

TO: SERVICE MANAGER MECHANICS
PARTS MANAGER

REVISED
11-14-94

No. 94-1

H.P. 450 (454 cid) Specifications S/N F347100 & UP

- A. Tune-up Specifications
- B. Electrical Specifications
- C. Carburetor Specifications
- D. Internal Engine Specifications
- E. Torque Specifications
- F. Wiring Diagram
- G. Water Flow Chart

A. TUNE-UP SPECIFICATIONS

Horsepower (Kilowatts)	450 (336)
Displacement (Liters)	454 CID (7.4)
Engine Type and Number of Cylinders	V-8
Bore	4.250 in. (108mm)
Stroke	4.00 in. (101.6mm)
Compression Ratio	8.8:1
Compression Pressure	175 psi (1207 kPa)
Ignition	Thunderbolt IV
Spark Plug Type	AC-MR43T, NGK BR6FS, or Champion RV8C
Spark Plug Gap	.035 in. (0.9mm)
Timing at Idle RPM (Note)	18° BTDC
Maximum Advance @ 3200 RPM	38° BTDC
Maximum RPM at Wide-Open-Throttle	4800-5200
Idle RPM in Forward Gear	700-750
Firing Order	1-8-4-3-6-5-7-2
Fuel Required	87 Octane $\{(R+M)\div 2\}$ or 92 RON
Fuel Pump Pressure	3-7 psi (10-48 kPa)

NOTE: Timing should be checked at 3200 RPM. At this RPM, timing should be 38° BTDC. Adjust initial timing to achieve 38° at 3200 RPM.

Electrical System	12-Volt Negative Ground
Alternator Rating	55 Amperes
Recommended Battery Rating	Min. 450 Amps Cold Cranking Amperage
Crankcase Oil Capacity with New Filter*	8 Qts. (7.5Liters)
Oil Pressure at 2000 RPM	30-70 psi (207-483 kPa)
Thermostat	143° F (62° C)
Cooling System Capacity	20 U.S. Qts. (18.9L)
Stern Drive Unit Oil Capacity With Monitor (Approx.)	Bravo: 2.8 U.S. Qts. (2.7L)

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

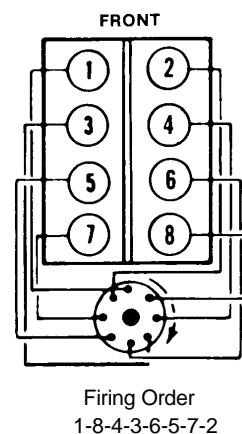


Figure 1. L.H. Rotation

B. ELECTRICAL SPECIFICATIONS

Ignition Specifications

Timing	38° BTDC @ 3200 RPM
Coil	Part No. 392-805570A2
Coil Primary Resistance (Ohms) Minimum	.60
Coil Primary Resistance (Ohms) Maximum	.80
Coil Secondary Resistance (Ohms)	9.4-11.7

Starter Motor Specifications

Mercury Marine Part Number	50-99418A-2			
Delco Remy Part Number	10455603			
Brush Spring Tension	56-105 OZ (1588-2976 g)			
No Load Test				
Volts	Amps. (Min.)	Amps. (Max.)	RPM (Min.)	RPM (max.)
10.6	70	120	5400	10,800

C. CARBURETOR SPECIFICATIONS

All measurements are $\pm 1/64$ in. (0.4mm).

Make (Model)	Holley (4150)
Part No. Mercury (Holley)	13549A14 (80466)
Float Adjustment	Bottom of Sight Plug Hole $\pm 1/32$ " (.8 mm)
Primary Jets	PORT: No. 81 STBD: No. 75
Secondary Jets	PORT: No. 89 STBD: No. 93
Accelerator Pump	.015" (.4 mm)
Choke Setting	Index Marks Aligned
Idle Mixture Screw Preliminary Setting	1/2 to 1 turn
Power Valve	6.5 IN-HG 848243 Holley # 125 - 65

D. INTERNAL ENGINE SPECIFICATIONS

**UNIT OF MEASUREMENT
in. (mm)**

Cylinder Bore:

Diameter		4.2500-4.2507 (107.950-107.986)	
Out of Round	Production	.001 (0.025) Max.	
	Service	.002 (0.05) Max.	
Taper	Production	Thrust Side	.0005 (0.0127) Max.
		Relief Side	.001 (0.025) Max.
	Service	.001 (0.025) Over production	

Piston: See Note

Clearance	Production & Service	.0025-.0037 (.064-.094)
-----------	----------------------	-------------------------

NOTE: Measure piston at wrist pin centerline and 90° from piston pin bore.

Piston Ring: (1)HI Production Limit

Compression	Groove Side Clearance	Production	Top	.0017-.0032 (.0432-.0812)	
			2nd	.0017-.0032 (.0432-.0812)	
		Service	High Limit Production + .001 (.02)		
	Gap	Production	Top	.015-.025 (0.381-0.635)	
			2nd	.015-.025 (0.381-0.635)	
		Service	(1) + .010 (.254)		
Oil	Groove Side Clearance	Production	.005-.0065 (0.13-0.15)		
		Service	High-Limit Production + .001 (0.02) Max.		
	Gap	Production	.020-.035 (0.5-0.85)		
		Service	High-Limit Production + .010 (0.25)		

Piston Pin:

Diameter		.9895-.9898 (25.1333-25.1409)
Clearance to Piston	Production	.00025-.00035 (0.0064-0.0089)
	Service	.0012 (0.03) Max.
Fit in Rod		.008-.0016 (0.203-0.406) Interference

Crankshaft:

Main Journal	Diameter	No. 1, 2, 3, 4, 5	2.7482-2.7489 (69.805-69.822)
	Taper & Out of Round	Production	.0002 (0.0050) Max.
		Service	.0002 -.005 (0.001-0.02)
Main Bearing Clearance	Production	No. 1, 2, 3, 4	.0013-.0025 (.0330-.064)
		No. 5	.0024-.0040 (0.0610-0.1016)
	Service	No. 1, 2, 3, 4	.0013-.0025 (0.0330-0.064)
		No. 5	.0024-.0040 (0.0610-0.1016)
Crankshaft End Play			.006-.010 (0.15-0.25)
Connecting Rod Journal	Diameter		2.1985-2.1995 (55.8419-55.8673)
	Taper & Out of Round	Production	.0005 (0.0127)
		Service	.001 (0.025)
Rod Bearing Clearance		Production	.009-.0025 (0.0229-0.0635)
		Service	.009-.0025 (0.0229-0.0635)
Rod Side Clearance			.013-.023 (0.35-0.58)
Crankshaft Runout @ #3 Main			.003 (0.076) Max

Camshaft and Drive:

Lobe Lift ± .002 (0.051 mm)	Intake	.339 (8.61)
	Exhaust	.352 (8.94)
Journal Diameter	1.948-1.949 (49.48-49.51)	
Journal Out-of-Round	.0005-.001 (0.013-0.025)	
Camshaft Run-Out	.0005-.001 (0.013-0.025)	
Timing Chain Deflection	3/8" (10 mm) from taut 3/4" (19mm) total	
End Play (Hydraulic Roller Cam)	.003-.008 (0.076-0.203)	

Valve System:

Lifter Type	Hydraulic Roller		
Rocker Arm Ratio	1.7:1		
Valve Lash (Intake & Exhaust)	1 Turn Down from Zero Lash		
Face Angle (Intake & Exhaust)	45°		
Seat Angle (Intake & Exhaust)	45°		
Seat Runout (Intake & Exhaust)	.002 (0.050) max.		
Seat Width	Intake	.040-.060 (1.02-1.52)	
	Exhaust	.060-.090 (1.52-2.29)	
Stem Clearance	Production	Intake	.001-.0027 (0.0254-0.0686)
		Exhaust	.0012-.0029 (0.0305-0.0737)
	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. @ In (NOTE)	Closed @ 1.900 (47.6)	150 lb. ft. (667 N.m.)
		Open @ 1.302 (33.1)	420 lb. ft. (1868 N.m.)
	Installed Height		1.900 (48.3)

NOTE: Test springs as a complete assembly with retainer.

Cylinder Head:

Gasket Surface Flatness	.007 (.15) Overall Max. .003 (0.076) within a 6 in. (152 mm) span
-------------------------	---

Flywheel:

Runout	.008 (0.203) Max. (Face Area)
--------	----------------------------------

E. TORQUE SPECIFICATIONS

Camshaft Sprocket/Gear (NOTE 1)	25 lb. ft. (34 N·m)
Conn. Rod Cap (NOTE 2)	65 lb. ft. (88 N·m)
Crankcase Front Cover	120 lb. in. (14 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	20 lb. ft. (27 N·m)
Exhaust Manifold (Bolts)	30 lb. ft. (41 N·m)
Flywheel (NOTE 1)	70 lb. ft. (95 N·m)
Flywheel Drive Coupler (NOTE 1)	35 lb. ft. (48 N·m)
Flywheel Housing	30 lb. ft. (41 N·m)
Intake Manifold (NOTE 4)	Step#1-15 lb. ft. (20 Nm.) Step#2-30 lb. ft. (41 N·m)
Main Bearing Cap	110 lb. ft. (149 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	15 lb. ft. (20 N·m)
Oil Pump (NOTE 1)	70 lb. ft. (95 N·m)
Oil Pump Cover (NOTE 1)	80 lb. in. (9 N·m)
Rocker Arm Stud (NOTE1)	45 lb. ft. (61 N·m)
Rocker Arm Cover	96 lb. in. (11 N·m)
Spark Plug	15 lb. ft. (20 N·m)
Torsional Damper	90 lb. ft. (122 N·m)
Water Pump	35 lb. ft. (48 N·m)
Cam Thrust Plate(NOTE 1)	70 lb.in. (8 N·m)

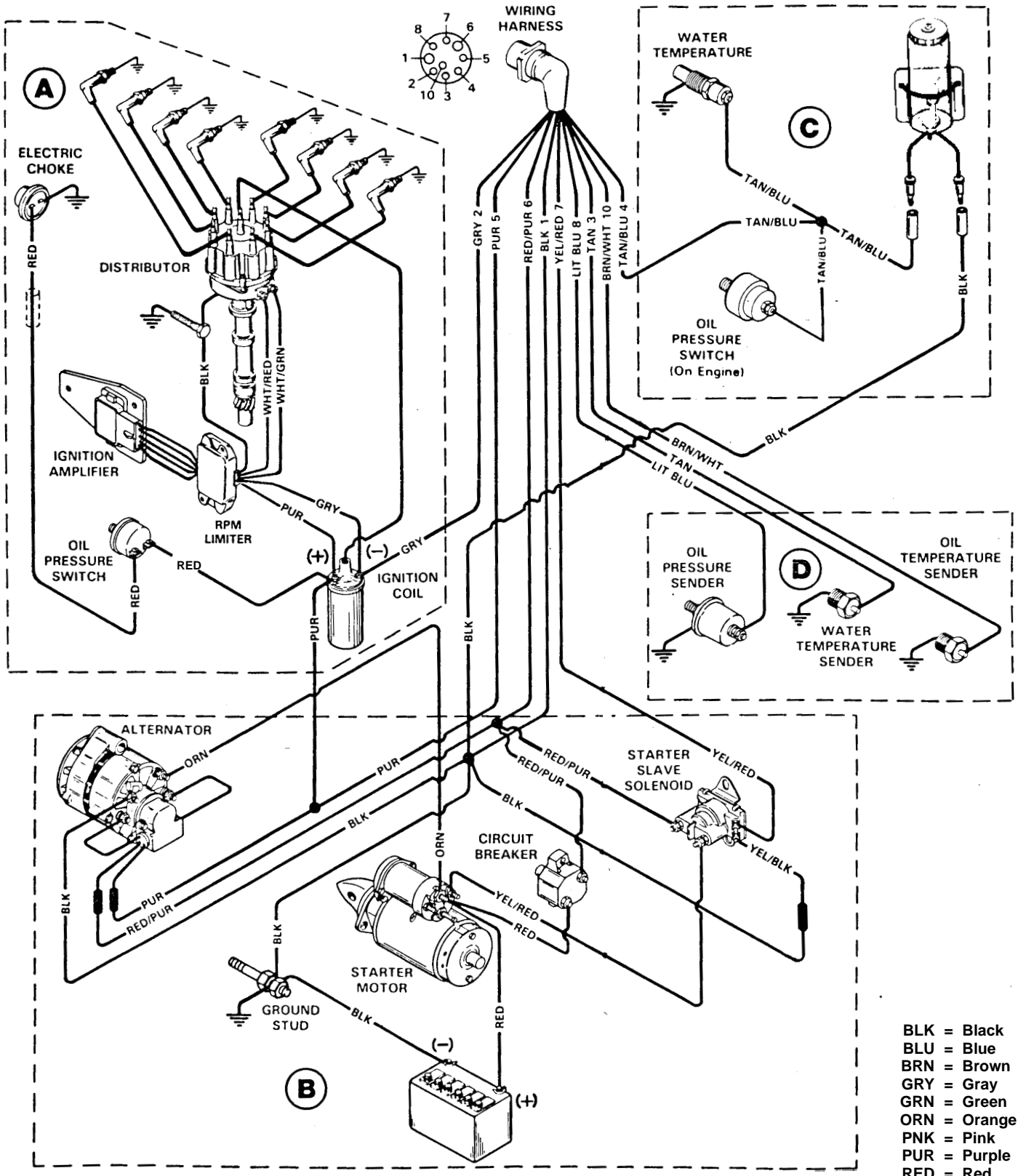
NOTE 1: Use Loctite 271 (P/N 92-32609-1) on threads.

NOTE 2: Apply engine oil to stud threads and contacting surface of nut.

NOTE 3: Apply moly lube under bolt head, and teflon pipe thread sealant (like Loctite sealant #592) on threads.

NOTE 4: Use only Mercury gasket P/N 27-818188

**F. ENGINE WIRING DIAGRAM - HP 450 (454 CID)
(THUNDERBOLT IGNITION)**

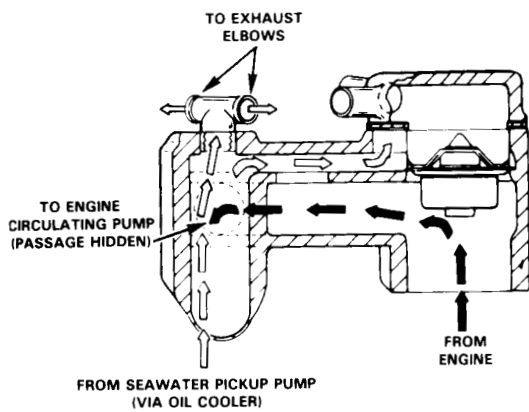
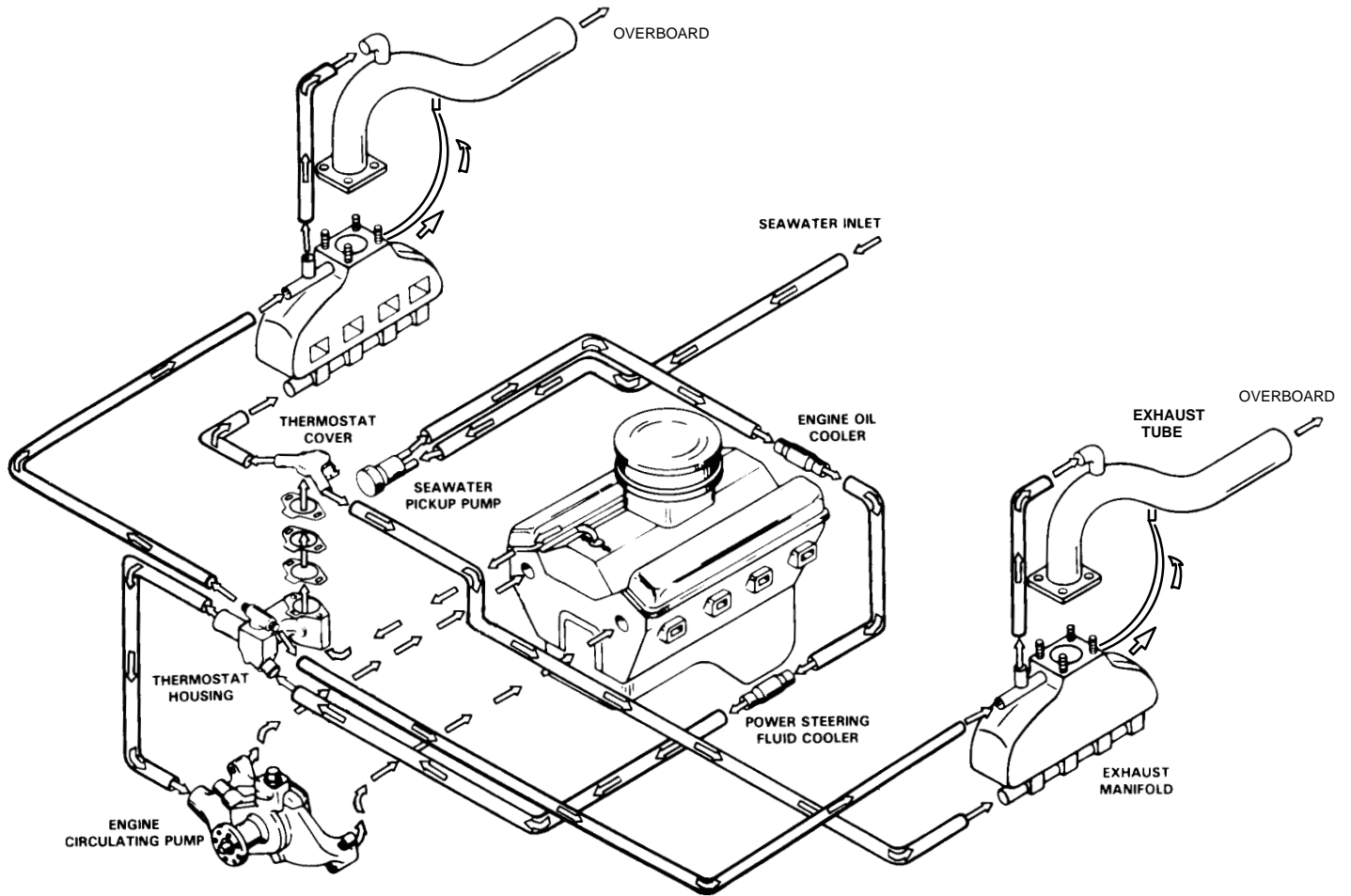


**A: Ignition and Choke System
B: Starting and Charging System**

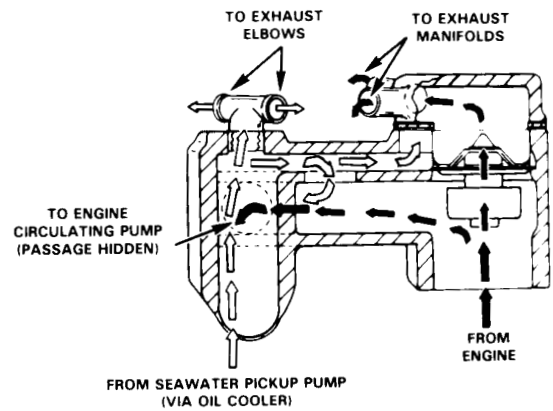
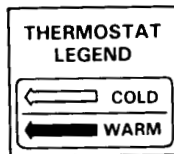
**C: Audio Warning System
D: Instrumentation System**

- BLK = Black
- BLU = Blue
- BRN = Brown
- GRY = Gray
- GRN = Green
- ORN = Orange
- PNK = Pink
- PUR = Purple
- RED = Red
- Tan = Tan
- WHT = White
- YEL = Yellow
- LIT = Light
- DRK = Dark

G. COOLING SYSTEM WATER FLOW DIAGRAM - HP 450 (454 CID)



COOLANT FLOW THROUGH THERMOSTAT HOUSING WITH THERMOSTAT CLOSED



COOLANT FLOW THROUGH THERMOSTAT HOUSING WITH THERMOSTAT OPEN

50743