
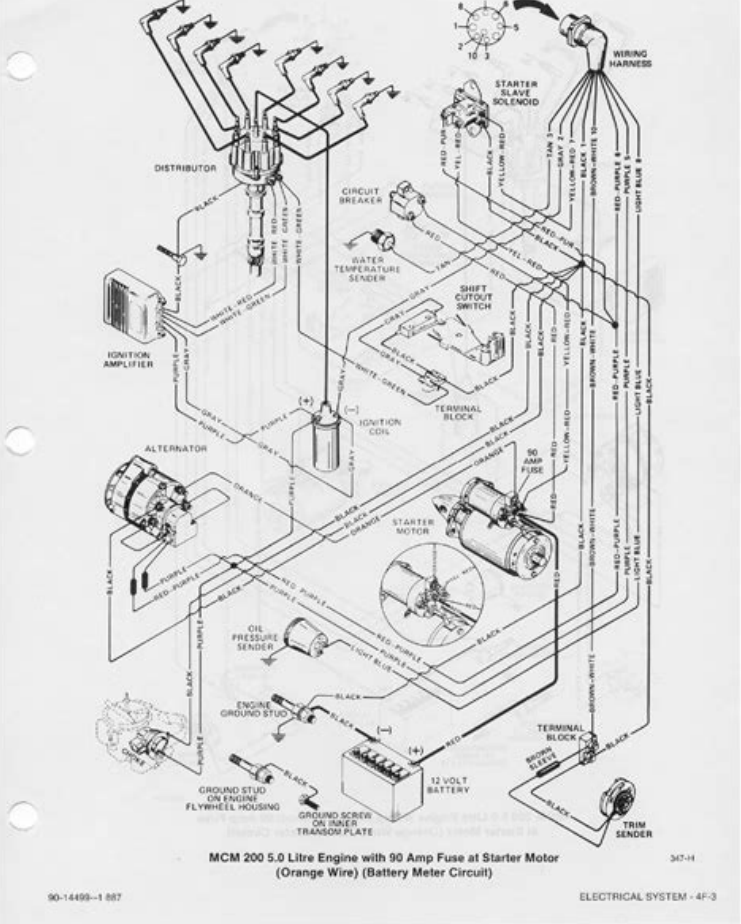


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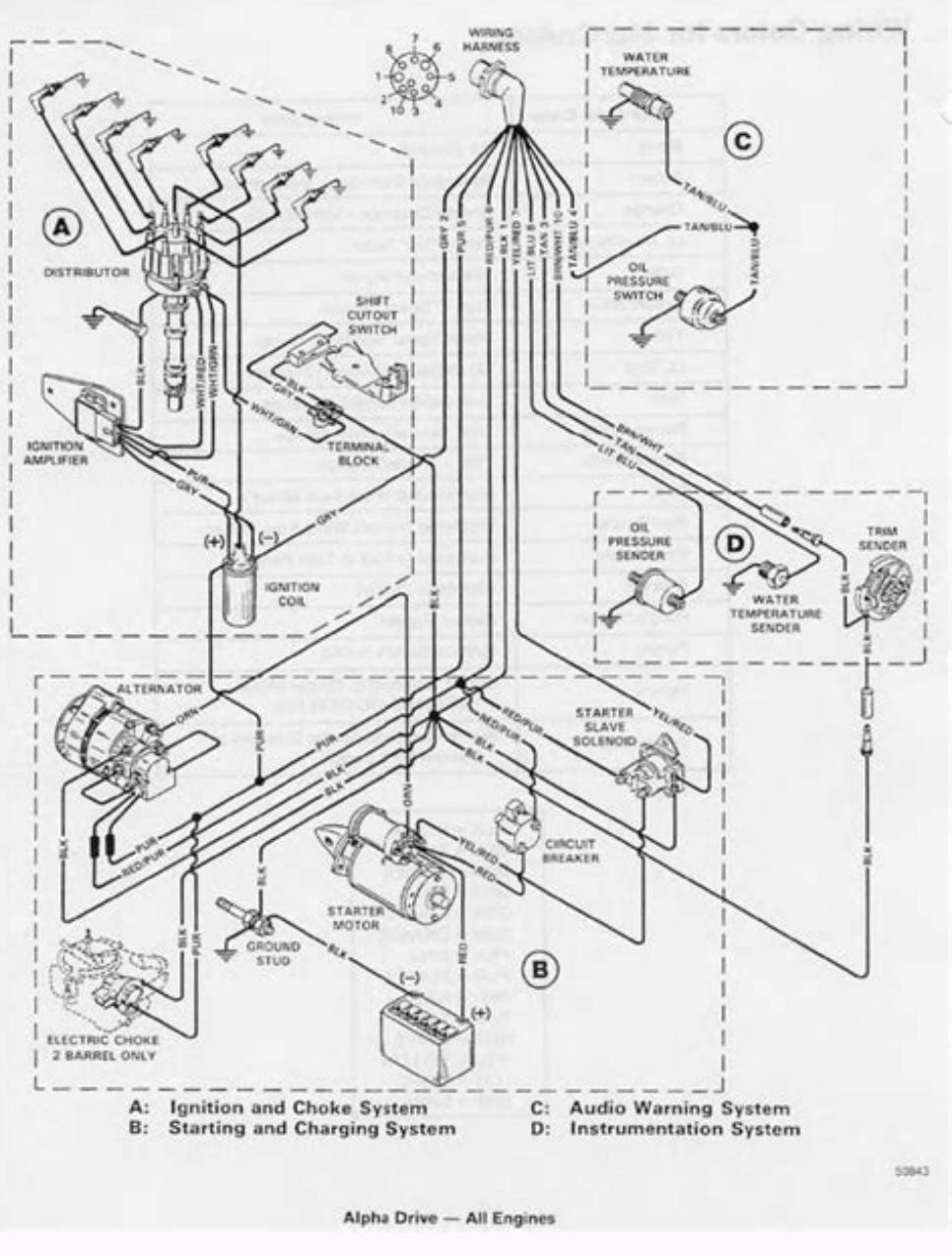


Use of replacement electrical, ignition or fuel system components, which do not comply with these rules and regulations, could result in a fire or explosion hazard and should be avoided. When servicing the electrical, ignition and fuel systems, it is extremely important that all components are properly installed and tightened. If not, any electrical or ignition component opening would permit sparks to ignite fuel vapors from fuel system leaks, if they existed.

1 2 3 4 5 6 7 8 9 Important Information Removal and Installation Engine Electrical Systems Fuel Systems Cooling System Exhaust System Drives Power Steering System 90-861328-1 NOVEMBER 1999 Page iii Service Manual Outline Section 1

- Important InformationA - General InformationB - MaintenanceC - Troubleshooting Section 2 - Removal and InstallationA - MCM Models Section 3 - EngineA - 262 CID / 4.3L Engines Section 4 - Electrical SystemsA - Starting SystemB - Ignition SystemC - Charging SystemD - InstrumentationE - Wiring Diagrams Section 5 - Fuel SystemsA - Fuel Delivery System For Carbureted EnginesB - Mercarb 2 Barrel CarburetorC - Weber 4 Barrel CarburetorD - SAVI Emission Fuel System With Weber CarburetorE - Fuel Delivery System For Electronic Fuel InjectionF - Fuel Injection Descriptions And System OperationG - Fuel Injection Disassembly And ReassemblyH - Fuel Injection System TroubleshootingI - Diagnostics Section 6 - Cooling SystemA - Seawater Cooled ModelsB - Closed Cooled Models Section 7 - Exhaust SystemA - GeneralB - Manifolds, Elbows and RisersC - Collectors Section 8 - DrivesA - Drive Shaft Models Section 9 - Power Steering SystemA - Pump and Related Components Page iv 90-861328-1 NOVEMBER 1999

Table of Contents IMPORTANT INFORMATIONSection 1A - General Information Introduction 1A-2.



How to Use This Manual 1A-2. Page Numbering 1A-2.
 How to Read a Parts Manual 1A-3.

Directional References 1A-4.
 Engine Rotation 1A-4. Engine Serial Number Location 1A-5. Propeller Information 1A-5.
 Water Testing New Engines 1A-6.

Boat and Engine Performance 1A-6.
 Boat Bottom 1A-6. Marine Fouling 1A-7. Weight Distribution 1A-8.

Water in Boat 1A-9.
 Elevation and Climate 1A-9. Section 1B - Maintenance Tools 1B-2.

Lubricants / Sealants / Adhesives 1B-2.

Maintenance Schedules 1B-3. Maintenance Intervals 1B-3.
 Gas Sterndrive 1B-3.

Routine Maintenance * 1B-3.
 Scheduled Maintenance * 1B-4.
 Engine and Tune-Up Specifications 1B-5.
 MCM (Sterndrive) 1B-5.
 Fluid Capacities 1B-6.
 Sterndrive Engines 1B-6.
 Sterndrives 1B-6.

20-Hour Break-In Period 1B-7.
 After Break-in Period 1B-7.

End of First Season Checkup 1B-7. Specifications 1B-8.

Fuel Recommendations 1B-8.
 Test For Alcohol Content In Gasoline 1B-10 Power Steering Fluid 1B-10.

Coolant for Closed Cooling System 1B-10.
 Crankcase Oil 1B-11.
 Overfilled Crankcase Oil 1B-11. Checking Engine Oil Level / Filling 1B-12. Changing Oil and Filter 1B-12. Changing Water Separating Fuel Filter 1B-13. Power Steering System 1B-15.
 Checking Fluid Level 1B-15.
 Engine Cold 1B-15.

Filling and Bleeding 1B-16.
 Closed Cooling System 1B-17.

Checking Coolant Level 1B-17.

Flushing System 1B-18.
 Lubrication 1B-20.

Throttle Cable 1B-20.
 Shift Cable 1B-20.

Engine Coupler / U-Joint Shaft Splines 1B-21.
 Sterndrive Drive Shaft Extension Models 1B-22.
 Cleaning Flame Arrestor 1B-22.
 Top Mounted Flame Arrestor 1B-23. Serpentine Drive Belt 1B-23.

Component Location 1B-23.

Serpentine Belt Routing 1B-24.

S/N 0L619083 and Below 1B-24.
 S/N 0L619084 and Above 1B-25. Inspection 1B-26.

Replacing and/or Adjusting Tension 1B-26. Ignition Timing 1B-27.

Thunderbolt V Models 1B-27.

EFI 1B-28.
 Cold Weather or Extended Storage 1B-29.
 Precautions 1B-29.

Power Package Layup 1B-31.
 Draining Instructions 1B-33.

Draining Sterndrive 1B-38.
 Recommissioning 1B-39.

90-861328-1 NOVEMBER 1999 Page v Section 1C - Troubleshooting Precautions 1C-2.

Used Spark Plug Analysis 1C-3.
 Normal Condition 1C-3.
 Chipped Insulator 1C-3. Wet Fouling (Oil Deposits) 1C-4.
 Cold Fouling 1C-4.

Overheating 1C-4. High Speed Glazing 1C-5.

Scavenger Deposits 1C-5.
 Pre-Ignition Damage 1C-5.
 Reversed Coil Polarity 1C-6. Splashed Deposits 1C-6.
 Mechanical Damage 1C-6.

Poor Boat Performance and/or Poor Maneuverability 1C-7.

Improper Full Throttle Engine RPM 1C-8. . . . RPM Too High 1C-8. . . .	
RPM Too Low 1C-8.	
.....	
..... Engine Cranks Over But Will Not Start Or Starts Hard 1C-9I.	
..... mportant Information 1C-9.	
.....	
..... Thunderbolt V Ignition (No Spark) 1C-10. . . Testing Thunderbolt V Ignition System 1C-10Fuel System Rich 1C-11.	
.....	
..... Fuel System Lean 1C-11.	
.....	
..... Miscellaneous 1C-11.	
Engine Will Not Crank Over 1C-12. Charging System Inoperative 1C-12. Noisy Alternator 1C-13.	
.....	
..... Instrumentation Malfunction 1C-13. Radio Noise 1C-13.	
.....	
.....	
..... Poor Fuel Economy 1C-14.	
..... Engine Runs Poorly at Idle 1C-14.	
..... Engine Runs Poorly At High RPM 1C-15.	
..... Engine Acceleration Is Poor 1C-16.	
.....	
..... Troubleshooting with Vacuum Gauge 1C-16. . Engine Noise 1C-17.	
.....	
..... Important Information 1C-17.	
.....	
..... Valve Cover Area 1C-17. Cylinder Area 1C-18.	
.....	
.....	
Camshaft Area 1C-18.	
..... Crankshaft Area 1C-19.	
..... Miscellaneous 1C-20.	
..... Oil Pressure 1C-21.	
.....	
..... Miscellaneous 1C-21.	
..... Low Oil Pressure 1C-22. High Oil Pressure 1C-22.	
.....	
..... Excessive Oil Consumption 1C-23.	
Water In Engine 1C-24.	
..... Important Information 1C-24. Water on Top of Pistons 1C-25. Water in Crankcase Oil 1C-25.	
..... Engine Overheats 1C-26.	
.....	
..... Mechanical 1C-26.	
.....	
..... Engine Overheats 1C-27.	
.....	
.....	
..... Cooling System 1C-27.	
..... Insufficient Water Flow from Belt Driven Seawater Pickup Pump 1C-28. Power Steering 1C-29.	
.....	
..... Poor, Erratic or No Assist 1C-29.	
.....	
..... Noisy Pump 1C-30.	
.....	
.....	
..... Fluid Leaks 1C-30.	
.....	
.....	
.....	
REMOVAL AND INSTALLATIONSection 2A - MCM Models Torque Specifications 2A-2.	
Tools 2A-2.	
..... Lubricants / Sealants / Adhesives 2A-2. Removal 2A-3.	
.....	
..... Installation and Alignment 2A-5.	
Engine Connections 2A-10.	
.....	
..... Electrical Connections 2A-11.	
.....	
..... Mercathode Connections 2A-12. Shift Cable Installation 2A-12.	
.....	
..... Power Steering Connections 2A-12.	
..... Fuel Supply Connections 2A-13.	
Throttle Cable Installation and Adjustment 2A-14.	
..... Page vi 90-861328-1 NOVEMBER 1999 ENGINESection 3A - 262 cid (4.3L) Engines Torque Specifications 3A-2.	
.....	
..... Lubricants / Sealants / Adhesives 3A-4.	
..... Tools 3A-4.	
..... Specifications 3A-6.	
.....	
..... General 3A-11.	
.....	
.....	
..... Bearing Failures 3A-14.	
.....	
.....	
..... Piston Failures 3A-16.	
Pre-Ignition 3A-16.	
.....	
..... Detonation 3A-17.	
.....	
..... Engine Mounts 3A-19.	
.....	
..... Rocker Arm Cover 3A-20. Removal 3A-20.	
.....	
.....	
..... Installation 3A-20.	
..... Intake Manifold 3A-21.	
.....	
..... Removal 3A-21. Cleaning and Inspection 3A-23.	
.....	
.....	
..... Installation 3A-23.	
.....	
.....	
..... Rocker Arm / Push Rod 3A-27. Removal 3A-27.	
..... Cleaning and Inspection 3A-28.	
..... Installation 3A-28.	
Hydraulic Roller Valve Lifters 3A-29. Locating Noisy Lifters 3A-30.	
..... Removal 3A-31.	
.....	
.....	
..... Cleaning and Inspection 3A-34. Installation 3A-34. Valve Stem Oil Seal / Valve Spring 3A-36.	
Removal - Head Installed 3A-36.	
.....	
..... Valve Assembly (Exploded View) 3A-38. Installation - Head Installed 3A-39.	
..... Cylinder Head 3A-40.	
..... Removal 3A-40.	
.....	
.....	
..... Cleaning and Inspection 3A-42. Installation 3A-43.	
..... Cylinder Head and Valve Conditioning 3A-47.	
Disassembly 3A-47.	
.....	
.....	
..... Cleaning 3A-47.	
.....	
.....	
.....	
..... Inspection 3A-48.	
.....	
..... Valve Guide Bore Repair 3A-49.	
..... Valve Springs - Checking Tension 3A-50.	
Valve Seat Repair 3A-50.	
..... Valve Grinding 3A-51.	
.....	
Reassembly 3A-52.	
.....	
.....	
Dipstick Specifications 3A-55.	
.....	
.....	
..... Oil Pan 3A-56.	
.....	
.....	
..... Removal 3A-56.	
.....	
..... Installation 3A-56.	
.....	
.....	
..... Oil Pump 3A-57.	
.....	
.....	
..... Removal 3A-57.	
.....	
..... Disassembly 3A-58.	
..... Cleaning and Inspection 3A-58. Reassembly 3A-58.	
.....	
..... Installation 3A-59.	
.....	
.....	
..... Torsional Damper 3A-59.	
..... Removal 3A-59.	
.....	
..... Installation 3A-60.	
Crankcase Front Cover Oil Seal 3A-61.	
..... Crankcase Front Cover 3A-62. Removal 3A-62.	
.....	
.....	
..... Cleaning and Inspection 3A-63. Installation 3A-63.	
.....	
.....	
..... Flywheel 3A-64.	
..... Removal 3A-64.	
..... Inspection 3A-64.	
.....	
.....	
..... Installation 3A-65.	
..... Rear Main Oil Seal 3A-66.	

Installation - Engine Not Disturbed 4B-14. Installation - Engine Disturbed 4B-14.
Distributor Cap 4B-15.
Removal 4B-15.
Inspection 4B-15.
Rotor/Sensor Wheel 4B-16. Removal 4B-16.
Inspection 4B-16.
Installation 4B-17.
Sensor 4B-17.
Removal 4B-17.
Inspection 4B-18.
Installation 4B-18.
Page viii 90-861328-1 NOVEMBER 1999 Section 4C - Charging SystemGeneral Precautions 4C-2.
EFI Electrical System Precautions 4C-2. Replacement Parts Warning 4C-2.
Multiple EFI Engine Battery Precautions 4C-3 Situation 4C-3.
Recommendations 4C-3.
Identification 4C-4. Specifications 4C-4. Mando 4C-4.
DelcoRemy 4C-5.
Tools 4C-5.
Lubricants / Sealants / Adhesives 4C-5.
Torque Specifications 4C-5.
Description 4C-6.
Testing 4C-7.
Charging System 4C-7.
Charging System Resistance 4C-8.
Circuitry 4C-10.
Component 4C-11. Exploded View 4C-16.
Alternator Repair 4C-17. Removal 4C-17.
Disassembly 4C-17.
Cleaning and Inspection 4C-22.
Reassembly 4C-22.
Installation 4C-26.
Pulley Removal 4C-27.
Battery Isolator Diagram 4C-28. Section 4D - InstrumentationTools 4D-2.
Lubricants / Sealants / Adhesives 4D-2. Identification 4D-2.
Special Information 4D-3.
Lighting Options 4D-3.
Gauges 4D-5.
Oil, Fuel and Temperature 4D-5. Battery Gauge 4D-6.
CruiseLog Meter 4D-7.
Vacuum Gauge 4D-7.
Speedometer 4D-7.
Tachometer 4D-8.
Gauge Replacement 4D-8.
Senders 4D-9.
Oil Pressure 4D-9.
Water Temperature 4D-10.
Fuel Tank Sender 4D-13. Switches 4D-16.
Ignition Key Switch 4D-16.
Lanyard Stop Switches 4D-17.
Testing 4D-17.
Start/Stop Switch 4D-19.
Audio Warning System 4D-20.
Buzzer 4D-20.
Oil Pressure Switch 4D-21. Water Temperature Switch 4D-21.
Section 4E - Wiring DiagramsWiring Colors for Mercury MerCruiser 4E-2. MCM Gasoline Engine Wiring Diagrams 4E-4 Starting and Charging Harness 4E-4.
Fuel and Ignition System Harnesses 4E-16Quicksilver Instrumentation 4E-22.
Dual Station Wiring 4E-24.
FUEL SYSTEMSection 5A - Fuel Delivery System For Carbureted Engines Identification 5A-2.
Replacement Parts Warning 5A-2.
Specifications 5A-2.
Torque Specifications 5A-2.
Tools 5A-3.
Lubricants / Sealants / Adhesives 5A-3. Precautions 5A-3. Fuel Supply Connections 5A-3. Fuel Delivery System 5A-4.
Recommendations 5A-4. Fuel System Components 5A-6.
Water Separating Fuel Filter 5A-7.
Replacement 5A-8.
Vent Hose Routing 5A-8.
Carbureted Models 5A-8. 90-861328-1 NOVEMBER 1999 Page ix Section 5B - Mercarb 2 Barrel Carburetor Identification 5B-2.
Replacement Parts Warning 5B-3.
Precautions 5B-3.
Torque Specifications 5B-3.
Specifications 5B-4.
Tools 5B-4.
Exploded View 5B-6.
Important Service Information 5B-8. High Altitude Re-Jetting 5B-8.
8 Point Carburetor Check List 5B-9.
Flooding At Idle RPM 5B-9.
Needle / Seat Change 5B-9.
Adjustable Accelerator Pump Lever 5B-10. Description 5B-10.
Maintenance 5B-11.
Flame Arrestor 5B-11.
Fuel Inlet Filter 5B-13.
Choke Inspection 5B-14.
Adjustments 5B-14.
Accelerator Rod 5B-14.
Choke Setting 5B-16.
Choke Unloader 5B-17.
Initial Idle Speed and Mixture 5B-17.
Final Idle Speed and Mixture 5B-18. Replacing Carburetor 5B-18.
Repair 5B-19.
Removal 5B-19.
Disassembly 5B-20.
Cleaning and Inspection 5B-28.
Reassembly 5B-30.
Installation 5B-40.
Section 5C - Weber 4 Barrel CarburetorIdentification 5C-2.
Carburetor Metering Rod And Jet Identification 5C-2. Torque Specifications 5C-4.
Specifications 5C-4.

. Tools 5C-5.
. Replacement Parts Warning 5C-5.
. Precautions 5C-6.
. Fuel Delivery System 5C-6.
. Fuel Supply Connections 5C-6.
. 8 Point Carburetor Check List 5C-7.
. Exploded View 5C-8.
. Description 5C-10.
. Important Service Information 5C-11.
. Adjustable Accelerator Pump Lever 5C-11. Hard Starting 5C-11.
. Maintenance 5C-12.
. Flame Arrestor 5C-12.
. Fuel Inlet Filter 5C-13.
. Adjustments 5C-14.
. Accelerator Pump 5C-14.
. Float Drop 5C-16.
. Float Level 5C-17.
. Electric Choke 5C-18.
. Idle Speed and Mixture 5C-18.
. Replacing Carburetor 5C-19.
. Repair 5C-19.
. Removal 5C-19.
. Disassembly 5C-21. Cleaning and Inspection 5C-32. Reassembly 5C-33.
. Installation 5C-44.
Section 5D - Sav1 Emission Fuel System With Weber 4 Barrel Carburetor Identification 5D-2.
. Replacement Parts Warning 5D-2.
. Torque Specifications 5D-2.
. Special Tools 5D-2.
. Engine Specifications 5D-3. Carburetor Specifications 5D-3.
. Carburetor Adjustment Specifications 5D-4. Description 5D-4.
. Special Notes 5D-5.
. Carburetor Top Cover 5D-5. Sealed Idle Mixture Screws 5D-5. Piston Bore of Emissions Model 5D-6. Precautions 5D-6.
. Maintenance 5D-7.
. Flame Arrestor 5D-7.
. Fuel Filter 5D-7. Positive Crankcase Ventilation (PCV) 5D-8 Troubleshooting 5D-8.
. Checking Ported Vacuum Switch and Carburetor Vacuum Circuit for Correct Operation 5D-9.
. Service Procedures 5D-11. Checking Positive Crankcase Ventilation (PCV) Valve 5D-11.
. Removing Seals From Idle Mixture Screws 5D-11.
. Installing New Seals 5D-12.
. Carburetor Installation 5D-12.
. Ported Vacuum Switch Installation 5D-13. Emissions System Connections 5D-13.
. Propane Assisted Idle Set Procedure 5D-15 Test Equipment 5D-18. Emissions Testing 5D-19.
. Page x 90-861328-1 NOVEMBER 1999 Section 5E - Fuel Delivery System For Electronic Fuel Injection Specifications 5E-2.
. Torque Specifications 5E-2.
. Tools 5E-2.
. Lubricants / Sealants / Adhesives 5E-2. Replacement Parts Warning 5E-2.
. Precautions 5E-3.
. Fuel Supply Connections 5E-3.
. Fuel Delivery System 5E-4.
. Recommendations 5E-4.
. Cool Fuel System Exploded View 5E-5.
. Fuel System Flow Diagrams 5E-6.
. Throttle Body Injection 5E-6.
. Water Separating Fuel Filter 5E-7.
. Water Separating Fuel Filter Replacement 5E-8.
. Cool Fuel System Repair 5E-8.
. Removal 5E-8.
. Disassembly 5E-10.
. Reassembly 5E-11.
. Installation 5E-13.
. Vacuum and Vent Hose Routing 5E-15. Throttle Body EFI 5E-15.
Section 5F - Fuel Injection Descriptions And System Operation Special Tools 5F-2.
. Service Precautions 5F-3. General Information 5F-5.
. Introduction 5F-5.
. Visual/Physical Inspection 5F-5.
. Basic Knowledge and Tools Required 5F-5 Electrostatic Discharge Damage 5F-5. Diagnostic Information 5F-5.
. Wiring Harness Service 5F-6.
. Wiring Connector Service 5F-7.
. Abbreviations 5F-8.
. ECM Self-Diagnostics 5F-9.
. Diagnostic Code Tool With Malfunction Indicator Lamp 5F-9. Intermittent Malfunction Indicator Lamp 5F-9.
. Reading Codes 5F-10.
. Scan Tools 5F-11.
. EFI Diagnostic Circuit Check 5F-11. Scan Tool Use With Intermittents 5F-11.
. Non-Scan Diagnosis of Driveability Concerns (With No Codes Set) 5F-12. Electronic Control Module (ECM) and Sensors 5F-13.
. General Description 5F-13.
. Computers and Voltage Signals 5F-13. Analog Signals 5F-13.
. Digital Signals 5F-14. Engine Control Module (ECM) 5F-15. Speed Density System 5F-16.
. ECM Input and Sensor Descriptions 5F-17.
. Spark Management 5F-22.
. High Energy Ignition with Ignition Control (IC) 5F-22.
. Modes Of Operation 5F-23.
. Base Ignition Timing 5F-24.
. Results of Incorrect Operation 5F-25. Fuel Metering System 5F-26.
. General Description 5F-26. Cool Fuel Systems 5F-26. Modes of Operation 5F-26. Throttle Body Injection Components 5F-28. Section 5G - Fuel Injection Disassembly And Reassembly Precautions 5G-2.
. Torque Specifications 5G-3.
. Flame Arrestor And Throttle Body 5G-4. Exploded Views - Throttle Body EFI 5G-7. Throttle Body Body And Adapter 5G-7. Throttle Body Assembly 5G-8.
. Fuel Pressure Relief Procedure 5G-9. Throttle Body EFI Components 5G-9. Fuel Meter Cover Assembly 5G-9.
. Fuel Injectors 5G-11.
. Throttle Body 5G-13.
. Throttle Body Adapter Plate 5G-17.
. Engine Control Module (ECM) 5G-18. Knock Sensor (KS) Module (MEFI 1 Only) 5G-19.
. Engine Coolant Temperature (ECT) Sensor 5G-20.
. Manifold Absolute Pressure (MAP) Sensor 5G-21. Throttle Position (TP) Sensor 5G-22.
. Idle Air Control (IAC) Valve 5G-23.
. Knock Sensor 5G-25.
90-861328-1 NOVEMBER 1999 Page xi Section 5H - Fuel Injection System Troubleshooting Scan Tool Normal Specifications 5H-2.
. Important Preliminary Checks 5H-3. Before Starting 5H-3.
. Visual / Physical Check 5H-3. Intermittents 5H-4.

Hard Start Symptom 5H-5	Surges and/or Chuggles Symptom 5H-7	Lack of Power, Sluggish or Spongy Symptom 5H-9
Detonation / Spark Knock Symptom 5H-11	Hesitation, Sag, Stumble Symptom 5H-13	Cuts Out, Misses Symptom 5H-15
Rough, Unstable or Incorrect Idle, Stalling Symptom 5H-17	Poor Fuel Economy Symptom 5H-20	Dieseling, Run-On Symptom 5H-22
Backfire Symptom 5H-23		
Section 5I - DiagnosticsSpecial Tools 5I-2	Diagnostic Circuit Check 5I-4	Scan Tool Normal Specifications 5I-4
Diagnostic Trouble Codes 5I-5	ECM Connector and EFI Symptoms Chart 5I-6	
J-1 Circuits with MEFI 1 5I-6	J-2 Circuits with MEFI 1 5I-8	
J-1 Circuits with MEFI 3 5I-10	J-2 Circuits with MEFI 3 5I-12	Wiring System Diagrams 5I-14
MEFI 1 5I-14	MEFI 3 5I-18	
General Diagnostic Tests 5I-21		
On-Board Diagnostic (OBD) System Check 5I-21	Chart A-1 No MIL or No DLC Data 5I-23	Chart A-2 MIL ON Steady - Will Not Flash DTC 12 5I-25
Chart A-3 Engine Cranks But Will Not Run 5I-27	Chart A-4 Fuel System Diagnosis 5I-29	Chart A-5 Fuel System Electrical Test 5I-31Chart A-6 EFI System / Ignition Relay Check 5I-33
Chart A-7 Ignition System Check 5I-35	Chart A-8 Idle Air Control (IAC) Functional Test 5I-41	Discrete Input Circuit Check - Non-Scan Only 5I-43
Clearing Codes Using CodeMate Tester 5I-48	Clearing Codes Using Scan Tool 5I-48	Diagnostic Testing 5I-49
Code 14 Engine Coolant Temperature (ECT) Sensor Circuit 5I-49	Code 15 Engine Coolant Temperature (ECT) Sensor Circuit 5I-52	Code 21 Throttle Position (TP) Sensor Circuit 5I-54
Code 22 Throttle Position (TP) Sensor Circuit 5I-57	Code 23 Intake Air Temperature (IAT) Sensor Circuit 5I-60	Code 25 Intake Air Temperature (IAT) Sensor Circuit 5I-62
Code 33 Manifold Absolute Pressure (MAP) Sensor Circuit 5I-64	Code 34 Manifold Absolute Pressure (MAP) Sensor Circuit 5I-67	Code 62 Fuel Pressure (FP) Sensor Circuit 5I-87
Code 41 Ignition Control (IC) Circuit 5I-70Code 42 Ignition Control (IC) Circuit 5I-72Code 43 Knock Sensor (KS) Circuit 5I-74Code 44 Knock Sensor (KS) Circuit 5I-77Code 45 Ignition Coil Driver Fault 5I-80	Code 51 Calibration Memory Failure 5I-82Code 52 EEPROM Failure 5I-83	Code 61 Fuel Pressure (FP) Circuit 5I-84
Page xii 90-861328--1 NOVEMBER 1999 COOLING SYSTEMSection 6A - Seawater Cooled Models Torque Specifications 6A-2	Tools 6A-2	
Special Tools 6A-2	Lubricants / Sealants / Adhesives 6A-3	Specifications 6A-3
Seawater Inlet Recommendations 6A-4	Transom Mounted or Through The Hull Seawater Pickups and Hose 6A-4	Seacock (Seawater Inlet Valve) 6A-4
Sea Strainer 6A-4	Seawater Pickups 6A-5	Through The Hull Mounted 6A-5
Transom Mounted 6A-6	Quicksilver Sea Strainer 6A-7	Removal 6A-7
Cleaning and Inspection 6A-9	Installation 6A-9	Seawater Pickup Pump 6A-11
Output Test 6A-11	Disassembly 6A-13	Reassembly 6A-14
Seawater Pump Bearing Housing 6A-15	Disassembly 6A-15	Cleaning and Inspection 6A-16
Reassembly 6A-17	Water Circulating Pump 6A-20	Removal 6A-20
Cleaning and Inspection 6A-20	Installation 6A-20	Drive Belt Tension Adjustment 6A-21
Flushing Seawater Cooling System 6A-21	Thermostat 6A-21	Removal 6A-21
Testing 6A-22	Installation 6A-23	Auxiliary Hot Water Heater Installation Information 6A-24
Seawater Flow Diagrams 6A-28	MCM 262 cid / 4.3L Alpha 6A-28	MCM 262 cid / 4.3L Bravo 6A-29
Draining Diagrams 6A-30	MCM 262 cid / 4.3L Alpha 6A-30	MCM 262 cid / 4.3L Bravo 6A-31
Section 6B - Closed Cooled ModelsTorque Specifications 6B-2	Lubricants / Sealants / Adhesives 6B-2	Specifications 6B-2
Closed Cooling System Capacity 6B-2	Coolant Specification 6B-2	Thermostat 6B-2
Pressure Cap Rating 6B-2	Description 6B-3	Coolant Recommendations 6B-3
Maintaining Coolant Level 6B-3	Pressure Cap Maintenance 6B-4	Heat Exchanger Repair 6B-5
Testing Closed Cooling System 6B-6	Testing Coolant for Alkalinity 6B-6	Pressure Testing System 6B-6
Testing for Cylinder Head Gasket Leak 6B-7	Testing Heat Exchanger 6B-8	Testing Pressure Cap 6B-8
Thermostat 6B-10	Removal 6B-10	Testing 6B-11
Installation 6B-12	Changing Coolant 6B-13	Closed Cooling Section 6B-13
Change Intervals 6B-13	Draining Instructions 6B-13	Cleaning System 6B-14
Closed Cooling Section 6B-14	Seawater Section 6B-15	Filling Closed Cooling Section 6B-16
Auxiliary Hot Water Heater Installation 6B-18	Heat Exchanger Bracket Hardware 6B-19	Heat Exchanger Hose Connections 6B-20
Water Flow Diagram 6B-21	MCM 262 cid / 4.3L Alpha 6B-21	MCM 262 cid / 4.3L Bravo 6B-22
90-861328--1 NOVEMBER 1999 Page xiii EXHAUST SYSTEMSection 7A - General Exhaust System Requirements 7A-2	Exhaust Elbow Risers 7A-2	MCM (Sterndrive) Engines With Through The Transom Exhaust 7A-2 Section 7B - Manifolds, Elbows and RisersTorque Specifications 7B-2
Lubricants / Sealants / Adhesives 7B-2	Exhaust Riser (Kit) 7B-2	Disassembly 7B-2
Cleaning and Inspection 7B-4	Installation 7B-6	Gaskets 7B-6
Manifold 7B-7	Sterndrive Exhaust Extension 7B-9	Section 7C - CollectorsTorque Specifications 7C-2
Lubricants / Sealants / Adhesives 7C-2	Bullhorn Exhaust 7C-3	Shutter Replacement 7C-3
Component Replacement 7C-4	DRIVESSection 8A - Drive Shaft Torque Specifications 8A-2	Tools 8A-2
Lubricants / Sealants / Adhesives 8A-2	Flywheel Housing / Output Shaft Housing Repair 8A-3	Exploded View 8A-3
Removal and Installation 8A-4	Disassembly 8A-4	Reassembly 8A-5
Drive Shaft Repair 8A-5	Removal 8A-5	Repair 8A-7

Replacement Drive Shafts 8A-7. Drive Shafts Modified to Shorter Lengths 8A-8.
. Installation 8A-8.
. Bearing Support Repair 8A-10.
. Removal 8A-10.
. Disassembly 8A-10.

. Reassembly 8A-11.

. Installation 8A-12.

Page xiv 90-861328--1 NOVEMBER 1999 POWER STEERING SYSTEMSection 9A - Pump And Related Components Torque Specifications 9A-2.
Tools 9A-2.
. Special Tools 9A-2.

. Lubricants / Sealants / Adhesives 9A-2. Precautions 9A-3.

. Power Steering Pump and Components(Exploded View) 9A-3.
. Serpentine Belt Routing 9A-4.

. S/N 0L619083 and Below 9A-4.
. S/N 0L619084 and Above 9A-5.

. Serpentine Belt Adjustment 9A-6. Removal 9A-6. Installation 9A-6.

. Important Service Information 9A-7.

. Pump Pulley Replacement 9A-7.
. Testing and Repair 9A-8.
. Checking Pump Fluid Level 9A-8. Filling and Air Bleeding System 9A-8. Pump Assembly 9A-8.

. Removal 9A-8.

. Installation 9A-10.

Hydraulic Hoses and Fluid Cooler 9A-11. High Pressure Hose (Pump-to-Control Valve) 9A-11.
. Low Pressure Hose (Cooler-to-Pump) 9A-13. Low Pressure Hose (Control Valve-to-Cooler) 9A-15. 1A GENERAL INFORMATIONSERVICE MANUAL NUMBER 25 90-861328--1 NOVEMBER 1999 Page 1A-1 IMPORTANT INFORMATIONSection 1A - General Information Table of Contents Introduction 1A-2.

. How to Use This Manual 1A-2.

. Page Numbering 1A-2.

. How to Read a Parts Manual 1A-3.
. Directional References 1A-4.

. Engine Rotation 1A-4.

. Engine Serial Number Location 1A-5.

Propeller Information 1A-5.

. Water Testing New Engines 1A-6.
. Boat and Engine Performance 1A-6.

. Boat Bottom 1A-6.

. Marine Fouling 1A-7. Weight Distribution 1A-8.

. Water in Boat 1A-9.
Elevation and Climate 1A-9. GENERAL INFORMATION SERVICE MANUAL NUMBER 25 Page 1A-9 90-861328--1 NOVEMBER 1999 Introduction This comprehensive overhaul and repair manual is designed as a service guide for themodels previously listed. It provides specific information, including procedures fordissassembly, inspection, assembly and adjustment to enable dealers to repair and tune these engines. Before attempting repairs or tune-up, it is suggested that the procedure first be read through to gain knowledge of the methods and tools used and the cautions and warnings requiredfor safety. How to Use This Manual This manual is divided into sections which represent major components and systems. Some sections are further divided into parts which more fully describe the component. Sections and section parts are listed on the "Service Manual Outline" page following "V-6Models Covered in This Manual" page. Page NumberingTwo number groups appear at the bottom of each page. Following is an example addescription. a b c d e f g a - Section Numberb - Section Partc - Page Numberd - Manual Part Numbere - Revision Numberf - Month Printedg - Year Printed GENERAL INFORMATIONSERVICE MANUAL NUMBER 25 90-861328--1 NOVEMBER 1999 Page 1A-3 How to Read a Parts Manual Power Steering Pump Assembly 1 2 3 4 5 6 7 8 9 10 REF.NO. PART NO. SYM. QTY. DESCRIPTION 1 90507A12 1 PUMP ASSEMBLY-Power Steering2 36- 95805 1 CAP3 73873A1 1 PULLEY4 16- 41877 1 STUD5 57- 65607T 1 V-BELT6 32- 806684 1 HOSE-Pressure (FITTINGS ON BOTH ENDS)7 25- 89879 1 O-RING8 25- 806232 1 O-RING9 13- 35048 1 LOCKWASHER (3/8 in.)10 61990 1 CABLE TIE REF. NO. : Number shown next to part on exploded view PART NO. : Mercury Part Number for ordering. If NSS (not sold separately) sometimes GMpart number will be given in description column. QTY. : The quantity that must be ordered. DESCRIPTION : Description of part, what parts are included with a part (all indented itemscome with the main item above the indented parts), and specialinformation. GENERAL INFORMATION SERVICE MANUAL NUMBER 25 Page 1A-4 90-861328--1 NOVEMBER 1999 Directional References Front of boat is bow; rear is stern. Starboard side is right side; port side is left side. In thismanual, all directional references are given as they appear when viewing boat from sternlooking toward bow. 72000 STARBOARD(RIGHT) PORT(LEFT) FORE or BOW(FRONT) AFT or STERN(REAR) Engine Rotation Engine rotation is determined by observing flywheel rotation from the rear (stern end) of theengine looking forward (toward water pump end). Propeller rotation is not necessarily thesame as engine rotation. When ordering replacement engine, short blocks or parts forengine, be certain to check engine rotation. Do not rely on propeller rotation in determiningengine rotation. 72001 Left Hand Rotation GENERAL INFORMATIONSERVICE MANUAL NUMBER 25 90-861328--1 NOVEMBER 1999 Page 1A-5 Engine Serial Number Location 72975 a b a - Serial Number Plateb - Starter Motor Propeller Information Refer to the "Propeller" section in appropriate Mercury MerCruiser Sterndrive ServiceManual, or order publication 90-8614492, "What You Should Know About QuicksilverPropellers." Changing diameter, pitch or coupling of a propeller will affect engine rpm and boatperformance. The blade configuration also will affect performance. Two like propellers,same pitch and diameter, from two different manufacturers also will perform differently. It is the responsibility of the boat manufacturer and/or selling dealer to equip the boat withthe correct propeller to allow the engine to operate within its specified rpm range at wideopen throttle (WOT).

Because of the many variables of boat design and operation, only testing will determine thebest propeller for the particular application. To test for correct propeller, operate boat (with an average load onboard) at WOT and checkrpm with an accurate tachometer. Engine rpm should be near top of the specified range sothat, under heavy load, engine speed will not fall below specifications. If engine exceeds the specified rpm, an increase in pitch and/or diameter is required. If engine is below rated rpm, a decrease in pitch and/or diameter is required. Normally, a change of approximately 200 rpm will be achieved for each one inch pitchchange of a propeller. CAUTIONIf a propeller is installed that does not allow engine rpm to reach the specifiedfull-throttle rpm range, the engine will "labor" and will not produce full power.Operation under this condition will cause excessive fuel consumption, engineoverheating and possible piston damage (due to detonation). On the other hand,installation of a propeller, that allows engine to run above the specified rpm limit, will cause excessive wear on internal engine parts which will lead to prematureengine failure.

GENERAL INFORMATION SERVICE MANUAL NUMBER 25 Page 1A-6 90-861328--1 NOVEMBER 1999 Water Testing New Engines Use care during the first 20 hours of operation on new Mercury MerCruiser engines possible engine failure may occur. If a new engine has to be water-tested at full throttlebefore the break-in period is complete, follow this procedure. 1. Start engine and run at idle rpm until normal operating temperature is reached. 2. Run boat up on plane. 3. Advance engine rpm (in 200 rpm increments) until engine reaches its maximum ratedrpm. IMPORTANT: Do not run at maximum rpm for more than 2 minutes. Boat and Engine Performance Boat BottomFor maximum speed, a boat bottom should be as flat as possible in a fore-aft direction(longitudinally) for approximately the last 5 ft (1.5 m). 72002 a a - Critical Bottom Area For best speed and minimum spray, the corner between the bottom and the transom shouldbe sharp. 72003a bc a - Bottom - Corner - Transom GENERAL INFORMATIONSERVICE MANUAL NUMBER 25 90-861328--1 NOVEMBER 1999 Page 1A-7 The bottom is referred to as having a "hook" if it is concave in the fore-and-aft direction. Ahook causes more lift on the bottom near the transom and forces the bow to drag. Thisincreases wetted surface and reduces boat speed. A hook, however, aids in planning andreduces any porpoising (rhythmic bouncing) tendency. A slight hook is often built in by themanufacturer. A hook also can be caused by incorrect trailering or storing the boat withsupport directly under the transom. 72004a a - Hook A "rocker" is the reverse of a hook. The bottom is convex or bulged in the fore-and-aft direction. It can cause the boat to porpoise. 72005a a - Rocker Any hook, rocker or surface roughness on the bottom, particularly in the all-importantcenter-aft portion will have a negative effect on speed, often several miles per hour on a fastboat. Marine FoulingFouling is an unwanted build-up (usually animal-vegetable-derived) occurring on the boat's/bottom and drive unit. Fouling adds up to drag, which reduces boat performance. In freshwater, fouling results from dirt, vegetable matter, algae or slime, chemicals, minerals andother pollutants.

In salt water, barnacles, moss and other marine growth often producedramatic build-up of material quickly. Therefore, it is important to keep the hull as clean aspossible in all water conditions to maximize boat performance. Antifouling paint, if required, may be applied to boat hull observing the following precautions. IMPORTANT: DO NOT paint anodes or MerCathode System reference electrode andanode, as this will render them ineffective as galvanic corrosion inhibitors. CAUTIONAvoid corrosion damage. Do not apply antifouling paint to Mercury MerCruiserdrive unit or transom assembly. GENERAL INFORMATION SERVICE MANUAL NUMBER 25 Page 1A-8 90-861328--1 NOVEMBER 1999 IMPORTANT: If antifouling protection is required, Tri-Butyl-Tin-Adipate (TBTa) baseantifouling paints are recommended on Mercury MerCruiser boating applications. Inareas where Tri-Butyl-Tin-Adipate base paints are prohibited by law, copper basepaints can be used on boat hull and boat transom. Corrosion damage that results from the improper application of antifouling paint will not be covered by the limitedwarranty. Observe the following: Avoid an electrical interconnection between the Mercury MerCruiser Product,Anodic Blocks, or MerCathode System and the paint by allowing a minimum of 1-1/2in. (40mm) UNPAINTED area on transom of the boat around these items.

Anti-Fouling Paintb - Minimum 1-1/2 in. (40 mm) UNPAINTED Area Weight DistributionWeight distribution is extremely important; it affects a boat's running angle or attitude. Forbest top speed, all movable weight - cargo and passengers - should be as far aft as possible to allow the bow to come up to a more efficient angle (3 to 5 degrees). On the negative sideof this approach is the problem that, as weight is moved aft, some boats will begin unacceptable porpoise. Secondly, as weight is moved aft, getting on plane becomes more difficult. Finally, the ride in choppy water becomes more uncomfortable as the weight goes aft. Withthese factors in mind, each boatowner should seek out what weight locations best suit his/herneeds. Weight and passenger loading placed well forward increases the "wetted area" of the boatbottom and, in some cases, virtually destroys the good performance and handlingcharacteristics of the boat.

Operation in this configuration can produce an extremely wetride, from wind-blown spray, and could even be unsafe in certain weather conditions orwhere bow steering may occur. Weight distribution is not confined strictly to fore and aft locations, but also applies to lateralweight distribution. Uneven weight concentration to port or starboard of the longitudinalcenterline can produce a severe listing attitude that can adversely affect the boat'sperformance, handling ability and riding comfort. In extreme rough water conditions, thesafety of the boat and passengers may be in jeopardy. GENERAL INFORMATIONSERVICE MANUAL NUMBER 25 90-861328--1 NOVEMBER 1999 Page 1A-9 Water in BoatWhen a boat loses performance, check bilge for water. Water can add considerable weightto the boat, thereby decreasing the performance and handling. Make certain that all drain passages are open for complete draining. Elevation and ClimateElevation has a very noticeable effect on the wide-open-throttle power of an engine. Sinceair (containing oxygen) gets thinner as elevation increases, the engine begins to starve forair. Humidity, barometric pressure and temperature do have a noticeable effect on thedensity of air. Heat and humidity thin the air. This phenomenon can become particularlyapparent when an engine is propped out on a cool dry day in spring and later, on a hot, humidday in August, does not have the same performance. See chart below. Although some performance can be regained by dropping to a lower pitch propeller, thebasic problem still exists. The propeller is too large in diameter for the reduced power output.The experienced marine dealer or a Quicksilver Propeller Repair Station can determine howmuch diameter to remove from a lower-pitch propeller for specific high-elevation locations.In some cases, a gear-ratio change to the drive unit to more reduction is possible and verybeneficial. It is a known fact that weather conditions exert a profound effect on power outputof internal combustion engines. Therefore, established horsepower ratings refer to thepower that the engine will produce at its rated rpm under a specific combination of weatherconditions. 72006 GENERAL INFORMATION SERVICE MANUAL NUMBER 25 Page 1A-10 90-861328--1 NOVEMBER 1999 THIS PAGE IS INTENTIONALLY BLANK 1B MAINTENANCESERVICE MANUAL NUMBER 25 90-861328--1 NOVEMBER 1999 Page 1B-1 IMPORTANT INFORMATIONSection 1B - Maintenance Table of Contents Tools 1B-2. Lubricants / Sealants / Adhesives 1B-2. Maintenance Schedules 1B-3.

. Maintenance Intervals 1B-3.

. Gas Sterndrive 1B-3.

. Routine Maintenance * 1B-3.
. Scheduled Maintenance * 1B-4.
. Engine and Tune-Up Specifications 1B-5. MCM (Sterndrive) 1B-5.
. Fluid Capacities 1B-6.
. Sterndrive Engines 1B-6.
. Sterndrives 1B-6.

. 20-Hour Break-In Period 1B-7.

. After Break-in Period 1B-7. End of First Season Checkup 1B-7.
. Specifications 1B-8.

. Fuel Recommendations 1B-8. Test For Alcohol Content In Gasoline 1B-10 Power Steering Fluid 1B-10. Coolant for Closed Cooling System 1B-10. Crankcase Oil 1B-11. Overfilled Crankcase Oil 1B-11.
. Checking Engine Oil Level / Filling 1B-12. Changing Oil and Filter 1B-12.
. Changing Water Separating Fuel Filter 1B-13. Power Steering System 1B-15.
. Checking Fluid Level 1B-15.
. Engine Cold 1B-15. Filling and Bleeding 1B-16.
. Closed Cooling System 1B-17. Checking Coolant Level 1B-17. Flushing System 1B-18.
. Lubrication 1B-20.
. Throttle Cable 1B-20.
. Shift Cable 1B-20.
. Engine Coupler / U-Joint Shaft Splines 1B-21.
. Sterndrive Drive Shaft Extension Models 1B-22.
. Cleaning Flame Arrestor 1B-22.
. Top Mounted Flame Arrestor 1B-23.
. Serpentine Drive Belt 1B-23.
. Component Location 1B-23.
. Serpentine Belt Routing 1B-24. S/N 0L619083 and Below 1B-24.
. S/N 0L619084 and Above 1B-25. Inspection 1B-26.
. Replacing and/or Adjusting Tension 1B-26. Ignition Timing 1B-27.
. Thunderbolt V Models 1B-27.
. EFI 1B-28.
. Cold Weather or Extended Storage 1B-29. Precautions 1B-29.
. Power Package Layup 1B-31.
. Draining Instructions 1B-33. Draining Sterndrive 1B-38.
. Recommissioning 1B-39.

. MAINTENANCE SERVICE MANUAL NUMBER 25 Page 1B-2 90-861328--1 NOVEMBER 1999 Tools Description Part Number Timing Light 91-99379 Quicksilver Scan Tool 91-823686A2 Lubricants / Sealants / Adhesives Description Part Number Quicksilver Liquid Neoprene 92-25711--3 Quicksilver 2-4-C Marine Lubricant With Teflon

seawater.seaconnection of closed cooling system.Clean, inspect and test pressure cap. * * * * * Replace coolant. * * * * * Only perform maintenance which applies to your particular power package. * Standard Models * Horizon Models * Whichever Occurs First * Interval will be reduced if not using extended life coolant. * Lubricate engine coupler every 50

2101 (1882) Propshaft Kilowatts (SAV1 Rating) 142 153 (142)2 1571 (146)2 Number of Cylinders V-6 Displacement 262 cid (4.3 l) Bore / Stroke - in. (mm) 4.0 x 3.48 (101.6 x 88.4) Compression Ratio 9.4:1 9.4:1 Compression Pressure Minimum 100 psi (690 kPa)7 Idle rpm In Neutral3 650 rpm5 600 rpm5 Maximum rpm (at WOT)3 4400-4800 rpm Oil Pressure (at 2000 rpm) Minimum 30 psi (207 kPa) Minimum Oil Pressure (at Idle) Minimum 4 psi (28 kPa) Fuel Pressure (1800 rpm) 3-7 psi (21-48 kPa) 30 psi (21-48 kPa) Electrical System 12 V Negative (-) Ground Alternator Rating 55 or 65 amp 8 Minimum Battery Requirements 375 cca / 475 mca / 90 Ah Firing Order 1-6-5-4-3-2 Spark Plug TypeAC - MR43LTS Champion - RS12YCNGK - BPR6EFS Spark Plug Gap .045 in. (1.1 mm) Timing (at idle rpm)4 10° BTDC 8° BTDC Preliminary Idle Mixture 1 1/4 Turns DNA Thermostat 160° F (71° C) 1 Power Rated in Accordance with NMMA (National Marine Manufacturers' Association) rating procedures.2 Power Rated in Accordance with SAV1 rating procedures.3 This rating procedure is used to certify that theengine complies with "Stage 1" Bodensee and Swiss Regulations. Horsepower differences shown result fromdifferences in test rpm, allowable test tolerances, and/or installation of special kit components.3 Measured using an accurate service tachometer with engine at normal operating temperature.4 Timing must be set using a special procedure as outlined in the appropriate section of this manual. Timing can-not be properly set using the conventional method.5 A special procedure must be followed to adjust idle rpm.

Consult your Authorized Mercury MerCruiser Dealerbefore attempting this procedure.6 Idle speed on EFI models is not adjustable.7 Minimum recorded compression in any one cylinder should not be less than 70 percent of the highest recordedcylinder.8 Serial Number Break for 65 Amp alternator: 0L619083 and above.

(19) 1 Always use dipstick to determine exact quantity of oil or fluid required.2 Seawater Cooling System capacity information is for winterization use only. Sterndrives NOTICE Unit Of Measurement: U.S. Fluid Ounces (Milliliters)All capacities are approximate fluid measures. Model ALPHA ONE Drive Unit Oil Capacity (With Gear Lube Monitor) 64 (1892) Model BRAVO ONE BRAVO TWO BRAVO THREE Drive Unit Oil Capacity(With Gear Lube Monitor) 88 (2603) 104 (3076) 96 (2839) MAINTENANCESERVICE MANUAL NUMBER 25 90-861328--1 NOVEMBER 1999 Page 1B-7 20-Hour Break-In Period IMPORTANT: The first 20 hours of operation is the engine break-in period. Correctbreak-in is essential to obtain minimum oil consumption and maximum engine performance. Do not exceed 3/4 throttle during in period, the following rules must be observed: * Do not operate below 1500 rpm for extended periods of time for first 10 hours. Shift into gear as soon as possible after starting and advance throttle above 1500 rpm if conditions permit safe operation. * Do not operate at one speed consistently for extended periods. * Do not exceed 3/4 throttle during first 10 hours. During next 10 hours, occasional operation at full throttle is permissible (5 minutes at a time maximum). * Avoid full throttle acceleration from IDLE speed. * Do not operate at full throttle until engine reaches normal operating temperature. After Break-in Period To help extend the life of your Mercury MerCruiser power package, the following recommen-dations should be considered: * Use a propeller that allows the engine to operate at or near the top of the maximum rpm range (refer to "Specifications" section) when at full throttle with a normal boat

Inspect alignment pin for damage; replace if necessary. Installation 1. Coat seal lips with clean 30W motor oil. 2. Install gasket and oil seal retainer with rear main seal.

3. Coat threads of oil seal retainer fasteners with Loctite Pipe Sealant with Teflon. 4. Install fasteners and torque to 133 lb-in (15 Nm).

5. Install oil pan fasteners. Torque engine oil pan nuts and bolts 18 lb-ft (25 Nm). NOTE: A one-piece oil pan gasket may be reused if it is still pliable and is not damaged. 262 CID (4.3L) ENGINESERVICE MANUAL NUMBER 25 90-861328-1 NOVEMBER 1999 Page 3A-69 Main Bearings IMPORTANT: Before removing main bearing caps or connecting rod caps, mark them reassembly in their original locations. Main bearings are of the precision insert type and do not use shims for adjustment. If clearances are found to be excessive, a new bearing, both upper and lower halves, will be required. Service bearings are available in standard size and .001 in., .010 in. and .020 in. undersize. Selective fitting of both rod and main bearing inserts is necessary in production in order to obtain close tolerances. For this reason you may find one half of a standard insert with onehalf of a .001 in. undersize insert which will decrease the clearance .0005 in. from using alight standard bearing. IMPORTANT: If crankshaft has an undersize journal and a new bearing is required, journal must be reconditioned to accept a .010 or .020 in. undersize bearing as .009in. undersize bearings are not available for service. InspectionIn general, the lower half of the bearing (except No. 1 bearing) shows a greater wear andthe most distress from fatigue. If, upon inspection, the lower half is suitable for use, it canbe assumed that the upper half is also satisfactory. If the lower half shows evidence of wearor damage, both upper and lower halves should be replaced. Never replace one half withoutreplacing the other half. Checking ClearancesTo obtain accurate measurements while using Plastigage, or its equivalent, engine must beout of the boat and upside down so the crankshaft will rest on the upper bearings and total clearance can be measured between lower bearing and journal. To ensure the proper seating of the crankshaft, all bearing cap bolts should be at theirspecified torque. In addition, before to checking fit of bearings, the surface of the crankshaftjournal and bearing should be wiped clean of oil. 1. With the oil pan and oil pump removed, remove bearing cap and wipe oil from journaland bearing cap to be inspected.

2. Place a piece of gauging plastic the full width of the bearing (parallel to the crankshaft)the journal as shown. 72357 a b a - Gauging Plastic - Journal 262 CID (4.3L) ENGINES SERVICE MANUAL NUMBER 25 Page 3A-70 90-861328-1 NOVEMBER 1999 3. Install the bearing cap and evenly torque the retaining bolts to specifications. Bearingcap MUST be torqued to specification in order to assure proper reading. Variations intorque affect the compression of the plastic gauge. IMPORTANT: Do not rotate the crankshaft while the gauging plastic is between thebearing and journal. 4. Remove bearing cap. The flattened gauging plastic will be found adhering to either thebearing cap or journal. 5.

On the edge of the gauging plastic envelope there is a graduated scale correlated inthousandths of an inch. Without removing the gauging plastic, measure its compressedwidth (at the widest point) with the graduations on the gauging plastic envelope. 72358 a b a - Compressed Gauging Plastic - Graduated Scale NOTE: Normally main bearing journals wear evenly and are not out of round. However, ifa bearing is being fitted to an out-of-round journal (.001 in. max.), be sure to fit to themaximum diameter of the journal: If the bearing is fitted to the minimum diameter, and thejournal is out of round .001 in., interference between the bearing and journal will result inrapid bearing failure. If the flattened gauging plastic tapers toward the middle ends, there is a difference in clearance, indicating taper, low spot or other irregularity of the bearing journal. Be sure to measure the journal with a micrometer. If the flattened gauging plasticindicates more than .01 in. difference, a. If the bearing clearance is within specifications, the bearing insert is satisfactory. If the clearance is not within specifications, replace the insert. Always replace both upper andlower inserts as a unit. 7. A standard, or .001 in. undersize bearing may produce the proper clearance. If not, itwill be necessary to regrind the crankshaft journal for use with the next undersize bearing. c. After selecting new bearing, recheck clearance. 8. Proceed to the next bearing. After all bearings have been checked, rotate the crankshaftto see that there is no excessive drag. When checking No. 1 main bearing, loosenaccessory drive belts to prevent tapered reading with plastic gauge. 262 CID (4.3L) ENGINESERVICE MANUAL NUMBER 25 90-861328-1 NOVEMBER 1999 Page 3A-71 9. Measure crankshaft end play by forcing the crankshaft to the extreme front position.Measure at the front end of the rear main bearing with a feeler gauge as shown[Specifications - .002-.006 (0.06-0.15)]. 72360 a a - Force Crankshaft to Extreme Forward Position ReplacementNOTE: Main bearings may be replaced with or without removing crankshaft. 72359 ab c Main Bearing Inserts - Lower Bearing Insert (Install in Cap) - Upper Bearing Insert (Install in Block) - Oil Groove 262 CID (4.3L) ENGINES SERVICE MANUAL NUMBER 25 Page 3A-72 90-861328-1 NOVEMBER 1999 WITH CRANKSHAFT REMOVED 1. Remove and inspect the crankshaft. 76580 2. Remove the main bearings from the cylinder block and main bearing caps. 76582 3. Coat bearing surfaces of new, correct size, main bearings with oil and install in theycylinder block and main bearing caps. 262 CID (4.3L) ENGINESERVICE MANUAL NUMBER 25 90-861328-1 NOVEMBER 1999 Page 3A-73 4. Install the crankshaft. 76579 WITHOUT CRANKSHAFT REMOVED 1. With oil pan, oil pump and spark shields removed, remove cap on main bearing requiringreplacement and remove bearing from cap. 2. Install main bearing remover/installer in oil hole in crankshaft journal. If such a tool is notavailable, a cotter pin may be bent, as shown, to do the job. 72622 a b a - Main Bearing Remover/Installer (J-3080) - Cotter Pin 3. Rotate the crankshaft clockwise as viewed from the front of engine. This will roll upperbearing out of block. 4. Oil new selected size upper bearing and insert plain (un-notched) end betweencrankshaft and indented or notched side of block. Rotate the bearing into place andremove tool from oil hole in crankshaft journal. 5. Oil new lower bearing and install in bearing cap.

6. Install main bearing cap with arrows pointing toward front of engine. 7. Torque all main bearing caps, EXCEPT THE REAR MAIN CAP, to 75 lb-ft (102 Nm).Torque rear main bearing cap to 10-12 lb-ft (14-16 Nm); then tap end of crankshaft, firstrearward then forward with a lead hammer. This will line up rear main bearing andcrankshaft thrust surfaces. Torque rear main bearing cap to 75 lb-ft (102 Nm). 262 CID (4.3L) ENGINES SERVICE MANUAL NUMBER 25 Page 3A-74 90-861328-1 NOVEMBER 1999 Connecting Rod Bearings Connecting rod bearings are of the precision insert type and do not use shims foradjustment. DO NOT FILE RODS OR ROD CAPS. If clearances are found to be excessive, a new bearing will be required. Service bearings are available in standard size and .001 in. and.002 in. undersize for use with new and used standard size crankshafts, and in .010 in. and.020 in. undersize for use with preconditioned crankshafts. On removing a connecting rod cap, it is possible to find a .010 in. undersize bearing. Theseare used in manufacturing for selective fitting. Inspection and ReplacementIMPORTANT: Before you remove the connecting rod cap, mark the side of the rod andcap with the cylinder number to assure matched reassembly of rod and cap. 1.

With oil pan and oil pump removed, remove the connecting rod cap and bearing. 2. Inspect the bearing for evidence of wear and damage. Do not reinstall a worn ordamaged bearing. 3. Wipe both upper and lower bearing shells and crankpin clean of oil. 4. Measure the crankpin for out-of-round or taper with a micrometer. If not withinspecifications, replace or recondition the crankshaft. If within specifications, measure the maximum diameter of the crankpin to determine new bearing size required. 5. If within specifications, measure new or used bearing clearances with gauging plasticor its equivalent. If a bearing is being fitted to an out-of-round crankpin, be sure to fit to the maximum diameter of the crankpin. If the bearing is fitted to the minimum diameter, and the crankpin is out of round .001 in., interference between the bearing and crankpinwill result in rapid bearing failure. a. Place a piece of gauging plastic, the length of the bearing (parallel to the crankshaft),on the crankpin or bearing surface as shown. Position the gauging plastic in the middle of the bearing shell. (Bearings are eccentric and false readings could occur if placed elsewhere.) 72361 a a - Gauging Plastic b

Install the bearing in the connecting rod and cap. c. Install the bearing cap and evenly torque nuts to 45 lb-ft (61 Nm). IMPORTANT: Do not turn the crankshaft with the gauging plastic installed. 262 CID (4.3L) ENGINESERVICE MANUAL NUMBER 25 90-861328-1 NOVEMBER 1999 Page 3A-75 d. Remove the bearing cap and using the scale on the gauging plastic envelope,measure the gauging plastic width at the widest point as shown. 72358 a b 6. If the clearance exceeds specifications, select a new, correct size bearing and measurethe clearance.

NOTE: Be sure to check what size bearing is being removed in order to determine properreplacement size bearing. If clearance cannot be brought within specifications, the crankpinwill have to be ground undersize.

If the crankpin is already at maximum undersize, replacecrankshaft. 7. Coat the bearing surface with oil, install the rod cap and torque nuts to 45 lb-ft (61 Nm). 8. When all connecting rod bearings have been installed, tap each rod lightly (parallel tothe crankpin) to make sure they have clearance. 9. Measure all connecting rod side clearances with a feeler gauge as shown[Specifications - .006-.014 (0.15-0.356)]. 72991 262 CID (4.3L) ENGINES SERVICE MANUAL NUMBER 25 Page 3A-76 90-861328-1 NOVEMBER 1999 Connecting Rod/Piston Assembly Removal 1. Remove oil pan and dipstick tube. 2. Remove oil pump. 76571 3. Remove distributor and intake manifold. 4. Remove cylinder heads. 76576 5. Use a ridge reamer to remove any ridge and/or deposits from upper end of cylinder bore. IMPORTANT: Before ridge and/or deposits are removed, turn crankshaft until pistons at bottom of stroke and place a cloth on top of piston to collect cuttings. After ridgeand /or deposits are removed, turn crankshaft until pistons is at top of stroke, thenremove cloth and cutters. 6. Mark connecting rods and bearing caps (left bank 1, 3 and 5; right bank 2, 4 and 6 from front to rear on same side as piston thrust). 7. Remove connecting rod cap and install connecting rod bolt guide (3/8-24) on bolts. Pushconnecting rod and piston assembly out of top of cylinder block. 262 CID (4.3L) ENGINESERVICE MANUAL NUMBER 25 90-861328-1 NOVEMBER 1999 Page 3A-77 NOTE: It will be necessary to turn crankshaft slightly to disconnect and remove someconnecting rod and piston assemblies. 72892 a a - Connecting Rod Bolt Guide (3/8-24) [J-5239] DisassemblyDisassemble piston from connecting rod using piston pin remover. 72893 a b c d e a - Piston Pin Remover (J-24086-B) - Arched Base - Piston - Connecting Rod - Rod Support 262 CID (4.3L) ENGINES SERVICE MANUAL NUMBER 25 Page 3A-78 90-861328-1 NOVEMBER 1999 Cleaning and Inspection CONNECTING RODS 1. Wash connecting rods in cleaning solvent and dry with compressed air. 2. Check for twisted and bent rods and inspect for nicks and cracks. Replace damagedconnecting rods.

1. Clean varnish from piston skirts with a cleaning solvent. DO NOT WIRE BRUSH ANYPART OF PISTON. Clean ring grooves with a groove cleaner and make sure oil ringholes are clean. 2. Inspect piston for damaged ring lands, skirts and pin bosses, wavy or worn ring lands,scuffed or damaged skirts and eroded areas at top of piston. 3. Inspect

grooves for nicks and burrs that might cause rings to hang up. 4. Measure piston skirt and check clearance as outlined under "Piston Selection." 5. Slip outer surface of a new top and second compression ring into respective piston ringgroove and roll ring entirely around the groove to make sure that ring does not bind. Ifring groove causes binding, remove by dressing with a fine cut file. If a distorted ringcauses binding, recheck with another ring. 72894 262 CID (4.3L) ENGINESERVICE MANUAL NUMBER 25 90-861328-1 NOVEMBER 1999 Page 3A-79 6. Proper clearance of piston ring in its groove is necessary for proper ring action.Therefore, when fitting new rings, clearances between ring and groove surfaces shouldbe measured. See "Specifications." 72895 PISTON PINS 1. Piston pin clearance is designed to maintain adequate clearance under all engineering operating conditions. Because of this, piston and piston pin are a matched set and notserviced separately. 2. Inspect piston pin bores and piston pins for wear. Piston pin bores and piston pins mustbe free of varnish and scuffing when measured. Measure piston pin with a micrometerand piston pin bore with a dial bore gauge or inside micrometer. If clearance is in excessof the .001 in. (0.02 mm) wear limit, replace piston and piston pin assembly. 262 CID (4.3L) ENGINES SERVICE MANUAL NUMBER 25 Page 3A-80 90-861328-1 NOVEMBER 1999 Reassembly PISTONS AND PISTON PINS IMPORTANT: When reassembling pistons and connecting rods, be aware that: • Piston and pin are machine fitted to each other and must remain together as amatched set. Do not intermix pistons and pins. • If original pistons and/or connecting rods are being used, be sure to assemblepistons and connecting rods so they can be reinstalled in same cylinder fromwhich they were removed. • Connecting rod bearing tangs are always toward outside of cylinder block. 72368 a a - Rod Bearing Tangs IMPORTANT: Notch in piston must be positioned facing toward the front of theengine. 72896 a a - Notch 262 CID (4.3L) ENGINESERVICE MANUAL NUMBER 25 90-861328-1 NOVEMBER 1999 Page 3A-81 1. Assemble piston to connecting rod using piston pin remover as shown. Follow instructions supplied with kit. 72897 a a - Piston Pin Remover (J-24086-B) 2. Once assembled, check piston for freedom of movement in all directions on connectingrod; piston should move freely. If it does not, piston pin bore is tight and piston/pin assembly must be replaced. 3.

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Flex the oil ring assembly to make sure ring is not binding. If ring groove is causingbinding, remove with a fine cut file. If a distorted ring is causing binding, use a newring. IMPORTANT: Use piston ring expander (91-24697) for compression ring installation. e. Install lower compression ring with marked side up, using ring expander. f. Install top compression ring with marked side up, using ring expander. InstallationIMPORTANT: Cylinder bores must be clean before piston installation. Clean with alight honing, as necessary. Then clean with hot water and detergent wash. Aftercleaning, swab bores several times with light engine oil and clean cloth, then wipewith a clean dry cloth. 1. Lubricate connecting rod bearings and install in rods and rod caps. 2. Lightly coat pistons, rings and cylinder walls with light engine oil. 3. With bearing caps removed, install connecting rod bolt guide (3/8-24) [J-5239] on con-necting rod bolts. IMPORTANT: Be sure ring gaps are properly positioned as shown. 72373 a b b c d e f g Ring Gap Locations - Oil Ring Spacer Gap (Tang In Hole Or Slot Within Arc) - Oil Ring Gaps - 2nd Compression Ring Gap - Top Compression Ring Gap - Port Sidef - Engine Fronty - Starboard Side 4. Install each connecting rod and piston assembly in its respective bore. Install withconnecting rod bearing tangs toward outside of cylinder block. Use piston ringcompressor to compress rings. Guide connecting rod into place on crankshaft journalwith connecting rod bolt guide. Use a hammer handle with light blows to install pistonto bore. Hold ring compressor firmly against cylinder block until all piston rings haveentered cylinder bore. 262 CID (4.3L) ENGINESERVICE MANUAL NUMBER 25 90-861328-1 NOVEMBER 1999 Page 3A-83 IMPORTANT: Be sure to install new pistons in same cylinders for which they were fitted, and used pistons in same cylinder from which they were removed. Eachconnecting rod and bearing cap should be marked, beginning at front of engine (1,3 and 5 in left bank and 2, 4 and 6 in right bank). Numbers on connecting rod and bearing cap must be on same side when installed in cylinder bore. If a connecting rods ever transposed from one block or cylinder to another, new bearings should be fitted and connecting rod should be numbered to correspond with new cylindernumber. 72552 a a - Piston Ring Compressor (J-8037) 5. ENGINE SERVICE MANUAL NUMBER 25 90-861328-1 NOVEMBER 1999 Page 3A-81 1. Assemble piston to connecting rod using piston pin remover as shown. Follow instructions supplied with kit. 72897 a a - Piston Pin Remover (J-24086-B) 2. Once assembled, check piston for freedom of movement in all directions on connectingrod; piston should move freely. If it does not, piston pin bore is tight and piston/pin assembly must be replaced. 3.

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Flex the oil ring assembly to make sure ring is not binding. If ring groove is causingbinding, remove with a fine cut file. If a distorted ring is causing binding, use a newring. IMPORTANT: Use piston ring expander (91-24697) for compression ring installation. e. Install lower compression ring with marked side up, using ring expander. f. Install top compression ring with marked side up, using ring expander. InstallationIMPORTANT: Cylinder bores must be clean before piston installation. Clean with alight honing, as necessary. Then clean with hot water and detergent wash. Aftercleaning, swab bores several times with light engine oil and clean cloth, then wipewith a clean dry cloth. 1. Lubricate connecting rod bearings and install in rods and rod caps. 2. Lightly coat pistons, rings and cylinder walls with light engine oil. 3. With bearing caps removed, install connecting rod bolt guide (3/8-24) [J-5239] on con-necting rod bolts. IMPORTANT: Be sure ring gaps are properly positioned as shown. 72373 a b b c d e f g Ring Gap Locations - Oil Ring Spacer Gap (Tang In Hole Or Slot Within Arc) - Oil Ring Gaps - 2nd Compression Ring Gap - Top Compression Ring Gap - Port Sidef - Engine Fronty - Starboard Side 4. Install each connecting rod and piston assembly in its respective bore. Install withconnecting rod bearing tangs toward outside of cylinder block. Use piston ringcompressor to compress rings. Guide connecting rod into place on crankshaft journalwith connecting rod bolt guide. Use a hammer handle with light blows to install pistonto bore. Hold ring compressor firmly against cylinder block until all piston rings haveentered cylinder bore. 262 CID (4.3L) ENGINESERVICE MANUAL NUMBER 25 90-861328-1 NOVEMBER 1999 Page 3A-83 IMPORTANT: Be sure to install new pistons in same cylinders for which they were fitted, and used pistons in same cylinder from which they were removed. Eachconnecting rod and bearing cap should be marked, beginning at front of engine (1,3 and 5 in left bank and 2, 4 and 6 in right bank). Numbers on connecting rod and bearing cap must be on same side when installed in cylinder bore. If a connecting rods ever transposed from one block or cylinder to another, new bearings should be fitted and connecting rod should be numbered to correspond with new cylindernumber. 72552 a a - Piston Ring Compressor (J-8037) 5. ENGINE SERVICE MANUAL NUMBER 25 90-861328-1 NOVEMBER 1999 Page 3A-81 1. Assemble piston to connecting rod using piston pin remover as shown. Follow instructions supplied with kit. 72897 a a - Piston Pin Remover (J-24086-B) 2. Once assembled, check piston for freedom of movement in all directions on connectingrod; piston should move freely. If it does not, piston pin bore is tight and piston/pin assembly must be replaced. 3.

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Flex the oil ring assembly to make sure ring is not binding. If ring groove is causingbinding, remove with a fine cut file. If a distorted ring is causing binding, use a newring. IMPORTANT: Use piston ring expander (91-24697) for compression ring installation. e. Install lower compression ring with marked side up, using ring expander. f. Install top compression ring with marked side up, using ring expander. InstallationIMPORTANT: Cylinder bores must be clean before piston installation. Clean with alight honing, as necessary. Then clean with hot water and detergent wash. Aftercleaning, swab bores several times with light engine oil and clean cloth, then wipewith a clean dry cloth. 1. Lubricate connecting rod bearings and install in rods and rod caps. 2. Lightly coat pistons, rings and cylinder walls with light engine oil. 3. With bearing caps removed, install connecting rod bolt guide (3/8-24) [J-5239] on con-necting rod bolts. IMPORTANT: Be sure ring gaps are properly positioned as shown. 72373 a b b c d e f g Ring Gap Locations - Oil Ring Spacer Gap (Tang In Hole Or Slot Within Arc) - Oil Ring Gaps - 2nd Compression Ring Gap - Top Compression Ring Gap - Port Sidef - Engine Fronty - Starboard Side 4. Install each connecting rod and piston assembly in its respective bore. Install withconnecting rod bearing tangs toward outside of cylinder block. Use piston ringcompressor to compress rings. Guide connecting rod into place on crankshaft journalwith connecting rod bolt guide. Use a hammer handle with light blows to install pistonto bore. Hold ring compressor firmly against cylinder block until all piston rings haveentered cylinder bore. 262 CID (4.3L) ENGINESERVICE MANUAL NUMBER 25 90-861328-1 NOVEMBER 1999 Page 3A-83 IMPORTANT: Be sure to install new pistons in same cylinders for which they were fitted, and used pistons in same cylinder from which they were removed. Eachconnecting rod and bearing cap should be marked, beginning at front of engine (1,3 and 5 in left bank and 2, 4 and 6 in right bank). Numbers on connecting rod and bearing cap must be on same side when installed in cylinder bore. If a connecting rods ever transposed from one block or cylinder to another, new bearings should be fitted and connecting rod should be numbered to correspond with new cylindernumber. 72552 a a - Piston Ring Compressor (J-8037) 5. ENGINE SERVICE MANUAL NUMBER 25 90-861328-1 NOVEMBER 1999 Page 3A-81 1. Assemble piston to connecting rod using piston pin remover as shown. Follow instructions supplied with kit. 72897 a a - Piston Pin Remover (J-24086-B) 2. Once assembled, check piston for freedom of movement in all directions on connectingrod; piston should move freely. If it does not, piston pin bore is tight and piston/pin assembly must be replaced. 3.

If a new connecting rod has been installed, mark connecting rod and cap (on side of rodand cap with slots for connecting rod bearing tangs) with cylinder number in which it will be installed. PISTON RINGS All compression rings are marked on upper side of ring. When installing compression rings,make sure that marked side is toward top of piston. Oil control rings are a three-piece type, consisting of two rings and a spacer. 1. Select rings comparable in size to cylinder bore and piston size. 2. Slip compression ring in cylinder bore, then press ring down into cylinder bore about 1/4in. (6 mm) (below ring travel). Be sure that ring is square with cylinder wall. 3. Measure gap between ends of ring with a feeler gauge as shown. 7372 4. If gap between ends of ring is below specifications, remove ring and try another for fit. 5. Fit each compression ring to cylinder in which it is going to be used. 6. Clean and inspect pistons. 262 CID (4.3L) ENGENES SERVICE MANUAL NUMBER 25 Page 3A-82 90-861328-1 NOVEMBER 1999 7. Install piston rings as follows: a. Install oil ring spacer in groove and insert anti-rotation tang in oil hole. b. Hold spacer ends together and install lower steel oil ring rail with gap properly located. c. Install upper steel oil ring rail with gap properly located.

Flex the oil ring assembly to make sure ring is not binding. If ring groove is causingbinding, remove with a fine cut file. If a distorted ring is causing binding, use a newring. IMPORTANT: Use piston ring expander (91-24697) for compression ring installation. e. Install lower compression ring with marked side up, using ring expander. f. Install top compression ring with marked side up, using ring expander. InstallationIMPORTANT: Cylinder bores must be clean before piston installation. Clean with alight honing, as necessary. Then clean with hot water and detergent wash. Aftercleaning, swab bores several times with light engine oil and clean cloth, then wipewith a clean dry cloth. 1. Lubricate connecting rod bearings and install in rods and rod caps. 2. Lightly coat pistons, rings and cylinder walls with light engine oil. 3. With bearing caps removed, install connecting rod bolt guide (3/8-24) [J-5239] on con-necting rod bolts. IMPORTANT: Be sure ring gaps are properly positioned as shown. 72373 a b b c d e f g Ring Gap Locations - Oil Ring Spacer Gap (Tang In Hole Or Slot Within Arc) - Oil Ring Gaps - 2nd