SUBARU
SERIES

Subaru Sambar English Factory Service Manual

Truck & Van

SAMBAR 660

1990~2006

V-KS3
V-KS4
V-KVS
V-KV4

2WD & 4WD

James L. Danko

Subaru Sambar English Factory Service Manual

English Version

Full Version

Truck & Van
Sambar 660cc
2WD &4WD

AT-MT Models

Subaru Kei Vehicles Series

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Yokohama, Japan
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All translations from original Japanese test to English completed by James Danko.

Disclaimer: All translations from one language to another can involve technical errors. The author has found mistakes in the original Japanese text. The best suitable English vocabulary has been chosen by the author.

Credits: I would like to thank the Subaru Motors Corporation (Japan) for their part in supplying required information.

Credits: I would like to thank Yoshiro for all his computer technology to make these books happen. His computer graphics and technology is simply the best. www.yoshiro.com

Introduction

Due to the high request for English version manuals on Japanese mini trucks & Vans, we are publishing wide variety information to provide the mini truck community with the ability to maintain their vehicles.

Japanese mini tucks & vans are produced only for the Japanese market. Therefore, all original manuals are only available in Japanese. This is the first of these books written in English.

Service manuals are not sold to the public in Japan, as in many countries. You must be a new car dealer to receive them. We have a few hundred in stock. We do not sell manuals from our own library. We will start publishing them in English (Translated) and our own original versions.

Translating from Japanese is by no way an easy task. It is a very time consuming effort. This book due to its high volume of diagrams took one year to complete.

This book or manual is for the professional mechanic. Simple items as how to change a spark plug, or an air-filter are not in this book. It is written in Factory Service Manual style. It is full of diagrams and schematics that are easily understood by a professional mechanic. How to do an engine overhaul using the correct parts sizes, measurements, torque, etc. Complete diagrams of all major parts, including body. You will have the same information as the Subaru Factory techs have. This book is written by a mechanic, for mechanics.

We have manuals for all Japanese manufactures. It's a time consuming process, please check our web page frequently as we post more information.

For more information please visit our home page at www.yokohamamotors.com

Comments or information on this book please email to info@yokohamamotors.com

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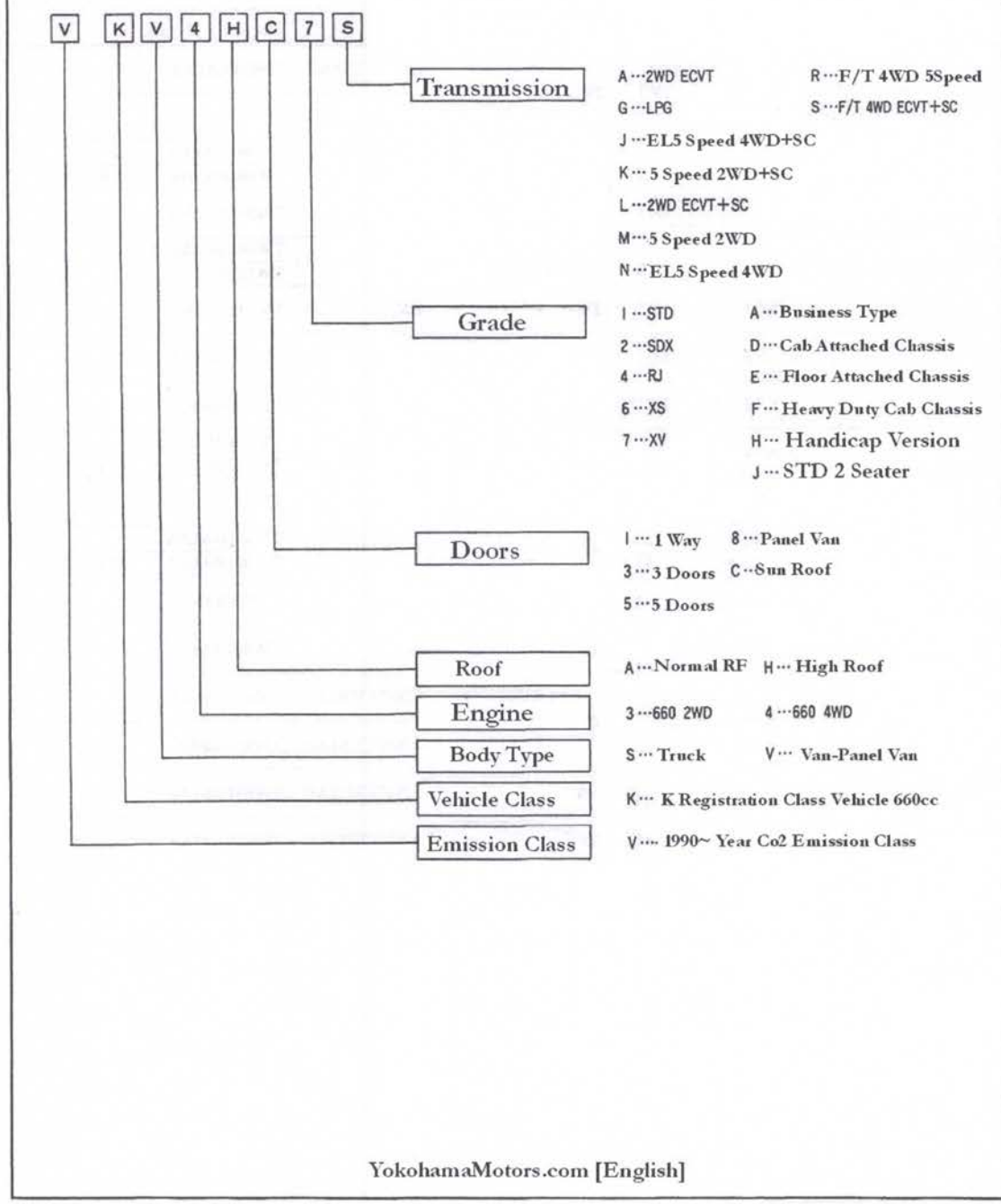
Chapter 1

Vehicle Identification

1. VIN Class Breakdown
2. Engine & Transmission Decoding
3. Engine-Transmission Combination Charts
4. VIN & Code Locations
5. Jacking Positions
6. Tire Size & Air Pressure Guide

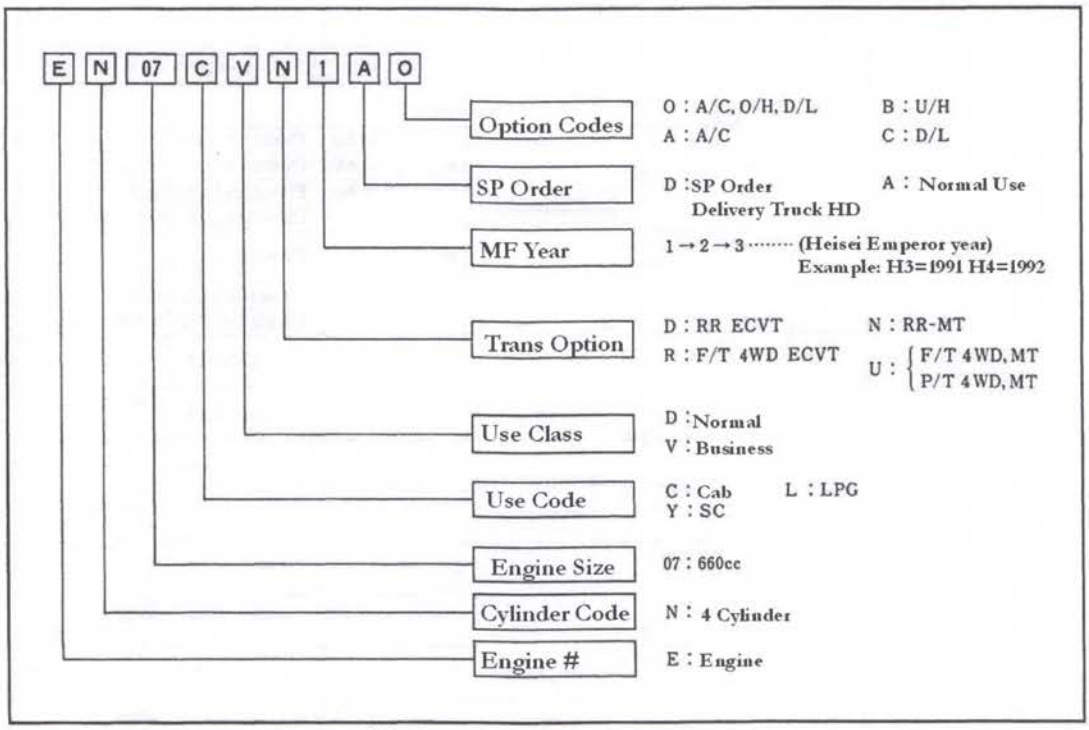
VIN Class Brakedown

Subaru Truck-Van Series K-Vehicles

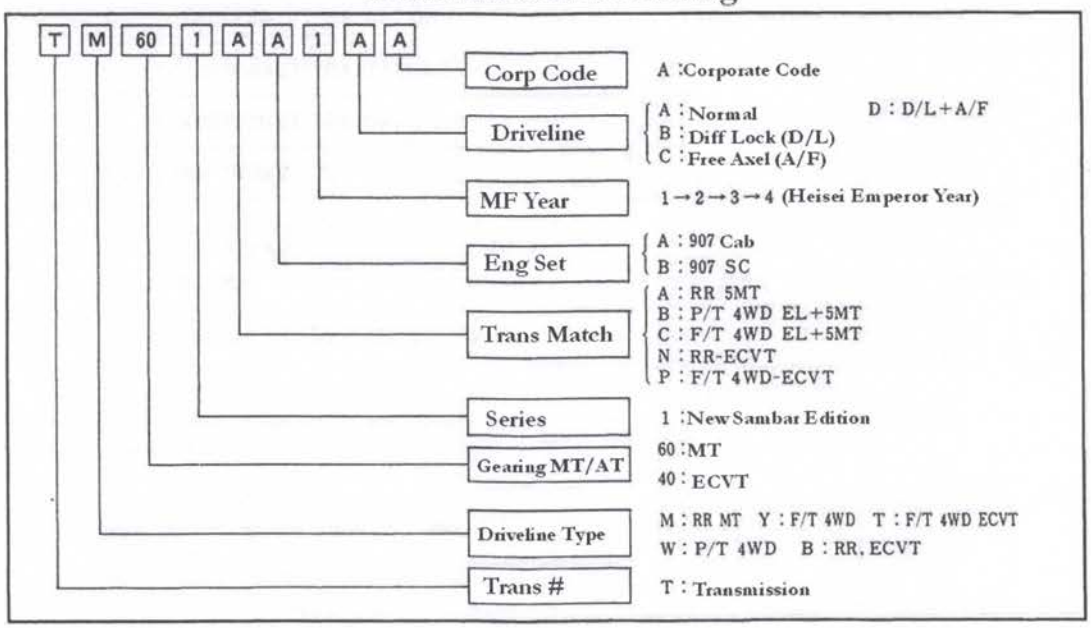


YokohamaMotors.com [English]

Engine Decoding



Transmission Decoding



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Engine & Transmission Combinations
Truck and Van

Vehicle Type				Series	Engine	Trans	Drive	Vehicle Code	Engine Code	Trans Code	Added Notes
TRUCK	NORMAL ROOF		STD	V-KS3	NA	5MT	2WD	KS3A11M	EN07CVN1AO	TM601AA1AA	
				V-KS3				KS3A31M	EN07CVN1AO	〃	
				V-KS4		EL+5MT	4WD	KS4A31N	EN07CVU1AO	TW601BA1AA	
										TW601BA1DA	D/L+A/F
			SDX	V-KS3	NA	5MT	2WD	KS3A32M	EN07CVN1AO	TM601AA1AA	
				V-KS4		EL+5MT	4WD	KS4A32N	EN07CVU1AO	TW601BA1AA	
										TW601BA1DA	D/L+A/F
			Bis Use	V-KS3	NA	5MT	2WD	KS3A3AM	EN07CVN1AO	TM601AA1AA	
			SDX | SC	V-KS3	SC	5MT	2WD	KS3A32K	EN07YVN1AO	TM601AB1AA	
				V-KS3		ECVT	2WD	KS3A32L	EN07YVD1AO	TB401NB1AA	
				V-KS4		EL+5MT	4WD	KS4A32J	EN07YVU1AO	TW601BB1AA	
										TW601BB1DA	D/L+A/F
	HROOF		SDX	V-KS3	NA	5MT	2WD	KS3H32M	EN07CVN1AO	TM601AA1AA	
				V-KS4		EL+5MT	4WD	KS4H32N	EN07CVU1AO	TW601BA1AA	
										TW601BA1DA	D/L+A/F
Panel Van High-Roof			STD	V-KV3	NA	5MT	2WD	KV3H81M	EN07CVN1AO	TM601AA1AA	
				V-KV4		EL+5MT	4WD	KV4H81N	EN07CVU1AO	TW601BA1AA	
VAN	NORMAL R	2Seat	STD	V-KV3	NA	5MT	2WD	KV3A5JM	EN07CVN1AO	TM601AA1AA	
		4 seat		V-KV3				KV3A51M	EN07CVN1AO	TM601AA1AA	
		4 Seat		V-KV4		EL+5MT	4WD	KV4A51N	EN07CVU1AO	TW601BA1AA	
			SDX	V-KV3	NA	5MT	2WD	KV3A52M	EN07CVN1AO	TM601AA1AA	
	HIGH ROOF	2 Seat	STD	V-KV3	NA	5MT	2WD	KV3H5JM	EN07CVN1AO	TM601AA1AA	
		5 Door	SDX	V-KV3	NA	5MT	2WD	KV3H52M	EN07CVN1AO	TM601AA1AA	
				V-KV4		EL+5MT	4WD	KV4H52N	EN07CVU1AO	TW601BA1AA	
		5 Door	SDX | SC	V-KV3	SC	5MT	2WD	KV3H52K-W	EN07YVN1AO	TM601AB1AA	
				V-KV3		ECVT		KV3H52L-W	EN07YVD1AO	TB401NB1AA	
				V-KV4	SC	EL+5MT	P/T 4WD	KV4H 52J	EN07YVU1AO	TW601BA1AA	
				V-KV4		ECVT	F/T 4WD	KV4H52S	EN07YVR1AO	TT401PB1AA	

Engine & Transmission Combinations

Vehicle Type				Series	Engine	Trans	Drive	Vehicle Code	Engine Code	Trans Code	Added Notes
TRY	HIGHT ROOF	5 DOOR	RJ	V-KV3	NA	5MT	2WD	KV3H54M	EN07CVN1AO	TM601AA1AA	
									EN07CVN1AD	TM601AA1AA	Ultra Heater
								KV3HC4M	EN07CVN1AO	TM601BA1AA	Dias-II
									EN07CVN1AD	TM601BA1AA	PRD Roof, U Heater
				V-KV4		EL+ 5MT	P/T 4WD	KV4H54N	EN07CVU1AO	TW601BA1AA	
								KV4HC4N	EN07CVU1AO	TW601BA1AA	Dias-II
										TW601BA1DA	D/L+A/F
			XS	V-KV3	SC	5MT	2WD	KV3H56K	EN07YVN1AO	TM601AB1AA	
								KV3HC6K	EN07YVN1AO	TM601AB1AA	Dias-II
						ECVT		KV3H56L	EN07YVD1AO	TB401NB1AA	
								KV3HC6L	EN07YVD1AO	TB401NB1AA	Dias-II
				V-KV4		EL+ 5MT	F/T 4WD	KV4H56R	EN07YVU1AO	TY601CB1AA	
								KV4HC6R	EN07YVU1AO	TY601CB1AA	Dias-II
						ECVT		KV4H56S	EN07YVR1AO	TT401PB1AA	
								KV4HC6S	EN07YVR1AO	TT401PB1AA	Dias-II
			XV	V-KV3	SC	5MT	2WD	KV3HC7K-J	EN07YVN1AO	TM601AB1AA	Production Roof
						ECVT		KV3HC7L-J	EN07YVD1AO	TB401NB1AA	Production Roof
				V-KV4		EL+ 5MT	F/T 4WD	KV4HC7R-J	EN07YVU1AO	TY601CB1AA	Production Roof
						ECVT		KV4HC7S-J	EN07YVR1AO	TT401PB1AA	Production Roof

W : Rear Wiper
J : Two Tone + Bronze Glass

Maker Option { D/L : Rear Diff Lock, A/F : Free Axel }

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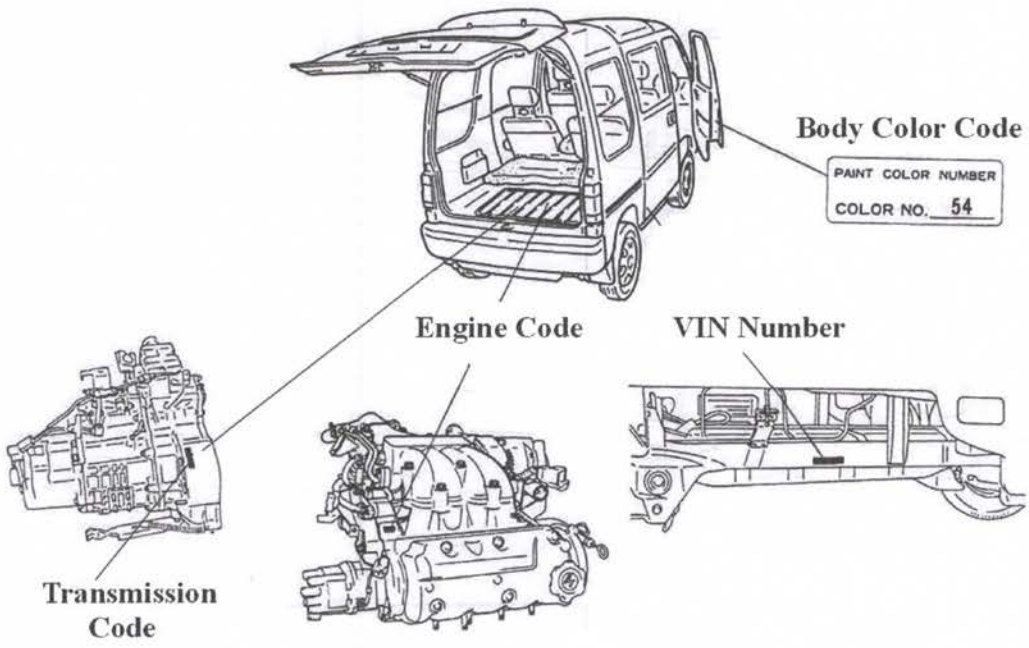
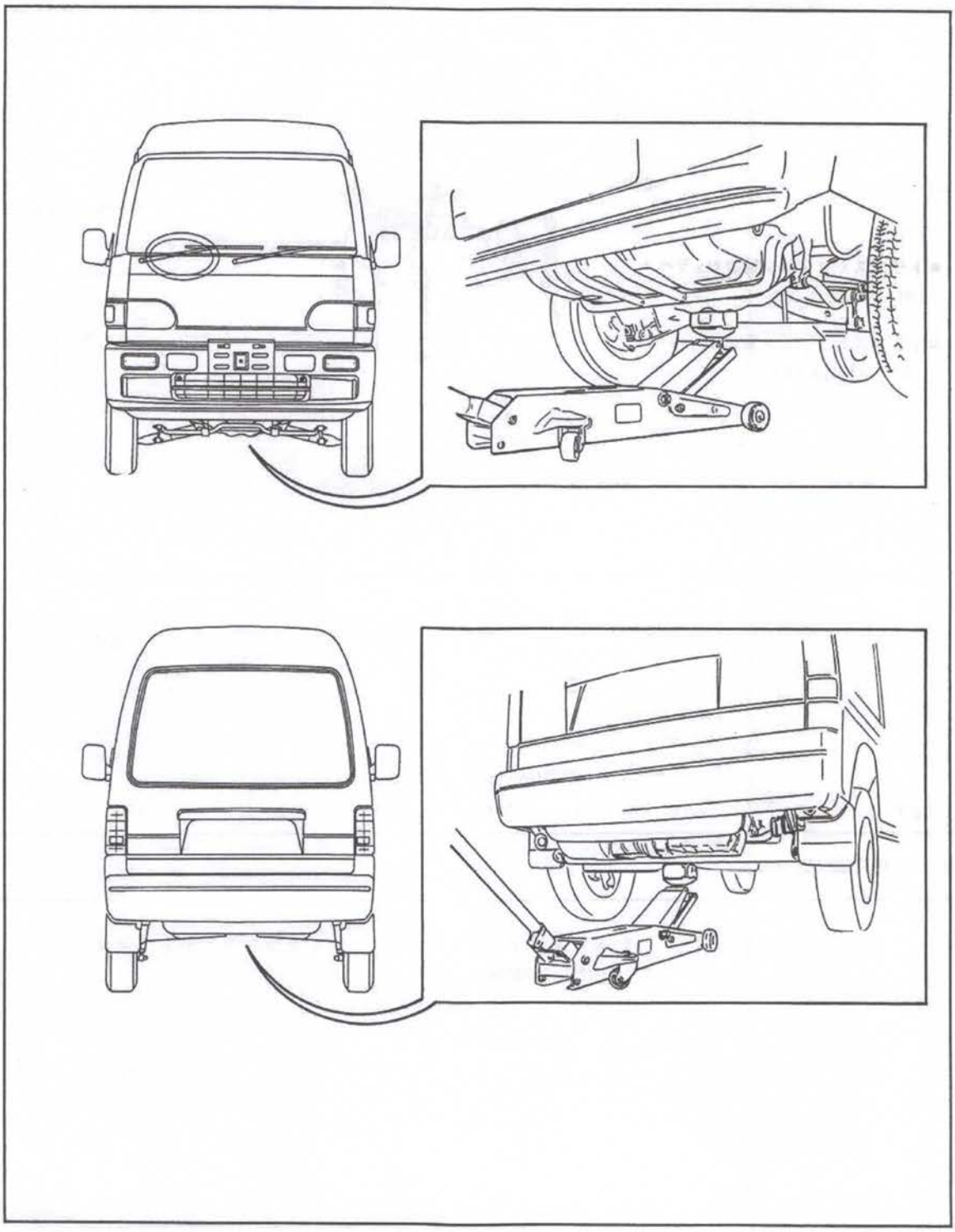
Vehicle VIN Engine & Transmission Number Location



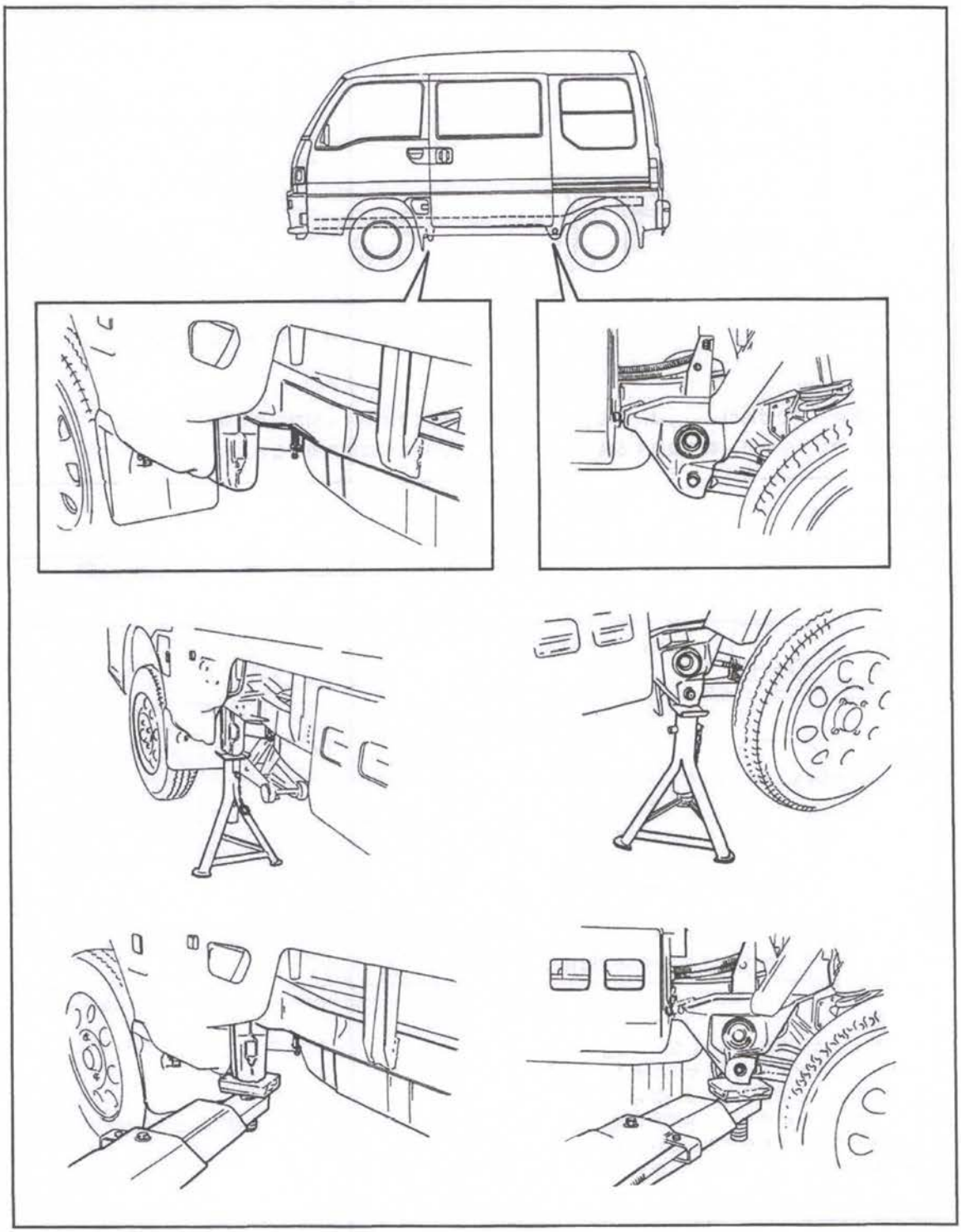
Vehicle Series	
KS 3	001301
KS 4	001301
KV 3	001301
KV 4	001301

Trans Code Series #	
TM60	953208~
TW60	953210~
TY 60	953211~
TB 40	136141~
TT 40	136137~

Jacking Locations



Jacking Positions



Tires

Wheel Balancing - Tire Pressure - Tire Rotation

Wheel Balance Weights

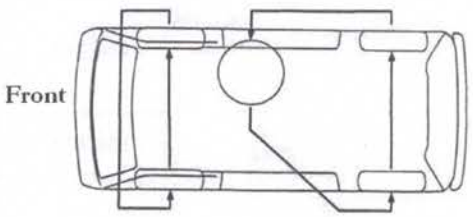
Note: Weight Increments Below

Weight (G)	Balance Weight Part#
5	723141290
10	723141300
15	723141310
20	723141320
25	723141330
30	723141340
35	723141350
40	723141360
45	723141370
50	723141380

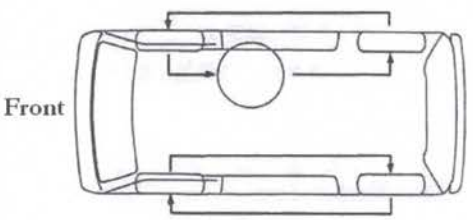
Note: All Weight Mesurments In Grams

Tire Rotation

Bias Ply Tires Rotation



Radial Tire Rotation



Tire Pressure

Tire Air Pressure Chart (kg/cm²)

Vehicle Type			Tire Size	Normal		Maximum	
				Front	Rear	Front	Rea
Truck	350kg	2 WD 4 WD	5.00-12- 4 PR/6PR	2.0	2.2	2.2	3.0
			145R12- 6 PR	2.0	2.2	2.2	3.0
VAN	350kg	2 WD 4 WD	5.00-12- 4 PR/ 6 PR	2.0	2.4	2.2	3.0
			145R12- 6 PR	2.0	2.2	2.2	3.0
Try	200kg	2 WD 4 WD	145SR12	2.0	2.0	2.2	2.2
			155SR12	1.8	2.0	2.0	2.2

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Chapter 2

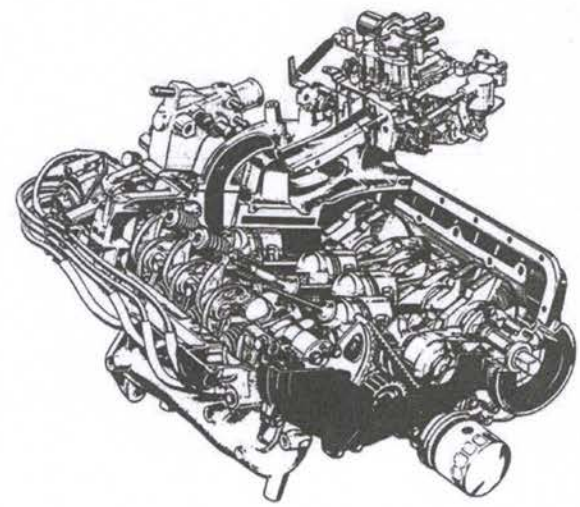
General Maintenance & Tune Up

16. Engine Specifications
17. Testing Equipment
18. Battery & Coolant
19. Oil & Filter Including Supercharger
20. Air & Fuel Filter
21. Spark Plugs
22. V- Belts
23. Valve Adjustment
24. Vacuum Hose
25. Distributor Point Settings
26. Timing
27. Idle Setting
28. CO-HC Levels and Adjustment
29. Engine Vacuum & Troubleshooting
30. Main Relay Location Guide

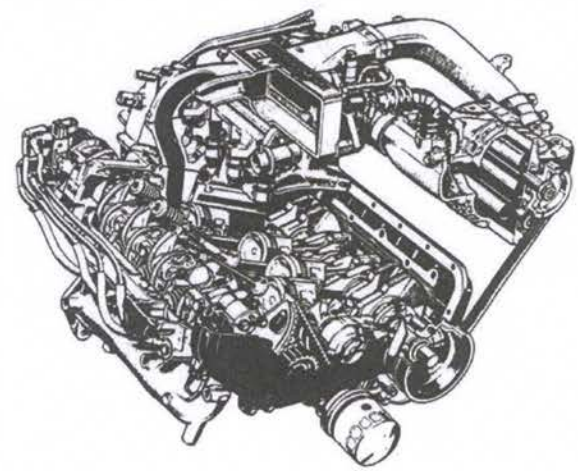
Engine Basic Specifications

Specifications		
Series	EN07C (NA)	EN07Y (SC)
Cylinder	4	←
CAM	SOHC	←
Engine (cc)	658	←
Bore/Stroke (mm)	56.0×66.8	←
Compression	9.8	8.3
HP Rating (PS/rpm)	40/6,500	55/6,200
Torque (kg-m/rpm)	5.5/3,500	7.1/3,800
Fuel	Carburated	EFI
Ignition	STD	Crank Sensor ECU Controled
Firing Order	#1-3-4-2	←
Forced Induction	—	Super Charged

EN07C



EN07Y



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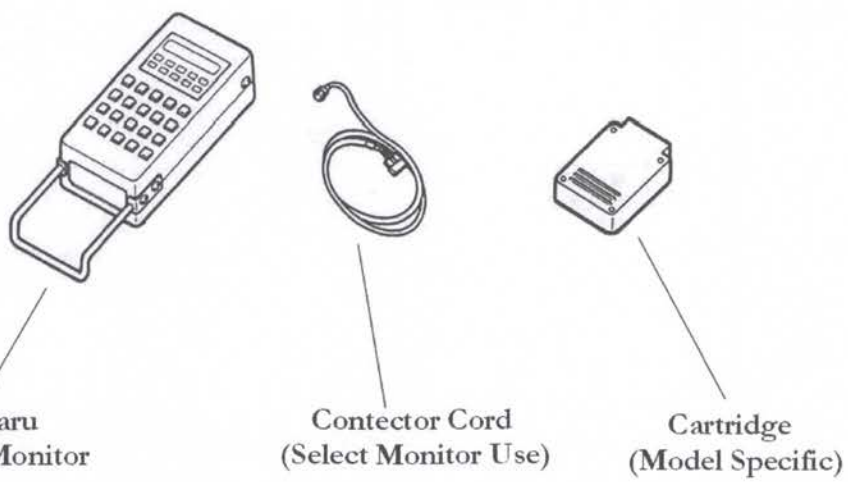
Engine Inspection & Testing Tools

ST	4985454000	Oil Filter Wrench	Oil Filter Replacement
	-----	Battery Tester	
	GU-51C	Compression Gage	Engine Compression
	-----	Timing Light	Engine Timing
	498307900	Subaru Select Monitor	Engine Test
	498348300	Cartridge	For Select Monitor
	-----	Thickness Gage	Valve Adjustment
	NA	NA	NA

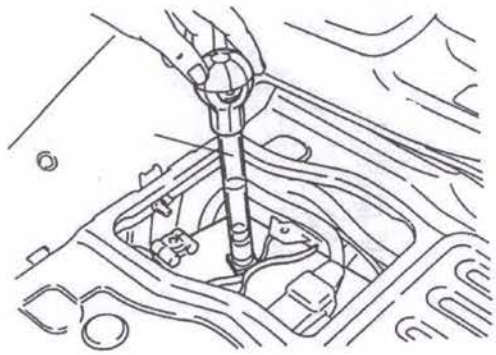
ST= Service Tool



Maintenence Check

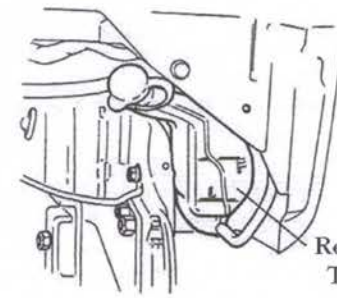
Battery

Battery Maintenance Check
1. Remove Battery Cover
2. Disconnect Battery Terminals
3. Remover Batter
4. Inspect Side of Battery for High-Low Level
5. Fill to Proper Level
6. Use Battery Tester To Check Volt 11.5~14V
7. Use Battery Fluid Tester
8. Clean Battery Terminals
9. Install Battery
10. Start Vehicle

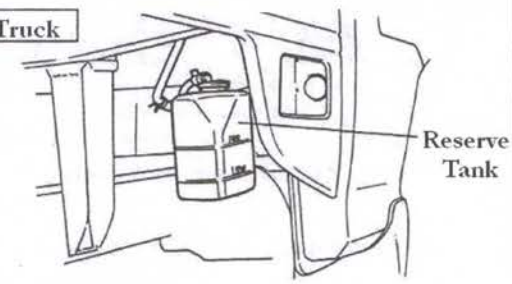


Coolant

VAN



Truck



Coolant Inspection
1. Check Reserve Tank for Proper Level
Note: If Tank is Dirty Remove and Flush
2. Fill Tank to Proper Level
Note: If Coolant Replacement is Scheduled
Drain Entire System & Replace with
New Coolant. Never Re-Use Coolant.

Coolant-Water Ratio

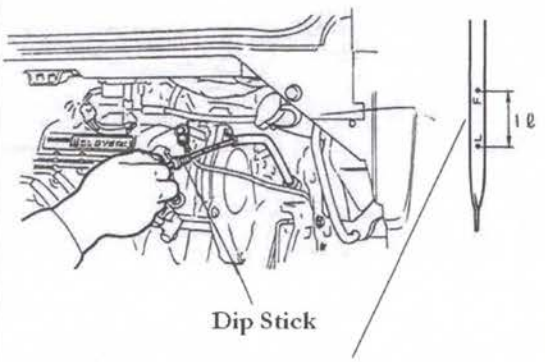
	2WD	4WD
Coolant	30%	50%
Temperature Range	−8℃ (−15℃)	−28℃ (−35℃)

Coolant Inspection

Check	Monthy
Replace	40,000K or 2 Years

Oil Level and Oil Change Including Filter

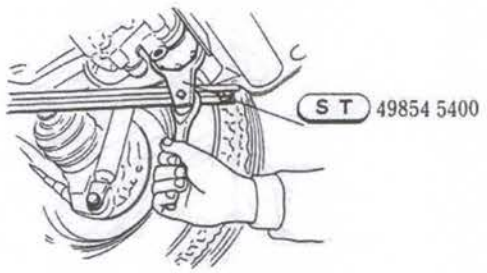
1. Open Engine Cover
2. Pull Out Engine Oil Dip Stick (Handle Yellow)
3. Wipe Off Oil and Repeat
4. Check Oil Level and Must be between L&F
   Note: If Oil is Below "L" or Dirty Proceed to Change Oil.
   Note: If Oil is Clean and a Bit Low Add Fresh Oil to Proper Level



Engine Oil

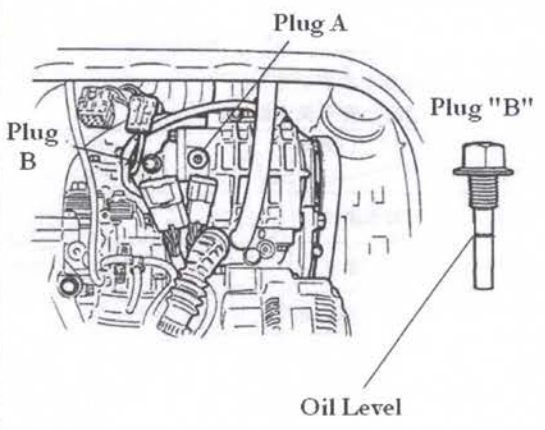
Use Straigh 30W For Multi-Season
Note: For Cold Weather Areas Use 7.5~30W
Note: Do NOT Use Heavy Weight 50W+

Oil Capacity
Oil Only: 2.8 Liters (MT) 2.9 Liters (ECTV)
Oil & Filter: 3.0 L (MT) 3.1 L (ECTV)



Oil Filter Part
Subaru Part Number
#15208-KA0120 #15208-KA010
Cross Number
Mitsubishi #MD134953
Mazda #B6Y1-14-302

Super Charger Oil Inspection



1. Remove Plug "B" First to Ceck Oil Level.
   Note: If Oil Level is In Range it is Not Necessary to Remove Plug "A"

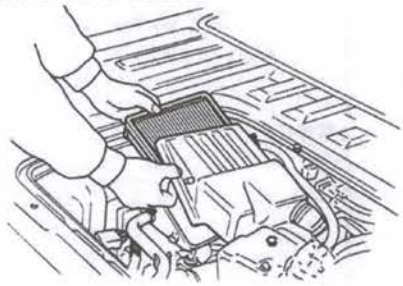
Oil	Shell MSC Gear Oil

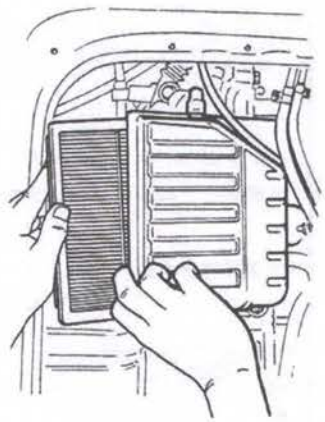
Plug A Torque	2.5±0.2kg-m
Plug B Torque	1.2±0.2kg-m

Maintenance Check

Air Filter

1. Remove Engine Cover
2. Un-Clip Plastic Air Cleaner Cover
3. Remove Air Cleaner





4. Vacuum or Wipe Out Air Cleaner Case
5. Use an Air Pressure Cleaner to Clean Filter

Note: Filter Should be Changed Every 20,000 Kilometers or Every 6 Months.

Fuel Filter

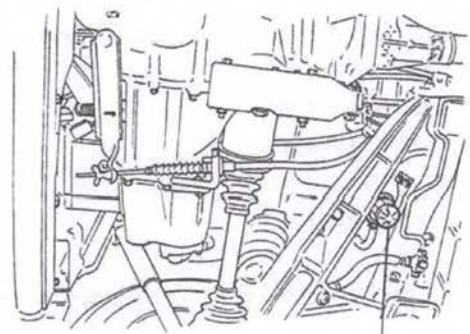
Note: Fuel Filters Should be Changed Once a Year or 20,000 Kilometers

Caution: EFI vehicles Fuel System is Under High Pressure.

EFI Engines: Disable Fuel Pump, Start Engine and Run Until Out of Fuel. Disconnect (-) Battery Connection. Remove and Replace Filter. Engage Fuel Pump and Re-Connect (-) Battery Conection. Start Engine and Observe For any Leaks.

Carbureted Engines: Remove & Replace Filter
Caution: Never Smoke Around Fuel, No Open Flames Within 50 Meters

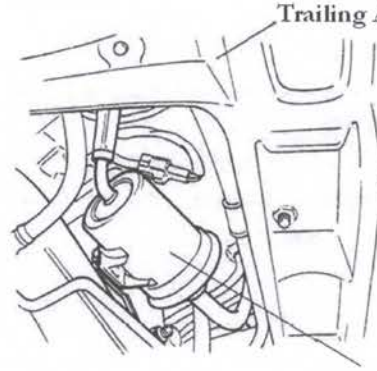
Carbureted Vehicle



EFI Vehicle

Fuel Filter

Trailing Arm

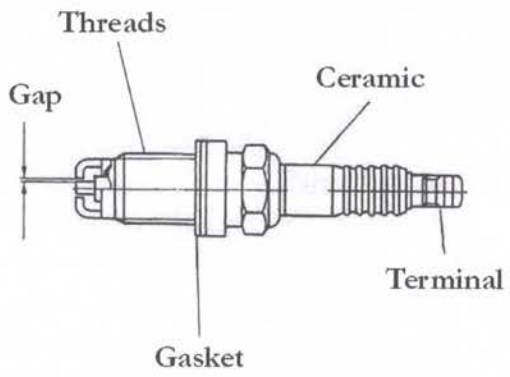


Fuel Filter

Spark Plugs

Spark Plugs are Recommended to be Changed Every 10,000 Kilometers.

Spark Pugs Can be Your Best Indication of the Inside of Your Engine.



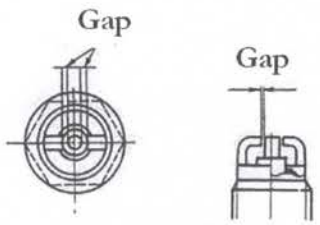
Appearence Indicators

Normal: Gayish Color-Replace at Recommended Time Period

Oil Deposits: Oily or wet Appearence
Remove Engine and Overhaul

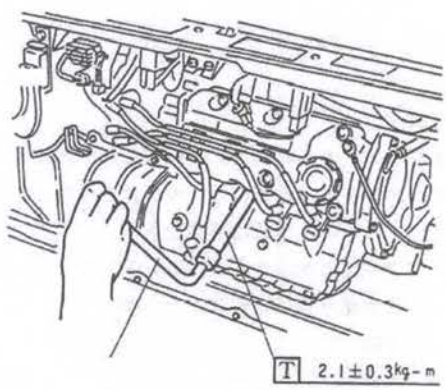
Burnt: Visualy Burnt or Insulator Cracked
Incorrect Heat Range

Gap Measurment Using a Feeler Gage



Note: Make Sure Engine Is Cool When Removing Spark Plugs

1. Open Engine Cover
2. Remove (One Wire at a Time) Plug Wire
3. Remove Old Plug (Discard)
4. Set Gap to New Plug and Install
5. Repeat Step for all 4 Cylinders



NGK	Nippon Denso	Gap (mm)
ZFR 6 G	K20DTR-S11	1.0~1.1
ZFR 5 G	K16DTR-S11	1.0~1.1

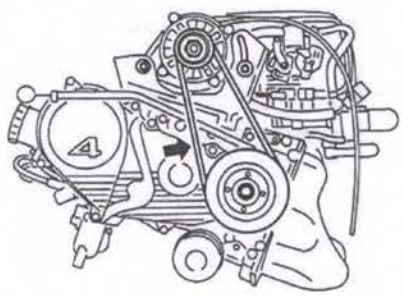
Note: Due to Engine Constant High Revelutions It is Recommended to Change Spark Plugs Every 10,000 Kilometers

V-Belts

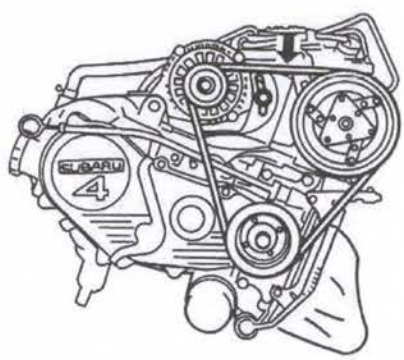
All V-Belts Should be Periodically Inspected for Cracks and Wear.

Note: All V-Belts Must be Changed at 100,000 Kilometers

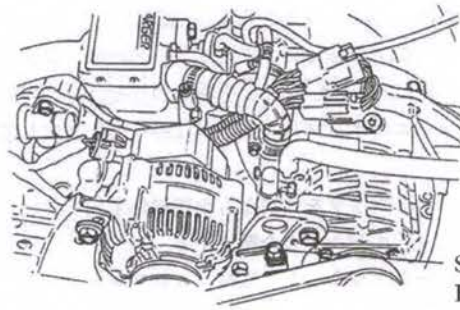
Carbureted Engine (No Accesories)

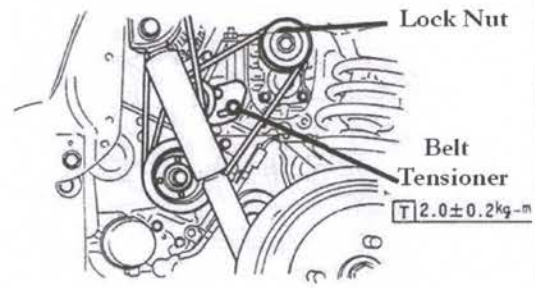


Carbureted Engine: AC Option

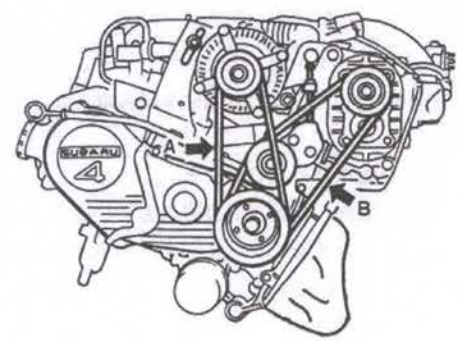


EFI Equiped Engines





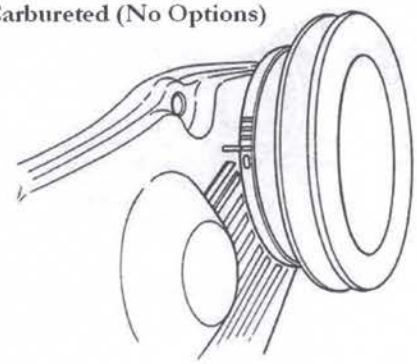
EFI Supercharged Engine



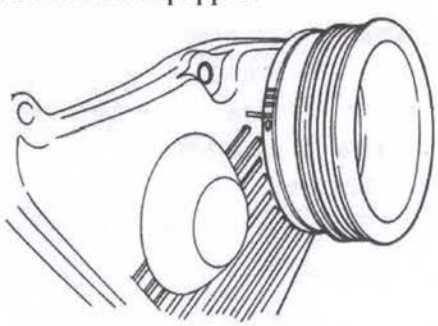
Valve Adjustment

Set the Crankshaft Timing Mark to Zero Degrees on the Compression Stroke as Indicated on the Picture Diagrams Below.

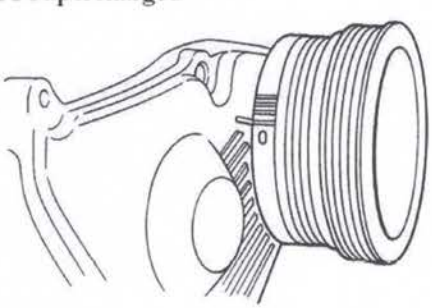
Carbureted (No Options)



Carbureted AC Equippted



EFI Supercharged

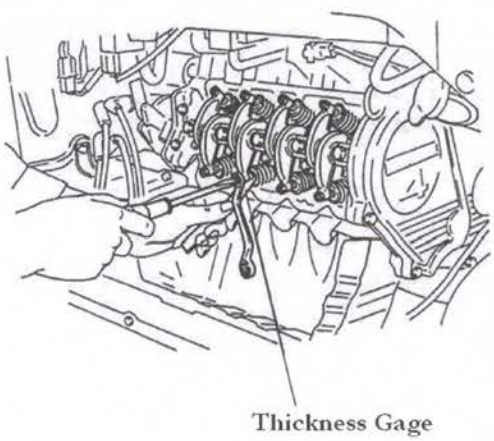


Note: Set Valve Adjustment With Engine Cold (Ambient Temperature)

1. Make Sure Engine is at TDC Compression Stroke.
2. Remove Valve Cover
3. Loosen Adjustment Nuts
4. Using a Screwdriver Loosen Intake and Exhaust Adjustment Screws

Set Cold	
Intake	0.15±0.02mm
Exhaust	0.20±0.02mm

Nut Torque	0.9±0.1kg-m



Thickness Gage

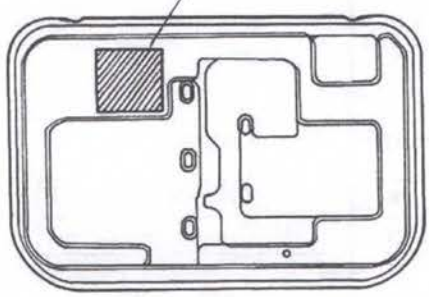
5. Set #1 Intake and Exhaust, #2 Intake, #3 Exhaust.
6. Turn the Engine One Rotation.
7. Set Remaining Valves to Specifications
8. Torque Retainer Nuts
9. Using a New Gasket Attach Valve Cover
10. Drain Oil and remove Oil Filter
11. Add New Oil and Filter
12. Run Engine at Various Idle Speeds 10 Min.
13. Test Drive

Non-AC Vehicle Vacuum Hose and Point Settings

Vacuum Hose Inspecton

Note: Vacuum Hoses Over The Years Become Dry and Cracked. This Leads to System Balance Trouble. It is an Important Step To Follow The Provided Diagrams Per Vehicle. Look for the Sticker Near The Engine Compartment

Vacuum Hose Diagram (Per Vehicle)



Note: Points Should be Changed Every 24,000 Kilometers or 2 Years

Point Dwell

Limit	Mitsubishi	49°~55°
	DENSO	49°~55°

Point Gap (mm)

Limit	Mitsubishi	0.45~0.55mm
	DENSO	0.4~0.5mm

Note: When Changing Points Make Sure To Grease The Cam With Fresh Lithium White Grease.

Point Spring Lift Pressure

Limit (Range)	Mitsubishi	450~600g
	DENSO	400~550g

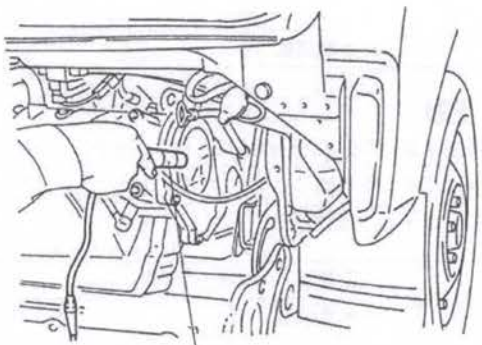
Condensor

Limit (Range)	Mitsubishi	0.243~0.297μF
	DENSO	0.225~0.275μF

Note: Condensors Should Be Changed Every 48,000 Kilometers or 4Years

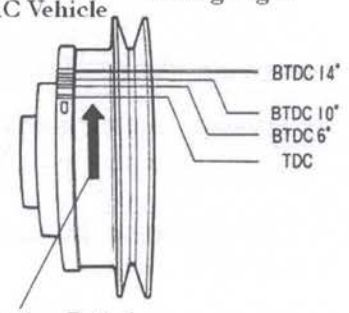
Timing Carbureted Vehicle

Caution: Beware of Moving Fan
1. Loosen Distributor Hold Down Bolt
2. Warm Engine
3. Remove and Plug Vacuum Hose
4. Using Timing Light Check Timing
5. Adjust as Necessary
6. Tighten Hold Down Bolt
7. Attach Vacuum Hose



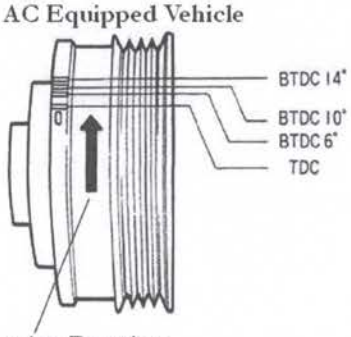
Timing Light

Non-AC Vehicle



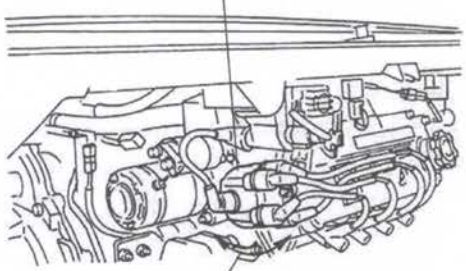
Engine Rotation

AC Equipped Vehicle



Engine Rotation

Distributor



Distributor Rotation L~R

Timing	(BTDC/rpm)
NA Carb	6° /800

Note: If Timing is Erratic Check Points and Distributor Cap. Also Check For Bad spark Plug Wires

Spark Plug Wires: Must be Changed Every 60,000 Kilometers

Point Adjustment: Every 12,000 Kilometers

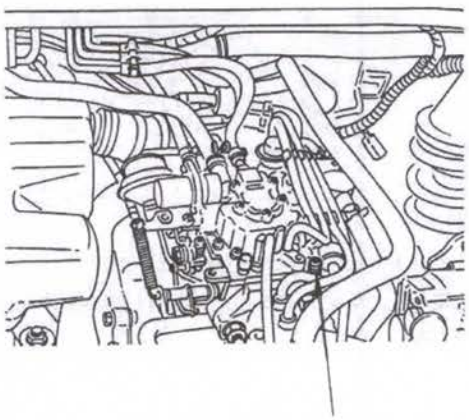
Cap Replacement: Every 24,000 Kilometers

Non-AC vehicle Idling and CO-HC Levels

Idling Setting

1. Warm Engine to Operating Temperature
2. Confirm Timing is Set Correct
   (See Timing Settings in Previous Steps)
3. Set Idle By Adjusting Idle Screw

Idle RPM	800±50rpm



Throttle Adjustment Screw

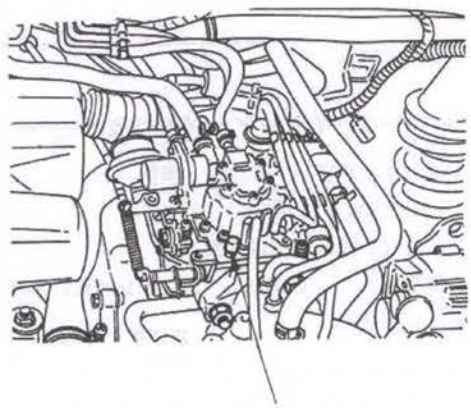
Caution: Alway Beware of The Fan With The Engine Running

CO-HC Levels

Note: Setting The Adjustment Screw Can Take Up To 5 Min to Take Effect

CO-HC Level Chart

CO(%)	1.5±0.5
HC(ppm)	1000 or Below



Idle Adjustment Screw

1. Warm Engine To Operating Temperature
2. Put CO-HO Tail Pipe Sniffer and Check Reading
3. If Adjustment is Required Wait up to 5 Min For a Reading to Take Effect.

Note: If All Timing Specifications Are Correct and CO-HC Can Not be Adjusted by The Idle Adjustment Screw The Carburetor Must be Replaced or Rebuilt.

Note: See The Following Page For More Setting Information

Carbureted

CO-HC (Continued)

Part	RPM	CO Level
Idle Adjustment Screw	Turn Right	Lower
	Turn Left	Higher

Note: Idle Adjustment Screw Has a CO Adjustment Level of 1.5(+-) 0.5%

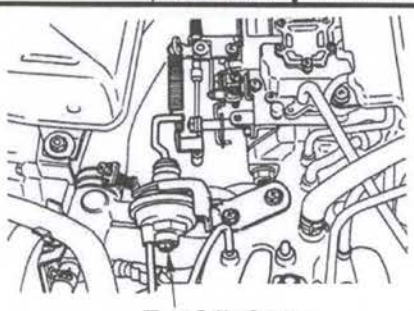
AC Equiped Carbured Vehicle

Fast Idle

AC Equiped Fast Idle Circuit is Set to 1050 (+-) 50 RPM

Note: Make Sure AC Switch is [ON]

Fast Idle Adjustment Screw	Turn	Engine RPM
	Turn Right	Idle Up
	Turn Left	Idle Down

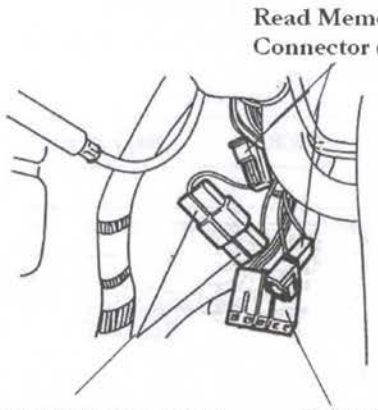


Fast Idle Screw

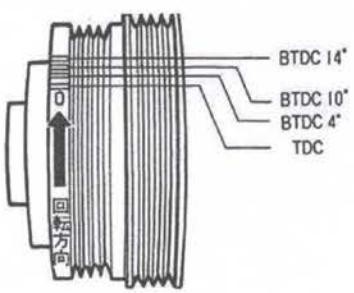
EFI Supercharged

Timing

Note: EFI Engine Timing is Set by Computer Hand Held Computer is Necessary



Note: The Timing Light Method Can be Used by By-Passing the Computer. If Setting the Timing Directly The Computer May Re-set Itself.



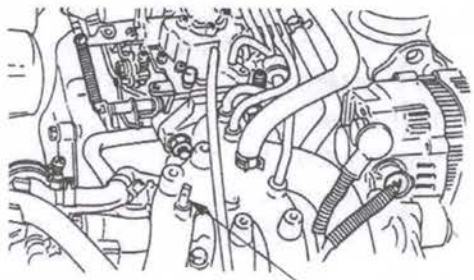
Set To: BTDC 10° /800rpm

Note: Most Timing Errors On Computer Controlled vehicles Are Vacuum Issues. Check for Leaks in Vacuum Lines. The Computer Will Re-Adjust Itself If a Vacuum Line is Found Broken and Repaired.

Idle Vacuum

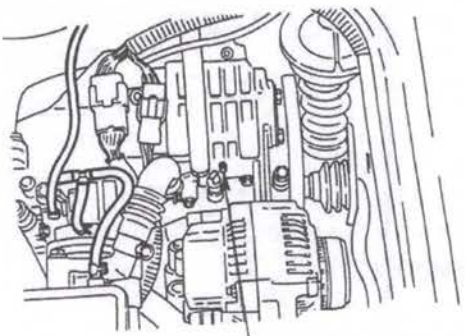
1. Warm Engine to Operting Temperature
2. AC Equiped Vehicles, Attach Vacuum Gage to AC Idle Nipple. 4WD Vehicles Attach Gage to Actuator Nipple.
3. Take Measurements and Compare to Chart Listed Below.

NA Vehicle



AC Fast Idle Nipple

SC Vehicle



4WD Atuator Nipple

Vacuum Specifications

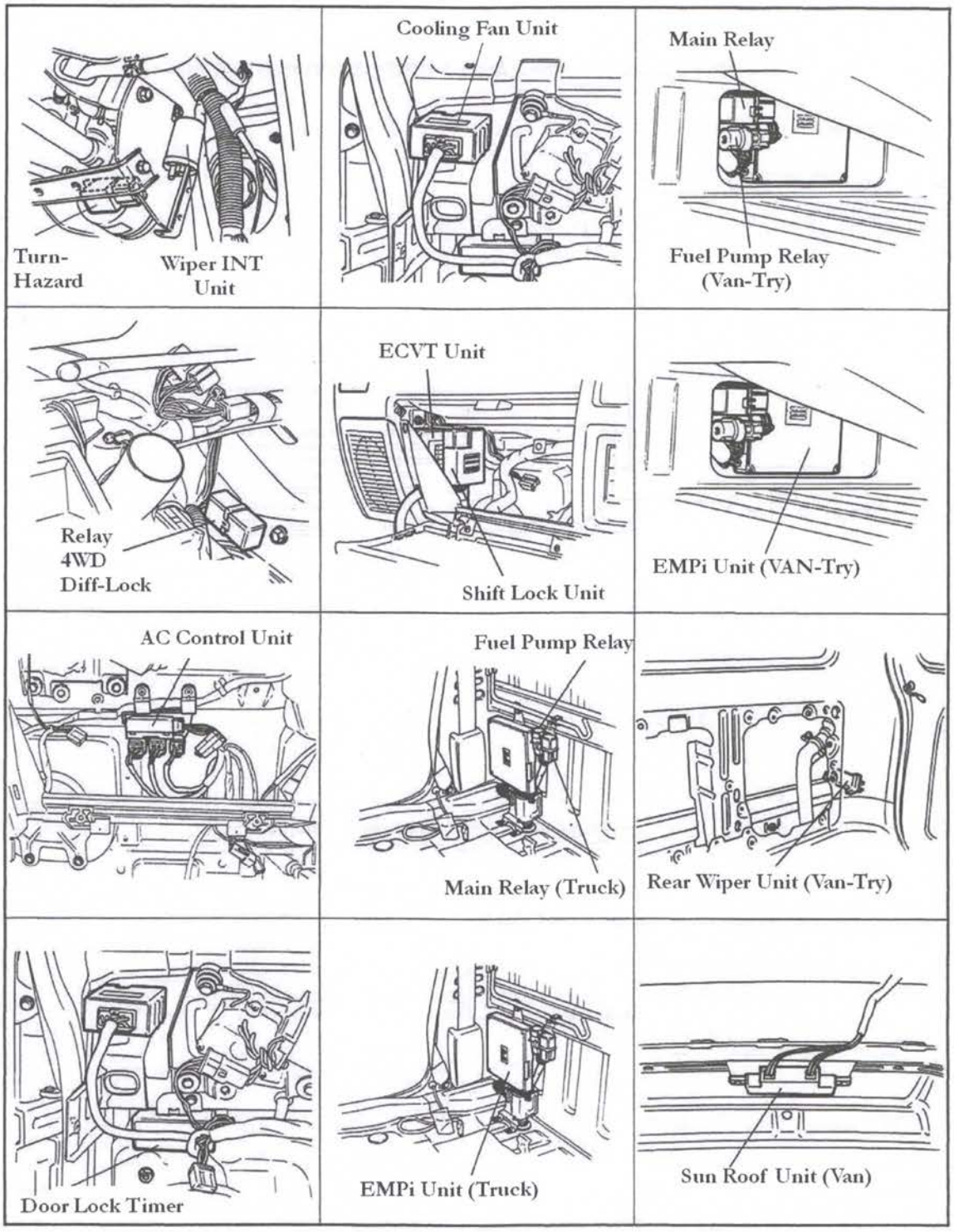
Vacuum (mmHg)	NA Vehicle		430~530
	EFI SC	MT	350~470
		ECVT	330~450

Note: Vacuum measurements Below The Readings Above Signify a Leak in The System

Troobleshooting

Vacuum Level	Cause
Too Low	1. Intake Gasket Leak 2. Ignition Timing 3. Valve Guide Worn 4. Valve Seat Worn 5. Bypass Valve Gasket 6. Supercharger Gasket (SC) 7. Carburetor Base Gasket 8. Carburetor 9. Vacuum Hose Leak
Too High	Timing Setting or Valve Adj
Fluctuation	Timing Miss or Bad Carb

Main Relay Locations



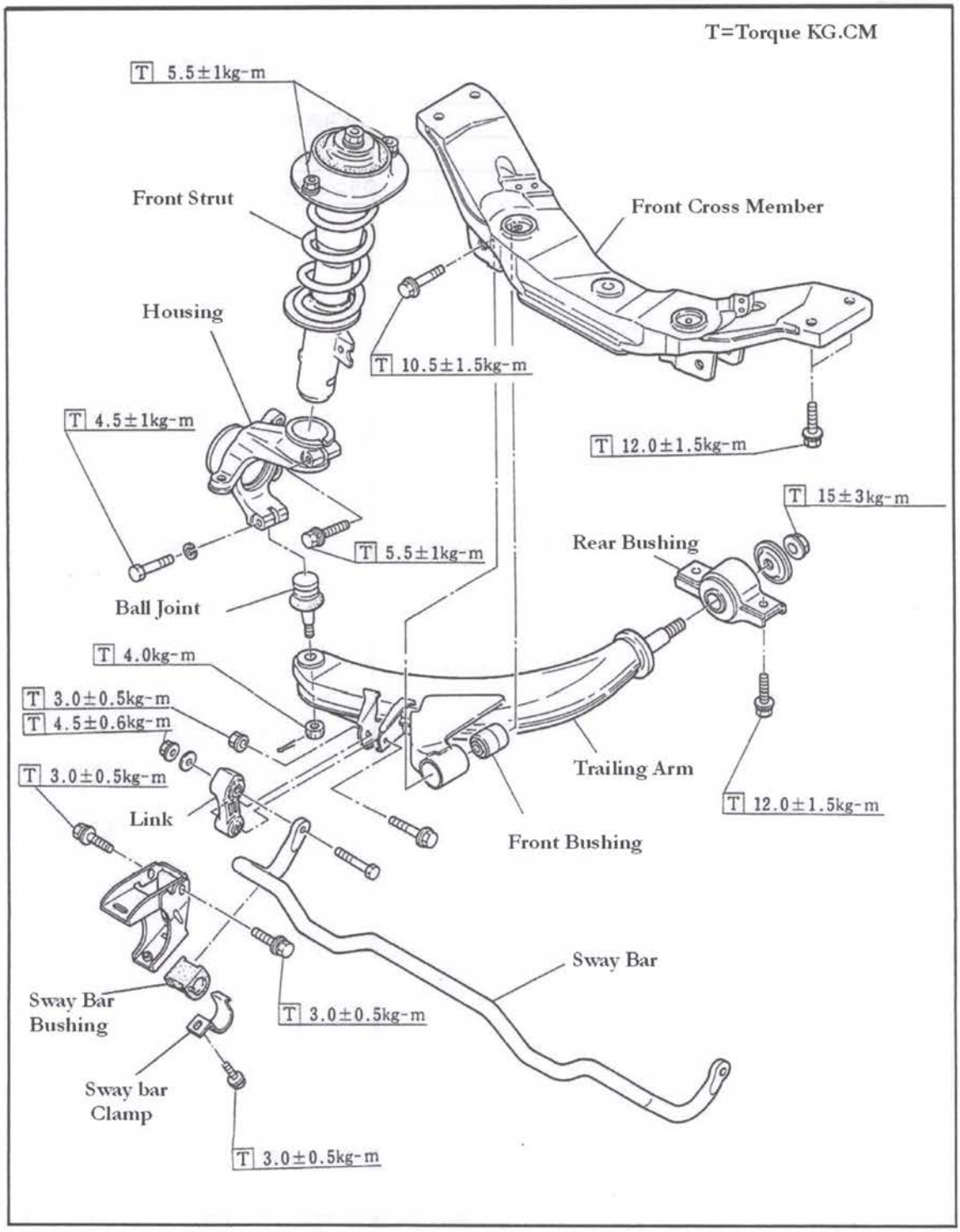
Chapter 3

Suspension

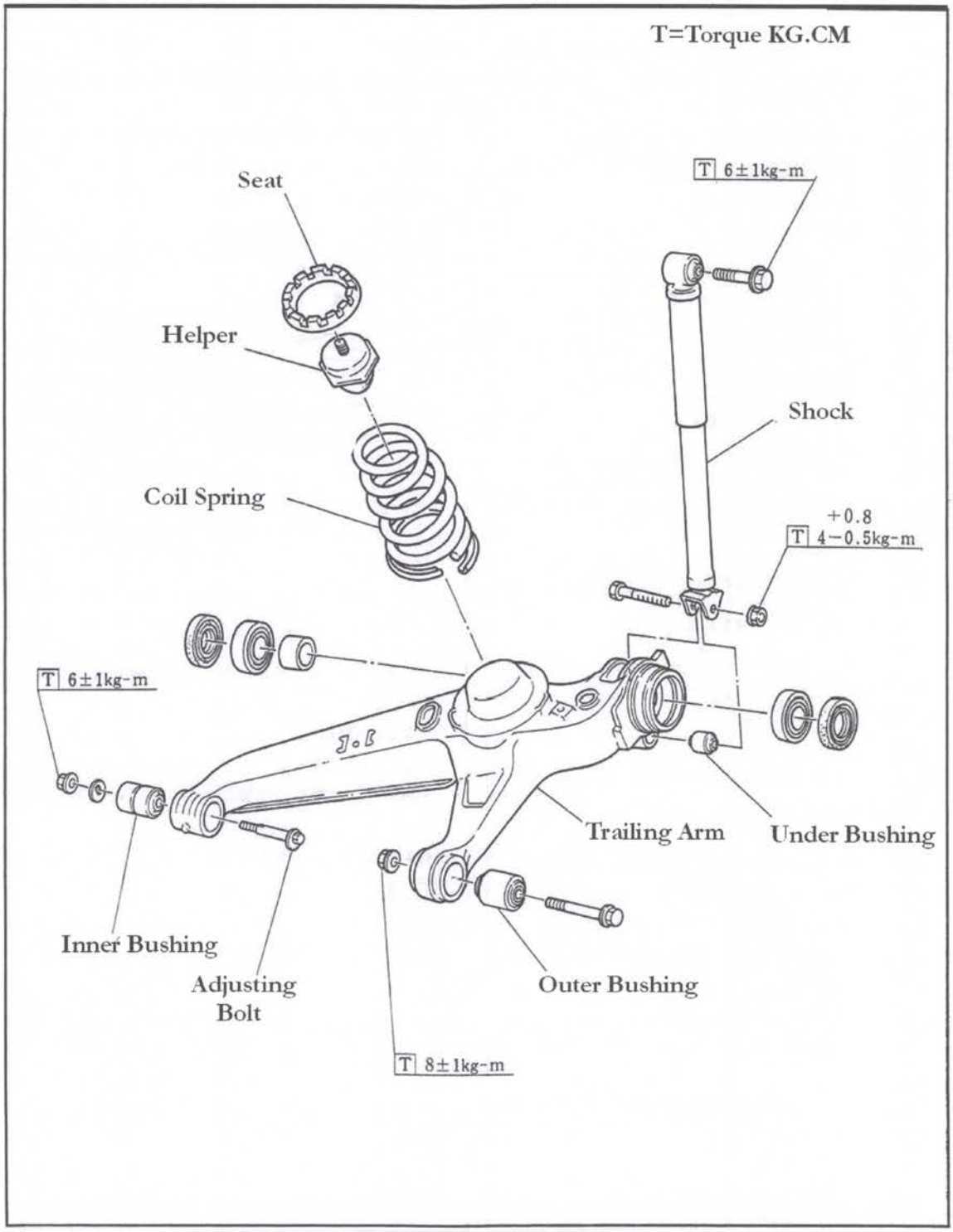
8. Front Suspension Components
9. Rear Suspension Components
10. Front and Rear Alignment
11. Camber & Caster Settings
12. Front Strut Removal & Replacement
13. Traverse Link
14. Rear Shock Absorber Remove & Replace

Note: Steering Components and Gear Box Located in Steering Chapter 4

Components (Front)



Components (Rear)



Alignment

Front Alignment Specifications

Camber	1° +-45'
Caster	3° 50'+-1°
Toe-In	IN 1+-3
Side Slip	0+-3

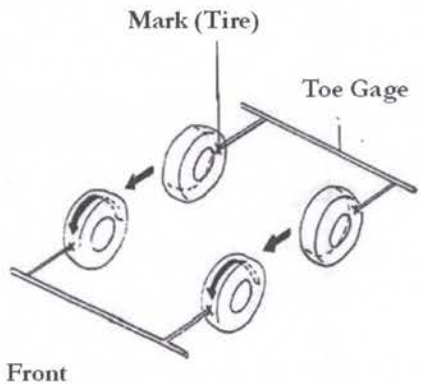
Rear Alignment Specifications

Camber	0'50'+-12
Caster	IN 1+-3
Toe-In	IN +-3

Note: Make Sure Tires Are Properly Inflated Before Working on Alignment Settings

1. Loosen Tie Rod Lock Nut
2. Adjust to the Above Chart Diagram
3. Tighten Lock Nuts

Front Toe-In

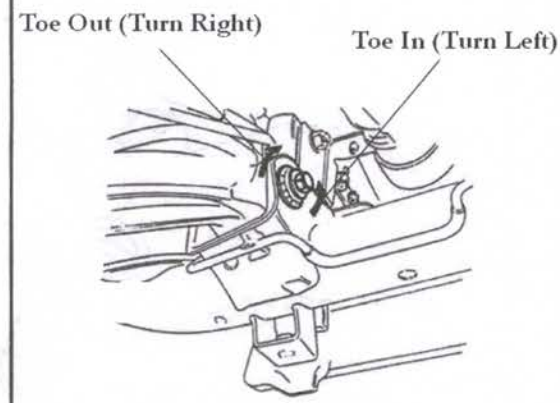


Tie Rod Torque= 7+-1kg.cm

Rear Toe-Out

Note: See Chart to Left For Toe Settings

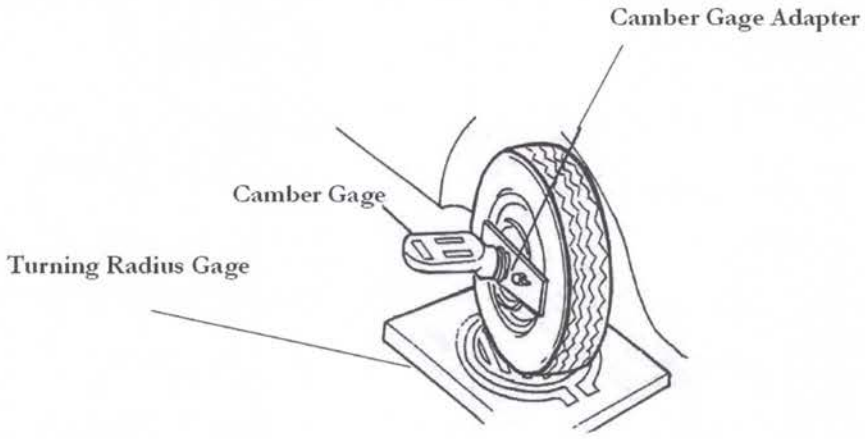
Lock Nut Torque= 6+-1kg.cm



Camber and Caster Setting

Note: Before Setting Caster & Camber Make Sure Tires Are Properly Inflated

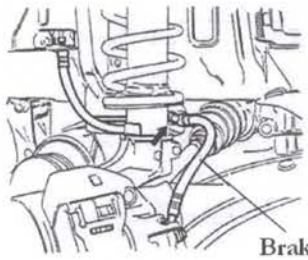
Use Serivce Tool ST 922640000 Camber Gage Adapter



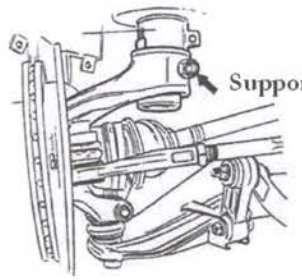
	Front	Rear
Camber	1°±45′	0°50′±45′
Caster	3°50′± 1°	—

Front Strut

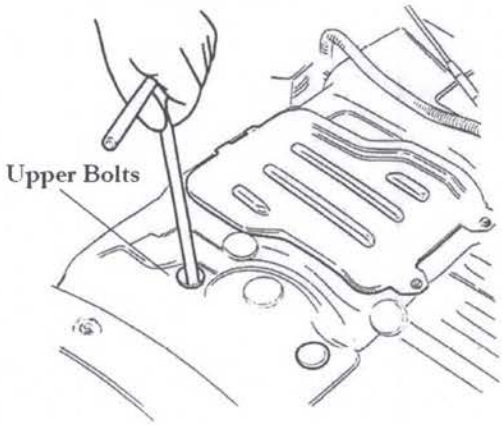
1. Set Side Brake
2. Jack Vehicle, Remove Tire
3. Remove Brake Hose From Strut



4. Remove Housing Support Bolt



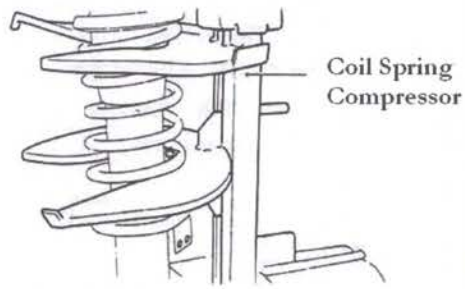
5. Pull Down on Housing to Seperate Strut. Use Rubber Hammer.
6. Remove Upper Attachment Bolts
7. Remove Strut



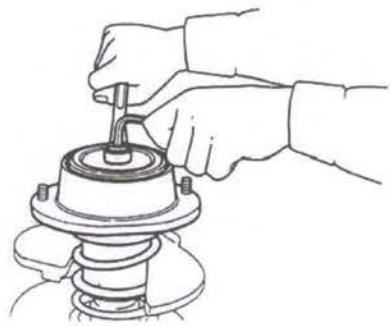
Strut Disassembly

Caution: Spring is Under Extream Pressure

1. Use a Coil Spring Compressor and Compress Coil Spring.



2. Use a Hexegon Wrench to Hold Strut Rod While Using a Box End Wrench to Loosen.



3. Seperate Mount
4. Slowly Release Coil Spring Compressor and Remove Coil Spring

Note: Wear Saftey Glasses When Working With Coil Springs

5. Remove Upper Spring Seat and Dust Cover

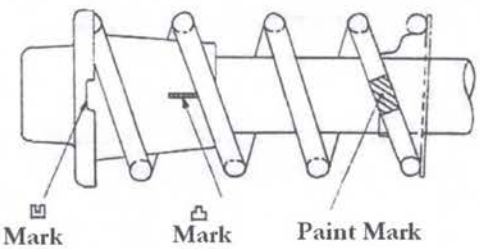
Front Strut Assembly

Assembly

Note: Make Sure All Surfaces Are Clean Before Assembly. Dirt Can Scratch Piston Surfaces Destroying The New Strut

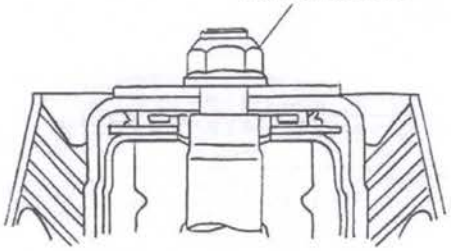
Note: Do Not Re- Use Self-Lock Nut Replace With New Nut

Assemble With Marks Lined Up

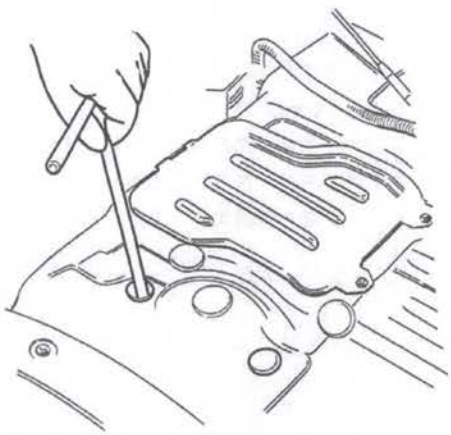


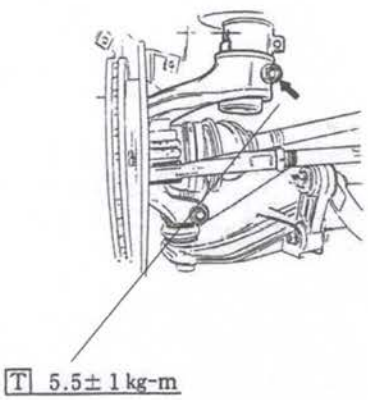
Self Lock Nut	6.5±0.5kg-m

Self Lock Nut

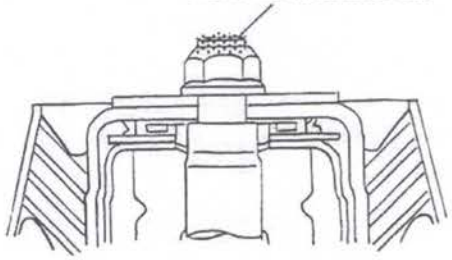


Install Strut

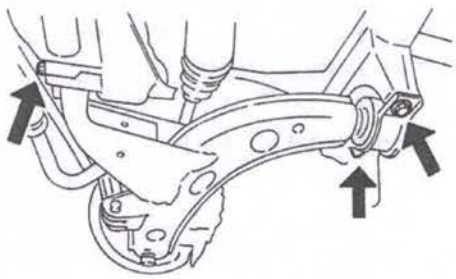


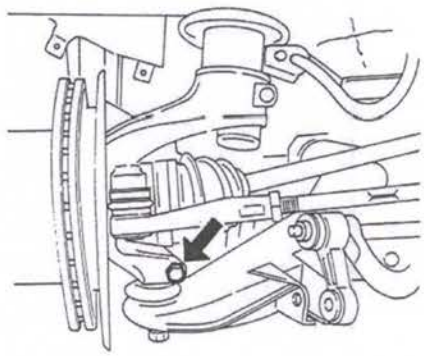


Place Lock Mark Seal

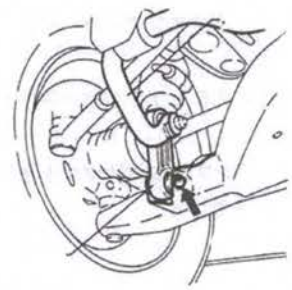


Transverse Link

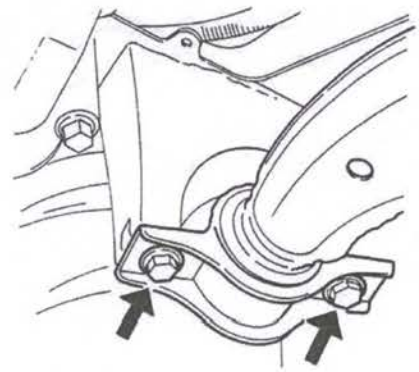




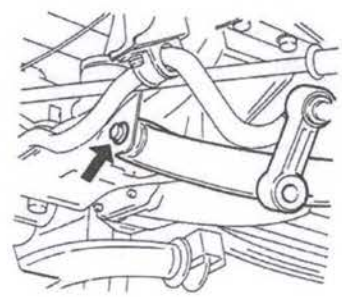
T 4.5± 1 kg-m



T 3.0±0.5kg-m



T 12.0±1.5kg-m

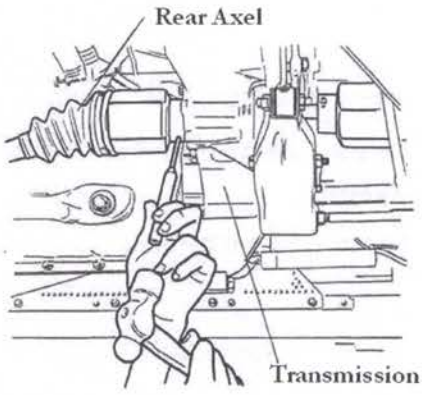


T 10.5±1.5kg-m

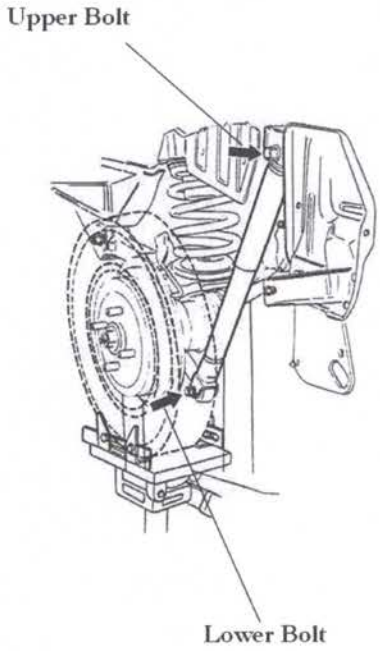
Rear Shock

Removal

1. Remove Rear Axel Shaft

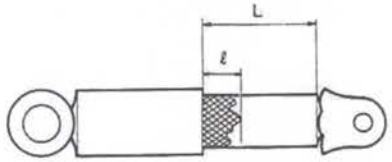


2. Jack Rear of Vehicle
3. Remove Tire
4. Remove Shock Attachment Bolts



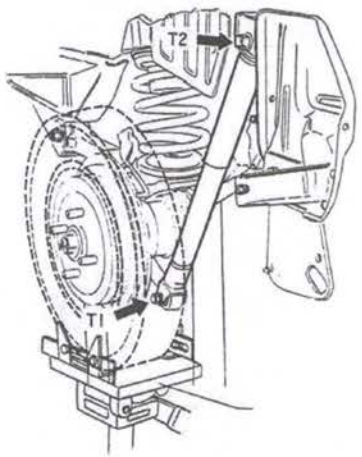
Inspection & Replacement

Note: Inspect Shocks for Oil Leaks
Leak Detected Replace



1. Replace Shock
2. Attach Bolts and Set Torque
3. Attach Drive Axel
4. Attach Tire
5. Lower Vehicle and Test Drive

T2 6 ± 1 kg-m
T1 4 +0.5 −0.8 kg-m



Chapter 4

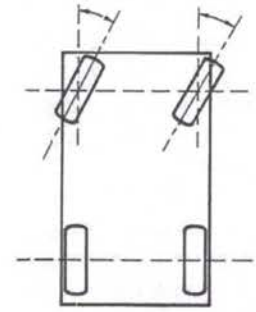
Steering

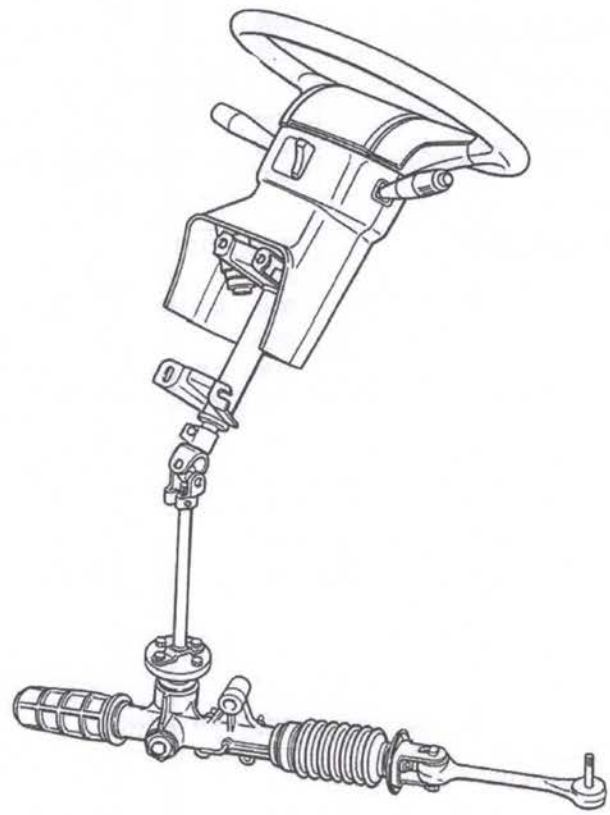
8. Specifications and Diagram
9. Exploded Component View (Steering Column)
10. Exploded Component View (Rack & Pinion)
11. Steering Column Removal/Disassembly/Assemble/Install
12. Steering Gear Box
13. Rack & Pinion Overhaul
14. Tie Rods

Steering

Specifications

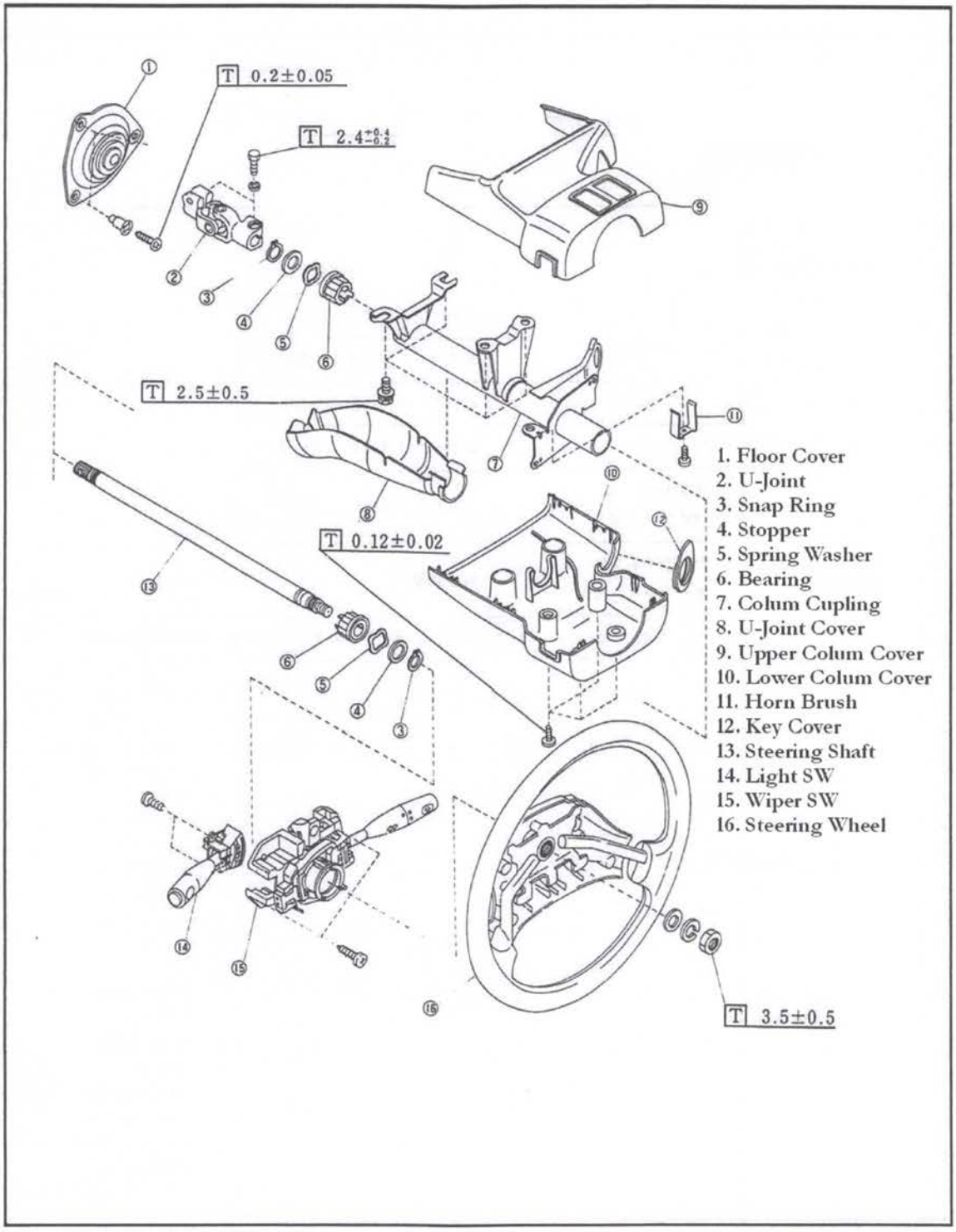
	Steering Wheel	Outer (mm)	ϕ370
		Turns	3.8
	Angle	Inner	36° 25′ $^{+1°\ 30'}_{-2°\ 30'}$
		Outer	33° 10′ $^{+1°\ 30'}_{-2°\ 30'}$
	Turning Radius (Meters)		3.9
GEAR BOX	Steering Type		Rack & Pinion
	Ratio		19.8
	Lubrication Grease		Bearing Grease



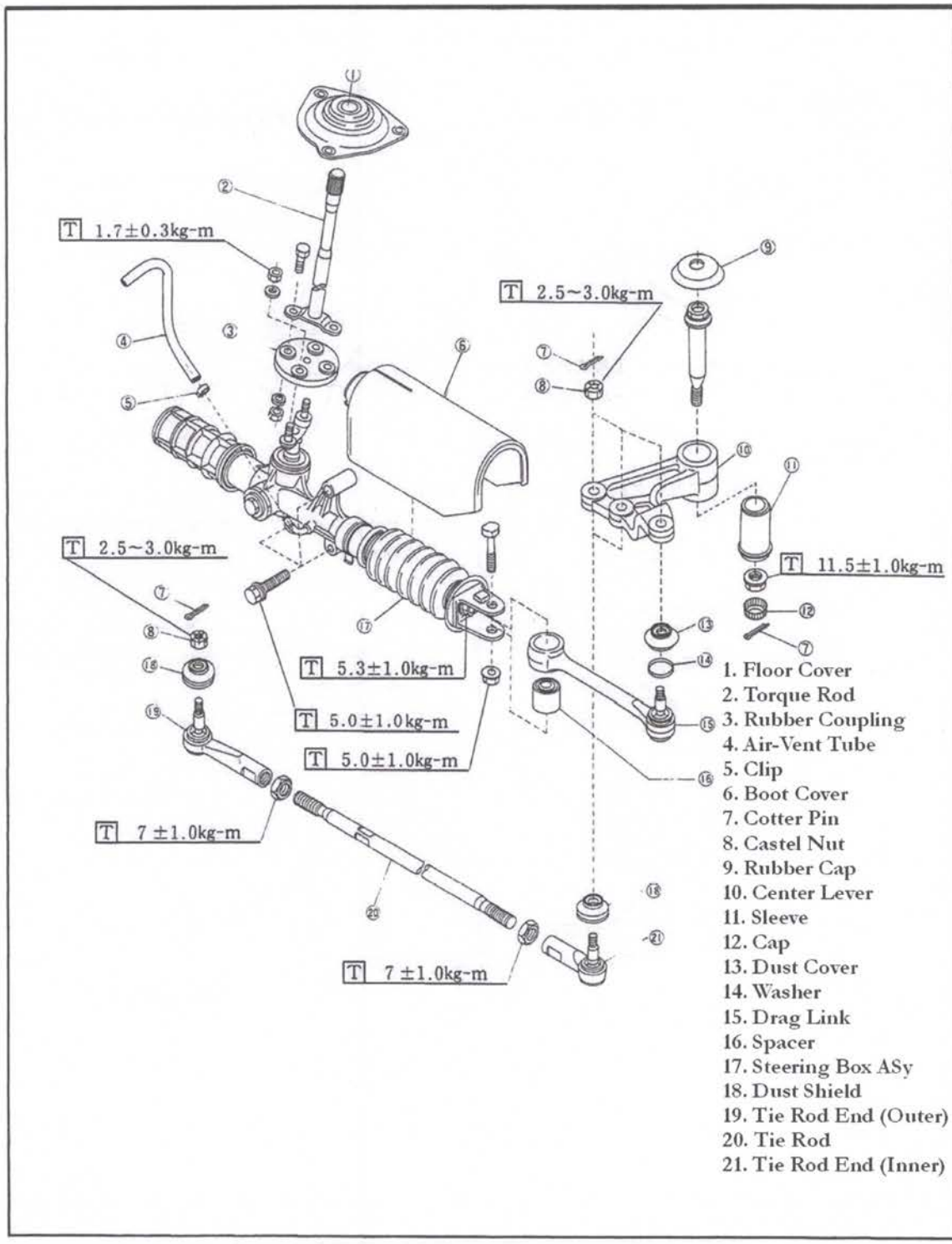


Steering Diagram

Exploded View

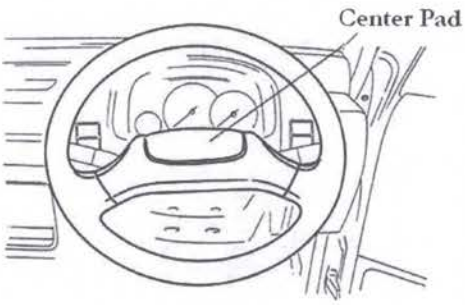


Exploded View (Rack & Pinion)

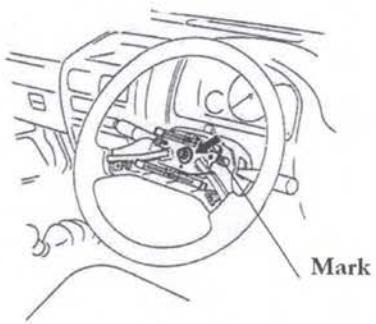


Steering Column Removal

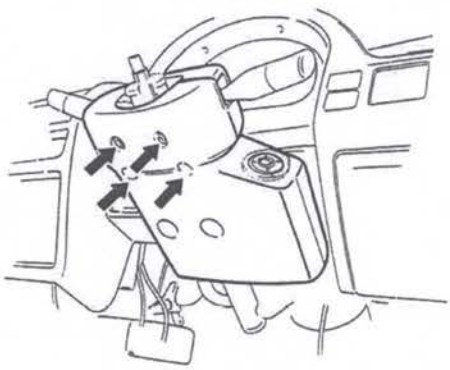
1. Disconnect (-) Battery Connection
2. Remove Steering Wheel Center Pad



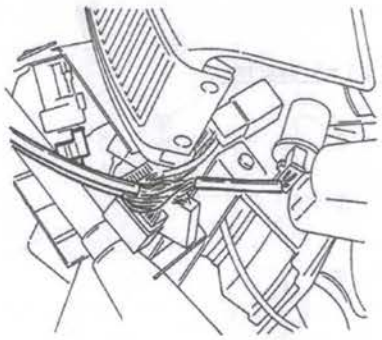
3. Center the Wheel and Remove Hold Down Nut.
Note: Make Note of Aignment Marks



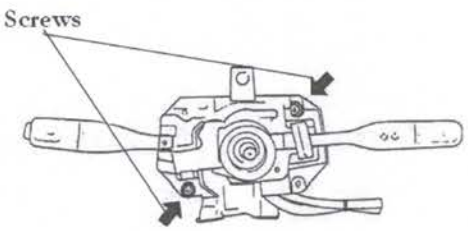
4. Remove Wheel and Then Remove Column Cover Attachment Screws



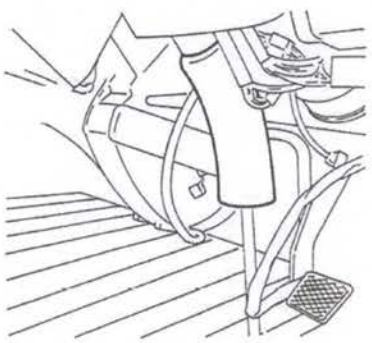
5. Disconnect Combination SW Electrical Connectors
6. (ECTV Vehicle)
Remove AT key Interlock Solinoid Electrical Connector



7. Remove SW Assemblies

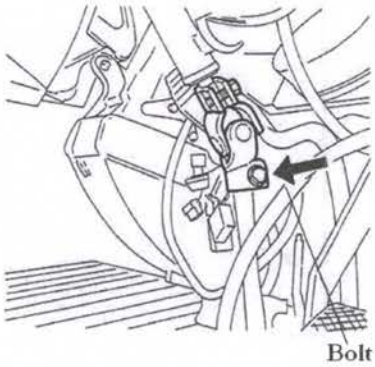


8. Remove U-Joint Cover



Steering Column Removal (Continued)

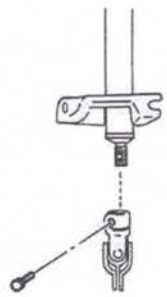
9. Remove U-Joint Lower Bolt



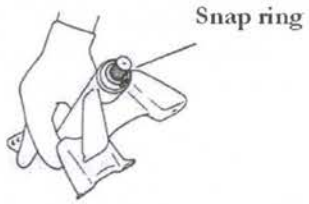
10. Remove Upper Column Attachent Bolts and Remove Column

Shaft Removal

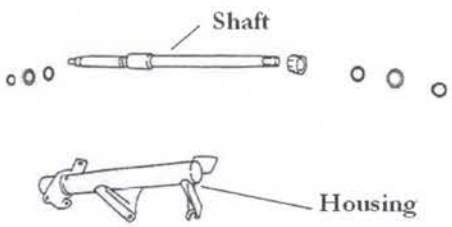
1. Remove U-Joint Attachment Bolt



2. Remove Snap Ring and Seperate Parts



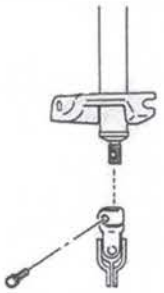
3. Seperate Parts, Clean and Inspect



Assembly

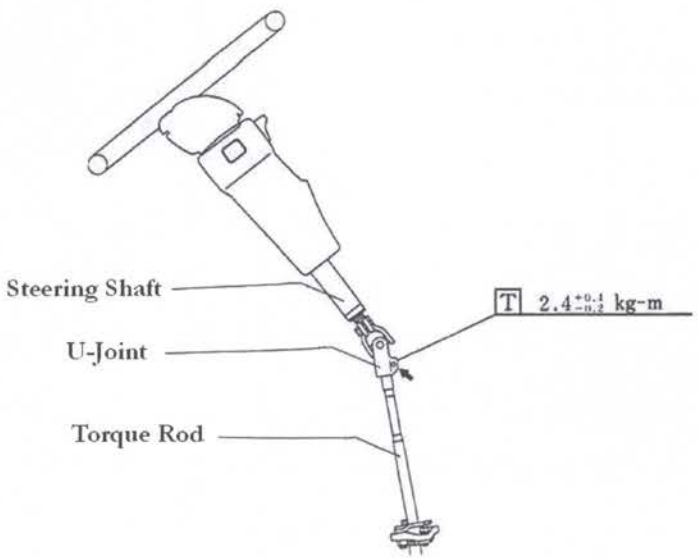
Note: Assemble in Revease Order
Use Torque Guild as Listed

Assembly Grease: Lithium or Bearing Grease



T 2.4$^{+0.4}_{-0.2}$ kg-m

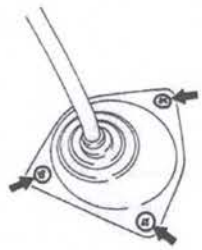
Steering Assembly



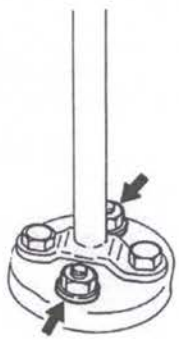
Steering Gear Box

Removal

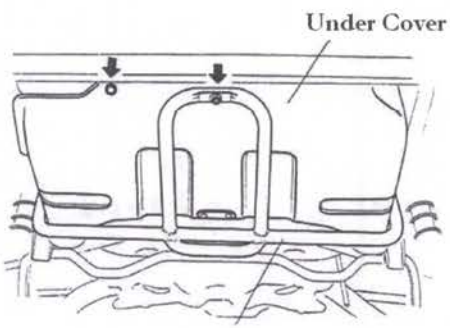
1. Remove Floor Cover (3) Screws



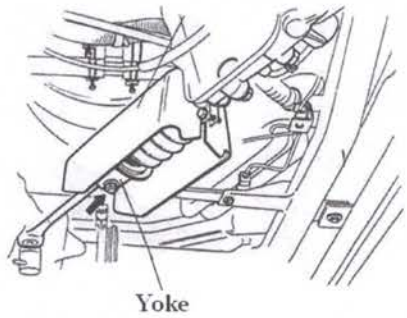
2. Remove Rubber Coupling Nuts



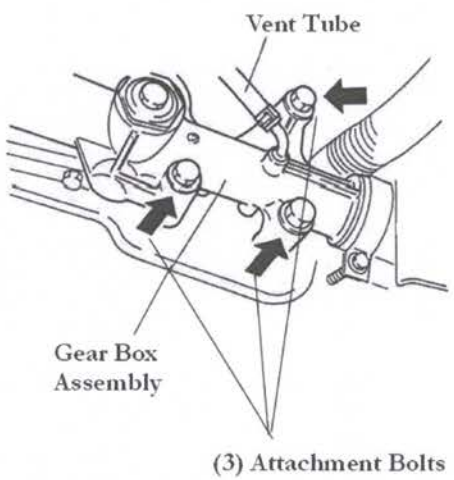
3. Raise Vehicle
4. Remove Under Cover



5. Remove Drag Link From Yoke



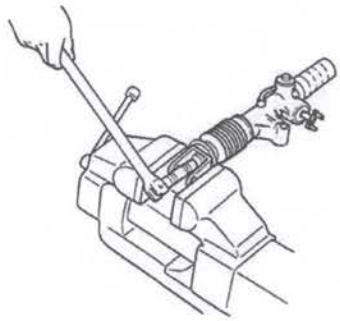
6. Remove Air-Vent Tube From GearBox Nipple
7. Remove Gear Box Attachment Bolts and Take Out Gear Box



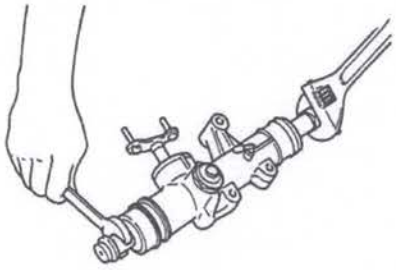
Rack & Pinion Rebuild

Note: Use Paint to Mark Pinion Location

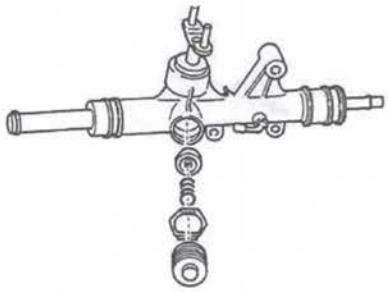
1. Carefully Place Unit in a Vise and Pinch Yoke. Romove Yoke.



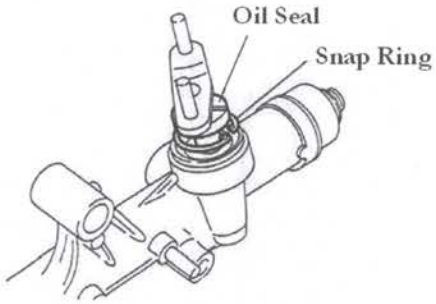
2. Remove Boot Cover and Discard
Note: Always Replace Boot With New Parts
3. Remove Stopper



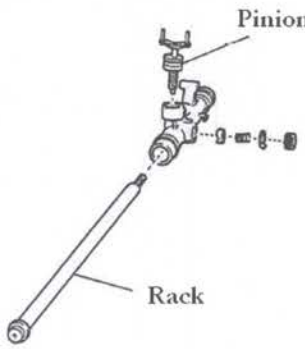
4. Slowly Back Out Adjustment Screw and Remove Parts. Place in Cleaning Tray



5. Remove Oil Seal
6. Remove Snap Ring



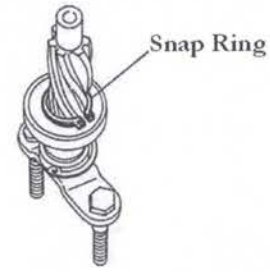
7. Slowly Pull Out Pinion Assembly
8. Remove Rack From housing



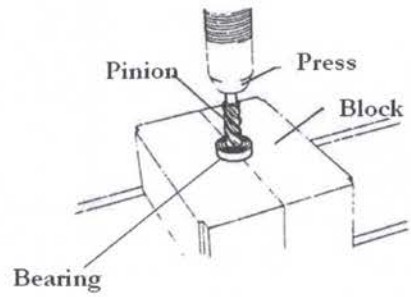
Rack & Pinion (Continued)

Pinion Bearing

9. Remove Snap Ring



10. Using a Press, Press Out Pinion From Bearing. Discard Bearing. Use Only New Bearing for Assembly



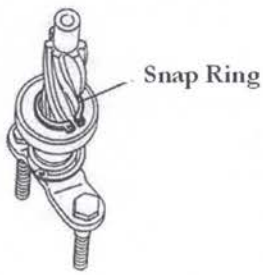
Note: Do Not Re-Use Snap Rings, Oil Seals, or Bearings.

Rake & Pinion (Assembly)

1. Press On New Bearing

Note: Use Only New Bearings and Rubber Seals

2. Cover Unit in Light Bearing Grease. Place Snap Ring in Place.

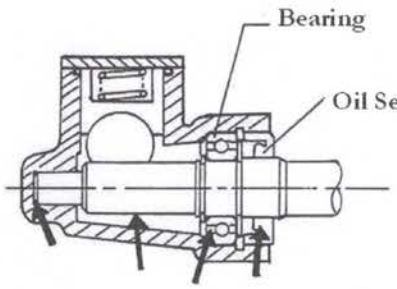


3. Grease Up the Gear Box Inside Before Assembling Parts

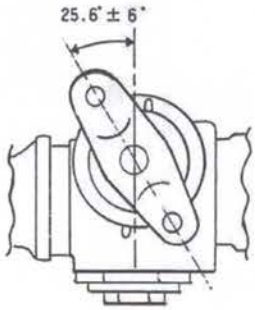
4. Grease Rack Unit and Slide Into Place

5. Take Care Not to Damage Pinion Gear Teeth While Assembling.

Assemble Unit and Check For any Binding Issues. Make Sure Unit is Dirt Free and All Surfaces Covered With Fresh Bearing Grease



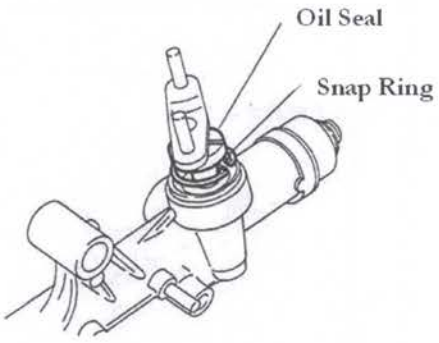
6. Take Caution When Assembling Pinion Unit. Pay Attention to Alignment Marks.



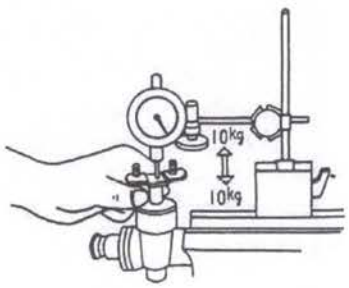
Rack and Pinion Assembly

9. Attach New Oil Seal and Snap Ring

Note: Do Not Re-Use Oil Seal & Snap Ring

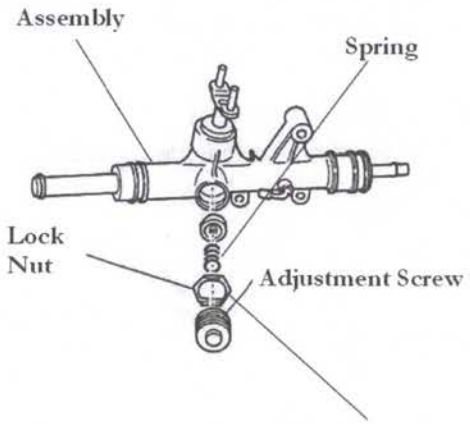


10. Use a Dial Gage and Check for Free Travel.
Allowance: 10 Kilograms=0.3mm



Limit	0.3mm

11. Assemble Unit and Set Initial Back Lash to within:
0.083 (mm)



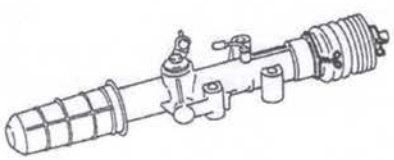
Lock Nut Torque : [T] 3.0~5.0kg-m

Assembly

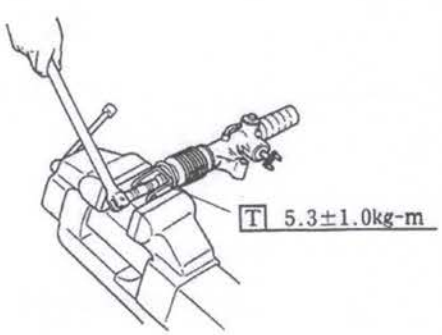
Final Assembly

Note: Never Re-Use Boots or Other Rubber Seals

Attach New Boots and Clean Unit For Installation



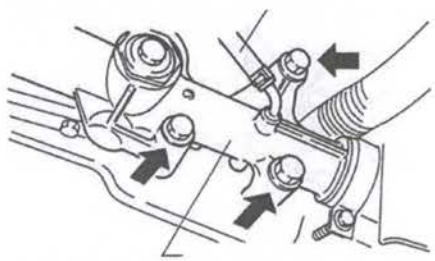
Place In a Vise and Install Yoke



Attach Unit Assembly and Torque To Spec Listed Below

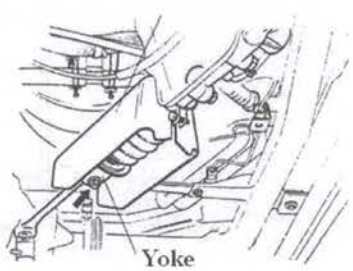
Attach Vent Tube

Vent Tube



T 5.0±1.0kg-m

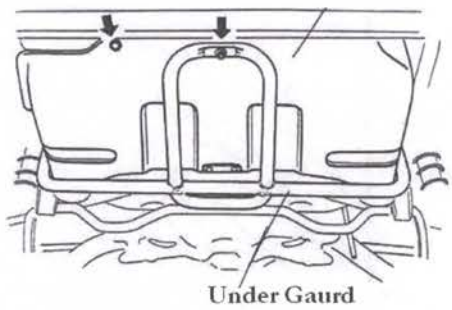
Attach Drag Link And Yoke, Torque to Spec.



T 5.0±1.0kg-m

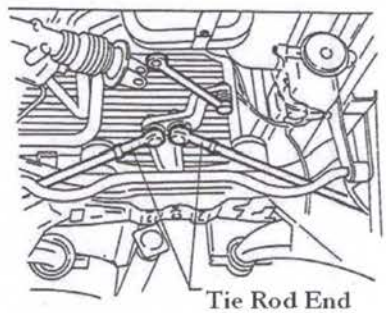
Tie Rod Ends

1. Lift Front of Vehicle and Remove Tires
2. Remove Under Cover and Guard

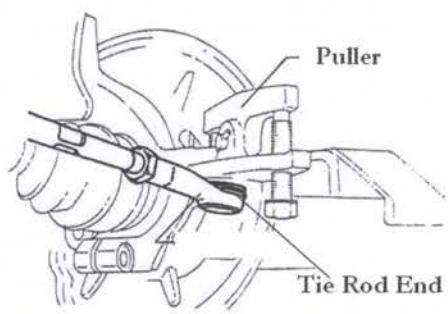


3. Remove Inner Tie Rod Cotter Pin and Castle Nut.

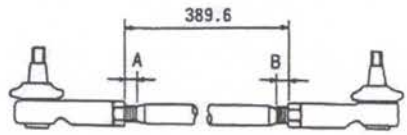
Note: Cotter Pin Can Not Be Re-Used



4. Use a Puller or Similar Tie Rod Removal Tool to Remove Tie Rod End



Note: Tie Rod Maximum Measurment as in Diagram Below is 389.6mm



Note: After any Modifications and or Repairs to Front End Components Will Require Front End Alignment Check

Note: Tie Rod Ends do Not Have Grease Nipples. Maintenance Free

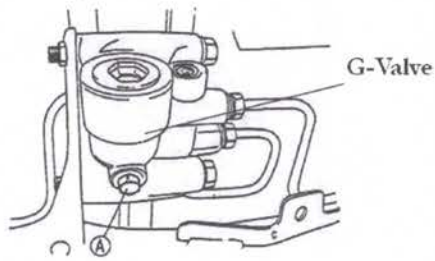
Chapter 5

Brake System

9. Bleeding Brake System (Air)
10. Parking Brake Adjustment
11. Master Cylinder System
12. Brake Booster
13. Disk Brake & Caliper Overhaul
14. Rear Brake Drum System Overhaul
15. Parking Brake Cable System
16. Complete Brake Line System

Air Bleeding

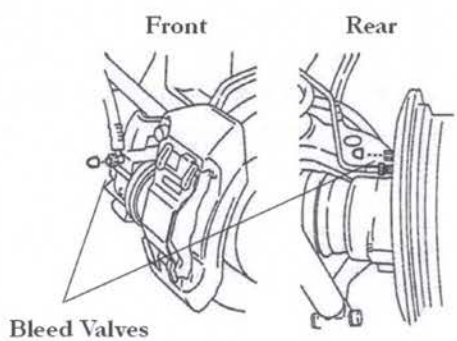
Caution: G-Valve Equiped Vehicles Will Need Bypass Before Bleeding Rear Brakes. See Below Diagram Reference (A). Turn 1 Rotation Open.



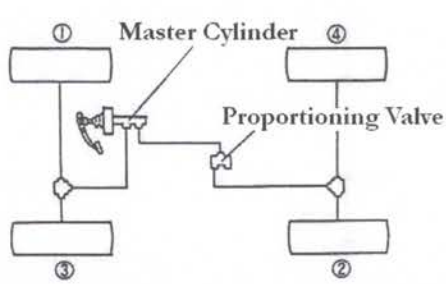
Note: 2 People Required

Use Chart Below For Order Of Bleeding Valves.

One Service Engineer Pumps Pedal 3 Times, Hold, Bleed Repeat. Repeat Procedure Until Air is Out.



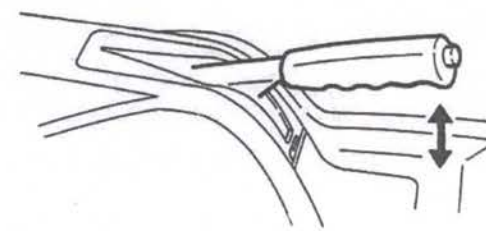
Bleed Air Series Order



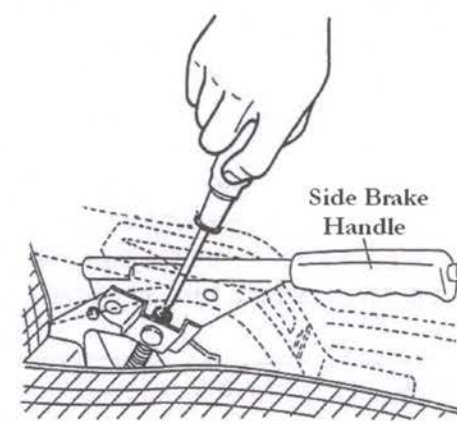
Parking Brake Lever

Parking Brake Lever Has 7~9 Inch Travel Allowance.

Force to Engage No More Than 20kg



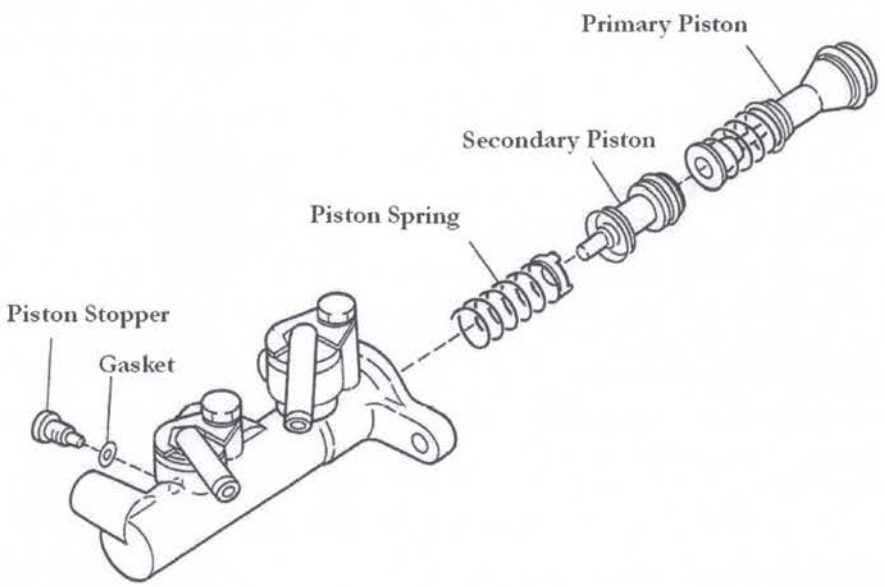
Note: Remove Side Brake Cover To Access Adjustment Screw



Tools	Snap Ring Pliers	Snap Ring Removal
	Dial Gage	Disk Rotor
	Micrometer	Disk Rotor Thickness
	Air Duster	
Oil	DOT3 - DOT4	

Master Cylinder

Exploded View



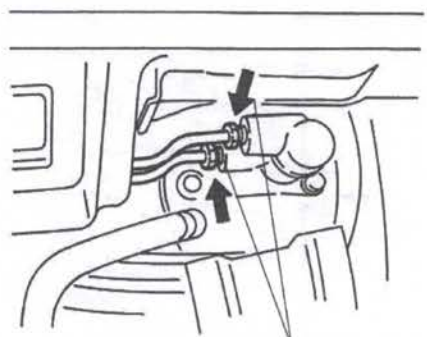
Master Cylinder Removal

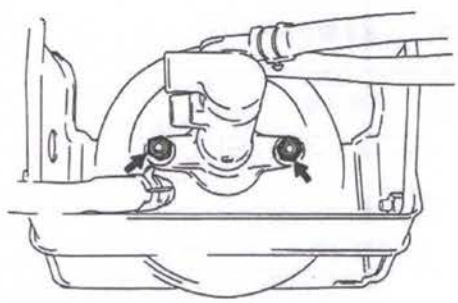
1. Drain Brake Fluid By Attaching Hose To FRONT and REAR Bleed Valves and Pump Master Cylinder Until Dry.

Note: Make Sure Old Brake Fluid Is Disposed of Properly. Never Re-Use Brake Fluid

2. Remove Steering Column (See Steering Section)

3. Remove Brake Lines From Assembly

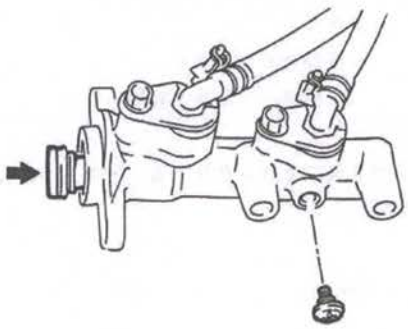




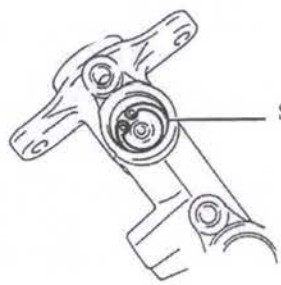
4. Remove Attachment Nuts and Slide Out Master Cylinder

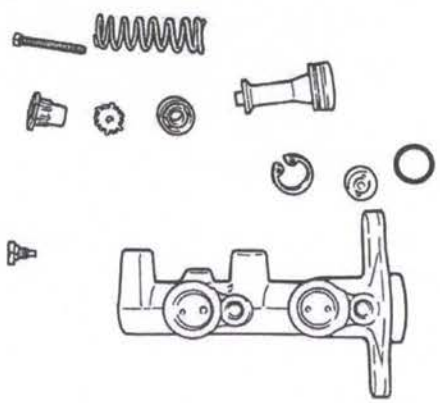
5. Disconnect Feeder Hoses (Wrap With Plastic Bag)

6. Remove Piston Stopper Screw

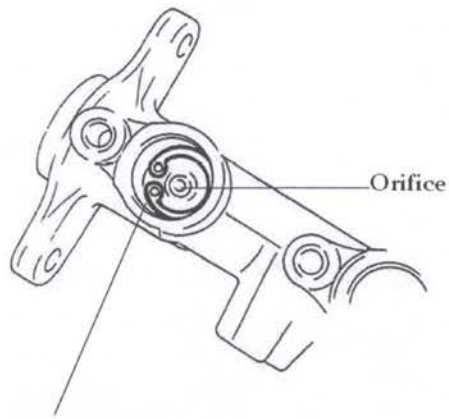


7. Disassemble Complete Unit and Clean and Inspect. If Cracks are Found Discard Complete Unit



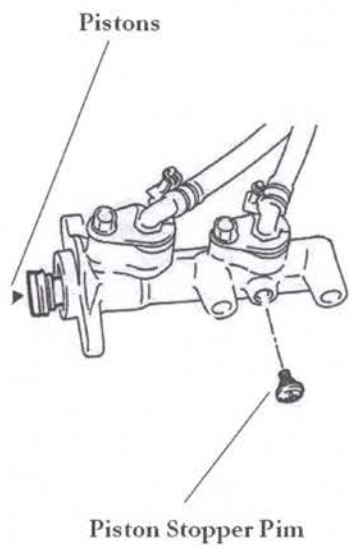


Note: As Previously mentioned, Any Cracks Found Are Not Repairable and Unit Must be Replaced



Thoroughly Clean All Parts Before Assembly

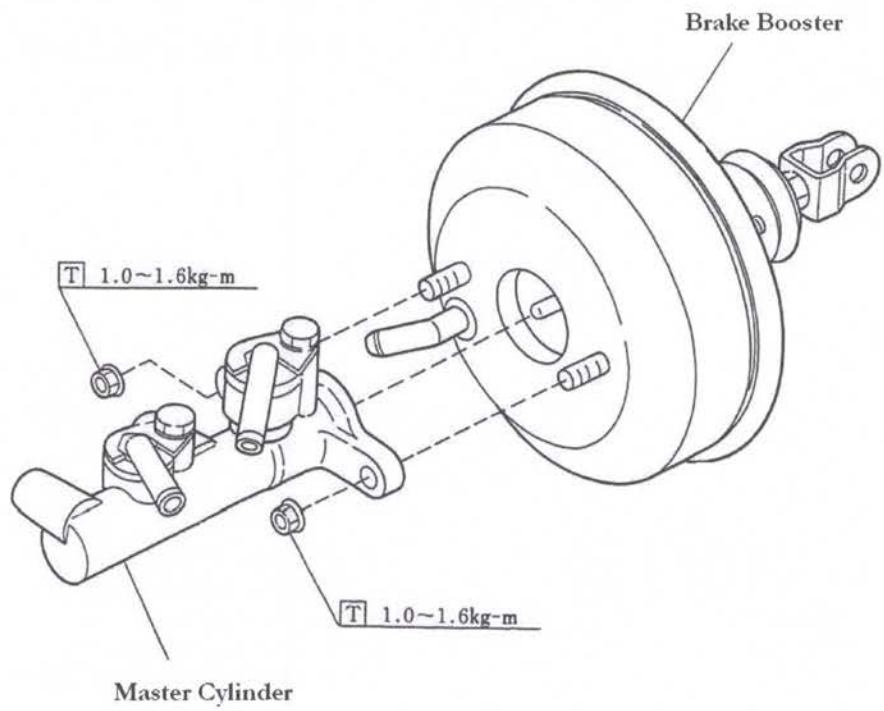
Never Re-Use Rubber Seals and Gaskets



Assemble Unit in Revearse Order
Use Only New Parts

1. Attach Fluid Line Hoses
2. Attach Assembly to Vehicle
3. Connect Fluid Lines
4. Bleed Brake Fluid Lines
5. Re- Assemble Steering Column

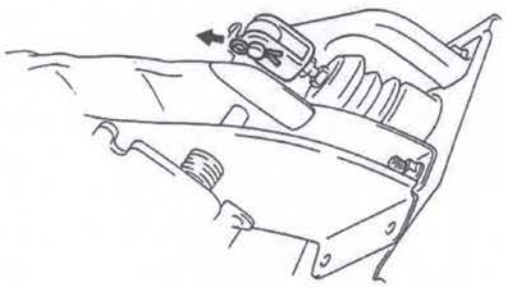
Brake Booster



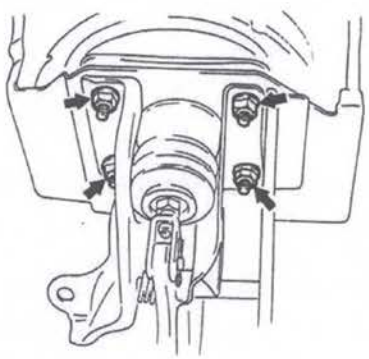
T= Torque kg.cm

Brake Booster Replacement

1. Drain Brake Fluid from Reserve Tank
2. Remove Steering Column if Necessary
3. Disconnect Brake Lines to Master Cylinder
4. Remove Master Cylinder
5. Disconnect Brake Pedal

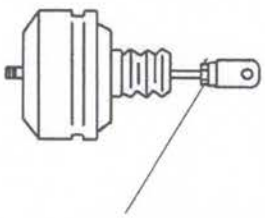


6. Remove the 4 Retaining Bolts
7. Remove Booster



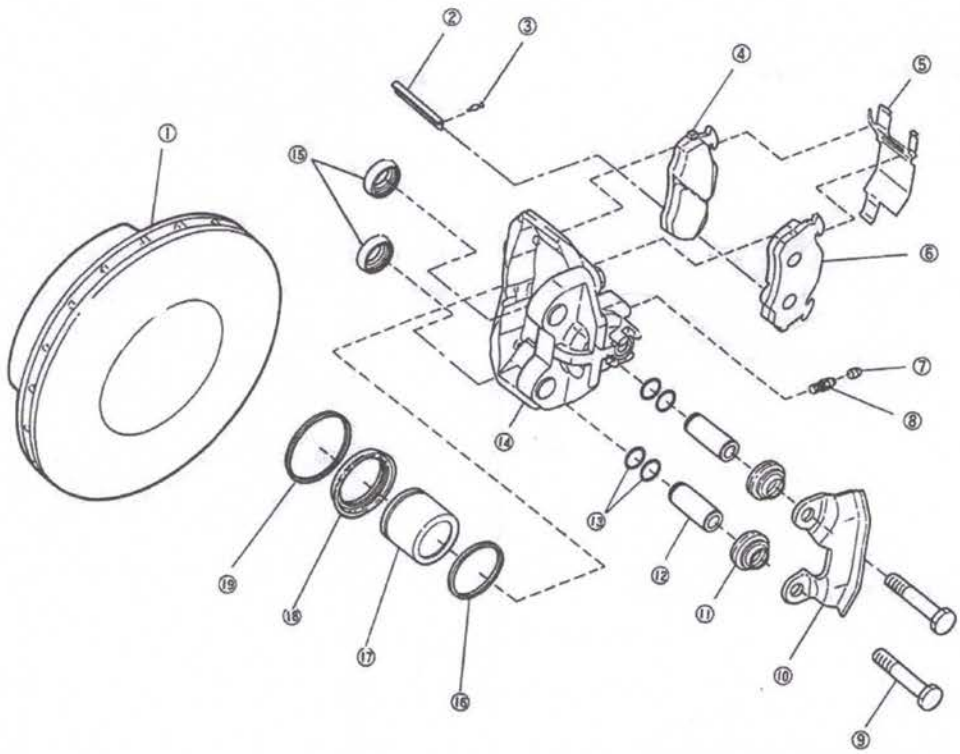
Note: Brake Boosters Can NOT be Repaired
They Must be Replace With New

Note: Only Adjustment Can be Made to Actuator Yoke Length



Adjustment Bolt

Front Disk Brake Expoded View

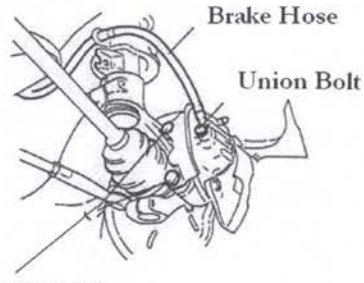


1. Disk Rotor
2. Key
3. Key Spring
4. Outer Pad
5. Pad Cover
6. Inner Pad
7. Cap
8. Air Bleeder Screw
9. Lock Pin Bolt
10. Caliper Cover
11. Outer Sleeve Boots
12. Sleeve
13. O Ring
14. Caliper
15. Inner Sleeve Boots
16. Oil Seal
17. Piston
18. Piston Boot
19. Boot Retainer

Caliper Removal -Pad Replacement- Caliper Disassembly

Caliper Removal

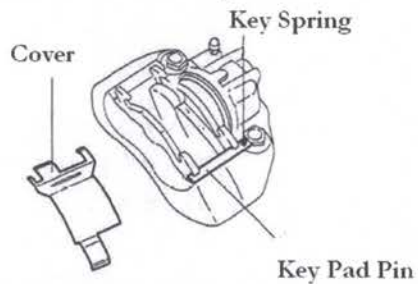
1. Jack Vehicle and Remove Front Tires
2. Remove Union Bolt and Place Hose End into Plastic Bag and Seal.
3. Remove Lock Pin Bolts



4. Remove Caliper

Pad Replacement

1. Remove Pad Cover
2. Remove Key Spring and Key Pad Pin
3. Clean Caliper With Brake Cleaner
4. Replace Brake Pads
5. Assemble
6. Bleed Air From Brake System

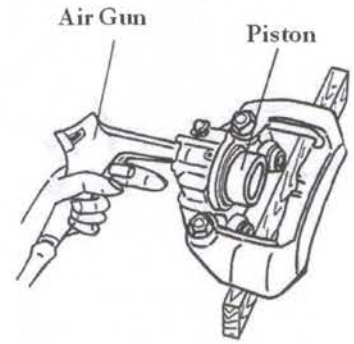


Caliper Disassembly

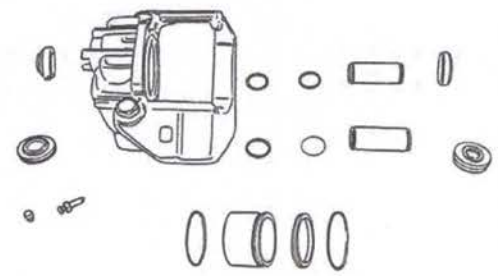
1. Follow Removal of Caliper Instructions
2. Remove Retainer Key and Pads
3. Place On Wood Block (Not in Vise)
4. Use Air Gun to Push Out Piston
5. Remove Piston and Related Parts
6. Check Cylinder Bore For Cracks or Piting

Note: If Piting or Cracks Found Replace Caliper

7. Clean Thoroughly
8. Use Caliper Rebuild Kit Containing All Necessary Parts

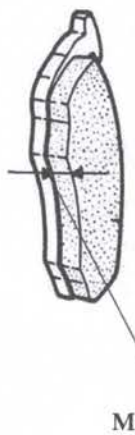


Exploded View of Caliper



Brake Pad Inspection -Disk Rotor Inspection

Brake Pad Thickness

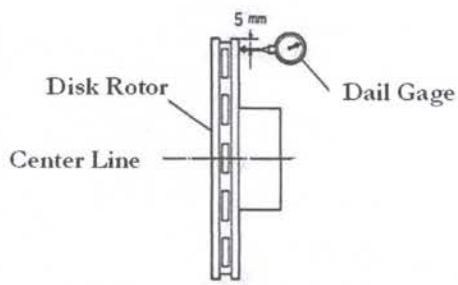


Limitations

Pad Thickness	Pass	15mm
	Fail	8 mm

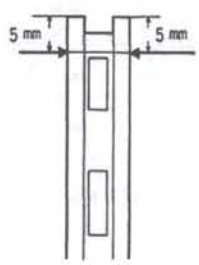
Disk Run-Out Limits

Note: Set Dail Gage 5mm From Top of Rotor



Brake Disk Run-Out Limit (mm)	0.1

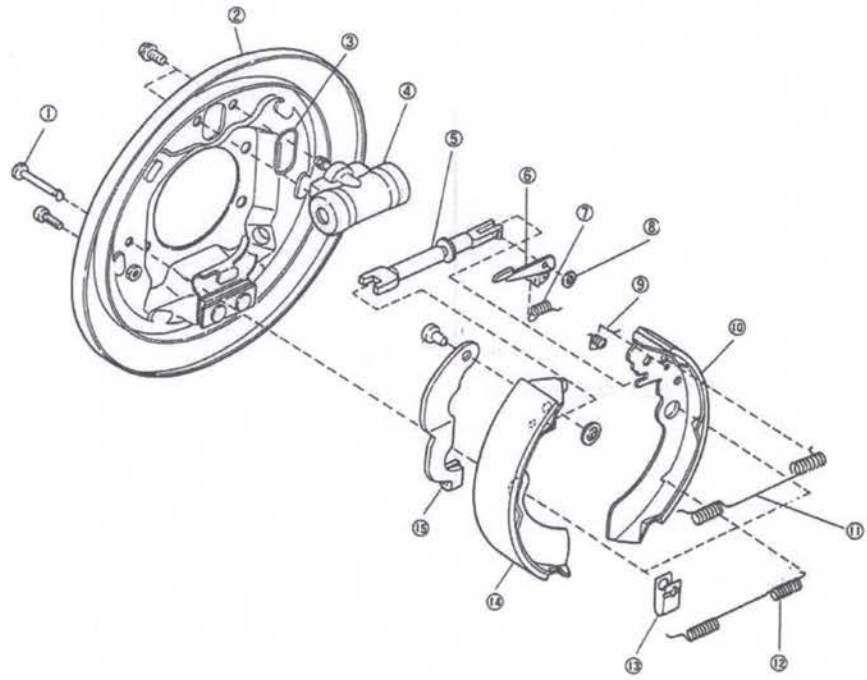
Note: Measure Thickness 5mm From Top



	Rotor Thickness
Fine	18.0mm
Limit	16.0mm

Rear Drum Brakes

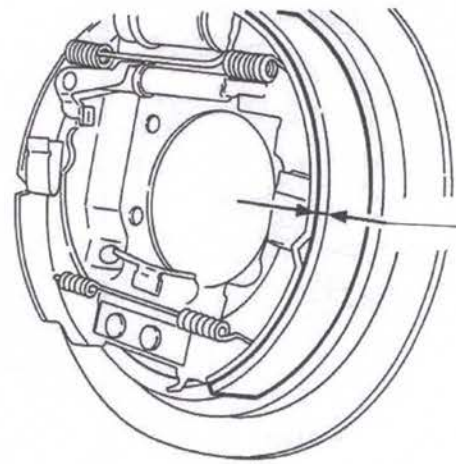
Expolded View



1. Hold Down Pin
2. Back (Dust) Plate
3. Adjust Hole
4. Wheel Cylinder
5. Auto-Adjust Assembly
6. Adjusting Lever
7. Lever Spring
8. Spring Washer
9. Lever Spring
10. Leading (F) Shoe
11. Upper Shoe Spring
12. Lower Shoe Spring
13. Hold Down Spring Clip
14. Trailing Shoe
15. Parking Lever

Brake Shoe Inspection

Note: Brake Shoes Should Be Inspected Every 24,000 Kilometers



Thickness Limitations

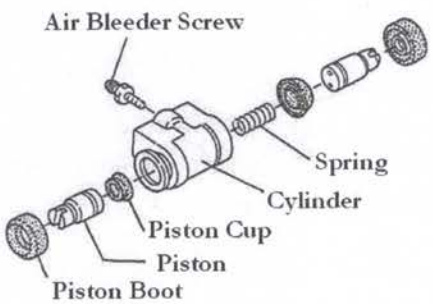
Fine	4.4㎜
Fail	1.7㎜

Fail= Replace

Wheel Cylinder

Wheel Clyinder Replacement

1. Jack Vehicle
2. Remove Tire
3. Remove Drum
4. Remove Brake Pads
5. Remove Wheel Cylinder Attachment Bolts



6. Rebuilt Wheel Cylinder With Replacement Kit

Note: If Cylinder Bore is Scratched Use Brake Cylinder Hone.

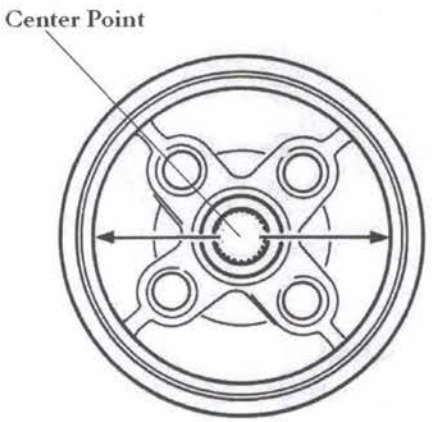
Note: If Cracked Replace Complete Unit

7. Assemble in Reverse Order
8. Bleed Brake System

Note: Never Re-Use Brake Oil

Brake Drum

Brake Drum Diameter

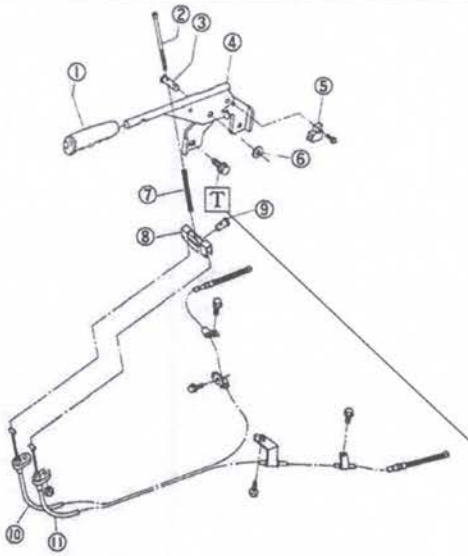


Brake Drum Measurments

Limit	180mm
Fail	182mm

Fail= Replace

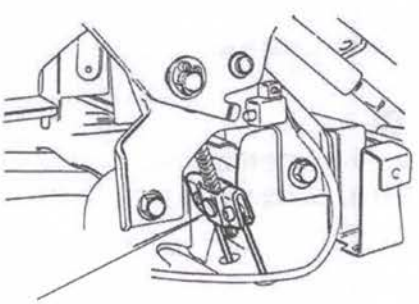
Parking Brake Cable System



1. Handle Grip
2. Adjusting Screw
3. Pin
4. Lever Assembly
5. Parking Brake Switch
6. Washer
7. Spring
8. Bracket (Cable)
9. Pin
10. Parking Brake Cable RH
11. Parking Brake Cable LH

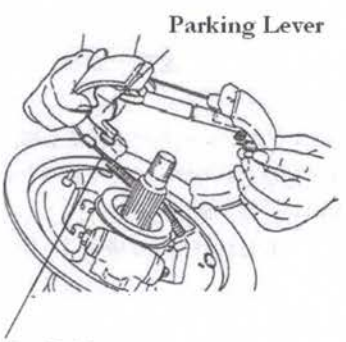
Parking Cable Replacement

1. Remove Rear Consol
2. Back Off Adjustment Screw Until Cable Bracket Is Loose. Seperate Cables



Bracket (Cable Retention)

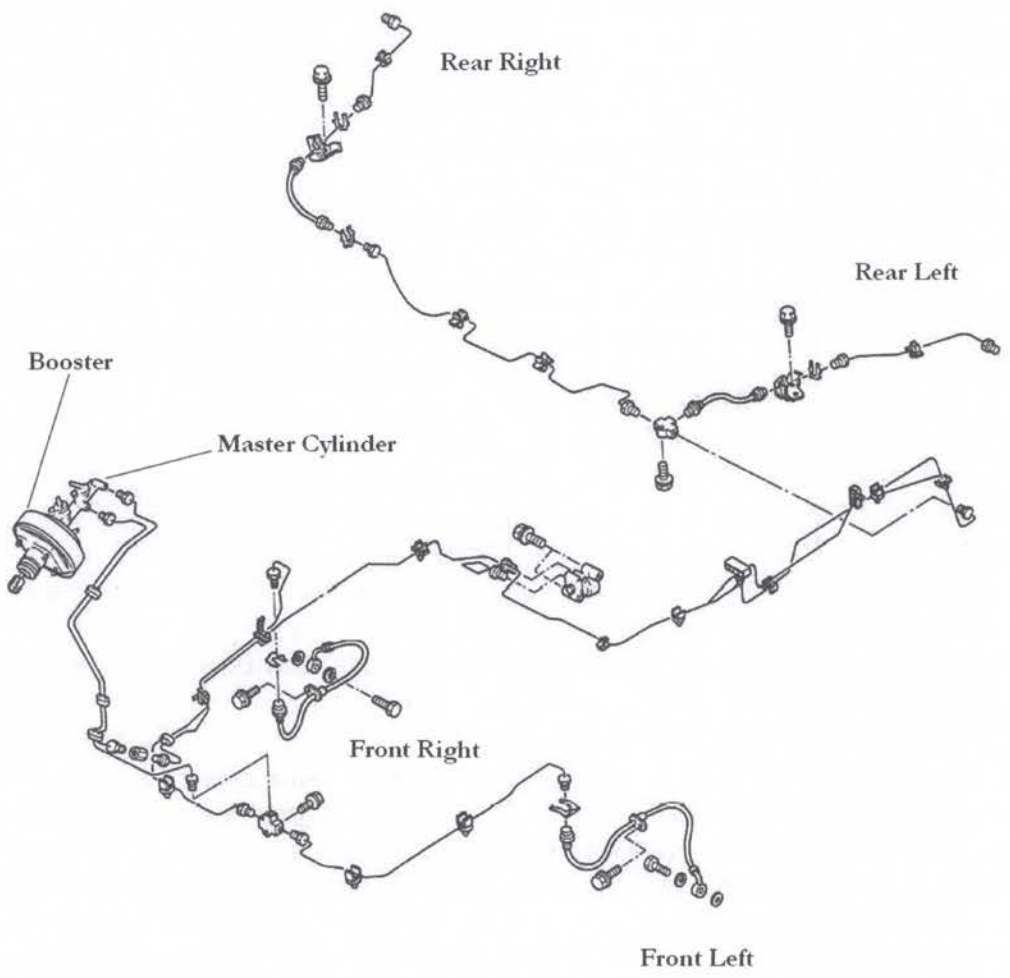
3. Jack up Vehicle Rear End, Remove Tires, Brake Drums
4. Remove Brake Shoes



5. Disconnect Cable From Brakes
6. Remove Cables From Vehicle
7. Replace With New Cables

Note: Cables Can NOT be Repaired

Brake Line Full Diagram



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Chapter 6

Engine Coolant & Cooling System

10. Coolant System Specifications and Capacities
11. Coolant System Components Diagram
12. Coolant System Radiator Components Diagrams
13. Engine Room Fan System
14. Troubleshooting Chart
15. Coolant Line Diagrams (Chassis Mount)
16. Water Pump
17. Engine Room Fan Circuit
18. Cooling Master Control Unit & Circuit

Engine Coolant System

Specifications

Vehicle Type			Carburetor		SC Vehicle	
			Truck	Van	MT	ECTV
Coolant System Type			Water- Cooled + Electric Fan Assist			
WATER PUMP	Pump Type		Impeller Type			
	Water Output RPM 85*C	2000RPM	20 ℓ /min			
		5000RPM	50 ℓ /min			
		7000RPM	100 ℓ /min			
	Impeller Measurment		ϕ62			
	Blades		8			
	Pulley		1.05			
	Thermostat					
	Opening Temp *C		78			
	Full Open Temp*C		93			
	Valve Total Lift (mm)		8			
	Coolant		Subaru Coolant			
	Coolant Capacity		6.5 Liters			
	Electric Fan Watt (W)		70	80	←	110
	Outer Fan Demension+Blades		ϕ270× 5			
RADIATOR	Radiator Type		Cross-Flow			
	(Kcal/H)		22500	21000	28000	29500
	Tank		Steel	Steel	←	←
	Core Material		Aluminum	Copper	←	←
	Core Dimensions		273×400×16	268×400×16	268×400×32	←
	Fan		Corrugated			
	Cap Pressure (kg/㎠)		0.9+-0.15 -0.05 Below			
	Oil Cooler		No	←	←	Yes
	Size	Pipe Dia	ϕ22	←	ϕ28	←
		Hoes Dia	ϕ21×ϕ28	←	ϕ27×ϕ35	←

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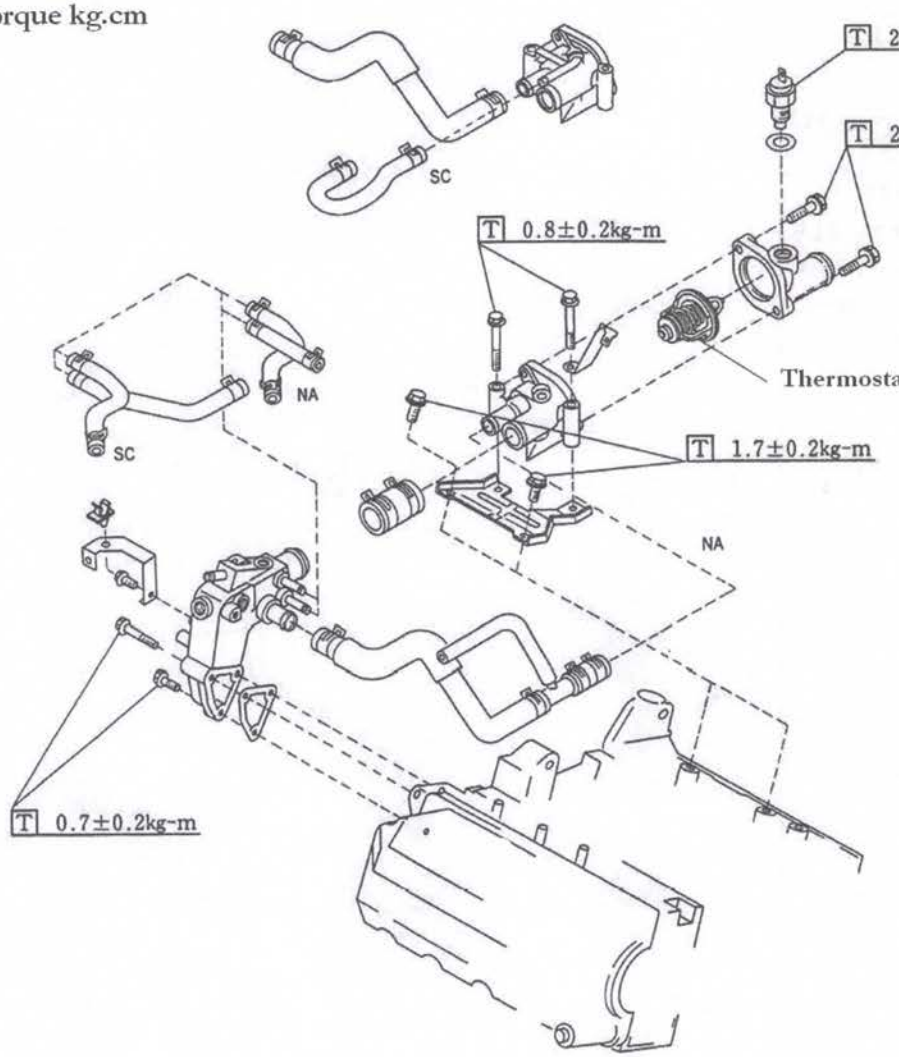
Engine Related Components

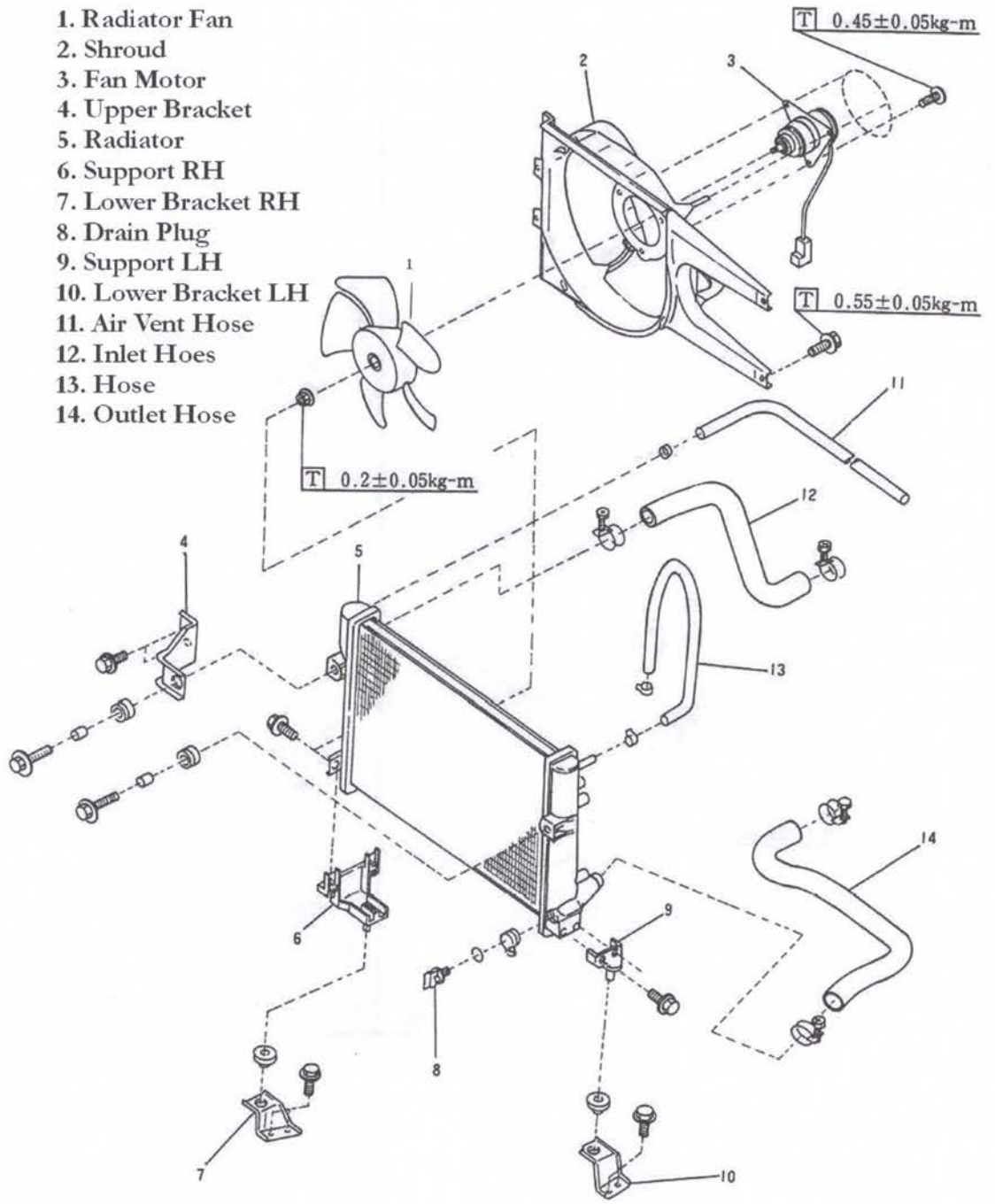
Expoled View

T=Torque kg.cm



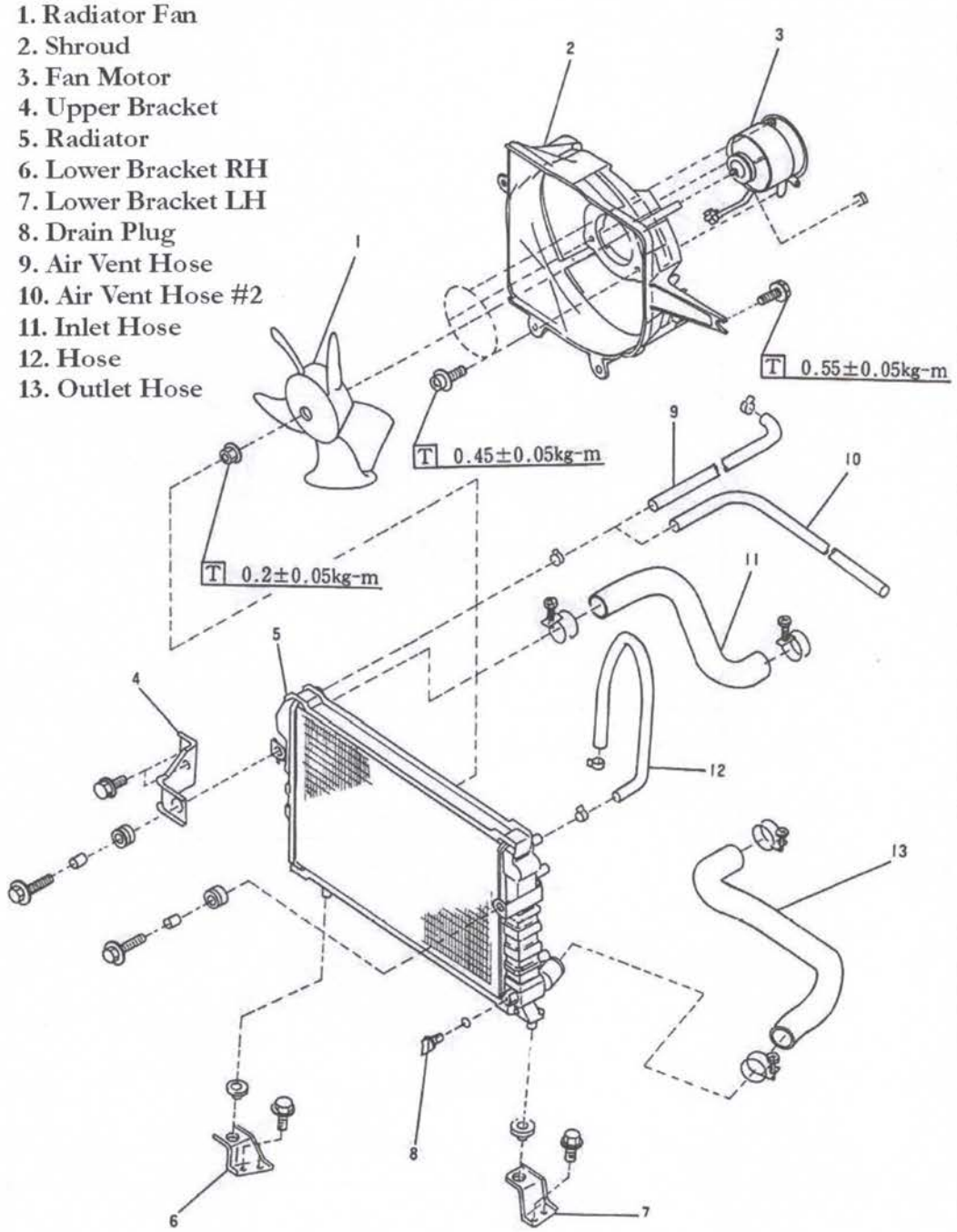
Truck Carbureted Vehicle

1. Radiator Fan
2. Shroud
3. Fan Motor
4. Upper Bracket
5. Radiator
6. Support RH
7. Lower Bracket RH
8. Drain Plug
9. Support LH
10. Lower Bracket LH
11. Air Vent Hose
12. Inlet Hoes
13. Hose
14. Outlet Hose

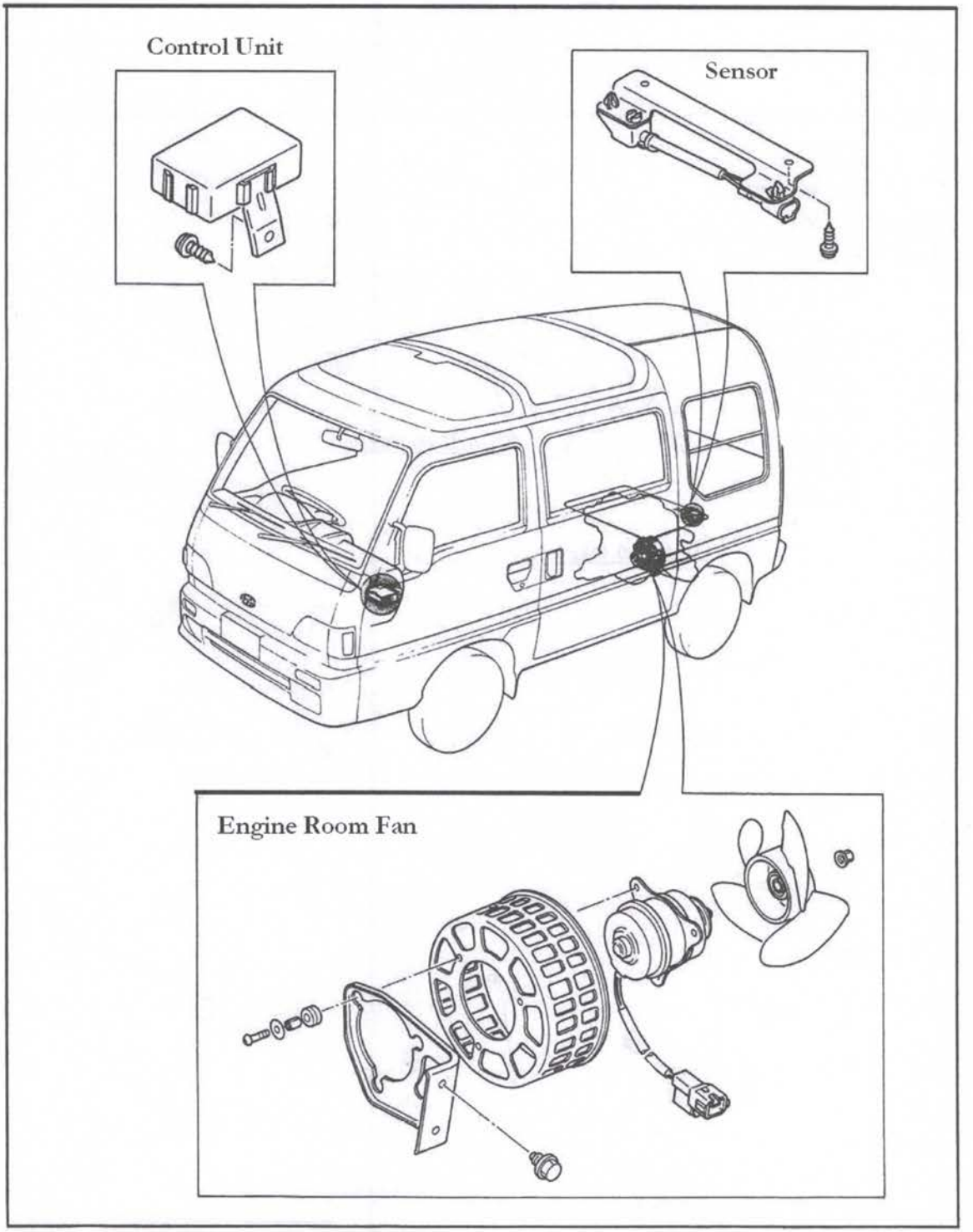


SC Vehicle

1. Radiator Fan
2. Shroud
3. Fan Motor
4. Upper Bracket
5. Radiator
6. Lower Bracket RH
7. Lower Bracket LH
8. Drain Plug
9. Air Vent Hose
10. Air Vent Hose #2
11. Inlet Hose
12. Hose
13. Outlet Hose



Engine Room Fan System

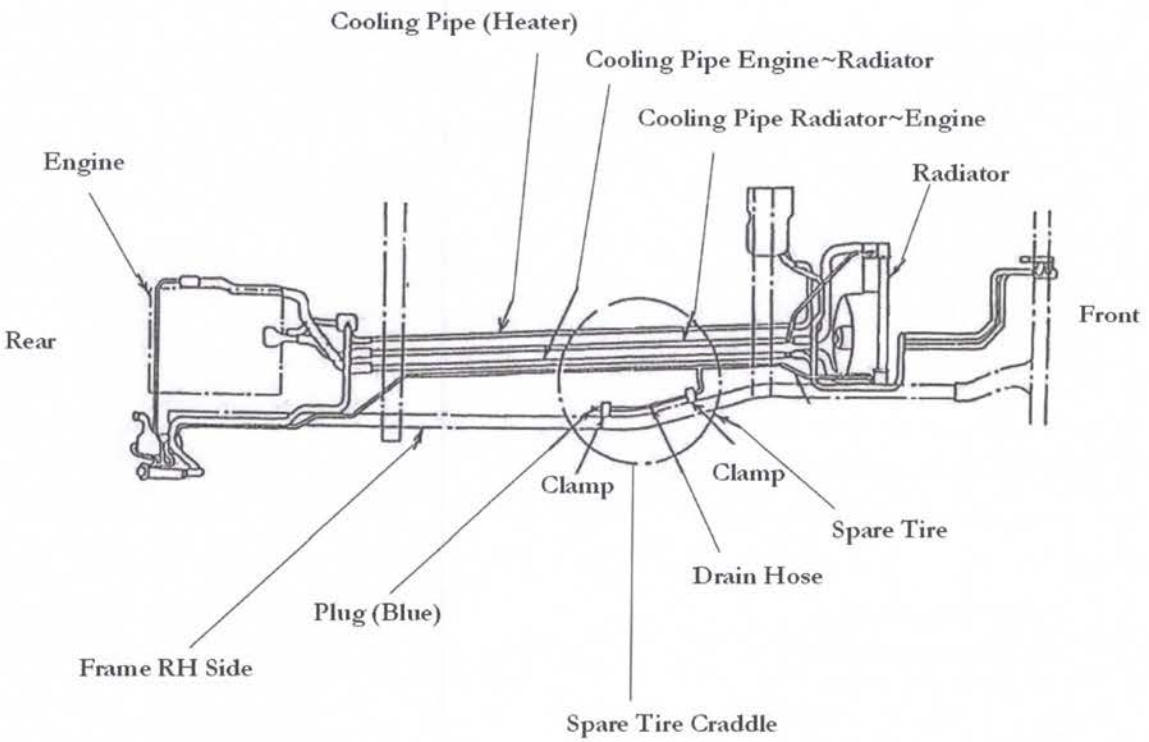


Troubleshooting

	Cause	Remedy
OVER HEAT	Coolant Low	Add Coolant
	Water Pump Pulley	Check Belt
	Water Pump Not Funtioning Correctly	Change Pump
	Electric Fan	Check Relay-Check Fan
	Thermostat	Change
	Coolant Leaking	Change Gasket
	Radiator Leak	Repair Radiator
	(Do Not Use Stop Leak) Water Pump Will Fail	
	Engine Oil Low	Add Oil
	Clutch Slippage	Repair Clutch
	Transmission Oil Low	Add Oil
	Water In Oil	Head Gasket
	Brake Engaged (Side Brake)	Release
Too Cool	Thermostat Stuck Open or Missing	Replace Thermostat
OTHERS	Inlet Hose Leaking	Replace Hose & Clamp
	Outlet Hose Leaking	Replace Hose and Clamp
	Water Pump Noise	Replace Pump
	Intake Manifold Water	Replace Gasket
	Water From Tailpipe	Replace Head Gasket

Engine Coolant System Diagram

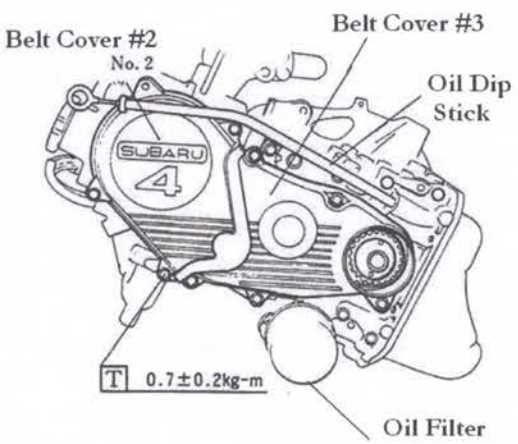
Hose & Pipe Routing



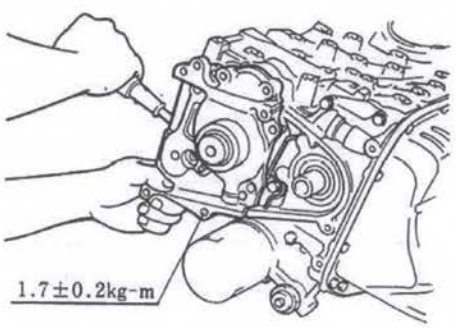
Water Pump

Removal & Replace

1. Remove Engine From Vehicle
2. Remove Altinator Belt, Tensioner, if Equiped Super Charger Belt, Crank Pulley
3. Remove Dip Stick Tube
4. Remove Timing Belt Cover #2 &#3



5. Loosen Tensioner and Remove Timing Belt
6. Remove the (6) Water Pump Retaining Bolts



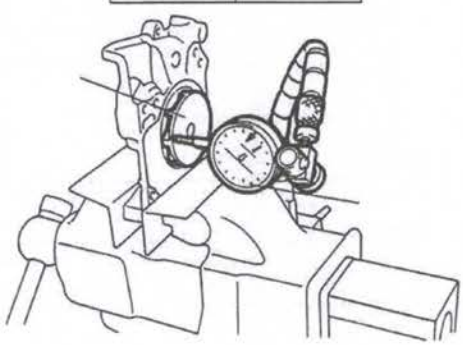
7. Remove Water Pump
8. Clean All Surfaces and Install New Water Pump

Inspection

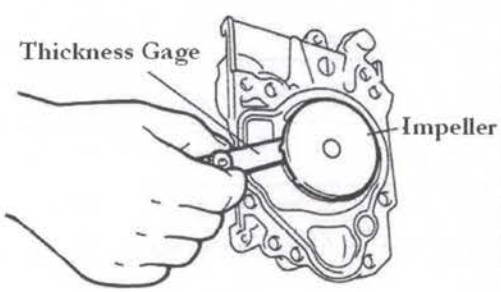
Note: This Section is For Inspection Puposes It is Highly Recommended to Simply Replace the Pump

End Play

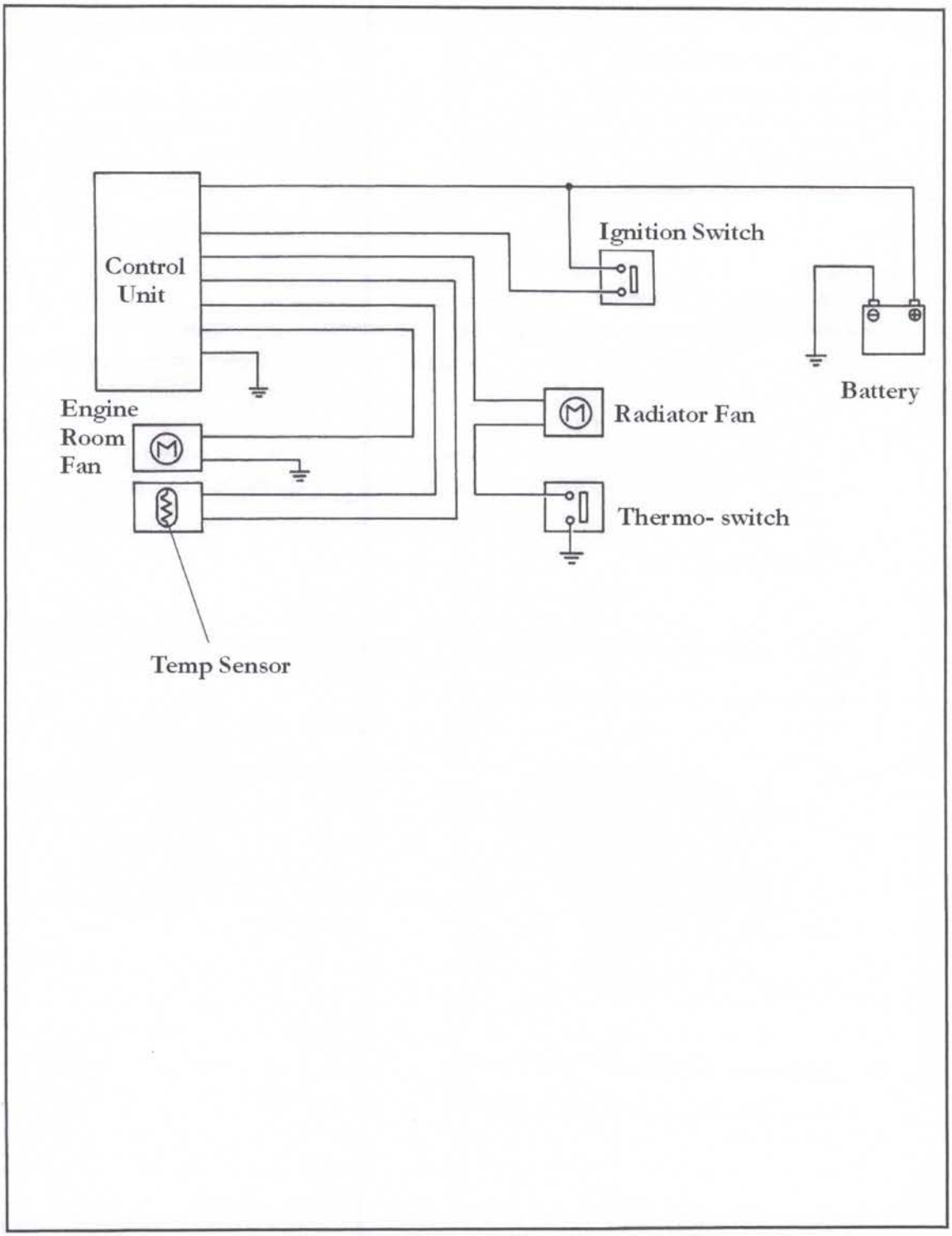
Limit	0.5mm



Clearence (mm)	Limit	0.3~0.9
	Replace	1.1



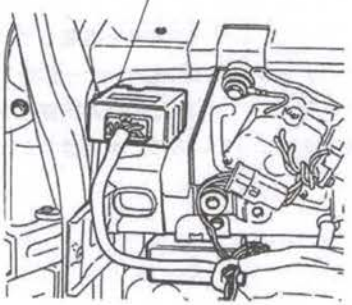
Engine Room Fan Circuit



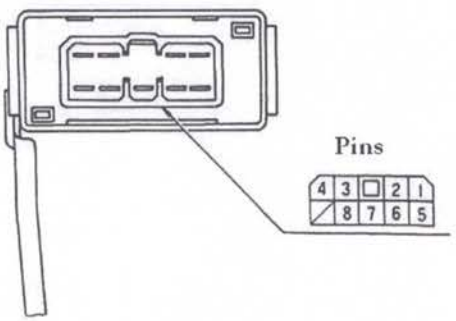
Control Unit Circuit

Note: See Electrical Diagram Section For More Information and Details

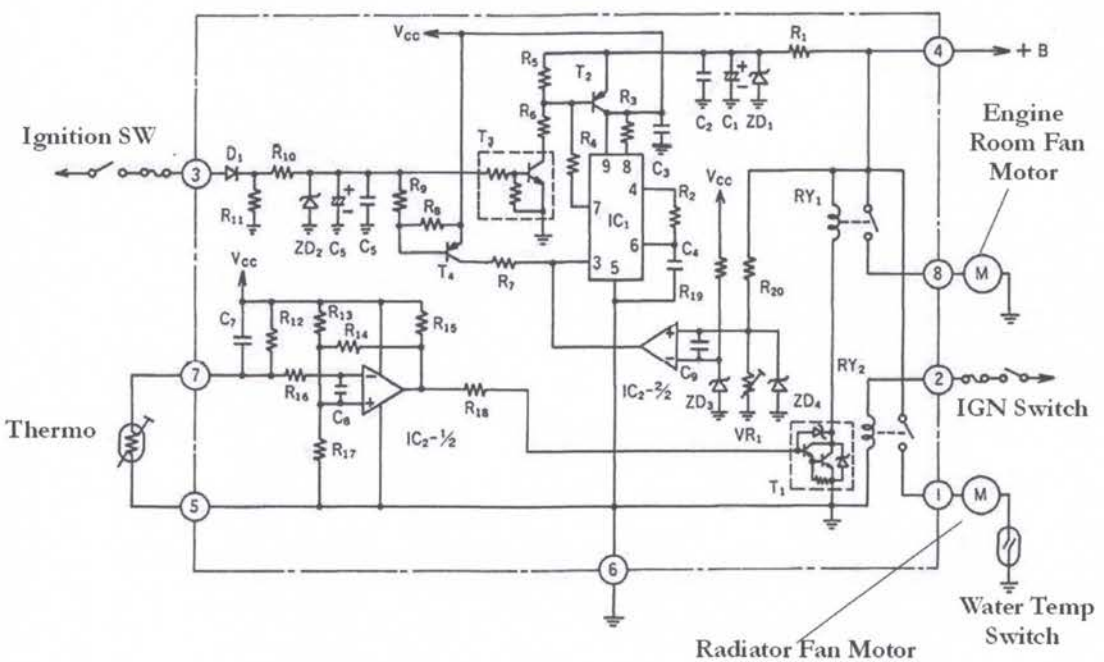
Cooling Fan Unit



Connector



Control Unit Circuit



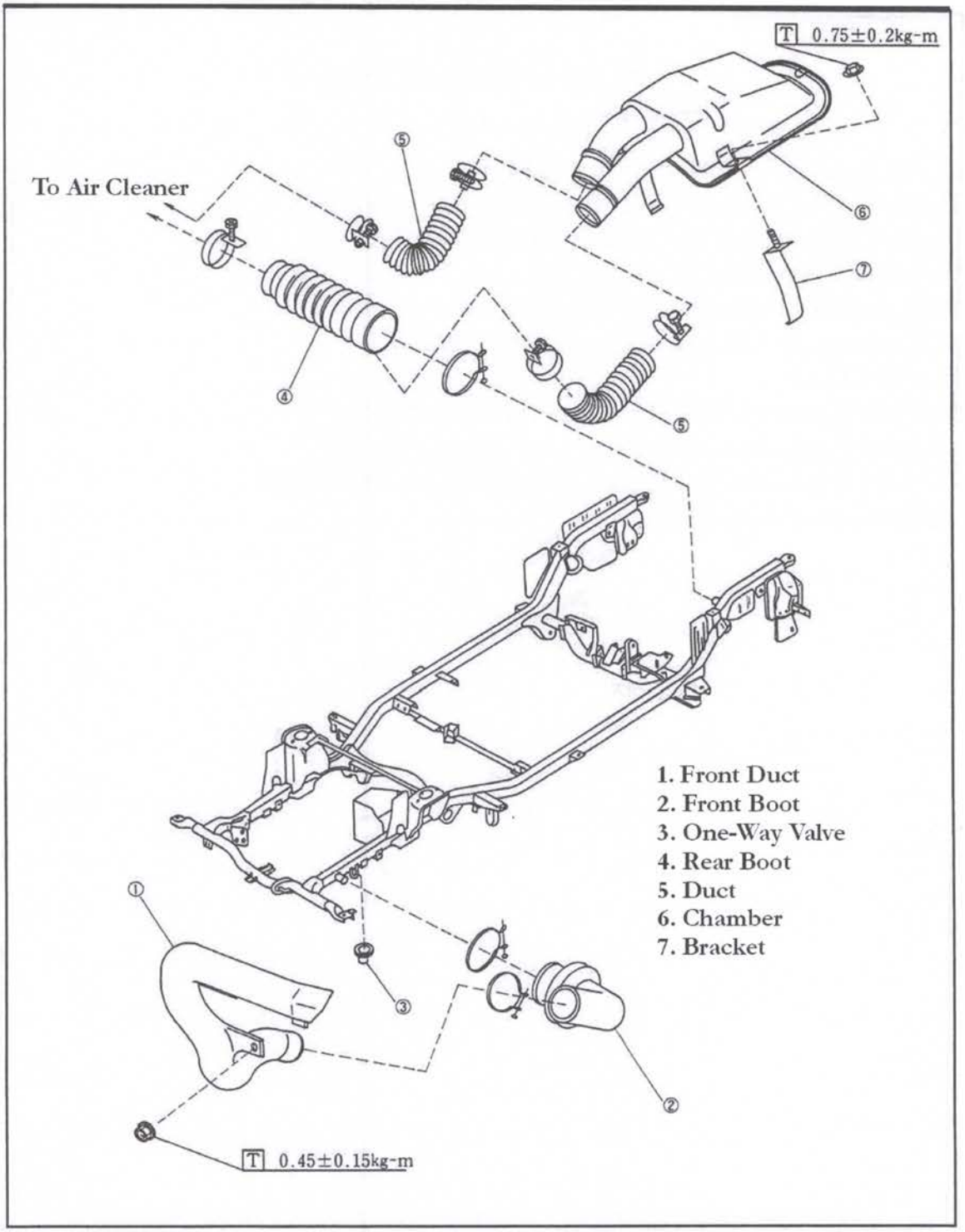
Chapter 7

Air – Fuel System – Exhaust

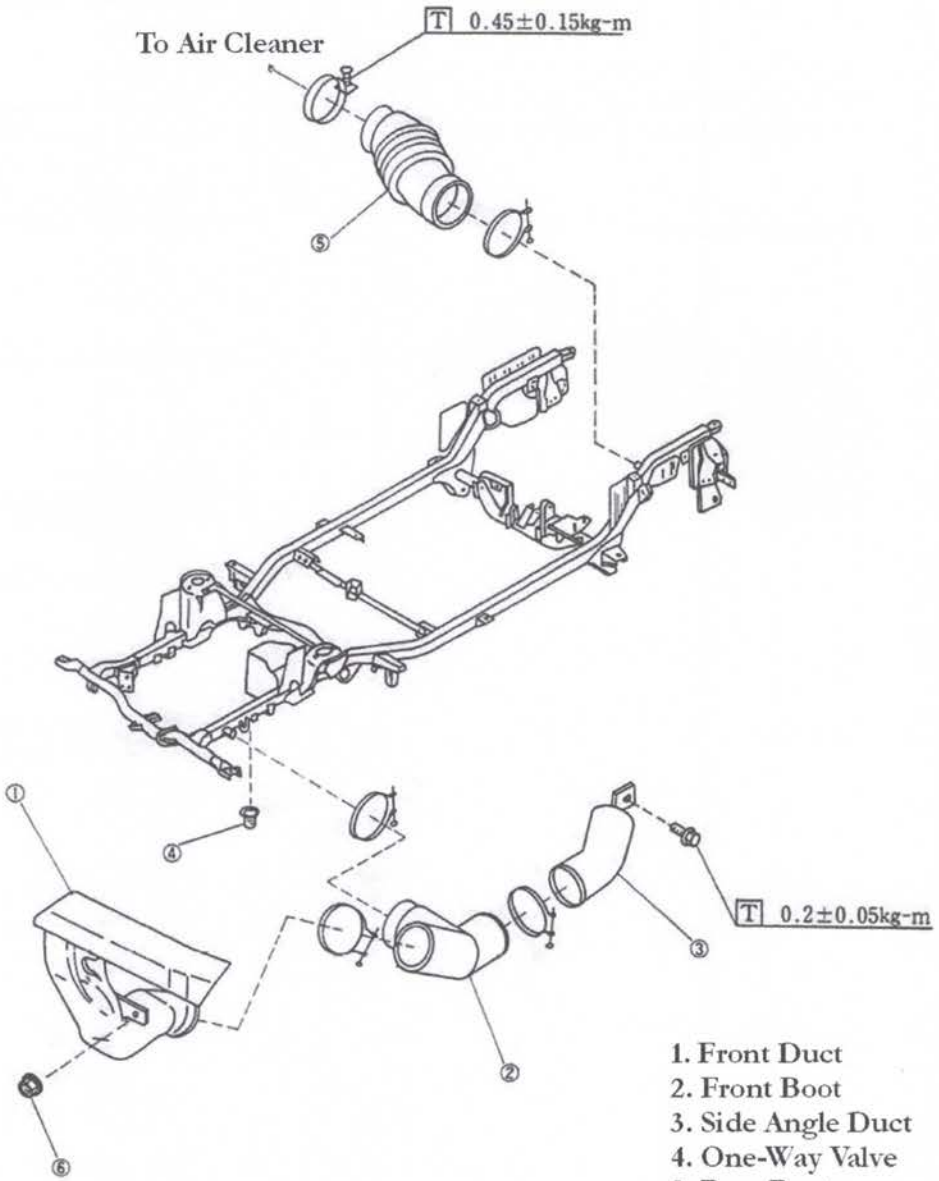
12. Air Intake System (Carbureted)
13. Air Intake System (Fuel Injected-Supercharged)
14. Air Cleaner and Air Intake Sensor
15. Intake Manifold (Carbureted)
16. Complete Fuel System Specifications
17. Carburetor Adjustments and Breakdown
18. Fuel Tank
19. Fuel System EMPi (Fuel Injected Vehicles)
20. Fuel Pump-Pressure Regulator-Knock Sensor
21. Fuel Injection-Air/Water Temp Sensors-O2 Sensor
22. Exhaust Truck-Van

Air Intake System

Carbureted Vehicle



SC Vehicle



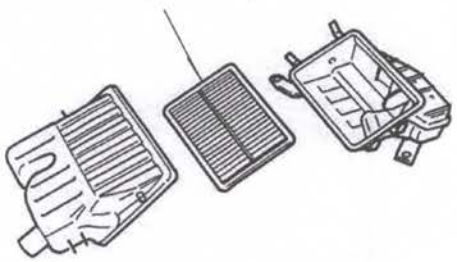
1. Front Duct
2. Front Boot
3. Side Angle Duct
4. One-Way Valve
5. Rear Boot
6. Hose Clamp

Air Intake System

Air Cleaner Case and Sensor

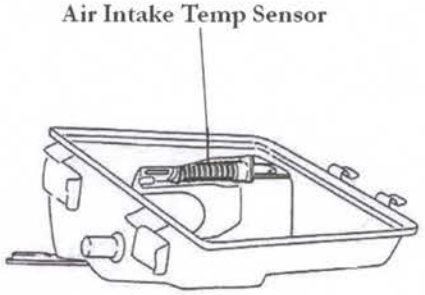
Note: Change Air Element Every 12,000K
Clean Air Cleaner Case Every 6 Months

Air Cleaner (Element)



Caution: The Air Intake Charge Temperature Sensor is Located in The Lower Case of The Air Cleaner Unit. Take Care Not to Damage the Sensor or System Balance Trouble Will Occur

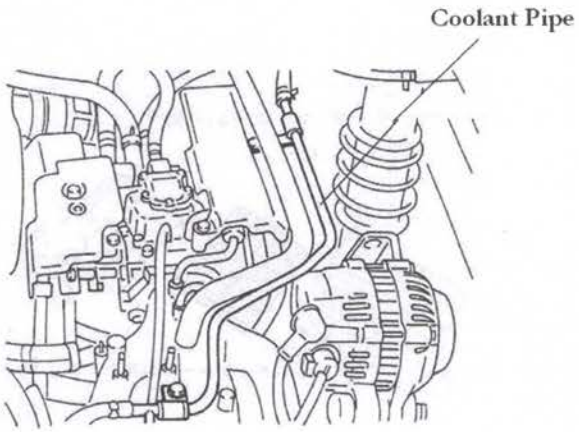
Air Intake Temp Sensor



Note: Do Not Forget to Connect Sensor if Air Cleaner Unit is Removed

Intake Manifold (Carbureted)

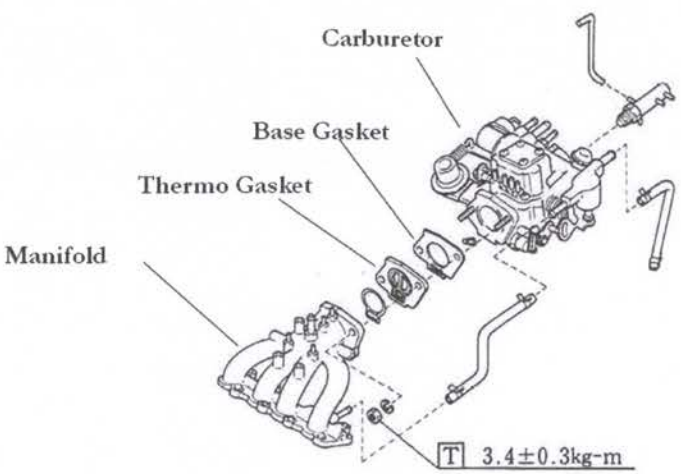
1. Disconnect (-) Negative Battery Terminal
2. Drain Coolant System
3. Remove Coolant Pipe in Below Diagram



4. Remove any Hoses Necessary and Mark (Label) With Tape

See Diagram Below
5. Disconnect Carburetor Linkage, Vacuum Hoses, Fuel Line, etc.
6. Remove Carburetor
7.Remove Intake Manifold
8. Clean All Surfaces Before Re-Assembly

Note: Never Re-Use Gaskets

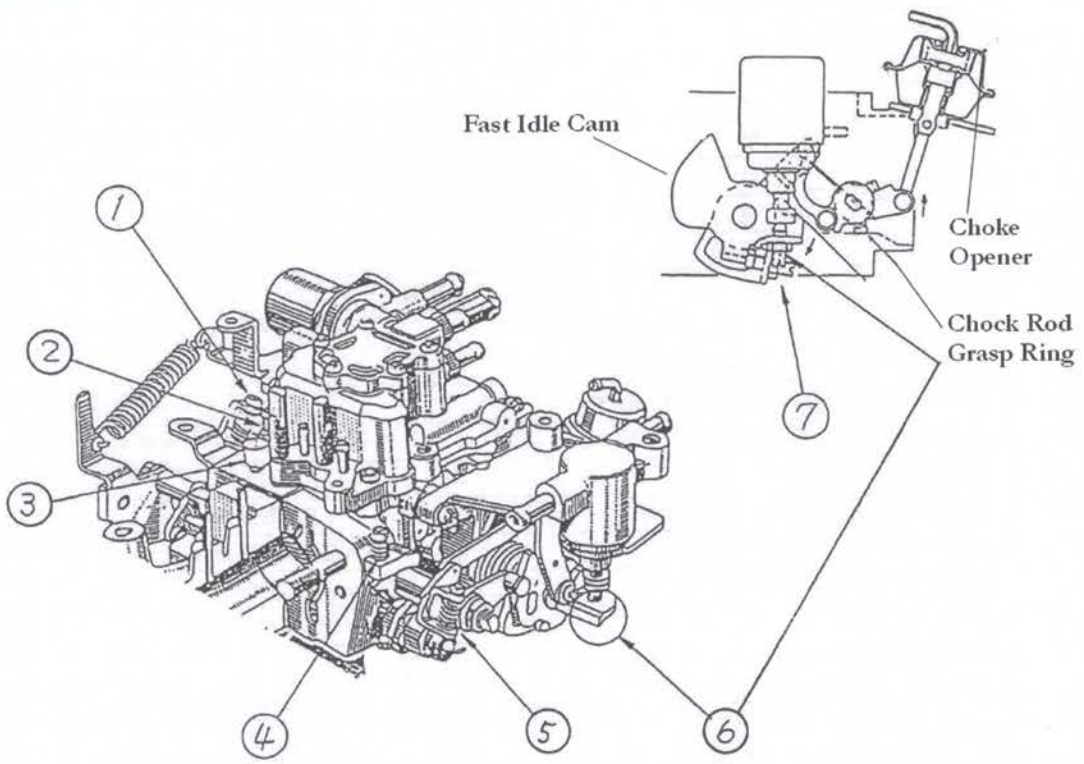


Fuel System Specification (Carbureted)

Vehicle Type		Carbureted Vehicle	
Fuel Tank	Capacity	40 ℓ	
	Location	Under Rear Floor Decking	
Fuel Pump Specifications	Type	Plunger (Van-Try)	Diaphragm (Truck)
	Output Press	0.15±0.03kg/㎡	←
	Output Volume	15 ℓ /h	←
	Amp Draw	1.5A	←
	Min Voltage	9V	←
	Hz	17Hz	–
Fuel Filter Type		Cartridge	
Fuel Return System (Yes-No)		Yes	
Fuel Seperator System (Yes-No)		No	
Fuel Vent System Type		Charcaol Canister Type	
Carburetor	Model	HVB32	
	Maker	Hitachi	
	Fuel Inlet Dia	Inner ϕ46 ϕ50 Outer	
	Fuel Outlet Dia	ϕ32	
	Venturi	Yes	
	Needle Valve Dia	ϕ1.4	
	Float Bowl Vent	Open Vent, Inner Vent Solenoid (Vent SW OP)	
	Main Nozzle	1	ϕ2.8 ϕ4
		2	ϕ2.5 ϕ3.5
	Secondary	1	ϕ3 ϕ4
		2	ϕ3.5 ϕ4.5
	Idle Hole Dia	ϕ1.3	
	Bypass Hole Dia	ϕ0.7−ϕ1.0 ℓ=3.8㎜	
	Power Valve Nozzle	ϕ0.4×1.9cc/10	
	Float Level	Float Chamber Surface Up 2.5(mm)	
	Carb Weight	2.8kg	

Notes

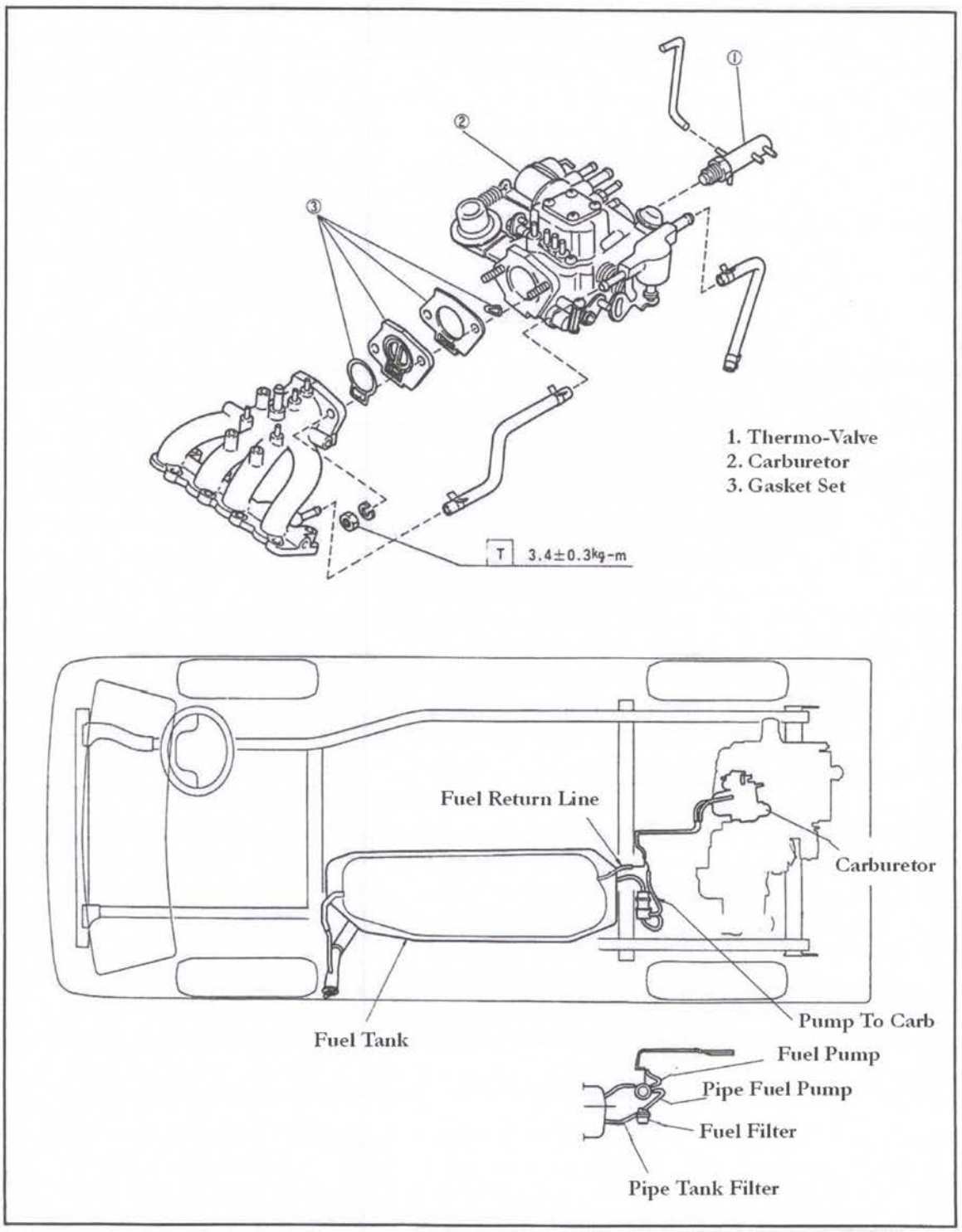
Carburetor Diagram



Adjustment Identification

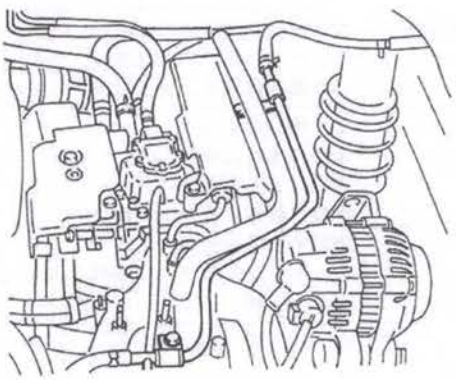
1. Venturi Adjustment Screw (A)
2. Venturi Adjustment Screw (B)
3. SAS Screw: CO% Control Right Turn: CO% Lean Left Turn: CO% Rich
4. TAS Screw: (Idle) Right Turn Idle Up- Left Turn Idle Down
5. Fast Idle Screw: Right Turn RPM Drop-Left Turn RPM Up
6. Choke Adjust Screw
7. Choke Adjust Screw (B)

Adjustment Screws



Carburetor Removal

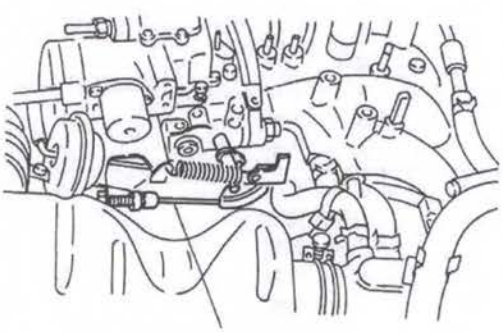
1. Remove (-) Battery Connction
2. Disconnect Pipe Braket Below



3. Remove the (2) Carburetor Covers
4. Drain Coolant System (See Coolant)
5. Mark Hoses and Remove

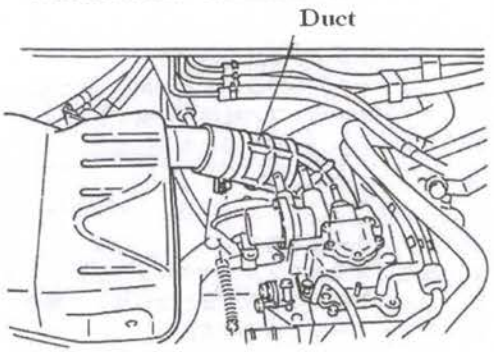
Caution: Fuel is Dangerous

6. Dicsonnect Accelerator Cable as Shown in the Diagram Below.

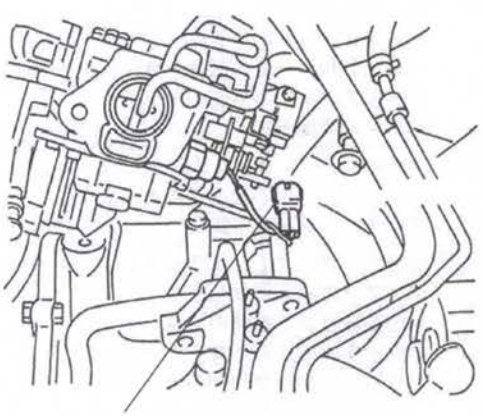


Accelerator Cable

7. Remove Air- Cleaner Duct



8. Remove the (2) Nuts Attaching The Carburetor to the Intake Manifold
9. Disconnect Throttle Cut-Off Solenoid Connector as in the Diagram Below



Connector

10. Remove Carburetor

Note: Always Use New Gaskets

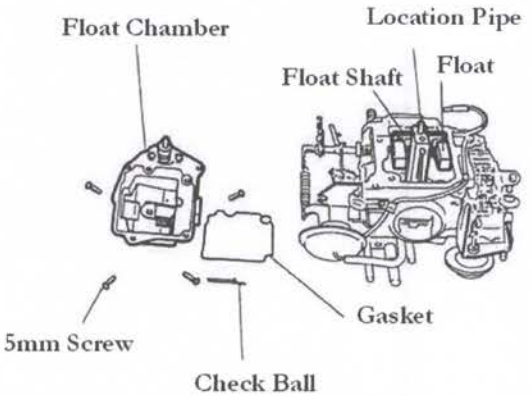
Torque For Intake to Carburetor Nuts

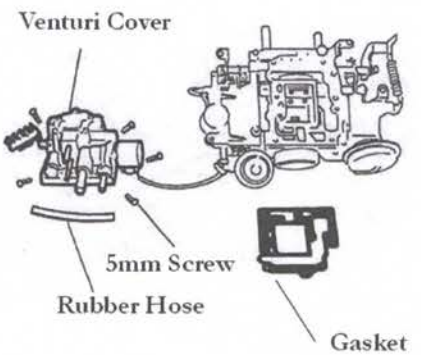
T 3.4±0.3kg-m

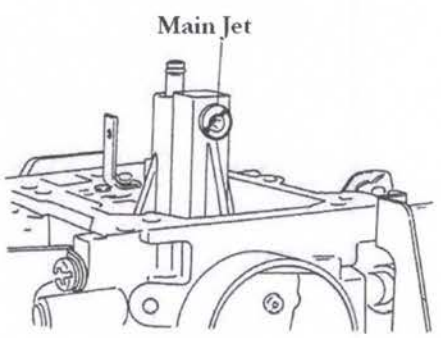
Carburetor Brakedown HVB32 Series

Note: Order Rebuild Kit For Hitachi HVB32

Detailed Instructions Included in Rebuild Kit
This Diagram for Reference Only







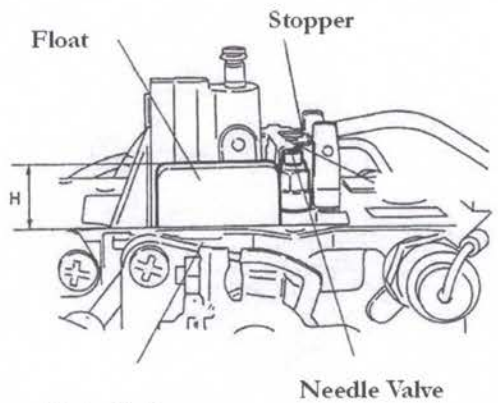
Note: Rebuild Kit Has Up To Date Specifications
This Page for Genearal Reference

Caburetor Float Bowl Measurment

HVB32-1 Series
HVB32-1A Series

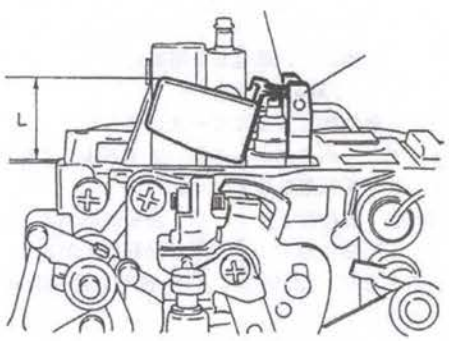
Float Measurment

High Point	14mm

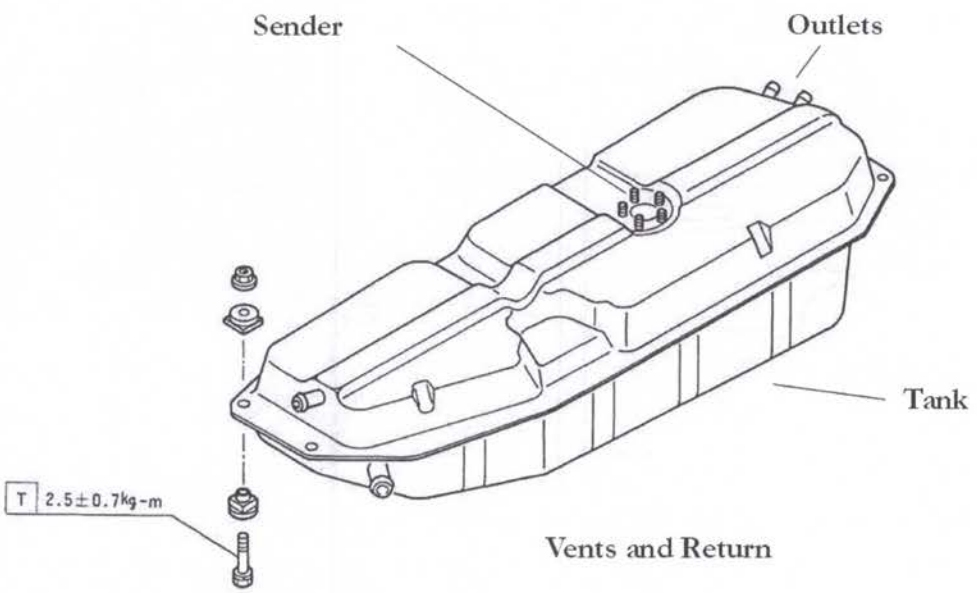


Float Measurment

Low Point	24.6~25.5mm



Fuel Tank



Attachment Bolts

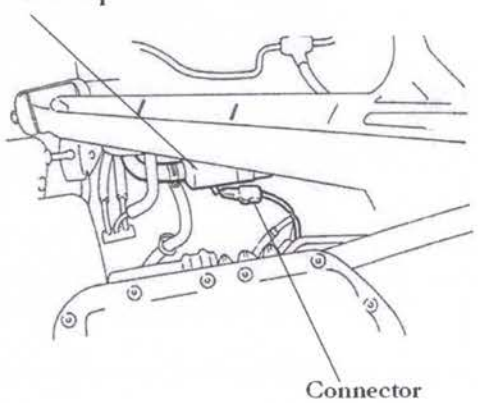
Note: Do Not Over Torque Attachment Bolts

Fuel System (EMPi)

Fuel Pump - Pressure Regulator - Knock Sensor

Fuel Pump

Fuel Pump



1. Disconnect Connector
2. Start Engine to Burn Fuel in Line and Relieve Fuel Pressure
3. Stop Engine Diconnect (-) battery Post
4. Disconnect From Bracket
5. Disconnect Fuel Lines
6. Remove Pump
7. Install new Pump
8. Connect Lines
9. Connect to Bracket
10. Connect Battery
11. Connect Pump Electrical Connector
12. Turn Key to ON Position 5 Seconds and OFF
13. Turn Key to Start and RUN Engine
14. Check for Leaks

Fuel Pump Pressure

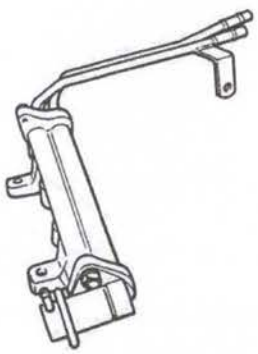
Fuel Pump Output Pressure IG SW ON

Normal	3.1kg/cm²

Fuel Pump Pressure at IDLE

Normal	2.6kg/cm²

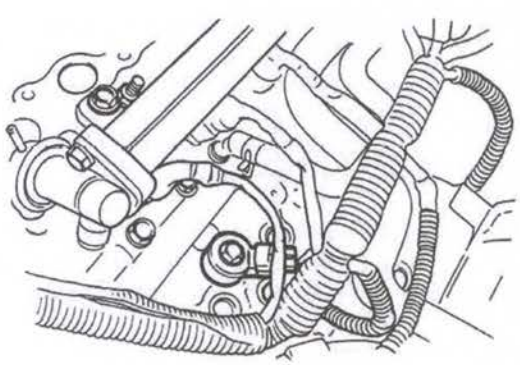
Pressure Regulator



Pressure Regulator Regulates to 3.1kg.cm

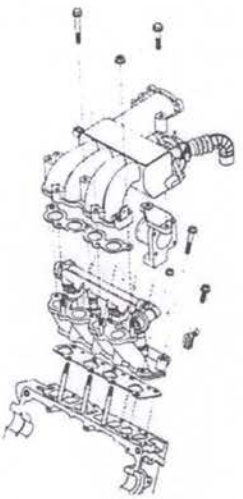
To Replace: Remove Lines and (2) Attachment Bolts

Knock Sensor



Knock Sensor: Detailed Schematic See Electrical Section of this Book

Fuel Injector - Air and Water Temp Sensor - O2 Sensor



Note: Rough Idle or No Idle Can Be Caused By Bad Injector(s)
First Check Iginition System Before Changing Injector(s)

Injector Test

1. Start Engine and Warm to Idle
2. Use a Stethoscope to Listen to Each Injector.
   You Should Hear Each Injector Make a Chi Chi Chi Sound. If an Injector is "Dead" Unplug the Connector and Plug Again.

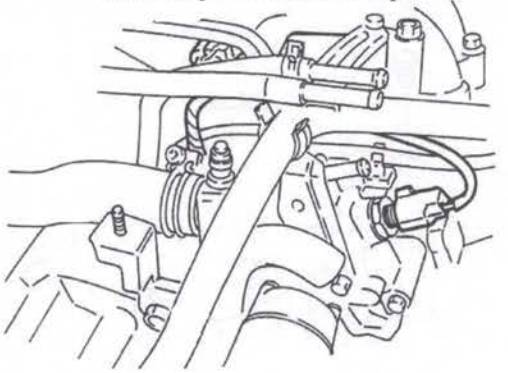
Note: Quick Check of Connector Circuit Live or Dead Connect to a Injector That is Known Live. If you Hear The Chi Chi Chi Sound You Know The Circuit is Good. Return Connector to Original Injector.

Note: If All Injectors Live Spray Water Mist Around Injectors to Check For Vacuum Leak. If Leak Found Change Seals

3. Change Bad Injector(s) and Seals

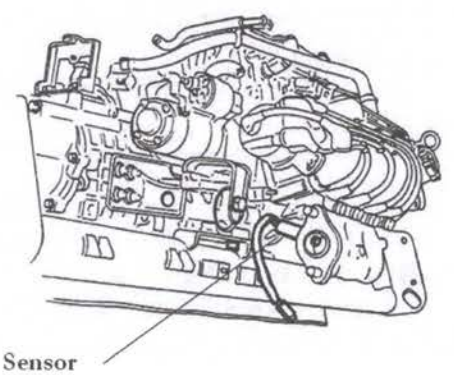
Note: Change ALL Seals

Air Temp and Water Temp



Note: See Electrical Section of this Book for Detailed Information on these Circuits

O2 Sensor

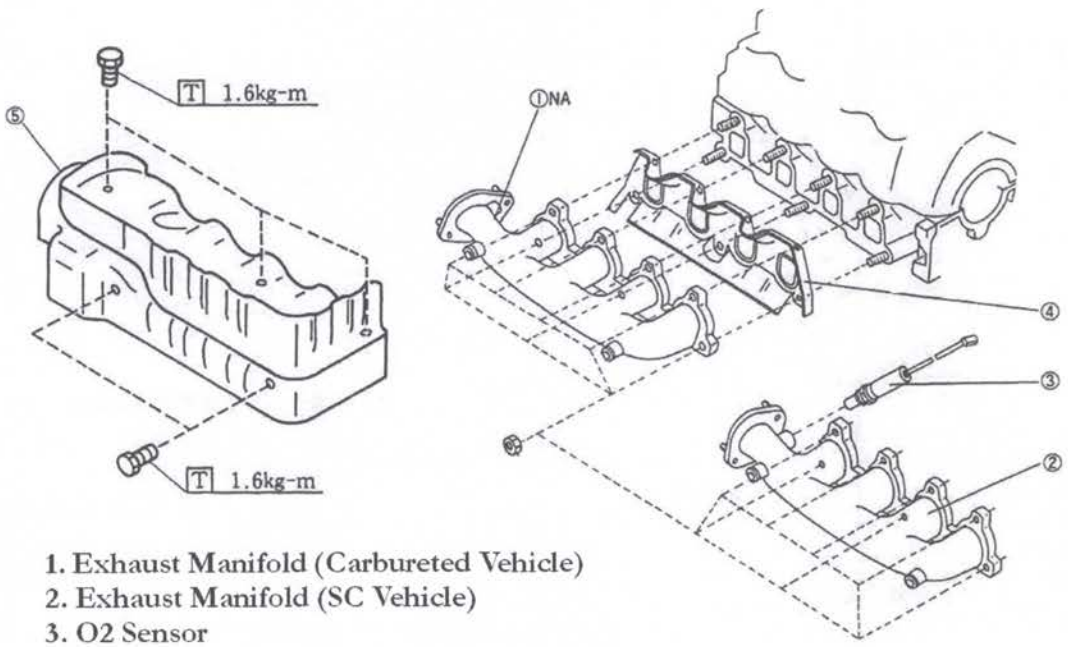


Note: O2 Sensor Detailed Information in The Electrical Section of this Book

1. Diconnect Electrical Connector
2. Remove and Replace Sensor

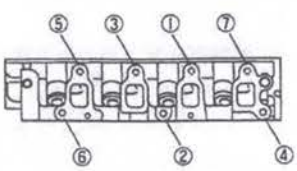
Exhaust System

Manifold and O2 Sensor



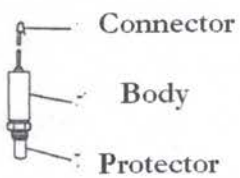
1. Exhaust Manifold (Carbureted Vehicle)
2. Exhaust Manifold (SC Vehicle)
3. O2 Sensor
4. Gasket
5. Heat Shield

Manifold Torque Sequence



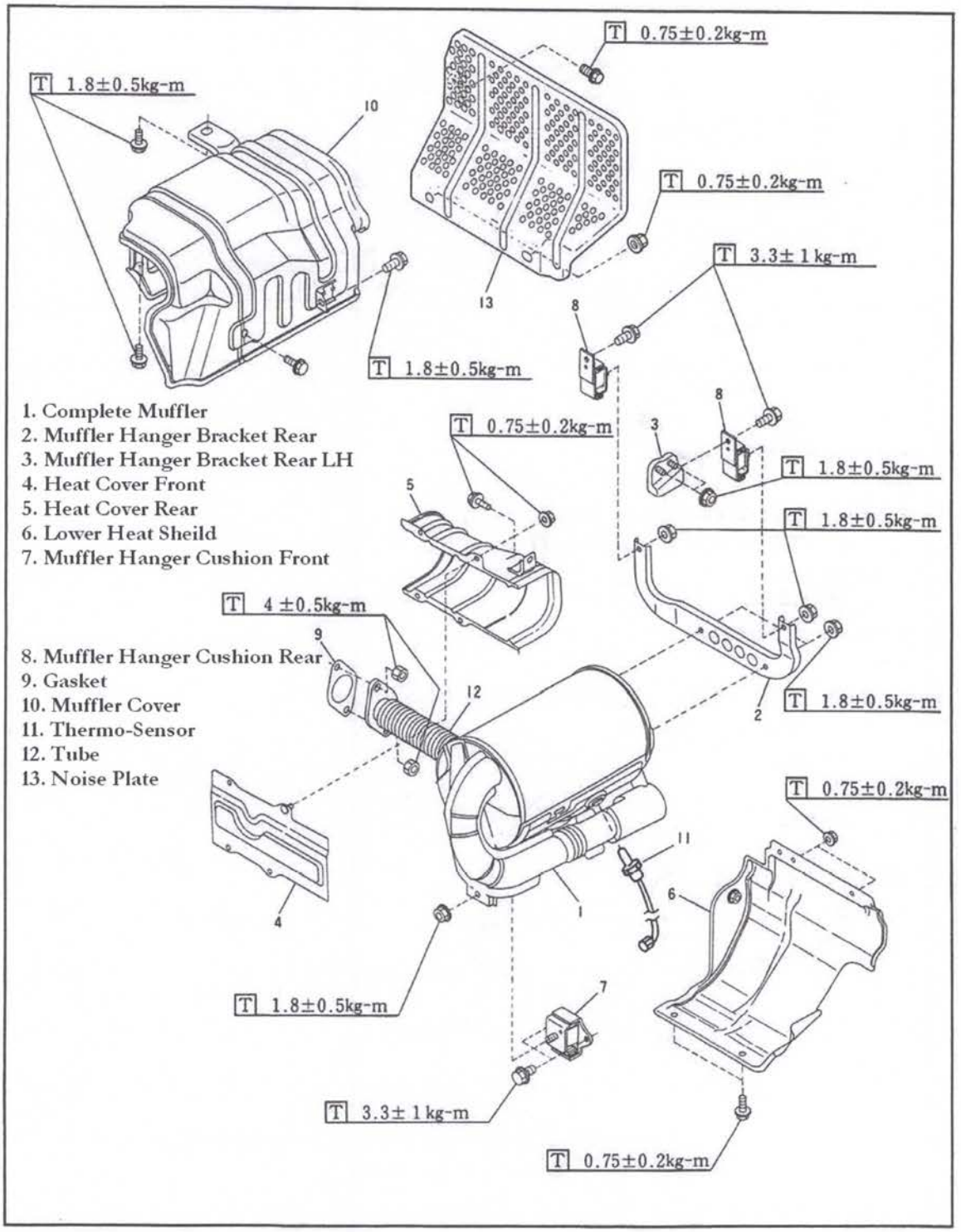
T=3.5+-0.5kg-m 2x

O2 Sensor



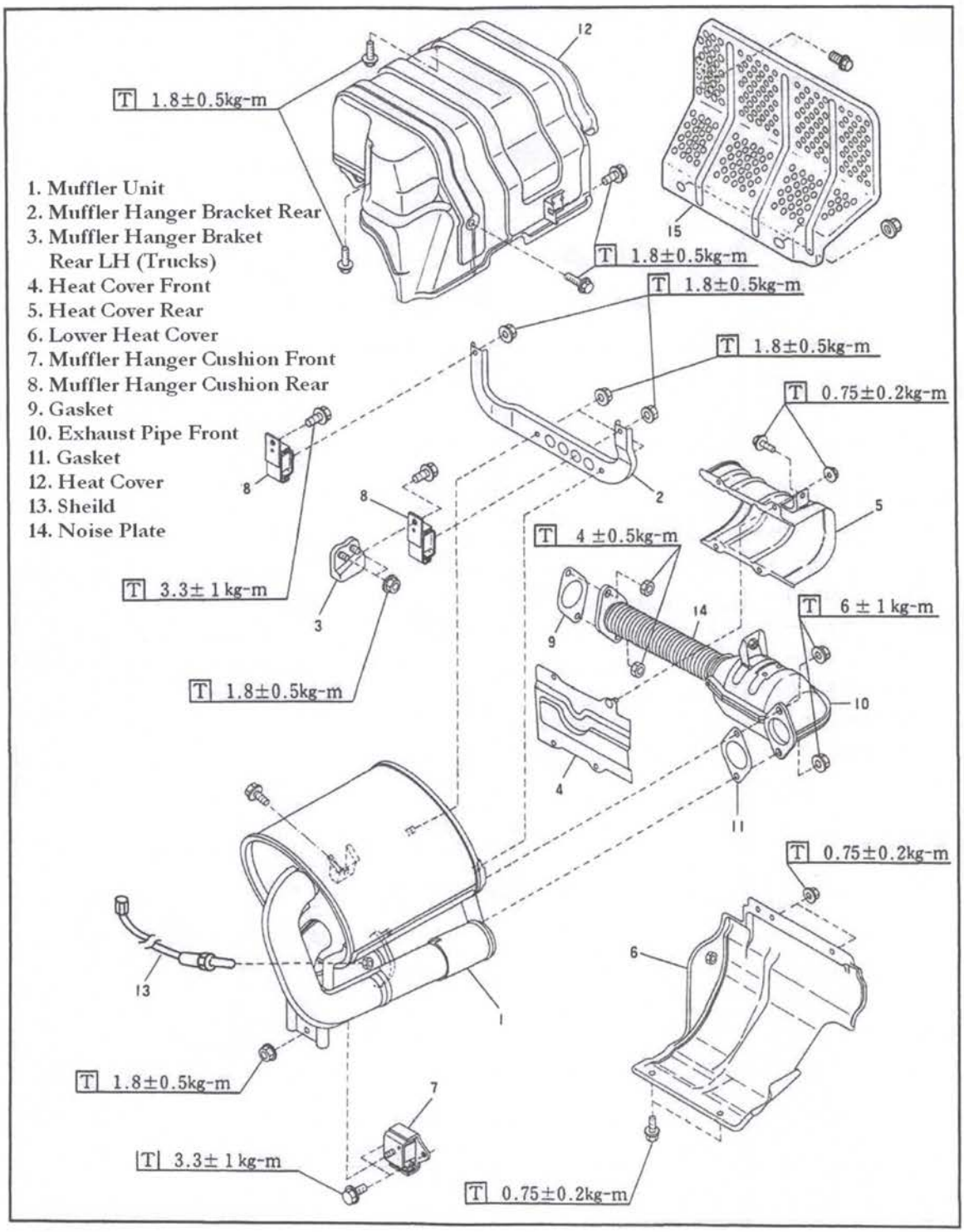
Note: NEVER Splice Wires on an O2 Sensor
You Cut it, its Trash

Truck Van Carbureted Muffler System



SC Vehicles

Muffler System



Chapter 8

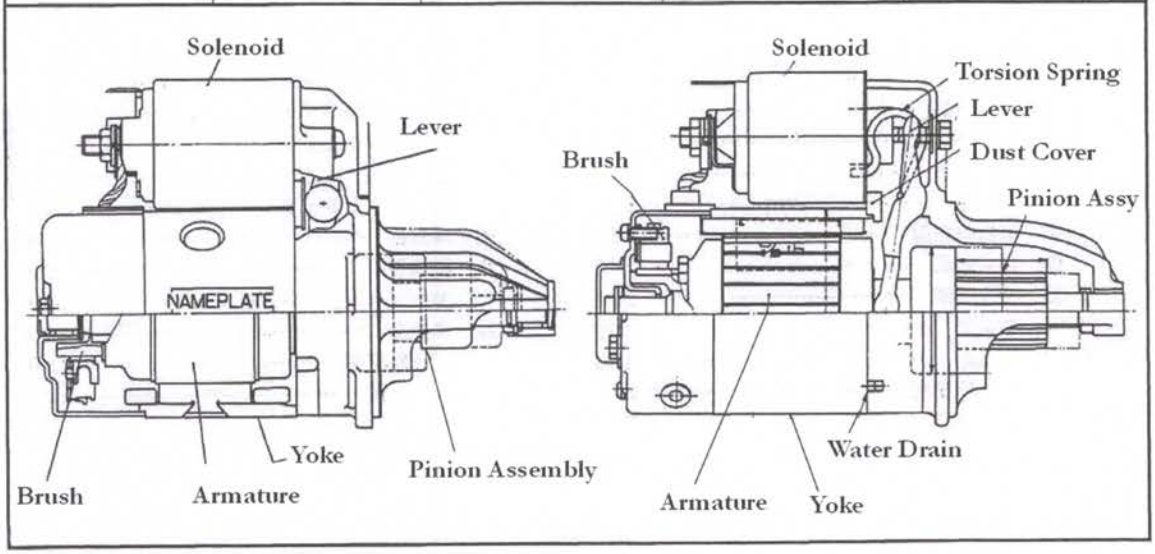
Starter & Alternator

5. Starter Specifications –Hitachi Series-Mitsubishi Series
6. Starter Overhaul Diagrams
7. Alternator Specifications- Mitsubishi Series-Denso Series
8. Alternator Diagram

Starter Specifications

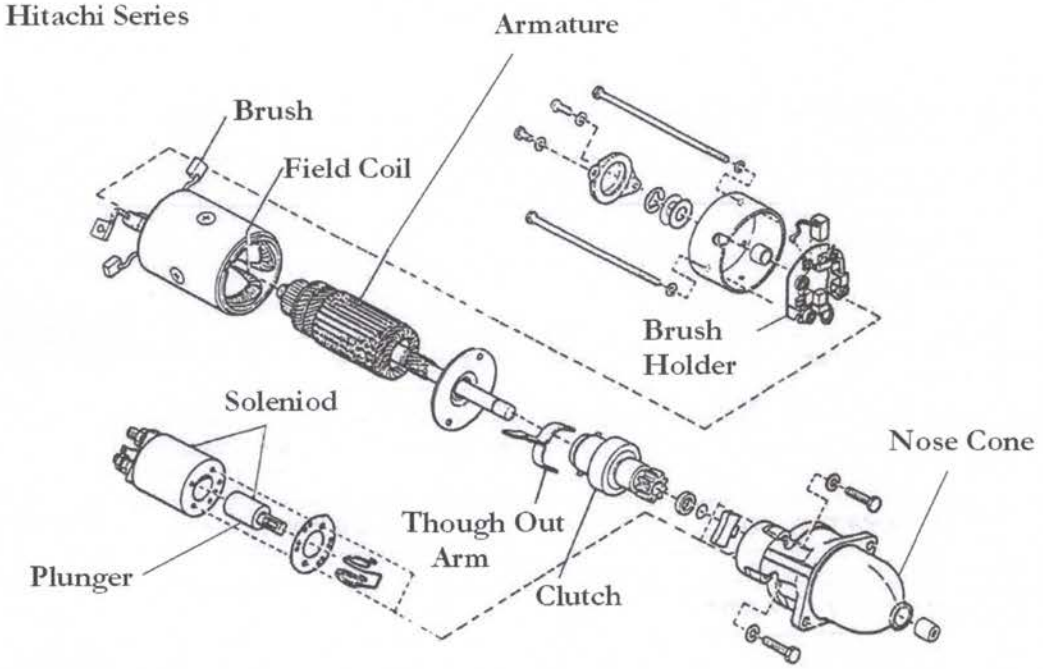
Subaru 660cc

Maker		Hitachi	Mitsubishi Electric	
Makers Part Number		S114-435	M_2T_3 7281	M_2T_4 2581
Voltage		12V	12V	←
Voltage Draw		0.65kW	0.65kW	0.75kW
Turn Direction		Left	Left	←
Pinion Teeth		8	8	←
Body Lenght		211.5mm	204mm	209mm
Yoke		ϕ90mm	ϕ90	←
Unit Weight		3.5kg	3.2kg	3.6kg
Motor	Volt Draw	11.5V	←	←
	AMP	40A(Less)	53A(Less)	←
	RPM	5000RPM	7000RPM	6000RPM

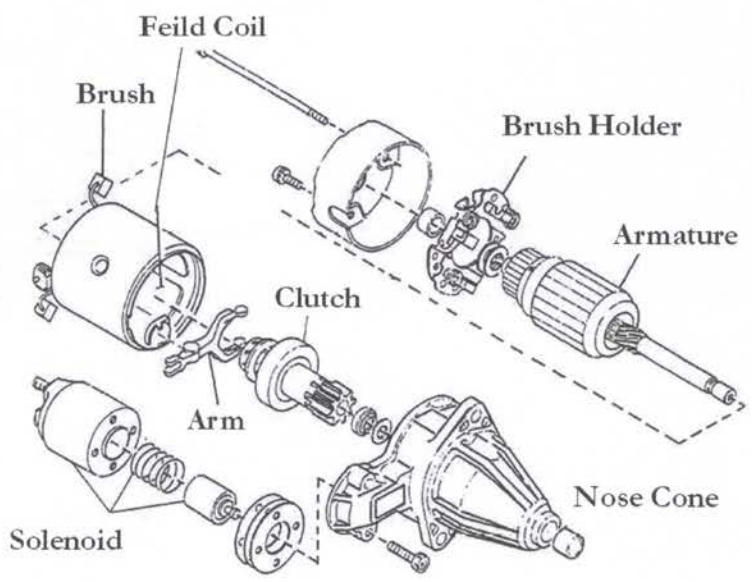


English Diagram

Hitachi Series



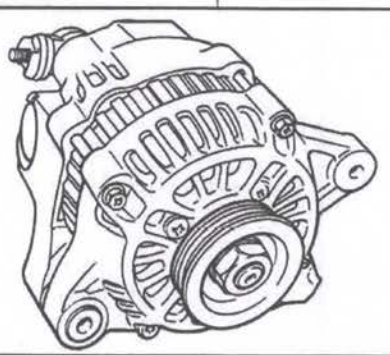
Mitsubishi Seires



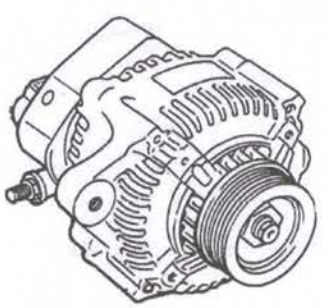
Alternator

Vehicle Type	NA Vehicle		SC Vehicle
Maker	Mitsubishi	Denso	Denso
Regulator Type	Internal IC	←	←
Battery	12V	←	←
Output	12V45A	←	12V50A
Ground	⊖	←	←
Spin Direction	Right	←	←
RPM	5000rpm	←	←
13.5v RPM Range	1150rpm	1020rpm	1200rpm
Maximum Output	14.5±0.3V	14.5±0.5	←
Pulley Size	65φ	←	52.5
Max AMP RPM Output	5000−43A	←	5000−50A
Unit Weight kg	3.6	3.2	3.9

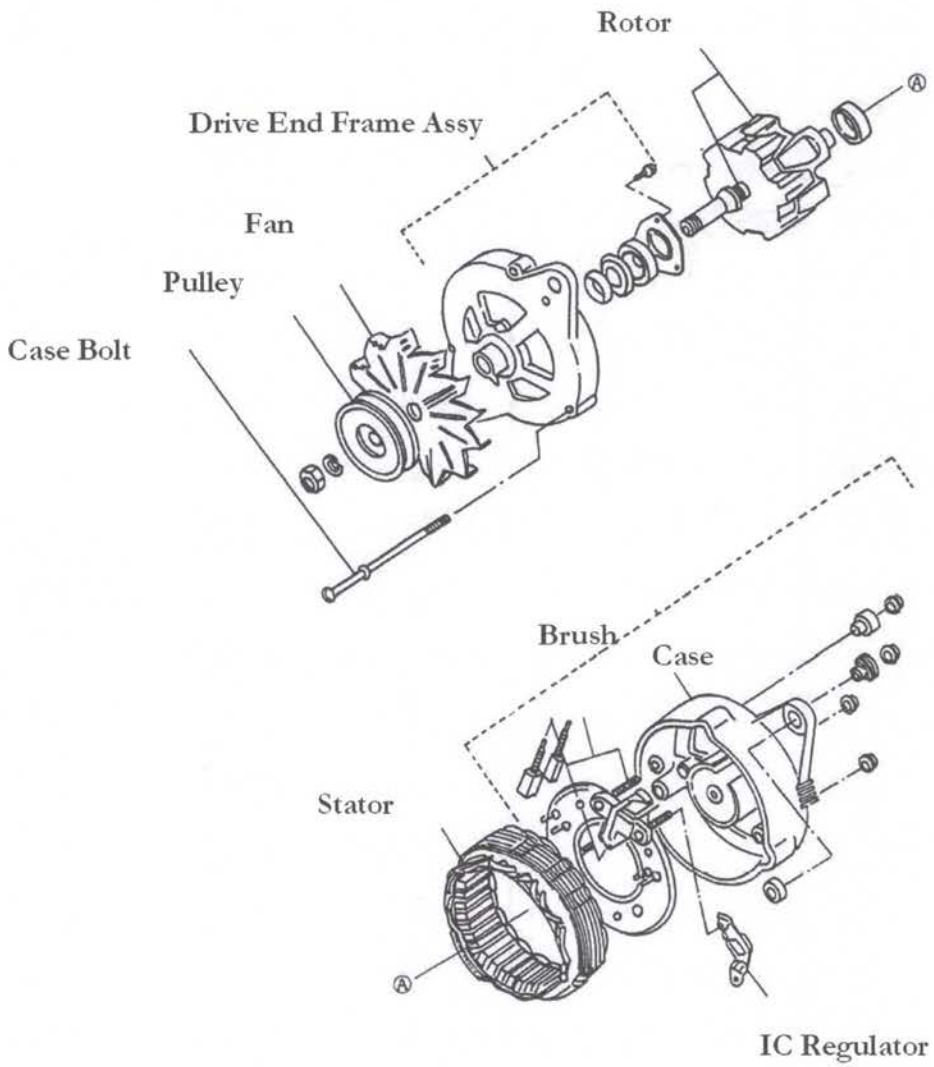
NA Vehicle



SC Vehicle



Exploded View



Chapter 9

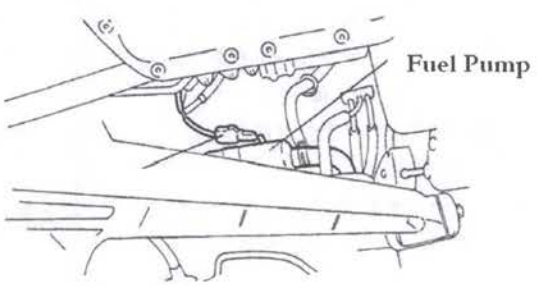
Engine & Transmission Removal

Complete Engine and Transmission Removal

Engine Removal

ST	89990 4100	Straight Pin	For DOJ Model Spring Pin
	49960 5400	Engine Hanger	Engine and or Transmission Removal

Engine Removal



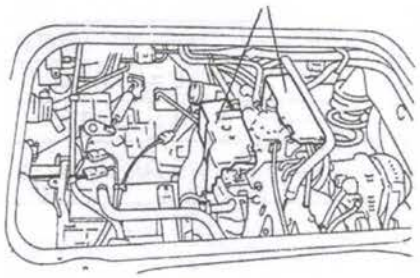
1. Disconnect Fuel Pump Conncetion (Above)
2. Start Engine Until Run Out of Fuel
3. Diconnect Battery (-) Terminial
4. Remove Engine COver Trap Door
5. Remove Rear Bumper and Rear Hood
   [Truck] Disconnect Back Lamp Etc.

Continued

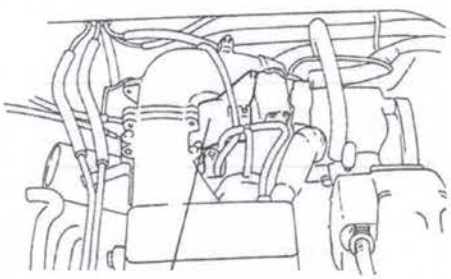
6. Remove Air Cleaner Case
   1. Remove Hose From Air Cleaner
   2. Remove Entire Unit
7. Jack Up Vehicle
8. Remove Diagnal Member R & L
9. Remove Muffler
   1. Remove Exhaust Pipe Cover
   2. Remove Heat Sheild (Rear)
   3. Remove Heat Sheild (Front)
   4. Remove Exhaust Manifold Plate
   5. Remove Hanger Bracket
   6. Remove (4) Bolts from Muffler Cover
   7. Disconnect Temp Sensor
   8. Remove Remaining Attachment Muffler Components
10. Remove Caburetor Cover (NA Vehicle) or Throttle Body Protector (SC) Vehicle

NA Vehicle

Caburetor Covers

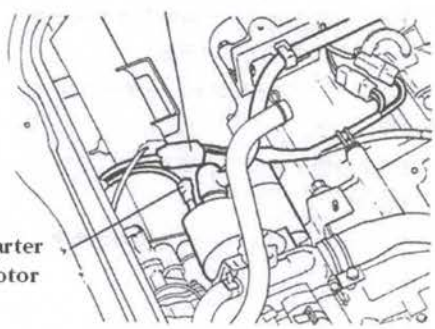


SC Vehicle



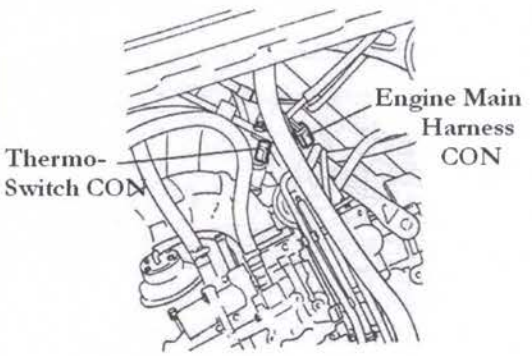
Throttle Body Cover

Transmission Harness

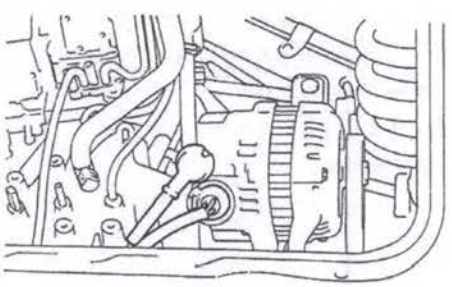


Starter Motor

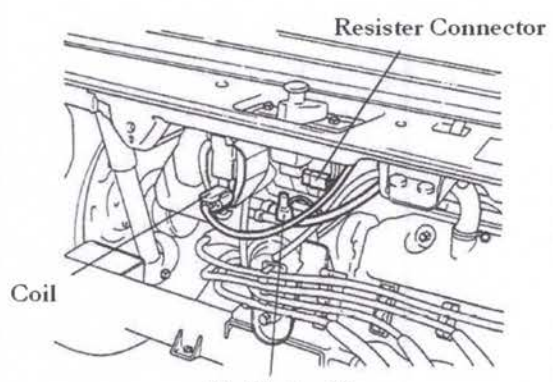
(3). Disconnect Main Harness and Thermo SW



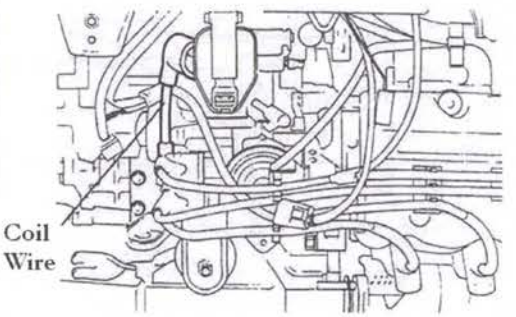
(4). Disconnect Altinator Connections



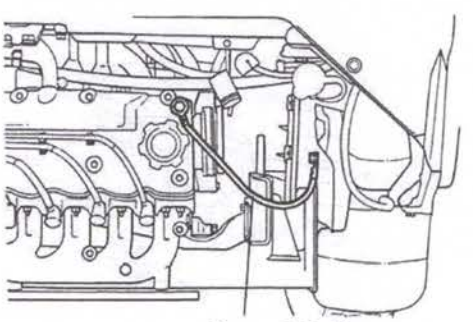
(5). Disconnect Ignition Coil
(6). Dicsonnect Distributor Harness
(7) Disconnect Resister CON



(8). Remove Coil Wire and IGN Coil

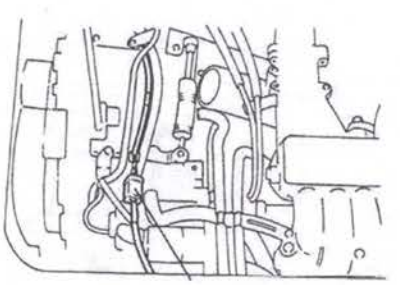


(9). Disconnect Engine Ground Cable

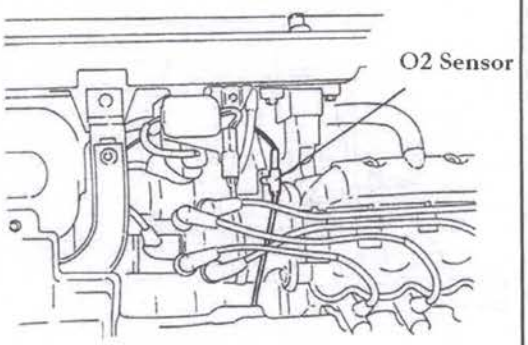


SC Vehicle

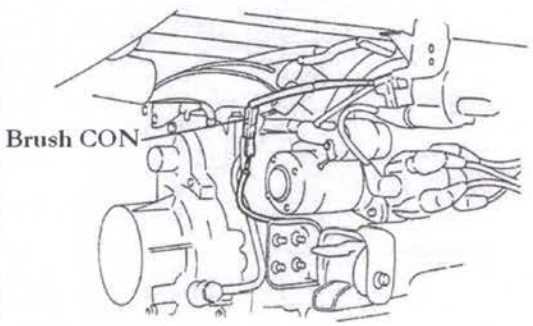
(1). Remove Starter Cable (+) and Harness CON
(2). Disconnect Transmission CON



(3) Remove 02 Sensor CON

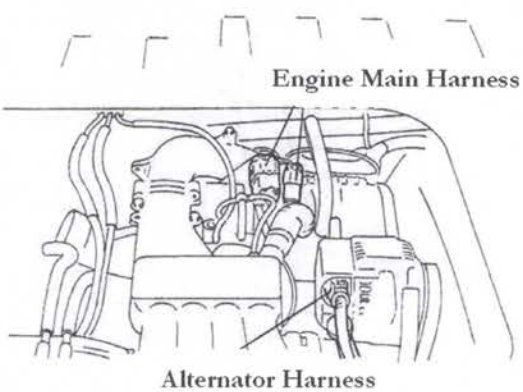


(4). ECVT Vehicle: Remove Brush CON

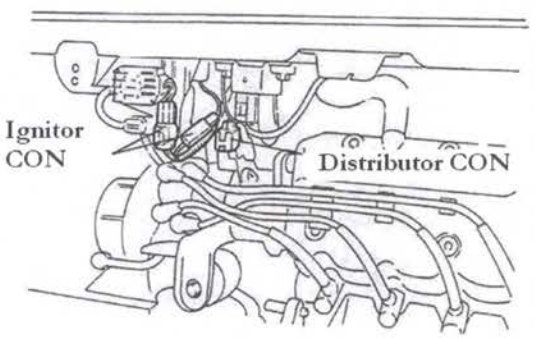


(5). Remove Engine Main Harness (2pc) and Thermo-Sw CON

(6). Remove ALT Termanal CON

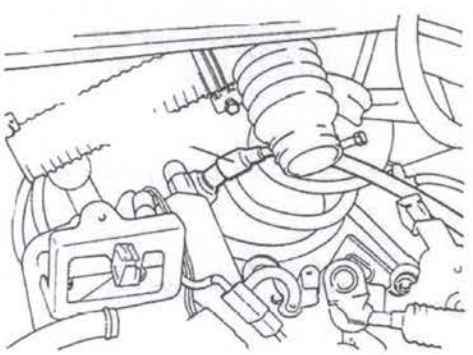


(7). Disconnect Distributor and Ignitor CON



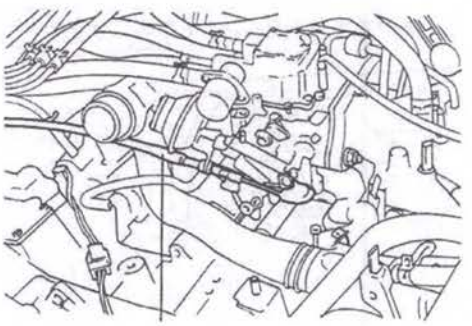
(8). Remove Ignition COil
(9). Remove Engine Ground

(12) Cable Removal
(1) Remove Speedometer Cable



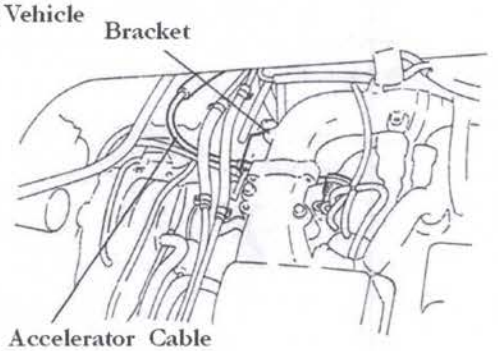
NA Vehicle

(2) Remove Accelerator Cable



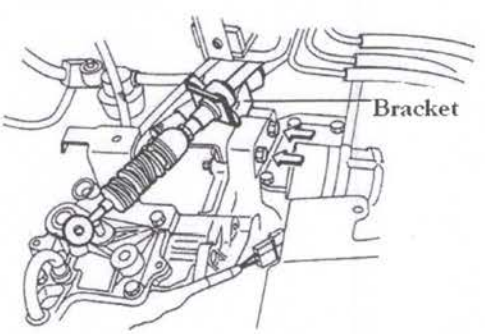
Acelerator Cable

SC Vehicle

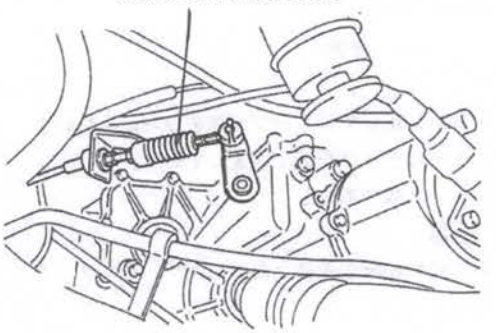


(3). Remove Shift Control Cable and Select Select Control Cable from Trans (MT)

MT Vehicle

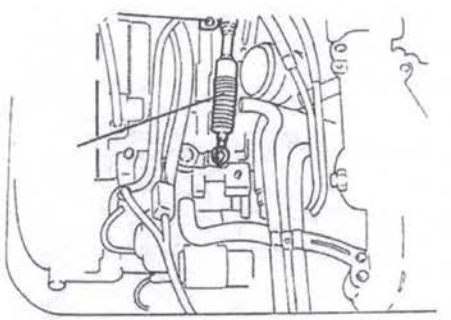


Select Control Cable



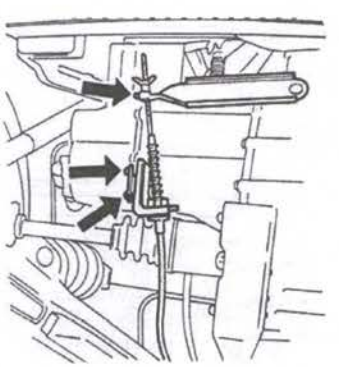
ECVT Vehicle

(4). Remove Complete Bracket and Cable



(5). Remove Clutch Cable from Fork Lever. Remove Cable Bracket from Tranny

MT Vehicle

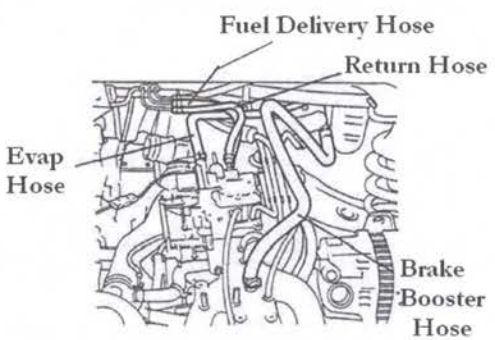


(6). Remove Speedometer Cable
Caution: Secure Cables with Tape to the Body During Engine Removal

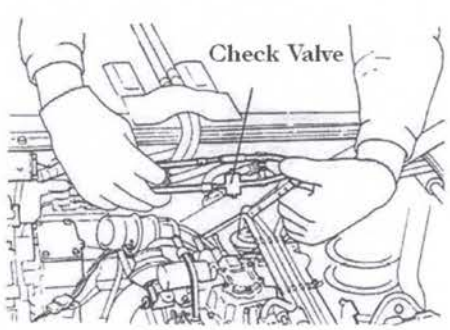
(13). Hose Removal

Caution: Mark Hoses by Funtion

NA Vehicle
(1). Remove Vacuum Hoses
(2). Remove Evap Hose from Carburetor
(3). Remove Fuel Hose from Both Delivery and Return

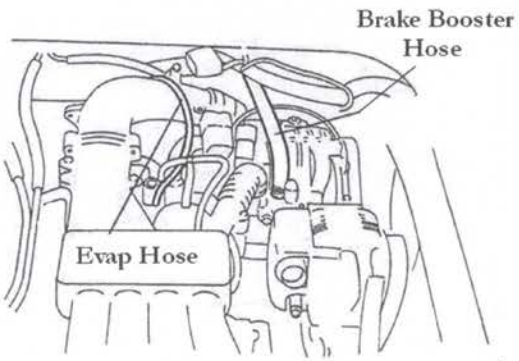


(4). 4WD Vehicles: Seperate Hoses (2pc) at The Check Valve Location. Diagram Below.

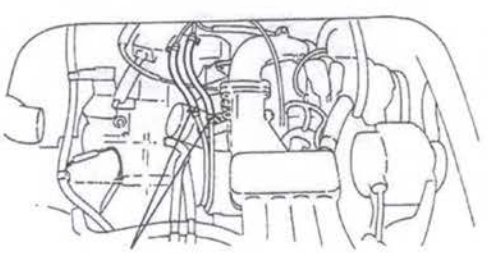


SC Vehicle

(1). Remove Brake Booster Hose from Supercharger
(2). Remove Evap Hose from Throttle Body



(3). Remove Fuel Hoses. See Below Diagram

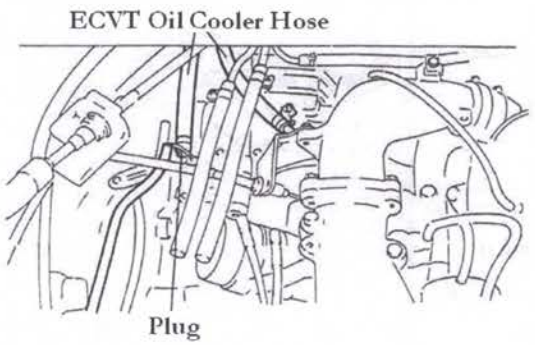


Disconnect Fuel Hose Here

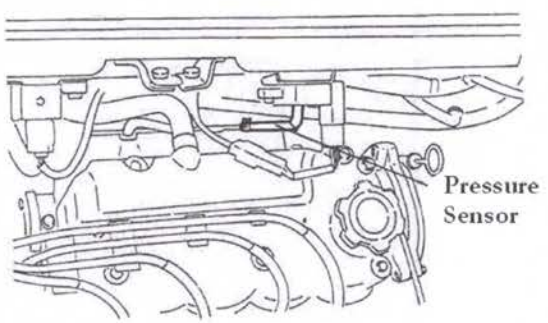
(4). Seperate 4WD Actuator Vacuum Hoses (2pc).

(5). ECVT Vehicle: Remove Oil Cooler Hose (2) Lines

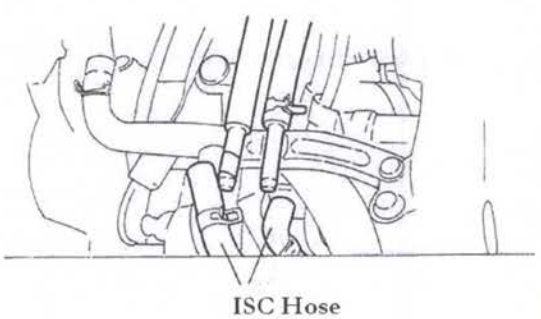
Caution: Plug the Lines After Removal



(6) Remove Pressure Sensor Hose

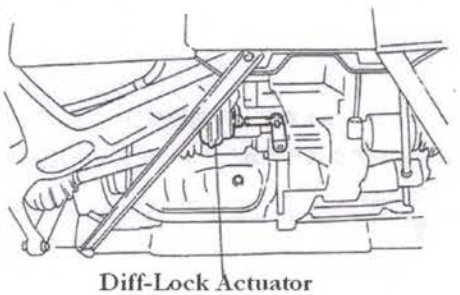


(7). Remove ISC (2) Hoses



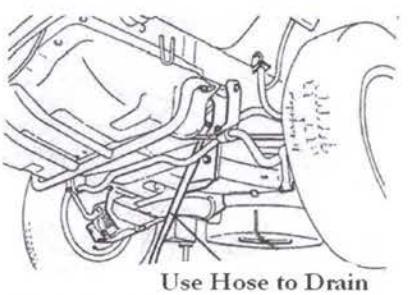
(14). Jack Up Rear

(15). Remove Diff-Lock Actuator From Transmission (4WD Vehicle Only)

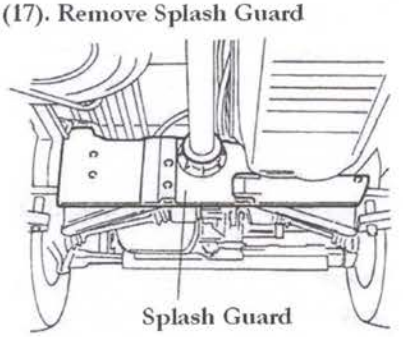


(16). Drain Coolant

Note: Never Re-Use Coolant



(17). Remove Splash Guard

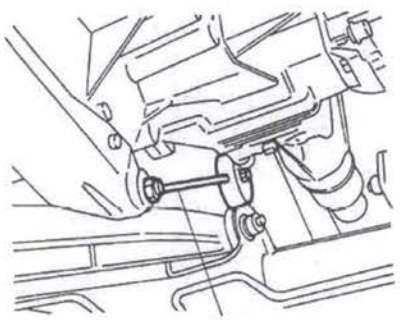


(18). Seperate Drive Shaft From Transmission (4WD Only)
(1). Remove Attachment Bolts
(2). Drain Differential
(3). Pull Shaft Out

Caution: Place Bucket Under Differential as Oil Will Leak Out.

Caution: Wrap Ends of Drive Shaft to Prevent Scratches to the Surface.

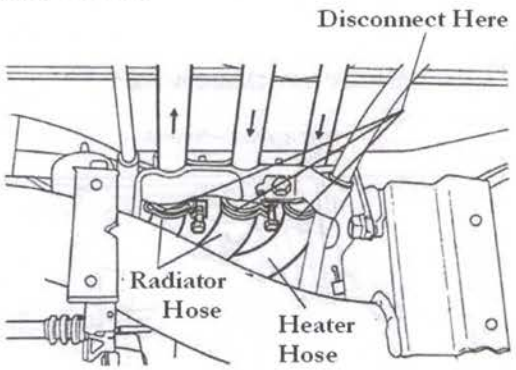
(19). Remove Pitching Stopper. See Diagram Below.



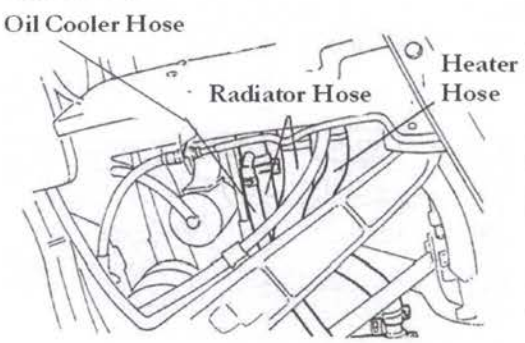
Pitching Stopper

(20). Remove Radiator and Heater Hoses

NA Vehicle
Remove Hoses

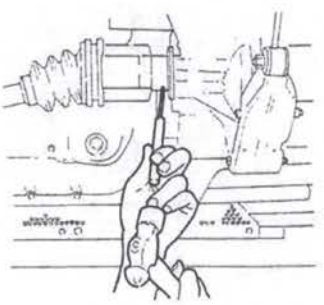


SC Vehicle
Remove Hoses

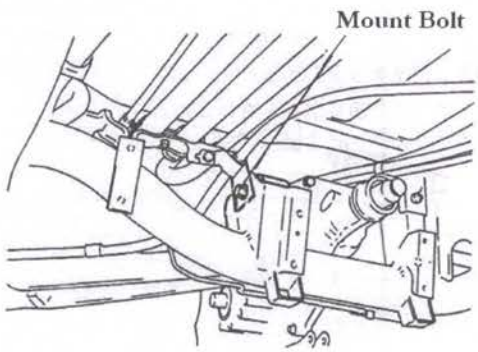


(21). Remove L & R Axel Shafts from Tranny

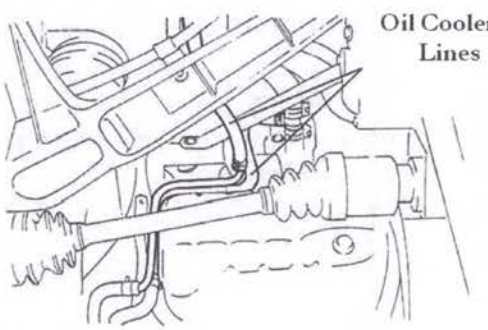
Caution: Be Careful Not to Damage Boots



(22). Remove Front Mount Bolts

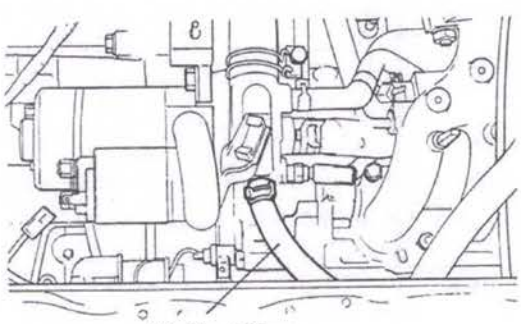


(23). ECVT Vehicle: Make Sure (2) Engine Oil Cooler Lines are Disconnected

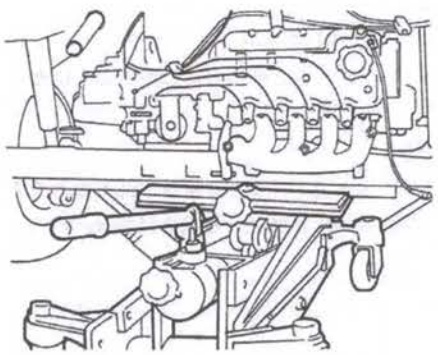


(24). Lower Vehicle

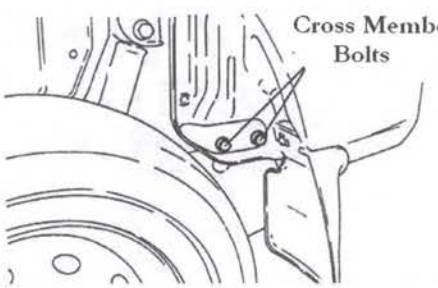
(25). Remove Radiator Vent Hose from Engine



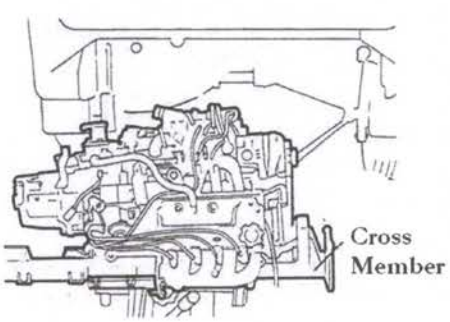
(26). Place Engine Jack Under Engine



(27). Remove Engine Cross Member Bolts (4)



(28). Remove Engine and Cross Member Combined.

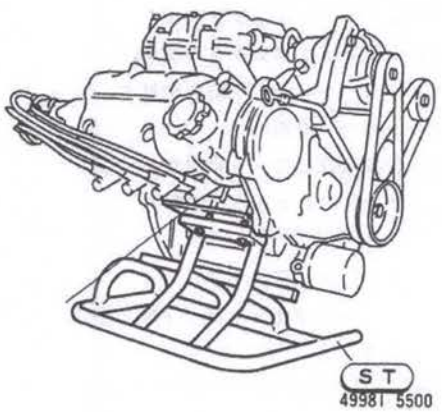


Chapter 10

Engine Overhaul

22. Engine Disassembly
23. Block Inspection
24. Cylinder Inspection
25. Piston Inspection Including Oversize Pistons
26. Block Deck-Journal and Bore Sizes
27. Piston Rings and Installation Positioning
28. Connecting Rods
29. Crankshaft & Journals
30. Journal Details and Clearances
31. Crankshaft Oil Seals
32. Block Assembly
33. Piston Installation
34. Oil Pump
35. Cylinder Head and Timing Belt System
36. Valve Rocker Assembly
37. Camshaft Specifications and Clearances
38. Camshaft Installation & Oil Seal
39. Cylinder Head – Valve Springs- Valves
40. Valve Guides- Valve Details
41. Oil Pump Overhaul
42. Oil Pressure Switch

Note: Use ST 499815500 Engine Stand



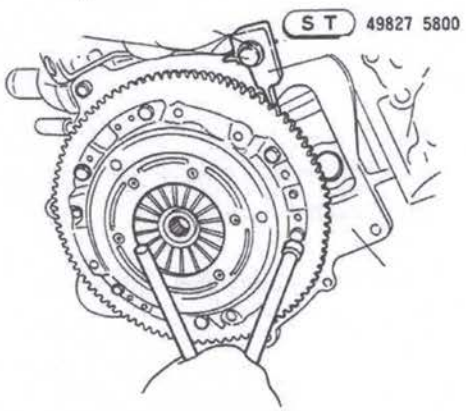
Note: Before Disassembly Steam Clean or Power Wash Unit
Make Sure All Electrical Components Have Been
Removed First

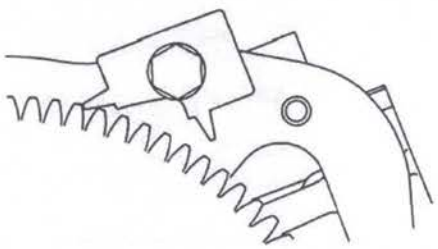
Engine Disassembly

1. Remove All Electrical Accessories
2. Remove Crank Pulley, Clutch, Flywheel

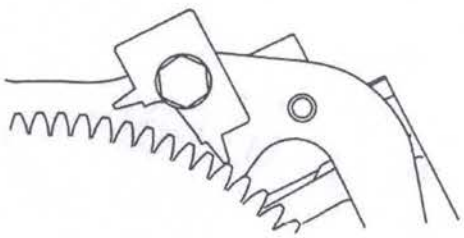
Note: Use Flywheel Holding Tool Below ST 49827-5800

3. Remove Cylinder Head and Components



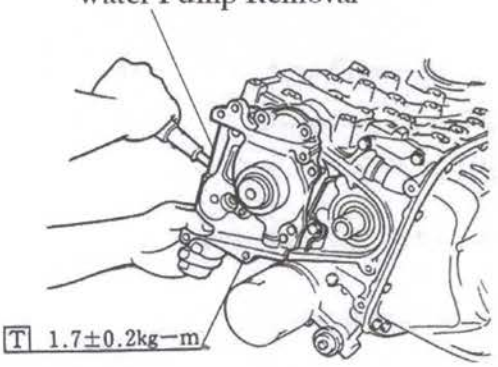


Two-Way Tool (Loose-Tight)

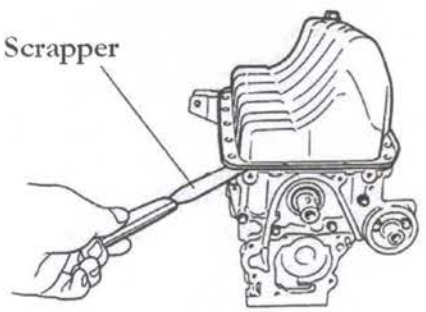


4. Strip Front of Engine Including Water Pump
5. Remove Oil Filter and Oil Cooler (SC Vehicle)

Water Pump Removal



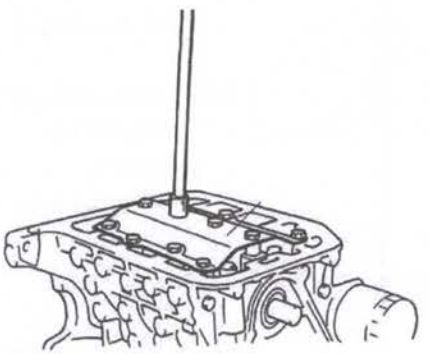
6. Place Block Up-Side Down on Clean Piece of Wood or Plastic



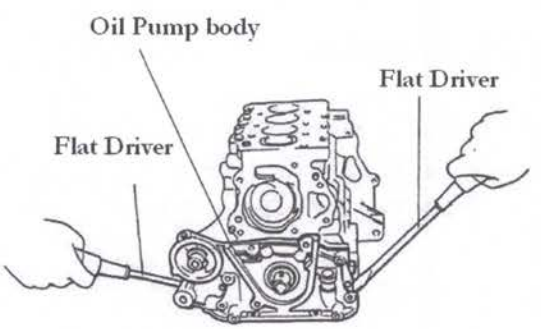
7. Romove Oil Pan Bolts and Use Gasket Scraper to Seperate Gasket From Pan. Lift Up Pan.

Engine Disassembly

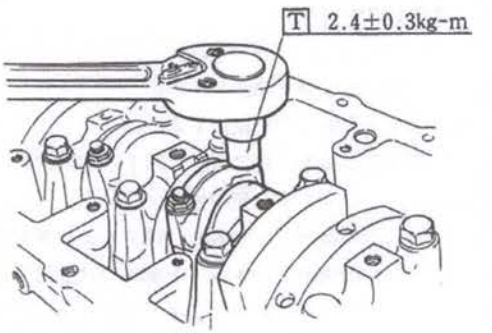
8. Remove Block Stiffener Plate



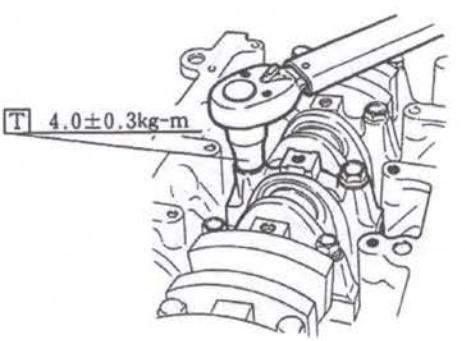
9. Remove Oil Pump Body



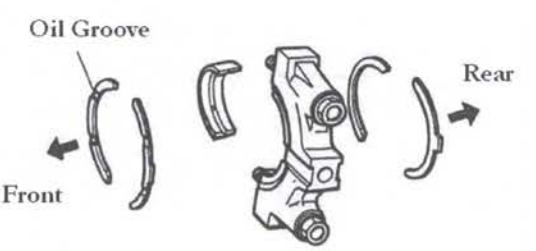
Note: Use Caution Not To Brake Casing



10. Remove Rod End Caps
(Mark Cap Cylinder #)
11. Remove Crankshaft End Caps
(Mark Cap)
12. Remove Crankshaft



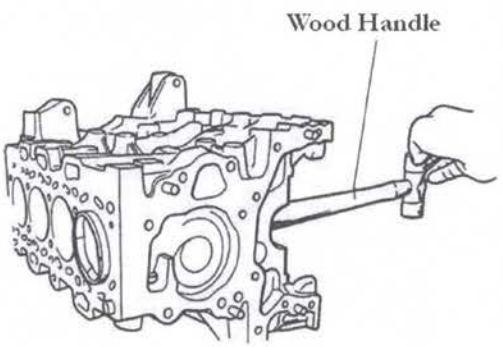
13. Remove Crankshaft Oil Seal
14. Remove Thrust Bearings



Disassembly and Block Inspection

15. Remove Pistons From Block

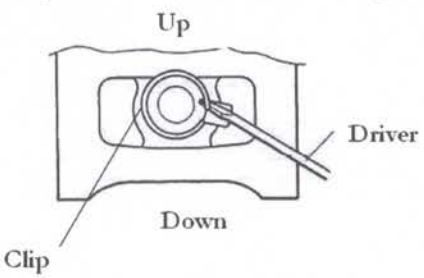
Note: Use Wood Handle to Push Out the Pistons



Note: Have Block Cleaned

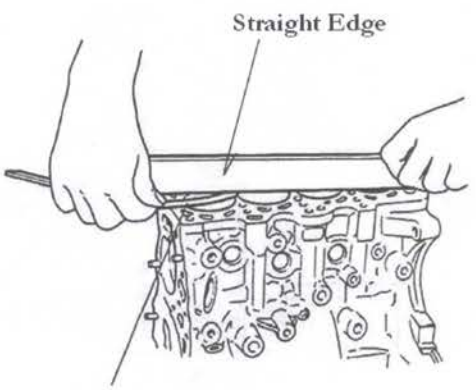
Piston and Connectiong Rod

1. Remove Circle Clip
2. Seperate Piston from Connecting Rod



Note: Circle Clips Can Not Be Re-Used

1. Use a Straight Edge (Not Ruler) and A Thickness Gage to Check Block] Deck For Straightness



Normal	0.05㎜
Limit	0.15㎜

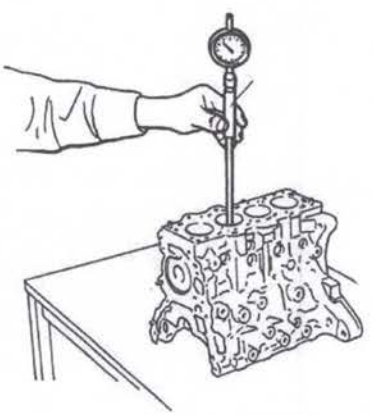
Note: Over 0.16mm Block Must be Milled

Note: If Block is Out of Specifications The Cylinder Head May Also be Affected. Check Cylinder Head Carefully.

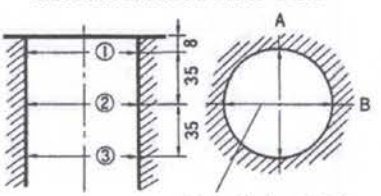
Block and Piston Inspection

Cylinder Inspection

Note: Check Cylinder Bores Visually for Any Visable Damage or Cracks. If Crack is Located Discard Block



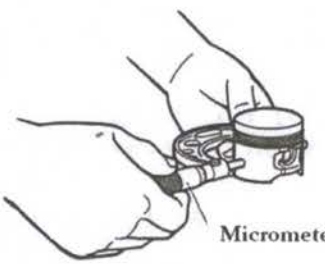
Measurement Points 1-2-3



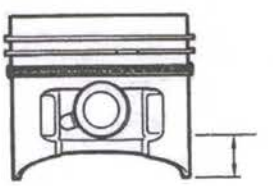
Crankshaft Direction

Cylinder Inside Dia	56.0~56.02mm
Circum Limit	0.05mm
Taper	0.05mm
Cylinder Dai Limit	Below 56.5mm

Piston Inspection



Micrometer



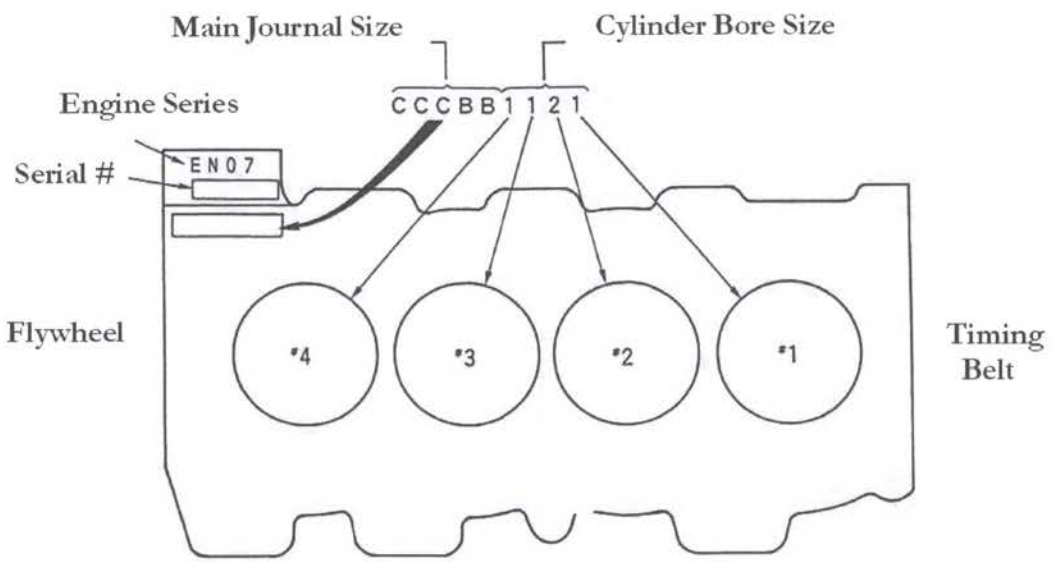
A
NA: 10mm
SC: 8.7mm

Piston Measurement 20 Degrees C		
Normal Limit	Size Div 1	55.975~55.985mm
	Size Div 2	55.986~55.995mm
Oversize 0.25		56.225~56.245mm
Oversize 0.5		56.475~56.495mm

Cylinder to Piston Gap	
Normal	0.015~0.035mm
Limit	0.06mm

Cylinder Bore & Piston Clearance

Block Deck

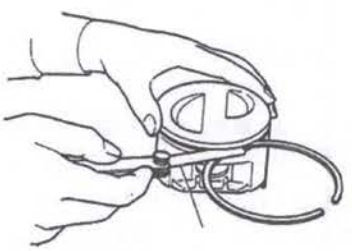


Piston Measurement 20 Degrees C		
Normal Limit	Size Div 1	55.975~55.985mm
	Size Div 2	55.986~55.995mm
Oversize 0.25		56.225~56.245mm
Oversize 0.5		56.475~56.495mm

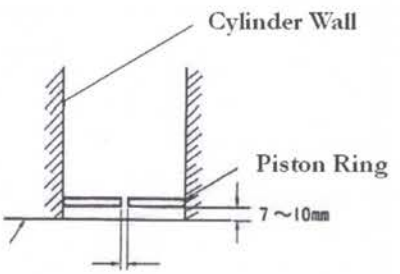
Cylinder to Piston Gap	
Normal	0.015~0.035mm
Limit	0.06mm

Piston Rings and Piston Angle

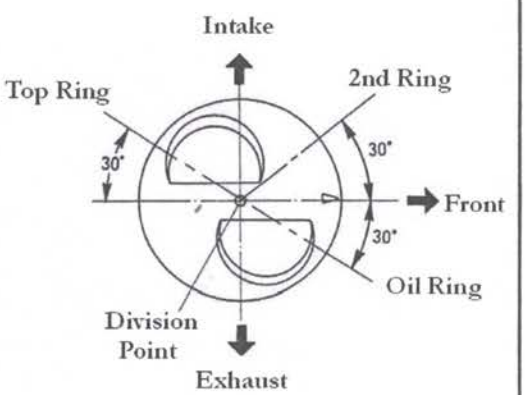
Piston Ring Inspection



	Normal	Limit
Top Ring	0.035~0.075mm	0.15mm
Secondary	0.025~0.065mm	0.15mm
Oil Ring	0	—



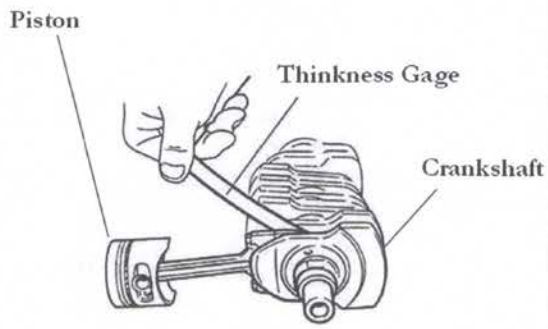
Piston Ring Position



		Normal	Limit
Top Ring	NA	0.15~0.3mm	0.8mm
	SC	0.15~0.25mm	0.7mm
Secondary		0.15~0.3mm	0.8mm
Oil Ring		0.1~0.6mm	0.8mm

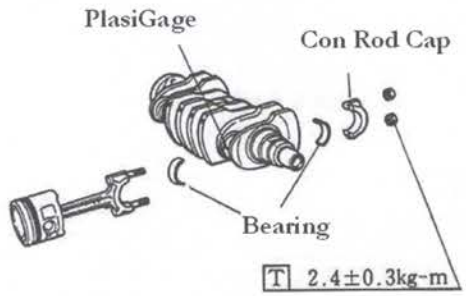
Connecting Rod Inspection

Side Clearance



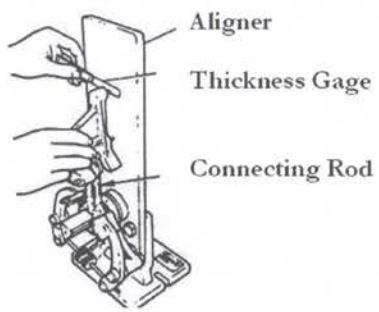
Side Clearance	Limit
0.07~0.33mm	0.4mm

Expoded Parts Diagram



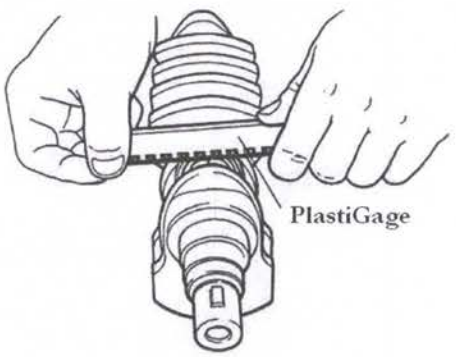
Note: See Next Page for Details

Connecting Rod Alignment Board



Alignment Limit	0.1mm

Crankshaft Inspection

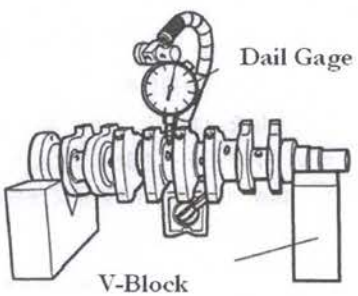


Normal	0.025~0.060mm
Limit	0.065 mm

Bearing Size	Bearing Thickness	Crank Pin Outer Dia
Normal	1.488~1.498	30.989~31.000
0.03 Undersize	1.506~1.510	30.959~30.970
0.05 Undersize	1.516~1.520	30.939~30.950
0.25 Undersize	1.616~1.620	30.739~30.750

Con Rod to Piston Pin	0.007~0.029mm
Limit	0.035mm

Crankshaft Journal
Round-Out



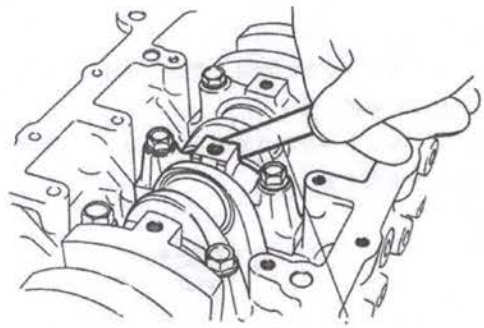
Limit	0.03 mm

Note: Undersize Bearings

Degree	0.03mm
Taper	0.02mm

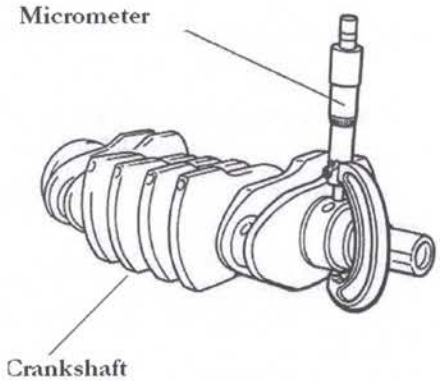
Availability: 0.03, 0.05, 0.25 (3 Types)
Check Parts Department for Stock or Special Order

Clearances



Thickness Gage

Journal Measurement



Side Clearance	Normal	Limit
	0.05~0.222	0.30

Torque Setting

Bearing Cap	4.0±0.3kg-m

Oil Clearance

		Normal	Limit
Normal Size	#1,#2,#4,#5 Journal	0.021~0.039	0.055
	#3 Journal	0.027~0.045	0.060
Under-Size	0.03 Under	Same	Same
	0.05 Under		
	0.25 Under		

Journal - Crankshaft -Bearing

Size / Division		Crank Journal		Crank Pin
		#1, #2, #4, #5 Journal	#3 Journal	
Normal	Diameter	41.973~41.991	41.967~41.985	30.989~31.000
	Thickness	1.494~1.512	←	1.488~1.498
0.03 Undersize	Diameter	41.943 ~41.963	41.937~41.955	30.959~30.970
	Thickness	1.515~1.518	←	1.515~1.518
0.05 Undersize	Diameter	41.923~41.941	41.917~41.935	30.939~30.950
	Thickness	1.525~1.528	←	1.525~1.528
0.25 Undersize	Diameter	41.723~41.741	41.717~41.735	30.739~30.750
	Thickness	1.625~1.628	←	1.625~1.628

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Crankshaft Oil Seal

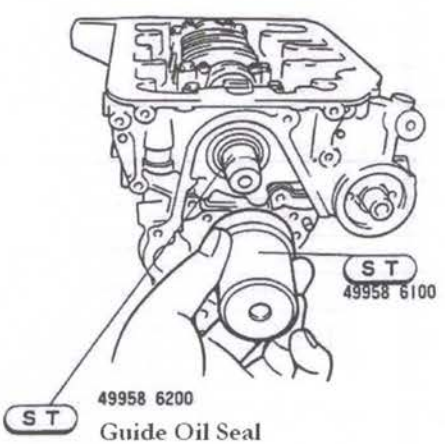
Note: Oil Seals Can Not be Re-Used

Coat all Seals With 30W Engine Oil

Rear Oil Seal

Oil Seal Guide
498725500
498725600
Press Oil Seal

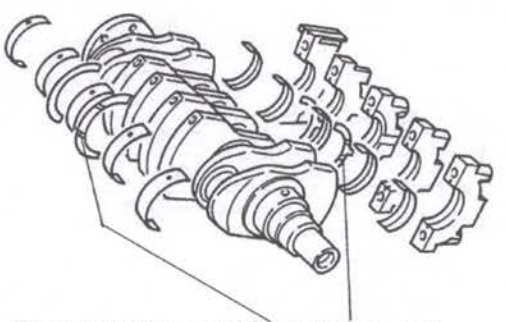
Front Oil Seal Installation



Guide Oil Seal

Engine Block Assembly

Note: Before Assembly Make Sure All Parts Are Clean and Plenty of Engine Oil For Coating Rotating Parts



Caution: Make sure Thrust Bearings in Correct Direction

Preparation

1. Gather All Related Parts
2. Coat All Moving Parts Heavily With 30W Engine Oil
3. Oil Seals Will Require a Coating of Light Grease of Assembly Grease if Available

Assembly

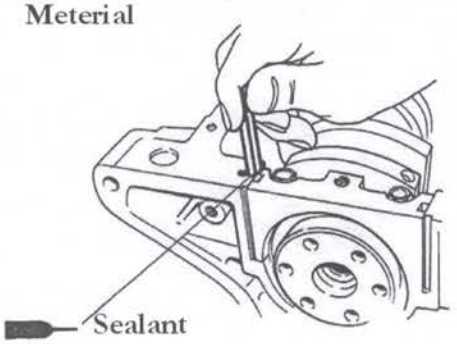
1. Install Crankshaft into Block
2. Attach Main Bearing Caps
   Torque: 4.0+-0.3Kg-m

Rotate Assembly And Check for Any Friction Points. If Binding is Detected Disassemble and Locate Problem

No Issues: Re-Torque Caps

Block Assembly

3. Coat Bearing Cap Seal With 1/3 Bead of 3Bond or Equivalent Bonding Meterial

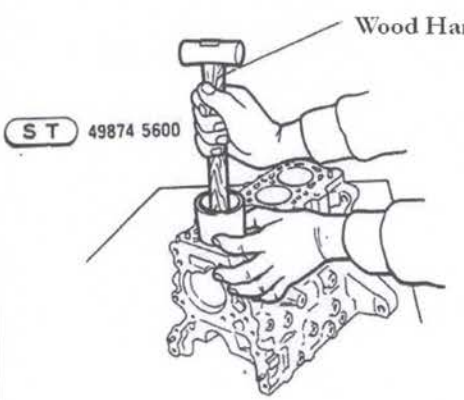


4. Assemble Pistons and Connecting Rods for Installation.

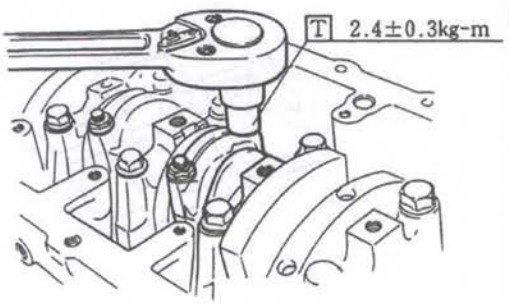
Note: Use the Chart in This Chapter of The Book For Ring Configuration

5. Use a Spring Compressor to Install Pistons into Their Respective Bores

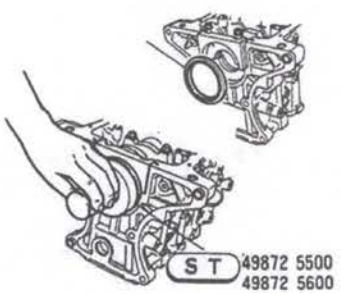
Note: Use a Vacuum Hose and Cover Rod End Bolts to Prevent Crank Damage



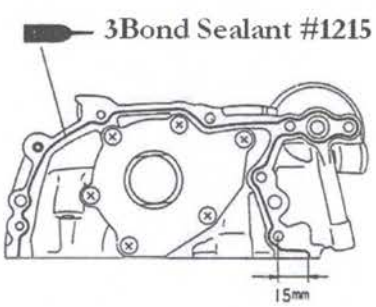
6. Attach Bearings and Caps Torque to Specifications Below



7. Attach Rear Oil Seal

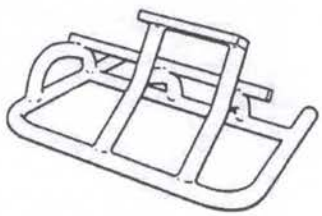


8. Attach Oil Pump

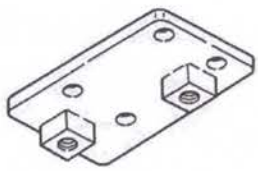


Special Tools

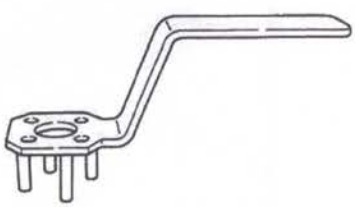
Engine Stand



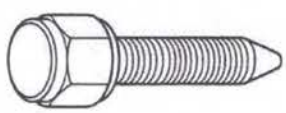
Engine Stand Adapter



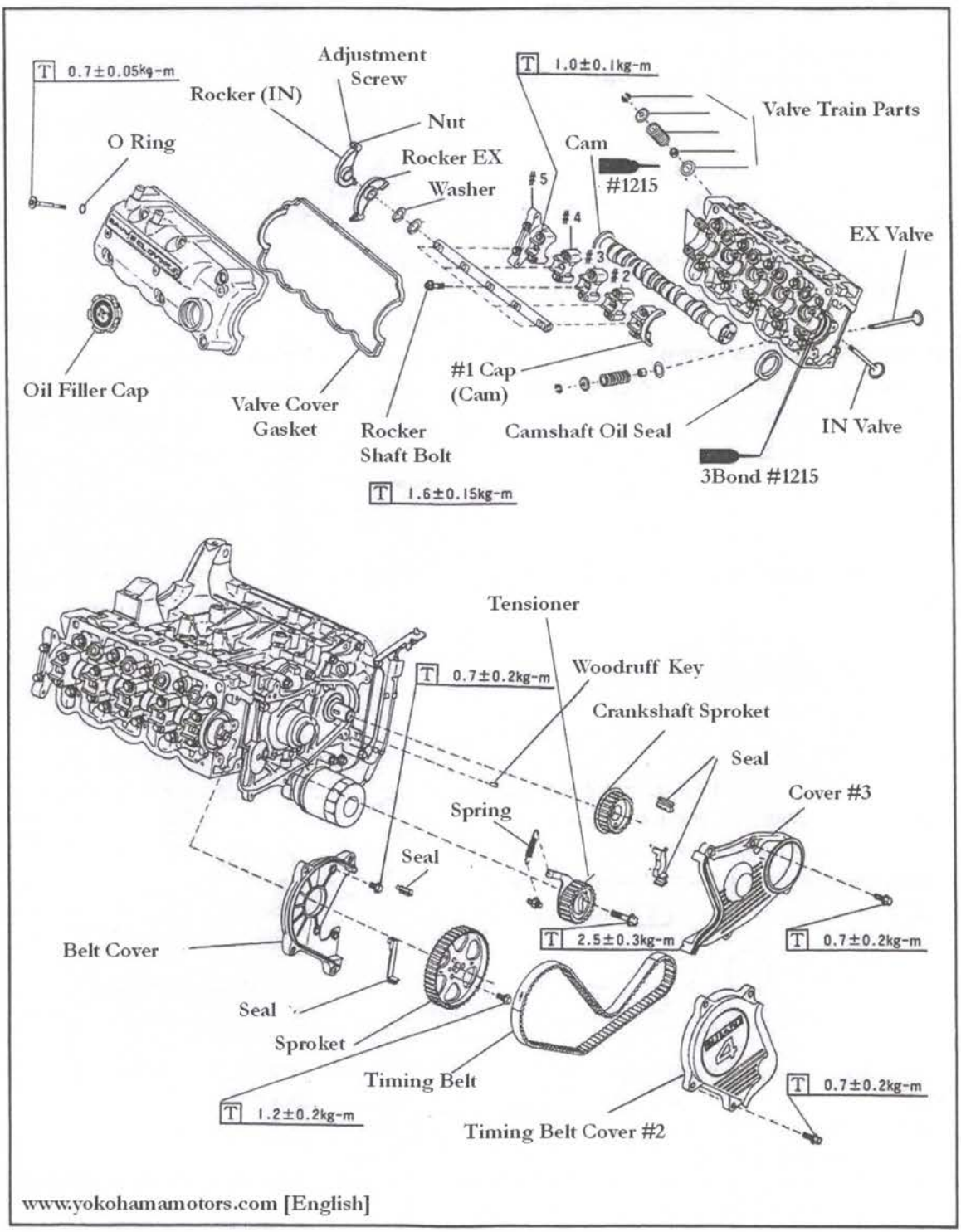
Crankshaft pulley Wrench



Bolt (Puller)



Cylinder Head and Timing Belt Components



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Timing Belt

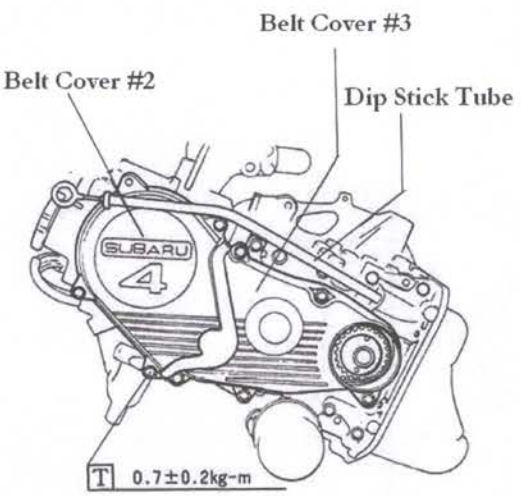
Note: Set Engine to TDC Compression Stroke

Preparation

1. Remove Engine Cover
2. Jack Up Vehicle and Remove Rear Right Tire
3. Remover Rear RH Wheel Housing Inside Engine Cover.

Removal

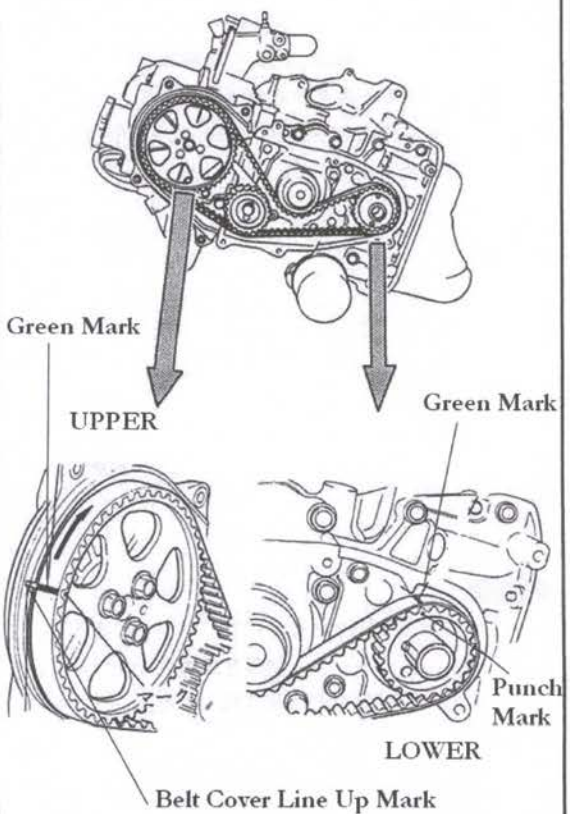
1. Remove Accessories: Altinator Etc V-Belts
2. SC Vehicle: Remove Supercharger Belt
3. Use ST Crankshaft Pulley Remover and Remove Crankshaft Pulley
4. Remove Timing Belt Cover
5. Remove Oil Dip Stick Tube Unit
6. Remove Timing Belt Cover #2, #3



7. Remove Timing Belt

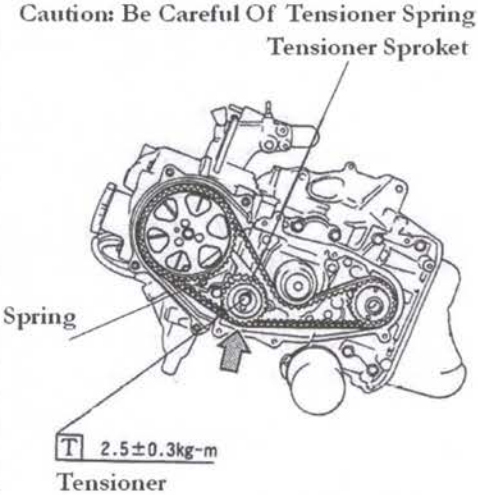
Note: Never Re-Use a Timing Belt

Change: Every 60,000 Kilometers

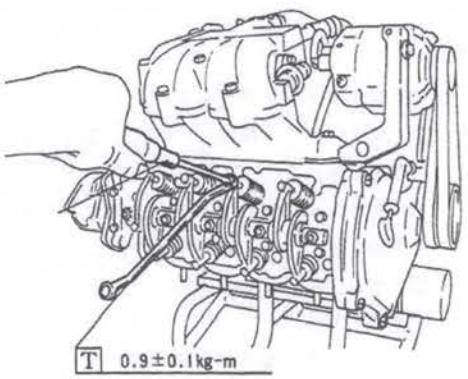


8. Install New Belt and Line Up With GREEN Marks. Set Tensioner and Torque Spec

Caution: Be Careful Of Tensioner Spring



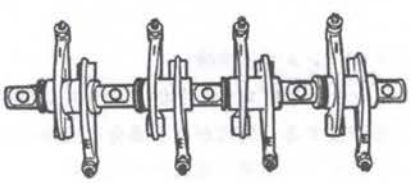
Valve Rocker Assembly



1. Remove Valve Cover
2. Loosen Valve Adjustment Srews
3. Remove (5) Rocker Shaft Attachment Bolts
4. Remove Rocker Arm Assembly

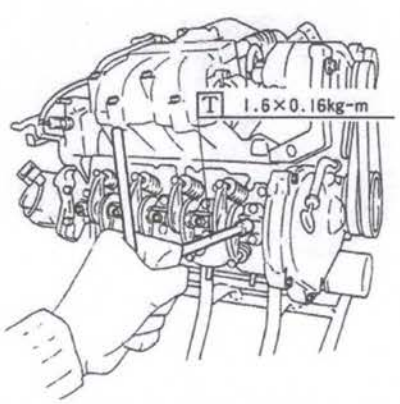
Note: Inspect Arms for Extream Wear or Cracks. If Found Discard Unit and Replace

Inspection



Specification [Rocker Arm+Shaft]

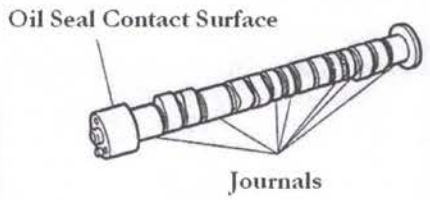
Rocker Arm & Shaft Clearance	Fine	0.016~0.052
	Limit	0.1
Rocker Arm (IN Dia)	Fine	16.0~16.018
Rocker Shaft (Out Dia)	Fine	15.984~15.966



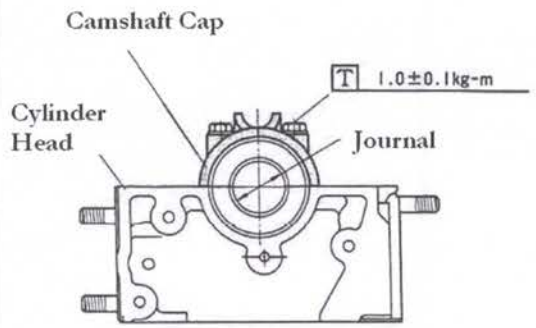
5. Replace Rocker Arm Shaft and Set Torque.
6. Set Valve Adjustment (Begining of this book).
7. Check Timing

Camshaft Specifications

Camshaft Journal Measurement

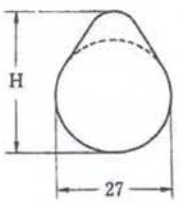


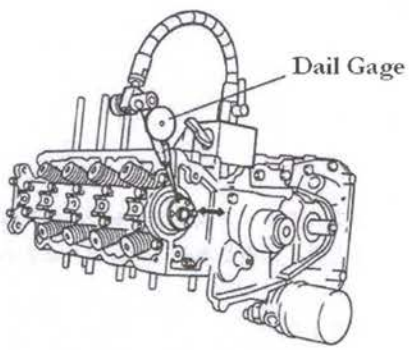
Journal		26.0~26.021mm
Camshaft Journal(Outer)		25.939~25.955mm
Journal Opening	Ok	0.045~0.082mm
	Out	0.1mm



Camshaft Lobe Measurement

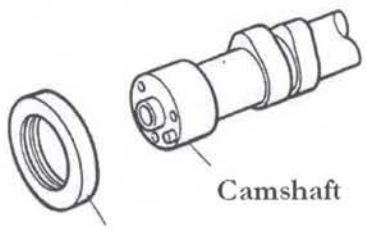
Cam "H" Limit	31.42~31.52mm
Replace	31.20mm





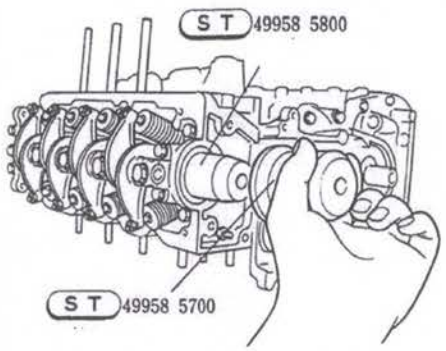
Side Clearnace	0.02~0.22mm
Over Limit	0.5mm

Camshaft Oil Seal



Note: Never Re-Use Oil Seals, Replace With New Parts

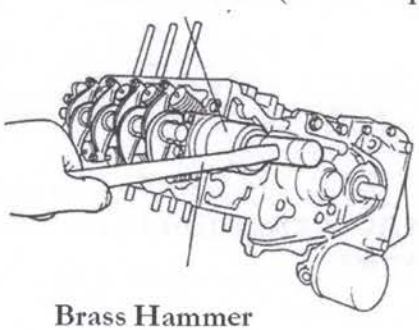
Use: Oil Seal Guide Tools for Proper Installation



Note: Lubricate Seal With Engine Oil Before Installation

Note: Tap Lightly When Installing Oil Seal

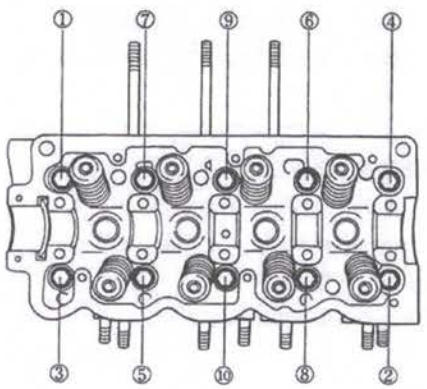
Guide Oil Seal (Cover Cup)



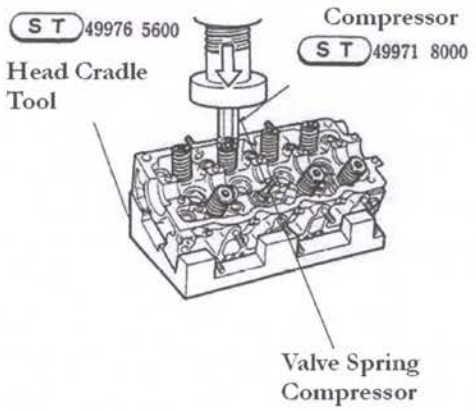
Cylinder Head - Valve Spring -Valve

Torque=3.0+-0.3kg-m

Cylinder Head Torque Sequence



Note:
Use Cylinder Head Cradle Holder Tool ST 49976-5600 To Hold Head In Place for Spring Removal and Installation Proceedures

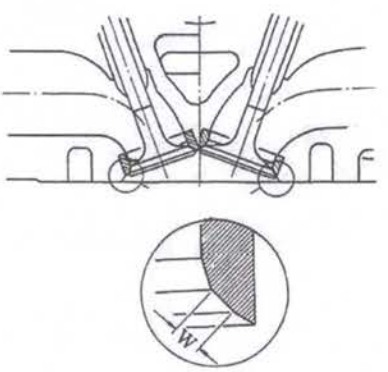


Use Above Combination for Removal and Installation of Valves and Springs

Valve Spring Specifications

Specifications		IN & EX
Free Length (mm)		43.46
Set	Pressure (kg)	18.2
	Spring Length	36.5
Lift	Pressure (kg)	44.9
	Spring Length	29.0

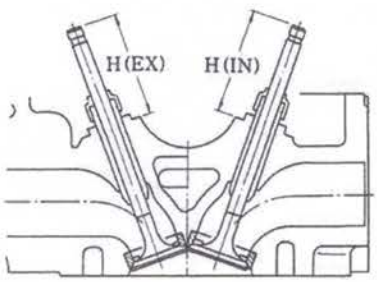
Valve Seat Specifications



Valve Seat	Intake	Exhaust
"W"	1.3mm	1.2mm

Valve - Valve Spring - Valve Guide

Valve Specifications



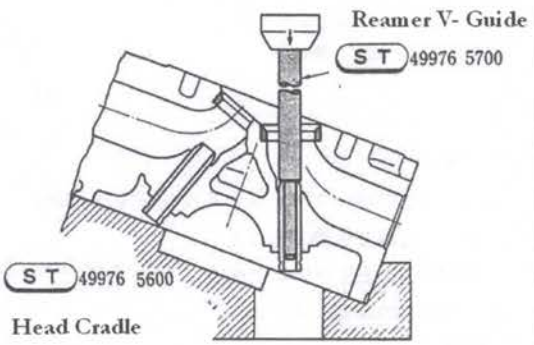
Valve Stem		IN	EX
"H"	Ok	41.3mm	41.4mm
	Fail	41.8mm	41.9mm
Side Clearance Limit		0.5mm	0.5mm

Valve Guide	Intake	Exhaust
Valve Stem (OP)	0.030~0.060	0.040~0.070
Opening Deg	0.130	0.150
V Guide (Out)	5.452~5.470	5.442~5.460
V Guide Limit	5.50 ~5.512	5.50 ~5.512
Head Clearance	0.060~0.027	0.060~0.027

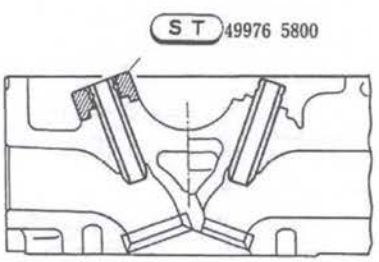
Specialty Tools

Part #	Part Name
49976 5600	Cylinder Head Cradle
49976 5700	Ream Bar Valve Guide
49976 5800	Adjuster Valve Guide
49976 5900	Reamer Valve Guide

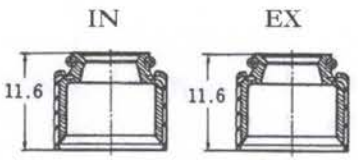
Use Sevice Tools For Guide Replacement



Valve Guide Adjuster Tool



Valve Oil Stem Seal

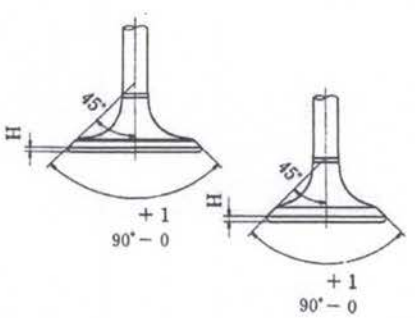


Intake (Black)

Exhaust (Brown)

Note: Replacement Oil Stem Seals are Marked and or Have a Color Code.

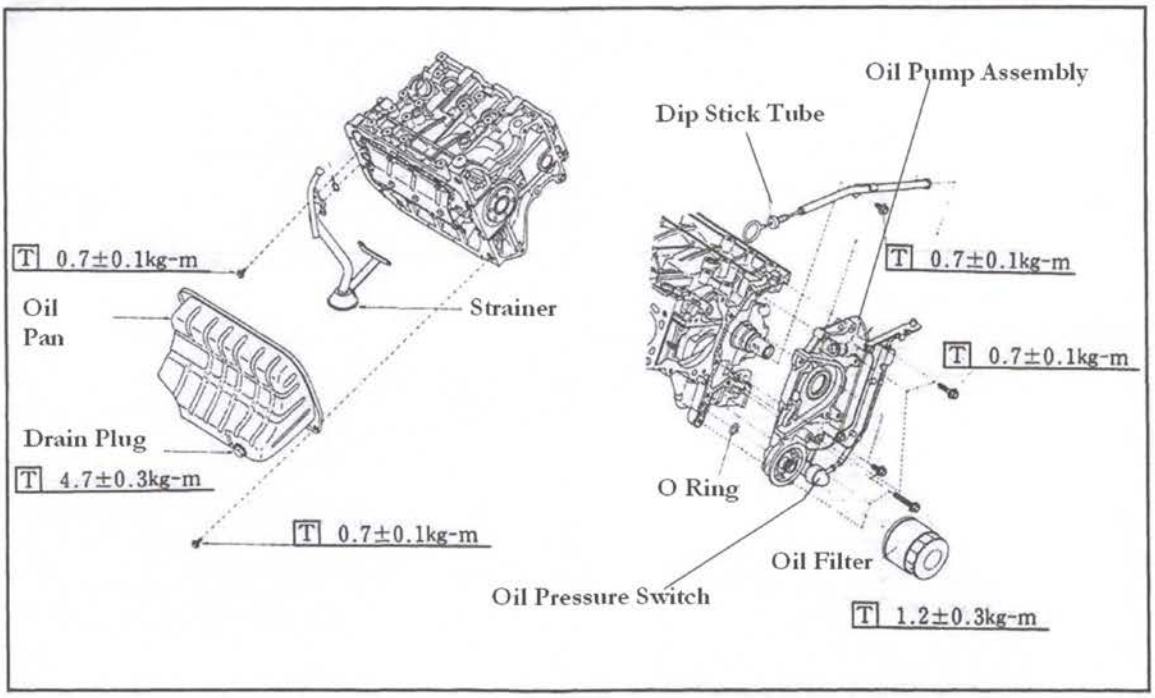
Valve Face Angle



		Intake	Exhaust
Valve Head "H"	Ok	1.0mm	1.0mm
	Limit	0.5mm	0.5mm
Valve Face		ϕ 26mm	ϕ 23mm
Valve Length		94.6mm	94.6mm

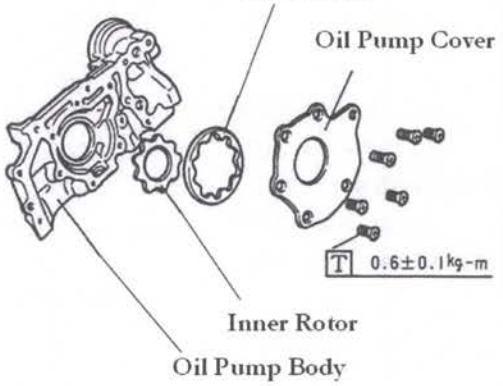
Oil Pump System

Oiling System Exploded View



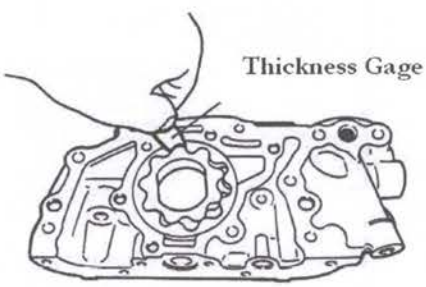
Oil Pump

Brakedown of Parts

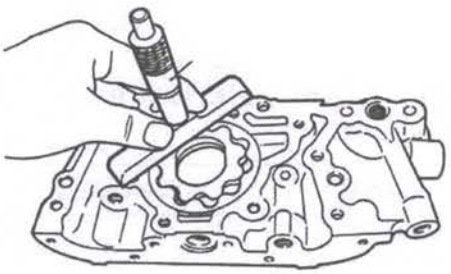


Inner to Outer Clearance

Clearance	Norm	0.05~0.18mm
	Out	0.2mm



Radial Clearance



Radial Clearance

Radial	Norm	0.12~0.19mm
	Fail	0.25mm

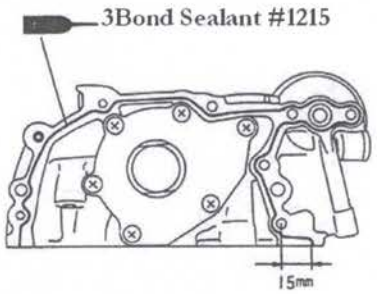
Side Clearance

Side Clearance	Norm	0.03~0.07mm
	Out	0.15mm

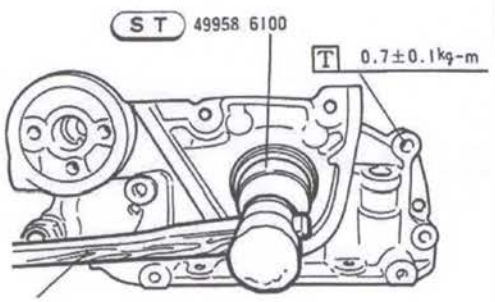
Out=Replace

Oil Pump Assembly

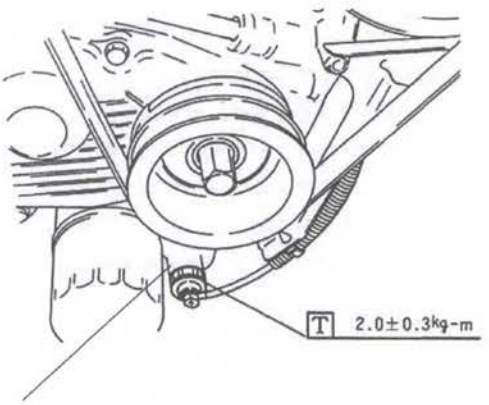
Attach Pump Assembly to Block



Install New Oil Seal



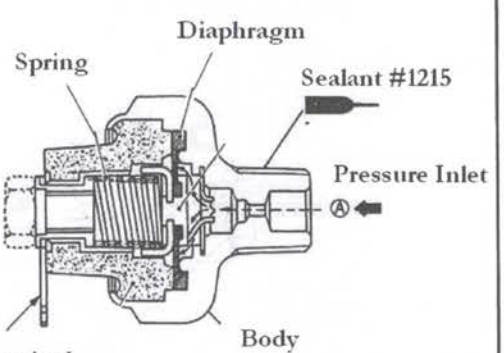
Oil Pressure Switch



Oil Pressure Switch

Note: Oil Pressure Switch Details See in This Book (Electrical Diagrams)

Oil Pressure Switch

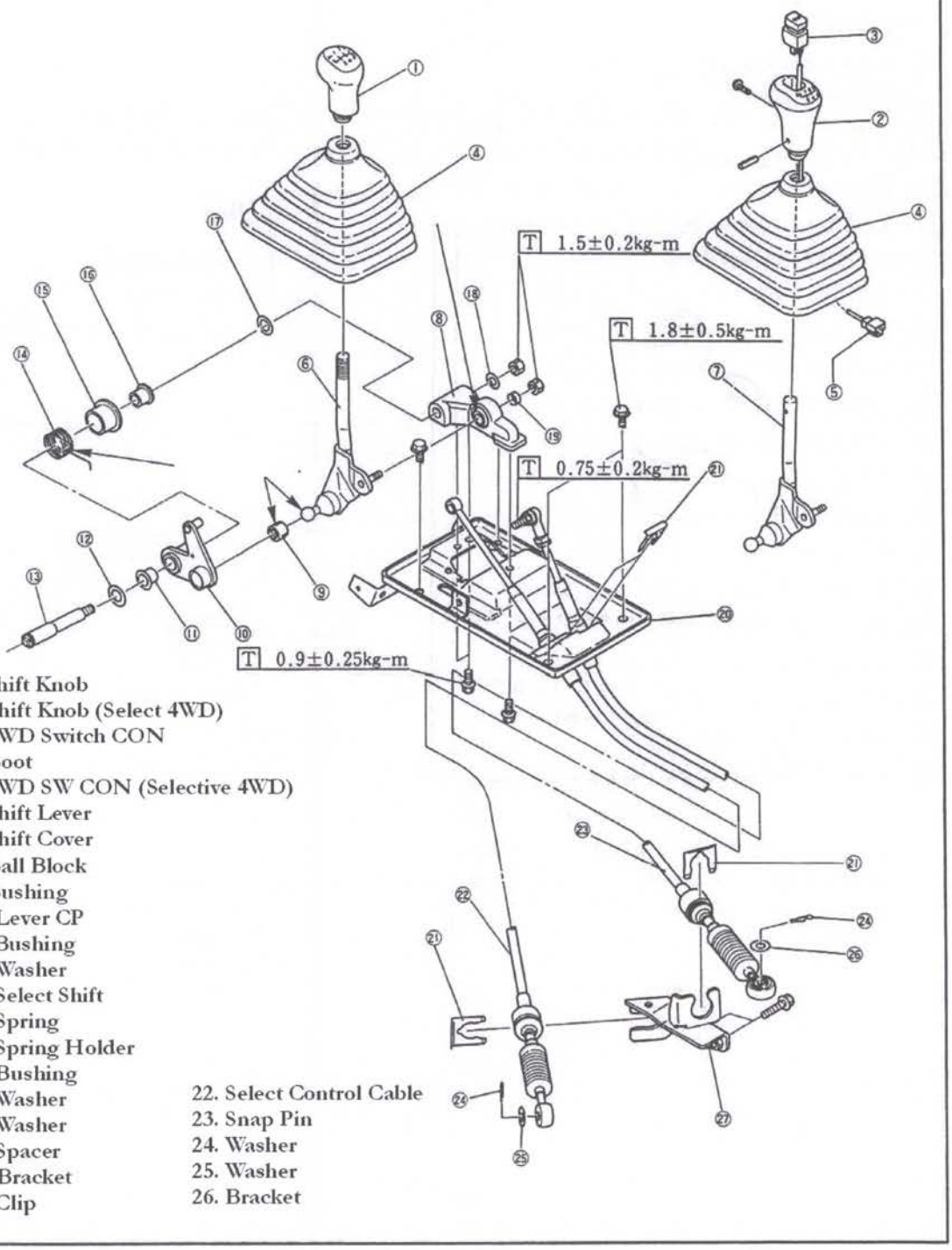


Chapter 11

Transmission and Differential 2WD - 4WD

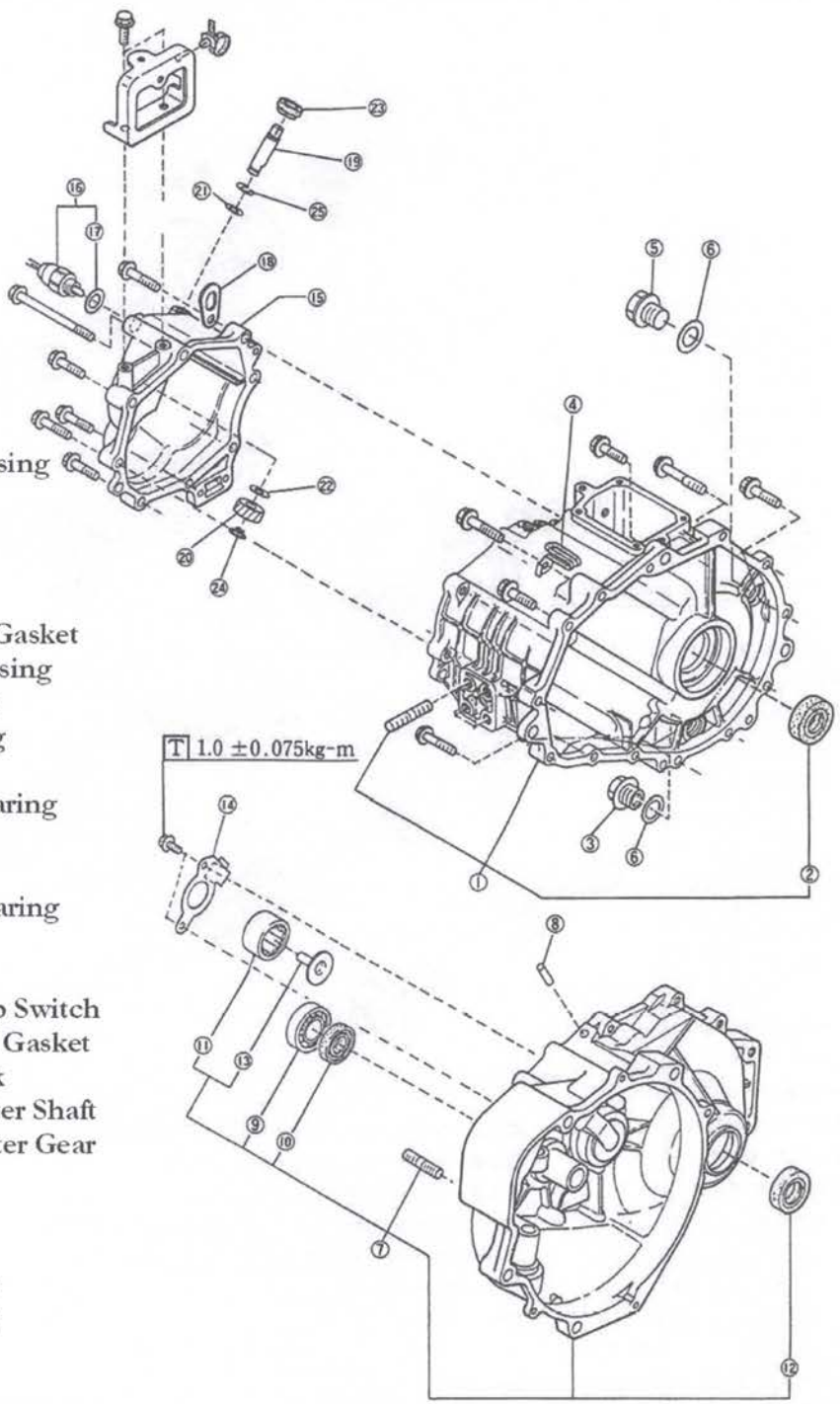
21. Gear Shift System
22. TM 60 Series 2WD Clutch Housing - Main Case - Side Case
23. TM 60 Series 2WD Main Shaft-Drive Pinion- Reverse Idler Shaft
24. TM 60 Series 2WD Shift & Select System
25. TM 60 Series 2WD Differential
26. TM 60 Series Selective 4WD Transmission Case Assembly
27. TM 60 Series Selective 4WD Shifter and Selector System
28. TM 60 Series Selective 4WD Drive Pinion-Main Shaft-Reverse Idler
29. TM 60 4WD Differential
30. TM 60 4WD Diff-Lock Differential Option
31. TM 60 4WD Diff-Lock Side Cover Assembly
32. TM 60 Selective 4WD Transfer Extension
33. Clutch & Pressure Plate Specifications
34. Clutch System Diagram
35. Clutch Cable Adjustment
36. Release Bearing and Fork
37. Clutch Disk – Flywheel – Pressure Plate
38. Clutch Assembly
39. Axel Shaft System
40. Axel Shaft Identification and Type

Gear Shift System



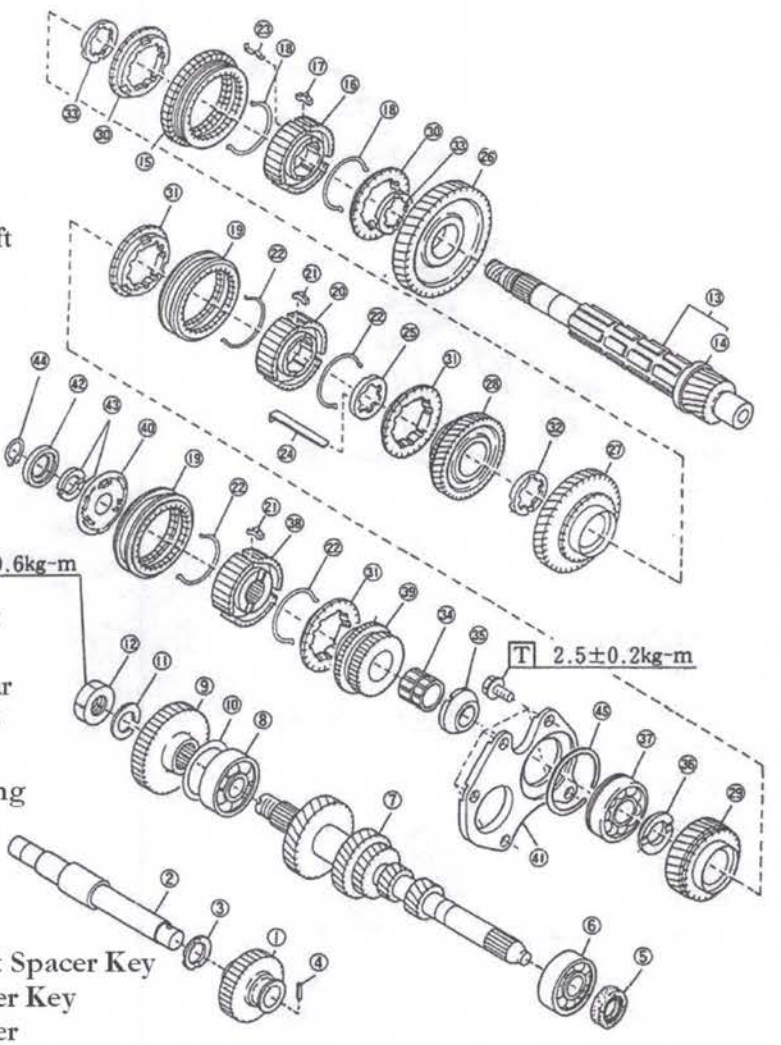
1. Shift Knob
2. Shift Knob (Select 4WD)
3. 4WD Switch CON
4. Boot
5. 4WD SW CON (Selective 4WD)
6. Shift Lever
7. Shift Cover
8. Ball Block
9. Bushing
10. Lever CP
11. Bushing
12. Washer
13. Select Shift
14. Spring
15. Spring Holder
16. Bushing
17. Washer
18. Washer
19. Spacer
20. Bracket
21. Clip
22. Select Control Cable
23. Snap Pin
24. Washer
25. Washer
26. Bracket

Clutch Housing - Main Case - Side Case



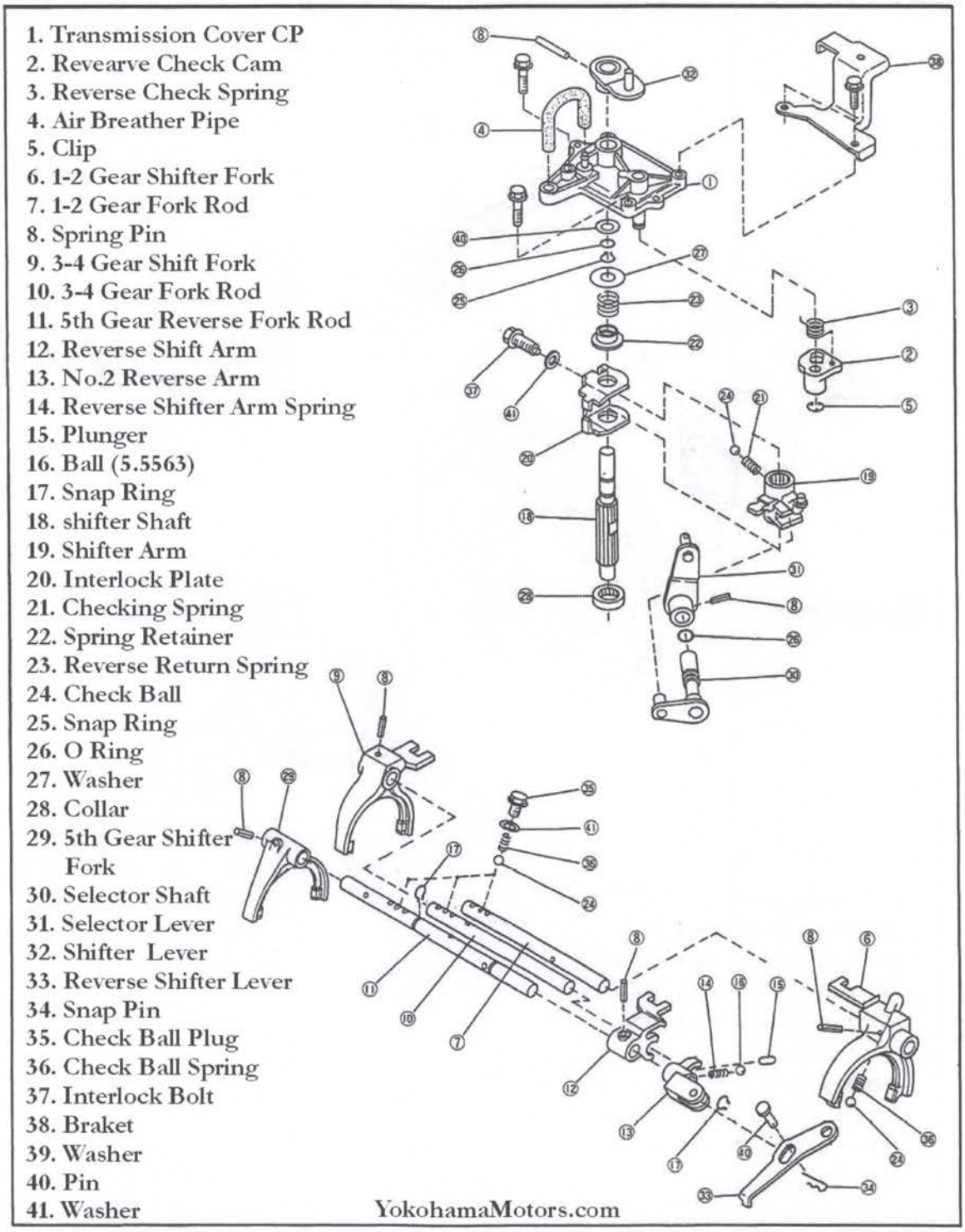
1. Clutch Housing
2. Oil Seal
3. Drain Plug
4. Clip
5. Oil Plug
6. Aluminum Gasket
7. Clutch Housing
8. Straight Pin
9. Ball Bearing
10. Oil Seal
11. Needle Bearing
12. Oil Seal
13. Oil Guide
14. Needle Bearing Retainer
15. Side Case
16. Back Lamp Switch
17. Aluminum Gasket
18. Trans Rack
19. Speedometer Shaft
20. Speedometer Gear
21. Washer
22. Washer
23. Oil Seal
24. Snap Ring
25. Snap Ring

Main Shaft - Drive Pinion Shaft - Reverse Idler Shaft



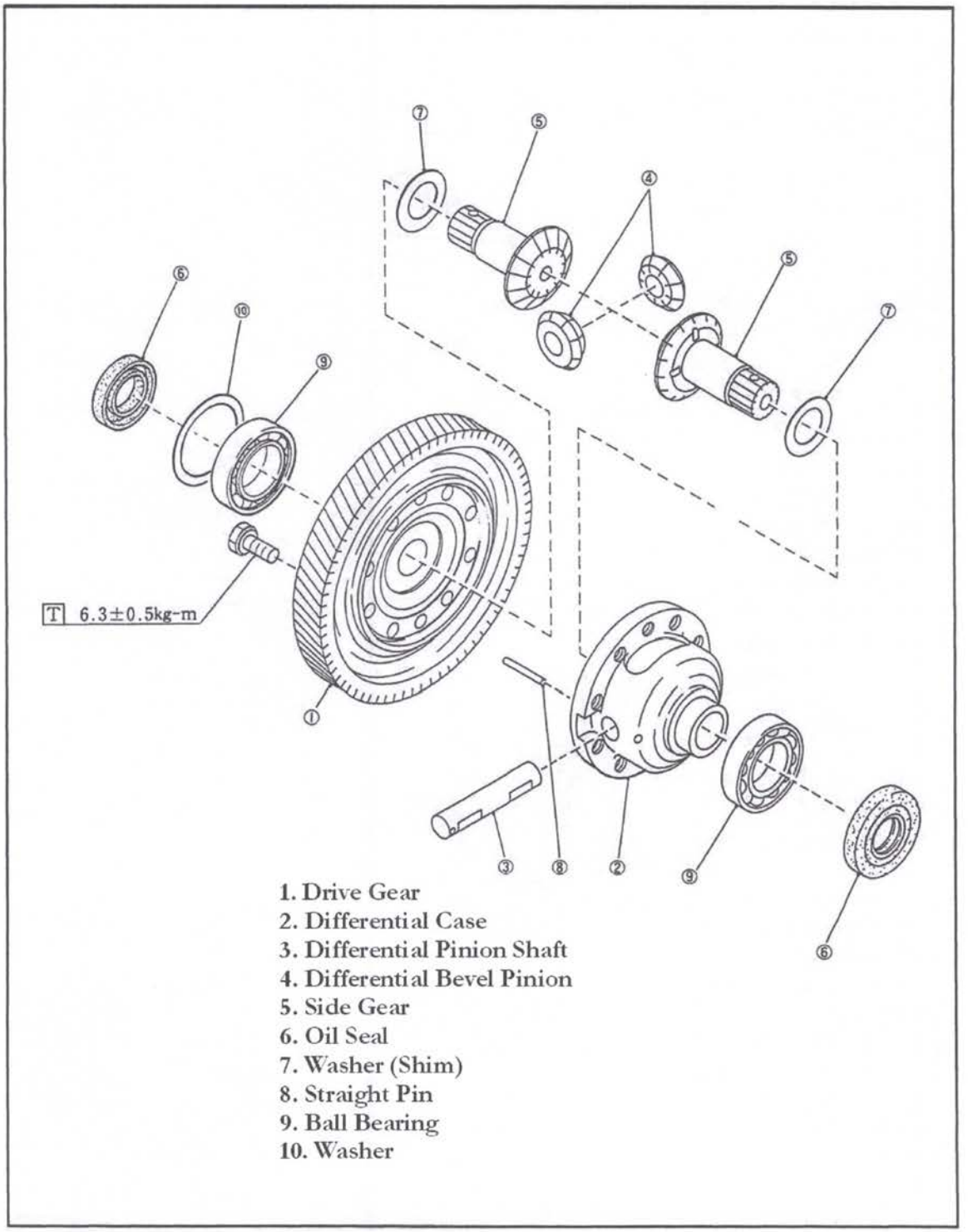
1. Revearse Idle gear
2. Revearve Idler Shaft
3. Thrust Washer
4. Spring Pin
5. Oil Seal
6. Ball Bearing
7. Main Shaft
8. Ball Bearing
9. 5th Drive Gear
10. Lock Washer
11. Nut
12. Washer
13. Drive Pinion Shaft
14. Washer
15. Reverse Drive Gear
16. Synchronizer Hub
17. Shifting Inside
18. Synchronizer Spring
19. Synchro Sleave
20. Synchro Hub
21. Shifting Inside
22. Synchro Spring
23. No. 2 Gear Thrust Spacer Key
24. Gear Thrust Spacer Key
25. Gear Thrust Spacer
26. 1rst Drive Gear
27. 2nd Drive Gear
28. 3rd Drive Gear
29. 4th Drive Gear
30. Synchronizer Ring
31. Synchronizer Ring
32. No. 3 Gear Thrust Spacer
33. No.4 Gear Thrust Spacer
34. Bushing
35. 5th Drive Thrust Plate
36. Thrust Washer
37. Drive Pinion Center Bearing
38. Synchronized Hub
39. 5th Drive Gear
40. Inside Stopper Plate
41. Retainer Plate
42. Retainer
43. Cotter Pin
44. Snap Ring
45. Snap Ring

Shift & Select



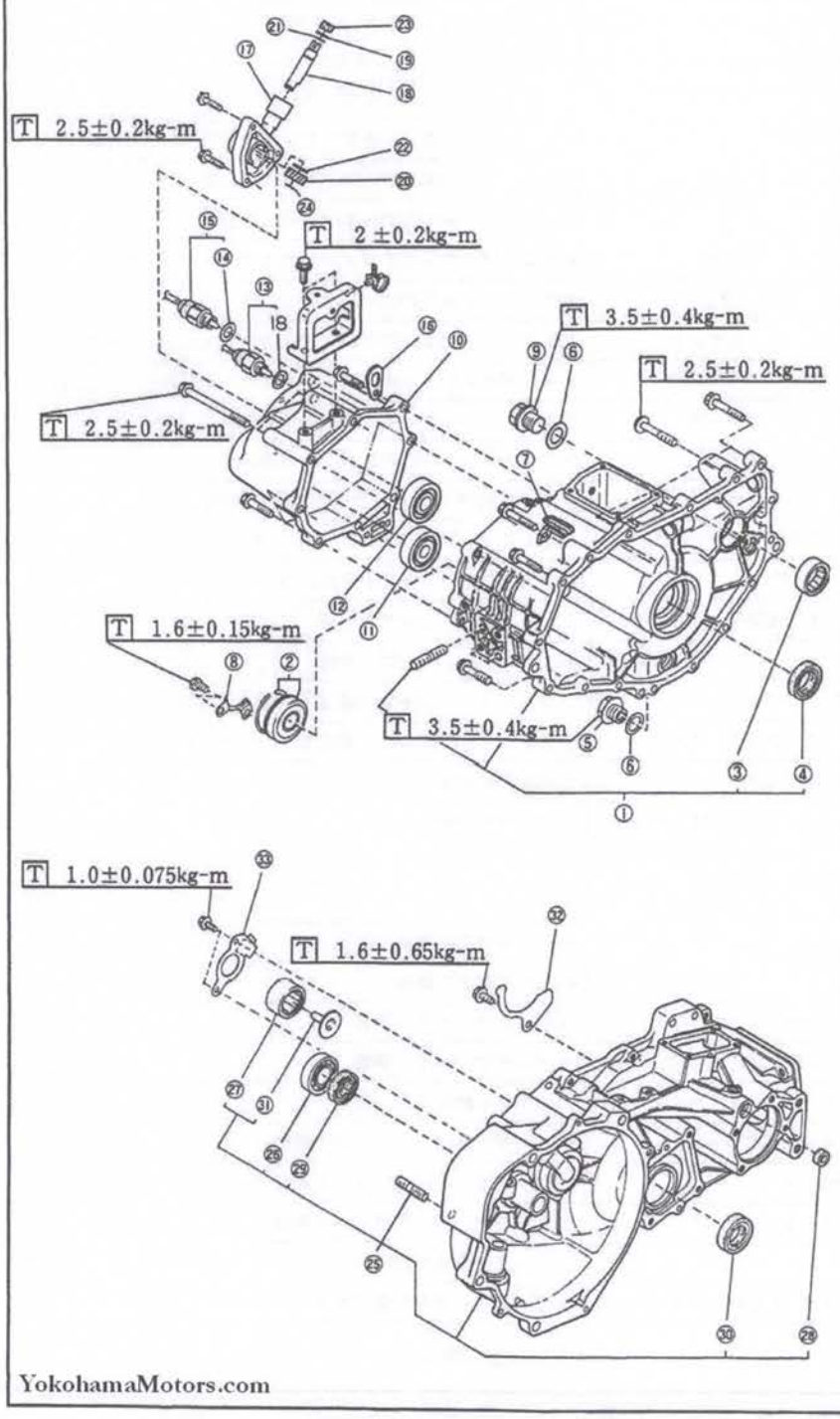
1. Transmission Cover CP
2. Revearve Check Cam
3. Reverse Check Spring
4. Air Breather Pipe
5. Clip
6. 1-2 Gear Shifter Fork
7. 1-2 Gear Fork Rod
8. Spring Pin
9. 3-4 Gear Shift Fork
10. 3-4 Gear Fork Rod
11. 5th Gear Reverse Fork Rod
12. Reverse Shift Arm
13. No.2 Reverse Arm
14. Reverse Shifter Arm Spring
15. Plunger
16. Ball (5.5563)
17. Snap Ring
18. shifter Shaft
19. Shifter Arm
20. Interlock Plate
21. Checking Spring
22. Spring Retainer
23. Reverse Return Spring
24. Check Ball
25. Snap Ring
26. O Ring
27. Washer
28. Collar
29. 5th Gear Shifter Fork
30. Selector Shaft
31. Selector Lever
32. Shifter Lever
33. Reverse Shifter Lever
34. Snap Pin
35. Check Ball Plug
36. Check Ball Spring
37. Interlock Bolt
38. Braket
39. Washer
40. Pin
41. Washer

Differential



1. Drive Gear
2. Differential Case
3. Differential Pinion Shaft
4. Differential Bevel Pinion
5. Side Gear
6. Oil Seal
7. Washer (Shim)
8. Straight Pin
9. Ball Bearing
10. Washer

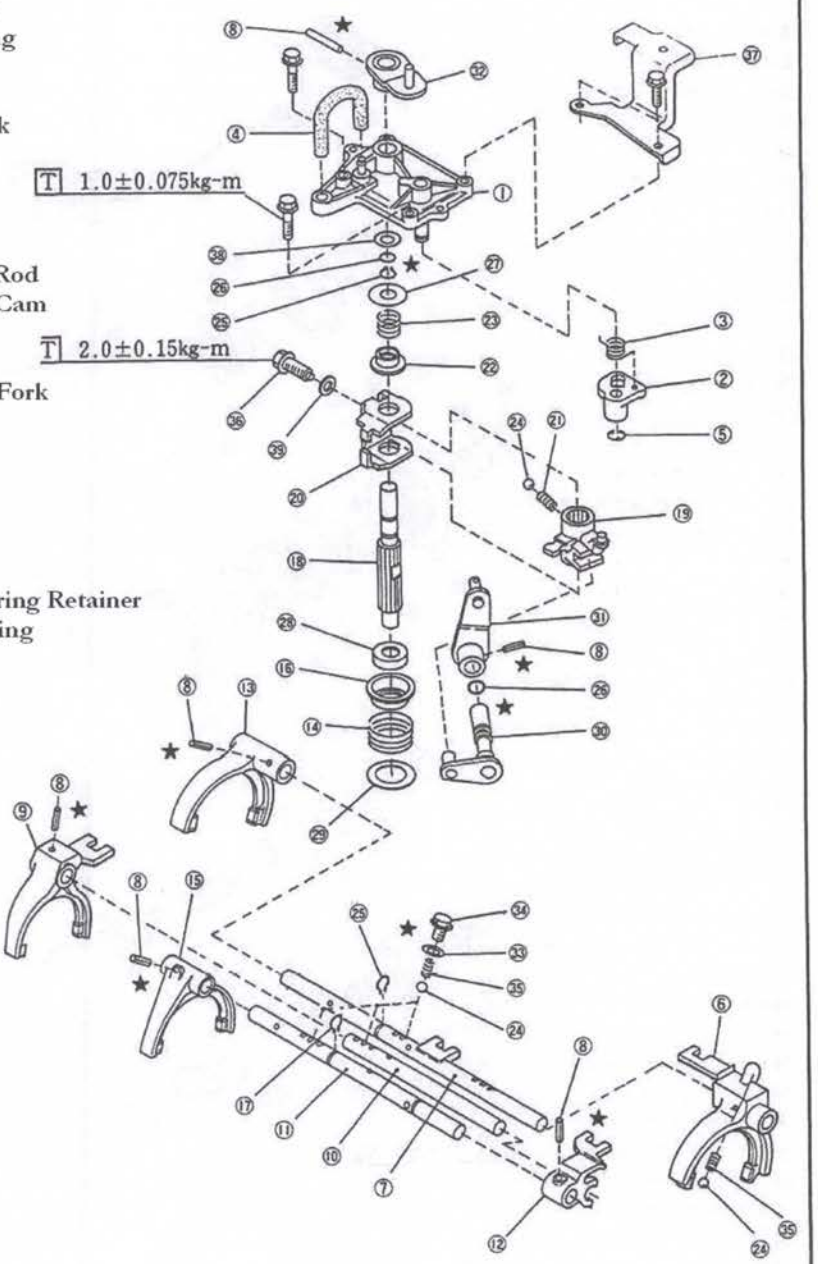
Transmission Case Brakedown



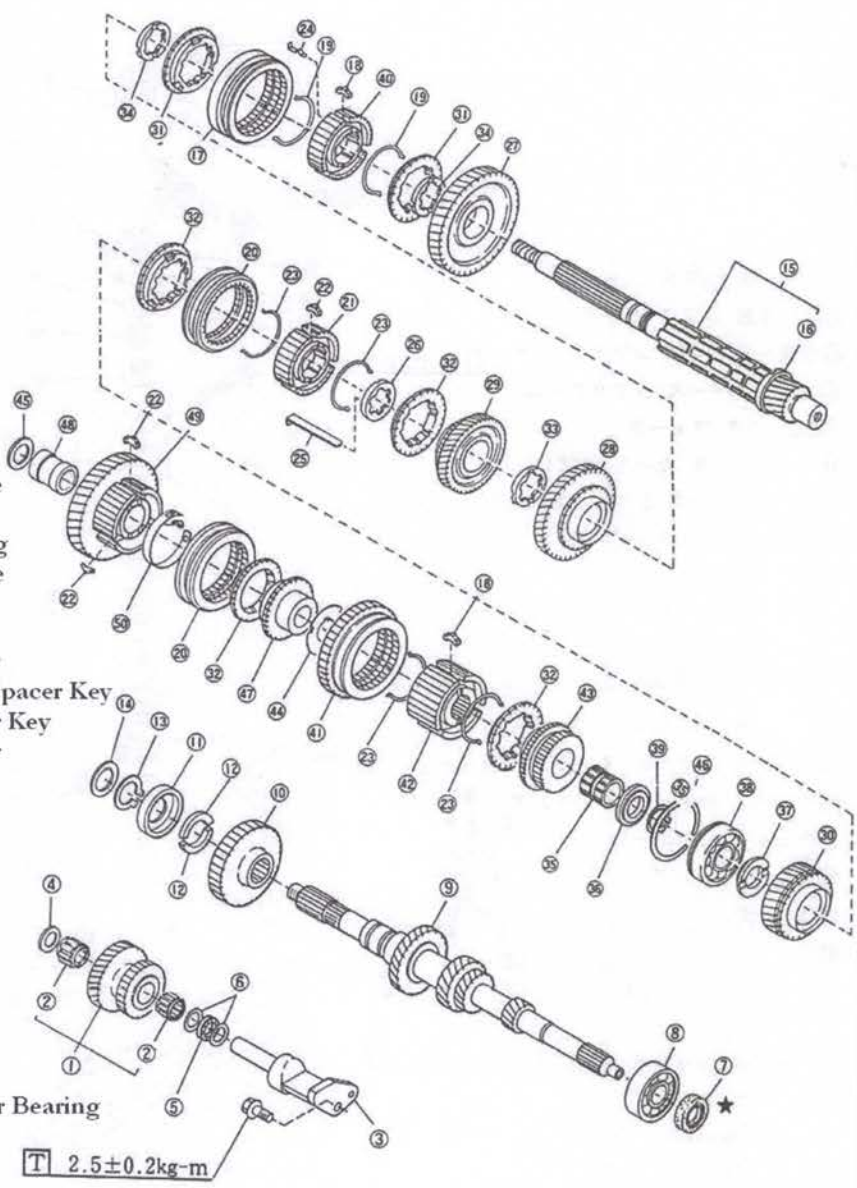
1. Main Case
2. Roller Bearing
3. Ball Bearing
4. Oil Seal
5. Drain Plug
6. Aluminum Gasket
7. Clip
8. Bearing Retainer
9. Oil Plug
10. Side Case
11. Ball Bearing
12. Bearing
13. Back up Lamp Switch
14. Aluminum Gasket
15. EL Switch
16. Trans Fork
17. Side Cover
18. Speedometer Shaft
19. Washer
20. Speedometer Gear
21. Snap Ring
22. Washer
23. Oil Seal
24. Snap Ring
25. Clutch Housing
26. Ball Bearing
27. Needle Bearing
28. Oil Seal
29. Oil Seal
30. Oil seal
31. Oil Seal
32. Oil Reserve Plate
33. Needle Bearing Retainer

Shifter and Selector

1. Transmission Cover CP
2. Reverse Check Cam
3. Reverse Check Spring
4. Air Breather Tube
5. Clip
6. 1~2 Gear Shifter Fork
7. 1~2 Shifter Rod
8. Spring Pin
9. 3~4 Shifter Fork
10. 3~4 Shifter Rod
11. 5th Release Shifter Rod
12. 5th Release Shifter Cam
13. EL Shifter Fork
14. Nuetral Set Spring
15. 5th Reverse Shifter Fork
16. Spring Retainer
17. Spring Ring
18. Shifter Shaft
19. Shifter Arm
20. Inter Lock Plate
21. Check Spring
22. Reverse Return Spring Retainer
23. Reverse Return Spring
24. Check Ball
25. Snap Ring
26. O Ring
27. Washer
28. Needle Set Spring Retainer
29. Washer
30. Selector Shaft
31. Selector Lever
32. Shifter Lever
33. Aluminum Gasket
34. Check Ball Plug
35. Check Ball Spring
36. Interlock Bolt
37. Bracket
38. Washer
39. Washer

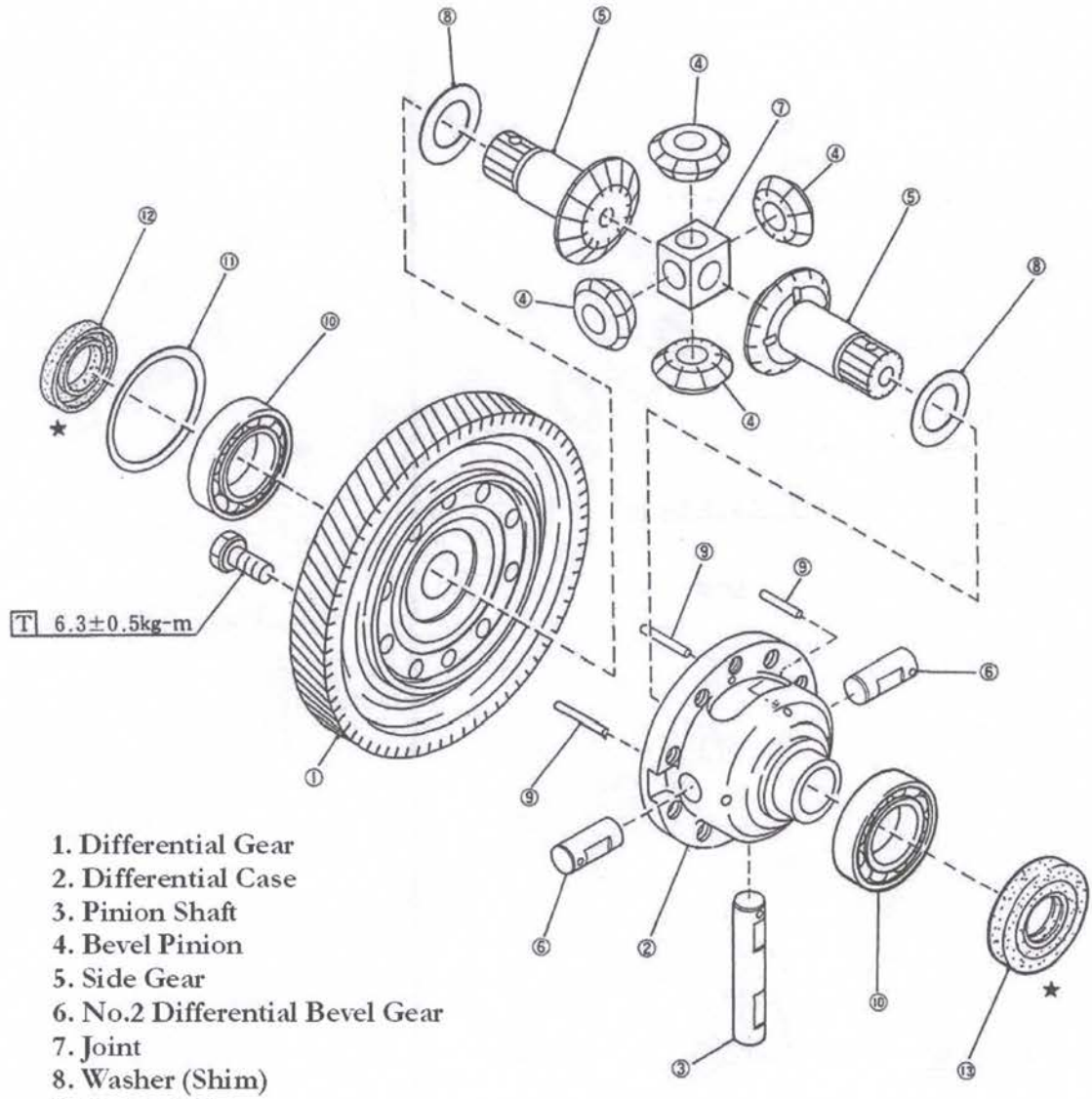


Drive Pinion - Main Shaft - Reverse Idler Shaft



1. Reverse Idle Gear
2. Roller Bearing
3. Reverse Idle Shaft
4. Thrust Washer
5. Needle Bearing
6. Washer
7. Oil Seal
8. Ball Bearing
9. Main Shaft
10. 5th Drive Gear
11. Retainer
12. Cotter
13. Snap Ring
14. Washer
15. Drive Pinion Shaft
16. Washer
17. Synchronizer Sleeve
18. Shifting Inside
19. Synchronizer Spring
20. Synchronizer Sleeve
21. Synchronizer Hub
22. Shifting Inside
23. Synchonizer Spring
24. No.2 Gear Thrust Spacer Key
25. Gear Thrust Spacer Key
26. Gear Thrust Spacer
27. 1rst Drive Gear
28. 2nd Drive Gear
29. 3rd Drive Gear
30. 4th Drive Gear
31. Sychronizer Ring
32. Synchronizer Ring
33. No.3 Gear Spacer
34. No.3 Gear Spacer
35. Bushing
36. Thrust Plate
37. Thrust Washer
38. Drive Pinion Center Bearing
39. Snap Ring
40. Synchronizer Hub
41. Reverse Drive Gear & Spring
42. Synchronizer Hub
43. 5th Driven Gear
44. Inside Stopper Plate
45. Washer
46. Snap Ring
47. EL Synchronizer Coupling
48. Bushing
49. EL Driven Gear & Hub
50. Synchronizer Spring

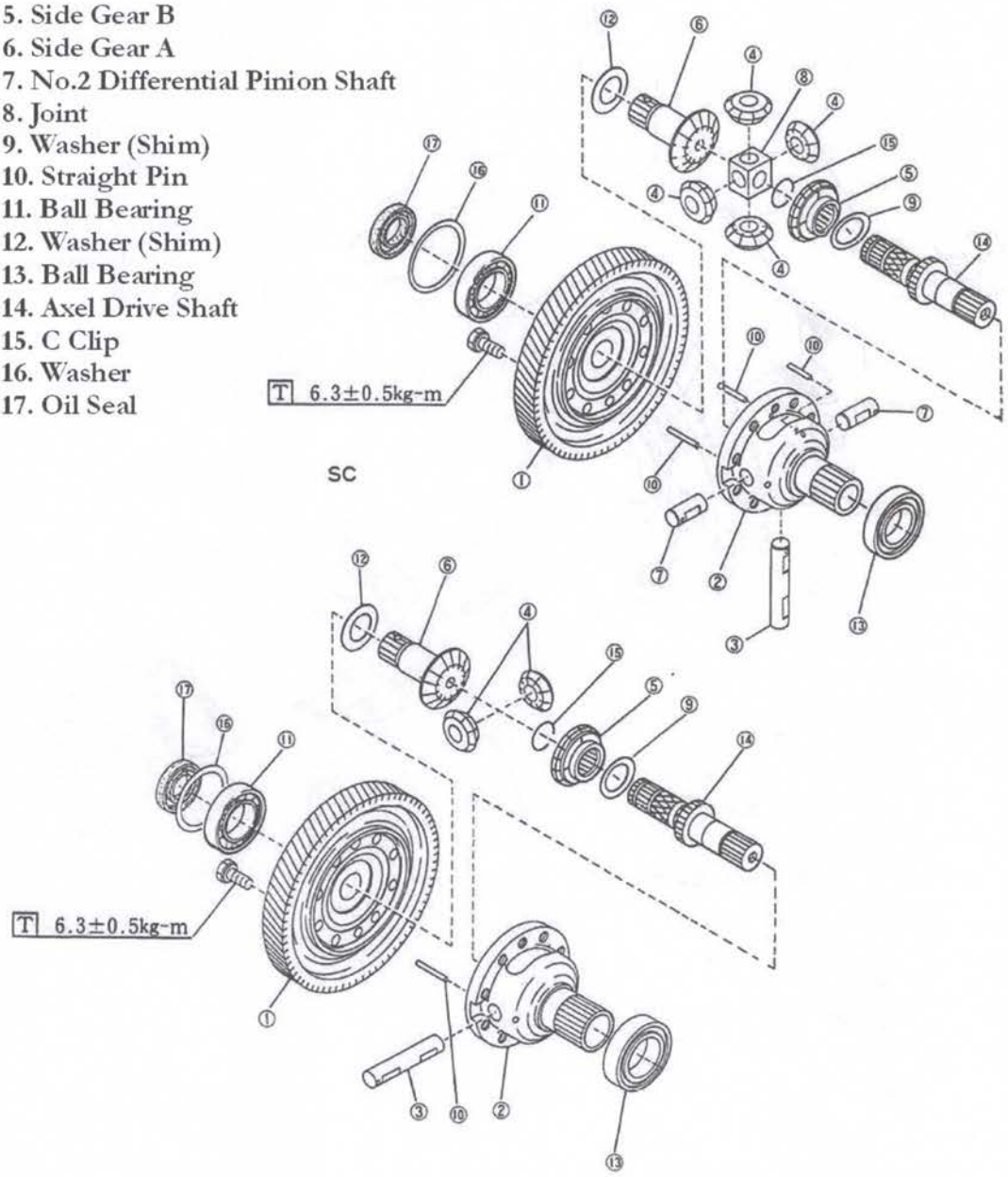
Differential



1. Differential Gear
2. Differential Case
3. Pinion Shaft
4. Bevel Pinion
5. Side Gear
6. No.2 Differential Bevel Gear
7. Joint
8. Washer (Shim)
9. Straight Pin
10. Ball Bearing
11. Washer
12. Oil Seal
13. Oil Seal

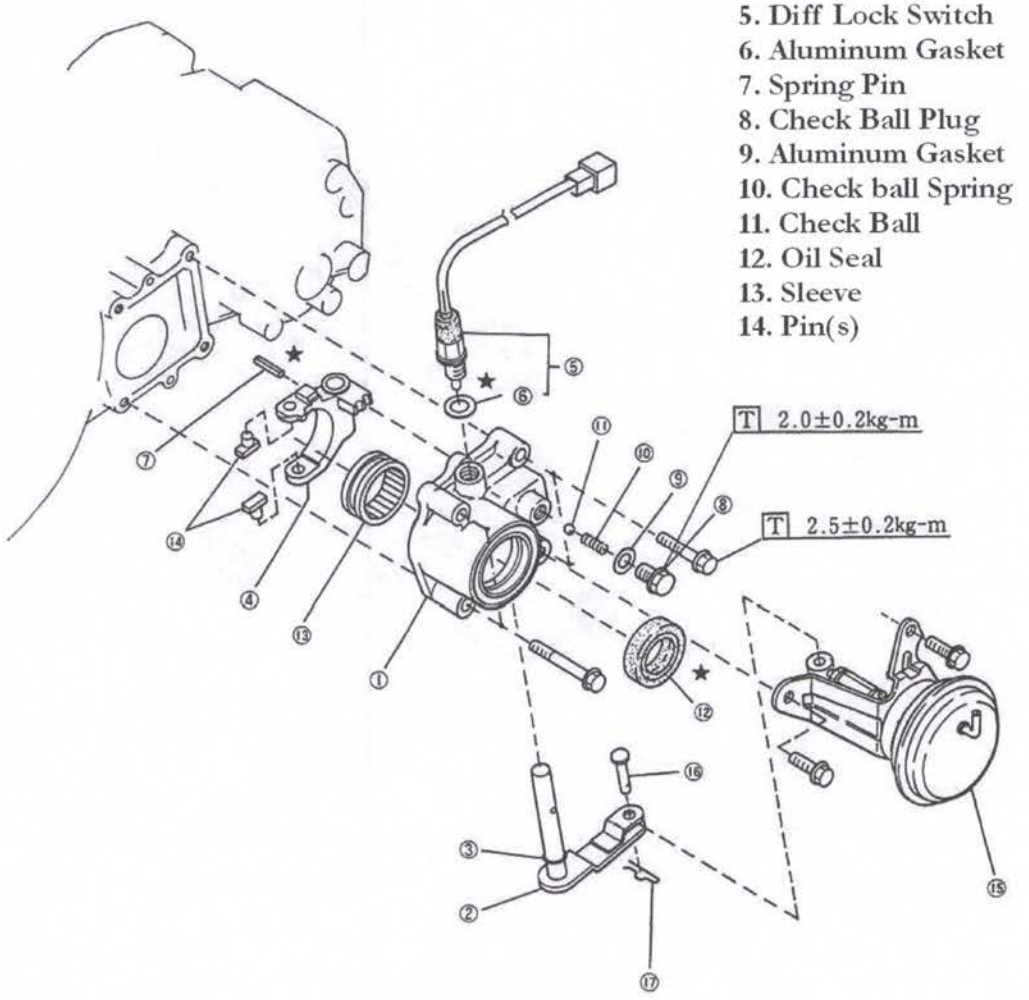
Diff- Lock Differential

1. Drive Gear
2. Differential Case
3. Pinion Shaft
4. Bevel Pinion
5. Side Gear B
6. Side Gear A
7. No.2 Differential Pinion Shaft
8. Joint
9. Washer (Shim)
10. Straight Pin
11. Ball Bearing
12. Washer (Shim)
13. Ball Bearing
14. Axel Drive Shaft
15. C Clip
16. Washer
17. Oil Seal



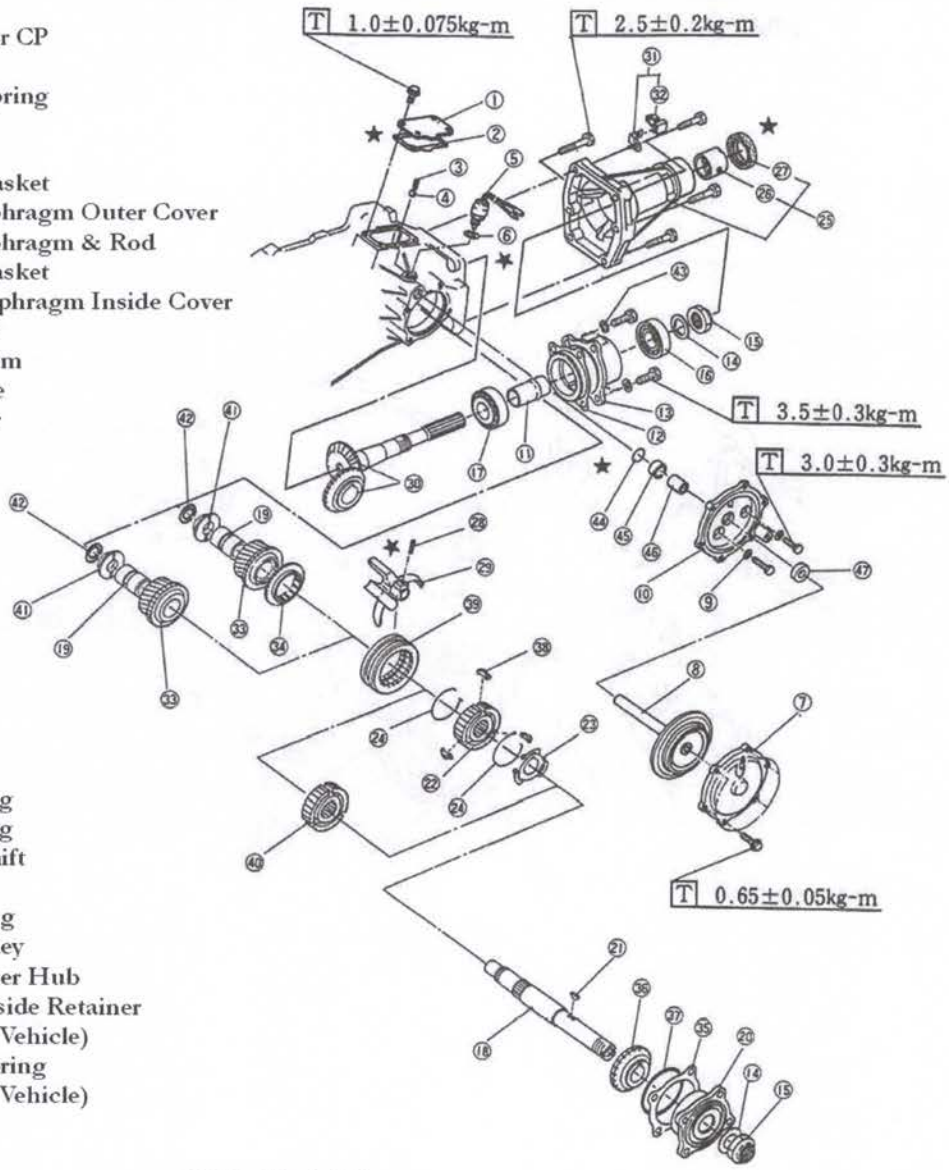
Differential Side Cover Diff-Lock Vehicle

Diff-Lock Option Vehicle



1. Side Cover CP
2. Lever
3. O Ring
4. Fork
5. Diff Lock Switch
6. Aluminum Gasket
7. Spring Pin
8. Check Ball Plug
9. Aluminum Gasket
10. Check ball Spring
11. Check Ball
12. Oil Seal
13. Sleeve
14. Pin(s)
15. Diff-Lock Actuator
16. Pin
17. Snap Pin

Transfer Extension



1. Transfer Cover CP
2. Gasket
3. Check Ball Spring
4. Check Ball
5. 4WD Switch
6. Aluminum Gasket
7. Transfer Diaphragm Outer Cover
8. Transfer Diaphragm & Rod
9. Aluminum Gasket
10. Transfer Diaphragm Inside Cover
11. Clasp Spacer
12. Backlash Shim
13. Bearing Case
14. Lock Washer
15. Lock Nut
16. Ball Bearing
17. Ball Bearing
18. Transfer Shift
19. Bushing
20. Ball Bearing
21. Woodriff Key
22. Synchronizer Hub
23. Shifting Inside Retainer (Free Axle Vehicle)
24. Synchro Spring (Free Axle Vehicle)
25. Extension
26. Bushing
27. Oil Seal
28. Spring Pin
29. Transfer Shifter Fork
30. Drive Bevel Gear
31. Stay (Free Axle Vehicle)
32. Support (Free Axle)
33. Transfer Driven Gear
34. Syncho Ring
35. Backlash Shim
36. Transfer Bevel Gear
37. O Ring
38. Shifting Inside (Fee Axel)
39. Syncho Sleeve
40. Transfer Synchro Hub
41. Washer
42. Snap Ring
43. Washer
44. O Ring
45. Oil Seal
46. Transfer Side Cover Pin
47. Oil Seal

Clutch System Specifications

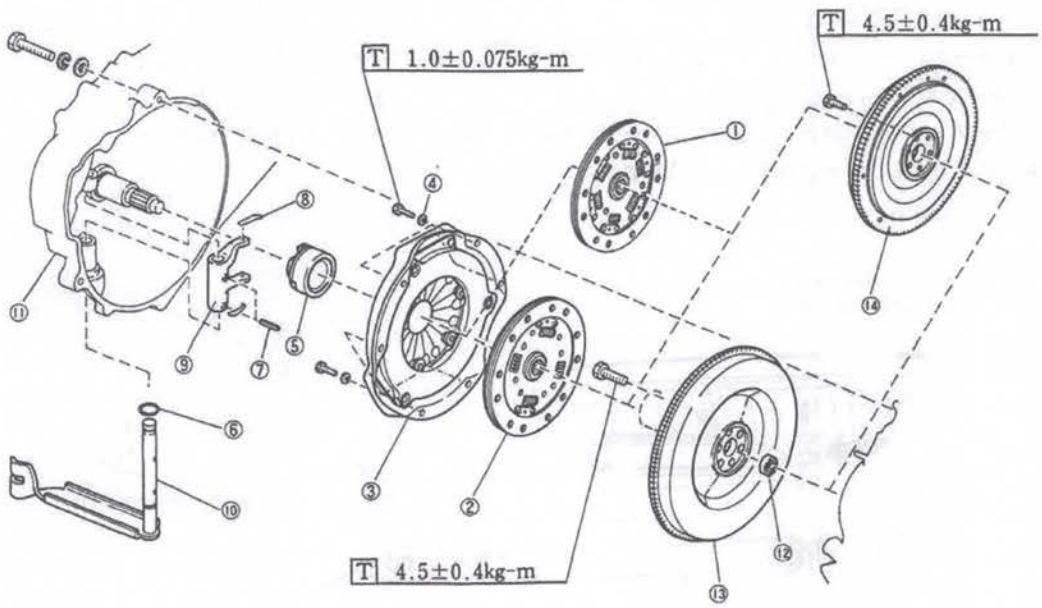
Clutch Pressure Plate & Disk

Specifications Chart

Engine Type		EN07				
Transmission		2WD	SC	Select 4WD	SC	Free Axel
		TM60	←	TW60	←	TY60
Clutch	Type	Single Disk	←	←	←	←
	Control	Mechanical	←	←	←	←
Clutch Pedal	Type	Suspended	←	←	←	←
	Pedal Ratio	4.5	←	←	←	←
	Stroke (mm)	115~120	130~135	115~120	130~135	←
Pressure Plate (Cover)	Type	Push	←	←	←	←
	Engage Load Kg	190	210	170	210	←
Clutch Disk	Dimensions	160×125×3.5	180×125×3.5	←	←	←
	Contact Area(cm2)	106	131	←	←	←
	Spline Teeth	23	←	←	←	←
	Plate Thickness	8.35+-0.4mm	←	←	←	←
	Meterial	Non-Asbestos	←	←	←	←

Clutch System Diagram

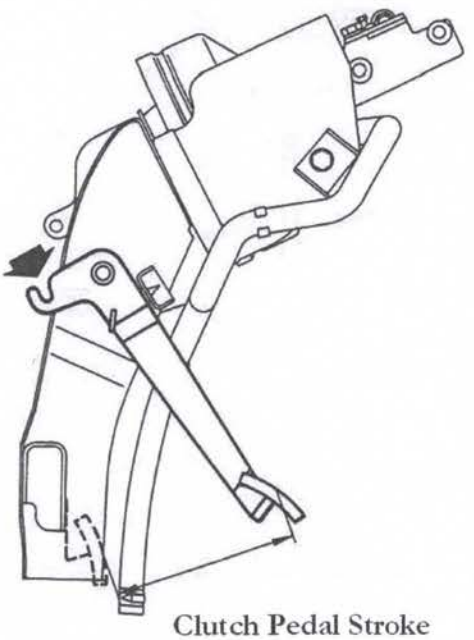
1. Clutch Disk (2WD NA Vehicle)
2. Clutch Disk (All Others)
3. Clutch Cover
4. Spring Washer
5. Release Bearing
6. O Ring
7. Straight Pin
8. Spring
9. Release Fork
10. Release Lever
11. Clutch Housing
12. Pilot Bearing
13. Flywheel (4WD SC Vehicle)
14. Flywheel (4WD and All Others)



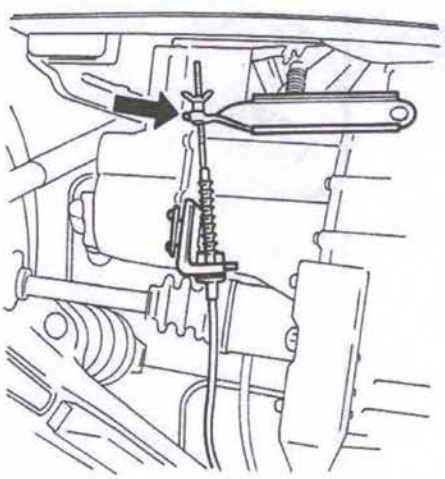
Clutch Cable

Removal

1. From the Transmission side, loosen Wing Nut
2. Remove Outer End Joint Clip Behind Clutch Pedal. Remove Cables from Pedal Bracket.
3. Remove Clutch Pedal Joint
4. Remove Front Under Cover and Remove Cable Retaining Clip from Under The Steering Gear Box
5. Remove Other Retaining Clips Along Cable Path (If Equiped).
6. Remove Transmission Cable Attachment Bracket
7. Remove Return Spring and Clutch Cable From Release Lever
8. Remove Grommet from Cab Floor. Pull Out Cable.



Clutch Pedal Stroke



Clutch Cable Attachment Point

Release Bearing & Release Fork

Note: Transmission Removed

Removal

1. Remove the (2) Springs from The Release Fork
2. Use ST **3987917000** Straight Pin Remover to Pull Out Straight Pin
3. Remove Clutch Release Fork and Clutch Release Lever CP

Caution: Bearing is Greasless Encapsulated Type. Do NOT Use Solvent to Clean

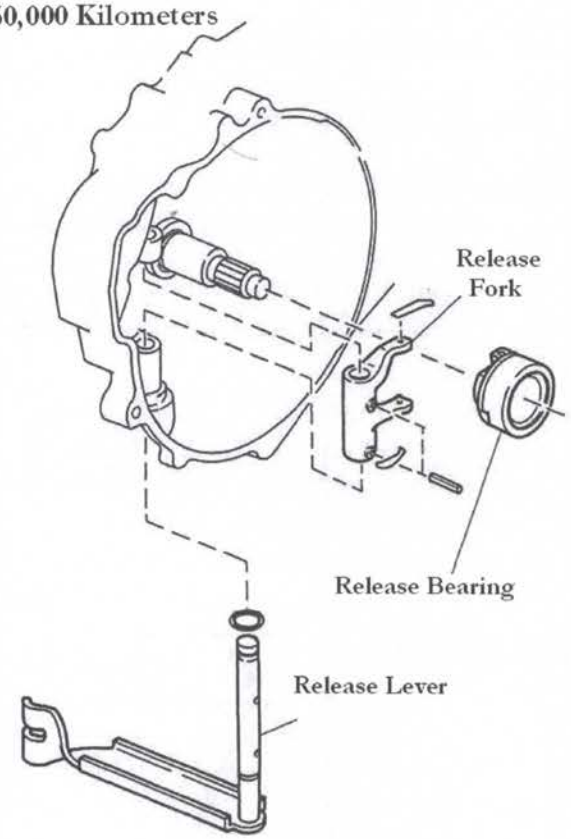
Bearing Inspection

Note: Bearing Shall Be Replaced Over **60,000** Kilometers

4. Inspect for Damage

5. Check for Rotation Smothness

Note: Best Practice is to Change All Clutch Parts as a Set. Including Bearing-Disk-Pressure Plate



Clutch Assembly

1. Use Clutch Disk Guide ST 499745400 To Prevent Disk Form Falling Out During Removal
2. Remove Clutch Cover Mounting Botls From Flywheel
3. Install Flywheel Stop Tool
4. Remove Bolts and Remove Flywheel

ST 498275800 (Flywheel Stopper)

Clutch Cover Inspection

Note: Be Careful Not To Spill Oil On Pressure Plate and Disk Surfaces

Note: Clutch Disk With Oil Saturation Must Be Discarded and Replaced

1. Inspect Backlash of Thrust Rivets (Slipage) and or Cracks. Missing Rivets Can Not Be Replaced. Unit Must be Discarded

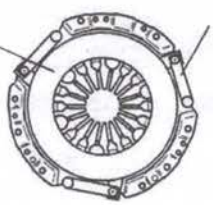
Diaphragm Plate

Thrust Rivets

2. Inspect for Galling, Piting or Other Damage.

Pressure Plate

Strap Plate



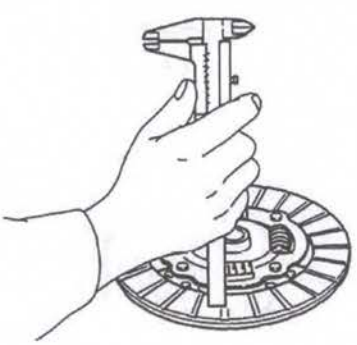
3. Inspect For Heat Damage or Warping

4. Check Stap Plates For Damage

Clutch Disk Inspection

1. Check Surface for Visible Damage

Normal	1.4mm
Limit	0.3mm



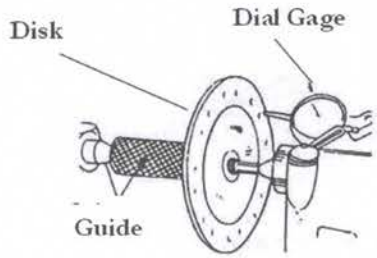
2. Measure Countersink Rivet to Disk Plate Surface (Specifications Above)

Clutch Disk - Flywheel

5. Clutch Disk Flutuation Limit

Limit	0.5mm

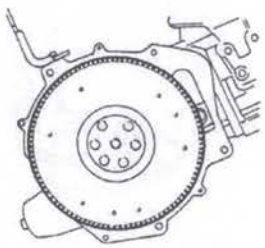
Measurment Point	TM60	150ϕ
	TM60 TW60 · TY60	170ϕ



Flywheel Inspection

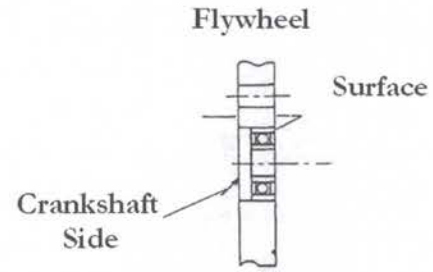
1. Inspect for Galling, Pitting, Heat Damage

2. Check Flywheel Teeth for Cracked or Missing Teeth

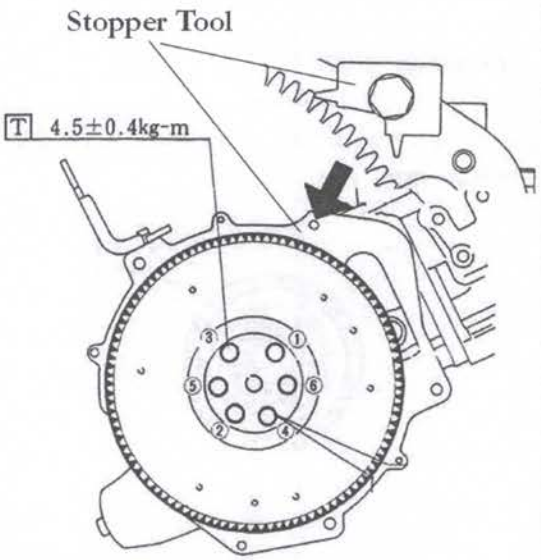


Note: Missing or Damage Teeth Have New Ring Gear Welded and Re-Balance

Note: One Piece Flywheel Units Can Not Be Repaired



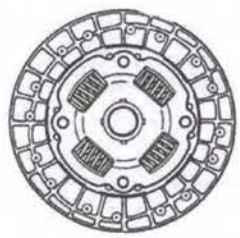
3. Attach Flywheel and Flywheel Stopper Set Torque



Torque To Specifications

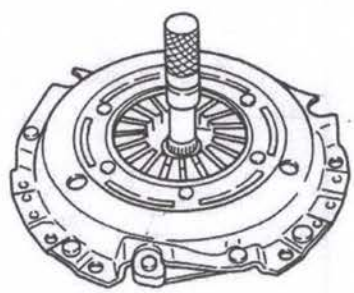
Clutch Assembly

1. Place Clutch Disk This Side Up



Face Up

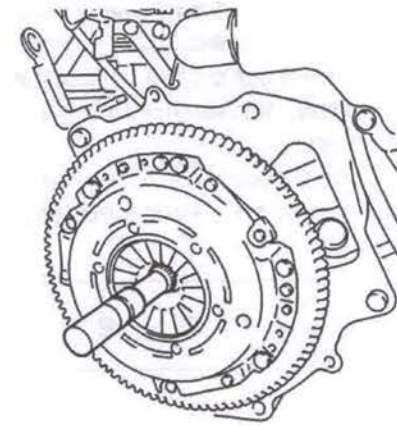
2. Place Pressure Plate Over The Top



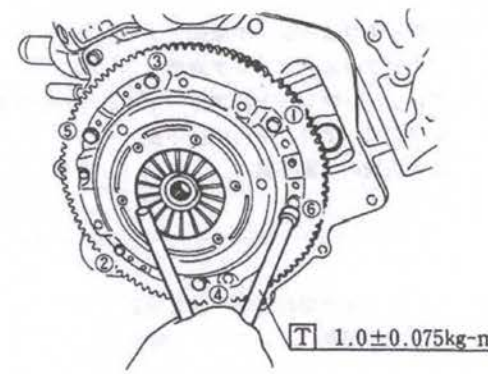
3. Use ST Tool **499745400** for NA Vehicles
ST **4997455000** For SC 4WD Vehicles

Place The Tool Through The Pressure Plate

4. Install Disk and Plate

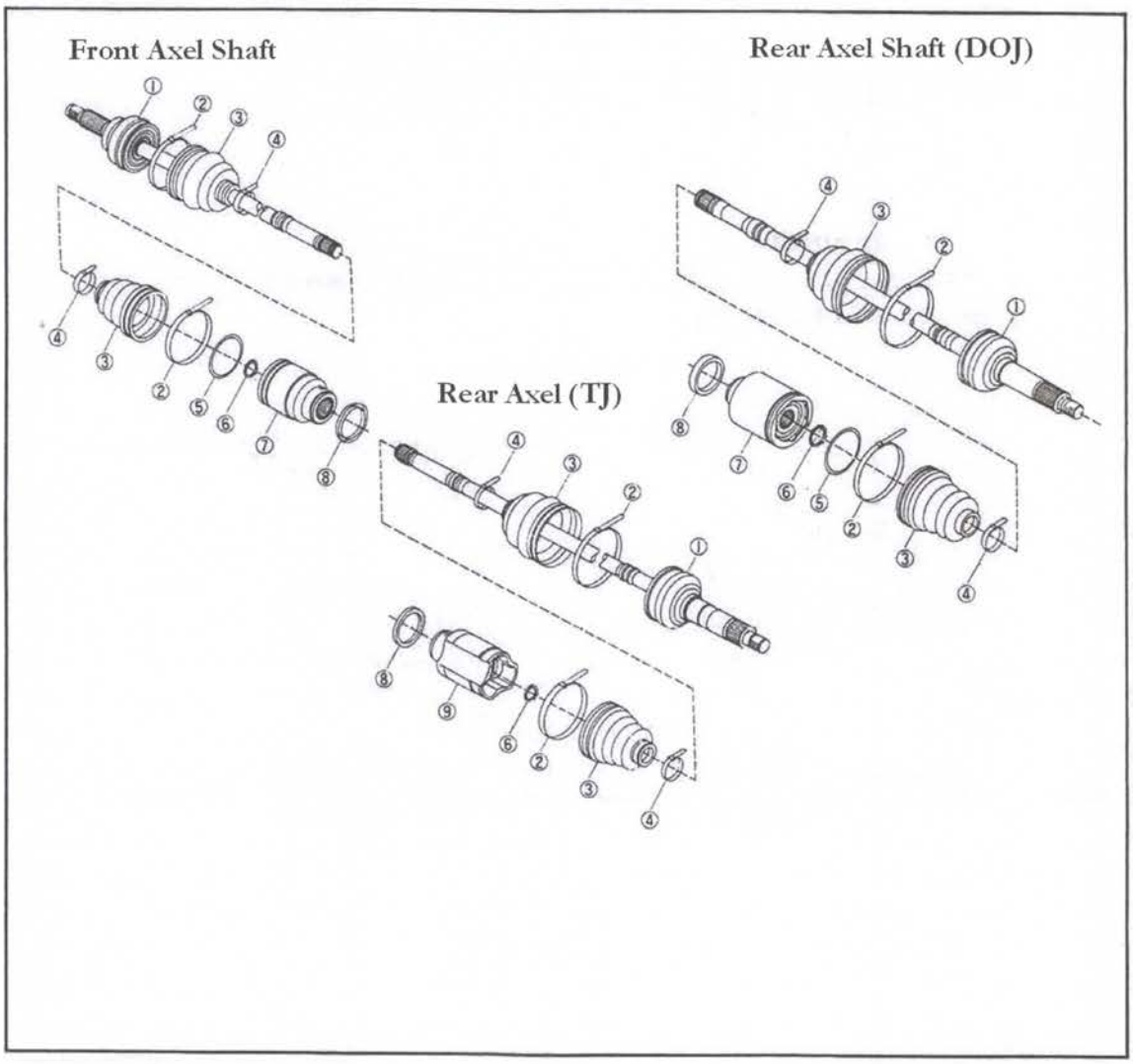


5. Torque Bolts to Specifications



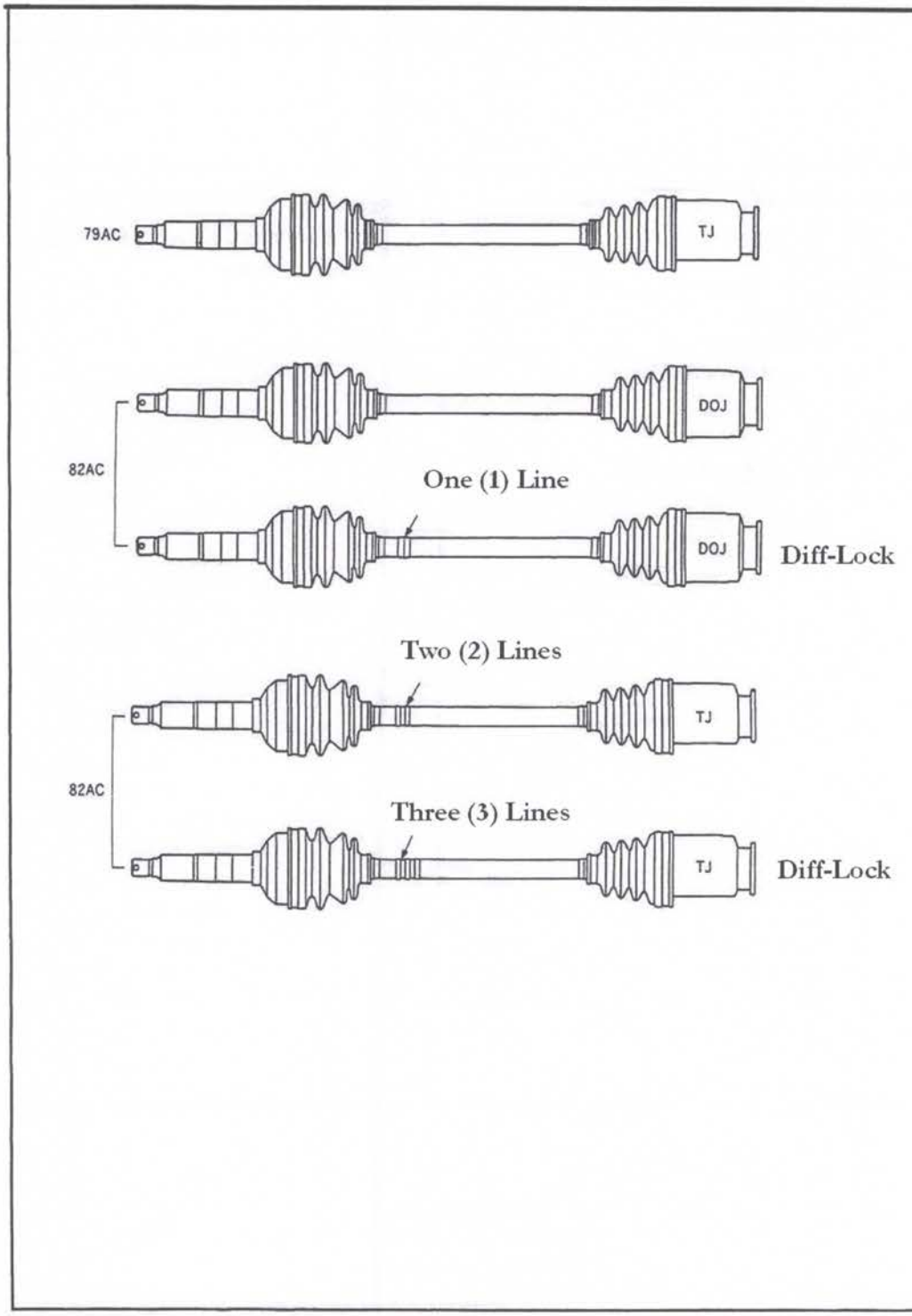
6. Remove Service Tool

Axel Shaft System



1. BJ
2. Boot Band (Large)
3. Dust Boot
4. Boot Band (Small)
5. Circle Clip
6. Snap Ring
7. DOJ
8. Inner Oil Seal
9. TJ

Drive Axel Types and Identification



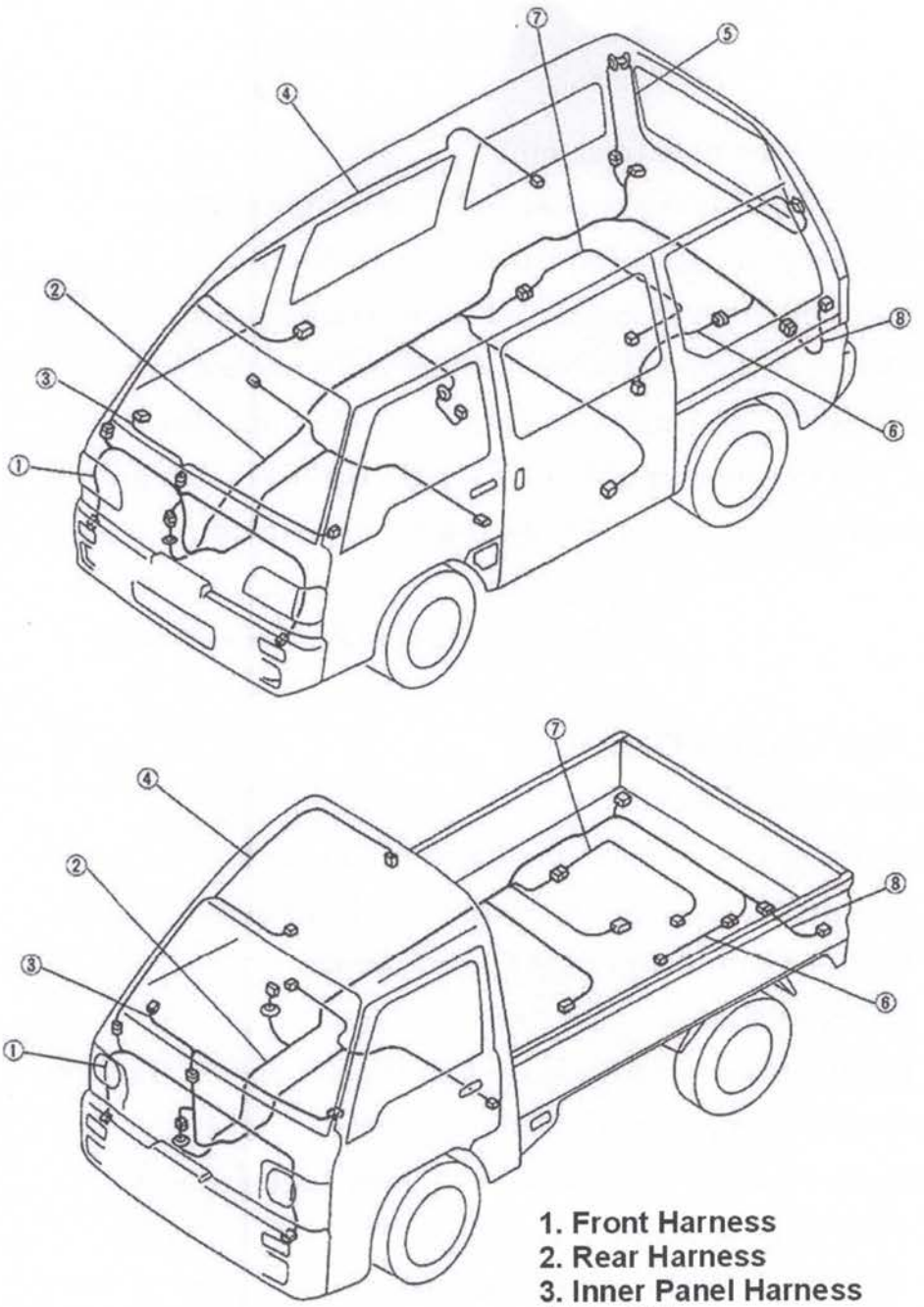
Chapter 12

Harness Diagrams

1. General Harness Locations
2. Truck Full Main Harness and Connection Codes
3. Connection Codes Explained (Truck-Van)
4. Van Full Main Harness and Connection Codes
5. Engine & Transmission Harness and Connections
6. Engine & Transmission Harness Code Breakdown
7. Front Component (Main) Harness Dash-Front Lighting
8. Front Component (Main) Connector Breakdown

Electrical Schematic Breakdowns

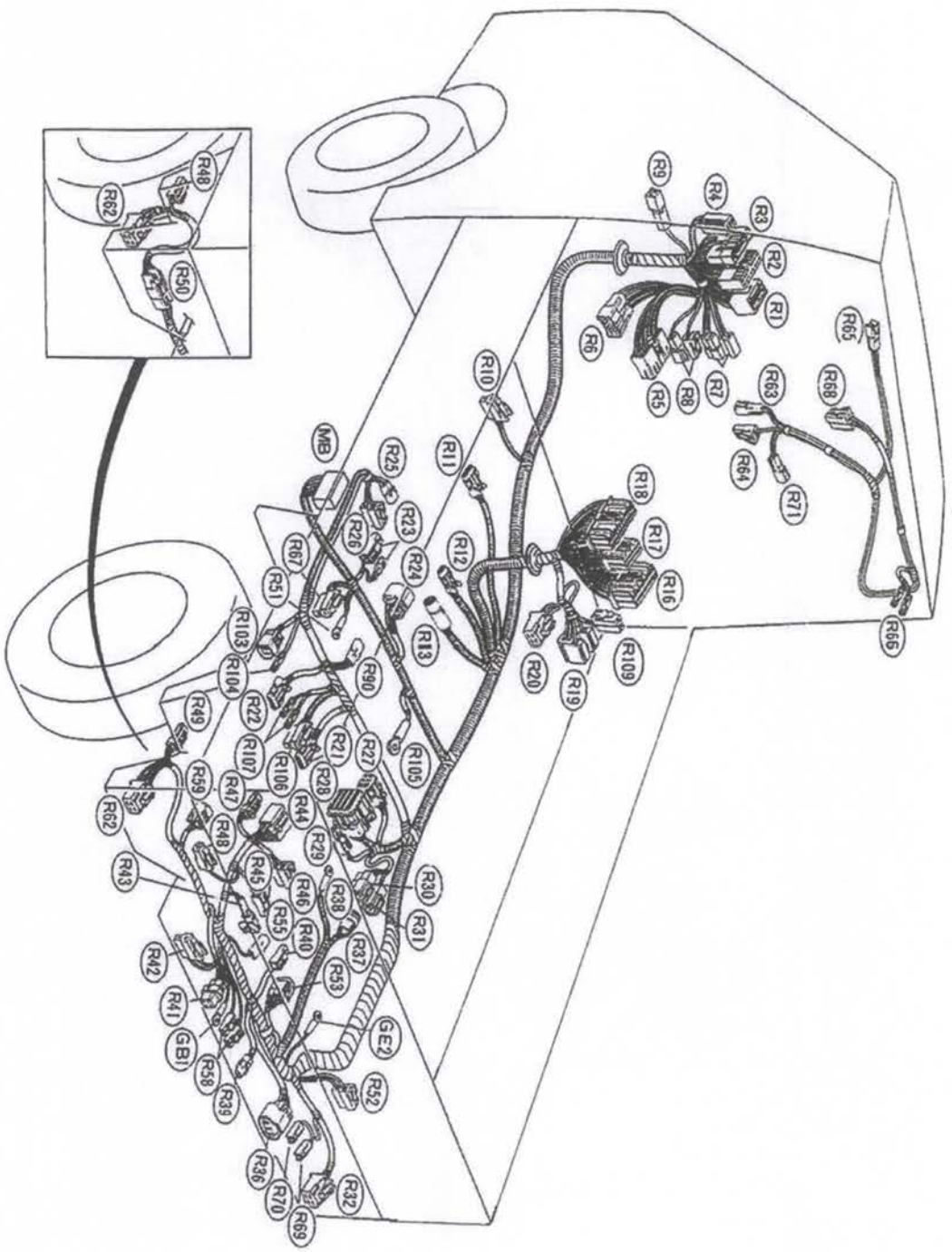
9. Turn Signal & Hazard
10. Stop Lamp Circuit
11. Lighting Circuit (Headlights-Running Lights)
12. Lighting Circuit Tail Assemblies & Illumination Lamps
13. Engine Control and Fuel Pump Circuits
14. Charging System
15. Engine Room and Radiator Fan (Van & Special Trucks)
16. Engine Radiator Fan (Basic Vehicle)
17. Radio (Audio) Circuits and Cigarette Lighter
18. Fuel Gage & Sending Unit
19. Full Time 4WD Control Circuits
20. Selective 4WD Control Circuits
21. Diff-Lock Control Circuits
22. EMPi Engine Control Management System Part 1 (Fuel Injection)
23. EMPi Engine Control Management System Part 2 (Fuel Injection)
24. Windshield Wiper System Front and Rear
25. Rear Defogger Circuit



1. Front Harness
2. Rear Harness
3. Inner Panel Harness
4. Roof Hrness
5. Back door Harness
6. Transmission Line
7. Engine Harness
8. Rear Combination

Sambar Main Harness

Pickup Truck



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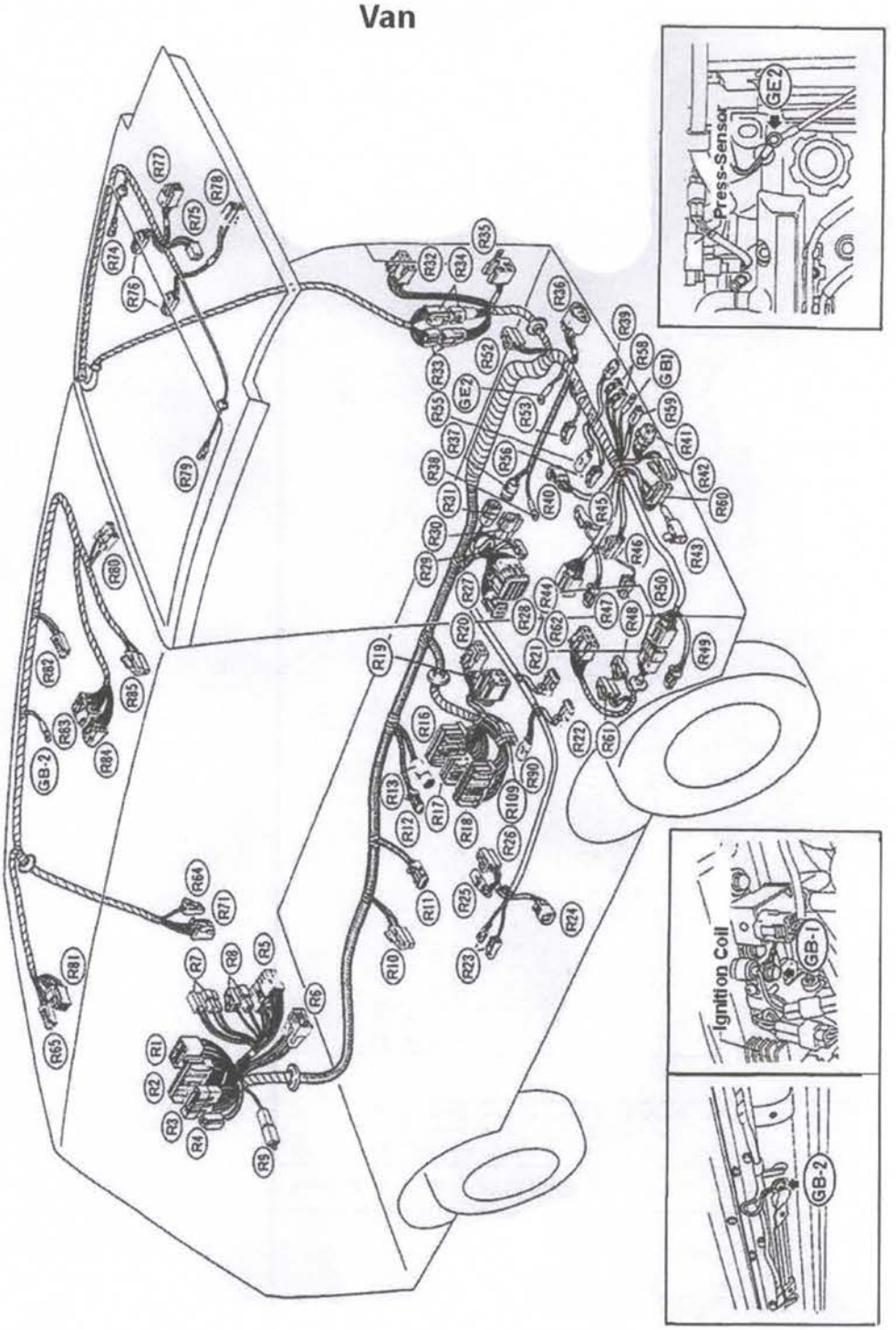
Main Harness Location

Van



Main Harness Connector Code Breakdown
Truck & Van

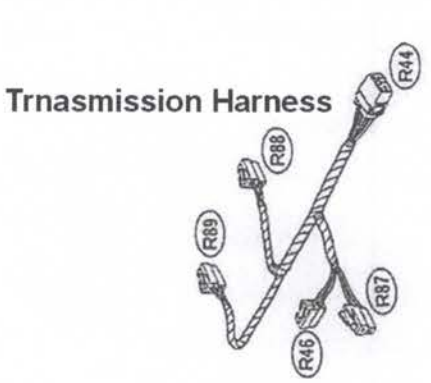
No.	Color	Function
R1	Black	Front Wiring Harness
R2	Black	Same
R3		Front wiring harness (SC)
R4		Front wiring harness
R5	Yellow	Select Monitor
R6	Blue	Front AC Harness
R7	Green	Test Mode Connector
R8	Black	Read Memory Connector
R9	Black	Diode (AC)
R10	Black	Radiator Fan
R11	Gray	Free Axel Solenoid
R12	Gray	High Press Cut Switch
R13	Black	Condenser Fan
R16	Yellow	EMPi Unit
R17	Yellow	EMPi Unit
R18	Yellow	EMPi Unit
R19	Brown	EMPi Main Relay
R20	Brown	Fuel Pump Relay
R21	Gray	4WD Solenoid
R22	Gray	Diff-Lock Solenoid
R23		Fuel Unit
R24		Fuel Pump
R25		Engine Room Fan
R26		VSV (Air-conditioning)
R27	Gray	Engine Harness
R28	Gray	Engine Harness
R29	Black	Thermo-Switch
R30	Black	Gas Temp Switch
R31	Black	Magnetic Clutch
R32		Rear Combination

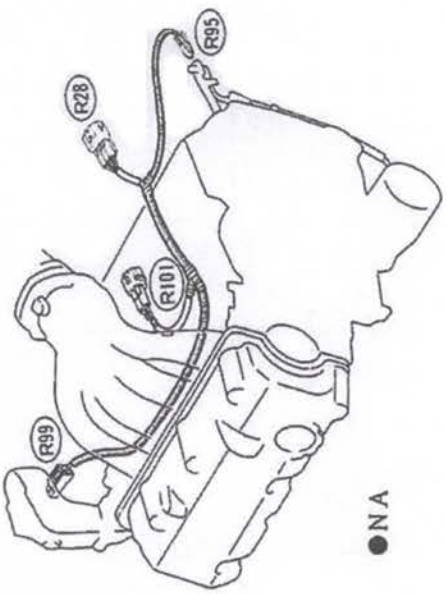
		Lamp(RH)
R33		Rear Gate Cord
R34		Rear Gate Cord
R35	Black	Rear Wiper Relay
R36	Green	Pressure Sensor
R37	Green	Alternator
R38		Alternator B
R39	Blue	ISC Valve
R40	Green	Distributor
R41	Gray	Igniter
R42	Black	Noise Condenser
R43		O2 Sensor
R44		Transmission Connector
R45		Starter Mg
R46		Back Switch
R47	Black	Electric Clutch
R48	Blue	Temp Sensor
R49	Gray	Thermostat
R50	Black	Rear Combination Connection
R52		Backup Warning Horn
R53	Black	Over speed cutoff
R55	Gray	Contact Breaker
R56	Black	Thermo Switch
R58		Resistor
R59	Black	Ignition Coil
R60		Ultra Heater Solenoid
R61		Rear Washer Motor
R62		Rear Combination Lamp (LH)
R64		Front Wiring Harness F6
R65		Room Lamp
R71	Green	Front Wiring Harness F8
R74		Rear Defroster
R75		Rear Wiper Motor

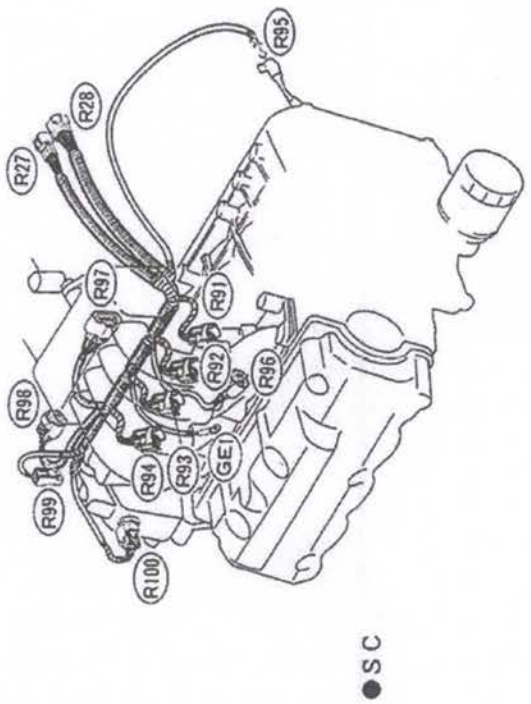
R76		License Lamp
R77		Back Door Opener
R78	Black	Back Door Switch
R79		Rear Defroster
R80	Black	Main Motor
R81		Sunroof Switch
R82	Gray	Luggage Compartment Lamp
R83		Sunroof Switch
R84		Sunroof Switch
R85		Limit Switch (Sunroof)
R90		Ds Range Solenoid
R109	Red	Jumper Wire (EMPi Unit)

Complete Main Codes

Engine Harness
&
Transmission Harness





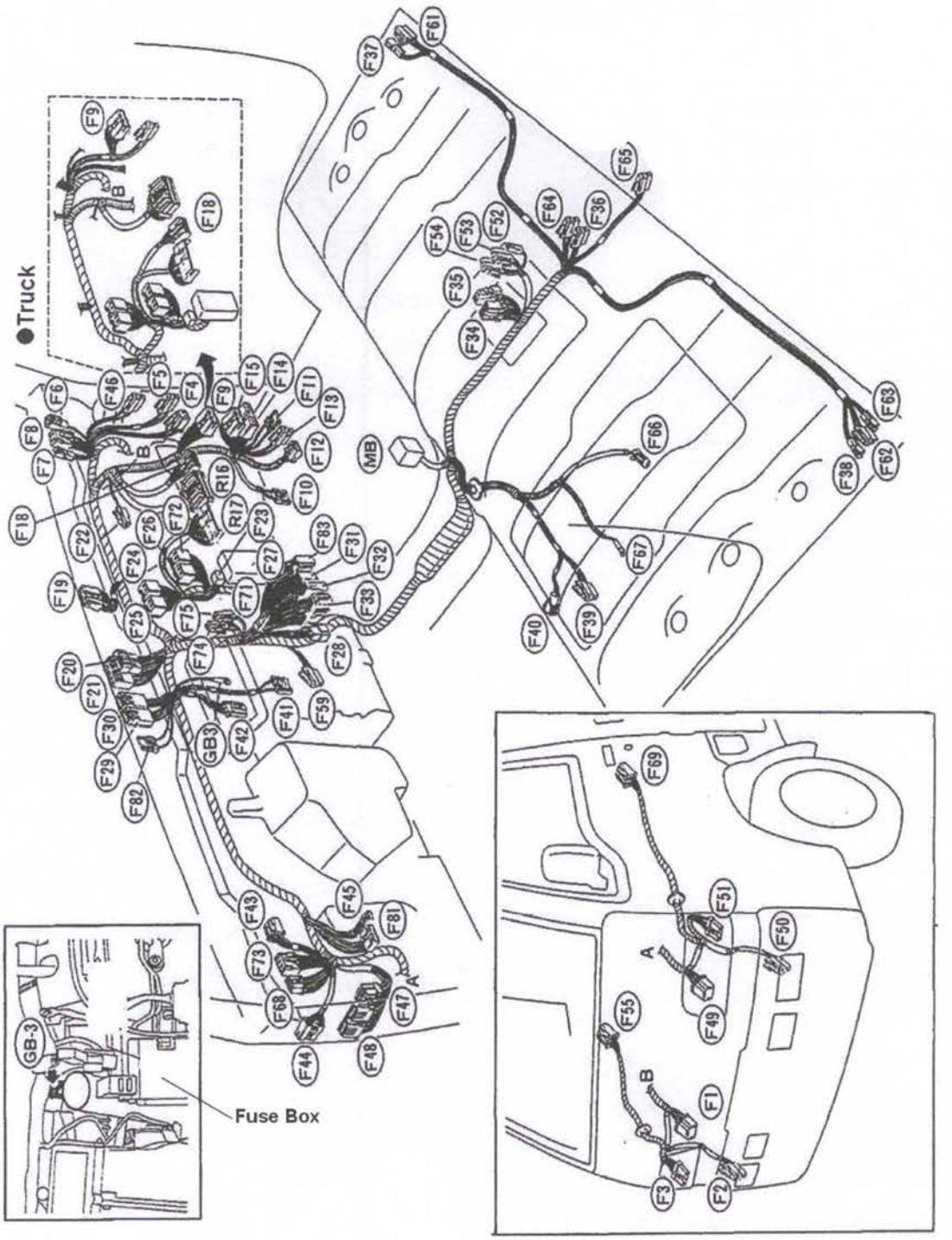


Engine & Transmission Harness Connector Codes

No.	Color	Description
R27	Gray	Rear Harness
R28	Gray	Rear Harness
R44		Rear Harness to Transmission Connection
R46		Backup Lamp Switch
R87	Brown	EL Switch (Selective 4WD)
R88	Brown	Diff-Lock Switch (Selective 4WD)
R89	Brown	2WD-4WD Switch (4WD)
R91	Gray	Injector #1
R92	Gray	Injector #2
R93	Gray	Injector #3
R94	Gray	Injector #4
R95		Oil Pressure Switch
R96	Brown	Knock-Sensor
R97	Gray	Throttle Sensor
R98	Black	Charge Sensor
R99	Black	Thermo-meter
R100	Green	Water Temp Sensor
R101	Gray	Carburetor IG Power

Complete Engine & Trans Connector Codes

Front Component (Main)



Front Component (Main) Harness
Truck & Van
Connector Code Breakdown

No.	Color Codes	Description (Function)
F1	Black	Headlight (RH)
F2		Front Turn signal Lamp (RH)
F3		Front Combination Lamp (RH)
F4		Accelerator SW (ECVT)
F5	Black	Brake Fluid
F6	Black	R64 Roof Wiring
F7	Blue	R63 Roof Wiring
F8	Green	R71 Roof Wiring
F9		Line End Check
F10	Black	Stop Lamp Switch
`F11	Black	Key Lock Solenoid
F12	Pink	Ignition Key Switch
F13	Black	Key Switch
F14	Black	Combination Switch
F15	Black	Combination Switch
F16		Combination Meter
F17		Combination Meter
F18		Combination Meter
F19		(OP)
F20		Panel Harness
F21		Panel Harness
F22		Backup PWR (Clock)
F23		Fuse Box #2 (AC Fuse)
F24	Blue	4WD Relay
F25	Green	Diff-Lock Relay
F26	Black	Free Axel Relay
F27		Fuse Box #1
F28	Black	R4 rear Wiring Harness

F29	Black	4WD Diode
F30		Diff-Lock Diode
F31		Rear Wiring Harness
F32	Black	Rear Wiring Harness
F33		Rear Wiring Harness(SC)
F34		Inhibitor Switch
F35		4WD Switch
F36		Parking Brake Switch
F37		Door Switch (RH)
F38		Door Switch (LH)
F39		Front Washer Motor
F40		Horn
F41		Heater Blower
F42	Brown	Heater Resister
F43		Front Wiper Motor
F44		Engine Room Fan (SC)
F45	Blue	AC Harness
F46	Blue	Accelerator Switch AC
F47	Black	Shift Lock Unit
F48	Yellow	ECVT Unit
F49	Black	Headlamp (LH)
F50		Front Turn Signal Lamp(LH)
F51		Front Combination Lamp (LH)
F52	Black	Parking Switch
F53	Black	Shift Lock Solenoid
F54	Blue	Injector
F55		Side Door Lock
F59		Switch
F61		Side Door SW (RH)
F62		Side Door (LH)
F63		Side Door Switch (Room Light)
F64	Brown	Rear Heater Switch
F65	Black	Plug Socket
F66	Gray	Rear Heater Blower
F67		Battery

F68		Side Door Lock Unit
F69		Side Door Lock (LH)
F71	Black	AC Harness
F72		Starter Relay
F73		(OP)
F74		IG PWR
F75	Black	ACC PWR
F81		AC Harness Connection
F82	Black	Resister
F83	Blue	Rear Harness AC

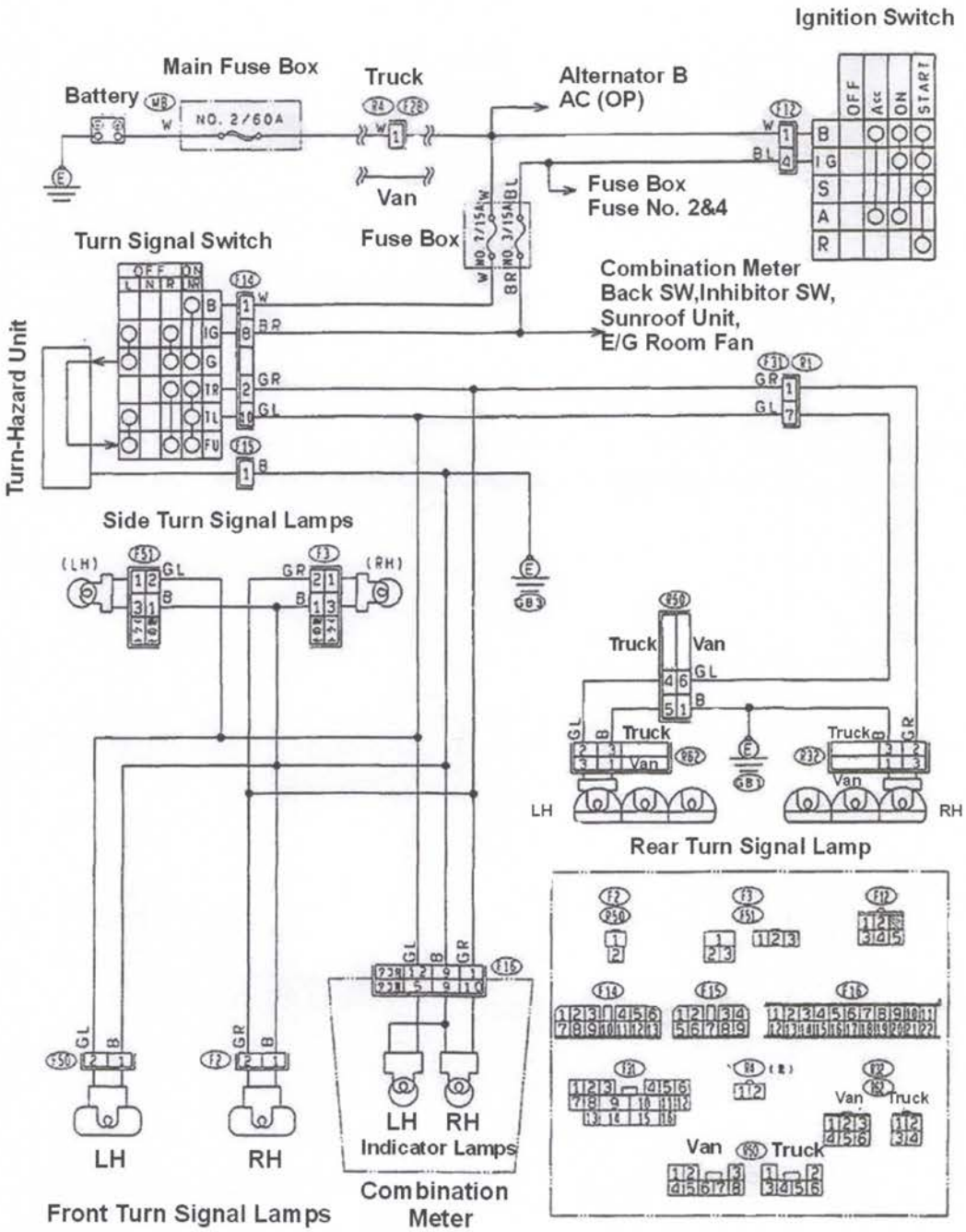
Completed

Electrical Schematics

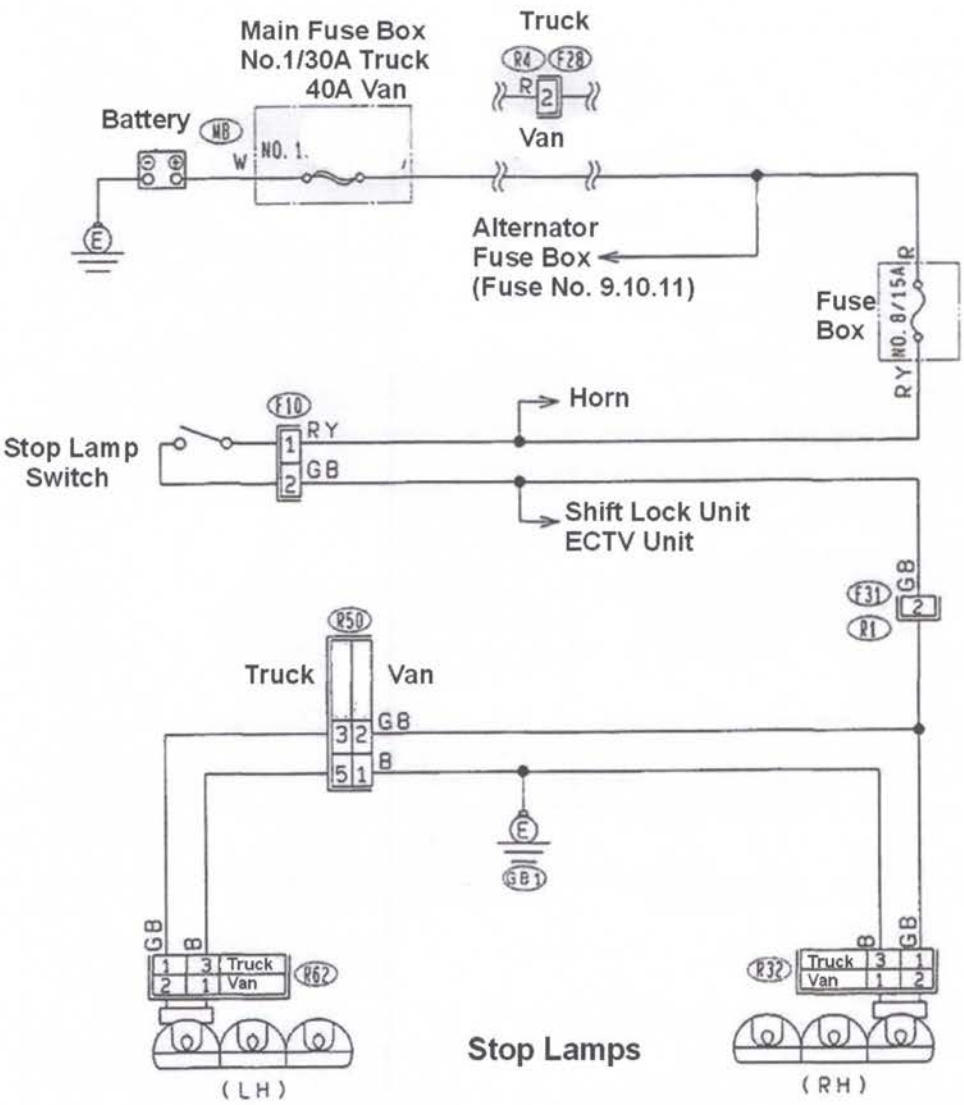
Use the following Color Codes that will be used thought this section.

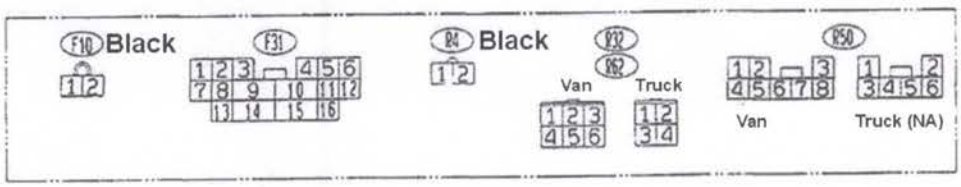
Color Symbol	Color Name
L	Blue
B	Black
Y	Yellow
G	Green
R	Red
W	White
Br	Brown
Lg	Light Green
Gr	Gray
P	Pink
Or	Orange
Lb	Light Blue
SA	Shielded Line (Inner)
SB	Shielded Line (Outer)

Turn Signal & Hazard Diagram

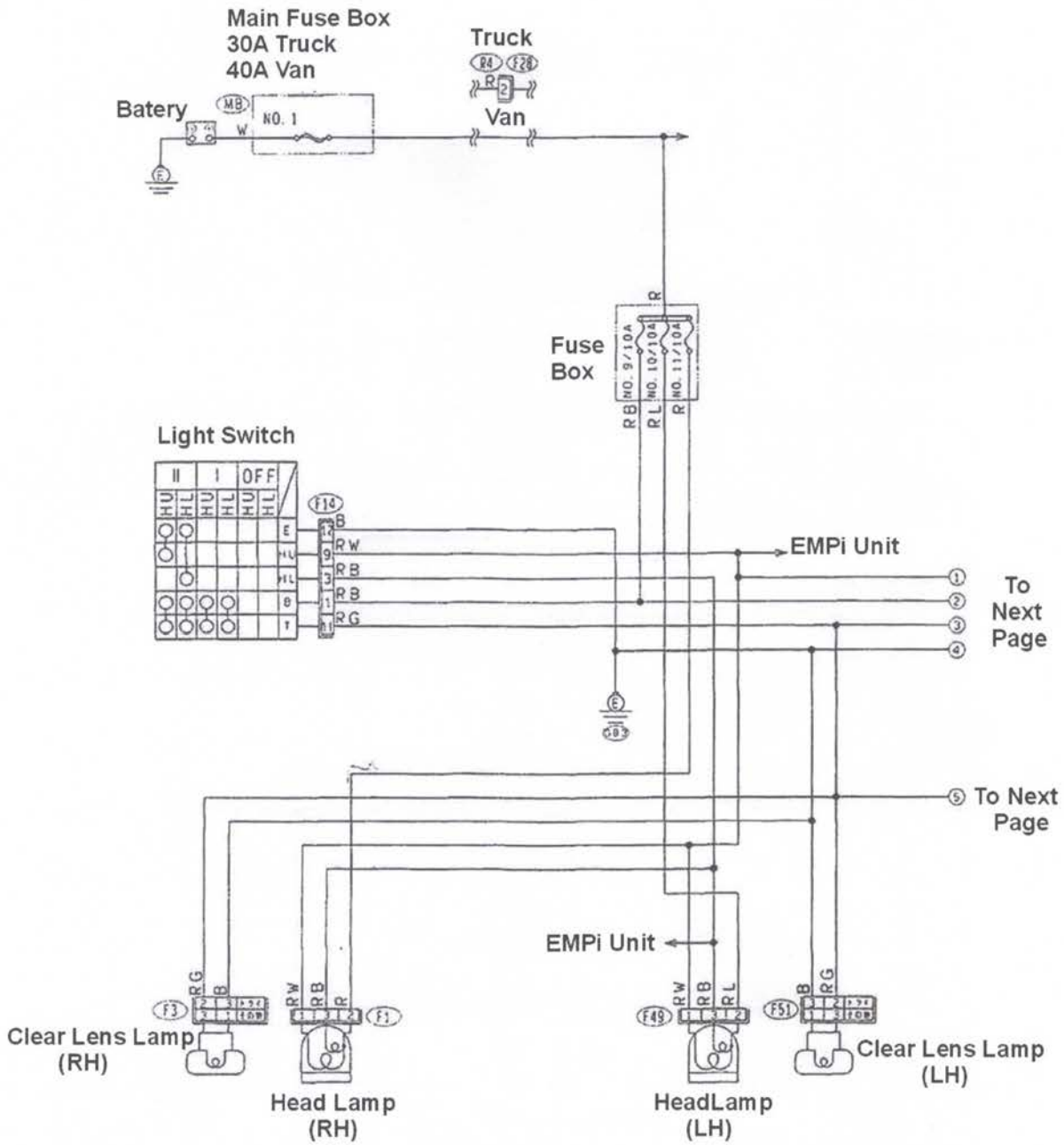


Stop Lamp Circuit

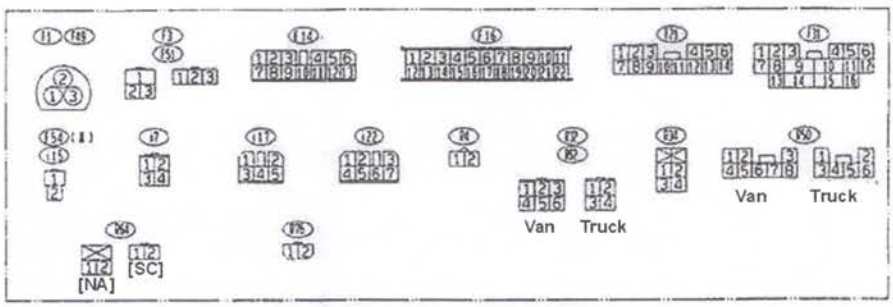




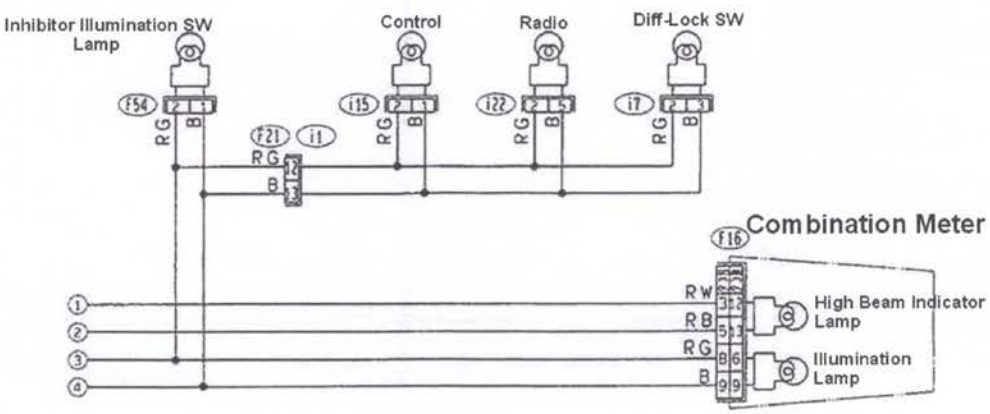
Lighting Circuit
Part 1

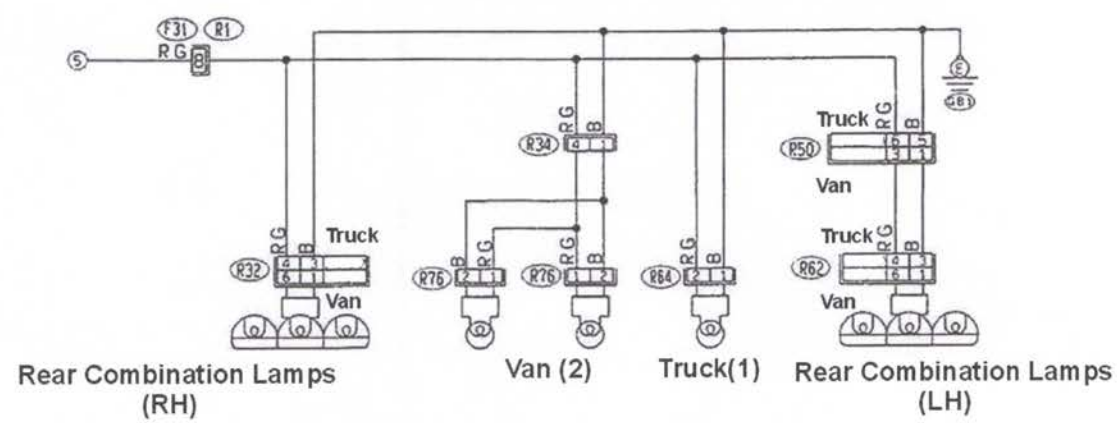


Lighting Circuit
Part 2



Illumination Lamps





Rear Combination Lamps (RH)

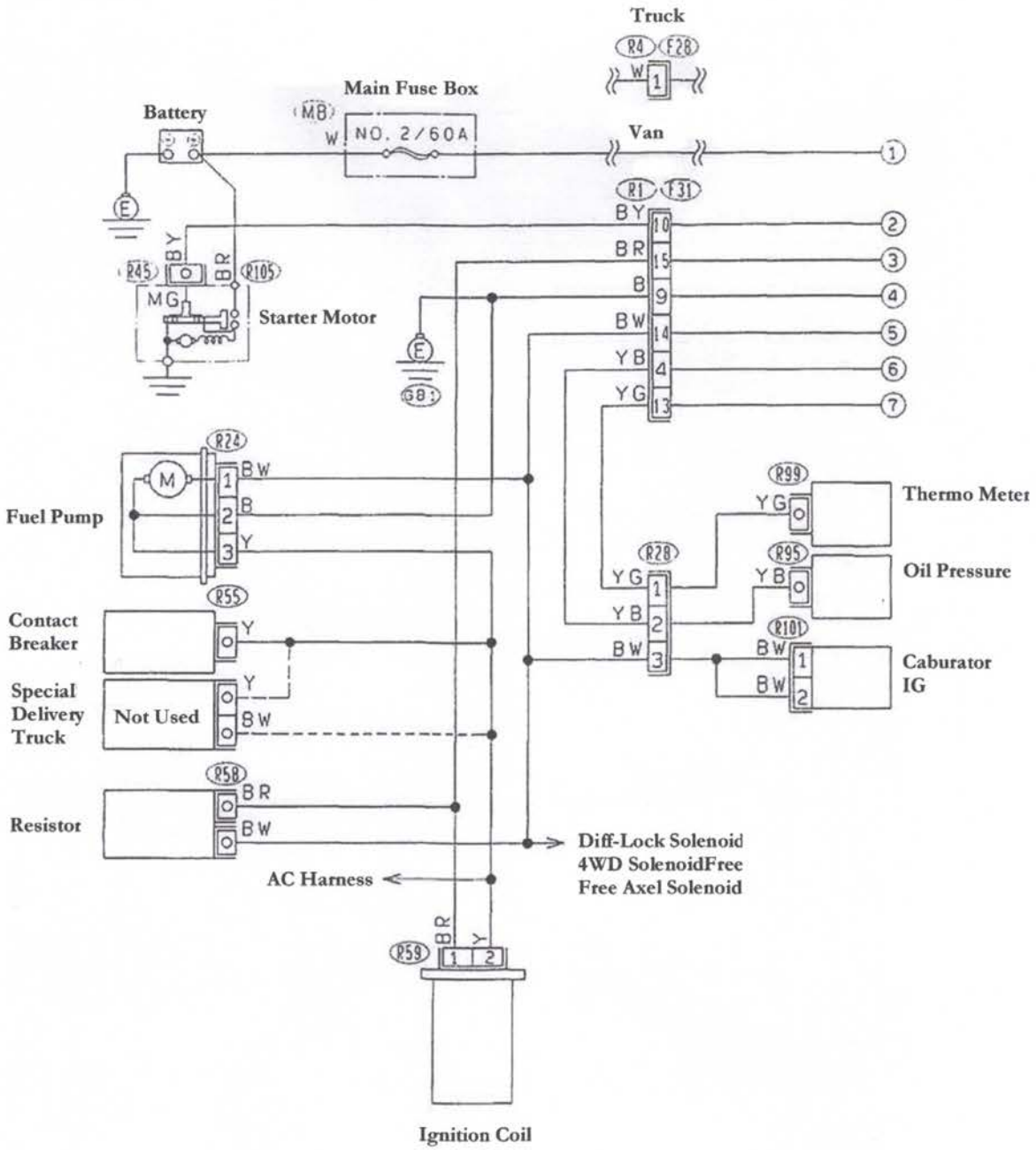
Van (2)

Truck(1)

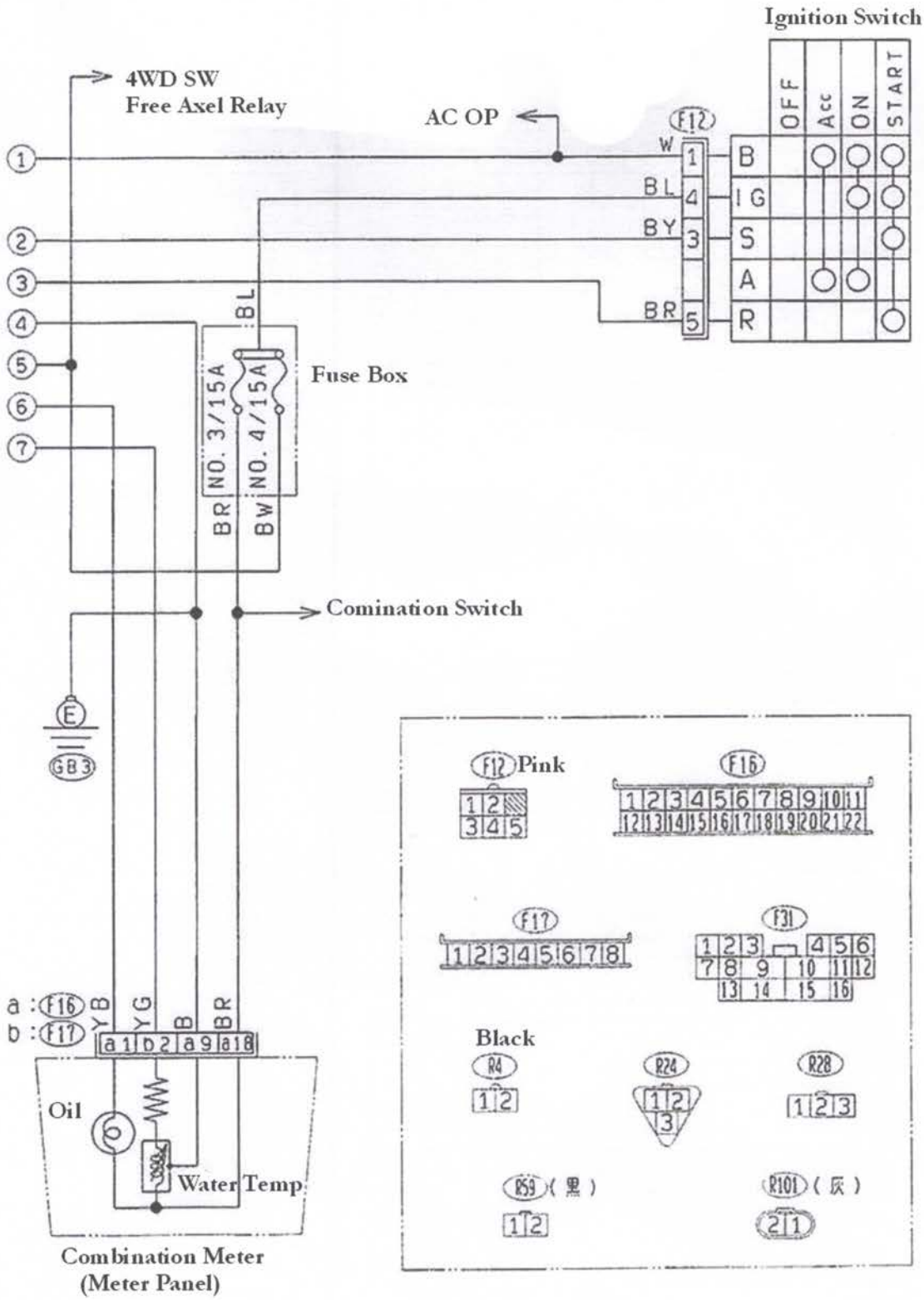
Rear Combination Lamps (LH)

Lisence Plate Lamp

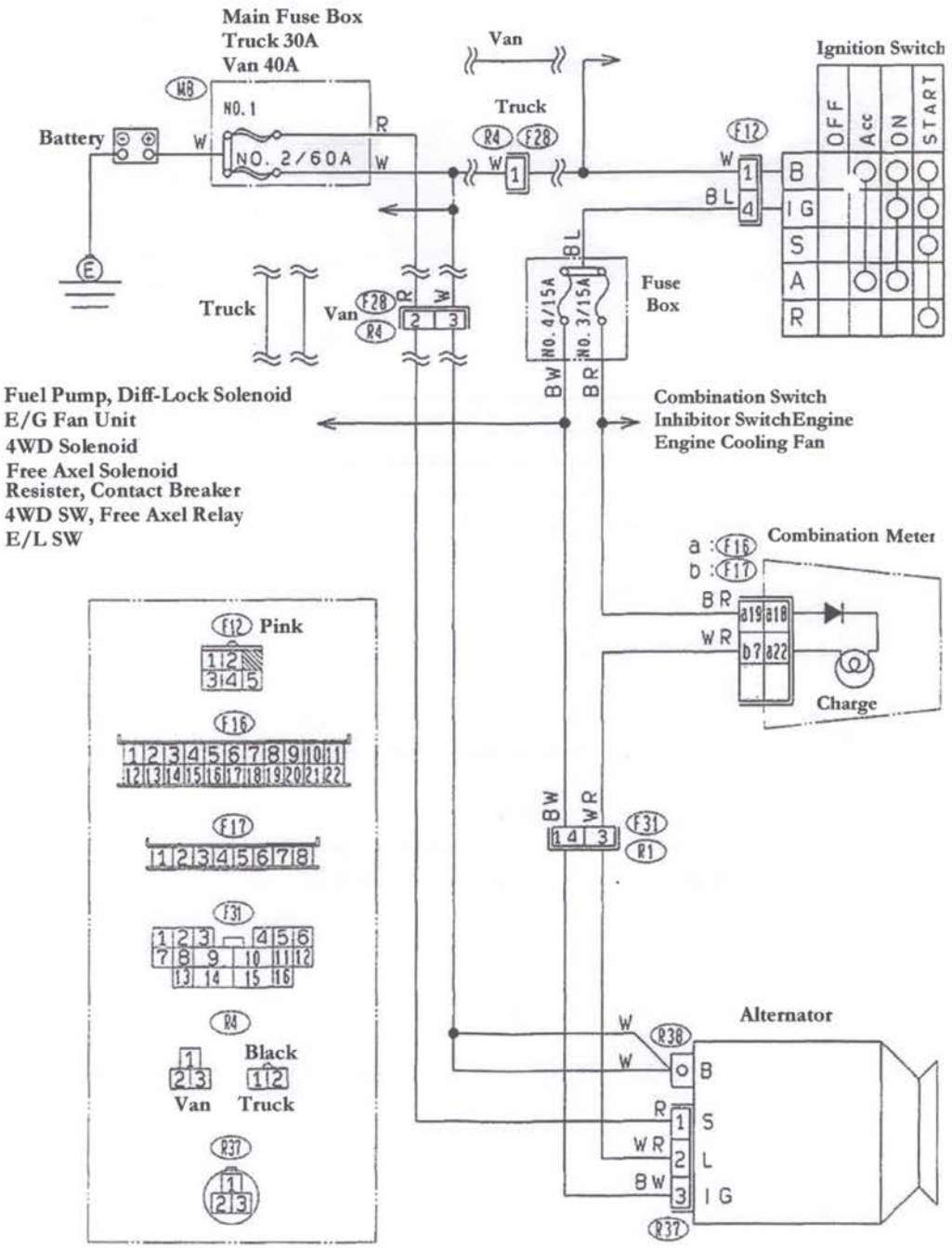
Engine Control & Fuel Pump System



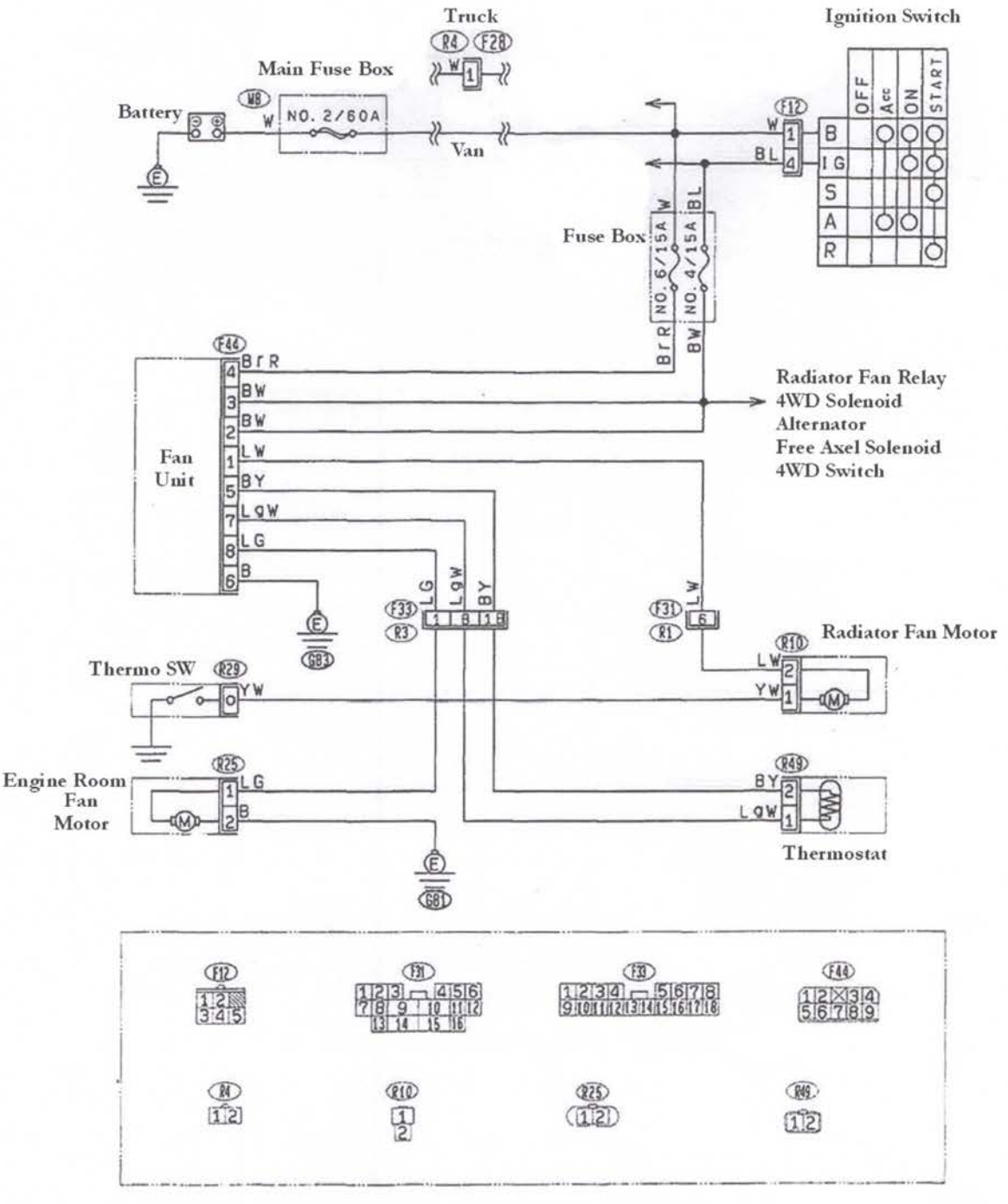
Engine Control Sensor Circuits
Continued



Charging System

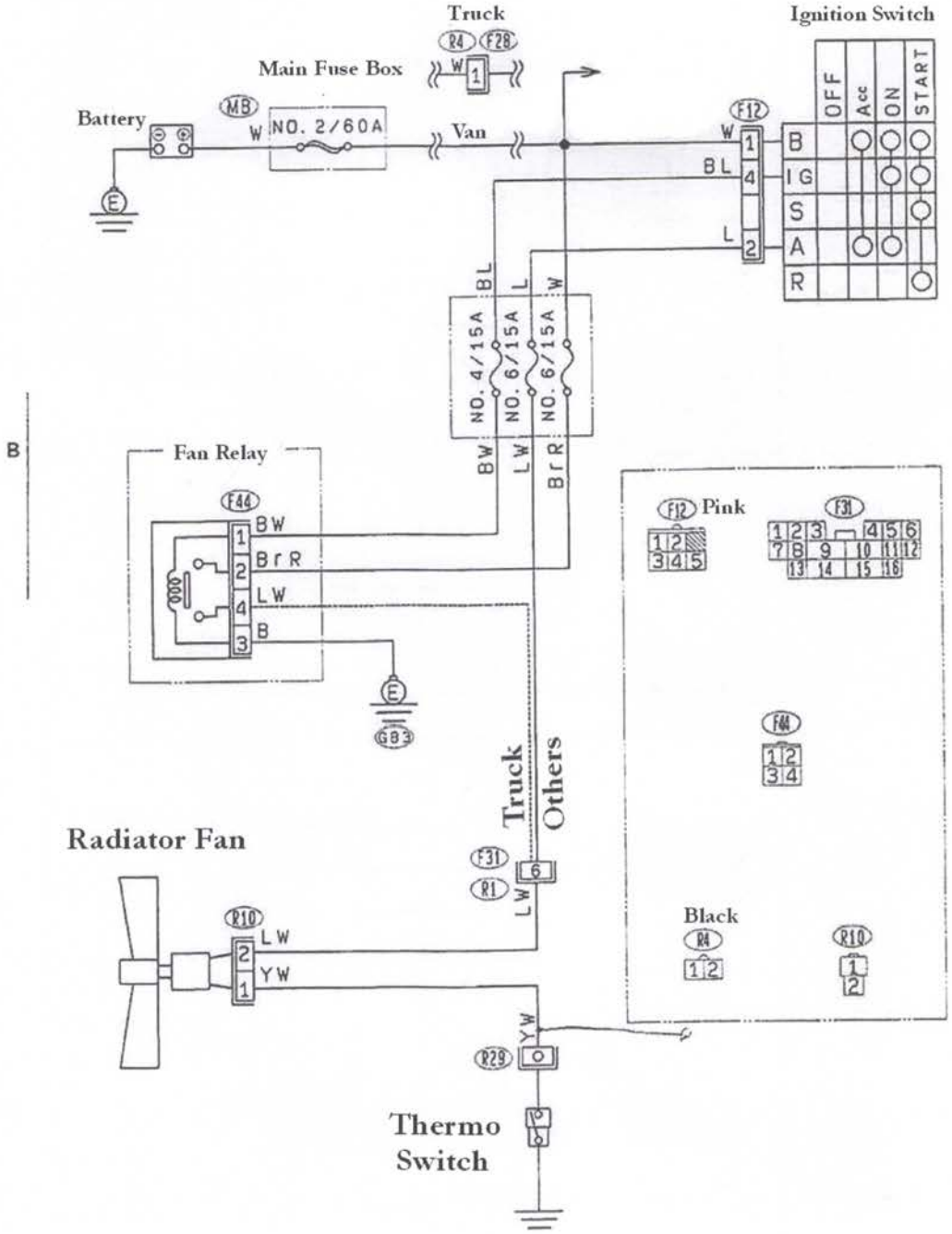


Engine Compartment Cooling
Engine Room Fan
Radiator Fan

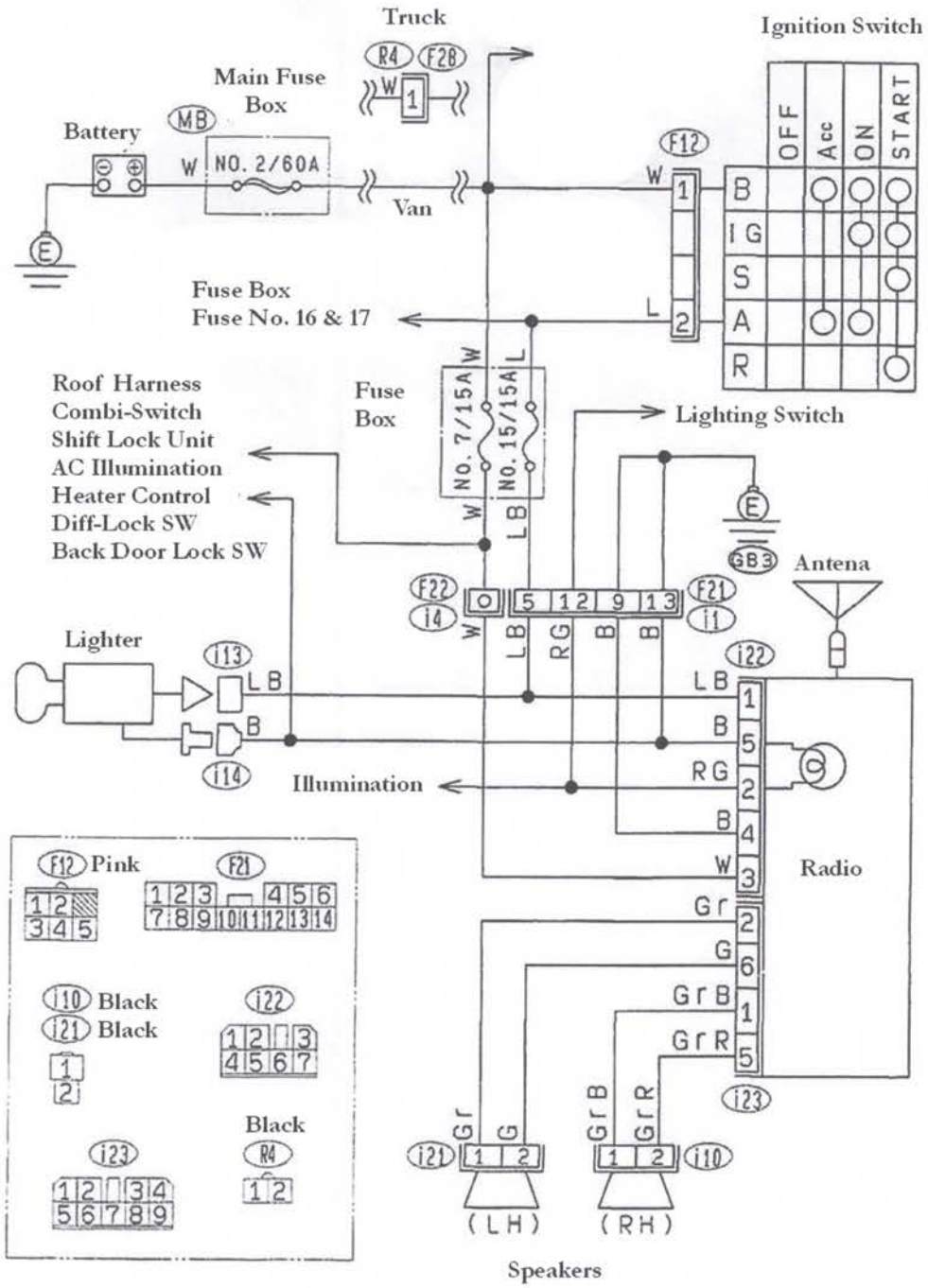


Connector Pins

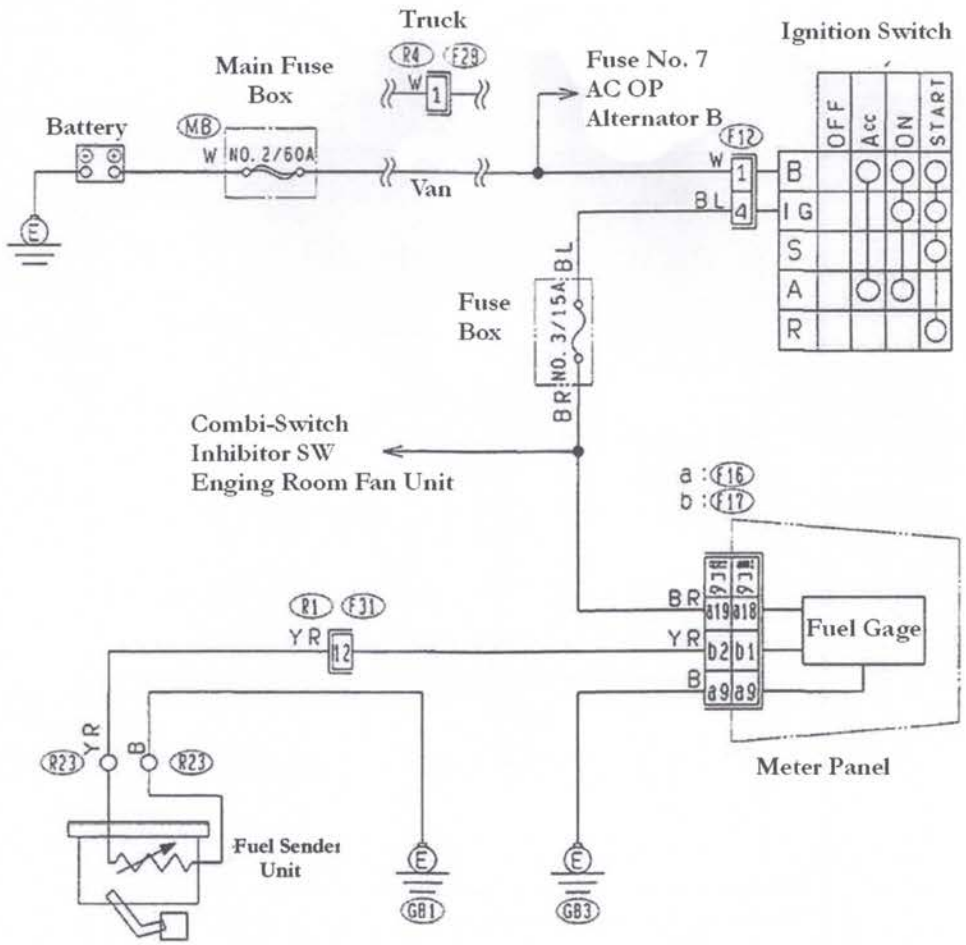
Radiator Fan Motor Circuit
Basic Model



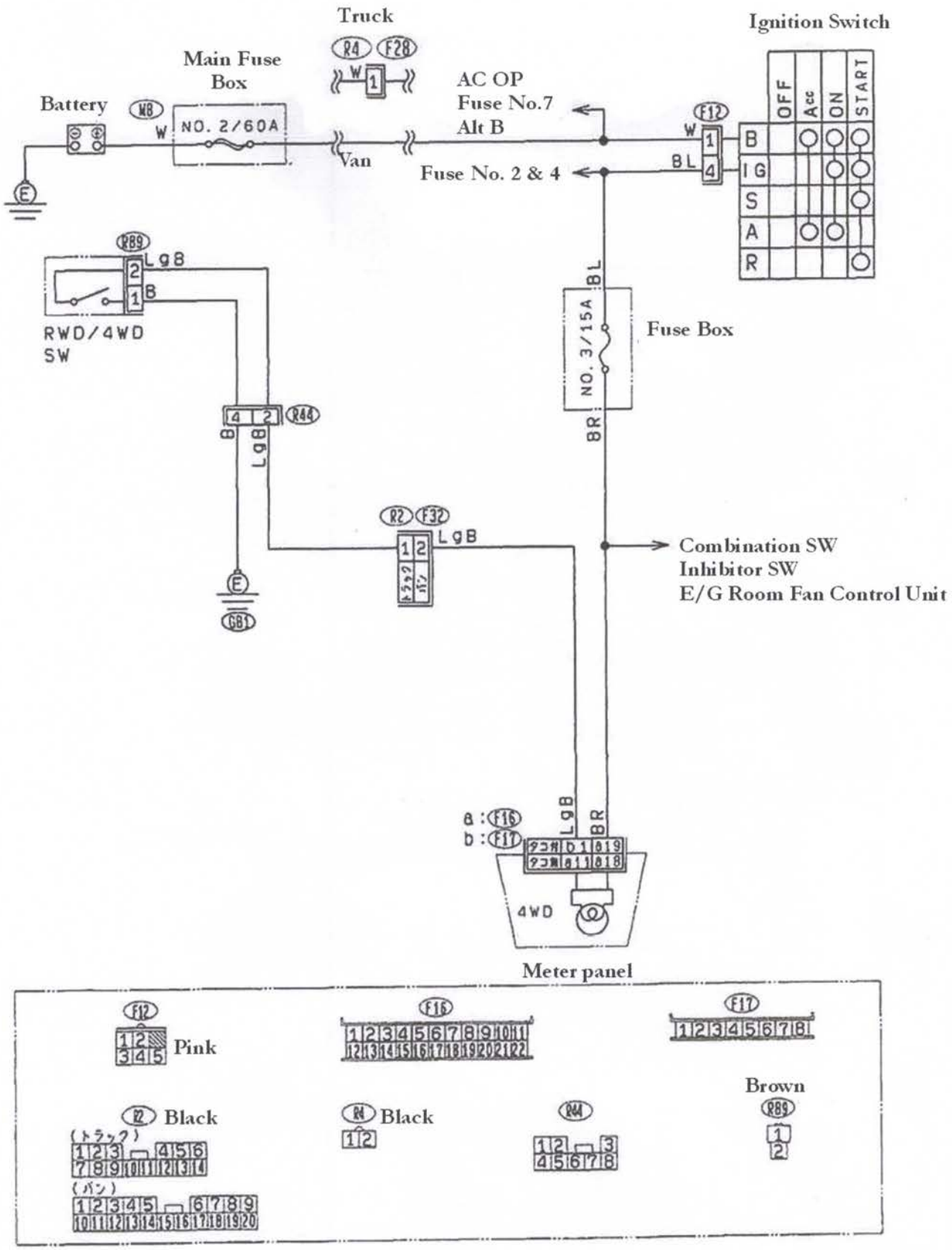
Radio (Audio) and Lighter Circuits



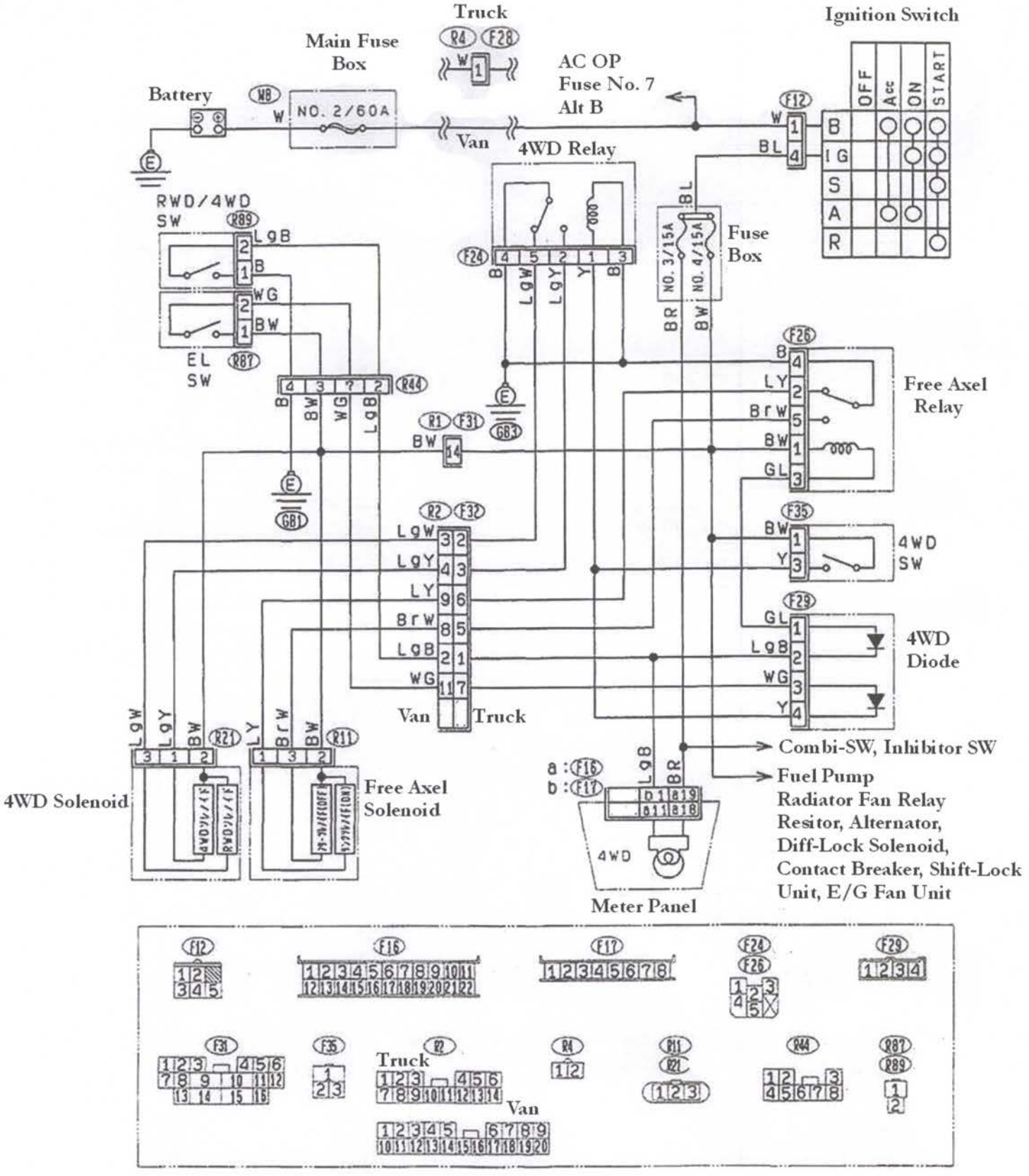
Fuel Gage & Sender Unit



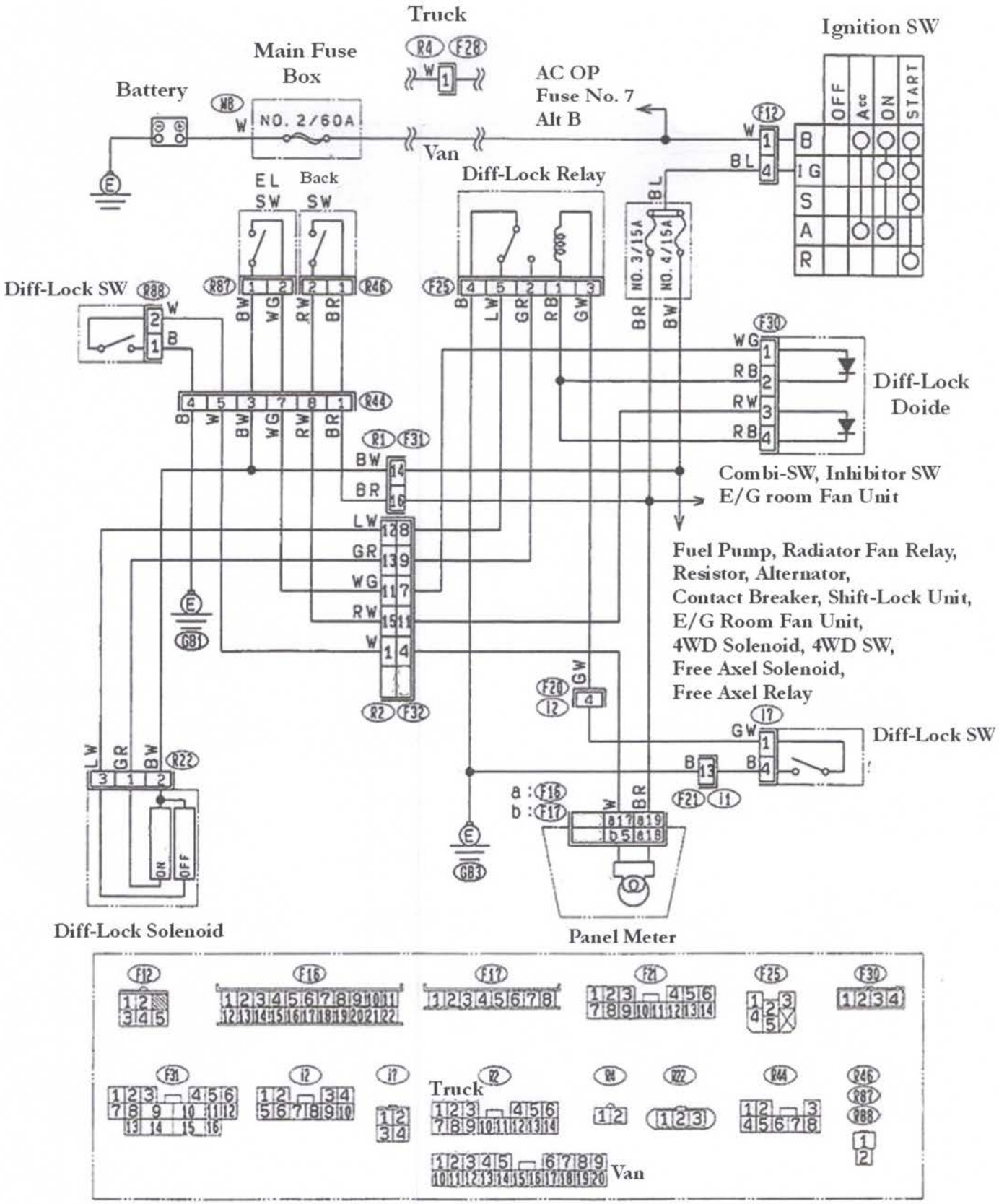
Full Time 4WD Control Circuit



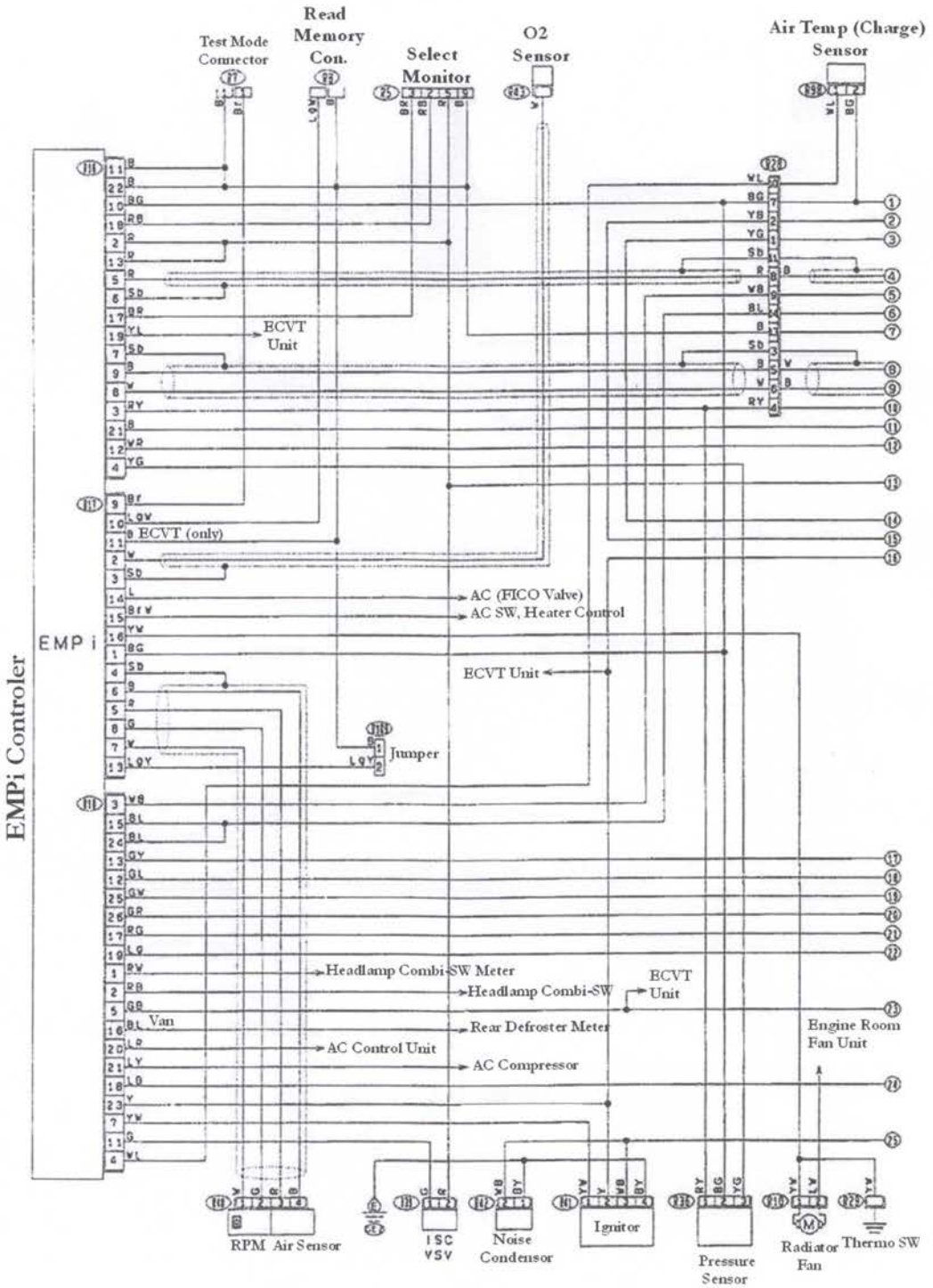
Selective 4WD Circuits



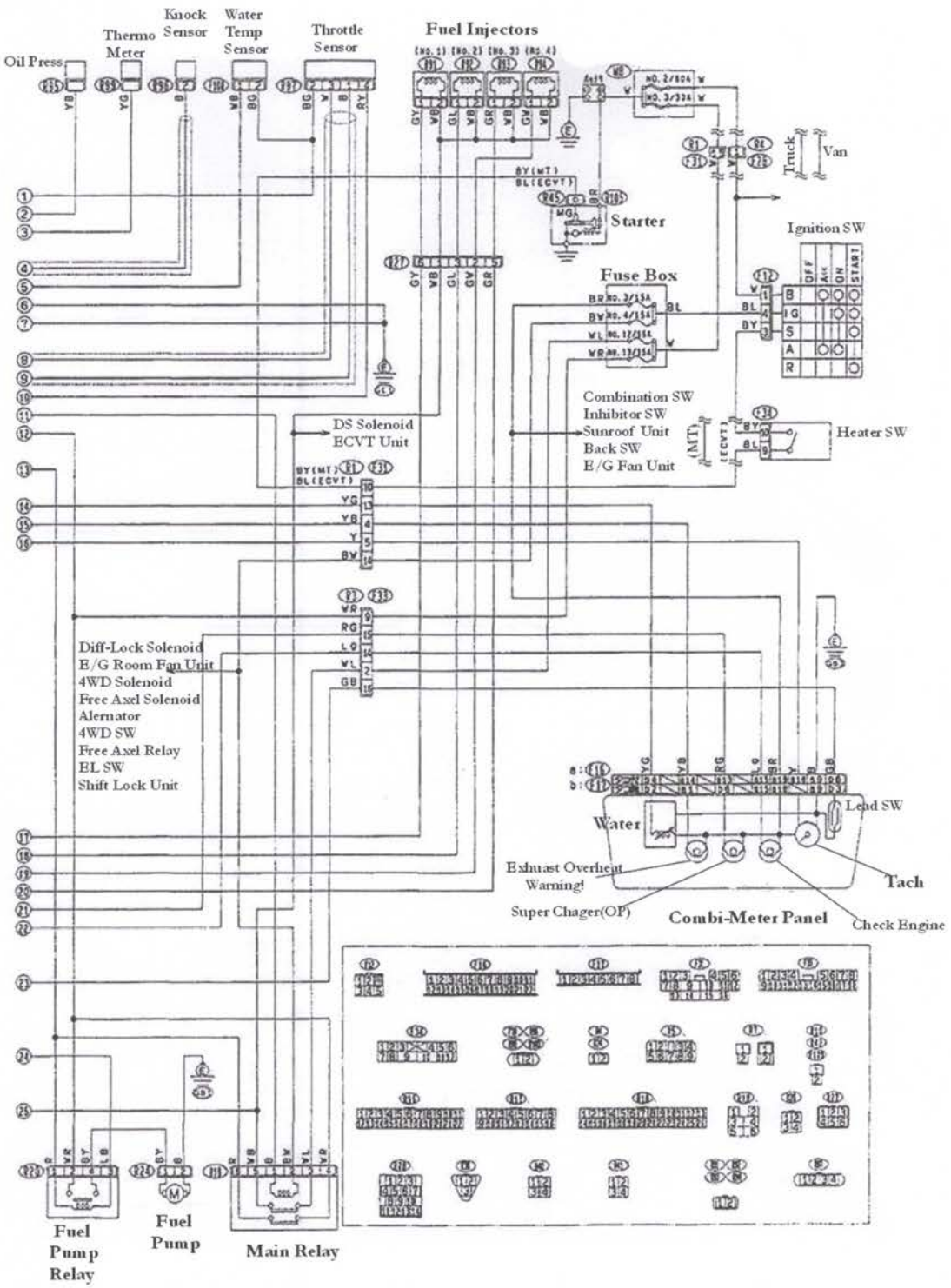
Diff-Lock Circuit



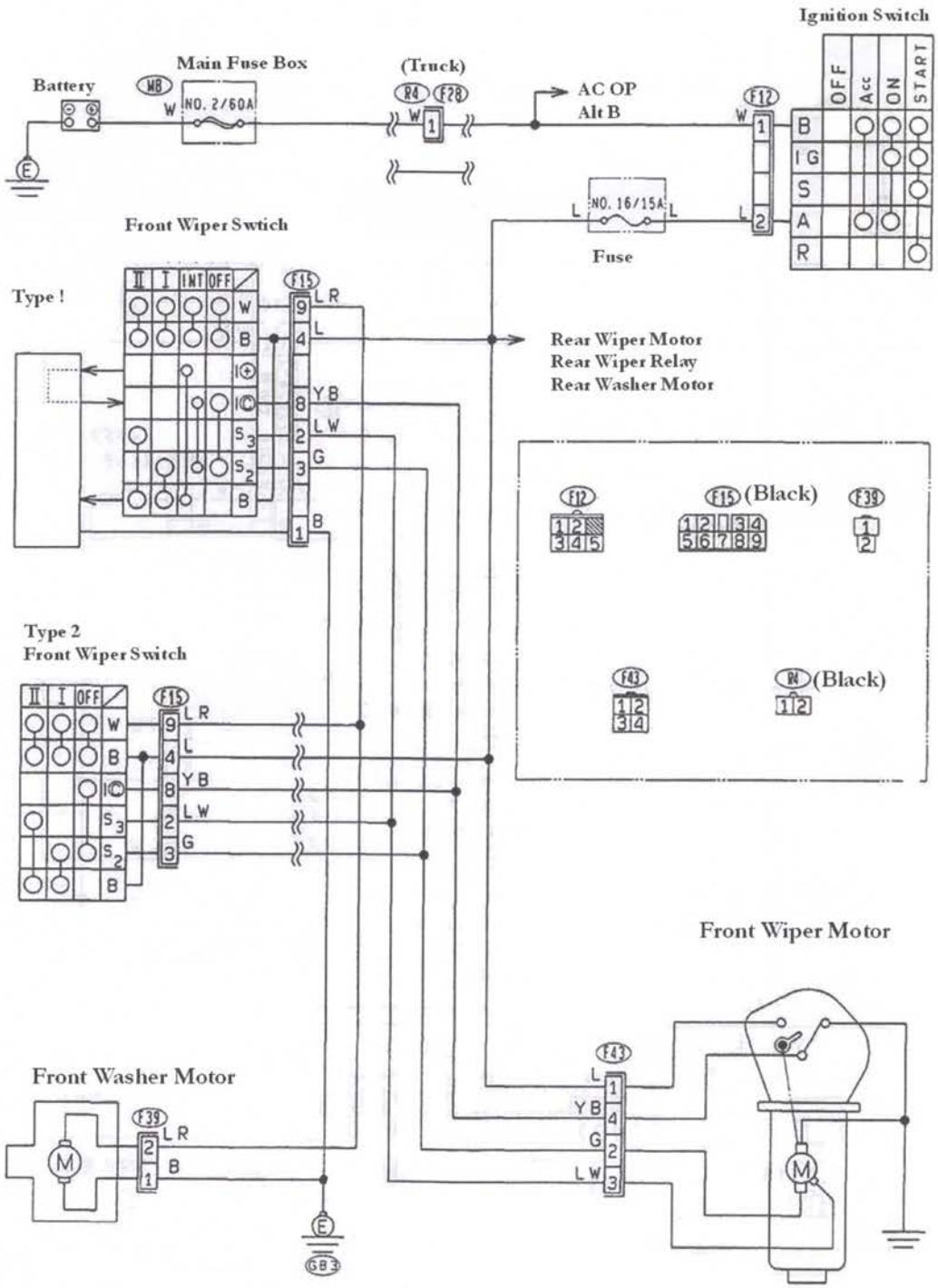
EMPi Engine Control Management System
Part 1



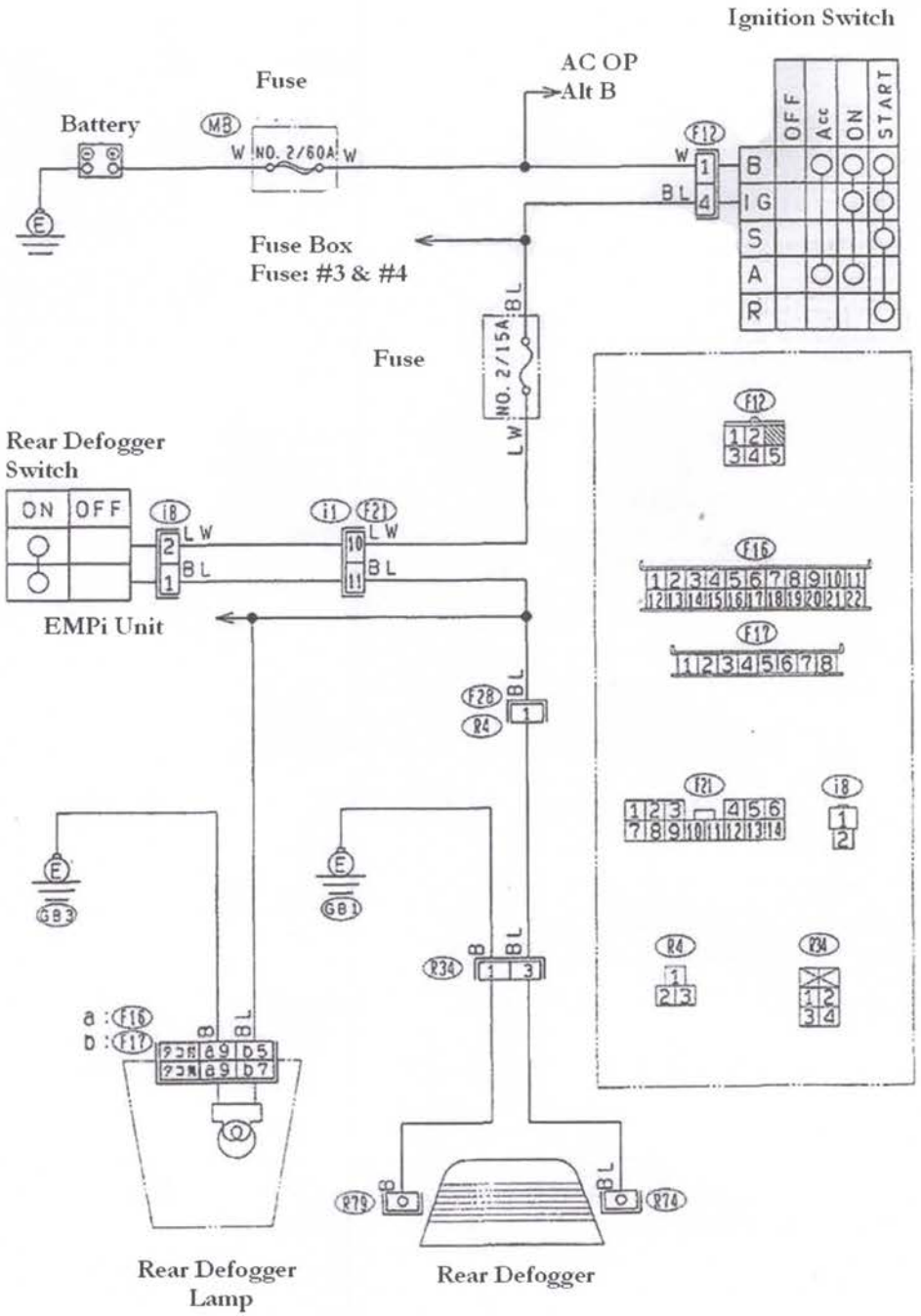
EMPi Engine Control Management System
Part 2



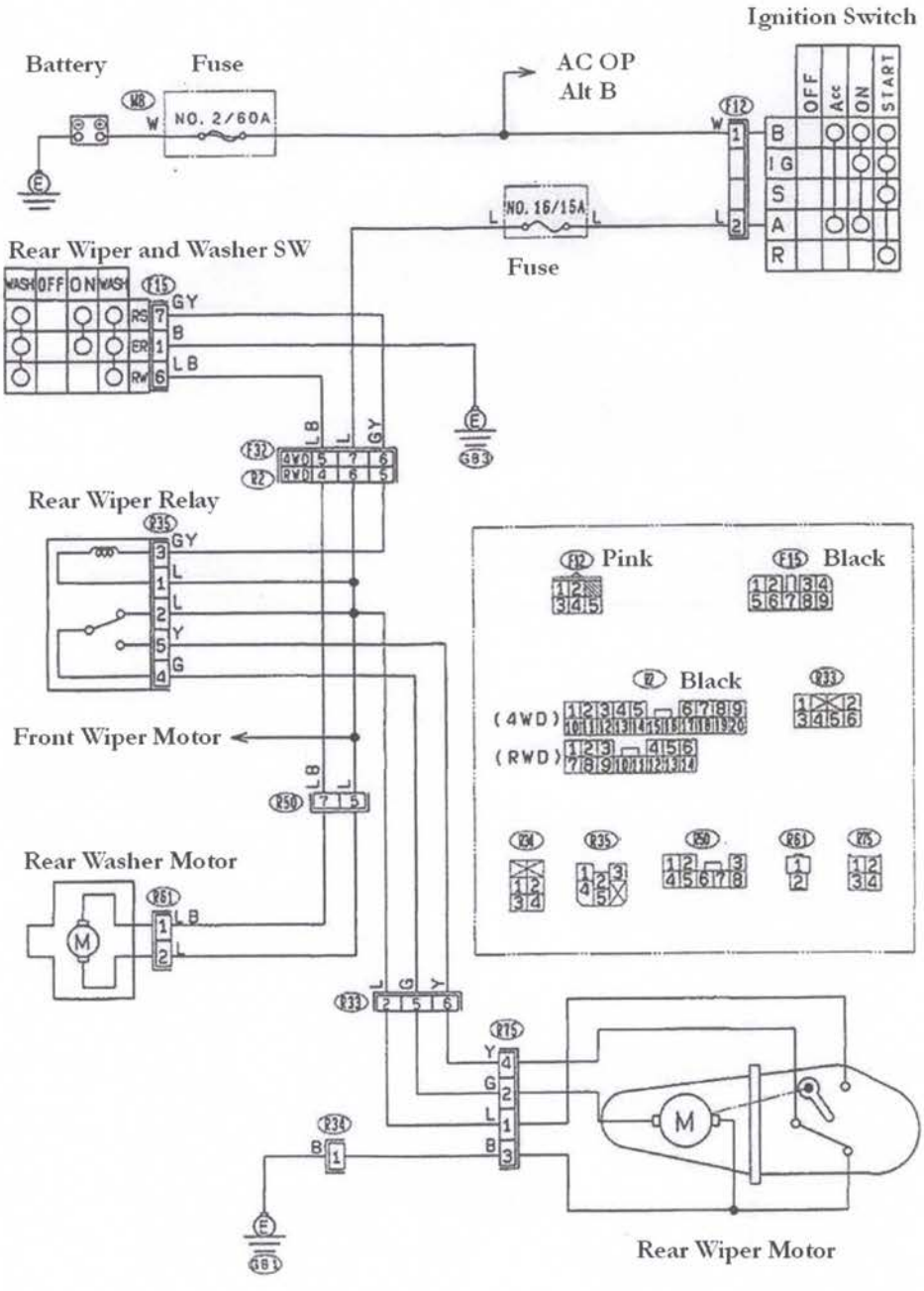
Front Washer & Wiper Motor



Rear Defogger System



Rear Wiper & Washer



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