mercruiser
STERN DRIVES & INBOARDS

service bulletin

MCM 170MR/190MR SPECIFICATIONS

NUMBER: 85-22

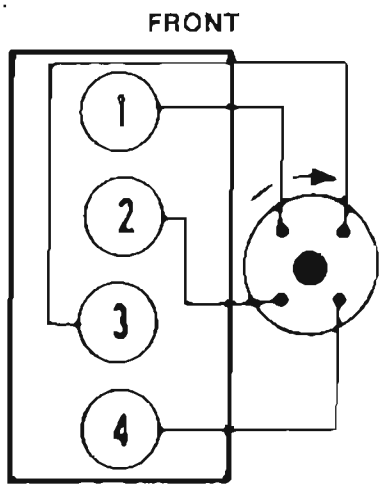
CIRCULATE TO:
SERVICE MANAGER ☐
PARTS MANAGER ☐
MECHANICS ☐
"Place in a Service Bulletin Binder"

A. TUNE-UP SPECIFICATIONS

Model	170MR	190MR
Horsepower (Kilowatts)	170 (127kw)	190 (142kw)
Displacement	224 CID (3.7 Litres)	
Engine Type and Number of Cylinders	In-Line 4	
Bore	4.36" (110.7mm)	
Stroke	3.75" (95.3mm)	
Compression Ratio	8.8:1	
Compression Pressure	150 PSI (1035 kPa)	
Point Gap	.022" (56mm)	
Point Dwell	28° - 34°	
Point Spring Tension	19-23 Oz. (538-652 g)	
Spark Plug Type	AC R42TS or Champion RV9YC	
Spark Plug Gap	.035" (.9mm)	
Timing at Idle RPM	8° BTDC	
Maximum RPM at Wide-Open-Throttle	4200-4600	4400-4800
Idle RPM in Forward Gear	650-700	
Firing Order	1-3-4-2	
Fuel Required	86 Octane Minimum (Average Octane Rating)	
Fuel Pump Pressure	3-6 PSI (21-41 kPa)	
Electrical System	12-Volt Negative Ground	
Alternator Rating	39 Amperes	

Model	170MR	190MR
Recommended Battery Rating	Min. 450 Amps - Cold Cranking Amperage	
Crankcase Oil Capacity with New Filter (Approx.)*	Approx. 5-1/2 Qts. (5.2 Litres)	Approx. 6-1/2 Qts. (6.1 Litres)
Oil Pressure at 2000 RPM	30-60 PSI (207-414 kPa)	
Valve Lash	.110-.210 (2.8-5.3mm)	
Cooling System Capacity	11 Qts. (10.4 Litres)	
Thermostat	160°F (71°C)	
Stern Drive Unit Oil Capacity (Approx.)*	32 Oz. (.95 Litres)	
Stern Drive Unit Gear Ratio	1.84:1 (1.65:1 Opt.)	

* *Approximately.*
ALWAYS use dipstick to determine exact quantity of oil required.



FIRING ORDER
1-3-4-2

LEFT-HAND ROTATION
ENGINE FIRING ORDER

B. ELECTRICAL SPECIFICATIONS

IGNITION SPECIFICATIONS

Engine Model	170MR-190MR
Resistor Wire (Ohms)	1.8 - 2 Ohms
Spark Plug Type Spark Plug Gap Point Dwell Point Spring Tension Timing	Refer to "Tune-Up Specifications"
Condenser	.18-.25 MFD

Engine Model	170MR-190MR
Coil	Part No. 32193
Coil Primary Resistance (Ohms) Minimum	1.1
Coil Primary Resistance (Ohms) Maximum	1.5
Coil Secondary Resistance (Ohms)	9,500-15,000

STARTER MOTOR SPECIFICATIONS

Identification Number	No Load Test					Brush Spring Tension
	Volts	Min. Amps	Max. Amps	Min. RPM	Max. RPM	
50-97499A2 (Delco-Remy) 1998404	10.6	60	100	5,300	10,600	56-105 Oz. (1588-2976 g)

C. CARBURETOR SPECIFICATIONS (170)

All Measurements are ± 1/64" (.4mm)

Make (Model)	MerCarb (35mm)
Part No. Mercury	1389-8489A5
Float Level (Note 1)	5/8" (15.8mm)
Pump Rod	1-5/32" (29mm)
Choke Unloader	.080" [5/64" (2mm)]
Choke Setting	Index Marks Aligned

Main Jet	1.65mm
Power Valve	.9mm
Idle Mixture Screw, Preliminary Setting	1-1/4 Turns

NOTES:

1) Measurement Taken From Gasket to Toe of Float. Before Checking, Raise Float and Let It Fall By Itself. DO NOT Force Downward By Hand.

D. CARBURETOR SPECIFICATIONS (190 with Wedge)

All Measurements are ± 1/64" (.4mm)

Make (Model)	Rochester (4MC)
Part No. Mercury (Rochester)	1347-8460 17081299
Float Level	(NOTE 1)
Pump Rod Hole Location	Inner
Accelerator Pump (NOTE 2)	23/64" (9.1mm)
Air Valve Dash Pot (Air Valve Rod)	.025" (.64mm)
Vacuum Break	.190" [3/16" (4.8mm)]
Air Valve Spring Wind Up	1/4 Turn (40-50 g)
Choke Adjustment	(NOTE 3)

Main Jet	.066"
Metering Rod (Primary)	.036"
Metering Rod (Secondary)	CZ-DE
Idle Mixture Screw Preliminary Setting	2-3 Turns

NOTES:

1) *If Fuel Inlet Needle Is SPRING LOADED: Float Lever Must Just Touch Needle Ball. DO NOT Push Down On Ball. Float Level Is 1/4" (6.4mm). IF Fuel Inlet Needle Is SOLID TYPE: Float Level Is 3/8" (9mm).*
2) *Accelerator Pump Measurement Taken From Flame Arrestor Mounting Surface to Pump Stem With Throttle Plates Fully Closed.*
3) *Index Mark On Cover Should Be 1/4" To The Right Of The Leanest Index Mark On Choke Housing.*

E. CARBURETOR SPECIFICATIONS (190 without Wedge)

All Measurements are ± 1/64" (.4mm)

Make (Model)	Rochester (4MC)
Part No. Mercury (Rochester)	1347-9142A2 (17083522)
Float Level	3/8" (9mm)
Pump Rod Hole Location	Inner
Accelerator Pump (NOTE 1)	23/64" (9.1mm)
Air Valve Dash Pot (Air Valve Rod)	.025" (.64mm)
Vacuum Break	.190" [3/16" (4.8mm)]
Air Valve Spring Wind Up	1/4 Turn (40-50 g)
Choke Adjustment	(NOTE 2)

Main Jet	.066"
Metering Rod (Primary)	.036"
Metering Rod (Secondary)	CZ-DE
Idle Mixture Screw, Preliminary Setting	2-3 Turns

NOTES:

1) *Accelerator Pump Measurement Taken From Flame Arrestor Mounting Surface to Pump Stem With Throttle Plates Fully Closed.*
2) *Index Mark On Cover Should Be 1/4" To The Right Of The Leanest Index Mark On Choke Housing.*

F. INTERNAL ENGINE SPECIFICATIONS

UNIT OF MEASUREMENT in. (mm)

▲ Different than MCM 470/488

MODEL	170MR	190MR
CU. IN. DISPLACEMENT	224 (3.7 litres)	

CYLINDER BORE:

Diameter			4.3602-4.3609 (110.749-110.767)
Out of Round		Production	.0005 (.0127) Max.
		Service	.0015 (.0381) Max.
Taper	Production	Thrust Side	.0005 (.0127) Max.
		Relief Side	.0005 (.0127) Max.
	Service		.003 (.076) Max.

CYLINDER BLOCK:

Deck Height (Note 1)	Production	10.255-10.265 (260.477-260.731)
	Service	10.240 (260.096) Min.
Main Bearing Bore Diameter	Production	▲ 2.9417-2.9429 (74.7191-74.7497)
	Service	2.9435 (74.7649) Max.
Hydraulic Lifter Bore Diameter	Production	.875-.876 (22.225-22.250)
	Service	.878 (22.301) Max.
Camshaft Bore Diameter		▲ 2.1258-2.1278 (53.995-54.046)

NOTE 1: Measured from center of main bearing bore to top of cylinder block.

PISTON: CLEARANCE

Production	See Page 7
Service	See Page 7

PISTON RING: COMPRESSION

Groove Clearance	Production	Top	.0025-.004 (.07-.1)
		2nd	.0025-.004 (.07-.1)
	Service	Top	.0025-.004 (.07-.1)
		2nd	.0025-.004 (.07-.1)
Gap	Production	Top	.010-.020 (.25-.5)
		2nd	.010-.020 (.25-.5)
	Service	Top	.010-.020 (.25-.5)
		2nd	.010-.020 (.25-.5)

PISTON RING: OIL

Groove Clearance	Production	.0011-.0065 (.03-.15)
	Service	.0011-.0065 (.03-.15)
Gap	Production	.010-.025 (.25-.6)
	Service	.010-.025 (.25-.6)

PISTON PIN:

Diameter		1.0399-1.0402 (26.413-26.421)
Clearance	Production	.0004-.0006 (.0102-.0152)
	Service	.0004-.0006 (.0102-.0152)
Fit in Rod		.0006-.0016 (.0152-.0406) Interference

MODEL			170MR	190MR

CRANKSHAFT:

Diameter			2.7472-2.7482 (69.779-69.804)
Main Journal	Taper	Production	.0002 (.0051) Max.
		Service	.0005 (.0127) Max.
	Out of Round	Production	.0002 (.0051) Max.
		Service	.0005 (.0127) Max.
Main Brg. Clearance		Production	▲ .0009-.0035 (.0229-.0889)
		Service	▲ .001-.0035 (.0254-.0889)
Rear Seal Area Diameter		Production	3.748-3.752 (95.1992-95.3008)
		Service	3.745 (95.123) Min.
Timing Sprocket (Note 1)		Production	1.380-1.381 (35.052-35.077)
		Service	1.379 (35.026) Min.
Balance of Crankshaft (Note 2)		Production	.50 oz. in.
Crankshaft End Play			.006-.010 (.15-.25)
Crankpin	Diameter		2.4979-2.4989 (63.447-63.472)
	Taper	Production	.0002 (.051) Max.
		Service	.0005 (.0127) Max.
	Out of Round	Production	.0002 (.051) Max.
		Service	.0005 (.0127) Max.
Rod Brg. Clearance		Production	.0009-.0031 (.0228-.0787)
		Service	.001-.003 (.03-.07)
Rod Side Clearance			.005-.012 (.15-.3)

NOTE 1: Because crankshaft has taper, measurement must be taken at rear half of sprocket area on crankshaft.
NOTE 2: Balanced without connecting rods.

ALTERNATOR ROTOR:

Front Oil Seal Diameter	Production	1.873-1.877 (47.5742-47.6758)
	Service	1.871 (47.5234) Min.

CRANKSHAFT TIMING SPROCKET:

Inside Diameter	Production	1.381-1.382 (35.0774-35.1028)

CAMSHAFT:

End Play		.002-.005 (.06-.1)
Lobe Lift (Max.)	Intake	▲ .287 (7.2898)
	Exhaust	▲ .290 (7.3660)
Lobe Wear Limit		.009 (.2286) Max.
Journal Diameter		▲ 2.1238-2.1248 (53.9445-53.9699)
Clearance		.001-.0026 (.0254-.0660)
Camshaft Runout		.001 (.0254) Max.
Timing Chain Deflection		1 (25)

CYLINDER HEAD:

Gasket Surface Flatness	.005 (.1) Max.

MODEL	170MR	190MR

VALVE SYSTEM:

Lifter				Hydraulic
Rocker Arm Ratio				1.73:1
Collapsed Tappet Gap				.110-.210 (2.794-5.334)
Face Angle	Intake			44°
	Exhaust			44°
Seat Angle	Intake			45°
	Exhaust			45°
Seat Runout (Int. & Exh.)				.002 (.0508) Max.
Seat Width	Intake			.060-.080 (1.524-2.032)
	Exhaust			.060-.080 (1.524-2.032)
Stem Clearance	Production		Int.	.001-.0027 (.0254-.0686)
			Exh.	.001-.0027 (.0254-.0686)
	Service		Int.	.0037 (.0940) Max.
			Exh.	.0052 (.1321) Max.
Springs (Note 1)	Free Length			2.18 [2-3/16 (55)]
	Pressure Lbs. Ft.		Closed	90-100 at 1.86 [1-55/64] [122-136 N.m at (47)]
			Open	255-275 at 1.36 [1-23/64] [346-372 N.m at (35)]
	Installed Height ± 1/32" (.8mm)		Intake	1.86 [1-55/64 (47)]
			Exhaust	1.86 [1-55/64 (47)]
	Damper			External

NOTE 1: Test Springs with Damper Installed

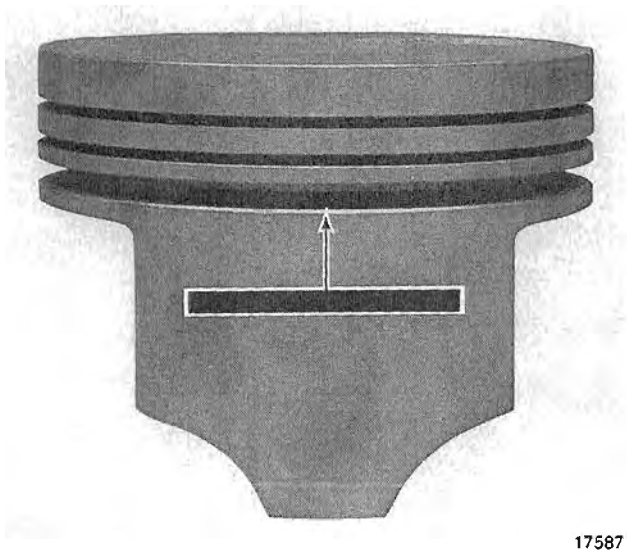


Figure 1. .002" - .0037" (.05 - .09mm)

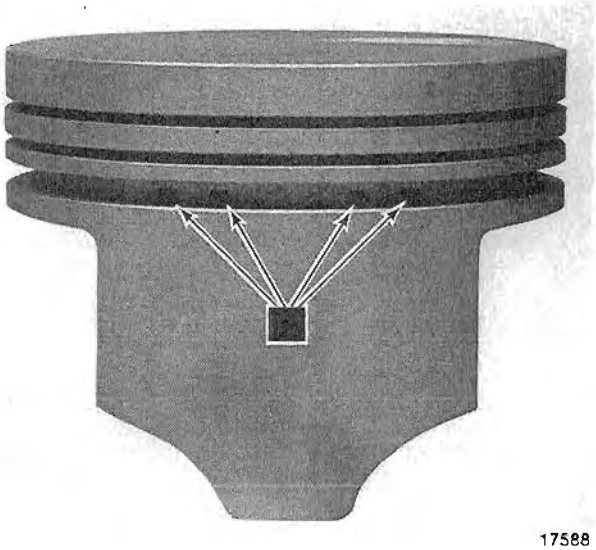
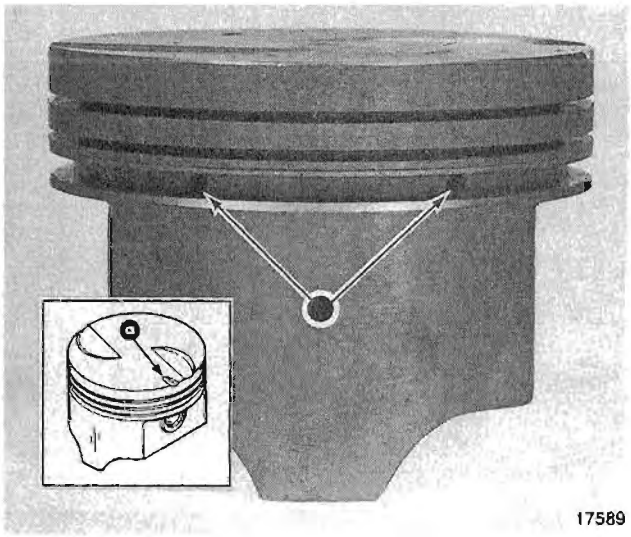
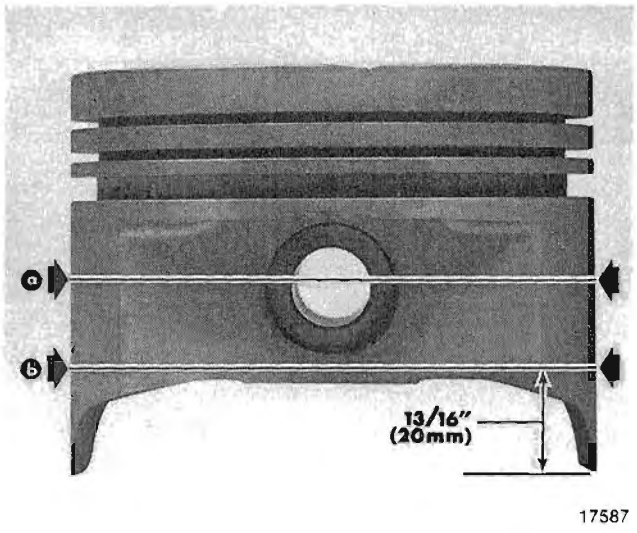


Figure 2. .004" - .0057" (.1 - .15mm)



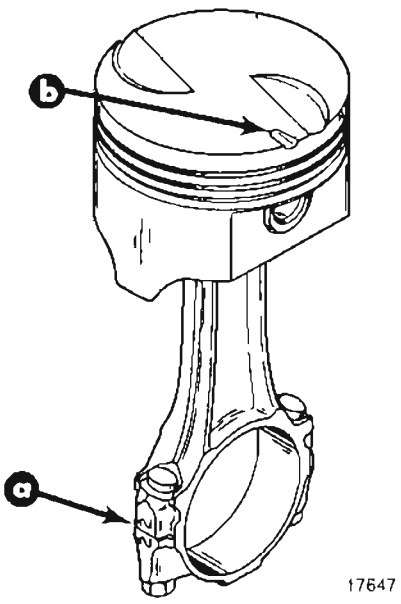
a - Notch

Figure 3. .001" - .0027" (.03 - .06mm)



a - Figures 1 or 2 b - Figure 3

Figure 4. Clearance Location



a - Number Toward Camshaft
b - Notch Toward Front

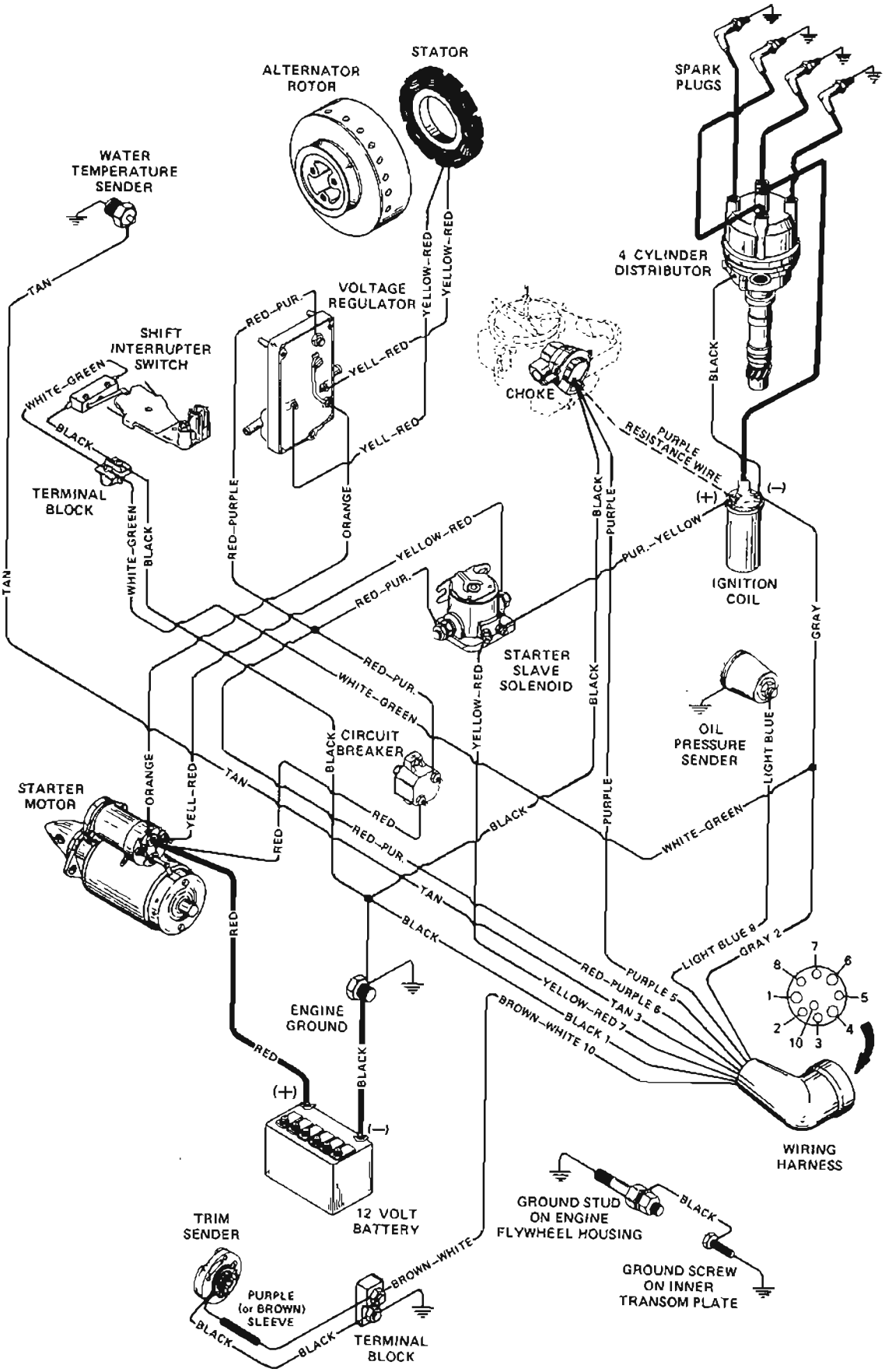
Figure 5.

G. TORQUE SPECIFICATIONS

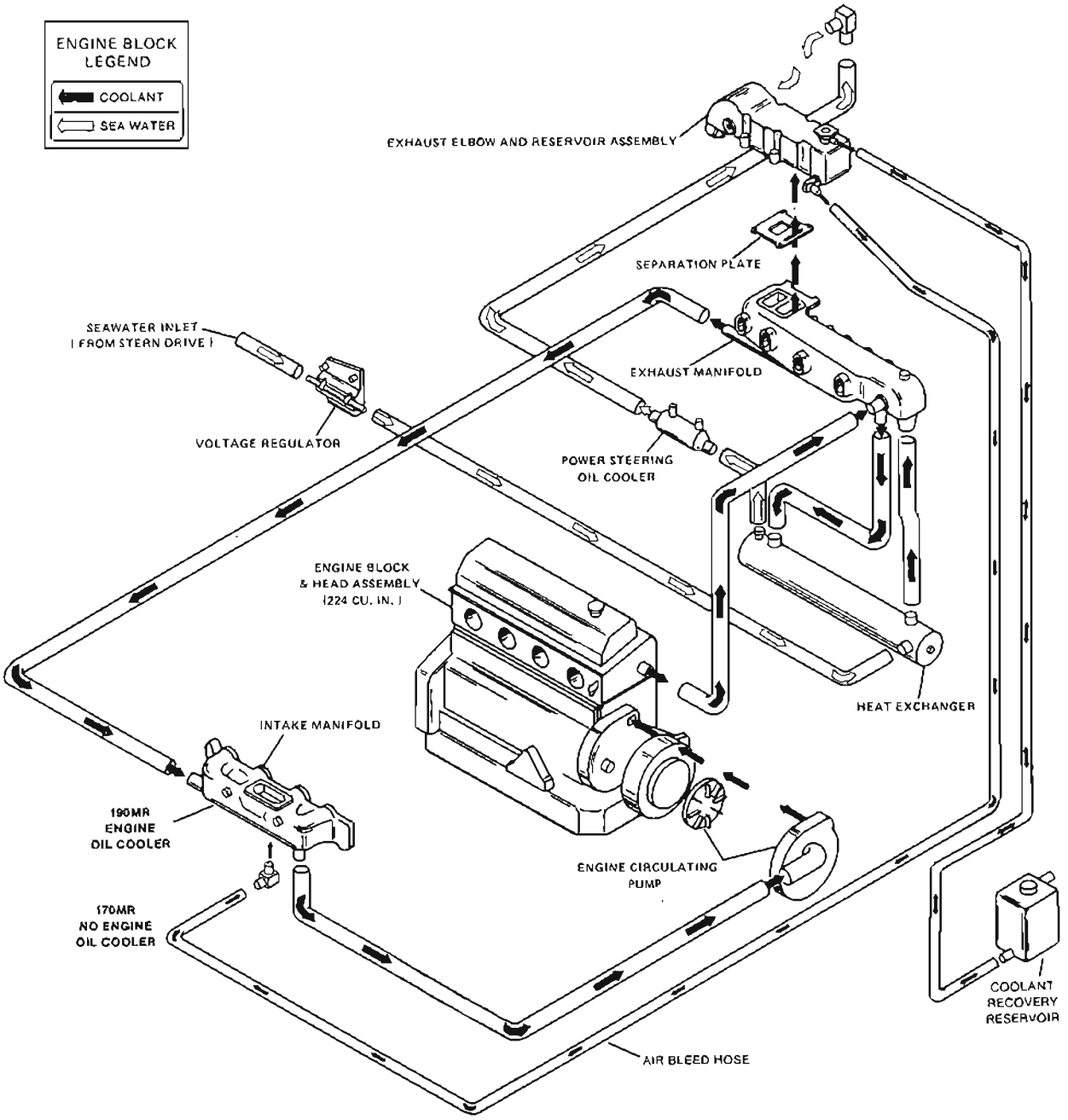
▲ Later Models of MCM 170MR/190MR

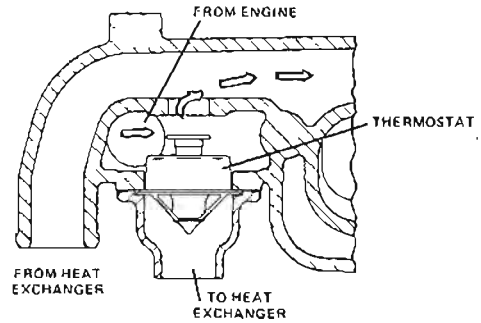
Fastener Location	Lbs. Ft. (N.m)	Lbs. In. (N.m)
Alternator Rotor to Crank	75 (102)	
▲ Camshaft Impeller Stud (Note 1)	15 (20)	
Camshaft Thrust Plate		115 (13)
Camshaft Sprocket Screws		150 (17)
Carburetor Mounting (2 BBL)	20 (27)	
Carburetor Mounting (4 BBL)	20 (27)	
Chain Tightener Bolt	20 (27)	
Connecting Rod Cap	40 (54)	
Coupler/Flywheel	30 (41)	
Cylinder Head (Note 2)	130 (176)	
Distributor Clamp	15 (20)	
Flywheel Housing to Block	30 (41)	
Front Mount to Block	50 (68)	
Impeller Cover	15 (20)	
Impeller Screw 5/16-18	15 (20)	
▲ Impeller (Note 4)	15 (20)	
Main Bearing Cap	55 (75)	
Manifold to Head (Exhaust)	25 (34)	
Manifold to Head (Intake)	25 (34)	
Oil Pan		130 (15)
Oil Pan Drain Plug	20 (27)	
Oil Pump Cover		120 (14)
Oil Pump to Block	25 (34)	
Oil Pump Pickup	20 (27)	
Oil Tube to Block	20 (27)	
Rocker Arm Cover		90 (10)
Rocker Arm Bolt (Note 3)	20 (27)	
Side Cover	15 (20)	
Spark Plug (14mm)	15 (20)	
Starter Motor	60 (81)	
Stator to Front Cover		45 (5)
Timing Chain Cover	15 (20)	
Water Pump Cover	15 (20)	

NOTES: 1) Left Hand (L.H.) Thread. Use Loctite 35.
2) Torque with Valves Closed and in 3 Steps. Retorque After First Start Up.
3) Torque with Valves Closed.
4) Left Hand (L.H.) Thread.

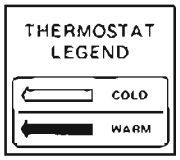


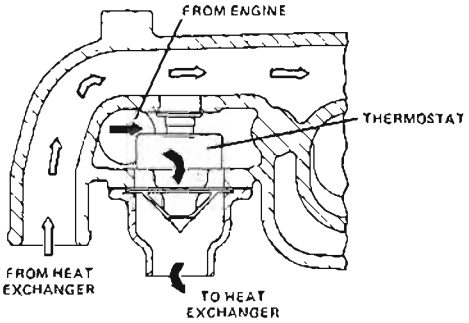
H. MCM 170MR/190MR WIRING DIAGRAM





COOLANT FLOW THROUGH EXHAUST MANIFOLD AND THERMOSTAT HOUSING ASSEMBLY WITH THERMOSTAT CLOSED





COOLANT FLOW THROUGH EXHAUST MANIFOLD AND THERMOSTAT HOUSING ASSEMBLY WITH THERMOSTAT OPEN

I. MCM 170MR/190MR WATER FLOW DIAGRAM