mercruiser HI-PERFORMANCE SERIES

service bulletin

TO: SERVICE MANAGER ☐ MECHANICS ☐
PARTS MANAGER ☐

No. 98-9

H.P. 500 EFI Specifications

TUNE-UP

Horsepower (Kilowatts)	470 (350 kw)
Displacement (Liters)	502 CID (8.2 L) V-8
Bore	4.468 in. (113.48mm)
Stroke	4.00 in. (101.6mm)
Compression Ratio	8.75:1
Compression Pressure	175 psi (1207 kPa)
Ignition	MEFI/EST Digital
Spark Plug Type-P/N	Champion RV8C or AC-MR43T or NGK BR6FS
Spark Plug Gap	.035 in. (0.9 mm)
Maximum RPM at Wide-Open-Throttle	4800-5200 RPM
Idle RPM (In and Out of Gear)	750 RPM
Fuel Required	87 Octane {(R+M)÷2} **(NOTE 1)**
Fuel Rail Pressure	Idle 39 PSI. (269 kPa) WOT 41 PSI. (282 kPa)
Electrical System	12-Volt Negative Ground
Alternator Rating	60 Amperes
Recommended Battery Rating	Min. 550 CCA
Crankcase Oil Capacity with New Filter	8 Qts. (7.5 Liters) **(NOTE 2)**
Oil Pressure at 2000 RPM	30 - 70 psi (207-483 kPa)
Seawater Cooling System	20 U.S. Qts. (19L) **(NOTE 3)**

NOTE: (1) *Without alcohol whenever possible.*

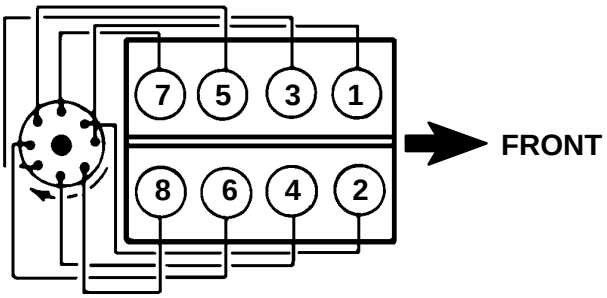
NOTE: (2) *Approximate, ALWAYS use dipstick to determine exact quantity of oil required.*

NOTE: (3) *Cooling System Capacity information is for winterization use only.*

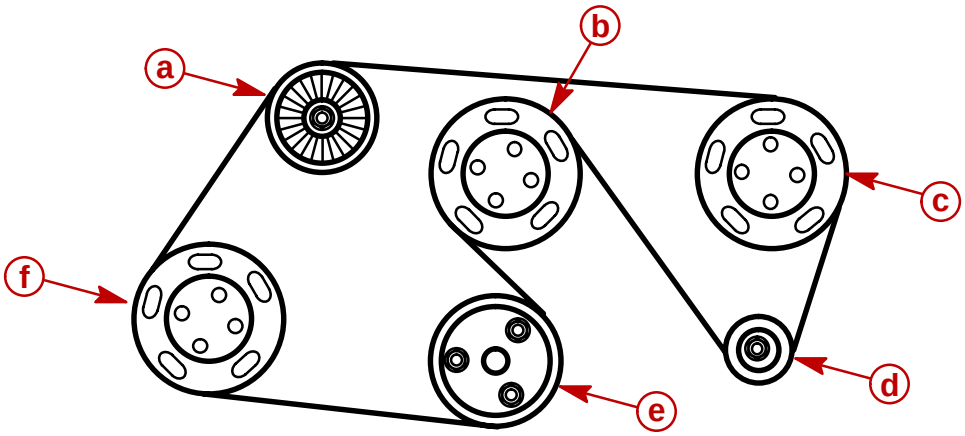
IDLER FIRING ORDER

Firing Order	1-8-4-3-6-5-7-2

Figure 1 L.H. Rotation



SERPENTINE BELT ROUTING



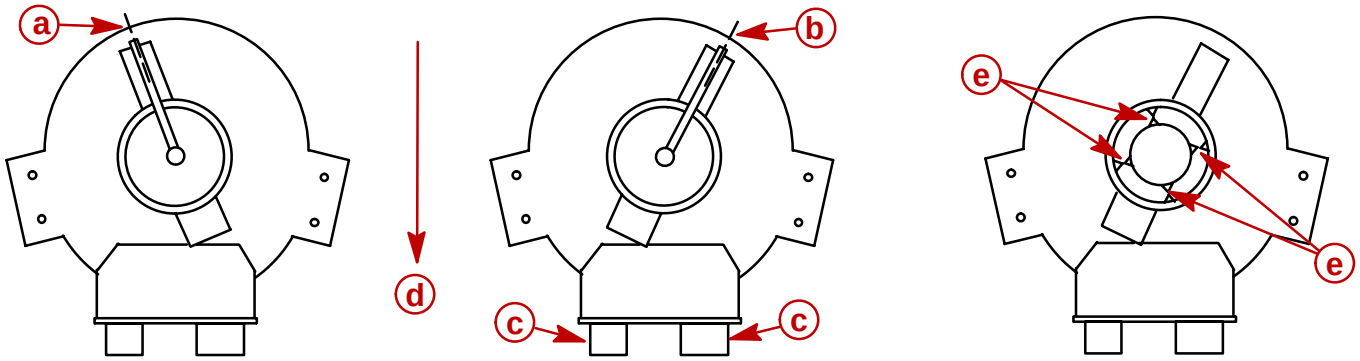
a - Idler Pulley
b - Circulating Pump Pulley
c - Power Steering Pulley (Non Power Steering Models Will Have an Idler Pulley Here)
d - Alternator Pulley
e - Crankshaft Pulley
f - Seawater Pump Pulley

Timing

Initial (Non Running) Set-up

NOTE: *Initial setup must be confirmed by the running mode after set-up.*

1. Rotate engine to have #1 Cyl at top firing position and Torsional Damper at 13° (13° for non-running set-up only).
2. For initial installation into engine, pickup will be approx. at point (a), then will rotate to (b) (#1 spark plug wire of cap) when seated, with the base plate connections (c) pointing straight back from engine (d).
3. Align four pointers of distributor with four pickups of outer ring (e), secure distributor shaft hold down and install cap.



Running Mode Set-up

1. Connect Digital Diagnostic Terminal (DDT) tester to the Data Link engine connection and set to **SERVICE MODE**.
2. Start engine and check timing at torsional damper with a timing light.
3. Timing should be 8°, if required loosen distributor hold down and rotate distributor to achieve correct timing then retighten hold down.

ELECTRICAL SPECIFICATIONS

Ignition Specifications

Coil	Mercury P/N 817378 Delco P/N 1115491
Coil Primary Resistance (Ohms) Minimum	.60
Coil Primary Resistance (Ohms) Maximum	.80
Coil Secondary Resistance (Ohms)	9.4-11.7

Starter Motor Specifications

Part No.	Mercury Marine 50-806964A-3 Delco 9000821			
No Load Test				
Volts	**Amps. (Min.)**	**Amps. (Max.)**	**RPM (Min.)**	**RPM (Max.)**
10.6	70	120	5400	10,800

INTERNAL ENGINE SPECIFICATIONS

UNIT OF MEASUREMENT: in. (mm)

Cylinder Bore

Diameter	4.4662 - 4.4655 (113.442 - 113.424)	
Out of Round	Production	.001 (0.0254)
	Service	.002 (0.051)
Taper	Production	.0005 (0.0127)
	Service	.001 (0.025)

Piston: See Note

Clearance	Production & Service	.004 - .006 (0.102 - 0.152)

NOTE: *Measure piston 1.300 in. (33.02 mm) down from lower oil ring groove and 90° from piston pin bore.*

Piston Ring:

COMPRESSION RINGS

Groove Side Clearance		
Production	Top & 2nd	.0017 - .0032 (0.044 - 0.0814)
Service	Top & 2nd	.0027 - .0042 (0.0687 - 0.1068)
End Gap		
Service	Top	.022 - .024 (0.558 - 0.610)
	2nd	.020 - .022 (0.508 - 0.558)

OIL RINGS

Groove Side Clearance	
Production	.0025 - .0045 (0.0635 - 0.1143)
Service	.006 (0.152)
End Gap	
Production	.015 - .055 (0.381 - 1.397)
Service	.015 - .055 (0.381 - 1.397)

Piston Pin: Free Floating

Diameter		.9895 - .9898 (0.251)
Clearance	Production	.00025 - .00035 (0.0064 - 0.0089)
	Service	.0012 (0.030)
Fit to Rod		.0008 - .0016 (0.0203 - 0.0406)

Crankshaft:

MAIN JOURNAL

Diameter	No. 1,2,3,4,5	2.748 - 2.749 (69.8195 - 69.8246)
Taper & Out of Round	Production	.0005 (0.0127)
	Service	.001 (0.0254)

CONNECTING ROD JOURNAL

Diameter		2.1990 - 2.2000 (55.855 - 55.880)
Taper & Out of Round	Production	.0005 (0.0127)
	Service	.001 (0.0254) max.

MAIN BEARING CLEARANCES

Production	No. 1,2,3,4	.0013 - .0025 (0.0330 - 0.064)
	No. 5	.0024 - .0040 (0.0610 - 0.1016)
Service	No. 1,2,3,4	.0010 - .0025 (0.025 - 0.0635)
	No. 5	.0025 - .0040 (0.0635 - 0.1016)
Crankshaft End Play		.006 - .010 (0.152 - 0.254)
Crankshaft Run Out		.005 (0.0125)

Rod Bearing Clearance Production	.0009 - .0025 (0.0229 - .0635)
Rod Bearing Clearance Service	.0009 - .0030 (0.0229 - .0762)
Rod Side Clearance	.013 - .023 (0.330 - 0.584)

Camshaft and Drive:

Lobe Lift ± .002 (0.051)	Intake	.352 (8.941)
	Exhaust	.359 (8.118)
Journal Diameter		1.948 - 1.949 (49.48 - 49.51)
Journal Out-of-Round		.001 (0.0254)
Camshaft Run-Out		.0015 (0.0381)
Timing Belt		Non Adjustable

Valve System:

Lifter Type		Hydraulic Roller
Rocker Arm Ratio		1.7:1
Valve Lash (Int. & Exh.)		1 Turn Down From Zero Lash
Face Angle (Int. & Exh.)		45°
Seat Angle (Int. & Exh.)		45°
Seat Run Out (Int. & Exh.)		.002 (0.0508)
Seat Width	Intake	.040 - .060 (1.02 - 1.52)
	Exhaust	.060 - .090 (1.52 - 2.29)
Stem Clearance		
Production	Intake	.0010 - .0025 (0.025 - 0.064)
	Exhaust	.0012 - .0025 (0.038 - 0.064)
Service	Intake	.0010 - .003 (0.025 - 0.076)
	Exhaust	.0010 - .003 (0.025 - 0.076)
Valve Spring		
Free Length		2.320 (58.93)
Pressure Lbs. @ Inches (mm) *(See Note)*	Closed @ 1.88 (47.7)	150 lbs. (667 N)
Pressure Lbs. @ Inches (mm) *(See Note)*	Open @ 1.28 (32.5)	415 lbs. (1846 N)
Installed Height		1.900 (48.3)

NOTE: *Test springs as a complete assembly with dampener.*

Cylinder Head:

Gasket Surface Flatness	.006 (0.152) Overall Max. .003” (0.076) Within a 6 in. (152mm) Span

Flywheel:

Run Out on Face Area	.008 (0.203) Max (Face Area)

TORQUE SPECIFICATIONS

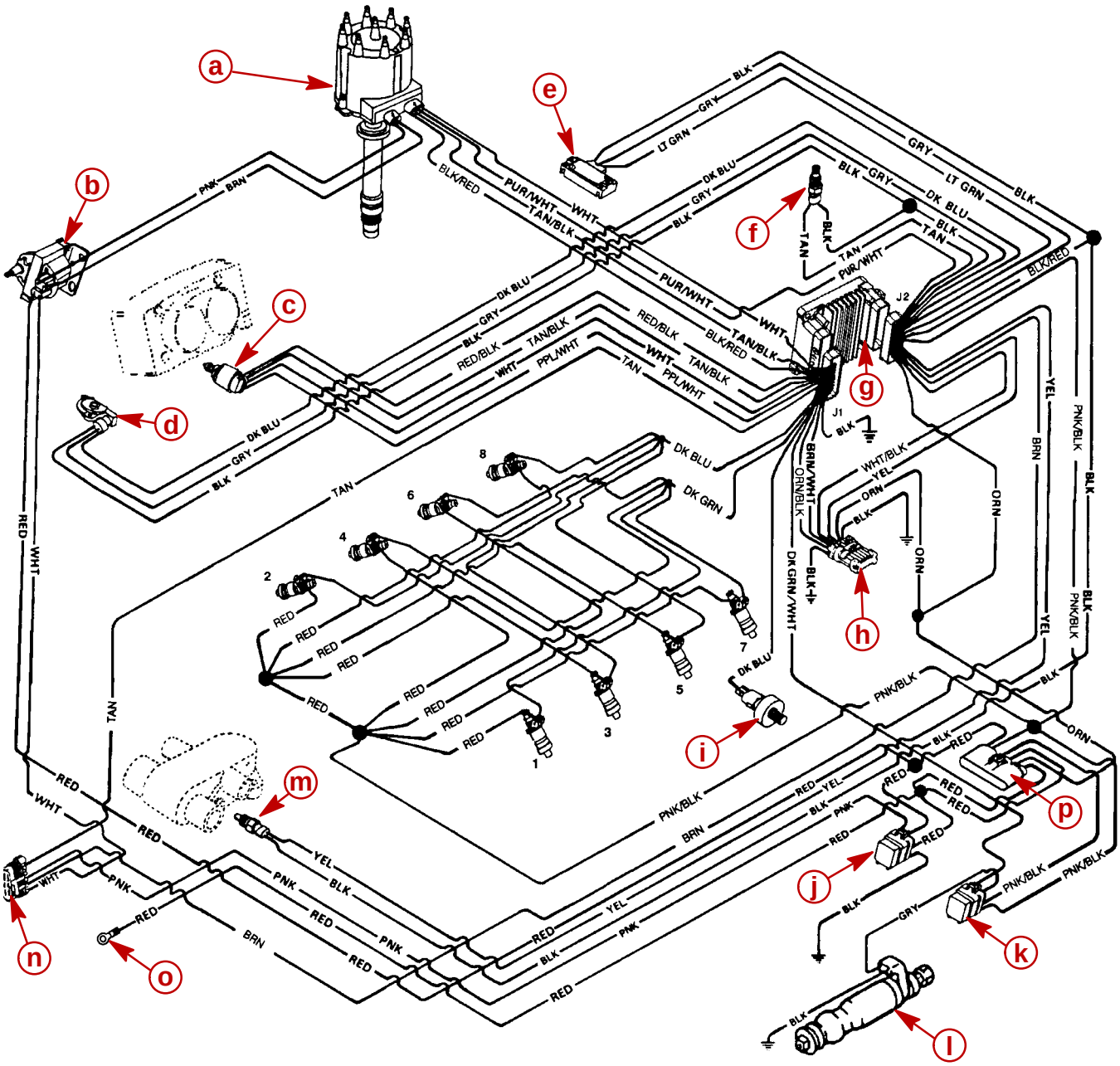
Camshaft Sprocket/Gear (NOTE 1)	25 lb.ft. (34 N·m)
Cam Thrust Plate	70 lb. In. (8 N·m)
Conn. Rod Cap (NOTE 2)	65 lb. ft. (88 N·m)
Main Bearing Cap (NOTE 2)	110 lb. ft. (149 N·m)
Crankcase Front Cover	80 lb. in. (9 N·m)
Cylinder Head (NOTE 3)	Step #1 - 20 lb. ft. (27 N·m) Step #2 - 50 lb. ft. (68 N·m) Step #3 - 75 lb. ft. (102 N·m)
Distributor Clamp	15 lb. ft. (20 N·m)
Flywheel (NOTE 1)	70 lb. ft. (95 N·m)
Flywheel Drive Plate (NOTE 1)	35 lb. ft. (48 N·m)
Flywheel Housing	30 lb. ft. (41 N·m)
Intake Manifold	30 lb. ft. (41 N·m)
Intake Plenum to Intake Manifold	8 lb. ft. (10.5 N·m)
Throttle Body to Intake Plenum	20 lb. ft. (27 N·m)
Fuel Rails to Intake Manifold	15 lb. ft. (20 N·m)
Oil Pan to Crankcase (5/16-18)	165 lb. in. (19 N·m)
Oil Pan to Crankcase (1/4-20)	80 lb. in. (9 N·m)
Oil Pan Drain Plug	20 lb. ft. (27 N·m)
Oil Pump (NOTE 1)	70 lb. ft. (95 N·m)
Oil Pump Cover	80 lb. in. (9 N·m)
Rocker Arm Stud (NOTE 1)	45 lb. ft. (61 N·m)
Rocker Arm Cover	72 lb. in. (8.1 N·m)
Exhaust Manifold	30 lb. ft. (41 N·m)
Spark Plug	15 lb. ft. (20 N·m)
Torsional Damper	85 lb. ft. (116 N·m)
Water Pump	30 lb. ft. (41 N·m)

NOTE: 1 *Use Loctite 271 (P/N 92-32609-1) on threads.*

NOTE: 2 *Apply moly lube on washer and under bolt head as well as on the threads.*

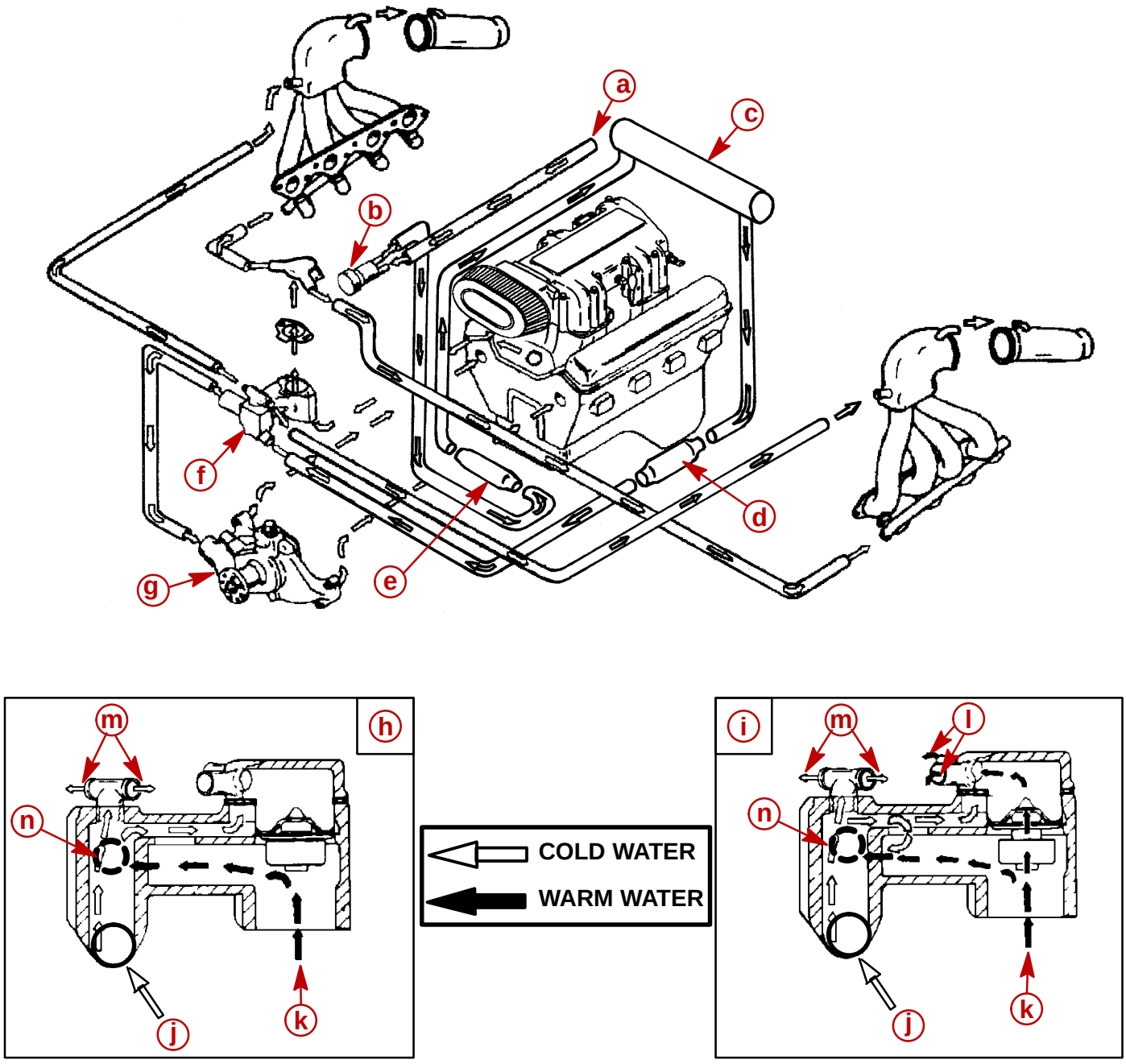
NOTE: 3 *Apply Perfect Seal under bolt head, and on threads.*

ENGINE ELECTRICAL SYSTEM 500 EFI



a - Distributor
b - Ignition Coil
c - Idle Air Control (IAC)
d - Throttle Position Sensor
e - Manifold Absolute Pressure Sensor
f - Manifold Air Temperature Sensor
g - ECM
h - ALDL Connector
i - Knock Sensor
J - Ignition Relay
k - Fuel Pump Relay
l - Fuel Cooler Pump
m Coolant Temperature Sensor
n - To Start & Charging Harness
o - 12V Supply To Harness
p - Fuse Block

COOLING SYSTEM WATER FLOW DIAGRAM 500 EFI



a - Seawater Inlet
b - Seawater Pickup Pump
c - Engine Oil Cooler
d - Power Steering Cooler
e - Fuel Cooler
f - Thermostat Housing
g - Engine Circulating Pump
h - Coolant Flow With Thermostat Closed
i - Coolant Flow With Thermostat Open
j - Coolant From Seawater Pickup Pump
k - Coolant From engine
l - Coolant To Exhaust Manifold
m -Coolant To Exhaust Elbows
n - Coolant To Engine Circulating Pump