Refer to AT-97, “DTC P0745 LINE PRESSURE SOLENOID VALVE”. 4.CHECK PNP SWITCH CIRCUIT With CONSULT-II Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to PNP switch circuit? Without CONSULT-II Does self-diagnosis show damage to PNP switch circuit?
Yes or No? Yes >> Check PNP switch circuit. Refer to AT-82, “DTC P0705 PARK/NEUTRAL POSITION SWITCH”. No >> GO TO 5. 5.CHECK SYMPTOM Check again. OK or NG? OK >> INSPECTION END NG >> GO TO 6. 6.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or
loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-174 TROUBLE DIAGNOSES FOR SYMPTOMS RE5R05A Vehicle Cannot Be Started From D1 SYMPTOM Vehicle cannot be
started from D1 on cruise test — Part 1. DIAGNOSTIC PROCEDURE 1.CHECK CONFIRM THE PROBLEM Vehicle does not creep in “R” position. OK or NG?
OK >> GO TO 2. NG >> Refer to AT-173, “Vehicle Does Not Creep Backward In “R” Position”. 2.CHECK SELF-DIAGNOSIS RESULTS Execute self-diagnosis. Do the self-diagnosis results indicate vehicle speed sensor A/T (revolution sensor), line pressure solenoid? Yes >> Check the malfunctioning system.
Refer to AT-86, “DTC P0720 VEHICLE SPEED SENSOR A/T (REVOLUTION SENSOR)”, AT-97, “DTC P0745 LINE PRESSURE SOLENOID VALVE”. No >> GO TO 2. 3.CHECK ACCELERATOR PEDAL POSITION SENSOR Check the accelerator pedal position sensor. Refer to EC section, “DTC P0121 ACCELERATOR PEDAL POSITION (APP) SENSOR”.
OK or NG? OK >> GO TO 3. NG >> Repair or replace the accelerator pedal position sensor. 4.CHECK LINE PRESSURE Check the line pressure at the engine stall point. Refer to AT-52, “LINE PRESSURE TEST”. OK or NG? OK >> GO TO 5. NG >> Replace the transmission assembly. Refer to AT-15, Precautions for A/T Assembly Replacement”.
5.CHECK SYMPTOM Check again. OK or NG? OK >> INSPECTION END NG >> GO TO 6. 6.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2.
Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”.
AT-175 TROUBLE DIAGNOSES FOR SYMPTOMS RE5R05A A/T Does Not Shift: D1 → D2 Or Does Not Kick down: D4 → D2 SYMPTOM The vehicle does not shift up from the D1 to D2 at the specified speed, or it does not kick down from the D4 to D2 even when the accelerator pedal is fully depressed. DIAGNOSTIC PROCEDURE 1.CHECK CONFIRM
THE PROBLEM Vehicle does not creep forward in “D” position and vehicle cannot be started from D1. OK or NG?
OK >> GO TO 2. NG >> Refer to AT-174, “Vehicle Does Not Creep Forward In “D” Position”, AT-175, “Vehicle Cannot Be Started From D1”. 2.CHECK PNP SWITCH CIRCUIT With CONSULT-II Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to PNP switch circuit? Without CONSULT-II Does self-diagnosis show damage to PNP
switch circuit? Yes or No?
Yes >> Check PNP switch circuit. Refer to AT-82, “DTC P0705 PARK/NEUTRAL POSITION SWITCH”. No >> GO TO 3. 3.CHECK SELF-DIAGNOSIS RESULTS Check vehicle speed sensor A/T (revolution sensor) and vehicle speed sensor MTR circuits. Refer to AT-86, “DTC P0720 VEHICLE SPEED SENSOR A/T (REVOLUTION SENSOR)”, AT-120, “DTC
P1721 VEHICLE SPEED SENSOR MTR”. OK or NG? OK >> GO TO 4. NG >> Repair or replace vehicle speed sensor A/T (revolution sensor) or vehicle speed sensor MTR. 4.CHECK ACCELERATOR PEDAL POSITION SENSOR Check the accelerator pedal position sensor. Refer to EC section, “DTC P0121 ACCELERATOR PEDAL POSITION (APP)
SENSOR”. OK or NG? OK >> GO TO 5. NG >> Repair or replace the accelerator pedal position sensor. 5.CHECK SYMPTOM Check again. OK or NG? OK >> INSPECTION END NG >> GO TO 6.
AT-176 RE5R05A TROUBLE DIAGNOSES FOR SYMPTOMS A/T Does Not Shift: D1 → D2 Or Does Not Kick down: D4 → D2 (Cont’d) 6.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1.
Repair or replace damaged parts. 2. Replace the transmission assembly.
Refer to AT-15, “Precautions for A/T Assembly Replacement”. SYMPTOM A/T Does Not Shift: D2 → D3 A/T does not shift up from the D2 to D3 at the specified speed. DIAGNOSTIC PROCEDURE 1.CHECK CONFIRM THE PROBLEM Vehicle does not creep forward in “D” position and vehicle cannot be started from D1.
OK or NG? OK >> GO TO 2.
NG >> Refer to AT-174, “Vehicle Does Not Creep Forward In “D” Position”, AT-175, “Vehicle Cannot Be Started From D1”. 2.CHECK PNP SWITCH CIRCUIT With CONSULT-II Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to PNP switch circuit? Without CONSULT-II Does self-diagnosis show damage to PNP switch circuit? Yes or
No? Yes >> Check PNP switch circuit. Refer to AT-82, “DTC P0705 PARK/NEUTRAL POSITION SWITCH”. No >> GO TO 3. 3.CHECK ACCELERATOR PEDAL POSITION SENSOR Check the accelerator pedal position sensor. Refer to EC section, “DTC P0121 ACCELERATOR PEDAL POSITION (APP) SENSOR”. OK or NG? OK >> GO TO 4.
NG >> Repair or replace the accelerator pedal position sensor. 4.CHECK SYMPTOM Check again. OK or NG?
OK >> INSPECTION END NG >> GO TO 5. 5.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG?
OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”.
AT-177 TROUBLE DIAGNOSES FOR SYMPTOMS RE5R05A A/T Does Not Shift: D3 → D4 SYMPTOM + + The vehicle does not shift up from the D3 to D4 at the specified speed. The vehicle does not shift up from the D3 to D4 unless A/T is warmed up. DIAGNOSTIC PROCEDURE 1.CHECK CONFIRM THE PROBLEM Vehicle does not creep forward in
“D” position and vehicle cannot be started from D1. OK or NG? OK >> GO TO 2. NG >> Refer to AT-174, “Vehicle Does Not Creep Forward In “D” Position”, AT-175, “Vehicle Cannot Be Started From D1”.
2.PNP SWITCH CIRCUIT With CONSULT-II Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to PNP switch circuit? Without CONSULT-II Does self-diagnosis show damage to PNP switch circuit? Yes or No? Yes >> Check PNP switch circuit. Refer to AT-82, “DTC P0705 PARK/NEUTRAL POSITION SWITCH”. No >> GO TO 3.
3.CHECK ACCELERATOR PEDAL POSITION SENSOR Check the accelerator pedal position sensor. Refer to EC section, “DTC P0121 ACCELERATOR PEDAL POSITION (APP) SENSOR”. OK or NG? OK >> GO TO 4. NG >> Repair or replace the accelerator pedal position sensor. 4.CHECK SYMPTOM Check again. OK or NG? OK >> INSPECTION END
NG >> GO TO 5. 5.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG?
OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-178 TROUBLE DIAGNOSES FOR SYMPTOMS RE5R05A A/T Does Not Shift: D4 → D5 SYMPTOM + + The vehicle does not shift up from the D4 to D5 at the specified speed. The
vehicle does not shift up from the D4 to D5 unless A/T is warmed up. DIAGNOSTIC PROCEDURE 1.CHECK CONFIRM THE PROBLEM Vehicle does not creep forward In “D” position and vehicle cannot be started from D1. OK or NG? OK >> GO TO 2. NG >> Refer to AT-174, “Vehicle Does Not Creep Forward In “D” Position”, AT-175, “Vehicle Cannot
Be Started From D1”. 2.CHECK SELF-DIAGNOSIS RESULTS With CONSULT-II After executing a traveling test, confirm that the self-diagnosis results indicate the following defective items: + PNP switch + A/T fluid temperature sensor + Vehicle speed sensor A/T (revolution sensor) + Vehicle speed sensor MTR Without CONSULT-II Execute the self-
diagnosis and confirm that a malfunction is indicated in the results. Yes or No? Yes >> Check the defective system(s). Refer to AT-82, “DTC P0705 PARK/NEUTRAL POSITION SWITCH”, AT-86, “DTC P0720 VEHICLE SPEED SENSOR A/T (REVOLUTION SENSOR)”, AT-110, “DTC P1710 A/T FLUID TEMPERATURE SENSOR CIRCUIT”, AT-120, “DTC
P1721 VEHICLE SPEED SENSOR MTR”. No >> GO TO 3. 3.CHECK ACCELERATOR PEDAL POSITION SENSOR Check the accelerator pedal position sensor. Refer to EC section, “DTC P0121 ACCELERATOR PEDAL POSITION (APP) SENSOR”. OK or NG? OK >> GO TO 4. NG >> Repair or replace the accelerator pedal position sensor.
4.CHECK SYMPTOM Check again. OK or NG? OK >> INSPECTION END NG >> GO TO 5. 5.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2.
Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-179 TROUBLE DIAGNOSES FOR SYMPTOMS RE5R05A A/T Does Not Perform Lock-up SYMPTOM A/T does not lock-up at the specified speed. DIAGNOSTIC PROCEDURE 1.CHECK SELF-DIAGNOSIS RESULTS Execute self-diagnosis results indicate

TCC solenoid valve. Yes or No? Yes >> Check the TCC solenoid valve circuit. Refer to AT-94, “DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE”.
No >> GO TO 2. 2.CHECK ACCELERATOR PEDAL POSITION SENSOR Check the accelerator pedal position sensor. Refer to EC section, “DTC P0121 ACCELERATOR PEDAL POSITION (APP) SENSOR”. OK or NG? OK >> GO TO 3. NG >> Repair or replace the accelerator pedal position sensor. 3.CHECK SYMPTOM Check again. OK or NG? OK >> INSPECTION END NG >> GO TO 4. 4.CHECK TCM INSPECTION 1.
Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-180 TROUBLE DIAGNOSES FOR SYMPTOMS RE5R05A A/T Does Not Hold Lock-up Condition SYMPTOM A/T lock-up condition cannot be maintained for more than 30 seconds. DIAGNOSTIC PROCEDURE 1.CHECK SELF-DIAGNOSIS RESULTS Does self-diagnosis show damage to engine speed signal circuit after cruise test. Yes or No? Yes >> Check the engine speed signal circuit. Refer to AT-120, “DTC P0725 ENGINE SPEED SIGNAL”. No >> GO TO 2. 2.CHECK SYMPTOM Check again. OK or NG? OK >> INSPECTION END NG >> GO TO 3. 3.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. Lock-up Is Not Released SYMPTOM A/T lock-up condition cannot be cancelled even after releasing the accelerator pedal. DIAGNOSTIC PROCEDURE 1.CHECK SELF-DIAGNOSIS RESULTS With CONSULT-II Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to closed throttle position and wide open throttle position switch circuit. Refer to AT-75, “DTC U1000 CAN COMMUNICATION LINE”. Without CONSULT-II Execute the self-diagnosis and confirm that a malfunction in the CAN communication is indicated in the results. Yes or No? Yes >> Check the CAN communication line. Refer to AT-75, “DTC U1000 CAN COMMUNICATION LINE”. No >> GO TO 2.
2.CHECK SYMPTOM Check again. OK or NG? OK >> INSPECTION END NG >> GO TO 3. AT-181 TROUBLE DIAGNOSES FOR SYMPTOMS Lock-up Is Not Released (Cont’d) RE5R05A 3.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. Engine Speed Does Not Return To Idle SYMPTOM When a shift down is performed, the engine speed does not smoothly return to the idling speed.
DIAGNOSTIC PROCEDURE 1.CHECK SELF-DIAGNOSIS RESULTS Execute self-diagnosis. Do the self-diagnosis results indicate a malfunction in the manual mode SW? Yes >> Check the manual mode switch. Refer to AT-146, “DTC P1815 MANUAL MODE SWITCH”. No >> GO TO 2. 2.CHECK ACCELERATOR PEDAL POSITION SENSOR Check the accelerator pedal position sensor. Refer to EC section, “DTC P0121 ACCELERATOR PEDAL POSITION (APP) SENSOR”. OK or NG? OK >> GO TO 3. NG >> Repair or replace the accelerator pedal position sensor. 3.CHECK SYMPTOM Check again. OK or NG? OK >> INSPECTION END NG >> GO TO 4. 4.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts.
2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-182 TROUBLE DIAGNOSES FOR SYMPTOMS RE5R05A A/T Does Not Shift: D5 → D4 SYMPTOM The vehicle does not shift down from the D5 to D4. DIAGNOSTIC PROCEDURE 1.CHECK SELF-DIAGNOSIS With CONSULT-II After executing a traveling test, confirm that the self-diagnosis results indicate the following malfunctioning items: + Input clutch solenoid valve + Vehicle speed sensor A/T (revolution sensor) + Vehicle speed sensor MTR Without CONSULT-II Execute the self-diagnosis and confirm that a malfunction is indicated in the results. Yes or No? Yes >> Check the malfunctioning system(s).
Refer to AT-86, “DTC P0720 VEHICLE SPEED SENSOR A/T (REVOLUTION SENSOR)”, AT-120, “DTC P1721 VEHICLE SPEED SENSOR MTR”, AT-131, “DTC P1752 INPUT CLUTCH SOLENOID VALVE”. No >> GO TO 2. 2.CHECK SYMPTOM Check again. OK or NG? OK >> INSPECTION END NG >> GO TO 3. 3.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-183 TROUBLE DIAGNOSES FOR SYMPTOMS RE5R05A A/T Does Not Shift: D4 → D3 SYMPTOM The vehicle does not shift down from the D4 to D3.
DIAGNOSTIC PROCEDURE 1.CHECK SELF-DIAGNOSIS With CONSULT-II After executing a traveling test, confirm that the self-diagnosis results indicate the following malfunctioning items: + High & low reverse clutch solenoid valve + Vehicle speed sensor A/T (revolution sensor) + Vehicle speed sensor MTR Without CONSULT-II Execute the self-diagnosis and confirm that a malfunction is indicated in the results. Yes or No? Yes >> Check the defective system(s).
Refer to AT-86, “DTC P0720 VEHICLE SPEED SENSOR A/T (REVOLUTION SENSOR)”, AT-120, “DTC P1721 VEHICLE SPEED SENSOR MTR”, AT-140, “DTC P1767 HIGH AND LOW REVERSE CLUTCH SOLENOID VALVE”. No >> GO TO 2. 2.CHECK SYMPTOM Check again. OK or NG? OK >> INSPECTION END NG >> GO TO 3. 3.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”.
AT-184 TROUBLE DIAGNOSES FOR SYMPTOMS RE5R05A A/T Does Not Shift: D3 → D2 SYMPTOM The vehicle does not shift down from the D3 to D2.
DIAGNOSTIC PROCEDURE 1.CHECK SELF-DIAGNOSIS With CONSULT-II After executing a traveling test, confirm that the self-diagnosis results indicate the following malfunctioning items: + Direct clutch solenoid valve + Vehicle speed sensor A/T (revolution sensor) + Vehicle speed sensor MTR Without CONSULT-II Execute the self-diagnosis and confirm that a malfunction is indicated in the results. Yes or No? Yes >> Check the malfunctioning system(s). Refer to AT-86, “DTC P0720 VEHICLE SPEED SENSOR A/T (REVOLUTION SENSOR)”, AT-120, “DTC P1721 VEHICLE SPEED SENSOR MTR”, AT-140, “DTC P1762 DIRECT CLUTCH SOLENOID VALVE”. No >> GO TO 2. 2.CHECK SYMPTOM Check again. OK or NG? OK >> INSPECTION END NG >> GO TO 3. 3.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-185 TROUBLE DIAGNOSES FOR SYMPTOMS RE5R05A A/T Does Not Shift: D2 → D1 SYMPTOM The vehicle does not shift down from the D2 to D1. DIAGNOSTIC PROCEDURE 1.PNP SWITCH CIRCUIT With CONSULT-II Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to PNP switch circuit? Without CONSULT-II Does self-diagnosis show damage to PNP switch circuit?
Yes or No? Yes >> Check PNP switch circuit.
Refer to AT-82, “DTC P0705 PARK/NEUTRAL POSITION SWITCH”. No >> GO TO 3. 2.CHECK SYMPTOM Check again. OK or NG? OK >> INSPECTION END NG >> GO TO 3.
3.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG? OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly. Refer to AT-15, “Precautions for A/T Assembly Replacement”. AT-186 TROUBLE DIAGNOSES FOR SYMPTOMS RE5R05A Vehicle Does Not Decelerate By Engine Brake SYMPTOM No engine brake is applied when the gear is shifted from the D2 to D1. DIAGNOSTIC PROCEDURE 1.PNP SWITCH CIRCUIT With CONSULT-II Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to PNP switch circuit? Without CONSULT-II Does self-diagnosis show damage to PNP switch circuit? Yes or No? Yes >> Check PNP switch circuit. Refer to AT-82, “DTC P0705 PARK/NEUTRAL POSITION SWITCH”. No >> GO TO 3. 2.CHECK SYMPTOM Check again. OK or NG? OK >> INSPECTION END NG >> GO TO 3. 3.CHECK TCM INSPECTION 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. OK or NG?
OK >> INSPECTION END NG >> 1. Repair or replace damaged parts. 2. Replace the transmission assembly.
Refer to AT-15, “Precautions for A/T Assembly Replacement”. Component Inspection BACK-UP LAMP RELAY Check continuity between BACK-UP LAMP relay harness connector terminals. Refer to AT-166, “Wiring Diagram — AT — NONDTC”. Item Ignition switch Shift position OFF — Connector No. BACK-UP LAMP relay Terminal No. Continuity 1-2 Yes 3-5 No E149 “R” position ON Yes 3-5 Except “R” position AT-187 No A/T SHIFT LOCK SYSTEM RE5R05A Description + The mechanical key interlock mechanism also operates as a shift lock: With the key switch turned to “ON”, the selector lever cannot be shifted from “P” (parking) to any other position unless the brake pedal is depressed. With the key removed, the selector lever cannot be shifted from “P” to any other position. The key cannot be removed unless the selector lever is placed in “P”. + The shift lock and key interlock mechanisms are controlled by the ON-OFF operation of the shift lock solenoid and by the operation of the rotator and slider located inside the key cylinder, respectively. SAT638K AT-188 A/T SHIFT LOCK SYSTEM RE5R05A Wiring Diagram — SHIFT — TAT117M AT-189 RE5R05A A/T SHIFT LOCK SYSTEM Diagnostic Procedure SAT915J SYMPTOM 1: + Selector lever cannot be moved from “P” position with key in “ON” position and brake pedal applied.
+ Selector lever can be moved from “P” position with key in “ON” position and brake pedal released. + Selector lever can be moved from “P” position when key is removed from key cylinder. SYMPTOM 2: Ignition key cannot be removed when selector lever is set to “P” position. It can be removed when selector lever is set to any position except “P”.
Check key interlock cable for damage. NG c OK . Check selector lever position for damage. NG c OK SAT639K . CHECK POWER SOURCE. 1.
Turn ignition switch to “OFF” position. (Do not start engine.) 2. Check voltage between stop lamp switch harness terminal V 1 and ground. Voltage: Battery voltage NG c Repair key interlock cable. Refer to “Key Interlock Cable”, AT-194. Check selector lever. Refer to “Control Linkage Adjustment”. Check the following items: 1. Harness for short or open between battery and stop lamp switch harness terminal V 1 2. 10A fuse OK . CHECK INPUT SIGNAL (STOP LAMP SWITCH). Turn ignition switch to “OFF” position. (Do not start engine.) + Check voltage between shift lock relay harness terminal V 2 and ground. Brake pedal Voltage Released 0V Depressed Battery voltage OK . A V AT-190 NG c Check the following items: 1.
Harness for short or open between shift lock relay harness connector 2 and stop lamp V switch harness connector V 2 2. Stop lamp switch (Refer to “Component Check”, AT-193.) RE5R05A A/T SHIFT LOCK SYSTEM Diagnostic Procedure (Cont’d) A V . CHECK POWER SOURCE. 1. Turn ignition switch to “ON” position. (Do not start engine.) 2. Check voltage between shift lock relay harness terminal V 4 and ground. Voltage: Battery voltage SAT640K c OK . CHECK INPUT SIGNAL-1 (SHIFT LOCK RELAY). Turn ignition switch to “ON” position. (Do not start engine.) + Check voltage between A/T device harness terminal V 4 and ground. SAT641K NG Brake pedal Voltage Released Battery voltage Depressed 0V NG c Check the following items: 1. Harness for short or open between battery and shift lock relay harness terminal V 4 2. 7.5A fuse 3. Ignition switch (Refer to EL section.) Check the following items: 1. Harness for short or open between A/T device harness connector V 4 and shift lock relay harness connector 3 V 2. Shift lock relay (Refer to EL section.) OK .
CHECK INPUT SIGNAL-2 (SHIFT LOCK RELAY). Turn ignition switch to “OFF” position. + Check voltage between A/T device harness terminal V 5 and ground. SAT642K Brake pedal Voltage Released 0V Depressed Battery voltage NG c Check the following items: 1. Harness for short or open between A/T device harness connector V 5 and shift lock relay harness connector 1 V 2. Shift lock relay (Refer to EL section.) 3. Diode-1 OK . SAT643K CHECK INPUT SIGNAL (DIODE-2). Turn ignition switch to “OFF” position.
(Do not start engine.) + Check continuity between A/T device harness terminals V 3 and V 5 . OK . B V AT-191 NG c Check the following item: 1. Diode-2 A/T SHIFT LOCK SYSTEM Diagnostic Procedure (Cont’d) RE5R05A B V . CHECK GROUND CIRCUIT.
1. Turn ignition switch to “OFF” position. 2. Disconnect A/T device harness connector. 3. Check continuity between A/T device harness terminal V 6 and ground. SAT644K NG c Repair harness or connector. c Replace park position switch.
c Replace shift lock solenoid. OK . CHECK PARK POSITION SWITCH. (Refer to “Component Check”, AT-193.) NG OK . CHECK SHIFT LOCK SOLENOID. (Refer to “Component Check”, AT-193.) NG OK . Reconnect shift lock harness connector.
.
Turn ignition switch from “OFF” to “ON” position. (Do not start engine.) .
Recheck shift lock operation. OK . INSPECTION END AT-192 NG c 1. Perform A/T device input/output signal inspection test. 2. If NG, recheck harness connector connection. A/T SHIFT LOCK SYSTEM RE5R05A Component Check SHIFT LOCK SOLENOID + Check operation by applying battery voltage between A/T 3 and V 4 . device harness connector terminals V SAT645K PARK POSITION SWITCH + Check continuity between A/T device harness connector ter5 and V 6 . minals V Condition Continuity When selector lever is set in “P” position and selector lever button is released Yes Except above No SAT646K STOP LAMP SWITCH + Check continuity between stop lamp switch harness connector terminals V 1 and V 2 . Condition SAT925J Continuity When brake pedal is released No When brake pedal is depressed Yes Check stop lamp switch after adjusting brake pedal — refer to BR section. AT-193 A/T SHIFT LOCK SYSTEM RE5R05A Key Interlock Cable SAT650K CAUTION: + Install key interlock cable in such a way that it will not be damaged by sharp bends, twists or interference with adjacent parts. + After installing key interlock cable to control device, make sure that casing cap and bracket are firmly secured in their positions. If casing cap can be removed with an external load of less than 39.2 N (4.0 kg, 8.8 lb), replace key interlock cable with new one. REMOVAL Unlock slider from adjuster holder and remove rod from cable. SAT651K AT-194 A/T SHIFT LOCK SYSTEM Key Interlock Cable (Cont’d) RE5R05A INSTALLATION 1.
Set key interlock cable to steering lock assembly and install lock plate.
2. Clamp cable to steering column and fix to control cable with band. 3. Set selector lever to P position. SAT920J 4. Insert interlock rod into adjuster holder. 5. Install casing cap to bracket. 6. Move slider in order to fix adjuster holder to interlock rod. SAT652K AT-195 ON-VEHICLE SERVICE ON-VEHICLE SERVICE Control Valve Assembly PFP:31020 ACS004LN REMOVAL 1. 2. 3. 4. Disconnect the negative battery terminal Disconnect heated oxygen sensor 2 harness connector. Drain ATF through drain plug. Remove oil pan and oil pan gasket. SCIA2308E 5. Disconnect terminal cord assembly connectors. CAUTION: Be careful not to damage connector. SCIA3412E 6. Disconnect fluid temperature sensor 2 connector. CAUTION: Be careful not to damage connector. SCIA2581E 7. Remove terminal cord assembly connectors from bracket. CAUTION: Be careful not to damage connector. SCIA2584E AT-2 ON-VEHICLE SERVICE 8. Disconnect revolution sensor connector. CAUTION: Be careful not to damage connector. A B AT SCIA2313E D 9.
Straighten terminal clips to free terminal cord assembly and revolution sensor harness then remove terminal clips.
CAUTION: Hang down terminal cord assembly and revolution sensor harness toward outside so as not to disturb removal of control valve assembly. E F G SCIA2314E 10. Remove bolts A, B and C from control valve assembly.
Bolt symbol Length mm (in) Number of bolts A 42 (1.65) 5 B 55 (2.17) 6 C 40 (1.57) 1 H I J SCIA2312E 11. Remove control valve assembly from transmission case.
CAUTION: When removing, be careful with the manual valve notch and manual plate height. Remove it vertically. K L M SCIA2315E 12. Remove fluid temperature sensor 2 with bracket from control valve assembly. SCIA2582E AT-3 ON-VEHICLE SERVICE 13. Remove bracket from fluid temperature sensor 2. SCIA2583E INSTALLATION 1. Install fluid temperature sensor 2 in bracket. SCIA2813E 2.
Install fluid temperature sensor 2 in control valve assembly. (With bracket.) : 6.9 - 8.8 N·m (0.71 - 0.89 kg-m, 61 - 77 in-lb) SCIA2582E 3. a. Install control valve assembly. Install control valve assembly in transmission case. SCIA2315E CAUTION: Hang down terminal cord assembly and revolution sensor harness toward outside so as not to disturb installation of control valve assembly. ● Make sure that turbine revolution sensor securely installs turbine revolution sensor hole. ● AT-4 ON-VEHICLE SERVICE ● Assemble it so that manual valve cutout is engaged with manual plate projection. A B AT SCIA2479E D b. Install bolts A, B and C in control valve assembly. Bolt symbol Length mm (in) Number of bolts A 42 (1.65) 5 B 55 (2.17) 6 C 40 (1.57) 1 E F G SCIA2312E c. H Tighten bolt 1, 2 and 3 temporarily to prevent dislocation. After that tighten them in order (1 → 2 → 3), and then tighten other bolts. I : 6.9 - 8.8 N·m (0.71 - 0.89 kg-m, 61 - 77 in-lb) J SCIA3170E 4. K Install terminal cord assembly connectors in bracket. L M SCIA2584E AT-5 ON-VEHICLE SERVICE 5. Connect terminal cord assembly connectors. SCIA3412E 6. Connect fluid temperature sensor 2 connector. SCIA2581E 7. Connect revolution sensor connector.
SCIA2313E 8. Securely fasten terminal harness with terminal clips. SCIA2314E 9. a. Install oil pan in transmission case. Install oil pan gasket in oil pan. CAUTION: ● Do not reuse oil pan gasket. ● Install it in the direction to align hole positions. AT-6 ON-VEHICLE SERVICE b. Install oil pan (with oil pan gasket) in transmission case. CAUTION: ● Install it so that drain plug comes to the position as shown in the figure. ● Be careful not to pinch harnesses. A B AT SCIA2308E D c. Tighten oil pan mounting bolts to the specified torque in numerical order shown in the figure after temporarily tightening them. CAUTION: Do not reuse oil pan mounting bolts. E : 6.9 - 8.8 N·m (0.71 - 0.89 kg-m, 61 - 77 in-lb) F 10. Install drain plug in oil pan. CAUTION: Do not reuse drain plug gasket. G : 29 - 39 N·m (3.0 - 4.0 kg-m, 22 - 29 ft-lb) 11. Connect heated oxygen sensor 2 harness connector. 12. Connect the negative battery terminal SCIA2492E H I J K L M AT-7 ON-VEHICLE SERVICE RE5R05A Control Linkage Adjustment SAT262JA Move selector lever from “P” position to “D” position. You should be able to feel the detents in each position. If the detents cannot be felt or the pointer indicating the position is improperly aligned, the linkage needs adjustment. 1. Place selector lever in “P” position. 2. Loosen lock nut. 3. Place manual shaft in “P” position. 4. Tighten lock nut to the specified torque. 5. Move selector lever from “P” position to “D” position. Make sure that selector lever can move smoothly. AT-196 A/T FLUID COOLER SYSTEM RE5R05A A/T Fluid Cooler SAT647K REMOVAL AND INSTALLATION 1. 2. 3. 4. 5. 6. 7. + + Remove front radiator grill. Refer to BT section. Disconnect fluid hoses from A/T fluid cooler unit. Remove A/T fluid cooler unit. Remove clips securing fluid hose (A/T fluid cooler unit to radiator) and loosen hose clamps, then remove the fluid hose. Loosen clamps securing fluid hose (A/T assembly to A/T fluid cooler unit), then remove the fluid hose. Remove bolts securing A/T fluid cooler tube bracket. Remove fluid hose with bracket. Reverse the removal procedure to install the A/T fluid cooler unit. Refer to the component drawing and specified tightening torque. Check A/T fluid level and refill if necessary. Refer to MA section (“CHASSIS AND BODY MAINTENANCE”). AT-197 A/T FLUID COOLER SYSTEM RE5R05A A/T Fluid Cooler Bypass Valve/For Europe SAT736K AT-198 REMOVAL AND INSTALLATION RE5R05A Removal SAT653K 1. 2. 3. 4. 5. 6.
7. Remove battery negative terminal. Remove exhaust tube. Remove fluid charging pipe from A/T assembly. Remove oil cooler pipe from A/T assembly. Plug up openings such as the fluid charging pipe hole, etc. Remove propeller shaft. Refer to PD section. Remove transfer control linkage and transfer harness connectors from transfer. Refer to TF section. 8. Remove A/T control linkage from A/T assembly. 9. Disconnect A/T solenoid valve (A/T unit assembly) harness connectors. 10. Remove starter motor. Refer to EL section. 11. Remove bolts securing torque converter to drive plate. + Remove the bolts by turning crankshaft. 12. Support A/T and transfer assembly with a jack. 13. Remove engine rear mounting member from body and A/T assembly. Refer to EM section. 14. Remove bolts securing A/T assembly to engine. + Secure torque converter to prevent it from dropping. + Secure A/T assembly to a jack.
15. Lower A/T assembly with transfer. SAT801C AT-199 REMOVAL AND INSTALLATION RE5R05A Installation + Drive plate runout Maximum allowable runout: Refer to EM section, “DRIVE PLATE RUNOUT”. If this runout is out of specification, replace drive plate with ring gear. SAT977H + When connecting torque converter to transmission, measure distance “A” to be certain that they are correctly assembled. Distance “A”: 25.0 mm (0.984 in) or more + Install converter to drive plate. + After converter is installed to drive plate, rotate crankshaft several turns and check to be sure that transmission rotates freely without binding. SAT017B + Tighten bolts securing transmission. SAT648K Bolt No. Tightening torqueNzm (kg-m, ft-lb) Bolt length “!”mm (in) 1 V 2 V 3 V 4 V 83 - 113 (8.5 - 11.5, 62 - 83) 62 (2.44) 29 - 39 (3.0 - 3.9, 22 - 28) 63 (2.48) 29 - 39 (3.0 - 3.9, 22 - 28) 43 (1.69) 29 - 39 (3.0 - 3.9, 22 - 28) 50 (1.97) Reinstall any part removed. Check fluid level in transmission. Check fluid leakage. Move selector lever through all positions to be sure that transmission operates correctly. With parking brake applied, rotate engine at idling. Move selector lever through “N” to “D” and to “R” positions. A slight shock should be felt by hand gripping selector each time transmission is shifted. + Perform road test. Refer to “ROAD TEST”, AT-53. + When replacing the A/T assembly, erase EFP ROM in TCM.
Refer to AT-15, “Precautions for A/T Assembly Replacement”. + + + + AT-200 RE5R05A SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications Engine TB48DE Automatic transmission model RE5R05A Destination Except for Europe For Europe 90X07 90X21 Transmission model code number Stall torque ratio 2.0 : 1 1st 3.540 2nd 2.264 3rd 1.471 4th 1.000 5th 0.834 Reverse 2.370 Transmission gear ratio Recommended fluid Nissan Matic Fluid J*1 Fluid capacity 10.4 - 10.7 liter (9-1/8 - 9-3/8 Imp qt) CAUTION: + Use only Nissan Genuine ATF Matic Fluid J. Do not mix with other fluid. + Using automatic transmission fluid other than Nissan Genuine ATF Matic Fluid J will deteriorate in driveability and automatic transmission durability, and may damage the automatic transmission, which is not covered by the warranty. *1: Refer to MA section, “Fluids and Lubricants”. Vehicle Speed When Shifting Gears Vehicle Speed km/h (MPH) Throttle position D 1 → D2 D 2 → D3 D3 → D 4 D4 → D 5 D5 → D 4 D4 → D 3 D3 → D 2 D2 → D 1 Full throttle 52 - 56 (32 - 35) 81 - 89 (50 - 55) 126 - 136 (78 - 85) 188 - 198 (117 - 123) 184 - 194 (114 - 121) 116 - 126 (72 - 78) 70 - 78 (43 - 48) 36 - 40 (22 - 25) Half throttle 32 - 36 (20 - 22) 62 - 68 (39 - 42) 104 - 112 (65 - 70) 126 - 134 (78 - 83) 100 - 108 (62 - 67) 61 - 69 (38 - 43) 37 - 43 (23 - 27) 10 - 14 (6 - 9) +At half throttle, the accelerator opening is 4/8 of the full opening. Vehicle Speed When Performing and Releasing Lock-up Vehicle speed km/h (MPH) Throttle position Closed throttle Half throttle Lock-up “ON” Lock-up “OFF” 64 - 72 (39 - 45) 61 - 69 (38 - 43) 164 - 172 (102 - 107) 130 - 138 (81 - 86) +At closed throttle, the accelerator opening is less than 1/8. + At half throttle, the accelerator opening is 4/8 of the full opening. Stall Revolution Stall revolution 1,900 - 2,200 rpm Line Pressure Line Pressure kpa (bar, kg/cm2, psi) Engine speed (rpm) Idling Revolution Stall Revolution “R” position “D”, “M” positions 392 - 441 (3.9 - 4.4, 4.0 - 4.5, 57 - 64) 373 - 422 (3.7 - 4.2, 3.8 - 4.3, 54 - 61) 1,310 - 1,500 (13.1 - 15.0, 13.4 - 15.3, 191 - 218) AT-201 RE5R05A SERVICE DATA AND SPECIFICATIONS (SDS) Solenoid Valves Name Resistance (Approx.) (Ω) Terminal No. Line pressure solenoid valve 7 Torque converter clutch solenoid valve 8 Input clutch solenoid valve 6 3-9 High & low reverse clutch solenoid valve 3 Front brake solenoid valve 5 Direct clutch solenoid valve 4 Low coast brake solenoid valve 20 - 40 2 A/T Fluid Temperature Sensor Name A/T fluid temperature sensor-1 A/T fluid temperature sensor-2 Condition CONSULT-II “DATA MONITOR” (Approx.) (V) Resistance (Approx.) (kΩ) 0°C (32°F) 2.2 15 20°C (68°F) 1.8 0.6 80°C (176°F) 0.6 0.9 0°C (32°F) 2.2 10 20°C (68°F) 1.7 4 80°C (176°F) 0.45 0.5 Turbine Revolution Sensor Name Condition Turbine revolution sensor-1 When moving at 50 km/h (31 MPH) in 4th gear with the closed throttle position signal “OFF”, use the CONSULT-II pulse frequency measuring function. CAUTION: Connect the diagnosis data link connector to the vehicle diagnosis connector. Turbine revolution sensor-2 When running at 20 km/h (12 MPH) in 1st gear with the closed throttle position signal “OFF”, use the CONSULT-II pulse frequency measuring function. CAUTION: Connect the diagnosis data link connector to the vehicle diagnosis connector.
Data (Approx.) 1.1 (kHz) Revolution Sensor Name Revolution sensor Condition When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function. CAUTION: Connect the diagnosis data link connector to the vehicle diagnosis connector. AT-202 Data (Approx.) 149 (Hz) BRAKE SYSTEM SECTION BR MODIFICATION NOTICE: + + + + Front disc brake and rear disc brake have been changed. Parking brake has been changed. Wiring Diagrams have been changed. Service data and specification (SDS) have been changed. CONTENTS
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SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications CLUTCH DISC CLUTCH COVER TB48DE Applied model TB48DE 300 Applied model 300 Wagon Facing size (Outer dia. x inner dia. x thickness) mm (in) 300 x 190 x 3.5 (11.81 x 7.48 x 0.14) Thickness of disc assembly with load mm (in)/N (kg, lb) 7.7 - 8.3 (0.30 - 0.33) /8,336 (850, 1,874) Wagon Full load N (kg, lb) 7,649 - 9,022 (780 - 920, 1,720 - 2,029) Inspection and Adjustment CLUTCH PEDAL CLUTCH COVER Unit: mm (in) Unit: mm (in) TB48DE TB48DE Applied model Wagon Pedal height “H*” Pedal free play “A” (at pedal pad) Applied model 200 - 210 (7.87 - 8.27) Wagon Diaphragm spring height “A” 1.0 - 3.0 (0.039 - 0.118) Uneven limit of diaphragm spring toe height *: Measured from surface of melt sheet to pedal pad CLUTCH DISC Unit: mm (in) TB48DE Applied model 300 Wagon Wear limit of facing surface to rivet head 0.3 (0.012) Runout limit of facing 1.3 (0.051) Distance of runout check point (from the hub center) Maximum backlash of spline (at outer edge of disc) 300 145 (5.71) 1.2 (0.047) CL-2 44 - 46 (1.732 - 1.811) 1.0 (0.039) ENGINE CONTROL SYSTEM SECTION EC MODIFICATION NOTICE: + TB48DE engine models have been applied to Europe.
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Refer to EC-121, “DTC U1000 CAN COMMUNICATION LINE”. x: Applicable —: Not applicable DTC*1 Items (CONSULT-II screen terms) Trip MI lighting up 2122 1 x EC-401 APP SEN 2/CIRC P2123 2123 1 x EC-401 APP SEN 2/CIRC P2127 2127 1 x EC-408 APP SEN 2/CIRC P2128 2128 1 x EC-408 APP SENSOR P2138 2138 1 x EC-421 BRAKE SW/CIRCUIT P1805 1805 2 — EC-395 CAN COMM CIRCUIT U1000 1000*5 1 x EC-121 CKP SEN/CIRCUIT P0335 0335 2 x EC-251 CKP SENSOR (COG) P1336 1336 2 x EC-381 CMP SEN/CIRC-B1 P0340 0340 2 x EC-257 CTP LEARNING P1225 1225 2 — EC-372 CTP LEARNING P1226 1226 2 — EC-374 CYL 1 MISFIRE P0301 0301 2 x EC-241 CYL 2 MISFIRE P0302 0302 2 x EC-241 CYL 3 MISFIRE P0303 0303 2 x EC-241 CYL 4 MISFIRE P0304 0304 2 x EC-241 CYL 5 MISFIRE P0305 0305 2 x EC-241 CYL 6 MISFIRE P0306 0306 2 x EC-241 ECM P0605 0605 1 or 2 x or — EC-283 ECM BACK UP/CIRC P1065 1065 2 x EC-290 ECT SEN/CIRCUIT P0117 0117 1 x EC-152 ECT SEN/CIRCUIT P0118 0118 1 x EC-152 ENG OVER TEMP P1217 1217 1 x EC-361 ETC ACTR P1121 1121 1 or 2 x EC-299 ETC FUNCTION/CIRC P1122 1122 1 x EC-301 ETC MOT P1128 1128 1 x EC-315 ETC MOT PWR P1124 1124 1 x EC-309 ETC MOT PWR P1126 1126 1 x EC-309 FUEL SYS-LEAN-B1 P0171 0171 2 x EC-218 FUEL SYS-LEAN-B2 P0174 0174 2 x EC-218 FUEL SYS-RICH-B1 P0172 0172 2 x EC-227 FUEL SYS-RICH-B2 P0175 0175 2 x EC-227 HO2S1 (B1) P0132 0132 2 x EC-163 HO2S1 (B1) P0133 0133 2 x EC-172 HO2S1 (B1) P0134 0134 2 x EC-172 CONSULT-II GST*2 ECM*3 APP SEN 1/CIRC P2122 APP SEN 1/CIRC EC-9 Reference page TB48DE A/T (WITH EURO-OBD) INDEX FOR DTC Alphabetical Index (Cont’d) DTC*1 Items (CONSULT-II screen terms) Trip MI lighting up 1143 2 x EC-320 P1144 1144 2 x EC-327 P0152 0152 2 x EC-163 HO2S1 (B2) P0153 0153 2 x EC-172 HO2S1 (B2) P0154 0154 2 x EC-172 HO2S1 (B2) P1163 1163 2 x EC-320 HO2S1 (B2) P1164 1164 2 x EC-327 HO2S1 HTR (B1) P0031 0031 2 x EC-124 HO2S1 HTR (B1) P0032 0032 2 x EC-124 HO2S1 HTR (B2) P0051 0051 2 x EC-124 HO2S1 HTR (B2) P0052 0052 2 x EC-124 HO2S2 (B1) P0138 0138 2 x EC-195 HO2S2 (B1) P0139 0139 2 x EC-205 HO2S2 (B1) P1146 1146 2 x EC-335 HO2S2 (B1) P1147 1147 2 x EC-348 HO2S2 (B2) P0158 0158 2 x EC-195 HO2S2 (B2) P0159 0159 2 x EC-205 HO2S2 (B2) P1166 1166 2 x EC-335 HO2S2 (B2) P1167 1167 2 x EC-348 HO2S2 HTR (B1) P0037 0037 2 x EC-132 HO2S2 HTR (B1) P0038 0038 2 x EC-132 HO2S2 HTR (B2) P0057 0057 2 x EC-132 HO2S2 HTR (B2) P0058 0058 2 x EC-132 IAT SEN/CIRCUIT P0112 0112 2 x EC-147 IAT SEN/CIRCUIT P0113 0113 2 x EC-147 INT/V TIM V/CIR-B1 P1111 1111 2 x EC-294 KNOCK SEN/CIRC-B1 P0327 0327 2 — EC-247 KNOCK SEN/CIRC-B1 P0328 0328 2 — EC-247 KNOCK SEN/CIRC-B2 P0332 0332 2 — EC-247 KNOCK SEN/CIRC-B2 P0333 0333 2 — EC-247 L/PRESS SOL/CIRC P0745 0745 2 x AT section MAF SEN/CIRCUIT P0102 0102 1 x EC-140 MAF SEN/CIRCUIT P0103 0103 1 x EC-140 MIL/CIRC P0650 0650 2 — EC-286 MULTI CYL MISFIRE P0300 0300 2 x EC-241 NATS MALFUNCTION P1610 - P1615 1610 - 1615 2 — EC-50 NO DTC IS DETECTED. 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NOTE: Regarding Y61 models with TB48DE engine, “B1” indicates bank 1 (cylinders number 1, 2 and 3), “B2” indicates bank 2 (cylinders number 4, 5 and 6). EC-11 INDEX FOR DTC TB48DE A/T (WITH EURO-OBD) DTC No. Index Check if the vehicle is a model with Euro-OBD (E-OBD) system or not by the “Type approval number” on the identification plate. Refer to GI section. NOTE: If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to EC-121, “DTC U1000 CAN COMMUNICATION LINE”. x: Applicable —: Not applicable DTC*1 Items (CONSULT-II screen terms) Trip MI lighting up NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED. — Flashing*4 EC-51 CAN COMM CIRCUIT 1 x EC-121 0000 NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED. — — — P0031 0031 HO2S1 HTR (B1) 2 x EC-124 P0032 0032 HO2S1 HTR (B1) 2 x EC-124 P0037 0037 HO2S2 HTR (B1) 2 x EC-132 P0038 0038 HO2S2 HTR (B1) 2 x EC-132 P0051 0051 HO2S1 HTR (B2) 2 x EC-124 P0052 0052 HO2S1 HTR (B2) 2 x EC-124 P0057 0057 HO2S2 HTR (B2) 2 x EC-132 P0058 0058 HO2S2 HTR (B2) 2 x EC-132 P0102 0102 MAF SEN/CIRCUIT 1 x EC-140 P0103 0103 MAF SEN/CIRCUIT 1 x EC-140 P0112 0112 IAT SEN/CIRCUIT 2 x EC-147 P0113 0113 IAT SEN/CIRCUIT 2 x EC-147 P0117 0117 ECT SEN/CIRCUIT 1 x EC-152 P0118 0118 ECT SEN/CIRCUIT 1 x EC-152 P0122 0122 TP SEN 2/CIRC 1 x EC-157 P0123 0123 TP SEN 2/CIRC 1 x EC-157 P0132 0132 HO2S1 (B1) 2 x EC-163 P0133 0133 HO2S1 (B1) 2 x EC-172 P0134 0134 HO2S1 (B1) 2 x EC-172 P0138 0138 HO2S2 (B1) 2 x EC-195 P0139 0139 HO2S2 (B1) 2 x EC-205 P0152 0152 HO2S1 (B2) 2 x EC-163 P0153 0153 HO2S1 (B2) 2 x EC-172 P0154 0154 HO2S1 (B2) 2 x EC-172 P0158 0158 HO2S2 (B2) 2 x EC-195 P0159 0159 HO2S2 (B2) 2 x EC-205 P0171 0171 FUEL SYS-LEAN-B1 2 x EC-218 P0172 0172 FUEL SYS-RICH-B1 2 x EC-227 P0174 0174 FUEL SYS-LEAN-B2 2 x EC-218 CONSULT-II GST*2 ECM*3 No DTC Flashing*4 U1000 1000*5 P0000 EC-12 Reference page TB48DE A/T (WITH EURO-OBD) INDEX FOR DTC DTC No. Index (Cont’d) DTC*1 Items (CONSULT-II screen terms) Trip MI lighting up FUEL SYS-RICH-B2 2 x EC-227 0222 TP SEN 1/CIRC 1 x EC-235 0223 TP SEN 1/CIRC 1 x EC-235 P0300 0300 MULTI CYL MISFIRE 2 x EC-241 P0301 0301 CYL 1 MISFIRE 2 x EC-241 P0302 0302 CYL 2 MISFIRE 2 x EC-241 P0303 0303 CYL 3 MISFIRE 2 x EC-241 P0304 0304 CYL 4 MISFIRE 2 x EC-241 P0305 0305 CYL 5 MISFIRE 2 x EC-241 P0306 0306 CYL 6 MISFIRE 2 x EC-241 P0327 0327 KNOCK SEN/CIRC-B1 2 — EC-247 P0328 0328 KNOCK SEN/CIRC-B1 2 — EC-247 P0332 0332 KNOCK SEN/CIRC-B2 2 — EC-247 P0333 0333 KNOCK SEN/CIRC-B2 2 — EC-247 P0335 0335 CKP SEN/CIRCUIT 2 x EC-251 P0340 0340 CMP SEN/CIRC-B1 2 x EC-257 P0420 0420 TW CATALYST SYS-B1 2 x EC-264 P0430 0430 TW CATALYST SYS-B2 2 x EC-264 P0444 0444 PURG VOLUME CONT/V 2 x EC-269 P0445 0445 PURG VOLUME CONT/V 2 x EC-269 P0500 0500 VEH SPEED SEN/CIRC 2 x EC-276 P0550 0550 PW ST P SEN/CIRC 2 — EC-278 P0605 0605 ECM 1 or 2 x or — EC-283 P0650 0650 MIL/CIRC 2 — EC-286 P0740 0740 TCC SOLENOID/CIRC 2 x AT section P0745 0745 L/PRESS SOL/CIRC 2 x AT section P1065 1065 ECM BACK UP/CIRC 2 x EC-290 P1111 1111 INT/V TIM V/CIR-B1 2 x EC-294 P1121 1121 ETC ACTR 1 or 2 x EC-299 P1122 1122 ETC FUNCTION/CIRC 1 x EC-301 P1124 1124 ETC MOT PWR 1 x EC-309 P1126 1126 ETC MOT PWR 1 x EC-309 P1128 1128 ETC MOT 1 x EC-315 P1143 1143 HO2S1 (B1) 2 x EC-320 P1144 1144 HO2S1 (B1) 2 x EC-327 P1146 1146 HO2S2 (B1) 2 x EC-335 P1147 1147 HO2S2 (B1) 2 x EC-348 P1163 1163 HO2S1 (B2) 2 x EC-320 P1164 1164 HO2S1 (B2) 2 x EC-327 P1166 1166 HO2S2 (B2) 2 x EC-335 P1167 1167 HO2S2 (B2) 2 x EC-348 CONSULT-II GST*2 ECM*3 P0175 0175 P0222 P0223 EC-13 Reference page TB48DE A/T (WITH EURO-OBD) INDEX FOR DTC DTC No. Index (Cont’d) DTC*1 Items (CONSULT-II screen terms) Trip MI lighting up ENG OVER TEMP 1 x EC-361 1225 CTP LEARNING 2 — EC-372 1226 CTP LEARNING 2 — EC-374 P1229 1229 SENSOR POWER/CIRC 1 x EC-376 P1336 1336 CKP SENSOR (COG) 2 x EC-381 P1610 - P1615 1610 - 1615 NATS MALFUNCTION 2 — EC-50 P1706 1706 P-N POS SW/CIRCUIT 2 x EC-388 P1805 1805 BRAKE SW/CIRCUIT 2 — EC-395 P2122 2122 APP SEN 1/CIRC 1 x EC-401 P2123 2123 APP SEN 1/CIRC 1 x EC-401 P2127 2127 APP SEN 2/CIRC 1 x EC-408 P2128 2128 APP SEN 2/CIRC 1 x EC-408 P2135 2135 TP SENSOR 1 x EC-415 P2138 2138 APP SENSOR 1 x EC-421 CONSULT-II GST*2 ECM*3 P1217 1217 P1225 P1226 Reference page *1: 1st trip DTC No. is the same as DTC No. *2: These numbers are prescribed by ISO 15031-5. *3: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN. *4: When engine is running. *5: The trouble shooting for these DTCs need CONSULT-II. NOTE: Regarding Y61 models with TB48DE engine, “B1” indicates bank 1 (cylinders number 1, 2 and 3), “B2” indicates bank 2 (cylinders number 4, 5 and 6). EC-14 PRECAUTIONS TB48DE A/T (WITH EURO-OBD) Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER” The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination and optional equipment.): + For a frontal collision The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. + For a side collision The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision). Information necessary to service the system safely is included in the RS section of this Service Manual. WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow harness connector. On Board Diagnostic (OBD) System of Engine and A/T The ECM has an on board diagnostic system. It will light up the malfunction indicator (MI) to warn the driver of a malfunction causing emission deterioration. CAUTION: + Be sure to turn the ignition switch OFF and disconnect the battery ground cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MI to light up. + Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MI to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.) + Certain systems and components, especially those related to OBD, may use a new style slidelocking type harness connector. For description and how to disconnect, refer to EL section.

+ Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc.

may cause the MI to light up due to the short circuit. + Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MI to light up due to the malfunction of the fuel injection system, etc. + Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

EC-15 PRECAUTIONS TB48DE A/T (WITH EURO-OBD) Precaution SEF289H + Always use a 12 volt battery as power source. + Do not attempt to disconnect battery cables while engine is running. + Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect battery ground cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned off. + Before removing parts, turn ignition switch OFF and then disconnect battery ground cable. + Do not disassemble ECM. + If battery cable is disconnected, the memory will return to the initial ECM values. The ECM will now start to self-control at its initial values. Engine operation can vary slightly when the cable is disconnected.

However, this is not an indication of a malfunction.

Do not replace parts because of a slight variation. SEF707Y + When connecting ECM harness connector, fasten it securely with levers as far as they will go as shown at right. PBIB1162E PBIB1163E EC-16 TB48DE A/T (WITH EURO-OBD) PRECAUTIONS Precaution (Cont’d) PBIB0090E MEF040D + When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break). Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors. + Securely connect ECM harness connectors. A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs. + Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc. + Keep engine control system parts and harness dry. + Before replacing ECM, perform “ECM Terminals and Reference Value” inspection and make sure ECM functions properly. Refer to EC-80, “ECM Terminals and Reference Value”. + Handle mass air flow sensor carefully to avoid damage. + Do not disassemble mass air flow sensor. + Do not clean mass air flow sensor with any type of detergent.

+ Do not disassemble electric throttle control actuator.

+ Even a slight leak in the air intake system can cause serious incidents. + Do not shock or jar the camshaft position sensor, crankshaft position sensor (OBD). + After performing each TROUBLE DIAGNOSIS, perform “DTC Confirmation Procedure” or “Overall Function Check”. The DTC should not be displayed in the “DTC Confirmation Procedure” if the repair is completed. The “Overall Function Check” should be a good result if the repair is completed. SAT652J EC-17 TB48DE A/T (WITH EURO-OBD) PRECAUTIONS Precaution (Cont’d) + When measuring ECM signals with a circuit tester, connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector. + When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor. + Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. SEF348N + Do not operate fuel pump when there is no fuel in lines. + Tighten fuel hose clamps to the specified torque. SEC686C + Do not depress accelerator pedal when starting. + Immediately after starting, do not rev up engine unnecessarily. + Do not rev up engine just prior to shutdown. SEF709Y SEF708Y + When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location. — Keep the antenna as far as possible from the electronic control units. — Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls. Do not let them run parallel for a long distance. — Adjust the antenna and feeder line so that the standingwave radio can be kept smaller. — Be sure to ground the radio to vehicle body. EC-18 TB48DE A/T (WITH EURO-OBD) PRECAUTIONS Precaution (Cont’d) + Regarding Y61 models with TB48DE engine, “B1” indicates bank 1 (cylinders number 1, 2, 3), “B2” indicates bank 2 (cylinders number 4, 5, 6). SEC888C SEC889C Wiring Diagrams and Trouble Diagnosis When you read wiring diagrams, refer to the following: + “How to Read Wiring Diagrams” in GI section + “POWER SUPPLY ROUTING” for power distribution circuit in EL section When you perform trouble diagnosis, refer to the following: + “HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES” in GI section + “How to Perform Efficient Diagnosis for an Electrical Incident” in GI section EC-19 PREPARATION TB48DE A/T (WITH EURO-OBD) Special Service Tools Tool number Tool name Description KV10117100 Heated oxygen sensor wrench Loosening or tightening heated oxygen sensors with 22 mm (0.87 in) hexagon nut NT379 KV10114400 Heated oxygen sensor wrench Loosening or tightening heated oxygen sensors a: 22 mm (0.87 in) NT636 Commercial Service Tools Tool name Description Fuel filler cap adapter Checking fuel tank vacuum relief valve opening pressure NT653 Socket wrench Removing and installing engine coolant temperature sensor NT705 Oxygen sensor thread cleaner ie: (J-43897-18) (J-43897-12) Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor AEM488 EC-20 TB48DE A/T (WITH EURO-OBD) PREPARATION Commercial Service Tools (Cont’d) Tool name Description Anti-seize lubricant ie: (PermatexTM 133AR or equivalent meeting MIL specification MIL-A907) Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

NT779 EC-21 ENGINE CONTROL SYSTEM TB48DE A/T (WITH EURO-OBD) System Diagram SEC745D EC-22 ENGINE CONTROL SYSTEM TB48DE A/T (WITH EURO-OBD) Vacuum Hose Drawing Refer to EC-22, “System Diagram” for Vacuum Control System. SEC665D EC-23 ENGINE CONTROL SYSTEM TB48DE A/T (WITH EURO-OBD) System Chart Input (Sensor) + Camshaft position sensor Crankshaft position sensor (OBD) Mass air flow sensor Engine coolant temperature sensor Heated oxygen sensor 1 Throttle position sensor Accelerator pedal position sensor Park/neutral position (PNP) switch Intake air temperature sensor Power steering pressure sensor Ignition switch Stop lamp switch Battery voltage Knock sensor Refrigerant pressure sensor Heated oxygen sensor 2*1 TCM (Transmission control module)*2 Air conditioner switch*2 Vehicle speed sensor*2 Electrical load signal*2 ECM Function Output (Actuator) Fuel injection & mixture ratio control Fuel injectors Electronic ignition system Power transistor Fuel pump control Fuel pump relay On board diagnostic system MI (On the instrument panel) Intake valve timing control Intake valve timing control solenoid valve Heated oxygen sensor 1 heater control Heated oxygen sensor 1 heater Heated oxygen sensor 2 heater control Heated oxygen sensor 2 heater EVAP canister purge flow control EVAP canister purge volume control solenoid valve Air conditioning cut control Air conditioner relay Power valve control VIAS control solenoid valve Cooling fan control Cooling fan relay *1: This sensor is not used to control the engine system under normal conditions.

*2: The signals are sent to the ECM through CAN communication line. Multiport Fuel Injection (MFI) System INPUT/OUTPUT SIGNAL CHART Sensor Input Signal to ECM Camshaft position sensor Engine speed and piston position Mass air flow sensor Amount of intake air Engine coolant temperature sensor Engine coolant temperature Heated oxygen sensor 1 Density of oxygen in exhaust gas Throttle position sensor Throttle position Accelerator pedal position sensor Accelerator pedal position Park/neutral position (PNP) switch Gear position Knock sensor Engine knocking condition Battery Battery voltage Power steering pressure sensor Power steering operation Heated oxygen sensor 2*1 Density of oxygen in exhaust gas Vehicle speed sensor*2 Vehicle speed Air conditioner switch*2 Air conditioner operation Ignition switch Start signal ECM Function Actuator Fuel injection & mixture ratio Fuel injectors control *1: Under normal conditions, this sensor is not for engine control operation. *2: This signal is sent to the ECM through CAN communication line. EC-24 SYSTEM DESCRIPTION ENGINE CONTROL TB48DE A/T (WITH EURO-OBD) SYSTEM Multiport Fuel Injection (MFI) System (Cont’d) The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from both the camshaft position sensor and the mass air flow sensor. VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below. + During warm-up + When starting the engine + During acceleration + Hot-engine operation + When selector lever is changed from “N” to “D” + High-load, high-speed operation + During deceleration + During high engine speed operation MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL) PBIB0121E The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses heated oxygen sensor 1 in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about heated oxygen sensor 1, refer to EC-163. This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture). This stage is referred to as the closed loop control condition. Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of heated oxygen sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2. Open loop control The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion. + Deceleration and acceleration + High-load, high-speed operation + Malfunction of heated oxygen sensor 1 or its circuit + Insufficient activation of heated oxygen sensor 1 at low engine coolant temperature + High engine coolant temperature + During warm-up + After shifting from “N” to “D” + When starting the engine EC-25 ENGINE CONTROL TB48DE A/T (WITH EURO-OBD) SYSTEM Multiport Fuel Injection (MFI) System (Cont’d) MIXTURE RATIO SELF-LEARNING CONTROL The mixture ratio feedback control system monitors the mixture ratio signal transmitted from heated oxygen sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot film) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio. Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of “injection pulse duration” to automatically compensate for the difference between the two ratios. “Fuel trim” refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim. “Short term fuel trim” is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from heated oxygen sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean. “Long term fuel trim” is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment. FUEL INJECTION TIMING SEF179U Two types of systems are used. Sequential multiport fuel injection system Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running. Simultaneous multiport fuel injection system Fuel is injected simultaneously into all six cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.

The six injectors will then receive the signals two times for each engine cycle. This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating. FUEL SHUT-OFF Fuel to each cylinder is cut off during deceleration or operation of the engine at excessively high speeds. EC-26 ENGINE CONTROL SYSTEM TB48DE A/T (WITH EURO-OBD) Electronic Ignition (EI) System INPUT/OUTPUT SIGNAL CHART Sensor Input Signal to ECM ECM Function Camshaft position sensor Engine speed and piston position Mass air flow sensor Amount of intake air Engine coolant temperature sensor Engine coolant temperature Throttle position sensor Throttle position Accelerator pedal position sensor Accelerator pedal position Knock sensor Engine knocking Park/neutral position (PNP) switch Gear position Battery Battery voltage Vehicle speed sensor*1 Vehicle speed Ignition switch Start signal Ignition timing control Actuator Power transistor *1: This signal is sent to the ECM through CAN communication line. SYSTEM DESCRIPTION SEF742M The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM. This data forms the map shown.

The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor. e.g., N: 1,800 rpm, Tp: 1.50 msec A °BTDC During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM. + At starting + During warm-up + At idle + At low battery voltage + During acceleration The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the antiknocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM.

The ECM retards the ignition timing to eliminate the knocking condition. EC-27 ENGINE CONTROL SYSTEM TB48DE A/T (WITH EURO-OBD) Air Conditioning Cut Control INPUT/OUTPUT SIGNAL CHART Sensor Input Signal to ECM ECM Function Air conditioner switch*1 Air conditioner “ON” signal Throttle position sensor Throttle valve opening angle Camshaft position sensor Engine speed Engine coolant temperature sensor Engine coolant temperature Battery Battery voltage Refrigerant pressure sensor Refrigerant pressure Power steering pressure sensor Power steering operation Vehicle speed sensor*1 Vehicle speed Ignition switch Start signal Air conditioner cut control Actuator Air conditioner relay *1: These signals are sent to the ECM through CAN communication line. SYSTEM DESCRIPTION This system improves engine operation when the air conditioner is used. Under the following conditions, the air conditioner is turned off. + When the accelerator pedal is fully depressed. + When cranking the engine. + At high engine speeds. + When the engine coolant temperature becomes excessively high.

+ When operating power steering during low engine speed or low vehicle speed. + When engine speed is excessively low. + When refrigerant pressure is excessively low or high. Fuel Cut Control (at No Load and High Engine Speed) INPUT/OUTPUT SIGNAL CHART Sensor Input Signal to ECM ECM Function Park/neutral position (PNP) switch Neutral position Throttle position sensor Throttle position Accelerator pedal position sensor Accelerator pedal position Engine coolant temperature sensor Engine coolant temperature Camshaft position sensor Engine speed Vehicle speed sensor*1 Vehicle speed Fuel cut control Actuator Fuel injectors *1: This signal is sent to the ECM through CAN communication line. SYSTEM DESCRIPTION If the engine speed is above 3,950 rpm with no load (for example, in neutral and engine speed over 3,950 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 1,500 rpm, then fuel cut is cancelled. NOTE: This function is different from deceleration control listed under “Multiport Fuel Injection (MFI) System”, EC-24. EC-28 ENGINE CONTROL SYSTEM TB48DE A/T (WITH EURO-OBD) CAN Communication SYSTEM DESCRIPTION CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

SYSTEM DIAGRAM SEL599Y Input/output signal chart T: Transmit R: Receive Signals Combination meter TCM ECM Engine speed signal R R T Engine coolant temperature signal R R T Accelerator pedal position signal R T Closed throttle position signal R T Wide open throttle position signal R T A/T fluid temperature warning lamp signal R T R Current gear position signal R T R T R Shift change signal Air conditioner switch signal T R Headlamp switch signal T R Rear window defogger switch signal T R Brake switch signal T R Vehicle speed signal T R R T R A/T self diagnosis signal Manual mode signal T EC-29 R BASIC SERVICE PROCEDURE TB48DE A/T (WITH EURO-OBD) Idle Speed and Ignition Timing Check IDLE SPEED With CONSULT-II Check idle speed in “DATA MONITOR” mode with CONSULT-II. With GST Check idle speed with GST. SEF058Y IGNITION TIMING Any of following two methods may be used. Method A 1.

Slide the harness protector of ignition coil No. 1 to clear the wires. 2. Attach timing light to the wires as shown. 3. Check ignition timing.

SEC560C Method B 1. Remove No. 1 ignition coil. 2. Connect No. 1 ignition coil and No. 1 spark plug with suitable high-tension wire as shown, and attach timing light clamp to this wire. SEC561C SEF166Y 3. Check ignition timing. SEC536DA EC-30 BASIC SERVICE PROCEDURE TB48DE A/T (WITH EURO-OBD) Accelerator Pedal Released Position Learning DESCRIPTION “Accelerator Pedal Released Position Learning” is an operation to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected. OPERATION PROCEDURE 1. 2. 3. 4.

5. Make sure that accelerator pedal is fully released.

Turn ignition switch “ON” and wait at least 2 seconds. Turn ignition switch “OFF” wait at least 10 seconds. Turn ignition switch “ON” and wait at least 2 seconds. Turn ignition switch “OFF” wait at least 10 seconds. Throttle Valve Closed Position Learning DESCRIPTION “Throttle Valve Closed Position Learning” is an operation to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected. OPERATION PROCEDURE 1. Make sure that accelerator pedal is fully released. 2. Turn ignition switch “ON”. 3. Turn ignition switch “OFF” wait at least 10 seconds. Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

Idle Air Volume Learning DESCRIPTION “Idle Air Volume Learning” is an operation to learn the idle air volume that keeps each engine within the specific range. It must be performed under any of the following conditions: + Each time electric throttle control actuator or ECM is replaced. + Idle speed or ignition timing is out of specification. PREPARATION Before performing “Idle Air Volume Learning”, make sure that all of the following conditions are satisfied. Learning will be cancelled if any of the following conditions are missed for even a moment. + Battery voltage: More than 12.9V (At idle) + Engine coolant temperature: 70 - 95°C (158 - 203°F) + PNP switch: ON + Electric load switch: OFF (Air conditioner, headlamp, rear window defogger) On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps. + Steering wheel: Neutral (Straight-ahead position) + Vehicle speed: Stopped + Transmission: Warmed-up For models with CONSULT-II, drive vehicle until “FLUID TEMP SE” in “DATA MONITOR” mode of “A/T” system indicates less than 0.9V.

For A/T models without CONSULT-II, drive vehicle for 10 minutes.

EC-31 BASIC SERVICE TB48DE A/T (WITH EURO-OBD) PROCEDURE Idle Air Volume Learning (Cont’d) OPERATION PROCEDURE With CONSULT-II 1. 2. 3. 4. Perform EC-31, “Accelerator Pedal Released Position Learning”. Perform EC-31, “Throttle Valve Closed Position Learning”. Start engine and warm it up to normal operating temperature. Check that all items listed under the topic “PREPARATION” (previously mentioned) are in good order. 5. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode. SEF217Z 6. Touch “START” and wait 20 seconds. SEF454Y 7. Make sure that “CMPLT” is displayed on CONSULT-II screen.

If “CMPLT” is not displayed, “Idle Air Volume Learning” will not be carried out successfully. In this case, find the cause of the incident by referring to the “Diagnostic Procedure” below. 8.

Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications. ITEM MBIB0238E SPECIFICATION Idle speed 675±50 rpm (in “P” or “N” position) Ignition timing 10±5° BTDC (in “P” or “N” position) EC-32 BASIC SERVICE TB48DE A/T (WITH EURO-OBD) PROCEDURE Idle Air Volume Learning (Cont’d) Without CONSULT-II NOTE: + It is better to count the time accurately with a clock. + It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction. 1. Perform EC-31, “Accelerator Pedal Released Position Learning”. 2. Perform EC-31, “Throttle Valve Closed Position Learning”. 3. Start engine and warm it up to normal operating temperature. 4. Check that all items listed under the topic “PREPARATION” (previously mentioned) are in good order. 5. Turn ignition switch “OFF” and wait at least 10 seconds. 6. Confirm that accelerator pedal is fully released, turn ignition switch “ON” and wait 3 seconds.

7. Repeat the following procedure quickly five times within 5 seconds. a. Fully depress the accelerator pedal. b.

Fully release the accelerator pedal. 8. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MI stops blinking and turned ON. 9.

Fully release the accelerator pedal within 3 seconds after the MI turned ON. 10. Start engine and let it idle. 11. Wait 20 seconds. PBIB0665E 12. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications. ITEM SPECIFICATION Idle speed 675±50 rpm (in “P” or “N” position) Ignition timing 10±5° BTDC (in “P” or “N” position) 13. If idle speed and ignition timing are not within the specification, “Idle Air Volume Learning” will not be carried out successfully. In this case, find the cause of the incident by referring to the “Diagnostic Procedure” below. DIAGNOSTIC PROCEDURE If idle air volume learning cannot be performed successfully, proceed as follows: 1. Check that throttle valve is fully closed. 2. Check PCV valve operation. 3. Check that downstream of throttle valve is free from air leakage.

4.

When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident. It is useful to perform EC-108, “TROUBLE DIAGNOSIS — SPECIFICATION VALUE”. 5. If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform “Idle air volume learning” all over again: — Engine stalls. — Erroneous idle.

EC-33 BASIC SERVICE PROCEDURE TB48DE A/T (WITH EURO-OBD) Fuel Pressure Check FUEL PRESSURE RELEASE Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger. With CONSULT-II SEF214Y 1. Turn ignition switch “ON”. 2. Perform “FUEL PRESSURE RELEASE” in “WORK SUPPORT” mode with CONSULT-II. 3. Start engine. 4. After engine stalls, crank it two or three times to release all fuel pressure. 5. Turn ignition switch “OFF”.

Without CONSULT-II 1. Remove fuel pump fuse located in fuse box. 2. Start engine. 3. After engine stalls, crank it two or three times to release all fuel pressure. 4. Turn ignition switch “OFF”. 5. Reinstall fuel pump fuse after servicing fuel system. SEC550C FUEL PRESSURE CHECK SEC551C SEF718BA + When reconnecting fuel line, always use new clamps.

+ Make sure that clamp screw does not contact adjacent parts. + Use a torque driver to tighten clamps. + Use Pressure Gauge to check fuel pressure. 1. Release fuel pressure to zero, refer to above. 2. Disconnect fuel hose between fuel filter and fuel tube (engine side). 3. Install pressure gauge between fuel filter and fuel tube. 4. Start engine and check for fuel leakage. 5. Read the indication of fuel pressure gauge. At idling: Approximately 245 kPa (2.45 bar, 2.5 kg/cm2, 36 psi) A few seconds after ignition switch is turned OFF to ON: Approximately 294 kPa (2.94 bar, 3.0 kg/cm2, 43 psi) 6. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold. 7. Plug intake manifold with a rubber cap. 8. Connect variable vacuum source to fuel pressure regulator. EC-34 BASIC SERVICE PROCEDURE TB48DE A/T (WITH EURO-OBD) 9. Start engine and read indication of fuel pressure gauge as vacuum is changed. Fuel pressure should decrease as vacuum increases. If results are unsatisfactory, replace fuel pressure regulator. Injector Removal and Installation 1. 2. 3. 4. 5. Release fuel pressure to zero. Disconnect harness connector clip.

Disconnect injector harness connectors. Disconnect fuel hoses from fuel tube assembly. Remove fuel tube assemblies in reverse numerical sequence of that shown in the figure at left.

SEC552C 6. 7. + + Expand and remove clips securing fuel injectors. Extract fuel injectors straight from fuel tubes. Do not extract injector by pinching connector. Be careful not to damage injector nozzles during removal. + Do not bump or drop fuel injectors. SEC553C SEC559C 8.

Install injector to fuel tube assembly. + Lubricate O-rings with a smear of silicone oil. + Be careful not to damage O-rings with service tools, finger nails or clips. Do not expand or twist O-rings. + Discard old clips, replace with new ones. 9. Position clips in grooves on fuel injectors. + Make sure that protrusions of fuel injectors are aligned with cutouts of clips after installation. 10. Align protrusions of fuel tubes with those of fuel injectors. Insert fuel injectors straight into fuel tubes. 11. After properly inserting fuel injectors, check to make sure that fuel tube protrusions are engaged with those of fuel injectors, and that flanges of fuel tube are engaged with clips. SEC554C EC-35 BASIC SERVICE TB48DE A/T (WITH EURO-OBD) PROCEDURE Injector Removal and Installation (Cont’d) SEC552C 12. Tighten fuel tube assembly mounting nuts in numerical sequence (indicated in the figure at left) and in two stages. : Tightening torque Nzm (kg-m, ft-lb) 1st stage: 9 - 20 (0.9 - 2.1, 7 - 15) 2nd stage: 21 - 26 (2.1 - 2.7, 16 - 19) 13. Insert fuel hoses into fuel tubes so that ends of fuel hoses butt up against fuel tubes; fasten with clamps, avoiding bulges. CAUTION: After properly connecting fuel tube assembly to injector and fuel hose, check connection for fuel leakage. EC-36 ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM Introduction The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including: Emission-related diagnostic information ISO Standard Diagnostic Trouble Code (DTC) Mode 3 of ISO 15031-5 Freeze Frame data Mode 2 of ISO 15031-5 System Readiness Test (SRT) code Mode 1 of ISO 15031-5 1st Trip Diagnostic Trouble Code (1st Trip DTC) Mode 7 of ISO 15031-5 1st Trip Freeze Frame data Test values and Test limits Mode 6 of ISO 15031-5 Calibration ID Mode 9 of ISO 15031-5 The above information can be checked using procedures listed in the table below. x: Applicable —: Not applicable DTC Freeze Frame data 1st trip DTC 1st trip Freeze Frame data SRT code Test value CONSULT-II x x x x x — GST x x*1 x — x x ECM x x*2 — — — — *1: 1st trip DTCs for self-diagnoses concerning SRT items cannot be shown on the GST display. *2: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other. The malfunction indicator (MI) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode.

(Refer to EC-65.) Two Trip Detection Logic When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MI will not light up at this stage. If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MI lights up.

The MI lights up at the same time when the DTC is stored.

The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MI, and store DTC and Freeze Frame data, even in the 1st trip, as shown below. x: Applicable —: Not applicable MI DTC 1st trip Items 1st trip DTC 2nd trip 1st trip displaying 2nd trip displaying 1st trip displaying 2nd trip displaying — — — x — x — — x — — x — — x — x — — — x — x x — Blinking Lighting up Blinking Lighting up Misfire (Possible three way catalyst damage) — DTC: P0300 P0306 is being detected x — — Misfire (Possible three way catalyst damage) — DTC: P0300 P0306 is being detected — — One trip detection diagnoses (Refer to EC-9.) — Except above — EC-37 ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM Emission-related Diagnostic Information EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS DTC*1 SRT code Test Value/ Test Limit (GST only) 1st trip DTC Reference page 1000*3 — — — EC-121 P0000 0000 — — — — HO2S1 HTR (B1) P0031 0031 x x x*4 EC-124 HO2S1 HTR (B1) P0032 0032 x x x*4 EC-124 HO2S2 HTR (B1) P0037 0037 x x x*4 EC-132 HO2S2 HTR (B1) P0038 0038 x x x*4 EC-132 HO2S1 HTR (B2) P0051 0051 x x x*4 EC-124 HO2S1 HTR (B2) P0052 0052 x x x*4 EC-124 HO2S2 HTR (B2) P0057 0057 x x x*4 EC-132 HO2S2 HTR (B2) P0058 0058 x x x*4 EC-132 MAF SEN/CIRCUIT P0102 0102 — — — EC-140 MAF SEN/CIRCUIT P0103 0103 — — — EC-140 IAT SEN/CIRCUIT P0112 0112 — — x EC-147 IAT SEN/CIRCUIT P0113 0113 — — x EC-147 ECT SEN/CIRCUIT P0117 0117 — — — EC-152 ECT SEN/CIRCUIT P0118 0118 — — — EC-152 TP SEN 2/CIRC P0122 0122 — — — EC-157 TP SEN 2/CIRC P0123 0123 — — — EC-157 HO2S1 (B1) P0132 0132 x x x*4 EC-163 HO2S1 (B1) P0133 0133 x x x*4 EC-172 HO2S1 (B1) P0134 0134 x x x*4 EC-172 HO2S2 (B1) P0138 0138 x x x*4 EC-195 HO2S2 (B1) P0139 0139 x x x*4 EC-205 HO2S1 (B2) P0152 0152 x x x*4 EC-163 HO2S1 (B2) P0153 0153 x x x*4 EC-172 HO2S1 (B2) P0154 0154 x x x*4 EC-172 HO2S2 (B2) P0158 0158 x x x*4 EC-195 HO2S2 (B2) P0159 0159 x x x*4 EC-205 FUEL SYS-LEAN-B1 P0171 0171 — — x EC-218 FUEL SYS-RICH-B1 P0172 0172 — — x EC-227 FUEL SYS-LEAN-B2 P0174 0174 — — x EC-218 FUEL SYS-RICH-B2 P0175 0175 — — x EC-227 TP SEN 1/CIRC P0222 0222 — — — EC-235 TP SEN 1/CIRC P0223 0223 — — — EC-235 MULTI CYL MISFIRE P0300 0300 — — x EC-241 CYL 1 MISFIRE P0301 0301 — — x EC-241 CYL 2 MISFIRE P0302 0302 — — x EC-241 Items (CONSULT-II screen terms) CONSULT-II GST*2 ECM CAN COMM CIRCUIT U1000 NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED. EC-38 ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM Emission-related Diagnostic Information (Cont’d) DTC*1 Items (CONSULT-II screen terms) SRT code Test Value/ Test Limit (GST only) 1st trip DTC Reference page CONSULT-II GST*2 ECM CYL 3 MISFIRE P0303 0303 — — x EC-241 CYL 4 MISFIRE P0304 0304 — — x EC-241 CYL 5 MISFIRE P0305 0305 — — x EC-241 CYL 6 MISFIRE P0306 0306 — — x EC-241 KNOCK SEN/CIRC-B1 P0327 0327 — — x EC-247 KNOCK SEN/CIRC-B1 P0328 0328 — — x EC-247 KNOCK SEN/CIRC-B2 P0332 0332 — — x EC-247 KNOCK SEN/CIRC-B2 P0333 0333 — — x EC-247 CKP SEN/CIRCUIT P0335 0335 — — x EC-251 CMP SEN/CIRC-B1 P0340 0340 — — x EC-257 TW CATALYST SYS-B1 P0420 0420 x x x*4 EC-264 TW CATALYST SYS-B2 P0430 0430 x x x*4 EC-264 PURG VOLUME CONT/V P0444 0444 — — x EC-269 PURG VOLUME CONT/V P0445 0445 — — x EC-269 VEH SPEED SEN/CIRC P0500 0500 — — x EC-276 PW ST P SEN/CIRC P0550 0550 — — x EC-278 ECM P0605 0605 — — x EC-283 MIL/CIRC P0650 0650 — — x EC-286 TCC SOLENOID/CIRC P0740 0740 — — x AT section L/PRESS SOL/CIRC P0745 0745 — — x AT section ECM BACK UP/CIRC P1065 1065 — — x EC-290 INT/V TIM V/CIR-B1 P1111 1111 — — x EC-294 ETC ACTR P1121 1121 — — x EC-299 ETC FUNCTION/CIRC P1122 1122 — — — EC-301 ETC MOT PWR P1124 1124 — — — EC-309 ETC MOT PWR P1126 1126 — — — EC-309 ETC MOT P1128 1128 — — — EC-315 HO2S1 (B1) P1143 1143 x x x*4 EC-320 HO2S1 (B1) P1144 1144 x x x*4 EC-327 HO2S2 (B1) P1146 1146 x x x*4 EC-335 HO2S2 (B1) P1147 1147 x x x*4 EC-348 HO2S1 (B2) P1163 1163 x x x*4 EC-320 HO2S1 (B2) P1164 1164 x x x*4 EC-327 HO2S2 (B2) P1166 1166 x x x*4 EC-335 HO2S2 (B2) P1167 1167 x x x*4 EC-348 ENG OVER TEMP P1217 1217 — — — EC-361 CTP LEARNING P1225 1225 — — x EC-372 CTP LEARNING P1226 1226 — — x EC-374 SENSOR POWER/CIRC P1229 1229 — — — EC-376 CKP SENSOR (COG) P1336 1336 — — x EC-381 EC-39 ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM Emission-related Diagnostic Information (Cont’d) DTC*1 Items (CONSULT-II screen terms) SRT code Test Value/ Test Limit (GST only) 1st trip DTC Reference page CONSULT-II GST*2 ECM NATS MALFUNCTION P1610 P1615 1610 - 1615 — — x EC-50 P-N POS SW/CIRCUIT P1706 1706 — — x EC-388 BRAKE SW/CIRCUIT P1805 1805 — — x EC-395 APP SEN 1/CIRC P2122 2122 — — — EC-401 APP SEN 1/CIRC P2123 2123 — — — EC-401 APP SEN 2/CIRC P2127 2127 — — — EC-408 APP SEN 2/CIRC P2128 2128 — — — EC-408 TP SENSOR P2135 2135 — — — EC-415 APP SENSOR P2138 2138 — — — EC-421 *1: 1st trip DTC No. is the same as DTC No. *2: These numbers are prescribed by ISO 15031-5. *3: The trouble shooting for these DTCs need CONSULT-II. *4: These are not displayed with GST. NOTE: Regarding Y61 models with TB48DE engine, “B1” indicates bank 1 (cylinders number 1, 2 and 3), “B2” indicates bank 2 (cylinders number 4, 5 and 6). DTC AND 1ST TRIP DTC The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed. If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MI will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MI lights up. In other words, the DTC is stored in the ECM memory and the MI lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MI during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory. Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in EC-49, “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”. For malfunctions in which 1st trip DTCs are displayed, refer to EC-38, “EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS. These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-II. 1st trip DTC is specified in Mode 7 of ISO 15031-5. 1st trip DTC detection occurs without lighting up the MI and therefore does not warn the driver of a problem. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests. When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in “Work Flow” procedure Step II, refer to EC-60, “WORK FLOW”.

Then perform “DTC Confirmation Procedure” or “Overall Function Check” to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair. How to read DTC and 1st trip DTC DTC and 1st trip DTC can be read by the following methods. With CONSULT-II With GST CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P0705, P0750, etc.

These DTCs are prescribed by ISO 15031-5. (CONSULT-II also displays the malfunctioning component or system.) EC-40 ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM Emission-related Diagnostic Information (Cont’d) No Tools The number of blinks of the MI in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0102, 0340 etc. These DTCs are controlled by NISSAN.

+ 1st trip DTC No. is the same as DTC No. + Output of a DTC indicates a malfunction.

However, GST or the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-II can identify malfunction status as shown below. Therefore, using CONSULT-II (if available) is recommended. A sample of CONSULT-II display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC. If the DTC is being detected currently, the time data will be “0”. If a 1st trip DTC is stored in the ECM, the time data will be “[1t]”. PBIB0911E FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, base fuel schedule and intake air temperature at the moment a malfunction is detected. Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II or GST.

The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For details, see EC-92, “Freeze Frame Data and 1st Trip Freeze Frame Data”. Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MI on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data. Priority 1 Items Freeze frame data 2 3 Misfire — DTC: P0300 - P0306 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175 Except the above items (Includes A/T related items) 1st trip freeze frame data For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip.

After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory. EC-41 ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM Emission-related Diagnostic Information (Cont’d) Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in EC-52, “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”. SYSTEM READINESS TEST (SRT) CODE System Readiness Test (SRT) code is specified in Mode 1 of ISO 15031-5. As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed. If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating “INCMP”, use the information in this Service Manual to set the SRT to “CMPLT”. In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate “CMPLT” for each application system. Once set as “CMPLT”, the SRT status remains “CMPLT” until the self-diagnosis memory is erased. Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer’s normal driving pattern; the SRT will indicate “INCMP” for these items. NOTE: + The SRT will also indicate “INCMP” if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours. If, during the state emissions inspection, the SRT indicates “CMPLT” for all test items, the inspector will continue with the emissions test.

However, if the SRT indicates “INCMP” for one or more of the SRT items the vehicle is returned to the customer untested. + If MI is “ON” during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates “CMPLT” for all test items. Therefore, it is important to check SRT (“CMPLT”) and DTC (No DTCs) before the inspection. SRT item The table below shows required self-diagnostic items to set the SRT to “CMPLT”. SRT item (CONSULT-II indication) CATALYST HO2S HO2S HTR Performance Priority*1 2 1 Required self-diagnostic items to set the SRT to “CMPLT” Corresponding DTC No. Three way catalyst function P0420, P0430 Heated oxygen sensor 1 P0132, P0152 Heated oxygen sensor 1 P0133, P0153 Heated oxygen sensor 1 P0134, P0154 Heated oxygen sensor 1 P1143, P1163 Heated oxygen sensor 1 P1144, P1164 Heated oxygen sensor 2 P0138, P0158 Heated oxygen sensor 2 P0139, P0159 Heated oxygen sensor 2 P1146, P1166 Heated oxygen sensor 2 P1147, P1167 Heated oxygen sensor 1 heater P0031, P0032, P0051, P0052 Heated oxygen sensor 2 heater P0037, P0038, P0057, P0058 1 *1: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT-II. EC-42 ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM Emission-related Diagnostic Information (Cont’d) SRT set timing SRT is set as “CMPLT” after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below. Example Self-diagnosis result Ignition cycle ← ON → OFF ← ON → Diagnosis ← ON → P0400 OK (1) — (1) OK (2) — (2) P0402 OK (1) — (1) — (1) OK (2) P1402 OK (1) OK (2) — (2) — (2) SRT of EGR “CMPLT” “CMPLT” “CMPLT” “CMPLT” P0400 OK (1) — (1) — (1) — (1) P0402 — (0) — (0) OK (1) — (1) P1402 OK (1) OK (2) — (2) — (2) SRT of EGR “INCMP” “INCMP” “CMPLT” “CMPLT” P0400 OK OK — — P0402 — — — — P1402 NG — NG NG (Consecutive NG) (1st trip) DTC 1st trip DTC — 1st trip DTC DTC (= MI “ON”) SRT of EGR “INCMP” “INCMP” “INCMP” “CMPLT” OFF OFF ← ON → Case 1 All OK Case 2 NG exists Case 3 OK: Self-diagnosis is carried out and the result is OK. NG: Self-diagnosis is carried out and the result is NG. —: Self-diagnosis is not carried out. When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate “CMPLT”. → Case 1 above When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses have at least one OK result. → Case 2 above If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate “CMPLT”. → Case 3 above The table above shows that the minimum number of cycles for setting SRT as “INCMP” is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons: + The SRT will indicate “CMPLT” at the time the respective self-diagnoses have one (1) OK result. + The emissions inspection requires “CMPLT” of the SRT only with OK self-diagnosis results. + When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to “CMPLT” of SRT, the self-diagnosis memory must be erased from ECM after repair. + If the 1st trip DTC is erased, all the SRT will indicate “INCMP”. NOTE: SRT can be set as “CMPLT” together with the DTC(s). Therefore, DTC check must always be carried

out prior to the state emission inspection even though the SRT indicates “CMPLT”. SRT service procedure If a vehicle has failed the state emissions inspection due to one or more SRT items indicating “INCMP”, review the flowchart diagnostic sequence on the next page. EC-43 ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM Emission-related Diagnostic Information (Cont’d) SEF573XB *1EC-40 *2EC-45 *3EC-45 EC-44 ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM Emission-related Diagnostic Information (Cont’d) How to display SRT code PBIB0666E WITH CONSULT-II Selecting “SRT STATUS” in “DTC CONFIRMATION” mode with CONSULT-II. For items whose SRT codes are set, a “CMPLT” is displayed on the CONSULT-II screen; for items whose SRT codes are not set, “INCMP” is displayed. A sample of CONSULT-II display for SRT code is shown at right. “INCMP” means the self-diagnosis is incomplete and SRT is not set. “CMPLT” means the self-diagnosis is complete and SRT is set. WITH GST Selecting Mode 1 with GST (Generic Scan Tool) How to set SRT code To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions. WITH CONSULT-II Perform corresponding DTC Confirmation Procedure one by one based on “Performance Priority” in the table on EC-42, “SRT Item”. WITHOUT CONSULT-II The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes. EC-45 ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM Emission-related Diagnostic Information (Cont’d) Driving pattern MBIB0241E EC-46 ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM Emission-related Diagnostic Information (Cont’d) The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc. Zone A refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest. Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A. *: Normal conditions refer to the following: + Sea level + Flat road + Ambient air temperature: 20 - 30°C (68 - 86°F) + Diagnosis is performed as quickly as possible under normal conditions.

Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed. Pattern 1: + The engine is started at the engine coolant temperature of −10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 121 and ground is 3.0 - 4.3V). + The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 121 and ground is lower than 1.4V).

Pattern 2: + When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended. *1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again. *2: Checking the vehicle speed with GST is advised. + Suggested Transmission Gear Position Set the selector lever in the “D” position with the overdrive switch turned ON. EC-47 ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM Emission-related Diagnostic Information (Cont’d) TEST VALUE AND TEST LIMIT (GST ONLY — NOT APPLICABLE TO CONSULT-II) The following is the information specified in Mode 6 of ISO 15031-5. The test value is a parameter used to determine whether a system/circuit diagnostic test is “OK” or “NG” while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

Items for which these data (test value and test limit) are displayed are the same as SRT code items.

These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen. x: Applicable —: Not applicable Test value (GST display) SRT item Self-diagnostic test item Test limit Application 01H Max. x 02H 81H Min. x 03H 02H Max. x 04H 82H Min. x 09H 04H Max. x 0AH 84H Min. x 0BH 04H Max. x 0CH 04H Max. x 0DH 04H Max. x 11H 05H Max. x 12H 85H Min. x 13H 05H Max. x 14H 05H Max. x 15H 05H Max. x 19H 86H Min. x 1AH 86H Min. x 1BH 06H Max. x 1CH 06H Max. x 21H 87H Min. x 22H 87H Min. x 23H 07H Max. x 24H 07H Max. x 29H 08H Max.

x 2AH 88H Min. x 2BH 09H Max. x 2CH 89H Min. x 2DH 0AH Max. x 2EH 8AH Min. x 2FH 0BH Max. x 30H 8BH Min. x TID CID 01H Three way catalyst function (Bank1) CATALYST Three way catalyst function (Bank2) Heated oxygen sensor 1 (Bank 1) Heated oxygen sensor 1 (Bank 2) HO2S Heated oxygen sensor 2 (Bank 1) Heated oxygen sensor 2 (Bank 2) Heated oxygen sensor 1 heater (Bank 1) Heated oxygen sensor 1 heater (Bank 2) HO2S HTR Heated oxygen sensor 2 heater (Bank 1) Heated oxygen sensor 2 heater (Bank 2) EC-48 ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM Emission-related Diagnostic Information (Cont’d) HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION How to Erase DTC (With CONSULT-II) The emission related diagnostic information in the ECM can be erased by selecting “ERASE” in the “SELFDIAG RESULTS” mode with CONSULT-II. If DTCs are displayed for both ECM and TCM (Transmission control module), they need to be erased individually from the ECM and TCM (Transmission control module). NOTE: If the DTC is not for A/T related items (see EC-9, “INDEX FOR DTC”), skip steps 2 through 4. 1. If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once. Wait at least 10 seconds and then turn it “ON” (engine stopped) again. 2. Turn CONSULT-II “ON” and touch “A/T”. 3. Touch “SELF-DIAG RESULTS”. 4. Touch “ERASE”. [The DTC in the TCM (Transmission control module) will be erased.] Then touch “BACK” twice. 5. Touch “ENGINE”. 6. Touch “SELF-DIAG RESULTS”. 7. Touch “ERASE”. (The DTC in the ECM will be erased.) SEF966X EC-49 ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM Emission-related Diagnostic Information (Cont’d) How to erase DTC (With GST) The emission related diagnostic information in the ECM can be erased by selecting Mode 4 with GST. NOTE: If the DTC is not for A/T related items (see EC-9, “INDEX FOR DTC”), skip step 2. 1.

If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once.

Wait at least 10 seconds and then turn it “ON” (engine stopped) again. 2. Perform “SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)” in AT section titled “TROUBLE DIAGNOSIS”, “Self-diagnosis”.

(The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.) 3. Select Mode 4 with GST (Generic Scan Tool). How to erase DTC (No Tools) 1.

If the ignition switch stays “ON” after repair work, be sure to turn ignition switch OFF” once. 2. Wait at least 10 seconds and then turn it “ON” (engine stopped) again. 3.

Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal. Refer to EC-52, “HOW TO SWITCH DIAGNOSTIC TEST MODE”. + If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours. + The following data are cleared when the ECM memory is erased. 1. Diagnostic trouble codes 2. 1st trip diagnostic trouble codes 3.

Freeze frame data 4. 1st trip freeze frame data 5. System readiness test (SRT) codes 6. Test values 7. Others Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures. NATS (Nissan Anti-theft System) SEF515Y + If the security indicator lights up with the ignition switch in the “ON” position or “NATS MALFUNCTION” is displayed on “SELF-DIAG RESULTS” screen, perform selfdiagnostic results mode with CONSULT-II using NATS program card. Refer to EL section, “NATS (NISSAN ANTI-THEFT SYSTEM)”.

+ Confirm no self-diagnostic results of NATS is displayed before touching “ERASE” in “SELF-DIAG RESULTS” mode with CONSULT-II. + When replacing ECM, initialization of NATS system and registration of all NATS ignition key IDs must be carried out with CONSULT-II using NATS program card. Therefore, be sure to receive all keys from vehicle owner. Regarding the procedures of NATS initialization and NATS ignition key ID registration, refer to CONSULT-II operation manual, NATS. EC-50 ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM Malfunction Indicator (MI) DESCRIPTION SAT652J The MI is located on the instrument panel. 1. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.

+ If the MI does not light up, refer to EL section “WARNING LAMPS”, or see EC-286. 2. When the engine is started, the MI should go off. If the MI remains on, the on board diagnostic system has detected an engine system malfunction. ON BOARD DIAGNOSTIC SYSTEM FUNCTION The on board diagnostic system has the following four functions. Diagnostic Test Mode KEY and ENG. Status Function Explanation of Function Ignition switch in “ON” position Engine stopped BULB CHECK This function checks the MI bulb for damage (blown, open circuit, etc.). If the MI does not come on, check MI circuit.

MALFUNCTION WARNING This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MI will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MI in the 1st trip. + “Misfire (Possible three way catalyst damage)” + “One trip detection diagnoses” SELF-DIAGNOSTIC RESULTS This function allows DTCs and 1st trip DTCs to be read. Mode I Engine running Ignition switch in “ON” position Engine stopped Mode II Engine running This function allows the fuel mixture condition (lean HEATED OXYGEN SENSOR 1 or rich), monitored by heated oxygen sensor 1, to MONITOR be read. MI flashing without DTC If the ECM is in Diagnostic Test Mode II, MI may flash when engine is running. In this case, check ECM diagnostic test mode, EC-52 “HOW TO SWITCH DIAGNOSTIC TEST MODE”. How to switch the diagnostic test (function) modes, and details of the above functions are described later, EC-52 “HOW TO SWITCH DIAGNOSTIC TEST MODE”. The following emission-related diagnostic information is cleared when the ECM memory is erased. + Diagnostic trouble codes + 1st trip diagnostic trouble codes + Freeze frame data + 1st trip freeze frame data + System readiness test (SRT) codes + Test values + Others EC-51 ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM Malfunction Indicator (MI) (Cont’d) HOW TO SWITCH DIAGNOSTIC TEST MODE NOTE: + It is better to count the time accurately with a clock. + It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction. + Always ECM returns to Diagnostic Test Mode I after ignition switch is turned “OFF”. How to set diagnostic test mode II (Self-diagnostic results) 1. 2.

a.

b.

3. Confirm that accelerator pedal is fully released, turn ignition switch “ON” and wait 3 seconds.

Repeat the following procedure quickly five times within 5 seconds. Fully depress the accelerator pedal. Fully release the accelerator pedal. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MI starts blinking. 4. Fully release the accelerator pedal. ECM has entered to Diagnostic Test Mode II (Self-diagnostic results). PBIB0092E How to set diagnostic test mode II (Heated oxygen sensor 1 monitor) 1. Set the ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-52, “How to set diagnostic test mode II (Self-diagnostic results)”.

2. Start Engine. ECM has entered to Diagnostic Test Mode II (Heated oxygen sensor 1 monitor). ECM will start heated oxygen sensor 1 monitoring from the bank 1 sensor. How to switch monitored sensor from bank 1 to bank 2 or vice versa 1. Fully depress the accelerator pedal quickly and then release it immediately. 2. Make sure that monitoring sensor has changed by MI blinking as follows. PBIB0093E How to erase diagnostic test mode II (Self-diagnostic results) 1.

Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-52, “How to set diagnostic test mode II (Self-diagnostic results)”. 2. Fully depress the accelerator pedal and keep it for more than 10 seconds. The emission-related diagnostic information has been erased from the backup memory in the ECM. 3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

EC-52 ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM Malfunction Indicator (MI) (Cont’d) DIAGNOSTIC TEST MODE I — BULB CHECK In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to EL section or see EC-286. DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING MI Condition ON When the malfunction is detected.

OFF No malfunction. + These DTC numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS) DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MI as shown below. The DTC and 1st trip DTC are displayed at the same time.

If the MI does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MI illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT-II or GST. A DTC will be used as an example for how to read a code. SEF952W A particular trouble code can be identified by the number of four-digit numeral flashes. The “zero” is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle. The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle. A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared. A change from one trouble code to another occurs at an interval of 1.8-second OFF. In this way, all the detected malfunctions are classified by their DTC numbers. The DTC “0000” refers to no malfunction. (See EC-9.) How to erase diagnostic test mode II (Self-diagnostic results) The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to EC-52, “HOW TO SWITCH DIAGNOSTIC TEST MODE”. + If the battery is disconnected, the DTC will be lost from the backup memory after approx 24 hours.

+ Be careful not to erase the stored memory before starting trouble diagnoses. EC-53 ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM Malfunction Indicator (MI) (Cont’d) DIAGNOSTIC TEST MODE II — HEATED OXYGEN SENSOR 1 MONITOR In this mode, the MI displays the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor 1. MI Fuel mixture condition in the exhaust gas ON Lean OFF Rich *Remains ON or OFF Any condition Air fuel ratio feedback control condition Closed loop system Open loop system *: Maintains conditions just before switching to open loop. To check the heated oxygen sensor 1 function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge. Next run engine at about 2,000 rpm for about 2 minutes under no-load conditions. Then make sure that the MI comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no-load. OBD System Operation Chart RELATIONSHIP BETWEEN MI, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS + + + + + When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory. When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MI will come on. For details, refer to EC-37, “Two Trip Detection Logic”. The MI will go off after the vehicle is driven 3 times with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset. The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring.

The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-II will count the number of times the vehicle is driven. The 1st trip DTC is not displayed when the self-diagnosis results in “OK” for the 2nd trip. SUMMARY CHART Items MI (goes off) DTC, Freeze Frame Data (no display) 1st Trip DTC (clear) 1st Trip Freeze Frame Data (clear) Fuel Injection System Misfire Other 3 (pattern B) 3 (pattern B) 3 (pattern B) 80 (pattern C) 80 (pattern C) 40 (pattern A) 1 (pattern C), *1 1 (pattern C), *1 1 (pattern B) *1, *2 *1, *2 1 (pattern B) For details about patterns “B” and “C” under “Fuel Injection System” and “Misfire”, see EC-56.

For details about patterns “A” and “B” under “Other”, see EC-58. *1: Clear timing is at the moment OK is detected. *2: Clear timing is when the same malfunction is detected in the 2nd trip. EC-54 ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM OBD System Operation Chart (Cont’d) RELATIONSHIP BETWEEN MI, DTC, 1ST TRIP DTC AND DRIVING PATTERNS FOR “MISFIRE” , “FUEL INJECTION SYSTEM” SEF392SA *1:When the same malfunction is detected in two consecutive trips, MI will light up. *2:MI will go off after vehicle is driven 3 times (pattern B) without any malfunctions. *3:When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM. *4:The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.) *5:When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM. EC-55 *6:The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected. *7:When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared. *8:1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM. ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM OBD System Operation Chart (Cont’d) EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE ”, “FUEL INJECTION SYSTEM” Driving pattern B means the vehicle operation as follows: All components and systems should be monitored at least once by the OBD system. + The B counter will be cleared when the malfunction is detected once regardless of the driving pattern. + The B counter will be counted up when driving pattern B is satisfied without any malfunction. + The MI will go off when the B counter reaches 3. (*2 in “OBD SYSTEM OPERATION CHART”) Driving pattern C means the vehicle operation as follows: 1. The following conditions should be satisfied at the same time: Engine speed: (Engine speed in the freeze frame data) ±375 rpm Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%] Engine coolant temperature (T) condition: + When the freeze frame data shows lower than 70°C (158°F), “T” should be lower than 70°C (158°F). + When the freeze frame data shows higher than or equal to 70°C (158°F), “T” should be higher than or equal to 70°C (158°F). Example: If the stored freeze frame data is as follows: Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F) To be satisfied with driving pattern C, the vehicle should run under the following conditions: Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F) + The C counter will be cleared when the malfunction is detected regardless of (1). + The C counter will be counted up when (1) is satisfied without the same malfunction. + The DTC will not be displayed after C counter reaches 80. + The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

EC-56 ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM OBD System Operation Chart (Cont’d) RELATIONSHIP BETWEEN MI, DTC, 1ST TRIP DTC AND DRIVING PATTERNS EXCEPT FOR “MISFIRE ”, “FUEL INJECTION SYSTEM” SEF393SA *1:When the same malfunction is detected in two consecutive trips, MI will light up. *2:MI will go off after vehicle is driven 3 times (pattern B) without any malfunctions. *3:When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4:The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.) *5:When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM. EC-57 *6:1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction. *7:When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared. ON BOARD DIAGNOSTIC (OBD) TB48DE A/T (WITH EURO-OBD) SYSTEM OBD System Operation Chart (Cont’d) EXPLANATION FOR DRIVING PATTERNS EXCEPT FOR “MISFIRE ”, “FUEL INJECTION SYSTEM” AEC574 + + + The A counter will be cleared when the malfunction is detected regardless of (1) - (4). The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.

The DTC will not be displayed after the A counter reaches 40. Driving pattern B means the vehicle operation as follows: All components and systems should be monitored at least once by the OBD system. + The B counter will be cleared when the malfunction is detected once regardless of the driving pattern. + The B counter will be counted up when driving pattern B is satisfied without any malfunctions. + The MI will go off when the B counter reaches 3 (*2 in “OBD SYSTEM OPERATION CHART”). EC-58 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Trouble Diagnosis Introduction INTRODUCTION MEF036D SEF233G The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, fouled spark plugs, or other malfunctions with the engine. It is much more difficult to diagnose an incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts. A visual check only may not find the cause of the incidents.

A roadtest with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the “Work Flow” on EC-60.

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A “Diagnostic Worksheet” like the example on EC-63 should be used. Start your diagnosis by looking for “conventional” malfunctions first. This will help troubleshoot driveability malfunctions on an electronically controlled engine vehicle. SEF234G EC-59 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Trouble Diagnosis Introduction (Cont’d) WORK FLOW Flow chart MBIB0159E *1:If time data of “SELF-DIAG RESULTS” is other than “0” or “[1t]”, perform EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. *2:If time data of “SELF-DIAG RESULTS” is other than “0” or “[1t]”, perform EC-112, “TROUBLE DIAGNO- SIS FOR INTERMITTENT INCIDENT”. *3:If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to EC-113, “POWER SUPPLY CIRCUIT FOR ECM”. *4:If malfunctioning part cannot be EC-60 detected, perform EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. *5:EC-46, “Driving Pattern” *6:EC-108, “TROUBLE DIAGNOSIS — SPECIFICATION VALUE” TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Trouble Diagnosis Introduction (Cont’d) Description for work flow STEP DESCRIPTION STEP I Get detailed information about the conditions and the environment when the incident/symptom occurred using the “DIAGNOSTIC WORK SHEET”, EC-62. STEP II Before confirming the concern, check and write down (print out using CONSULT-II or GST) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the data. (Refer to EC-49, “HOW TO ERASE EMISSIONRELATED DIAGNOSTIC INFORMATION”.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV.

If the incident cannot be verified, perform EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The “Symptom Matrix Chart” will be useful. See EC-71.) Also check related service bulletins for information. STEP III Try to confirm the symptom and under what conditions the incident occurs. The “DIAGNOSTIC WORK SHEET” and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. If the malfunction code is detected, skip STEP IV and perform STEP V. STEP IV Try to detect the (1st trip) DTC by driving in (or performing) the “DTC Confirmation Procedure”. Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or GST. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. In case the “DTC Confirmation Procedure” is not available, perform the “Overall Function Check” instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified “check” is an effective alternative. The “NG” result of the “Overall Function Check” is the same as the (1st trip) DTC detection. STEP V Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-66.) If CONSULT-II is available, perform “DATA MONITOR (SPEC)” mode with CONSULT-II and proceed to the “TROUBLE DIAGNOSIS — SPECIFICATION VALUE”. (Refer to EC-108) (If malfunction is detected, proceed to “PERAIR/REPLACE”.) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-71.) STEP VI Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) “Harness Layouts”.

Gently shake the related connectors, components or wiring harness with CONSULT-II set in “DATA MONITOR (AUTO TRIG)” mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II.

Refer to EC-80, 103. The “Diagnostic Procedure” in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure.

For details, refer to “Circuit Inspection” in GI section. Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. STEP VII Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer’s initial complaint. Perform the “DTC Confirmation Procedure” and confirm the normal code [DTC No. P0000] is detected. If the incident is still detected in the final check, perform STEP VI by using a method different from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and TCM (Transmission control module).

(Refer to EC-49, “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION” and AT section.) EC-61 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Trouble Diagnosis Introduction (Cont’d) DIAGNOSTIC WORKSHEET Description SEF907L There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate. In general, each customer feels differently about an incident. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

Some conditions may cause the MI to come on steady or blink and DTC to be detected. Examples: + Vehicle ran out of fuel, which caused the engine to misfire. + Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere. EC-62 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Trouble Diagnosis Introduction (Cont’d) Worksheet sample MTBL0017 EC-63 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) DTC Inspection Priority Chart If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

NOTE: If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to EC-121, “DTC U1000 CAN COMMUNICATION LINE”. Priority Detected items (DTC) + + + + + + + + + + + + + + U1000 CAN communication line P0102 P0103 Mass air flow sensor P0112 P0113 Intake air temperature sensor P0117 P0118 Engine coolant temperature sensor P0122 P0123 P0222 P0223 P1225 P1226 P1229 P2135 Throttle position sensor P0327 P0328 P0332 P0333 Knock sensor P0335 P1336 Crankshaft position sensor (OBD) P0340 Camshaft position sensor P0500 Vehicle speed sensor P0605 ECM P0705 Park/Neutral position (PNP) switch P1610-P1615 NATS P1706 Park/Neutral position (PNP) switch P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor 2 + + + + + + + + + + P0031 P0037 P0132 P0138 P0550 P0740 P1065 P1111 P1122 P1124 P1805 P0032 P0051 P0052 Heated oxygen sensor 1 heater P0038 P0057 P0058 Heated oxygen sensor 2 heater P0133 P0134 P0152 P0153 P0154 P1143 P1144 P1163 P1164 Heated oxygen sensor 1 P0139 P0158 P0159 P1146 P1147 P1166 P1167 Heated oxygen sensor 2 Power steering pressure sensor P0745 A/T solenoid valves ECM power supply Intake valve timing control solenoid valve Electric throttle control function P1126 P1128 Electric throttle control actuator Brake switch 3 + + + + + P0171 P0300 P0420 P0444 P1121 P1217 P0172 P0174 P0175 Fuel injection system function - P0306 Misfire P0430 Three way catalyst function P0445 EVAP canister purge volume control solenoid valve Electric throttle control actuator Engine over temperature (OVERHEAT) 1 EC-64 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD)

Fail-safe Chart +When the DTC listed below is detected, the ECM enters fail-safe mode and the MI lights up. DTC No. Detected items Engine operating condition in fail-safe mode P0102 P0103 Mass air flow sensor circuit Engine speed will not rise more than 2,400 rpm due to the fuel cut.

P0117 P0118 Engine coolant temperature sensor circuit Engine coolant temperature will be determined by ECM based on the time after turning ignition switch “ON” or “START”. CONSULT-II displays the engine coolant temperature decided by ECM. Condition Engine coolant temperature decided (CONSULT-II display) Just as ignition switch is turned ON or Start 40°C (104°F) More than approx. 4 minutes after ignition ON or Start 80°C (176°F) Except as shown above 40 - 80°C (104 - 176°F) (Depends on the time) When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running. P0122 P0123 P0222 P0223 P2135 Throttle position sensor The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor. P1121 Electric throttle control actuator (ECM detect the throttle valve is stuck open.) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls.

The engine can restart in “N” or “P” position, and engine speed will not exceed 1,000 rpm or more. P1122 Electric throttle control function ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. P1124 P1126 Throttle control motor relay ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. P1128 Throttle control motor ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx.

5 degrees) by the return spring P1229 Sensor power supply ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor. EC-65 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Basic Inspection Preparation + (1) (2) (3) (4) (5) (6) (7) (8) Make sure that the following parts are in good order. Battery Ignition system Engine oil and coolant levels Fuses ECM harness connector Vacuum hoses Air intake system (Oil filler cap, oil level gauge, etc.) Fuel pressure (9) Engine compression (10) Throttle valve + On air conditioner equipped models, checks should be carried out while the air conditioner is “OFF”. +

When measuring “CO” percentage, insert probe more than 40 cm (15.7 in) into tail pipe. + Turn off headlamps, heater blower, rear window defogger.

+ Keep front wheels pointed straight ahead. Precaution: Perform Basic Inspection without electrical or mechanical loads applied; + Headlamp switch is OFF, + Air conditioner switch is OFF, + Rear window defogger switch is OFF, + Steering wheel is in the straight-ahead position, etc. SEC297D BEFORE STARTING 1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.

2. Open engine hood and check the following: + Harness connectors for improper connections + Wiring harness for improper connections, pinches, and cuts + Vacuum hoses for splits, kinks and improper connections + Hoses and ducts for leaks + Air cleaner clogging + Gasket SEF976U . 1. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge. Ensure engine stays below 1,000 rpm. 2. Run engine at about 2,000 rpm for about 2 minutes under no-load. 3. Make sure that no DTC is displayed with CONSULT-II.

. SEF977U A V EC-66 OK NG c Repair or replace components as necessary according to corresponding “Diagnostic Procedure”. . A V TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Basic Inspection (Cont’d) A V D V . NG CHECK TARGET IDLE SPEED. With CONSULT-II SEF978U 1. Run engine at about 2,000 rpm for about 2 minutes under no-load. 2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute. 3. Read idle speed in “DATA MONITOR” mode with CONSULT-II. 675±50 rpm (in “P” or “N” position) . c PERFORM THROTTLE VALVE CLOSED POSITION LEARNING. 1. Stop engine. 2. Perform EC-31, “Throttle Valve Closed Position Learning”. OK . PERFORM IDLE AIR VOLUME LEARNING. Refer to EC-31, “Idle Air Volume Learning”. Is “Idle Air Volume Learning” carried out successfully? Without CONSULT-II 1. Run engine at about 2,000 rpm for about 2 minutes under no-load. 2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute. 3. Check idle speed. 675±50 rpm (in “P” or “N” position) Yes OK No .

. B V C V C V SEF058Y .

1. Follow the construction of “Idle Air Volume Learning”.

2. Go to V D . . CHECK IGNITION TIMING. 1. Run engine at idle. 2. Check ignition timing with a timing light. 10±5° BTDC (in “P” or “N” position) NG c OK SEC536DA ADJUST CAMSHAFT POSITION SENSOR. 1. Start engine and warm it up to normal operating temperature. With CONSULT-II . K V OK D b V 2. Select “TARGET IGN TIM ADJ” in “WORK SUPPORT”. 3. Touch start. 4. Adjust camshaft position sensor using timing light.

10°±5° BTDC Without CONSULT-II 2.

Adjust camshaft position sensor using timing light. 10°±5° BTDC SEC537D NG .

CHECK TIMING CHAIN INSTALLATION. Check timing chain installation. Refer to “TIMING CHAIN” in EM section. . D b V EC-67 NG Repair the timing chain installation. TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Basic Inspection (Cont’d) B V . CHECK TARGET IDLE SPEED AGAIN. NG c With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Read idle speed in “DATA MONITOR” mode with CONSULT-II. 675±50 rpm (in “P” or “N” position) SEC536DA Check the following.

+ Check camshaft position sensor and circuit. Refer to EC-257. If NG, repair or replace. Then go to V D . . OK CHECK ECM FUNCTION. 1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is the rarely the case.) 2. Perform initialization of NATS (Nissan AntiTheft System) and registration of NATS (Nissan Anti-Theft System) ignition key IDs. Refer to EC-50, “NATS (Nissan Anti-Theft System)”. Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. 675±50 rpm (in “P” or “N” position) OK . D V J V . CHECK IGNITION TIMING. 1. Run engine at idle.

2. Check ignition timing with a timing light. 10°±5° BTDC (in “P” or “N” position) OK NG . PERFOR THROTTLE c VALVE CLOSED POSITION LEARNING. 1. Stop engine. 2. Perform EC-31, “Throttle Valve Closed Position Learning”. . . K V PERFORM IDLE AIR VOLUME LEARNING. Refer to EC-31, “Idle Air Volume Learning”. Is “Idle Air Volume Learning” carried out successfully? No Yes . . H G V V H V . 1. Follow the construction of “Idle Air Volume Learning”. 2. Go to V D . EC-68 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Basic Inspection (Cont’d) G V VI . CHECK TARGET IDLE SPEED AGAIN. . NG c With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Read idle speed in “DATA MONITOR” mode with CONSULT-II. 675±50 rpm (in “P” or “N” position) SEC536DA Check the following. + Check camshaft position sensor and circuit. Refer to EC-257. If NG, repair or replace. Then go to V D . . CHECK ECM FUNCTION.

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is the rarely the case.) 2. Perform initialization of NATS (Nissan AntiTheft System) and registration of NATS (Nissan Anti-Theft System) ignition key IDs. Refer to EC-50, “NATS (Nissan Anti-Theft System)”. Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. 675±50 rpm (in “P” or “N” position) OK SEC537D . D V . CHECK IGNITION TIMING AGAIN. 1. Run engine at idle. 2. Check ignition timing with a timing light. 10±5° BTDC (in “P” or “N” position) NG c OK ADJUST CAMSHAFT POSITION SENSOR. 1. Start engine and warm it up to normal operating temperature. With CONSULT-II 2.

Select “TARGET IGN TIM ADJ” in “WORK SUPPORT”.

3. Touch start. 4. Adjust camshaft position sensor using timing light. 10°±5° BTDC Without CONSULT-II . K V OK J V b 2. Adjust camshaft position sensor using timing light. 10°±5° BTDC NG . CHECK TIMING CHAIN INSTALLATION. Check timing chain installation. Refer to EM section, “TIMING CHAIN”. If NG, repair the timing chain installation. Then go to V D . . I V EC-69 OK TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Basic Inspection (Cont’d) K V With three way catalyst .

Set the diagnostic test mode II (Heated oxygen sensor 1 monitor). Refer to EC-52.

. SAT652J Run engine at about 2,000 rpm for about 2 minutes under no-load. . CHECK HEATED OXYGEN SENSOR 1 SIGNAL. With CONSULT-II 1. See “HO2S1 MNTR” in “DATA MONITOR” mode. 2. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature), check that the monitor fluctuates between “LEAN” and “RICH” more than 5 times during 10 seconds. 1 cycle: RICH → LEAN → RICH 2 cycles: RICH → LEAN → RICH → LEAN → RICH -- OR --Without CONSULT-II Make sure that malfunction indicator lamp goes on and off more than 5 times during 10 seconds at 2,000 rpm. OK b . ERASE UNNECESSARY DTC. After this inspection, unnecessary DTC No. might be displayed. Erase the stored memory in ECM and TCM (Transmission control module). Refer to “HOW TO ERASE EMISSIONRELATED DIAGNOSTIC INFORMATION, EC-49. OK . INSPECTION END EC-70 NG c Check oxygen sensor and the circuit. OK TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Symptom Matrix Chart SYSTEM — BASIC ENGINE CONTROL SYSTEM Warranty symptom code Fuel 1 1 2 3 2 3 3 Fuel pressure regulator system 2 3 4 4 4 4 4 4 Injector circuit 1 1 2 3 2 2 2 2 Evaporative emission system 3 3 4 4 4 4 4 4 4 4 Positive crankcase ventilation system 3 3 4 4 4 4 4 4 4 4 Incorrect idle speed adjustment 3 3 1 1 1 1 1 1 Electric throttle control actuator 1 1 2 3 3 2 2 2 2 2 Incorrect ignition timing adjustment 3 3 1 1 1 1 1 1 Ignition circuit 1 1 2 2 2 2 2 2 Main power supply and ground circuit 2 2 3 3 3 3 3 Cooling 3 3 3 2 3 3 3 3 3 3 2 3 3 3 3 3 3 3 Ignition Cooling fan circuit Air conditioner circuit BATTERY DEAD (UNDER CHARGE) OVERCHARGING OVERCOOLS Reference page AA AB AC AD AE AF AG AH AJ AK AL AM 1P 1X HA Fuel pump circuit Air EXCESSIVE OIL CONSUMPTION EXCESSIVE FUEL CONSUMPTION OVERHEATS/WATER TEMPERATURE HIGH SLOW/NO RETURN TO IDLE IDLING VIBRATION ROUGH IDLE/HUNTING HIGH IDLE/LOW IDLE LACK OF POWER/POOR ACCELERATION SPARK KNOCK/DETONATION HESITATION/SURGING/FLAT SPOT ENGINE STALL SYSTEM — Basic engine control system HARD/NO START/RESTART (EXCP. HA) SYMPTOM 1 - 6: The numbers refer to the order of inspection. EC-71 3 4 2 EC-459 4 EC-34 2 EC-453 3 3 1 2 3 EC-269 1 EC-481 EC-30 2 EC-299 EC-301 EC-309 EC-315 EC-30 EC-428 2 1 EC-113 3 EC-361 2 HA section TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Symptom Matrix Chart (Cont’d) Warranty symptom code Engine control BATTERY DEAD (UNDER CHARGE) OVERCHARGING OVERCOOLS EXCESSIVE OIL CONSUMPTION EXCESSIVE FUEL CONSUMPTION OVERHEATS/WATER TEMPERATURE HIGH SLOW/NO RETURN TO IDLE IDLING VIBRATION ROUGH IDLE/HUNTING HIGH IDLE/LOW IDLE LACK OF POWER/POOR ACCELERATION SPARK KNOCK/DETONATION HESITATION/SURGING/FLAT SPOT ENGINE STALL SYSTEM — Engine control system HARD/NO START/RESTART (EXCP. HA) SYMPTOM Reference page AA AB AC AD AE AF AG AH AJ AK AL AM 1P 1X HA Camshaft position sensor circuit 2 2 2 2 2 3 3 3 Mass air flow sensor circuit 1 1 2 2 2 2 2 2 2 Engine coolant temperature sensor circuit 1 1 2 3 2 3 2 2 3 Throttle position sensor circuit 1 Accelerator pedal position sensor circuit 2 3 Heated oxygen sensor 1 circuit 1 2 2 3 2 2 1 2 2 3 3 3 3 3 2 2 3 3 2 2 2 2 3 3 3 2 Start signal circuit 2 3 2 EC-257 2 EC-140 2 EC-152 2 EC-235 EC-372 EC-374 EC-415 EC-401 EC-408 EC-421 2 2 Vehicle speed sensor circuit ECM 2 2 Intake valve timing control system Knock sensor circuit 2 2 3 3 3 3 3 2 3 3 EC-172 EC-372 EC-320 EC-327 3 EC-294 3 EC-276 3 EC-247 3 EC-283 EC-450 Park/Neutral position switch circuit 3 Variable Induction Air Control (VIAS) system 3 2 3 EC-388 EC-446 Electrical load signal circuit 2 3 3 EC-470 Power steering pressure sensor circuit 2 3 3 EC-278 1 - 6: The numbers refer to the order of inspection. EC-72 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Symptom Matrix Chart (Cont’d) SYSTEM — ENGINE MECHANICAL & OTHER Warranty symptom code Fuel Fuel tank Fuel piping Vapor lock Valve deposit Poor fuel (Heavy weight gasoline, Low octane) Air Air duct Air cleaner Air leakage from air duct (Mass air flow sensor — Electric throttle control actuator) Electric throttle control actuator, Throttle wire Air leakage from intake manifold/ Collector/Gasket Cranking Battery Alternator circuit Starter circuit PNP switch Drive plate Engine Cylinder head Cylinder head gasket Cylinder block Piston Piston ring Connecting rod Bearing Crankshaft Valve Timing chain mechanism Camshaft Intake valve Exhaust valve Exhaust Exhaust manifold/Tube/Muffler/Gasket Three way catalyst* Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery Oil level (Low)/Filthy oil Cooling Radiator/Hose/Radiator filler cap Thermostat Water pump Water gallery Cooling fan Coolant level (low)/Contaminated coolant NATS (Nissan Anti-Theft System) BATTERY DEAD (UNDER CHARGE) OVERCHARGING OVERCOOLS EXCESSIVE OIL CONSUMPTION EXCESSIVE FUEL CONSUMPTION OVERHEATS/WATER TEMPERATURE HIGH SLOW/NO RETURN TO IDLE IDLING VIBRATION ROUGH IDLE/HUNTING HIGH IDLE/LOW IDLE LACK OF POWER/POOR ACCELERATION SPARK KNOCK/DETONATION HESITATION/SURGING/FLAT SPOT ENGINE STALL SYSTEM — Engine mechanical & other HARD/NO START/RESTART (EXCP. HA) SYMPTOM Reference page AA AB AC AD AE AF AG AH AJ AK AL AM 1P 1X HA 5 FE section 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 — 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 FE section — 1 1 1 1 1 1 1 1 3 4 6 1 EL section AT section EM section 4 6 6 6 6 6 6 6 6 6 EM section 6 5 6 5 6 5 6 5 6 5 6 5 6 5 6 5 6 5 6 6 6 6 6 6 6 6 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 6 6 6 EM section & FE section FE section Lubrication 5 5 5 LC section 2 5 5 5 5 4 5 2 1 1 1 - 6: The numbers refer to the order of inspection. EC-73 EC section MA section EC-50 or EL section TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Engine Control Component Parts Location SEC666D EC-74 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Engine Control Component Parts Location (Cont’d) SEC733D EC-75 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Engine Control Component Parts Location (Cont’d) SEC734D EC-76 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Engine Control Component Parts Location (Cont’d) SEC744D EC-77 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Circuit Diagram TEC410M EC-78 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Circuit Diagram (Cont’d) TEC329M EC-79 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) ECM Harness Connector Terminal Layout PBIB0075E ECM Terminals and Reference Value PREPARATION 1. ECM is located behind the center console. For this inspection, remove instrument lower driver panel. 2. Remove ECM harness protector. SEC667D 3. Perform all voltage measurements with the connector connected. Extend tester probe as shown to perform tests easily.

+ Open harness securing clip to make testing easily. + Use extreme care not to touch 2 pins at one time. + Data is for comparison and may not be exact.

MEC486B ECM INSPECTION TABLE Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II. CAUTION: Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. EC-80 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) ECM Terminals and Reference Value (Cont’d) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC voltage) BATTERY VOLTAGE (11 - 14V)*1 Engine is running. Warm-up condition Idle speed 5 6 7 13 14 15 BR/W GY/L BR/Y GY/R BR GY Injector Injector Injector Injector Injector Injector No. No. No. No. No. No. 1 2 3 4 5 6 SEC984C BATTERY VOLTAGE (11 - 14V)*1 Engine is running. Warm-up condition Engine speed is 2,000 rpm. SEC985C Approximately 7.0V*1 Engine is running. 8 G/Y Heated oxygen sensor 1 heater (bank 2) Warm-up condition Engine speed is below 2,800 rpm. PBIB0519E Engine is running. Engine speed is above 2,800 rpm. BATTERY VOLTAGE (11 - 14V) Approximately 7.0V*1 Engine is running. 9 Y/B Heated oxygen sensor 1 heater (bank 1) Warm-up condition Engine speed is below 2,800 rpm.

PBIB0519E Engine is running. Engine speed is above 2,800 rpm.

BATTERY VOLTAGE (11 - 14V) Engine is running. 10 Y/R Heated oxygen sensor 2 heater (bank 2) Warm-up condition After keeping engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load Engine speed is below 3,200 rpm 0 - 1.0V Ignition switch “ON” Engine stopped Engine is running. Engine speed is above 3,200 rpm EC-81 BATTERY VOLTAGE (11 - 14V) TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) ECM Terminals and Reference Value (Cont’d) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC voltage) Engine is running.

11 R/G Warm-up condition After keeping engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load Engine speed is below 3,200 rpm Heated oxygen sensor 2 heater (bank 1) 0 - 1.0V Ignition switch “ON” Engine stopped Engine is running. BATTERY VOLTAGE (11 - 14V) Engine speed is above 3,200 rpm 0 - 0.1V*1 Engine is running. Warm-up condition Idle speed 18 19 20 21 29 30 Y/R G Y R/B R/G R Ignition Ignition Ignition Ignition Ignition Ignition signal signal signal signal signal signal No. No. No. No. No. No. 1 2 3 4 5 6 SEC986C 0 - 0.2V*1 Engine is running. Warm-up condition Engine speed is 2,000 rpm. SEC987C 26 27 P/L LG/R Throttle control motor relay VIAS control solenoid valve Ignition switch “OFF” BATTERY VOLTAGE (11 - 14V) Ignition switch “ON” 0 - 1.0V Engine is running. BATTERY VOLTAGE (11 - 14V) Idle speed Engine is running. 0 - 1.0V Engine speed is above 5,000 rpm.

35 Y/G MI Ignition switch “ON” 0 - 1.0V Engine is running. BATTERY VOLTAGE (11 - 14V) Idle speed Ignition switch “ON” 41 R/Y Fuel pump relay For 5 seconds after turning ignition switch “ON” Engine is running. 0 - 1.0V Ignition switch “ON” More than 5 seconds after turning ignition switch “ON” EC-82 BATTERY VOLTAGE (11 - 14V) TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) ECM Terminals and Reference Value (Cont’d) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC voltage) Engine is running. Ignition switch “OFF” 42 B/Y ECM relay (Self shut-off) 0 - 1.0V For 5 seconds after turning ignition switch “OFF” Ignition switch “OFF” 5 seconds passed after turning ignition switch “OFF” 53 W/G BATTERY VOLTAGE (11 - 14V) Ignition switch “OFF” 0V Ignition switch “ON” BATTERY VOLTAGE (11 - 14V) Ignition switch BATTERY VOLTAGE (11 - 14V)*1 Engine is running. Idle speed 54 W/B EVAP canister purge volume control solenoid valve SEC990C BATTERY VOLTAGE (11 - 14V)*1 Engine is running. Engine speed is about 2,000 rpm (More than 100 seconds after starting engine). SEC991C Engine is running. 0 - 1.0V 55 L/B Cooling fan relay (High) Cooling fan is operating at high speed. Engine is running. Cooling fan is not operating. BATTERY VOLTAGE (11 - 14V) Engine is running. 0 - 1.0V 56 L Cooling fan relay (Low) Cooling fan is operating. Engine is running. Cooling fan is not operating. 59 R/W Start signal BATTERY VOLTAGE (11 - 14V) Ignition switch “ON” Approximately 0V Ignition switch “START” 9 - 14V Ignition switch “ON” Approx. 0V Snow mode switch is “OFF” 60 Y/G Snow mode switch Ignition switch “ON” Snow mode switch is “ON” EC-83 BATTERY VOLTAGE (11 - 14V) TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) ECM Terminals and Reference Value (Cont’d) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC voltage) Approx. 2.6 - 2.7V*1 Engine is running. Warm-up condition Idle speed 63 B/W Camshaft position sensor (POS signal) SEC750D Approx. 2.5 - 2.6V*1 Engine is running. Engine speed is 2,000 rpm SEC751D Ignition switch “ON” Approximately 0V Gear position is Neutral. 80 R/PU PNP switch Ignition switch “ON” Approximately 5V Except the above gear position Approx. 0.3 - 0.6V*1 Engine is running. (Warm-up condition) Idle speed 83 84 L L SEC746D Camshaft position sensor (REF signal) Approx. 0.3 - 0.6V*1 Engine is running. Engine speed is 2,000 rpm SEC747D Ignition switch “ON” 87 W Accelerator pedal position sensor 1 Engine stopped Gear position is “D” Accelerator pedal fully released More than 0.36V Ignition switch “ON” Engine stopped Gear position is “D” Accelerator pedal fully depressed EC-84 Less than 4.75V TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) ECM Terminals and Reference Value (Cont’d) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC voltage) Engine is running. 88 R/G Refrigerant pressure sensor Warm-up condition Both A/C switch and blower switch are “ON” (Compressor operates) 1.0 - 4.0V Engine is running. 89 B Sensors’ ground Warm-up condition Idle speed Approximately 0V Engine is running.

91 W/G Mass air flow sensor Warm-up condition Idle speed 0.75 - 1.2V Engine is running. Warm-up condition Engine speed is 2,500 rpm.

1.7 - 2.4V 94 LG Accelerator pedal position sensor 2 power supply Ignition switch “ON” Approximately 2.5V 95 W Power supply for ECM (Buck-up) Ignition switch “OFF” BATTERY VOLTAGE (11 - 14V) Ignition switch “ON” 98 R/L Throttle position sensor 2 Engine stopped Gear position is “D” Accelerator pedal fully released Less than 4.75V Ignition switch “ON” Engine stopped Gear position is “D” Accelerator pedal fully depressed More than 0.36V 99 L/W Intake air temperature sensor Engine is running. Approximately 0 - 4.8V Output voltage varies with intake air temperature. 100 R Accelerator pedal position sensor 2 ground Ignition switch “ON” Approximately 0V 103 Y Sensors’ power supply Ignition switch “ON” Approximately 5V Engine is running. Approximately 0V Brake pedal fully released 106 G/Y Stop lamp switch Engine is running. Brake pedal fully depressed EC-85 BATTERY VOLTAGE (11 - 14V) TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) ECM Terminals and Reference Value (Cont’d) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC voltage) Ignition switch “ON” 108 L Throttle position sensor 1 Engine stopped Gear position is “D” Accelerator pedal fully released More than 0.36V Ignition switch “ON” Engine stopped Gear position is “D” Accelerator pedal fully depressed Less than 4.75V Engine is running. 109 B/W Mass air flow sensor ground Warm-up condition Idle speed Approximately 0V 1 - 2V (AC range) Engine is running. Warm-up condition Idle speed 111 W SEC748D Crankshaft position sensor (OBD) 3 - 4V (AC range) Engine is running. Engine speed is 2,000 rpm. SEC749D Engine is running. 114 W Heated oxygen sensor 1 (bank 1) 115 W Heated oxygen sensor 1 (bank 2) Warm-up condition Engine speed is 2,000 rpm. 0 - Approximately 1.0V (Periodically change) Engine is running. Warm-up condition Engine speed is 2,000 rpm.

0 - Approximately 1.0V (Periodically change) Ignition switch “ON” 117 G Accelerator pedal position sensor 2 Engine stopped Gear position is “D” Accelerator pedal fully released More than 0.18V Ignition switch “ON” Engine stopped Gear position is “D” Accelerator pedal fully depressed Less than 2.37V Engine is running. 0.5 - 4.5V 118 BR/W Power steering pressure sensor Steering wheel is being turned Engine is running. 0.4 - 0.8V Steering wheel is not being turned EC-86 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) ECM Terminals and Reference Value (Cont’d) TERMINAL NO. 121 WIRE COLOR LG/B ITEM Engine coolant temperature sensor CONDITION Engine is running. DATA (DC voltage) Approximately 0 - 4.8V Output voltage varies with engine coolant temperature. Engine is running. 123 W Heated oxygen sensor 2 (bank 2) Warm-up condition Revving engine from idle to 3,000 rpm quickly after the following conditions are met After keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load 0 - Approximately 1.0V Engine is running. 124 W Heated oxygen sensor 2 (bank 1) 125 126 W W Knock sensor (Bank 1) Knock sensor (Bank 2) Warm-up condition Revving engine from idle to 3,000 rpm quickly after the following conditions are met After keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load 0 - Approximately 1.0V Engine is running. Approximately 2.5V Idle speed 0 - 14V*1 Ignition switch “ON” 151 L/W Throttle control motor (Open) Engine stopped Gear position is “D” Accelerator pedal is depressing PBIB1105E Engine is running. 152 R Intake valve timing control solenoid valve Warm-up condition Engine speed is between 1,000 rpm and 4,200 rpm During high load condition Vehicle speed is more than 8 km/h (5 MPH) Engine is running. Those other than above 153 156 159 165 168 B B B B B Approximately 0V BATTERY VOLTAGE (11 - 14V) Engine is running.

ECM ground Engine ground Idle speed EC-87 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) ECM Terminals and Reference Value (Cont’d) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC voltage) 0 - 14V*1 Ignition switch “ON” 154 L/B Throttle control motor (Close) Engine stopped Gear position is “D” Accelerator pedal is releasing PBIB1105E 157 G Throttle control motor relay power supply Ignition switch “ON” BATTERY VOLTAGE (11 - 14V) 163 166 B/R Power supply for ECM Ignition switch “ON” BATTERY VOLTAGE (11 - 14V) 164 PU Data link connector Ignition switch “ON” CONSULT-II or GST is disconnected. BATTERY VOLTAGE (11 - 14V) 171 W/R CAN communication line Ignition switch “ON” Approximately 1.7 - 2.3V Output voltage varies with the communication status. 174 G/B CAN communication line Ignition switch “ON” Approximately 2.6 - 3.2V Output voltage varies with the communication status. *1: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.) EC-88 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) CONSULT-II Function FUNCTION Diagnostic test mode Work support Function This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-II unit. Self-diagnostic results Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*1 Data monitor Input/Output data in the ECM can be read. Data monitor (SPEC) Input/Output of the specification for Basic fuel schedule, AFM, A/F feedback control value and the other data monitor items can be read. Active test Diagnostic Test Mode in which

CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range. Function test This mode is used to inform customers when their vehicle condition requires periodic maintenance. DTC & SRT confirmation The status of system monitoring tests and the self-diagnosis status/result can be confirmed. ECM part number ECM part number can be read. *1: The following emission-related diagnostic information is cleared when the ECM memory is erased. + Diagnostic trouble codes + 1st trip diagnostic trouble codes + Freeze frame data + 1st trip freeze frame data + System readiness test (SRT) codes + Test values + Others EC-89 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) CONSULT-II Function (Cont’d) ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION DIAGNOSTIC TEST MODE Item WORK SUPPORT DTC*1 FREEZE FRAME DATA x x Camshaft position sensor x x Mass air flow sensor x Engine coolant temperature sensor x Heated oxygen sensor 1 Heated oxygen sensor 2 INPUT Crankshaft position sensor (OBD) ENGINE CONTROL COMPONENT PARTS SELF-DIAGNOSTIC RESULTS x x DTC & SRT CONFIRMATION ACTIVE TEST DTC WORK SUPPORT x x x x x x x x x x x x x x x x Vehicle speed signal x x x Accelerator pedal position sensor x x x Throttle position sensor x x x x x Refrigerant pressure sensor x x Closed throttle position switch (accelerator pedal position sensor signal) x x Air conditioner switch x x Intake air temperature sensor x Knock sensor x x x Park/neutral position (PNP) switch x x x Stop lamp switch x x x Power steering pressure sensor x x x x Battery voltage x x Electrical load signal x x Injectors x x x x x x x x x x x x x x x x Throttle control motor relay x Throttle control motor x EVAP canister purge volume control solenoid valve x Air conditioner relay Fuel pump relay SRT STATUS x Power transistor (Ignition timing) OUTPUT DATA MONITOR DATA MONITOR (SPEC) x x Cooling fan relay x x x Heated oxygen sensor 1 heater x x x x Heated oxygen sensor 2 heater x x x x Intake valve timing control solenoid valve x x x Calculated load value x VIAS control solenoid valve x x x x x x x: Applicable *1: This item includes 1st trip DTCs. *2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-41, “FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA”. EC-90 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) CONSULT-II Function (Cont’d) CONSULT-II INSPECTION PROCEDURE 1.

Turn ignition switch OFF.

2. Connect “CONSULT-II” and “CONSULT-II CONVERTER” to data link connector, which is located under the drivers side dash panel. 3. Turn ignition switch ON.

SAT619K 4. Touch “START (NISSAN BASED VHCL)”. MBIB0233E 5. Touch “ENGINE”. If “ENGINE” is not indicated, go to GI section, “CONSULT-II Data Link Connector (DLC) Circuit”. SEF995X 6.

Perform each diagnostic test mode according to each service procedure. For further information, see the CONSULT-II Operation Manual. SEF824Y EC-91 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) CONSULT-II Function (Cont’d) WORK SUPPORT MODE Work item WORK ITEM CONDITION USAGE FUEL PRESSURE RELEASE + FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS. When releasing fuel pressure from fuel line IDLE AIR VOL LEARN + THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM. When learning the idle air volume SELF-LEARNING CONT + THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT. When clearing the coefficient of self-learning control value TARGET IDLE RPM ADJ* + IDLE CONDITION When setting target idle speed TARGET IGN TIM ADJ* + IDLE CONDITION When adjusting target ignition timing *: This function is not necessary in the usual service procedure. SELF-DIAG RESULTS MODE Self diagnostic item Regarding items of “DTC and 1st trip DTC”, refer to EC-9, “INDEX FOR DTC”. Freeze frame data and 1st trip freeze frame data Freeze frame data item*1 Description DIAG TROUBLE CODE [PXXXX] + The engine control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to EC-9, “INDEX FOR DTC”.) FUEL SYS-B1 + “Fuel injection system status” at the moment a malfunction is detected is displayed.

+ One mode in the following is displayed. “MODE 2”: Open loop due to detected system malfunction “MODE 3”: Open loop due to driving conditions (power enrichment, deceleration enrichment) “MODE 4”: Closed loop - using oxygen sensor(s) as feedback for fuel control “MODE 5”: Open loop - has not yet satisfied condition to go to closed loop FUEL SYS-B2 CAL/LD VALUE [%] + The calculated load value at the moment a malfunction is detected is displayed. COOLANT TEMP [°C] or + The engine coolant temperature at the moment a malfunction is detected is displayed. [°F] L-FUEL TRIM-B1 [%] + “Long-term fuel trim” at the moment a malfunction is detected is displayed. + The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim. S-FUEL TRIM-B1 [%] + “Short-term fuel trim” at the moment a malfunction is detected is displayed.

+ The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule. ENGINE SPEED [rpm] + The engine speed at the moment a malfunction is detected is displayed. VHCL SPEED [km/h] or [mph] + The vehicle speed at the moment a malfunction is detected is displayed. B/FUEL SCHDL [msec] + The base fuel schedule at the moment a malfunction is detected is displayed. INT/A TEMP SE [°C] or [°F] + The intake air temperature at the moment a malfunction is detected is displayed. *1: The items are the same as those of 1st trip freeze frame data. EC-92 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) CONSULT-II Function (Cont’d) DATA MONITOR MODE Monitored item x: Applicable Monitored item [Unit] ECM INPUT SIGNALS MAIN SIGNALS CAN DIAG SUPPORT MNTR Description Remarks ENG SPEED [rpm] x x + Accuracy becomes poor if engine + Indicates the engine speed comspeed drops below the idle rpm. puted from the POS signal (1° sig+ If the signal is interrupted while nal) of the camshaft position senthe engine is running, an abnormal sor. value may be indicated. MAS A/F SE-B1 [V] x x + The signal voltage of the mass air flow sensor is displayed. B/FUEL SCHDL [msec] x + “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. A/F ALPHA-B1 [%] x A/F ALPHA-B2 [%] x COOLAN TEMP/S [°C] or [°F] + When the engine is stopped, a certain value is indicated. + The mean value of the air-fuel ratio feedback correction factor per + This data also includes the data for the air-fuel ratio learning concycle is indicated. trol. + The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.

x x HO2S1 (B1) [V] x x HO2S1 (B2) [V] x + The signal voltage of the heated oxygen sensor 1 is displayed. x + The signal voltage of the heated oxygen sensor 2 is displayed. HO2S2 (B1) [V] x HO2S2 (B2) [V] x HO2S1 MNTR (B1) [RICH/LEAN] x HO2S1 MNTR (B2) [RICH/LEAN] x HO2S2 MNTR (B1) [RICH/LEAN] x HO2S2 MNTR (B2) [RICH/LEAN] x VHCL SPEED SE [km/h] or [mph] x x + When the engine is stopped, a certain value is indicated. + When the engine coolant temperature sensor is open or shortcircuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed. + Display of heated oxygen sensor 1 + After turning ON the ignition signal during air-fuel ratio feedswitch, “RICH” is displayed until back control: air-fuel mixture ratio feedback conRICH ... means the mixture trol begins. became “rich”, and control is being + When the air-fuel ratio feedback is affected toward a leaner mixture. clamped, the value just before the LEAN ... means the mixture clamping is displayed continubecame “lean”, and control is ously. being affected toward a rich mixture. + Display of heated oxygen sensor 2 signal: RICH ... means the amount of oxygen after three way catalyst is + When the engine is stopped, a certain value is indicated. relatively small. LEAN ... means the amount of oxygen after three way catalyst is relatively large. x + The vehicle speed computed from the vehicle speed signal is displayed. EC-93 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) CONSULT-II Function (Cont’d) CAN DIAG SUPPORT MNTR Monitored item [Unit] ECM INPUT SIGNALS MAIN SIGNALS BATTERY VOLT [V] x x ACCEL SEN 1 [V] x x ACCEL SEN 2 [V] x + The accelerator pedal position sensor signal voltage is displayed. x + The throttle position sensor signal voltage is displayed. THRTL SEN 1 [V] x THRTL SEN 2 [V] x INT/A TEMP SE [°C] or [°F] START SIGNAL [ON/OFF] CLSD THL POS [ON/OFF] x x x Description + The power supply voltage of ECM is displayed. x + The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated. x + Indicates [ON/OFF] condition of the starter signal computed from the signals of the crankshaft position sensor (POS), camshaft position sensor (PHASE) and battery voltage. x + Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal. AIR COND SIG [ON/OFF] x x + Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal. P/N POSI SW [ON/OFF] x x + Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal. x + [ON/OFF] condition of the power steering oil pressure switch as determined by the power steering oil pressure signal is indicated. x + Indicates [ON/OFF] condition from the electrical load signal.

ON ... Rear window defogger switch is ON and/or lighting switch is in 2nd position.

OFF ... Both rear window defogger switch and lighting switch are OFF. PW/ST SIGNAL [ON/OFF] x LOAD SIGNAL [ON/OFF] x IGNITION SW [ON/OFF] x + Indicates [ON/OFF] condition from ignition switch. BRAKE SW [ON/OFF] x + Indicates [ON/OFF] condition from the stop lamp switch signal. INJ PULSE-B1 [msec] x INJ PULSE-B2 [msec] IGN TIMING [BTDC] x Remarks + After starting the engine, [OFF] is displayed regardless of the starter signal. + Indicates the actual fuel injection pulse width compensated by ECM according to the input signals. + When the engine is stopped, a certain computed value is indicated. + Indicates the ignition timing computed by ECM according to the input signals. + When the engine is stopped, a certain value is indicated. EC-94 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) CONSULT-II Function (Cont’d) Monitored item [Unit] ECM INPUT SIGNALS MAIN SIGNALS CAN DIAG SUPPORT MNTR Description CAL/LD VALUE [%] + “Calculated load value” indicates the value of the current airflow divided by peak airflow. MASS AIRFLOW [gzm/s] + Indicates the mass airflow computed by ECM according to the signal voltage of the mass air flow sensor. PURG VOL C/V [%] + Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. + The opening becomes larger as the value increases. VIAS S/V [ON/OFF] + The control condition of the VIAS control solenoid valve (determined by ECM according to the input signal) is indicated. + OFF ... VIAS control solenoid valve is not operating. + ON ... VIAS control solenoid valve is operating. INT/V SOL (B1) [%] + The control condition of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. ON ... intake valve timing control is operating. OFF ... Intake valve timing control is not operating. AIR COND RLY [ON/OFF] x + The air conditioner relay control condition (determined by ECM according to the input signals) is indicated. FUEL PUMP RLY [ON/OFF] x + Indicates the fuel pump relay control condition determined by ECM according to the input signals. x*2 + Indicates the throttle control motor relay control condition determined by the ECM according to the input signals. THRTL RELAY [ON/OFF] COOLING FAN [HI/LOW/OFF] HO2S1 HTR (B1) [ON/OFF] HO2S1 HTR (B2) [ON/OFF] + Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI ... High speed operation LOW ... Low speed operation OFF ... Stop + Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM according to the input signals. EC-95 Remarks TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) CONSULT-II Function (Cont’d) Monitored item [Unit] ECM INPUT SIGNALS MAIN SIGNALS CAN DIAG SUPPORT MNTR HO2S2 HTR (B1) [ON/OFF] Description + Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals. HO2S2 HTR (B2) [ON/OFF] IDL A/V LEARN [YET/CMPLT] + Display the condition of idle air volume learning YET ... Idle air volume learning has not been performed yet. CMPLT ... Idle air volume learning has already been performed successfully. TRVL AFTER MIL [km] or [mile] + Distance traveled while MI is activated. O2SEN HTR DTY [%] + Indicates the heated oxygen sensor 1 heater control value computed by the ECM according to the input signals. AC PRESS SEN [V] Remarks + The signal voltage from the refrigerant pressure sensor is displayed. x Voltage [V] Frequency [msec], [Hz] or [%] DUTY-HI DUTY-LOW + Voltage, frequency, duty cycle or pulse width measured by the probe. + Only “#” is displayed if item is unable to be measured. + Figures with “#”s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.

+ Indicates the communication condition of CAN communication line. + These items are not displayed in “SELECTION FROM MENU” mode. PLS WIDTH-HI PLS WIDTH-LOW CAN COMM [OK/NG] x CAN CIRC 1 [OK/UNKWN] x CAN CIRC 2 [OK/UNKWN] x CAN CIRC 3 [OK/UNKWN] x CAN CIRC 4 [OK/UNKWN] x CAN CIRC 5 [OK/UNKWN] x CAN CIRC 6 [OK/UNKWN] x CAN CIRC 7 [OK/UNKWN] x NOTE: Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically. EC-96 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) CONSULT-II Function (Cont’d) DATA MONITOR (SPEC) MODE Monitored item ECM input signals Main signals Description ENG SPEED [rpm] x x + Indicates the engine speed computed from the POS signal (1° signal) of the camshaft position sensor. MAS A/F SE-B1 [V] x x + The signal voltage of the mass air flow sensor specification is displayed. B/FUEL SCHDL [msec] x + “Base fuel schedule” indicates the fuel injection pulse width programmed + When engine is running specification range is indicated. into ECM, prior to any learned on board correction. A/F ALPHA-B1 [%] x A/F ALPHA-B2 [%] x Monitored item [Unit] Remarks + When engine is running specification range is indicated. + When engine is running specification + The mean value of the air-fuel ratio range is indicated. feedback correction factor per cycle is + This data also includes the data for indicated. the air-fuel ratio learning control. NOTE: Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically. ACTIVE TEST MODE Test item TEST ITEM CONDITION JUDGEMENT CHECK ITEM (REMEDY) + Engine: Return to the original trouble condition FUEL INJECTION + Change the amount of fuel injection using CONSULT-II. If trouble symptom disappears, see CHECK ITEM. + Harness and connectors + Fuel injectors + Heated oxygen sensor 1 + Engine: Return to the original trouble condition IGNITION TIMING + Timing light: Set + Retard the ignition timing using CONSULT-II. If trouble symptom disappears, see CHECK ITEM. + Perform “Idle Air Volume Learning”. Harness and connectors Compression Fuel injectors Power transistor Spark plugs Ignition coils POWER BALANCE + Engine: After warming up, idle the engine. + A/C switch “OFF” Engine runs rough or dies.

+ Shift lever “N” + Cut off each injector signal one at a time using CONSULT-II. + + + + + + COOLING FAN* + Ignition switch: ON + Turn the cooling fan “ON” and “OFF” with CONSULT-II. Cooling fan moves and stops. + Harness and connectors + Cooling fan relay + Cooling fan motor ENG COOLANT TEMP + Engine: Return to the original trouble condition + Change the engine coolant temperature using CONSULT-II. If trouble symptom disappears, see CHECK ITEM. + Harness and connectors + Engine coolant temperature sensor + Fuel injectors FUEL PUMP RELAY + Ignition switch: ON (Engine stopped) + Turn the fuel pump relay “ON” and “OFF” using CONSULT-II and listen to operating sound. Fuel pump relay makes the operating sound. + Harness and connectors + Fuel pump relay Solenoid valve makes an operating sound. + Harness and connectors + Solenoid valve + Ignition switch: ON + Turn solenoid valve “ON” and VIAS SOL VALVE “OFF” with CONSULT-II and listen for operating sound. EC-97 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) CONSULT-II Function (Cont’d) TEST ITEM CONDITION JUDGEMENT CHECK ITEM (REMEDY) PURG VOL CONT/V + Engine: After warming up, run engine at 1,500 rpm. + Change the EVAP canister purge Engine speed changes according to + Harness and connectors the opening percent. + Solenoid valve volume control solenoid valve opening percent using CONSULT-II. V/T ASSIGN ANGLE + Engine: Return to the original trouble condition + Change intake valve timing using CONSULT-II. If trouble symptom disappears, see CHECK ITEM.

+ Harness and connectors + Intake valve timing control solenoid valve *: Leaving cooling fan “OFF” with CONSULT-II while engine is running may cause the engine to overheat. DTC & SRT CONFIRMATION MODE SRT STATUS mode For details, refer to EC-42, “SYSTEM READINESS TEST (SRT) CODE”. SRT work support mode This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

DTC work support mode Test mode Test item Condition Reference page HO2S1 (B1) P0133, P0153 EC-172 HO2S1 (B1) P0134, P0154 EC-185 HO2S1 HO2S1 (B1) P1143, P1163 EC-320 Refer to corresponding trouble diagnosis for DTC. HO2S1 (B1) P1144, P1164 H02S2 EC-327 HO2S2 (B1) P0139, P0159 EC-205 HO2S2 (B1) P1146, P1166 EC-335 HO2S2 (B1) P1147, P1167 EC-348 EC-98 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) CONSULT-II Function (Cont’d) REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA) Description SEF705Y SEF707X CONSULT-II has two kinds of triggers and they can be selected by touching “SETTING” in “DATA MONITOR” mode. 1. “AUTO TRIG” (Automatic trigger): + The malfunction will be identified on the CONSULT-II screen in real time. In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM. At the moment a malfunction is detected by ECM, “MONITOR” in “DATA MONITOR” screen is changed to “Recording Data ...

xx%” as shown at right, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, “REAL-TIME DIAG” screen is displayed. If “STOP” is touched on the screen during “Recording Data ... xx%”, “REAL-TIME DIAG” screen is also displayed. The recording time after the malfunction detection and the recording speed can be changed by “TRIGGER POINT” and “Recording Speed”. Refer to CONSULT-II OPERATION MANUAL. 2. “MANU TRIG” (Manual trigger): + DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM. DATA MONITOR can be performed continuously even though a malfunction is detected. Operation 1.

“AUTO TRIG” + While trying to detect the DTC/1st trip DTC by performing the “DTC Confirmation Procedure”, be sure to select to “DATA MONITOR (AUTO TRIG)” mode. You can confirm the malfunction at the moment it is detected.

+ While narrowing down the possible causes, CONSULT-II should be set in “DATA MONITOR (AUTO TRIG)” mode, especially in case the incident is intermittent. When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the “DTC Confirmation Procedure”, the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to “Incident Simulation Tests” in GI section.) 2. “MANU TRIG” + If the malfunction is displayed as soon as “DATA MONITOR” is selected, reset CONSULT-II to “MANU TRIG”. By selecting “MANU TRIG” you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.

EC-99 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) CONSULT-II Function (Cont’d) PBIB0197E EC-100 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Generic Scan Tool (GST) Function DESCRIPTION Generic Scan Tool (OBDII scan tool) complying with ISO 15031-4 has 8 different functions explained below. ISO9141 is used as the protocol. The name “GST” or “Generic Scan Tool” is used in this service manual. SEF139P FUNCTION Diagnostic test mode Function MODE 1 READINESS TESTS MODE 2 (FREEZE DATA) MODE 3 DTCs This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information. This mode gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-41, “FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA”. This mode gains access to emission-related power train trouble codes which were stored by ECM. This mode can clear all emission-related diagnostic information.

This includes: + Clear number of diagnostic trouble codes (MODE 1) + Clear diagnostic trouble codes (MODE 3) + Clear trouble code for freeze frame data (MODE 1) + Clear freeze frame data (MODE 2) + Reset status of system monitoring test (MODE 1) + Clear on board monitoring test results (MODE 6 and 7) MODE 4 CLEAR DIAG INFO MODE 6 (ON BOARD TESTS) This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored. MODE 7 (ON BOARD TESTS) This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions. MODE 8 — MODE 9 (CALIBRATION ID) This mode is not applicable on this vehicle. This mode enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs. GST INSPECTION PROCEDURE 1. Turn ignition switch OFF. 2. Connect “GST” to data link connector, which is located under the driver side dash panel near the fuse box cover. 3. Turn ignition switch ON. SAT619K EC-101 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Generic Scan Tool (GST) Function (Cont’d) 4. Enter the program according to instruction on the screen or in the operation manual.

(*: Regarding GST screens in this section, sample screens are shown.) SEF398S 5. Perform each diagnostic mode according to each service procedure. For further information, see the GST Operation Manual of the tool maker. SEF416S EC-102 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) CONSULT-II Reference Value in Data Monitor Mode Remarks: + Specification data are reference values. + Specification data are output/input values which are detected or supplied by the ECM at the connector. * Specification data may not be directly related to their components signals/values/operations.

i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data.

This IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors. MONITOR ITEM CONDITION SPECIFICATION ENG SPEED + Tachometer: Connect Almost the same speed as the + Run engine and compare CONSULT-II value with the tachometer indica- tachometer indication. tion. MAS A/F SE-B1 + + + + Engine: After warming up Air conditioner switch: OFF Shift lever: N No-load Idle Approx. 1.3 - 1.7V 2,500 rpm Approx. 1.7 - 2.4V + + + + Engine: After warming up Shift lever: N Air conditioner switch: OFF No-load Idle 5.0 - 5.5 msec 2,000 rpm 5.0 - 5.5 msec Maintaining engine speed at 2,000 rpm 75% - 125% B/FUEL SCHDL A/F ALPHA-B1 A/F ALPHA-B2 + Engine: After warming up COOLAN TEMP/S + Engine: After warming up HO2S1 (B1) HO2S1 (B2) + Engine: After warming up HO2S2 (B1) HO2S2 (B2) Revving engine from idle up to 3,000 + Engine: After warming up + Keeping the engine speed rpm quickly. between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load 0 - 0.3V ←→ Approx. 0.6 1.0V HO2S1 MNTR (B1) HO2S1 MNTR (B2) + Engine: After warming up LEAN ←→ RICH Changes more than 5 times during 10 seconds. HO2S2 MNTR (B1) HO2S2 MNTR (B2) + Engine: After warming up Revving engine from idle up to 3,000 + Keeping the engine speed rpm quickly. between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load LEAN ←→ RICH VEH SPEED SE + Turn drive wheels and compare CONSULT-II value with the speedometer indication. Almost the same speed as the speedometer indication BATTERY VOLT + Ignition switch: ON (Engine stopped) 11 - 14V ACCEL SEN1 ACCEL SEN2* + Ignition switch: ON (engine stopped) + Shift lever: D Accelerator pedal: Fully released More than 0.36V Accelerator pedal: Fully depressed Less than 4.75V + Ignition switch: ON (Engine stopped) + Shift lever: D Accelerator pedal: Fully released More than 0.5V Accelerator pedal: Fully depressed Less than 1.5V THRTL SEN1 THRTL SEN2* More than 70°C (158°F) Maintaining engine speed at 2,000 rpm Maintaining engine speed at 2,000 rpm 0 - 0.3V ←→ Approx. 0.6 1.0V START SIGNAL + Ignition switch: ON → START → ON OFF → ON → OFF CLSD THL POS + Ignition switch: ON ON Accelerator pedal: Fully released Accelerator pedal: Slightly depressed OFF EC-103 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) CONSULT-II Reference Value in Data Monitor Mode (Cont’d) MONITOR ITEM AIR COND SIG P/N POSI SW PW/ST SIGNAL LOAD SIGNAL CONDITION + Engine: After warming up, idle the engine Air conditioner switch: OFF OFF Air conditioner switch: ON (Compressor operates.) ON + Ignition switch: ON Shift lever: P or N ON Shift lever: Except above OFF Steering wheel is in neutral position. (Forward direction) OFF Steering wheel is turned. ON Rear window defogger switch is ON and/or lighting switch is in 2nd. ON Rear window defogger switch is OFF and lighting switch is OFF. OFF Brake pedal: Fully released OFF Brake pedal: Slightly depressed ON + Engine: After warming up, idle the engine + Ignition switch: ON IGNITION SW + Ignition switch: ON → OFF → ON BRAKE SW + Ignition switch: ON INJ PULSE-B1 INJ PULSE-B2 IGN TIMING CAL/LD VALUE MASS AIRFLOW PURG VOL C/V VIAS S/V INT/V SOL-B1 FUEL PUMP RLY THRTL RELAY ON → OFF → ON + + + + Engine: After warming up Shift lever: N Air conditioner switch: OFF No-load Idle 3.0 - 4.0 msec 2,000 rpm 3.0 - 4.0 msec + + + + Engine: After warming up Shift lever: N Air conditioner switch: OFF No-load Idle 10°±5° BTDC 2,000 rpm 25° - 45° BTDC + + + + Engine: After warming up Shift lever: N Air conditioner switch: OFF No-load Idle 10% - 35% 2,500 rpm 10% - 35% + + + + Engine: After warming up Shift lever: N Air conditioner switch: OFF No-load Idle 3.0 - 9.0 gzm/s 2,500 rpm 10.0 - 25.0 gzm/s + + + + Engine: After warming up Shift lever: N Air conditioner switch: OFF No-load Idle 0% 2,000 rpm 65 - 85% Idle OFF More than 5,000 rpm ON + Engine: After warming up + Engine: Idle + + + + AIR COND RLY SPECIFICATION OFF Engine: After warning up Engine speed is between 1,000 rpm and 4,200 rpm Vehicle speed is more than 8 km/h (5 MPH).

During high load condition + Engine: After warming up, idle the engine ON Air conditioner switch: OFF OFF Air conditioner switch: ON (Compressor operates) ON + For 1 seconds after turning ignition switch ON + Engine running or cranking ON + Except above conditions OFF + Ignition switch: ON ON EC-104 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) CONSULT-II Reference Value in Data Monitor Mode (Cont’d) MONITOR ITEM COOLING FAN HO2S1 HTR (B1) HO2S1 HTR (B2) HO2S2 HTR (B1) HO2S2 HTR (B2) CONDITION + Engine: After warming up, idle the engine + Air conditioner switch: OFF + Vehicle stopped SPECIFICATION Engine coolant temperature is 94°C (201°F) or less OFF Engine coolant temperature is between 95°C (203°F) and 99°C (210°F) LOW Engine coolant temperature is 100°C (212°F) or more HIGH + Engine: After warming up + Engine speed: Below 2,800 rpm ON + Engine speed: Above 2,800 rpm OFF + Engine speed: Below 3,200 rpm after the following conditions are met. + Engine: After warming up + Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load ON + Engine speed: Above 3,200 rpm OFF TRVL AFTER MIL + Ignition switch: ON Vehicle has traveled after MI has turned ON. 0 - 65,280 km (0 - 40,565 mile) O2SEN HTR DTY + Engine coolant temperature when engine started: More than 80° (176°F) + Engine speed: Below 2,800 rpm Approx. 50% AC PRESS SEN + Ignition switch: ON (Engine stopped) Approx. 1.6V + Engine: Idle + Air conditioner switch: OFF 1.0 - 2.0V VEH SPEED SE + Turn drive wheels and compare speedometer indication with the CONSULT-II value. Almost the same speed as the CONSULT-II value CAN COMM + Ignition switch: ON OK CAN CIRC 1 OK CAN CIRC 2 OK CAN CIRC 3 UNKWN CAN CIRC 4 OK CAN CIRC 5 UNKWN CAN CIRC 6 UNKWN CAN CIRC 7 UNKWN *: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal. EC-105 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Major Sensor Reference Graph in Data Monitor Mode The following are the major sensor reference graphs in “DATA MONITOR” mode. CLSD THL POS, ACCEL SEN 1, THRTL SEN 1 Below is the data for “CLSD THL POS”, “ACCEL SEN 1” and “THRTL SEN 1” when depressing the accelerator pedal with the ignition switch “ON” and with selector lever in “D” position.

The signal of “ACCEL SEN 1” and “THRTL SEN 1” should rise gradually without any intermittent drop or rise after “CLSD THL POS” is changed from “ON” to “OFF”. PBIB0198E ENG SPEED, MAS A/F SE-B1, THRTL SEN 1, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1 Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL SEN 1”, “HO2S2 (B1)”, “HO2S1 (B1)” and “INJ PULSE-B1” when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently. Each value is for reference, the exact value may vary. SEF241Y EC-106 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Major Sensor Reference Graph in Data Monitor Mode (Cont’d) PBIB0668E EC-107 TROUBLE DIAGNOSIS — SPECIFICATION TB48DE A/T (WITH EURO-OBD) VALUE Description The specification (SP) value indicates the tolerance of the value that is displayed in “DATA MONITOR (SPEC)” mode of CONSULT-II during normal operation of the Engine Control System. When the value in “DATA MONITOR (SPEC)” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “DATA MONITOR (SPEC)” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions. The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL. The SP value will be displayed for the following three items: + B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction) + A/F ALPHA-B1/B2 (The mean value of air-fuel ratio feedback correction factor per cycle) + MAS A/F SE-B1 (The signal voltage of the mass air flow sensor) Testing condition Vehicle driven distance: More than 5,000 km (3,017 miles) Barometric pressure: 98.3 - 104.3 kPa (0.98 - 1.04 bar, 1.003 - 1.064 kg/cm2, 14.25 - 15.12 psi) Atmospheric temperature: 20 - 30°C (68 - 86°F) Engine coolant temperature: 75 - 95°C (167 - 203°F) Transmission: Warmed-up*1 Electrical load: Not applied*2 Engine speed: Idle After the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates more than 60°C (140°F). *2: Rear window defogger switch, air conditioner switch, lighting switch are “OFF”. Steering wheel is straight ahead. + + + + + + + *1: Inspection Procedure SEF601Z NOTE: Perform “DATA MONITOR (SPEC)” mode in maximum scale display. 1. Perform EC-66, “Basic Inspection”. 2. Confirm that the testing conditions indicated above are met. 3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1/B2” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULTII. 4. Make sure that monitor items are within the SP value. 5. If NG, go to EC-109, “Diagnostic Procedure”. EC-108 TROUBLE DIAGNOSIS — SPECIFICATION TB48DE A/T (WITH EURO-OBD) VALUE Diagnostic Procedure SEF613ZD EC-109 TROUBLE DIAGNOSIS — SPECIFICATION TB48DE A/T (WITH EURO-OBD) VALUE Diagnostic Procedure (Cont’d) SEF768Z EC-110 TROUBLE DIAGNOSIS — SPECIFICATION TB48DE A/T (WITH EURO-OBD) VALUE Diagnostic Procedure (Cont’d) SEF615ZA EC-111 TROUBLE DIAGNOSIS FOR INTERMITTENT TB48DE A/T (WITH EURO-OBD) INCIDENT Description Intermittent incidents (I/I) may occur. In many cases, the malfunction resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer’s complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of I/I occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear.

Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area. Common I/I Report Situations STEP in Work Flow Situation II The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than “0” or “[1t]”. III The symptom described by the customer does not recur. IV (1st trip) DTC does not appear during the DTC Confirmation Procedure. VI The Diagnostic Procedure for PXXXX does not indicate the malfunctioning area. Diagnostic Procedure 1 INSPECTION START Erase (1st trip) DTCs. Refer to EC-49, “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”.

c GO TO 2.

2 CHECK GROUND TERMINALS Check ground terminals for corroding or loose connection. Refer to GI section, “Incident Simulation Tests”. OK or NG OK c GO TO 3. NG c Repair or replace. 3 SEARCH FOR ELECTRICAL INCIDENT Perform GI section, “Incident Simulation Tests”.

OK or NG OK c INSPECTION END NG c Repair or replace. EC-112 POWER SUPPLY CIRCUIT TB48DE A/T (WITH EURO-OBD) FOR ECM Wiring Diagram TEC243M EC-113 POWER SUPPLY CIRCUIT TB48DE A/T (WITH EURO-OBD) FOR ECM Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO. WIRE COLOR ITEM DATA (DC voltage) CONDITION Engine is running. Ignition switch “OFF” 42 B/Y ECM relay (Self-shutoff) 0 - 1.0V For 5 seconds after turning ignition switch “OFF” Ignition switch “OFF” A few seconds passed after turning ignition switch “OFF” 53 163 166 W/G B/R Ignition switch “OFF” 0V Ignition switch “ON” BATTERY VOLTAGE (11 - 14V) Ignition switch “ON” BATTERY VOLTAGE (11 - 14V) Ignition switch Power supply for ECM BATTERY VOLTAGE (11 - 14V) EC-114 POWER SUPPLY CIRCUIT TB48DE A/T (WITH EURO-OBD) FOR ECM Wiring Diagram (Cont’d) TEC144M EC-115 POWER SUPPLY CIRCUIT TB48DE A/T (WITH EURO-OBD) FOR ECM Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. 156 159 165 168 WIRE COLOR B B B B ITEM CONDITION DATA (DC Voltage) Engine is running. ECM ground Engine ground Idle speed Diagnostic Procedure 1 INSPECTION START Start engine. Is engine running? Yes or No Yes c GO TO 11. No c GO TO 2. 2 CHECK ECM POWER SUPPLY CIRCUIT-I 1. Turn ignition switch “OFF” and then “ON”. 2. Check voltage between ECM terminal 53 and ground with CONSULT-II or tester. SEC817C Voltage: Battery voltage OK or NG OK c GO TO 4. NG c GO TO 3. 3 DETECT MALFUNCTIONING PART Check the following.

+ Harness connectors M52, F7 + Fuse block (J/B) connector M2 + 10A fuse + Harness for open or short between ECM and fuse c Repair open circuit or short to ground or short to power in harness or connectors. EC-116 POWER SUPPLY CIRCUIT TB48DE A/T (WITH EURO-OBD) FOR ECM Diagnostic Procedure (Cont’d) 4 CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I 1. Turn ignition switch “OFF”. 2.

Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals 156, 159, 165, 168 and engine ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to power.

OK or NG OK c GO TO 6. NG c GO TO 5. 5 DETECT MALFUNCTIONING PART Check the following. + Joint connector-7 + Harness for open or short between ECM and ground c Repair open circuit or short to power in harness or connectors. 6 CHECK ECM POWER SUPPLY CIRCUIT-II 1. Disconnect ECM relay. SEC668D 2. Check voltage between ECM relay terminals 2 and 5 and ground with CONSULT-II or tester. PBIB0071E Voltage: Battery voltage OK or NG OK c GO TO 8. NG c GO TO 7. EC-117 POWER SUPPLY CIRCUIT TB48DE A/T (WITH EURO-OBD) FOR ECM Diagnostic Procedure (Cont’d) 7 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + 10A fuse + 15A fuse + Harness for open or short between ECM relay and battery c Repair open circuit or short to ground or short to power in harness or connectors. 8 CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Check harness continuity between ECM terminal 42 and ECM relay terminal 1. Refer to Wiring Diagram. Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 10. NG c GO TO 9.

9 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M52, F7 + Harness for open or short between ECM and ECM relay c Repair open circuit or short to ground or short to power in harness or connectors. 10 CHECK ECM RELAY Refer to EC-120. OK or NG OK c GO TO EC-428. NG c Replace ECM relay. 11 CHECK ECM POWER SUPPLY CIRCUIT-III 1. Stop engine and wait at least 10 seconds.

2. Turn ignition switch “ON” and then “OFF”. 3. Check voltage between ECM terminals 163, 166 and ground with CONSULT-II or tester. SEC819C Voltage: After turning ignition switch “OFF”, battery voltage will exist for a few seconds, then drop approximately 0V. OK or NG OK c NG (Battery voltage does not exist.) c GO TO 15. GO TO 12. NG (Battery voltage exists for more than a few seconds.) c GO TO 14. EC-118 POWER SUPPLY CIRCUIT TB48DE A/T (WITH EURO-OBD) FOR ECM Diagnostic Procedure (Cont’d) 12 CHECK ECM POWER SUPPLY CIRCUIT-IV 1. Disconnect ECM relay. SEC668D 2. Check voltage between ECM relay terminal 7 and ground with CONSULT-II or tester. PBIB0074E Voltage: Battery voltage OK or NG OK c GO TO 14. NG c GO TO 13. 13 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + Harness for open or short between ECM relay and 10A fuse c Repair open circuit or short to ground or short to power in harness or connectors. 14 CHECK ECM POWER SUPPLY CIRCUIT-V 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminals 163, 166 and ECM relay terminal 6. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 16. NG c GO TO 15. 15 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M52, F7 + Harness for open or short between ECM and ECM relay c Repair open circuit or short to ground or short to power in harness or connectors. EC-119 POWER SUPPLY CIRCUIT TB48DE A/T (WITH EURO-OBD) FOR ECM Diagnostic Procedure (Cont’d) 16 CHECK ECM RELAY Refer to EC-120, “Component Inspection”. OK or NG OK c GO TO 17. NG c Replace ECM relay. 17 CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II 1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector.

3. Check harness continuity between ECM terminals 156, 159, 165, 168 and engine ground. Refer to Wiring Diagram. Continuity should exist. 4.

Also check harness for short to power. OK or NG OK c GO TO 19.

NG c GO TO 18.

18 DETECT MALFUNCTIONING PART Check the following.

+ Joint connector-7 + Harness for open or short between ECM and ground c Repair open circuit or short to power in harness or connectors. 19 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. OK or NG OK c INSPECTION END Component Inspection ECM RELAY 1. Apply 12V direct current between ECM relay terminals 1 and 2. 2. Check continuity between relay terminals 3 and 5, 6 and 7. Condition PBIB0077E Continuity 12V direct current supply between terminals 1 and 2 Yes OFF No 3. If NG, replace ECM relay. EC-120 DTC U1000 CAN COMMUNICATION TB48DE A/T (WITH EURO-OBD) LINE Description CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only. On Board Diagnosis Logic This self-diagnosis has the one trip detection logic. DTC No. U1000 1000 Trouble diagnosis name CAN communication line DTC detecting condition Possible cause + ECM can not communicate to other con- + Harness or connectors (CAN communication line is open or trol units. shorted).

+ ECM can not communicate for more than the specified time. DTC Confirmation Procedure 1. Turn ignition switch “ON” and wait at least 3 seconds. 2.

Select “DATA MONITOR” mode with CONSULT-II. 3. If DTC is detected, go to EC-123, “Diagnostic Procedure”. EC-121 DTC U1000 CAN COMMUNICATION TB48DE A/T (WITH EURO-OBD) LINE Wiring Diagram TEC258M EC-122 DTC U1000 CAN COMMUNICATION TB48DE A/T (WITH EURO-OBD) LINE Diagnostic Procedure 1 INSPECTION START 1. Turn ignition switch “ON”. 2. Select “CAN DIAG SUPPORT MNTR” in “DATA MONITOR” mode with CONSULT-II. 3.

Print out the CONSULT-II screen. SEC575D c Go to EL section. EC-123 DTC P0031, P0032, P0051, P0052 HO2S1 TB48DE A/T (WITH EURO-OBD) HEATER Description SYSTEM DESCRIPTION Sensor Input Signal to ECM ECM Function Camshaft position sensor Engine speed Engine coolant temperature sensor Engine coolant temperature Actuator Heated oxygen sensor 1 heater Heated oxygen sensor 1 heater control The ECM performs ON/OFF duty control of the heated oxygen sensor 1 heater corresponding to the engine speed and engine coolant temperature. The duty percent varies with engine coolant temperature when engine is started. OPERATION Engine speed rpm Heated oxygen sensor 1 heater Above 2,800 OFF Below 2,800 ON CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM HO2S1 HTR (B1) HO2S1 HTR (B2) CONDITION SPECIFICATION + Engine: After warming up + Engine speed: Below 2,800 rpm ON + Engine speed: Above 2,800 rpm OFF On Board Diagnosis Logic DTC No. P0031 0031 (Bank 1) Trouble diagnosis name P0052 0052 (Bank 2) Possible cause Heated oxygen sensor 1 heater control circuit low + Harness or connectors The current amperage in the heated oxy(The heated oxygen sensor 1 heater gen sensor 1 heater circuit is out of the circuit is open or shorted.) normal range. (An excessively low voltage signal is sent + Heater oxygen sensor 1 heater to ECM through the heated oxygen sensor 1 heater.) Heated oxygen sensor 1 heater control circuit high + Harness or connectors The current amperage in the heated oxy(The heated oxygen sensor 1 heater gen sensor 1 heater circuit is out of the circuit is shorted.) normal range. (An excessively high voltage signal is sent + Heater oxygen sensor 1 heater to ECM through the heated oxygen sensor 1 heater.) P0051 0051 (Bank 2) P0032 0032 (Bank 1) DTC detecting condition DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle. EC-124 DTC P0031, P0032, P0051, P0052 HO2S1 TB48DE A/T (WITH EURO-OBD) HEATER DTC Confirmation Procedure (Cont’d) WITH CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch “OFF” and wait at least 10 seconds. 3. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II. 4. Start engine and run it for at least 6 seconds at idle speed. 5. If 1st trip DTC is detected, go to EC-129, “Diagnostic Procedure”. SEF058Y WITH GST 1. 2.

3. 4.

5. 6. 7. + Start engine and warm it up to normal operating temperature.

Turn ignition switch “OFF” and wait at least 10 seconds. Start engine and run it for at least 6 seconds at idle speed. Turn ignition switch “OFF” and wait at least 10 seconds. Start engine and run it for at least 6 seconds at idle speed. Select “MODE 3” with GST. If DTC is detected, go to EC-129, “Diagnostic Procedure”. When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended. EC-125 DTC P0031, P0032, P0051, P0052 HO2S1 TB48DE A/T (WITH EURO-OBD) HEATER Wiring Diagram BANK 1 TEC409M EC-126 DTC P0031, P0032, P0051, P0052 HO2S1 TB48DE A/T (WITH EURO-OBD) HEATER Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground.

CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor.

Use a ground other than ECM terminals, such as the ground. TERWIRE MINAL COLOR NO. ITEM CONDITION DATA (DC Voltage) Approximately 7.0V★ Engine is running. Warm-up condition. Engine speed is below 2,800 rpm. 9 Y/B Heated oxygen sensor 1 heater (bank 1) PBIB0519E Ignition switch “ON” Engine stopped. Engine is running. Engine speed is above 2,800 rpm. ★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.) EC-127 BATTERY VOLTAGE (11 - 14V) DTC P0031, P0032, P0051, P0052 HO2S1 TB48DE A/T (WITH EURO-OBD) HEATER Wiring Diagram (Cont’d) BANK 2 TEC414M EC-128 DTC P0031, P0032, P0051, P0052 HO2S1 TB48DE A/T (WITH EURO-OBD) HEATER Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Approximately 7.0V★ Engine is running. Warm-up condition. Engine speed is below 2,800 rpm. 8 G/Y Heated oxygen sensor 1 heater (bank 2) PBIB0519E Ignition switch “ON” Engine stopped. Engine is running. BATTERY VOLTAGE (11 - 14V) Engine speed is above 2,800 rpm. ★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.) Diagnostic Procedure 1 CHECK HO2S1 POWER SUPPLY CIRCUIT 1. Turn ignition switch “OFF”. 2. Disconnect heated oxygen sensor 1 harness connector. SEC671D 3. Turn ignition switch “ON”.

4.

Check voltage between HO2S1 terminal 3 and ground with CONSULT-II or tester. PBIB0112E Voltage: Battery voltage OK or NG OK c GO TO 3.

NG c GO TO 2.

EC-129 DTC P0031, P0032, P0051, P0052 HO2S1 TB48DE A/T (WITH EURO-OBD) HEATER Diagnostic Procedure (Cont’d) 2 DETECT MALFUNCTIONING PART Check the following.

+ Harness connectors E127, M21 + Harness connectors M55, F35 + Fuse block (J/B) connector E112 + 15A fuse + Harness for open or short between heated oxygen sensor 1 and fuse c Repair open circuit or short to ground or short to power in harness or connectors. 3 CHECK HO2S1 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram. MTBL1566 Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 4. NG c Repair open circuit or short to ground or short to power in harness or connectors. 4 CHECK HEATED OXYGEN SENSOR 1 HEATER Refer to EC-131, “Component Inspection”. OK or NG OK c GO TO 5.

NG c Replace malfunctioning heated oxygen sensor 1. 5 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END EC-130 DTC P0031, P0032, P0051, P0052 HO2S1 TB48DE A/T (WITH EURO-OBD) HEATER Component Inspection HEATED OXYGEN SENSOR 1 HEATER 1. Check resistance between HO2S1 terminals as follows. Terminal No. Resistance 2 and 3 3.3 - 4.0Ω at 20°C (68°F) 1 and 2, 3, 4 Ω (Continuity should not exist.) 4 and 1, 2, 3 2. If NG, replace heated oxygen sensor 1. CAUTION: + Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. + Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. SEF249Y EC-131 DTC P0037, P0038, P0057, P0058 HO2S2 TB48DE A/T (WITH EURO-OBD) HEATER Description SYSTEM DESCRIPTION Sensor Input Signal to ECM ECM Function Camshaft position sensor Engine speed Engine coolant temperature sensor Engine coolant temperature Mass air flow sensor Amount of intake air Actuator Heated oxygen sensor 2 heater Heated oxygen sensor 2 heater control The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature. OPERATION Engine speed rpm Heated oxygen sensor 2 heater Above 3,200 OFF + Below 3,200 rpm after the following conditions are met. + Engine: After warming up + Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load ON CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM HO2S2 HTR (B1) HO2S2 HTR (B2) CONDITION SPECIFICATION + Engine speed: Below 3,200 rpm after the following conditions are met. ON + Engine: After warming up + Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load + Engine speed: Above 3,200 rpm OFF On Board Diagnosis Logic DTC No. P0037 0037 (Bank 1) Trouble diagnosis name P0058 0058 (Bank 2) Possible cause Heated oxygen sensor 2 heater control circuit low + Harness or connectors The current amperage in the heated oxy(The heated oxygen sensor 2 heater gen sensor 2 heater circuit is out of the circuit is open or shorted.) normal range. (An excessively low voltage signal is sent + Heater oxygen sensor 2 heater to ECM through the heated oxygen sensor 2 heater.) Heated oxygen sensor 2 heater control circuit high + Harness or connectors The current amperage in the heated oxy(The heated oxygen sensor 2 heater gen sensor 2 heater circuit is out of the circuit is shorted.) normal range. (An excessively high voltage signal is sent + Heater oxygen sensor 2 heater to ECM through the heated oxygen sensor 2 heater.) P0057 0057 (Bank 2) P0038 0038 (Bank 1) DTC detecting condition DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle. EC-132 DTC P0037, P0038, P0057, P0058 HO2S2 TB48DE A/T (WITH EURO-OBD) HEATER DTC Confirmation Procedure (Cont’d) WITH CONSULT-II SEF174Y 1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II. 2. Start engine and warm it up to the normal operating temperature. 3. Turn ignition switch “OFF” and wait at least 10 seconds. 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load. 5. Let engine idle for one minute. 6. If 1st trip DTC is detected, go to EC-137, “Diagnostic Procedure”. WITH GST 1.

Start engine and warm it up to the normal operating temperature. 2. Turn ignition switch “OFF” and wait at least 10 seconds. 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load. 4. Let engine idle for one minute. 5. Turn ignition switch “OFF” and wait at least 10 seconds. 6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load. 7. Let engine idle for one minute. 8. Select “MODE 3” with GST. 9. If DTC is detected, go to EC-137, “Diagnostic Procedure”. + When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended. EC-133 DTC P0037, P0038, P0057, P0058 HO2S2 TB48DE A/T (WITH EURO-OBD) HEATER Wiring Diagram BANK 1 TEC413M EC-134 DTC P0037, P0038, P0057, P0058 HO2S2 TB48DE A/T (WITH EURO-OBD) HEATER Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 11 R/G Heated oxygen sensor 2 heater (bank 1) Warm-up condition Engine speed: Below 3,200 rpm after the following conditions are met.

Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load 0 - 1.0V Ignition switch “ON” Engine stopped. Engine is running. Engine speed is above 3,200 rpm. EC-135 BATTERY VOLTAGE (11 - 14V) DTC P0037, P0038, P0057, P0058 HO2S2 TB48DE A/T (WITH EURO-OBD) HEATER Wiring Diagram (Cont’d) BANK 2 TEC340M EC-136 DTC P0037, P0038, P0057, P0058 HO2S2 TB48DE A/T (WITH EURO-OBD) HEATER Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 10 Y/R Warm-up condition Engine speed: Below 3,200 rpm after the following conditions are met. Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load Heated oxygen sensor 2 heater (bank 2) 0 - 1.0V Ignition switch “ON” Engine stopped. Engine is running. BATTERY VOLTAGE (11 - 14V) Engine speed is above 3,200 rpm. Diagnostic Procedure 1 CHECK HO2S2 POWER SUPPLY CIRCUIT 1. Turn ignition switch “OFF”. 2. Disconnect heated oxygen sensor 2 harness connector. SEC669D 3. Turn ignition switch “ON”. 4. Check voltage between HO2S2 terminal 3 and ground with CONSULT-II or tester. PBIB0112E Voltage: Battery voltage OK or NG OK c GO TO 3. NG c GO TO 2.

EC-137 DTC P0037, P0038, P0057, P0058 HO2S2 TB48DE A/T (WITH EURO-OBD) HEATER Diagnostic Procedure (Cont’d) 2 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + Harness connectors M55, F35 + Fuse block (J/B) connector E112 + 15A fuse + Harness for open or short between heated oxygen sensor 2 and fuse c Repair open circuit or short to ground or short to power in harness or connectors.

3 CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 4. NG c Repair open circuit or short to ground or short to power in harness or connectors. 4 CHECK HEATED OXYGEN SENSOR 2 HEATER Refer to EC-139, “Component Inspection”. OK or NG OK c GO TO 5. NG c Replace malfunctioning heated oxygen sensor 2. 5 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END EC-138 MTBL1567 DTC P0037, P0038, P0057, P0058 HO2S2 TB48DE A/T (WITH EURO-OBD) HEATER Component Inspection HEATED OXYGEN SENSOR 2 HEATER 1. Check resistance between HO2S2 terminals as follows. Terminal No. Resistance 2 and 3 5.0 - 7.0Ω at 25°C (77°F) 1 and 2, 3, 4 Ω (Continuity should not exist) 4 and 1, 2, 3 2. If NG, replace heated oxygen sensor 2. CAUTION: + Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. + Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. SEF249Y EC-139 DTC P0102, P0103 MAF TB48DE A/T (WITH EURO-OBD) SENSOR Component Description SEC266C The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot film that is supplied with electric current from the ECM. The temperature of the hot film is controlled by the ECM a certain amount. The heat generated by the hot film is reduced as the intake air flows around it. The more air, the greater the heat loss. Therefore, the ECM must supply more electric current to maintain the temperature of the hot film as air flow increases. The ECM detects the air flow by means of this current change. CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM MAS A/F SE-B1 CAL/LD VALUE MASS AIRFLOW CONDITION SPECIFICATION + + + + Engine: After warming up Air conditioner switch: OFF Shift lever: N No-load Idle Approx.

1.3 - 1.7V 2,500 rpm Approx. 1.7 - 2.4V + + + + Engine: After warming up Shift lever: N Air conditioner switch: OFF No-load Idle 10% - 35% 2,500 rpm 10% - 35% + + + + Engine: After warming up Shift lever: N Air conditioner switch: OFF No-load Idle 3.0 - 9.0 gzm/s 2,500 rpm 10.0 - 25.0 gzm/s On Board Diagnosis Logic These self-diagnoses have the one trip detection logic. DTC No. Trouble diagnosis name DTC detecting condition Possible cause P0102 0102 Mass air flow sensor circuit low input An excessively low voltage from the sensor is sent to ECM when engine is running. + Harness or connectors (The sensor circuit is open or shorted.) + Intake air leaks + Mass air flow sensor P0103 0103 Mass air flow sensor circuit high input An excessively high voltage from the sensor is sent to ECM. + Harness or connectors (The sensor circuit is open or shorted.) + Mass air flow sensor FAIL-SAFE MODE When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up. Detected items Mass air flow sensor circuit Engine operating condition in fail-safe mode Engine speed will not rise more than 2,400 rpm due to the fuel cut. DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. EC-140 DTC P0102, P0103 MAF TB48DE A/T

(WITH EURO-OBD) SENSOR DTC Confirmation Procedure (Cont’d) PROCEDURE FOR DTC P0102 With CONSULT-II 1. 2. 3. 4. Turn ignition switch “ON”. Select “DATA MONITOR” mode with CONSULT-II. Start engine and wait at least 5 seconds. If DTC is detected, go to EC-143, “Diagnostic Procedure”. SEF058Y With GST Follow the procedure “With CONSULT-II” above. PROCEDURE FOR DTC P0103 With CONSULT-II 1. 2. 3. 4.
Turn ignition switch “ON”. Select “DATA MONITOR” mode with CONSULT-II. Wait at least 5 seconds. If DTC is detected, go to EC-143, “Diagnostic Procedure”. If DTC is not detected, go to next step. 5. Start engine and wait at least 5 seconds. 6. If DTC is detected, go to EC-143, “Diagnostic Procedure”. SEF058Y With GST Follow the procedure “With CONSULT-II” above. EC-141 DTC P0102, P0103 MAF TB48DE A/T (WITH EURO-OBD) SENSOR Wiring Diagram TEC146M EC-142 DTC P0102, P0103 MAF TB48DE A/T (WITH EURO-OBD) SENSOR Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.
TERMINAL NO.
WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. Warm-up condition Idle speed 91 W/G 1.3 - 1.7V Mass air flow sensor Engine is running.
Warm-up condition Engine speed is 2,500 rpm. 103 Y Sensor power supply (Mass air flow sensor) 109 B/W Sensor ground (Mass air flow sensor) Ignition switch “ON” 1.7 - 2.4V Approximately 5V Engine is running. Warm-up condition Idle speed Diagnostic Procedure 1 INSPECTION START Which malfunction (P0102 or P0103) is duplicated? P0102 or P0103 P0102 c GO TO 2. P0103 c GO TO 3. 2 CHECK INTAKE SYSTEM Check the following for connection. + Air duct + Vacuum hoses + Intake air passage between air duct to intake manifold OK or NG OK c GO TO 3. NG c Reconnect the parts. EC-143 Approximately 0V DTC P0102, P0103 MAF TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure (Cont’d) 3 RETIGHTEN GROUND SCREWS 1. Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws. SEC690C c GO TO 4. 4 CHECK MAF SENSOR POWER SUPPLY CIRCUIT 1. Disconnect MAF sensor harness connector. SEC688C 2. Turn ignition switch “ON”. 3. Check voltage between MAF sensor terminals 2, 4 and ground with CONSULT-II or tester. PBIB0076E MTBL1568 OK or NG OK c GO TO 6. NG c GO TO 5. EC-144 DTC P0102, P0103 MAF TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure (Cont’d) 5 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M52, F7 + Harness for open or short between mass air flow sensor and ECM + Harness for open or short between mass air flow sensor and ECM relay c Repair open circuit or short to ground or short to power in harness or connectors. 6 CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector. 3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 109. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 7. NG c Repair open circuit or short to ground or short to power in harness or connectors. 7 CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Check harness continuity between MAF sensor terminal 1 and ECM terminal 91.
Refer to Wiring Diagram.
Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 8. NG c Repair open circuit or short to ground or short to power in harness or connectors. 8 CHECK MASS AIR FLOW SENSOR Refer to EC-146, “Component Inspection”. OK or NG OK c GO TO 9. NG c Replace mass air flow sensor. 9 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END EC-145 DTC P0102, P0103 MAF TB48DE A/T (WITH EURO-OBD) SENSOR Component Inspection MASS AIR FLOW SENSOR 1. Reconnect harness connectors disconnected. 2. Start engine and warm it up to normal operating temperature. 3. Check voltage between ECM terminal 91 (Mass air flow sensor signal) and ground. PBIB0078E Condition Voltage V Ignition switch “ON” (Engine stopped.) Approx. 1.0 Idle (Engine is warmed-up to normal operating temperature.) 1.3 - 1.7 2,500 rpm (Engine is warmed-up to normal operating temperature.) 1.7 - 2.4 Idle to about 4,000 rpm* 1.3 - 1.7 to Approx. 4.0 *: Check for liner voltage rise in response to engine being increased to about 4,000 rpm. 4. If the voltage is out of specification, proceed the following. a. Turn ignition switch “OFF”. b. Disconnect mass air flow sensor harness connector and reconnect it again. c. Perform steps 2 and 3 again. 5. If NG, remove mass air flow sensor from air duct. Check hot film for damage or dust. 6. If NG, clean or replace mass air flow sensor. EC-146 DTC P0112, P0113 IAT SENSOR TB48DE A/T (WITH EURO-OBD) Component Description The intake air temperature sensor is built into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM. The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise. SEC266C Intake air temperature °C (°F) Voltage* V Resistance kΩ −10 (14) 4.43 7.9 - 9.3 25 (77) 3.32 1.9 - 2.1 80 (176) 1.23 0.31 - 0.37 *: These data are reference values and are measured between ECM terminal 99 (Intake air temperature sensor) and ground. SEF012P CAUTION: Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.
On Board Diagnosis Logic DTC No. Trouble diagnosis name DTC detecting condition P0112 0112 Intake air temperature sensor circuit low input An excessively low voltage from the sensor is sent to ECM. P0113 0113 Intake air temperature sensor circuit high input An excessively high voltage from the sensor is sent to ECM. Possible cause + Harness or connectors (The sensor circuit is open or shorted.) + Intake air temperature sensor DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
WITH CONSULT-II 1. 2. 3.
4. Turn ignition switch “ON”. Select “DATA MONITOR” mode with CONSULT-II. Wait at least 5 seconds. If 1st trip DTC is detected, go to EC-150, “Diagnostic Procedure”. SEF058Y EC-147 DTC P0112, P0113 IAT TB48DE A/T (WITH EURO-OBD) SENSOR DTC Confirmation Procedure (Cont’d) WITH GST Follow the procedure “WITH CONSULT-II” above. EC-148 DTC P0112, P0113 IAT SENSOR TB48DE A/T (WITH EURO-OBD) Wiring Diagram TEC343M EC-149 DTC P0112, P0113 IAT SENSOR TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure 1 CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT 1. Turn ignition switch “OFF”.
2. Disconnect mass air flow sensor (intake air temperature sensor is built-into) harness connector. SEC688C 3. Turn ignition switch “ON”. 4. Check voltage between MAF sensor terminal 5 and ground. PBIB0066E Voltage: Approximately 5V OK or NG OK c GO TO 2. NG c Repair open circuit or short to ground or short to power in harness or connectors. 2 CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector. 3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 109.
Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 3. NG c Repair open circuit or short to ground or short to power in harness or connectors. 3 CHECK INTAKE AIR TEMPERATURE SENSOR Refer to EC-151, “Component Inspection”. OK or NG OK c GO TO 4. NG c Replace mass air flow sensor (with intake air temperature sensor). EC-150 DTC P0112, P0113 IAT TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure (Cont’d) 4 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END Component Inspection INTAKE AIR TEMPERATURE SENSOR 1.
Check resistance between mass air flow sensor terminals 3 and 5 under the following conditions. Intake air temperature °C (°F) Resistance kΩ 25 (77) 1.9 - 2.1 2.
If NG, replace mass air flow sensor (with intake air temperature sensor).
SEC266C SEF012P EC-151 DTC P0117, P0118 ECT TB48DE A/T (WITH EURO-OBD) SENSOR Component Description The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases. SEF594K SEF012P Engine coolant temperature °C (°F) Voltage* V Resistance kΩ −10 (14) 4.4 7.0 - 11.4 20 (68) 3.5 2.1 - 2.9 50 (122) 2.2 0.68 - 1.00 90 (194) 0.9 0.236 - 0.260 *: These data are reference values and are measured between ECM terminal 121 (Engine coolant temperature sensor) and ground. CAUTION: Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. On Board Diagnosis Logic These self-diagnoses have the one trip detection logic. DTC No. P0117 0117 P0118 0118 Trouble Diagnosis Name Engine coolant temperature sensor circuit low input Engine coolant temperature sensor circuit high input DTC Detecting Condition An excessively low voltage from the sensor is sent to ECM. An excessively high voltage from the sensor is sent to ECM. EC-152 Possible Cause + Harness or connectors (The sensor circuit is open or shorted.) + Engine coolant temperature sensor DTC P0117, P0118 ECT TB48DE A/T (WITH EURO-OBD) SENSOR On Board Diagnosis Logic (Cont’d) FAIL-SAFE MODE When this malfunction is detected, the ECM enters fail-safe mode and the MI lights up. Detected items Engine coolant temperature sensor circuit Engine operating condition in fail-safe mode Engine coolant temperature will be determined by ECM based on the time after turning ignition switch “ON” or “START”. CONSULT-II displays the engine coolant temperature decided by ECM. Condition Engine coolant temperature decided (CONSULT-II display) Just as ignition switch is turned ON or Start 40°C (104°F) More than approx. 4 minutes after ignition ON or Start 80°C (176°F) Except as shown above 40 - 80°C (104 - 176°F) (Depends on the time) When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.
DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. WITH CONSULT-II 1. 2. 3. 4. Turn ignition switch “ON”.
Select “DATA MONITOR” mode with CONSULT-II. Wait at least 5 seconds. If DTC is detected, go to EC-155, “Diagnostic Procedure”. SEF058Y WITH GST Follow the procedure “WITH CONSULT-II” above. EC-153 DTC P0117, P0118 ECT TB48DE A/T (WITH EURO-OBD) SENSOR Wiring Diagram TEC147M EC-154 DTC P0117, P0118 ECT TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure 1 CHECK ECT SENSOR POWER SUPPLY CIRCUIT 1. Turn ignition switch “OFF”. 2. Disconnect engine coolant temperature (ECT) sensor harness connector. SEC689C 3. Turn ignition switch “ON”.
4.
Check voltage between ECT sensor terminal 2 and ground with CONSULT-II or tester. SEF645R Voltage: Approximately 5V OK or NG OK c GO TO 2.
NG c Repair open circuit or short to ground or short to power in harness or connectors. 2 CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Check harness continuity between ECT sensor terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist.
3. Also check harness for short to ground and short to power.
OK or NG OK c GO TO 4. NG c GO TO 3. 3 DETECT MALFUNCTIONING PART Check the following. + Harness for open or short between engine coolant temperature sensor and ECM c Repair open circuit or short to ground or short to power in harness or connectors. EC-155 DTC P0117, P0118 ECT TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure (Cont’d) 4 CHECK ENGINE COOLANT TEMPERATURE SENSOR Refer to EC-156, “Component Inspection”. OK or NG OK c GO TO 5. NG c Replace engine coolant temperature sensor. 5 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END Component Inspection ENGINE COOLANT TEMPERATURE SENSOR 1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure. PBIB0353E SEF012P Engine coolant temperature °C (°F) Voltage* V Resistance kΩ −10 (14) 4.4 7.0 - 11.4 20 (68) 3.5 2.1 - 2.9 50 (122) 2.2 0.68 - 1.00 90 (194) 0.9 0.236 - 0.260 *: These data are reference values and are measured between ECM terminal 121 (Engine coolant temperature sensor) and ground. 2. If NG, replace engine coolant temperature sensor. EC-156 DTC P0122, P0123 TP SENSOR TB48DE A/T (WITH EURO-OBD) Component Description PBIB0145E Electric Throttle Control Actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement. The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM.
In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM.
The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition. CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values.
MONITOR ITEM THRTL SEN1 THRTL SEN2* CONDITION + Ignition switch: ON (Engine stopped) + Shift lever: D SPECIFICATION Accelerator pedal: Fully released More than 0.5V Accelerator pedal: Fully depressed Less than 1.5V *: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs for ECM terminal voltage signal.
On Board Diagnosis Logic These self-diagnoses have the one trip detection logic. DTC No. Trouble diagnosis name DTC detecting condition P0122 0122 Throttle position sensor 2 circuit low input An excessively low voltage from the TP sensor 2 is sent to ECM. P0123 0123 Throttle position sensor 2 circuit high input An excessively high voltage from the TP sensor 2 is sent to ECM. Possible cause + Harness or connectors (The TP sensor 2 circuit is open or shorted.) + Electric throttle control actuator (TP sensor 2) FAIL-SAFE MODE When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up. Engine operation condition in fail-safe mode The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor. EC-157 DTC P0122, P0123 TP SENSOR TB48DE A/T (WITH EURO-OBD) DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10V at idle. WITH CONSULT-II 1. 2. 3. 4. Turn ignition switch “ON”.
Select “DATA MONITOR” mode with CONSULT-II. Start engine and let it idle for 1 second. If DTC is detected, go to EC-160, “Diagnostic Procedure”. SEF058Y WITH GST Follow the procedure “WITH CONSULT-II” above. EC-158 DTC P0122, P0123 TP SENSOR TB48DE A/T (WITH EURO-OBD) Wiring Diagram TEC399M EC-159 DTC P0122, P0123 TP TB48DE A/T (WITH EURO-OBD) SENSOR Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 89 B Sensor ground Warm-up condition Idle speed Approximately 0V Ignition switch “ON” Engine stopped Shift lever position is “D” Accelerator pedal fully released 98 R/L Less than 4.75V Throttle position sensor 2 Ignition switch “ON” Engine stopped Shift lever position is “D” Accelerator pedal fully depressed 103 Y Sensor power supply Ignition switch “ON” More than 0.36V Approximately 5V Ignition switch “ON” Engine stopped Shift lever position is “D” Accelerator pedal fully released 108 L More than 0.36V Throttle position sensor 1 Ignition switch “ON” Engine stopped Shift lever position is “D” Accelerator pedal fully depressed Less than 4.75V Diagnostic Procedure 1 RETIGHTEN GROUND SCREWS 1. Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws. SEC690C c GO TO 2. EC-160 DTC P0122, P0123 TP TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure (Cont’d) 2 CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT 1. Disconnect electric throttle control actuator harness connector. SEC182D 2. Turn ignition switch “ON”. 3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester. PBIB0082E Voltage: Approximately 5V OK or NG OK c GO TO 3. NG c Repair open circuit or short to ground or short to power in harness or connectors. 3 CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector. 3. Check harness continuity between electric throttle control actuator terminal 5 and ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.
OK or NG OK c GO TO 4. NG c Repair open circuit or short to ground or short to power in harness or connectors. 4 CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Check harness continuity between ECM terminal 98 and electric throttle control actuator terminal 2. Refer to Wiring Diagram. Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c Repair open circuit or short to ground or short to power in harness or connectors.
EC-161 DTC P0122, P0123 TP TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure (Cont’d) 5 CHECK THROTTLE POSITION SENSOR Refer to EC-162, “Component Inspection”. OK or NG OK c GO TO 7. NG c GO TO 6. 6 REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. 2. 3. 4. Replace the electric throttle control actuator. Perform EC-31, “Accelerator Pedal Released Position Learning”. Perform EC-31, “Throttle Valve Closed Position Learning”. Perform EC-31, “Idle Air Volume Learning”. c INSPECTION END 7 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END Component Inspection THROTTLE POSITION SENSOR 1. 2. 3. 4. 5. PBIB0179E Reconnect all harness connectors disconnected. Perform EC-31, “Throttle Valve Closed Position Learning”. Turn ignition switch “ON”. Set selector lever to “D” position. Check voltage between ECM terminals 108 (TP sensor 1 signal), 98 (TP sensor 2 signal) and engine ground under the following conditions. Terminal Accelerator pedal Voltage 108 (Throttle position sensor 1) Fully released More than 0.36V Fully depressed Less than 4.75V Fully released Less than 4.75V Fully depressed More than 0.36V 98 (Throttle position sensor 2) 6. If NG, replace electric throttle control actuator and go to the next step. 7. Perform EC-31, “Accelerator Pedal Released Position Learning”. 8. Perform EC-31, “Throttle Valve Closed Position Learning”. 9. Perform EC-31, “Idle Air Volume Learning”. EC-162 DTC P0132, P0152 HO2S1 TB48DE A/T (WITH EURO-OBD) Component Description The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V. SEF463R SEF288D CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values.
MONITOR ITEM CONDITION SPECIFICATION HO2S1 (B1) HO2S1 (B2) + Engine: After warming up Maintaining engine speed at 2,000 rpm 0 - 0.3V ←→ Approx. 0.6 1.0V HO2S1 MNTR (B1) HO2S1 MNTR (B2) + Engine: After warming up Maintaining engine speed at 2,000 rpm LEAN ←→ RICH Changes more than 5 times during 10 seconds. On Board Diagnosis Logic To judge the malfunction of the heated oxygen sensor 1, this diagnosis measures response time of heated oxygen sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and heated oxygen sensor 1 temperature index. Judgment is based on whether the compensated time (heated oxygen sensor 1 cycling time index) is inordinately long or not. SEF010V DTC No. P0133 0133 (Bank 1) Trouble diagnosis name Heated oxygen sensor 1 circuit slow response DTC detecting condition The response of the voltage signal from the sensor takes more than the specified time. P0153 0153 (Bank 2) EC-172 Possible cause + Harness or connectors (The sensor circuit is open or shorted.) + Heated oxygen sensor 1 + Heated oxygen sensor 1 heater + Fuel pressure + Injectors + Intake air leaks + Exhaust gas leaks + PCV valve + Mass air flow sensor DTC P0133, P0153 HO2S1 TB48DE A/T (WITH EURO-OBD) DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed. NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. TESTING CONDITION: + Always perform at a temperature above −10°C (14°F). + Before performing the following procedure, confirm that battery voltage is more than 11V at idle.
WITH CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Stop engine and wait at least 10 seconds. 3. Turn ignition switch “ON” and select “HO2S1 (B1) P0133” or “HO2S1 (B2) P0153” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4. Touch “START”. 5. Start engine and let it idle for at least 3 minutes. NOTE: Never raise engine speed above 2,800 rpm after this step. If the engine speed limit is exceeded, return to step 5. SEF338Z 6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”.
(It will take approximately 20 to 50 seconds.) ENG SPEED SEF339Z 1,550 - 2,500 rpm Vehicle speed More than 80 km/h (50 MPH) B/FUEL SCHDL 5 - 16.7 msec Selector lever Suitable position If “TESTING” is not displayed after 5 minutes, retry from step 2. EC-173 DTC P0133, P0153 HO2S1 TB48DE A/T (WITH EURO-OBD) 7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-178, “Diagnostic Procedure”. SEF658Y Overall Function Check Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.
WITH GST 1. Start engine and warm it up to normal operating temperature. 2. Set voltmeter probes between ECM terminal 115 [HO2S1(B1) signal] or 114 [HO2S1(B2) signal] and engine ground. 3. Check the following with engine speed held at 2,000 rpm constant under no load. — The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 4. If NG, go to EC-178, “Diagnostic Procedure”. SEC184DA EC-174 DTC P0133, P0153 HO2S1 TB48DE A/T (WITH EURO-OBD) Wiring Diagram BANK 1 TEC408M EC-175 DTC P0133, P0153 TB48DE A/T (WITH EURO-OBD) HO2S1 Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 115 W Heated oxygen sensor 1 (bank 1) Warm-up condition Engine speed is 2,000 rpm. EC-176 0 - Approximately 1.0V (Periodically change) DTC P0133, P0153 TB48DE A/T (WITH EURO-OBD) HO2S1 Wiring Diagram (Cont’d) BANK 2 TEC412M EC-177 DTC P0133, P0153 TB48DE A/T (WITH EURO-OBD) HO2S1 Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 114 W Heated oxygen sensor 1 (bank 2) Warm-up condition Engine speed is 2,000 rpm. 0 - Approximately 1.0V (Periodically change) Diagnostic Procedure 1 RETIGHTEN GROUND SCREWS 1. Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws.
SEC690C c GO TO 2. 2 RETIGHTEN HEATED OXYGEN SENSOR 1 Loosen and retighten heated oxygen sensor 1. Tightening torque: 40 - 60 Nzm (4.1 - 6.2 kg-m, 30 - 44 ft-lb) SEC888C c GO TO 3.
EC-178 DTC P0133, P0153 TB48DE A/T (WITH EURO-OBD) HO2S1 Diagnostic Procedure (Cont’d) 3 CHECK FOR EXHAUST GAS LEAK 1. Start engine and run it at idle. 2. Listen for an exhaust gas leak before three way catalyst (Manifold). SEC502D OK or NG OK c GO TO 4. NG c Repair or replace. 4 CHECK FOR INTAKE AIR LEAK Listen for an intake air leak after the mass air flow sensor. OK or NG OK c GO TO 5. NG c Repair or replace. EC-179 DTC P0133, P0153 TB48DE A/T (WITH EURO-OBD) HO2S1 Diagnostic Procedure (Cont’d) 5 CLEAR THE SELF-LEARNING DATA With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching “CLEAR”. SEF215Z 4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine? Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2.
Turn ignition switch “OFF”. 3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. SEC688C 4. 5. 6. 7. 8. Stop engine and reconnect mass air flow sensor harness connector. Make sure that DTC P0102 is displayed.
Erase the DTC memory. Refer to EC-49, “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”. Make sure that DTC P0000 is displayed. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?
Yes or No Yes c Perform trouble diagnosis for DTC P0171, P0174 or DTC P0172, P0175 (Refer to EC-218 or EC-227). No c GO TO 6. EC-180 DTC P0133, P0153 TB48DE A/T (WITH EURO-OBD) HO2S1 Diagnostic Procedure (Cont’d) 6 CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Disconnect heated oxygen sensor 1 harness connector. SEC671D 3. Disconnect ECM harness connector. 4.
Check harness continuity between HO2S1 terminal 4 and ground. Refer to Wiring Diagram. Continuity should exist. 5. Also check harness for short to ground and short to power. OK or NG OK c GO TO 8.
NG c GO TO 7. 7 DETECT MALFUNCTIONING PART Check the following. + Joint connector-7 + Harness for open or short between HO2S1 and ground c Repair open circuit or short to power in harness or connectors. EC-181 DTC P0133, P0153 TB48DE A/T (WITH EURO-OBD) HO2S1 Diagnostic Procedure (Cont’d) 8 CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram. MTBL1571 Continuity should exist. 2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram. MTBL1572 Continuity should not exist. 3. Also check harness for short to power. OK or NG OK c GO TO 9. NG c Repair open circuit or short to ground or short to power in harness or connectors. 9 CHECK HEATED OXYGEN SENSOR 1 HEATER Refer to EC-131, “Component Inspection”. OK or NG OK c GO TO 9. NG c Replace malfunctioning heated oxygen sensor 1. 10 CHECK MASS AIR FLOW SENSOR Refer to EC-146, “Component Inspection”. OK or NG OK c GO TO 11.
NG c Replace mass air flow sensor. 11 CHECK PCV VALVE Refer to EC-482, “Component Inspection”. OK or NG OK c GO TO 12. NG c Replace PCV valve. 12 CHECK HEATED OXYGEN SENSOR 1 Refer to EC-183, “Component Inspection”. OK or NG OK c GO TO 13. NG c Replace malfunctioning heated oxygen sensor 1.
EC-182 DTC P0133, P0153 TB48DE A/T (WITH EURO-OBD) HO2S1 Diagnostic Procedure (Cont’d) 13 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END Component Inspection HEATED OXYGEN SENSOR 1 With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II. 3. Select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps. 5. Touch “RECORD” on CONSULT-II screen. SEF646Y 6. Check the following. + “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” 5 times in 10 seconds. 5 times (cycles) are counted as shown at right. + “HO2S1 (B1)/(B2)” voltage goes above 0.6V at least once. + “HO2S1 (B1)/(B2)” voltage goes below 0.3V at least once. + “HO2S1 (B1)/(B2)” voltage never exceeds 1.0V. SEF647Y SEF648Y CAUTION: + Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. + Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. EC-170 DTC P0132, P0152 TB48DE A/T (WITH EURO-OBD) HO2S1 Component Inspection (Cont’d) Without CONSULT-II SEC184DA 1. Start engine and warm it up to normal operating temperature. 2. Set voltmeter probes between ECM terminal 115 [HO2S1 (B1) signal] or 114 [HO2S1 (B2) signal] and engine ground. 3. Check the following with engine speed held at 2,000 rpm constant under no load. + The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. + The maximum voltage is over 0.6V at least one time. + The minimum voltage is below 0.3V at least one time.
+ The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V CAUTION: + Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
+ Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. EC-194 DTC P0138, P0158 HO2S2 TB48DE A/T (WITH EURO-OBD) Component Description SEF327R The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2. This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation. CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM CONDITION SPECIFICATION HO2S2 (B1) HO2S2 (B2) + Engine: After warming up Revving engine from idle to 3,000 + Keeping the engine speed rpm quickly. between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load 0 - 0.3V ←→ Approx.
0.6 1.0V HO2S2 MNTR (B1) HO2S2 MNTR (B2) + Engine: After warming up Revving engine from idle to 3,000 + Keeping the engine speed rpm quickly. between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load LEAN ←→ RICH On Board Diagnosis Logic The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1.
The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuelcut. SEF305UA DTC No. P0138 0138 (Bank 1) Trouble diagnosis name Heated oxygen sensor 2 circuit high voltage DTC detecting condition An excessively high voltage from the sensor is sent to ECM. P0158 0158 (Bank 2) EC-195 Possible cause + Harness or connectors (The sensor circuit is open or shorted.) + Heated oxygen sensor 2 DTC P0138, P0158 HO2S2 TB48DE A/T (WITH EURO-OBD) DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed. NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
WITH CONSULT-II 1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II. 2. Start engine and warm it up to the normal operating temperature. 3. Turn ignition switch “OFF” and wait at least 10 seconds. 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load. 5. Let engine idle for two minutes. 6. If 1st trip DTC is detected, go to EC-200, “Diagnostic Procedure”. SEF174Y WITH GST 1. Start engine and warm it up to the normal operating temperature. 2. Turn ignition switch “OFF” and wait at least 10 seconds. 3.
Start engine and keep the engine speed between 3,500 and 4,000 rpm for

8. If NG, replace heated oxygen sensor 2. CAUTION: + Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. + Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. EC-204 DTC P0139, P0159 HO2S2 TB48DE A/T (WITH EURO-OBD) Component Description SEF327R The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2. This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. Under normal conditions the heated oxygen sensor 2 is not used for engine control operation. CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values.

MONITOR ITEM CONDITION SPECIFICATION HO2S2 (B1) HO2S2 (B2) + Engine: After warming up Revving engine from idle to 3,000 + Keeping the engine speed rpm quickly. between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load 0 - 0.3V ←→ Approx. 0.6 1.0V HO2S2 MNTR (B1) HO2S2 MNTR (B2) + Engine: After warming up Revving engine from idle to 3,000 + Keeping the engine speed rpm quickly.

between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load LEAN ←→ RICH On Board Diagnosis Logic The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time.

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor’s voltage is faster than specified during the various driving condition such as fuel-cut. SEF302U DTC No. P0139 0139 (Bank 1) Trouble diagnosis name Heated oxygen sensor 2 circuit slow response DTC detecting condition It takes more time for the sensor to respond between rich and lean than the specified time. P0159 0159 (Bank 2) EC-205 Possible cause + Harness or connectors (The sensor circuit is open or shorted.) + Heated oxygen sensor 2 + Fuel pressure + Injectors + Intake air leaks DTC P0139, P0159 HO2S2 TB48DE A/T (WITH EURO-OBD) DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed. NOTE: + “COMPLETED” will appear on CONSULT-II screen when all tests “COND1”, “COND2” and “COND3” are completed. + If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. TESTING CONDITION: Never stop engine during this procedure. If the engine is stopped, retry this procedure from step 2 in “Procedure for COND1”. WITH CONSULT-II Procedure for COND1 For the best results, perform “DTC WORK SUPPORT” at a temperature of 0 to 30°C (32 to 86°F) 1. Start engine and warm it up to the normal operating temperature. 2. Turn ignition switch “OFF” and wait at least 10 seconds. 3.

Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load. 4. Let engine idle one minute. 5. Select “HO2S2 (B1) P0139” or “HO2S2 (B2) P0159” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II. 6. Touch “START”. 7. Let engine idle for at least 30 seconds. 8. Rev engine up to 2,000 rpm 2 or 3 times quickly under no load. If “COMPLETED” appears on CONSULT-II screen, go to step 2 in “Procedure for COND3”. If “COMPLETED” does not appear on CONSULT-II screen, go to the following step. 9. When the following conditions are met, “TESTING” will be displayed at “COND1” on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 60 seconds.) ENG SPEED More than 1,000 rpm B/FUEL SCHDL More than 1.0 msec COOLANT TEMP/S 70 - 100°C Selector level Suitable position PBIB0552E NOTE: + If “TESTING” is not displayed after 5 minutes, retry from step 2 in “Procedure for COND1”. + If “COMPLETED” already appears at “COND2” on CONSULT-II screen before “Procedure for COND2” is conducted, it is unnecessary to conduct step 1 in “Procedure for COND2”. EC-206 DTC P0139, P0159 TB48DE A/T (WITH EURO-OBD) HO2S2 DTC Confirmation Procedure (Cont’d) Procedure for COND2 1. While driving, release accelerator pedal completely with “OD” OFF from the above condition [step 9] until “INCOMPLETE” at “COND2” on CONSULT-II screen has turned to “COMPLETED”. (It will take approximately 4 seconds.) NOTE: If “COMPLETED” already appears at “COND3” on CONSULT-II screen before “Procedure for COND3” is conducted, it is unnecessary to conduct step 1 in “Procedure for COND3”.

PBIB0553E Procedure for COND3 SEF668Y 1. Stop vehicle and let it idle until “INCOMPLETE” of “COND3” on CONSULT-II screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.) 2. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-212, “Diagnostic Procedure”. If “CAN NOT BE DIAGNOSED” is displayed, perform the following. a. Turn ignition switch “OFF” and leave the vehicle in a cool place (soak the vehicle). b. Turn ignition switch “ON” and select “COOLANTEMP/S” in “DATA MONITOR” mode with CONSULT-II. c. Start engine and warm it up while monitoring “COOLANTEMP/S” indication on CONSULT-II.

d. When “COOLANTEMP/S” indication reaches to 70°C (158°F), go to “Procedure for COND 1” step 3.

Overall Function Check Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed. WITH GST 1. Start engine and warm it up to the normal operating temperature. 2.

Turn ignition switch “OFF” and wait at least 10 seconds. 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load. 4. Let engine idle for one minute. 5. Set voltmeter probes between ECM terminal 124 [HO2S2 (B1) signal] or 123 [HO2S2 (B2) signal] and engine ground. 6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times. (Depress and release accelerator pedal as soon as possible.) A change of voltage should be more than 0.06V for 1 second during this procedure. If the voltage can be confirmed in step 6, step 7 is not necessary. 7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) SEC774D EC-207 DTC P0139, P0159 TB48DE A/T (WITH EURO-OBD) HO2S2 Overall Function Check (Cont’d) in “D” position with “OD” OFF. A change of voltage should be more than 0.06V for 1 second during this procedure. 8. If NG, go to EC-212, “Diagnostic Procedure”. EC-208 DTC P0139, P0159 HO2S2 TB48DE A/T (WITH EURO-OBD) Wiring Diagram BANK 1 TEC411M EC-209 DTC P0139, P0159 TB48DE A/T (WITH EURO-OBD) HO2S2 Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO.

WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 124 W Heated oxygen sensor 2 (bank 1) Warm-up condition Revving engine from idle to 3,000 rpm quickly after the following conditions are met. Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load EC-210 0 - Approximately 1.0V DTC P0139, P0159 TB48DE A/T (WITH EURO-OBD) HO2S2 Wiring Diagram (Cont’d) BANK 2 TEC336M EC-211 DTC P0139, P0159 TB48DE A/T (WITH EURO-OBD) HO2S2 Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 123 W Heated oxygen sensor 2 (bank 2) Warm-up condition Revving engine from idle to 3,000 rpm quickly after the following conditions are met. Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load 0 - Approximately 1.0V Diagnostic Procedure 1 RETIGHTEN GROUND SCREWS 1. Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws. SEC690C c GO TO 2. EC-212 DTC P0139, P0159 TB48DE A/T (WITH EURO-OBD) HO2S2 Diagnostic Procedure (Cont’d) 2 CLEAR THE SELF-LEARNING DATA With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II. 3.

Clear the self-learning control coefficient by touching “CLEAR”. SEF215Z 4. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine? 1. 2. 3. 4.

Without CONSULT-II Start engine and warm it up to normal operating temperature. Turn ignition switch “OFF”. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. Stop engine and reconnect mass air flow sensor harness connector. SEC688C 5. 6. 7. 8. Make sure that DTC P0102 is displayed. Erase the DTC memory.

Refer to EC-49, “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”. Make sure that DTC P0000 is displayed. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?

Is it difficult to start engine? Yes or No Yes c Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-218 or EC-227. No c GO TO 3. EC-213 DTC P0139, P0159 TB48DE A/T (WITH EURO-OBD) HO2S2 Diagnostic Procedure (Cont’d) 3 CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Disconnect heated oxygen sensor 2 harness connector. SEC669D 3.

Disconnect ECM harness connector. 4. Check harness continuity between HO2S2 terminal 4 and ground. Refer to Wiring Diagram. Continuity should exist. 5. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c GO TO 4.

4 DETECT MALFUNCTIONING PART Check the following. + Joint connector-7 + Harness for open or short between HO2S2 and ground c Repair open circuit or short to power in harness or connectors. EC-214 DTC P0139, P0159 TB48DE A/T (WITH EURO-OBD) HO2S2 Diagnostic Procedure (Cont’d) 5 CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram. MTBL1577 Continuity should exist. 2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram. MTBL1578 Continuity should not exist. 3. Also check harness for short to power. OK or NG OK c GO TO 6. NG c Repair open circuit or short to ground or short to power in harness or connectors.

6 CHECK HEATED OXYGEN SENSOR 2 Refer to EC-215, “Component Inspection”. OK or NG OK c GO TO 7. NG c Replace heated oxygen sensor 2. 7 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END Component Inspection HEATED OXYGEN SENSOR 2 With CONSULT-II 1.

Start engine and warm it up to the normal operating temperature. 2.

Turn ignition switch “OFF” and wait at least 10 seconds. 3.

Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load. 4. Let engine idle for one minute. EC-215 DTC P0139, P0159 TB48DE A/T (WITH EURO-OBD) HO2S2 Component Inspection (Cont’d) 5.

Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II. SEF662Y 6. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%. SEF972YA “HO2S2 (B1)/(B2)” should be when the “FUEL INJECTION” “HO2S2 (B1)/(B2)” should be when the “FUEL INJECTION” above 0.68V at least once is +25%. below 0.48V at least once is −25%. CAUTION: + Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

+ Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. Without CONSULT-II 1. Start engine and warm it up to the normal operating temperature. 2. Turn ignition switch “OFF” and wait at least 10 seconds. 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load. 4.

Let engine idle for one minute. 5. Set voltmeter probes between ECM terminal 124 [HO2S2 (B1) signal] or 123 [HO2S2 (B2) signal] and engine ground. EC-216 DTC P0139, P0159 TB48DE A/T (WITH EURO-OBD) HO2S2 Component Inspection (Cont’d) SEC774D 6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times. (Depress and release accelerator pedal as soon as possible.) The voltage should be above 0.68V at least once during this procedure. If the voltage is above 0.68V at step 6, step 7 is not necessary. 7. Keep vehicle idling for 10 minutes, then check voltage.

Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF.

The voltage should be below 0.48V at least once during this procedure. 8. If NG, replace heated oxygen sensor 2.

CAUTION: + Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. + Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. EC-217 DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION TB48DE A/T (WITH EURO-OBD) On Board Diagnosis Logic With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and light up the MI (2 trip detection logic). Sensor Heated oxygen sensors 1 DTC No. P0171 0171 (Bank 1) P0174 0174 (Bank 2) Input Signal to ECM Density of oxygen in exhaust gas (Mixture ratio feedback signal) ECM function Fuel injection control Trouble diagnosis name DTC detecting condition Fuel injection system too lean + Fuel injection system does not operate properly. + The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.) Actuator Fuel injectors Possible cause + + + + + + + + Intake air leaks Heated oxygen sensor 1 Injectors Exhaust gas leaks Incorrect fuel pressure Lack of fuel Mass air flow sensor Incorrect PCV hose connection DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. WITH CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch “OFF” and wait at least 10 seconds. 3.

Turn ignition switch “ON” and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II. SEF215Z 4. Clear the self-learning control coefficient by touching “CLEAR”. 5. Select “DATA MONITOR” mode with CONSULT-II. 6. Start engine again and let it idle for at least 10 minutes. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to EC-222, “Diagnostic Procedure”. 7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too. 8. Crank engine while depressing accelerator pedal. If engine starts, go to EC-222, “Diagnostic Procedure”. If engine does not start, check exhaust and intake air leak visually. EC-218 DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION TB48DE A/T (WITH EURO-OBD) DTC Confirmation Procedure (Cont’d) WITH GST 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch “OFF” and wait at least 10 seconds. SEC688C 3. Disconnect mass air flow sensor harness connector.

Then restart and run engine for at least 5 seconds at idle speed.

4. Stop engine and reconnect mass air flow sensor harness connector. 5. Select “MODE 3” with GST. Make sure DTC P0102 is detected.

6. Select “MODE 4” with GST and erase the DTC P0102. 7. Start engine again and let it idle for at least 10 minutes. 8. Select “MODE 7” with GST. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists.

If so, go to EC-222, “Diagnostic Procedure”.

9. If it is difficult to start engine at step 7, the fuel injection system has a malfunction. 10.

Crank engine while depressing accelerator pedal. If engine starts, go to EC-222, “Diagnostic Procedure”. If engine does not start, check exhaust and intake air leak visually. EC-219 DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION TB48DE A/T (WITH EURO-OBD) Wiring Diagram BANK 1 TEC424M EC-220 DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION TB48DE A/T (WITH EURO-OBD) Wiring Diagram (Cont’d) BANK 2 TEC425M EC-221 DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure 1 CHECK EXHAUST GAS LEAK 1. Start engine and run it at idle. 2. Listen for an exhaust gas leak before three way catalyst (manifold). SEC502D OK or NG OK c GO TO 2. NG c Repair or replace. 2 CHECK FOR INTAKE AIR LEAK 1. Listen for an intake air leak after the mass air flow sensor. 2.

Check PCV hose connection. OK or NG OK c GO TO 3. NG c Repair or replace. EC-222 DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure (Cont’d) 3 CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2.

Disconnect corresponding heated oxygen sensor 1 (HO2S1) harness connector. SEC671D 3. Disconnect ECM harness connector.

4. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram. MTBL1579 Continuity should exist. 5. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram. MTBL1580 Continuity should not exist. 6. Also check harness for short to power. OK or NG OK c GO TO 4. NG c Repair open circuit or short to ground or short to power in harness or connectors. 4 CHECK FUEL PRESSURE 1. Release fuel pressure to zero. Refer to EC-34, “FUEL PRESSURE RELEASE”. 2.

Install fuel pressure gauge and check fuel pressure. Refer to EC-34, “FUEL PRESSURE CHECK”. At idling: 245 kPa (2.45 bar, 2.5 kg/cm2, 36 psi) OK or NG OK c GO TO 6. NG c GO TO 5. EC-223 DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure (Cont’d) 5 DETECT MALFUNCTIONING PART Check the following. + Fuel pump and circuit (Refer to EC-459, “FUEL PUMP CIRCUIT”.) + Fuel pressure regulator (Refer to EC-34, “FUEL PRESSURE CHECK”.) + Fuel lines (Refer to MA section.) + Fuel filter for clogging c Repair or replace. 6 CHECK MASS AIR FLOW SENSOR With CONSULT-II 1. Install all removed parts. 2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

3.0 - 9.0 gzm/sec: at idling 10.0 - 25.0 gzm/sec: at 2,500 rpm With GST 1. Install all removed parts. 2. Check mass air flow sensor signal in MODE 1 with GST. 3.0 - 9.0 gzm/sec: at idling 10.0 - 25.0 gzm/sec: at 2,500 rpm OK or NG OK c GO TO 7. NG c Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-140, “DTC P0102, P0103 MAF SENSOR”. EC-224 DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure (Cont’d) 7 CHECK FUNCTION OF INJECTORS With CONSULT-II 1. Start engine. 2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II. PBIB0133E 3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-II 1. Start engine. MEC703B 2. Listen to each injector operating sound. Clicking noise should be heard. OK or NG OK c GO TO 8.

NG c Perform trouble diagnosis for EC-453, “INJECTOR CIRCUIT”. EC-225 DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure (Cont’d) 8 CHECK INJECTOR 1. 2. 3. 4. Confirm that the engine is cooled down and there are no fire hazards near the vehicle. Turn ignition switch “OFF”. Disconnect injector harness connectors on bank 2 (for DTC P0171), bank 1 (for DTC P0174). Remove injector gallery assembly. Refer to EM section. Keep fuel hose and all injectors connected to injector gallery. The injector harness connectors on bank 1 (for DTC P0171), bank 2 (for DTC P0174) should remain connected. 5. Disconnect all ignition coil harness connectors. 6. Prepare pans or saucers under each injector. 7. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors. SEF595Q Fuel should be sprayed evenly for each injector. OK or NG OK c GO TO 9. NG c Replace injectors from which fuel does not spray out. Always replace O-ring with new ones. 9 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END EC-226 DTC P0172, P0175 FUEL INJECTION SYSTEM TB48DE A/T (WITH EURO-OBD) FUNCTION On Board Diagnosis Logic With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and light up the MI (2 trip detection logic). Sensor Heated oxygen sensors 1 DTC No. P0172 0172 (Bank 1) P0175 0175 (Bank 2) Input Signal to ECM Density of oxygen in exhaust gas (Mixture ratio feedback signal) ECM function Fuel injection control Trouble diagnosis name DTC detecting condition Fuel injection system too rich + Fuel injection system does not operate properly. + The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.) Actuator Fuel injectors Possible cause + + + + + Heated oxygen sensor 1 Injectors Exhaust gas leaks Incorrect fuel pressure Mass air flow sensor DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. WITH CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch “OFF” and wait at least 10 seconds. 3. Turn ignition switch “ON” and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II. SEF215Z 4. Clear the self-learning control coefficient by touching “CLEAR”. 5. Select “DATA MONITOR” mode with CONSULT-II. 6. Start engine again and let it idle for at least 10 minutes. The 1st trip DTC P0172, P0175 should be detected at this stage, if a malfunction exists. If so, go to EC-231, “Diagnostic Procedure”. 7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.

8. Crank engine while depressing accelerator pedal. If engine starts, go to EC-231, “Diagnostic Procedure”. If engine does not start, remove ignition plugs and check for fouling, etc. EC-227 DTC P0172, P0175 FUEL INJECTION SYSTEM TB48DE A/T (WITH EURO-OBD) FUNCTION DTC Confirmation Procedure (Cont’d) WITH GST SEC688C 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch “OFF” and wait at least 10 seconds. 3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed. 4. Stop engine and reconnect mass air flow sensor harness connector. 5. Select “MODE 3” with GST. Make sure DTC P0102 is detected. 6.

Select “MODE 4” with GST and erase the DTC P0102. 7. Start engine again and let it idle for at least 10 minutes. 8. Select “MODE 7” with GST.

The 1st trip DTC P0172 or P0175 should be detected at this stage, if a malfunction exists. If so, go to EC-231, “Diagnostic Procedure”. 9. If it is difficult to start engine at step 7, the fuel injection system has a malfunction. 10. Crank engine while depressing accelerator pedal. If engine starts, go to EC-231, “Diagnostic Procedure”. If engine does not start, check exhaust and intake air leak visually. EC-228 DTC P0172, P0175 FUEL INJECTION SYSTEM TB48DE A/T (WITH EURO-OBD) FUNCTION Wiring Diagram BANK 1 TEC424M EC-229 DTC P0172, P0175 FUEL INJECTION SYSTEM TB48DE A/T (WITH EURO-OBD) FUNCTION Wiring Diagram (Cont’d) BANK 2 TEC425M EC-230 DTC P0172, P0175 FUEL INJECTION SYSTEM TB48DE A/T (WITH EURO-OBD) FUNCTION Diagnostic Procedure 1 CHECK EXHAUST GAS LEAK 1. Start engine and run it at idle.

2. Listen for an exhaust gas leak before three way catalyst (manifold). SEC502D OK or NG OK c GO TO 2. NG c Repair or replace. 2 CHECK FOR INTAKE AIR LEAK Listen for an intake air leak after the mass air flow sensor. OK or NG OK c GO TO 3. NG c Repair or replace. EC-231 DTC P0172, P0175 FUEL INJECTION SYSTEM TB48DE A/T (WITH EURO-OBD) FUNCTION Diagnostic Procedure (Cont’d) 3 CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Disconnect corresponding heated oxygen sensor 1 (HO2S1) harness connector. SEC671D 3. Disconnect ECM harness connector. 4. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram. MTBL1581 Continuity should exist. 5. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram. MTBL1582 Continuity should not exist. 6. Also check harness for short to power. OK or NG OK c GO TO 4. NG c Repair open circuit or short to ground or short to power in harness or connectors. 4 CHECK FUEL PRESSURE 1. Release fuel pressure to zero.

Refer to EC-34, “FUEL PRESSURE RELEASE”. 2. Install fuel pressure gauge and check fuel pressure. Refer to EC-34, “FUEL PRESSURE CHECK”. At idling: 245 kPa (2.45 bar, 2.5 kg/cm2, 36 psi) OK or NG OK c GO TO 6. NG c GO TO 5. 5 DETECT MALFUNCTIONING PART Check the following. + Fuel pump and circuit (Refer to EC-459, “FUEL PUMP CIRCUIT”.) + Fuel pressure regulator (Refer to EC-34, “FUEL PRESSURE CHECK”.) c Repair or replace. EC-232 DTC P0172, P0175 FUEL INJECTION SYSTEM TB48DE A/T (WITH EURO-OBD) FUNCTION Diagnostic Procedure (Cont’d) 6 CHECK MASS AIR FLOW SENSOR With CONSULT-II 1. Install all removed parts.

2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II. 3.0 - 9.0 gzm/sec: at idling 10.0 - 25.0 gzm/sec: at 2,500 rpm With GST 1. Install all removed parts. 2. Check mass air flow sensor signal in MODE 1 with GST. 3.0 - 9.0 gzm/sec: at idling 10.0 - 25.0 gzm/sec: at 2,500 rpm OK or NG OK c GO TO 7. NG c Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-140, “DTC P0102, P0103 MAF SENSOR”. 7 CHECK FUNCTION OF INJECTORS With CONSULT-II 1.

Start engine. 2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II. PBIB0133E 3. Make sure that each circuit produces a momentary engine speed drop. Without CONSULT-II 1. Start engine. 2. Listen to each injector operating sound. MEC703B Clicking noise should be heard. OK or NG OK c GO TO 8. NG c Perform trouble diagnosis for EC-453, “INJECTOR CIRCUIT”. EC-233 DTC P0172, P0175 FUEL INJECTION SYSTEM TB48DE A/T (WITH EURO-OBD) FUNCTION Diagnostic Procedure (Cont’d) 8 CHECK INJECTOR 1. Remove injector assembly. Refer to EM section. Keep fuel hose and all injectors connected to injector gallery. 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle. 3. Disconnect injector harness connectors bank 2 (for DTC P0172), bank 1 (for P0175). The injector harness connectors on bank 1 (for P0172), bank 2 (for P0175) should remain connected. 4. Disconnect all ignition coil harness connectors. 5. Prepare pans or saucers under each injectors. 6. Crank engine for about 3 seconds. Make sure fuel does not drip from injector. OK or NG OK (Does not drip.) c GO TO 9. NG (Drips.) c Replace the injectors from which fuel is dripping.

Always replace O-ring with new one.

9 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”.

c INSPECTION END EC-234 DTC P0222, P0223 TP SENSOR TB48DE A/T (WITH EURO-OBD) Component Description PBIB0145E Electric Throttle Control Actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement. The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition. CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM THRTL SEN1 THRTL SEN2* CONDITION + Ignition switch: ON (Engine stopped) + Shift lever: D SPECIFICATION Accelerator pedal: Fully released More than 0.5V Accelerator pedal: Fully depressed Less than 1.5V *: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal. On Board Diagnosis Logic These self-diagnoses have the one trip detection logic. DTC No. Trouble diagnosis name DTC detecting condition P0222 0222 Throttle position sensor 1 circuit low input An excessively low voltage from the TP sensor 1 is sent to ECM. P0223 0223 Throttle position sensor 1 circuit high input An excessively high voltage from the TP sensor 1 is sent to ECM. Possible cause + Harness or connectors (The TP sensor 1 circuit is open or shorted.) + Electric throttle control actuator (TP sensor 1) FAIL-SAFE MODE When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up. Engine operation condition in fail-safe mode The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.

So, the acceleration will be poor. DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10V at idle. EC-235 DTC P0222, P0223 TP TB48DE A/T (WITH EURO-OBD) SENSOR DTC Confirmation Procedure (Cont’d) WITH CONSULT-II 1. 2. 3. 4.

Turn ignition switch “ON”. Select “DATA MONITOR” mode with CONSULT-II. Start engine and let it idle for 1 second. If DTC is detected, go to EC-238, “Diagnostic Procedure”. SEF058Y WITH GST Follow the procedure “WITH CONSULT-II” above. EC-236 DTC P0222, P0223 TP SENSOR TB48DE A/T (WITH EURO-OBD) Wiring Diagram TEC398M EC-237 DTC P0222, P0223 TP TB48DE A/T (WITH EURO-OBD) SENSOR Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 89 B Sensor ground (Throttle position sensor) Warm-up condition Idle speed Approximately 0V Ignition switch “ON” Engine stopped Shift lever position is “D” Accelerator pedal fully released 98 R/L Less than 4.75V Throttle position sensor 2 Ignition switch “ON” Engine stopped Shift lever position is “D” Accelerator pedal fully depressed 103 Y Sensor power supply (Throttle position sensor) Ignition switch “ON” More than 0.36V Approximately 5V Ignition switch “ON” Engine stopped Shift lever position is “D” Accelerator pedal fully released 108 L More than 0.36V Throttle position sensor 1 Ignition switch “ON” Engine stopped Shift lever position is “D” Accelerator pedal fully depressed Less than 4.75V Diagnostic Procedure 1 RETIGHTEN GROUND SCREWS 1. Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws.

SEC690C c GO TO 2. EC-238 DTC P0222, P0223 TP TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure (Cont’d) 2 CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT 1. Disconnect electric throttle control actuator harness connector. SEC182D 2. Turn ignition switch “ON”. 3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester. PBIB0082E Voltage: Approximately 5V OK or NG OK c GO TO 3. NG c Repair open circuit or short to ground or short to power in harness or connectors.

3 CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector. 3. Check harness continuity between electric throttle control actuator terminal 5 and engine ground.

Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.

OK or NG OK c GO TO 4. NG c Repair open circuit or short to ground or short to power in harness or connectors.

4 CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1.

Check harness continuity between ECM terminal 108 and electric throttle control actuator terminal 4. Refer to Wiring Diagram. Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c Repair open circuit or short to ground or short to power in harness or connectors. EC-239 DTC P0222, P0223 TP TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure (Cont’d) 5 CHECK THROTTLE POSITION SENSOR Refer to EC-240, “Component Inspection”. OK or NG OK c GO TO 7. NG c GO TO 6. 6 REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. 2. 3.

4. Replace the electric throttle control actuator. Perform EC-31, “Accelerator Pedal Released Position Learning”. Perform EC-31, “Throttle Valve Closed Position Learning”. Perform EC-31, “Idle Air Volume Learning”. c INSPECTION END 7 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END Component Inspection THROTTLE POSITION SENSOR 1. 2. 3. 4. Reconnect all harness connectors disconnected. Perform EC-31, “Throttle Valve Closed Position Learning”. Turn ignition switch “ON”. Set selector lever to “D” position. 5. Check voltage between ECM terminals 108 (TP sensor 1 signal), 98 (TP sensor 2 signal) and engine ground under the following conditions. PBIB0179E Terminal Accelerator pedal Voltage 108 (Throttle position sensor 1) Fully released More than 0.36V Fully depressed Less than 4.75V Fully released Less than 4.75V Fully depressed More than 0.36V 98 (Throttle position sensor 2) 6. If NG, replace electric throttle control actuator and go to the next step. 7.

Perform EC-31, “Accelerator Pedal Released Position Learning”. 8. Perform EC-31, “Throttle Valve Closed Position Learning”.

9. Perform EC-31, “Idle Air Volume Learning”. EC-240 DTC P0300 - P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE TB48DE A/T (WITH EURO-OBD) On Board Diagnosis Logic When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (OBD) signal to vary, ECM can determine that a misfire is occurring. Sensor Crankshaft position sensor (OBD) Input Signal to ECM Engine speed ECM function On board diagnosis of misfire The misfire detection logic consists of the following two conditions. 1. One Trip Detection Logic (Three Way Catalyst Damage) On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MI will blink. When a misfire condition occurs, the ECM monitors the CKP sensor (OBD) signal every 200 engine revolutions for a change. When the misfire condition decreases to a level that will not damage the TWC, the MI will turn off. If another misfire condition occurs that can damage the TWC on a second trip, the MI will blink. When the misfire condition decreases to a level that will not damage the TWC, the MI will remain on. If another misfire condition occurs that can damage the TWC, the MI will begin to blink again. 2. Two Trip Detection Logic (Exhaust quality deterioration) For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MI will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions. A misfire malfunction can be detected on any one cylinder or on multiple cylinders. DTC No. Trouble diagnosis name DTC detecting condition P0300 0300 Multiple cylinder misfire detected Multiple cylinder misfire. P0301 0301 No.1 cylinder misfire detected No. 1 cylinder misfires. P0302 0302 No. 2 cylinder misfire detected No. 2 cylinder misfires. P0303 0303 No. 3 cylinder misfire detected No. 3 cylinder misfires. P0304 0304 No. 4 cylinder misfire detected No. 4 cylinder misfires. P0305 0305 No. 5 cylinder misfire detected No. 5 cylinder misfires. P0306 0306 No. 6 cylinder misfire detected No. 6 cylinder misfires. Possible cause + + + + + + + + + + + Improper spark plug Insufficient compression Incorrect fuel pressure The injector circuit is open or shorted Fuel injectors Intake air leak The ignition signal circuit is open or shorted Lack of fuel Drive plate or flywheel Heated oxygen sensor 1 Incorrect PCV hose connection DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed.

NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. EC-241 DTC P0300 - P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE TB48DE A/T (WITH EURO-OBD) DTC Confirmation Procedure (Cont’d) WITH CONSULT-II PBIB0164E 1. Turn ignition switch “ON”, and select “DATA MONITOR” mode with CONSULT-II. 2. Start engine and warm it up to normal operating temperature.

3. Turn ignition switch “OFF” and wait at least 10 seconds. 4. Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes. Hold the accelerator pedal as steady as possible. NOTE: Refer to the freeze frame data for the test driving conditions. 5. If 1st trip DTC is detected, go to EC-242, “Diagnostic Procedure”. WITH GST Follow the procedure “WITH CONSULT-II” above. Diagnostic Procedure 1 CHECK FOR INTAKE AIR LEAK AND PCV HOSE 1. Start engine and run it at idle speed. 2.

Listen for the sound of the intake air leak. 3. Check PCV hose connection. OK or NG OK c GO TO 2. NG c Repair or replace. 2 CHECK FOR EXHAUST SYSTEM CLOGGING Stop engine and visually check exhaust tube, three way catalyst and muffler for dents. OK or NG OK c GO TO 3. NG c Repair or replace. EC-242 DTC P0300 - P0306 MULTIPLE CYLINDER MISFIRE, NO.

1 - 6 CYLINDER MISFIRE TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure (Cont’d) 3 PERFORM POWER BALANCE TEST With CONSULT-II 1. Perform “POWER BALANCE” in “ACTIVE TEST” mode. PBIB0133E 2.

Is there any cylinder which does not produce a momentary engine speed drop? Without CONSULT-II When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop? SEC793C Yes or No Yes c GO TO 4. No c GO TO 7. 4 CHECK INJECTOR Does each injector make an operating sound at idle? MEC703B Yes or No Yes c GO TO 5. No c Check injector(s) and circuit(s). Refer to EC-453, “INJECTOR CIRCUIT”. EC-243 DTC P0300 - P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure (Cont’d) 5 1. 2. 3. 4. CHECK IGNITION SPARK Disconnect ignition coil assembly from rocker cover. Connect a known good spark plug to the ignition coil assembly. Place end of spark plug against a suitable ground and crank engine. Check for spark.

SEF575Q OK or NG OK c GO TO 6. NG c Check ignition coil, power transistor and their circuits. Refer to EC-428, “IGNITION SIGNAL”. 6 CHECK SPARK PLUGS Remove the spark plugs and check for fouling, etc.

SEF156I OK or NG OK c GO TO 7. NG c Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to MA section. 7 CHECK COMPRESSION PRESSURE Check compression pressure. Refer to EM section.

Standard: 1,226 kPa (12.26 bar, 12.5 kg/cm2, 178 psi)/200 rpm Minimum: 1,030 kPa (10.30 bar, 10.5 kg/cm2, 149 psi)/200 rpm Difference between each cylinder: 98 kPa (0.98 bar, 1.0 kg/cm2, 14 psi)/200 rpm OK or NG OK c GO TO 8. NG c Check pistons, piston rings, valves, valve seats and cylinder head gaskets. EC-244 DTC P0300 - P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure (Cont’d) 8 CHECK FUEL PRESSURE 1. Install all removed parts. 2. Release fuel pressure to zero. Refer to EC-34, “FUEL PRESSURE RELEASE”. 3. Install fuel pressure gauge and check fuel pressure.

Refer to EC-34, “FUEL PRESSURE CHECK”.

At idle: Approx. 245 kPa (2.45 bar, 2.5 kg/cm2, 36 psi) OK or NG OK c GO TO 9. NG c Follow the construction of “FUEL PRESSURE CHECK”. 9 CHECK IGNITION TIMING Check the following items. Refer to EC-66, “Basic Inspection”. MTBL1583 OK or NG OK c GO TO 10. NG c Follow the “Basic Inspection”. 10 CHECK HEATED OXYGEN SENSOR 1 Refer to EC-170, “Component Inspection”. OK or NG OK c GO TO 12. NG c GO TO 11.

11 CHECK MASS AIR FLOW SENSOR With CONSULT-II Check mass air flow sensor signal in “DATA MONITOR” mode with CONSULT-II. 3.0 - 9.0 gzm/sec: at idling 10.0 - 25.0 gzm/sec: at 2,500 rpm With GST Check mass air flow sensor signal in MODE 1 with GST.

3.0 - 9.0 gzm/sec: at idling 10.0 - 25.0 gzm/sec: at 2,500 rpm OK or NG OK c GO TO 12. NG c Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-140, “DTC P0102, P0103 MAF SENSOR”. 12 CHECK SYMPTOM MATRIX CHART Check items on the rough idle symptom in EC-71, “Symptom Matrix Chart”. OK or NG OK c GO TO 13. NG c Repair or replace. EC-245 DTC P0300 - P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure (Cont’d) 13 ERASE THE 1ST TRIP DTC Some tests may cause a 1st trip DTC to be set. Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-49, “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”. c GO TO 14. 14 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END EC-246 DTC P0327, P0328, P0332, TB48DE A/T (WITH EURO-OBD) P0333 KS Component Description The knock sensor is attached to the cylinder block.

It senses engine knocking using a piezoelectric element.

A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

SEF598K On Board Diagnosis Logic The MI will not light up for these self-diagnoses. DTC No. P0327 0327 (bank 1) P0332 0332 (bank 2) P0328 0328 (bank 1) P0333 0333 (bank 2) Trouble Diagnosis Name DTC Detecting Condition Knock sensor circuit low input An excessively low voltage from the sensor is sent to ECM. Knock sensor circuit high input An excessively high voltage from the sensor is sent to ECM. Possible Cause + Harness or connectors (The sensor circuit is open or shorted.) + Knock sensor DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10V at idle. WITH CONSULT-II 1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.

2. Start engine and run it for at least 5 seconds at idle speed. 3. If 1st trip DTC is detected, go to EC-249, “Diagnostic Procedure”.

SEF058Y WITH GST Follow the procedure “WITH CONSULT-II” above. EC-247 DTC P0327, P0328, P0332, TB48DE A/T (WITH EURO-OBD) P0333 KS Wiring Diagram TEC153M EC-248 DTC P0327, P0328, P0332, TB48DE A/T (WITH EURO-OBD) P0333 KS Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 125 W Knock sensor (bank 1) Approximately 2.5V Idle speed Engine is running. 126 W Knock sensor (bank 2) Approximately 2.5V Idle speed Diagnostic Procedure 1 CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-I 1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector. 3.

Check resistance between ECM terminal 125 (bank 1) or 126 (bank 2) and engine ground. Refer to Wiring Diagram. NOTE: It is necessary to use an ohmmeter which can measure more than 10 MΩ. Resistance: Approximately 530 - 590 kΩ [at 20°C (68°F)] 4.

Also check harness for short to ground and short to power. OK or NG OK c GO TO 4. NG c GO TO 2. 2 CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-II 1. Disconnect knock sensor harness connector. SEC889C 2. Check harness continuity between ECM terminal 125 (bank 1) or 126 (bank 2) and knock sensor terminal 1. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 3. NG c Repair open circuit or short to ground or short to power in harness or connectors. EC-249 DTC P0327, P0328, P0332, TB48DE A/T (WITH EURO-OBD) P0333 KS Diagnostic Procedure (Cont’d) 3 CHECK KNOCK SENSOR Refer to EC-250, “Component Inspection”. OK or NG OK c GO TO 5. NG c Replace knock sensor. 4 RETIGHTEN GROUND SCREWS Loosen and retighten engine ground screws. SEC690C c GO TO 5. 5 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END Component Inspection KNOCK SENSOR Check resistance between knock sensor terminal 1 and ground. NOTE: It is necessary to use an ohmmeter which can measure more than 10 MΩ. Resistance: Approximately 530 - 590 kΩ [at 20°C (68°F)] SEF478Y CAUTION: Do not use any knock sensors that have been dropped or physically damaged. Use only new ones. EC-250 DTC P0335 CKP SENSOR TB48DE A/T (WITH EURO-OBD) (OBD) Component Description SEF804Z The crankshaft position sensor (OBD) is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet, core and coil.

When the engine is running, the high and low parts of the teeth cause the gap with the sensor change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes. The ECM receives the voltage signal and detects the fluctuation of the engine revolution. This sensor is not used to control the engine system. It is used only for the on board diagnosis. CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM ENG SPEED CONDITION SPECIFICATION + Tachometer: Connect Almost the same speed as the + Run engine and compare CONSULT-II value with the tachometer indica- tachometer indication. tion. On Board Diagnosis Logic DTC No. P0335 0335 Trouble diagnosis name Crankshaft position sensor (OBD) circuit DTC detecting condition + The proper pulse signal from the crankshaft position sensor (OBD) is not sent to ECM while the engine is running at the specified engine speed. Possible cause + Harness or connectors (The sensor circuit is open or shorted.) + Crankshaft position sensor (OBD) DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON”. WITH CONSULT-II 1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II. 2. Start engine and run it for at least 15 seconds at idle speed. 3. If 1st trip DTC is detected, go to EC-254, “Diagnostic Procedure”. SEF058Y EC-251 DTC P0335 CKP SENSOR TB48DE A/T (WITH EURO-OBD) (OBD) DTC Confirmation Procedure (Cont’d) WITH GST Follow the procedure “WITH CONSULT-II” above. EC-252 DTC P0335 CKP SENSOR TB48DE A/T (WITH EURO-OBD) (OBD) Wiring Diagram TEC344M EC-253 DTC P0335 CKP SENSOR TB48DE A/T (WITH EURO-OBD) (OBD) Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.

89 WIRE COLOR B ITEM CONDITION Crankshaft position sensor (OBD) ground DATA (DC Voltage) Engine is running.

Approximately 0V Idle speed Approximately 1 - 2V★ Engine is running. Warm-up condition. Idle speed 111 W SEC748D Crankshaft position sensor (OBD) Approximately 3 - 4V★ Engine is running. Engine speed is 2,000 rpm SEC749D ★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.) Diagnostic Procedure 1 RETIGHTEN GROUND SCREWS 1. Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws.

SEC690C c GO TO 2. EC-254 DTC P0335 CKP SENSOR TB48DE A/T (WITH EURO-OBD) (OBD) Diagnostic Procedure (Cont’d) 2 CHECK CKP SENSOR (OBD) POWER SUPPLY CIRCUIT 1. Disconnect crankshaft position (CKP) sensor (OBD) harness connector and ECM harness connector. SEC732D 2. Check harness continuity between CKP sensor (OBD) terminal 1 and ECM terminal 111. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 4. NG c GO TO 3. 3 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E201, E70 + Harness connectors E127, M21 + Harness connectors M51, F6 + Harness for open or short between crankshaft position sensor (OBD) and ECM c Repair open circuit or short to ground or short to power in harness or connectors. 4 CHECK CKP SENSOR (OBD) GROUND CIRCUIT FOR OPEN AND SHORT 1. Reconnect ECM harness connector. 2. Check harness continuity between CKP sensor (OBD) terminal 2 and ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for and short to ground and short to power. OK or NG OK c GO TO 6. NG c GO TO 5. 5 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E202, E69 + Harness connectors E127, M21 + Harness connectors M51, F6 + Harness for open or short between crankshaft position sensor (OBD) and ECM c Repair open circuit or short to ground or short to power in harness or connectors. EC-255 DTC P0335 CKP SENSOR TB48DE A/T (WITH EURO-OBD) (OBD) Diagnostic Procedure (Cont’d) 6 CHECK SHIELD CIRCUIT 1.

Disconnect harness connectors E201, E70. 2. Check harness continuity between harness connector E70 terminal 10 and ground. Continuity should exist. 3. Also check harness for short to ground and short to power. 4. Then reconnect harness connectors.

OK or NG OK c GO TO 8. NG c GO TO 7. 7 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + Harness connectors M51, F6 + Joint connector-7 + Harness for open or short between harness connector E70 and ground c Repair open circuit or short to power in harness or connectors. 8 CHECK CRANKSHAFT POSITION SENSOR (OBD) Refer to EC-256, “Component Inspection”. OK or NG OK c GO TO 9. NG c Replace crankshaft position sensor (OBD). 9 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END Component Inspection CRANKSHAFT POSITION SENSOR (OBD) 1. Loosen the fixing bolt of the sensor. 2. Disconnect crankshaft position sensor (OBD) harness connector. 3. Remove the sensor. 4. Visually check the sensor for chipping. SEF960N 5. Check resistance as shown in the figure. Resistance: Approximately 512 - 632Ω [at 20°C (68°F)] 6. If NG, replace crankshaft position sensor (OBD). SEF231W EC-256 DTC P0340 CAMSHAFT POSITION TB48DE A/T (WITH EURO-OBD) (CMP) SENSOR Component Description SEC695C The camshaft position sensor (CMPS) is a basic component of the ECM. It monitors engine speed and piston position. It sends signals to the ECM to control fuel injection, ignition timing and other functions.

The camshaft position sensor has a rotor plate and a waveforming circuit. The rotor plate has 360 slits for 1° signal and 6 slits for 120° signal. Light Emitting Diodes (LED) and photo diodes are built into the wave-forming circuit. When the rotor plate passes between the LED and the photo diode, the following happens: Slits in the rotor plate continually cut the transmitted light to the photo diode from the LED. This generates rough-shaped pulses converted into on-off pulses by the wave forming circuit sent to the ECM. SEF614B ECM Terminals and Reference Value Specification data are reference values, and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals such as the body ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC voltage) 1.0 - 4.0V*1 Engine is running. (Warmed-up condition) Idle speed 63 B/W SEC750D Camshaft position sensor (POS

signal) 1.0 - 4.0V*1 Engine is running. (Warmed-up condition) Engine speed is 2,000 rpm. SEC751D EC-257 TERMINAL NO. DTC P0340 CAMSHAFT POSITION TB48DE A/T (WITH EURO-OBD) (CMP) SENSOR ECM Terminals and Reference Value (Cont'd) WIRE COLOR ITEM DATA (DC voltage) CONDITION Approximately 0.3 0.6V*1 Engine is running. (Warmed-up condition) Idle speed 83 84 L SEC746D Camshaft position sensor (REF signal) Approximately 0.3 0.6V*1 Engine is running. (Warmed-up condition) Engine speed is 2,000 rpm. SEC747D *1: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.) On Board Diagnosis Logic Diagnostic Trouble Code No. P0340 0340 Malfunction is detected when ....

A) Either 1° or 120° signal is not sent to ECM for the first few seconds during engine cranking. .... B) Either 1° or 120° signal is not sent to ECM during engine running. .... Check Items (Possible Cause) + Harness or connectors (The camshaft position sensor circuit is open or shorted.) + Camshaft position sensor + Starter motor (Refer to EL section.) + Starting system circuit (Refer to EL section.) + Dead (Weak) battery C) Either 1° or 120° signal is not in the normal pattern during engine running.

DTC Confirmation Procedure Perform "Procedure for malfunction A" first. If DTC cannot be confirmed, perform "Procedure for malfunction B and C". NOTE: If "DTC CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle. EC-258 DTC P0340 CAMSHAFT POSITION TB48DE A/T (WITH EURO-OBD) (CMP) SENSOR DTC Confirmation Procedure (Cont'd) PROCEDURE FOR MALFUNCTION A With CONSULT-II 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II. 2) Crank engine at least 2 seconds. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.) 3) If DTC is detected, go to "Diagnostic Procedure", EC-261. Without CONSULT-II SEF013Y 1) Crank engine for at least 2 seconds. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)

2) Turn ignition switch "OFF", wait at least 10 seconds and then turn "ON". 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

4) If DTC is detected, go to "Diagnostic Procedure", EC-261. PROCEDURE FOR MALFUNCTION B AND C With CONSULT-II 1) 2) 3) 4) Turn ignition switch "ON". Select "DATA MONITOR" mode with CONSULT-II.

Start engine and run it for at least 2 seconds at idle speed.

If DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-261. Without CONSULT-II 1) Start engine and run it for at least 2 seconds at idle speed. 2) Turn ignition switch "OFF", wait at least 10 seconds and then turn "ON". 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM. 4) If DTC is detected, go to "Diagnostic Procedure", EC-261. EC-259 DTC P0340 CAMSHAFT POSITION TB48DE A/T (WITH EURO-OBD) (CMP) SENSOR Wiring Diagram TEC145M EC-260 DTC P0340 CAMSHAFT POSITION TB48DE A/T (WITH EURO-OBD) (CMP) SENSOR Diagnostic Procedure INSPECTION START . No CHECK STARTING SYSTEM. Does the engine turn over? (Does the starter motor operate?) c Check starting system. (Refer to EL section.) Yes . SEC690C 1. Turn ignition switch "OFF".

2. Loosen and retighten engine ground screws. OK . SEC696C NG Check the following. CHECK POWER SUPPLY.

c + Harness connectors 1. Disconnect camshaft position sensor M52 , F7 harness connector. 2.

Turn ignition switch "ON". + Harness for open or 3. Check voltage between terminal V short between camshaft 3 and position sensor and ECM ground with CONSULT-II or tester.

Voltage: Battery voltage + Harness for open or short between camshaft OK position sensor and ECM relay If NG, repair harness or connectors. . CHECK GROUND CIRCUIT. 1. Turn ignition switch "OFF". 2. Check harness continuity between terminal V 4 and engine ground. Refer to Wiring Diagram. Continuity should exist.

If OK, check harness for short to power. NG c Repair open circuit, short to power in harness or connectors. OK . SEC697C CHECK INPUT SIGNAL CIRCUIT. 1. Disconnect ECM harness connector. 2. Check harness continuity between CMPS terminals V 1 ,V 2 and ECM terminals. CMPS terminal ECM terminal Continuity 120° signal (REF signal) 1 V 83 , V 84 V Yes 1° signal (POS signal) 2 V 63 V Yes Refer to Wiring Diagram. If OK, check harness for short to ground and short to power. . A V EC-261 OK NG c Repair open circuit, short to ground or short to power in harness or connectors. DTC P0340 CAMSHAFT POSITION TB48DE A/T (WITH EURO-OBD) (CMP) SENSOR Diagnostic Procedure (Cont'd) A V .

CHECK COMPONENT. (Camshaft position sensor). Refer to "COMPONENT INSPECTION", EC-262. NG c Replace camshaft position sensor. OK . CHECK INTERMITTENT INCIDENT. Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112.

. INSPECTION END Component Inspection CAMSHAFT POSITION SENSOR 1. Start engine and warm it up to the normal operating temperature. 2.

Check voltage between the following ECM terminals and ground with DC range. SEC827C ECM terminal Reference illustration 1° signal (POS signal) 63 V A V 120° signal (REF signal) 83 , V 84 V B V CAUTION: Do not use ECM ground terminals when measuring voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals such as the body ground. EC-262 DTC P0340 CAMSHAFT POSITION TB48DE A/T (WITH EURO-OBD) (CMP) SENSOR Component Inspection (Cont'd) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC voltage) 1.0 - 4.0V*1 Engine is running. (Warmed-up condition) Idle speed 63 B/W SEC750D Camshaft position sensor (POS signal) 1.0 - 4.0V*1 Engine is running. (Warmed-up condition) Engine speed is 2,000 rpm. SEC751D Approximately 0.3 0.6V*1 Engine is running. (Warmed-up condition) Idle speed 83 84 L SEC746D Camshaft position sensor (REF signal) Approximately 0.3 0.6V*1 Engine is running. (Warmed-up condition) Engine speed is 2,000 rpm. SEC747D *1: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.) If NG, replace camshaft position sensor. EC-263 DTC P0420, P0430 THREE WAY CATALYST TB48DE A/T (WITH EURO-OBD) FUNCTION On Board Diagnosis Logic The ECM monitors the switching frequency ratio of heated oxygen sensors 1 and 2. A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase. When the frequency ratio of heated oxygen sensors 1 and 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed. SEF484YF DTC No. P0420 0420 (Bank 1) Trouble diagnosis name DTC detecting condition Catalyst system efficiency + Three way catalyst (manifold) does not below threshold operate properly. + Three way catalyst (manifold) does not have enough oxygen storage capacity. P0430 0430 (Bank 2) Possible cause + + + + + + + Three way catalyst (manifold) Exhaust tube Intake air leaks Fuel injectors Fuel injector leaks Spark plug Improper ignition timing DTC Confirmation Procedure NOTE: If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test. WITH CONSULT-II TESTING CONDITION: + Open engine hood before conducting the following procedure. + Do not hold engine speed for more than the specified minutes below.

1. Start engine and warm it up to the normal operating temperature.

2.

Turn ignition switch "OFF" and wait at least 10 seconds. 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load. 4. Let engine idle for one minute.

5. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-II. 6. Rev engine up to 2,500 to 3,500 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely. If "INCMP" of "CATALYST" changed to "COMPLT", go to step 9 7. Wait 5 seconds at idle. PBIB0566E EC-264 DTC P0420, P0430 THREE WAY CATALYST TB48DE A/T (WITH EURO-OBD) FUNCTION DTC Confirmation Procedure (Cont'd) 8.

Rev engine up to 2,000 to 3,000 rpm and maintain it "INCMP" of "CATALYST" changes to "CMPLT" (It will approximately 5 minutes).

If not "CMPLT", stop engine and cool it down to less 70°C (158°F) and then retest from step 1.

a. Turn ignition switch "OFF" and leave the vehicle in a place (soak the vehicle). until take than cool PBIB0567E b. Turn ignition switch "ON" and select "COOLANTEMP/S" in "DATA MONITOR" mode with CONSULT-II. c. Start engine and warm it up while monitoring "COOLANTEMP/S" indication on CONSULT-II.

d. When "COOLANTEMP/S" indication reaches to 70°C (158°F), go to step 3.

SEF013Y 9. Select "SELF-DIAG RESULTS" mode with CONSULT-II. 10. Confirm that the 1st trip DTC is not detected. If the 1st trip DTC is detected, go to EC-266, "Diagnostic Procedure". SEF535Z Overall Function Check Use this procedure to check the overall function of the three way catalyst (Manifold). During this check, a DTC might not be confirmed. CAUTION: Always drive vehicle at a safe speed. WITH GST 1. Start engine and warm it up to the normal operating temperature. 2. Turn ignition switch "OFF" and wait at least 10 seconds. 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load. 4. Let engine idle for one minute. EC-265 DTC P0420, P0430 THREE WAY CATALYST TB48DE A/T (WITH EURO-OBD) FUNCTION Overall Function Check (Cont'd) 5. Set voltmeters probes between ECM terminals 115 [HO2S1 (B 1) signal], 114 [HO2S1 (B 2) signal] and engine ground, and ECM terminals 124 [HO2S2 (B 1) signal], 123 [HO2S2 (B 2) signal] and engine ground. 6. Keep engine speed at 2,000 rpm constant under no load. SEC184DA SEC672D 7. Make sure that the voltage switching frequency (high & low) between ECM terminals 124 and engine ground, or 123 and engine ground is very less than that of ECM terminals 115 and engine ground, or 114 and engine ground. Switching frequency ratio = A/B A: Heated oxygen sensor 2 voltage switching frequency B: Heated oxygen sensor 1 voltage switching frequency This ratio should be less than 0.75. If the ratio is greater than above, it means three way catalyst does not operate properly. Go to EC-266, "Diagnostic Procedure". NOTE: If the voltage at terminal 35 or 36 does not switch periodically more than 5 times within 10 seconds at step 7, perform trouble diagnosis for "DTC P0133, P0153" first. (See EC-172.) Diagnostic Procedure 1 CHECK EXHAUST SYSTEM Visually check exhaust tubes and muffler for dent. OK or NG OK c GO TO 2. NG c Repair or replace. 2 CHECK EXHAUST GAS LEAK 1. Start engine and run it at idle. 2. Listen for an exhaust gas leak before the three way catalyst (manifold). SEC502D OK or NG OK c GO TO 3. NG c Repair or replace. EC-266 DTC P0420, P0430 THREE WAY CATALYST TB48DE A/T (WITH EURO-OBD) FUNCTION Diagnostic Procedure (Cont'd) 3 CHECK INTAKE AIR LEAK Listen for an intake air leak after the mass air flow sensor. OK or NG OK c GO TO 4. NG c Repair or replace. 4 CHECK IGNITION TIMING Check the following items. Refer to EC-66, "Basic Inspection". MTBL1584 OK or NG OK c GO TO 5. NG c Follow the EC-66, "Basic Inspection". 5 CHECK INJECTORS 1. Stop engine and then turn ignition switch "ON". 2. Check voltage between ECM terminals 5, 6, 7, 13, 14, 15 and ground with CONSULT-II or tester. SEC743D Battery voltage should exist. 3. Refer to Wiring Diagram for Injectors, EC-454. OK or NG OK c GO TO 6. NG c Perform EC-455, "Diagnostic Procedure".

EC-267 DTC P0420, P0430 THREE WAY CATALYST TB48DE A/T (WITH EURO-OBD) FUNCTION Diagnostic Procedure (Cont'd) 6 1. 2. 3.

4.

5. CHECK IGNITION SPARK Turn ignition switch "OFF". Disconnect ignition coil assembly from rocker cover. Connect a known good spark plug to the ignition coil assembly. Place end of spark plug against a suitable ground and crank engine. Check for spark. SEF575Q OK or NG OK c GO TO 7. NG c Check ignition coil with power transistor and their circuit. Refer to EC-428, "IGNITION SIGNAL". 7 CHECK INJECTOR 1. Turn ignition switch "OFF". 2. Remove injector assembly. Refer to EM section. Keep fuel hose and all injectors connected to injector gallery. 3. Disconnect all ignition coil harness connectors. 4. Turn ignition switch "ON".

Make sure fuel does not drip from injector.

OK or NG OK (Does not drip.) c GO TO 8.

NG (Drips.) c Replace the injector(s) from which fuel is dripping. 8 CHECK INTERMITTENT INCIDENT Refer to EC-112, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT". Trouble is fixed. c INSPECTION END Trouble is not fixed. c Replace three way catalyst (Manifold). EC-268 DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID TB48DE A/T (WITH EURO-OBD) VALVE Description SYSTEM DESCRIPTION Sensor Input Signal to ECM Camshaft position sensor Engine speed Mass air flow sensor Amount of intake air Engine coolant temperature sensor Engine coolant temperature Ignition switch Start signal Throttle position sensor Throttle position Accelerator pedal position sensor Closed throttle position Heated oxygen sensors 1 Density of oxygen in exhaust gas (Mixture ratio feedback signal) Vehicle speed sensor Vehicle speed ECM Function Actuator EVAP canister purge flow control EVAP canister purge volume control solenoid valve *: This signal is sent to the ECM through CAN communication line. This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes. COMPONENT DESCRIPTION The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister.

The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve. SEF337U CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM PURG VOL C/V CONDITION + + + + Engine: After warming up Shift lever: N Air conditioner switch: OFF No-load SPECIFICATION Idle 0% 2,000 rpm 65 - 85% On Board Diagnosis Logic DTC No. P0444 0444 P0445 0445 Trouble diagnosis name EVAP canister purge volume control solenoid valve circuit open EVAP canister purge volume control solenoid valve circuit shorted DTC detecting condition An excessively low voltage signal is sent to ECM through the valve An excessively high voltage signal is sent to ECM through the valve EC-269 Possible cause + Harness or connectors (The solenoid valve circuit is open or shorted.) + EVAP canister purge volume control solenoid valve + Harness or connectors (The solenoid valve circuit is shorted.) + EVAP canister purge volume control solenoid valve DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID TB48DE A/T (WITH EURO-OBD) VALVE DTC Confirmation Procedure NOTE: If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test. TESTING CONDITION: Before performing the following procedure, confirm battery voltage is more than 11V at idle. WITH CONSULT-II 1. 2. 3. 4. Turn ignition switch "ON". Select "DATA MONITOR" mode with CONSULT-II. Start engine and let it idle for at least 30 seconds.

If 1st trip DTC is detected, go to EC-273, "Diagnostic Procedure".

SEF058Y WITH GST Follow the procedure "WITH CONSULT-II" above. EC-270 DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID TB48DE A/T (WITH EURO-OBD) VALVE Wiring Diagram TEC418M EC-271 DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID TB48DE A/T (WITH EURO-OBD) VALVE Wiring Diagram (Cont'd) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage.

Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) BATTERY VOLTAGE (11 - 14V) Engine is running. Idle speed 54 W/B EVAP canister purge volume control solenoid valve PBIB0050E Approximately 10V★ Engine is running. Engine speed is about 2,000 rpm (More than 100 seconds after starting engine) PBIB0520E ★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.) EC-272 DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID TB48DE A/T (WITH EURO-OBD) VALVE Diagnostic Procedure 1 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT 1. Turn ignition switch "OFF". 2. Disconnect EVAP canister purge volume control solenoid valve harness connector. SEC785C 3. Turn ignition switch "ON".

4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester. SEC815C Voltage: Battery voltage OK or NG OK c GO TO 3. NG c GO TO 2. 2 DETECT MALFUNCTIONING PART Check the following. + 10A fuse + Fuse block (J/B) connector M2 + Harness connectors M52, F7 + Harness for open or short between EVAP canister purge volume control solenoid valve and fuse c Repair open circuit or short to ground or short to power in harness or connectors. EC-273 DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID TB48DE A/T (WITH EURO-OBD) VALVE Diagnostic Procedure (Cont'd) 3 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 54 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.

OK or NG OK (With CONSULT-II) c GO TO 4. OK (Without CONSULT-II) c GO TO 5. NG c Repair open circuit or short to ground or short to power in harness or connectors. 4 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION With CONSULT-II 1. Reconnect all harness connectors disconnected. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening. PBIB0147E OK or NG OK c GO TO 6. NG c GO TO 5. 5 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE Refer to EC-275, "Component Inspection". OK or NG OK c GO TO 6. NG c Replace EVAP canister purge volume control solenoid valve. 6 CHECK INTERMITTENT INCIDENT Refer to EC-112, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT". c INSPECTION END EC-274 DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID TB48DE A/T (WITH EURO-OBD) VALVE Component Inspection EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE With CONSULT-II Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions. Condition (PURG VOL CONT/V value) PBIB0149E Air passage continuity between A and B 100.0% Yes 0.0% No Without CONSULT-II Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions. Condition Air passage continuity between A and B 12V direct current supply between terminals 1 and 2 Yes No supply No PBIB0150E EC-275 DTC P0500 VSS TB48DE A/T (WITH EURO-OBD) Description NOTE: If DTC P0500 is displayed with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to EC-121, "DTC U1000 CAN COMMUNICATION LINE". The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the combination meter. The combination meter then sends a signal to the ECM through CAN communication line. On Board Diagnosis Logic DTC No. P0500 0500 Trouble diagnosis name Vehicle speed sensor DTC detecting condition The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven. Possible cause + Harness or connectors (The CAN communication line is open or shorted.) + Harness or connectors (The vehicle speed signal circuit is open or shorted.) + Combination meter + Vehicle speed signal DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed. NOTE: If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test. TESTING CONDITION: Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle. WITH CONSULT-II 1. Start engine. 2. Read "VHCL SPEED SE" in "DATA MONITOR" mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position. If NG, go to EC-277, "Diagnostic Procedure". If OK, go to following step. 3. Select "DATA MONITOR" mode with CONSULT-II. 4. Warm engine up to normal operating temperature. 5. Maintain the following conditions for at least 60 consecutive seconds. SEF196Y ENG SPEED More than 1,350 rpm COOLAN TEMP/S More than 70°C (158°F) B/FUEL SCHDL More than 6.5 msec Selector lever Suitable position PW/ST SIGNAL OFF 6. If 1st trip DTC is detected, go to EC-277, "Diagnostic Procedure". EC-276 DTC P0500 VSS TB48DE A/T (WITH EURO-OBD) Overall Function Check Use this procedure to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed. WITH GST 1. Lift up drive wheels. 2.

Start engine. 3. Read vehicle speed signal in "MODE 1" with GST.

The vehicle speed signal on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position. 4. If NG, go to EC-277, "Diagnostic Procedure". Diagnostic Procedure 1 CHECK VEHICLE SPEED SENSOR CIRCUIT Refer to EL section. OK or NG OK c GO TO 2.

NG c Repair or replace. 2 CHECK COMBINATION METER Check combination meter function.

Refer to EL section.

c INSPECTION END EC-277 DTC P0550 PSP SENSOR TB48DE A/T (WITH EURO-OBD) Component Description Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load. This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load. SEC735D CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values.

MONITOR ITEM PW/ST SIGNAL CONDITION + Engine: After warming up, idle the engine SPECIFICATION Steering wheel is in neutral position. (Forward direction) OFF Steering wheel is turned. ON On Board Diagnosis Logic The MI will not light up for this diagnosis.

DTC No. P0550 0550 Trouble diagnosis name Power steering pressure sensor circuit DTC detecting condition An excessively low or high voltage from the sensor is sent to ECM. Possible cause + Harness or connectors (The sensor circuit is open or shorted.) + Power steering pressure sensor DTC Confirmation Procedure NOTE: If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test. WITH CONSULT-II 1.

2.

3. 4. Turn ignition switch "ON". Select "DATA MONITOR" mode with CONSULT-II. Start engine and let it idle for at least 5 seconds. If 1st trip DTC is detected, go to EC-280, "Diagnostic Procedure". WITH GST Follow the procedure "WITH CONSULT-II" above. EC-278 DTC P0550 PSP SENSOR TB48DE A/T (WITH EURO-OBD) Wiring Diagram TEC342M EC-279 DTC P0550 PSP TB48DE A/T (WITH EURO-OBD) SENSOR Wiring Diagram (Cont'd) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. 89 WIRE COLOR B 103 Y ITEM CONDITION Sensor ground (Power steering pressure sensor) Sensor power supply (Power steering pressure sensor) DATA (DC Voltage) Engine is running. Approximately 0V Idle speed Ignition switch "ON" Approximately 5V Engine is running. 0.5 - 4.0V 118 BR/W Power steering pressure sensor Steering wheel is being turned. Engine is running. 0.4 - 0.8V Steering wheel is not being turned. Diagnostic Procedure 1 RETIGHTEN GROUND SCREWS 1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screws. SEC690C c GO TO 2. EC-280 DTC P0550 PSP TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure (Cont'd) 2 CHECK PSP SENSOR POWER SUPPLY CIRCUIT 1. Disconnect PSP sensor harness connector. SEC735D 2. Turn ignition switch "ON".

3. Check voltage between PSP sensor terminal 1 and ground with CONSULT-II or tester. PBIB0085E Voltage: Approximately 5V OK or NG OK c GO TO 3. NG c Repair open circuit or short to ground or short to power in harness or connectors. 3 CHECK PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3.

Check harness continuity between PSP sensor terminal 3 and ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 4. NG c Repair open circuit or short to ground or short to power in harness or connectors. 4 CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Check harness continuity between ECM terminal 118 and PSP sensor terminal 2. Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c Repair open circuit or short to ground or short to power in harness or connectors. EC-281 DTC P0550 PSP TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure (Cont'd) 5 CHECK PSP SENSOR Refer to EC-282, "Component Inspection". OK or NG OK c GO TO 6. NG c Replace PSP sensor. 6 CHECK INTERMITTENT INCIDENT Refer to EC-112, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT". c INSPECTION END Component Inspection POWER STEERING PRESSURE SENSOR 1. Reconnect all harness connectors disconnected. 2. Start engine and let it idle. 3. Check voltage between ECM terminal 118 and ground under the following conditions. Condition SEC736D Voltage Steering wheel is being turned fully. 0.5 - 4.0V Steering wheel is not being turned. 0.4 - 0.8V EC-282 DTC P0605 ECM TB48DE A/T (WITH EURO-OBD) Component Description The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine. SEF093X On Board Diagnosis Logic This self-diagnosis has one or two trip detection logic. DTC No. P0605 0605 Trouble diagnosis name Engine control module DTC detecting condition A) ECM calculation function is malfunctioning. B) ECM EEP-ROM system is malfunctioning.

C) ECM self shut-off function is malfunctioning. Possible cause + ECM FAIL-SAFE MODE ECM enters fail-safe mode when malfunction A is detected. Detected items Malfunction A Engine operation condition in fail-safe mode ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. DTC Confirmation Procedure Perform "PROCEDURE FOR MALFUNCTION A" first. If the DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B". If there is no malfunction on "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE FOR MALFUNCTION C". NOTE: If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test. PROCEDURE FOR MALFUNCTION A With CONSULT-II 1. Turn ignition switch "ON". 2. Select "DATA MONITOR" mode with CONSULT-II. 3. If 1st DTC is detected, go to EC-285, "Diagnostic Procedure".

SEF058Y With GST Follow the procedure "With CONSULT-II" above. EC-283 TB48DE A/T (WITH EURO-OBD) DTC P0605 ECM DTC Confirmation Procedure (Cont'd) PROCEDURE FOR MALFUNCTION B With CONSULT-II 1. Turn ignition switch "ON" and wait at least 1 second. 2. Select "DATA MONITOR" mode with CONSULT-II. 3. Turn ignition switch "OFF", wait at least 10 seconds, and then turn "ON". 4. If 1st trip DTC is detected, go to EC-285, "Diagnostic Procedure". SEF058Y With GST Follow the procedure "With CONSULT-II" above. PROCEDURE FOR MALFUNCTION C With CONSULT-II 1. Turn ignition switch "ON" and wait at least 1 second. 2. Select "DATA MONITOR" mode with CONSULT-II. 3. Turn ignition switch "OFF", wait at least 10 seconds, and then turn "ON". 4. Repeat step 3 for 32 times.

5.

If 1st trip DTC is detected, go to EC-285, "Diagnostic Procedure". SEF058Y With GST Follow the procedure "With CONSULT-II" above. EC-284 DTC P0605 ECM TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure 1 INSPECTION START With CONSULT-II Turn ignition switch "ON". Select "SELF DIAG RESULTS" mode with CONSULT-II.

Touch "ERASE". Perform "DTC Confirmation Procedure". See EC-283. 5. Is the 1st trip DTC P0605 displayed again? 1. 2. 3. 4. With GST Turn ignition switch "ON". Select MODE 4 with GST. Touch "ERASE". Perform "DTC Confirmation Procedure". See EC-283. 5. Is the 1st trip DTC P0605 displayed again? 1. 2. 3. 4. Yes or No Yes c GO TO 2. No c INSPECTION END 2 REPLACE ECM 1. Replace ECM. 2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EC-50, "NATS (Nissan Anti-theft System)". 3. Perform EC-31, "Accelerator Pedal Released Position Learning". 4. Perform EC-31, "Throttle Valve Closed Position Learning". 5. Perform EC-31, "Idle Air Volume Learning". c INSPECTION END EC-285 DTC P0650 MI TB48DE A/T (WITH EURO-OBD) Component Description Malfunction Indicator (MI) is located on the instrument panel. When the ignition switch is turned ON without engine running, MI will light up. This is a bulb check. When the engine is started, MI should go off. If MI remains on, the on board diagnostic system has detected an engine system malfunction. On Board Diagnosis Logic The MI will not light up for this self-diagnosis.

DTC No. P0650 0650 Trouble diagnosis name Malfunction indicator (MI) control circuit DTC detecting condition Possible cause + Harness or connectors + An excessively high voltage is sent to (MI circuit is open or shorted.) ECM through the MI circuit under the + MI condition that calls for MI light up. + An excessively low voltage is sent to ECM through the MI circuit under the condition that calls for MI not to light up. FAIL-SAFE MODE ECM enters fail-safe mode when both DTC P0650 and another DTC, which calls for MI to light up, are detected at the same time. Detected items MI circuit Engine operating condition in fail-safe mode Engine speed will not rise more than 2,500 rpm due to the fuel cut. DTC Confirmation Procedure NOTE: If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test. WITH CONSULT-II 1. 2. 3.

4. Turn ignition switch "ON" and wait at least 1 second. Select "DATA MONITOR" mode with CONSULT-II. Start engine and let it idle for 1 second. If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-288. SEF058Y WITH GST Follow the procedure "WITH CONSULT-II" above. EC-286 DTC P0650 MI TB48DE A/T (WITH EURO-OBD) Wiring Diagram TEC422M EC-287 TB48DE A/T (WITH EURO-OBD) DTC P0650 MI Wiring Diagram (Cont'd) Specification data are reference values and are measured between each terminal and body ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. 35 WIRE COLOR Y/G ITEM CONDITION MI DATA (DC Voltage) Ignition switch "ON" 0 - 1.0V Engine is running. BATTERY VOLTAGE (11 - 14V) Idle speed Diagnostic Procedure 1 1. 2. 3. 4. CHECK MIL POWER SUPPLY CIRCUIT Turn ignition switch "OFF". Disconnect combination meter harness connector. Turn ignition switch "ON". Check voltage between combination meter terminal 46 and ground with CONSULT-II or tester. SEC737D Voltage: Battery voltage OK or NG OK c GO TO 3. NG c GO TO 2. 2 DETECT MALFUNCTIONING PART Check the following.

+ Fuse block (J/B) connector M3 + 10A fuse + Harness for open or short between fuse block (J/B) and combination meter c Repair harness or connectors. 3 CHECK MIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 35 and combination meter terminal 3. Refer to Wiring Diagram.

Continuity should exist. 4.

Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c GO TO 4. EC-288 TB48DE A/T (WITH EURO-OBD) DTC P0650 MI Diagnostic Procedure (Cont'd) 4 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M52, F7 + Harness for open or short between ECM and combination meter c Repair open circuit or short to ground or short to power in harness or connectors. 5 CHECK COMBINATION METER Check continuity between combination meter terminals 46 and 3 under the following conditions. SEC777D MTBL1599 OK or NG OK c GO TO 6. NG c Replace combination meter. 6 CHECK INTERMITTENT INCIDENT Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-112. OK or NG OK c Replace combination meter. Refer to EL section. NG c Repair or replace. EC-289 DTC P1065 ECM POWER TB48DE A/T (WITH EURO-OBD) SUPPLY Component Description Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc. SEF093X On Board Diagnosis Logic DTC No. P1065 1065 Trouble diagnosis name DTC detecting condition ECM power supply circuit ECM back up RAM system does not function properly. Possible cause + Harness or connectors [ECM power supply (back-up) circuit is open or shorted.] + ECM DTC Confirmation Procedure NOTE: If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test. WITH CONSULT-II 1. 2. 3. 4. Turn ignition switch "ON" and wait at least 1 second. Select "DATA MONITOR" mode with CONSULT-II. Start engine and let it idle for 1 second. Turn ignition switch "OFF", wait at least 10 seconds, and then turn "ON". 5. Repeat steps 3 and 4 four times.

6. If 1st trip DTC is detected, go to EC-292, "Diagnostic Procedure".

SEF058Y WITH GST Follow the procedure "WITH CONSULT-II" above. EC-290 DTC P1065 ECM POWER TB48DE A/T (WITH EURO-OBD) SUPPLY Wiring Diagram TEC244M EC-291 DTC P1065 ECM POWER TB48DE A/T (WITH EURO-OBD) SUPPLY Wiring Diagram (Cont'd) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. 95 WIRE COLOR W ITEM CONDITION Power supply for ECM (Buck-up) Ignition switch "ON" DATA (DC Voltage) BATTERY VOLTAGE (11 - 14V) Diagnostic Procedure 1 CHECK ECM POWER SUPPLY 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check voltage between ECM terminal 95 and ground with CONSULT-II or tester.

PBIB0087E Voltage: Battery voltage OK or NG OK c GO TO 3. NG c GO TO 2. 2 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + Harness connectors M52, F7 + 10A fuse + Harness for open or short between ECM and battery c Repair open circuit or short to ground or short to power in harness or connectors. 3 CHECK INTERMITTENT INCIDENT Refer to EC-112, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT". OK or NG OK c GO TO 4. NG c Repair open circuit or short to ground or short to power in harness or connectors. EC-292 DTC P1065 ECM POWER TB48DE A/T (WITH EURO-OBD) SUPPLY Diagnostic Procedure (Cont'd) 4 PERFORM DTC CONFIRMATION PROCEDURE With CONSULT-II Turn ignition switch "ON". Select "SELF DIAG RESULTS" mode with CONSULT-II.

Touch "ERASE".

Perform "DTC Confirmation Procedure". See EC-290. 5. Is the 1st trip DTC P1065 displayed again? 1. 2. 3. 4. With GST Turn ignition switch "ON". Select MODE 4 with GST.

Touch "ERASE". Perform "DTC Confirmation Procedure".

See EC-290. 5. Is the 1st trip DTC P1065 displayed again? 1. 2. 3. 4. Yes or No Yes c GO TO 5. No c INSPECTION END 5 REPLACE ECM 1. Replace ECM. 2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EC-50, "NATS (Nissan Anti-theft System)". 3. Perform EC-31, "Accelerator Pedal Released Position Learning". 4. Perform EC-31, "Throttle Valve Closed Position Learning". 5. Perform EC-31, "Idle Air Volume Learning". c INSPECTION END EC-293 DTC P1111 IVT CONTROL SOLENOID TB48DE A/T (WITH EURO-OBD) VALVE Description SYSTEM DESCRIPTION Sensor Input Signal to ECM Camshaft position sensor Engine speed Engine coolant temperature sensor Engine coolant temperature Vehicle speed sensor Vehicle speed The intake valve timing control system is utilized to control intake valve opening and closing timing. Engine coolant temperature signals, engine speed, amount of intake air, vehicle speed and throttle position are used to determine intake valve timing. The intake camshaft sprocket position is regulated by oil pressure controlled by the intake valve timing control. ECM Function Intake valve timing control Actuator Intake valve timing control solenoid valve When ECM sends ON signal to intake valve timing control solenoid valve, oil pressure is transmitted to camshaft sprocket. Then, intake side camshaft is advanced. SEC776D Operation Engine operating condition Intake valve timing control solenoid valve Intake valve opening and closing time Valve overlap Engine valve timing + Engine coolant temperature is between 70°C (158°F) to 119°C (246°F) and engine speed is between 1,000 rpm and 4,200 rpm. + During high load condition + Vehicle speed is more than 8 km/h (5 MPH). ON Advance Increased II V Those other than above OFF Normal Normal VI EC-294 DTC P1111 IVT CONTROL SOLENOID TB48DE A/T (WITH EURO-OBD) VALVE CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM CONDITION SPECIFICATION + Engine: Idle INT/V SOL-B1 + + + + OFF Engine: After warning up Engine speed is between 1,000 rpm and 4,200 rpm Vehicle speed is more than 8 km/h (5 MPH). During high load condition ON On Board Diagnosis Logic DTC No. P1111 1111 Trouble diagnosis name Intake valve timing control solenoid valve circuit DTC detecting condition An improper voltage is sent to the ECM through intake valve timing control solenoid valve. Possible cause + Harness or connectors (Solenoid valve circuit is open or shorted.) + Intake valve timing control solenoid valve DTC Confirmation Procedure NOTE: If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test. WITH CONSULT-II 1. 2. 3. 4. Turn ignition switch "ON". Select "DATA MONITOR" mode with CONSULT-II. Start engine and let it idle for 5 seconds. If 1st trip DTC is detected, go to EC-297, "Diagnostic Procedure". SEF058Y WITH GST Following the procedure "WITH CONSULT-II" above. EC-295 DTC P1111 IVT CONTROL SOLENOID TB48DE A/T (WITH EURO-OBD) VALVE Wiring Diagram TEC419M EC-296 DTC P1111 IVT CONTROL SOLENOID TB48DE A/T (WITH EURO-OBD) VALVE Wiring Diagram (Cont'd) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 152 R Intake valve timing control solenoid valve Intake valve timing control solenoid is operating. Approximately 0V Engine is running.

Intake valve timing control solenoid is not operating. BATTERY VOLTAGE (11 - 14V) ★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.) Diagnostic Procedure 1 CHECK IVT CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT 1. Turn ignition switch "OFF". 2. Disconnect intake valve timing control solenoid valve harness connector. SEC793C 3. Turn ignition switch "ON". 4. Check voltage between intake valve timing control solenoid valve terminal 2 and ground with CONSULT-II or tester. SEC794C Voltage: Battery voltage OK or NG OK c GO TO 3. NG c GO TO 2. EC-297 DTC P1111 IVT CONTROL SOLENOID TB48DE A/T (WITH EURO-OBD) VALVE Diagnostic Procedure (Cont'd) 2 DETECT MALFUNCTION PART Check the following. + Harness connectors M52, F7 + 10A fuse + Fuse block (J/B) connector M2 + Harness for open or short between intake valve timing control solenoid valve and fuse c Repair open circuit or short to ground or short to power in harness or connectors. 3 CHECK IVT CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF".

2.

Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 152 and intake valve timing control solenoid valve terminal 1. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 4. NG c Repair open circuit or short to ground or short to power in harness or connectors. 4 CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE Refer to EC-298, "Component Inspection". OK or NG OK c GO TO 5. NG c Replace intake valve timing control solenoid valve. 5 CHECK INTERMITTENT INCIDENT Refer to EC-112, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT. c INSPECTION END Component Inspection INTAKE VALVE TIMING CONTROL SOLENOID VALVE 1. Check oil passage visually for any metal debris. 2. Supply intake valve timing control solenoid valve terminals with battery voltage. 3. Make sure that inside plunger protrudes. If NG, replace intake valve timing control solenoid valve. SEC795C EC-298 DTC P1121 ELECTRIC THROTTLE CONTROL TB48DE A/T (WITH EURO-OBD) ACTUATOR Component Description Electric Throttle Control Actuator consists of throttle control motor, throttle position sensor, etc. The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition. On Board Diagnosis Logic DTC No. P1121 1121 Trouble diagnosis name Electric throttle control actuator DTC detecting condition A) Electric throttle control actuator does not function properly due to the return spring malfunction. B) Throttle valve opening angle in fail-safe mode is not in specified range. C) ECM detect the throttle valve is stuck open. This self-diagnosis has the one trip detection logic. Possible cause + Electric throttle control actuator FAIL-SAFE MODE When the malfunction A or B is detected in the two consecutive trips, the ECM enters fail-safe mode and the MI lights up. When the malfunction C is detected even in the 1st trip, the ECM enters fail-safe mode and the MI lights up. Detected items Engine operating condition in fail-safe mode Malfunction A The ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.

Malfunction B ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less. Malfunction C While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in "N" or "P" position, and engine speed will not exceed 1,000 rpm or more. DTC Confirmation Procedure NOTE: + Perform "PROCEDURE FOR MALFUNCTION A AND B" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION C". If there is no malfunction on "PROCEDURE FOR MALFUNCTION A AND B", perform "PROCEDURE FOR MALFUNCTION C". + If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test. PROCEDURE FOR MALFUNCTION A AND B With CONSULT-II SEF058Y 1. Turn ignition witch "ON" and wait at least 1 second. 2. Select "DATA MONITOR" mode with CONSULT-II. 3. Shift selector lever to "D" position and wait at least 2 seconds. 4. Turn ignition switch "OFF", wait at least 10 seconds, and then turn "ON". 5. If 1st trip DTC is detected, go to EC-300, "Diagnostic Procedure". EC-299 DTC P1121 ELECTRIC THROTTLE CONTROL TB48DE A/T (WITH EURO-OBD) ACTUATOR DTC Confirmation Procedure (Cont'd) With GST Follow the procedure "With CONSULT-II" above. PROCEDURE FOR MALFUNCTION C With CONSULT-II 1. Turn ignition switch "ON" and wait at least 1 second. 2.

Select "DATA MONITOR" mode with CONSULT-II. 3. Shift selector lever to "D" position and wait at least 2 seconds. 4. Shift selector lever to "N" or "P" position. 5. Start engine and let it idle for 3 seconds. 6. If DTC is detected, go to EC-300, "Diagnostic Procedure". SEF058Y With GST Follow the procedure "With CONSULT-II" above. Diagnostic Procedure 1 CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY 1. Remove the intake air duct. 2.

Perform 31, "Accelerator Pedal Released Position Learning". 3. Check if a foreign matter is caught between the throttle valve and the housing. SEC183D OK or NG OK c GO TO 2. NG c Remove the foreign matter and clean the electric throttle control actuator inside.

2 REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. 2.

3.

4.

Replace the electric throttle control actuator. Perform EC-31, "Accelerator Pedal Released Position Learning". Perform EC-31, "Throttle Valve Closed Position Learning". Perform EC-31, "Idle Air Volume Learning". c INSPECTION END EC-300 DTC P1122 ELECTRIC THROTTLE CONTROL TB48DE A/T (WITH EURO-OBD) FUNCTION Description NOTE: If DTC P1122 is displayed with DTC P1121 or 1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-299 or EC-309. Electric Throttle Control Actuator consists of throttle control motor, throttle position sensor, etc. The throttle control motor is operated by the ECM and it opens and closes the throttle valve.

The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition. On Board Diagnosis Logic This self-diagnosis has the one trip detection logic. DTC No. P1122 1122 Trouble diagnosis name Electric throttle control performance problem DTC detecting condition Electric throttle control function does not operate properly. Possible cause + Harness or connectors (Throttle control motor circuit is open or shorted.) + Harness or connectors (Throttle control motor relay circuit is open or shorted.) + Electric throttle control actuator + Throttle control motor relay FAIL-SAFE MODE When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up. Engine operating condition in fail-safe mode ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. DTC Confirmation Procedure NOTE: If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II SEF058Y 1. 2. 3. 4. Turn ignition switch "ON" and wait at least 2 seconds. Select "DATA MONITOR" mode with CONSULT-II. Start engine and let it idle for 5 seconds. If DTC is detected, go to EC-303, "Diagnostic Procedure". WITH GST Follow the procedure "WITH CONSULT-II" above. EC-301 DTC P1122 ELECTRIC THROTTLE CONTROL TB48DE A/T (WITH EURO-OBD) FUNCTION Wiring Diagram TEC404M EC-302 DTC P1122 ELECTRIC THROTTLE CONTROL TB48DE A/T (WITH EURO-OBD) FUNCTION Wiring Diagram (Cont'd) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. 26 WIRE COLOR P/L ITEM CONDITION Throttle control motor relay DATA (DC Voltage) Ignition switch "OFF" BATTERY VOLTAGE (11 - 14V) Ignition switch "ON" 0 - 1.0V 0 - 14V★ Ignition switch "ON" 151 L/W Throttle control motor (Open) Engine stopped Shift lever position is "D" Accelerator pedal is depressed PBIB0534E 153 B Throttle control motor ground Engine is running. Approximately 0V 0 - 14V★ Ignition switch "ON" 154 L/B Throttle control motor (Close) Engine stopped Shift lever position is "D" Accelerator pedal is released PBIB0533E 157 G Throttle control motor power supply Ignition switch "ON" BATTERY VOLTAGE (11 - 14V) ★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.) Diagnostic Procedure 1 RETIGHTEN GROUND SCREWS 1. Turn ignition switch "OFF".

2. Loosen and retighten engine ground screws. SEC690C c GO TO 2. EC-303 DTC P1122 ELECTRIC THROTTLE CONTROL TB48DE A/T (WITH EURO-OBD) FUNCTION Diagnostic Procedure (Cont'd) 2 CHECK THROTTLE CONTROL MOTOR GROUND CIRCUIT FOR OPEN AND SHORT 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 153 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power. OK or NG OK c GO TO 3. NG c Repair open circuit or short to power in harness or connectors. 3 CHECK THROTTLE CONTROL MOTOR RELAY SIGNAL CIRCUIT 1. Reconnect harness connectors disconnected.

2.

Check voltage between ECM terminal 157 and ground under the following conditions with CONSULT-II or tester. SEC740D MTBL1585 OK or NG OK c GO TO 11. NG c GO TO 4.

EC-304 DTC P1122 ELECTRIC THROTTLE CONTROL TB48DE A/T (WITH EURO-OBD) FUNCTION Diagnostic Procedure (Cont'd) 4 CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT 1. Turn ignition switch "OFF".

2. Disconnect throttle control motor relay. SEC185D 3. Check voltage between throttle control motor relay terminals 2, 3 and ground. PBIB0097E Voltage: Battery voltage OK or NG OK c GO TO 6. NG c GO TO 5. 5 DETECT MALFUNCTIONING PART Check the following.

+ 15A fuse + Harness for open or short between throttle control motor relay and fuse c Repair open circuit or short to ground or short to power in harness or connectors. 6 CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 157 and throttle control motor relay terminal 5. Refer to Wiring Diagram. Continuity should exist.

3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 8. NG c GO TO 7. EC-305 DTC P1122 ELECTRIC THROTTLE CONTROL TB48DE A/T (WITH EURO-OBD) FUNCTION Diagnostic Procedure (Cont'd) 7 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + Harness connectors M55, F35 + Harness for open or short between ECM and throttle control motor relay c Repair open circuit or short to ground or short to power in harness or connectors. 8 CHECK THROTTLE CONTROL MOTOR RELAY OUTPUT SIGNAL CIRCUIT 1. Check continuity between ECM terminal 26 and throttle control motor relay terminal 1. Refer to Wiring Diagram. Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 10. NG c GO TO 9. 9 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + Harness connectors M55, F35 + Harness for open or short between ECM and throttle control motor relay c Repair open circuit or short to ground or short to power in harness or connectors. 10 CHECK THROTTLE CONTROL MOTOR RELAY Refer to EC-308, "Component Inspection". OK or NG OK c GO TO 14. NG c Replace throttle control motor relay.

EC-306 DTC P1122 ELECTRIC THROTTLE CONTROL TB48DE A/T (WITH EURO-OBD) FUNCTION Diagnostic Procedure (Cont'd) 11 CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT 1. Turn ignition switch "OFF". 2. Disconnect electric throttle control actuator harness connector. SEC182D 3. Disconnect ECM harness connector.

4. Check harness continuity between the following terminals.

Refer to Wiring Diagram. MTBL1586 5. Also check harness for short to ground and short to power. OK or NG OK c GO TO 12. NG c Repair open circuit or short to ground or short to power in harness or connectors. 12 CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY 1. Remove the intake air duct. 2. Check if foreign matter is caught between the throttle valve and the housing. SEC183D OK or NG OK c GO TO 13. NG c Remove the foreign matter and clean the electric throttle control actuator inside. EC-307 DTC P1122 ELECTRIC THROTTLE CONTROL TB48DE A/T (WITH EURO-OBD) FUNCTION Diagnostic Procedure (Cont'd) 13 CHECK THROTTLE CONTROL MOTOR Refer to

EC-308, “Component Inspection”. OK or NG OK c GO TO 14. NG c GO TO 15. 14 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT. OK or NG OK c GO TO 15. NG c Repair or replace harness or connectors. 15 REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. 2. 3. 4. Replace the electric throttle control actuator. Perform EC-31, “Accelerator Pedal Released Position Learning”. Perform EC-31, “Throttle Valve Closed Position Learning”. Perform EC-31, “Idle Air Volume Learning”. c INSPECTION END Component Inspection THROTTLE CONTROL MOTOR RELAY 1. Apply 12V direct current between relay terminals 1 and 2. 2. Check continuity between relay terminals 3 and 5. Conditions PBIB0098E Continuity 12V direct current supply between terminals 1 and 2 Yes No current supply No 3. If NG, replace throttle control motor relay. THROTTLE CONTROL MOTOR PBIB0095E 1.
Disconnect electric throttle control actuator harness connector. 2. Check resistance between terminals 3 and 6. Resistance: Approximately 1 - 15 Ω [at 25°C (77°F)] 3. If NG, replace electric throttle control actuator and go to next step. 4. Perform EC-31, “Accelerator Pedal Released Position Learning”. 5. Perform EC-31, “Throttle Valve Closed Position Learning”. 6. Perform EC-31, “Idle Air Volume Learning”.
EC-308 DTC P1124, P1126 THROTTLE CONTROL MOTOR TB48DE A/T (WITH EURO-OBD) RELAY Component Description Power supply for the Throttle Control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM. CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM THRTL RELAY CONDITION SPECIFICATION + Ignition switch: ON ON On Board Diagnosis Logic These self-diagnoses have the one trip detection logic.
DTC No. Trouble diagnosis name DTC detecting condition Possible cause P1124 1124 Throttle control motor relay circuit short ECM detect the throttle control motor relay + Harness or connectors is stuck ON. (Throttle control motor relay circuit is shorted.) + Throttle control motor relay P1126 1126 Throttle control motor relay circuit open ECM detects a voltage of power source for throttle control motor is excessively low. + Harness or connectors (Throttle control motor relay circuit is open.) + Throttle control motor relay FAIL-SAFE MODE When the malfunction is detected, ECM enters fail-safe mode and the MI lights up. Engine operating condition in fail-safe mode ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. PROCEDURE FOR DTC P1124 TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10V at idle. EC-309 DTC P1124, P1126 THROTTLE CONTROL MOTOR TB48DE A/T (WITH EURO-OBD) RELAY DTC Confirmation Procedure (Cont’d) With CONSULT-II 1.
Turn ignition switch “ON” and wait at least 1 second. 2. Select “DATA MONITOR” mode with CONSULT-II. 3. If DTC is detected, go to EC-312, “Diagnostic Procedure”. SEF058Y With GST Follow the procedure “With CONSULT-II” above. PROCEDURE FOR DTC P1126 With CONSULT-II 1. 2. 3.
4. Turn ignition switch “ON” and wait at least 2 seconds. Select “DATA MONITOR” mode with CONSULT-II. Start engine and let it idle for 5 seconds. If DTC is detected, go to EC-312, “Diagnostic Procedure”. SEF058Y With GST Follow the procedure “With CONSULT-II” above. EC-310 DTC P1124, P1126 THROTTLE CONTROL MOTOR TB48DE A/T (WITH EURO-OBD) RELAY Wiring Diagram TEC405M EC-311 DTC P1124, P1126 THROTTLE CONTROL MOTOR TB48DE A/T (WITH EURO-OBD) RELAY Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. 26 WIRE COLOR P/L 157 G ITEM CONDITION Throttle control motor relay Throttle control motor power supply DATA (DC Voltage) Ignition switch “OFF” BATTERY VOLTAGE (11 - 14V) Ignition switch “ON” 0 - 1.0V Ignition switch “ON” BATTERY VOLTAGE (11 - 14V) Diagnostic Procedure 1 CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT 1. Turn ignition switch “OFF”. 2. Disconnect throttle control motor relay.
SEC185D 3. Check voltage between throttle control motor relay terminals 2, 3 and ground. PBIB0097E Voltage: Battery voltage OK or NG OK c GO TO 3.
NG c GO TO 2. 2 DETECT MALFUNCTIONING PART Check the following. + 15A fuse + Harness for open or short between throttle control motor relay and fuse c Repair open circuit or short to ground or short to power in harness or connectors. EC-312 DTC P1124, P1126 THROTTLE CONTROL MOTOR TB48DE A/T (WITH EURO-OBD) RELAY Diagnostic Procedure (Cont’d) 3 CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 157 and throttle control motor relay terminal 5. Refer to Wiring Diagram. Continuity should exist.
3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c GO TO 4. 4 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + Harness connectors M51, F35 + Harness for open or short between ECM and throttle control motor relay c Repair open circuit or short to ground or short to power in harness or connectors. 5 CHECK THROTTLE CONTROL MOTOR RELAY OUTPUT SIGNAL CIRCUIT 1. Check continuity between ECM terminal 26 and throttle control motor relay terminal 1. Refer to Wiring Diagram. Continuity should exist. 2.
Also check harness for short to ground and short to power. OK or NG OK c GO TO 7. NG c GO TO 6. 6 DETECT MALFUNCTIONING PART Check the following.
+ Harness connectors E127, M21 + Harness connectors M55, F35 + Harness for open or short between ECM and throttle control motor relay c Repair open circuit or short to ground or short to power in harness or connectors. 7 CHECK THROTTLE CONTROL MOTOR RELAY Refer to EC-314, “Component Inspection”. OK or NG OK c GO TO 8. NG c Replace throttle control motor relay. 8 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END EC-313 DTC P1124, P1126 THROTTLE CONTROL MOTOR TB48DE A/T (WITH EURO-OBD) RELAY Component Inspection THROTTLE CONTROL MOTOR RELAY 1. Apply 12V direct current between relay terminals 1 and 2. 2. Check continuity between relay terminals 3 and 5. Conditions PBIB0098E Continuity 12V direct current supply between terminals 1 and 2 Yes No current supply No 3. If NG, replace throttle control motor relay. EC-314 DTC P1128 THROTTLE CONTROL TB48DE A/T (WITH EURO-OBD) MOTOR Component Description The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition. On Board Diagnosis Logic This self-diagnosis has the one trip detection logic. DTC No. P1128 1128 Trouble diagnosis name Throttle control motor circuit short DTC detecting condition ECM detects short both circuits between ECM and throttle control motor. Possible cause + Harness or connectors (Throttle control motor circuit is shorted.) + Electric throttle control actuator (Throttle control motor) FAIL-SAFE MODE When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up. Engine operating condition in fail-safe mode ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. WITH CONSULT-II 1. 2. 3.
4. Turn ignition switch “ON” and wait at least 2 seconds. Select “DATA MONITOR” mode with CONSULT-II. Start engine and let it idle for 5 seconds.
If DTC is detected, go to EC-317, “Diagnostic Procedure”. SEF058Y WITH GST Follow the procedure “WITH CONSULT-II” above. EC-315 DTC P1128 THROTTLE CONTROL TB48DE A/T (WITH EURO-OBD) MOTOR Wiring Diagram TEC406M EC-316 DTC P1128 THROTTLE CONTROL TB48DE A/T (WITH EURO-OBD) MOTOR Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage.
Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) 0 - 14V★ Ignition switch “ON” 151 L/W Throttle control motor (Open) Engine stopped Shift lever position is “D” Accelerator pedal is depressed PBIB0534E 0 - 14V★ Ignition switch “ON” 154 L/B Throttle control motor (Close) Engine stopped Shift lever position is “D” Accelerator pedal is released PBIB0533E ★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.) Diagnostic Procedure 1 RETIGHTEN GROUND SCREWS 1. Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws. SEC690C c GO TO 2. EC-317 DTC P1128 THROTTLE CONTROL TB48DE A/T (WITH EURO-OBD) MOTOR Diagnostic Procedure (Cont’d) 2 CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT 1. Turn ignition switch “OFF”. 2. Disconnect electric throttle control actuator harness connector.
SEC182D 3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram. MTBL1587 5. Also check harness for short to ground and short to power. OK or NG OK c GO TO 3. NG c Repair open circuit or short to ground or short to power in harness or connectors. 3 CHECK THROTTLE CONTROL MOTOR Refer to EC-319, “Component Inspection”. OK or NG OK c GO TO 4. NG c GO TO 5. 4 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. OK or NG OK c GO TO 5.
NG c Repair or replace harness or connectors. 5 REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. 2.
3. 4. Replace the electric throttle control actuator. Perform EC-31, “Accelerator Pedal Released Position Learning”. Perform EC-31, “Throttle Valve Closed Position Learning”. Perform EC-31, “Idle Air Volume Learning”. c INSPECTION END EC-318 DTC P1128 THROTTLE CONTROL TB48DE A/T (WITH EURO-OBD) MOTOR Component Inspection THROTTLE CONTROL MOTOR PBIB0095E 1. Disconnect electric throttle control actuator harness connector. 2. Check resistance between terminals 3 and 6. Resistance: Approximately 1 - 15Ω [at 25°C (77°F)] 3.
If NG, replace electric throttle control actuator and go to next step. 4. Perform EC-31, “Accelerator Pedal Released Position Learning”. 5. Perform EC-31, “Throttle Valve Closed Position Learning”. 6. Perform EC-31, “Idle Air Volume Learning”. EC-319 DTC P1143, P1163 HO2S1 TB48DE A/T (WITH EURO-OBD) Component Description The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio.
The ideal air-fuel ratio occurs near the radical change from 1V to 0V. SEF463R SEF288D CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM CONDITION SPECIFICATION HO2S1 (B1) HO2S1 (B2) + Engine: After warming up Maintaining engine speed at 2,000 rpm 0 - 0.3V ←→ Approx. 0.6 1.0V HO2S1 MNTR (B1) HO2S1 MNTR (B2) + Engine: After warming up Maintaining engine speed at 2,000 rpm LEAN ←→ RICH Changes more than 5 times during 10 seconds. On Board Diagnosis Logic To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high and whether the “lean” output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected. SEF300U DTC No. P1143 1143 (Bank 1) P1163 1163 (Bank 2) Trouble diagnosis name Heated oxygen sensor 1 lean shift monitoring DTC detecting condition Possible cause The maximum and minimum voltage from + Heated oxygen sensor 1 the sensor are not reached to the specified + Heated oxygen sensor 1 heater + Fuel pressure voltages. + Injectors + Intake air leaks EC-320 DTC P1143, P1163 HO2S1 TB48DE A/T (WITH EURO-OBD) DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed. NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. TESTING CONDITION: + Always perform at a temperature above −10°C (14°F).
+ Before performing following procedure, confirm that battery voltage is more than 11V at idle. WITH CONSULT-II PBIB0546E 1. Start engine and warm it up to normal operating temperature. 2. Stop engine and wait at least 10 seconds. 3. Turn ignition switch “ON” and select “HO2S1 (B1) P1143” of “HO2S1” or “HO2S1 (B2) P1163” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II. 4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes. NOTE: Never raise engine speed above 2,800 rpm after this step.
If the engine speed limit is exceeded, return to step 5. 6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.) PBIB0547E ENG SPEED 1,050 - 2,500 rpm Vehicle speed Less than 100 km/h (62 MPH) B/FUEL SCHDL 5 - 16.7 msec Selector lever Suitable position If “TESTING” is not displayed after 5 minutes, retry from step 2. 7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-322, “Diagnostic Procedure”. SEC769C EC-321 DTC P1143, P1163 HO2S1 TB48DE A/T (WITH EURO-OBD) Overall Function Check Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed. WITH GST 1. Start engine and warm it up to normal operating temperature. 2. Set voltmeter probes between ECM terminal 115 [HO2S1 (B1) signal] or 114 [HO2S1 (B2) signal] and engine ground. 3. Check one of the following with engine speed held at 2,000 rpm constant under no load. + The maximum voltage is over 0.6V at least one time. + The minimum voltage is over 0.1V at least one time. 4. If NG, go to EC-322, “Diagnostic Procedure”. SEC184DA Diagnostic Procedure 1 RETIGHTEN GROUND SCREWS 1.
Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws.
SEC690C c GO TO 2. EC-322 DTC P1143, P1163 TB48DE A/T (WITH EURO-OBD) HO2S1 Diagnostic Procedure (Cont’d) 2 RETIGHTEN HEATED OXYGEN SENSOR 1 Loosen and retighten corresponding heated oxygen sensor 1. SEC888C Tightening torque: 40 - 60 Nzm (4.1 - 6.2 kg-m, 30 - 44 ft-lb) c GO TO 3. EC-323 DTC P1143, P1163 TB48DE A/T (WITH EURO-OBD) HO2S1 Diagnostic Procedure (Cont’d) 3 CLEAR THE SELF-LEARNING DATA With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching “CLEAR”. SEF215Z 4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171 or P0174 detected? Is it difficult to start engine? Without CONSULT-II 1. 2.
3. 4. Start engine and warm it up to normal operating temperature. Turn ignition switch “OFF”. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. Stop engine and reconnect mass air flow sensor harness connector. 5. 6. 7. 8. Make sure that DTC P0102 is displayed. Erase the DTC memory. Refer to EC-49, “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”.
Make sure that DTC P0000 is displayed. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171 or P0174 detected? Is it difficult to start engine? Yes or No SEC688C Yes c Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-218. No c GO TO 4. 4 CHECK HEATED OXYGEN SENSOR 1 HEATER Refer to EC-131, “Component Inspection”. OK or NG OK c GO TO 5. NG c Replace malfunctioning heated oxygen sensor 1. EC-324 DTC P1143, P1163 TB48DE A/T (WITH EURO-OBD) HO2S1 Diagnostic Procedure (Cont’d) 5 CHECK HEATED OXYGEN SENSOR 1 Refer to EC-325, “Component Inspection”. OK or NG OK c GO TO 6. NG c Replace malfunctioning heated oxygen sensor 1. 6 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT. For circuit, refer to EC-165, “Wiring Diagram”. c INSPECTION END Component Inspection HEATED OXYGEN SENSOR 1 With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II. 3. Select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps. 5.
Touch “RECORD” on CONSULT-II screen. SEF646Y 6. Check the following.
+ “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” 5 times in 10 seconds. 5 times (cycles) are counted as shown at right. + “HO2S1 (B1)/(B2)” voltage goes above 0.6V at least once. + “HO2S1 (B1)/(B2)” voltage goes below 0.3V at least once.
+ “HO2S1 (B1)/(B2)” voltage never exceeds 1.0V. SEF647Y EC-325 DTC P1143, P1163 TB48DE A/T (WITH EURO-OBD) HO2S1 Component Inspection (Cont’d) SEF648Y CAUTION: + Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. + Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. Without CONSULT-II SEC184DA 1.
Start engine and warm it up to normal operating temperature. 2. Set voltmeter probes between ECM terminal 115 [HO2S1 (B1) signal] or 114 [HO2S1 (B2) signal] and engine ground. 3. Check the following with engine speed held at 2,000 rpm constant under no load. + The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. + The maximum voltage is over 0.6V at least one time. + The minimum voltage is below 0.3V at least one time. + The voltage never exceeds 1.0V.
1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V CAUTION: + Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. + Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.
EC-326 DTC P1144, P1164 HO2S1 TB48DE A/T (WITH EURO-OBD) Component Description The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM.
The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V. SEF463R SEF288D CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM CONDITION SPECIFICATION HO2S1 (B1) HO2S1 (B2) + Engine: After warming up Maintaining engine speed at 2,000 rpm 0 - 0.3V ←→ Approx. 0.6 1.0V HO2S1 MNTR (B1) HO2S1 MNTR (B2) + Engine: After warming up Maintaining engine speed at 2,000 rpm LEAN ←→ RICH Changes more than 5 times during 10 seconds. On Board Diagnosis Logic To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high.
The “lean” output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected. SEF299U DTC No. P1144 1144 (Bank 1) P1164 1164 (Bank 2) Trouble diagnosis name Heated oxygen sensor 1 rich shift monitoring DTC detecting condition Possible cause The maximum and minimum voltages from + Heated oxygen sensor 1 + Heated oxygen sensor 1 heater the sensor are beyond the specified volt+ Fuel pressure ages. + Injectors EC-327 DTC P1144, P1164 HO2S1 TB48DE A/T (WITH EURO-OBD) DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed. NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. TESTING CONDITION: + Always perform at a temperature above −10°C (14°F). + Before performing the following procedure, confirm that battery voltage is more than 11V at idle. WITH CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Stop engine and wait at least 5 seconds. 3. Turn ignition switch “ON” and select “HO2S1 (B1) P1144” or “HO2S1 (B2) P1164” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II. 4. Touch “START”. 5. Start engine and let it idle for at least 3 minutes. NOTE: Never raise engine speed above 2,800 rpm after this step. If the engine speed limit is exceeded, return to step 5. PBIB0548E 6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.) ENG SPEED PBIB0549E 1,500 - 2,500 rpm Vehicle speed Less than 100 km/h (62 MPH) B/FUEL SCHDL 5 - 16.7 msec Selector lever Suitable position If “TESTING” is not displayed after 5 minutes, retry from step 2. EC-328 DTC P1144, P1164 HO2S1 TB48DE A/T (WITH EURO-OBD) 7.
Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-329, “Diagnostic Procedure”. SEC772C Overall Function Check Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed. WITH GST 1. Start engine and warm it up to normal operating temperature. 2. Set voltmeter probes between ECM terminal 115 [HO2S1 (B1) signal] or 114 [HO2S1 (B2) signal] and engine ground. 3. Check one of the following with engine speed held at 2,000 rpm constant under no load. — The maximum voltage is below 0.8V at least one time. — The minimum voltage is below 0.32V at least one time. 4. If NG, go to EC-329, “Diagnostic Procedure”. SEC184DA Diagnostic Procedure 1 RETIGHTEN GROUND SCREWS 1. Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws. SEC690C c GO TO 2. EC-329 DTC P1144, P1164 TB48DE A/T (WITH EURO-OBD) HO2S1 Diagnostic Procedure (Cont’d) 2 RETIGHTEN HEATED OXYGEN SENSOR 1 Loosen and retighten heated oxygen sensor 1. SEC888C Tightening torque: 40 - 60 Nzm (4.1 - 6.2 kg-m, 30 - 44 ft-lb) c GO TO 3. EC-330 DTC P1144, P1164 TB48DE A/T (WITH EURO-OBD) HO2S1 Diagnostic Procedure (Cont’d) 3 CLEAR THE SELF-LEARNING DATA With CONSULT-II 1.
Start engine and warm it up to normal operating temperature. 2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching “CLEAR”. SEF215Z 4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine? Without CONSULT-II 1. 2. 3. 4. Start engine and warm it up to normal operating temperature. Turn ignition switch “OFF”.
Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
Stop engine and reconnect mass air flow sensor harness connector. 5. 6.
7. 8. Make sure that DTC P0102 is displayed. Erase the DTC memory.
Refer to EC-49, “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”. Make sure that DTC P0000 is displayed. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine? SEC688C Yes or No Yes c Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-227. No c GO TO 4. EC-331 DTC P1144, P1164 TB48DE A/T (WITH EURO-OBD) HO2S1 Diagnostic Procedure (Cont’d) 4 CHECK HO2S1 CONNECTOR FOR WATER 1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 1 harness connector. 3. Check connectors for water. SEC671D Water should not exist. OK or NG OK c GO TO 5. NG c Repair or replace harness or connectors. 5 CHECK HEATED OXYGEN SENSOR 1 HEATER Refer to EC-131, “Component Inspection”. OK or NG OK c GO TO 6. NG c Replace malfunctioning heated oxygen sensor 1. 6 CHECK HEATED OXYGEN SENSOR 1 Refer to EC-332, “Component Inspection”. OK or NG OK c GO TO 7. NG c Replace malfunctioning heated oxygen sensor 1. 7 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. For circuit, refer to EC-165, “Wiring Diagram”. c INSPECTION END Component Inspection HEATED OXYGEN SENSOR 1 With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II. 3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”. 4. Hold engine speed at 2,000 rpm under no load during the following steps. EC-332 DTC P1144, P1164 TB48DE A/T (WITH EURO-OBD) HO2S1 Component Inspection (Cont’d) 5. Touch “RECORD” on CONSULT-II screen. SEF646Y 6. Check the following. + “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” 5 times in 10 seconds. 5 times (cycles) are counted as shown at right.
+ “HO2S1 (B1)/(B2)” voltage goes above 0.6V at least once. + “HO2S1 (B1)/(B2)” voltage goes below 0.3V at least once. + “HO2S1 (B1)/(B2)” voltage never exceeds 1.0V.
SEF647Y SEF648Y CAUTION: + Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. + Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Set voltmeter probes between ECM terminal 115 [HO2S1 (B1) signal] or 114 [HO2S1 (B2) signal] and engine ground. 3. Check the following with engine speed held at 2,000 rpm constant under no load.
+ The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. + The maximum voltage is over 0.6V at least one time. + The minimum voltage is below 0.3V at least one time. SEC184DA EC-333 DTC P1144, P1164 TB48DE A/T (WITH EURO-OBD) HO2S1 Component Inspection (Cont’d) + The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V CAUTION: + Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. + Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. EC-334 DTC P1146, P1166 HO2S2 TB48DE A/T (WITH EURO-OBD) Component Description SEF327R The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2. This sensor is made of ceramic zirconia.
The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. Under normal conditions the heated oxygen sensor 2 is not used for engine control operation. CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM CONDITION SPECIFICATION HO2S2 (B1) HO2S2 (B2) + Engine: After warming up Revving engine from idle to 3,000 + Keeping the engine speed rpm quickly. between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load 0 - 0.3V ←→ Approx. 0.6 1.0V HO2S2 MNTR (B1) HO2S2 MNTR (B2) + Engine: After warming up Revving engine from idle to 3,000 + Keeping the engine speed rpm quickly. between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load LEAN ←→ RICH On Board Diagnosis Logic The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut. SEF972Z DTC No. P1146 1146 (Bank 1) Trouble diagnosis name DTC detecting condition Heated oxygen sensor 2 The minimum voltage from the sensor is minimum voltage monitor- not reached to the specified voltage. ing P1166 1166 (Bank 2) EC-335 Possible cause + Harness or connectors (The sensor circuit is open or shorted.) + Heated oxygen sensor 2 + Fuel pressure + Injectors DTC P1146, P1166 HO2S2 TB48DE A/T (WITH EURO-OBD) DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed. NOTE: + “COMPLETED” will appear on CONSULT-II screen when all tests “COND1”, “COND2” and “COND3” are completed.
+ If “DTC confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. TESTING CONDITION: Never stop engine during this procedure. If the engine is stopped, retry procedure from step 2 in “Procedure for COND1” WITH CONSULT-II Procedure for COND1 For the best results, perform “DTC WORK SUPPORT” at a temperature of 0 to 30°C (32 to 86°F).
1. Start engine and warm it up to the normal operating temperature. 2. Turn ignition switch “OFF” and wait at least 10 seconds. 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load. 4. Let engine idle for one minute. 5. Select “HO2S2 (B1) P1146” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II. 6. Touch START”.
7. Let engine idle for at least 30 seconds. 8. Rev engine up to 2,000 rpm 2 or 3 times quickly under no load. If “COMPLETED” appears on CONSULT-II screen, go to step 2 in Procedure for COND3”. If “COMPLETED” does not appear on CONSULT-II screen, go to the following step. 9. When the following conditions are met, “TESTING” will be displayed at “COND1” on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 60 seconds.) ENG SPEED More than 1,000 rpm B/FUEL SCHDL More than 1.0 msec COOLANT TEMP/S 70 - 100°C Selector lever Suitable position PBIB0555E NOTE: + If “TESTING” is not displayed after 5 minutes, retry from step 2 in “Procedure for COND1”. + If “COMPLETED” already appears at “COND2” on CONSULT-II screen before “Procedure for COND2” is conducted, it is unnecessary to conduct step 1 in “Procedure for COND2”. EC-336 DTC P1146, P1166 TB48DE A/T (WITH EURO-OBD) HO2S2 DTC Confirmation Procedure (Cont’d) Procedure for COND2 1.
While driving, release accelerator pedal completed with “OD” OFF from the above condition [step 9] until “INCOMPLETE” at “COND2” on CONSULT-II screen has turned to “COMPLETED” (It will take approximately 4 seconds.) NOTE: If “COMPLETE” already appears at “COND3” on CONSULT-II screen before “Procedure for COND3” is conducted, it is unnecessary to conduct step 1 in “Procedure for COND3”. PBIB0556E Procedure for COND3 SEC775C 1. Stop vehicle and let it idle until “INCOMPLETE” of “COND3” on CONSULT-II screen has turned to COMPLETED”. (It will take a maximum of approximately 6 minutes.) 2. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-342, “Diagnostic Procedure”. If “CAN NOT BE DIAGNOSED” is displayed, perform the following. a.
Turn ignition switch “OFF” and leave the vehicle in a cool place (soak the vehicle). b. Turn ignition switch “ON” and select “COOLANTEMP/S” in “DATA MONITOR” mode with CONSULT-II c. Start engine and warm it up while monitoring “COOLANTEMP/S” indication on CONSULT-II. d. When “COOLANTEMP/S” indication reaches to 70°C (158°F), go to “Procedure for COND 1” step 3. Overall Function Check Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed. WITH GST 1. Start engine and warm it up to the normal operating temperature. 2. Turn ignition switch “OFF” and wait at least 10 seconds. 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load. 4. Let engine idle for one minute. 5. Set voltmeter probes between ECM terminal 124 [HO2S2 (B1) signal] or 123 [HO2S2 (B2) signal] and engine ground. 6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times. (Depress and release accelerator pedal as soon as possible.) The voltage should be below 0.48V at least once during this procedure. If the voltage can be confirmed in step 6, step 7 is not necessary. SEC774D EC-337 DTC P1146, P1166 TB48DE A/T (WITH EURO-OBD) HO2S2 Overall Function Check (Cont’d) 7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF. The voltage should be below 0.48V at least once during this procedure. 8. If NG, go to EC-342, “Diagnostic Procedure”. EC-338 DTC P1146, P1166 HO2S2 TB48DE A/T (WITH EURO-OBD) Wiring Diagram BANK 1 TEC411M EC-339 DTC P1146, P1166 TB48DE A/T (WITH EURO-OBD) HO2S2 Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 124 W Heated oxygen sensor 2 (bank 1) Warm-up condition. Revving engine from idle to 3,000 rpm quickly after the following conditions are met. Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load EC-340 0 - Approximately 1.0V DTC P1146, P1166 TB48DE A/T (WITH EURO-OBD) HO2S2 Wiring Diagram (Cont’d) BANK 2 TEC336M EC-341 DTC P1146, P1166 TB48DE A/T (WITH EURO-OBD) HO2S2 Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 123 W Heated oxygen sensor 2 (bank 2) Warm-up condition. Revving engine from idle to 3,000 rpm quickly after the following conditions are met.
Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load 0 - Approximately 1.0V Diagnostic Procedure 1 RETIGHTEN GROUND SCREWS 1. Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws. SEC690C c GO TO 2. EC-342 DTC P1146, P1166 TB48DE A/T (WITH EURO-OBD) HO2S2 Diagnostic Procedure (Cont’d) 2 CLEAR THE SELF-LEARNING DATA With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching “CLEAR”. SEF215Z 4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine? Without CONSULT-II 1. 2. 3. 4. Start engine and warm it up to normal operating temperature.
Turn ignition switch “OFF”. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. Stop engine and reconnect mass air flow sensor harness connector. 5. 6. 7. 8. Make sure that DTC P0102 is displayed. Erase the DTC memory. Refer to EC-49, “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”. Make sure that DTC P0000 is displayed. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine? SEC688C Yes or No Yes c Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-227. No c GO TO 3. EC-343 DTC P1146, P1166 TB48DE A/T (WITH EURO-OBD) HO2S2 Diagnostic Procedure (Cont’d) 3 CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2.
Disconnect heated oxygen sensor 2 harness connector. SEC669D 3. Disconnect ECM harness connector. 4.
Check harness continuity between HO2S2 terminal 4 and ground. Refer to Wiring Diagram. Continuity should exist. 5. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c GO TO 4. 4 DETECT MALFUNCTIONING PART Check the following. + Joint connector-7 + Harness for open or short between heated oxygen sensor 2 and ground c Repair open circuit or short to power in harness or connectors. EC-344 DTC P1146, P1166 TB48DE A/T (WITH EURO-OBD) HO2S2 Diagnostic Procedure (Cont’d) 5 CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram. MTBL1588 Continuity should exist. 2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram. MTBL1589 Continuity should not exist. 3.
Also check harness for short to power. OK or NG OK c GO TO 6. NG c Repair open circuit or short to ground or short to power in harness or connectors. 6 CHECK HEATED OXYGEN SENSOR 2 Refer to EC-345, “Component Inspection”.
OK or NG OK c GO TO 7. NG c Replace heated oxygen sensor 2. 7 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END Component Inspection HEATED OXYGEN SENSOR 2 With CONSULT-II 1. Start engine and warm it up to the normal operating temperature. 2. Turn ignition switch “OFF” and wait at least 10 seconds. 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load. 4. Let engine idle one minute. EC-345 DTC P1146, P1166 TB48DE A/T (WITH EURO-OBD) HO2S2 Component Inspection (Cont’d) 5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II. SEF662Y 6. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.
SEF972YA “HO2S2 (B1)/(B2)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%. “HO2S2 (B1)/(B2)” should be below 0.48V at least once when the “FUEL INJECTION” is −25%. CAUTION: + Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. + Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. Without CONSULT-II 1. Start engine and warm it up to the normal operating temperature. 2. Turn ignition switch “OFF” and wait at least 10 seconds. 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load. 4. Let engine idle for one minute. 5. Set voltmeter probes between ECM terminal 124 [HO2S2 (B1) signal] or 123 [HO2S2 (B2) signal] and engine ground. EC-346 DTC P1146, P1166 TB48DE A/T (WITH EURO-OBD) HO2S2 Component Inspection (Cont’d) SEC774D 6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times. (Depress and release accelerator pedal as soon as possible.) The voltage should be above 0.68V at least once during this procedure. If the voltage is above 0.68V at step 6, step 7 is not necessary. 7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF. The voltage should be below 0.48V at least once during this procedure. 8. If NG, replace heated oxygen sensor 2. CAUTION: + Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. + Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. EC-347 DTC P1147, P1167 HO2S2 TB48DE A/T (WITH EURO-OBD) Component Description SEF327R The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2. This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. Under normal conditions the heated oxygen sensor 2 is not used for engine control operation. CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM CONDITION SPECIFICATION HO2S2 (B1) HO2S2 (B2) + Engine: After warming up Revving engine from idle to 3,000 + Keeping the engine speed rpm quickly. between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load 0 - 0.3V ←→ Approx. 0.6 1.0V HO2S2 MNTR (B1) HO2S2 MNTR (B2) + Engine: After warming up Revving engine from idle to 3,000 + Keeping the engine speed rpm quickly. between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load LEAN ←→ RICH On Board Diagnosis Logic The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut. SEF259VA DTC No. P1147 1147 (Bank 1) Trouble diagnosis name Heated oxygen sensor 2 maximum voltage monitoring DTC detecting condition The maximum voltage from the sensor is not reached to the specified voltage. P1167 1167 (Bank 2) EC-348 Possible cause + Harness or connectors (The sensor circuit is open or shorted.) + Heated oxygen sensor 2 + Fuel pressure + Injectors + Intake air leaks DTC P1147, P1167 HO2S2 TB48DE A/T (WITH EURO-OBD) DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed. NOTE: + “COMPLETED” will appear on CONSULT-II screen when all tests “COND1”, “COND2” and “COND3” are completed. + If “DTC confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. TESTING CONDITION: Never stop engine during this procedure. If the engine is stopped, retry procedure from step 2 in “Procedure for COND1” WITH CONSULT-II Procedure for COND1 For the best results, perform “DTC WORK SUPPORT” at a temperature of 0 to 30°C (32 to 86°F). 1. Start engine and warm it up to the normal operating temperature. 2. Turn ignition switch “OFF” and wait at least 10 seconds. 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load. 4. Let engine idle for one minute. 5. Select “HO2S2 (B1) P1147” or “HO2S2 (B2) P1167” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II. 6. Touch “START”. 7. Let engine idle for at least 30 seconds.
8. Rev engine up to 2,000 rpm 2 or 3 times quickly under no load. If “COMPLETED” appears on CONSULT-II screen, go to step 2 in “Procedure for COND3”. If “COMPLETED” does not appear on CONSULT-II screen, go to the following step. 9. When the following conditions are met, “TESTING” will be displayed at “COND1” on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 60 seconds.) ENG SPEED More than 1,000 rpm B/FUEL SCHDL More than 1.0 msec COOLANT TEMP/S 70 - 100°C Selector lever Suitable position PBIB0557E NOTE: + If “TESTING” is not displayed after 5 minutes, retry from step 2 in Procedure for COND1”. + If “COMPLETED” already appears at “COND2” on CONSULT-II screen before “Procedure for COND2” is conducted, it is unnecessary to conduct step 1 in “Procedure for COND2”. EC-349 DTC P1147, P1167 TB48DE A/T (WITH EURO-OBD) HO2S2 DTC Confirmation Procedure (Cont’d) Procedure for COND2 1. While driving, release accelerator pedal completed with “OD” OFF from the above condition [step 9] until “INCOMPLETE” at “COND2” on CONSULT-II screen has turned to “COMPLETED” (It will take approximately 4 seconds.) NOTE: If “COMPLETE” already appears at “COND3” on CONSULT-II screen before “Procedure for COND3” is conducted, it is unnecessary to conduct step 1 in “Procedure for COND3”. PBIB0558E Procedure for COND3 SEC778C 1. Stop vehicle and let it idle until “INCOMPLETE” of “COND3” on CONSULT-II screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.) 2.
Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-355, “Diagnostic Procedure”. If “CAN NOT BE DIAGNOSED” is displayed, perform the following. a. Turn ignition switch “OFF” and leave the vehicle in a cool place (soak the vehicle). b. Turn ignition switch “ON” and select “COOLANTEMP/S” in “DATA MONITOR” mode with CONSULT-II c. Start engine and warm it up while monitoring “COOLANTEMP/S” indication on CONSULT-II. d. When “COOLANTEMP/S” indication reaches to 70°C (158°F), go to “Procedure for COND 1” step 3. Overall Function Check Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed. WITH GST 1. Start engine and warm it up to the normal operating temperature. 2. Turn ignition switch “OFF” and wait at least 10 seconds. 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load. 4. Let engine idle for one minute. 5. Set voltmeter probes between ECM terminal 124 [HO2S2 (B1) signal] or 123 [HO2S2 (B2) signal] and engine ground.
6.
Check the voltage when revving up to 4,000 rpm under no load at least 10 times. (Depress and release accelerator pedal as soon as possible.) The voltage should be above 0.68V at least once during this procedure. If the voltage can be confirmed in step 6, step 7 is not necessary. SEC774D EC-350 DTC P1147, P1167 TB48DE A/T (WITH EURO-OBD) HO2S2 Overall Function Check (Cont’d) 7. Keep vehicle idling for 10 minutes, then check the voltage.
Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF. The voltage should be above 0.68V at least once during this procedure. 8.
If NG, go to EC-355, “Diagnostic Procedure”. EC-351 DTC P1147, P1167 HO2S2 TB48DE A/T (WITH EURO-OBD) Wiring Diagram BANK 1 TEC411M EC-352 DTC P1147, P1167 TB48DE A/T (WITH EURO-OBD) HO2S2 Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.
TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 124 W Heated oxygen sensor 2 (bank 1) Warm-up condition. Revving engine from idle to 3,000 rpm quickly after the following conditions are met. Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load EC-353 0 - Approximately 1.0V DTC P1147, P1167 TB48DE A/T (WITH EURO-OBD) HO2S2 Wiring Diagram (Cont’d) BANK 2 TEC336M EC-354 DTC P1147, P1167 TB48DE A/T (WITH EURO-OBD) HO2S2 Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 123 W Heated oxygen sensor 2 (bank 2) Warm-up condition. Revving engine from idle to 3,000 rpm quickly after the following conditions are met. Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load 0 - Approximately 1.0V Diagnostic Procedure 1 RETIGHTEN GROUND SCREWS 1.
Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws. SEC690C c GO TO 2. EC-355 DTC P1147, P1167 TB48DE A/T (WITH EURO-OBD) HO2S2 Diagnostic Procedure (Cont’d) 2 CLEAR THE SELF-LEARNING DATA With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2.
Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching “CLEAR”.
SEF215Z 4. Run engine for at least 10 minutes at idle speed.
Is the 1st trip DTC P0171 or P0174 detected?
Is it difficult to start engine? Without CONSULT-II 1.
2. 3. 4. Start engine and warm it up to normal operating temperature. Turn ignition switch “OFF”. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. Stop engine and reconnect mass air flow sensor harness connector. 5. 6. 7. 8. Make sure that DTC P0102 is displayed. Erase the DTC memory. Refer to EC-49, “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”. Make sure that DTC P0000 is displayed. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171 or P0174 detected? Is it difficult to start engine? SEC688C Yes or No Yes c Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-218. No c GO TO 3. EC-356 DTC P1147, P1167 TB48DE A/T (WITH EURO-OBD) HO2S2 Diagnostic Procedure (Cont’d) 3 CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Disconnect heated oxygen sensor 2 harness connector. SEC669D 3. Disconnect ECM harness connector. 4. Check harness continuity between HO2S2 terminal 4 and ground. Refer to Wiring Diagram. Continuity should exist.
5. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c GO TO 4. 4 DETECT MALFUNCTIONING PART Check the following. + Joint connector-7 + Harness for open or short between heated oxygen sensor 2 and ground c Repair open circuit or short to power in harness or connectors. EC-357 DTC P1147, P1167 TB48DE A/T (WITH EURO-OBD) HO2S2 Diagnostic Procedure (Cont’d) 5 CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram. MTBL1590 Continuity should exist. 2. Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram. MTBL1591 Continuity should not exist. 3. Also check harness for short to power. OK or NG OK c GO TO 6. NG c Repair open circuit or short to ground or short to power in harness or connectors. 6 CHECK HEATED OXYGEN SENSOR 2 Refer to EC-358, “Component Inspection”. OK or NG OK c GO TO 7. NG c Replace heated oxygen sensor 2. 7 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END Component Inspection HEATED OXYGEN SENSOR 2 With CONSULT-II 1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch “OFF” and wait at least 10 seconds. 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load. 4. Let engine idle for one minute.
EC-358 DTC P1147, P1167 TB48DE A/T (WITH EURO-OBD) HO2S2 Component Inspection (Cont’d) 5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II. SEF662Y 6. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%. SEF972YA “HO2S2 (B1)/(B2)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%. “HO2S2 (B1)/(B2)” should be below 0.48V at least once when the “FUEL INJECTION” is -25%. CAUTION: + Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. + Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. Without CONSULT-II 1. Start engine and warm it up to the normal operating temperature. 2. Turn ignition switch “OFF” and wait at least 10 seconds. 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load. 4. Let engine idle for one minute. 5. Set voltmeter probes between ECM terminal 124 [HO2S2 (B1) signal] or 123 [HO2S2 (B2) signal] and engine ground. EC-359 DTC P1147, P1167 TB48DE A/T (WITH EURO-OBD) HO2S2 Component Inspection (Cont’d) SEC774D 6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times. (Depress and release accelerator pedal as soon as possible.) The voltage should be above 0.68V at least once during this procedure. If the voltage is above 0.68V at step 6, step 7 is not necessary. 7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF. The voltage should be below 0.56V at least once during this procedure. 8. If NG, replace heated oxygen sensor 2. CAUTION: + Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. + Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. EC-360 DTC P1217 ENGINE OVER TEMPERATURE TB48DE A/T (WITH EURO-OBD) (OVERHEAT) System Description Vehicle speed sensor Engine coolant temperature sensor Air conditioner switch Vehicle speed c Engine coolant temperature c ECM c Cooling fan relays Air conditioner “ON” signal c The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF]. Operation SEC775D CONSULT-II Reference Value In Data Monitor Mode Remarks: Specification data are reference values. MONITOR ITEM COOLING FAN AIR COND SIG CONDITION + After warming up engine, idle the engine. + Air conditioner switch “OFF” + Vehicle stopped + Engine: After warming up, idle the engine SPECIFICATION Engine coolant temperature is 94°C (201°F) or less. OFF Engine coolant temperature is between 95°C (203°F) and 99°C (210°F) LOW Engine coolant temperature is 100°C (212°F) or more. HIGH Air conditioner switch: “OFF” OFF Air conditioner switch: “ON” (Compressor operates.) ON EC-361 DTC P1217 ENGINE OVER TEMPERATURE TB48DE A/T (WITH EURO-OBD) (OVERHEAT) ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM DATA (DC voltage) CONDITION Engine is running. 56 L Cooling fan relay (Low speed) BATTERY VOLTAGE (11 - 14V) Cooling fan is not operating. Engine is running. Approximately 0V Cooling fan is operating.

Engine is running. 55 L/B Cooling fan relay (High speed) Cooling fan is not operating. Cooling fan is operating at low speed. BATTERY VOLTAGE (11 - 14V) Engine is running. Approximately 0V Cooling fan is operating at high speed. On Board Diagnosis Logic This diagnosis continuously monitors the engine coolant temperature. If the cooling fan or another component in the cooling system malfunctions, the engine coolant temperature will rise. When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is detected by the ECM and the MIL lights on. Diagnostic trouble code No. P1217 1217 Malfunction is detected when ... + Cooling fan does not operate properly (Overheat).

+ Cooling fan system does not operate properly (Overheat). + Engine coolant was not added to the system using the proper filling method. Check Items (Possible Cause) + Harness or connectors (The cooling fan circuit is open or shorted) + Cooling fan + Thermostat + Improper ignition timing + Engine coolant temperature sensor + Blocked radiator + Blocked front end (Improper fitting of nose mask) + Crushed vehicle frontal area (Vehicle frontal is collided but not repaired) + Blocked air passage by improper installation of front fog lamp or fog lamps. + Improper mixture ratio of coolant + Damaged bumper For more information, refer to “MAIN 12 CAUSES OF OVERHEATING”, EC-370.

CAUTION: When a malfunction is indicated, be sure to replace the coolant following the procedure in the MA section (“Changing Engine Coolant”, “ENGINE MAINTENANCE”). Also, replace the engine oil. a.

Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA section (“Anti-freeze Coolant Mixture Ratio”, “RECOMMENDED LUBRICANTS AND FLUIDS”). b. After refilling coolant, run engine to ensure that no water-flow noise is emitted. EC-362 DTC P1217 ENGINE OVER TEMPERATURE TB48DE A/T (WITH EURO-OBD) (OVERHEAT) Overall Function Check Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING: Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator. Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off. AEC640 With CONSULT-II SEF646X 1) Check the coolant level and mixture ratio (using coolant tester) in the reservoir tank and radiator. Allow engine to cool before checking coolant level and mixture ratio. + If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to “Diagnostic Procedure”, EC-365. + If the coolant mixture ratio is out of the range of 45 to 55% (varies depending on destinations), replace the coolant in the following procedure LC section, “Changing Engine Coolant”. 2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to “Diagnostic Procedure”, EC-365. 3) Turn ignition switch “ON”. 4) Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II. 5) If the results are NG, go to “Diagnostic Procedure”, EC-365. Without CONSULT-II SEC163BA 1) Check the coolant level and mixture ratio (using coolant tester) in the reservoir tank and radiator. Allow engine to cool before checking coolant level and mixture ratio. If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to “Diagnostic Procedure”, EC-365. + If the coolant mixture ratio is out of the range of 45 to 55% (varies depending on destinations), replace the coolant in the following procedure LC section, “Changing Engine Coolant”.

2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to “Diagnostic Procedure”, EC-365. 3) Start engine.

Be careful not to overheat engine. 4) Set temperature control lever to full cold position.

5) Turn air conditioner switch “ON”. 6) Turn blower fan switch “ON”. 7) Run engine at idle for a few minutes with air conditioner operating. Be careful not to overheat engine. 8) Make sure that cooling fan operates. Refer to “OPERATION” table of Cooling fan, EC-361. If NG, go to “Diagnostic Procedure”, EC-365. EC-363 DTC P1217 ENGINE OVER TEMPERATURE TB48DE A/T (WITH EURO-OBD) (OVERHEAT) Wiring Diagram TEC151M EC-364 DTC P1217 ENGINE OVER TEMPERATURE TB48DE A/T (WITH EURO-OBD) (OVERHEAT) Diagnostic Procedure INSPECTION START . Do you have CONSULT-II? No c Yes GO TO V A Without CONSULT-II. . CHECK COOLING FAN LOW SPEED OPERATION. SEC698C NG c With CONSULT-II 1. Disconnect cooling fan relay-2 and -3. 2. Turn ignition switch “ON”.

3. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II. 4. Make sure that cooling fans-1 and -2 operate at low speed. GO TO V C . Check cooling fan low speed control circuit. OK .

CHECK COOLING FAN HIGH SPEED OPERATION. SEF646X With CONSULT-II 1. Turn ignition switch “OFF”. 2. Reconnect cooling fan relay-2 and -3. 3. Turn ignition switch “ON”. 4.

Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II. 5. Make sure that cooling fans-1 and -2 operate at high speed. OK . GO TO V B . SEF111X EC-365 NG c GO TO V D . Check cooling fan high speed control circuit. DTC P1217 ENGINE OVER TEMPERATURE TB48DE A/T (WITH EURO-OBD) (OVERHEAT) Diagnostic Procedure (Cont’d) A V .

CHECK COOLING FAN LOW SPEED OPERATION. SEC698C NG c Without CONSULT-II 1. Disconnect cooling fan relays-2 and -3. 2. Start engine and let it idle. 3. Set temperature lever at full cold position. 4.

Turn air conditioner switch “ON”. 5. Turn blower fan switch “ON”. 6. Make sure that cooling fans-1 and -2 operate at low speed. C . Check cooling GO TO V fan low speed control circuit. OK . CHECK COOLING FAN HIGH SPEED OPERATION. SEC163BA Without CONSULT-II 1. Turn ignitions witch “OFF”. 2. Reconnect cooling fan relays-2 and -3. 3. Turn air conditioner switch and blower fan switch “OFF”. 4. Disconnect engine coolant temperature sensor harness connector. 5. Connect 150Ω resistor to engine coolant temperature sensor harness connector. 6. Restart engine and make sure that cooling fans-1 and -2 operate at high speed. OK . GO TO V B .

SEC322D EC-366 NG c GO TO V D . Check cooling fan high speed control circuit. DTC P1217 ENGINE OVER TEMPERATURE TB48DE A/T (WITH EURO-OBD) (OVERHEAT) Diagnostic Procedure (Cont’d) B V . SLC754A CHECK COOLING SYSTEM FOR LEAK. Apply pressure to the cooling system with a tester, and check if the pressure drops. Testing pressure: 157 kPa (1.6 kg/cm2, 23 psi) CAUTION: Higher than the specified pressure may cause radiator damage. Pressure should not drop. NG c Check the following for leak. + Hose + Radiator + Water pump (Refer to LC section, “Water Pump”.) If NG, repair or replace. OK . SLC755A CHECK RADIATOR CAP. Apply pressure to cap with a tester and check radiator cap relief pressure. Radiator cap relief pressure: For the Middle East: 78 - 98 kPa (0.78 - 0.98 bar, 0.8 1.0 kg/cm2, 11 - 14 psi) Except above: 108 - 127 kPa (1.08 - 1.27 bar, 1.1 - 1.3 kg/cm2, 16 - 18 psi) NG c Replace radiator cap.

OK . SLC343 NG CHECK THERMOSTAT. Replace thermostat. c 1. Remove thermostat. 2. Check valve seating condition at normal room temperatures. It should seat tightly. 3. Check valve opening temperature and valve lift. Valve opening temperature: 76.5°C (170°F) [standard] Valve lift: More than 10 mm/90°C (0.39 in/194°F) 4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to LC section, “Thermostat”. OK . CHECK ENGINE COOLANT TEMPERATURE SENSOR.

Refer to “COMPONENT INSPECTION”, EC-156. OK . CHECK MAIN 12 CAUSES. If the cause cannot be isolated, go to “MAIN 12 CAUSES OF OVERHEATING”, EC-370. . CHECK INSPECTION END EC-367 NG c Replace engine coolant temperature sensor. DTC P1217 ENGINE OVER TEMPERATURE TB48DE A/T (WITH EURO-OBD) (OVERHEAT) Diagnostic Procedure (Cont’d) C V . CHECK COOLING FAN POWER SUPPLY CIRCUIT. 1. Turn ignition switch “OFF”. 2. Disconnect cooling fan relay-1. 3. Turn ignition switch “ON”. 4. Check voltage between cooling fan relay-1 terminals V 1 ,V 3 ,V 6 and ground with CONSULT-II or tester. Battery voltage c OK SEC699C . SEC700C NG CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector. 3. Check harness continuity between cooling fan relay-1 terminal V 5 and cooling fan motor-1 terminal V 1 , cooling fan motor-1 terminal V 4 and body ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. 5. Check harness continuity between cooling fan relay-1 terminal V 7 and cooling fan motor-2 terminal V 1 , cooling fan motor-2 terminal V 4 and body ground. Refer to Wiring Diagram. Continuity should exist. 6. Also check harness for short to ground and short to power. . NG c NG c OK . CHECK COOLING FAN RELAY-1. Refer to “Component Inspection”, EC-371 OK CHECK INTERMITTENT INCIDENT. Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-112.

. OK INSPECTION END EC-368 NG c Check the following. + Harness connectors E127 , M21 + Harness connectors M52 , F7 + Harness for open or short between cooling fan relay-1 and ECM If NG, repair open circuit or short to ground or short to power in harness or connectors. Replace cooling fan relay. OK CHECK COOLING FAN MOTORS-1 AND -2. Refer to “Component Inspection”, EC-371. . Repair open circuit or short to ground or short to power in harness or connectors. OK CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT. 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal V 56 and cooling fan relay-1 terminal V 2 . Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. . Check the following. + 10A fuse + 40A fusible links + Harness for open or short between cooling fan relay-1 and fuse + Harness for open or short between cooling fan relay-1 and battery If NG, repair open circuit or short to ground to short to power in harness or connectors. NG c Replace cooling fan motors. DTC P1217 ENGINE OVER TEMPERATURE TB48DE A/T (WITH EURO-OBD) (OVERHEAT) Diagnostic Procedure (Cont’d) D V . SEC780C CHECK COOLING FAN POWER SUPPLY CIRCUIT. 1. Turn ignition switch “OFF”. 2. Disconnect cooling fan relays-2 and -3. 3. Turn ignition switch “ON”. 4. Check voltage between cooling fan relays-2 and -3 terminals V 1 ,V 6 and ground with CONSULT-II or tester. Battery voltage NG c Check the following.

+ Harness for open or short between cooling fan relays-2 and -3 and 10A fuse + Harness for open or short between cooling fan relays-2 and fusible link If NG, repair harness or connectors.

OK . SEC698C CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT 1.

Turn ignition switch “OFF”. 2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector. 3. Check harness continuity between cooling fan relay-2 terminal V 7 and cooling fan motor-1 terminal V 2 , cooling fan relay-2 terminal V 3 and cooling fan motor-1 terminal V 3 , cooling fan relay-2 terminal V 5 and body ground. Refer to Wiring Diagram. Continuity should exist. 4.

Also check harness for short to ground and short to power.

5. Check harness continuity between cooling fan relay-3 terminal V 7 and cooling fan motor-2 terminal V 2 , cooling fan relay-3 terminal V 3 , cooling fan relay-2 terminal V 5 . Refer to Wiring Diagram. Continuity should exist. 6. Also check harness for short to ground and short to power. NG c Repair open circuit or short to ground or short to power in harness or connectors.

c Check the following. + Harness connectors E127 , OK . SEC700C CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT.

1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal V 55 and cooling fan relay-2 terminal V 2 , cooling fan relay-3 terminal V 2 . Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short power. NG M21 + Harness connectors M52 , F7 + Harness for open or short between cooling fan relay-2 and -3 and ECM If NG, repair open circuit or short to ground or short to power in harness or connectors. OK . CHECK COOLING FAN RELAYS-2 AND -3. Refer to “Component Inspection”, EC-371. NG c Replace cooling fan relays.

OK . CHECK COOLING FAN MOTORS. Refer to “Component Inspection”, EC-371. OK . CHECK INTERMITTENT INCIDENT. Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-112.

OK . INSPECTION END EC-369 NG c Replace cooling fan motors.

DTC P1217 ENGINE OVER TEMPERATURE TB48DE A/T (WITH EURO-OBD) (OVERHEAT) Main 12 Causes of Overheating Engine Step Inspection item OFF 1 + + + + 2 Equipment Standard Reference page + Visual No blocking + Coolant mixture + Coolant tester 30 - 50% coolant mixture See “RECOMMENDED FLUIDS AND LUBRICANTS” in MA section.

3 + Coolant level + Visual Coolant up to MAX level in reservoir tank and radiator filler neck See “Changing Engine Coolant”, “ENGINE MAINTENANCE” in MA section. 4 + Radiator cap + Pressure tester 108 - 127 kPa (1.08 - 1.27 bar, 1.1 - 1.3 kg/cm2, 16 - 18 psi) 59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm2, 9 - 14 psi) (Limit) See “System Check”, “ENGINE COOLING SYSTEM” in LC section. ON*2 5 + Coolant leaks + Visual No leaks See “System Check”, “ENGINE COOLING SYSTEM” in LC section. ON*2 6 + Thermostat + Touch the upper and lower radiator hoses Both hoses should be hot. See “Thermostat” and “Radiator”, “ENGINE COOLING SYSTEM” in LC section. ON*1 7 + Cooling fan + Visual (Coupling) + CONSULT-II Operating OFF 8 + Combustion gas leak + Color checker chemical Negative tester 4 gas analyzer — ON*3 9 + Coolant temperature gauge + Visual — Blocked Blocked Blocked Blocked radiator condenser radiator grille bumper Gauge less than 3/4 when driving — See “TROUBLE DIAGNOSIS FOR DTC P1217”, EC-361. + Coolant overflow to res- + Visual ervoir tank No overflow during driving See “Changing Engine and idling Coolant”, “ENGINE MAINTENANCE” in MA section. OFF*4 10 + Coolant return from res- + Visual ervoir tank to radiator Should be initial level in reservoir tank See “ENGINE MAINTENANCE” in MA section.

OFF 11 + Cylinder head + Straight gauge feeler gauge 0.1 mm (0.004 in) Maximum distortion (warping) See “Inspection”, “CYLINDER HEAD” in EM section.

12 + Cylinder block and pistons + Visual No scuffing on cylinder walls or piston See “Inspection”, “CYLINDER BLOCK” in EM section. *1: Engine running at idle for coupling type. Turn ignition switch ON for electrical cooling fan. *2: Engine running at 3,000 rpm for 10 minutes. *3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes. *4: After 60 minutes of cool down time. For more information, refer to “OVERHEATING CAUSE ANALYSIS” in LC section. EC-370 DTC P1217 ENGINE OVER TEMPERATURE TB48DE A/T (WITH EURO-OBD) (OVERHEAT) Component Inspection COOLING FAN RELAYS-1, -2 AND -3 Check continuity between terminals V 3 and V 5 ,V 6 and V 7 . Conditions SEF745U Continuity 12V direct current supply between terminals 1 and 2 Yes No current supply No If NG, replace relay. COOLING FAN MOTORS-1 AND -2 1. Disconnect cooling fan motor harness connectors. 2. Supply cooling fan motor terminals with battery voltage and check operation. Terminals Cooling fan motor SEF734W Speed (+) (−) Low 1 4 High 1, 2 3, 4 Cooling fan motor should operate. If NG, replace cooling fan motor. EC-371 DTC P1225 TP SENSOR TB48DE A/T (WITH EURO-OBD) Component Description PBIB0145E Electric Throttle Control Actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement. The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition. On Board Diagnosis Logic The MI will not light up for this self-diagnosis. DTC No. P1225 1225 Trouble diagnosis name Closed throttle position learning performance problem DTC detecting condition Closed throttle position learning value is excessively low.

Possible cause + Electric throttle control actuator (TP sensor 1 and 2) DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10V at idle. WITH CONSULT-II 1. 2. 3. 4. 5. Turn ignition switch “ON”. Select “DATA MONITOR” mode with CONSULT-II. Turn ignition switch “OFF”, wait at least 10 seconds. Turn ignition switch “ON”. If 1st trip DTC is detected, go to EC-373, “Diagnostic Procedure”. WITH GST SEF058Y Follow the procedure “With CONSULT-II” above.

EC-372 DTC P1225 TP SENSOR TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure 1 CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY 1. Turn ignition switch “OFF”. 2. Remove the intake air duct. 3. Check if foreign matter is caught between the throttle valve and the housing. SEC183D OK or NG OK c GO TO 2. NG c Remove the foreign matter and clean the electric throttle control actuator inside. 2 REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. 2. 3. 4. Replace the electric throttle control actuator. Perform EC-31, “Accelerator Pedal Released Position Learning”. Perform EC-31, “Throttle Valve Closed Position Learning”. Perform EC-31, “Idle Air Volume Learning”. c INSPECTION END EC-373 DTC P1226 TP SENSOR TB48DE A/T (WITH EURO-OBD) Component Description PBIB0145E Electric Throttle Control Actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has the two sensors.

These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition. On Board Diagnosis Logic The MI will not light up for this self-diagnosis.

DTC No. P1226 1226 Trouble diagnosis name Closed throttle position learning performance problem DTC detecting condition Possible cause Closed throttle position learning is not per- + Electric throttle control actuator formed successfully, repeatedly. (TP sensor 1 and 2) DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II 1. 2. 3. 4. 5. 6. Turn ignition switch “ON”. Select “DATA MONITOR” mode with CONSULT-II. Turn ignition switch “OFF”, wait at least 10 seconds. Turn ignition switch “ON”. Repeat steps 3 and 4, 32 times. If 1st trip DTC is detected, go to EC-375, “Diagnostic Procedure”. WITH GST SEF058Y Follow the procedure “With CONSULT-II” above. EC-374 DTC P1226 TP SENSOR TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure 1 CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY 1. Turn ignition switch “OFF”.

2. Remove the intake air duct. 3. Check if foreign matter is caught between the throttle valve and the housing. SEC183D OK or NG OK c GO TO 2. NG c Remove the foreign matter and clean the electric throttle control actuator inside. 2 REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. 2. 3. 4. Replace the electric throttle control actuator.

Perform EC-31, “Accelerator Pedal Released Position Learning”. Perform EC-31, “Throttle Valve Closed Position Learning”. Perform EC-31, “Idle Air Volume Learning”. c INSPECTION END EC-375 DTC P1229 SENSOR POWER TB48DE A/T (WITH EURO-OBD) SUPPLY On Board Diagnosis Logic This self-diagnosis has the one trip detection logic. DTC No. P1229 1229 Trouble diagnosis name Sensor power supply circuit short DTC detecting condition Possible cause ECM detects a voltage of power source for + Harness or connectors sensor is excessively low or high.

(The TP sensor 1 and 2 circuit is shorted.) (APP sensor circuit is shorted.) (MAF sensor circuit is shorted.) (Power steering pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) + Electric throttle control actuator (TP sensor 1 and 2) + Accelerator pedal position sensor (APP sensor 1) + MAF sensor + Power steering pressure sensor + Refrigerant pressure sensor + ECM pin terminal FAIL-SAFE MODE When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up. Engine operation condition in fail-safe mode ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10V at idle. WITH CONSULT-II 1. 2.

3. 4. Turn ignition switch “ON”. Select “DATA MONITOR” mode with CONSULT-II. Start engine and let it idle for 1 second. If DTC is detected, go to EC-378, “Diagnostic Procedure”. WITH GST Follow the procedure “WITH CONSULT-II” above. SEF058Y EC-376 DTC P1229 SENSOR POWER TB48DE A/T (WITH EURO-OBD) SUPPLY Wiring Diagram TEC407M EC-377 DTC P1229 SENSOR POWER TB48DE A/T (WITH EURO-OBD) SUPPLY Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. 103 WIRE COLOR Y ITEM CONDITION Sensors’ power supply Ignition switch “ON” DATA (DC Voltage) Approximately 5V Diagnostic Procedure 1 RETIGHTEN GROUND SCREWS 1.

Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws. SEC690C c GO TO 2. EC-378 DTC P1229 SENSOR POWER TB48DE A/T (WITH EURO-OBD) SUPPLY Diagnostic Procedure (Cont’d) 2 CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT 1.

Disconnect electric throttle control actuator harness connector. SEC182D 2. Turn ignition switch “ON”. 3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester. PBIB0082E Voltage: Approximately 5V OK or NG OK c GO TO 4. NG c GO TO 3. 3 CHECK SENSOR POWER SUPPLY CIRCUITS FOR SHORT Check the following. + Harness for short to power and short to ground, between the following terminals. MTBL1592 + ECM pin terminal. OK or NG OK c GO TO 4. NG c Repair short to ground or short to power in harness or connectors. EC-379 DTC P1229 SENSOR POWER TB48DE A/T (WITH EURO-OBD) SUPPLY Diagnostic Procedure (Cont’d) 4 CHECK COMPONENTS Check the following. + Accelerator pedal position sensor (Refer to EC-427, “Component Inspection”.) + Mass air flow sensor (Refer to EC-146, “Component Inspection”.) + Power steering pressure sensor (Refer to EC-282, “Component Inspection”.) OK or NG OK c GO TO 7. NG c Replace malfunctioning component. 5 CHECK THROTTLE POSITION SENSOR Refer to EC-420, “Component Inspection”. OK or NG OK c GO TO 6. NG c GO TO 5. 6 REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. 2. 3. 4. Replace electric throttle control actuator. Perform EC-31, “Accelerator Pedal Released Position Learning”. Perform EC-31, “Throttle Valve Closed Position Learning”. Perform EC-31, “Idle Air Volume Learning”. c INSPECTION END 7 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END EC-380 DTC P1336 CKP SENSOR TB48DE A/T (WITH EURO-OBD) (OBD) Component Description SEF804Z The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution. The sensor consists of a permanent magnet, core and coil. When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes. The ECM receives the voltage signal and detects the fluctuation of the engine revolution. This sensor is not used to control the engine system. It is used only for the on board diagnosis.

SEC732D ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage.

Doing so may result in damage to the ECM’s transistor. Use a ground other than the ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (AC Voltage) Approximately 1 - 2V★ Engine is running. Warm-up condition. Idle speed SEC748D 111 W Crankshaft position sensor (OBD) 3 - 4V★ (AC range) Engine is running. Engine speed is 2,000 rpm SEC749D ★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.) EC-381 DTC P1336 CKP SENSOR TB48DE A/T (WITH EURO-OBD) (OBD) On Board Diagnosis Logic Malfunction is detected when a chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM. POSSIBLE CAUSE + Harness or connectors + Crankshaft position sensor (OBD) + Drive plate/Flywheel DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. With CONSULT-II 1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II. 2. Start engine and run it for at least 2 minutes at idle speed. 3. If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-384. With GST Follow the procedure “With CONSULT-II”. SEF058Y EC-382 DTC P1336 CKP SENSOR TB48DE A/T (WITH EURO-OBD) (OBD) Wiring Diagram TEC344M EC-383 DTC P1336 CKP SENSOR TB48DE A/T (WITH EURO-OBD) (OBD) Diagnostic Procedure 1 RETIGHTEN GROUND SCREWS 1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws. SEC690C c GO TO 2. 2 CHECK CKPS (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors. SEC732D 2. Check continuity between ECM terminal 111 and sensor terminal 1.

Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 4. NG c GO TO 3. 3 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E201, E70 + Harness connectors E127, M21 + Harness connectors M51, F6 + Harness for open or short between ECM and crankshaft position sensor (OBD) c Repair open circuit or short to ground or short to power in harness or connectors. EC-384 DTC P1336 CKP SENSOR TB48DE A/T (WITH EURO-OBD) (OBD) Diagnostic Procedure (Cont’d) 4 CHECK CKPS (OBD) GROUND CIRCUIT FOR OPEN AND SHORT 1. Reconnect ECM harness connectors. 2.

Check harness continuity between CKPS (OBD) terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist.

3.

Also check harness for short to ground and short to power. OK or NG OK c GO TO 6. NG c GO TO 5. 5 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E202, E69 + Harness connectors E127, M21 + Harness connectors M51, F6 + Harness for open between crankshaft position sensor (OBD) and ECM c Repair open circuit or short to ground or short to power in harness or connectors. 6 CHECK IMPROPER INSTALLATION 1. Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD). 2. Perform “DTC Confirmation Procedure”, again. Is a 1st trip DTC P1336 detected? Yes or No Yes c GO TO 7. No c INSPECTION END EC-385 DTC P1336 CKP SENSOR TB48DE A/T (WITH EURO-OBD) (OBD) Diagnostic Procedure (Cont’d) 7 1. 2. 3. 4. CHECK CRANKSHAFT POSITION SENSOR (OBD) Disconnect crankshaft position sensor (OBD) harness connector.

Loosen the fixing bolt of the sensor. Remove the sensor.

Visually check the sensor for chipping. SEF960N 5. Check resistance as shown in the figure. SEF504V Resistance: Approximately 512 - 632Ω [at 20°C (68°F)] OK or NG OK c GO TO 8.

NG c Replace crankshaft position sensor (OBD). 8 CHECK CKPS (OBD) SHIELD CIRCUIT FOR OPEN AND SHORT 1. Disconnect harness connectors E201, E70. 2. Check harness continuity between harness connector E70 terminal 10 and engine ground. Continuity should exist. 3. Also check harness for short to power. OK or NG OK c GO TO 10. NG c GO TO 9. 9 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E201, E70 + Harness connectors E127, M21 + Harness connectors M51, F6 + Joint connector-7 + Harness for open between harness connector F38 and engine ground c Repair open circuit or short to power in harness or connectors. EC-386 DTC P1336 CKP SENSOR TB48DE A/T (WITH EURO-OBD) (OBD) Diagnostic Procedure (Cont’d) 10 CHECK GEAR TOOTH Visually check for chipping flywheel or drive plate gear tooth (cog). OK or NG OK c GO TO 11. NG c Replace the flywheel or drive plate. 11 CHECK INTERMITTENT INCIDENT Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-112. c INSPECTION END EC-387 DTC P1706 PNP SWITCH TB48DE A/T (WITH EURO-OBD) Component Description When the shift lever position is “P” or “N”, park/neutral position (PNP) switch is “ON”. ECM detects the position because the continuity of the line (the “ON” signal) exists. CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM P/N POSI SW CONDITION + Ignition switch: ON SPECIFICATION Shift lever: P or N ON Shift lever: Except above OFF On Board Diagnosis Logic DTC No. P1706 1706 Trouble diagnosis name Park/neutral position switch DTC detecting condition The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.

Possible cause + Harness or connectors (PNP switch circuit is open or shorted.) + Park/neutral position (PNP) switch DTC Confirmation Procedure CAUTION: Always drive vehicle at a safe speed. NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II 1. Turn ignition switch “ON”. 2.

Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II. Then check the “P/N POSI SW” signal under the following conditions. Position (Selector lever) SEF212Y Known-good signal “N” and “P” position ON Except the above position OFF If NG, go to EC-392, “Diagnostic Procedure”.

If OK, go to following step. 3. Select “DATA MONITOR” mode with CONSULT-II. 4. Start engine and warm it up to normal operating temperature. 5.

Maintain the following conditions for at least 60 consecutive seconds. ENG SPEED 1,250 - 6,375 rpm COOLAN TEMP/S More than 70°C (158°F) B/FUEL SCHDL More than 5 msec VHCL SPEED SE More than 64 km/h (40 MPH) Selector lever Suitable position SEF213Y EC-388 DTC P1706 PNP TB48DE A/T (WITH EURO-OBD) SWITCH DTC Confirmation Procedure (Cont’d) 6. If 1st trip DTC is detected, go to EC-392, “Diagnostic Procedure”. Overall Function Check Use this procedure to check the overall function of the park/ neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed. WITH GST 1. Turn ignition switch “ON”. 2.

Check voltage between ECM terminal 80 (PNP switch signal) and body ground under the following conditions. Condition (Gear position) Voltage V (Known-good data) “P” and “N” position Approximately 0 Except the above position Battery voltage 3. If NG, go to EC-392, “Diagnostic Procedure”. PBIB0169E EC-389 DTC P1706 PNP SWITCH TB48DE A/T (WITH EURO-OBD) Wiring Diagram TEC420M EC-390 DTC P1706 PNP TB48DE A/T (WITH EURO-OBD) SWITCH Wiring Diagram (Cont’d) TEC421M EC-391 DTC P1706 PNP TB48DE A/T (WITH EURO-OBD) SWITCH Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION:

Do not use ECM ground terminals when measuring input/output voltage.

Doing so may result in damage to the ECM’s transistor.

Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Ignition switch “ON” Approximately 0V Shift lever position is “P” or “N”.

80 R/PU PNP switch Ignition switch “ON” Except the above gear position BATTERY VOLTAGE (11 - 14V) Diagnostic Procedure 1 INSPECTION START Do you have CONSULT-II?

Yes or No Yes c GO TO 2. No c GO TO 3. 2 CHECK PNP SWITCH SIGNAL 1. Turn ignition switch “ON”. 2. Select “A/T”, then “DATA MONITOR” mode while CONSULT-II. 3. Select “P/N POSI SW” signal and check its indication under the following conditions. PBIB0102E MTBL1597 OK or NG OK c GO TO 5. NG c GO TO 4. EC-392 DTC P1706 PNP TB48DE A/T (WITH EURO-OBD) SWITCH Diagnostic Procedure (Cont’d) 3 CHECK PNP SWITCH SIGNAL Confirm that the PNP switch signal is sent to TCM correctly. Refer to AT section. OK or NG OK c GO TO 5. NG c GO TO 4. 4 CHECK PNP SWITCH CIRCUIT Check the PNP switch circuit. Refer to AT section. c INSPECTION END 5 CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I 1. Turn ignition switch “OFF”. 2. Disconnect TCM harness connector. SEC298D 3. Disconnect park/neutral position relay-3 harness connector. SEC185D 4. Check harness continuity between TCM terminal 48 and park/neutral position relay-3 terminal 2. Refer to Wiring Diagram. Continuity should exist. 5. Also check harness for short to ground and short to power. OK or NG OK c GO TO 6. NG c Repair open circuit or short to ground or short to power in harness or connectors. EC-393 DTC P1706 PNP TB48DE A/T (WITH EURO-OBD) SWITCH Diagnostic Procedure (Cont’d) 6 CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II 1. Check harness continuity between park/neutral position relay-3 terminal 1, 6 and ground. Refer to Wiring Diagram. Continuity should exist. 2. Also check harness for short to power.

OK or NG OK c GO TO 7. NG c Repair open circuit or short to power in harness or connectors. 7 CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-III 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 80 and park/neutral position relay-3 terminal 7. Refer to Wiring Diagram.

Continuity should exist. 3.

Also check harness for short to ground and short to power. OK or NG OK c GO TO 9. NG c GO TO 8. 8 DETECT MALFUNCTIONING PART Check the following. + Harness connectors F7, M52 + Harness connectors M21, E127 + Harness for open between ECM and park/neutral position relay-3 c Repair open circuit or short to ground or short to power in harness or connectors. 9 CHECK PARK/NEUTRAL POSITION RELAY-3 Refer to AT section. OK or NG OK c NG c 10 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END EC-394 DTC P1805 BRAKE SWITCH TB48DE A/T (WITH EURO-OBD) Description Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving. CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM BRAKE SW CONDITION + Ignition switch: ON SPECIFICATION Brake pedal: Fully released OFF Brake pedal: Slightly depressed ON On Board Diagnosis Logic The MI will not light up for this self-diagnosis. DTC No. P1805 1805 Trouble diagnosis name Brake switch DTC detecting condition A brake switch signal is not sent to ECM for an extremely long time while the vehicle is driving. Possible cause + Harness or connectors (Stop lamp switch circuit is open or shorted.) + Stop lamp switch FALI-SAFE MODE When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up. Engine operating condition in fail-safe mode ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor. Vehicle condition Driving condition When engine is idling Normal When accelerating Poor acceleration DTC Confirmation Procedure WITH CONSULT-II 1. 2. 3. 4. 5.

Turn ignition switch “ON”.

Fully depress the brake pedal for at least 5 seconds. Erase the DTC with CONSULT-II.

Select “DATA MONITOR” mode with CONSULT-II.

If 1st trip DTC is detected, go to EC-397, “Diagnostic Procedure”.

SEF058Y WITH GST Follow the procedure “WITH CONSULT-II” above. EC-395 DTC P1805 BRAKE SWITCH TB48DE A/T (WITH EURO-OBD) Wiring Diagram TEC249M EC-396 DTC P1805 BRAKE TB48DE A/T (WITH EURO-OBD) SWITCH Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. Approximately 0V Brake pedal fully released 106 G/Y Stop lamp switch Engine is running. Brake pedal depressed BATTERY VOLTAGE (11 - 14V) Diagnostic Procedure 1 CHECK STOP LAMP SWITCH CIRCUIT 1. Turn ignition switch “OFF”. 2.

Check the stop lamp when depressing and releasing the brake pedal.

MTBL1593 OK or NG OK c GO TO 4.

NG c GO TO 2. EC-397 DTC P1805 BRAKE TB48DE A/T (WITH EURO-OBD) SWITCH Diagnostic Procedure (Cont’d) 2 CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT 1. Disconnect stop lamp switch harness connector. SEC194D 2. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.

PBIB0117E Voltage: Battery voltage OK or NG OK c GO TO 4. NG c GO TO 3. 3 DETECT MALFUNCTIONING PART Check the following. + 10A fuse + Fuse block (J/B) connector M3 + Harness for open and short between stop lamp switch and battery c Repair open circuit or short to ground or short to power in harness or connectors. EC-398 DTC P1805 BRAKE TB48DE A/T (WITH EURO-OBD) SWITCH Diagnostic Procedure (Cont’d) 4 CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector. 3. Disconnect stop lamp switch harness connector. SEC194D 4. Check harness continuity between ECM terminal 106 and stop lamp switch terminal 2. Refer to Wiring Diagram. Continuity should exist. 5. Also check harness for short to ground and short to power. OK or NG OK c GO TO 6. NG c GO TO 5.

5 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M52, F7 + Harness for open or short between ECM and stop lamp switch c Repair open circuit or short to ground or short to power in harness or connectors. 6 CHECK STOP LAMP SWITCH Refer to EC-399, “Component Inspection”. OK or NG OK c GO TO 7. NG c Replace stop lamp switch. 7 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END Component Inspection STOP LAMP SWITCH 1. Disconnect stop lamp switch harness connector. SEC194D EC-399 DTC P1805 BRAKE TB48DE A/T (WITH EURO-OBD) SWITCH Component Inspection (Cont’d) 2. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions. Conditions Continuity Brake pedal fully released Should not exist. Brake pedal depressed Should exist.

If NG, adjust brake pedal installation, refer to BR section, and perform step 2 again. PBIB0118E EC-400 DTC P2122, P2123 APP TB48DE A/T (WITH EURO-OBD) SENSOR Component Description PBIB0146E The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM. Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM.

The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals. Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values.

MONITOR ITEM ACCEL SEN1 ACCEL SEN2* CLSD THL POS CONDITION SPECIFICATION + Ignition switch: ON (engine stopped) + Shift lever position is “D” Accelerator pedal: Fully released More than 0.36V Accelerator pedal: Fully depressed Less than 4.75V + Ignition switch: ON (engine stopped) + Shift lever position is “D” Accelerator pedal: Fully released ON Accelerator pedal: Slightly depressed OFF *: Accelerator pedal position sensor 2 signal is converted by ECM internally.

Thus, it differs from ECM terminal voltage signal. On Board Diagnosis Logic These self-diagnoses have the one trip detection logic. DTC No. Trouble diagnosis name DTC detecting condition P2122 2122 Accelerator pedal position An excessively low voltage from the APP sensor 1 circuit low input sensor 1 is sent to ECM. P2123 2123 Accelerator pedal position An excessively high voltage from the APP sensor 1 circuit high input sensor 1 is sent to ECM. Possible cause + Harness or connectors (The APP sensor 1 circuit is open or shorted.) + Accelerator pedal position sensor (Accelerator pedal position sensor 1) FAIL-SAFE MODE When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up. Engine operating condition in fail-safe mode The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of throttle valve to be slower than the normal condition. So, the acceleration will be poor. EC-401 DTC P2122, P2123 APP TB48DE A/T (WITH EURO-OBD) SENSOR DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10V at idle. WITH CONSULT-II 1. 2. 3. 4.

Turn ignition switch “ON”. Select “DATA MONITOR” mode with CONSULT-II. Start engine and let it idle for 1 second. If DTC is detected, go to EC-405, “Diagnostic Procedure”. SEF058Y WITH GST Follow the procedure “WITH CONSULT-II” above. EC-402 DTC P2122, P2123 APP TB48DE A/T (WITH EURO-OBD) SENSOR Wiring Diagram TEC401M EC-403 DTC P2122, P2123 APP TB48DE A/T (WITH EURO-OBD) SENSOR Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Ignition switch “ON” 87 W Accelerator pedal position sensor 1 Engine stopped Shift lever position is “D” Accelerator pedal fully released More than 0.36V Ignition switch “ON” Engine stopped Shift lever position is “D” Accelerator pedal fully depressed Less than 4.75V Engine is running.

89 B Sensor ground (Accelerator pedal position sensor 1) 94 LG Sensor power supply (Accelerator pedal position sensor 2) Ignition switch “ON” Approximately 2.5V 100 R Sensor ground (Accelerator pedal position sensor 2) Ignition switch “ON” Approximately 0V 103 Y Sensor power supply (Accelerator pedal position sensor 1) Ignition switch “ON” Approximately 5V Warm-up condition. Idle speed Approximately 0V Ignition switch “ON” 117 G Accelerator pedal position sensor 2 Engine stopped Shift lever position is “D” Accelerator pedal fully released More than 0.18V Ignition switch “ON” Engine stopped Shift lever position is “D” Accelerator pedal fully depressed EC-404 Less than 2.37V DTC P2122, P2123 APP TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure 1 RETIGHTEN GROUND SCREWS 1. Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws. SEC690C c GO TO 2. 2 CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT 1. Disconnect accelerator pedal position (APP) sensor harness connector. SEC182D 2. Turn ignition switch “ON”. 3. Check voltage between APP sensor terminal 7 and ground with CONSULT-II or tester. SEC673D Voltage: Approximately 5V OK or NG OK c GO TO 4. NG c GO TO 3.

EC-405 DTC P2122, P2123 APP TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure (Cont’d) 3 DETECT MALFUNCTIONING PART Check the following. + Harness for open or short between ECM and accelerator pedal position sensor c Repair open circuit or short to ground or short to power in harness or connectors. 4 CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector. 3. Check harness continuity between APP sensor terminal 9 and ground.

Refer to Wiring Diagram.

Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 6. NG c GO TO 5. 5 DETECT MALFUNCTIONING PART Check the following. + Harness for open or short between ECM and accelerator pedal position sensor c Repair open circuit or short to ground or short to power in harness or connectors. 6 CHECK APP SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Check harness continuity between ECM terminal 87 and APP sensor terminal 8. Refer to Wiring Diagram. Continuity should exist.

2.

Also check harness for short to ground and short to power. OK or NG OK c GO TO 8.

NG c GO TO 7. 7 DETECT MALFUNCTIONING PART Check the following. + Harness for open or short between ECM and accelerator pedal position sensor c Repair open circuit or short to ground or short to power in harness or connectors. 8 CHECK APP SENSOR Refer to EC-407, “Component Inspection”. OK or NG OK c GO TO 10. NG c GO TO 9.

9 1.

2. 3. 4. REPLACE APP SENSOR Replace the accelerator pedal position sensor. Perform EC-31, “Accelerator Pedal Released Position Learning”. Perform EC-31, “Throttle Valve Closed Position Learning”. Perform EC-31, “Idle Air Volume Learning”. c INSPECTION END EC-406 DTC P2122, P2123 APP TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure (Cont’d) 10 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END Component Inspection ACCELERATOR PEDAL POSITION SENSOR 1. Reconnect all harness connectors disconnected. 2. Turn ignition switch “ON”. 3. Check voltage between ECM terminals 87 (APP sensor 1 signal), 117 (APP sensor 2 signal) and engine ground under the following conditions. Terminal PBIB0184E Accelerator pedal Voltage 87 (Accelerator pedal position sensor 1) Fully released More than 0.36V Fully depressed Less than 4.75V 117 (Accelerator pedal position sensor 2) Fully released More than 0.18V Fully depressed Less than 2.37V 4. If NG, replace accelerator pedal assembly and go to the next step. 5. Perform EC-31, “Accelerator Pedal Released Position Learning”. 6.

Perform EC-31, “Throttle Valve Closed Position Learning”. 7. Perform EC-31, “Idle Air Volume Learning”. EC-407 DTC P2127, P2128 APP TB48DE A/T (WITH EURO-OBD) SENSOR Component Description PBIB0146E The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM. Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals. Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut. CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM ACCEL SEN1 ACCEL SEN2* CLSD THL POS CONDITION SPECIFICATION + Ignition switch: ON (engine stopped) + Shift lever position is “D” Accelerator pedal: Fully released More than 0.36 Accelerator pedal: Fully depressed Less than 4.75V + Ignition switch: ON (engine stopped) + Shift lever position is “D” Accelerator pedal: Fully released ON Accelerator pedal: Slightly depressed OFF *: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal. On Board Diagnosis Logic These self-diagnoses have the one trip detection logic. DTC No. Trouble diagnosis name DTC detecting condition P2127 2127 Accelerator pedal position An excessively low voltage from the APP sensor 2 circuit low input sensor 2 is sent to ECM. P2128 2128 Accelerator pedal position An excessively high voltage from the APP sensor 2 circuit high input sensor 2 is sent to ECM. Possible cause + Harness or connectors (The APP sensor 2 circuit is open or shorted.) + Accelerator pedal position sensor (Accelerator pedal position sensor 2) FAIL-SAFE MODE When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up. Engine operating condition in fail-safe mode The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor. EC-408 DTC P2127, P2128 APP TB48DE A/T (WITH EURO-OBD) SENSOR DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10V at idle. WITH CONSULT-II 1. 2. 3. 4. Turn ignition switch “ON”. Select “DATA MONITOR” mode with CONSULT-II.

Start engine and let it idle for 1 second. If DTC is detected, go to EC-411, “Diagnostic Procedure”. SEF058Y WITH GST Follow the procedure “WITH CONSULT-II” above. EC-409 DTC P2127, P2128 APP TB48DE A/T (WITH EURO-OBD) SENSOR Wiring Diagram TEC402M EC-410 DTC P2127, P2128 APP TB48DE A/T (WITH EURO-OBD) SENSOR Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Ignition switch “ON” 87 W Accelerator pedal position sensor 1 Engine stopped Shift lever position is “D” Accelerator pedal fully released More than 0.36V Ignition switch “ON” Engine stopped Shift lever position is “D” Accelerator pedal fully depressed Less than 4.75V Engine is running. 89 B Sensors’ ground 94 LG Sensor power supply (Accelerator pedal position sensor 2) Ignition switch “ON” Approximately 2.5V 100 R Sensor ground (Accelerator pedal position sensor 2) Ignition switch “ON” Approximately 0V 103 Y Sensors’ power supply Ignition switch “ON” Approximately 5V Warm-up condition. Idle speed Approximately 0V Ignition switch “ON” 117 G Accelerator pedal position sensor 2 Engine stopped Shift lever position is “D” Accelerator pedal fully released More than 0.18V Ignition switch “ON” Engine stopped Shift lever position is “D” Accelerator pedal fully depressed Less than 2.37V Diagnostic Procedure 1 RETIGHTEN GROUND SCREWS 1. Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws. SEC690C c GO TO 2. EC-411 DTC P2127, P2128 APP TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure (Cont’d) 2 CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT 1. Disconnect accelerator pedal position (APP) sensor harness connector. SEC182D 2. Turn ignition switch “ON”. 3. Check voltage between APP sensor terminal 10 and ground with CONSULT-II or tester. SEC674D Voltage: Approximately 2.5V OK or NG OK c GO TO 4. NG c GO TO 3. 3 DETECT MALFUNCTIONING PART Check the following. + Harness for open or short between ECM and accelerator pedal position sensor c Repair open circuit or short to ground or short to power in harness or connectors. 4 CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector. 3. Check harness continuity between APP sensor terminal 12 and ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 6. NG c GO TO 5. EC-412 DTC P2127, P2128 APP TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure (Cont’d) 5 DETECT MALFUNCTIONING PART Check the following. + Harness for open or short between ECM and accelerator pedal position sensor c Repair open circuit or short to ground or short to power in harness or connectors. 6 CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Check harness continuity between ECM terminal 117 and APP sensor terminal 11.

Refer to Wiring Diagram. Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 8. NG c GO TO 7. 7 DETECT MALFUNCTIONING PART Check the following.

+ Harness for open or short between ECM and accelerator pedal position sensor c Repair open circuit or short to ground or short to power in harness or connectors. 8 CHECK APP SENSOR Refer to EC-414, “Component Inspection”.
OK or NG OK c GO TO 10. NG c GO TO 9. 9 1. 2. 3. 4. REPLACE APP SENSOR Replace the accelerator pedal position sensor.
Perform EC-31, “Accelerator Pedal Released Position Learning”. Perform EC-31, “Throttle Valve Closed Position Learning”. Perform EC-31, “Idle Air Volume Learning”. c INSPECTION END 10 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”.
c INSPECTION END EC-413 DTC P2127, P2128 APP TB48DE A/T (WITH EURO-OBD) SENSOR Component Inspection ACCELERATOR PEDAL POSITION SENSOR 1. Reconnect all harness connectors disconnected. 2.
Turn ignition switch “ON”. 3. Check voltage between ECM terminals 87 (APP sensor 1 signal), 117 (APP sensor 2 signal) and engine ground under the following conditions. Terminal PBIB0184E Accelerator pedal Voltage 87 (Accelerator pedal position sensor 1) Fully released More than 0.36V Fully depressed Less than 4.75V 117 (Accelerator pedal position sensor 2) Fully released More than 0.18V Fully depressed Less than 2.37V 4. If NG, replace accelerator pedal assembly and go to the next step. 5. Perform EC-31, “Accelerator Pedal Released Position Learning”. 6.
Perform EC-31, “Throttle Valve Closed Position Learning”. 7. Perform EC-31, “Idle Air Volume Learning”. EC-414 DTC P2135 TP SENSOR TB48DE A/T (WITH EURO-OBD) Component Description PBIB0145E Electric Throttle Control Actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement. The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition. CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM THRTL SEN1 THRTL SEN2* CONDITION + Ignition switch: ON (Engine stopped) + Shift lever: D SPECIFICATION Accelerator pedal: Fully released More than 0.5V Accelerator pedal: Fully depressed Less than 1.5V *: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal. On Board Diagnosis Logic This self-diagnosis has the one trip detection logic. DTC No. P2135 2135 Trouble diagnosis name Throttle position sensor circuit range/performance problem DTC detecting condition Possible cause Rationally incorrect voltage is sent to ECM + Harness or connector (The TP sensor 1 and 2 circuit is open compared with the signals from TP sensor or shorted.) 1 and TP sensor 2. + Electric throttle control actuator (TP sensor 1 and 2) FAIL-SAFE MODE When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.
Engine operation condition in fail-safe mode The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor. EC-415 DTC P2135 TP SENSOR TB48DE A/T (WITH EURO-OBD) DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10V at idle. WITH CONSULT-II 1. 2. 3. 4. Turn ignition switch “ON”. Select “DATA MONITOR” mode with CONSULT-II. Start engine and let it idle for 1 second. If DTC is detected, go to EC-418, “Diagnostic Procedure”. SEF058Y WITH GST Follow the procedure “WITH CONSULT-II” above. EC-416 DTC P2135 TP SENSOR TB48DE A/T (WITH EURO-OBD) Wiring Diagram TEC400M EC-417 DTC P2135 TP TB48DE A/T (WITH EURO-OBD) SENSOR Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 89 B Sensor ground (Throttle position sensor) Warm-up condition. Idle speed Approximately 0V Ignition switch “ON” Engine stopped Shift lever position is “D” Accelerator pedal fully released 98 R/L Less than 4.75V Throttle position sensor 2 Ignition switch “ON” Engine stopped Shift lever position is “D” Accelerator pedal fully depressed 103 Y Sensor power supply (Throttle position sensor) Ignition switch “ON” More than 0.36V Approximately 5V Ignition switch “ON” Engine stopped Shift lever position is “D” Accelerator pedal fully released 108 L More than 0.36V Throttle position sensor 1 Ignition switch “ON” Engine stopped Shift lever position is “D” Accelerator pedal fully depressed Less than 4.75V Diagnostic Procedure 1 RETIGHTEN GROUND SCREWS 1. Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws. SEC690C c GO TO 2. EC-418 DTC P2135 TP TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure (Cont’d) 2 CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT 1. Disconnect electric throttle control actuator harness connector. SEC182D 2. Turn ignition switch “ON”. 3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester. PBIB0082E Voltage: Approximately 5V OK or NG OK c GO TO 4. NG c Repair open circuit or short to ground or short to power in harness or connectors. 3 CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”.
2.
Disconnect ECM harness connector. 3. Check harness continuity between electric throttle control actuator terminal 5 and engine ground. Refer to Wiring Diagram.
Continuity should exist. 4. Also check harness for short to ground and short to power.
OK or NG OK c GO TO 4. NG c Repair open circuit or short to ground or short to power in harness or connectors. 4 CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Check harness continuity between ECM terminal 108 and electric throttle control actuator terminal 4, ECM terminal 98 and electric throttle control actuator terminal 2. Refer to Wiring Diagram. Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c Repair open circuit or short to ground or short to power in harness or connectors.
EC-419 DTC P2135 TP TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure (Cont’d) 5 CHECK THROTTLE POSITION SENSOR Refer to EC-420, “Component Inspection”.
OK or NG OK c GO TO 7. NG c GO TO 6.
6 REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. 2. 3. 4. Replace the electric throttle control actuator. Perform EC-31, “Accelerator Pedal Released Position Learning”. Perform EC-31, “Throttle Valve Closed Position Learning”. Perform EC-31, “Idle Air Volume Learning”. c INSPECTION END 7 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END Component Inspection THROTTLE POSITION SENSOR 1. 2. 3. 4. 5. PBIB0179E Reconnect all harness connectors disconnected. Perform EC-31, “Throttle Valve Closed Position Learning”. Turn ignition switch “ON”. Set selector lever to “D” position. Check voltage between ECM terminals 108 (TP sensor 1 signal), 98 (TP sensor 2 signal) and engine ground under the following conditions.
Terminal Accelerator pedal Voltage 108 (Throttle position sensor 1) Fully released More than 0.36V Fully depressed Less than 4.75V 98 (Throttle position sensor 2) Fully released Less than 4.75V Fully depressed More than 0.36V 6. If NG, replace electric throttle control actuator and go to the next step. 7. Perform EC-31, “Accelerator Pedal Released Position Learning”. 8. Perform EC-31, “Throttle Valve Closed Position Learning”.
9. Perform EC-31, “Idle Air Volume Learning”. EC-420 DTC P2138 APP SENSOR TB48DE A/T (WITH EURO-OBD) Component Description PBIB0146E The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM. Accelerator pedal position sensor has two sensors.
These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals. Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut. CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM ACCEL SEN1 ACCEL SEN2* CLSD THL POS CONDITION SPECIFICATION + Ignition switch: ON (engine stopped) + Shift lever position is “D” Accelerator pedal: Fully released More than 0.36V Accelerator pedal: Fully depressed Less than 4.75V + Ignition switch: ON (engine stopped) + Shift lever position is “D” Accelerator pedal: Fully released ON Accelerator pedal: Slightly depressed OFF *: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal. On Board Diagnosis Logic This self-diagnosis has the one trip detection logic. DTC No. P2138 2138 Trouble diagnosis name DTC detecting condition Possible cause Accelerator pedal position Rationally incorrect voltage is sent to ECM + Harness or connector (The APP sensor 1 and 2 circuit is open compared with the signals from APP sensensor circuit range/ or shorted.) sor 1 and APP sensor 2. performance problem + Accelerator pedal position sensor 1 and 2 FAIL-SAFE MODE When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up. Engine operating condition in fail-safe mode The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of throttle valve to be slower than the normal condition. So, the acceleration will be poor. EC-421 DTC P2138 APP SENSOR TB48DE A/T (WITH EURO-OBD) DTC Confirmation Procedure NOTE: If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10V at idle. WITH CONSULT-II 1. 2.
3. 4.
Turn ignition switch “ON”.
Select “DATA MONITOR” mode with CONSULT-II. Start engine and let it idle for 1 second. If DTC is detected, go to EC-425, “Diagnostic Procedure”. SEF058Y WITH GST Follow the procedure “WITH CONSULT-II” above. EC-422 DTC P2138 APP SENSOR TB48DE A/T (WITH EURO-OBD) Wiring Diagram TEC403M EC-423 DTC P2138 APP TB48DE A/T (WITH EURO-OBD) SENSOR Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Ignition switch “ON” 87 W Accelerator pedal position sensor 1 Engine stopped Shift lever position is “D” Accelerator pedal fully released More than 0.36V Ignition switch “ON” Engine stopped Shift lever position is “D” Accelerator pedal fully depressed Less than 4.75V Engine is running. 89 B Sensor ground (Accelerator pedal position sensor 1) 94 LG Sensor power supply (Accelerator pedal position sensor 2) Ignition switch “ON” Approximately 2.5V 100 R Sensor ground (Accelerator pedal position sensor 2) Ignition switch “ON” Approximately 0V 103 Y Sensor power supply (Accelerator pedal position sensor 1) Ignition switch “ON” Approximately 5V Warm-up condition. Idle speed Approximately 0V Ignition switch “ON” 117 G Accelerator pedal position sensor 2 Engine stopped Shift lever position is “D” Accelerator pedal fully released More than 0.18V Ignition switch “ON” Engine stopped Shift lever position is “D” Accelerator pedal fully depressed EC-424 Less than 2.37V DTC P2138 APP SENSOR TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure 1 RETIGHTEN GROUND SCREWS 1.
Turn ignition switch “OFF”. 2.
Loosen and retighten engine ground screws. SEC690C c GO TO 2. 2 CHECK APP SENSOR POWER SUPPLY CIRCUIT 1. Disconnect accelerator pedal position (APP) sensor harness connector.
SEC182D 2. Turn ignition switch “ON”. 3. Check voltage between APP sensor terminals 7, 10 and ground with CONSULT-II or tester. PBIB0084E Voltage: Approximately 5V OK or NG OK c GO TO 4. NG c GO TO 3. EC-425 DTC P2138 APP TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure (Cont’d) 3 DETECT MALFUNCTIONING PART Check the following. + Harness for open or short between ECM and accelerator pedal position sensor c Repair open circuit or short to ground or short to power in harness or connectors. 4 CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector. 3. Check harness continuity between APP sensor terminals 9, 12 and ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 6. NG c GO TO 5. 5 DETECT MALFUNCTIONING PART Check the following. + Harness for open or short between ECM and accelerator pedal position sensor c Repair open circuit or short to ground or short to power in harness or connectors. 6 CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Check harness continuity between ECM terminal 87 and APP sensor terminal 8, ECM terminal 117 and APP sensor terminal 11. Refer to Wiring Diagram. Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 8. NG c GO TO 7. 7 DETECT MALFUNCTIONING PART Check the following. + Harness for open or short between ECM and accelerator pedal position sensor c Repair open circuit or short to ground or short to power in harness or connectors. 8 CHECK APP SENSOR Refer to EC-427, “Component Inspection”. OK or NG OK c GO TO 10.
NG c GO TO 9. 9 1.
2. 3. 4.
REPLACE APP SENSOR Replace the accelerator pedal position sensor. Perform EC-31, “Accelerator Pedal Released Position Learning”. Perform EC-31, “Throttle Valve Closed Position Learning”. Perform EC-31, “Idle Air Volume Learning”. c INSPECTION END EC-426 DTC P2138 APP SENSOR 10 TB48DE A/T (WITH EURO-OBD) CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. Component Inspection ACCELERATOR PEDAL POSITION SENSOR 1. Reconnect all harness connectors disconnected. 2. Turn ignition switch “ON”. 3. Check voltage between ECM terminals 87 (APP sensor 1 signal), 117 (APP sensor 2 signal) and engine ground under the following conditions. Terminal PBIB0184E Accelerator pedal Voltage 87 (Accelerator pedal position sensor 1) Fully released More than 0.36V Fully depressed Less than 4.75V 117 (Accelerator pedal position sensor 2) Fully released More than 0.18V Fully depressed Less than 2.37V 4. If NG, replace accelerator pedal assembly and go to the next step. 5. Perform EC-31, “Accelerator Pedal Released Position Learning”. 6.
Perform EC-31, “Throttle Valve Closed Position Learning”.
7. Perform EC-31, “Idle Air Volume Learning”. EC-427 IGNITION SIGNAL TB48DE A/T (WITH EURO-OBD) Component Description IGNITION COIL & POWER TRANSISTOR The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns on and off the ignition coil primary circuit. This on-off operation induces the proper high voltage in the coil secondary circuit. SEC781C EC-428 IGNITION SIGNAL TB48DE A/T (WITH EURO-OBD) Wiring Diagram TEC415M EC-429 TB48DE A/T (WITH EURO-OBD) IGNITION SIGNAL Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. Ignition switch “OFF” 42 B/Y ECM relay (Self shut-off) 0 - 1.0V For a few seconds after turning ignition switch “OFF” Ignition switch “OFF” More than a few seconds passed after turning ignition switch “OFF” 163 166 B/R B/R Power supply for ECM Ignition switch “OFF” EC-430 BATTERY VOLTAGE (11 - 14V) BATTERY VOLTAGE (11 - 14V) TB48DE A/T (WITH EURO-OBD) IGNITION SIGNAL Wiring Diagram (Cont’d) TEC416M EC-431 TB48DE A/T (WITH EURO-OBD) IGNITION SIGNAL Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) 0 - 0.1V★ Engine is running. Warm-up condition. Idle speed 18 19 20 Y/R G Y Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 3 PBIB0521E 0 - 0.2V★ Engine is running. Warm-up condition. Engine speed is 2,000 rpm PBIB0522E ★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.) EC-432 TB48DE A/T (WITH EURO-OBD) IGNITION SIGNAL Wiring Diagram (Cont’d) TEC417M EC-433 TB48DE A/T (WITH EURO-OBD) IGNITION SIGNAL Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage.
Doing so may result in damage to the ECM’s transistor.
Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) 0 - 0.1V★ Engine is running. Warm-up condition. Idle speed 21 29 30 R/B R/G R Ignition signal No. 4 Ignition signal No. 5 Ignition signal No. 6 PBIB0521E 0 - 0.2V★ Engine is running. Warm-up condition. Engine speed is 2,000 rpm PBIB0522E ★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.) EC-434 IGNITION SIGNAL TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure 1 CHECK ENGINE START Turn ignition switch “OFF”, and restart engine.
Is engine running? Yes or No Yes (With CONSULT-II) c GO TO 2. Yes (Without CONSULT-II) c GO TO 3. No c GO TO 4. 2 CHECK OVERALL FUNCTION With CONSULT-II 1.
Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II. 2. Make sure that each circuit produces a momentary engine speed drop. PBIB0133E OK or NG OK c INSPECTION END NG c GO TO 13. EC-435 TB48DE A/T (WITH EURO-OBD) IGNITION SIGNAL Diagnostic Procedure (Cont’d) 3 CHECK OVERALL FUNCTION Without CONSULT-II 1. Let engine idle. 2. Read the voltage signal between ECM terminals 18, 19, 20, 21, 29, 30 and ground with an oscilloscope. SEC828C 3. Verify that the oscilloscope screen shows the signal wave as shown below. PBIB0521E OK or NG OK c INSPECTION END NG c GO TO 13. 4 CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I 1. Turn ignition switch “ON”. 2. Check voltage between ECM terminals 163, 166 and ground with CONSULT-II or tester. PBIB0135E Voltage: Battery voltage OK or NG OK c GO TO 5. NG c Go to EC-113, “POWER SUPPLY CIRCUIT FOR ECM”. EC-436 TB48DE A/T (WITH EURO-OBD) IGNITION SIGNAL Diagnostic Procedure (Cont’d) 5 1. 2. 3. 4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II Turn ignition switch “OFF”. Disconnect condenser harness connector. Turn ignition switch “ON”. Check voltage between condenser terminal 1 and ground with CONSULT-II or tester. PBIB0624E Voltage: Battery voltage OK or NG OK c GO TO 11. NG c GO TO 6. 6 CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III 1.
Turn ignition switch “OFF”. 2. Disconnect ECM relay. SEC668D 3. Check harness continuity between ECM relay terminal 3 and condenser terminal 1. Refer to Wiring Diagram.
Continuity should exist.
4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 8. NG c GO TO 7. 7 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M55, F35 + Harness for open or short between ECM relay and condenser c Repair open circuit or short to ground or short to power in harness or connectors. EC-437 TB48DE A/T (WITH EURO-OBD) IGNITION SIGNAL Diagnostic Procedure (Cont’d) 8 CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV Check voltage between ECM relay terminal 5 and ground with CONSULT-II or tester. SEC741D Voltage: Battery voltage OK or NG OK c GO TO 10. NG c GO TO 9. 9 DETECT MALFUNCTIONING PART Check the following.
+ Harness connectors E127, M21 + 15A fuse + Harness for open or short between ECM relay and battery c Repair or replace harness or connectors. 10 CHECK ECM RELAY Refer to EC-112, “Component Inspection”. OK or NG OK c GO TO 20. NG c Replace ECM relay. 11 CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Disconnect condenser harness connector. 3. Check harness continuity between condenser terminal 2 and ground. Refer to Wiring diagram. Continuity should exist. 4. Also check harness for short to power. OK or NG OK c GO TO 12. NG c Repair open circuit or short to power in harness or connector. 12 CHECK CONDENSER Refer to EC-441, “Component Inspection”. OK or NG OK c GO TO 13.
NG c Replace condenser. EC-438 TB48DE A/T (WITH EURO-OBD) IGNITION SIGNAL Diagnostic Procedure (Cont’d) 13 CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V 1. Turn ignition switch “OFF”. 2. Reconnect all harness connectors disconnected. 3. Disconnect ignition coil harness connector.
SEC783C SEC784C 4.
Turn ignition switch “ON”. 5. Check voltage between ignition coil terminal 1 and ground with CONSULT-II or tester. SEF107S Voltage: Battery voltage OK or NG OK c GO TO 15. NG c GO TO 14. 14 DETECT MALFUNCTIONING PART Check the following. + Harness connectors F25, F121 + Harness for open or short between ignition coil and ECM relay c Repair open circuit or short to ground or short to power in harness or connectors. EC-439 TB48DE A/T (WITH EURO-OBD) IGNITION SIGNAL Diagnostic Procedure (Cont’d) 15 CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Check harness continuity between ignition coil terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power. OK or NG OK c GO TO 17. NG c GO TO 16.
16 DETECT MALFUNCTIONING PART Check the following.
+ Harness connectors F25, F121 + Harness for open or short between ignition coil and ground c Repair open circuit or short to power in harness or connectors.
17 CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1.
Disconnect ECM harness connector. 2.
Check harness continuity between ECM terminals 18, 19, 20, 21, 29, 30 and ignition coil terminal 3. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 19. NG c GO TO 18.
18 DETECT MALFUNCTIONING PART Check the following. + Harness connectors F25, F121 + Harness for open or short between ECM and ignition coil c Repair open circuit or short to ground or short to power in harness or connectors.
19 CHECK IGNITION COIL WITH POWER TRANSISTOR Refer to EC-441, “Component Inspection”. OK or NG OK c GO TO 20. NG c Replace ignition coil with power transistor.
20 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END EC-440 IGNITION SIGNAL TB48DE A/T (WITH EURO-OBD) Component Inspection ECM RELAY 1. Apply 12V direct current between ECM relay terminals 1 and 2. 2.
Check continuity between relay terminals 3 and 5, 6 and 7. Condition PBIB0077E Continuity 12V direct current supply between terminals 1 and 2 Yes OFF No 3. If NG, replace ECM relay. CONDENSER 1. Turn ignition switch “OFF”. 2. Disconnect condenser harness connector.
3. Check resistance between condenser terminals 1 and 2. Resistance: Above 1 MΩ at 25°C (77°F) MBIB0031E IGNITION COIL WITH POWER TRANSISTOR 1. Turn ignition switch “OFF”. 2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.
Terminal No. 3 and 1 Resistance Ω [at 25°C (77°F)] Except 0 or 3 and 2 Except 0 1 and 2 MBIB0032E EC-441 SNOW MODE SWITCH TB48DE A/T (WITH EURO-OBD) Component Description To turn on the switch, push the lower side of it. The indicator light of the switch will illuminate and the transmission shifts into the snow driving mode. + This mode is used for standing starts on slippery (snowy, sandy) roads. + When the selector lever is in the D position, the transmission shifts from 1st to 5th gear automatically from standing starts or when accelerating from low speed. SEC222D ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor.
Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC voltage) Ignition switch “ON” 60 Y/G Snow mode switch Snow mode switch is snow position. Snow switch is “ON”. Battery voltage (11 - 14V) Ignition switch “ON” Approximately 0V Except above switch position EC-442 SNOW MODE SWITCH TB48DE A/T (WITH EURO-OBD) Wiring Diagram TEC332M EC-443 SNOW MODE SWITCH TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure INSPECTION START . OK CHECK OVERALL FUNCTION. 1. Turn ignition switch “ON”. 2. Check voltage as follows.
Snow mode switch SEC188D c ECM terminal V 60 voltage AUTO 0V SNOW 11 - 14 V (Battery voltage) Snow mode switch NG Ab V CHECK SNOW INDICATOR LAMP. 1. Turn ignition switch “ON”. 2. Check snow indicator lamp as follows. NG Snow indicator lamp AUTO OFF SNOW ON . OK INSPECTION END . CHECK POWER SUPPLY FOR SNOW MODE SWITCH. 1. Turn ignition switch “OFF”. 2. Disconnect snow mode switch harness connector. 3. Turn ignition switch “ON”. 4. Check voltage between snow mode switch terminal V 2 and ground. Battery voltage NG c OK . CHECK INPUT SIGNAL CIRCUIT-I.
1. Turn ignition switch “OFF”. 2.
Disconnect ECM harness connector. 3. Check harness continuity between snow mode switch terminal V 1 and ECM terminal V 60 . Refer to Wiring Diagram. Continuity should exist.
4. Check harness continuity between ECM terminal V 60 and snow mode switch terminal V 6 . Refer to wiring diagram. Continuity should exist.
5. Also check harness for short to ground and short to power. If OK, reconnect ECM harness connector. . NG c Check the following. + 7.5A fuse + Harness connectors M20 , B19 + Harness for open or short between snow mode switch and fuse. If NG, repair open circuit, short to ground or short to power in harness or connectors. Check the following. + Harness connector B19 , M20 + Harness connector M52 , F7 + Harness for open or short between snow mode switch and ECM If NG, repair open circuit, short to ground or short to power in harness or connectors. OK NG Check the following. CHECK GROUND CIRCUIT. c + Harness connector B19 , 1. Check harness continuity between snow M20 mode switch harness connector terminal 7 and ground. + Harness for open or V Refer to Wiring Diagram. short between snow Continuity should exist. mode switch and ground. If OK, check harness for short to power. If NG, repair open circuit, short to power in harness OK or connectors. . CHECK INTERMITTENT INCIDENT. Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-112. . INSPECTION END EC-444 SNOW MODE SWITCH TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure (Cont’d) A V . CHECK SNOW INDICATOR LAMP INPUT SIGNAL CIRCUIT. 1. Check continuity between snow mode switch terminal V 1 and V 6 . Refer to wiring diagram. Continuity should exist. 2. Also check harness for short to ground and short to power. NG c Repair open circuit, short to ground or short to power in harness or connectors. OK . CHECK SNOW INDICATOR LAMP GROUND. 1. Check harness continuity between snow mode switch terminal V 7 and ground. Refer to wiring diagram. Continuity should exist. NG c OK . CHECK SNOW INDICATOR LAMP. Refer to EL or AT section.
OK . INSPECTION END EC-445 NG c Check the following. + Harness connectors B19 , M20 + Harness for open or short between snow mode switch and ground If NG, repair open circuit, short to power in harness or connectors. Replace snow indicator lamp or snow mode switch assembly. VARIABLE INDUCTION AIR CONTROL TB48DE A/T (WITH EURO-OBD) SYSTEM (VIAS) Description SYSTEM DESCRIPTION Sensor Input Signal to ECM Mass air flow sensor Amount of intake air Throttle position sensor Throttle position Accelerator pedal position sensor Accelerator pedal position Ignition switch Start signal Camshaft position sensor Engine speed Engine coolant temperature sensor Engine coolant temperature ECM function VIAS control Actuator VIAS control solenoid valve SEC802C When the engine is running at low or medium speed, the ECM sends the signal to the VIAS control solenoid valve then power valve is fully closed.
Under this condition, the effective suction port length is equivalent to the total length of the intake manifold collector’s suction port including the intake valve. This long suction port provides increased air intake which results in improved suction efficiency and higher torque generation. The surge tank and one-way valve are provided. When engine is running at high speed, the ECM does not send the signal to the VIAS control solenoid valve, thus enabling power valve to be fully opened. This signal introduces the intake manifold vacuum into the power valve actuator and therefore opens the power valve to two suction passages together in the collector. Under this condition, the effective port length is equivalent to the EC-446 VARIABLE INDUCTION AIR CONTROL TB48DE A/T (WITH EURO-OBD) SYSTEM (VIAS) Description (Cont’d) length of the suction port provided independently for each cylinder. This shortened port length results in enhanced engine output with reduced suction resistance under high speeds. COMPONENT DESCRIPTION Power valve The power valve is installed in intake manifold collector and used to control the suction passage of the variable induction air control system. It is set in the fully closed or fully opened position by the power valve actuator operated by the vacuum stored in the surge tank. The vacuum in the surge tank is controlled by the VIAS control solenoid valve. SEC803C VIAS control solenoid valve The VIAS control solenoid valve cuts the intake manifold vacuum signal for power valve control. It responds to ON/OFF signals from the ECM.
When the solenoid is off, the vacuum signal from the intake manifold is for high speed. When the ECM sends an ON signal the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator. SEC804C ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage.
Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.
TERMINAL NO. WIRE COLOR ITEM CONDITION Engine is running. 27 LG/R VIAS control solenoid valve Idle speed DATA (DC Voltage) BATTERY VOLTAGE (11 - 14V) Engine is running. 0 - 1.0V Engine speed is above 5,000 rpm. EC-447 VARIABLE INDUCTION AIR CONTROL TB48DE A/T (WITH EURO-OBD) SYSTEM (VIAS) Wiring Diagram TEC161M EC-448 VARIABLE INDUCTION AIR CONTROL TB48DE A/T (WITH EURO-OBD) SYSTEM (VIAS) Diagnostic Procedure INSPECTION START . CHECK OVERALL FUNCTION. SEC805C OK c INSPECTION END With CONSULT-II 1.
Start engine and warm it up to normal operating temperature. 2. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.
3. Turn VIAS control solenoid valve “ON” and “OFF”, and make sure that power valve actuator rod moves. Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2.
Rev engine quickly up to above 5,000 rpm and make sure that power valve actuator rod moves. NG . SEC806C NG Check the following. CHECK VIAS CONTROL SOLENOID c + Harness connectors VALVE POWER SUPPLY CIRCUIT. M52 , F7 1. Stop engine. 2. Disconnect VIAS control solenoid valve + 10A fuse harness connector. + Harness continuity 3. Turn ignition switch “ON”. between fuse and VIAS 4. Check voltage between terminal V control solenoid valve 1 and If NG, repair harness or ground with CONSULT-II or tester. connectors. Voltage: Battery voltage .
SEC804C OK CHECK VIAS CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT. 1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector. 3.
Check harness continuity between ECM terminal V 27 and terminal V 2 .
Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. . . OK Replace VIAS control solenoid valve as intake manifold collector assembly. EC-449 Repair open circuit or short to ground or short to power in harness or connectors. OK c INSPECTION END NG CHECK INTERMITTENT INCIDENT.
Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-112. . c OK RETEST OVERALL FUNCTION. 1. Reconnect harness connectors disconnected.
2. Perform CHECK OVERALL FUNCTION again. SEC807C NG NG c Repair or replace harness or connectors. START SIGNAL TB48DE A/T (WITH EURO-OBD) CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM START SIGNAL CONDITION SPECIFICATION + Ignition switch: ON → START → ON OFF → ON → OFF ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. 59 WIRE COLOR R/W ITEM CONDITION DATA (DC Voltage) Ignition switch “ON” Approximately 0V Ignition switch “START” 9 - 12V Start signal EC-450 START SIGNAL TB48DE A/T (WITH EURO-OBD) Wiring Diagram TEC163M EC-451 START SIGNAL TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure INSPECTION START . CHECK OVERALL FUNCTION. OK c INSPECTION END With CONSULT-II PBIB0182E 1. Turn ignition switch “ON”. 2. Check “START SIGNAL” in “DATA MONITOR” mode with CONSULT-II.
IGN “ON” IGN “START” OFF ON -- OR --Without CONSULT-II SEC824C 1. Turn ignition switch to “START”.
2. Check voltage between ECM terminal 59 and ground. V Voltage: Ignition switch “START” Battery voltage (9 - 12V) Except above Approximately 0V NG .
Check if 7.5A fuse is OK. NG c Replace 7.5A fuse.
OK . NG Check the following. CHECK INPUT SIGNAL CIRCUIT. c + Harness connectors 1. Turn ignition switch “OFF”. M52 , F7 2. Disconnect ECM harness connector and + Harness for open or 7.5A fuse. short between ECM and 3. Check harness continuity between ECM fuse block terminal V 59 and fuse block. If NG, repair open circuit, Refer to Wiring Diagram. short to ground or short to Continuity should exist. power in harness or conIf OK, check harness for short to ground nectors. and short to power. OK .
CHECK INTERMITTENT INCIDENT. Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-112. . INSPECTION END EC-452 INJECTOR CIRCUIT TB48DE A/T (WITH EURO-OBD) Component Description The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs. SEF375Z CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM B/FUEL SCHDL INJ PULSE-B1 INJ PULSE-B2 CONDITION SPECIFICATION + + + + Engine: After warming up Shift lever: N Air conditioner switch: OFF No-load Idle 5.0 - 5.5 msec 2,000 rpm 5.0 - 5.5 msec + + + + Engine: After warming up Shift lever: N Air conditioner switch: OFF No-load Idle 3.0 - 4.0 msec 2,000 rpm 3.0 - 4.0 msec EC-453 INJECTOR CIRCUIT TB48DE A/T (WITH EURO-OBD) Wiring Diagram TEC162M EC-454 INJECTOR CIRCUIT TB48DE A/T (WITH EURO-OBD) Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground.
CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor.
Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) BATTERY VOLTAGE (11 - 14V)★ Engine is running. Warm-up condition. Idle speed 5 6 7 13 14 15 BR/W GY/L BR/Y GY/R BR GY Injector Injector Injector Injector Injector Injector No. No. No. No. No. No. 1 2 3 4 5 6 PBIB0529E BATTERY VOLTAGE (11 - 14V)★ Engine is running. Warm-up condition. Engine speed is 2,000 rpm PBIB0530E ★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.) Diagnostic Procedure 1 INSPECTION START Turn ignition switch to “START”. Is any cylinder ignited? Yes or No Yes c GO TO 2. No c GO TO 3. EC-455 INJECTOR CIRCUIT TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure (Cont’d) 2 CHECK OVERALL FUNCTION With CONSULT-II 1. Start engine. 2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II. PBIB0133E 3. Make sure that each circuit produces a momentary engine speed drop. Without CONSULT-II
1. Start engine.
2. Listen to each injector operating sound. MEC703B Clicking noise should be heard.
OK or NG OK c INSPECTION END NG c GO TO 3. EC-456 INJECTOR CIRCUIT TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure (Cont’d) 3 CHECK INJECTOR POWER SUPPLY CIRCUIT 1.
Turn ignition switch “OFF”. 2.
Disconnect injector harness connector. SEC793C 3. Turn ignition switch “ON”. 4. Check voltage between injector terminal 2 and ground with CONSULT-II or tester. PBIB0289E Voltage: Battery voltage OK or NG OK c GO TO 5. NG c GO TO 4. 4 DETECT MALFUNCTIONING PART Check the following. + Harness connectors F12, F101 + Harness connectors M52, F7 + Fuse block (J/B) connector M2 + 10A fuse + Harness for open or short between injector and fuse c Repair open circuit or short to ground or short to power in harness or connectors. 5 CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector. 3. Check harness continuity between injector terminal 1 and ECM terminals 5, 6, 7, 13, 14, 15. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 7.
NG c GO TO 6. EC-457 INJECTOR CIRCUIT TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure (Cont’d) 6 DETECT MALFUNCTIONING PART Check the following. + Harness connectors F101, F12 + Harness for open or short between ECM and injector c Repair open circuit or short to ground or short to power in harness or connectors. 7 CHECK INJECTOR Refer to EC-458, “Component Inspection”. OK or NG OK c GO TO 8. NG c Replace injector. 8 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. c INSPECTION END Component Inspection INJECTOR 1. Disconnect injector harness connector. 2. Check resistance between terminals as shown in the figure. Resistance: 13.5 - 17.5Ω [at 20°C (68°F)] SEC809C EC-458 FUEL PUMP TB48DE A/T (WITH EURO-OBD) System Description Engine speed Camshaft position sensor c ECM Start signal Ignition switch c Fuel pump relay c The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine storability. If the ECM receives a 120° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to operate. If the 120° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump. Condition Fuel pump operation Ignition switch is turned to ON. Engine running and cranking Operates for 5 seconds. Operates. When engine is stopped Stops in 1 second. Except as shown above Stops. Component Description The fuel pump with a fuel damper is an in-tank type (the pump and damper are located in the fuel tank). SEF609V CONSULT-II Reference Value in Data Monitor Mode Remarks: Specification data are reference values. MONITOR ITEM FUEL PUMP RLY CONDITION SPECIFICATION + Ignition switch is turned to ON (Operates for 5 seconds). + Engine running and cranking + When engine is stopped (Stops in 1 second) ON Except as shown above OFF EC-459 FUEL PUMP TB48DE A/T (WITH EURO-OBD) ECM Terminals and Reference Value Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor.
Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC voltage) Ignition switch “ON” 41 R/Y Fuel pump relay For 5 seconds after turning ignition switch “ON” Engine is running. 0 - 1.0V Ignition switch “ON” BATTERY VOLTAGE (11 - 14V) 5 seconds after turning ignition switch “ON” EC-460 FUEL PUMP TB48DE A/T (WITH EURO-OBD) Wiring Diagram TEC164M EC-461 FUEL PUMP TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure INSPECTION START . SEC810C CHECK OVERALL FUNCTION. 1. Turn ignition switch “ON”. 2. Pinch fuel feed hose with fingers. Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned “ON”.
OK c INSPECTION END NG . CHECK POWER SUPPLY. 1. Turn ignition switch “OFF”. 2. Disconnect fuel pump relay. 3.
Turn ignition switch “ON”. 1 , 4. Check voltage between terminals V 3 and ground with CONSULT-II or V tester. Voltage: Battery voltage NG c Check the following. + 15A fuse + Harness for open or short between fuse and fuel pump relay If NG, repair harness or connectors. OK SEC684CA . CHECK GROUND CIRCUIT-I. 1. Turn ignition switch “OFF”. 2. Disconnect fuel tank gauge unit (fuel pump) harness connector. 3. Check harness continuity between terminal V 6 and body ground. NG c Refer to Wiring Diagram.
Continuity should exist. If OK, check harness for short to power. Check the following. + Harness connectors C2 , B37 + Harness for open or short between fuel pump and body ground If NG, repair open circuit, short to power in harness or connectors.
OK SEF479P . CHECK GROUND CIRCUIT-II. 1. Turn ignition switch “OFF”. 2. Check harness continuity between relay terminal V 5 and fuel pump terminal V 4 . Refer to Wiring Diagram.
Continuity should exist. If OK, check harness for short to ground and short to power. OK SEF608V . A V (Go to next page.) EC-462 NG c Check the following. + Harness connectors M20 , B19 + Harness connectors B137 , C2 + Harness for open or short between fuel pump and fuel pump relay If NG, repair open circuit, short to ground or short to power in harness or connectors. TB48DE A/T (WITH EURO-OBD) FUEL PUMP Diagnostic Procedure (Cont’d) A V . CHECK OUTPUT SIGNAL CIRCUIT. 1. Disconnect ECM harness connector.
2. Check harness continuity between ECM 41 and fuel pump relay termiterminal V nal V 2 . Refer to Wiring Diagram. SEF073Y NG c Continuity should exist. If OK, check harness for short to ground and short to power. OK Check the following. + Harness connectors M52 , F7 + Harness for open or short between ECM and fuel pump relay If NG, repair open circuit, short to ground or short to power in harness or connectors.
. CHECK COMPONENT (Fuel pump relay). NG c Replace fuel pump relay. With CONSULT-II 1. Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector. 2. Turn ignition switch “ON”. 3. Turn fuel pump relay “ON” and “OFF” in “ACTIVE TEST” mode with CONSULT-II and check operating sound.
-- OR --Without CONSULT-II Refer to “COMPONENT INSPECTION”, EC-464. OK . CHECK COMPONENT (Fuel pump). Refer to “COMPONENT INSPECTION”, EC-464. OK . CHECK INTERMITTENT INCIDENT.
Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-112.
. INSPECTION END EC-463 NG c Replace fuel pump. FUEL PUMP TB48DE A/T (WITH EURO-OBD) Component Inspection FUEL PUMP RELAY Check continuity between terminals V 3 and V 5 . Conditions SEF511P Continuity 12V direct current supply between terminals V 1 and V 2 Yes No current supply No If NG, replace relay. FUEL PUMP 1.
Disconnect fuel pump harness connector.
4 and V 6 .
2.
Check resistance between terminals V Resistance: 0.2 - 5.0Ω at 25°C (77°F) If NG, replace fuel pump. SEF607V EC-464 REFRIGERANT PRESSURE TB48DE A/T (WITH EURO-OBD) SENSOR Component Description The refrigerant pressure sensor is installed at the liquid tank of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system. SEC742D SEF099X EC-465 REFRIGERANT PRESSURE TB48DE A/T (WITH EURO-OBD) SENSOR Wiring Diagram TEC341M EC-466 REFRIGERANT PRESSURE TB48DE A/T (WITH EURO-OBD) SENSOR Wiring Diagram (Cont’d) Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Engine is running. 88 R/G Refrigerant pressure sensor B Sensor ground (Refrigerant pressure sensor) Engine is running. 89 103 Y Sensors’ power supply Ignition switch “ON” Warm-up condition. Both A/C switch and blower switch are “ON”. (Compressor operates.) Warm-up condition. Idle speed 1.0 - 4.0V Approximately 0V Approximately 5V Diagnostic Procedure 1 CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION 1. Start engine and warm it up to normal operating temperature. 2. Turn A/C switch and blower switch “ON”. 3. Check voltage between ECM terminal 88 and ground with CONSULT-II or tester.
PBIB0187E Voltage: 1.0 - 4.0V OK or NG OK c INSPECTION END NG c GO TO 2.
EC-467 REFRIGERANT PRESSURE TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure (Cont’d) 2 CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT 1. Turn A/C switch and blower switch “OFF”. 2. Stop engine. 3. Disconnect refrigerant pressure sensor harness connector. SEC742D 4. Turn ignition switch “ON”. 5. Check voltage between refrigerant pressure sensor terminal 1 and ground with CONSULT-II or tester. PBIB0085E Voltage: Approximately 5V OK or NG OK c GO TO 4. NG c GO TO 3. 3 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + Harness connectors M51, F6 + Harness for open or short between ECM and refrigerant pressure sensor c Repair open circuit or short to ground or short to power in harness or connectors. 4 CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector. 3.
Check harness continuity between refrigerant pressure sensor terminal 3 and ground. Refer to Wiring Diagram. Continuity should exist.
4. Also check harness for short to ground and short to power.
OK or NG OK c GO TO 6. NG c GO TO 5. EC-468 REFRIGERANT PRESSURE TB48DE A/T (WITH EURO-OBD) SENSOR Diagnostic Procedure (Cont’d) 5 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + Harness connectors M51, F6 + Harness for open or short between ECM and refrigerant pressure sensor c Repair open circuit or short to ground or short to power in harness or connectors. 6 CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN ANDSHORT 1.
Check harness continuity between ECM terminal 88 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram. Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 8. NG c GO TO 7. 7 DETECT MALFUNCTIONING PART Check the following.
+ Harness connectors E127, M21 + Harness connectors M51, F6 + Harness for open or short between ECM and refrigerant pressure sensor c Repair open circuit or short to ground or short to power in harness or connectors. 8 CHECK INTERMITTENT INCIDENT Refer to EC-112, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”. OK or NG OK c Replace refrigerant pressure sensor. NG c Repair or replace. EC-469 ELECTRICAL LOAD SIGNAL TB48DE A/T (WITH EURO-OBD) Description The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred through the CAN communication line from combination meter to ECM. CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM LOAD SIGNAL CONDITION + Ignition switch: ON SPECIFICATION Rear window defogger switch is ON and/or lighting switch is 2nd. ON Rear window defogger switch is OFF and lighting switch is OFF. OFF EC-470 ELECTRICAL LOAD SIGNAL TB48DE A/T (WITH EURO-OBD) Wiring Diagram TEC426M EC-471 ELECTRICAL LOAD TB48DE A/T (WITH EURO-OBD) SIGNAL Wiring Diagram (Cont’d) TEC371M EC-472 ELECTRICAL LOAD SIGNAL TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure 1 CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I With CONSULT-II With GST 1. Turn ignition switch “ON”. 2. Connect CONSULT-II or GST and select “DATA MONITOR” mode. 3. Select “LOAD SIGNAL” and check indication under the following conditions. PBIB0103E MTBL1594 OK or NG OK (With CONSULT-II) c GO TO 2. OK (Without CONSULT-II) c GO TO 3.

NG c GO TO 4. EC-473 ELECTRICAL LOAD TB48DE A/T (WITH EURO-OBD) SIGNAL Diagnostic Procedure (Cont'd) 2 CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II With CONSULT-II Check "LOAD SIGNAL" indication under the following conditions. PBIB0103E MTBL1595 OK or NG OK c INSPECTION END NG c GO TO 5. 3 CHECK REAR WINDOW DEFOGGER FUNCTION 1. Start engine. 2. Turn "ON" the rear window defogger switch. 3. Check the rear windshield. Is the rear windshield heated up? Yes or No Yes c GO TO 4. No c Check rear window defogger circuit. Refer to xx. 4 CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT 1. 2. 3. 4. Stop engine. Disconnect rear window defogger relay. Disconnect combination meter harness connector. Check harness continuity between rear window defogger relay terminal 5 and combination meter terminal 27. Refer to Wiring Diagram. Continuity should exist. 5. Also check harness for short to ground and short to power.

OK or NG OK c GO TO 6. NG c GO TO 5. 5 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + Harness for open or short between rear window defogger relay and combination meter c Repair open circuit or short to ground or short to power in harness or connectors. EC-474 ELECTRICAL LOAD TB48DE A/T (WITH EURO-OBD) SIGNAL Diagnostic Procedure (Cont'd) 6 CHECK COMBINATION METER Refer to EL section. OK or NG OK c GO TO 10. NG c Replace combination meter. 7 CHECK HEADLAMP FUNCTION 1. Start engine. 2. Lighting switch "ON" at 2nd position. 3. Check that headlamp high beams are illuminated. OK or NG OK c GO TO 8. NG c Check headlamp circuit. Refer to EL section. 8 1. 2. 3. 4. CHECK HEADLAMP INPUT SIGNAL CIRCUIT Stop engine.

Disconnect combination meter harness connector. Disconnect combination switch harness connector. Check harness continuity between combination switch terminals 6, 7 and combination meter terminal 26.

SEC761D MTBL1596 5. Also check harness for short to ground and short to power. OK or NG OK c GO TO 10. NG c GO TO 9. 9 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + Diode E108 + Harness for open or short between combination switch and combination meter c Repair open circuit or short to ground or short to power. EC-475 ELECTRICAL LOAD TB48DE A/T (WITH EURO-OBD) SIGNAL Diagnostic Procedure (Cont'd) 10 CHECK COMBINATION METER Refer to EL section. OK or NG OK c GO TO 11. NG c Replace combination meter.

11 CHECK INTERMITTENT INCIDENT Refer to EC-112, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT". c INSPECTION END EC-476 DATA LINK CONNECTORS TB48DE A/T (WITH EURO-OBD) Wiring Diagram TEC423M EC-477 EVAPORATIVE EMISSION TB48DE A/T (WITH EURO-OBD) SYSTEM Description SYSTEM DESCRIPTION PBIB0491E The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister. The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank. The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases. EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling. EC-478 EVAPORATIVE EMISSION TB48DE A/T (WITH EURO-OBD) SYSTEM Description (Cont'd) EVAPORATIVE EMISSION LINE DRAWING SEC665D EC-479 EVAPORATIVE EMISSION TB48DE A/T (WITH EURO-OBD) SYSTEM Component Inspection EVAP CANISTER Check EVAP canister as follows: 1. Block port C. Orally blow air through port A. Check that air flows freely through port B. 2. Block port A. Orally blow air through port C. Check that air flows freely through port B. SEF917W FUEL CHECK VALVE 1. Blow air through connector on fuel tank side. A considerable resistance should be felt and a portion of air flow should be directed toward the EVAP canister side. 2. Blow air through connector on EVAP canister side. Air flow should be smoothly directed toward fuel tank side.

3. If fuel check valve is suspected of not properly functioning in steps 1 and 2 above, replace it. SEF631V FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP) 1. Wipe clean valve housing. SEF989X 2. Check valve opening pressure and vacuum. Pressure: 16.0 - 20.0 kPa (0.16 - 0.200 bar, 0.163 - 0.204 kg/cm2, 2.32 - 2.90 psi) Vacuum: −6.0 to −3.5 kPa (−0.060 to −0.035 bar, −0.061 to −0.036 kg/cm2, −0.87 to −0.51 psi) 3. If out of specification, replace fuel filler cap as an assembly. SEF943S EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE Refer to EC-275, "Component Inspection". EC-480 POSITIVE CRANKCASE TB48DE A/T (WITH EURO-OBD) VENTILATION Description SYSTEM DESCRIPTION PBIB0492E This system returns blow-by gas to the intake manifold. The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold. During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve. Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover. Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction. On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions. SEC481D EC-481 POSITIVE CRANKCASE TB48DE A/T (WITH EURO-OBD) VENTILATION Component Inspection PCV (POSITIVE CRANKCASE VENTILATION) VALVE With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.

SEC137A PCV VALVE VENTILATION HOSE 1. Check hoses and hose connections for leaks.

2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace. ET277 EC-482 SERVICE DATA AND SPECIFICATIONS TB48DE A/T (WITH EURO-OBD) (SDS) Fuel Pressure Regulator Fuel pressure kPa (bar, kg/cm2, psi) At idle Approximately 245 (2.45, 2.5, 36) A few seconds after ignition switch is turned OFF to ON Approximately 294 (2.94, 3.0, 43) Idle Speed and Ignition Timing Idle speed rpm No-load*1 (in "N" position) Target idle speed Air conditioner: ON (in "N" position) 675±50 750 rpm or more Ignition timing 10°±5° BTDC *1: Under the following conditions: + Air conditioner switch: OFF + Steering wheel: Kept in straight-ahead position + Electrical load: OFF (Lights, heater fan & rear window defogger) Mass Air Flow Sensor Supply voltage V Battery voltage (11 - 14) Output voltage at idle V 0.75 - 1.5 at idle* 1.7 - 2.4 at 2,500 rpm* *: Engine is warmed up to normal operating temperature and running under no-load. Engine Coolant Temperature Sensor Temperature °C (°F) Resistance 20 (68) 2.1 - 2.9 kΩ 50 (122) 0.68 - 1.00 kΩ 90 (194) 0.236 - 0.260 kΩ Heated Oxygen Sensor 1 Resistance [at 25°C (77°F)] 3.3 - 4.0Ω Heated Oxygen Sensor 2 Resistance [at 25°C (77°F)] 5.0 - 7.0Ω Fuel Pump Resistance [at 25°C (77°F)] Ω 0.2 - 5.0 EC-483 SERVICE DATA AND SPECIFICATIONS TB48DE A/T (WITH EURO-OBD) (SDS) EVAP Canister Purge Volume Control Solenoid Valve Ω Resistance [at 20°C (68°F)] 31 - 35 Injector Ω Resistance [at 20°C (77°F)] 14.0 - 15.0 Ignition Coil with Power Transistor Resistance Ω [at 25°C (77°F)] Terminal No. (Polarity) 3 (+) - 2 (−) Except 0 or 1 (+) - 3 (−) Except 0 1 (+) - 2 (−) Condenser Resistance [at 25°C (77°F)] MΩ Above 1 Throttle Control Motor Resistance [at 25°C (77°F)] Approximately 1 - 15 Ω EC-484 ENGINE AND EMISSION CONTROL OVERALL SYSTEM ZD30DDTi Circuit Diagram TEC395M EC-485 TROUBLE DIAGNOSIS FOR POWER SUPPLY ZD30DDTi Main Power Supply and Ground Circuit TEC352M EC-486 DTC 0102 MASS AIR FLOW SEN ZD30DDTi Wiring Diagram TEC353M EC-487 DTC 0104 VEHICLE SPEED SEN ZD30DDTi Wiring Diagram TEC354M EC-488 DTC 0208 OVER HEAT ZD30DDTi Wiring Diagram TEC355M EC-489 DTC 0208 OVER HEAT ZD30DDTi Diagnostic Procedure 1 INSPECTION START Do you have CONSULT-II? Yes or No Yes c GO TO 2. No c GO TO 3. 2 CHECK COOLING FAN OPERATION With CONSULT-II 1.

Turn ignition switch "ON". 2. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.

SEF646X 3. Make sure that cooling fan-1 operates. OK or NG OK c GO TO 12. NG c GO TO 4.

3 1. 2.

3. 4. CHECK COOLING FAN OPERATION Without CONSULT-II Turn ignition switch "OFF". Disconnect engine coolant temperature sensor harness connector. Connect 150Ω resistor to engine coolant temperature sensor harness connector. Restart engine and make sure that cooling fan operates. MEC475B OK or NG OK c GO TO 12. NG c GO TO 4. EC-490 DTC 0208 OVER HEAT Diagnostic Procedure (Cont'd) 4 ZD30DDTi CHECK COOLING FAN POWER SUPPLY CIRCUIT 1. Turn ignition switch "OFF". 2. Disconnect cooling fan relay-1. SEF690V 3. Turn ignition switch "ON". 4. Check voltage between cooling fan relay-1 terminals 1, 3, 6 and ground with CONSULT-II or tester. SEC533D OK or NG OK c GO TO 6.

NG c GO TO 5. 5 DETECT MALFUNCTIONING PART Check the following.

+ Fuse block (J/B) connector E112 + 10A fuse or 20A fuse + 40A fusible links + Harness for open or short between cooling fan relay-1 and fuse + Harness for open or short between cooling fan relay-1 and battery c Repair open circuit or short to ground or short to power in harness or connectors. EC-491 DTC 0208 OVER HEAT Diagnostic Procedure (Cont'd) 6 ZD30DDTi CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Disconnect cooling fan motor-1 harness connector. SEF691V 3. Check harness continuity between cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1, cooling fan relay-1 terminal 7 and cooling fan motor-1 terminal 3, cooling fan motor-1 terminals 2, 4 and body ground. Refer to Wiring Diagram.

Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 7. NG c Repair open circuit or short to ground or short to power in harness or connectors. 7 CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 14 and cooling fan relay-1 terminal 2. Refer to Wiring Diagram. Continuity should exist.

3. Also check harness for short to ground and short to power. OK or NG OK c GO TO 9. NG c GO TO 8. 8 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + Harness connectors M52, F7 + Harness for open or short between cooling fan relay-1 and ECM c Repair open circuit or short to ground or short to power in harness or connectors. 9 CHECK COOLING FAN RELAY-1 Refer to "Component Inspection", EC-495. OK or NG OK c GO TO 10. NG c Replace cooling fan relay. EC-492 DTC 0208 OVER HEAT Diagnostic Procedure (Cont'd) 10 ZD30DDTi CHECK COOLING FAN MOTOR-1 Supply battery voltage between the following terminals and check operation. SEF645V MTBL1304 OK or NG OK c GO TO 11. NG c Replace cooling fan motor. 11 CHECK INTERMITTENT INCIDENT Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT". c INSPECTION END 12 CHECK COOLING SYSTEM FOR LEAK Apply pressure to the cooling system with a tester, and check if the pressure drops. Testing pressure: 98 kPa (0.98 bar, 1.0 kg/cm2, 14 psi) CAUTION: Higher than the specified pressure may cause radiator damage. SLC754A Pressure should not drop. OK or NG OK c GO TO 14. NG c GO TO 13. EC-493 DTC 0208 OVER HEAT Diagnostic Procedure (Cont'd) 13 ZD30DDTi DETECT MALFUNCTIONING PART Check the following for leak. + Hose + Radiator + Water pump (Refer to LC section, "Water Pump".) c Repair or replace.

14 CHECK RADIATOR CAP Apply pressure to cap with a tester and check radiator cap relief pressure. SLC755A Radiator cap relief pressure: 59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm2, 9 - 14 psi) OK or NG OK c GO TO 15. NG c Replace radiator cap. 15 CHECK THERMOSTAT 1. Remove thermostat. 2. Check valve seating condition at normal room temperatures. It should seat tightly. 3. Check valve opening temperature and valve lift. SLC343 Valve opening temperature: 82°C (180°F) [standard] (Models for cold areas) 76.5°C (170°F) [standard] (Models for except cold areas) Valve lift: More than 10 mm/95°C (0.394 in/203°F) 4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to LC section, "Thermostat". OK or NG OK c GO TO 16. NG c Replace thermostat. EC-494 ZD30DDTi DTC 0208 OVER HEAT Diagnostic Procedure (Cont'd) 16 CHECK ENGINE COOLANT TEMPERATURE SENSOR 1. Remove engine coolant temperature sensor. 2. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure. SEF304X OK or NG OK c GO TO 17. NG c Replace engine coolant temperature sensor. 17 CHECK MAIN 12 CAUSES If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-496. c INSPECTION END Component Inspection COOLING FAN RELAY-1 Check continuity between terminals V 3 and V 5 ,V 6 and V 7 . Conditions SEC202B Continuity 12V direct current supply between terminals 1 and 2 Yes No current supply No If NG, replace relay. EC-495 ZD30DDTi DTC 0208 OVER HEAT Main 12 Causes of Overheating Engine Step Inspection item OFF 1 + + + + 2 Equipment Standard Reference page + Visual No blocking + Coolant mixture + Coolant tester 30 - 50% coolant mixture See "RECOMMENDED FLUIDS AND LUBRICANTS" in MA section. 3 + Coolant level + Visual Coolant up to MAX level in reservoir tank and radiator filler neck See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA section. 4 + Radiator cap + Pressure tester 59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm2, 9 - 14 psi) (Limit) See "System Check", "ENGINE COOLING SYSTEM" in LC section. ON*2 5 + Coolant leaks + Visual No leaks See "System Check", "ENGINE COOLING SYSTEM" in LC section. ON*2 6 + Thermostat + Touch the upper and lower radiator hoses Both hoses should be hot. See "Thermostat" and "Radiator", "ENGINE COOLING SYSTEM" in LC section. ON*1 7 + Cooling fan + Visual Operating OFF 8 + Combustion gas leak + Color checker chemical Negative tester 4 gas analyzer — ON*3 9 + Coolant temperature gauge + Visual — Blocked Blocked Blocked Blocked radiator condenser radiator grille bumper Gauge less than 3/4 when driving — See "DTC 0208 OVER HEAT". + Coolant overflow to res- + Visual ervoir tank No overflow during driving See "Changing Engine and idling Coolant", "ENGINE MAINTENANCE" in MA section. OFF*4 10 + Coolant return from res- + Visual ervoir tank to radiator Should be initial level in reservoir tank See "ENGINE MAINTENANCE" in MA section. OFF 11 + Cylinder head + Straight gauge feeler gauge 0.1 mm (0.004 in) Maximum distortion (warping) See "Inspection", "CYLINDER HEAD" in EM section. 12 + Cylinder block and pistons + Visual No scuffing on cylinder walls or piston See "Inspection", "CYLINDER BLOCK" in EM section. *1: Engine running at idle. *2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes. *4: After 60 minutes of cool down time. For more information, refer to "OVERHEATING CAUSE ANALYSIS" in LC section. EC-496 DTC 0402 P9zFUEL TEMP SEN ZD30DDTi Wiring Diagram TEC356M EC-497 DTC 0403 ACCEL POS SENSOR ZD30DDTi Wiring Diagram TEC357M EC-498 DTC 0902 ECM RLY ZD30DDTi Wiring Diagram TEC358M EC-499 DTC 1003 EGR VOLUME CONT/V ZD30DDTi Wiring Diagram TEC359M EC-500 MI (MIL) & DATA LINK CONNECTORS ZD30DDTi Wiring Diagram TEC396M EC-501 ELECTRICAL SYSTEM SECTION EL When you read wiring diagrams: + Read GI section, "HOW TO READ WIRING DIAGRAMS". When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES" and "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT". + Check for any service bulletins before servicing the vehicle. MODIFICATION NOTICE: + + Combination meter has been changed. Wiring Diagram has been changed. CONTENTS PRECAUTIONS AND PREPARATION .... 4 Supplemental Restraint System (SRS) ''AIR BAG'' and ''SEAT BELT PRE-TENSIONER''............ 4 Precautions for Trouble Diagnoses .... 4 Precautions for Harness Repair .... 4 POWER SUPPLY ROUTING.......................................

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277 Wiring Diagram Codes (Cell Codes) .... 277 EL-3 PRECAUTIONS AND PREPARATION Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER" used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination and optional equipment.): + For a frontal collision The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. + For a side collision The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision). Information necessary to service the system safely is included in the RS section of this Service Manual. WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual.

SRS wiring harnesses can be identified by yellow harness connector. Precautions for Trouble Diagnoses CAN SYSTEM + Do not apply voltage of 7.0V or higher to the measurement terminals. + Use the tester with its open terminal voltage being 7.0V or less. Precautions for Harness Repair CAN SYSTEM + Solder the repaired parts, and wrap with tape. [Frays of twisted line must be within 110 mm (4.33 in)] PKIA0306E EL-4 PRECAUTIONS AND PREPARATION Precautions for Harness Repair (Cont'd) + Do not perform bypass wire connections for the repair parts. (The spliced wire will become separated and the characteristics of twisted line will be lost.) PKIA0307E EL-5 POWER SUPPLY ROUTING Schematic TEL745M EL-6 POWER SUPPLY ROUTING Wiring Diagram — POWER — BATTERY POWER SUPPLY — IGNITION SW. IN ANY POSITION TEL809M EL-7 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) TEL810M EL-8 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) TEL746M EL-9 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) TEL747M EL-10 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) TEL748M EL-11 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) ACCESSORY POWER SUPPLY — IGNITION SW. IN "ACC" OR "ON" TEL647M EL-12 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) IGNITION POWER SUPPLY — IGNITION SW. IN "ON" AND/OR "START" TEL749M EL-13 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) TEL811M EL-14 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) TEL750M EL-15 POWER SUPPLY ROUTING Wiring Diagram — POWER — (Cont'd) TEL812M EL-16 GROUND DISTRIBUTION Engine Room Harness/LHD Models CEL430M EL-17 GROUND DISTRIBUTION Engine Room Harness/LHD Models (Cont'd) CEL431M EL-18 GROUND DISTRIBUTION Engine Room Harness/RHD Models CEL437M EL-19 GROUND DISTRIBUTION Engine Room Harness/RHD Models (Cont'd) CEL438M EL-20 GROUND DISTRIBUTION Engine Control Harness/LHD Models TB48DE ENGINE CEL432M EL-21 GROUND DISTRIBUTION Engine Control Harness/LHD Models (Cont'd) CEL433M EL-22 GROUND DISTRIBUTION Engine Room Harness/RHD Models TB48DE ENGINE CEL301M EL-23 GROUND DISTRIBUTION Engine Room Harness/RHD Models (Cont'd) TB48DE ENGINE CEL302M EL-24 GROUND DISTRIBUTION Main Harness/LHD Models CEL490M EL-25 GROUND DISTRIBUTION Main Harness/LHD Models (Cont'd) CEL434M EL-26 GROUND DISTRIBUTION Main Harness/LHD Models (Cont'd) CEL435M EL-27 GROUND DISTRIBUTION Main Harness/RHD Models CEL440M EL-28 GROUND DISTRIBUTION Main Harness/RHD Models (Cont'd) CEL441M EL-29 GROUND DISTRIBUTION Main Harness/RHD Models (Cont'd) CEL442M EL-30 GROUND DISTRIBUTION Body Harness/LHD Models CEL400M EL-31 GROUND DISTRIBUTION Body Harness/LHD Models (Cont'd) CEL436M EL-32 GROUND DISTRIBUTION Body Harness/RHD Models CEL443M EL-33 GROUND DISTRIBUTION Body No. 2 Harness/LHD Models CEL402M EL-34 GROUND DISTRIBUTION Body No. 2 Harness/RHD Models CEL444M EL-35 GROUND DISTRIBUTION Back Door and Rear Window Defogger Harness/LHD Models CEL296M EL-36 GROUND DISTRIBUTION Back Door and Rear Window Defogger Harness/RHD Models CEL445M EL-37 COMBINATION SWITCH Check RHD MODELS FOR EUROPE AND LHD MODELS CEL446M EL-38 STEERING SWITCH Check WITH ASCD AND AUDIO SWITCH CEL310M EL-39 BATTERY Service Data and Specifications (SDS) ZD30DDTi Applied model TB48DE Except for North Europe Standard Type Capacity V-AH EL-40 Option For North Europe 115D31L 110D26L x 2 12-70 12-128 (64 + 64) STARTING SYSTEM Wiring Diagram — START —/A/T Models with TB48 Engine TEL652M EL-41 STARTING SYSTEM Service Data and Specifications (SDS) STARTER S114-878A Type S13-551A S14-607 HITACHI make Reduction gear type ZD30DDTi Applied model TB48DE Standard System voltage V Option 12 No-load Terminal voltage Current Revolution V 11 A Less than 90 rpm 2,300 11 11 Less than 160 3,300 3,400 Minimum diameter of commutator mm (in) 28 (1.102) Minimum length of brush mm (in) 10.5 (0.413) 11 (0.43) 10.5 (0.413) 16.2 (1.65, 3.64) 28.4 - 34.3 (2.9 - 3.5, 6.4 - 7.7) 24.5 - 34.3 (2.5 - 3.5, 5.5 - 7.7) Clearance between bearing metal and armature shaft mm (in) Less than 0.2 (0.008) — — Clearance "!" between pinion front edge and pinion stopper mm (in) 0.3 - 2.5 (0.012 - 0.098) — — Movement "!" in height of pinion assembly mm (in) — Brush spring tension N (kg, lb) EL-42 35.5 (1.398) 0.3 - 2.0 (0.012 - 0.079) CHARGING SYSTEM Wiring Diagram — CHARGE — TEL653M EL-43 CHARGING SYSTEM Construction MEL206O SEL544V EL-44 CHARGING SYSTEM Service Data and Specifications (SDS) ALTERNATOR LR1110-718 LR190-752 Type HITACHI Applied model Nominal rating V-A TB48DE ZD30DDTi 12-110 12-90 Ground polarity Negative Minimum revolution under noload (When 13.5V is applied) rpm Hot output current (When 13.5V is applied) A/rpm Regulated output voltage Less than 950 Less than 1,000 More than 35/1,300 More than 85/2,500 More than 110/5,000 More than 23/1,300 More than 65/2,500 More than 87/5,000 V 14.1 - 14.7 Minimum length of brush mm (in) 6.0 (0.236) Brush spring pressure N (g, oz) 1.0 - 3.43 (102 - 350, 3.60 - 12.34) Slip ring minimum outer diameter mm (in) Rotor (Field coil) resistance EL-45 Ω 26.0 (1.024) 2.31 2.67 HEADLAMP — Conventional Type — Wiring Diagram — H/LAMP — TEL654M EL-46 HEADLAMP — Headlamp Aiming Control — Wiring Diagram — H/AIM — TEL736M EL-47 HEADLAMP — Headlamp Aiming Control — Wiring Diagram — H/AIM — (Cont'd) TEL751M EL-48 HEADLAMP — Daytime Light System — Wiring Diagram — DTRL — TEL655M EL-49 HEADLAMP — Daytime Light System — Wiring Diagram — DTRL — (Cont'd) TEL656M EL-50 PARKING, LICENSE AND TAIL LAMPS Wiring Diagram — TAIL/L —/Type A Rear combination lamps are not located on rear bumper. TEL752M EL-51 PARKING, LICENSE AND TAIL LAMPS Wiring Diagram — TAIL/L —/Type A (Cont'd) TEL212M EL-52 PARKING, LICENSE AND TAIL LAMPS Wiring Diagram — TAIL/L —/Type B LHD MODELS FOR EUROPE Rear combination lamps are located on rear bumper. TEL658M EL-53 PARKING, LICENSE AND TAIL LAMPS Wiring Diagram — TAIL/L —/Type B (Cont'd) TEL213M EL-54 PARKING, LICENSE AND TAIL LAMPS Wiring Diagram — TAIL/L —/Type C RHD MODELS FOR EUROPE, CHINA, AUSTRALIA AND SOUTH AFRICA Rear combination lamps are located on rear bumper. TEL753M EL-55 PARKING, LICENSE AND TAIL LAMPS Wiring Diagram — TAIL/L —/Type C (Cont'd) TEL394M EL-56 BACK-UP LAMP Wiring Diagram — BACK/L —/LHD Models for TB48 Engine with A/T TEL660M EL-57 BACK-UP LAMP Wiring Diagram — F/FOG —/RHD Models for Europe and China TEL755M EL-58 BACK-UP LAMP Wiring Diagram — F/FOG —/LHD Models for Europe TEL813M EL-59 REAR FOG LAMP Wiring Diagram — R/FOG —/For Europe and China WITH FRONT FOG LAMP TEL814M EL-60 REAR FOG LAMP Wiring Diagram — R/FOG —/For Europe and China (Cont'd) TEL756M EL-61 REAR FOG LAMP Wiring Diagram — R/FOG —/For Europe and China (Cont'd) WITHOUT FRONT FOG LAMP TEL757M EL-62 TURN SIGNAL AND HAZARD WARNING LAMPS Wiring Diagram — TURN —/Type A RHD MODELS EXCEPT FOR EUROPE, AUSTRALIA AND SOUTH AFRICA Rear combination lamps are not located on rear bumper. TEL817M EL-63 TURN SIGNAL AND HAZARD WARNING LAMPS Wiring Diagram — TURN —/Type A (Cont'd) TEL818M EL-64 TURN SIGNAL AND HAZARD WARNING LAMPS Wiring Diagram — TURN —/Type C FOR EUROPE Rear combination lamps are located on rear bumper. TEL758M EL-65 TURN SIGNAL AND HAZARD WARNING LAMPS Wiring Diagram — TURN —/Type C (Cont'd) FOR SOUTH AFRICA Rear combination lamps are located on rear bumper. TEL815M EL-67 TURN SIGNAL AND HAZARD WARNING LAMPS Wiring Diagram — TURN —/Type C (Cont'd) TEL838M EL-66 TURN SIGNAL AND HAZARD WARNING LAMPS Wiring Diagram — TURN —/Type C (Cont'd) TEL816M EL-68 ILLUMINATION Schematic TEL667M EL-69 ILLUMINATION Wiring Diagram — ILL — TEL668M EL-70 ILLUMINATION Wiring Diagram — ILL — (Cont'd) TEL669M EL-71 ILLUMINATION Wiring Diagram — ILL — (Cont'd) TEL759M EL-72 ILLUMINATION Wiring Diagram — ILL — (Cont'd) TEL671M EL-73 ILLUMINATION Wiring Diagram — ILL — (Cont'd) TEL672M EL-74 ILLUMINATION Wiring Diagram — ILL — (Cont'd) TEL673M EL-75 ILLUMINATION Wiring Diagram — ROOM/L —/LHD Models for Europe TEL676M EL-76 ILLUMINATION Wiring Diagram — ROOM/L —/LHD Models for Europe (Cont'd) TEL677M EL-77 ILLUMINATION Wiring Diagram — ROOM/L —/RHD Models for Europe TEL760M EL-78 ILLUMINATION Wiring Diagram — ROOM/L —/RHD Models for Europe (Cont'd) TEL761M EL-79 INTERIOR ROOM LAMP — Without Timer — Wiring Diagram — ROOM/L —/LHD Models TEL762M EL-80 INTERIOR ROOM LAMP — Without Timer — Wiring Diagram — ROOM/L —/RHD Models TEL763M EL-81 METER AND GAUGES Combination Meter SEL738Y EL-82 METER AND GAUGES Schematic TEL837M EL-83 METER AND GAUGES Wiring Diagram — METER — TEL764M EL-84 METER AND GAUGES Wiring Diagram — METER — (Cont'd) TEL765M EL-85 METER AND GAUGES Wiring Diagram — LOAD/S —/TB48 Engine Models with A/T TEL622M EL-86 METER AND GAUGES Wiring Diagram — LOAD/S —/TB48 Engine Models with A/T (Cont'd) TEL623M EL-87 METER AND GAUGES CAN Communication/TB48 Engine Models With A/T SYSTEM DESCRIPTION CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent).

In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only. System diagram SEL599Y Input/Output signal chart T: Transmit Signals R: Receive Combination meter TCM ECM Engine speed signal R R T Engine coolant temperature signal R R T Accelerator pedal position signal R T Closed throttle position signal R T Wide open throttle position signal R T A/T fluid temperature warning lamp signal R T R Current gear position signal R T R T R Shift change signal Air conditioner switch signal T R Headlamp switch signal T R Rear window defogger switch signal T R Brake switch signal T R Vehicle speed signal T R R T R A/T self diagnosis signal Manual mode signal T EL-88 R COMPASS AND THERMOMETER Wiring Diagram — COMPAS — TEL486M EL-89 WARNING LAMPS Schematic TEL766M EL-90 WARNING LAMPS Schematic (Cont'd) TEL807M EL-91 WARNING LAMPS Wiring Diagram — WARN — TEL819M EL-92 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL820M EL-93 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL821M EL-94 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL841M EL-95 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL822M EL-96 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL767M EL-97 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL823M EL-98 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL808M EL-99 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL824M EL-100 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) TEL825M EL-101 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) LHD MODELS TEL826M EL-102 WARNING LAMPS Wiring Diagram — WARN — (Cont'd) RHD MODELS TEL768M EL-103 A/T INDICATOR Wiring Diagram — AT/IND —/TB48 Engine Models with A/T TEL735M EL-104 A/T INDICATOR Wiring Diagram — CHIME —/LHD Models for Europe TEL827M EL-105 HEADLAMP WASHER Wiring Diagram — HLC — TEL772M EL-106 HEADLAMP WASHER Wiring Diagram — HLC — (Cont'd) TEL773M EL-107 HEADLAMP WASHER Washer Tube Layout CEL448M EL-108 CIGARETTE LIGHTER Wiring Diagram — CIGAR —/LHD Models TEL699M EL-109 CIGARETTE LIGHTER Wiring Diagram — CIGAR —/RHD Models TEL774M EL-110 WIPER DEICER Wiring Diagram — DEICER — TEL775M EL-111 REAR WINDOW DEFOGGER Wiring Diagram — DEF —/LHD Models for Europe TEL701M EL-112 REAR WINDOW DEFOGGER Wiring Diagram — DEF —/LHD Models for Europe (Cont'd) TEL702M EL-113 REAR WINDOW DEFOGGER Wiring Diagram — DEF —/RHD Models Except for Europe TEL776M EL-114 AUDIO Schematic/For Europe TEL777M EL-115 AUDIO Wiring Diagram — AUDIO —/LHD Models for Europe TEL784M EL-116 AUDIO Wiring Diagram — AUDIO —/LHD Models for Europe (Cont'd) TEL785M EL-117 AUDIO Wiring Diagram — AUDIO —/LHD Models for Europe (Cont'd) TEL786M EL-118 AUDIO Wiring Diagram — CD/CHG —/With IDIN Type CD Auto Changer TEL713M EL-119 AUDIO Wiring Diagram — REMOTE — FM-AM TUNER RADIO WITH SUB-HARNESS TEL840M EL-120 CLOCK Wiring Diagram — CLOCK — TEL828M EL-121 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Schematic/TB48 and TD42Ti Engine Models TEL737M EL-122 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Wiring Diagram — ASCD —/TB48 and TD42Ti Engine Models TEL569M EL-123 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Wiring Diagram — ASCD —/TB48 and TD42Ti Engine Models (Cont'd) TEL570M EL-124 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Wiring Diagram — ASCD —/TB48 and TD42Ti Engine Models (Cont'd) TEL714M EL-125 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Wiring Diagram — ASCD —/TB48 and TD42Ti Engine Models (Cont'd) TEL738M EL-126 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Fail-safe System/TB48 Engine Models DESCRIPTION When the fail-safe system senses a malfunction, it deactivates ASCD operation. The SET indicator in the combination meter will then flash.

SEL255W MALFUNCTION DETECTION CONDITIONS Detection conditions + + + + + + ASCD operation during malfunction detection ASCD steering (RESUME/ACCEL, CANCEL, SET/COAST) switch is stuck. Vacuum motor ground circuit or power circuit is open or shorted. Air valve ground circuit or power circuit is open or shorted. Release valve ground circuit or power circuit is open or shorted. Vehicle speed sensor is faulty. ASCD control unit internal circuit is malfunctioning. + ASCD is deactivated. + Vehicle speed memory is canceled. + ASCD is deactivated. + Vehicle speed memory is not canceled. + ASCD brake switch or stop lamp switch is faulty. EL-127 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Trouble Diagnoses/TB48 Engine Models SYMPTOM CHART ASCD cannot be set. ("CRUISE" indicator lamp does not ON.) X ASCD cannot be set. ("SET" indicator lamp does not blink.) ASCD cannot be set. ("SET" indicator lamp blinks.★1) X 132 133 133 135 ASCD PUMP CIRCUIT CHECK ASCD ACTUATOR/PUMP CHECK 131 VEHICLE SPEED SENSOR CHECK 130 ASCD STEERING SWITCH CHECK SYMPTOM 129 ASCD BRAKE/STOP LAMP SWITCH CHECK) POWER SUPPLY AND GROUND CIRCUIT CHECK REFERENCE PAGE (EL- Diagnostic procedure FAIL-SAFE SYSTEM CHECK PROEDURE X★3 X X X X X X X Vehicle speed does not decrease after SET/COAST switch has been pressed. X X Vehicle speed does not return to the set speed after RESUME/ACCEL switch has been pressed.★2 X X Vehicle speed does not increase after RESUME/ACCEL switch has been pressed. X X System is not released after CANCEL switch (steering) has been pressed. X X Large difference between set speed and actual vehicle speed. X X X Deceleration is greatest immediately after ASCD has been set. X X X ★1: It indicates that system is in fail-safe. After completing diagnostic procedures, perform "FAIL-SAFE SYSTEM CHECK" (EL-129) to verify repairs. ★2: If vehicle speed is greater than 48 km/h (30 MPH) after system has been released, pressing RESUME/ACCEL switch returns vehicle speed to the set speed previously achieved. However, doing so when the ASCD main switch is turned to "OFF", vehicle speed will not return to the set speed since the memory is canceled.

★3: Check only main switch built-in steering switch. EL-128 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Trouble Diagnoses/TB48 Engine Models (Cont'd) FAIL-SAFE SYSTEM CHECK 1. Turn ignition switch to ON position. 2. Turn ASCD main switch to ON and check if the "set indicator" blinks. If the indicator lamp blinks, check the following. + ASCD steering switch. Refer to EL-132. SEL417V 3. Drive the vehicle at more than 48 km/h (30 MPH) and push SET/COAST switch. If the indicator lamp blinks, check the following.

+ Vehicle speed sensor.

Refer to EL-133. + ASCD pump circuit. Refer to EL-133. + Replace control unit. SEL767P 4. Depress brake pedal slowly (brake pedal should be depressed more than 5 seconds). If the indicator lamp blinks, check the following. + ASCD brake/stop lamp switch.

Refer to EL-131.

SAT797A 5. END. (System is OK.) EL-129 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Trouble Diagnoses/TB48 Engine Models (Cont'd) POWER SUPPLY AND GROUND CIRCUIT CHECK 1 CHECK POWER SUPPLY CIRCUIT FOR ASCD CONTROL UNIT 1. Disconnect ASCD control unit harness connector. 2. Turn ignition switch ON. 3. Check voltage between ASCD control unit harness connector M17 terminal 5 (G) and ground. SEL256WD Yes or No Yes c GO TO 2. No c Check the following.

2 + 7.5A fuse (No. 14 located in the fuse block) + Harness for open or short CHECK GROUND CIRCUIT FOR ASCD CONTROL UNIT Check continuity between ASCD control unit harness connector M17 terminal 17 (B) and body ground. SEL257WD Yes or No Yes c Power supply and ground circuit is OK. No c Repair harness. EL-130 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Trouble Diagnoses/TB48 Engine Models (Cont'd) ASCD BRAKE/STOP LAMP SWITCH CHECK 1 CHECK ASCD BRAKE SWITCH CIRCUIT 1. Disconnect ASCD control unit harness connector. 2. Turn ignition switch ON. 3. Check voltage between ASCD control unit harness connector M17 terminal 8 (BR/Y) and ground. SEL258WG OK or NG OK c GO TO 2. NG c Check the following. + ASCD brake switch Refer to "Electrical Component Inspection" + Park/neutral position relay-2 (A/T models) Refer to "Electrical Component Inspection" + Manual mode position relay (A/T models) Refer to "Electrical Component Inspection" + ASCD clutch switch (M/T models) Refer to "Electrical Component Inspection" + Harness for open or short 2 (EL-137). (EL-137). (EL-137).

(EL-137). CHECK STOP LAMP SWITCH CIRCUIT 1. Disconnect ASCD control unit harness connector. 2. Check voltage between ASCD control unit harness connector M17 terminal 23 (G/Y) and ground. SEL259WD OK or NG OK c ASCD brake/stop lamp switch is OK. NG c Check the following. + 10A fuse [No. 14, located in the fuse block (J/B)] + Harness for open or short between ASCD control unit and stop lamp switch + Harness for open or short between fuse and stop lamp switch + Stop lamp switch Refer to "Electrical Component Inspection" (EL-137). EL-131 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Trouble Diagnoses/TB48 Engine Models (Cont'd) ASCD STEERING SWITCH CHECK 1 CHECK ASCD STEERING SWITCH CIRCUIT FOR ASCD CONTROL UNIT Check voltage between ASCD control unit harness connector M17 terminal 11 (GY/R) and ground. SEL005Y OK or NG OK c ASCD steering switch is OK.

NG c GO TO 2. 2 CHECK ASCD STEERING SWITCH 1. Disconnect ASCD steering switch. 2. Check continuity between RS3 terminals 1 and 2 by pushing each switch. SEL196Y OK or NG OK c Check harness for open or short between ASCD steering switch and ASCD control unit. NG c Replace ASCD steering switch. EL-132 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Trouble Diagnoses/TB48 Engine Models (Cont'd) VEHICLE SPEED SENSOR CHECK 1 CHECK SPEEDOMETER OPERATION Does speedometer operate normally? Yes c GO TO 2. No c Check speedometer and vehicle speed sensor circuit. 2 CHECK VEHICLE SPEED INPUT 1. Apply wheel chocks and jack up drive wheel. 2. Disconnect ASCD control unit harness connector.

3. Check voltage between control unit M17 terminal 22 (L/OR) and ground with turning drive wheel slowly by hand. SEL263WD Yes or No Yes c Vehicle speed sensor is OK. No c Check harness for open or short between ASCD control unit terminal 22 and combination meter terminal 65. ASCD PUMP CIRCUIT CHECK 1 CHECK ASCD PUMP 1. Disconnect ASCD pump connector. 2. Measure resistance between ASCD pump terminals 1 and 2, 3, 4. SEL262WC OK or NG OK c GO TO 2. NG c Replace ASCD pump. EL-133 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Trouble Diagnoses/TB48 Engine Models f (Cont'd) 2 CHECK ASCD PUMP CIRCUIT 1. Disconnect ASCD control unit harness connector. 2. Check harness for open or short between ASCD control unit and ASCD pump. SEL269WD OK or NG OK c GO TO 3. NG c Repair harness. 3 CHECK ASCD PUMP POWER SUPPLY 1. Jack-up the drive wheels. 2 Maintain the conditions below. + Vehicle speed is more than 48 km/h (30 MPH). + Main switch (CRUISE lamp) is ON. + Set/coast switch (SET lamp) is ON. Check voltage between ASCD control unit harness connector M17 terminal 12 (W) and ground. SEL381WD OK or NG OK c ASCD pump power supply is OK. NG c Replace ASCD control unit. EL-134 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Trouble Diagnoses/TB48 Engine Models (Cont'd) ASCD ACTUATOR/PUMP CHECK 1 CHECK VACUUM HOSE Check vacuum hose (between ASCD actuator and ASCD pump) for breakage, cracks or fracture. MEL402G OK or NG OK c GO TO 2. NG c Repair or replace hose. 2 CHECK ASCD WIRE Check wire for improper installation, rust formation or breaks. OK or NG OK c GOTO 3. NG c Repair or replace wire. Refer to "ASCD Wire Adjustment" (EL-138). 3 CHECK ASCD ACTUATOR 1. Disconnect vacuum hose from ASCD actuator.

2. Connect the hose of hand vacuum pump to ASCD actuator. SEL264WE OK or NG OK c GO TO 4. NG c Replace ASCD actuator.

EL-135 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Trouble Diagnoses/TB48 Engine Models (Cont'd) 4 1. 2. 3. 4. CHECK ASCD PUMP Disconnect vacuum hose from ASCD pump and ASCD pump connector. If necessary remove ASCD pump. Connect vacuum gauge to ASCD pump. Apply 12V direct current to ASCD pump and check operation. SEL265WE OK or NG OK c INSPECTION END NG c Replace ASCD pump. EL-136 AUTOMATIC SPEED CONTROL DEVICE (ASCD) Electrical Component Inspection/TB48 Engine Models ASCD BRAKE SWITCH AND STOP LAMP SWITCH Continuity Condition CEL488-A ASCD brake switch Stop lamp switch When brake pedal is depressed No Yes When brake pedal is released Yes No Check each switch after adjusting brake pedal — refer to BR section. ASCD CLUTCH SWITCH (FOR M/T MODELS) Condition Continuity When clutch pedal is depressed No When clutch pedal is released Yes MEL381K PARK/NEUTRAL POSITION RELAY-2 (FOR A/T MODELS) Continuity A/T selector lever position Between terminals 3 and 4 "P" No "N" No Except "P" and "N" Yes CEL364A MANUAL MODE POSITION RELAY (FOR A/T MODELS) Continuity A/T selector lever position Between terminals 3 and 5 Manual mode No Except manual mode Yes CEL365A EL-137 AUTOMATIC SPEED CONTROL DEVICE (ASCD) ASCD Wire Adjustment/TB48 Engine Models CEL749 CAUTION: + Be careful not to twist ASCD wire when removing it. + Do not tense ASCD wire excessively during adjustment. Adjust the tension of ASCD wire in the following manner. 1. Loosen lock nut and adjusting nut.

2. Make sure that accelerator wire is properly adjusted.

Refer to FE section, "ACCELERATOR CONTROL SYSTEM". 4. Tighten adjusting nut just until throttle drum starts to move. 5. Loosen adjusting nut again 1/2 to 1 turn. 6. Tighten lock nut. EL-138 POWER DOOR LOCK Schematic/Without Theft Warning System Models TEL471M EL-139 POWER DOOR LOCK Wiring Diagram — D/LOCK —/Without Theft Warning System Models TEL839M EL-140 POWER DOOR LOCK Wiring Diagram — D/LOCK —/Without Theft Warning System Models (Cont'd) TEL473M EL-141 POWER DOOR LOCK Wiring Diagram — D/LOCK —/Without Theft Warning System Models (Cont'd) TEL474M EL-142 POWER DOOR LOCK Schematic/With Theft Warning System Models TEL573M EL-143 POWER DOOR LOCK Wiring Diagram — D/LOCK —/With Theft Warning System Models LHD MODELS TEL790M EL-144 POWER DOOR LOCK Wiring Diagram — D/LOCK —/With Theft Warning System Models (Cont'd) TEL791M EL-145 POWER DOOR LOCK Wiring Diagram — D/LOCK —/With Theft Warning System Models (Cont'd) TEL792M EL-146 POWER DOOR LOCK Wiring Diagram — D/LOCK —/With Theft Warning System Models (Cont'd) TEL793M EL-147 POWER DOOR LOCK Wiring Diagram — D/LOCK —/With Theft Warning System Models (Cont'd) RHD MODELS TEL578M EL-148 POWER DOOR LOCK Wiring Diagram — D/LOCK —/With Theft Warning System Models (Cont'd) TEL794M EL-149 POWER DOOR LOCK Wiring Diagram — D/LOCK —/With Theft Warning System Models (Cont'd) TEL580M EL-150 POWER DOOR LOCK Wiring Diagram — D/LOCK —/With Theft Warning System Models (Cont'd) TEL581M EL-151 POWER DOOR LOCK — Super Lock — Schematic TEL261M EL-152 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/LHD Models TEL719M EL-153 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/LHD Models (Cont'd) TEL263M EL-154 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/LHD Models (Cont'd) TEL264M EL-155 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/LHD Models (Cont'd) TEL720M EL-156 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/LHD Models (Cont'd) TEL266M EL-157 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/RHD Models TEL796M EL-158 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/RHD Models (Cont'd) TEL268M EL-159 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/RHD Models (Cont'd) TEL269M EL-160 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/RHD Models (Cont'd) TEL270M EL-161 POWER DOOR LOCK — Super Lock — Wiring Diagram — S/LOCK —/RHD Models (Cont'd) TEL271M EL-162 POWER DOOR LOCK/WAGON AND HARDTOP MODELS Trouble Diagnoses/With Theft Warning System Models EL-165 EL-166 EL-167 EL-168 DIAGNOSTIC PROCEDURE 3 (Door key cylinder switch check) DIAGNOSTIC PROCEDURE 4 (Door switch check) DIAGNOSTIC PROCEDURE 5 [Key switch (insert) check] None of the doors lock/unlock when operating any switch. EL-164 DIAGNOSTIC PROCEDURE 2 (Door lock actuator check) SYMPTOM EL-163 DIAGNOSTIC PROCEDURE 1 (Door lock/unlock switch check) REFERENCE PAGE POWER SUPPLY AND GROUND CIRCUIT CHECK SYMPTOM CHART X X X X One or more doors are not locked and/or unlocked. X Door lock/unlock switch does not operate. X Door key cylinder does not operate. X Key reminder door system does not operate properly. POWER SUPPLY AND GROUND CIRCUIT CHECK Power supply circuit check Terminal Ignition switch ⊕ @ OFF ACC ON 10 V 11 V Ground Battery voltage Battery voltage Battery voltage Ground SEL883W Ground circuit check Terminals Continuity 16 - Ground V Yes SEL881VB EL-163 POWER DOOR LOCK/WAGON AND HARDTOP MODELS Trouble Diagnoses/With Theft Warning System Models (Cont'd) DIAGNOSTIC PROCEDURE 1 (Door lock and unlock switch check) CHECK DOOR LOCK AND UNLOCK SWITCH INPUT SIGNAL. Check voltage between control unit terminal V 23 or V 35 and ground. SEL028WA Terminals 23 - Ground V Door lock and unlock switch condition Lock N and Unlock Unlock 35 - Ground V N and Lock OK c Door lock and unlock switch is OK. Voltage (V) 0 Battery voltage 0 Battery voltage NG SEL873W . CHECK DOOR LOCK AND UNLOCK SWITCH. 1. Disconnect door lock and unlock switch connector.

2. Check continuity between each door lock and unlock switch terminals. Power window main switch [Door lock and unlock switch (with power window)] Condition SEL628X Unlock N Lock Terminals 18 17 j No continuity j 19 j j Door lock and unlock switch (without power window) Condition Lock N Unlock Terminals 2 j No continuity 1 j 3 j j OK . Check the following. + Ground circuit for power window main switch [Door lock and unlock switch (with power window)] or door lock and unlock switch (without power window) + Harness for open or short between power window main switch [Door lock and unlock switch (with power window)] or door lock and unlock switch (without power window) and control unit connector EL-164 NG c Replace power window main switch (with power window) or door lock and unlock switch (without power window). POWER DOOR LOCK/WAGON AND HARDTOP MODELS Trouble Diagnoses/With Theft Warning System Models (Cont'd) DIAGNOSTIC PROCEDURE 2 (Door lock actuator check) CHECK DOOR LOCK ACTUATOR CIRCUIT. Check voltage for door lock actuator. Door lock actuator front LH NG c SEL031WA Terminals Door lock/unlock switch condition ⊕ @ Voltage (V) Lock Unlock 15 V 13 V Ground Ground Battery voltage Replace smart entrance control unit. (Before replacing control unit, perform DIAGNOSTIC PROCEDURE 1.) Door lock actuator front RH, rear and back SEL032WA Terminals Door lock/unlock switch condition ⊕ @ Voltage (V) Lock Unlock 15 V 14 V Ground Ground Battery voltage OK . CHECK DOOR LOCK ACTUATOR.

1. Disconnect door lock actuator connector. 2. Apply 12V direct current to door lock actuator and check operation. SEL874W Terminals Door lock actuator operation ⊕ @ Unlocked → Locked Locked → Unlocked 3 V 1 V 1 V 3 V OK . Repair harness between smart entrance control unit connector and door lock actuator. EL-165 NG c Replace door lock actuator. POWER DOOR LOCK/WAGON AND HARDTOP MODELS Trouble Diagnoses/With Theft Warning System Models (Cont'd) DIAGNOSTIC PROCEDURE 3 (Door key cylinder switch check) CHECK DOOR KEY CYLINDER SWITCH INPUT SIGNAL (LOCK/UNLOCK SIGNAL). Check voltage between smart entrance control unit terminal V 30 or V 41 and ground. Terminals ⊕ @ 41 Ground V 30 V Ground Key position Voltage [V] Between neutral and lock 0 Other positions Approx. 5 Between neutral and unlock 0 Other positions Approx. 5 OK c Door key cylinder switch is OK. c Replace door key cylinder switch. SEL038WA NG .

CHECK DOOR KEY CYLINDER SWITCH. 1. Disconnect door key cylinder switch connector. 2. Check continuity between door key cylinder switch terminals. Terminals Front LH: 1 -V 2 V Front RH and Back: V 3 -V 2 Front LH: 3 -V 2 V Front RH and Back: V 1 -V 2 Key position Continuity Neutral No Between neutral and lock Yes Neutral No Between neutral and unlock Yes OK . SEL875WB Check the following. + Door key cylinder switch ground circuit + Harness for open or short between smart entrance control unit and door key cylinder switch EL-166 NG POWER DOOR LOCK/WAGON AND HARDTOP MODELS Trouble Diagnoses/With Theft Warning System Models (Cont'd) DIAGNOSTIC PROCEDURE 4 (Door switch check) CHECK DOOR SWITCH INPUT SIGNAL. Check voltage between smart entrance control unit terminal V 28 or V 29 and ground. SEL876W Terminals OK c Door switch is OK. Condi- Voltage tion [V] ⊕ @ Front LH door switch 29 V Ground Front door, Rear and back door switch 28 Ground Open V 0 Approx. Closed 5 Open 0 Closed Approx. 5 NG . CHECK DOOR SWITCH. 1. Disconnect door switch connector. 2. Check continuity between door switch terminals. Terminals Front LH door switch 1 -V 3 V Back door switch RH Other door switches 1 -V 2 V 1 V Ground Condition Continuity Closed No Open Yes Closed Open Closed Open No Yes No Yes OK . Check the following. + Door switch ground circuit (Front LH, back door RH) or door switch ground condition + Harness for open or short between smart entrance control unit and door switch SEL877W EL-167 NG c Replace door switch. POWER DOOR LOCK/WAGON AND HARDTOP MODELS Trouble Diagnoses/With Theft Warning System Models (Cont'd) DIAGNOSTIC PROCEDURE 5 [Key switch (insert) check] CHECK KEY SWITCH INPUT SIGNAL CHECK. Check voltage between smart entrance control unit terminal V 32 and ground. SEL010WA Condition of key switch Voltage [V] Key is inserted. Approx. 12 Key is removed. 0 OK c Key switch is OK. NG . CEL363A CHECK KEY SWITCH. 1. Disconnect key switch connector. 2. Check continuity between key switch terminals. Terminals 1 -V 2 V Condition Continuity Key is inserted.

Yes Key is removed.

No OK . Check the following. + 7.5A fuse [No. 24 , located in fuse block (J/B)] + Harness for open or short between key switch and fuse + Harness for open or short between smart entrance control unit and key switch EL-168 NG c Replace key switch. MULTI-REMOTE CONTROL SYSTEM Schematic/With Theft Warning System Models TEL584M EL-169 MULTI-REMOTE CONTROL SYSTEM Wiring Diagram — MULTI —/LHD Models with Theft Warning System TEL586M EL-170 MULTI-REMOTE CONTROL SYSTEM Wiring Diagram — MULTI —/LHD Models with Theft Warning System (Cont’d) TEL588M EL-171 MULTI-REMOTE CONTROL SYSTEM Wiring Diagram — MULTI —/LHD Models with Theft Warning System (Cont’d) TEL589M EL-172 MULTI-REMOTE CONTROL SYSTEM Wiring Diagram — MULTI —/LHD Models with Theft Warning System (Cont’d) TEL799M EL-173 MULTI-REMOTE CONTROL SYSTEM Wiring Diagram — MULTI —/RHD Models with Theft Warning System TEL591M EL-174 MULTI-REMOTE CONTROL SYSTEM Wiring Diagram — MULTI —/RHD Models with Theft Warning System (Cont’d) TEL592M EL-175 MULTI-REMOTE CONTROL SYSTEM Wiring Diagram — MULTI —/RHD Models with Theft Warning System (Cont’d) TEL800M EL-176 MULTI-REMOTE CONTROL SYSTEM Trouble Diagnoses/With Theft Warning System Models TROUBLE SYMPTOM + All functions of remote control system do not operate. NG CHECK REMOTE CONTROLLER BATTERY. Refer to DIAGNOSTIC PROCEDURE 1. . c Replace battery. OK Enter the Identity (ID) code of different or new remote controller. . No Can the new ID code be entered? c . Go to DIAGNOSTIC PROCEDURE 2. Yes Replace with the originally used multi-remote controller. + Some functions of multi-remote controller do not operate. 1 DOOR LOCK OR UNLOCK DOES NOT FUNCTION. V (Pressing lock or unlock button of remote controller normally locks or unlocks all doors.) No + Check if power door lock system functions with door lock & unlock switch. -- OR --2 HAZARD INDICATOR DOES NOT FLASH PROPERLY WHEN PRESSING V No LOCK OR UNLOCK BUTTON OF REMOTE CONTROLLER. + Check if hazard indicator flashes with hazard switch. If check is OK, Go to DIAGNOSTIC PROCEDURE 3. -- OR --3 FRONT INTERIOR ROOM LAMP DOES NOT TURN ON FOR 30 SECV ONDS WHEN PRESSING UNLOCK BUTTON OF REMOTE CONTROLLER. + Check if the front interior room lamp switch is in the “door” position, the lamp illuminates when a door is open. No If check is OK, Go to DIAGNOSTIC PROCEDURE 4. -- OR --4 PANIC ALARM (HORN AND HEADLAMP) DOES NOT ACTIVATE WHEN V PANIC ALARM BUTTON IS CONTINUOUSLY PRESSED FOR MORE THAN 1.5 SECONDS. (With theft warning system) + Check if horn and headlamps activate when test is conducted as follows: 1. Open the driver’s window. 2. Close all doors. 3. Lock doors with the key. 4. Wait for about 30 seconds to make sure that the lighted “SECURITY” warnNo ing lamp begins to blink.

5. Manually unlock with driver’s door lock knob, then panic alarm should activate. (The alarm will stop when door is locked and unlocked with the key.) c Check “POWER DOOR LOCK” system. c Check “Hazard indicator lamp” circuit. c Check “Front interior room lamp” circuit. c Check “THEFT WARNING” system.

Yes . Enter the identity (ID) code of different or new remote controller and recheck operation to see if the same trouble as indicated above occurs. No Yes c Check multi-remote controller operation again. If necessary, replace Smart Entrance Control Unit. . Replace the multi-remote controller.

NOTE: + Always check remote controller battery before replacing remote controller. EL-177 MULTI-REMOTE CONTROL SYSTEM Trouble Diagnoses/With Theft Warning System Models (Cont’d) DIAGNOSTIC PROCEDURE 1 Check remote controller battery. CHECK REMOTE CONTROLLER BATTERY. Remove battery and measure voltage between battery positive and negative terminals ⊕ and @. SEL672U Measuring terminal ⊕ @ Battery positive terminal ⊕ Battery negative terminal @ Standard value 2.5 - 3.0V Note: Remote controller does not function if battery is not set correctly. DIAGNOSTIC PROCEDURE 2 All remote controls do not function even if remote controller is operated properly.

SEL883W CHECK MAIN POWER SUPPLY AND GROUND CIRCUIT. 1) Remove key from ignition.

2) Disconnect connector from smart entrance control unit. Check voltage between smart entrance control unit terminal V 10 or V 11 and GND. Battery voltage should exist. NG c + 7.5A fuse [No. 24 , located in fuse block (J/B)] + M92 circuit breaker + Harness for open or short between smart entrance control unit and circuit breaker + Harness for open or short between circuit breaker and fusible link Refer to EL-MULTI-05 or 09. OK .

SEL013WA Check continuity between terminal V 16 and GND. Continuity should exist.

Refer to EL-MULTI-05 or 09. . OK A V (Go to next page.) EL-178 Check the following. + 40A fusible link (Letter e , located in fuse and fusible link box) NG c Check GND harness. MULTI-REMOTE CONTROL SYSTEM Trouble Diagnoses/With Theft Warning System Models (Cont’d) A V . CHECK DOOR SWITCH CIRCUIT. Check continuity between smart entrance control unit terminal V 29 and GND, V 28 and GND. Terminals ⊕ @ Front door switch LH 29 V GND Other door switches 28 V GND SEL876W NG c Voltage [V] Condition Open 0 Close Approx.

5 Open 0 Close Approx. 5 Check the following. + Door switch + Door switch ground circuit (Front LH side and back door RH) or door switch case ground condition (Front RH side, rear and back door LH) + Harness for open or short Refer to EL-MULTI-08 or 11. OK .

SEL056WA CHECK IGNITION SWITCH “ACC” CIRCUIT. Check voltage between smart entrance control unit terminal V 21 and GND while ignition switch is “ACC”. Does battery voltage exist? No c Check the following. + 7.5A fuse [No. 9 , located in fuse block (J/B)] + Harness for open or short Refer to EL-MULTI-05 or 09. Yes . KEY SWITCH INPUT SIGNAL CHECK. Check voltage between smart entrance control unit terminal V 32 and GND. SEL010WA Condition Voltage [V] Key is inserted Approx. 12 Key is pulled 0 Refer to EL-MULTI-05 or 09. OK . B V EL-179 NG c Check the following. + 7.5A fuse [No. 24 , located in fuse block (J/B)] + Key switch + Harness for open or short between smart entrance control unit and key switch + Harness for open or short between key switch and fuse MULTI-REMOTE CONTROL SYSTEM Trouble Diagnoses/With Theft Warning System Models (Cont’d) B V . CHECK DOOR LOCK/UNLOCK SWITCH. 1. Disconnect door lock/unlock switch connector. 2. Check continuity between each door lock/unlock switch terminals. SEL873W Power window main switch [Door lock/unlock switch (with power window)] Condition Unlock N Lock Terminals 17 j No continuity 19 j j 18 j Door lock and unlock switch (without power window) SEL628X Condition Lock N Unlock Terminals 2 j No continuity 1 j 3 j j OK . Check operation parts in multi-remote control system for function.

EL-180 NG c Replace door lock/unlock switch.

MULTI-REMOTE CONTROL SYSTEM Trouble Diagnoses/With Theft Warning System Models (Cont’d) DIAGNOSTIC PROCEDURE 3 Hazard indicator does not flash properly when pressing lock or unlock button of remote controller.

Everything else functions. SEL059WA CHECK HAZARD INDICATOR OPERATION. 1. Disconnect smart entrance control unit connector. 2. Apply ground to smart entrance control unit terminal V 7 . Does hazard indicator illuminate? Yes c Replace smart entrance control unit.

Refer to EL-MULTI-07 or 10. No . Check multi-remote control relay. NG c Replace. OK SEL878W . CHECK POWER SUPPLY FOR MULTIREMOTE CONTROL RELAY. 1. Disconnect multi-remote control relay connector. 2. Measure voltage between terminal V 2 and body ground. Battery voltage should exist. NG c Check the following. + 10A fuse (No. 48 , located in fuse and fusible link box) + Harness for open or short OK . SEL879W CHECK MULTI-REMOTE CONTROL RELAY CIRCUIT. 1. Disconnect multi-remote control relay connector. 2. Measure voltage between terminals V 3 and V 5 . Battery voltage should exist. 3. Measure voltage between terminals V 6 and V 7 . Battery voltage should exist. OK . Check harness for open or short between smart entrance control unit and multi-remote control relay. EL-181 NG c Check harness for open or short. MULTI-REMOTE CONTROL SYSTEM Trouble Diagnoses/With Theft Warning System Models (Cont’d) DIAGNOSTIC PROCEDURE 4 Front interior room lamp does not turn on for 30 seconds when pressing unlock button of remote controller. Everything else functions. SEL061WA CHECK INTERIOR LAMP CIRCUIT. When front interior room lamp switch is “DOOR” position, check voltage across smart entrance control unit terminal V 8 and GND.

Does battery voltage exist? No c Repair harness between smart entrance control unit connector and front interior room lamp connector.

Refer to EL-MULTI-07. Yes . When all doors are closed and driver’s door is locked, push unlock button of remote controller and check voltage across smart entrance control unit terminal V 8 and GND. Is voltage approx. 0V? Yes . Check system again. EL-182 No c Replace smart entrance control unit. MULTI-REMOTE CONTROL SYSTEM ID Code Entry Procedure/With Theft Warning System Models REMOTE CONTROLLER ID SET UP WITH CONSULT-II NOTE: If a remote controller is lost, the ID code of the lost remote controller must be erased to prevent unauthorized use. When the ID code of a lost remote controller is not known, all controller ID codes should be erased. After all ID codes are erased, the ID codes of all remaining and/or new remote controllers must be re-registered. 1.

Turn ignition switch “OFF”. 2. Connect CONSULT-II to the data link connector. SEF532VA 3. Turn ignition switch “ON”. 4. Touch “START”.

PBR455D 5. Touch “SMART ENTRANCE”. SEL845W 6. Touch “MULTI REMOTE ENT”. SEL846W EL-183 MULTI-REMOTE CONTROL SYSTEM ID Code Entry Procedure/With Theft Warning System Models (Cont’d) 7. Touch “WORK SUPPORT”. SEL274W SEL277W 8. The items are shown on the figure at left can be set up. + “REMO CONT ID CONFIR” Use this mode to confirm if a remote controller ID code is registered or not. + “REMO CONT ID REGIST” Use this mode to register a remote controller ID code. NOTE: Register the ID code when remote controller or smart entrance control unit is replaced, or when additional remote controller is required. + “REMO CONT ID ERASUR” Use this mode to erase a remote controller ID code. + “HZRD REM SET” Use this mode to activate or deactivate the hazard reminder. EL-184 MULTI-REMOTE CONTROL SYSTEM ID Code Entry Procedure/With Theft Warning System Models (Cont’d) REMOTE CONTROLLER ID SETUP WITHOUT CONSULT-II Close all doors. . Insert key into and remove it from the ignition key cylinder more than six times within 10 seconds. (The hazard warning lamp will then flash twice.) NOTE + Withdraw key completely from ignition key cylinder each time. + If procedure is performed too fast, system will not enter registration mode.

. Insert key into ignition key cylinder and turn ignition key switch to “ACC” position. . Push any button on remote controller once. (The hazard warning lamp will then flash twice.) At this time, the oldest ID code is erased (pushed out).

Then, the new ID code is entered.

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Do you want to enter any additional remote controller ID codes? A maximum four ID codes can be entered. If more than four ID codes are entered, the oldest ID code will be erased. No Yes . ADDITIONAL ID CODE ENTRY Lock the door with driver’s lock/unlock switch (power window main switch). . Push any button on the new remote controller once. (The hazard warning lamp will then flash twice.) b At this time, the oldest ID code is erased (pushed out).

Then, the new ID code is entered. .

b No Do you want to enter an additional remote controller ID code? A maximum four ID codes can be entered. If more than four ID codes are entered, the oldest ID code will be erased. Yes . ADDITIONAL ID CODE ENTRY Unlock the door, then lock again with driver’s lock/unlock switch (power window main switch). . A V (Go to next page.) EL-185 MULTI-REMOTE CONTROL SYSTEM ID Code Entry Procedure/With Theft Warning System Models (Cont’d) A V . Open driver side door.

. END. After entering the identity (ID) code, check the operation of multi-remote control system. NOTE + If a remote controller is lost, the ID code of the lost remote controller must be erased to prevent unauthorized use. When the ID code of a lost remote controller is not known, all controller ID codes should be erased. After all ID codes are erased, the ID codes of all remaining and/or new remote controllers must be re-registered. To erase all ID codes in memory, register one ID code (remote controller) four times.

After all ID codes are erased, the ID codes of all remaining and/or new remote controllers must be re-registered. + When registering an additional remote controller, the existing ID codes in memory may or may not be erased. If four ID codes are stored in memory, when an additional code is registered, only the oldest code is erased. If less than four ID codes are stored in memory, when an additional ID code is registered, the new ID code is added and no ID codes are erased. + If you need to activate more than two additional new remote controllers, repeat the procedure “Additional ID code entry” for each new remote controller. + Entry of maximum four ID codes is allowed. When more than four ID codes are entered, the oldest ID code will be erased. + Even if same ID code that is already in the memory is input, the same ID code can be entered.

The code is counted as an additional code. EL-186 MULTI-REMOTE CONTROL SYSTEM Remote Controller Battery Replacement/With Theft Warning System Models SEL042X EL-187 THEFT WARNING SYSTEM Schematic TEL595M EL-188 THEFT WARNING SYSTEM Wiring Diagram — THEFT —/LHD Models TEL596M EL-189 THEFT WARNING SYSTEM Wiring Diagram — THEFT —/LHD Models (Cont’d) TEL597M EL-190 THEFT WARNING SYSTEM Wiring Diagram — THEFT —/LHD Models (Cont’d) TEL726M EL-191 THEFT WARNING SYSTEM Wiring Diagram — THEFT —/LHD Models (Cont’d) TEL599M EL-192 THEFT WARNING SYSTEM Wiring Diagram — THEFT —/LHD Models (Cont’d) TEL332M EL-193 THEFT WARNING SYSTEM Wiring Diagram — THEFT —/RHD Models TEL600M EL-194 THEFT WARNING SYSTEM Wiring Diagram — THEFT —/RHD Models (Cont’d) TEL601M EL-195 THEFT WARNING SYSTEM Wiring Diagram — THEFT —/RHD Models (Cont’d) TEL801M EL-196 THEFT WARNING SYSTEM Wiring Diagram — THEFT —/RHD Models (Cont’d) TEL603M EL-197 THEFT WARNING SYSTEM Wiring Diagram — THEFT —/RHD Models (Cont’d) TEL834M EL-198 UNIFIED METER CONTROL UNIT (TIME CONTROL SYSTEM) Schematic/Except for Europe and With Theft Warning System Models TEL835M EL-199 NATS (Nissan Anti-Theft System)/TB48DE ENGINE MODELS FOR EUROPE System Description NATS (Nissan Anti-Theft System) has the following immobilizer functions: + Since only NATS ignition keys, whose ID nos. have been registered into the ECM and IMMU of NATS, allow the engine to run, operation of a stolen vehicle without a NATS registered key is prevented by NATS. That is to say, NATS will immobilize the engine if someone tries to start it without the registered key of NATS. + Both of the originally supplied ignition key IDs have been NATS registered. If requested by the vehicle owner, a maximum of five key IDs can be registered into the NATS components. + The security indicator blinks when the ignition switch is in “OFF” or “ACC” position. Therefore, NATS warns outsiders that the vehicle is equipped with the anti-theft system.

+ When NATS detects trouble, the security indicator lamp lights up while ignition key is in the “ON” position. + NATS trouble diagnoses, system initialization and additional registration of other NATS ignition key IDs must be carried out using CONSULT-II hardware and CONSULT-II NATS software. When NATS initialization has been completed, the ID of the inserted ignition key is automatically NATS registered. Then, if necessary, additional registration of other NATS ignition key IDs can be carried out. Regarding the procedures of NATS initialization and NATS ignition key ID registration, refer to CONSULT-II operation manual, NATS. + When servicing a malfunction of the NATS (indicated by lighting up of Security Indicator Lamp) or registering another NATS ignition key ID no., it is necessary to re-register original key identification. Therefore, be sure to receive ALL KEYS from vehicle owner. System Composition The immobilizer function of the NATS consists of the following: + NATS ignition key + NATS immobilizer control unit NATS (IMMU), located in the ignition key cylinder + Engine control module (ECM) + NATS security indicator SEL085W EL-200 NATS (Nissan Anti-Theft System)/TB48DE ENGINE MODELS FOR EUROPE Wiring Diagram — NATS — TEL728M EL-201 NATS (Nissan Anti-Theft System)/TB48DE ENGINE MODELS FOR EUROPE Wiring Diagram — NATS — (Cont’d) TEL729M EL-202 NATS (Nissan Anti-Theft System)/TB48DE ENGINE MODELS FOR EUROPE CONSULT-II CONSULT-II INSPECTION PROCEDURE 1. Turn ignition switch OFF. 2. Insert NATS program card into CONSULT-II.

Program card AEN00A/B 3. Connect CONSULT-II to Data link connector which is located behind the fuse box cover. SEF532VA 4. Turn ignition switch ON. 5. Touch “START”. PBR455D 6. Perform each diagnostic test mode according to each service procedure. For further information, see the CONSULT-II Operation Manual, NATS. SEL150X EL-203 NATS (Nissan Anti-Theft System)/TB48DE ENGINE MODELS FOR EUROPE CONSULT-II (Cont’d) CONSULT-II DIAGNOSTIC TEST MODE FUNCTION CONSULT-II DIAGNOSTIC TEST MODE Description C/U INITIALIZATION When replacing any of the following components, C/U initialization is necessary. [NATS ignition key/IMMU/ECM/Dongle unit] SELF-DIAG RESULTS Detected items (screen terms) are as shown in the chart below. NOTE: When any initialization is performed, all ID previously registered will be erased. So all NATS ignition keys must be registered again. The engine cannot be started with an unregistered key.

In this case, the system may show “DIFFERENCE OF KEY” or “LOCK MODE” as a self-diagnostic result on the CONSULT-II screen. HOW TO READ SELF-DIAGNOSTIC RESULTS SEL151X SELF-DIAGNOSTIC RESULTS ITEM CHART Detected items (Screen terms) Description Reference page ECM INT CIRC-IMMU The malfunction of ECM internal circuit of IMMU communication line is detected. EL-207 CHAIN OF ECM-IMMU Communication impossible between ECM and IMMU. (In rare case, “CHAIN OF ECM-IMMU” might be stored during key registration procedure, even if the system is not malfunctioning.) EL-208 DIFFERENCE OF KEY IMMU can receive the key ID signal but the result of ID verification between key ID and IMMU is NG. EL-210 CHAIN OF IMMU-KEY IMMU cannot receive the key ID signal. Otherwise, the registered ID signal from dongle unit cannot be received when the IMMU requests the ID. EL-210 ID DISCORD, IMM-ECM The result of ID verification between IMMU and ECM is NG. System initialization is required. EL-211 DON’T ERASE BEFORE CHECKING ENG DIAG Engine trouble data and NATS trouble data have been detected in ECM. EL-205 LOCK MODE When the starting operation is carried out 5 or more times consecutively under the following conditions, NATS will shift the mode to one which prevents the engine from being started. + unregistered ignition key is used + IMMU or ECM malfunctioning EL-212 EL-204 NATS (Nissan Anti-Theft System)/TB48DE ENGINE MODELS FOR EUROPE Trouble Diagnoses WORK FLOW *NOTE: In rare case, “CHAIN OF ECM-IMMU” might be stored as a selfdiagnostic result during key registration procedure, even if the system is not malfunctioning. CHECK IN . Listen to customer complaints or request.

(Get symptoms) NOTE: If customer reports a “No start” condition, request ALL KEYS to be brought to the Dealer in case of a NATS malfunction. KEY SERVICE REQUEST (Additional key ID registration) TROUBLE .

. Verify the security indicator. INITIALIZATION (Refer to CONSULT-II operation manual NATS.) .

Using the CONSULT-II program card for NATS check the c “SELF-DIAG RESULTS” with CONSULT-II. b . . Self-diagnostic results referring to NATS, but no information about engine self-diagnostic results is displayed on CONSULTII. Self-diagnostic results referring to NATS and “DON’T ERASE BEFORE CHECKING ENG DIAG” are displayed on CONSULT-II. (This means that engine trouble data has been detected in ECM.) . Turn ignition switch “OFF”. . . Repair NATS. (If necessary, carry out “C/U INITIALIZATION” with CONSULTII.*) Turn ignition switch “OFF”. .

.

Turn ignition switch “ON”. Repair NATS according to self-diagnostic results referring to NATS. (If necessary, carry out “C/U INITIALIZATION” with CONSULTII.*) . .

Erase the NATS “SELF-DIAG RESULTS” by using CONSULTII. (Touch “ERASE”) Do not erase the NATS “SELF-DIAG RESULTS” by using CONSULT-II. . . Start the engine. NG Check the engine “SELF-DIAG RESULTS” with CONSULT-II by using the CONSULT-II generic program card.

(Engine diagnostic software included) . b . Verify no lighting up of the security indicator. Repair engine control system (Refer to EC section.) when selfdiagnostic results except “NATS MALFUNCTION” are detected. When only “NATS MALFUNCTION” is detected, erase the selfdiagnostic results and go to the next step. OK . . CHECK OUT Start the engine. Does the engine start properly?

OK . . Perform running test with CONSULT-II in engine “SELF-DIAG RESULTS” mode. Erase the NATS and engine “SELF-DIAG RESULTS” by using the CONSULT-II program card for NATS and generic program card. . . NG Verify “NO DTC” displayed on the CONSULT-II screen.

Start the engine. OK . CHECK OUT EL-205 NG NATS (Nissan Anti-Theft System)/TB48DE ENGINE MODELS FOR EUROPE Trouble Diagnoses (Cont’d) SYMPTOM MATRIX CHART 1 (Self-diagnosis related item) Displayed “SELF-DIAG RESULTS” on CONSULT-II screen. SYMPTOM ECM INT CIRC-IMMU CHAIN OF ECM-IMMU DIAGNOSTIC PROCEDURE (Reference page) PROCEDURE 1 (EL-207) PROCEDURE 2 (EL-208) + Security indicator lighting up* + Engine does not start SYSTEM (Malfunctioning part or mode) ECM B In rare case, “CHAIN OF ECM-IMMU might be stored during key registration procedure, even if the system is not malfunctioning.

— Open circuit in battery voltage line of IMMU circuit C1 Open circuit in ignition line of IMMU circuit C2 Open circuit in ground line of IMMU circuit C3 Open circuit in communication line between IMMU and ECM C4 Short circuit between IMMU and ECM communication line and battery voltage line C4 Short circuit between IMMU and ECM communication line and ground line C4 ECM DIFFERENCE OF KEY CHAIN OF IMMU-KEY + MIL staying ON + Security indicator lighting up* B IMMU A PROCEDURE 3 (EL-210) Unregistered key D IMMU A PROCEDURE 4 (EL-210) Malfunction of key ID chip E IMMU A System initialization has not yet been completed. F ECM B LOCK MODE D Engine trouble data and NATS trouble data have been detected in ECM — ID DISCORD, IMM-ECM PROCEDURE 5 (EL-211) LOCK MODE PROCEDURE 6 (EL-212) DON’T ERASE BEFORE CHECKING ENG DIAG REFERENCE PART NO. OF ILLUSTRATION ON DIAGNOSTIC SYSTEM DIAGRAM WORK FLOW (EL-205) *: When NATS detects trouble, the security indicator lights up while ignition key is in the “ON” position. SYMPTOM MATRIX CHART 2 (Non self-diagnosis related item) SYMPTOM Security ind.

does not light up. DIAGNOSTIC PROCEDURE (Reference page) PROCEDURE 7 (EL-213) SYSTEM (Malfunctioning part or mode) REFERENCE PART NO. OF ILLUSTRATION ON DIAGNOSTIC SYSTEM DIAGRAM Security ind. — Open circuit between Fuse and NATS IMMU — Continuation of initialization mode — NATS IMMU A EL-206 NATS (Nissan Anti-Theft System)/TB48DE ENGINE MODELS FOR EUROPE Trouble Diagnoses (Cont’d) DIAGNOSTIC SYSTEM DIAGRAM SEL087WI DIAGNOSTIC PROCEDURE 1 Self-diagnostic results: “ECM INT CIRC-IMMU” displayed on CONSULT-II screen Confirm SELF-DIAGNOSTIC RESULTS “ECM INT CIRC-IMMU” displayed on CONSULT-II screen. Ref. part No. B. .

SEL152X Replace ECM. . Perform initialization with CONSULT-II. For the operation of initialization, refer to “CONSULT-II operation manual NATS”. EL-207 NATS (Nissan Anti-Theft System)/TB48DE ENGINE MODELS FOR EUROPE Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 2 Self-diagnostic results: “CHAIN OF ECM-IMMU” displayed on CONSULT-II screen *: In rare case, “CHAIN OF ECM-IMMU” might be stored during key registration procedure, even if the system is not malfunctioning. Confirm SELF-DIAGNOSTIC RESULTS “CHAIN OF ECMIMMU”* displayed on CONSULT-II screen. OK SEL153X . CHECK POWER SUPPLY CIRCUIT FOR IMMU. Check voltage between terminal V 8 of IMMU and ground. Voltage: Battery voltage NG c OK . SEL782Y CHECK IGN SW. ON SIGNAL. Check voltage between terminal V 7 of IMMU and ground while ignition switch is in the “ON” position.

Voltage: Battery voltage NG c OK . SEL783Y CHECK GROUND CIRCUIT FOR IMMU. Check harness continuity between IMMU terminal V 4 and ground. Continuity should exist.

NG Check the following: + 10A fuse (No. 50 , located in the fuse and fusible link box) + Harness for open or short between fuse and IMMU connector Ref. part No. C1 Check the following: + 10A fuse [No. 25 , located in the fuse block (J/B)] + Harness for open or short between fuse and IMMU connector Ref. part No. C2 c Repair harness. Ref. part No. C3 c Repair harness. Ref. part No. C4 OK . CHECK COMMUNICATION ON OPEN CIRCUIT. Check harness continuity between ECM terminal 167 and IMMU terminal V 1 . Continuity should exist. OK . SEL156X A V SEL924Y EL-208 NG NATS (Nissan Anti-Theft System)/TB48DE ENGINE MODELS FOR EUROPE Trouble Diagnoses (Cont’d) A V .

SEL925Y CHECK COMMUNICATION LINE BATTERY SHORT CIRCUIT. 1. Disconnect ECM connector and IMMU connector. 2.

Turn ignition switch to ON. 3. Check voltage between ECM terminal 167 or IMMU terminal V 1 and ground. No voltage should exist. NG c Repair harness. Ref. part No. C4 c Repair harness. Ref. part No. C4 OK . CHECK COMMUNICATION LINE GROUND SHORT CIRCUIT. 1. Turn ignition switch OFF. 2. Check continuity between ECM terminal 167 or IMMU terminal V 1 and ground. Continuity should not exist. OK SEL926Y . SIGNAL FROM ECM TO IMMU CHECK 1. Check the signal between ECM terminal 167 and ground with CONSULT-II or oscilloscope when ignition switch is turned “ON”. 2.

Make sure signals which are shown in the figure below can be detected during 750 msec. just after ignition switch is turned “ON”. OK SEL193X NG . + IMMU is malfunctioning. 1. Replace IMMU. Ref. part No. A 2. Perform initialization with CONSULT-II. For the initialization procedure, refer to “CONSULT-II operation manual NATS”. EL-209 NG c + ECM is malfunctioning. 1.

Replace ECM. Ref. part No. B 2. Perform initialization with CONSULT-II. For the initialization procedure, refer to “CONSULT-II operation manual NATS”. NATS (Nissan Anti-Theft System)/TB48DE ENGINE MODELS FOR EUROPE Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 3 Self-diagnostic results: “DIFFERENCE OF KEY” displayed on CONSULT-II screen Confirm SELF-DIAGNOSTIC RESULTS “DIFFERENCE OF KEY” displayed on CONSULT-II screen. OK SEL163X .

PERFORM INITIALIZATION. Perform initialization with CONSULT-II. Re-register all NATS ignition key IDs. For the initialization procedure, refer to “CONSULT-II operation manual NATS”. Initialization with CONSULT-II incomplete or failed + IMMU is malfunctioning.

c 1. Replace IMMU. Ref. part No. A 2. Perform initialization with CONSULT-II. For the initialization procedure, refer to “CONSULT-II operation manual NATS”. Initialization completed SEL566W . Start engine. . END. (The ignition key was unregistered.) Ref. part No. D DIAGNOSTIC PROCEDURE 4 Self-diagnostic results: “CHAIN OF IMMU-KEY” displayed on CONSULT-II screen Confirm SELF-DIAGNOSTIC RESULTS “CHAIN OF IMMU-KEY” displayed on CONSULT-II screen. OK . SEL165X CHECK NATS IGNITION KEY ID CHIP. Start engine with another registered NATS ignition key. Does the engine start? No . + IMMU is malfunctioning. 1. Replace IMMU. Ref part No. A 2. Perform initialization with CONSULT-II.

For the initialization procedure, refer to “CONSULT-II operation manual NATS”. EL-210 Yes c + Ignition key ID chip is mal- functioning. 1. Replace the ignition key. Ref. part No. E 2. Perform initialization with CONSULT-II. For the initialization procedure, refer to “CONSULT-II operation manual NATS”. NATS (Nissan Anti-Theft System)/TB48DE ENGINE MODELS FOR EUROPE Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 5 Self-diagnostic results: “ID DISCORD, IMM-ECM” displayed on CONSULT-II screen Confirm SELF-DIAGNOSTIC RESULTS “ID DISCORD, IMMECM*” displayed on CONSULT-II screen. SEL166X . PERFORM INITIALIZATION. Perform initialization with CONSULT-II. Re-register all NATS ignition key IDs. For the initialization procedure, refer to “CONSULT-II operation manual NATS”.

Initialization completed SEL566W . Start engine. (END) (System initialization was not completed.

Ref. part No. F) EL-211 * “ID DISCORD, IMM-ECM”: Registered ID of IMMU is in discord with that of ECM.

Initialization with CONSULT-II incomplete or failed + ECM is malfunctioning. c 1. Replace ECM. Ref. part No. B 2. Perform initialization with CONSULT-II. For the initialization procedure, refer to “CONSULT-II operation manual NATS”. NATS (Nissan Anti-Theft System)/TB48DE ENGINE MODELS FOR EUROPE Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 6 Self-diagnostic results: “LOCK MODE” displayed on CONSULT-II screen Confirm SELF-DIAGNOSTIC RESULTS “LOCK MODE” is displayed on CONSULT-II screen. . SEL167X 1. Turn the ignition switch to OFF position. 2. Turn the ignition key switch to ON position with a registered key. (Do not start engine.) Wait 5 seconds. 3. Return the key to the OFF position. 4. Repeat steps 2 and 3 twice (total of three cycles). 5. Start the engine. Does the engine start? Yes c System is OK. (Now the system is escaped from “LOCK MODE”.) No . SEL566W CHECK NATS IMMU INSTALLATION. Refer to “How to Replace NATS IMMU” in EL-214. NG c Reinstall NATS IMMU correctly.

OK .

PERFORM INITIALIZATION. Perform initialization with CONSULT-II. For the initialization procedure, refer to “CONSULT-II operation manual NATS”. Can the system be initialized?

Note: If the initialization is incompleted or failed, CONSULT-II shows message on the screen. No . Go to DIAGNOSTIC PROCEDURE 4, EL-210 to check “CHAIN OF IMMU-KEY”. EL-212 Yes c System is OK. NATS (Nissan Anti-Theft System)/TB48DE ENGINE MODELS FOR EUROPE Trouble Diagnoses (Cont’d) DIAGNOSTIC PROCEDURE 7 “SECURITY IND.

DOES NOT LIGHT UP” Check 7.5A fuse [No. 24 , located in the fuse block (J/B)]. NG c Replace fuse. OK . NATS INITIALIZATION 1) Install the 7.5A fuse. 2) Perform initialization with CONSULT-II. For the operation of initialization, refer to “CONSULT-II operation manual NATS”. . Turn ignition switch “OFF”. . Start engine and turn ignition switch “OFF”.

.

Check the security ind. lighting. OK c END NG . 1. Disconnect security ind. connector. 2. Check voltage between security ind.

connector terminal V 1 and ground. Voltage: Battery voltage NG c Check harness for open or short between fuse and security ind. OK SEL931UA . CHECK INDICATOR LAMP. NG c Replace security indicator lamp. c NATS IMMU is malfunctioning. Replace IMMU. OK . CHECK NATS IMMU FUNCTION. 1. Connect security ind. connector. 2. Check continuity between NATS IMMU terminal V 6 and ground. Continuity should exist intermittently. OK SEL164X . Check harness for open or short between security indicator and NATS IMMU. EL-213 NG . Perform initialization with CONSULT-II. For the operation of initialization, refer to “CONSULT-II operation manual NATS”. NATS (Nissan Anti-Theft System)/TB48DE ENGINE MODELS FOR EUROPE How to Replace NATS IMMU NOTE: + If NATS IMMU is not installed correctly, NATS system will not operate properly and SELF-DIAG RESULTS on CONSULT-II screen will show “LOCK MODE”. SEL096WD EL-214 NATS (Nissan Anti-Theft System)/ZD ENGINE MODELS Wiring Diagram — NATS —/For Europe TEL731M EL-215 NATS (Nissan Anti-Theft System)/ZD ENGINE MODELS Wiring Diagram — NATS —/LHD Models for Europe TEL732M EL-216 NATS (Nissan Anti-Theft System)/ZD ENGINE MODELS Wiring Diagram — NATS —/RHD Models for Europe TEL805M EL-217 NATS (Nissan Anti-Theft System)/ZD ENGINE MODELS Wiring Diagram — NATS —/Except for Europe TEL806M EL-218 CAN SYSTEM/TB48 ENGINE MODELS WITH A/T Wiring Diagram — CAN — TEL615M EL-219 CAN SYSTEM/TB48 ENGINE MODELS WITH A/T Trouble Diagnoses WORK FLOW 1.

Print all the data of “SELF-DIAG RESULTS” and “DATA MONITOR” for “ENGINE” and “A/T” displayed on CONSULT-II. Refer to “DTC U1000 CAN COMMUNICATION LINE” (EC section) for “ENGINE” and “DTC U1000 CAN COMMUNICATION LINE” (AT section) for “A/T”. 2. Attach the printed sheet of “SELF-DIAG RESULTS” and “DATA MONITOR” onto the check sheet. Refer to “CHECK SHEET” (EL-221). 3.

Based on the data monitor results, put “v” marks onto the items with “UNKWN” or “NG” in the check sheet table. Refer to “CHECK SHEET” (EL-221). NOTE: If “NG” is displayed on “CAN COMM” for the diagnosed control unit, replace the control unit. 4.

According to the check sheet results (example), start inspection. Refer to “CHECK SHEET RESULTS (EXAMPLE)” (EL-222). EL-220 CAN SYSTEM/TB48 ENGINE MODELS WITH A/T Trouble Diagnoses (Cont’d) CHECK SHEET SEL601Y EL-221 CAN SYSTEM/TB48 ENGINE MODELS WITH A/T Trouble Diagnoses (Cont’d) CHECK SHEET RESULTS (EXAMPLE) SEL602Y NOTE: If “NG” is displayed on “CAN COMM” for the diagnosed control unit, replace the control unit. EL-222 CAN SYSTEM/TB48 ENGINE MODELS WITH A/T Trouble Diagnoses (Cont’d) INSPECTION Proceed trouble diagnosis according to the check sheet results (example). Case 1: Replace ECM. Case 2: Replace TCM. Case 3: Check ECM Circuit. Refer to “ECM CIRCUIT CHECK” (EL-223). Case 4: Check TCM Circuit. Refer to “TCM CIRCUIT CHECK” (EL-223). Case 5: Check Combination meter Circuit. Refer to “COMBINATION METER CIRCUIT CHECK” (EL-224). Case 6: Check CAN communication Circuit. Refer to “CAN COMMUNICATION CIRCUIT CHECK” (EL-225).

ECM CIRCUIT CHECK 1 1. 2. + + + CHECK CONNECTOR Turn ignition switch OFF. Check following terminals and connector for damage, bend and loose connection. (Control module-side and harness-side) ECM Harness connector F6 Harness connector M51 OK or NG OK c GO TO 2. NG c Repair terminal or connector. 2 CHECK HARNESS FOR OPEN CIRCUIT 1. Disconnect ECM connector. 2. Check resistance between ECM harness connector F39 terminals 174 (G/B) and 171 (W/R). SEL603Y 174 (G/B) - 171 (W/R): Approx. 108 - 132Ω OK or NG OK c Replace ECM.

NG c Repair harness between ECM and harness connector M88. TCM CIRCUIT CHECK 1 1. 2. + + + CHECK CONNECTOR Turn ignition switch OFF. Check following terminals and connector for damage, bend and loose connection. (Control module-side and harness-side) TCM Harness connector E106 Harness connector M88 OK or NG OK c GO TO 2.

NG c Repair terminal or connector. EL-223 CAN SYSTEM/TB48 ENGINE MODELS WITH A/T Trouble Diagnoses (Cont’d) 2 CHECK HARNESS FOR OPEN CIRCUIT 1. Disconnect TCM connector. 2. Check resistance between TCM harness connector E123 terminals 6 (G/B) and 7 (W/R). SEL604Y 6 (G/B) - 7 (W/R): Approx. 54 - 66Ω OK or NG OK c Replace TCM. NG c Repair harness between TCM and harness connector M51.

COMBINATION METER CIRCUIT CHECK 1 CHECK CONNECTOR 1. Turn ignition switch OFF. 2. Check terminals and connector of combination meter for damage, bend and loose connection. (Meter-side and harness-side) OK or NG OK c GO TO 2. NG c Repair terminal or connector. 2 CHECK HARNESS FOR OPEN CIRCUIT 1. Disconnect combination meter connector. 2. Check resistance between combination meter harness connector M143 terminals 66 (G/B) and 67 (W/R).

SEL605Y 66 (G/B) - 67 (W/R): Approx. 108 -132Ω OK or NG OK c Replace combination meter.

NG c Repair harness between combination meter and harness connector M88. EL-224 CAN SYSTEM/TB48 ENGINE MODELS WITH A/T Trouble Diagnoses (Cont’d) CAN COMMUNICATION CIRCUIT CHECK 1 CHECK CONNECTOR 1. Turn ignition switch OFF. 2. Check following terminals and connector for damage, bend and loose connection. (Control module-side, meter-side and harness-side) + ECM + TCM + Combination meter + Between ECM and TCM OK or NG OK c GO TO 2. NG c Repair terminal or connector. 2 CHECK HARNESS FOR SHORT CIRCUIT 1. Disconnect ECM connector and harness connector F6.

2. Check continuity between ECM harness connector F39 terminals 174 (G/B) and 171 (W/R). SEL603Y 174 (G/B) - 171 (W/R): Continuity should not exist. OK or NG OK c GO TO 3. NG c Repair harness between ECM and harness connector F6. 3 CHECK HARNESS FOR SHORT CIRCUIT Check continuity between ECM harness connector F39 terminals 174 (G/B), 171 (W/R) and ground. SEL606Y 174 (G/B) - Ground: Continuity should not exist.

171 (W/R) - Ground: Continuity should not exist. OK or NG OK c GO TO 4. NG c Repair harness between ECM and harness connector F6. EL-225 CAN SYSTEM/TB48 ENGINE MODELS WITH A/T Trouble Diagnoses (Cont’d) 4 CHECK HARNESS FOR SHORT CIRCUIT 1.

Disconnect TCM connector and harness connector E106. 2.

Check continuity between TCM harness connector E123 terminals 6 (G/B) and 7 (W/R). SEL604Y 6 (G/B) - 7 (W/R): Continuity should not exist. OK or NG OK c GO TO 5. NG c Repair harness between TCM and harness connector E106. 5 CHECK HARNESS FOR SHORT CIRCUIT Check continuity between TCM harness connector E123 terminals 6 (G/B), 7 (W/R) and ground. SEL607Y 6 (G/B) - Ground: Continuity should not exist. 7 (W/R) - Ground: Continuity should not exist. OK or NG OK c GO TO 6. NG c Repair harness between TCM and harness connector F106. EL-226 CAN SYSTEM/TB48 ENGINE MODELS WITH A/T Trouble Diagnoses (Cont’d) 6 CHECK HARNESS FOR SHORT CIRCUIT 1. Disconnect combination meter connector. 2. Check continuity between combination meter harness connector M143 terminals 66 (G/B) and 67 (W/R). SEL605Y 66 (G/B) - 67 (W/R): Continuity should not exist. OK or NG OK c GO TO 7.

NG c + Repair harness between combination meter and harness connector M88. + Repair harness between combination meter and harness connector M51. 7 CHECK HARNESS FOR SHORT CIRCUIT Check continuity between combination meter harness connector M143 terminals 66 (G/B), 67 (W/R) and ground. SEL608Y 66 (G/B) - Ground: Continuity should not exist. 67 (W/R) - Ground: Continuity should not exist. OK or NG OK c GO TO 8. NG c + Repair harness between combination meter and harness connector M88. + Repair harness between combination meter and harness connector M51.

8 ECM/COMBINATION METER INTERNAL CIRCUIT INSPECTION Check components inspection. Refer to “ECM/COMBINATION METER INTERNAL CIRCUIT INSPECTION” (EL-228). OK or NG OK c Reconnect all connectors to perform “SELF-DIAG RESULTS” and “DATA MONITOR” for “ENGINE” and “A/T” displayed on CONSULT-II. Refer to “DTC U1000 CAN COMMUNICATION LINE” (EC section) for “ENGINE” and “DTC U1000 CAN COMMUNICATION LINE” (AT section) for “A/T”. NG c Replace ECM and/or combination meter. EL-227 CAN SYSTEM/TB48 ENGINE MODELS WITH A/T Component Inspection ECM/COMBINATION METER INTERNAL CIRCUIT INSPECTION + Remove ECM and combination meter from vehicle. + Check resistance between ECM terminals 174 and 171. + Check resistance between combination meter terminals 66 and 67. SEL609Y Unit Terminal ECM 174 - 171 Combination meter 66 - 67 Resistance value (Ω) Approx. 108 - 132 EL-228 LOCATION OF ELECTRICAL UNITS Engine Compartment CEL449M EL-229 LOCATION OF ELECTRICAL UNITS Engine Compartment (Cont’d) CEL450M EL-230 LOCATION OF ELECTRICAL UNITS Passenger Compartment — LHD Models CEL451M EL-231 LOCATION OF ELECTRICAL UNITS Passenger Compartment — LHD Models (Cont’d) CEL452M EL-232 LOCATION OF ELECTRICAL UNITS Passenger Compartment — RHD Models CEL453M EL-233 LOCATION OF ELECTRICAL UNITS Passenger Compartment — RHD Models (Cont’d) CEL454M EL-234 LOCATION OF ELECTRICAL UNITS NOTE EL-235 HARNESS LAYOUT How to Read Harness Layout Example: G2 E1 B/6 : ASCD ACTUATOR Connector color / Cavity Connector number Grid reference The following Harness Layouts use a map style grid to help locate connectors on the drawings: + Main Harness + Engine Room Harness (Engine Compartment) To 1) 2) 3) 4) 5) use the grid reference Find the desired connector number on the connector list. Find the grid reference. On the drawing, find the crossing of the grid reference letter column and number row. Find the connector number in the crossing zone. Follow the line (if used) to the connector. CONNECTOR SYMBOL Main symbols of connector (in Harness Layout) are indicated in the below. Water proof type Standard type Connector type Male Female — — Male + Cavity: Less than 4 + Relay connector + Cavity: From 5 to 8 + Cavity: More than 9 + Ground terminal etc.

— EL-236 Female HARNESS LAYOUT Main Harness/LHD Models CEL455M EL-237 HARNESS LAYOUT Main Harness/LHD Models (Cont’d) CEL456M EL-238 HARNESS LAYOUT Main Harness/LHD Models (Cont’d) CEL457M EL-239 HARNESS LAYOUT NOTE EL-240 HARNESS LAYOUT Main Harness/RHD Models CEL458M EL-241 HARNESS LAYOUT Main Harness/RHD Models (Cont’d) CEL459M EL-242 HARNESS LAYOUT Main Harness/RHD Models (Cont’d) CEL460M EL-243 HARNESS LAYOUT Main Harness/RHD Models (Cont’d) CEL461M EL-244 HARNESS LAYOUT Engine Room Harness/LHD Models GASOLINE ENGINE MODELS CEL462M EL-245 HARNESS LAYOUT Engine Room Harness/LHD Models (Cont’d) CEL463M EL-246 HARNESS LAYOUT Engine Room Harness/LHD Models (Cont’d) CEL486M EL-247 HARNESS LAYOUT Engine Room Harness/LHD Models (Cont’d) NOTE EL-248 HARNESS LAYOUT Engine Room Harness/LHD Models (Cont’d) DIESEL ENGINE MODELS CEL464M EL-249 HARNESS LAYOUT Engine Room Harness/LHD Models (Cont’d) CEL465M EL-250 HARNESS LAYOUT Engine Room Harness/LHD Models (Cont’d) PASSENGER COMPARTMENT CEL466M EL-251 HARNESS LAYOUT Engine Room Harness/LHD Models (Cont’d) CEL467M EL-252 HARNESS LAYOUT Engine Room Harness/RHD Models GASOLINE ENGINE MODELS CEL468M EL-253 HARNESS LAYOUT Engine Room Harness/RHD Models (Cont’d) CEL469M EL-254 HARNESS LAYOUT Engine Room Harness/RHD Models (Cont’d) DIESEL ENGINE MODELS CEL470M EL-255 HARNESS LAYOUT Engine Room Harness/RHD Models (Cont’d) CEL471M EL-256 HARNESS LAYOUT Engine Room Harness/RHD Models (Cont’d) PASSENGER COMPARTMENT CEL472M EL-257 HARNESS LAYOUT Engine Room Harness/RHD Models (Cont’d) CEL473M EL-258 HARNESS LAYOUT Engine Harness TB48DE ENGINE CEL485M EL-259 HARNESS LAYOUT NOTE EL-260 HARNESS LAYOUT (Cont’d) ZD ENGINE CEL475M EL-261 HARNESS LAYOUT NOTE EL-262 HARNESS LAYOUT Engine Control Harness TB48DE ENGINE CEL476M EL-263 HARNESS LAYOUT Engine Control Harness (Cont’d) CEL477M EL-264 HARNESS LAYOUT Body Harness/LHD Models WAGON CEL478M EL-265 HARNESS LAYOUT Body Harness/LHD Models (Cont’d) CEL479M EL-266 HARNESS LAYOUT Body Harness/LHD Models (Cont’d) HARDTOP CEL487M EL-267 HARNESS LAYOUT Body Harness/LHD Models (Cont’d) CEL488M EL-268 HARNESS LAYOUT Body Harness/RHD Models WAGON CEL480M EL-269 HARNESS LAYOUT Body Harness/RHD Models (Cont’d) CEL481M EL-270 HARNESS LAYOUT Body No. 2 Harness/LHD Models WAGON CEL418M EL-271 HARNESS LAYOUT Body No. 2 Harness/LHD Models (Cont’d) HARDTOP CEL419M EL-272 HARNESS LAYOUT Body No. 2 Harness/RHD Models WAGON CEL482M EL-273 HARNESS LAYOUT Body No. 2 Harness/RHD Models (Cont’d) HARDTOP CEL483M EL-274 HARNESS LAYOUT Chassis Harness CEL489M EL-275 HARNESS LAYOUT Back Door Harness and Rear Window Defogger Harness CEL420M EL-276 WIRING DIAGRAM CODES (CELL CODES) Wiring Diagram Codes (Cell Codes) Use the chart below to find out what each wiring diagram code stands for.

Refer to the wiring diagram code in the alphabetical index to find the location (Page number) of each wiring diagram. Code Section Wiring Diagram Name Code Section Wiring Diagram Name A/C, A HA Auto Air Conditioner EGVC/V EC EGR Volume Control Valve A/C, M HA Manual Air Conditioner ETC1 EC Throttle Control Motor A/T AT A/T ETC2 EC Throttle Control Motor ABS BR Anti-lock Brake System ETC3 EC Throttle Control Motor APPS1 EC Accelerator Pedal Position Sensor F/FOG EL Front Fog Lamp APPS2 EC Accelerator Pedal Position Sensor F/PUMP EC Fuel Pump APPS3 EC Accelerator Pedal Position Sensor FCUT EC Fuel Cut System APS EC Accelerator Position Sensor FICD EC IACV-FICD Solenoid Valve ASCD EL Automatic Speed Control Device FPSW1 AT ATF Pressure Switch 1 AT/IND EL A/T Indicator Lamp FPSW3 AT ATF Pressure Switch 3 AUDIO EL Audio FPSW5 AT ATF Pressure Switch 5 BACK/L EL Back-up Lamp FPSW6 AT ATF Pressure Switch 6 BRK/SW EC Brake Switch Signal FR/B AT Front Brake Solenoid Valve CAN AT CAN Communication Line FR/BF AT Front Brake Solenoid Valve CAN EC CAN Communication Line FTS AT CAN EL CAN Communication Line A/T Fluid Temperature Sensor Circuit CD/CHG EL CD Auto Changer FUELB1 EC Fuel Injection System Function (Bank 1) CHARGE EL Charging System CHIME EL Warning Chime FUELB2 EC Fuel Injection System Function (Bank 2) CIGAR EL Cigarette Lighter GLOW EC Quick Glow System CKPS EC Crankshaft Position Sensor H/AIM EL Headlamp Aiming Control System CLOCK EL Clock H/LAMP EL Headlamp CMPS EC Camshaft Position Sensor HLC EL Headlamp Washer COMPAS EL Compass and Thermometer COOL/F EC Cooling Fan Control HLR/C AT High and Low Reverse Clutch Solenoid Valve D/C AT Direct Clutch Solenoid Valve HLR/CF AT D/CF AT Direct Clutch Solenoid Valve High and Low Reverse Clutch Solenoid Valve D/LOCK EL Power Door Lock I/C AT Input Clutch Solenoid Valve DEF EL Rear Window Defogger I/CF AT Input Clutch Solenoid Valve DEICER EL Wiper Deicer I/LOCK AT A/T Interlock IATS EC Intake Air Temperature Sensor IGNSYS EC Ignition Signal ILL EL Illumination INJECT EC Injector INJPMP EC Electronic Control Fuel Injection Pump INT/V EC Intake Air Control Valve Control Solenoid Valve DIFF/L PD Differential Lock DLC EC Data Link Connector DTRL EL Headlamp — Daytime Light System E/BRE AT A/T 1st Engine Braking ECMRLY EC ECM Relay ECTS EC Engine Coolant Temperature Sensor EC EGRC-Solenoid Valve and Throttle Control Solenoid Valve EGRC/V EL-277 WIRING DIAGRAM CODES (CELL CODES) Wiring Diagram Codes (Cell Codes) (Cont’d) Code Section Wiring Diagram Name IVC EC Intake Valve Timing Control Solenoid Valve ROOM/L EL Interior Room Lamp RP/SEN EC Refrigerant Pressure Sensor KS EC Knock Sensor S/LOCK EL Power Door Lock - Super Lock - LC/B AT Low Coast Brake Solenoid Valve S/SIG EC Start Signal LC/BF AT Low Coast Brake Solenoid Valve S/TANK FE Sub Fuel Tank Control System LOAD EC Electrical Load Signal SEN/PW EC Sensor Power Supply LPSV AT Line Pressure Solenoid Valve SHIFT AT A/T Shift Lock System MAFS EC Mass Air Flow Sensor SRS RS Supplemental Restraint System MAIN EC Main Power Supply and Ground Circuit STAB RA Stabilizer Release Device METER EL Meter and Gauges START EL Starting System MIL EC Mulfunction Indicator Lamp STSIG AT Start Signal Circuit MMSW AT Manual Mode Switch TAIL/L EL Parking, License and Tail Lamps MULTI EL Multi-remote Control System TCCSIG AT A/T TCC Signal (Lock Up) NATS EL Nissan Anti-Theft System TCV AT Torque Converter Clutch Solenoid Valve NLS EC Needle Lift Sensor TCV EC Injection Timing Control Valve NONDTC AT Non-detective Items THEFT EL Theft Warning System EC Heated Oxygen Sensor 1 Heater (B1) (Front) TPS1 EC Throttle Position Sensor TPS2 EC Throttle Position Sensor TPS3 EC Throttle Position Sensor TRQ/SG EC Engine Torque Control Signal TRSA/T AT Turbine Revolution Sensor O2H1B1 Code Section Wiring Diagram Name O2H1B2 EC Heated Oxygen Sensor 1 Heater (B2) (Front) O2H2B1 EC Heated Oxygen Sensor 2 Heater (B1) (Rear) O2H2B2 EC Heated Oxygen Sensor 2 Heater (B2) (Rear) TURN EL Turn Signal and Hazard Warning Lamps O2S1B1 EC Heated Oxygen Sensor 1 (B1) (Front) VIAS/V EC Variable Induction Air Control System O2S1B2 EC Heated Oxygen Sensor 1 (B2) (Front) VSS EC Vehicle Speed Sensor VSSA/T AT Vehicle Speed Sensor A/T O2S2B1 EC Heated Oxygen Sensor 2 (B1) (Rear) WARN EL Warning Lamps EL Front Wiper and Washer EC Heated Oxygen Sensor 2 (B2) (Rear) WIPER O2S2B2 OILP/W EC Engine Oil Pressure Warning System PGC/V EC EVAP Canister Purge Volume Control Solenoid Valve PNP/SW AT Park/Neutral Position Switch PNP/SW EC Park/Neutral Position Switch POWER AT Transmission Control Module (Power Supply) POWER EC ECM Power Supply For Back-up POWER EL Power Supply Routing PS/SEN EC Power Steering Pressure Sensor R/COOL HA Rear Cooler System R/FOG EL Rear Fog Lamp

EL-278 ENGINE MECHANICAL SECTION EM MODIFICATION NOTICE: + + + Engine mounting parts have been modified.

Models with three way catalyst have been introduced for the Middle East. TB48DE engine has been introduced for Europe. CONTENTS
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2 NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING .... 4 NVH Troubleshooting Chart - Engine Noise ....
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Components.. 26 Removal.. 27 Disassembly... 29 Inspection.. 29 Valve Clearance .... 35 Assembly ....
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44 Disassembly.. 45 Inspection... 46 Assembly .... 52 Assembly .... 52 SERVICE DATA AND SPECIFICATIONS (SDS) .... 55 General Specifications... 55 Inspection and
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TB48DE PREPARATION Special Service Tools Tool number Tool name Description KV10111100 Seal cutter Removing steel oil pan and timing chain case NT046 KV101056S0 Ring gear stopper 1 KV10105630 Adapter 2 KV10105610 Plate Preventing crankshaft from rotating a: 3 (0.12) b: 6.4 (0.252) c: 2.8 (0.110) d: 6.6 (0.260) e: 107 (4.21) f: 14 (0.55) g: 20 (0.79) h: 14 (0.55) dia. Unit: mm (in) NT617 Commercial Service Tools Tool name Description Spark plug wrench Removing and installing spark plug NT047 Valve oil seal drift Installing valve oil seal a: 25 (0.98) dia. b: 14.4 (0.567) dia. c: 11.8 (0.465) dia. d: 10 (0.39) e: 11 (0.43) f: 9 (0.35) Unit: mm (in) NT602 Valve guide drift Removing and installing valve guide Intake & Exhaust a = 10 mm (0.39 in) dia.

b = 6.5 mm (0.256 in) dia. NT015 EM-2 PREPARATION Commercial Service Tools (Cont’d) Tool name TB48DE Description Valve guide reamer Reaming valve guide V 1 or hole for oversize valve guide V 2 Intake & Exhaust d1 = 7.000 mm (0.2756 in) dia. d2 = 11.19 mm (0.4406 in) dia. NT016 Valve seat cutter set Finishing valve seat dimensions NT048 Front oil seal drift Installing front oil seal a = 80 mm (3.15 in) dia. b = 58 mm (2.28 in) dia. NT049 Piston pin drift Removing and installing piston pin a = 22.5 mm (0.886 in) dia. b = 12.5 mm (0.492 in) dia. NT074 Piston ring expander Removing and installing piston ring NT030 EM-3 NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING TB48DE NVH Troubleshooting Chart — Engine Noise Use the chart below to help you find the cause of the symptom. 1. Locate the area where noise occurs. 2. Confirm the type of noise. 3. Specify the operating condition of engine. 4. Check specified noise source. If necessary, repair or replace these parts. Operating condition of engine Location of noise Top of engine Rocker cover Cylinder head Type of noise Front of engine Timing chain cover When starting When idling When racing While driving Source of noise Check item Reference page Ticking or clicking C A — A B — Tappet noise Valve clearance EM-35 Rattle C A — A B C Camshaft bearing noise Camshaft journal clearance Camshaft runout EM-30 — Piston pin noise Piston and piston pin clearance Connecting rod bushing clearance EM-46, 51 A Piston slap noise Piston-to-bore clearance Piston ring side clearance Piston ring end gap Connecting rod bend and torsion EM-46, 47 Connecting rod bushing clearance (Small end) Connecting rod bearing clearance (Big end) EM-50, 51 Slap or knock Crankshaft pulley Cylinder block (Side of engine) Oil pan Before After warm-up warm-up — Slap or rap A A — — — B B B B Knock A B C B B B Connecting rod bearing noise Knock A B — A B C Main bearing noise Main bearing oil clearance Crankshaft runout EM-49 Timing chain cracks and wear Timing chain

tensioner operation EM-15, 19 Drive belts deflection Tapping or ticking A A — B B B Timing chain and chain tensioner noise Squeaking or fizzing A B — B — C Drive belts (Sticking or slipping) Creaking A B A B A B Drive belts (Slipping) MA section (“Checking Drive Belts”, “ENGINE MAINTEIdler pulley bearing operation NANCE”) Front of engine
Squall Creak A: Closely related A B: Related B — C: Sometimes related B A —: Not related EM-4 B Water pump Water pump operation noise LC section (“Water Pump Inspection”, “ENGINE COOLING SYSTEM”) OUTER COMPONENT PARTS TB48DE SEM018H EM-5 OUTER COMPONENT PARTS TB48DE SEM044H EM-6 OUTER COMPONENT
PARTS TB48DE CAUTION: + Be careful not to damage heated oxygen sensor. + Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. + Perform procedures for “Throttle Valve Closed Position Learning” whenever harness connector of electric
throttle control actuator is disconnected. Refer to BASIC SERVICE PROCEDURE in EC section. + If electric throttle control actuator is replaced, perform procedures for “Idle Air Volume Learning” after finishing repairs. Refer to BASIC SERVICE PROCEDURE, in EC section. EM-7 POWER VALVE ACTUATOR TB48DE DISASSEMBLY 1. Remove
washer and E-ring. 2.
Remove actuator assembly.
3. Disconnect shaft lever from actuator rod. ASSEMBLY 1. 2. 3. + MEM266A Connect shaft lever with actuator rod. Install actuator assembly with stopper.
Install washer and E-ring. Use a new E-ring. ADJUSTMENT 1. Apply vacuum pressure of 33.3 to 40.0 kPa (333 to 400 mbar, 250 to 300 mmHg, 9.84 to 11.81 inHg) to the actuator. 2. Loosen adjusting screw until it is separated from the lever. 3. Screw in adjusting screw until it contacts the shaft lever, and then screw it in two turns ±45°. 4. Apply
vacuum pressure of 40.0±13.3 kPa (400±133 mbar, 300±100 mmHg, 11.81±3.94 inHg) to the actuator. Switch on and off power valve to check more than three times if the valve operates smoothly with no play or looseness. EM-8 COMPRESSION PRESSURE TB48DE Measurement of Compression Pressure 1. Warm up engine. 2. Turn ignition switch
OFF. 3. Release fuel pressure. Refer to “Releasing Fuel Pressure” in EC section.
4. Disconnect ignition coil harness connector. 5. Remove air intake duct, upper collector, throttle body (or electric throttle control actuator), ignition coil and all spark plugs. 6. 7. 8. + SEM040H 9. + + + Attach a compression tester to No. 1 cylinder.
Crank the engine and record the highest gauge indication. Repeat the measurement on each cylinder as shown below. Always use a fully-charged battery to obtain specified engine revolution.
Compression pressure: kPa (bar, kg/cm2, psi)/rpm Standard 1,226 (12.26, 12.5, 178)/200 Minimum 1,030 (10.30, 10.5, 149)/200 Difference limit between cylinders: 98 (0.98, 1.0, 14)/200 If cylinder compression in one or more cylinders is low, pour a small amount of engine oil into cylinders through the spark plug holes and retest compression. If
adding oil helps the compression, piston rings may be worn or damaged. If so, replace piston rings after checking piston. If pressure stays low, a valve may be sticking or seating improperly. Inspect and repair valve and valve seat. (Refer to SDS.) If valve or valve seat is damaged excessively, replace them. If compression in any two adjacent cylinders
is low and if adding oil does not help the compression, there is leakage past the gasket surface. If so, replace cylinder head gasket.
EM-9 OIL PAN TB48DE SEM061H Removal 1. 2. 3. + Remove engine undercover. Drain engine oil. Remove steel oil pan bolts. Loosen steel oil pan bolts in reverse order. SEM740F SEM751F EM-10 OIL PAN Removal (Cont’d) 4. a. + + TB48DE Remove steel oil pan. Insert SST between aluminum oil pan and steel oil pan. Be careful not to damage
aluminum mating surface. Do not insert screwdriver, or oil pan flange will be deformed. SEM741F b. Slide SST by tapping on the side of the SST with a hammer. SEM742F 5. Remove steel oil pan. SEM743F 6. Disconnect left side of the tie rod end. Refer to “STEERING LINKAGE” in ST section. SEM714F 7. Remove transmission bolts. SEM744F EM-
11 OIL PAN Removal (Cont’d) TB48DE 8. Remove aluminum oil pan bolts. + Loosen aluminum oil pan bolts in reverse order. MEM203A 9.
Remove aluminum oil pan using SST. + Be careful not to damage aluminum mating surface. + Do not insert screwdriver, or oil pan flange will be deformed. 10. Remove oil strainer. SEM746F Installation 1. Install oil strainer. 2.
Install aluminum oil pan. a. Use a scraper to remove all traces of liquid gasket from mating surfaces. + Also remove traces of liquid gasket from mating surface of cylinder block, front cover and steel oil pan. + Remove old liquid gasket from the bolt hole and thread. SEM747F b. Apply a continuous bead of liquid gasket to mating surface of aluminum
oil pan.
+ Use Genuine Liquid Gasket or equivalent.
SEM159F c. Apply liquid gasket to inner sealing surface as shown in figure.
+ Be sure liquid gasket is 3.5 to 4.5 mm (0.138 to 0.177 in) in diameter. + Attaching should be done within 5 minutes after coating. SEM745F EM-12 OIL PAN Installation (Cont’d) d.
+ + + + TB48DE Install aluminum oil pan. Apply liquid gasket to the shank of the bolts marked with ★. Use Genuine Liquid Gasket or equivalent. Tightening should be done within 5 minutes after coating. Tighten bolts in numerical order. Tightening torque: ★: 8.43 - 10.8 Nzm (0.86 - 1.1 kg-m, 75 - 95 in-lb) Others: 20.6 - 26.5 Nzm (2.1 - 2.7 kg-m, 16 -
19 ft-lb) MEM203A 3. Install the transmission bolts. Refer to Service Manual NISSAN Y61 SUPPLEMENT-V 1st Revision (Publication No. SM1E-Y61EG1), AT-199.
SEM744F 4. Install steel oil pan. a. Use a scraper to remove all traces of liquid gasket from mating surfaces. + Also remove traces of liquid gasket from mating surface of aluminum oil pan. SEM749F b. Apply a continuous bead of liquid gasket to mating surface of aluminum oil pan. + Use Genuine Liquid Gasket or equivalent. + Be sure liquid gasket
is 3.5 to 4.5 mm (0.138 to 0.177 in) in diameter. + Attaching should be done within 5 minutes after coating. SEM159F EMO0252D EM-13 OIL PAN Installation (Cont’d) c.
+ + 4. TB48DE Install steel oil pan. Tighten in numerical order as shown in the figure. Wait at least 30 minutes before refilling engine oil. Connect left side of the tie rod end. Refer to “STEERING LINKAGE” in ST section. 5. Install in reverse order of removal for remaining steps paying attention to the following. + After refilling engine oil, check
engine oil level. + Start engine and check that there is no leakage of engine oil. SEM751F EM-14 TB48DE TIMING CHAIN Components SEM062H 1. 2. 3. 4. 5. Chain tensioner Camshaft sprocket (Intake) Camshaft sprocket (Exhaust) O-ring Timing chain slack guide 6. Timing chain tension guide 7. Timing chain 8. Crankshaft sprocket 9. Oil pump
drive spacer 10. Front cover EM-15 11. 12. 13. 14. 15. 16. Dowel pin Front oil seal Crankshaft pulley Cylinder head front cover Camshaft position sensor Chain guide TIMING CHAIN Components (Cont’d) TB48DE CAUTION + After removing timing chain, do not turn and camshaft separately, or valves will strike piston heads. + When installing chain
tensioner, oil seats, or other sliding parts, lubricate contacting surfaces with new engine oil. + Apply new engine oil to bolt threads and seat surfaces when installing camshaft sprocket and crankshaft pulley. + When removing oil pump assembly, remove camshaft position sensor (PHASE), then remove timing chain from engine.
+ Be careful not to damage sensor edges. Removal 1. Remove engine undercover. 2. Drain engine oil. 3. Drain engine coolant from radiator. Be careful not to spill engine coolant on drive belts. 4. Remove radiator and radiator shroud. Refer to “Radiator” in LC section. 5. Release fuel pressure.
Refer to “Fuel Pressure Release” in EC section. 6. Remove the following belts. + A/C compressor drive belt + Power steering oil pump drive belt + Alternator drive belt 7. Remove fan coupling with fan. 8. Remove power steering oil pump and power steering oil pump bracket. 9. Remove A/C compressor idler pulley. 10. Remove alternator and
alternator bracket. 11. Remove oil pans. Refer to EM-13, “Removal” of OIL PAN. (Publication No. SM1E-Y61EG0) 12. Remove air duct from intake manifold collector. 13. Remove vacuum hoses, fuel hoses, and so on. 14. Remove ignition coils. 15. Remove spark plugs. MEM205A EM-16 TIMING CHAIN Removal (Cont’d) TB48DE 16. Remove rocker
cover bolts in numerical order as shown in the figure. MEM206A 17. Set No. 1 piston at TDC on its compression stroke. MEM207A + Rotate crankshaft until mating mark on camshaft sprocket is set at position indicated in figure. MEM208A 18.
Remove camshaft position sensor. + Do not allow any magnetic materials to contact the camshaft position sensor. + Be careful not to drop or damage sensor.
19. Remove cylinder head front cover using Seal cutter [SST: KV10111100]. MEM209AA 20. Remove timing chain guide from camshaft bracket. 21. Attach a suitable stopper pin to chain tensioner to hold plunger at its compressed position. 22. Remove chain tensioner. MEM210A EM-17 TIMING CHAIN Removal (Cont’d) TB48DE 23. Loosen camshaft
sprocket bolts holding camshaft at hexagonal area. + Apply paint to timing chain and cam sprockets for alignment during installation. 24. Remove camshaft sprockets. SEM041H 25.
Remove front cover bolts at cylinder head front side. MEM212A 26. Remove starter motor, and set ring gear stopper (SST) using mounting bolt holes of starter motor. EMO0299D 27. Loosen crankshaft pulley bolt. 28.
Remove crankshaft pulley with a suitable puller. MEM214A 29. Remove water pump pulley and water pump. Refer to LC-13, “Water Pump” (Publication No. SM1E-Y61EG1). 30. Remove front cover bolts as shown. 31. Remove front cover carefully using Seal cutter [SST: KV10111100].
+ Be careful not to damage or bend front end of cylinder head gasket. + If cylinder head gasket is damaged, replace it with a new one. MEM215A EM-18 TIMING CHAIN Removal (Cont’d) 32. Remove 33. Remove 34. Remove 35. Remove TB48DE timing chain. oil pump drive spacer. tension guide and slack guide. crankshaft sprocket. SEM019H 36.
Remove O-rings from front cover. MEM217A Inspection Check for cracks and excessive wear at roller links. Replace if necessary. SEM885F Installation 1. Install crankshaft sprocket on crankshaft. + There is no installation direction. MEM267A 2. Position crankshaft so that No. 1 piston is at TDC and key way is at 12 o’clock. MEM218A EM-19
TIMING CHAIN Installation (Cont’d) TB48DE 3. Install timing chain on crankshaft sprocket. + Support chain with a suitable tool to keep the mating mark aligned. SEM021H 4. Install timing chain slack guide and timing chain tension guide. SEM020H 5. Install camshaft sprocket. + Set timing chain by aligning mating marks with those of camshaft
sprockets. MEM221A 6. Install camshaft sprocket bolts and tighten them to specified torque holding camshaft at hexagonal area. + Apply new engine oil to bolt threads and seat surface. SEM042H 7. Install chain tensioner. + Before installing chain tensioner, insert a suitable pin into pin hole of chain tensioner to keep plunger compressed. + After
installing chain tensioner, remove the pin to release plunger. 8. Install timing chain guide to camshaft bracket.
MEM223A EM-20 TIMING CHAIN Installation (Cont’d) TB48DE 9. Replace front oil seal with new one, and remove all traces of liquid gasket from mating surface using a scraper. + Also remove traces of liquid gasket from mating surface of cylinder block. + For front oil seal replacement, refer to “FRONT OIL SEAL”, EM-24.
MEM224A 10.
Apply a continuous bead of liquid gasket to mating surface of front cover. + Use Genuine Liquid Gasket or equivalent. + Attaching should be done within 5 minutes after coating. MEM225A 11. Install front cover.
+ Lift front cover at an angle and install it to mounting position so that front cover will come in contact with both cylinder head gasket lower surface and cylinder block front surface at the same time. + Be careful not to damage cylinder head gasket. PBIC0563E Bolt No. a. b. Tightening torque Nzm (kg-m, in-lb) 6.9 - 9.5 (0.70 - 0.97, 61 - 84) Bolt
length mm (in) 45 (1.77) 16 (0.63) MEM226A + Make sure three O-rings are present and new ones.
+ Be careful not to damage oil seal when installing front cover. MEM217A EM-21 TIMING CHAIN Installation (Cont’d) TB48DE 12. Install front cover bolts at cylinder head front side. MEM212A MEM227A 13. Install oil pump drive spacer. 14. Install water pump and water pump pulley. Refer to “Water Pump” in LC section. 15. Install idler pulley and
bracket. 16. Install oil pan. Refer to EM-15, “Installation” (Publication No. SM1E-Y61EG0). 17. Install crankshaft pulley. + Tightening procedure a. Tighten bolt to 54.0 to 63.8 Nzm (5.5 to 6.5 kg-m, 39.8 to 47.0 ft-lb). b. Turn bolt 120 to 125 degrees clockwise using marks provided on bolt flange. Turning for one mark equals 120 degrees. 18.
Remove ring gear stopper. 19.
Install starter motor. 20. Install cylinder head front cover. + Apply liquid gasket to cylinder head front cover. + Use Genuine Liquid Gasket or equivalent. MEM228A 21. Install camshaft position sensor with new O-ring. MEM209AA EM-22 TIMING CHAIN Installation (Cont’d) TB48DE 22. Before installing rocker cover, apply a continuous bead of
liquid gasket to mating surface of cylinder head. + Use Genuine Liquid Gasket or equivalent. MEM229A MMA120A 23. Install rocker cover with new rocker cover gasket and tighten bolts in numerical order as shown in the figure.
24. Install spark plugs.
25. Install ignition coils. 26. Install alternator and alternator bracket. 27. Install power steering oil pump and power steering oil pump bracket.
28. Install fan coupling with fan. 29. Drive belts.
For adjusting drive belt deflection, refer to “Checking Drive Belts” in MA section. 30. Reinstall parts in reverse order of removal.
EM-23 OIL SEAL TB48DE Replacement VALVE OIL SEAL 1. Remove rocker cover. 2. Remove camshaft. 3. Remove valve spring. Refer to “Removal”, EM-31 (Publication No. SM1E-Y61EG1). 4. Remove valve oil seal with suitable tool. Piston concerned should be set at TDC to prevent valve from falling. MEM230A 5. Apply new engine oil to new valve
oil seal, and install it with [SST: KV10116300] to dimension as shown. MEM231A FRONT OIL SEAL 1. Remove the following parts: + Engine under cover + Radiator and radiator shroud: Refer to “Radiator” in LC section.
+ Drive belts and cooling fan + Crankshaft pulley and oil pump drive spacer: Refer to “TIMING CHAIN”, EM-15. 2. Remove front oil seal from front cover. + Be careful not to scratch front cover. MEM232A 3. Apply new engine oil to new oil seal and install it using a suitable tool. + Install new oil seal in the direction as shown in the figure. SEM715A
MEM233A EM-24 OIL SEAL Replacement (Cont’d) TB48DE REAR OIL SEAL 1. Separate clutch assembly or automatic transmission.
Refer to “REMOVAL AND INSTALLATION” in MT or AT section.
2. Remove flywheel or drive plate.
3. Remove bolts fixing from both rear and bottom sides. 4. Remove rear oil seal retainer assembly using Seal cutter [SST: KV10111100]. 5. Remove traces of liquid gasket from mating surface of cylinder block and oil pan using scraper. + Replace oil seal and retainer assembly as a single unit. SEM064H 6. Apply a continuous bead of liquid gasket to
mating surfaces of rear oil seal retainer (both for cylinder block and oil pan sides). + Use Genuine Liquid Gasket or equivalent. a. Coat of liquid gasket should be maintained within 2.0 to 3.0 mm (0.079 to 0.118 in) and 3.5 to 4.5 mm (0.138 - 0.177 in) dia. range. b. Attach oil seal retainer to cylinder block within 5 minutes after coating. c. Wait at least
30 minutes before refilling engine oil or starting engine. EM-25 TB48DE CYLINDER HEAD Components MEM234A 1.
2.
3. 4. Oil filler cap Rocker cover Rocker cover gasket Intake valve timing control solenoid valve (If so equipped) 5. Camshaft bracket 6. Intake camshaft 7.
Exhaust camshaft 8. Timing chain guide 9. Cylinder head bolt 10. Shim 11. Valve lifter 12. Valve cotter 13. Valve spring retainer 14. Valve spring EM-26 15. 16. 17. 18. 19. 20. 21. Valve spring seat Valve oil seal Valve guide Cylinder head Cylinder head gasket Valve seat Valve CYLINDER HEAD Components (Cont’d) TB48DE CAUTION + When
installing camshaft, lubricate contacting surfaces with new engine oil. + When tightening cylinder head bolts, camshaft sprocket bolts and camshaft bracket bolts, lubricate bolt threads and seat surfaces with new engine oil. + Attach tags to valve lifters so as not to mix them up. + Be careful not to damage heated oxygen sensor. + Discard any heated
oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Removal 1. Remove engine undercovers. 2. Drain engine coolant from radiator and cylinder block. Be careful not to spill coolant on drive belts. 3. Release fuel pressure. Refer to “Fuel Pressure Release” in EC
section. 4. Remove drive belts.
5. Remove air duct to intake manifold collector. 6. Remove front exhaust tube. MMA119A 7. Disconnect vacuum hoses, fuel hoses, water hoses, wires, harness, connectors and so on. 8. Remove intake manifold. 9. Disconnect heated oxygen sensor connectors. (Except for the Middle East) 10 Remove exhaust manifold. 11. Remove ignition coils. 12.
Remove spark plugs. MEM205A 13. Remove rocker cover bolts in numerical order as shown in the figure. MEM206A 14. Set No. 1 piston at TDC on its compression stroke. MEM207A EM-27 CYLINDER HEAD Removal (Cont’d) TB48DE + Rotate crankshaft until mating mark on camshaft sprocket is set at position indicated in figure at left. MEM208A
15. Remove camshaft position sensor. + Do not allow any magnetic materials to contact the camshaft position sensor. + Be careful not to damage sensor. 16. Remove cylinder head front cover using Tool (Seal cutter). MEM209A 17. Remove timing chain guide from camshaft bracket. 18. Attach a suitable stopper pin to chain tensioner to hold plunger
at its compressed position. 19. Remove chain tensioner. MEM210A 20. Loosen camshaft sprocket bolts holding camshaft at hexagonal area. + Apply paint to timing chain and cam sprockets for alignment during installation. 21. Remove camshaft sprockets. MEM211A 22. Remove camshaft brackets and camshafts. + Apply mating marks to brackets to
ensure correct reassembly. + Bolts should be loosened in two or three steps and in numerical order as shown. MEM235A EM-28 CYLINDER HEAD Removal (Cont’d) TB48DE 23. Remove cylinder head bolts. 24. Remove cylinder head. + Head warpage or cracking could result from removing in incorrect order. + Cylinder head bolts should be loosened
in two or three steps and in numerical order as shown. MEM236A Disassembly 1. Remove valve components with Tool. 2. Remove valve oil seal with a suitable tool. MEM237A Inspection CYLINDER HEAD DISTORTION MEM238A + Clean surface of cylinder head. + Use a reliable straightedge and feeler gauge to check the flatness of cylinder head
mating surface. + Check along six positions shown in figure. Head surface flatness: Standard: Less than 0.07 mm (0.0028 in) Limit: 0.2 mm (0.008 in) If beyond the specified limit, replace or resurface it. Resurfacing limit: The limit for cylinder head resurfacing is determined by the amount of cylinder block resurfacing. Amount of cylinder head
resurfacing is “A”. Amount of cylinder block resurfacing is “B”. The maximum limit is as follows: A + B = 0.2 mm (0.008 in) After resurfacing cylinder head, check that camshaft rotates freely by hand. If resistance is felt, replace cylinder head. Nominal cylinder head height: 130.9 - 131.3 mm (5.15 - 5.17 in) CAMSHAFT VISUAL CHECK Check
camshaft for scratches, seizure and wear. EM-29 CYLINDER HEAD Inspection (Cont’d) TB48DE CAMSHAFT RUNOUT 1. Measure camshaft runout at the center journal. Runout (Total indicator reading): Standard Less than 0.02 mm (0.0008 in) Limit 0.1 mm (0.004 in) 2. If it exceeds the limit, replace camshaft. SEM875A CAMSHAFT CAM HEIGHT 1.
Measure camshaft cam height. Standard cam height: Intake 43.465 - 43.655 mm (1.7112 - 1.7187 in) Exhaust 43.065 - 43.255 mm (1.6955 - 1.7029 in) Cam wear limit: 0.15 mm (0.0059 in) 2. If wear is beyond the limit, replace camshaft.
SEM549A CAMSHAFT JOURNAL CLEARANCE 1.
Install camshaft bracket and tighten bolts to the specified torque. 2. Measure inner diameter of camshaft bearing. Standard inner diameter: No. 1 to No. 7 bearing 28.000 - 28.021 mm (1.1024 - 1.1032 in) MEM239A SEM012A 3. Measure outer diameter of camshaft journal. Standard outer diameter: No. 1 to No. 7 journal 27.935 - 27.955 mm (1.0998 -
1.1006 in) 4. If clearance exceeds the limit, replace camshaft and/or cylinder head. Camshaft journal clearance: Standard 0.045 - 0.086 mm (0.0018 - 0.0034 in) Limit 0.15 mm (0.0059 in) CAMSHAFT END PLAY 1. Install camshaft in cylinder head. Refer to EM-38. 2. Measure camshaft end play. Camshaft end play: Standard 0.115 - 0.188 mm (0.0045 -
0.0074 in) Limit 0.20 mm (0.0079 in) 3. If limit is exceeded, replace camshaft and remeasure end play. SEM918F EM-30 TB48DE CYLINDER HEAD Inspection (Cont’d) + If limit is still exceeded after replacing camshaft, replace cylinder head. CAMSHAFT SPROCKET RUNOUT 1. Install sprocket on camshaft. 2. Measure camshaft sprocket runout.
Runout (Total indicator reading): Limit 0.15 mm (0.0059 in) 3. If it exceeds the limit, replace camshaft sprocket. MEM240A VALVE GUIDE CLEARANCE 1. Measure valve deflection as shown in figure. (Valve and valve guide wear the most in this direction.) Valve deflection limit (Dial gauge reading): Intake & Exhaust 0.2 mm (0.008 in) SEM345D 2. If
it exceeds the limit, check valve to valve guide clearance. a. Measure valve stem diameter and valve guide inner diameter. b. Calculate valve to valve guide clearance. Valve to valve guide clearance = valve guide inner diameter − valve stem diameter. c. Check that clearance is within specification. Unit: mm (in) SEM938C Standard Limit Intake 0.020
- 0.053 (0.0008 - 0.0021) 0.1 (0.004) Exhaust 0.040 - 0.073 (0.0016 - 0.0029) 0.1 (0.004) + If it exceeds the limit, replace valve and remeasure clearance. + If limit is still exceeded after replacing valve, replace valve guide. EM-31 CYLINDER HEAD Inspection (Cont’d) TB48DE VALVE GUIDE REPLACEMENT 1. To remove valve guide, heat cylinder
head to 110 to 130°C (230 to 266°F). SEM008A 2. Drive out valve guide with a press [under a 20 kN (2 ton, 2.2 US ton, 2.0 Imp ton) pressure] or hammer and suitable tool. SEM931C 3. Ream cylinder head valve guide hole. Valve guide hole diameter (for oversize service parts): Intake & Exhaust 11.175 - 11.196 mm (0.4400 - 0.4408 in) SEM932C 4.
Heat cylinder head to 110 to 130°C (230 to 266°F) and press service valve guide into cylinder head. Projection “L”: 13.5 - 13.7 mm (0.531 - 0.539 in) MEM241A 5. Ream valve guide. Finished size: Intake & Exhaust 7.000 - 7.018 mm (0.2756 - 0.2763 in) SEM932C EM-32 CYLINDER HEAD Inspection (Cont’d) TB48DE VALVE SEATS Check valve seats
for pitting at contact surface. Resurface or replace if excessively worn. + Before repairing valve seats, check valve and valve guide for wear. If they have worn, replace them. Then correct valve seat. + Use both hands to cut uniformly. SEM934C REPLACING VALVE SEAT FOR SERVICE PARTS 1. Bore out old seat until it collapses. Set machine depth
stop so that boring cannot contact the bottom face of seat recess in cylinder head. 2. Ream cylinder head recess. Reaming bore for service valve seat Oversize [0.5 mm (0.020 in)]: Refer to SDS, EM-57. Use the valve guide center for reaming to ensure valve seat will have the correct fit. SEM795A 3. Heat cylinder head to 110 to 130°C (230 to 266°F).
4. Press fit valve seat until it seats on the bottom. SEM008A SEM892B 5.
Cut or grind valve seat using suitable tool to the specified dimensions as shown in SDS, EM-57, 57.
6. After cutting, lap valve seat with abrasive compound. 7. Check valve seating condition. Seat face angle “α”: 44°45′ Contacting width “W”: Intake 1.05 - 1.35 mm (0.0413 - 0.0531 in) Exhaust 1.25 - 1.55 mm (0.0492 - 0.0610 in) Valve stem projection (Standard): Intake 41.46 mm (1.6323 in) Exhaust 41.31 mm (1.6264 in) MEM242A EM-33 CYLINDER
HEAD Inspection (Cont’d) TB48DE VALVE DIMENSIONS Check dimensions of each valve. Refer to SDS, EM-56 for dimensions. When valve head has been worn down to 0.5 mm (0.020 in) in margin thickness, replace valve. Grinding allowance for valve stem tip is 0.2 mm (0.008 in) or less. SEM188A VALVE SPRING Squareness 1. Measure dimension
“S”. Out-of-square “S”: Less than 2.2 mm (0.087 in) 2.
If it exceeds the limit, replace spring. SEM288A Pressure Check valve spring pressure at specified spring height. Pressure: Standard 421 N (42.9 kg, 94.6 lb) at 27.4 mm (1.079 in) Limit More than 396 N (40.4 kg, 89.0 lb) at 27.4 mm (1.079 in) If it exceeds the limit, replace spring. EM113 VALVE LIFTER AND VALVE SHIM 1. Check contact and
sliding surfaces for wear or scratches. AEM410 2. Check diameter of valve lifter and valve lifter guide bore.
Valve lifter outside diameter: 33.960 - 33.975 mm (1.3370 - 1.3376 in) AEM411 EM-34 TB48DE CYLINDER HEAD Inspection (Cont’d) Lifter guide inside diameter: 34.000 - 34.021 mm (1.3386 - 1.3394 in) Clearance between valve lifter and valve lifter guide: Standard 0.025 - 0.061 mm (0.0010 - 0.0024 in) Limit 0.1 mm (0.004 in) If it exceeds the limit,
replace valve lifter or cylinder head which exceeds the standard diameter tolerance. SEM920F Valve Clearance CHECKING MEM207A Check valve clearance while engine is cold and not running. 1. Remove engine ornament cover and rocker cover. 2. Remove all spark plugs. 3. Set No. 1 cylinder at TDC on its compression stroke. + Align pointer with
TDC mark on crankshaft pulley. + Check that all valve lifters on No. 1 cylinder are loose. + If not, turn crankshaft one revolution (360°) and align as described above. 4. Check only those valves shown in the figure. Crankshaft position No. 1 TDC Valve No. 1 No. 2 No. 3 No. 4 No. 5 No. 6 INT EXH INT EXH INT EXH INT EXH INT EXH INT EXH j j j j j j
MEM243A + Using a feeler gauge, measure clearance between valve lifter and camshaft.
+ Record any valve clearance measurements which are out of specification. They will be used later to determine the required replacement adjusting shim. Valve clearance for checking (Cold): Intake 0.25 - 0.33 mm (0.010 - 0.013 in) Exhaust 0.29 - 0.37 mm (0.011 - 0.015 in) SEM139D 5. Turn crankshaft one revolution (360°) and align mark on
crankshaft pulley with pointer. 6. Check only those valves shown in the figure. Crankshaft position Valve No. 1 No. 3 No. 4 No. 5 No. 6 INT EXH INT EXH INT EXH INT EXH INT EXH No. 6 TDC MEM244A No. 2 j j j j + Use the same procedure as mentioned in step 4. EM-35 j j CYLINDER HEAD Valve Clearance (Cont’d) TB48DE 7. If all
valve clearances are within specification, install the following parts: + Rocker cover + All spark plugs + Engine ornament cover ADJUSTING Adjust valve clearance while engine is cold. 1.
Turn crankshaft. Position cam lobe upward on camshaft for valve that must be adjusted. 2. Place Tool (A) around camshaft as shown in figure.
CAUTION: Be careful not to damage cam surface with Tool (A). SEM941F 3. Rotate Tool (A) so that valve lifter is pushed down. SEM924F 4. Place Tool (B) between camshaft and the edge of valve lifter to retain valve lifter. CAUTION: + Tool (B) must be placed as close to camshaft bracket as possible. + Be careful not to damage cam surface with Tool
(B). 5. Remove Tool (A). MEM269A 6. Blow air into the hole on adjusting shim to separate it from valve lifter. MEM270A EM-36 TB48DE CYLINDER HEAD Valve Clearance (Cont’d) MEM271A 7. Remove adjusting shim using a small screwdriver and a magnetic finger. 8. Determine replacement adjusting shim size using the following formula. + Use a
micrometer to determine thickness of removed shim. + Calculate thickness of new adjusting shim so valve clearance comes within specified values. R = Thickness of removed shim N = Thickness of new shim M = Measured valve clearance Intake: N = R + [M − 0.29 mm (0.011 in)] Exhaust: N = R + [M − 0.33 mm (0.013 in)] Shims are available in 37
sizes from 1.96 mm (0.0772 in) to 2.68 mm (0.1055 in), in steps of 0.02 mm (0.0008 in).
SEM145D + Select the closest size shim to the calculated thickness. Refer to chart in SDS, EM-56. SEM308D 9. Install new shim using a suitable tool. + Install with the surface on which the thickness is stamped facing down. SEM146D 10. Place Tool (A) as explained in steps 2 and 3. 11. Remove Tool (B). 12. Remove Tool (A). 13. Recheck valve
clearance. Valve clearance: Unit: mm (in) Cold* Hot (reference data) Intake 0.25 - 0.33 (0.010 - 0.013) 0.32 - 0.40 (0.013 - 0.016) Exhaust 0.29 - 0.37 (0.011 - 0.015) 0.33 - 0.41 (0.013 - 0.016) SEM147D EM-37 TB48DE CYLINDER HEAD Valve Clearance (Cont’d) *: At a temperature of approximately 20°C (68°F) Whenever valve clearances are adjusted
to cold specifications, check that the clearances satisfy hot specifications and adjust again if necessary. Assembly 1. + + + Install valve component parts.
Always use new valve oil seal. Refer to EM-24. Before installing valve oil seal, install valve spring seat.
After installing valve components, tap valve stem tip with a plastic hammer to assure a proper fit. + Install valve spring with paint mark (narrow pitch) end toward cylinder head. MEM245A Installation MEM246A 1. Before installing cylinder head gasket, apply a continuous bead of liquid gasket to mating surface of cylinder block. 2. Install cylinder
head gasket. + When installing cylinder head, use new cylinder head gasket. 3. Install cylinder head. + Do not rotate crankshaft and camshaft separately, or valves will strike piston heads. + Apply new engine oil to cylinder head bolt threads and seat surfaces. + Tightening procedure a. Tighten bolts to 98.1 - 107.9 Nzm (10 - 11 kg-m, 73 79 ft-lb). b.
Loosen bolts completely.
c. Tighten bolts to 40.2 - 50.0 Nzm (4.1 - 5.0 kg-m, 30 36 ft-lb). d. Turn bolts 90 to 95 degrees clockwise.
Tightening torque Nzm (kg-m, ft-lb) MEM247A Bolts (1 - 14) a b c d 98.1 - 107.9 (10.0 - 11.0, 73 - 79) 0 (0, 0) 40.2 - 50.0 (4.1 - 5.0, 30 - 36) 90 - 95 degrees MEM248A EM-38 CYLINDER HEAD Installation (Cont’d) TB48DE 4.
Install camshaft. MEM272A + Make sure camshafts are aligned as shown in figure. MEM249A 5. Install camshaft brackets.
+ Make sure camshaft brackets are aligned as marked during disassembly.
MEM250A MEM251A + Apply new engine oil to bolt threads and seat surface. + Tighten camshaft bracket bolts in the following steps. a. Tighten bolts 13 - 16, then 1 - 12. : 1.96 Nzm (0.2 kg-m, 17 in-lb) b. Tighten bolts 1 - 16. : 5.88 Nzm (0.6 kg-m, 52 in-lb) c. Tighten bolts 1 - 16. : 9.02 - 11.8 Nzm (0.92 - 1.20 kg-m, 80 - 104 in-lb) + If any part of valve
assembly or camshaft is replaced, check valve clearance according to reference data. After completing assembly check valve clearance. Refer to “Checking” and “Adjusting” in “VALVE CLEARANCE” (EM-35). Reference data valve clearance (Cold): Intake 0.25 - 0.33 mm (0.010 - 0.013 in) Exhaust 0.29 - 0.37 mm (0.011 - 0.015 in) EM-39 CYLINDER
HEAD Installation (Cont’d) TB48DE 6. Install camshaft sprocket. + Set timing chain by aligning mating marks with those of camshaft sprockets. MEM221A 7. Install camshaft sprocket bolts to correct torque. + Apply new engine oil to bolt threads and seat surface. MEM222A 8. Install chain tensioner. + Before installing chain tensioner, insert a
suitable pin into pin hole of chain tensioner. + After installing chain tensioner, remove the pin. 9. Install timing chain guide. MEM223A 10. Install cylinder head front cover. + Apply liquid gasket to cylinder head front cover.
+ Use Genuine Liquid Gasket or equivalent. MEM228A 11. Install camshaft position sensor. MEM209A EM-40 CYLINDER HEAD Installation (Cont’d) TB48DE 12. Before installing rocker cover, apply a continuous bead of liquid gasket to mating surface of cylinder head. MEM229A MMA120A 13.
Install rocker cover with rocker cover gasket and tighten bolts in numerical order as shown in the figure. 14. Install spark plugs. 15. Install ignition coils. 16. Install exhaust manifold. 17. Install intake manifold. 18.
Connect vacuum hoses, fuel hoses, water hose, wire, harness, connectors and so on. 19. Connect heated oxygen sensor. (Except for the Middle East models) 20. Install front exhaust tube. 21. Install engine undercovers. 22. Install air duct to intake manifold collector. 23. Drive belts. For adjusting drive belt deflection, refer to “Checking Drive Belts” in
MA section. 24. Reinstall parts in reverse order of removal. EM-41 ENGINE REMOVAL TB48DE SEM063H CAUTION: + Before removing engine assembly and transmission assembly, be sure to remove crankshaft position sensor on models for Europe. + Be careful not to drop or damage crankshaft position sensor.
EM-42 ENGINE REMOVAL TB48DE WARNING: + Situate vehicle on a flat and solid surface. + Place chocks at front and back of rear wheels. + Do not remove engine until exhaust system has completely cooled off. Otherwise, you may burn yourself and/or fire may break out in the fuel line. + For safety during subsequent steps, the tension of wires
should be slackened against the engine.
+ Before disconnecting fuel hose, release fuel pressure from fuel line. Refer to “Releasing Fuel Pressure” in EC section. + Be sure to hoist engine in a safe manner. CAUTION: + When lifting engine, be careful not to strike adjacent parts, especially accelerator wire casing, brake lines, and brake master cylinder. + In hoisting the engine, always use
engine slingers in a safe manner. + For engines not equipped with engine slingers, attach proper slingers and bolts described in the PARTS CATALOG. MEM262A + Remove engine after removing transmission with transfer from vehicle paying attention to the following. (1) Remove radiator. Refer to LC section. (2) For transmission and transfer
removal, refer to MT or AT section. MEM263A (3) When removing two mounting bolts from upper side of transmission, remove front engine mounts and lower engine to the minimum level of the front mount where the bolt removal is possible.
MEM264A (4) When separating transmission and rear plate, remove transmission mounting bolts. Position Tool into mating surface of transmission and rear plate, and slide it along mating surface. + Be careful not to damage mating surfaces. SEM943B EM-43 CYLINDER BLOCK TB48DE SEM043H EM-44 CYLINDER BLOCK TB48DE CAUTION: +
When installing sliding parts such as bearings and pistons, be sure to apply engine oil on the sliding surfaces. + Place the removed parts such as bearings and bearing caps in their proper order and direction. + When tightening connecting rod nuts, main bearing cap bolts and flywheel bolts, apply engine oil to the thread portion and seating surface of
them. Disassembly PISTON AND CRANKSHAFT MEM253A 1. Place engine on work stand. 2. Drain coolant and remove water pump. 3. Drain oil. 4.
Remove oil pan and oil strainer. 5. Remove rocker cover. 6. Remove cylinder head front cover. 7. Remove crankshaft pulley. 8. Remove front cover. 9. Remove timing chain. 10. Remove camshaft. 11. Remove cylinder head. 12. Remove flywheel or drive plate. 13.
Remove pistons. + When disassembling piston and connecting rod, remove snap rings first, then heat piston to 60 to 70°C (140 to 158°F) or use piston pin press stand at room temperature. SEM877B 14. Remove bearing cap and crankshaft. + Before removing bearing cap, measure crankshaft end play. SEM985B EM-45 CYLINDER BLOCK TB48DE
Inspection PISTON AND PISTON PIN CLEARANCE 1. Measure inner diameter of piston pin hole “dp”. Standard diameter “dp”: 22.993 - 23.005 mm (0.9052 - 0.9057 in) SEM149B 2. Measure outer diameter of piston pin “Dp”. Standard diameter “Dp”: 22.989 - 23.001 mm (0.9051 - 0.9055 in) 3.
Calculate piston pin clearance. −0.002 to 0.010 mm (−0.0001 to 0.0004 in) If it exceeds the limit, replace piston assembly with pin. SEM821B PISTON RING SIDE CLEARANCE SEM024AC Side clearance: Top ring 0.040 - 0.080 mm (0.0016 - 0.0031 in) 2nd ring 0.030 - 0.070 mm (0.0012 - 0.0028 in) Oil ring 0.065 - 0.135 mm (0.0026 - 0.0053 in) Max.
limit of side clearance (Top and 2nd rings): 0.1 mm (0.004 in) If out of specification, replace piston and piston pin assembly. PISTON RING GAP SEM822B Standard ring gap: Top ring 0.30 - 0.45 mm (0.0118 - 0.0177 in) 2nd ring 0.30 - 0.45 mm (0.0118 - 0.0177 in) Oil ring 0.20 - 0.60 mm (0.0079 - 0.0236 in) Max. limit of ring gap: 1.5 mm (0.059 in) If
out of specification, replace piston ring. If gap still exceeds the limit even with a new ring, rebore the cylinder and use oversized piston and piston ring assembly. Refer to SDS, EM-59. + When replacing the piston, inspect cylinder block surface for scratches or seizure. If scratches or seizure is found, hone or replace the cylinder block. EM-46
CYLINDER BLOCK Inspection (Cont’d) TB48DE CONNECTING ROD BEND AND TORSION Bend: Limit 0.15 mm (0.0059 in) per 100 mm (3.94 in) length Torsion: Limit 0.3 mm (0.012 in) per 100 mm (3.94 in) length If it exceeds the limit, replace connecting rod assembly. SEM150B CYLINDER BLOCK DISTORTION AND WEAR MEM254A 1. Clean
upper face of cylinder block and measure the distortion. Limit: 0.10 mm (0.0039 in) 2. If out of specification, resurface it. The resurfacing limit is determined by the cylinder head resurfacing in engine. Amount of cylinder head resurfacing is “A”. Amount of cylinder block resurfacing is “B”. The maximum limit is as follows: A + B = 0.2 mm (0.008 in)
Nominal cylinder block height from crankshaft center: 254.95 - 255.05 mm (10.0374 - 10.0413 in) 3. If necessary, replace cylinder block. PISTON-TO-BORE CLEARANCE Method A (Using bore gauge and micrometer) MEM255A 1. Using a bore gauge, measure cylinder bore for wear, out-ofround or taper. Standard inner diameter: 99.500 - 99.550 mm
(3.9173 - 3.9193 in) Wear limit: 0.20 mm (0.0079 in) Out-of-round (X − Y) standard: 0.025 mm (0.0010 in) Taper (A − B) standard: 0.025 mm (0.0010 in) If it exceeds the limit, rebore all cylinders.
Replace cylinder block if necessary. 2. Check for scratches or seizure. If seizure is found, hone it.
EM-47 CYLINDER BLOCK Inspection (Cont’d) TB48DE + If cylinder block or piston is replaced with a new one, select piston of the same grade number punched on cylinder block upper surface. MEM256A 3. Measure piston skirt diameter. Piston diameter “A”: Refer to SDS, EM-59.
Measuring point “a” (Distance from the bottom): 20 mm (0.79 in) 4. Check that piston-to-bore clearance is within the specification.
Piston-to-bore clearance “B”: 0.030 - 0.050 mm (0.0012 - 0.0020 in) SEM990B 5. Determine piston oversize according to amount of cylinder wear.
Oversize pistons are available for service. Refer to SDS. 6. Cylinder size is determined by adding piston-to-bore clearance to piston diameter “A”. Rebored size calculation: D=A+B−C where, D: Bored diameter A: Piston diameter as measured B: Piston-to-bore clearance C: Honing allowance 0.02 mm (0.0008 in) 7. Install main bearing caps, and tighten
to the specified torque to prevent distortion of cylinder bores in final assembly. 8. Cut cylinder bores. + When any cylinder needs boring, all other cylinders must also be bored. + Do not cut too much out of the cylinder bore at a time. Cut only 0.05 mm (0.0020 in) or so in diameter at a time. 9. Hone the cylinders to obtain specified piston-to-bore
clearance. 10. Measure the finished cylinder bore for out-of-round and taper. + Measurement should be done after cylinder bore cools down. EM-48 CYLINDER BLOCK Inspection (Cont’d) TB48DE Method B (Using feeler gauge) Measure the extracting force by pulling feeler gauge straight upward. Feeler gauge thickness: 0.04 mm (0.0016 in)
Extracting force: 2.0 - 14.7 N (0.2 - 1.5 kg, 0.4 - 3.3 lb) EM305 CRANKSHAFT 1.
Check crankshaft main and pin journals for score, bias, wear or cracks. 2. With a micrometer, measure journals for taper and out-ofround. Out-of-round (X − Y): Less than 0.003 mm (0.0001 in) Taper (A − B): Less than 0.003 mm (0.0001 in) EM757 3. Measure crankshaft runout. Runout (Total indicator reading): Less than 0.02 mm (0.0008 in)
MEM273A BEARING CLEARANCE Method A (Using bore gauge and micrometer) Main bearing clearance 1. Set main bearings in their proper positions on cylinder block and main bearing cap. SEM986B 2. Install main bearing cap to cylinder block. Tighten all bolts in correct order in two or three stages. 3. Measure inner diameter “A” of main
bearing. SEM154B EM-49 CYLINDER BLOCK Inspection (Cont’d) TB48DE 4. Measure outer diameter “Dm” of crankshaft main journal. 5. Calculate main bearing clearance. Main bearing clearance = A − Dm Standard: 0.030 - 0.087 mm (0.0012 - 0.0034 in) Limit: 0.09 mm (0.0035 in) 6. If it exceeds the limit, replace bearing. 7. If the clearance cannot
be adjusted within the standard of any bearing, grind crankshaft journal and use undersized bearing. SEM506A a. When grinding crank pin and crank journal, fillet R should be finished as shown in the figure. R: All journal 1.5 - 1.7 mm (0.059 - 0.067 in) All pins 1.5 - 1.7 mm (0.059 - 0.067 in) b. Refer to SDS for grinding crankshaft and available
service parts. KBIA0148E 8. If crankshaft, cylinder block and main bearings are replaced with new ones, check that the clearance of main bearing is within specifications. CONNECTING ROD BEARING CLEARANCE (Big end) 1.
Install connecting rod bearing to connecting rod and cap. 2.
Install connecting rod cap to connecting rod. Tighten bolts to the specified torque. 3. Measure inner diameter “C” of bearing. SEM153B 4. Measure outer diameter “Dp” of crankshaft pin journal.
5. Calculate connecting rod bearing clearance.
Connecting rod bearing clearance = C − Dp Standard: 0.027 - 0.061 mm (0.0011 - 0.0024 in) Limit: 0.09 mm (0.0035 in) 6. If it exceeds the limit, replace bearing. 7. If the clearance cannot be adjusted within the standard of any bearing, grind crankshaft journal and use undersized bearing. Refer to step 7 of “MAIN BEARING CLEARANCE”. SEM958A
EM-50 CYLINDER BLOCK Inspection (Cont’d) TB48DE Method B (Using plastigage) EM142 CAUTION: + Do not turn crankshaft or connecting rod while the plastigage is being inserted.
+ When bearing clearance exceeds the specified limit, ensure that the proper bearing has been installed. Then if excessive bearing clearance exists, use thicker main bearing or undersized bearing so that the specified bearing clearance is obtained. Main bearing clearance: Standard 0.030 - 0.087 mm (0.0012 - 0.0034 in) Limit 0.1 mm (0.004 in)
Connecting rod bearing clearance: Standard 0.027 - 0.061 mm (0.0011 - 0.0024 in) Limit 0.09 mm (0.0035 in) CONNECTING ROD BUSHING CLEARANCE (Small end) 1. Measure inner diameter “C” of bushing. SEM151B 2. Measure outer diameter “Dp” of piston pin. 3. Calculate connecting rod bushing clearance. C − Dp = 0.005 - 0.017 mm (0.0002
- 0.0007 in) If it exceeds the limit, replace connecting rod bushing and/or piston set with pin.
SEM903A REPLACEMENT OF CONNECTING ROD SMALL END BUSHING 1. Drive in the small end bushing until it is flush with the end surface of the rod. Be sure to align the oil holes. 2. After driving in the small end bushing, ream the bushing. Small end bushing inside diameter: Finished size 23.000 - 23.012 mm (0.9055 - 0.9060 in) SEM062A EM-
51 CYLINDER BLOCK Inspection (Cont’d) TB48DE FLYWHEEL/DRIVE PLATE RUNOUT Runout (Total indicator reading): Flywheel (M/T model) 0.1 mm (0.004 in) or less Drive plate (A/T model) 0.1 mm (0.004 in) or less If runout exceeds the limit, replace flywheel. CAUTION: Do not disassemble flywheel assembly. SEM929A Assembly PISTON 1.
Install a new snap ring on one side of the piston pin hole. Ensure that ends of snap ring face down and fit properly into groove. SEM005C 2. Heat piston to 60 to 70°C (140 to 158°F) and assemble piston, piston pin, connecting rod and new snap ring.
+ Align the direction of piston and connecting rod. + Numbers stamped on connecting rod and cap correspond to each cylinder. SEM015C + After assembly, make sure piston swings smoothly. 3. Set piston rings as shown. SEM160B Assembly CRANKSHAFT 1. Set main bearings in their proper positions on cylinder block and main bearing cap. + Do
not confuse upper and lower sides of main bearings. SEM986B EM-52 CYLINDER BLOCK Assembly (Cont’d) TB48DE 2. Install crankshaft and main bearing caps and tighten bolts to the specified torque. + Prior to tightening bearing cap bolts, place bearing cap in its proper position by shifting crankshaft in the axial direction. + Tighten bearing cap
bolts gradually in two or three stages starting with the center bearing and move outward sequentially. + After securing bearing cap bolts, make sure crankshaft turns smoothly by hand. SEM007C 3. Apply a continuous bead of liquid gasket to mating surfaces of rear oil seal retainer (both for cylinder block and oil pan sides). + Use Genuine Liquid
Gasket or equivalent.
a. Coat of liquid gasket should be maintained within 2.0 to 3.0 mm (0.079 to 0.118 in) dia. range. b. Attach oil seal retainer to cylinder block within 5 minutes after coating. c. Wait at least 30 minutes before refilling engine oil or starting engine. MEM268A 4. Measure crankshaft end play. Crankshaft end play: Standard 0.05 - 0.169 mm (0.0020 -
0.0067 in) Limit 0.3 mm (0.012 in) If end play exceeds the limit, replace No. 6 bearing and measure again.
If it still exceeds the limit, replace crankshaft also. SEM006C 5. Install connecting rod bearings in connecting rods and connecting rod caps. + Confirm that correct bearings are used. Refer to “Inspection”, EM-47 (Publication No. SM1E-Y61EG1). + Install bearings so that oil hole in connecting rod aligns with oil hole of bearing. SEM159B 6.
Install pistons with connecting rods. (1) Install them into corresponding cylinders with SST. + Be careful not to scratch cylinder wall by connecting rod. + Arrange so that front mark on piston head faces toward front of engine. SEM008C EM-53 CYLINDER BLOCK Assembly (Cont’d) EM329 TB48DE (2) Install connecting rod bearing caps. Tighten
connecting rod bearing cap nuts to the specified torque. : Connecting rod bearing nut (1) Tighten to 38 to 40 Nzm (3.9 to 4.1 kg-m, 28 to 30 ft-lb) (2) Tighten to 67 to 71 Nzm (6.8 to 7.2 kg-m, 49 to 52 ft-lb) or if you have an angle wrench, tighten bolts to 40 to 45 degrees clockwise. Angle tightening is preferable. 7. Measure connecting rod side
clearance. Connecting rod side clearance: Standard 0.20 - 0.35 mm (0.0079 - 0.0138 in) Limit 0.40 mm (0.0157 in) If clearance exceeds the limit, replace connecting rod and/or crankshaft. SEM162B 8. Install flywheel (M/T) or drive plate (A/T) as shown in the figure. SEM065H EM-54 SERVICE DATA AND SPECIFICATIONS (SDS) TB48DE General
Specifications Unit: kPa (bar, kg/cm2, psi)/rpm Cylinder arrangement Displacement 6, in-line Compression pressure cm3 (cu in) 4,759 (290.39) mm (in) 99.5 x 102.0 (3.917 x 4.016) Bore and stroke Valve arrangement Firing order Standard 1,226 (12.26, 12.5, 178)/200 Minimum 1,030 (10.30, 10.5, 149)/200 Differential limit between cylinders DOHC
1-5-3-6-2-4 Number of piston rings Compression 2 Oil 1 Number of main bearings 7 Compression ratio 9.0 Inspection and Adjustment CYLINDER HEAD MEM257A Unit: mm (in) Standard Limit Height (H) 130.9 - 131.3 (5.1535 5.1693) 0.2 (0.008)* Surface distortion Less than 0.07 (0.0028) 0.2 (0.008) *: Total amount of cylinder head resurfacing and
cylinder block resurfacing EM-55 98 (0.98, 1.0, 14)/200 SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment (Cont’d) VALVE TB48DE Available shims Unit: mm (in) SEM188 Valve head diameter “D” Intake 38.35 - 38.65 (1.5098 - 1.5217) Exhaust 33.15 - 33.45 (1.3051 - 1.3169) Valve length “L” Intake 99.86 - 100.46 (3.9315 -
3.9551) Exhaust 98.01 - 98.61 (3.8587 - 3.8823) Valve stem diameter “d” Thickness mm (in) Identificaiton mark 1.96 (0.0772) 196 1.98 (0.0780) 198 2.00 (0.0787) 200 2.02 (0.0795) 202 2.04 (0.0803) 204 2.06 (0.0811) 206 2.08 (0.0819) 208 2.10 (0.0827) 210 2.12 (0.0835) 212 2.14 (0.0843) 214 2.16 (0.0850) 216 2.18 (0.0858) 218 2.20 (0.0866) 220
2.22 (0.0874) 222 2.24 (0.0882) 224 2.26 (0.0890) 226 228 Intake 6.965 - 6.980 (0.2742 - 0.2748) 2.28 (0.0898) Exhaust 6.945 - 6.960 (0.2734 - 0.2740) 2.30 (0.0906) 230 2.32 (0.0913) 232 2.34 (0.0921) 234 2.36 (0.0929) 236 2.38 (0.0937) 238 2.40 (0.0945) 240 2.42 (0.0953) 242 2.44 (0.0961) 244 2.46 (0.0969) 246 2.48 (0.0976) 248 2.50 (0.0984)
250 2.52 (0.0992) 252 2.54 (0.1000) 254 2.56 (0.1008) 256 2.58 (0.1016) 258 2.60 (0.1024) 260 2.62 (0.1031) 262 2.64 (0.1039) 264 2.66 (0.1047) 266 2.68 (0.1055) 268 Valve seat angle “α” Intake 45°15′ - 45°45′ Exhaust Valve margin “T” Intake 1.25 - 1.55 (0.0492 - 0.0610) Exhaust 1.45 - 1.75 (0.0571 - 0.0689) Valve margin “T” limit More than 0.5
(0.020) Valve stem end surface grinding limit Less than 0.2 (0.008) Valve clearance Unit: mm (in) Cold* Hot (reference data) Intake 0.25 - 0.33 (0.010 - 0.013) 0.32 - 0.40 (0.013 - 0.016) Exhaust 0.29 - 0.37 (0.011 - 0.015) 0.33 - 0.41 (0.013 - 0.016) *: At temperature of approximately 20°C (68°F) Whenever valve clearances are adjusted to cold
specifications, check that the clearances satisfy hot specifications and adjust again if necessary.
EM-56 SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment (Cont’d) Valve spring Free height Intake valve seat mm (in) 50.27 (1.9791) Pressure height mm/N (mm/kg, in/lb) 27.4/421 (27.4/42.8, 1.079/94.4) Assembled height mm/N (mm/kg, in/lb) 37/217 (37/22.1, 1.457/48.7) Out-of-square TB48DE mm (in) 2.2 (0.087) Valve lifter
Unit: mm (in) Standard Limit Valve lifter outer diameter 33.960 - 33.975 (1.3370 - 1.3376) — Cylinder block valve lifter hole diameter 34.000 - 34.021 (1.3386 - 1.3394) — Valve lifter to lifter hole clearance 0.025 - 0.061 (0.0010 - 0.0024) 0.1 (0.004) *: Total indicator reading Valve guide MEM258A Unit: mm (in) Standard Oversize Valve guide Exhaust
valve seat Outer diameter Intake Exhaust 11.023 - 11.034 (0.4340 -0.4344) 11.223 - 11.234 (0.4418 - 0.4423) Valve guide Inner diameter [Finished size] Intake Exhaust 7.000 - 7.018 (0.2756 - 0.2763) Cylinder head valve guide hole diameter Intake Exhaust 10.975 - 10.996 (0.4321 - 0.4329) 11.175 - 11.196 (0.4400 - 0.4408) Interference fit of valve
guide Intake Exhaust 0.027 - 0.059 (0.0011 - 0.0023) Standard Limit Stem to guide clearance Intake 0.020 - 0.053 (0.0008 - 0.0021) Exhaust 0.040 - 0.073 (0.0016 - 0.0029) Valve deflection limit — 0.1 (0.004) 0.2 (0.008) MEM259A EM-57 SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment (Cont’d) CAMSHAFT AND CAMSHAFT
BUSHING TB48DE Valve timing Unit: mm (in) Camshaft journal to bushing clearance [Oil clearance] Standard Limit 0.045 - 0.086 (0.0018 - 0.0034) 0.15 (0.0059) 28.000 - 28.021 (1.1024 - 1.1032) — 27.935 - 27.955 (0.9817 - 1.1006) — Less than 0.02 (0.0008) 0.1 (0.004) 0.115 - 0.188 (0.0045 - 0.0074) 0.2 (0.0079) Inner diameter of camshaft bearing
1st-7th (Rear) Outer diameter of camshaft journal 1st-7th (Rear) Camshaft runout (Total indicator reading) Camshaft end play MEM260A Unit: degree Intake valve timing control solenoid EM671 Cam height “A” Intake 43.465 - 43.655 (1.7112 - 1.7187) Exhaust 43.065 - 43.255 (1.6955 - 1.7029) Wear limit of cam height 0.15 (0.0059) EM-58 a b c d e f
ON 240 248 19 47 5 55 OFF 240 248 −1 67 5 55 SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment (Cont’d) CYLINDER BLOCK TB48DE PISTON, PISTON RING AND PISTON PIN Unit: mm (in) Available piston Unit: mm (in) MEM261A Surface flatness Standard Limit Less than 0.03 (0.0012) SEM891B Piston skirt diameter “A”
Standard 0.10 (0.0039) Grade No. 1 Cylinder bore Grade No. 2 Inner diameter Standard Grade No. 1 Grade No. 2 Grade No. 3 Grade No. 4 Grade No. 5 Grade No. 3 99.500 (3.9173 99.510 (3.9177 99.520 (3.9181 99.530 (3.9185 99.540 (3.9189 - 99.510 3.9177) 99.520 3.9181) 99.530 3.9185) 99.540 3.9189) 99.550 3.9193) Wear limit 0.20 (0.0079)
Out-of-round (X − Y) Less than 0.025 (0.0010) Taper (A − B) Less than 0.025 (0.0010) Difference in inner diameter between cylinders Standard Less than 0.05 (0.0020) Wear limit 0.20 (0.0079) Grade No. 4 Grade No. 5 99.460 (3.9157 99.470 (3.9161 99.480 (3.9165 99.490 (3.9169 99.500 (3.9173 - 99.470 3.9161) 99.480 3.9165) 99.490 3.9169)
99.500 3.9173) 99.510 3.9177) Oversize 0.50 (0.0197) (mark: “50”) 99.960 - 100.010 (3.9354 - 3.9374) 1.00 (0.0394) (mark: “100”) “a” dimension 100.460 - 100.510 (3.9551 - 3.9571) 20 (0.79) Piston pin hole diameter 22.993 - 23.005 (0.9052 - 0.9057) Piston clearance to cylinder block 0.030 - 0.050 (0.0012 - 0.0020) Values measured at ambient
temperature of 20°C (68°F) EM-59 SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment (Cont’d) Piston ring TB48DE CRANKSHAFT Unit: mm (in) Standard Limit Side clearance Top 0.040 - 0.080 (0.0016 - 0.0031) 2nd 0.030 - 0.070 (0.030 - 0.070) Ring gap at master bore D = 99.500 (3.9173) [70.897 - 70.921 (2.7912 - 2.7922)
Pin journal dia. “Dp” 56.913 - 56.926 (2.2407 - 2.2412) Center distance “r” 50.95 - 51.05 (2.0059 - 2.0098) Out-of-round (X − Y) 0.1 (0.004) Standard Less than 0.003 (0.0001) Taper (A − B) 0.065 - 0.135 (0.0026 - 0.0053) Oil Unit: mm (in) Main journal dia. “Dm” Standard Less than 0.003 (0.0001) Runout [TIR]*] Standard Less than 0.02 (0.0008) Free
end play Top 0.30 - 0.45 (0.0118 - 0.0177) 2nd 0.30 - 0.45 (0.0118 - 0.0177) Oil 0.20 - 0.60 (0.0079 - 0.0236) Standard Limit 0.05 - 0.169 (0.0020 - 0.0067) 0.30 (0.0118) 1.5 (0.059) Piston pin Unit: mm (in) Piston pin outer diameter Interference fit of piston pin to piston Piston pin to connecting rod bushing clearance 22.989 - 23.001 (0.9051 0.9055)
SEM645 −0.002 to 0.010 (−0.0001 - 0.0004) 0.005 - 0.017 (0.0002 - 0.0007) Values measured at ambient temperature of 20°C (68°F) CONNECTING ROD Unit: mm (in) Center distance 163.45 - 163.55 (6.4350 - 6.4390) EM715 Bend, torsion [per 100 (3.94)] *: Total indicator reading Limit Bend 0.15 (0.0059) Torsion 0.3 (0.012) Piston pin bushing
inner diameter 23.000 - 23.012 (0.9055 - 0.9060) Connecting rod big end inner diameter 59.987 - 60.000 (2.3617 - 2.3622) Side clearance Standard Limit 0.20 - 0.35 (0.0079 - 0.0138) 0.40 (0.0157) EM-60 SERVICE DATA AND SPECIFICATIONS (SDS) Inspection and Adjustment (Cont’d) AVAILABLE MAIN BEARING TB48DE MISCELLANEOUS
COMPONENTS Unit: mm (in) Thickness “T” Standard 2.008 - 2.012 (0.0791 - 0.0792) Main journal diameter “Dm” — Unit: mm (in) Flywheel/Drive plate Runout [TIR]* Less than 0.1 (0.004) *: Total indicator reading Undersize 0.50 (0.0197) 2.258 - 2.262 (0.0889 - 0.0891) 1.00 (0.0394) 2.508 - 2.512 (0.0987 - 0.0989) Grind so that bearing clearance is
the specified value. Bearing clearance Unit: mm (in) Main bearing clearance Standard Limit AVAILABLE CONNECTING ROD BEARING Unit: mm (in) Standard Thickness “T” Crank pin journal diameter “Dp” 1.513 - 1.517 (0.0596 - 0.0597) — 1.638 - 1.642 (0.0645 - 0.0646) 0.50 (0.0197) 1.763 - 1.767 (0.0694 - 0.0696) 0.75 (0.0295) 1.888 - 1.892
(0.0743 - 0.0745) 1.00 (0.0394) 2.013 - 2.017 (0.0793 - 0.0794) 0.09 (0.0035) Connecting rod bearing clearance Standard Limit Undersize 0.25 (0.0098) 0.030 - 0.087 (0.0012 - 0.0034) Grind so that bearing clearance is the specified value. EM-61 0.027 - 0.061 (0.0011 - 0.0024) 0.09 (0.0035) ACCELERATOR CONTROL, FUEL & EXHAUST SYSTEMS
SECTION FE MODIFICATION NOTICE: + TB48DE engine model has been added. CONTENTS
ACCELERATOR CONTROL SYSTEM .... 2 Accelerator Control System...................................... 2 Adjusting Accelerator Wire .... 3 TROUBLE DIAGNOSES .... 4 Self-diagnosis for Sub Fuel Tank
Control Module .... 4 Circuit Diagram - S/TANK - .... 5 Wiring Diagram - S/TANK - .... 6 Component Inspection...
10 FUEL SYSTEM .... 11 EXHAUST SYSTEM .... 12 ACCELERATOR CONTROL SYSTEM Accelerator Control System CAUTION: The accelerator wire should be adjusted when removing and replacing any parts of the accelerator control system, shown in the illustration. a.

Warm up engine to normal operating temperature. Then stop it. b. Check to see if throttle valve fully opens when accelerator pedal is fully depressed and if it returns to idle position when released. c. Adjust accelerator pedal free play by turning adjusting nut. d. Check accelerator control parts for improper contact with any adjacent parts.
e.
When connecting accelerator wire, be careful not to twist or scratch its inner wire. f. Apply a light coat of recommended multi-purpose grease to all sliding or friction surfaces. Do not apply grease to wire. g. For ASCD wire adjustment, refer to “ASCD Wire Adjustment” in EL section. FE-2 ACCELERATOR CONTROL SYSTEM TB48DE ENGINE MODELS MFE028A Adjusting Accelerator Wire 1. Loosen lock nut, and tighten adjusting nut until throttle drum starts to move. 2. From that position turn back adjusting nut 1.5 to 2 turns, and fasten it with lock nut. MFE029A FE-3 TROUBLE DIAGNOSES Self-diagnosis for Sub Fuel Tank Control Module SUB FUEL TANK CONTROL MODULE TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values, and measured between each terminal and V 11 (ground) with a voltmeter. WIRE COLOR TERMINAL NO. 1 ITEM CONDITION Wagon and Hardtop R Power source Ignition switch “ON” DATA (DC voltage) Approximately 12V Ignition switch “ON” Sub fuel tank switch is “ON”. Main fuel tank is not full. Sub fuel tank is not empty. 2 G/B Sub fuel pump 3 G/W Power source Ignition switch “ON” or “ACC” Approximately 12V 4 L/Y B*1 Grounding Ignition switch “ON” Approximately 0V 5 W/L Sub fuel gauge Ignition switch “ON” Approximately 0 - 4V 6 PU Full switch Approximately 12V Ignition switch “ON” Approximately 5V Main fuel tank is not full.
7 G Fuel gauge Ignition switch “ON” Approximately 0 - 2.5V 8 PU/R W/G*1 Engine running Engine running Approximately 12V 9 G/B Sub fuel tank switch Ignition switch “ON” Approximately 5V 10 L Indicator Ignition switch “ON” Approximately 12V 12 R Power source Any time Approximately 12V 13 W/R Sub fuel tank warning lamp Ignition switch “ON” Approximately 0V *1: Except for TB45S engine models FE-4 TROUBLE DIAGNOSES Circuit Diagram — S/TANK — WAGON AND HARDTOP MODELS TFE035M FE-5 TROUBLE DIAGNOSES Wiring Diagram — S/TANK — WAGON AND HARDTOP MODELS TFE036M FE-6 TROUBLE DIAGNOSES Wiring Diagram — S/TANK — (Cont’d) WAGON AND HARDTOP MODELS TFE039M FE-7 TROUBLE DIAGNOSES Wiring Diagram — S/TANK — (Cont’d) WAGON AND HARDTOP MODELS (LHD) TFE038M FE-8 TROUBLE DIAGNOSES Wiring Diagram — S/TANK — (Cont’d) WAGON AND HARDTOP MODELS (RHD) TFE040M FE-9 TROUBLE DIAGNOSES Component Inspection SUB FUEL TANK GAUGE UNIT Refer to “METER AND GAUGES” in EL section. Sub fuel pump Check resistance between terminals V 4 and V 5 with ohmmeter. Resistance: Approximately less than 2Ω MFE034A FE-10 FUEL SYSTEM MFE036A FE-11 EXHAUST SYSTEM SFE813A FE-12 FUSE AND FUSIBLE LINK BOX Terminal Arrangement CEL484M JOINT CONNECTOR (J/C) Terminal Arrangement CEL275M Edition: October 2002 Release: November 2002 (01) Publication No.: SM2E00-1Y61E0E Reference No.: 7711346699 QUICK REFERENCE INDEX GENERAL INFORMATION GI MAINTENANCE MA ENGINE MECHANICAL EM PATROL GR ENGINE LUBRICATION & COOLING SYSTEMS LC MODEL Y61 SERIES ENGINE CONTROL SYSTEM EC ACCELERATOR CONTROL, FUEL & EXHAUST SYSTEM FE CLUTCH CL MANUAL TRANSMISSION MT AUTOMATIC TRANSMISSION AT TRANSFER TF PROPELLER SHAFT & DIFFERENTIAL CARRIER PD FRONT AXLE & FRONT SUSPENSION FA REAR AXLE & REAR SUSPENSION RA BRAKE SYSTEM BR STEERING SYSTEM ST RESTRAINT SYSTEM RS BODY & TRIM BT HEATER & AIR CONDITIONER HA ELECTRICAL SYSTEM EL ALPHABETICAL INDEX IDX NISSAN EUROPE S.A.S. © 2002 NISSAN EUROPE S.A.S. Produced in The Netherlands Not to be reproduced in whole or in part without the prior written permission of Nissan Europe S.A.S., Paris, France. FOREWORD This manual contains maintenance and repair procedures for NISSAN PATROL GR, model Y61 series. In order to assure your safety and the efficient functioning of the vehicle, this manual should be read thoroughly. It is especially important that the PRECAUTIONS in the GI section be completely understood before starting any repair task.
All information in this manual is based on the latest product information at the time of publication. The right is reserved to make changes in specifications and methods at any time without notice. IMPORTANT SAFETY NOTICE The proper performance of service is essential for both the safety of the technician and the efficient functioning of the vehicle. The service methods in this Service Manual are described in such a manner that the service may be performed safely and accurately. Service varies with the procedures used, the skills of the technician and the tools and parts available. Accordingly, anyone using service procedures, tools or parts which are not specifically recommended by NISSAN must first completely satisfy himself that neither his safety nor the vehicle’s safety will be jeopardized by the service method selected. NISSAN EUROPE S.A.S. Service Engineering Section Paris, France GENERAL INFORMATION SECTION GI OUTLINE OF MODIFICATIONS: For Europe: + + + + + + TB48DE engine (cold area specification) has been adopted. 5-speed automatic transmission (RE5R05A) has been adopted on models with TB48DE engine. Exterior and interior design has been changed. Electronic throttle control actuator has been adopted on models with TB48DE engine.
ASCD (Automatic Speed Control Device) has been adopted on models with TB48DE engine. Refrigerant pressure sensor on liquid tank has been adopted on models with TB48DE engine. APPLIED FROM: Wagon and Hardtop models For Europe: JN1TFSY61U0000001 CONTENTS CONSULT-II CHECKING SYSTEM.............................. 2 Function and System Application .... 2 Nickel Metal Hydride Battery Replacement.............. 2 Checking Equipment..
3 CONSULT-II Data Link Connector (DLC) Circuit ...... 3 IDENTIFICATION INFORMATION .... 4 Model Variation.. 4 Identification Number.. 6 Dimensions ....
6 CONSULT-II CHECKING SYSTEM Function and System Application Diagnostic test mode Function ENGINE A/T ABS AIR BAG NATS*1 SMART ENTRANCE x*2 — — — — — Work support This mode enables a technician to adjust some devices faster and more accurate by following the indications on CONSULT-II. Self-diagnostic results Self-diagnostic results can be read and erased quickly. x x x x x — Trouble diagnostic record Current self-diagnostic results and all trouble diagnostic records previously stored can be read.
— — — x — — ECU discriminated No. Classification number of a replacement ECU can be read to prevent an incorrect ECU from being installed. — — — x — — Data monitor Input/Output data in the ECU (ECM) can be read. x x x — — — DTC work support This mode enables a technician to set operating conditions to confirm self-diagnosis status/results. — x — — — — Active test Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range. x — x — — — x x x — — — ECU (ECM) part numECU (ECM) part number can be read.
ber Control unit initialization All registered ignition key IDs in NATS components can be initialized and new IDs can be registered. — — — — x — Self-function check ECM checks its own NATS communication interface. — — — — x*3 — DTC confirmation The results of SRT (System Readiness Test) and the self-diagnosis status/results can be confirmed. x*2 — — — — — — — — — — x x x x x — — A maximum of four IDs (identifications) can REMO CONT ID SET be registered in the memory using the remote controller. These IDs can be also be UP confirmed and erased as required. Function test Conducted by CONSULT-II instead of a technician to determine whether each system is “OK” or “NG” (No Good). x: Applicable *1: NATS (Nissan Anti-Theft System) *2: Not available for diesel engine models. *3: Except for ZD30DDTi engine models. Nickel Metal Hydride Battery Replacement CONSULT-II contains a nickel metal hydride battery. When replacing the battery obey the following: WARNING: Replace the nickel metal hydride battery with Genuine CONSULT-II battery only. Use of another battery may present a risk of fire or explosion. The battery may present a fire or chemical burn hazard if mistreated. Do not recharge, disassemble or dispose of in fire. Keep the battery out of reach of children and discard used battery conforming to the local regulations. GI-2 CONSULT-II CHECKING SYSTEM Checking Equipment When ordering the below equipment, contact your NISSAN distributor. Tool name Description NISSAN CONSULT-II 1 CONSULT-II unit (Tester V internal software: Resident version 3.3.0) and accessories 2 Program card AED01C V and AEN00B (For NATS) To confirm the best combination of those softwares, refer to CONSULT-II Operation SGI100A Manual. NOTE: + The CONSULT-II must be used in conjunction with a program card. CONSULT-II does not require loading (Initialization) procedure. + Be sure the CONSULT-II is turned off before installing or removing a program card.
CONSULT-II Data Link Connector (DLC) Circuit SOM397 INSPECTION PROCEDURE If the CONSULT-II cannot diagnose the system properly, check the following items. Symptom Check item CONSULT-II cannot access any system. + CONSULT-II DLC power supply circuit (Terminal 8) and ground circuit (Terminal 4) (For detailed circuit, refer to EC section, “MIL & DATA LINK CONNECTORS”.) + CONSULT-II (DDL) cable CONSULT-II cannot access individual system. (Other systems can be accessed.) + CONSULT-II program card (Check the appropriate CONSULT-II program card for the system.
Refer to “Checking Equipment” above.) + Power supply and ground circuit for the control unit of the system (For detailed circuit, refer to wiring diagram for each system.) + Open or short circuit between the system and CONSULT-II DLC (For detailed circuit, refer to wiring diagram for each system.) GI-3 IDENTIFICATION INFORMATION Model Variation WAGON AND HARDTOP MODELS Model Rear seat arrangement Destination Steering position Hardtop Station Wagon 2nd seat 2nd center split bench seat Forward facing Engine Side facing or Seatless Front differential 3rd seat Seatless Forward facing Side facing H233B Rear differential Transmission Transfer FS5R50B S RE4R03A FS5R50B RHD SE RE4R03A FS5R50B SE RE4R03A FS5R50B ZD30DDTi Europe S RE4R03A FS5R50B TX12A SE RE4R03A LHD FS5R50B RE4R03A TB48DE RE5R05A H233B/H260 Grade SE KWSSREFY61UEA — — TWSSREFY61UEA — — — — TWSSREAY61UEA — KWSSRFFY61UEA — — TWSSRFFY61UEA — — KWSSRFAY61UEA — — TWSSRFAY61UEA — — — — TWSSRHFY61UEA — — — — TWSSRHAY61UEA — KWSSLEFY61UGA KWSSLEFY61USP TWSSLEFY61USP TWSSLEFY61UGA — — — TWSSLEAY61UGA — — KWSSLFFY61UGA — — TWSSLFFY61UGA — — — — TWSSLFFY61USA — KWSSLFAY61UGA — — TWSSLFAY61UGA — — — — TWSSLFAY61USA — — — — TWSSLHFY61UGA — — — — TWSSLHFY61USA — — — — TWSSLHAY61UGA — — — — TWSSLHAY61USA — — — — TGPSLHNY61ESA — GI-4 IDENTIFICATION INFORMATION Model Variation (Cont’d) Prefix and suffix designations T GN S L A F Y61 S R A A: 3rd/2nd seat forward facing Q: 3rd/2nd seat side facing P: 3rd/2nd seat seatless R: Except for the Middle East and Europe K: Middle East E: RHD for Europe G: Central/South Europe S: North Europe S: Carburetor engine E: Multiport fuel injection system engine N: Diesel engine U: Turbocharger engine F: 5-speed floor shift manual transmission A: 4-speed floor shift automatic transmission N: 5-speed floor shift automatic transmission A: S, STD, DX E: GL (SGL), ST, S F: SGL, TI, SAFARI, SE H: GRX, S-SAFARI, SE L: LH drive R: RH drive S: Long wheelbase (4WD) GN: TB45S or TB45E engine VT: TD42 engine WS: ZD30DDTi engine GP: TB48DE engine T: Station Wagon K: Hardtop GI-5 IDENTIFICATION INFORMATION Identification Number VEHICLE IDENTIFICATION NUMBER (Chassis number) Prefix and suffix designations For Europe (Except for Israel) JN1 T E S Y61 U 0 XXXXXX Vehicle serial number 0: Stopgap (no meaning) U: Europe S: Long wheelbase (4WD) Engine type E: ZD30DDTi F: TB48DE Body type T: Station Wagon K: Hardtop Manufacturer JN1: Japan produced vehicle Dimensions FOR EUROPE Wagon Hardtop Overall length mm (in) 5,070 (199.6)*1 5,065 (199.4)*2 5,020 (197.6)*3 4,495 (177.0)*2 4,450 (175.2)*3 Overall width mm (in) 1,930 (76.0)*1, *2 1,840 (72.4)*3 1,930 (76.0)*2 1,840 (72.4)*3 Overall height mm (in) 1,855 (73.0) 1,840 (72.4) Front tread mm (in) 1,605 (63.2)*1, *2 1,555 (61.2)*3 1,605 (63.2)*2 1,555 (61.2)*3 Rear tread mm (in) 1,625 (64.0)*1, *2 1,575 (62.0)*3 1,625 (64.0)*2 1,575 (62.0)*3 Wheelbase mm (in) 2,970 (116.9) 2,400 (94.5) *1: For models equipped with 275/70R16 tires *2: For models equipped with 265/70R16 tires *3: For models equipped with 235/80R16 tires GI-6 HEATER & AIR CONDITIONER SECTION HA MODIFICATION NOTICE: + Wiring diagram has been changed. + Relief valve to compressor has been added. + Rear thermo amp. and rear solenoid valve relay have been eliminated. (Except for the Middle East) + Trouble diagnosis procedure for magnet clutch (auto) has been added. (Model with TB48 engine for Europe) CONTENTS MANUAL AND AUTO PRECAUTIONS AND PREPARATION .... 2 Supplemental Restraint System (SRS) ″AIR BAG″ and ″SEAT BELT PRE-TENSIONER″ .... 2 DESCRIPTION .... 3 Refrigeration Cycle .... 3 AUTO DESCRIPTION .... 4 Control Operation ....
4 TROUBLE DIAGNOSES .... 6 Circuit Diagram - A/C, A -/TB48 Engine .... 6 Wiring Diagram - A/C, A -/TB48 Engine .... 7 Auto Amp. Terminals and Reference Value............ 11 Magnet Clutch (For Europe).................................. 13 Magnet Clutch... 18 REAR COOLER TROUBLE DIAGNOSES .... 19 Wiring Diagram - R/COOL -/With Front Auto A/C... 19 PRECAUTIONS AND PREPARATION MANUAL AND AUTO Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER” The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination and optional equipment.): + For a frontal collision The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. + For a side collision The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision). Information necessary to service the system safely is included in the RS section of this Service Manual. WARNING: + To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer. + Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section. + Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS. HA-2 DESCRIPTION MANUAL AND AUTO Refrigeration Cycle REFRIGERANT SYSTEM PROTECTION Pressure Relief Valve The refrigerant system is also protected by a pressure relief valve, located in the rear head of the compressor. When the pressure of refrigerant in the system increases to an unusual level [more than 3,727 kPa (38 kg/cm2, 540 psi)], the release port on the pressure relief valve automatically opens and releases refrigerant into the atmosphere.
SHA652FA HA-3 DESCRIPTION AUTO Control Operation RHA210I AUTO SWITCH The compressor, air intake doors, air mix door, mode doors, and blower speed are automatically controlled so that the in-vehicle temperature will reach, and be maintained at the set temperature selected by the operator. The air conditioning cooling function operates only when the engine is running. ECON SWITCH Fully automatic control with the compressor off. With the compressor off, the system will not remove heat (cool) or de-humidify. The system will maintain the in-vehicle temperature at the set temperature when the set temperature is above the ambient (outside) temperature. TEMPERATURE SWITCH (Potentio Temperature Control) Increases or decreases the set temperature. OFF SWITCH The compressor and blower are off, the air intake doors are set to the outside air position. Then, the mode doors are set to the foot (80% foot and 20% defrost) position. In the off position, the A/C system uses the vehicle’s “flow through” ventilation. It tries to maintain the interior temperature based on the last set temperature of the system. FAN SWITCH Manual control of the blower speed. Four speeds are available for manual control (as shown on the display screen): low , medium low , medium high , high MODE SWITCH Manual control of the air discharge outlets. Four selections are available (as shown on the display screen): face , bi-level , foot , defrost/foot HA-4 DESCRIPTION Control Operation (Cont’d) AUTO RECIRCULATION (REC) SWITCH ON position: Interior air is recirculated inside the vehicle. OFF position: Automatic control resumes. Recirculation is canceled when AUTO, DEF or ECON is selected. Recirculation resumes when another mode is chosen. DEFROSTER (DEF) SWITCH Positions the mode doors to the defrost position. Also positions the air intake doors to the outside air position. HA-5 TROUBLE DIAGNOSES AUTO Circuit Diagram — A/C, A —/TB48 Engine THA133M HA-6 TROUBLE DIAGNOSES AUTO Wiring Diagram — A/C, A —/TB48 Engine THA134M HA-7 AUTO TROUBLE DIAGNOSES Wiring Diagram — A/C, A —/TB48 Engine (Cont’d) THA135M HA-8 AUTO TROUBLE DIAGNOSES Wiring Diagram — A/C, A —/TB48 Engine (Cont’d) THA136M HA-9 AUTO TROUBLE DIAGNOSES Wiring Diagram — A/C, A —/TB48 Engine (Cont’d) THA137M HA-10 TROUBLE DIAGNOSES AUTO Auto Amp. Terminals and Reference Value INSPECTION OF AUTO AMP. + Measure voltage between each terminal and body ground by following “AUTO AMP. INSPECTION TABLE”. SHA739F SHA758F + Pin connector terminal layout RHA501GF HA-11 AUTO TROUBLE DIAGNOSES Auto Amp. Terminals and Reference Value (Cont’d) AUTO AMP. INSPECTION TABLE TERMINAL No. (Wire color) ITEM VOLTAGE V CONDITION 1 (RY) Power supply for IGN — Approximately 12 2 (Y) Power supply for BAT — Approximately 12 3 (B) Ground — — 4 (Y)*2 (LG)*4 5 (L) 8 (GY/R) Compressor ON signal ON Approximately 0 OFF Approximately 12 Compressor LAN signal — Approximately 5.5 In-vehicle sensor — — 9 (PU) Ambient sensor — — 10 (R) Sunload sensor — 11 (B) Ground 12 (L/B) Power supply for illumination 13 (OR/B) Intake door position switch 14 (P) Intake door position switch 15 (G/Y) Power supply for mode and air mix door motor 17 (GY/L) Fan control amp. control signal 18 (L/W) Blower motor feed back 19*1 (Y/L) Fan ON signal — — — Illumination switch ON Approximately 12 RECIRCULATION Approximately 0 FRESH or 20% FRESH Approximately 12 FRESH Approximately 0 RECIRCULATION or 20% FRESH Approximately 12 — Approximately 12 Low, middle low or middle high Approximately 2.5 - 3.0 High Approximately 9 - 10 Low Approximately 7 - 10 ON Approximately 0 Fan speed Blower fan OFF Power supply for blower motor 21 (Y/R) Thermal transmitter 23 (OR) Intake door position switch 24 (G/Y) Sensor ground — — 25 (G/W) Intake sensor — — 27*2 (Y/B) FICD ON signal 28 (LG/B) Rear cooler relay 35 (Y/L)*5 (OR/L)*6 Rear cooler switch 36*3 (Y) *1: *2: *3: *4: *5: *6: — Approximately 5 20 (L/R) — Approximately 12 — 20% FRESH Approximately 0 RECIRCULATION or FRESH Approximately 12 Compressor ON Ambient temperature 20.5°C or less Approximately 0 Ambient temperature 23.5°C or more Approximately 12 Rear cooler ON Approximately 0 Rear cooler OFF Approximately 12 Rear cooler switch ON Approximately 0 Rear cooler switch OFF Approximately 12 Front solenoid valve relay A/T models Except for Europe For the Middle East with cool box Except for the Middle East With rear cooler front switch and without cool box Without rear cooler front switch HA-12 Cool box switch ON Approximately 0 Cool box switch OFF Approximately 12 AUTO TROUBLE DIAGNOSES Magnet Clutch (For Europe) TROUBLE DIAGNOSIS PROCEDURE FOR MAGNET CLUTCH (FOR TB48 ENGINE) SYMPTOM: + Magnet clutch does not engage. Inspection flow SHA764F *1: HA-64 in Y61 SERVICE MANUAL, publication No. SM8E-0Y61E0E *5: HA-104 in Y61 SERVICE MANUAL, publication No. SM8E-0Y61E0E *9: HA-79 in Y61 SERVICE MANUAL, publication No. SM8E-0Y61E0E *2: HA-65 in Y61 SERVICE MANUAL, publication No. SM8E-0Y61E0E *6: HA-106 in Y61 SERVICE MANUAL, publication No. SM8E-0Y61E0E *10: HA-70 in Y61 SERVICE MANUAL, publication No. SM8E-0Y61E0E *3: HA-67 in Y61 SERVICE MANUAL, publication No. SM8E-0Y61E0E *4: HA-14 *7: HA-108 in Y61 SERVICE MANUAL, publication No. SM8E-0Y61E0E *8: HA-110 in Y61 SERVICE MANUAL, *11: HA-69 in Y61 SERVICE MANUAL, publication No. SM8E-0Y61E0E *12: HA-119 in Y61 SERVICE MANUAL, publication No. SM8E-0Y61E0E HA-13 publication No. SM8E-0Y61E0E AUTO TROUBLE DIAGNOSES Magnet Clutch (For Europe) (Cont’d) DIAGNOSTIC PROCEDURE (TB48 ENGINE FOR EUROPE) SYMPTOM: Magnet clutch does not engage when A/C switch and fan switch are ON. Yes CHECK POWER SUPPLY FOR COMPRESSOR. Disconnect compressor harness connector. Do approx. 12 volts exist between compressor harness connector terminal No. V 1 and body ground?
. c Check magnet clutch coil. NG . Replace magnet clutch. No Disconnect A/C relay harness connector.
Note .
CHECK CIRCUIT CONTINUITY BETWEEN A/C RELAY HARNESS CONNECTOR TERMINAL NO. V 3 AND COMPRESSOR HARNESS CONNECTOR TERMINAL NO. V 1 . Continuity should exist. If OK, check harness for short. SHA738F OK . CHECK POWER SUPPLY FOR A/C RELAY. Reconnect A/C relay harness connector. Do approx. 12 volts exist between A/C relay harness connector terminal Nos. V 1 , 5 and body ground? V No c Yes . CHECK POWER SUPPLY CIRCUIT AND 20A (No.) FUSE AT FUSE BLOCK. Refer to EL section (“Wiring Diagram”, “POWER SUPPLY ROUTING”). NG CHECK A/C RELAY AFTER DISCONNECTING IT. Refer to HA-18. c Replace A/C relay. SHA788F . OK A V (Go to next page.) Note: If the result is NG or No after checking circuit continuity, repair harness or connector. SHA580F SHA581FA HA-14 TROUBLE DIAGNOSES Magnet Clutch (For Europe) (Cont’d) AUTO A V .
Reconnect A/C relay harness connector. . SHA582FA CHECK COIL SIDE CIRCUIT OF A/C RELAY. Do approx.
12 volts exist between ECM harness connector terminal No. V 24 and body ground? No c Disconnect A/C relay harness connector. Disconnect ECM harness connector. Yes . CHECK CIRCUIT CONTINUITY BETWEEN A/C RELAY HARNESS CONNECTOR TERMINAL NO. 2 AND ECM HARNESS V CONNECTOR TERMINAL NO. V 24 . Continuity should exist. If OK, check harness for short. .
SHA583F Note Disconnect thermo control amp. harness connector. . CHECK THERMO CONTROL AMP. CIRCUIT. Do approx. 12 volts exist between thermo control amp. harness connector terminal No. V 3 and body ground? No c C V Yes RHA660G . CHECK POWER SUPPLY FOR THERMO CONTROL AMP. Do approx. 12 volts exist between thermo control amp.
harness connector terminal No. V 1 and body ground? No c Check power supply circuit and 20A fuse (No. , located in the fuse block). Yes . B V (Go to next page.) RHA661G Note: If the result is NG or No after checking circuit continuity, repair harness or connector. HA-15 TROUBLE DIAGNOSES Magnet Clutch (For Europe) (Cont’d) AUTO B V .
Disconnect auto amp.
harness connector. Note . RHA662G Check circuit continuity between thermo control amp. harness connector terminal No. V 2 and auto amp. harness connector terminal No. V 4 . Continuity should exist. If OK, check harness for short. OK . NG CHECK THERMO CONTROL AMP. Refer to HA-59 in Y61 SERVICE MANUAL, (publication No. SM7E2Y61G1). c Replace thermo control amp. c Replace refrigerant pressure sensor. OK . RHA190I NG CHECK REFRIGERANT PRESSURE SENSOR. Refer to HA-18. OK . CHECK FAN SIGNAL. Measure voltage between auto amp. harness connector terminal No. V 19 and body ground. Terminal No. ⊕ @ 19 Body ground Condition Voltage A/C: ON 0V A/C: OFF 5V OK INSPECTION END c RHA191I NG . B If the voltage is approx. 0V when A/C switch OFF, go to A. If the voltage is approx.
5V when A/C switch ON, go to B.
Replace auto amp. c A . Disconnect combination meter harness connector.
Note . Check circuit continuity between auto amp. harness connector terminal No. V 19 and combination meter harness connector terminal No. V 43 . OK . Check combination meter. Note: If the result is NG or No after checking circuit continuity, repair harness or connector. HA-16 TROUBLE DIAGNOSES Magnet Clutch (For Europe) (Cont’d) AUTO C V . Disconnect combination meter harness connector. Note . SHA700FA Check circuit continuity between combination meter harness connector terminal No. 42 and thermo control amp. harness conV nector terminal No. V 3 . Continuity should exist.
If OK, check harness for short. OK . Check combination meter. Note: If the result is NG or No after checking circuit continuity, repair harness or connector. HA-17 TROUBLE DIAGNOSES AUTO Magnet Clutch COMPONENT INSPECTION A/C Relay Check continuity between terminal Nos. 3 and 5. Conditions SHA479F Continuity 12V direct current supply between terminal Nos. 1 and 2 Yes No current supply No If NG, replace relay.
Refrigerant Pressure Sensor Make sure that higher A/C refrigerant-pressure results in higher refrigerant-pressure sensor output voltage. Check voltage between ECM harness connector terminal No. 88 (R/G) and body ground. Refer to refrigerant pressure sensor in ECM. SHA701FA SHA315FI HA-18 TROUBLE DIAGNOSES REAR COOLER Wiring Diagram — R/COOL —/With Front Auto A/C THA138M HA-19 REAR COOLER TROUBLE DIAGNOSES Wiring Diagram — R/COOL —/With Front Auto A/C (Cont’d) THA070M HA-20 ALPHABETICAL INDEX SECTION IDX ALPHABETICAL INDEX A A/C control operation (auto A/C) ....
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4 Oil Pump .... 4 Oil Jet.. 6 Oil Filter .... 7 Oil Cooler.. 7 ENGINE COOLING SYSTEM....................................... 9 Cooling Circuit .... 9 System Check... 9 Water Pump...
11 Thermostat.. 11 Water Outlet... 12 Radiator .... 13 Cooling Fan Control System (For Europe)............. 14 SERVICE DATA AND SPECIFICATIONS (SDS) .... 15 Engine Lubrication System....................................
15 Engine Cooling System ....
15 TB48DE PRECAUTIONS AND PREPARATION Liquid Gasket Application Procedure SEM164F a.
Use a scraper to remove all traces of old liquid gasket from mating surfaces and grooves. Also, completely clean any oil from these areas. b. Apply a continuous bead of liquid gasket to mating surfaces. (Use Genuine Liquid Gasket or equivalent.) + For oil pan, be sure liquid gasket diameter is 3.5 to 4.5 mm (0.138 to 0.177 in). + For areas except oil pan, be sure liquid gasket diameter is 2.0 to 3.0 mm (0.079 to 0.118 in). c. Apply liquid gasket around the inner side of bolt holes (unless otherwise specified). d. Assembly should be done within 5 minutes after coating. e. Wait at least 30 minutes before refilling engine oil and engine coolant. AEM080 Special Service Tools *: Special tool or commercial equivalent Tool number Tool name Description ST25051001* Oil pressure gauge Measuring oil pressure Maximum measuring range: 2,452 kPa (24.5 bar, 25 kg/cm2, 356 psi) NT558 ST25052000* Hose Adapting oil pressure gauge to cylinder block NT559 EG17650301 Radiator cap tester adapter Adapting radiator cap tester to radiator filler neck and reservoir tank cap a: 28 (1.10) dia. b: 31.4 (1.236) dia. c: 41.3 (1.626) dia. Unit: mm (in) NT564 LC-2 ENGINE LUBRICATION SYSTEM TB48DE Lubricating Circuit MLC113A LC-3 ENGINE LUBRICATION SYSTEM TB48DE Oil Pressure Check WARNING: + Be careful not to burn yourself, as the engine and oil may be hot. + Oil pressure check should be done in “Neutral” gear position.
1. Check oil level. 2. Remove oil pressure switch. SLC694A 3. Install pressure gauge. 4. Start engine and warm it up to normal operating temperature. 5. Check oil pressure with engine running under no-load. Engine speed rpm Approximate discharge pressure kPa (bar, kg/cm2, psi) Idle speed 2,800 More than 49 (0.49, 0.5, 7) 294 - 490 (2.94 - 4.90, 3.0 - 5.0, 43 - 71) MLC114A If difference is extreme, check oil passage and oil pump. 6. Install oil pressure switch with sealant. Oil pressure switch: : 10 - 16 Nzm (1.0 - 1.6 kg-m, 87 - 139 in-lb) Oil Pump REMOVAL AND INSTALLATION 1. Drain engine oil. 2. Drain coolant from radiator and cylinder block.
Refer to MA section (“Changing Engine Coolant”, “ENGINE MAINTENANCE”). 3. Remove power steering pump drive belt, alternator drive belt and A/C compressor drive belt. 4. Remove radiator and radiator shroud. 5. Remove fan coupling with fan. 6. Remove crankshaft pulley.
7. Remove water pump. 8.
Remove power steering pump and power steering pump bracket.
9. Remove alternator and alternator bracket.
10. Remove left side of the tie rod end. 11. Remove oil pans. Refer to “Removal” of “OIL PAN” in EM section. 12. Remove cylinder head front cover. 13. Remove front cover assembly. 14. Remove oil pump assembly.
15. Reinstall any part removed in reverse order of removal. LC-4 TB48DE ENGINE LUBRICATION SYSTEM Oil Pump (Cont’d) DISASSEMBLY AND ASSEMBLY MLC115A 1 Oil pump cover V 2 Inner gear V 3 Outer gear V 4 Front cover V 5 O-ring V 6 Regulator valve V 7 Spring V 8 Regulator plug V + When installing oil pump, apply engine oil to gears. OIL PUMP INSPECTION Using a feeler gauge, straightedge and micrometers, check the following clearances: Unit: mm (in) Body to outer gear clearance V 1 Inner gear to outer gear tip clearance V 2 MLC116A 0.114 - 0.260 (0.0045 - 0.0102) Below 0.18 (0.0071) Body to inner gear clearance V 3 0.030 - 0.070 (0.0012 - 0.0028) Body to outer gear clearance V 4 0.030 - 0.190 (0.0012 - 0.0075) Inner gear to brazed portion of housing clearance V 5 0.045 - 0.091 (0.0018 - 0.0036) + If the tip clearance (V 2) exceeds the limit, replace gear set. + If body to gear clearances (V 1 , V 3 , V 4 , V 5) exceed the limit, replace oil pump body assembly. MLC117A LC-5 ENGINE LUBRICATION SYSTEM Oil Pump (Cont’d) TB48DE SLC182B REGULATOR VALVE INSPECTION 1. Visually inspect components for wear and damage. 2. Check oil pressure regulator valve sliding surface and valve spring. 3. Coat regulator valve with engine oil. Check that it falls smoothly into the valve hole by its own weight. If damaged, replace regulator valve set or oil pump cover. SLC183B 4. Check regulator valve to oil pump cover clearance. Clearance: 6 : 0.040 - 0.097 mm (0.0016 - 0.0038 in) V If it exceeds the limit, replace oil pump cover. SLC184B OIL PRESSURE RELIEF VALVE INSPECTION (For oil cooler) Inspect oil pressure relief valve for movement, cracks and breaks by pushing the ball. If replacement is necessary, remove valve by prying it out with suitable tool.
Install a new valve in place by tapping it. SLC185B Oil Jet INSPECTION (For timing chain) Make sure that the holes are not clogged. Clean them with a wire if necessary. Drive oil jet into place after positioning alignment mark on cylinder block. MLC118A LC-6 ENGINE LUBRICATION SYSTEM TB48DE Oil Filter The oil filter is a small, full-flow cartridge type and is provided with a relief valve. SLC035B Oil Cooler MLC119A REMOVAL AND INSTALLATION 1. Disconnect water hoses from oil cooler, pinching hoses near oil cooler to prevent engine coolant from spilling. 2. Remove oil cooler. Put mating marks for easier installation. 3. Installation is in reverse order of removal. + Do not spill engine oil and engine coolant on the drive belt. + Completely wipe off any engine oil and engine coolant that adheres to the engine and the vehicle. 4. Check oil level and add engine oil. 5. After warming up engine, check that there is no leakage of engine oil and engine coolant. INSPECTION 1. Check oil cooler for cracks. LC-7 ENGINE LUBRICATION SYSTEM Oil Cooler (Cont’d) TB48DE 2. Check oil cooler for clogging by blowing through coolant inlet. If necessary, replace oil cooler assembly. LC-8 ENGINE COOLING SYSTEM TB48DE Cooling Circuit SLC466B System Check WARNING: Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure coolant escaping from the radiator. Wrap a thick cloth around the cap.
Slowly turn it a quarter turn to allow built-up pressure to escape. Carefully remove the cap by turning it all the way. CAUTION: Do not install the reservoir tank cap (pressure side), which is provided with valves, to radiator on models for the Middle East. CHECKING COOLING SYSTEM HOSES Check hoses for the following: + Improper attachment + Leaks + Cracks + Damage + Chafing + Deterioration LC-9 ENGINE COOLING SYSTEM System Check (Cont’d) TB48DE CHECKING COOLING SYSTEM FOR LEAKS To check for leakage, apply pressure to the cooling system with a tester. Testing pressure: 157 kPa (1.57 bar, 1.6 kg/cm2, 23 psi) CAUTION: Higher pressure than specified may cause radiator damage. SLC134B CHECKING RADIATOR CAP Except for the Middle East To check radiator cap, apply pressure to cap with a tester. Radiator cap relief pressure: Standard 108 - 127 kPa (1.08 - 1.27 bar, 1.1 - 1.3 kg/cm2, 16 - 18 psi) Limit 59 kPa (0.59 bar, 0.6 kg/cm2, 9 psi) SLC135B Pull the negative pressure valve to open it. Check that it closes completely when released. SMA967B CHECKING RESERVOIR TANK CAP (PRESSURE SIDE) For the Middle East SLC135B To check reservoir tank cap (pressure side), apply pressure to cap with a tester. Reservoir tank cap relief pressure: Standard 78 - 98 kPa (0.78 - 0.98 bar, 0.8 - 1.0 kg/cm2, 11 - 14 psi) Limit 59 kPa (0.59 bar, 0.6 kg/cm2, 9 psi) LC-10 ENGINE COOLING SYSTEM System Check (Cont’d) TB48DE Pull the negative pressure valve to open it. Check that it closes completely when released.
SMA967B Water Pump CAUTION: + When removing water pump assembly, be careful not to get coolant on drive belt. + Water pump cannot be disassembled and should be replaced as a unit. + Always replace with new gasket.
+ After installing water pump, connect hose and clamp securely, then check for leaks using radiator cap tester. Refer to MA section.
MLC121A REMOVAL 1. Drain coolant from radiator and cylinder block. Refer to MA section (“Changing Engine Coolant”, “ENGINE MAINTENANCE”). 2. Remove power steering pump drive belt, alternator drive belt and A/C compressor drive belt. 3. Remove radiator shroud. 4. Remove fan coupling with fan. 5. Remove water pump. MMA119A INSPECTION 1. Check for badly rusted or corroded body assembly and vane. 2. Check for rough operation due to excessive end play. MLC122A Thermostat + After installation, run engine for a few minutes and check for leaks.
+ Be careful not to spill coolant in engine compartment. Use a rag to absorb coolant. REMOVAL Drain coolant from radiator and cylinder block. Refer to MA section (“Changing Engine Coolant”, “ENGINE MAINTENANCE”). MLC123A LC-11 TB48DE ENGINE COOLING SYSTEM Thermostat (Cont’d) INSPECTION 1. Check valve seating condition at ordinary temperatures. It should seat tightly. 2. Check valve opening temperature and maximum valve lift. Gulf standard model Valve opening temperature Maximum valve lift SLC252B °C (°F) mm/°C (in/°F) 76.5 (170) 10/90 (0.39/194) 3. Then check if valve closes at 5°C (9°F) below valve opening temperature. Water Outlet INSPECTION Visual inspection for water leaks. If there is leakage, replace gasket. MLC124A LC-12 ENGINE COOLING SYSTEM TB48DE Radiator FOR EUROPE SLC521B LC-13 ENGINE COOLING SYSTEM TB48DE Cooling Fan Control System (For Europe) Cooling fan is controlled by ECM (Engine control module). For details, refer to EC section [“Cooling Fan”, “DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)”]. SLC522B LC-14 SERVICE DATA AND SPECIFICATIONS (SDS) TB48DE Engine Lubrication System OIL PRESSURE CHECK OIL PUMP INSPECTION Unit: mm (in) Engine rpm Approximate discharge pressure kPa (bar, kg/cm2, psi) Body to outer gear clearance V 1 0.114 - 0.260 (0.0045 - 0.0102) Idle speed 2,800 More than 49 (0.49, 0.5, 7) 294 - 490 (2.94 - 4.90, 3.0 - 5.0, 43 - 71) Inner gear to outer gear tip clearance V 2 Below 0.18 (0.0071) Body to inner gear clearance V 3 0.030 - 0.070 (0.0012 - 0.0028) Body to outer gear clearance V 4 0.030 - 0.190 (0.0012 - 0.0075) Inner gear to brazed portion of housing clearance V 5 0.045 - 0.091 (0.0018 - 0.0036) Regulator valve to oil pump cover 6 V 0.040 - 0.097 (0.0016 - 0.0038) Engine Cooling System RADIATOR THERMOSTAT Except for the Middle East Standard Unit: kPa (bar, kg/cm2, psi) Radiator cap Standard Limit Leakage test pressure 108 - 127 (1.08 - 1.27, 1.1 - 1.3, 16 - 18) Valve opening temperature °C (°F) Max. valve lift 59 (0.59, 0.6, 9) 157 (1.57, 1.6, 23) For the Middle East Unit: kPa (bar, kg/cm2, psi) Reservoir tank cap (pressure side) Standard Limit Leakage test pressure 78 - 98 (0.78 - 0.98, 0.8 - 1.0, 11 - 14) 59 (0.59, 0.6, 9) 157 (1.57, 1.6, 23) LC-15 mm/°C (in/°F) 76.5 (170) 10/90 (0.39/194) MAINTENANCE SECTION MA MODIFICATION NOTICE: + + + + Platinum-tipped spark plugs have been used on models with three way catalyst for the Middle East and Europe. (TB48DE engine) Specifications of drive belt deflection have been modified. (TB48DE engine) TB48DE engine maintenance information for Europe has been added. Chassis and body maintenance information for the Middle East and Europe has been added. (TB48DE engine) CONTENTS PRECAUTIONS AND PREPARATION .... 2 Special Service Tools .... 2 PERIODIC MAINTENANCE (For Europe) ....
3 Maintenance Schedule for Petrol Engines (Annual Mileage < 30,000 km/year) .... 3 Chassis and Body Maintenance.............................. 4 Maintenance Under Severe Driving Conditions (Annual Driving Distance < 30,000 km/year) .... 5 Maintenance Schedule for Petrol Engines (Annual Mileage > 30,000 km/year) .... 6 Chassis and Body Maintenance.............................. 7 Maintenance Under Severe Driving Conditions (Annual Driving Distance > 30,000 km) .... 8 RECOMMENDED FLUIDS AND LUBRICANTS........... 9 Fluids and Lubricants .... 9 TB48DE ENGINE MAINTENANCE .... 10 Checking Tightening Torque .... 10 Checking Drive Belts .... 11 Changing Engine Coolant...................................... 12 Changing Spark Plugs (Platinum-Tipped Type)...... 14 Checking Cooling System .... 15 Checking Fuel Lines .... 16 Changing Fuel Filter .... 16 Cleaning and Changing Air Cleaner Filter .... 16 Checking Cyclone Pre-air Cleaner .... 17 Changing Engine Oil... 17 Changing Oil Filter... 18 Checking and Changing Spark Plugs .... 18 Checking Positive Crankcase Ventilation (PCV) System .... 19 Checking Vacuum Hoses and Connections............
20 Checking Vapor Lines .... 20 CHASSIS AND BODY MAINTENANCE ....
21 Checking A/T Fluid .... 21 Changing A/T Fluid.. 21 Checking Disc Brake .... 22 SERVICE DATA AND SPECIFICATIONS (SDS) .... 23 Engine Maintenance (TB48DE).............................. 23 PRECAUTIONS AND PREPARATION Special Service Tools Tool number Tool name Engine application Description TB48DE EG17650301 Radiator cap tester adapter Adapting radiator cap tester to radiator filler neck and reservoir tank cap a: 28 (1.10) dia.
b: 31.4 (1.236) dia. c: 41.3 (1.626) dia. Unit: mm (in) NT564 KV10115801 Oil filter wrench X Removing oil filter X NT362 MA-2 PERIODIC MAINTENANCE (For Europe) The following tables show the normal maintenance schedule. Depending upon weather and atmospheric conditions, varying road surfaces, individual driving habits and vehicle usage, additional or more frequent maintenance may be required. Periodic maintenance beyond the last period shown on the tables requires similar maintenance. Maintenance Schedule for Petrol Engines (Annual Mileage < 30,000 km/year) TB48DE ENGINE Abbreviations: R = Replace I = Inspect: Correct or replace if necessary MAINTENANCE OPERATION MAINTENANCE INTERVAL 15 (9) 12 30 (18) 24 45 (27) 36 60 (36) 48 75 (45) 60 90 (54) 72 105 (63) 84 120 (72) 96 Reference pages Engine oil (Use recommended oil)★ R R R R R R R R — Engine oil filter (Use NISSAN genuine part or equivalent)★ R R R R R R R R — Drive belts I I I I I I I I MA-11 Cooling system I I I I I I I I — I — Perform on a kilometer basis, but on an annual basis when driving less than 15,000 km (9,000 miles) per year km x 1,000 (miles x 1,000) Months Engine compartment and under vehicle Engine anti-freeze coolant (Use genuine NISSAN Anti-Freeze Coolant (L2N) or equivalent) See NOTE (1) I Air cleaner filter (Viscous paper type)★ Intake and exhaust valve clearance R R See NOTE (2) — — Fuel and EVAP vapour lines Spark plugs (Platinum-tipped type) R I I I Replace every 100,000 km (60,000 miles) Fuel filter★ R I — MA-14 — NOTE: (1) First replace at 90,000 km (54,000 miles)/60 months, then every 60,000 km (36,000 miles)/48 months. Perform “I” (Checking the mixture ratio and correcting the mixture ratio if necessary) at the middle of replacement interval. (2) Periodic maintenance is not required. However, if valve noise increases, check valve clearance. ★ Maintenance items with “★” should be performed more frequently according to “Maintenance Under Severe Driving Conditions”. MA-3 PERIODIC MAINTENANCE (For Europe)

Chassis and Body Maintenance Abbreviations: R = Replace, I = Inspect: Correct or replace if necessary, L = Lubricate, T = Tighten, [ ] = At the specified mileage only MAINTENANCE OPERATION MAINTENANCE INTERVAL km x 1,000 15 30 45 60 75 90 105 120 (miles x 1,000) (9) (18) (27) (36) (45) (54) (63) (72) Months 12 24 36 48 60 72 84 96 Headlamp aiming I I I I I I I I — Wheel alignment (if necessary, balance & rotate wheels) I I I I I I I I — Brake pads, rotors & other brake components★ I I I I I I I I MA-22 Foot brake, parking brake & clutch (for free play, stroke & operation) I I I I I I I I — I — I — R — I — R — Perform on a kilometer basis, but on an annual basis when driving less than 15,000 km (9,000 miles) per year. Reference pages Underhood and under vehicle Brake booster vacuum hoses, connections & check valve I Brake & clutch, systems and fluid (for level and leaks) I Brake fluid★ I I I R Power steering fluid and lines (for level and leaks) I Ventilation air filter★ I I R I R ASCD vacuum hoses I I I I I R I R I I R I I I I I I I I — Greasing point of propeller shaft★ See NOTE (1) L L L L L L L L — Transfer fluid and differential gear oil (for level & leaks or replace)★ See NOTE (2) I I I R I I I R — Drive shafts & steering damper★ I I I I I I I I — Front wheel bearing grease★ I R I R I R I R — L — Front axle joint in knuckle flange L L L Free-running hub grease★ I I I I I I I I — Body mounting bolts & nuts T T T T T T T T — Steering gear & linkage, axle & suspension parts, propeller shaft & exhaust system★ I I I I I I I I — Body corrosion See NOTE (3) — NOTE: (1) The propeller shaft should be re-greased after being immersed in water. (2) Including differential gear with differential lock. (3) Inspect once per year. ★ Maintenance items with “★” should be performed more frequently according to “Maintenance under severe driving conditions”. MA-4 PERIODIC MAINTENANCE (For Europe) Maintenance Under Severe Driving Conditions (Annual Driving Distance < 30,000 km/year) The maintenance intervals shown on the preceding pages are for normal operating conditions. If the vehicle is mainly operated under severe driving conditions as shown below, more frequent maintenance must be performed on the following items as shown in the table. A B C D E — — — — — Driving in dusty conditions Repeatedly driving short distances Towing a trailer or caravan Extensive idling Driving in extremely adverse weather conditions or in areas where ambient temperatures are either extremely low or extremely high F — Driving in high humidity or mountainous areas Driving condition G — Driving in areas using salt or other corrosive materials H — Driving on rough and/or muddy roads or in the desert I — Driving with frequent use of braking or in mountainous areas J — Frequent driving in water Maintenance item A B C D . . .

. . . Engine oil & engine oil filter A . . . .

. . Air cleaner filter A . . . E . . . . . Fuel filter A . C . . . G H I . Brake pads, rotors & other brake components . . . .

. F . . . . Brake fluid A . . . . Ventilation air filter . . C . . . . H . . Automatic transmission fluid . . . . . .

G H . J Greasing point of propeller shaft .

. C . .

. . H . . Transfer fluid and differential gear oil . . C . . .

. H . . Drive shafts & steering damper . . . . J Front wheel bearing grease . . . .

. . . . . J Free-running hub grease . . . . . . G H . . Steering gear & linkage, axle & suspension parts, propeller shaft & exhaust system MA-5 Maintenance operation Maintenance interval Replace Every 7,500 km (4,500 miles) or 6 months Replace Every 30,000 km (18,000 miles) or 24 months Replace Every 45,000 km (27,000 miles) or 36 months Inspect Every 7,500 km (4,500 miles) or 6 months Replace Every 15,000 km (9,000 miles) or 12 months Replace Every 15,000 km (9,000 miles) or 12 months Replace Every 30,000 km (18,000 miles) or 24 months Lubricate Every 7,500 km (4,500 miles) or 6 months Replace Every 30,000 km (18,000 miles) or 24 months Inspect Every 7,500 km (4,500 miles) or 6 months Inspect Every 7,500 km (4,500 miles) or 6 months Inspect Every 7,500 km (4,500 miles) or 6 months Inspect Every 7,500 km (4,500 miles) or 6 months PERIODIC MAINTENANCE (For Europe) Maintenance Schedule for Petrol Engines (Annual Mileage > 30,000 km/year) TB48DE ENGINE Abbreviations: R = Replace I = Inspect: Correct or replace if necessary MAINTENANCE OPERATION MAINTENANCE INTERVAL 15 (9) 30 (18) 45 (27) 60 (36) 75 (45) 90 (54) 105 (63) 120 (72) Reference pages Engine oil (Use recommended oil)★ R R R R R R R R — Engine oil filter (Use NISSAN genuine part or equivalent)★ R R R R R R R R — Drive belts I I I I I I I I MA-11 I I — R I — R R — I I — Perform on a kilometer basis only. km x 1,000 (miles x 1,000) Engine compartment and under vehicle Cooling system Engine anti-freeze coolant (Use genuine NISSAN Anti-Freeze Coolant (L2N) or equivalent) I I See NOTE (1) I Air cleaner filter (Viscous paper type)★ Intake & exhaust valve clearance See NOTE (2) — Fuel and EVAP vapor lines Spark plugs (Platinum-tipped type) Replace every 100,000 km (60,000 miles) Fuel filter★ R MA-14 — NOTE: (1) First replace at 90,000 km (54,000 miles), then every 60,000 km (36,000 miles). Perform “I” (checking the mixture ratio and correcting the mixture ratio if necessary) at the middle of replacement interval. (2) Periodic maintenance is not required. However, if valve noise increases, check valve clearance. ★ Maintenance items with “★” should be performed more frequently according to “Maintenance Under Severe Driving Conditions”. MA-6 PERIODIC MAINTENANCE (For Europe) Chassis and Body Maintenance Abbreviations: R = Replace, I = Inspect: Correct or replace if necessary, L = Lubricate, T = Tighten MAINTENANCE OPERATION Perform on a kilometer basis only MAINTENANCE INTERVAL km x 1,000 (miles x 1,000) 30 60 90 120 (18) (36) (54) (72) Reference pages Underhood and under vehicle Headlamp aiming I I I I Wheel alignment (if necessary, balance & rotate wheels) I I I I — Brake pads, rotors & other brake components★ I I I I MA-22 Foot brake, parking brake & clutch (for free play, stroke & operation) I I I I — Brake booster vacuum hoses, connections & check valve I Brake & clutch, systems and fluid (for level and leaks) I Brake fluid★ I I R — I — I — R — Power steering fluid and lines (for level and leaks) I I I I — Ventilation air filter★ R R R R — ASCD vacuum hoses I I I I — Greasing point of propeller shaft★ See NOTE (1) L L L L — Transfer fluid and differential gear oil (for level & leaks or replace)★ See NOTE (2) I R I R — Drive shafts & steering damper★ I I I I — Front wheel bearing grease★ I R I R — Front axle joint in knuckle flange L — Free-running hub grease★ I L I I I — Body mounting bolts & nuts T T T T — I I I I Steering gear & linkage, axle & suspension parts, propeller shaft & exhaust system★ Body corrosion See NOTE (3) — — NOTE: (1) The propeller shaft should be re-greased after being immersed in water. (2) Including differential gear with differential lock. (3) Inspect once per year. ★ Maintenance items with “★” should be performed more frequently according to “Maintenance under severe driving conditions”. MA-7 PERIODIC MAINTENANCE (For Europe) Maintenance Under Severe Driving Conditions (Annual Driving Distance > 30,000 km) The maintenance intervals shown on the preceding pages are for normal operating conditions. If the vehicle is mainly operated under severe driving conditions as shown below, more frequent maintenance must be performed on the following items as shown in the table.

A B C D E — — — — — Driving in dusty conditions Repeatedly driving short distances Towing a trailer or caravan Extensive idling Driving in extremely adverse weather conditions or in areas where ambient temperatures are either extremely low or extremely high F — Driving in high humidity or mountainous areas Driving condition G — Driving in areas using salt or other corrosive materials H — Driving on rough and/or muddy roads or in the desert I — Driving with frequent use of braking or in mountainous areas J — Frequent driving in water Maintenance item A B C D . . . . . . Engine oil & engine oil filter A . .

. . . . Air cleaner filter A . . . E . . . . .

Fuel filter A . C . . . G H I . Brake pads, rotors & other brake components . . . . . F . . .

. Brake fluid A . . . .

Ventilation air filter . . C . . . . H . . Automatic transmission fluid .

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. . .

. G H . J Greasing point of propeller shaft . . C . . . . H . . Transfer fluid and differential gear oil . . C .

. .

. H . . Drive shafts & steering damper . . . .

. .

. . . J Front wheel bearing grease . . . . J Free-running hub grease . . . . .

. G H . . Steering gear & linkage, axle & suspension parts, propeller shaft & exhaust system MA-8 Maintenance operation Maintenance interval Replace Every 7,500 km (4,500 miles) Replace Every 30,000 km (18,000 miles) Replace Every 45,000 km (27,000 miles) Inspect Every 15,000 km (9,000 miles) Replace Every 30,000 km (18,000 miles) Replace Every 15,000 km (9,000 miles) Replace Every 60,000 km (36,000 miles) Lubricate Every 15,000 km (9,000 miles) Replace Every 30,000 km (18,000 miles) Inspect Every 15,000 km (9,000 miles) Inspect Every 15,000 km (9,000 miles) Inspect Every 15,000 km (9,000 miles) Inspect Every 15,000 km (9,000 miles) RECOMMENDED FLUIDS AND LUBRICANTS Fluids and Lubricants Capacity (Approximate) Liter Imp measure Engine oil (Refill) With oil filter Without oil filter TB45E, TB45S 7.6 TB48DE 6.8 6 qt TD42, TD42T 10.5 9-1/4 qt ZD30DDTi 8.2 7-1/4 qt TB45E, TB45S 7.3 6-3/8 qt TB48DE 6.5 5-3/4 qt TD42, TD42T 9.3 8-1/8 qt 7.7 6-3/4 qt 12.0 13.2 10-5/8 qt 11-5/8 qt 13.0 11-1/2 qt ZD30DDTi Cooling system (with reservoir tank) With front heater TB45E, TB45S RHD TB48DE LHD Except for the Middle East & Europe For the Middle East & Europe TD42, TD42T RHD ZD30DDTi LHD Without front heater Except Europe For Europe Except Europe For Europe TB45E, TB45S Except for the Middle East For the Middle East TB48DE TD42, TD42T ZD30DDTi With rear heater RHD TB48DE TD42 LHD Except for the Middle East & Europe For the Middle East & Europe RHD ZD30DDTi LHD Except Europe For Europe For Europe Except Europe For Europe Manual transmission oil FS5R50B Differential carrier gear oil (without limited slip differential) Without diff. lock With diff. lock Differential carrier gear oil (with limited slip differential) Except Europe Transfer fluid TX12A Automatic transmission fluid RE5R05A RE4R03A Power steering fluid Brake and clutch fluid Multi-purpose grease Propeller shaft grease 13.8 12-1/8 qt 15.1 12.7 13.0 12.9 13.2 11.3 13-1/4 qt 11-1/8 qt 11-1/2 qt 11-3/8 qt 11-5/8 qt 10 qt 12.5 11 qt 13.3 11-3/4 qt 14.4 12.0 14.1 12-5/8 qt 10-5/8 qt 12-3/8 qt 13.9 12-1/4 qt 14.7 LHD 6-3/4 qt + Except for Europe Nissan Genuine Engine Coolant or equivalent in its quality*6 + For Europe Genuine Nissan Anti-freeze Coolant (L2N) or equivalent*6 13 qt 16.0 13.8 14.1 14.0 14.3 14-1/8 12-1/8 12-3/8 12-3/8 12-5/8 3.5 6-1/8 qt API GL-4, Viscosity SAE 75W-85 2.4 3.0 4-1/4 qt 5-1/4 qt API GL-5*1 2.1 3-3/4 qt 1.9 1-5/8 qt qt qt qt qt qt 9-1/8 - 9-3/8 qt 11.8 10-3/8 qt Refill to the proper oil level according to the instructions in the “Maintenance and do-ityourself” section of the owner’s manual. — — 10.4 - 10.7 Air conditioning system refrigerant Air conditioning system lubricants Recommended Fluids/Lubricants Gasoline engine: API SE, SF, SG SH, SJ or SL*1 ILSAC grade GF-I, GF-II, GF-III or SG+*1 Diesel engine: API CC, CD, CE, CF, CF-4 or JASO DH-1*1 for TD42, TD42T API CF4 or ACEA B3-96.98 or ACEA B3/E3-96.98 or JASO DH-1*5 for Europe, ZD30DDTi And API CD, CE, CF, CF-4 or JASO DH-1*1, *5 except for Europe, ZD30DDTi — — — — Gear Oil Hypoid LSD (Part No.: KLD3114002) or equivalent*2 Genuine Nissan ATF or equivalent*4 or API GL-4*1 Genuine Nissan ATF Matic Fluid J*3 Genuine Nissan ATF or equivalent*4 Type DEXRONTMIII or equivalent For Europe: DOT 3 or DOT 4 (U.S. FMVSS No. 116)*7 Except for Europe: DOT 3 (U.S. FMVSS No. 116) NLGI No. 2 (Lithium soap base) NLGI No. 2 (Molybdenum disulphide lithium soap base) HFC-134a (R-134a) Nissan A/C System Oil Type S or exact equivalent *1: For further details, see “SAE viscosity number”. *2: API GL-5, SAE 140 and 10% volume of LSD Friction Modifier (Part No.: 38469-C6000) is an equivalent. *3: Using automatic transmission fluid other than Nissan Genuine ATF Matic Fluid J will cause deterioration in driveability and automatic transmission durability, and may damage the automatic transmission, which is not covered by the warranty. *4: For more information regarding suitable fluids, contact a Nissan dealer for correct brand(s) of DEXRONTMIII/MERCONTM Automatic Transmission Fluid. *5: Never use API CG-4. *6: Use Nissan Genuine Engine Coolant [For Europe, use Genuine Nissan Anti-freeze Coolant (L2N)] or equivalent in its quality, in order to avoid possible aluminum corrosion within the engine cooling system caused by the use of non-genuine engine coolant. Note that any repairs for the incidents within the engine cooling system while using non-genuine engine coolant may not be covered by the warranty even if such incidents occurred during the warranty period. *7: Never mix DOT 3 & DOT 4. MA-9 ENGINE MAINTENANCE TB48DE Checking Tightening Torque + Checking should be performed while engine is cold. MANIFOLD BOLTS AND NUTS Intake manifold: : 24.5 - 31.4 Nzm (2.5 - 3.2 kg-m, 18 - 23 ft-lb) Exhaust manifold: : 28.4 - 32.4 Nzm (2.9 - 3.3 kg-m, 21 - 23 ft-lb) EXHAUST TUBE NUTS : 51 - 64.7 Nzm (5.2 - 6.5 kg-m, 38 - 47 ft-lb) MA-10 TB48DE ENGINE MAINTENANCE Checking Drive Belts MMA121A 1.

Inspect for cracks, fraying, wear or oil adhesion. If necessary, replace with a new one. 2. Inspect drive belt deflections by pushing on the belt midway between pulleys. Adjust if belt deflections exceed the limit.

Belt deflection: Unit: mm (in) Used belt deflection Deflection of new belt Limit Deflection after adjustment Alternator 10 (0.39) 8 (0.31) 7 (0.28) Air conditioner compressor 12 (0.47) 9 (0.35) 8 (0.31) Power steering oil pump 21 (0.83) 17 - 18 (0.67 - 0.71) 13 - 14 (0.51 - 0.55) Applied pushing force 98 N (10 kg, 22 lb) Inspect drive belt deflections when engine is cold. MA-11 ENGINE MAINTENANCE TB48DE Changing Engine Coolant EXCEPT FOR THE MIDDLE EAST SMA972C WARNING: To avoid being scalded, never change the coolant when the engine is hot. — DRAINING ENGINE COOLANT — 1. Turn the ignition switch from “OFF” to “ON” and make sure that the A/C display indicates “32”. Then turn ignition switch to “OFF” for models with AUTO air conditioner. Turn the temperature control knob to full hot position for models with MANUAL air conditioner. 2. Open radiator drain cock at the bottom of radiator, and remove radiator cap to drain. + Be careful not to allow coolant to contact drive belts. SMA156D 3. Remove air relief plug at front top of intake manifold collector (upper). MMA134A 4. 5.

6. — 7. 8. Remove cylinder block drain plug to drain. Remove reservoir tank to drain and clean. If drained coolant is contaminated, flush the cooling system. FLUSHING COOLING SYSTEM — Close drain cock and drain plug, then install air relief plug. Install reservoir tank. MMA119A MA-12 ENGINE MAINTENANCE Changing Engine Coolant (Cont’d) TB48DE 9. Fill radiator and reservoir tank with water, and close radiator cap and reservoir tank cap. 10. Run engine and warm it up to normal operating temperature. 11. Race engine 2 or 3 times under no-load. 12.

Stop engine and wait until it cools down.

13.

Repeat step 2 through step 11 until clear water begins to drain from radiator. 14. Drain water. — REFILLING ENGINE COOLANT — 15. Remove air relief plug. Close drain cock and tighten drain plug securely.

+ Apply sealant to the thread of drain plug. Cylinder block drain plug : 34.3 - 44.1 Nzm (3.5 - 4.5 kg-m, 26 - 32 ft-lb) SMA182B SMA412B 16. Fill radiator with coolant up to the filler neck and install radiator cap.

Install air relief plug when coolant overflows from air relief hole. Follow instructions attached to anti-freeze container for mixing ratio of anti-freeze to water. For coolant mixture ratio, refer to “RECOMMENDED FLUID AND LUBRICANTS” of original Service Manual. Coolant capacity (With reservoir tank): liter (lmp qt) With rear heater LHD models 13.9 (12-1/4) RHD models 14.1 (12-3/8) With front heater LHD models 13.0 (11-1/2) RHD models 13.2 (11-5/8) Without front heater 12.5 (11) Reservoir tank capacity (for MAX level): 0.6 liter (1/2 lmp qt) Pour coolant through coolant filler neck slowly to allow air in system to escape. 17. Fill reservoir tank with coolant up to “MAX” level and then install cap. 18. Warm up engine to normal operating temperature. 19.

Run engine at 2,000 rpm for 10 seconds and return to idle speed. + Repeat 2 or 3 times. Watch coolant temperature gauge so as not to overheat the engine. 20. Stop engine and cool it down.

+ Cool down using a fan to reduce the time. 21. Refill reservoir tank to Max line with coolant.

22. Repeat step 18 through step 21 two or more times. MA-13 ENGINE MAINTENANCE Changing Engine Coolant (Cont’d) TB48DE 23. Warm up engine, and check for sound of coolant flow while running engine from idle up to 2,000 rpm with heater temperature control set at several positions between COOL and HOT. + Sound may be noticeable at heater water cock. 24. If sound is heard, bleed air from cooling system by repeating steps 18 through 23 until coolant level no longer drops. + Clean excess coolant from engine. Changing Spark Plugs (Platinum-Tipped Type) MODELS WITH THREE WAY CATALYST FOR THE MIDDLE EAST AND EUROPE 1. Disconnect harness connectors and remove ignition coils from spark plugs. MMA129A 2. Remove spark plugs with spark plug wrench. Spark plug: Make SMA581C NGK Standard type PLFR5A-11 Hot type PLFR4A-11 Cold type PLFR6A-11 Use standard type spark plug under normal conditions. The hot type spark plug is suitable when fouling occurs with the standard spark plug under conditions such as: + Frequent engine starts + Low ambient temperature The cold type spark plug is suitable when spark knock occurs with the standard spark plug under conditions such as: + Extended highway driving + Frequent high engine revolution 3.

Check insulator for cracks or chips, gasket for damage or deterioration and electrode for wear and burning. If they are excessively worn away, replace with new spark plugs. Gap (Nominal): 1.1 m (0.043 in) CAUTION: + Do not use a wire brush for cleaning. + If plug tip is covered with carbon, spark plug cleaner may be used. Cleaner air pressure: Less than 588 kPa (5.88 bar, 6 kg/cm2, 85 psi) Cleaning time: Less than 20 seconds SMA773C MA-14 TB48DE ENGINE MAINTENANCE Changing Spark Plugs (Platinum-Tipped Type) (Cont’d) + Checking and adjusting plug gap is not required between change intervals. 4. Install spark plugs. Install ignition coils to spark plugs and reconnect harness connector of ignition coil. Spark plug: : 19.6 - 29.4 Nzm (2.0 - 3.0 kg-m, 15 - 21 ft-lb) SMA806CA Checking Cooling System CHECKING HOSES Check hoses for proper attachment and for leaks, cracks, damage, loose connections, chafing and deterioration. CHECKING RADIATOR CAP Except for the Middle East To check radiator cap, apply pressure to cap with a tester. Radiator cap relief pressure: Standard 108 - 127 kPa (1.08 - 1.27 bar, 1.1 - 1.3 kg/cm2, 16 - 18 psi) Limit 59 kPa (0.59 bar, 0.6 kg/cm2, 9 psi) SLC135B Pull the negative pressure valve to open it. Check that it closes completely when released. SMA967B CHECKING COOLING SYSTEM FOR LEAKS Apply pressure to the cooling system with cap tester to check for leakage. Testing pressure: 157 kPa (1.57 bar, 1.6 kg/cm2, 23 psi) CAUTION: Higher pressure than the specified value may cause damage to radiator. MMA125A MA-15 ENGINE MAINTENANCE TB48DE Checking Fuel Lines Inspect fuel lines and tank for proper attachment and for leaks, cracks, damage, loose connections, chafing and deterioration. If necessary, repair or replace faulty parts. CAUTION: Tighten high-pressure rubber hose clamp so that clamp end is 3 mm (0.12 in) from hose end. Tightening torque specifications are the same for all rubber hose clamps. Ensure that screw does not contact adjacent parts. SMA804AC Changing Fuel Filter WARNING: Before removing fuel filter, release fuel pressure from fuel line to eliminate danger. 1. Release fuel pressure from fuel line. Refer to EC section (“Fuel Pressure Release”, “BASIC SERVICE PROCEDURE”). 2. Loosen fuel hose clamps. 3. Replace fuel filter. + Be careful not to spill fuel over engine compartment. Place a shop towel to absorb fuel. + Use a high-pressure type fuel filter. Do not use a synthetic resinous fuel filter. + When tightening fuel hose clamps, refer to “Checking Fuel Lines”. MMA127A Cleaning and Changing Air Cleaner Filter Viscous paper type The viscous paper type filter does not need cleaning between renewals. SMA979C MA-16 TB48DE ENGINE MAINTENANCE Cleaning and Changing Air Cleaner Filter (Cont’d) Dry paper type It is necessary to clean the element or replace it at the recommended intervals, more often under dusty driving conditions. SMA980CA + To properly tighten wing nuts, position clamps at four places and tighten wing nuts until they touch air cleaner. Then tighten them three more turns. + Clean inside air cleaner body when changing the element, or cleaning for dry paper type.

SMA981C Checking Cyclone Pre-air Cleaner 1.

Remove dust exhaust valve and check duct for dust clogging. Clean away any dust. Dust exhaust valve can be removed through the front left wheelwell. 2. Install the dust exhaust valve and its cover provided at the wheelwell to original position. MMA133A Changing Engine Oil WARNING: Be careful not to burn yourself, as the engine oil is hot. 1.

Warm up engine, and check for oil leakage from engine components.

2. Remove drain plug and oil filler cap.

3. Drain oil and refill with new engine oil. Oil grade: API SE, SF, SG, SH or SJ Viscosity: See “RECOMMENDED FLUIDS AND LUBRICANTS”. MMA128A Refill oil capacity (Approximately): Unit: liter (lmp qt) With oil filter change Without oil filter change 6.8 (6) 6.5 (5-3/4) CAUTION: + Be sure to clean drain plug and install with new washer. Drain plug: : 29.4 - 39.2 Nzm (3.0 - 4.0 kg-m, 22 - 28 ft-lb) + Use recommended engine oil.

MA-17 ENGINE MAINTENANCE Changing Engine Oil (Cont’d) TB48DE 4. Check oil level on a level surface. 5. Start engine and check area around drain plug and oil filter for oil leakage. 6. Run engine for a few minutes, then turn it off. After more than 10 minutes, check oil level. SMA155D Changing Oil Filter 1.

Remove oil filter with a suitable tool. WARNING: Be careful not to burn yourself, as the engine and the engine oil are hot. SMA985CA 2. Before installing new oil filter, clean the oil filter mounting surface on cylinder block, and coat the rubber seal of oil filter with a little engine oil. SMA010 3. Screw in the oil filter until a slight resistance is felt, then tighten additionally more than 2/3 turn. 4. Add engine oil. Refer to Changing Engine Oil. SMA886B Checking and Changing Spark Plugs 1. Disconnect harness connectors and remove ignition coils from spark plugs. MMA129A MA-18 ENGINE MAINTENANCE Checking and Changing Spark Plugs (Cont’d) TB48DE 2. Remove spark plugs with spark plug wrench. Spark plug: Make SMA581C NGK Standard type LFR5A-11 Hot type LFR4A-11 Cold type LFR6A-11 Use standard type spark plug under normal conditions. The hot type spark plug is suitable when fouling occurs with the standard spark plug under conditions such as: + frequent engine starts + low ambient temperature The cold type spark plug is suitable when spark knock occurs with the standard spark plug under conditions such as: + extended highway driving + frequent high engine revolution 3. Clean plugs in sand blast cleaner. 4. Check insulator for cracks or chips, gasket for damage or deterioration and electrode for wear and burning. If they are excessively worn away, replace with new spark plugs. 5. Check spark plug gap. Gap: 1.0 - 1.1 mm (0.039 - 0.043 in) 6. Install spark plugs. Install ignition coils to spark plugs and reconnect harness connector of ignition coil. Spark plug: : 19.6 - 29.4 Nzm (2.0 - 3.0 kg-m, 15 - 21 ft-lb) SMA476 Checking Positive Crankcase Ventilation (PCV) System CHECKING PCV VALVE With engine running at idle, remove ventilation hose from rocker cover; if valve is working properly, a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet. MMA130A CHECKING VENTILATION HOSES 1. Check hoses and hose connections for leaks. 2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace. MMA131A MA-19 ENGINE MAINTENANCE TB48DE Checking Vacuum Hoses and Connections Check vacuum hoses for improper attachment and for leaks, cracks, damage, loose connections, chafing and deterioration. Checking Vapor Lines 1. Visually inspect vapor lines for proper attachment and for cracks, damage, loose connections, chafing and deterioration. 2. Inspect vacuum relief valve of fuel tank filler cap for clogging, sticking, etc.

Refer to EVAPORATIVE EMISSION CONTROL SYSTEM INSPECTION in EC section.

MMA132A MA-20 CHASSIS AND BODY MAINTENANCE Checking A/T Fluid — RE5R05A — NOTE: Use only service part of A/T fluid level gauge. 1.Remove the oil charging pipe cap. 2. Insert A/T fluid gauge. 3. Warm up engine. 4. Check for fluid leakage. 5. Before driving, fluid level can be checked at fluid temperatures of 30 to 50°C (86 to 122°F) using “COLD” range on A/T fluid level gauge. a. Park vehicle on level surface and set parking brake. b.

Start engine and move selector lever through each gear position. Leave selector lever in “P” position. c. Check fluid level with engine idling. d.

Remove A/T fluid level gauge and wipe clean with lint-free paper. e. Re-insert A/T fluid level gauge into oil charging pipe as far as it will go. f. Remove A/T fluid level gauge and note reading.

If reading is at low side of range, add fluid to the oil charging pipe. Do not overfill. 6.Drive vehicle for approximately 5 minutes in urban areas. 7. Re-check fluid level at fluid temperature of 50 to 80°C (122 to 176°F) using “HOT” range on A/T fluid level gauge. 8. Check fluid condition. + If fluid is very dark or smells burned, refer to AT section for checking operation of A/T. Flush cooling system after repair of A/T. + If A/T fluid contains frictional material (clutches, bands, etc.), replace radiator and flush cooler line using cleaning solvent and compressed air after repair of A/T. 9. Make sure AT fluid level gauge is removed then install the oil charging pipe cap. Bolt: 4.4 - 5.8 Nzm (0.45 - 0.59 kg-m, 39.1 - 51.2 in-lb) Changing A/T Fluid — RE5R05A — NOTE: Use only service part of A/T fluid level gauge. 1.Warm up A/T fluid. 2. Stop engine.

3. Remove the oil charging pipe cap. 4. Drain A/T fluid from drain plug and refill with new A/T fluid. Always refill same volume with drained fluid. + To replace the A/T fluid, pour in new oil at the oil charging pipe with the engine idling and at the same time drain the old oil from the radiator cooler hose return side. + When the color of the oil coming out is abut the same as the color of the new oil, the replacement is complete. The amount of new transmission fluid to use should be 30 to 50% of the stipulated amount. A/T fluid: Nissan Matic Fluid J Fluid capacity: 10.4 - 10.7 liter (9-1/8 - 9-3/8 Imp qt) CAUTION: + Use only Nissan Genuine ATF Matic Fluid J. Do not mix with other fluid.

+ Using automatic transmission fluid other than Nissan Genuine ATF Matic Fluid J will cause deterioration in driveability and automatic transmission durability, and may damage the automatic transmission, which is not covered by the warranty. Drain plug: 29 - 39 Nzm (3.0 - 4.0 kg-m, 22 - 29 ft-lb) 5.Run engine at idle speed for 5 minutes. 6. Check fluid level and condition.

Refer to MA-21, “Checking A/T Fluid”.

If fluid is still dirty, repeat step 2 through 5.

+ Make sure A/T fluid level gauge is removed then install the oil charging pipe cap. Bolt: 4.4 - 5.8 Nzm (0.45 - 0.59 kg-m, 39.1 - 51.2 in-lb) MA-21 CHASSIS AND BODY MAINTENANCE Checking Disc Brake ROTOR SMA260A Check condition and thickness. Standard thickness: Front CL41VA 34 mm (1.34 in) CL36VE 32 mm (1.26 in) Rear CL20VA 18 mm (0.71 in) CL18VF 18 mm (0.71 in) Minimum thickness: Front CL41VA 32 mm (1.26 in) CL36VE 30 mm (1.18 in) Rear CL20VA 16 mm (0.63 in) CL18VF 16 mm (0.63 in) CALIPER Check for leakage. SMA922A PAD Check for wear or damage.

Standard thickness: Front CL41VA 10 mm (0.39 in) CL36VE 12 mm (0.47 in) Rear CL20VA 11 mm (0.43 in) CL18VF 10 mm (0.39 in) Minimum thickness: 2.0 mm (0.079 in) SMA847B MA-22 SERVICE DATA AND SPECIFICATIONS (SDS) Engine Maintenance (TB48DE) INSPECTION AND ADJUSTMENT Cooling system check Drive belt deflection Except for the Middle East Unit: kPa (bar, kg/cm2, psi) Unit: mm (in) Cooling system testing pressure Used belt deflection Deflection of new belt Limit Deflection after adjustment Alternator 10 (0.39) 8 (0.31) 7 (0.28) Air conditioner compressor 12 (0.47) 9 (0.35) 8 (0.31) Power steering oil pump 21 (0.83) 17 - 18 (0.67 - 0.71) 13 - 14 (0.51 - 0.55) Applied pushing force Radiator cap relief pressure 108 - 127 (1.08 - 1.27, 1.1 1.3, 16 - 18) Limit 59 (0.59, 0.6, 9) Unit: kPa (bar, kg/cm2, psi) 98 N (10 kg, 22 lb) Cooling system testing pressure Unit: ! (lmp qt) Without oil filter change Standard For the Middle East Oil capacity (Refill capacity) With oil filter change 157 (1.57, 1.6, 23) Radiator cap relief pressure 6.8 (6) 6.5 (5-3/4) 157 (1.57, 1.6, 23) Standard 78 - 98 (0.78 - 0.98, 0.8 1.0, 11 - 14) Limit 59 (0.59, 0.6, 9) Spark plug type (Platinum-tipped type) Models with three way catalyst for the Middle East and Europe Standard type PLFR5A-11 Hot type PLFR4A-11 Cold type Plug gap (Nominal) MA-23 PLFR6A-11 1.1 mm (0.043 in) PROPELLER SHAFT & DIFFERENTIAL CARRIER SECTION PD MODIFICATION NOTICE: + + Wiring Diagrams have been changed. Service Data and Specifications have been changed. CONTENTS DIFFERENTIAL LOCK .... 2 Wiring Diagram - DIFF/L - .... 2 SERVICE DATA AND SPECIFICATIONS (SDS) .... 4 Propeller Shaft .... 4 Final Drive... 5 DIFFERENTIAL LOCK Wiring Diagram — DIFF/L — TPD016M PD-2 DIFFERENTIAL LOCK Wiring Diagram — DIFF/L — (Cont’d) TPD015M PD-3 SERVICE DATA AND SPECIFICATIONS (SDS) Propeller Shaft GENERAL SPECIFICATIONS Front propeller shaft Applied model Except for ZD30DDTi engine Propeller shaft model 2F80B Number of joints 2 Type of journal bearing Solid (Disassembly type) Coupling type with transmission Flange type Distance between yokes 73 (2.87) mm (in) Shaft length (Spider-to-spider) mm (in) 810 (31.89) Shaft outer diameter 50.8 (2.000) mm (in) Rear propeller shaft Applied model TB48DE Transmission 5A/T Body ZD30DDTi M/T Wagon Wagon A/T Hardtop Propeller shaft model Wagon Hardtop 2F100H Number of joints 2 Type of journal bearing Solid (Disassembly type) Coupling type with transmission Flange type Distance between yokes 94 (3.70) mm (in) Shaft length (Spider-to-spider) mm (in) 1,025 (40.35) 1,011 (39.80) 440 (17.32) 1,044 (41.10) 480 (18.90) 90 (3.54) 89.6 (3.528) 57 (2.24) 89.6 (3.528) 75.2 (2.961) Shaft outer diameter mm (in) Available snap rings 2F100H 2F80B Thickness mm (in) Color Part Number 1.99 (0.0783) White 37146-C9400 2.02 (0.0795) Yellow 37147-C9400 2.05 (0.0807) Red 37148-C9400 2.08 (0.0819) Green 37149-C9400 2.11 (0.0831) Blue 37150-C9400 2.14 (0.0843) Light brown 37151-C9400 2.17 (0.0854) Black 37152-C9400 2.20 (0.0866) Colorless 37153-C9400 PD-4 Thickness mm (in) Color Part Number 1.95 (0.0768) White 37146-61502 1.98 (0.0780) Yellow 37147-61502 2.01 (0.0791) Red 47148-61502 2.04 (0.0803) Green 47149-61502 2.07 (0.0815) Blue 37150-61502 2.10 (0.0827) Light brown 37151-61502 2.13 (0.0839) Pink 47146-61502 2.16 (0.0850) Gold 37147-61502 2.19 (0.0862) Black 47148-61502 2.22 (0.0874) Colorless 37149-61502 SERVICE DATA AND SPECIFICATIONS (SDS) Final Drive GENERAL SPECIFICATIONS Wagon Engine TB48DE Transmission ZD30DDTi 5A/T 5M/T, 4A/T Standard Front final drive H233B 2-pinion Gear ratio 3.545 4.375 Number of teeth (Ring gear/drive pinion) 39/11 35/8 Oil capacity (Approx.) ! (Imp pt) 5.4 (9-1/2) Standard Optional Rear final drive [Grade] Standard Optional H233B 4-pinion LSD Diff. lock LSD Diff. lock 4-pinion LSD Diff. lock Gear ratio 3.545 4.375 Number of teeth (Ring gear/drive pinion) 39/11 35/8 LSD Diff. lock Oil capacity (Approx.) 2.4 (4-1/4) 2.1 (3-3/4) 3.0 (5-1/4) 2.1 (3-3/4) 3.0 (5-1/4) 2.4 (4-1/4) 2.1 (3-3/4) 3.0 (5-1/4) ! (Imp pt) Hardtop Engine ZD30DDTi Transmission 5M/T 4A/T Standard Front final drive H233B 2-pinion Gear ratio 4.375 Number of teeth (Ring gear/drive pinion) 35/8 Oil capacity (Approx.) ! (Imp pt) 5.4 (9-1/2) Standard Optional Rear final drive [Grade] Standard H233B 4-pinion LSD Diff. lock LSD Diff. lock Gear ratio 4.375 Number of teeth (Ring gear/drive pinion) 35/8 Oil capacity (Approx.) ! (Imp pt) Optional 2.4 (4-1/4) 2.1 (3-3/4) 3.0 (5-1/4) 2.1 (3-3/4) PD-5 3.0 (5-1/4) 4-pinion Diff. lock LSD Diff. lock 2.4 (4-1/4) 3.0 (5-1/4) 2.1 (3-3/4) 3.0 (5-1/4) SERVICE DATA AND SPECIFICATIONS (SDS) Final Drive (Cont’d) Differential actuator mounting adjusting shim Thickness mm (in) Part number 0.4 (0.016) 38154 06J00 1.0 (0.039) 38154 06J01 0.9 (0.035) 38154 06J02 1.5 (0.059) 38154 06J03 Diff. lock actuator adjustment Standard length A PD-6 mm (in) 80.9 - 84.8 (3.185 - 3.340) REAR AXLE & REAR SUSPENSION SECTION RA MODIFICATION NOTICE: + + Tightening torque for bearing cage has been changed. Wiring diagrams have been changed. CONTENTS REAR AXLE...

2 Components... 2 STABILIZER RELEASE DEVICE................................. 3 Wiring Diagram .... 3 REAR AXLE Components DRUM BRAKE TYPE SRA887A RA-2 STABILIZER RELEASE DEVICE Wiring Diagram TRA007M RA-3 STABILIZER RELEASE DEVICE Wiring Diagram (Cont’d) TRA008M RA-4 RESTRAINT SYSTEM SECTION RS MODIFICATION NOTICE: Air bag system wiring diagram has been changed. CONTENTS TROUBLE DIAGNOSES - Supplemental Restraint System (SRS) .... 2 Schematic .... 2 Wiring Diagram - SRS -/LHD Models........................ 3 Wiring Diagram - SRS -/RHD Models .... 7 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Schematic TRS061M RS-2 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS —/LHD Models LHD MODELS TRS062M RS-3 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS —/LHD Models (Cont’d) TRS063M RS-4 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS —/LHD Models (Cont’d) LHD MODELS WITH CONSULT-II (EXCEPT FOR TD ENGINE MODELS WITH NATS) TRS065M RS-5 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS —/LHD Models (Cont’d) TRS066M RS-6 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS —/RHD Models RHD MODELS TRS072M RS-7 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS —/RHD Models (Cont’d) TRS073M RS-8 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS —/RHD Models (Cont’d) RHD MODELS WITH CONSULT-II (EXCEPT FOR TD ENGINE MODELS WITH NATS) TRS075M RS-9 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS —/RHD Models (Cont’d) TRS076M RS-10 STEERING SYSTEM SECTION ST MODIFICATION NOTICE: + Tightening torque for air bag module has been changed. CONTENTS STEERING WHEEL AND STEERING COLUMN .... 2 Removal and Installation .... 2 STEERING WHEEL AND STEERING COLUMN Removal and Installation SST013D 1 V 2 V 3 V Air bag module Steering wheel Spiral cable 4 V 5 V 6 V Combination switch Steering column assembly Column cover ST-2 7 V 8 V Lower shaft Coupling AUTOMATIC TRANSMISSION SECTION AT MODIFICATION NOTICE: + + Wiring diagrams have been changed. Service data and Specifications (SDS) have been changed. CONTENTS RE4R03A OVERALL SYSTEM ....4002 Circuit Diagram ....4002 Wiring Diagram — A/T —......................................4003 RE5R05A TROUBLE DIAGNOSIS..4011 Circuit Diagram ....4011 TROUBLE DIAGNOSES FOR SYMPTOMS............4012 Wiring Diagram — AT — NONDTC......................4012 SERVICE DATA AND SPECIFICATIONS (SDS) ......4014 General Specifications..4014 Vehicle Speed When Shifting Gears ....4014 Vehicle Speed When Performing and Releasing Lock-up ....4014 Stall Revolution...4014 Line Pressure...4014 Solenoid Valves ....4015 A/T Fluid Temperature Sensor..............................4015 Turbine Revolution Sensor ....4015 Revolution Sensor ....4015 AT-4001 OVERALL SYSTEM RE4R03A Circuit Diagram TAT141M AT-4002 OVERALL SYSTEM RE4R03A Wiring Diagram — A/T — TAT061M AT-4003 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) RE4R03A TAT136M AT-4004 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) RE4R03A TAT142M AT-4005 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) RE4R03A TAT146M AT-4006 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) RE4R03A TAT111M AT-4007 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) RE4R03A TAT143M AT-4008 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) RE4R03A TAT128M AT-4009 OVERALL SYSTEM Wiring Diagram — A/T — (Cont’d) RE4R03A TAT114M AT-4010 TROUBLE DIAGNOSIS RE5R05A Circuit Diagram TAT144M AT-4011 TROUBLE DIAGNOSES FOR SYMPTOMS RE5R05A Wiring Diagram — AT — NONDTC TAT106M AT-4012 RE5R05A TROUBLE DIAGNOSES FOR SYMPTOMS Wiring Diagram — AT — NONDTC (Cont’d) TAT145M AT-4013 RE5R05A SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications Engine TB48DE Automatic transmission model RE5R05A Destination Except for Europe For Europe 91X69 91X68 Transmission model code number Stall torque ratio 2.0 : 1 1st 3.540 2nd 2.264 3rd 1.471 4th 1.000 5th 0.834 Reverse 2.370 Transmission gear ratio Recommended fluid Genuine Nissan ATF Matic Fluid J*1 Fluid capacity 10.4 - 10.7 liter (9-1/8 - 9-3/8 Imp qt) CAUTION: + Use only Genuine Nissan ATF Matic Fluid J*1. Do not mix with other fluid. + Using automatic transmission fluid other than Genuine Nissan ATF Matic Fluid J*1 will deteriorate in driveability and automatic transmission durability, and may damage the automatic transmission, which is not covered by the warranty. *1: Refer to MA section, “Fluids and Lubricants”. Vehicle Speed When Shifting Gears Vehicle Speed km/h (MPH) Throttle position D 1 → D2 D2 → D 3 D3 → D 4 D 4 → D5 D5 → D 4 D4 → D 3 D3 → D 2 D2 → D 1 Full throttle 52 - 56 (32 - 35) 81 - 89 (50 - 55) 126 - 136 (78 - 85) 188 - 198 (117 - 123) 184 - 194 (114 - 121) 116 - 126 (72 - 78) 70 - 78 (43 - 48) 36 - 40 (22 - 25) Half throttle 32 - 36 (20 - 22) 62 - 68 (39 - 42) 104 - 112 (65 - 70) 126 - 134 (78 - 83) 100 - 108 (62 - 67) 61 - 69 (38 - 43) 37 - 43 (23 - 27) 10 - 14 (6 - 9) + At half throttle, the accelerator opening is 4/8 of the full opening. Vehicle Speed When Performing and Releasing Lock-up Vehicle speed km/h (MPH) Throttle position Closed throttle Half throttle + + Lock-up “ON” Lock-up “OFF” 64 - 72 (39 - 45) 61 - 69 (38 - 43) 164 - 172 (102 - 107) 130 - 138 (81 - 86) At closed throttle, the accelerator opening is less than 1/8. At half throttle, the accelerator opening is 4/8 of the full opening. Stall Revolution Stall revolution 1,900 - 2,200 rpm Line Pressure Line Pressure kPa (bar, kg/cm2, psi) Engine speed (rpm) “R” position “D”, “M” positions Idling Revolution 392 - 441 (3.9 - 4.4, 4.0 - 4.5, 57 - 64) 373 - 422 (3.7 - 4.2, 3.8 - 4.3, 54 - 61) Stall Revolution 1,700 - 1,890 (17.0 - 18.9, 17.3 - 19.3, 247 - 274) 1,310 - 1,500 (13.1 - 15.0, 13.4 - 15.3, 191 - 218) AT-4014 RE5R05A SERVICE DATA AND SPECIFICATIONS (SDS) Solenoid Valves Name Resistance (Approx.) (Ω) Terminal No. Line pressure solenoid valve 7 Torque converter clutch solenoid valve 8 Input clutch solenoid valve 6 3-9 High & low reverse clutch solenoid valve 3 Front brake solenoid valve 5 Direct clutch solenoid valve 4 Low coast brake solenoid valve 20 - 40 2 A/T Fluid Temperature Sensor Name A/T fluid temperature sensor-1 A/T fluid temperature sensor-2 Condition CONSULT-II “DATA MONITOR” (Approx.) (V) Resistance (Approx.) (kΩ) 0°C (32°F) 2.2 15 20°C (68°F) 1.8 0.6 80°C (176°F) 0.6 0.9 0°C (32°F) 2.2 10 20°C (68°F) 1.7 4 80°C (176°F) 0.45 0.5 Turbine Revolution Sensor Name Condition Turbine revolution sensor-1 When moving at 50 km/h (31 MPH) in 4th gear with the closed throttle position signal “OFF”, use the CONSULT-II pulse frequency measuring function. CAUTION: Connect the diagnosis data link connector to the vehicle diagnosis connector. Turbine revolution sensor-2 When running at 20 km/h (12 MPH) in 1st gear with the closed throttle position signal “OFF”, use the CONSULT-II pulse frequency measuring function.

CAUTION: Connect the diagnosis data link connector to the vehicle diagnosis connector. Data (Approx.) 1.3 (kHz) Revolution Sensor Name Revolution sensor Condition When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function. CAUTION: Connect the diagnosis data link connector to the vehicle diagnosis connector. AT-4015 Data (Approx.) 185 (Hz) BRAKE SYSTEM SECTION BR MODIFICATION NOTICE: + + Engine direction indicator stamp has been added to brake booster hose. Service data and specifications (SDS) have been changed. CONTENTS VACUUM PIPING..4002 Vacuum Hose ....4002 SERVICE DATA AND SPECIFICATIONS (SDS) ......4003 General Specifications..4003 BR-4001 VACUUM PIPING Vacuum Hose SBR374F BR-4002 SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications Body Applied model Wagon/Hardtop ZD30DDTi (For Europe) TB45E (For the Middle East) TB48DE TD42 (For the Middle East) Front brake Type Cylinder bore diameter mm (in) CL41VA disc brake CL36VE disc brake 51.1 (2.012) x 2 48.1 (1.894) x 2 Pad dimension Length x width x thick145 x 56.5 x 10 (5.79 x 2.224 x 0.39) ness mm (in) Rotor outer diameter x thickness mm (in) 147 x 56.5 x 12 (5.79 x 2.224 x 0.47) 316 x 34 (12.44 x 1.34) 306 x 32 (12.05 x 1.26) Rear brake Type CL20VA disc brake CL18VF disc brake LT30 drum brake Cylinder bore diameter mm (in) 51.1 (2.012) 48.1 (1.894) 25.4 (1.00) Lining or pad dimension Length x width x thickness mm (in) 111 x 34 x 11 (4.37 x 1.34 x 0.43) 111 x 41.8 x 10 (4.37 x 1.646 x 0.39) 296 x 50 x 6.1 (11.65 x 1.97 x 0.240) Drum inner diameter mm (in) — — 295 (11.61) Rotor outer diameter x thickness mm (in) 330 x 18 (12.99 x 0.71) 316 x 18 (12.44 x 0.71) — Brake booster Model 235T Diaphragm diameter mm (in) Primary: 252 (9.92) Secondary: 230 (9.06) Master cylinder bore diameter mm (in) 26.9 (17/16) Control valve Type Split point x reducing ratio kPa (bar, kg/cm2, psi) Recommended brake fluid LSV (Variable) x 0.3 (Variable) x 0.3 DOT 3 or DOT 4 BR-4003 (Variable) x 0.15 BODY & TRIM SECTION BT MODIFICATION NOTICE: Following parts have been changed: + Front bumper + Rear bumper + Instrument panel + Overfender + License lamp finisher + Rear seat CONTENTS BODY END ....4002 Body Front End..4002 Body Rear End and Opener................................4005 INSTRUMENT PANEL...4006 EXTERIOR ....4009 SEAT ....4012 Rear Seat...4012 ★ For seat belt, refer to MA and RS section. ★ For wiring diagrams of body electrical systems, refer to EL section. BT-4001 BODY END Body Front End + + + + + When removing or installing hood, place a cloth or other padding on front fender panel and cowl top. This prevents vehicle body from being scratched.

Bumper fascia is made of plastic. Do not use excessive force and be sure to keep oil away from it.

Hood adjustment: Adjust at hinge portion. Hood lock adjustment: After adjusting, check hood lock control operation. Apply a coat of grease to hood locks engaging mechanism. Hood opener: Do not attempt to bend cable forcibly. Doing so increases effort required to unlock hood. REMOVAL — Front bumper assembly j 1 j 2 j 3 j 4 j 5 j 6 j 7 j 8 Remove front guard bar.

Refer to “EXTERIOR” for details, BT-9. Remove clips securing front grille and remove the front grille. Remove left and right headlamp washer nozzle. (If equipped.) Remove screws and bolts securing left and right front bumper side bracket. Remove bolts securing bumper lower to engine under cover.

Remove bolts securing left and right front bumper stay upper (without winch). Remove bolts securing left and right front bumper stay side. Extract bumper assembly. PIIB1965E BT-4002 BODY END Body Front End (Cont’d) PIIB1966E BT-4003 BODY END Body Front End (Cont’d) PIIB1967E BT-4004 BODY END Body Rear End and Opener Bumper fascia is made of plastic. Do not use excessive force and be sure to keep oil away from it. Back door lock system adjustment: Adjust lock & striker so that they are in the center.

After adjustment, check back door lock operation. + Back door hatch lock system adjustment: Adjust lock & striker so that they are in the center. After adjustment, check back door hatch lock operation. + Opener cable: Do not attempt to bend cable using excessive force. + After installation, make sure that back door and fuel filler lid open smoothly.

WARNING: + Be careful not to scratch back door stay and/or back door hatch stay when installing back door and/or back door hatch. A scratched stay may cause gas leakage. + The contents of the back door stay and back door hatch stay are under pressure. Do not take apart, puncture, apply heat or allow fire near them. + + REMOVAL — Rear bumper assembly j 1 j 2 j 3 j 4 Remove Remove Remove Remove rear bumper finisher. screws securing left and right mudguard. bolts securing rear bumper to bumper reinforcement. nuts securing rear bumper reinforcement. PIIB1968E BT-4005 INSTRUMENT PANEL CAUTION: + Disconnect both battery cables in advance. + Disconnect air bag system line in advance. + Never tamper with or force air bag lid open, as this may adversely affect air bag performance. + Be careful not to scratch pad and other parts.

REMOVAL — Instrument panel assembly Instrument panel assembly Combination meter Remove air bag module (driver) and steering wheel. Refer to “SUPPLEMENTAL RESTRAINT SYSTEM” in RS section for details. Remove dash side lower finishers. Refer to “Side and Floor Trim” in “INTERIOR TRIM” for details, BT-15 in Service Manual (Pub. No. SM7E2Y61G1). j 1 Steering column cover and combination switch + Remove screws. j 2 Lower instrument panel on driver side + Remove bolts and screws. j 3 Cluster lid A + Remove screws then disconnect harness connectors. j 4 Combination meter + Remove screws then disconnect harness connectors. j 5 Cluster lid C + Pull out then disconnect harness connectors. + Remove screws then remove in-vehicle sensor. j 6 Audio + Remove screws then disconnect harness connectors. j 7 A/C control unit + Remove screws then disconnect harness connectors.

j 8 Console M/T or A/T finisher + Remove screws then disconnect harness connectors. j 9 Console box assembly + Remove screws then disconnect harness connectors. j 10 Instrument panel stay cover + Remove screws then disconnect harness connectors. j 11 Glove box assembly and lower instrument panel on passenger side + Remove screws. j 12 Mirror control switch + Disconnect harness connector. Remove front pillar garnish. Refer to “Side and Floor Trim” in “INTERIOR TRIM” for details, BT-15 in Service Manual (Pub. No. SM7E2Y61G1). j 13 Mask instrument LH/RH or sensors. + Disconnect harness connectors (models with sensors). j 14 Instrument panel and pads + Remove bolts and nuts then disconnect harness connectors. BT-4006 Audio & A/C control Console box INSTRUMENT PANEL PIIB1969E BT-4007 INSTRUMENT PANEL PIIB1970E BT-4008 EXTERIOR PIIB1974E BT-4009 EXTERIOR j 13 Over fender PIIB1972E BT-4010 EXTERIOR j 21 License lamp finisher PIIB1973E BT-4011 SEAT Rear Seat WAGON (Type-III) PIIB1975E BT-4012 CLUTCH SECTION CL MODIFICATION NOTICE: + + Clutch cover has been changed, and clutch orifice has been added to 2-door models based on the grade of ZD30DDTi engine. Service Data and Specifications (SDS) have been changed. CONTENTS CLUTCH PIPING ....4002 Removal and Installation ....4002 SERVICE DATA AND SPECIFICATIONS (SDS) ......4003 General Specifications..4003 Inspection and Adjustment ....4003 CL-4001 CLUTCH PIPING Removal and Installation PCIB0685E PCIB0681E Carefully observe the following steps during clutch tube removal and installation. + Do not spill clutch fluid onto painted surfaces. If it spills, wipe up immediately and wash the affected area with water. + When fixing clutch hose to bracket, align clutch hose metal fittings with bracket positioning emboss and lock plate to secure. At this time, prevent twisting or damage of clutch hose.

In addition, be careful not to damage clutch hose. + Tighten clutch tube flare nut to the specified torque. CAUTION: Be careful not to damage flare nut and clutch tube. + Tighten the union bolt to the specified torque. CAUTION: Do not reuse the copper washer. + After installation, bleed the clutch tube. CL-4002 SERVICE DATA AND SPECIFICATIONS (SDS) General Specifications CLUTCH DISC TB45E Applied model 275 Pickup Facing size (Outer dia. x inner dia. x thickness) mm (in) Thickness of disc assembly with load mm (in)/N (kg, lb) TB48DE TD42 300 H/T H/T Wagon Wagon and Pickup 300 x 190 x 3.5 (11.81 x 7.48 x 0.14) 7.8 - 8.4 (0.31 - 0.33)/ 7,845 (800, 1,764) TD42Ti 275 Wagon 275 x 180 x 3.5 (10.83 x 7.09 x 0.14) 7.7 - 8.3 (0.30 0.33)/ 6,865 (700, 1,543) ZD30DDTi 275 x 180 x 3.5 (10.83 x 7.09 x 0.14) 7.7 - 8.3 (0.30 7.8 - 8.4 (0.31 - 0.33)/ 0.33)/ 7,845 (800, 1,764) 8,340 (851, 1,875) 7.8 - 8.2 (0.31 - 0.32)/ 6,865 (700, 1,543) 7.9 - 8.5 (0.31 0.34)/ 7,845 (800, 1,764) CLUTCH COVER TB45E Applied model TB48DE 275 Pickup 7,355 - 8,335 Full load (750 - 850, 1,653 N (kg, lb) 1,874) ZD30DDTi TD42 300 H/T 275 Wagon 7,670 - 9,010 (780 - 920, 1,724 - 2,025) TD42Ti H/T and Wagon Wagon and Pickup 7,650 - 9,030 7,670 - 9,010 (780 - 921, 1,720 (780 - 920, 1,724 - 2,025) 2,030) 6,473 7,257 (660 - 740, 1,455 1,631) 7,355 8,335 (750 - 850, 1,653 1,874) Inspection and Adjustment CLUTCH DISC Unit: mm (in) Applied model Pickup TB45E TB48DE 275 300 H/T Wagon ZD30DDTi TD42 TD42Ti 275 H/T Wear limit of facing surface to rivet head 0.3 (0.012) Runout limit of facing 1.3 (0.051) Wagon Wagon and Pickup Distance of runout check point (from the hub center) 130 (5.12) 145 (5.71) 130 (5.12) Maximum backlash of spline (at outer edge of disc) 1.1 (0.043) 1.2 (0.047) 1.1 (0.043) CLUTCH COVER Unit: mm (in) Applied model Pickup TB45E TB48DE 275 300 H/T Wagon Diaphragm spring height “A” Uneven limit of diaphragm spring toe height ZD30DDTi TD42 275 H/T Wagon 44 - 46 (1.732 - 1.811) 0.7 (0.028) 1.0 (0.039) CL-4003 TD42Ti 0.7 (0.028) Wagon and Pickup ENGINE CONTROL SYSTEM SECTION EC MODIFICATION NOTICE: + + Wiring diagrams have been modified.

MAF sensor has been changed for ZD30DDTi engine models. CONTENTS TB45E ENGINE AND EMISSION CONTROL OVERALL SYSTEM...4003 Circuit Diagram ....4003 TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS..4004 Vehicle Speed Sensor (VSS) ....4004 TB48DE M/T ENGINE AND EMISSION CONTROL OVERALL SYSTEM...4005 Circuit Diagram ....4005 VEHICLE SPEED SENSOR (VSS) ....4007 Wiring Diagram ....4007 ELECTRICAL LOAD SIGNAL.................................4008 Wiring Diagram ....4008 Diagnostic Procedure ....4009 TB48DE A/T ENGINE AND EMISSION CONTROL OVERALL SYSTEM..4013 Circuit Diagram ....4013 SNOW MODE SWITCH ....4015 Wiring Diagram ....4015 ELECTRICAL LOAD SIGNAL.................................4016 Wiring Diagram ....4016 Diagnostic Procedure ....4018 TB48DE A/T (WITH EURO-OBD) TROUBLE DIAGNOSIS...4022 Circuit Diagram ....4022 SNOW MODE SWITCH ....4024 Wiring Diagram ....4024 ELECTRICAL LOAD SIGNAL.................................4025 Wiring Diagram ....4025 Diagnostic Procedure ....4027 TD42 QUICK-GLOW SYSTEM.................................4031 Circuit Diagram ....4031 Wiring Diagram ....4033 FAST IDLE CONTROL CIRCUIT ....4036 Wiring Diagram ....4036 ZD30DDTi ENGINE AND EMISSION CONTROL OVERALL SYSTEM...4037 Circuit Diagram ....4037 TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ....4038 CONSULT-II Reference Value in Data Monitor Mode ....4038 ECM Terminals and Reference Value ....4040 DTC 0102 MASS AIR FLOW SEN...........................4047 Component Description ....4047 CONSULT-II Reference Value in Data Monitor Mode ....4047 ECM Terminals and Reference Value ....4047 On Board Diagnosis Logic..................................4047 DTC Confirmation Procedure ....4048 Wiring Diagram ....4049 Diagnostic Procedure ....4050 DTC 0104 VEHICLE SPEED SEN ....4053 Wiring Diagram ....4053 HEAT UP SWITCH ....4054 Wiring Diagram ....4054 Diagnostic Procedure ....4055 AIR CONDITIONER CONTROL ....4058 Wiring Diagram ....4058 EC-4001 CONTENTS TD42Ti ENGINE AND EMISSION CONTROL OVERALL SYSTEM...4059 Circuit Diagram ....4059 (Cont’d) TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS...4060 Vehicle Speed Sensor (VSS) ....4060 When you read wiring diagrams: + Read GI section, “HOW TO READ WIRING DIAGRAMS”. + See EL section, “POWER SUPPLY ROUTING” for power distribution circuit. When you perform trouble diagnoses, read GI section, “HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES” and “HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT”. EC-4002 ENGINE AND EMISSION CONTROL OVERALL SYSTEM TB45E Circuit Diagram TEC515M EC-4003 TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS TB45E Vehicle Speed Sensor (VSS) TEC532M EC-4004 ENGINE AND EMISSION CONTROL OVERALL SYSTEM TB48DE M/T Circuit Diagram TEC516M EC-4005 ENGINE AND EMISSION CONTROL OVERALL SYSTEM Circuit Diagram (Cont’d) TB48DE M/T TEC533M EC-4006 VEHICLE SPEED SENSOR (VSS) TB48DE M/T Wiring Diagram TEC534M EC-4007 ELECTRICAL LOAD SIGNAL TB48DE M/T Wiring Diagram TEC517M EC-4008 TB48DE M/T ELECTRICAL LOAD SIGNAL Diagnostic Procedure INSPECTION START . Do you have CONSULT-II? No c A . (Without CONGo to j SULT-II) c Check rear window defogB .) ger circuit. (Go to j c Check lighting switch cirC .) cuit. (Go to j Yes . PBIB0103E CHECK OVERALL FUNCTION-I. With CONSULT-II 1.

Turn ignition switch ON. 2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II. Rear window defogger ON LOAD SIGNAL: ON Rear window defogger OFF LOAD SIGNAL: OFF NG OK . PBIB0296E CHECK OVERALL FUNCTION-II. With CONSULT-II Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II. Lighting switch ON at 2nd position LOAD SIGNAL: ON Lighting switch OFF LOAD SIGNAL: OFF OK . INSPECTION END PBIB0103E PBIB0296E EC-4009 NG ELECTRICAL LOAD SIGNAL Diagnostic Procedure (Cont’d) TB48DE M/T j A . SEC022E CHECK OVERALL FUNCTION-I. Without CONSULT-II 1. Turn ignition switch ON. 2. Check voltage between ECM terminal j 96 and ground with tester. Rear window defogger ON Voltage: Battery voltage Rear window defogger OFF Voltage: 0V NG c Check rear window defogB .) ger circuit. (Go to j c Check lighting switch cirC .) cuit. (Go to j OK . SEC010E CHECK OVERALL FUNCTION-II. Without CONSULT-II Check voltage between ECM terminal j 97 and ground with tester. Lighting switch ON at 2nd position Voltage: Battery voltage Lighting switch OFF Voltage: 0V OK . INSPECTION END EC-4010 NG ELECTRICAL LOAD SIGNAL Diagnostic Procedure (Cont’d) TB48DE M/T j B . CHECK REAR WINDOW DEFOGGER FUNCTION.

1. Start engine. 2. Turn ON the rear window defogger switch. 3. Check the rear windshield. Is the rear windshield heated up?

No c Refer to EL section. Yes PBIB0302E . CHECK POWER SUPPLY CIRCUIT. 1.

Stop engine. 2. Disconnect rear window defogger relay. 3. Check voltage between rear window defogger relay terminal j 3 and ground with CONSULT-II or tester. Voltage: Battery voltage NG c OK . CHECK INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT.

1. Disconnect ECM harness connector. 2. Check harness continuity between rear window defogger relay terminal j 5 and ECM terminal j 96 . Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. NG c OK . CHECK REAR WINDOW DEFOGGER RELAY. Refer to EL section. OK . CHECK INTERMITTENT INCIDENT. Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-125 in Service Manual (Publication No. SM1EY61EG1). . INSPECTION END EC-4011 NG c Check the following. + 15A fuse + Harness for open or short between rear window defogger relay and battery If NG, repair open circuit or short to ground or short to power in harness or connectors. Check the following. + Harness connectors E127 , M21 + Harness connectors M50 , F5 + Harness for open or short between rear window defogger relay and ECM If NG, repair open circuit or short to ground or short to power in harness or connectors. Replace rear window defogger relay. ELECTRICAL LOAD SIGNAL Diagnostic Procedure (Cont’d) TB48DE M/T j C .

SEC011E CHECK POWER SUPPLY. 1. Turn ignition switch OFF. 2. Disconnect combination switch harness connector. 3. Check voltage between combination switch terminal j 5 and ground with CONSULT-II or tester. Voltage: Battery voltage NG c OK . SEC012E CHECK INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT. 1. Disconnect ECM harness connector. 2. Check harness continuity between combination switch terminals j 6 ,j 7 and ECM terminal j 97 .

Continuity should exist. 3. Also check harness for short to ground and short to power. NG c OK . CHECK COMBINATION SWITCH.

Refer to EL section. OK . SEC013E CHECK INTERMITTENT INCIDENT. Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-125 in Service Manual (Publication No. SM1EY61EG1). . INSPECTION END EC-4012 NG c Check the following. + 15A fuse + Harness for open or short between combination switch and battery If NG, repair open circuit or short to ground or short to power in harness or connectors.

Check the following. + Harness connectors E127 , M21 + Harness connectors M50 , F5 + Diode E108 + Harness for open or short between combination switch and ECM If NG, repair open circuit or short to ground or short to power in harness or connectors. Replace combination switch. ENGINE AND EMISSION CONTROL OVERALL SYSTEM TB48DE A/T Circuit Diagram TEC518M EC-4013 ENGINE AND EMISSION CONTROL OVERALL SYSTEM Circuit Diagram (Cont’d) TB48DE A/T TEC519M EC-4014 SNOW MODE SWITCH TB48DE A/T Wiring Diagram WITH SNOW MODE SWITCH TEC521M EC-4015 ELECTRICAL LOAD SIGNAL TB48DE A/T Wiring Diagram TEC522M EC-4016 ELECTRICAL LOAD SIGNAL Wiring Diagram (Cont’d) TB48DE A/T TEC523M EC-4017 ELECTRICAL LOAD SIGNAL TB48DE A/T Diagnostic Procedure 1 CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I With CONSULT-II 1. Turn ignition switch “ON”. 2. Connect CONSULT-II and select “DATA MONITOR” mode. 3. Select “LOAD SIGNAL” and check indication under the following conditions. PBIB0103E MTBL1594 OK or NG OK c GO TO 2. NG c GO TO 3. EC-4018 ELECTRICAL LOAD SIGNAL Diagnostic Procedure (Cont’d) 2 TB48DE A/T CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II With CONSULT-II Check “LOAD SIGNAL” indication under the following conditions. PBIB0103E MTBL1595 OK or NG OK c INSPECTION END NG c GO TO 7. 3 CHECK REAR WINDOW DEFOGGER FUNCTION 1. Start engine. 2. Turn “ON” the rear window defogger switch. 3. Check the rear windshield. Is the rear windshield heated up?

Yes or No Yes c GO TO 4. No c Check rear window defogger circuit. Refer to EL section. 4 CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT 1. 2. 3. 4. Stop engine. Disconnect rear window defogger relay. Disconnect combination meter harness connector. Check harness continuity between rear window defogger relay terminal 5 and combination meter terminal 27.

Refer to Wiring Diagram. Continuity should exist.

5. Also check harness for short to ground and short to power. OK or NG OK c GO TO 6. NG c GO TO 5. 5 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + Harness for open or short between rear window defogger relay and combination meter c Repair open circuit or short to ground or short to power in harness or connectors. EC-4019 ELECTRICAL LOAD SIGNAL Diagnostic Procedure (Cont’d) 6 TB48DE A/T CHECK COMBINATION METER Refer to EL section.

OK or NG OK c GO TO 11. NG c Replace combination meter. 7 CHECK HEADLAMP FUNCTION 1.

Start engine. 2.

Lighting switch “ON” at 2nd position. 3. Check that headlamp high beams are illuminated. OK or NG OK c GO TO 8. NG c Check headlamp circuit. Refer to EL section. 8 1. 2. 3. 4. CHECK HEADLAMP INPUT SIGNAL CIRCUIT Stop engine. Disconnect combination meter harness connector. Disconnect combination switch harness connector. Check harness continuity between combination switch terminals 6, 7 and combination meter terminal 26. SEC014E MTBL1596 5. Also check harness for short to ground and short to power. OK or NG OK c GO TO 10. NG c GO TO 9. 9 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + Diode E108 + Harness for open or short between combination switch and combination meter c Repair open circuit or short to ground or short to power. EC-4020 ELECTRICAL LOAD SIGNAL Diagnostic Procedure (Cont’d) 10 TB48DE A/T CHECK COMBINATION METER Refer to EL section. OK or NG OK c GO TO 11. NG c Replace combination meter. 11 CHECK INTERMITTENT INCIDENT Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-125 in Service Manual (Publication No. SM1E-Y61EG1). c INSPECTION END EC-4021 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Circuit Diagram TEC410M EC-4022 TROUBLE DIAGNOSIS TB48DE A/T (WITH EURO-OBD) Circuit Diagram (Cont’d) TEC520M EC-4023 SNOW MODE SWITCH TB48DE A/T (WITH EURO-OBD) Wiring Diagram TEC521M EC-4024 ELECTRICAL LOAD SIGNAL TB48DE A/T (WITH EURO-OBD) Wiring Diagram TEC522M EC-4025 ELECTRICAL LOAD TB48DE A/T (WITH EURO-OBD) SIGNAL Wiring Diagram (Cont’d) TEC523M EC-4026 ELECTRICAL LOAD SIGNAL TB48DE A/T (WITH EURO-OBD) Diagnostic Procedure 1 CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I With CONSULT-II With GST 1. Turn ignition switch “ON”. 2. Connect CONSULT-II or GST and select “DATA MONITOR” mode. 3. Select “LOAD SIGNAL” and check indication under the following conditions. PBIB0103E MTBL1594 OK or NG OK c GO TO 2.

NG c GO TO 3.

EC-4027 ELECTRICAL LOAD TB48DE A/T (WITH EURO-OBD) SIGNAL Diagnostic Procedure (Cont’d) 2 CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II With CONSULT-II Check “LOAD SIGNAL” indication under the following conditions. PBIB0103E MTBL1595 OK or NG OK c INSPECTION END NG c GO TO 7. 3 CHECK REAR WINDOW DEFOGGER FUNCTION 1. Start engine. 2. Turn “ON” the rear window defogger switch. 3. Check the rear windshield. Is the rear windshield heated up? Yes or No Yes c GO TO 4. No c Check rear window defogger circuit. Refer to EL section. 4 CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT 1. 2. 3. 4. Stop engine. Disconnect rear window defogger relay. Disconnect combination meter harness connector. Check harness continuity between rear window defogger relay terminal 5 and combination meter terminal 27. Refer to Wiring Diagram.

Continuity should exist. 5. Also check harness for short to ground and short to power.

OK or NG OK c GO TO 6. NG c GO TO 5. 5 DETECT MALFUNCTIONING PART Check the following.

+ Harness connectors E127, M21 + Harness for open or short between rear window defogger relay and combination meter c Repair open circuit or short to ground or short to power in harness or connectors. EC-4028 ELECTRICAL LOAD TB48DE A/T (WITH EURO-OBD) SIGNAL Diagnostic Procedure (Cont’d) 6 CHECK COMBINATION METER Refer to EL section. OK or NG OK c GO TO 11. NG c Replace combination meter. 7 CHECK HEADLAMP FUNCTION 1. Start engine. 2. Lighting switch “ON” at 2nd position. 3. Check that headlamp high beams are illuminated. OK or NG OK c GO TO 8. NG c Check headlamp circuit. Refer to EL section. 8 1. 2. 3. 4. CHECK HEADLAMP INPUT SIGNAL CIRCUIT Stop engine. Disconnect combination meter harness connector. Disconnect combination switch harness connector. Check harness continuity between combination switch terminals 6, 7 and combination meter terminal 26. SEC014E MTBL1596 5. Also check harness for short to ground and short to power. OK or NG OK c GO TO 10. NG c GO TO 9. 9 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E127, M21 + Diode E108 + Harness for open or short between combination switch and combination meter c Repair open circuit or short to ground or short to power. EC-4029 ELECTRICAL LOAD TB48DE A/T (WITH EURO-OBD) SIGNAL Diagnostic Procedure (Cont’d) 10 CHECK COMBINATION METER Refer to EL section. OK or NG OK c GO TO 11. NG c Replace combination meter. 11 CHECK INTERMITTENT INCIDENT Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-145 in Service Manual (Publication No. SM2E-Y61FG1). c INSPECTION END EC-4030 QUICK-GLOW SYSTEM TD42 Circuit Diagram EXCEPT FOR COLD AREAS TEC524M EC-4031 QUICK-GLOW SYSTEM Circuit Diagram (Cont’d) TD42 FOR COLD AREAS TEC525M EC-4032 QUICK-GLOW SYSTEM TD42 Wiring Diagram FOR COLD AREAS TEC535M EC-4033 QUICK-GLOW SYSTEM Wiring Diagram (Cont’d) TD42 TEC536M EC-4034 QUICK-GLOW SYSTEM Wiring Diagram (Cont’d) TD42 TEC537M EC-4035 FAST IDLE CONTROL CIRCUIT TD42 Wiring Diagram TEC526M EC-4036 ENGINE AND EMISSION CONTROL OVERALL SYSTEM ZD30DDTi Circuit Diagram TEC527M EC-4037 TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ZD30DDTi CONSULT-II Reference Value in Data Monitor Mode Remarks: + Specification data are reference values. + Specification data are output/input values which are detected or supplied by the ECM at the connector. * Specification data may not be directly related to their components signals/values/operations. MONITOR ITEM CONDITION CKPSzRPM (TDC) SPECIFICATION + Run engine and compare CONSULT-II value with the tachometer indication. Almost the same speed as the tachometer indication. COOLAN TEMP/S + Engine: After warming up More than 70°C (158°F) VHCL SPEED SE + Turn drive wheels and compare CONSULT-II value with the speedometer indication Almost the same speed as the speedometer indication FUEL TEMP SEN + Engine: After warming up More than 40°C (104°F) + Ignition switch: ON (Engine stopped) Accelerator pedal: fully released 0.40 - 0.60V ACCEL POS SEN Accelerator pedal: fully depressed Approx. 4.5V + Ignition switch: ON (Engine stopped) Accelerator pedal: fully depressed ON Except above OFF + Ignition switch: ON (Engine stopped) Accelerator pedal: fully released CLOSE Accelerator pedal: slightly open OPEN + Ignition switch: ON (Engine stopped) Accelerator pedal: fully released ON OFF ACCEL SW Accelerator pedal: slightly open OFF SPILL/V + Engine: After warming up Approx. 13°CA BATTERY VOLT + Ignition switch: ON (Engine stopped) 11 - 14V P/N POSI SW + Ignition switch: ON START SIGNAL + Ignition switch: ON → START → ON AIR COND SIG + Engine: After warming up, idle the engine CMPSzRPM-PUMP FULL ACCEL SW ACCEL SW (FC) BRAKE SW IGN SW WARM UP SW Shift lever: Park/Neutral ON Except above OFF OFF → ON → OFF Air conditioner switch: OFF OFF Air conditioner switch: ON (Compressor operates.) ON Brake pedal: depressed ON Brake pedal: released OFF + Ignition switch: ON → OFF ON → OFF Heat up switch: ON ON Heat up switch: OFF OFF + Ignition switch: ON + Ignition switch: ON (Engine stopped) Approx. 0.4V Idle MAS AIR/FL SE + + + + Engine: After warming up Air conditioner switch: OFF Shift lever: Neutral position No-load DECELER F/CUT + Engine: After warming up INJ TIMG C/V + Engine: After warming up, idle the engine. AIR COND RLY + Engine: After warming up, idle the engine. GLOW RLY 1.5 - 1.9V 1.5 - 1.9 to Approx. 4.0V (Check for Engine is revving from idle to about 4,000 liner voltage rise in response to rpm engine being increased to about 4,000 rpm.) Idle OFF Approx.

50 - 70% Air conditioner switch: OFF OFF Air conditioner switch: ON (Compressor operates.) ON + Refer to EC-252 in Service Manual (Publication No. SM9E-Y61CG3). + When cooling fan is stopped. OFF + When cooling fan operates. ON COOLING FAN EC-4038 ZD30DDTi TROUBLE DIAGNOSIS — GENERAL DESCRIPTION CONSULT-II Reference Value in Data Monitor Mode (Cont’d) MONITOR ITEM EGR VOL CON/V VNT S/V 1 CONDITION + + + + Engine: After warming up Air conditioner switch: “OFF” Shift lever: Neutral position No-load After 1 minute of idling More than 10 steps Revving engine from idle to 3,200 rpm 0 step + + + + Engine: After warming up Air conditioner switch: “OFF” Shift lever: Neutral position No-load Idle Approx.

56% 2,000 rpm Approx. 20% BARO SEN + Ignition switch: ON SWRL CON S/V 1 + Lift up the vehicle + Engine: After warming up let it idle for more than 1 second. + Air conditioner switch: “OFF” + No-load EXH/GAS REG V* SPECIFICATION + + + + Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm2, 14.59 psi) Approx. 1,000 m (3,281 ft): Approx.

88.95 kPa (0.8895 bar, 0.907 kg/cm2, 12.90 psi) Approx. 1,500 m (4,922 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm2, 12.06 psi) Approx. 2,000 m (6,562 ft): Approx.

78.36 kPa (0.7836 bar, 0.799 kg/cm2, 11.36 psi) Shift lever: Except “P” and “Neutral” positions ON Shift lever: Neutral position OFF Vehicle: Stopped Engine speed: Below 1,200 rpm Engine coolant temperature: Below 87°C (189°F) Heat up switch: ON Except above ON OFF *: This item is applicable for cold area models. On other models, “OFF” is always displayed. EC-4039 TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ZD30DDTi ECM Terminals and Reference Value ECM INSPECTION TABLE Remarks: Specification data are reference values and are measured between each terminal and ground. CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM’s transistor. Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION Engine is running. 2 R/W Intake air control valve control solenoid valve DATA (DC Voltage and Pulse Signal) BATTERY VOLTAGE (11 - 14V) Ignition switch “OFF” For a few seconds after turning ignition switch “OFF” Approximately 0.1V Ignition switch “ON” Ignition switch “OFF” 4 B/Y ECM relay (Self-shutoff) Approximately 0.25V For a few seconds after turning ignition switch “OFF” Ignition switch “OFF” A few seconds passed after turning ignition switch “OFF” BATTERY VOLTAGE (11 - 14V) Approximately 5.7V Engine is running. Warm-up condition Idle speed SEF255Z 5 Y/B Tachometer Approximately 6V Engine is running. Warm-up condition Engine speed is 2,000 rpm SEF256Z EC-4040 ZD30DDTi TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ECM Terminals and Reference Value (Cont’d) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage and Pulse Signal) Engine is running. 11 BR/Y Exhaust gas control valve control solenoid valve Engine speed is below 1,200 rpm Engine coolant temperature is below 87°C (189°F) Stop the vehicle Heat up switch is “ON” Engine is running. Except the above condition Engine is running. Cooling fan is not operating 14 L Approximately 0.1V BATTERY VOLTAGE (11 - 14V) BATTERY VOLTAGE (11 - 14V) Cooling fan relay Engine is running.

Approximately 0.1V Cooling fan is operating Engine is running. Air conditioner switch is “OFF” 15 Y/L Air conditioner relay BATTERY VOLTAGE (11 - 14V) Engine is running. Both air conditioner switch and blower fan switch are “ON” (Compressor is operating) Approximately 0.1V Ignition switch “ON” Approximately 1V Glow lamp is “ON” 16 L/W Glow lamp Ignition switch “ON” Glow lamp is “OFF” BATTERY VOLTAGE (11 - 14V) Ignition switch “ON” Approximately 0V Brake pedal fully released 17 G/Y Stop lamp switch Ignition switch “ON” Brake pedal depressed 18 G Malfunction indicator lamp Ignition switch “ON” Approximately 1V Engine is running. BATTERY VOLTAGE (11 - 14V) Idle speed 19 20 LG/R R/W Engine coolant temperature sensor BATTERY VOLTAGE (11 - 14V) Engine is running.

Approximately 0 - 4.8V Output voltage varies with engine coolant temperature Ignition switch “ON” Approximately 0V Ignition switch “START” BATTERY VOLTAGE (11 - 14V) Start signal EC-4041 ZD30DDTi TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ECM Terminals and Reference Value (Cont’d) TERMINAL NO. WIRE COLOR ITEM CONDITION Engine is running. Air conditioner switch is “OFF” 21 LG/B Air conditioner switch DATA (DC Voltage and Pulse Signal) BATTERY VOLTAGE (11 - 14V) Engine is running. Both air conditioner switch and blower fan switch are “ON” (Compressor is operating) Approximately 0.1V Ignition switch “ON” 22 P/B Park/Neutral position switch Gear position is “Neutral” (M/T models) Gear position is “P” or “N” (A/T models) Ignition switch “ON” Except the above gear position Approximately 0V BATTERY VOLTAGE (11 - 14V) Ignition switch “ON” 0.4 - 0.6V 23 W Accelerator position sensor Accelerator pedal fully released Ignition switch “ON” Approximately 4.5V Accelerator pedal fully depressed Voltage goes high up once in a few seconds Engine is running. 24 PU/W A/T signal No. 1 Warm-up condition Idle speed SEF448Z 0 - Approximately 4.8V Engine is running. Lift up the vehicle In 1st gear position Vehicle speed is 10 km/h (6 MPH) SEF257Z 26 L/OR Vehicle speed sensor Approximately 2.2V Engine is running. Lift up the vehicle In 2nd gear position Vehicle speed is 30 km/h (19 MPH) SEF258Z EC-4042 ZD30DDTi TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ECM Terminals and Reference Value (Cont’d) TERMINAL NO. WIRE COLOR ITEM CONDITION Ignition switch “ON” Accelerator pedal fully released 29 R/L DATA (DC Voltage and Pulse Signal) BATTERY VOLTAGE (11 - 14V) Accelerator switch (F/C) Ignition switch “ON” Approximately 0V Accelerator pedal depressed Engine is running. Warm-up condition Idle speed 30 P Approximately 0V A/T signal No. 3 Engine is running. Warm-up condition Engine speed is 2,000 rpm Ignition switch “ON” 31 R/L Accelerator position switch (Idle) Accelerator pedal fully released Approximately 7.7V BATTERY VOLTAGE (11 - 14V) Ignition switch “ON” Approximately 0V Accelerator pedal depressed Ignition switch “ON” Approximately 0V 32 W/G Accelerator position switch (Full) Accelerator pedal released Ignition switch “ON” Accelerator pedal fully depressed BATTERY VOLTAGE (11 - 14V) Engine is running. 33 G/Y Electronic control fuel injection pump Warm-up condition Idle speed Ignition switch “ON” Approximately 2.5V Approximately 0.4V Engine is running. Warm-up condition Idle speed 35 R 1.5 - 1.9V Mass air flow sensor Engine is running. Warm-up condition Engine is revving from idle to about 4,000 rpm 1.5 - 1.9 to Approximately 4.0V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm.) Voltage goes high up once in a few seconds Engine is running. 37 P/B A/T signal No. 2 Warm-up condition Idle speed SEF448Z EC-4043 ZD30DDTi TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ECM Terminals and Reference Value (Cont’d) TERMINAL NO. 38 39 43 WIRE COLOR B/Y ITEM CONDITION DATA (DC Voltage and Pulse Signal) Ignition switch “OFF” 0V Ignition switch “ON” BATTERY VOLTAGE (11 - 14V) Ignition switch Engine is running. B B ECM ground 40 R/B Electronic control fuel injection pump 42 L/G 64 Y/G 65 Y/R Approximately 0V Idle speed Engine is running. Warm-up condition Idle speed Engine is running. Data link connector Idle speed (CONSULT-II is connected and turned on) Approximately 2.5V Approximately 0V Less than 9V Approximately 0V Engine is running. Warm-up condition Idle speed 44 L SEF333Y Crankshaft position sensor (TDC) Approximately 0V Engine is running. Warm-up condition Engine speed is 2,000 rpm SEF334Y Engine is running. L Charge air pressure sensor 47 B/W Crankshaft position sensor (TDC) ground 48 G/R Accelerator position sensor power supply Ignition switch “ON” Approximately 5V 49 W Sensor power supply Ignition switch “ON” Approximately 5V 46 Warm-up condition Idle speed Approximately 2.0V Engine is running. Warm-up condition Idle speed Approximately 0V Engine is running. 50 B Sensor ground Warm-up condition Idle speed EC-4044 Approximately 0V ZD30DDTi TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ECM Terminals and Reference Value (Cont’d) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage and Pulse Signal) Engine is running. 51 L/W Accelerator position sensor ground L/B Electronic control fuel injection pump Engine is running. 52 Electronic control fuel injection pump Engine is running. 53 L/R Warm-up condition Idle speed Approximately 0V Approximately 0.1V Idle speed Approximately 1.0V Idle speed Engine is running. 54 L/B Swirl control valve control solenoid valve Warm-up condition At idle speed for more than 1 second Lift up the vehicle Gear position is in positions other than “P” and “Neutral” Approximately 0.1V Engine is running. Idle speed Lift up the vehicle Gear position is in “P” or “Neutral” 56 61 116 W W W Power supply for ECM Ignition switch “ON” BATTERY VOLTAGE (11 - 14V) BATTERY VOLTAGE (11 - 14V) Voltage goes high up once in a few seconds Engine is running. 58 L/OR A/T signal No. 4 Warm-up condition Idle speed SEF448Z Ignition switch “ON” Approximately 0V Heat up switch is “ON” 59 BR/W Heat up switch Ignition switch “ON” Heat up switch is “OFF” BATTERY VOLTAGE (11 - 14V) Ignition switch “ON” 0.4 - 0.6V 68 B/W Accelerator position sensor signal output Accelerator pedal fully released Ignition switch “ON” Approximately 4.5V Accelerator pedal fully depressed EC-4045 ZD30DDTi TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ECM Terminals and Reference Value (Cont’d) TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage and Pulse Signal) Approximately 6.8V Engine is running. Warm-up condition Idle speed 101 R/B Variable nozzle turbocharger control solenoid valve SEF253Z Approximately 11V Engine is running. Warm-up condition Engine speed is 2,000 rpm SEF254Z Engine is running. 102 G/R Current return Idle speed 103 105 109 115 L/Y L/W L R/L EGR volume control valve 106 112 118 B B B ECM ground 111 LG/B Glow relay BATTERY VOLTAGE (11 - 14V) Engine is running. Warm-up condition Idle speed 0.1 - 14V Engine is running. Approximately 0V Idle speed Refer to “GLOW CONTROL SYSTEM”, EC-252 in Service Manual (Publication No. SM9E-Y61CG3). EC-4046 ZD30DDTi DTC 0102 MASS AIR FLOW SEN Component Description The mass air flow (MAF) sensor is placed in the stream of intake air. It measures the intake air flow rate by measuring a part of the entire intake air flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss. Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change. PBIB1604E CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values. MONITOR ITEM CONDITION SPECIFICATION + Ignition switch: ON (Engine stopped) + + + + MAS AIR/FL SE Engine: After warming up Air conditioner switch: “OFF” Shift lever: Neutral position No-load Approx. 0.4V Idle 1.5 - 1.9V Engine is revving from idle to about 4,000 rpm 1.5 - 1.9 to Approx. 4.0V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm.) ECM Terminals and Reference Value Specification data are reference values, and are measured between each terminal and ground.

CAUTION: Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM’s transistor.

Use a ground other than ECM terminals, such as the ground. TERMINAL NO. WIRE COLOR ITEM CONDITION DATA (DC Voltage) Ignition switch “ON” Approximately 0.4V Engine is running. 1.5 - 1.9V Warm-up condition Idle speed 35 R Mass air flow sensor Engine is running. Warm-up condition Engine is revving from idle to about 4,000 rpm 1.5 - 1.9 to Approximately 4.0V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm.) Engine is running. 50 B Sensor ground Approximately 0V Warm-up condition Idle speed On Board Diagnosis Logic Malfunction is detected when ... Check Items (Possible Cause) + An excessively high or low voltage from the sensor is sent to ECM. + Harness or connectors (The sensor circuit is open or shorted.) + Mass air flow sensor EC-4047 DTC 0102 MASS AIR FLOW SEN ZD30DDTi DTC Confirmation Procedure WITH CONSULT-II 1) 2) 3) 4) Turn ignition switch “ON”, and wait at least 6 seconds. Select “DATA MONITOR” mode with CONSULT-II. Start engine and wait at least 3 seconds. If DTC is detected, go to “Diagnostic Procedure”, EC-4050. WITHOUT CONSULT-II SEF817Y 1) Turn ignition switch “ON”, and wait at least 6 seconds. 2) Start engine and wait at least 3 seconds. 3) Turn ignition switch “OFF”, wait at least 5 seconds and then turn “ON”. 4) Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM. 5) If DTC is detected, go to “Diagnostic Procedure”, EC-4050. EC-4048 DTC 0102 MASS AIR FLOW SEN ZD30DDTi Wiring Diagram TEC528M EC-4049 DTC 0102 MASS AIR FLOW SEN ZD30DDTi Diagnostic Procedure 1 CHECK MAF SENSOR POWER SUPPLY CIRCUIT 1.

Turn ignition switch “OFF”. 2. Disconnect mass air flow sensor harness connector.

SEF226Z 3. Turn ignition switch “ON”. 4. Check voltage between mass air flow sensor terminal 2 and ground with CONSULT-II or tester.

SEC015E OK or NG OK c GO TO 3. NG c GO TO 2. 2 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E230, F12 + Harness connectors M50, F5 + Harness for open or short between mass air flow sensor and ECM + Harness for open or short between mass air flow sensor and ECM relay c Repair open circuit or short to ground or short to power in harness or connector. EC-4050 DTC 0102 MASS AIR FLOW SEN Diagnostic Procedure (Cont’d) 3 ZD30DDTi CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch “OFF”.

2. Loosen and retighten engine ground screws. SEF227Z 3. Disconnect ECM harness connector. 4. Disconnect TCM harness connector. 5. Check harness continuity between mass air flow sensor terminal 3 and ECM terminal 50, TCM terminal 42. Refer to Wiring Diagram. Continuity should exist. 6. Also check harness for short to ground and short to power. OK or NG OK c GO TO 5. NG c GO TO 4. 4 DETECT MALFUNCTIONING PART Check the following.

+ Harness connectors E230, F12 + Harness connectors M51, F6 + Harness connectors E106, M88 + Harness for open or short between mass air flow sensor and ECM + Harness for open or short between mass air flow sensor and TCM (Transmission control module) c Repair open circuit or short to ground or short to power in harness or connectors. 5 CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Check harness continuity between mass air flow sensor terminal 4 and ECM terminal 35. Refer to Wiring Diagram. Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK c GO TO 7. NG c GO TO 6. 6 DETECT MALFUNCTIONING PART Check the following. + Harness connectors E230, F12 + Harness for open or short between mass air flow sensor and ECM c Repair open circuit or short to ground or short to power in harness or connectors. EC-4051 DTC 0102 MASS AIR FLOW SEN Diagnostic Procedure (Cont’d) 7 ZD30DDTi CHECK SHIELD CIRCUIT 1. Disconnect harness connectors E230, F12. 2. Check harness continuity between harness connector F12 terminal 5 and ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power. OK or NG OK c GO TO 9. NG c GO TO 8. 8 DETECT MALFUNCTIONING PART Check the following. + Joint connector-4 + Harness for open or short between harness connector F12 and ground c Repair open circuit or short to power in harness or connectors. 9 CHECK MASS AIR FLOW SENSOR 1. Reconnect harness connectors disconnected. 2. Start engine and warm it up to normal operating temperature. 3. Check voltage between ECM terminal 35 (Mass air flow sensor signal) and ground. SEF400YA 4. If the voltage is out of specification, proceed the following. a.

Check for the cause of uneven air flow through mass air flow sensor.

Refer to the following. + Crushed air ducts + Malfunctioning seal of air cleaner element + Uneven dirt of air cleaner element + Improper specification of intake air system parts b. If NG, repair or replace malfunctioning part and perform steps 2 to 4 again. 5. Turn ignition switch “OFF”. 6. Disconnect MAFS harness connector and connect it again. 7. Perform steps 2 and 3 again. OK or NG OK c GO TO 10. NG c Replace mass air flow sensor.

10 CHECK INTERMITTENT INCIDENT Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-107 in Service Manual (Publication No. SM9E-Y61CG3). c INSPECTION END EC-4052 DTC 0104 VEHICLE SPEED SEN ZD30DDTi Wiring Diagram TEC538M EC-4053 HEAT UP SWITCH ZD30DDTi Wiring Diagram TEC529M EC-4054 HEAT UP SWITCH ZD30DDTi Diagnostic Procedure 1 INSPECTION START Do you have CONSULT-II? Yes or No Yes c GO TO 2. No c GO TO 3. 2 CHECK OVERALL FUNCTION With CONSULT-II 1. Turn ignition switch “ON”. 2.

Check “WARM UP SW” in “DATA MONITOR” mode with CONSULT-II under the following conditions. SEF302Z OK or NG OK c INSPECTION END NG c GO TO 4. 3 CHECK OVERALL FUNCTION Without CONSULT-II 1. Turn ignition switch “ON”.

2. Check voltage between ECM terminal 59 and ground under the following conditions. SEF303Z OK or NG OK c INSPECTION END NG c GO TO 4. EC-4055 HEAT UP SWITCH Diagnostic Procedure (Cont’d) 4 1. 2. 3.

4. 5. ZD30DDTi CHECK HEAT UP SWITCH POWER SUPPLY CIRCUIT Turn heat up switch “OFF”. Turn ignition switch “OFF”. Disconnect heat up switch harness connector. Turn ignition switch “ON”. Check voltage between heat up switch terminal 1 and ground with CONSULT-II or tester. SEC016E OK or NG OK c GO TO 6. NG c GO TO 5. 5 DETECT MALFUNCTIONING PART Check the following. + Fuse block (J/B) connector M3 + 10A fuse + Harness for open or short between heat up switch and fuse c Repair open circuit or short to ground or short to power in harness or connectors. 6 CHECK HEAT UP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT 1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector.

3. Check harness continuity between ECM terminal 59 and heat up switch terminals 3, 5.

Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. OK or NG OK c GO TO 8. NG c GO TO 7. 7 DETECT MALFUNCTIONING PART Check the following. + Harness connectors M51, F6 + Harness for open or short between heat up switch and ECM c Repair open circuit or short to ground or short to power in harness or connectors. EC-4056 HEAT UP SWITCH Diagnostic Procedure (Cont’d) 8 ZD30DDTi CHECK HEAT UP SWITCH INDICATOR LAMP GROUND CIRCUIT FOR OPEN OR SHORT 1. Check harness continuity between heat up switch terminal 6 and ground. Refer to Wiring Diagram.

Continuity should exist. 2. Also check harness for short to power.

OK or NG OK c GO TO 9. NG c Repair open circuit or short to power in harness or connectors. 9 CHECK HEAT UP SWITCH INDICATOR LAMP Check harness continuity between heat up switch terminals 5 and 6 under the following conditions. SEC018E OK or NG OK c GO TO 10. NG c Replace heat up switch. 10 CHECK HEAT UP SWITCH Check continuity between heat up switch terminals 1 and 3 under the following conditions. SEC017E OK or NG OK c GO TO 11. NG c Replace heat up switch. 11 CHECK INTERMITTENT INCIDENT Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-107 in Service Manual (Publication No. SM9E-Y61CG3). c INSPECTION END EC-4057 AIR CONDITIONER CONTROL ZD30DDTi Wiring Diagram TEC530M EC-4058 ENGINE AND EMISSION CONTROL OVERALL SYSTEM TD42Ti Circuit Diagram TEC539M EC-4059 TROUBLE DIAGNOSES FOR NON-DETECTABLE ITEMS TD42Ti Vehicle Speed Sensor (VSS) TEC540M EC-4060 ELECTRICAL SYSTEM SECTION EL When you read wiring diagrams: + Read GI section, “HOW TO READ WIRING DIAGRAMS”. When you perform trouble diagnoses, read GI section, “HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES” and “HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT”. + Check for any service bulletins before servicing the vehicle.

MODIFICATION NOTICE: + Wiring Diagrams have been changed.

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Never touch the glass envelope. + Do not leave headlamp reflector without bulb for a long period of time.

Dust, moisture, smoke, etc. entering headlamp body may affect the performance of the headlamp. Remove headlamp bulb from the headlamp reflector just before a replacement bulb is installed. 1. Disconnect negative battery cable. 2. Remove side combination lamp and radiator grille. 3. Disconnect headlamp connector. 4. Remove headlamp assembly. WARNING: Never service a xenon headlamp with wet hands.

XENON BULB (HIGH AND LOW BEAM) 1. Remove headlamp seal cover by turning it counterclockwise. 2. Turn bulb socket counterclockwise with keep pushing, then remove it. CEL586M SEL442V 3. Release retaining pin. 4. Remove the xenon bulb. 5. Install in the reverse order of removal. CAUTION: + When disposing of the xenon bulb, do not break it; always dispose of it as is. + Make sure to install the bulb securely; if the xenon bulb is improperly installed in its socket, high-tension current leaks occur. This may lead to a melted bulb and/or bulb socket. 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TEL004N EL-4073 TURN SIGNAL AND HAZARD WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — TURN —/Type B (Cont’d) TEL005N EL-4074 TURN SIGNAL AND HAZARD WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — TURN —/Type C FOR EUROPE Rear combination lamps are located on rear bumper. TEL006N EL-4075 TURN SIGNAL AND HAZARD WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — TURN —/Type C (Cont’d) TEL007N EL-4076 TURN SIGNAL AND HAZARD WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — TURN —/Type D FOR AUSTRALIA AND SOUTH AFRICA Rear combination lamps are located on rear bumper. TEL008N EL-4077 TURN SIGNAL AND HAZARD WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — TURN —/Type D (Cont’d) TEL009N EL-4078 ILLUMINATION/WAGON AND HARDTOP MODELS Schematic TEL010N EL-4079 ILLUMINATION/WAGON AND HARDTOP MODELS Wiring Diagram — ILL — TEL011N EL-4080 ILLUMINATION/WAGON AND HARDTOP MODELS Wiring Diagram — ILL — (Cont’d) TEL012N EL-4081 ILLUMINATION/WAGON AND HARDTOP MODELS Wiring Diagram — ILL — (Cont’d) TEL013N EL-4082 ILLUMINATION/WAGON AND HARDTOP MODELS Wiring Diagram — ILL — (Cont’d) TEL014N EL-4083 ILLUMINATION/WAGON AND HARDTOP MODELS Wiring Diagram — ILL — (Cont’d) TEL015N EL-4084 ILLUMINATION/WAGON AND HARDTOP MODELS Wiring Diagram — ILL — (Cont’d) TEL016N EL-4085 ILLUMINATION/WAGON AND HARDTOP MODELS Wiring Diagram — ILL — (Cont’d) TEL017N EL-4086 ILLUMINATION/WAGON AND HARDTOP MODELS Wiring Diagram — ILL — (Cont’d) TEL018N EL-4087 INTERIOR ROOM LAMP/WAGON AND HARDTOP MODELS — With Timer — Schematic/LHD Models Except for China TEL411M EL-4088 INTERIOR ROOM LAMP/WAGON AND HARDTOP MODELS — With Timer — Wiring Diagram — ROOM/L —/LHD Models Except for China TEL412M EL-4089 INTERIOR ROOM LAMP/WAGON AND HARDTOP MODELS — With Timer — Wiring Diagram — ROOM/L —/LHD Models Except for China (Cont’d) TEL413M EL-4090 INTERIOR ROOM LAMP/WAGON AND HARDTOP MODELS — With Timer — Wiring Diagram — ROOM/L —/LHD Models Except for China (Cont’d) TEL674M EL-4091 INTERIOR ROOM LAMP/WAGON AND HARDTOP MODELS — With Timer — Wiring Diagram — ROOM/L —/RHD Models for Europe TEL019N EL-4092 INTERIOR ROOM LAMP/WAGON AND HARDTOP MODELS — With Timer — Wiring Diagram — ROOM/L —/RHD Models for Europe (Cont’d) TEL020N EL-4093 INTERIOR ROOM LAMP/WAGON AND HARDTOP MODELS — Without Timer — Wiring Diagram — ROOM/L —/RHD Models TEL021N EL-4094 METER AND GAUGES/WAGON AND HARDTOP MODELS Combination Meter CEL587M EL-4095 METER AND GAUGES/WAGON AND HARDTOP MODELS Schematic TEL022N EL-4096 METER AND GAUGES/WAGON AND HARDTOP MODELS Wiring Diagram — METER — TEL023N EL-4097 METER AND GAUGES/WAGON AND HARDTOP MODELS Wiring Diagram — METER — (Cont’d) TEL024N EL-4098 COMPASS AND THERMOMETER/WAGON AND HARDTOP MODELS Wiring Diagram — COMPAS — TEL144N EL-4099 WARNING LAMPS/WAGON AND HARDTOP MODELS Schematic TEL899M EL-4100 WARNING LAMPS/WAGON AND HARDTOP MODELS Schematic (Cont’d) TEL143N EL-4101 WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — WARN — TEL901M EL-4102 WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — WARN — (Cont’d) TEL902M EL-4103 WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — WARN — (Cont’d) TEL903M EL-4104 WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — WARN — (Cont’d) TEL904M EL-4105 WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — WARN — (Cont’d) TEL905M EL-4106 WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — WARN — (Cont’d) TEL906M EL-4107 WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — WARN — (Cont’d) TEL025N EL-4108 WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — WARN — (Cont’d) TEL908M EL-4109 WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — WARN — (Cont’d) TEL909M EL-4110 WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — WARN — (Cont’d) LHD MODELS TEL910M EL-4111 WARNING LAMPS/WAGON AND HARDTOP MODELS Wiring Diagram — WARN — (Cont’d) RHD MODELS TEL026N EL-4112 WARNING CHIME/WAGON AND HARDTOP MODELS Wiring Diagram — CHIME —/Except for Europe and with Theft Warning System Models TEL027N EL-4113 WARNING CHIME/WAGON AND

HARDTOP MODELS Wiring Diagram — CHIME —/LHD Models for Europe TEL028N EL-4114 WARNING CHIME/WAGON AND HARDTOP MODELS Wiring Diagram — CHIME —/RHD Models for Europe TEL029N EL-4115 WARNING CHIME/WAGON AND HARDTOP MODELS Wiring Diagram — CHIME —/With Theft Warning System Models TEL030N EL-4116 FRONT WIPER AND WASHER/WAGON AND HARDTOP MODELS Wiring Diagram — WIPER — TEL031N EL-4117 REAR WIPER AND WASHER/WAGON AND HARDTOP MODELS Wiring Diagram — WIP/R — LHD MODELS TEL032N EL-4118 REAR WIPER AND WASHER/WAGON AND HARDTOP MODELS Wiring Diagram — WIP/R — (Cont’d) LHD MODELS TEL033N EL-4119 REAR WIPER AND WASHER/WAGON AND HARDTOP MODELS Wiring Diagram — WIP/R — (Cont’d) RHD MODELS TEL034N EL-4120 REAR WIPER AND WASHER/WAGON AND HARDTOP MODELS Wiring Diagram — WIP/R — (Cont’d) RHD MODELS TEL035N EL-4121 HEADLAMP WASHER/WAGON AND HARDTOP MODELS Wiring Diagram — HLC — TEL036N EL-4122 HEADLAMP WASHER/WAGON AND HARDTOP MODELS Wiring Diagram — HLC — (Cont’d) TEL037N EL-4123 HORN/WAGON AND HARDTOP MODELS Wiring Diagram — HORN — TEL038N EL-4124 WIPER DEICER/WAGON AND HARDTOP MODELS Wiring Diagram — DEICER — TEL039N EL-4125 REAR WINDOW DEFOGGER/WAGON AND HARDTOP MODELS Wiring Diagram — DEF —/LHD Models Without Theft Warning System TEL040N EL-4126 REAR WINDOW DEFOGGER/WAGON AND HARDTOP MODELS Wiring Diagram — DEF —/LHD Models Without Theft Warning System (Cont’d) TEL041N EL-4127 REAR WINDOW DEFOGGER/WAGON AND HARDTOP MODELS Wiring Diagram — DEF —/RHD Models Except for Europe and With Theft Warning System TEL042N EL-4128 REAR WINDOW DEFOGGER/WAGON AND HARDTOP MODELS Wiring Diagram — DEF —/RHD Models Except for Europe and With Theft Warning System (Cont’d) TEL043N EL-4129 REAR WINDOW DEFOGGER/WAGON AND HARDTOP MODELS Wiring Diagram — DEF —/LHD Models With Theft Warning System TEL044N EL-4130 REAR WINDOW DEFOGGER/WAGON AND HARDTOP MODELS Wiring Diagram — DEF —/LHD Models With Theft Warning System (Cont’d) TEL045N EL-4131 REAR WINDOW DEFOGGER/WAGON AND HARDTOP MODELS Wiring Diagram — DEF —/RHD Models for Europe TEL046N EL-4132 REAR WINDOW DEFOGGER/WAGON AND HARDTOP MODELS Wiring Diagram — DEF —/RHD Models for Europe (Cont’d) TEL047N EL-4133 REAR WINDOW DEFOGGER/WAGON AND HARDTOP MODELS Wiring Diagram — DEF —/RHD Models With Theft Warning System TEL140N EL-4134 REAR WINDOW DEFOGGER/WAGON AND HARDTOP MODELS Wiring Diagram — DEF —/RHD Models With Theft Warning System (Cont’d) TEL141N EL-4135 AUDIO/WAGON AND HARDTOP MODELS Schematic/LHD Models with Sub-harness TEL048N EL-4136 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — AUDIO —/LHD Models with Sub-harness TEL049N EL-4137 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — AUDIO —/LHD Models with Sub-harness (Cont’d) TEL050N EL-4138 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — AUDIO —/LHD Models with Sub-harness (Cont’d) TEL051N EL-4139 AUDIO/WAGON AND HARDTOP MODELS Schematic/RHD Models with Sub-harness TEL053N EL-4140 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — AUDIO —/RHD Models with Sub-harness TEL054N EL-4141 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — AUDIO —/RHD Models with Sub-harness (Cont’d) TEL055N EL-4142 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — AUDIO —/RHD Models with Sub-harness (Cont’d) TEL056N EL-4143 AUDIO/WAGON AND HARDTOP MODELS Schematic/LHD Models without Sub-harness TEL057N EL-4144 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — AUDIO —/LHD Models without Sub-harness TEL058N EL-4145 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — AUDIO —/LHD Models without Sub-harness (Cont’d) TEL059N EL-4146 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — AUDIO —/LHD Models without Sub-harness (Cont’d) TEL060N EL-4147 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — AUDIO —/LHD Models without Sub-harness (Cont’d) TEL061N EL-4148 AUDIO/WAGON AND HARDTOP MODELS Schematic/RHD Models without Sub-harness TEL062N EL-4149 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — AUDIO —/RHD Models without Sub-harness TEL063N EL-4150 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — AUDIO —/RHD Models without Sub-harness (Cont’d) TEL064N EL-4151 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — AUDIO —/RHD Models without Sub-harness (Cont’d) TEL065N EL-4152 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — AUDIO —/RHD Models without Sub-harness (Cont’d) TEL066N EL-4153 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — CD AUTO CHANGER — WITH 1-DIN TYPE CD AUTO CHANGER TEL067N EL-4154 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — REMOTE — WITH SUB-HARNESS AND ASCD TEL068N EL-4155 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — REMOTE — (Cont’d) WITH SUB-HARNESS WITHOUT ASCD TEL069N EL-4156 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — REMOTE — (Cont’d) WITHOUT SUB-HARNESS WITH ASCD TEL070N EL-4157 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — REMOTE — (Cont’d) WITHOUT SUB-HARNESS AND ASCD TEL071N EL-4158 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — P/ANT —/LHD Models TEL072N EL-4159 AUDIO/WAGON AND HARDTOP MODELS Wiring Diagram — P/ANT —/RHD Models TEL073N EL-4160 TELEPHONE (PRE WIRE) Wiring Diagram — PHONE — TEL139N EL-4161 NAVIGATION SYSTEM System Description OUTLINE SKIA0370E The navigation system periodically calculates the vehicle’s current position according to the following three signals: Travel distance of the vehicle as determined by the vehicle speed sensor, turning angle of the vehicle as determined by the gyroscope (angular velocity sensor), and the direction of vehicle travel as determined by the GPS antenna (GPS information). The current position of the vehicle is then identified by comparing the calculated vehicle position with map data read from the map DVD-ROM, which is stored in the DVD-ROM drive (map-matching), and indicated on the screen with a current location mark. By comparing the vehicle position detection results found by the GPS and by map-matching, more accurate vehicle position data can be used. The current vehicle position will be calculated by detecting the distance the vehicle moved from the previous calculation point and its direction.

SEL684V TRAVEL DISTANCE Travel distance calculations are based on the vehicle speed sensor input signal. Therefore, the calculation may become incorrect as the tires wear down. To prevent this, an automatic distance fine adjustment function has been adopted. TRAVEL DIRECTION Change in the travel direction of the vehicle is calculated by a gyroscope (angular velocity sensor) and a GPS antenna (GPS information). As the gyroscope and GPS antenna have both merit and demerit, input signals from them are prioritized in each situation. However, this order of priority may change in accordance with more detailed travel conditions so that the travel direction is detected more accurately.

Type Advantage Disadvantage Gyroscope (angular velocity sensor) + Can detect the vehicle’s turning angle quite accurately. + Direction errors may accumulate when the vehicle is driven for long distances without stopping.

GPS antenna (GPS information) + Can detect the vehicle’s travel direction (North/South/East/West). + Correct direction cannot be detected when the vehicle speed is low. EL-4162 NAVIGATION SYSTEM System Description (Cont’d) MAP-MATCHING SEL685V Map-matching is a function that repositions the vehicle on the road map when a new location is judged to be the most accurate. This is done by comparing the current vehicle position, calculated by the method described in the position detection principle, with the road map data around the vehicle, read from the map DVD-ROM stored in the DVD-ROM drive. Therefore, the vehicle position may not be corrected after the vehicle is driven over a certain distance or time in which GPS information is hard to receive. In this case, the current location mark on the display must be corrected manually. NOTE: The road map data is based on data stored in the map DVD-ROM. + In map-matching, alternative routes to reach the destination will be shown and prioritized, after the road on which the vehicle is currently driven has been judged and the current location mark has been repositioned. If there is an error in distance and/or direction, the alternative routes will be shown in different order of priority, and the wrong road can be avoided. If two roads are running in parallel, they are of the same priority. Therefore, the current location mark may appear on either of them alternately, depending on maneuvering of the steering wheel and configuration of the road. + Map-matching does not function correctly when the road on which the vehicle is driving is new and not recorded in the map DVD-ROM, or when the road pattern stored in the map data and the actual road pattern are different due to repair. When driving on a road not present in the map, the map-matching function may find another road and position the current location mark on it. Then, when the correct road is detected, the current location mark may leap to it. Effective range for comparing the vehicle position and travel direction calculated by the distance and direction with the road data read from the map DVD-ROM is limited. Therefore, when there is an excessive gap between the current vehicle position and the position on the map, correction by map-matching is not possible. SEL686V + SKIA0613E EL-4163 NAVIGATION SYSTEM System Description (Cont’d) GPS (GLOBAL POSITIONING SYSTEM) SEL526V GPS (Global Positioning System) has been developed and controlled by the US Department of Defense. The system utilizes GPS satellite (NAVSTAR), sending out radio waves while flying on an orbit around the earth at the height of approx. 21,000 km (13,000 miles). The GPS receiver calculates the vehicle’s position in three dimensions (latitude/longitude/altitude) according to the time lag of the radio waves received from four or more GPS satellites (three-dimensional positioning). If radio waves were received only from three GPS satellites, the GPS receiver calculates the vehicle’s position in two dimensions (latitude/longitude), utilizing the altitude data calculated previously by using radio waves from four or more GPS satellites (two-dimensional positioning). Accuracy of the GPS will deteriorate under the following conditions. + In two-dimensional positioning, the GPS accuracy will deteriorate when the altitude of the vehicle position changes. + There may be an error of approximately 10 m (30 ft.) in position detected by three-dimensional positioning, which is more accurate than two-dimensional positioning. The accuracy can be even lower depending on the arrangement of the GPS satellites utilized for the positioning. + Position detection is not possible when the vehicle is in an area where radio waves from the GPS satellite do not reach, such as in a tunnel, parking lot in a building, and under an elevated highway. Radio waves from the GPS satellites may not be received when some object is located over the GPS antenna. + Position correction by GPS is not available while the vehicle is stopped. COMPONENT DESCRIPTION NAVI control unit + + The gyro (angular speed sensor) and the DVD-ROM drive are built-in units that control the navigation functions. Signals are received from the gyro, the vehicle speed sensor, and the GPS antenna. Vehicle location is determined by combining this data with the data contained in the DVD-ROM map. Locational information is shown on liquid crystal display panel. PKIA0248E DVD-ROM drive Maps, traffic control regulations, and other pertinent information can be easily read from the DVD-ROM disc. Map DVD-ROM + + PKIA0249E The map DVD-ROM has maps, traffic control regulations, and other pertinent information. To improve DVD-ROM map matching and route determination functions, the DVD-ROM uses an exclusive Nissan format. Therefore, the use of a DVD-ROM provided by other manufacturers cannot be used. EL-4164 NAVIGATION SYSTEM System Description (Cont’d) Gyro (Angular speed sensor) + + The oscillator gyro sensor is used to detect changes in vehicle steering angle. The gyro is built into the navigation (NAVI) control unit. BIRDVIEWT The BIRDVIEWT provides a detailed and easily seen display of road conditions covering the vehicle’s immediate to distant area. + MAP DISPLAY SKIA1377E + BIRDVIEWT SKIA1378E Description + + + + Display area: Trapezoidal representation showing approximate distances (Wn, D, and Wd). Ten horizontal grid lines indicate display width while six vertical grid lines indicate display depth and direction. Drawing line area shows open space, depth, and immediate front area. Each area is to a scale of approximately 5:6:25.

Pushing the “ZOOM IN” button during operation displays the scale change and the view point height on the left side of the screen. The height of the view point increases or decreases when “ZOOM” or “WIDE” is selected. SEL691V EL-4165 NAVIGATION SYSTEM System Description (Cont’d) MAP DISPLAY Function of each icon is as follows: 1. Azimuth indication. 2. Position marker.

— The tip of the arrow shows the current location. The shaft of the arrow indicates the direction in which the vehicle is traveling. 3. GPS reception signal (indicates current reception conditions). 4.

Distance display (shows the distance in a reduced scale). SKIA1379E FUNCTION OF NAVI SWITCH Display with pushed “DEST” switch + Easy Mode + Expert Mode SKIA9542E SKIA9142E The Function of Each Icon Is as Follows: MODE Icon Description Easy Address Book Expert x Favorite place can be saved to memory. Address (City/Street) x x The destination can be searched from the address. Point of Interest (POI) x x The destination of favorite facility can be searched. Phone Number x The destination can be searched from the phone number. Previous Dest. x The previous ten destinations stored in memory are displayed. Intersection x The destination can be searched from the intersection. City Center x The destination can be searched from city name. Map x The destination can be searched from the map. Home x Sets the home as a destination. Help x Explanation of navigational functions appear on the display. EL-4166 NAVIGATION SYSTEM System Description (Cont’d) Display with pushed “ROUTE” switch + Easy Mode + Expert Mode SKIA1382E SKIA1383E The Function of Each Icon Is as Follows: MODE Icon Description Easy Expert Quick Stop x x The selected facility is set as the destination or waypoint. (Route guidance has been turned OFF or the destination has been reached) Where am I? x x Next, current and previous street names can be displayed. Route Info.* x The following can be set. + Complete Route + Turn List + Route Simulation (Displayed only when the destination area has been set.) Edit Route* x Change the destination or add the transit points of the route set in the route guide. (Displayed only when the automatic reroute function has been turned OFF and the recommended route is not followed.) Route Calculation x This key is used to start the route calculation after all the settings are completed. Help x Explanation of navigational functions appear on the display. *: When destinations have been entered, route guidance has been turned OFF or destination has been reached, “Route Info.” and “Edit Route” are not displayed. EL-4167 NAVIGATION SYSTEM System Description (Cont’d) Display with pushed “SETTING” switch SKIA9143E The Function of Each Icon Is as Follows: Icon Description Display Settings of display can be performed. Language Language can be selected for the display and voice guidance. Use the program CD-ROM disc to change the language. Navigation Settings and adjusting of navigation can be performed. Navigation Expert Mode Easy Mode and Expert Mode can be switched. Guidance Volume The volume and/or on/off of voice prompt can be controlled by the joystick. Help Explanation of navigational functions appear on the display. Display with pushed “INFO” button + + When the “INFO” button is pushed, the following will display on the screen. Warning message (if there are any) → DRIVE INFORMATION → MAINTENANCE INFOMATION → OFF. Display items Display/Setting contents Elapsed Time DRIVE INFORMATION MAINTENANCE INFOMATION Displays driving time with a range of 0:00:00 to 9999:59:59. Driving Distance [(km) or (miles)] Displays driving distance with a range of 0.0 to 99999.9. Average speed [(km/h) or (MPH)] Displays average speed with a range of 0.0 to 999.9. Reminder 1 Maintenance intervals of vehicle’s consumables and setting of cycles. Reminder 2 Maintenance intervals of vehicle’s consumables and setting of cycles. Reminder 3 Maintenance intervals of vehicle’s consumables and setting of cycles. “LANGUAGE SETTINGS” mode + Select one of the languages which appear on the screen. NOTE: Languages that do not appear on the screen must be loaded from program disk. SKIA1399E EL-4168 NAVIGATION SYSTEM System Description (Cont’d) “NAVIGATION SETTINGS” mode How To Perform Navigation Settings 1. Start the engine. 2.

Push “SETTING” button. 3.

Select “Navigation” key. + Easy Mode SKIA9543E + Expert Mode SKIA1385E Application Items MODE Icon Description Easy Expert Reference page View x x Map display mode can be switched. EL-4170 Heading x x Heading of the map display can be customized for either north heading or the actual driving direction of the vehicle. EL-4170 Nearby Display Icons x Icons of facilities can be displayed. Facilities to be displayed can be selected from the variety selections. EL-4170 Save Current Location x Current vehicle location can be registered in Address Book. EL-4170 Edit Address Book x Address Book can be edited. EL-4170 Clear Memory x Address Book, Previous destination or Avoid area can be deleted. EL-4171 Auto Re-route On/Off x On/Off of Auto Re-route can be switched. EL-4171 Quick Stop Customer Settings x One facility of your selection can be added to your Quick Stop. EL-4171 Set Average speed for Estimated Journey Time x Average vehicle speed can be set to calibrate estimated journey time for the destination. EL-4171 GPS Information x The GPS data includes longitude, latitude and altitude (distance above sea level) of the present vehicle position, and current date and time for the area in which the vehicle is being driven. Also indicated are the GPS reception conditions and the GPS satellite position. EL-4171 Avoid Area Setting x A particular area can be avoided when routing. EL-4172 Tracking On/Off x Tracking to the present vehicle position can be displayed. EL-4172 Adjust Current Location x Current location of position marker can be adjusted. Direction of position marker also can be calibrated when heading direction of the vehicle on the display is not matched with the actual direction. EL-4172 Switch beep On/Off x Button tone can be selected On/Off. EL-4172 EL-4169 NAVIGATION SYSTEM System Description (Cont’d) “VIEW” mode 1. Select “BIRDVIEWT” or “Plan View” icon. + To open the map screen display with BIRDVIEWT, select “BIRDVIEWT”. + To open the map screen display with Plan View, select “Plan View”. SKIA0554E “HEADING” mode + + To display the car heading up, select “Heading up”. To display North up, select “North up”. SKIA0561E “NEARBY DISPLAY ICONS” mode + Select an icon to display on the map screen. SKIA1394E “SAVE CURRENT LOCATION” mode + The current vehicle location can be registered in “Address Book”. NOTE: “Address Book” can store 50 items max. SKIA1388E “EDIT ADDRESS BOOK” mode + Edit the items registered in Address Book. SKIA0560E EL-4170 NAVIGATION SYSTEM System Description (Cont’d) “CLEAR MEMORY” mode + To delete all the stored places in “Address Book”, “Avoid Area” and “Previous Dest”, select “Yes”. SKIA9146E “AUTO RE-ROUTE” mode + + To Perform the auto re-route of route, select “ON”. Not to Perform the auto re-route of route, select “OFF”. SKIA0558E “QUICK STOP CUSTOMER SETTINGS” mode + Select a category for the “Quick Stop” menu. SKIA1389E “SET AVERAGE SPEED” mode + + Set the average vehicle speed to calibrate the estimated journey time for the destination. Set three items; “Motorway”, “Main Roads”, and “Ordinary Roads”. SKIA9544E “GPS INFORMATION” mode Latitude, longitude, altitude, astrometric state, and satellite location are displayed as GPS information. NOTE: Altitude is displayed only in three-dimensional status.

+ SKIA0555E EL-4171 NAVIGATION SYSTEM System Description (Cont’d) “AVOID AREA SETTING” mode + Areas to avoid can be registered. SKIA0563E “TRACKING” mode + To leave the tracking marks on the map, select “On”. + To delete the tracking marks on the map, select “Off”. NOTE: When a trail display is turned OFF, trail data is erased from the memory. SKIA9545E “ADJUST CURRENT LOCATION” mode 1. Select an icon “right” or “left” to calibrate the heading direction. (Arrow marks will rotate corresponding to the calibration key.) SKIA1395E 2. Select “Set”. Then the vehicle mark will be matched to the arrow mark. SKIA1396E “BUTTON TONE/BEEP RESPONSE” mode Select “Switch Beep”. + When Beep Setting is on (indicator light on), a beep will sound if the button is pushed. NOTE: Items in exception of Beep Setting ON/OFF. + An error beep. + An interrupted-screen beep. SKIA9148E EL-4172 NAVIGATION SYSTEM Precautions for NAVI Control Unit Replacement When replacing the NAVI control unit, eject the map DVD-ROM before disconnecting the battery. The NAVI control unit has the following information stored in its memory. Record the memory contents before replacing the control unit, and input them in the new unit as necessary.

+ Brightness of light when ON/OFF + Dimming switching + Display color switching + Latest status (map screen/BIRDVIEWT, reduced scale, rotation angle of map screen, route guide ON/OFF, track ON/OFF, etc.) + Current position + Destination, passing point 1 - 5 + Registered places, their names, etc. NOTE: Only removing the battery does not erase the memory. + + Component Parts And Harness Connector Location PKIB1033E EL-4173 NAVIGATION SYSTEM Schematic TEL074N EL-4174 NAVIGATION SYSTEM Wiring Diagram — NAVI — TEL075N EL-4175 NAVIGATION SYSTEM Wiring Diagram — NAVI — (Cont’d) TEL076N EL-4176 NAVIGATION SYSTEM Wiring Diagram — NAVI — (Cont’d) TEL077N EL-4177 NAVIGATION SYSTEM Wiring Diagram — NAVI — (Cont’d) TEL078N EL-4178 NAVIGATION SYSTEM Wiring Diagram — NAVI — (Cont’d) LHD MODELS TEL079N EL-4179 NAVIGATION SYSTEM Wiring Diagram — NAVI — (Cont’d) TEL080N EL-4180 NAVIGATION SYSTEM Wiring Diagram — NAVI — (Cont’d) RHD MODELS TEL081N EL-4181 NAVIGATION SYSTEM Wiring Diagram — NAVI — (Cont’d) TEL082N EL-4182 NAVIGATION SYSTEM Terminals and Reference Value for NAVI Control Unit + Measure using circuit tester and oscilloscope. + Measure with connector connected unless otherwise specified. CAUTION: Confirm voltage between negative terminal on each unit and ground is approximately 0V. + If ignition switch ON is required in measurement condition, measure with engine running to prevent battery discharge. Terminal No. (wire color) Item Example of symptom — Approx. 0V — — — Battery voltage ON — Approx. 0V — ON Battery Input Ground — 1 (B) Ground Ground Ground Ground 4 (B) Reference value Operation (−) 3 (R/G) Condition Ignition switch (+) 2 (R/G) Signal input/ output 6 (L/OR) Ground ACC power Input ACC 7 (Y) 8 (BR) Voice guide signal Output ON 9 — Shield — — 12 (R) 17 RGB area signal output ON — System does not work properly. — System does not work properly. Battery voltage Only route guide and operation guide are not heard. Push the “VOICE” switch SKIA0171J — — — Push the “D/N” switch. RGB screen is not shown. SKIA0162E 15 (B) 17 RGB signal (B: blue) Output ON Select “Color bar” of CONFIRMATION/ ADJUSTMENT function. RGB screen looks yellowish. SKIA0167E 16 (W) 17 RGB synchronizing signal Output ON 17 Ground RGB shield — ON — 18 (R) 17 RGB signal (R: red) Output ON Select “Color bar” of CONFIRMATION/ ADJUSTMENT function. Push the “MAP” switch. RGB screen is rolling. SKIA0164E Approx. 0V — RGB screen looks bluish. SKIA0165E EL-4183 NAVIGATION SYSTEM Terminals and Reference Value for NAVI Control Unit (Cont’d) Terminal No. (wire color) (+) (−) 21 (G) 17 Item RGB signal (G: green) Signal input/ output Output Condition Reference value Ignition switch Operation ON Select “Color bar” of CONFIRMATION/ ADJUSTMENT function. Example of symptom RGB screen looks reddish. SKIA0166E 25 (L/B) 26 (R/W) Illumination signal Input Ground IGN signal Input Ground Reverse signal Ground ON ON Lighting switch position 1st or 2nd Battery voltage Lighting switch position OFF Approx. 0V — Battery voltage Select R-position 27 (Y) Input Vehicle speed signal Ground 43 — Shield 44 (W) 43 Communication signal (+) Vehicle information setting is not possible. The navigation current location mark moves strangely when the vehicle is moving backwards. Battery voltage ON Other position 28 (R/W) Night illumination for switches does not illuminate. Input ON When vehicle speed is approx. 40 km/h (25 MPH) — — — Input/ Output ON — Approx. 0V Navigation current location mark does not indicate the correct position. ELF1084D — — System does not work properly. SKIA0175E 43 Communication signal (—) 49 Ground GPS antenna signal 50 — 45 (B) Input/ Output ON System does not work properly — SKIA0176E Shield Input ON — — Connector is not connected. — EL-4184 Approx. 5V — GPS correction is not possible. — NAVIGATION SYSTEM Terminals and Reference Value for Display Terminal No. (wire color) (+) (−) 1 (R) 4 Item RGB signal (R: red) Signal input/ output Input Condition Reference value Ignition switch Operation ON Select “Color bar” of CONFIRMATION/ ADJUSTMENT function. Example of symptom RGB screen looks bluish. SKIA0165E 2 (G) 4 RGB signal (G: green) Input ON Select “Color bar” of CONFIRMATION/ ADJUSTMENT function. RGB screen looks reddish. SKIA0166E 3 (B) 4 RGB signal (B: blue) Input ON Select “Color bar” of CONFIRMATION/ ADJUSTMENT function.

RGB screen looks yellowish. SKIA0167E 4 — Shield 7 (W) 4 RGB synchronizing signal — — Input ON — — — Push the “MAP” switch. RGB screen is rolling. SKIA0164E 8 (R) Ground RGB area signal Input ON Push the “D/N” switch. RGB screen is not shown. SKIA0162E 15 (OR) Ground Communication signal (DISP-SW) Output ON Push the “INFO” switch. System does not work properly. SKIA0835E 16 (B) 17 Communication signal (NAVI-DISP) Input ON Push the “INFO” switch. System does not work properly. SKIA0832E EL-4185 NAVIGATION SYSTEM Terminals and Reference Value for Display (Cont’d) Terminal No. (wire color) (+) (−) 17 — Item Shield Signal input/ output — Condition Reference value Ignition switch Operation — — Example of symptom — — 19 (L/OR) Ground ACC power Input ACC — Battery voltage System does not work properly. 21 (R/G) Ground Battery power supply Input — — Battery voltage System does not work properly. 22 (B) Ground Ground — ON — Approx. 0V 23 (R/G) Ground Battery power supply Input — — Battery voltage 24 (B) Ground Ground — ON — Approx.

0V — System does not work properly. — Terminals and Reference Value for NAVI Switch Terminal No. (wire color) Item Signal input/ output (+) (−) 1 (L/OR) Ground ACC power 3 (B) Illumination signal Input Communication signal (DISP-SW) Input 2 (L/B) 4 (OR) Ground Input Condition Reference value Ignition switch Operation ACC — Battery voltage Lighting switch position 1st or 2nd Battery voltage Lighting switch position OFF Approx. 0V ON ON Example of symptom All operations do not work. Night illumination for switches does not illuminate. Push the “INFO” switch System does not work properly. SKIA0835E 5 (L/W) 6 Communication signal (SW-NAVI) 6 — 7 (B) Ground Push the “INFO” switch System does not work properly. Output ON Shield — — — — Ground — ON — Approx. 0V SKIA0832E EL-4186 — All operations do not work. NAVIGATION SYSTEM Terminals and Reference Value for Transfer Unit Terminal No. (wire color) (+) (−) 1 (L) 2 (PU) Item Voice guide signal Signal input/ output Output Condition Ignition switch ON Reference value Example of symptom Operation Only route guide and operation guide are not heard. Push the “VOICE” switch ELL0234D Voice change relay ON signal 6 (BR) 4 (R) 7 — 8 (Y) 10 (BR) 9 — Shield 11 (W) 9 Communication signal (+) Shield Voice guide signal Push the “VOICE” switch Output ON — — Input ON — — — Input/ Output ON — — Only route guide and operation guide are not heard. Approx. 5V — — Only route guide and operation guide are not heard. Push the “VOICE” switch SKIA0171E — — System does not work properly. SKIA0175E 13 (B) 9 Communication signal (−) Input/ Output ON System does not work properly. — SKIA0176E 15 — Shield 18 (L/W) 15 Communication signal (SW-NAVI) — — — Input ON — — — System does not work properly. SKIA0832E 19 — Shield — — — EL-4187 — — NAVIGATION SYSTEM Terminals and Reference Value for Transfer Unit (Cont’d) Terminal No. (wire color) (+) (−) 20 (B) 19 Item Communication signal (NAVI-DISP) Signal input/ output Input Condition Reference value Ignition switch Operation ON — Example of symptom System does not work properly. SKIA0832E 25 (B) Ground Ground — ON — Approx. 0V 27 (B) Ground Ground — ON — Approx. 0V — — 29 (L/OR) Ground ACC power Input ACC — Battery voltage System does not work properly. 31 (R/G) Ground Battery Input OFF — Battery voltage System does not work properly. Terminals and Reference Value for Voice Change Relay Terminal No. (wire color) Item Signal input/ output Condition Ignition switch Reference value Example of symptom Operation (+) (−) 2 (BR) 1 (R) Voice change relay ON signal Input ON Push the “VOICE” switch 3 (OR) 5 (G) Audio sound signal Input ON Receive audio signal Only route guide and operation guide are not heard. Approx. 5V No sound from door speaker and tweeter LH SKIA0177E 4 (L)*1 (BR)*2 8 (B/W)*1 Voice guide (B/R)*2 signal Output ON Only route guide and operation guide are not heard. Push the “VOICE” switch ELL0234D 6 (L) 7 (PU) Voice guide signal Input ON Only route guide and operation guide are not heard. Push the “VOICE” switch ELL0234D *1 : LHD models. *2 : RHD models. EL-4188 NAVIGATION SYSTEM Self-Diagnosis Function DESCRIPTION + + + Diagnosis function consists of the self-diagnosis mode performed automatically and the CONFIRMATION/ ADJUSTMENT mode operated manually. Self-diagnosis mode checks for connections between the units constituting this system, analyzes each individual unit at the same time, and displays the results on the LCD screen. CONFIRMATION/ADJUSTMENT mode is used to perform trouble diagnosis that require operation and judgment by an operator (malfunction that cannot be automatically judged by the system), to check/change the set value, and to display the History of Errors of the navigation system.

DIAGNOSIS ITEM Mode Description + NAVI Control unit diagnosis (DVD-ROM drive will not be diagnosed when no map DVD-ROM is in it.). + Performs diagnosis of each unit and connections between control unit and GPS antenna, as well as between control unit and each unit. Self-diagnosis Display Color tone and shading of the screen can be checked by the display of a color bar and a gray scale. Vehicle signals Analyzes the following vehicle signals: Vehicle speed signal, light signal, ignition switch signal, and reverse signal. Display Longitude & Latitude Confirmation/ Adjustment Navigation Display the map. Use the joystick to adjust position. Longitude and latitude will be displayed. Under ordinary conditions, the navigation system distance measuring function will automatically compensate for minute decreases in wheel and tire diameter Speed Calibracaused by tire wear or low-pressure. Speed calibration immediately restores systion tem accuracy in cases such as when distance calibration is needed because of the use of tire chains in inclement weather. Angle Adjustment Corrects difference between actual turning angle of a vehicle and turning angle of the car mark on the display. Initialize Location This mode is for initializing the current location. Use when the vehicle is transported a long distance on a trailer, etc. Diagnosis results previously stored in the memory (before turning ignition switch ON) are displayed in this mode. Time and location when/where the errors occurred are also displayed. History of Errors Self-Diagnosis Mode OPERATION PROCEDURE 1. Start the engine. 2. Push and hold “MAP” and “DAY/NIGHT” switches simultaneously for 5 seconds or more. + Push the “BACK” switch and the initial system screen will be shown. PKIB1537E EL-4189 NAVIGATION SYSTEM Self-Diagnosis Mode (Cont’d) 3. The initial trouble diagnosis screen will be shown, and items “Self-Diagnosis” and “Confirmation/Adjustment” will become selective. SKIA0381E 4.

Perform self-diagnosis by selecting the “Self-Diagnosis”. + Self-diagnosis subdivision screen will be shown and the operation enters the self-diagnosis mode. + A bar graph shown below the self-diagnosis subdivision screen indicates progress of the diagnosis. SKIA0382E SKIA9192E SKIA9193E 5. On the “SELF-DIAGNOSIS” screen, each unit name will be colored according to the diagnosis result, as follows. Green: No malfunctioning. Yellow: Cannot be judged by self-diagnostic results. Red: Unit is malfunctioning. Gray: Diagnosis has not been done. + If several malfunctions are present in a unit, color of its switch on the screen will be either red, yellow, or gray, determined by the malfunction of the highest priority. + Lines between navigation unit and GPS antenna are green or yellow based on diagnosis results. + Lines between control unit and units other than those above are gray regardless of diagnosis results. CAUTION: + Navigation Unit = NAVI control unit + Communication converter = Transfer unit + Satellite Switch = NAVI switch 6. Select a switch on the “SELF-DIAGNOSIS” screen and comments for the diagnosis results will be shown. + When the switch is green, the following comment will be shown. “Self-Diagnosis was successful. Further diagnosis and adjustments are recommended. Follow the “confirmation/adjustments” menu or refer to the service manual.” + When the switch is yellow, the following comment will be shown.

“Connection to the following unit is not responding. See the service manual for further diagnosis.” + When the switch is red, the following comment will be shown. “Navigation Unit is abnormal.” EL-4190 NAVIGATION SYSTEM Self-Diagnosis Mode (Cont’d) + When the switch is gray, the following comment will be shown. “Self-diagnosis for DVD-ROM DRIVER of NAVI was not conducted due to no insertion of DVD-ROM.” SELF-DIAGNOSIS RESULT Quick reference table 1. Select an applicable diagnosis No. in the diagnosis result quick reference table. 2. Find estimated malfunctioning system in the diagnosis No. table and perform check. 3. Turn the ignition switch to OFF and perform self-diagnosis again. Diagnosis result quick reference table Screen switch Diagnosis No. Switch color Navigation Unit Red x 1 Gray x 2 x 3 x 4 Yellow GPS antenna x x 5 CAUTION: Check the following when the self-diagnosis mode cannot be used. + NAVI control unit power supply and ground. + Display power supply and ground. + NAVI switch power supply and ground. + Transfer unit power supply and ground. + AV communication line between NAVI switch and Display, AV communication line between Display and Transfer unit, AV communication line between Transfer unit and NAVI control unit. Method of diagnosis for malfunctioning system When system does not start, indicate malfunction connection between units by outbreak sound from system. Diagnosis procedure. 1. Turn ignition switch ON.

Make sure whether or not route guide start sound which is output from NAVI control unit indicate 10 seconds after. 2.

Push and hold “MAP” and “DAY/NIGHT” switches simultaneously for 5 seconds or more. Make sure whether or not 2 times of beep sound or route guide start sound indicate. 3. According to the former two steps, select an proper diagnosis No. in the diagnosis result quick reference table.

4. Find estimated malfunctioning system from the diagnosis No. table and perform check. Diagnosis result quick reference table + Procedure 1 10 seconds after turn ignition switch ON. Procedure 2 Push and hold “MAP” and “DAY/NIGHT” switches simultaneously for 5 seconds or more. Diagnosis No. Route guide start sound indicates 6 There is no sound 7 Two times of beep sound from NAVI switch * 8 There is no sound 9 Route guide start sound appears There is no sound *: Indicated when pushing both “MAP” and “DAY/NIGHT” simultaneously. (Unnecessary to push them 5 seconds or more.) EL-4191 NAVIGATION SYSTEM Self-Diagnosis Mode (Cont’d) Self-diagnosis codes Diagnosis No. Possible cause Reference page 1 NAVI control unit malfunction — 2 NAVI control unit judged no map DVD-ROM is inserted. — 3 When “DVD-ROM is not recognized. Please check the disc.” is shown. 1. Eject map DVD-ROM and check if it is compatible with the system. 2. Check ejected DVD-ROM for dirt, damage, and warps. 3.

If no error is found, insert a known good map DVD-ROM of the same type and perform selfdiagnosis again. If same result is shown, the NAVI control unit is malfunctioning. If result is normal, the map DVD-ROM is malfunctioning. — 4 If “Error found in DVD-ROM or DVD-ROM driver in control unit. Please perform diagnosis in accordance with service manual” is shown, performed same inspection as diagnosis No. 3.

— 5 GPS antenna system 1. Visually check for a broken wire in the GPS antenna coaxial cable. 2. Disconnect the GPS antenna connector and make sure that approximately 5V is supplied from NAVI control unit. If not, the NAVI control unit is inoperative. If the voltage is supplied, replace the GPS antenna and perform self-diagnosis again. If the same result is shown, the NAVI control unit is inoperative.

— 6 Display power supply and ground circuit. Communication line between display and NAVI switch. EL-4203 7 NAVI switch power supply and ground circuit. Communication line between NAVI switch and transfer unit. EL-4204 8 NAVI control unit power supply and ground circuit. Communication line between NAVI control unit and transfer unit. EL-4204 9 Transfer unit power supply and ground circuit. Communication line between transfer unit and display. EL-4205 Confirmation/Adjustment Mode OPERATION PROCEDURE 1.

Start the engine. 2. Push and hold “MAP” and “DAY/NIGHT” switches simultaneously for 5 seconds or more. + Push the “BACK” switch and the initial system screen will be shown. PKIB1537E

EL-4210 NAVIGATION SYSTEM Trouble Diagnoses (Cont'd) 3. CHECK RGB SIGNAL 1. Connect NAVI control unit connector and display connector. PKIB0553E 2. 3. 4. + Turn ignition switch ON. Display “Color bar” by “CONFIRMATION/ADJUSTMENT” mode. Check the following with CONSULT-ll or oscilloscope. When the screen looks bluish.
Voltage signal between NAVI control unit connector M167 terminal 18 (R) and 17.
18 (BR) - 19: Refer to EL-4183. + When the screen looks reddish. Voltage signal between NAVI control unit connector M167 terminal 21 (G) and 17. 21 (W) - 19: Refer to EL-4183. + When the screen looks yellowish. Voltage signal between NAVI control unit connector M167 terminal 15 (B) and 17. 15 (R) - 19: Refer to EL-4183. OK or NG OK ©
Replace display. NG © Replace NAVI control unit. RGB SCREEN IS NOT SHOWN 1. CHECK HARNESS 1. Turn ignition switch OFF. PKIB0554E 2.
Disconnect NAVI control unit connector and display connector. 3. Check continuity between NAVI control unit harness connector M167 terminals 12 (R), 17 and display harness connector M170 terminals 8 (R), 4. 12 (R) - 8 (R) Continuity should exist. 17 - 4 Continuity should exist. 4. Check continuity between NAVI control unit harness connector
M167 terminals 12 (R), 17 and ground. 12 (R), 17 - Ground Continuity should not exist. OK or NG OK © GO TO 2.
NG © Repair harness or connector. EL-4211 NAVIGATION SYSTEM Trouble Diagnoses (Cont'd) 2. 1. 2. 3. 4.
CHECK RGB AREA SIGNAL Connect NAVI control unit connector and display connector. Turn ignition switch ON. Push “INFO” switch.
Check the signal between NAVI control unit connector M167 terminals 12 (R) and 17 with CONSULT-ll or oscilloscope. PKIB0555E 12 (R) - 17: Refer to EL-4183. OK or NG OK © Replace display. NG © Replace NAVI control unit. RGB SCREEN IS ROLLING 1. CHECK RGB SYNCHRONIZING CIRCUIT 1. Turn ignition switch OFF.
2. Disconnect NAVI control unit connector and display connector. 3. Check continuity between NAVI control unit harness connector M167 terminals 16 (W), 17 and display harness connector M170 terminals 7 (W), 4. PKIB0556E 16 (W) - 7 (W) Continuity should exist. 17 - 4 Continuity should exist. 4. Check continuity between NAVI control unit
harness connector M167 terminals 16 (W), 17 and ground. 16 (W), 17 - Ground Continuity should not exist. OK or NG OK © GO TO 2.
NG © Repair harness or connector. EL-4212 NAVIGATION SYSTEM Trouble Diagnoses (Cont'd) 2. 1.
2. 3. 4.
CHECK RGB SYNCHRONIZING SIGNAL Connect NAVI control unit connector and display connector.
Turn ignition switch ON. Push the “MAP” switch. Check the signal between NAVI control unit harness connector M167 terminals 16 (W) and 17 with CONSULT-ll or oscilloscope. PKIB0557E 16 (W) - 19: Refer to EL-4183. OK or NG OK © Replace display. NG © Replace NAVI control unit. GUIDE SOUND IS NOT HEARD 1. CHECK VOICE GUIDE
SETTING + While driving in the dark pink route, voice guide does not operate. NOTE: Voice guide is only available at intersections that satisfy certain conditions (indicated by + on the map). Therefore, guidance may not be given even when the route on the map changes direction. + Is volume setting not switched ON? Yes or No Yes © GO TO 2. No ©
Switch the setting ON and turn the volume up. EL-4213 NAVIGATION SYSTEM Trouble Diagnoses (Cont'd) 2. CHECK VOICE GUIDE CIRCUIT 1. Turn ignition switch OFF. 2. Disconnect NAVI control unit connector and transfer unit connector. 3. Check continuity between NAVI control unit harness connector M167 terminals 7 (Y), 8 (BR), and
transfer unit harness connector M173 terminals 8 (Y), 10 (BR). SKIA9115E 7 (Y) - 8 (Y) Continuity should exist. 8 (BR) - 10 (BR) Continuity should exist. 4. Check continuity between NAVI control unit harness connector M167 terminals 7 (Y), 8 (BR) and ground. 7 (Y), 8 (BR) - Ground Continuity should not exist. OK or NG OK © GO TO 3. NG © + Check
connector housings for disconnected or loose terminals. + Repair harness or connector.
3. 1. 2. 3. 4. CHECK VOICE GUIDE SIGNAL (NAVI CONTROL UNIT) Connect NAVI control unit connector and transfer unit connector. Turn ignition switch ON. Push “VOICE” switch.
Check the signal between NAVI control unit harness connector M167 terminals 7 (Y) and 8 (BR) with CONSULT-ll or oscilloscope.
SKIA9113E 7 (Y) - 8 (BR): Refer to EL-4183. OK or NG OK © GO TO 4. NG © Replace NAVI control unit. EL-4214 NAVIGATION SYSTEM Trouble Diagnoses (Cont'd) 4.
CHECK VOICE CHANGE RELAY CIRCUIT: (1) 1. Turn ignition switch OFF. 2. Disconnect transfer unit connector and voice change relay connector. 3. Check continuity between transfer unit harness connector M173 terminals 1 (L), 2 (PU) and voice change relay harness connector M174 terminals 6 (L), 7 (PU). SKIA9122E 1 (L) - 6 (L) Continuity
should exist. 2 (PU) - 7 (PU) Continuity should exist. 4. Check continuity between transfer unit harness connector M173 terminals 1 (L), 2 (PU) and ground. 1 (L), 2 (PU) - Ground Continuity should not exist. OK or NG OK © GO TO 5. NG © Repair harness or connector. 5. 1. 2. 3. 4. CHECK VOICE GUIDE SIGNAL (TRANSFER UNIT) Connect transfer
unit connector and voice change relay connector. Turn ignition switch ON. Push “VOICE” switch. Check the signal between transfer unit harness connector M173 terminals 1 (L) and 2 (PU) with CONSULT-ll or oscilloscope. SKIA9118E 1 (L) - 2 (PU): Refer to EL-4187. OK or NG OK © GO TO 6.
NG © Replace transfer unit. EL-4215 NAVIGATION SYSTEM Trouble Diagnoses (Cont'd) 6. CHECK VOICE CHANGE RELAY CIRCUIT: (2) 1. Turn ignition switch OFF. 2. Disconnect transfer unit connector and voice change relay connector.
3. Check continuity between transfer unit harness connector M173 terminals 6 (BR), 4 (R) and voice change relay harness connector terminals 2 (BR), 1 (R). SKIA9121E 6 (BR) - 2 (BR) Continuity should exist. 4 (R) - 1 (R) Continuity should exist. 4. Check continuity between transfer unit harness connector M173 terminals 6 (BR), 4 (R) and ground. 6
(BR), 4 (R) - Ground Continuity should not exist. OK or NG OK © GO TO 7.
NG © Repair harness or connector.
7. 1. 2. 3. 4.
CHECK VOICE CHANGE RELAY ON SIGNAL Connect voice transfer unit connector. Turn ignition switch ON. Push “VOICE” switch. Check voltage between transfer unit harness connector M173 terminal 6 (BR) and 4 (R). SKIA9119E 6 (BR) - 4 (R): Approx. 5V OK or NG OK © Replace voice change relay. NG © Replace transfer unit. DISPLAY
QUALITY CONTROL CANNOT CHANGE SCREEN 1. CHECK SYMPTOM Do other systems operate normally?
Yes or No Yes © Replace display. No © Check symptom again. EL-4216 NAVIGATION SYSTEM Trouble Diagnoses (Cont'd) DRIVING TEST 1. DRIVING TEST 1 1. Scroll the map screen to display the area to make correction. Push “ENTER” and select “CURRENT LOCATION CORRECTION”. 2. Correct direction of the vehicle mark. 3. Perform the
distance correction of the “CONFIRMATION/ADJUSTMENT” mode. NOTE: Normally, adjustment is not necessary because this system has automatic distance correction function. However, when a tire chain is fitted, adjustment in accordance with the tire diameter ratio must be made. 4. Are symptoms applicable to the Example of Symptoms Judged
Not Malfunction (EL-4218) present after driving the vehicle? Yes or No Yes © Limit of the location detection capacity of the navigation system. No © GO TO 2. 2. DRIVING TEST 2 + Did any malfunction occur when the proper test in the following test patterns is performed? + Test pattern Driving test finds the difference between the symptoms
monitored with and without each sensor. — Test pattern 1: Test method with no GPS location correction Disconnect the GPS antenna connector connected to the NAVI control unit. Accurately adjust the current location and the direction, then drive the vehicle. — Test pattern 2: Test method with no map-matching Accurately adjust the current location
and the direction. Eject the map DVD-ROM from the NAVI control unit with the ignition switch turned to OFF, then drive the vehicle. After driving, insert the map DVD-ROM back in the unit, display the track of the vehicle on the map screen and compare it with the actual road configuration. + Sample tests — Perform test pattern 1. — Perform test
pattern 1 and 2. Compare the track of the vehicle on the map screen and the actual road configuration. For fairly accurate tracking, plotting shall be made every several hundred meters. — Perform test pattern 1 and 2. Drive on a road of which distance is accurately known (by utilizing distance posts on a highway). Calculate the rate of change
(increased/decreased) of the distance by comparing with the actual distance. Correction = 1 — A/B A: Distance shown on the screen B: Actual distance Yes or No Yes © + If adjustment is insufficient, perform adjustment again. + If any error is found in the map, please let us know. + Replace NAVI control unit.
No © Limit of the location detection capacity of the navigation system. EL-4217 NAVIGATION SYSTEM Example of Symptoms Judged Not Malfunction BASIC OPERATION Symptom Cause Remedy Display brightness adjustment is set fully to DARK side. Adjust the display brightness. Volume control is set to OFF, MIN or MAX.
Adjust the audio guide volume. Audio guidance is not available while the vehicle is driving on a dark pink route. System is not malfunction. Screen is too dark. Motion of the image is too slow. Temperature inside the vehicle is low. Wait until the temperature inside the vehicle reaches the proper temperature. Small black or bright spots appear on the
screen. Symptom peculiar to a liquid crystal display. System is not malfunction. No image is shown. No guide sound is heard. Audio guide volume is too low or too high. VEHICLE MARK Symptom Cause Remedy Map screen and BIRDVIEWT Name of the place vary with the screen. Some thinning of the character data is done to prevent the display
becoming to complex. In some cases and in some locations, the display contents may differ. The same place System is not malfunction. name, street name, etc. may not be displayed every time on account of the data processing. Vehicle mark is not positioned correctly. Vehicle is transferred by ferry or by towing after its ignition switch is turned to
OFF. Screen will not switch to nighttime mode after the lighting switch is turned ON. The daytime screen is selected by the “SWITCH SCREENS” when the last time the Perform screen dimming and select the nightscreen dimming setting is done. Switching between daytime/nighttime screen time screen by “SWITCH SCREENS”. may be inhibited by
the automatic illumination adjustment function. Map screen will not scroll in accordance with the vehicle travel. Current location is not displayed. Push “MAP” switch to display the current location. Vehicle mark will not be shown. Current location is not displayed. Push “MAP” switch to display the current location. GPS satellite signal is intercepted
because the vehicle is in or behind a building.
Move the vehicle out to an open space. GPS satellite signal cannot be received Accuracy indicator (GPS satellite mark) on the map screen stays gray.
because an obstacle is placed on top of the display.
Vehicle location accuracy is low. Drive the vehicle for a while in the GPS satellite signal receiving condition.
Do not place anything in the center on top of the display. GPS satellites are located badly. Wait until the location becomes better. Accuracy indicator (GPS satellite mark) on the map screen stays gray. Current location is not determined. Vehicle speed setting by the vehicle speed pulse has been deviated (advanced or retarded) from the actual vehicle
speed because tire chain is fitted or the system has been used on another vehicle. Drive the vehicle for a while [for approx. 30 minutes at approx. 30 km/h (19 MPH)] and the deviation will be automatically adjusted. If advancement or retard still occur, perform the distance adjustment by “CONFIRMATION/ ADJUSTMENT” mode of diagnosis function.
Map data has error or omission. (Vehicle mark is always deviated to the same position.) As a rule, an updated map DVD-ROM will be released once a year. EL-4218 NAVIGATION SYSTEM Example of Symptoms Judged Not Malfunction (Cont'd) DESTINATION, PASSING POINTS, AND MENU ITEMS CANNOT BE SELECTED/SET Symptom Passing
point is not searched when re-searching the route. Route information will not be displayed. Cause Remedy The vehicle has already passed the passing point, or the system judged so. To include the passing points that have been passed into the route again, set the route again. Route searching has not been done. Set the destination and perform route
searching. Vehicle mark is not on the recommended route. Drive on the recommended route. Route guide is turned OFF. Turn the route guide ON. Route information is not available on the dark System is not malfunction. pink route. After the route searching, no guide sign will appear as the vehicle goes near the entrance/exit to the toll road. Vehicle
mark is not on the recommended route. (On the display, only guide signs related to the recommended route will be shown.) Drive on the recommended route. Automatic route searching is not possible. Vehicle is driving on a highway (gray route), or no recommended route is available. Drive on a road to be searched. Or re-search the route manually. In
this case, however, the whole route will be searched. Performed automatic detour search (or detour search). However, the result is the same as that of the previous search. Performed search with every conditions considered. However, the result is the same as that of the previous search. System is not malfunction. Passing points cannot be set. More
than five passing points were set. Passing points can be set up to five. To stop at more than five points, perform sharing in several steps. When setting the route, the starting point cannot be selected. The current vehicle location is always set as the starting point of a route. System is not malfunction. Some menu items cannot be selected. The vehicle is
being driven. Stop the vehicle at a safe place and then operate the system. VOICE GUIDE Symptom Voice guide will not operate. Voice guide does not match the actual road pattern. Cause Remedy Note: Voice guide is only available at intersections that satisfy certain conditions (indicated by + on the map). Therefore, guidance System is not
malfunction. may not be given even when the route on the map changes direction. The vehicle is not on the recommended route. Return to the recommended route or re-search the route. Voice guide is turned OFF. Turn the voice guide ON. Route guide is turned OFF. Turn the route guide ON. Voice guide may vary with the direction to which the
vehicle is turn and the connection of the road to other roads.
Drive in conformity to the actual traffic rules. EL-4219 NAVIGATION SYSTEM Example of Symptoms Judged Not Malfunction (Cont'd) ROUTE SEARCHING Symptom No route is shown. Cause Remedy No road to be searched is found around the destination.
Find wider road (orange road or wider) nearby and reset the destination and passing points onto it.
Take care of the traveling direction when there are separate up and down roads. Starting point and the destination are too close. Set the destination at more distant point. Turn the time-regulating search conditions Conditional traffic regulation (day of the OFF. Turn “Avoid regulation time” in the week/time of the day) is set at the area around the
current location or the destination. search conditions OFF. Indicated route is intermittent. In some areas, highways (gray routes) are not used for the search (Note). Therefore, the System is not malfunction. route to the current position or the passing points may be intermittent. When the vehicle has passed the recommended route, it is deleted from
the screen. A recommended route is controlled by each section. When the vehicle has passed the passing point 1, then the map data from the System is not malfunction. starting point up to the passing point 1 will be deleted. (The data may remain undeleted in some area.) Detouring route is recommended. In some areas, highways (gray routes) are
not used for the search (Note).
Therefore, detour route may be recommended. Set the route closer to the basic route (gray route). A detour route may be shown when some traffic regulation (one-way traffic, etc.) is set at the area around the starting point or the destination. Slightly move the starting point or the destination, or set the passing point on the route of your choice. In the
area where highways (gray routes) are used for the search, left turn has priority System is not malfunction. around the current location and the destination (passing points). For this reason, the recommended route may be detouring. Landmarks on the map do not match This can be happen due to omission or error the actual ones. in the map data.
Recommended route is far from the starting point, passing points, and destination. Starting point, passing points, and destination of the route guide were set far from the desired points because route searching data around these area were not stored. As a rule, an updated map DVD-ROM will be released once a year. Wait until the latest map has
become available. Reset the destination onto the road nearby. If this road is one of the highways (gray routes), an ordinary road nearby may be displayed as the recommended route. NOTE: Except for the ordinance-designated cities and the prefectural capitals (Applicable areas may be changed in the updated map disc.) EL-4220 NAVIGATION
SYSTEM Example of Symptoms Judged Not Malfunction (Cont'd) EXAMPLES OF CURRENT LOCATION MARK DISPLACEMENT Vehicle's travel amount is calculated by reading its travel distance and turning angle. Therefore, if the vehicle is driven in the following manner, an error will occur in the vehicle's current location display. If correct location
has not been restored after driving the vehicle for a while, perform location correction. SEL698V EL-4221 NAVIGATION SYSTEM Example of Symptoms Judged Not Malfunction (Cont'd) Cause (condition) Driving condition Remarks (correction, etc.) Y-intersections At a Y intersection or similar gradual division of roads, error the direction of travel
deduced by the sensor may result in the current location mark appearing on the wrong road. ELK0192D Spiral roads When driving on a large, continuous spiral road (such as loop bridge), turning angle error is accumulated and the vehicle mark may deviate from the correct location. ELK0193D Straight roads Road configuration Zigzag roads When
driving on a long, straight road and slow curve without stopping, map-matching does not work effectively enough and distance errors may accumulate. As a result, the vehicle mark may deviate from the correct location when the vehicle If after travelling about 10 km (6 turned at a corner. miles) the correct location has not ELK0194D been restored,
perform location correction and, if necessary, direction correction. When driving on a zigzag road, the map may be matched to other roads in the similar direction nearby at every turn, and the vehicle mark may deviate from the correct location. ELK0195D Roads laid out in a grid pattern When driving at where roads are laid out in a grid pattern,
where many roads are running in the similar direction nearby, the map may be matched to them by mistake and the vehicle mark may deviate from the correct location. ELK0196D Parallel roads When two roads are running in parallel (such as highway and sideway), the map may be matched to the other road by mistake and the vehicle mark may
deviate from the correct location. ELK0197D EL-4222 NAVIGATION SYSTEM Example of Symptoms Judged Not Malfunction (Cont'd) Cause (condition) In a parking lot Driving condition Remarks (correction, etc.) When driving in a parking lot, or other location where there are no roads on the map, matching may place the vehicle mark on a nearby
road. When the vehicle returns to the road, the vehicle mark may have deviated from the correct location.
When driving in circle or turning the steering wheel repeatedly, direction errors accumulate, and the vehicle SEL709V mark may deviate from the correct location.
Turn table When the ignition switch is OFF, the navigation system cannot get the signal from the gyroscope (angular speed sensor). Therefore, the displayed direction may be wrong and the correct road may not be easily returned to after rotating the vehicle on a turntable with the ignition OFF. Place SEL710V Slippery roads On snow, wet roads,
gravel, or other roads where tires may slip easily, accumulated mileage errors may cause the vehicle mark to deviate from the correct road. Slopes When parking in sloped garages, when travelling on banked roads, or in other cases where the vehicle turns when tilted, an error in the turning angle will occur, and the vehicle mark may deviate from the
road. Road not displayed on the map screen If after travelling about 10 km (6 miles) the correct location has not been restored, perform location correction and, if necessary, direction correction.
When driving on new roads or other roads not displayed on the map screen, map matching does not function correctly and matches the location to a nearby road. When the vehicle returns to a road which is on the map, the vehicle mark may deviate from the correct road. SEL699V Map data Different road pattern (Changed due to repair) If the road
pattern stored in the map data and the actual road pattern are different, map matching does not function correctly and matches the location to a nearby road. The vehicle mark may deviate from the correct road. ELK0201D Vehicle Use of tire chains Drive the vehicle for a while. If the When tire chains are used, the miledistance is still deviated, adjust
it by age is not correctly detected, and the using the distance adjustment funcvehicle mark may deviate from the tion. (If the tire chain is removed, correct road. recover the original value.) EL-4223 NAVIGATION SYSTEM Example of Symptoms Judged Not Malfunction (Cont'd) Cause (condition) Precautions for driving Driving condition Remarks
(correction, etc.) Just after the engine is started If the vehicle is driven off just after the engine is started when the gyroscope (angular speed sensor) correction is not completed, the vehicle can lose its direction and may have deviated from the correct location. Wait for a short while before driving after starting the engine. Continuous driving without
stopping When driving long distances without stopping, direction errors may accumulate, and the current location mark may deviate from the correct road. Stop and adjust the orientation. Abusive driving Spinning the wheels or engaging in other kinds of abusive driving may result in the system being unable to perform correct detection, and may
cause the vehicle mark to deviate from the correct road. If after travelling about 10 km (6 miles) the correct location has not been restored, perform location correction and, if necessary, direction correction. If the accuracy of location settings is poor, accuracy may be reduced when the correct road cannot be found, particularly in places where there
are many roads. Enter in the road displayed on the screen with an accuracy of approx. 1 mm. NOTE: Whenever possible, use detailed map for the correction. If the accuracy of location settings during correction is poor, accuracy may be reduced afterwards.
Perform direction correction. Position correction accuracy How to correct location SEL699V Direction when location is corrected SEL702V THE CURRENT POSITION MARK SHOWS A POSITION WHICH IS COMPLETELY WRONG In the following cases, the current location mark may appear on completely different position in the map depending on
the GPS satellite signal receiving conditions. In this case, perform location correction and direction correction. + When location correction has not been done — If the receiving conditions of the GPS satellite signal is poor, if the current location mark becomes out of place, it may move to a completely different location and not come back if location
correction is not done. The position will be corrected if the GPS signal can be received. + When the vehicle has traveled by ferry, or when the vehicle has been being towed — Because calculation of the current location cannot be done when travelling with the ignition OFF, for example when travelling by ferry or when being towed, the location before
travel is displayed. If the precise location can be detected with GPS, the location will be corrected. THE CURRENT POSITION MARK JUMPS In the following cases, the current location mark may appear to jump as a result of automatic correction of the current location. + When map matching has been done — If the current location and the current
location mark are different when map matching is done, the current location mark may seem to jump.
At this time, the location may be “corrected” to the wrong road or to a location which is not on a road. + When GPS location correction has been done — If the current location and the current location mark are different when the location is corrected using GPS measurements, the current location mark may seem to jump.
At this time, the location may be “corrected” to a location which is not on a road.
EL-4224 NAVIGATION SYSTEM Example of Symptoms Judged Not Malfunction (Cont'd) THE CURRENT LOCATION MARK IS IN A RIVER OR THE SEA The navigation system moves the current location mark with no distinction between land and rivers or sea. If the location mark is somehow out of place, it may appear that the vehicle is driving in a
river or the sea. WHEN DRIVING ON THE SAME ROAD, SOMETIMES THE CURRENT LOCATION MARK IS IN THE RIGHT PLACE AND SOMETIMES IT IS THE WRONG PLACE The conditions of the GPS antenna (GPS data) and gyroscope (angular speed sensor) change gradually. Depending on the road traveled and the operation of the steering
wheel, the location detection results will be different. Therefore, even on a road on which the location has never been wrong, conditions may cause the vehicle mark to deviate. LOCATION CORRECTION BY MAP MATCHING IS SLOW + + The map matching function needs to refer to the data of the surrounding area. It is necessary to drive some
distance for the function to work. Because map matching operates on this principle, when there are many roads running in similar directions in the surrounding area, no matching determination may be made. The location may not be corrected until some special feature is found. ALTHOUGH THE GPS RECEIVING DISPLAY IS GREEN, THE VEHICLE
MARK DOES NOT RETURN TO THE CORRECT LOCATION + + + The GPS accuracy has an error of about 10 m (30 ft). In some cases the current location mark may not be on the correct street, even when GPS location correction is done. The navigation system compares the results of GPS location detection with the results from map-matching
location detection. The one which is determined to have higher accuracy is used. GPS location correction may not be performed when the vehicle is stopped. THE NAME OF THE CURRENT PLACE IS NOT DISPLAYED The current place name may not be displayed if there are no place names displayed on the map screen. CONTENTS OF THE DISPLAY
DIFFER FOR THE BIRDVIEWT AND THE (FLAT) MAP SCREEN Difference of the BIRDVIEWT screen from the flat map screen are as follows.
+ + + + + The current place name displays names which are primarily in the direction of vehicle travel. The amount of time before the vehicle travel or turn angle is updated on the screen is longer than for the (flat) map display. The conditions for display of place names, roads, and other data are different for nearby areas and for more distant areas.
Some thinning of the character data is done to prevent the display becoming to complex. In some cases and in some locations, the display contents may differ. The same place name, street name, etc.
may be displayed multiple times. EL-4225 NAVIGATION SYSTEM Program Loading NOTE: Program loading is operated when the version of soft is upgraded to the latest one, or when language is switched. SKIA9552E EL-4226 DOOR MIRROR/WAGON AND HARDTOP MODELS Wiring Diagram — MIRROR —/LHD Models TEL083N EL-4227 DOOR
MIRROR/WAGON AND HARDTOP MODELS Wiring Diagram — MIRROR —/LHD Models (Cont'd) TEL084N EL-4228 DOOR MIRROR/WAGON AND HARDTOP MODELS Wiring Diagram — MIRROR —/RHD Models TEL085N EL-4229 DOOR MIRROR/WAGON AND HARDTOP MODELS Wiring Diagram — MIRROR —/RHD Models (Cont'd) TEL086N EL-
4230 HEATED SEAT/WAGON AND HARDTOP MODELS Wiring Diagram — HSEAT — TEL087N EL-4231 HEATED SEAT/WAGON AND HARDTOP MODELS Wiring Diagram — HSEAT — (Cont'd) TEL671A EL-4232 AUTOMATIC SPEED CONTROL DEVICE (ASCD)/WAGON AND HARDTOP MODELS Schematic/TB48 and TD42Ti Engine Models TEL088N
EL-4233 AUTOMATIC SPEED CONTROL DEVICE (ASCD)/WAGON AND HARDTOP MODELS Wiring Diagram — ASCD —/TB48 and TD42Ti Engine Models TEL569M EL-4234 AUTOMATIC SPEED CONTROL DEVICE (ASCD)/WAGON AND HARDTOP MODELS Wiring Diagram — ASCD —/TB48 and TD42Ti Engine Models (Cont'd) TEL570M EL-4235
AUTOMATIC SPEED CONTROL DEVICE (ASCD)/WAGON AND HARDTOP MODELS Wiring Diagram — ASCD —/TB48 and TD42Ti Engine Models (Cont'd) TEL089N EL-4236 AUTOMATIC SPEED CONTROL DEVICE (ASCD)/WAGON AND HARDTOP MODELS Wiring Diagram — ASCD —/TB48 and TD42Ti Engine Models (Cont'd) TEL090N EL-4237
POWER WINDOW/WAGON AND HARDTOP MODELS Schematic TEL091N EL-4238 POWER WINDOW/WAGON AND HARDTOP MODELS Wiring Diagram — WINDOW — TEL254M EL-4239 POWER WINDOW/WAGON AND HARDTOP MODELS Wiring Diagram — WINDOW — (Cont'd) TEL092N EL-4240 POWER WINDOW/WAGON AND HARDTOP
MODELS Wiring Diagram — WINDOW — (Cont'd) TEL093N EL-4241 POWER WINDOW/WAGON AND HARDTOP MODELS Wiring Diagram — WINDOW — (Cont'd) LHD WAGON MODELS TEL094N EL-4242 POWER WINDOW/WAGON AND HARDTOP MODELS Wiring Diagram — WINDOW — (Cont'd) RHD WAGON MODELS TEL095N EL-4243
POWER DOOR LOCK/WAGON AND HARDTOP MODELS Schematic/Without Theft Warning System Models TEL096N EL-4244 POWER DOOR LOCK/WAGON AND HARDTOP MODELS Wiring Diagram — D/LOCK —/Without Theft Warning System Models TEL097N EL-4245 POWER DOOR LOCK/WAGON AND HARDTOP MODELS Wiring Diagram —
D/LOCK —/Without Theft Warning System Models (Cont'd) TEL098N EL-4246 POWER DOOR LOCK/WAGON AND HARDTOP MODELS Wiring Diagram — D/LOCK —/Without Theft Warning System Models (Cont'd) TEL099N EL-4247 POWER DOOR LOCK/WAGON AND HARDTOP MODELS Wiring Diagram — D/LOCK —/Without Theft Warning System
Models (Cont'd) TEL100N EL-4248 POWER DOOR LOCK/WAGON AND HARDTOP MODELS Schematic/With Theft Warning System Models TEL573M EL-4249 POWER DOOR LOCK/WAGON AND HARDTOP MODELS Wiring Diagram — D/LOCK —/LHD Models With Theft Warning System TEL101N EL-4250 POWER DOOR LOCK/WAGON AND
HARDTOP MODELS Wiring Diagram — D/LOCK —/LHD Models With Theft Warning System (Cont'd) TEL102N EL-4251 POWER DOOR LOCK/WAGON AND HARDTOP MODELS Wiring Diagram — D/LOCK —/LHD Models With Theft Warning System (Cont'd) TEL103N EL-4252 POWER DOOR LOCK/WAGON AND HARDTOP MODELS Wiring Diagram
— D/LOCK —/LHD Models With Theft Warning System (Cont'd) TEL104N EL-4253 POWER DOOR LOCK/WAGON AND HARDTOP MODELS Wiring Diagram — D/LOCK —/RHD Models With Theft Warning System TEL105N EL-4254 POWER DOOR LOCK/WAGON AND HARDTOP MODELS Wiring Diagram — D/LOCK —/RHD Models With Theft Warning
System (Cont'd) TEL106N EL-4255 POWER DOOR LOCK/WAGON AND HARDTOP MODELS Wiring Diagram — D/LOCK —/RHD Models With Theft Warning System (Cont'd) TEL107N EL-4256 POWER DOOR LOCK/WAGON AND HARDTOP MODELS Wiring Diagram — D/LOCK —/RHD Models With Theft Warning System (Cont'd) TEL108N EL-4257
POWER DOOR LOCK/WAGON AND HARDTOP MODELS Schematic — Super Lock — TEL109N EL-4258 POWER DOOR LOCK/WAGON AND HARDTOP MODELS Wiring Diagram — S/LOCK — TEL110N EL-4259 POWER DOOR LOCK/WAGON AND HARDTOP MODELS Wiring Diagram — S/LOCK — (Cont'd) TEL111N EL-4260 POWER DOOR
LOCK/WAGON AND HARDTOP MODELS Wiring Diagram — S/LOCK — (Cont'd) TEL112N EL-4261 POWER DOOR LOCK/WAGON AND HARDTOP MODELS Wiring Diagram — S/LOCK — (Cont'd) TEL113N EL-4262 POWER DOOR LOCK/WAGON AND HARDTOP MODELS Wiring Diagram — S/LOCK — (Cont'd) TEL114N EL-4263 MULTI-REMOTE
CONTROL SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — MULTI —/LHD Models Except for Europe, The Middle East and With Theft Warning System TEL829M EL-4264 MULTI-REMOTE CONTROL SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — MULTI —/LHD Models Except for Europe, The Middle East and With
Theft Warning System (Cont'd) TEL721M EL-4265 MULTI-REMOTE CONTROL SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — MULTI —/RHD Models Except for Europe, South Africa and With Theft Warning System TEL115N EL-4266 MULTI-REMOTE CONTROL SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — MULTI
—/RHD Models Except for Europe, South Africa and With Theft Warning System (Cont'd) TEL116N EL-4267 MULTI-REMOTE CONTROL SYSTEM/WAGON AND HARDTOP MODELS Schematic/With Theft Warning System Models TEL584M EL-4268 MULTI-REMOTE CONTROL SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — MULTI
—/LHD Models with Theft Warning System TEL586M EL-4269 MULTI-REMOTE CONTROL SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — MULTI —/LHD Models with Theft Warning System (Cont'd) TEL117N EL-4270 MULTI-REMOTE CONTROL SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — MULTI —/LHD Models
with Theft Warning System (Cont'd) TEL589M EL-4271 MULTI-REMOTE CONTROL SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — MULTI —/LHD Models with Theft Warning System (Cont'd) TEL799M EL-4272 MULTI-REMOTE CONTROL SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — MULTI —/RHD Models with
Theft Warning System TEL118N EL-4273 MULTI-REMOTE CONTROL SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — MULTI —/RHD Models with Theft Warning System (Cont'd) TEL592M EL-4274 MULTI-REMOTE CONTROL SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — MULTI —/RHD Models with Theft Warning
System (Cont'd) TEL119N EL-4275 MULTI-REMOTE CONTROL SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — MULTI —/LHD Models for Europe and The Middle East TEL120N EL-4276 MULTI-REMOTE CONTROL SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — MULTI —/LHD Models for Europe and The Middle East
(Cont'd) TEL121N EL-4277 THEFT WARNING SYSTEM/WAGON AND HARDTOP MODELS Schematic TEL122N EL-4278 THEFT WARNING SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — THEFT —/LHD Models TEL123N EL-4279 THEFT WARNING SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — THEFT —/LHD
Models (Cont'd) TEL124N EL-4280 THEFT WARNING SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — THEFT —/LHD Models (Cont'd) TEL726M EL-4281 THEFT WARNING SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — THEFT —/LHD Models (Cont'd) TEL125N EL-4282 THEFT WARNING SYSTEM/WAGON AND
HARDTOP MODELS Wiring Diagram — THEFT —/LHD Models (Cont'd) TEL126N EL-4283 THEFT WARNING SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — THEFT —/RHD Models TEL127N EL-4284 THEFT WARNING SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — THEFT —/RHD Models (Cont'd) TEL128N EL-4285
THEFT WARNING SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — THEFT —/RHD Models (Cont'd) TEL129N EL-4286 THEFT WARNING SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram — THEFT —/RHD Models (Cont'd) TEL142N EL-4287 THEFT WARNING SYSTEM/WAGON AND HARDTOP MODELS Wiring Diagram —
THEFT —/RHD Models (Cont'd) TEL130N EL-4288 THEFT WARNING SYSTEM/WAGON AND HARDTOP MODELS NOTE EL-4289 SUPER LOCK CONTROL UNIT/WAGON AND HARDTOP MODELS Schematic/RHD Models for Europe TEL131N EL-4290 SUPER LOCK CONTROL UNIT/WAGON AND HARDTOP MODELS Schematic/RHD Models for
Europe (Cont'd) TEL132N EL-4291 UNIFIED METER CONTROL UNIT (TIME CONTROL SYSTEM)/WAGON AND HARDTOP MODELS Schematic/Except RHD Models for Europe and With Theft Warning System Models TEL133N EL-4292 NATS (Nissan Anti-Theft System)/TB48DE ENGINE MODELS FOR EUROPE Wiring Diagram — NATS — TEL134N
EL-4293 NATS (Nissan Anti-Theft System)/TB48DE ENGINE MODELS FOR EUROPE Wiring Diagram — NATS — (Cont'd) TEL729M EL-4294 NATS (Nissan Anti-Theft System)/ZD ENGINE MODELS Wiring Diagram — NATS —/LHD Models for Europe TEL135N EL-4295 NATS (Nissan Anti-Theft System)/ZD ENGINE MODELS Wiring Diagram — NATS
—/LHD Models for Europe (Cont'd) TEL136N EL-4296 NATS (Nissan Anti-Theft System)/ZD ENGINE MODELS Wiring Diagram — NATS —/RHD Models for Europe TEL137N EL-4297 NATS (Nissan Anti-Theft System)/ZD ENGINE MODELS Wiring Diagram — NATS —/RHD Models for Europe (Cont'd) TEL138N EL-4298 NATS (Nissan Anti-Theft
System)/ZD ENGINE MODELS NOTE EL-4299 LOCATION OF ELECTRICAL UNITS/WAGON AND HARDTOP MODELS Engine Compartment CEL449M EL-4300 LOCATION OF ELECTRICAL UNITS/WAGON AND HARDTOP MODELS Engine Compartment (Cont'd) CEL579M EL-4301 LOCATION OF ELECTRICAL UNITS/WAGON AND HARDTOP
MODELS Passenger Compartment — LHD Models CEL580M EL-4302 LOCATION OF ELECTRICAL UNITS/WAGON AND HARDTOP MODELS Passenger Compartment — LHD Models (Cont'd) CEL581M EL-4303 LOCATION OF ELECTRICAL UNITS/WAGON AND HARDTOP MODELS Passenger Compartment — RHD Models CEL582M EL-4304
LOCATION OF ELECTRICAL UNITS/WAGON AND HARDTOP MODELS Passenger Compartment — RHD Models (Cont'd) CEL583M EL-4305 LOCATION OF ELECTRICAL UNITS/WAGON AND HARDTOP MODELS NOTE EL-4306 HARNESS LAYOUT How to Read Harness Layout Example: G2 E1 B/6 : ASCD ACTUATOR Connector color / Cavity
Connector number Grid reference The following Harness Layouts use a map style grid to help locate connectors on the drawings: + Main Harness + Engine Room Harness + Body Harness To 1) 2) 3) 4) 5) use the grid reference Find the desired connector number on the connector list. Find the grid reference. On the drawing, find the crossing of the
grid reference letter column and number row. Find the connector number in the crossing zone. Follow the line (if used) to the connector. CONNECTOR SYMBOL Main symbols of connector (in Harness Layout) are indicated in the below. Water proof type Standard type Connector type Male Female — — Male + Cavity: Less than 4 + Relay connector +
Cavity: From 5 to 8 + Cavity: More than 9 + Ground terminal etc. — EL-4307 Female HARNESS LAYOUT/WAGON AND HARDTOP MODELS Main Harness/LHD Models TEL071V EL-4308 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Main Harness/LHD Models (Cont'd) TEL072V EL-4309 HARNESS LAYOUT/WAGON AND HARDTOP
MODELS Main Harness/LHD Models (Cont'd) TEL073V EL-4310 HARNESS LAYOUT/WAGON AND HARDTOP MODELS NOTE EL-4311 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Main Harness/RHD Models TEL074V EL-4312 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Main Harness/RHD Models (Cont'd) TEL075V EL-4313
HARNESS LAYOUT/WAGON AND HARDTOP MODELS Main Harness/RHD Models (Cont'd) TEL076V EL-4314 HARNESS LAYOUT/WAGON AND HARDTOP MODELS NOTE EL-4315 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Engine Room Harness/LHD Models GASOLINE ENGINE MODELS TEL077V EL-4316 HARNESS LAYOUT/WAGON
AND HARDTOP MODELS Engine Room Harness/LHD Models (Cont'd) TEL078V EL-4317 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Engine Room Harness/LHD Models (Cont'd) DIESEL ENGINE MODELS TEL079V EL-4318 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Engine Room Harness/LHD Models (Cont'd) TEL080V EL-
4319 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Engine Room Harness/LHD Models (Cont'd) PASSENGER COMPARTMENT TEL081V EL-4320 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Engine Room Harness/LHD Models (Cont'd) TEL082V EL-4321 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Engine Room
Harness/RHD Models GASOLINE ENGINE MODELS TEL083V EL-4322 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Engine Room Harness/RHD Models (Cont'd) TEL084V EL-4323 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Engine Room Harness/RHD Models (Cont'd) DIESEL ENGINE MODELS TEL085V EL-4324 HARNESS
LAYOUT/WAGON AND HARDTOP MODELS Engine Room Harness/RHD Models (Cont'd) TEL086V EL-4325 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Engine Room Harness/RHD Models (Cont'd) PASSENGER COMPARTMENT TEL087V EL-4326 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Engine Room Harness/RHD Models
(Cont'd) TEL088V EL-4327 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Engine Harness ZD ENGINE TEL089V EL-4328 HARNESS LAYOUT/WAGON AND HARDTOP MODELS NOTE EL-4329 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Body Harness/LHD Models WAGON TEL090V EL-4330 HARNESS LAYOUT/WAGON AND
HARDTOP MODELS Body Harness/LHD Models (Cont'd) TEL091V EL-4331 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Body Harness/LHD Models (Cont'd) HARDTOP TEL092V EL-4332 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Body Harness/LHD Models (Cont'd) TEL093V EL-4333 HARNESS LAYOUT/WAGON AND
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HARDTOP MODELS Body Harness/RHD Models (Cont'd) TEL097V EL-4337 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Body No. 2 Harness/LHD Models WAGON TEL098V EL-4338 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Body No. 2 Harness/LHD Models (Cont'd) HARDTOP TEL099V EL-4339 HARNESS LAYOUT/WAGON
AND HARDTOP MODELS Body No. 2 Harness/RHD Models WAGON TEL100V EL-4340 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Body No. 2 Harness/RHD Models (Cont'd) HARDTOP TEL101V EL-4341 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Chassis Harness TEL102V EL-4342 HARNESS LAYOUT/WAGON AND HARDTOP
MODELS LHD MODELS Front Door Harness (Driver side) TEL103V RHD MODELS TEL104V EL-4343 HARNESS LAYOUT/WAGON AND HARDTOP MODELS LHD MODELS Front Door Harness (Passenger side) TEL105V RHD MODELS TEL106V EL-4344 HARNESS LAYOUT/WAGON AND HARDTOP MODELS LH SIDE Rear Door Harness TEL107V
RH SIDE TEL108V EL-4345 HARNESS LAYOUT/WAGON AND HARDTOP MODELS Back Door Harness and Rear Window Defogger Harness TEL109V EL-4346 WIRING DIAGRAM CODES (CELL CODES) Wiring Diagram Codes (Cell Codes) Use the chart below to find out what each wiring diagram code stands for. Refer to the wiring diagram code in
the alphabetical index to find the location (Page number) of each wiring diagram. Code Section Wiring Diagram Name Code Section Wiring Diagram Name A/C, A HA Auto Air Conditioner R/HEAT HA Rear Heater System A/C, M HA Manual Air Conditioner REMOTE EL Audio (Remote Control Switch) A/CCUT EC Air Conditioner Control ROOM/L EL
Interior Room Lamp A/T AT A/T S/LOCK EL Power Door Lock — Super Lock ASCD EL Automatic Speed Control Device S/TANK FE Sub Fuel Tank Control System AUDIO EL Audio SRS RS Supplemental Restraint System BACK/L EL Back-up Lamp STAB RA Stabilizer Release Device CD/CHG EL CD Auto Changer STOP/L EL Stop Lamp CHIME EL
Warning Chime TAIL/L EL Parking, License and Tail Lamps COMPAS EL Compass and Thermometer THEFT EL Theft Warning System COOL/B HA Cool Box TRQ/SG EC Engine Torque Control Signal D/LOCK EL Power Door Lock TURN EL DEF EL Rear Window Defogger Turn Signal and Hazard Warning Lamps DEICER EL Wiper Deicer VSS EC
Vehicle Speed Sensor DTRL EL Headlamp — Daytime Light System WARN EL Warning Lamps F/FOG EL Front Fog Lamp WINDOW EL Power Window FICD EC IACV-FICD Solenoid Valve WIP/R EL Rear Wiper and Washer GLOW EC Quick Glow System WIPER EL Front Wiper and Washer H/AIM EL Headlamp Aiming Control System H/LAMP EL
Headlamp HEATUP EC Heat Up Switch HLC EL Headlamp Washer HORN EL Horn HSEAT EL Heated Seat ILL EL Illumination LOAD EC Electrical Load Signal MAFS EC Mass Air Flow Sensor METER EL Meter and Gauges MIRROR EL Door Mirror MULTI EL Multi-remote Control System NATS EL Nissan Anti-Theft System NAVI EL Navigation
System NONDTC AT Non-detective Items P/ANT EL Power Antenna PHONE EL Telephone POWER EL Power Supply Routing R/COOL HA Rear Cooler System R/FOG EL Rear Fog Lamp EL-4347 ENGINE MECHANICAL SECTION EM MODIFICATION NOTICE: + Valve lifter of ZD30DDTi engine has been changed from a type without shim to a type
with adjusting shim. CONTENTS PREPARATION..........4002 Special Service Tools ....4002 ZD CAMSHAFT ....4003 Removal and Installation ....4003 Inspection..........4003 VALVE CLEARANCE
INSPECTIONS AND ADJUSTMENTS..........4005 Adjustments ....4005 TIMING GEAR ....4008 Removal and Installation ....4008 Removal..........4009
Installation..........4012 CYLINDER HEAD..........4016 Disassembly and Assembly..........4016 SERVICE DATA AND SPECIFICATIONS (SDS) ......4017 Valve ....4017 EM-4001 PREPARATION Special Service Tools Tool number Tool name
Description Changing adjusting shims KV101151S0 Lifter stopper set j 1 KV10115110 Camshaft pliers j 2 KV10115120 Lifter stopper NT041 KV101056S0 Ring gear stopper j 1 KV10105630 Adapter j 2 KV10105610 Plate Preventing crankshaft from rotating a: 3 (0.12) b: 6.4 (0.252) c: 2.8 (0.110) d: 6.6 (0.260) e: 107 (4.21) f: 14 (0.55) g: 20 (0.79) h:
14 (0.55) dia. Unit: mm (in) NT617 KV10111100 Seal cutter Removing gear case NT046 WS39930000 Tube presser Pressing the tube of liquid gasket NT052 EM-4002 CAMSHAFT ZD Removal and Installation SEM350GA Inspection VISUAL INSPECTION OF VALVE LIFTER AND ADJUSTING SHIM + + + Check if surfaces of valve lifter and adjusting
shim have any wear or cracks. Replace valve lifter or adjusting shim if necessary. Select the thickness of adjusting shim so that valve clearance is the standard when replacing. Refer to EM-4005, “Adjustments”. SEM160D VALVE LIFTER OUTER DIAMETER Measure the outer diameter of the valve lifter with a micrometer. Standard: 34.450 - 34.465
mm (1.3563 - 1.3569 in) FEM018 EM-4003 CAMSHAFT Inspection (Cont'd) ZD LIFTER GUIDE INNER DIAMETER Measure the lifter guide inner diameter of the cylinder head with an inside micrometer. Standard: 34.495 - 34.515 mm (1.3581 - 1.3589 in) PBIC0367E VALVE LIFTER CLEARANCE CALCULATIONS Clearance = Lifter guide inner
diameter − Valve lifter outer diameter Standard: 0.030 - 0.065 mm (0.0012 - 0.0026 in) If it exceeds the standard value, refer to the outer diameter and inner diameter standard values and replace valve lifter and/or cylinder head. EM-4004 VALVE CLEARANCE INSPECTIONS AND ADJUSTMENTS ZD Adjustments NOTE: Adjust valve clearance while
engine is cold. + Remove the adjusting shim for parts which are outside the specified valve clearance.
1. Remove the spill tube. Refer to “BASIC SERVICE PROCEDURE” in EC section. 2. Rotate the crankshaft to face the cam nose for adjusting shims that are to be removed upward. 3. Thoroughly wipe off engine oil on the upper side of the cylinder head (for the air gun used in step 7). 4. Move the round hole of the adjusting shim to the front with an
extra-fine screwdriver or like that. CAUTION: Perform (the above procedure) while camshaft do not contact with adjusting shim. PBIC0373E FEM029A 5. Grip the camshaft with camshaft pliers (SST), then using the camshaft as a support point, push the adjusting shim downward to compress the valve spring. CAUTION: Do not damage the camshaft,
cylinder head, and the outer circumference of the valve lifter. 6.
With the valve spring in a compressed state, remove the camshaft pliers (SST) by securely setting the outer circumference of the valve lifter with the end of the lifter stopper (SST). + Hold the lifter stopper by hand until the shim is removed. CAUTION: Do not retrieve the camshaft pliers forcefully, as the camshaft will be damaged. 7. Remove the
adjusting shim from the valve lifter by blowing air through the round hole of the adjusting shim with an air gun. CAUTION: + When blowing, use goggles to protect your eye. + To prevent any remaining oil from being blown around, thoroughly wipe the area clean. PBIC0374E EM-4005 ZD VALVE CLEARANCE INSPECTIONS AND ADJUSTMENTS
Adjustments (Cont'd) 8. Remove the adjusting shim by using a magnetic holder. PBIC0375E SEM145D 9. Measure the thickness of the adjusting shim using a micrometer. + Measure near the center of the shim (the part that touches the camshaft). 10.
Select the new adjusting shim from the following methods. Calculation method of the adjusting shim thickness: $t = t_1 + (C_1 - C_2)$ t = Thickness of replacement adjusting shim t_1 = Thickness of removed adjusting shim C_1 = Measured valve clearance C_2 = Specified valve clearance When engine is cold [Approximately 20°C (68°F)] 0.35 mm (0.014 in)
+ JEM184G New adjusting shims have the thickness stamped on the rear side. Stamped Shim thickness 2.35 2.40 . . . 3.05 2.35 (0.0925) 2.40 (0.0945) . .
. 3.05 (0.1201) mm (in) The thickness of the adjusting shim ranges from 2.35 to 3.05 mm (0.0925 to 0.1201 in), where in the space of 0.05 mm (0.0020 in). There are 15 types of shims available. 11. Fit the selected adjusting shim to the valve lifter. CAUTION: Place the stamped side of the adjusting shim to the valve lifter. + EM-4006 VALVE
CLEARANCE INSPECTIONS AND ADJUSTMENTS Adjustments (Cont'd) ZD 12. Compress the valve spring using the camshaft pliers (SST) and remove the lifter stopper (SST). FEM029A 13. Rotate the crankshaft 2 to 3 times by hand. 14. Confirm that the valve clearance is within the specification. Valve clearance: When engine is cold [Approximately
20°C (68°F)] Intake and exhaust 0.30 - 0.40 mm (0.012 - 0.016 in) 15.
Install remaining parts in the reverse order of removal. EM-4007 ZD TIMING GEAR Removal and Installation 2 idler gears are shown in this chapter. Idler gear (A) has scissors gear, and idler gear (B) does not. SEM185HB EM-4008 TIMING GEAR ZD Removal 1.
+ + + + + + + + + Remove the following parts. Undercover Engine oil (Drain) Engine coolant (Drain) Engine cover Intercooler Air inlet pipe Air cleaner case Throttle body Swirl and intake air control valve control solenoid valve and bracket + Vacuum tank + Glow plate + Rocker cover + Spill tube + Radiator shrouds (Rear and Lower) + Cooling fan
+ Radiator hose (Upper and Lower) + Auxiliary belt and auto tensioner. 2. Remove the alternator. 3. Remove the A/C compressor and bracket with piping connected. Move and support it at the LH side of engine bay with a rope to avoid putting load on piping. Refer to HA section in NISSAN Service Manual (Publication No. SM9E-Y61CG2 or SM9E-
Y61CG3). 4. Remove the chain cover, timing chain and other parts in connection. Before removing timing chain, remove injection pump sprocket with No. 1 cylinder being positioned at TDC. Refer to the figure. Refer to “TIMING CHAIN”, EM-37 in NISSAN Service Manual (Publication No. SM9E-Y61CG2 or SM9E-Y61CG3). CAUTION: After removing
timing chain, never rotate crankshaft, or the piston will push the valve up and damage the valve. + Do not paint the match mark on the timing chain beforehand as the No. 1 cylinder is set at the TDC during assembly. SEM376G 5. Remove the TDC sensor. CAUTION: + Do not drop or hit the sensor. + Store in a clean place free of iron filings, etc. + Do
not place near any magnetic equipment. 6. Remove the water pump and its stud bolts. Refer to “WATER PUMP” in LC section in NISSAN Service Manual (Publication No. SM9E-Y61CG2 or SM9E-Y61CG3). 7. Remove the water inlet. EM-4009 TIMING GEAR Removal (Cont'd) ZD 8. Remove the crankshaft pulley. + To fix the crankshaft, remove the
starter motor, and set ring gear stopper (SST). CAUTION: + Do not damage or magnetize the signal detection protrusions of the crankshaft pulley. + After removing timing chain, never rotate crankshaft, or the piston will push the valve up and damage the valve. FEM051 9. Remove the gear case. + Using the grooved places shown in the figure,
remove the gear case by using a screwdriver and a seal cutter (SST). 10. Remove the front oil seal from the gear case by using a screwdriver. CAUTION: Do not damage the gear case. FEM052 SEM377G 11. Fix the internal mechanism setting bolt [part No.: 81-20620-28, screw dia.: M6, dimension below neck: 20 mm (0.79 in)] to the bolt hole of the
idler gear (A) and tighten to the specification. : 2.5 - 3.4 Nzm (0.25 - 0.35 kg-m, 22 - 30 in-lb) CAUTION: + Only use the genuine setting bolt, or the idler gear (A) will be damaged. + Do not rotate the crankshaft as the head of the setting bolts interferes with the gear case. + Do not remove the setting bolt from the idler gear (A) until the timing chain
and all of the parts in connection have been installed.
+ If these bolts are not installed, internal mechanism will disengage after the idler gear is removed. This will prohibit the idler gear from being reusable. 12. Remove the idler gears (A) and (B). + Check the backlash of each gear before removing. Refer to EM-52, “BACKLASH OF EACH GEAR”, “Inspection” in NISSAN Service Manual (Publication No.
SM9E-Y61CG2 or SM9E-Y61CG3). CAUTION: + Do not loosen the internal mechanism setting bolt of the idler gear (A). (The idler gear cannot be reused when the internal mechanism is released.) + During removal of the idler gears (A) and (B), do not face the rear side downward as the idler shaft will drop. SEM348G EM-4010 TIMING GEAR
Removal (Cont'd) ZD 13. Set the fuel injection timing gear with the pulley holder (SST). 14. Remove injection pump timing gear. SEM378G 15. Extract the balancer shaft taking care not to damage the inner bushes of the cylinder block.
16. Remove the fuel injection pump. 17.
Remove the front plate. SEM352G EM-4011 TIMING GEAR ZD Installation SEM206H 1. Install the front plate. 1) Install the O-ring and gasket to the cylinder block. + Apply liquid gasket uniformly and thinly to the front and reverse sides of gasket. Use Genuine Liquid Gasket or equivalent. 2) Install the front plate. + Before installing, apply liquid
gasket to the mating surfaces of the cylinder block and the oil pan (upper). Use Genuine Liquid Gasket or equivalent.
+ Lightly tap with a hammer if the dowel pin cannot be inserted easily. CAUTION: Make sure that the O-ring does not pop out. SEM207H 2. Install the fuel injection pump. + After installing the front plate, align the 6 mm (0.24 in) dia. hole of the pump flange and the 6 mm (0.24 in) dia. hole position of the pump body. 3. Install each timing gear. +
Align the match marks of the timing gears by referring to the figure below. + When installing timing gear, follow the order (j 1 ,j 2) shown in the dotted box in the figure below to facilitate installation. FEM042 EM-4012 TIMING GEAR Installation (Cont'd) ZD FEM043 4.
Install the front oil seal to the gear case. + Apply engine oil to the fitting side. + Evenly insert the front oil seal using a drift [outer dia.: approx. 64 mm (2.52 in)] completely. CAUTION: Make sure the oil seal does not spill off the end side of the gear case. FEM044 5. Install the gear case. 1) Before installing gear case, remove all traces of liquid gasket
from mating surface using a scraper. 2) Align gasket with dowel and install. SEM353G EM-4013 TIMING GEAR Installation (Cont'd) FEM045 ZD 3) Install the O-rings to the gear case. + The O-ring at the top position shown in the figure can be installed in during cylinder head installation. 4) Apply a continuous bead of liquid gasket to the gear case
and the oil pan (upper). + Use Genuine Liquid Gasket or equivalent. CAUTION: Apply the liquid gasket around the bolt holes shown by the arrows in the figure. a. Coat of liquid gasket should be maintained within the specified range as shown in the figure. b. Attach gear case to cylinder block within 5 minutes after coating.
c. Wait at least 30 minutes before refilling engine oil or starting engine. SEM208H 5) Install the gear case. + Insert the gear case diagonally to prevent it from dragging over the liquid gasket applied on the timing gear case and the oil pan (upper). + Align the dowel pin at the lower position of cylinder block with the hole on the gear case side. + Tap
the area around the dowel pin with a plastic hammer if it cannot be inserted easily. CAUTION: Do not pop out the O-rings. SEM209H 6) Install the holding bolt referring to the figure. Dimension below neck: A: 25 mm (0.98 in) B: 30 mm (1.18 in) C: 50 mm (1.97 in) D: 80 mm (3.15 in) E: 20 mm (0.79 in) 7) Install the holding bolts from the rear side of
the front plate. FEM046 6. Install the crankshaft pulley. + Insert by aligning the 2 sides of the oil pump with the 2 sides of the shaft on the rear side of the crankshaft pulley. CAUTION: Do not damage the oil seal lip when inserting. + Refer to EM-51, “Removal” in NISSAN Service Manual (Publication No. SM9E-Y61CG2 or SM9E-Y61CG3) for the
crankshaft setting procedures when tightening the holding nut. 7. Install the water pump.
+ Install it before installing the TDC sensor. Refer to “Water Pump” in LC section. EM-4014 TIMING GEAR Installation (Cont'd) SEM349G ZD 8. Install the TDC sensor. + Align the bracket knock pin with the hole on the gear case side and tighten the holding bolt. + Confirm that the clearance between the end of the sensor and the signal detection
protrusion of the crankshaft pulley is within the specification. Standard: 1±0.8 mm (0.039±0.031 in) + Arrange the TDC sensor harness to the position shown in the figure. CAUTION: Confirm that the harness has no deflection around the crankshaft pulley when installing the clamp. 9. Install the timing chain, other parts in connection with the timing
chain, and the chain cover. Refer to EM-37, “TIMING CHAIN” in NISSAN Service Manual (Publication No. SM9EY61CG2 or SM9E-Y61CG3). 10. Remove the internal mechanism setting bolt of the idler gear (A).
11. Apply liquid gasket to the plug thread. 12. Install in the reverse order of removal.
FEM047 EM-4015 CYLINDER HEAD ZD Disassembly and Assembly FEM081A EM-4016 SERVICE DATA AND SPECIFICATIONS (SDS) ZD Valve VALVE CLEARANCE Unit: mm (in) Items Cold* Intake and exhaust 0.30 - 0.40 (0.012 - 0.016) *: Approximately 20°C (68°F) AVAILABLE SHIMS Thickness mm (in) Identification mark 2.35 (0.0925) 2.35 2.40
(0.0945) 2.40 2.45 (0.0965) 2.45 2.50 (0.0984) 2.50 2.55 (0.1004) 2.55 2.60 (0.1024) 2.60 2.65 (0.1043) 2.65 2.70 (0.1063) 2.70 2.75 (0.1083) 2.75 2.80 (0.1102) 2.80 2.85 (0.1122) 2.85 2.90 (0.1142) 2.90 2.95 (0.1161) 2.95 3.00 (0.1181) 3.00 3.05 (0.1201) 3.05 JEM184G VALVE LIFTER Unit: mm (in) Valve lifter outer diameter 34.450 - 34.465 (1.3563
- 1.3569) Lifter guide inner diameter 34.495 - 34.515 (1.3581 - 1.3589) Clearance between lifter and lifter guide 0.030 - 0.065 (0.0012 - 0.0026) EM-4017 ACCELERATOR CONTROL, FUEL & EXHAUST SYSTEMS SECTION FE MODIFICATION NOTICE: + Wiring diagram of sub fuel tank control system has been modified. CONTENTS TROUBLE
DIAGNOSES ....4002 Self-diagnosis for Sub Fuel Tank Control Module.4002 Circuit Diagram — S/TANK — ....4003 Wiring Diagram — S/TANK — ....4004 EXHAUST SYSTEM ....4008 FE-4001 TROUBLE DIAGNOSES Self-diagnosis for Sub Fuel Tank Control Module
SUB FUEL TANK CONTROL MODULE TERMINALS AND REFERENCE VALUE Remarks: Specification data are reference values, and measured between each terminal and j 11 or j 4 (ground) with a voltmeter. WIRE COLOR TERMINAL NO.
1 ITEM CONDITION Wagon and Hardtop R Power source Ignition switch “ON” DATA (DC voltage) Approximately 12V Ignition switch “ON” Sub fuel tank switch is “ON”. Main fuel tank is not full. Sub fuel tank is not empty. 2 G/B Sub fuel pump 3 G/W Power source Ignition switch “ON” and “ACC” Approximately 12V 4 B Grounding Any time

Approximately 0V 5 W/L Sub fuel gauge Ignition switch “ON” Approximately 0 - 4V 6 PU Full switch Approximately 12V Ignition switch “ON” Approximately 5V Main fuel tank is not full. 7 G Fuel gauge Ignition switch “ON” Approximately 0 - 2.5V 8 W/G Engine running Engine running Approximately 12V 9 G/B Sub fuel tank switch Ignition switch “ON” Approximately 5V Sub fuel tank switch is “OFF”.
Ignition switch “ON” 10 L Indicator Approximately 12V Sub fuel tank switch is “OFF”. 11 B Grounding Any time Approximately 0V 12 R Power source Any time Approximately 12V Ignition switch “ON” 13 W/R Sub fuel tank warning lamp Engine is not running. Sub fuel tank control system is in normal condition. FE-4002 Approximately 0V TROUBLE DIAGNOSES Circuit Diagram — S/TANK — WAGON AND HARDTOP MODELS TFE061M FE-4003 TROUBLE DIAGNOSES Wiring Diagram — S/TANK — WAGON AND HARDTOP MODELS TFE051M FE-4004 TROUBLE DIAGNOSES Wiring Diagram — S/TANK — (Cont’d) WAGON AND HARDTOP MODELS TFE062M FE-4005 TROUBLE DIAGNOSES Wiring Diagram — S/TANK — (Cont’d) WAGON AND HARDTOP MODELS (LHD) TFE063M FE-4006 TROUBLE DIAGNOSES Wiring Diagram — S/TANK — (Cont’d) WAGON AND HARDTOP MODELS (RHD) TFE064M FE-4007 EXHAUST SYSTEM SFE872A FE-4008 SUPER MULTIPLE JUNCTION (SMJ) LHD MODELS Installation To install SMJ, tighten bolts until orange “fulltight” mark appears and then retighten to specified torque as required. : 3 - 5 Nzm (0.3 - 0.5 kg-m, 26 - 43 in-lb) CAUTION: Do not overtighten bolts, otherwise, they may be damaged. CEL773 CEL789 CEL842 RHD MODELS Installation To install SMJ, tighten bolts until orange “fulltight” mark appears and then retighten to specified torque as required.
: 3 - 5 Nzm (0.3 - 0.5 kg-m, 26 - 43 in-lb) CAUTION: Do not overtighten bolts, otherwise, they may be damaged. CEL841 EL-4348 SUPER MULTIPLE JUNCTION (SMJ) Terminal Arrangement CEL584M EL-4349 FUSE AND FUSIBLE LINK BOX/WAGON AND HARDTOP MODELS Terminal Arrangement CEL585M EL-4350 Edition: July 2004 Release: July 2004 (01) Publication No.: SM4E00-1Y61E0E Reference No.: 7711347233 QUICK REFERENCE INDEX GENERAL INFORMATION GI MAINTENANCE MA ENGINE MECHANICAL EM PATROL ENGINE LUBRICATION & COOLING SYSTEMS LC MODEL Y61 SERIES ENGINE CONTROL SYSTEM EC ACCELERATOR CONTROL, FUEL & EXHAUST SYSTEM FE CLUTCH CL MANUAL TRANSMISSION MT AUTOMATIC TRANSMISSION AT TRANSFER TF PROPELLER SHAFT & DIFFERENTIAL CARRIER PD FRONT AXLE & FRONT SUSPENSION FA REAR AXLE & REAR SUSPENSION RA BRAKE SYSTEM BR STEERING SYSTEM ST RESTRAINT SYSTEM RS BODY & TRIM BT HEATER & AIR CONDITIONER HA ELECTRICAL SYSTEM EL ALPHABETICAL INDEX IDX NISSAN EUROPE S.A.S. © 2004 NISSAN EUROPE S.A.S. Produced in The Netherlands Not to be reproduced in whole or in part without the prior written permission of Nissan Europe S.A.S., Paris, France. FOREWORD This manual contains maintenance and repair procedures for NISSAN PATROL, model Y61 series. In order to assure your safety and the efficient functioning of the vehicle, this manual should be read thoroughly. It is especially important that the PRECAUTIONS in the GI section be completely understood before starting any repair task. All information in this manual is based on the latest product information at the time of publication. The right is reserved to make changes in specifications and methods at any time without notice. IMPORTANT SAFETY NOTICE The proper performance of service is essential for both the safety of the technician and the efficient functioning of the vehicle. The service methods in this Service Manual are described in such a manner that the service may be performed safely and accurately. Service varies with the procedures used, the skills of the technician and the tools and parts available. Accordingly, anyone using service procedures, tools or parts which are not specifically recommended by NISSAN must first completely satisfy himself that neither his safety nor the vehicle’s safety will be jeopardized by the service method selected. NISSAN EUROPE S.A.S. Service Engineering Section Paris, France GENERAL INFORMATION SECTION GI OUTLINE OF MODIFICATIONS: + + Manual transmission gear ratio has been modified corresponding to the increase of ZD30DDTi engine horsepower for Europe. Navigation system has been adopted for Europe. APPLIED FROM: For Europe: JN1TESY61U0140001 JN1KESY61U0140001 JN1TFSY61U0010001 Wagon and Hardtop models For the Middle East: JN8BY15Y*5X507001 JN6BY11Y*5X507001 JN8CY15Y*5X470001 JN6CY11Y*5X470001 JN8BY14Y*5X520001 JN8FY15Y*5X540001 For Israel: JN1TESY61*5X806001 JN1KESY61*5X806001 CONTENTS CONSULT-II CHECKING SYSTEM .....4002 Function and System Application .....4002 Nickel Metal Hydride Battery Replacement.....4002 Checking Equipment.....4003 CONSULT-II Data Link Connector (DLC) Circuit ..4003 IDENTIFICATION INFORMATION.....4005 Model Variation .....4005 Identification Number.....4007 Dimensions .....4008 Wheels & Tires .....4009 GI-4001 CONSULT-II CHECKING SYSTEM Function and System Application Diagnostic test mode Function ENGINE A/T ABS AIR BAG NATS*1 SMART ENTRANCE x*2 x*4 — — — — Work support This mode enables a technician to adjust some devices faster and more accurate by following the indications on CONSULT-II. Self-diagnostic results Self-diagnostic results can be read and erased quickly. x x x x — Trouble diagnostic record Current self-diagnostic results and all trouble diagnostic records previously stored can be read. — — — x — — ECU discriminated No. Classification number of a replacement ECU can be read to prevent an incorrect ECU from being installed. — — — x — — Data monitor Input/Output data in the ECU (ECM) can be read. x x x — — — DTC work support This mode enables a technician to set operating conditions to confirm self-diagnosis status/results.
— x — — — — Active test Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range. x — x — — — x x x — — — ECU (ECM) part numECU (ECM) part number can be read. ber Control unit initialization All registered ignition key IDs in NATS components can be initialized and new IDs can be registered. — — — — x — Self-function check ECM checks its own NATS communication interface. — — — — x*3 — DTC confirmation The results of SRT (System Readiness Test) and the self-diagnosis status/results can be confirmed. x*2 — — — — — A maximum of four IDs (identifications) can REMO CONT ID SET be registered in the memory using the remote controller. These IDs can be also be UP confirmed and erased as required.
— — — — — x x x x x — — Function test Conducted by CONSULT-II instead of a technician to determine whether each system is “OK” or “NG” (No Good). x: Applicable *1: NATS (Nissan Anti-Theft System) *2: Not available for diesel engine models. *3: Except for ZD30DDTi engine models. *4: RE4R03A models only Nickel Metal Hydride Battery Replacement CONSULT-II contains a nickel metal hydride battery. When replacing the battery obey the following: WARNING: Replace the nickel metal hydride battery with Genuine CONSULT-II battery only. Use of another battery may present a risk of fire or explosion. The battery may present a fire or chemical burn hazard if mistreated. Do not recharge, disassemble or dispose of in fire. Keep the battery out of reach of children and discard used battery conforming to the local regulations. GI-4002 CONSULT-II CHECKING SYSTEM Checking Equipment When ordering the below equipment, contact your NISSAN distributor. Tool name Description NISSAN CONSULT-II j 1 CONSULT-II unit (Tester internal software: Resident version 3.3.0) and accessories j 2 Program card AED01C and AEN00A or AEN00B (For NATS) SGI100A NOTE: + The CONSULT-II must be used in conjunction with a program card. CONSULT-II does not require loading (Initialization) procedure.
+ Be sure the CONSULT-II is turned off before installing or removing a program card. CONSULT-II Data Link Connector (DLC) Circuit (For TD42Ti engine models and TD engine models with NATS) TGI005M GI-4003 CONSULT-II CHECKING SYSTEM CONSULT-II Data Link Connector (DLC) Circuit (Cont’d) (For ECM equipped models except TD42Ti engine and TD engine with NATS) TGI006M INSPECTION PROCEDURE If the CONSULT-II cannot diagnose the system properly, check the following items. Symptom Check item CONSULT-II cannot access any system. + CONSULT-II DLC power supply circuit (Terminal 8) and ground circuit (Terminal 4) (For detailed circuit, refer to EC section, “MIL & DATA LINK CONNECTORS”.) + CONSULT-II (DDL) cable CONSULT-II cannot access individual system. (Other systems can be accessed.) + CONSULT-II program card (Check the appropriate CONSULT-II program card for the system. Refer to “Checking Equipment” above.) + Power supply and ground circuit for the control unit of the system (For detailed circuit, refer to wiring diagram for each system.) + Open or short circuit between the system and CONSULT-II DLC (For detailed circuit, refer to wiring diagram for each system.) GI-4004 IDENTIFICATION INFORMATION Model Variation WAGON AND HARDTOP MODELS Model Rear seat arrangement Destination Steering position Hardtop Station Wagon 2nd seat 2nd center split bench seat Forward facing Engine Side facing or Seatless Front differential 3rd seat Seatless Forward facing Side facing H233B Rear differential Transmission Transfer S GL TB45E FS5R50B Middle East LHD TX12A TB48DE RE5R05A TD42 FS5R50B FS5R50B FS5R50B RHD FS5R50B FS5R50B ZD30DDTi Europe FS5R50B — TGNSLEFY61EKA — — — — — GL — — — — TGPSLEFY61EKQ SGL — — — TGPSLEFY61EKA — SAFARI — — — TGPSLFFY61EKA — S-SAFARI — — — TGPSLHFY61EKA — GL — — — — TGPSLENY61EKQ SGL — — — TGPSLENY61EKA — SAFARI — — — TGPSLFNY61EKA — S-SAFARI — — — TGPSLHNY61EKA — S — — — — TVTSLAFY61NKQ GL — — — — TVTSLEFY61NKQ SGL — — — TVTSLEFY61NKA — S KWSSREFY61UEA — — TWSSREFY61UEA — — KWSSRFFY61UEA — — TWSSRFFY61UEA — — KWSSRFAY61UEA — — TWSSRFAY61UEA — — — — TWSSRHFY61UEA — — — — TWSSRHAY61UEA — KWSSLEFY61UGA KWSSLEFY61USP — TWSSLEFY61UGA — KWSSLFFY61UGA — — TWSSLFFY61UGA — — SE FS5R50B RE5R05A TGNSLEFY61EKQ — LHD TB48DE TGNSLAFY61EKQ — — RE4R03A RE4R03A — — KGNSLFFY61EKA S TX12A — — SGL SE RE4R03A KGNSLAFY61EKA KGNSLAFY61EKQ KGNSLEFY61EKA SAFARI SE RE4R03A H233B/H260 Grade SE — — — TWSSLFFY61USA KWSSLFAY61UGA — — TWSSLFAY61UGA — — — — TWSSLFAY61USA — — — — TWSSLHFY61UGA — — — — TWSSLHFY61USA — — — — TWSSLHAY61UGA — — — — TWSSLHAY61USA — — — — TGPSLHNY61ESA — GI-4005 IDENTIFICATION INFORMATION Model Variation (Cont’d) PREFIX AND SUFFIX DESIGNATIONS T GN S L A F Y61 E K A A: 3rd/2nd seat forward facing Q: 3rd/2nd seat side facing P: 3rd/2nd seat seatless K: Middle East E: RHD for Europe G: Central/South Europe S: North Europe E: Multiport fuel injection system engine N: Diesel engine U: Turbocharger engine F: 5-speed floor shift manual transmission A: 4-speed floor shift automatic transmission N: 5-speed floor shift automatic transmission A: S, STD, DX E: GL (SGL), ST, S F: SGL, TI, SAFARI, SE H: GRX, S-SAFARI, SE L: LH drive R: RH drive S: Long wheelbase GN: TB45E engine VT: TD42 engine WS: ZD30DDTi engine GP: TB48DE engine T: Station Wagon K: Hardtop GI-4006 IDENTIFICATION INFORMATION Identification Number VEHICLE IDENTIFICATION NUMBER (Chassis number) Prefix and suffix designations For the Middle East SGI993-R For Europe (Except for Israel) JN1 T E S Y61 U 0 XXXXXX Vehicle serial number 0: Stopgap (no meaning) U: Europe S: Long wheelbase (4WD) Engine type E: ZD30DDTi F: TB48DE Body type T: Station Wagon K: Hardtop Manufacturer JN1: Japan produced vehicle GI-4007 IDENTIFICATION INFORMATION Identification Number (Cont’d) For Israel JN1 T E S Y61 5 X XXXXXX Vehicle serial number Manufacturing plant X: Hiratsuka Model year 5: 2005 model year S: Long wheelbase (4WD) Engine type E: ZD30DDTi Body type T: Station Wagon K: Hardtop Manufacturer JN1: Japan produced vehicle Dimensions FOR THE MIDDLE EAST Wagon Hardtop Overall length*1 mm (in) 5,080 (200.0)*2, *5 5,030 (198.0)*3, *6 4,505 (177.4)*4, *7 4,460 (175.6)*3, *6 4,505 (177.4)*4, *7 Overall width mm (in) 1,840 (72.4)*3 1,940 (76.4)*2, *4 1,840 (72.4)*3 1,940 (76.4)*4 Overall height mm (in) 1,555 (61.2)*3 1,605 (63.2)*2, *4 1,555 (61.2)*3 1,605 (63.2)*4 Rear tread mm (in) 1,575 (62.0)*3 1,625 (64.0)*2, *4 1,575 (62.0)*3 1,625 (64.0)*4 Wheelbase mm (in) 2,970 (116.9) 2,400 (94.5) *1: With winch, 15 mm (0.59 in) is added to the overall length. With front spoiler, 30 mm (1.18 in) is added. *2: 275/70R16, 275/65R17 tires *3: 235/80R16, 235/80R16LT tires *4: 265/70R16, 265/70R16LT tires *5: 15 mm (0.59 in) is added with pintle hook, and 50 mm (1.97 in) is added with spare tire cover.
*6: 100 mm (3.94 in) is added with spare tire cover. *7: 20 mm (0.79 in) is added with pintle hook, and 55 mm (2.17 in) is added with spare tire cover. FOR EUROPE Wagon Hardtop Overall length mm (in) 5,145 (202.6)*1, *4 5,045 (198.6)*2 5,095 (200.6)*3 4,525 (178.1)*1, *4 4,475 (176.2)*2 4,620 (181.9)*3 Overall width mm (in) 1,940 (76.4)*1, *3 1,840 (72.4)*2 1,940 (76.4)*1, *3 1,840 (72.4)*2 Overall height mm (in) 1,855 (73.0) 1,840 (72.4) Front tread mm (in) 1,605 (63.2)*1, *3 1,555 (61.2)*2 1,605 (63.2)*1, *3 1,555 (61.2)*2 Rear tread mm (in) 1,625 (64.0)*1, *3 1,575 (62.0)*2 1,625 (64.0)*1, *3 1,575 (62.0)*2 Wheelbase mm (in) 2,970 (116.9) 2,400 (94.5) *1: *2: *3: *4: For models equipped with 275/65R17 tires For models equipped with 235/80R16 tires For models equipped with 265/70R16 tires 50 mm (1.97 in) is added with spare tire cover. GI-4008 IDENTIFICATION INFORMATION Wheels & Tires FOR THE MIDDLE EAST Road wheel Size Offset 16 x 6JJ 16 x 8JJ* 17 x 8JJ 35 (1.38) 10 (0.39) 10 (0.39) 235/80R16 109S, 235/80R16LT 265/70R16 112S, 275/70R16, 265/70R16LT 275/65R17 16 x 6JJ 16 x 8JJ* 17 x 8JJ 35 (1.38) 10 (0.39) 10 (0.39) 235/80R16 109S 265/70R16 112S 275/65R17 114H mm (in) Tire size *: Steel or Aluminum wheel FOR EUROPE Road wheel Size Offset Tire size mm (in) *: Steel or Aluminum wheel GI-4009 HEATER & AIR CONDITIONER SECTION HA MODIFICATION NOTICE: + Wiring diagram has been changed. + Automatic A/C controller has been changed. + Front thermo amp. for auto A/C has been eliminated. CONTENTS AUTO DESCRIPTION .....4002 Features (TB48 Engine Models) .....4002 REAR HEATER TROUBLE DIAGNOSES .....4003 Wiring Diagram — R/HEAT —/LHD Models .....4003 Wiring Diagram — R/HEAT —/RHD Models.....4004 Mode Door Motor.....4035 Air Mix Door Motor .....4036 Intake Door Motor.....4037 Blower Motor.....4038 Magnet Clutch.....4039 Insufficient Cooling .....4052 Insufficient Heating .....4053 Self-diagnosis .....4054 REAR COOLER MANUAL TROUBLE DIAGNOSES .....4005 Wiring Diagram — A/C, M —/Wagon and Hardtop Models with ZD Engine .....4005 AUTO DESCRIPTION .....4007 Control Operation .....4007 TROUBLE DIAGNOSES .....4008 Circuit Diagram — A/C, A —/TB48 Engine .....4008 Wiring Diagram — A/C, A —/TB48 Engine .....4009 Circuit Diagram — A/C, A —/TB45 Engine .....4013 Wiring Diagram — A/C, A —/TB45 Engine .....4014 Circuit Diagram — A/C, A —/TD Engine .....4017 Wiring Diagram — A/C, A —/TD Engine .....4018 Circuit Diagram — A/C, A —/ZD Engine .....4021 Wiring Diagram — A/C, A —/ZD Engine .....4022 Self-diagnosis .....4032 Operational Check .....4032 A/C System.....4034 TROUBLE DIAGNOSES .....4055 Wiring Diagram — R/COOL —/LHD Models with Front Auto A/C .....4055 Wiring Diagram — R/COOL —/LHD Models with Front Manual A/C Except for TB45E Engine .....4057 Wiring Diagram — R/COOL —/LHD Models with Front Manual A/C for TB45E Engine.....4059 Wiring Diagram — R/COOL —/RHD Models with Front Auto A/C .....4061 Wiring Diagram — R/COOL —/RHD Models with Front Manual A/C.....4063 COOL BOX TROUBLE DIAGNOSES .....4065 Wiring Diagram — COOL/B —/All Engines Except TB48 and TB45E Wagon Models for the Middle East .....4065 Wiring Diagram — COOL/B —/TB48 and TB45E Engine Wagon Models for the Middle East.....4066 HA-4001 DESCRIPTION AUTO Features (TB48 Engine Models) CAN COMMUNICATION SYSTEM DESCRIPTION CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.
SYSTEM CONSTRUCTION Magnet clutch control RHA408I When A/C switch is pressed, turn fan control dial to ON or set mode control dial to DEF position, A/C auto amp. inputs compressor ON signal to ECM. ECM judges whether compressor can be turned ON, based on each sensor status (refrigerant pressure sensor signal, throttle angle, etc.). When sending compressor ON signal to ECM from A/C auto amp., ECM simultaneously sends compressor feedback signal to unified meter C/U via CAN communication line. Unified meter control unit sends compressor feedback signal to A/C auto amp. Then, A/C auto amp. uses input compressor feedback signal to control air inlet. HA-4002 TROUBLE DIAGNOSES REAR HEATER Wiring Diagram — R/HEAT —/LHD Models THA185M HA-4003 TROUBLE DIAGNOSES REAR HEATER Wiring Diagram — R/HEAT —/RHD Models THA186M HA-4004 TROUBLE DIAGNOSES MANUAL Wiring Diagram — A/C, M —/Wagon and Hardtop Models with ZD Engine THA187M HA-4005 MANUAL TROUBLE DIAGNOSES Wiring Diagram — A/C, M —/Wagon and Hardtop Models with ZD Engine (Cont’d) THA188M HA-4006 DESCRIPTION AUTO Control Operation RHA371I MODE CONTROL DIAL Controls the air discharge outlets. Positions the air outlet doors to the defrost position.
Also positions the intake doors to the outside air position. When shifting mode control dial to DEF under the following conditions compressor is turned ON. (A/C LED ON) + FAN: ON + A/C: OFF TEMPERATURE CONTROL DIAL (POTENTIO TEMPERATURE CONTROL) Increase or decrease the set temperature. FAN CONTROL DIAL Automatically or Manually control the blower speed. Twenty-five speeds are available for manual control. Shifting fan control dial to AUTO, compressor is turned ON automatically. INTAKE SWITCH + + + + + When intake switch is ON, REC LED turns ON, and air inlet is fixed to REC. When press intake switch again, FRE LED turns ON, and air inlet is fixed to FRE. When intake switch is pressed for approximately 1.5 seconds or longer, REC and FRE LEDs blink twice. Then, automatic control mode is entered. Inlet status is displayed even during automatic control. Automatic control mode is entered when REC and FRE LEDs are turned OFF. When shifting mode control dial to DEF position, FRE LED is turned ON, or when compressor is turned from ON to OFF, FRE indicator is automatically turned OFF (fixed to FRE mode). REC mode can be re-entered by pressing intake switch again. (Except DEF position) A/C SWITCH The compressor is ON or OFF. (Pressing the A/C switch when the fan control dial is ON will turn off the A/C switch and compressor.) HA-4007 TROUBLE DIAGNOSES AUTO Circuit Diagram — A/C, A —/TB48 Engine THA189M HA-4008 TROUBLE DIAGNOSES AUTO Wiring Diagram — A/C, A —/TB48 Engine THA190M HA-4009 AUTO TROUBLE DIAGNOSES Wiring Diagram — A/C, A —/TB48 Engine (Cont’d) THA191M HA-4010 AUTO TROUBLE DIAGNOSES Wiring Diagram — A/C, A —/TB48 Engine (Cont’d) THA192M HA-4011 AUTO TROUBLE DIAGNOSES Wiring Diagram — A/C, A —/TB48 Engine (Cont’d) THA193M HA-4012 TROUBLE DIAGNOSES AUTO Circuit Diagram — A/C, A —/TB45 Engine THA194M HA-4013 TROUBLE DIAGNOSES AUTO Wiring Diagram — A/C, A —/TB45 Engine THA195M HA-4014 AUTO TROUBLE DIAGNOSES Wiring Diagram — A/C, A —/TB45 Engine (Cont’d) THA196M HA-4015 AUTO TROUBLE DIAGNOSES Wiring Diagram — A/C, A —/TB45 Engine (Cont’d) THA197M HA-4016 TROUBLE DIAGNOSES AUTO Circuit Diagram — A/C, A —/TD Engine THA198M HA-4017 TROUBLE DIAGNOSES AUTO Wiring Diagram — A/C, A —/TD Engine THA199M HA-4018 AUTO TROUBLE DIAGNOSES Wiring Diagram — A/C, A —/TD Engine (Cont’d) THA200M HA-4019 AUTO TROUBLE DIAGNOSES Wiring Diagram — A/C, A —/TD Engine (Cont’d) THA201M HA-4020 TROUBLE DIAGNOSES AUTO Circuit Diagram — A/C, A —/ZD Engine THA202M HA-4021 TROUBLE DIAGNOSES AUTO Wiring Diagram — A/C, A —/ZD Engine THA203M HA-4022 AUTO TROUBLE DIAGNOSES Wiring Diagram — A/C, A —/ZD Engine (Cont’d) THA204M HA-4023 AUTO TROUBLE DIAGNOSES Wiring Diagram — A/C, A —/ZD Engine (Cont’d) THA205M HA-4024 TROUBLE DIAGNOSES AUTO Self-diagnosis INTRODUCTION AND GENERAL DESCRIPTION The self-diagnostic system diagnoses sensors, door motors, blower motor, etc. by system line. Self-diagnosis is step-1 to 7. There are two ways of changing method during self-diagnosis. + Switching to self-diagnosis step-1 to 4. Shifting from usual control to the self-diagnostic system is accomplished by starting the engine (turning the ignition switch from OFF to ON) and pressing A/C switch for at least 5 seconds. The A/C switch must be pressed within 10 seconds after starting the engine (ignition switch is turned ON). This system will be canceled by either pressing intake switch or turning the ignition switch OFF. Shifting from one step to another is accomplished be means of turning fan control dial, as required. + Switching to self-diagnosis step-5 to 7 (Auxiliary mechanism). Shifting from usual control to the self-diagnostic system is accomplished by starting the engine (turning the ignition switch from OFF to ON) and pressing intake switch for at least 5 seconds. The intake switch must be pressed within 10 seconds after starting the engine (ignition switch is turned ON). This system will be canceled by either pressing A/C switch or turning the ignition switch OFF. Shifting from one step to another is accomplished by means of turning fan control dial, as required. HA-4025 TROUBLE DIAGNOSES Self-diagnosis (Cont’d) AUTO RJIA2106E CAUTION: This A/C system cannot perform the setup of the FOOT position (Self-diagnosis: STEP-6). LED of A/C switch illuminates. It means that it is fixed to the initial setting. HA-4026 AUTO TROUBLE DIAGNOSES Self-diagnosis (Cont’d) STEP-BY-STEP PROCEDURE Set mode control dial to AUTO. . Set temperature control dial to 25°C. . Set fan control dial to OFF. RHA409I . Turn ignition switch ON. . Set in self-diagnostic mode. Within 10 seconds after starting engine (ignition switch is turned “ON”.), press A/C switch for at least 5 seconds. . STEP 1 - LEDs ARE CHECKED. Do all LEDs illuminate? No c Yes Malfunctioning A/C switch or LED. Replace A/C auto amp. . Set fan control dial to AUTO.
. Advance to self-diagnosis STEP 2? No c Yes Malfunctioning fan control dial. Replace A/C auto amp. . Set fan control dial to OFF. .
Return to self-diagnosis STEP 1? Yes . Set fan control dial to AUTO. . j A (Go to next page.) HA-4027 No c Malfunctioning fan control dial. Replace A/C auto amp. AUTO TROUBLE DIAGNOSES Self-diagnosis (Cont’d) j A . STEP 2 - SENSOR CIRCUITS ARE CHECKED FOR OPEN OR SHORT CIRCUIT. Does LED of A/C switch illuminate? No Yes RJIA1480E . Set fan control dial to 1 - 12th step. . B j (Go to next page.) . Refer to the following chart. MODE position Malfunctioning sensor (including circuits) Reference page VENT Ambient sensor HA-125* B/L In-vehicle sensor HA-127* FOOT Sunload sensor*1 HA-129* D/F Intake sensor HA-132* DEF Air mix door motor (LCU) PBR HA-101* *: Refer to Y61 SERVICE MANUAL, Publication No. SM7E-2Y61G1. *1: Conduct self-diagnosis STEP 2 under sunshine. When conducting indoors, aim a light (more than 60W) at sunload sensor, otherwise LED of A/C switch will indicate despite that sunload sensor is functioning properly. HA-4028 AUTO TROUBLE DIAGNOSES Self-diagnosis (Cont’d) j B . STEP 3 - MODE DOOR POSITIONS ARE CHECKED. Does LED of A/C switch illuminate? No Yes RHA372I . Set fan control dial to 13 - 25th step. . Mode door motor is malfunctioning. Result . j C (Go to next page.) HA-4029 LED status Mode door motor operates in good order A/C: ON Mode door motor is malfunctioning REC: ON AUTO TROUBLE DIAGNOSES Self-diagnosis (Cont’d) j C .
STEP 4 - OPERATION OF EACH ACTUATOR IS CHECKED. Engine running. . Refer to the following chart and confirm discharge air flow, air temperature, blower motor voltage and compressor operation. Checks must be made visually, by listening to any noise, or by touching air outlets with your hand, etc. for improper operation. Mode control dial position Actuator test pattern Mode door Intake door Air mix door Blower motor Compressor REC Full Cold 4 - 5V ON REC Full Cold 9 - 11V ON REC Full Cold 7 - 9V OFF FRE Full Hot 7 - 9V OFF FRE Full Hot 7 - 9V ON FRE Full Hot 10 12V ON VENT AUTO RHA654FF VENT VENT B/L B/L FOOT FOOT D/F D/F DEF DEF OK . Turn ignition switch OFF or press intake switch. . END HA-4030 NG c + Air outlet does not change. Go to HA-4035. + Intake door does not change.
Go to HA-4037.
+ Discharge air temperature does not change. Go to HA-4036. + Magnet clutch does not engage. Go to HA-4039. + Blower motor operation is malfunctioning. Go to HA-4038. AUTO TROUBLE DIAGNOSES Self-diagnosis (Cont’d) AUXILIARY MECHANISM: TEMPERATURE SETTING TRIMMER The trimmer compensates for differences in range of ±3°C between temperature setting (Temperature control dial position) and temperature felt by driver. Operating procedures for this trimmer are as follows: 1. Set temperature at 25°C. 2. Set fan control dial to OFF. 3. Turn ignition switch ON. 4. Set in self-diagnostic mode as follows. Within 10 seconds after starting engine (ignition switch is turned ON.), press intake switch for at least 5 seconds. 5. Turn temperature control dial as desired. Temperature will change at a rate of 1°C each time a dial is turned. LED status of each switch Setting temperature FRE REC A/C −3°C ON ON ON −2°C ON ON OFF −1°C ON OFF ON 0°C (Initial setting) OFF OFF OFF 1°C OFF OFF ON 2°C OFF ON OFF 3°C OFF ON ON When battery cable is disconnected, trimmer operation is canceled. Temperature set becomes that of initial condition, i.e. 0°C. AUXILIARY MECHANISM: FOOT POSITION SETTING TRIMMER CAUTION: This A/C system cannot perform the setup of the FOOT position. LED of A/C switch illuminates. It means that it is fixed to the initial setting.
AUXILIARY MECHANISM: INLET PORT MEMORY FUNCTION When ignition switch is turned from OFF to ON, inlet port can be set to AUTO or manual. Operating procedures for this trimmer are as follows: 1. Set fan control dial to 1st - 25th step. 2. Turn ignition switch ON. 3. Set in self-diagnostic mode as follows. Within 10 seconds after starting engine (ignition switch is turned ON.), press intake switch for at least 5 seconds. 4. Press intake switch as desired. LED status of intake switch Setting status FRE REC FRE OFF ON Manual REC status is AUTO control (Initial setmemorized. ting) (Initial setting) ON OFF Manual FRE status is memorized. AUTO control ON ON Manual FRE status is memorized. Manual REC status is memorized.
OFF OFF AUTO control AUTO control HA-4031 REC Setting changeover method Intake switch: ON TROUBLE DIAGNOSES AUTO Operational Check The purpose of the operational check is to confirm that the system is as it should be. The systems which will be checked are the blower, mode (discharge air), intake air, temperature decrease, temperature increase and A/C switch. CONDITIONS: + Engine running and at normal operating temperature. PROCEDURE: 1. Check blower 1) Turn fan control dial to 1st speed. Blower should operate at low speed.
2) Turn fan control dial to 2nd speed, and continue checking blower speed until all speeds are checked. 3) Leave blower on MAX speed.
RHA373I 2. Check discharge air 1) Turn mode control dial to each position. RHA374I 2) Confirm that discharge air comes out according to the air distribution table at left. Refer to “Discharge Air Flow”, “DESCRIPTION” (HA-14) in Y61 SERVICE MANUAL, Publication No. SM7E-2Y61G1.
NOTE: Confirm that the compressor clutch is engaged (sound or visual inspection) and intake door position is at FRESH when the DEF position is selected. Intake door position is checked in the next step. RHA654FF HA-4032 TROUBLE DIAGNOSES Operational Check (Cont’d) AUTO 3. Check intake door 1) Press intake switch. Recirculation indicator should illuminate. 2) Press intake switch again.
Fresh indicator should illuminate.
3) Listen for intake door position change (you should hear blower sound change slightly). RHA375I 4. Check temperature decrease 1) Turn temperature control dial until 18°C. 2) Check for cold air at discharge air outlets. RHA376I 5. Check temperature increase 1) Turn temperature control dial until 32°C. 2) Check for hot air at discharge air outlets. RHA377I 6. Check A/C switch 1) Turn fan control dial to AUTO position. 2) Press A/C switch. (LED will turn ON.) Confirm that the compressor clutch engages (sound or visual inspection). (Discharge air and suction air will depend on ambient, in-vehicle and set temperatures.) RHA378I HA-4033 TROUBLE DIAGNOSES AUTO A/C System TROUBLE DIAGNOSIS PROCEDURE FOR A/C SYSTEM SYMPTOM: + A/C system does not come on. Inspection flow RHA379I *1: HA-96 in Y61 SERVICE MANUAL, Publication No. SM7E-2Y61G1 *2: HA-4032 HA-4034 AUTO TROUBLE DIAGNOSES Mode Door Motor TROUBLE DIAGNOSIS PROCEDURE FOR MODE DOOR MOTOR (LAN) SYMPTOM: + Air outlet does not change. + Mode door motor does not operate normally. Inspection flow RHA380I *1: *2: *3: *4: *5: HA-14* HA-4032 HA-4027 HA-4028 HA-4029 *6: HA-4030 *7: HA-125* *8: HA-127* *9: HA-129* *10: HA-132* *: Refer to Y61 SERVICE MANUAL, Publication No. SM7E-2Y61G1. HA-4035 *11: HA-101* *12: HA-87* *13: HA-99* *14: HA-91* AUTO TROUBLE DIAGNOSES Air Mix Door Motor TROUBLE DIAGNOSIS PROCEDURE FOR AIR MIX DOOR (LAN) SYMPTOM: + Discharge air temperature does not change. + Air mix door motor does not operate. Inspection flow RHA381I *5: HA-127* *1: HA-4027 *6: HA-129* *2: HA-4028 *7: HA-132* *3: HA-4027 see STEP 4 *8: HA-101* *4: HA-125* *: Refer to Y61 SERVICE MANUAL, Publication No. SM7E-2Y61G1. HA-4036 *9: HA-91* *10: HA-100* *11: HA-103* *12: HA-4032 AUTO TROUBLE DIAGNOSES Intake Door Motor TROUBLE DIAGNOSIS PROCEDURE FOR INTAKE DOOR SYMPTOM: + Intake door does not change. + Intake door motor does not operate normally. Inspection flow RHA382I *1: *2: *3: *4: HA-4027 HA-4028 HA-4027 see STEP 4 HA-125* *5: *6: *7: *8: *9: HA-107* *10: HA-106* *11: HA-4032 *12: HA-91* HA-127* HA-129* HA-132* HA-101* *: Refer to Y61 SERVICE MANUAL, Publication No. SM7E-2Y61G1. HA-4037 AUTO TROUBLE DIAGNOSES Blower Motor TROUBLE DIAGNOSIS PROCEDURE FOR BLOWER MOTOR SYMPTOM: + Blower motor operation is malfunctioning. + Blower motor operation is malfunctioning under out of starting fan speed control. Inspection flow RHA383I *1: *2: *3: *4: HA-4027 HA-4028 HA-4030 HA-111* *8: HA-132* *9: HA-91* *10: HA-4032 *5: HA-125* *6: HA-127* *7: HA-129* *: Refer to Y61 SERVICE MANUAL, Publication No. SM7E-2Y61G1. HA-4038 TROUBLE DIAGNOSES AUTO Magnet Clutch TROUBLE DIAGNOSIS PROCEDURE FOR MAGNET CLUTCH SYMPTOM: + Magnet clutch does not engage. Inspection flow RHA384I *1: *2: *3: *4: HA-4027 HA-4027 see STEP 2 HA-4027 see STEP 4 HA-4040: TB48 engine HA-4043: TB45 engine HA-4046: TD engine HA-4049: ZD engine *5: HA-125 in Y61 SERVICE MANUAL, publication No. SM7E-2Y61G1 *6: HA-132 in Y61 SERVICE MANUAL, publication No. SM7E-2Y61G1 *7: HA-4032 *8: HA-91 in Y61 SERVICE MANUAL, publication No. SM7E-2Y61G1 HA-4039 *9: HA-43 in Y61 SERVICE MANUAL, publication No. SM7E-2Y61G1 AUTO TROUBLE DIAGNOSES Magnet Clutch (Cont’d) DIAGNOSTIC PROCEDURE (TB48 ENGINE EXCEPT FOR THE MIDDLE EAST) SYMPTOM: Magnet clutch does not engage when A/C switch and fan control dial are ON. CHECK INTAKE SENSOR CIRCUIT. Refer to self-diagnosis (HA-4027) and intake sensor circuit (HA-132 in Y61 SERVICE MANUAL, publication No. SM7E2Y61G1.) . Yes CHECK POWER SUPPLY FOR COMPRESSOR. Disconnect compressor harness connector. Do approx. 12 volts exist between compressor harness connector terminal No. j 1 and ground?
c Check magnet clutch coil. . NG Replace magnet clutch. Refer to HA-178 in Y61 SERVICE MANUAL (publication No. SM7E-2Y61G1). No . Disconnect A/C relay. Note .
RHA385I CHECK CIRCUIT CONTINUITY BETWEEN A/C RELAY HARNESS CONNECTOR TERMINAL NO. j 3 AND COMPRESSOR HARNESS CONNECTOR TERMINAL NO. j 1 . Continuity should exist. If OK, check harness for short. OK . SHA579F CHECK POWER SUPPLY FOR A/C RELAY. Disconnect A/C relay. Do approx. 12 volts exist between A/C relay harness connector terminal Nos. j 1 , j 5 and ground? No c Yes . CHECK A/C RELAY AFTER DISCONNECTING IT. Refer to HA-41 in Y61 SERVICE MANUAL, publication No. SM1E-Y61EG1. Check power supply circuit and 10A or 20A (No.) located in the fuse block (J/B). Refer to EL section (“Wiring Diagram”, “POWER SUPPLY ROUTING”). N

is not available, select the viscosity from the chart, that is suitable for the outside temperature range. SMA204D MA-4002 ENGINE MAINTENANCE TB45E, TB48DE Cleaning and Changing Air Cleaner Filter To properly tighten wing nuts, position clamps at four places and tighten wing nuts until they touch air cleaner. Then tighten them three more turns by hand. CAUTION: Do not use pliers or any other tools to tighten wing nuts. + Clean inside air cleaner body when changing the element, or cleaning for dry paper type. + SMA981C MA-4003 MANUAL TRANSMISSION SECTION MT MODIFICATION NOTICE: + + Transmission gear ratio has been changed based on the upgrade of ZD30DDTi engine. Service Data and Specifications (SDS) have been changed. CONTENTS FS5R50B General Specifications.....4002 SERVICE DATA AND SPECIFICATIONS .....4002 MT-4001 FS5R50B SERVICE DATA AND SPECIFICATIONS General Specifications TB45E Applied model Pickup Hardtop TB48DE Wagon ZD30DDTi Hardtop TD42 Wagon TD42Ti Wagon & Pickup 4WD Transmission FS5R50B Number of speed 5 Transmission control Floor direct Shift pattern Synchromesh type Warner Gear ratio 1st 4.262 4.084 4.556 4.262 2nd 2.455 2.353 2.625 2.455 3rd 1.488 1.426 1.591 1.488 4th 1.000 1.000 1.000 1.000 OD 0.850 0.880 0.836 0.850 Reverse 3.971 3.806 4.245 3.971 Drive 27 29 26 27 1st 44 44 44 44 2nd 39 39 39 39 3rd 39 39 39 39 OD 25 27 23 25 Reverse 41 41 41 41 Drive 34 35 35 34 1st 13 13 13 13 2nd 20 20 20 20 3rd 33 33 33 33 OD 37 37 37 37 Reverse 13 13 13 13 Number of teeth Mainshaft Countershaft Reverse idler gear Oil capacity 27 ! (Imp pt) 3.5 (6-1/8) 1st, 2nd and 3rd double baulk ring type synchronizer Remarks Reverse synchronizer type MT-4002 PROPELLER SHAFT & DIFFERENTIAL CARRIER SECTION PD MODIFICATION NOTICE: Service Data and Specifications have been changed. CONTENTS SERVICE DATA AND SPECIFICATIONS (SDS) .....4002 Final Drive.....4002 PD-4001 Standard Diff. lock Optional Diff. lock 35/8 4.375 4-pinion H260 Standard 35/8 4.375 4-pinion Wagon 3.0 (5-1/4) 39/11 3.545 Diff. lock Optional 5.4 (9-1/2) 39/11 3.545 2-pinion H233B Standard 5A/T Standard TB48DE Oil capacity (Approx.) 2.4 (4-1/4) 2.1 (3-3/4) 3.0 (5-1/4) 4.7 (8-1/4) 3.7 (6-1/2) 2.4 (4-1/4) ! (Imp pt) 37/9 Number of teeth (Drive gear/drive pinion) LSD 4.111 4-pinion H233B Gear ratio Rear final drive [Grade] 5M/T Optional 37/9 Number of teeth (Drive gear/drive pinion) Oil capacity (Approx.) ! (Imp pt) 4.111 TB45E Gear ratio Front final drive Transmission Engine Body type GENERAL SPECIFICATIONS LSD 37/9 4.111 2.1 (3-3/4) H233B Standard 37/9 4.111 5M/T Diff. lock Optional ZD30DDTi 3.0 (5-1/4) 35/8 4.375 Standard 35/8 4.375 4A/T 2.4 (4-1/4) 37/9 4.111 4-pinion H233B Standard 37/9 4.111 5M/T TD42 SERVICE DATA AND SPECIFICATIONS (SDS) Final Drive PD-4002 Standard 5M/T Transmission Optional Oil capacity (Approx.) ! (Imp pt) 2.4 (4-1/4) 3.0 (5-1/4) 37/9 Number of teeth (Drive gear/drive pinion) LSD 4.111 Diff. lock Gear ratio Rear final drive [Grade] 4-pinion 37/9 Number of teeth (Drive gear/drive pinion) Oil capacity (Approx.) ! (Imp pt) 4.111 Gear ratio Front final drive TB45E Engine Body type 2.1 (3-3/4) Standard 5M/T Diff. lock H233B 5.4 (9-1/2) 2-pinion H233B Standard Hardtop 3.0 (5-1/4) Optional ZD30DDTi 3.0 (5-1/4) 35/8 4.375 Diff. lock Standard 35/8 4.375 4A/T SERVICE DATA AND SPECIFICATIONS (SDS) Final Drive (Cont'd) PD-4003 REAR AXLE & REAR SUSPENSION SECTION MODIFICATION NOTICE: + Wiring diagrams have been changed. CONTENTS STABILIZER RELEASE DEVICE.....4002 Wiring Diagram .....4002 RA-4001 RA STABILIZER RELEASE DEVICE Wiring Diagram LHD MODELS TRA011M RA-4002 STABILIZER RELEASE DEVICE Wiring Diagram (Cont'd) LHD MODELS TRA012M RA-4003 STABILIZER RELEASE DEVICE Wiring Diagram (Cont'd) RHD MODELS TRA013M RA-4004 STABILIZER RELEASE DEVICE Wiring Diagram (Cont'd) RHD MODELS TRA014M RA-4005 RESTRAINT SYSTEM SECTION RS MODIFICATION NOTICE: + + Air bag system wiring diagrams have been changed. Rear seat belt has been changed. CONTENTS TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) .....4002 Schematic .....4002 Wiring Diagram — SRS — (LHD Models) .....4003 Wiring Diagram — SRS — (RHD Models).....4008 SEAT BELTS .....4013 Rear Seat Belt .....4013 RS-4001 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Schematic TRS081M RS-4002 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS — (LHD Models) TRS062M RS-4003 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS — (LHD Models) (Cont'd) TRS082M RS-4004 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS — (LHD Models) (Cont'd) TRS083M RS-4005 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS — (LHD Models) (Cont'd) TD ENGINE MODELS WITH NATS TRS084M RS-4006 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS — (LHD Models) (Cont'd) EXCEPT FOR TD ENGINE MODELS WITH NATS TRS085M RS-4007 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS — (RHD Models) TRS072M RS-4008 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS — (RHD Models) (Cont'd) TRS086M RS-4009 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS — (RHD Models) (Cont'd) TRS087M RS-4010 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS — (RHD Models) (Cont'd) TD ENGINE MODELS WITH NATS TRS088M RS-4011 TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) Wiring Diagram — SRS — (RHD Models) (Cont'd) EXCEPT FOR TD ENGINE MODELS WITH NATS TRS089M RS-4012 SEAT BELTS Rear Seat Belt REMOVAL (WAGON) Remove rear seat. Refer to "SEAT" in BT section for details. Remove 3rd seat. Refer to BT-38 in Service Manual (Pub.
No. SM7E-2Y61G1). Slide side seat belt anchor cover. Remove side seat belt anchor bolt. Remove luggage upper and lower finishers.
Refer to BT-17 in Service Manual (Pub. No. SM7E-2Y61G1). Remove shoulder anchor bolt. Remove headlining. Refer to BT-21 in Service Manual (Pub.
No. SM7E-2Y61G1). Remove the bolt and anchor bolt securing side seat belt retractor, then remove side seat belt and side seat belt retractor. j 9 Remove the bolt and anchor bolt securing center seat belt retractor, then remove center seat belt and center seat belt retractor. j 1 j 2 j 3 j 4 j 5 j 6 j 7 j 8 PIIB1985E RS-4013 SEAT BELTS Rear Seat Belt (Cont'd) REMOVAL (HARDTOP) Fold the rear seat forward. Slide anchor cover. Remove shoulder anchor cover. Remove anchor bolt. Remove shoulder anchor bolt. Remove luggage upper and lower finishers. Refer to BT-17 in Service Manual. (Pub. No. SM7E-2Y61G1). Remove headlining.
Refer to BT-23 in Service Manual (Pub. No. SM7E-2Y61G1). Remove anchor bolt securing side seat belt retractor, then remove side seat belt and side seat belt retractor. j 9 Remove anchor bolt securing center seat belt retractor, then remove center seat belt and center seat belt retractor.
j 1 j 2 j 3 j 4 j 5 j 6 j 7 j 8 PIIB1986E RS-4014 TRANSFER SECTION TF MODIFICATION NOTICE: TX12A transfer model with gear component parts have been changed. CONTENTS MAJOR OVERHAUL .....4002 Case Components .....4002 Gear Components .....4003 TF-4001 MAJOR OVERHAUL Case Components SMT098E TF-4002 MAJOR OVERHAUL Gear Components SMT216E TF-4003