Service Manual Outline

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Notice

Throughout this publication, “Dangers”, “Warnings” and “Cautions” (accompanied by the International HAZARD Symbol ⚠) are used to alert the mechanic to special instructions concerning a particular service or operation that may be hazardous if performed incorrectly or carelessly. **OBSERVE THEM CAREFULLY!**

These “Safety Alerts” alone cannot eliminate the hazards that they signal. Strict compliance to these special instructions when performing the service, plus “Common Sense” operation, are major accident prevention measures.

⚠ DANGER

DANGER - Immediate hazards which WILL result in severe personal injury or death.

⚠ WARNING

WARNING - Hazards or unsafe practices which COULD result in severe personal injury or death.

⚠ CAUTION

Hazards or unsafe practices which could result in minor personal injury or product or property damage.

Notice to Users of This Manual

This service manual has been written and published by the Service Department of Mercury Marine to aid our dealers’ mechanics and company service personnel when servicing the products described herein.

It is assumed that these personnel are familiar with the servicing procedures of these products, or like or similar products manufactured and marketed by Mercury Marine, that they have been trained in the recommended servicing procedures of these products which includes the use of mechanics’ common hand tools and the special Mercury Marine or recommended tools from other suppliers.

We could not possibly know of and advise the service trade of all conceivable procedures by which a service might be performed and of the possible hazards and/or results of each method. We have not undertaken any such wide evaluation. Therefore, anyone who uses a service procedure and/or tool, which is not recommended by the manufacturer, first must completely satisfy himself that neither his nor the products safety will be endangered by the service procedure selected.

All information, illustrations and specifications contained in this manual are based on the latest product information available at the time of publication. As required, revisions to this manual will be sent to all dealers contracted by us to sell and/or service these products.

It should be kept in mind, while working on the product, that the electrical system and ignition system are capable of violent and damaging short circuits or severe electrical shocks. When performing any work where electrical terminals could possibly be grounded or touched by the mechanic, the battery cables should be disconnected at the battery.

Any time the intake or exhaust openings are exposed during service they should be covered to protect against accidental entrance of foreign material which could enter the cylinders and cause extensive internal damage when the engine is started.

It is important to note, during any maintenance procedure replacement fasteners must have the same measurements and strength as those removed. Numbers on the heads of the metric bolts and on the surfaces of metric nuts indicate their strength. American bolts use radial lines for this purpose, while most American nuts do not have strength markings. Mismatched or incorrect fasteners can result in damage or malfunction, or possibly personal injury. Therefore, fasteners removed should be saved for reuse in the same locations whenever possible. Where the fasteners are not satisfactory for re-use, care should be taken to select a replacement that matches the original.

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Cleanliness and Care of Outboard Motor

A marine power product is a combination of many machined, honed, polished and lapped surfaces with tolerances that are measured in the ten thousands of an inch./mm. When any product component is serviced, care and cleanliness are important. Throughout this manual, it should be understood that proper cleaning, and protection of machined surfaces and friction areas is a part of the repair procedure. This is considered standard shop practice even if not specifically stated.

Whenever components are removed for service, they should be retained in order. At the time of installation, they should be installed in the same locations and with the same mating surfaces as when removed.

Before raising or removing and outboard engine from a boat, the following precautions should be adhered to:

1. Check that flywheel is secured to end of crankshaft with a locknut and lifting eye is threaded into flywheel a minimum of 5 turns.
2. Connect a hoist of suitable strength to the lifting eye.

In addition, personnel should not work on or under an outboard which is suspended. Outboards should be attached to work stands, or lowered to ground as soon as possible.

We reserve the right to make changes to this manual without prior notification.

Refer to dealer service bulletins for other pertinent information concerning the products described in this manual.

Page Numbering

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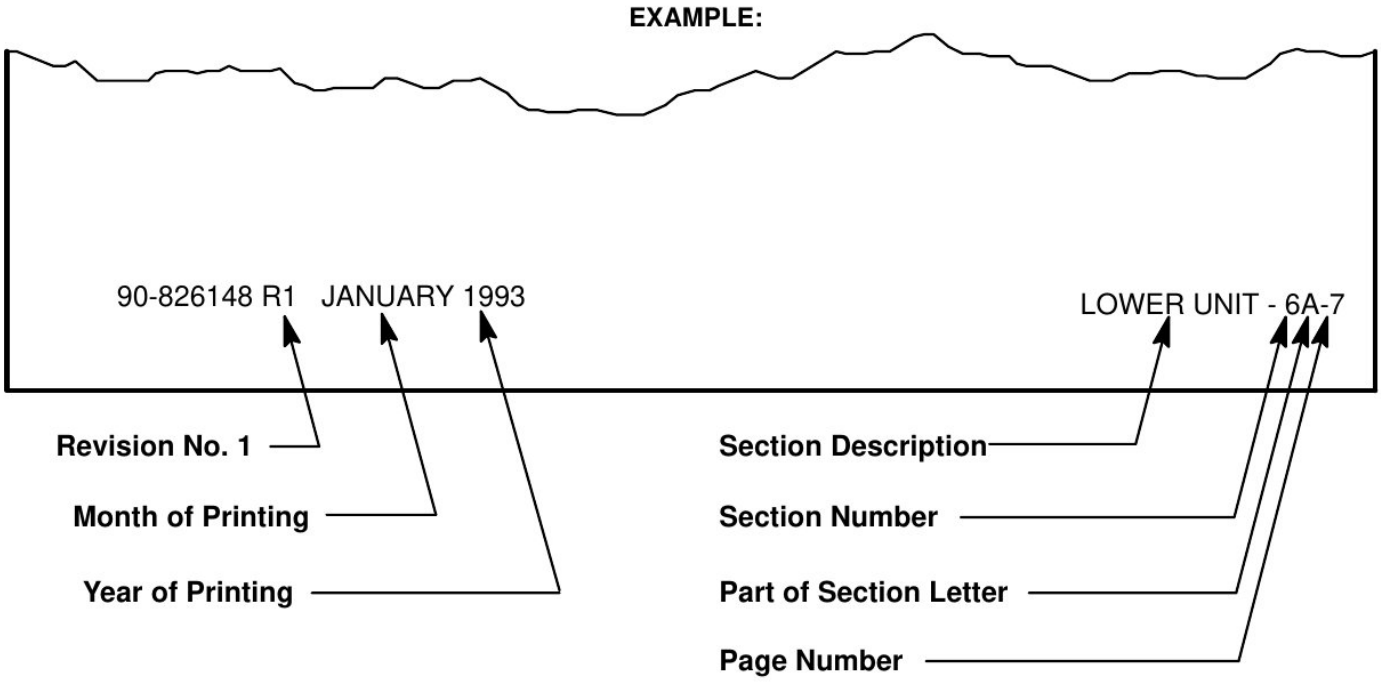

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IMPORTANT INFORMATION

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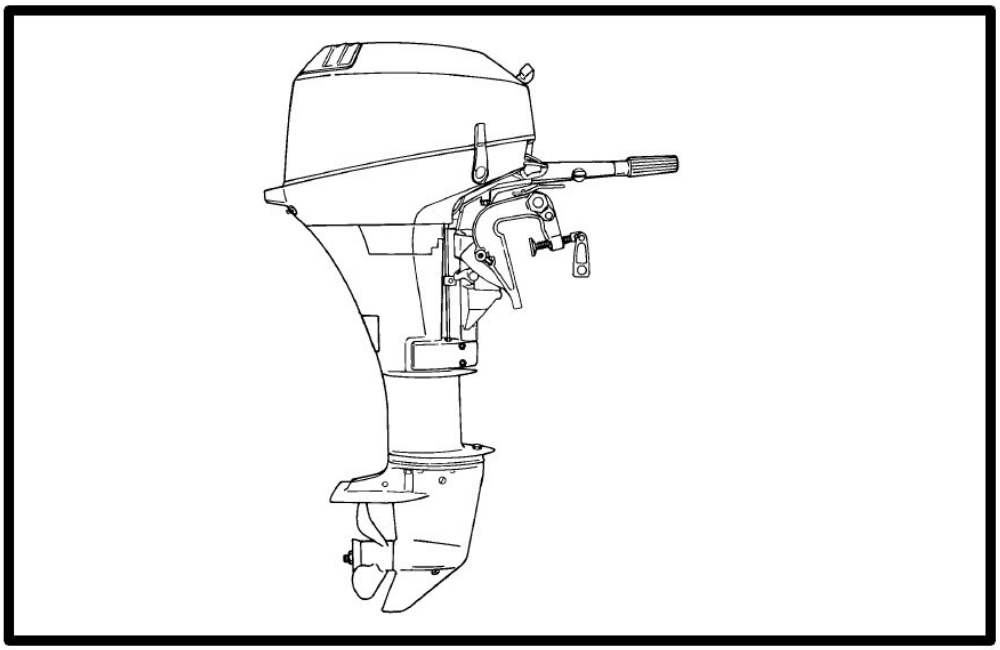

SPECIFICATIONS

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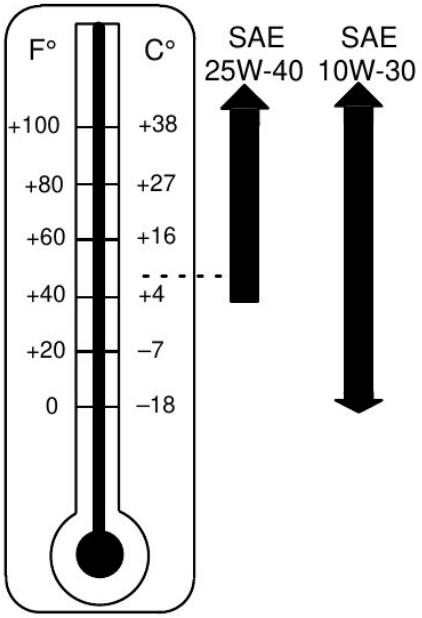
General Specifications

Model 8/9.9		
HORSEPOWER (KW)	**Model 8.0 (BODENSEE)** **Model 9.9 (BODENSEE)** **Model 9.9**	8.0 (6.0) 9.9 (7.4) 9.9 (7.4)
OUTBOARD WEIGHT	**Manual Start** **Electric Start**	102 lbs. (46.3kg) 107 lbs. (48.5kg)
FUEL	**Recommended Gasoline**	Automotive Unleaded with a minimum pump posted octane rating of 87
OIL	**Engine Oil Capacity** 	Either 1.0 quart (1.0 Liter) SAE 10W-30 viscosity oil is recommended for use in all temperatures. SAE 25W-40 viscosity oil may be used at temperatures above 40 °F (4°C). Use Quicksilver 4-Cycle Marine Oil with the proper viscosity for the expected temperature in your area (see chart above). If not available, use a premium quality 4 cycle engine oil, certified to meet or exceed anyone or combination of the following American Petroleum Institute (API) Service Classification SH, SG, SF, CF-4, CE, CD, CDII.
IGNITION SYSTEM	**Type** **Spark Plug Type (NGK)** **Spark Plug Gap** **Firing Order**	Capacitor Discharge Ignition CR6HS 0.024 - 0.028 in. (0.6 - 0.7 mm) 1 - 2
BATTERY	**Battery Rating**	465 Marine Cranking Amps (MCA) or 350 Cold Cranking Amps (CCA)
STARTING SYSTEM	**Manual Start** **Electric Start** **Ampere Draw Under:** **(Load)** **(No Load)**	Recoil Start 12 Volt 41.5 Amperes 14.2 Amperes
CHARGING SYSTEM	**Alternator Output** **Manual Start Model** **Electric Start Model**	 6 Amperes (Non Regulated Lighting Coil) 10 Amperes (Regulated)
FUEL SYSTEM	**Fuel Pump Type** **Fuel Pump:** **Pressure** **Diaphragm Stroke** **Plunger Stroke** **Fuel Tank Capacity**	External (Plunger/Diaphragm) 3-6 PSI (20-41 kPa) 0.0945 in. (2.4 mm) 0.2283 in. (5.8 mm) 6.6 U.S. Gallons

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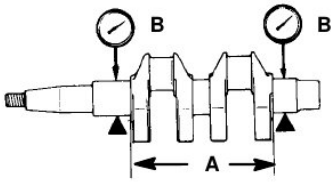
Model 8/9.9		
CARBURETOR SPECIFICATIONS	**Idle RPM** **Trolling RPM** **Wide Open Throttle (WOT) RPM** **8.0/9.9 (BODENSEE)** **9.9** **Pilot Screw (Turns Out)** **8.0/9.9 (BODENSEE)** **9.9** **Main Jet Size** **8.0/9.9 (BODENSEE)** **9.9** **Pilot Jet** **Enrichener Jet** **Float Height***	950 ± 50 RPM (Out Of Gear) 850 ± 50 5000 - 5500 4500 - 5500 Not Adjustable 3 ± 1 #82 #86 #48 .024 (0.61 mm) 1 ± 0.04 in. (25.5 ± 1 mm)
TIMING SPECIFICATIONS	**Ignition Timing (Full Retarded) 850 ± 50 RPM** **(Full Advanced) 2500-3000 RPM**	5° ± 1° B.T.D.C. 35° ± 1° B.T.D.C.
CYLINDER BLOCK	**Type** **Displacement** **Number of Cylinders**	4 Stroke Cycle – Over Head Camshaft 14.16 cu. in. (232cc) 2
STROKE	**Length**	1.67 in. (42.4mm)
CYLINDER BORE	**Diameter (Std)** **Taper/Out of Round Maximum** **Bore Type** **Bore Wear Limit**	2.323 in. (59.0mm) 0.003 in. (0.076mm) Steel 2.326 in. (59.1mm)
PISTON	**Piston Type** **O.D. at Skirt (Standard)** **(Oversize) 0.010 (0.254mm)** **(Oversize) 0.020 (0.508mm)**	Aluminum 2.3209 - 2.3216 in. (58.950 - 58.965 mm) 2.333 in. (59.25 mm) 2.343 in. (59.50 mm)
COMPRESSION/ RATIO	**Compression Ratio** **Cylinder Compression (cold engine)**	9.3:1 Highest reading and lowest reading should not differ by more than 10%
CRANKSHAFT	**Top Main Bearing Journal** **Bottom Main Bearing Journal** **Connecting Rod Journal** **Crankshaft Width (Width of Thrust Surfaces) "A"** **Runout Limit "B"** **Main Bearing Clearance** 	1.181 in. ± 0.0001 in. (30.0 mm ± 0.003 mm) 1.181 in. ± 0.0001 in. (30.0 mm ± 0.003 mm) 1.102 in. ± 0.0001 in. (28.0 mm ± 0.003 mm) 4.87 - 4.88 in. (123.7 - 123.9 mm) 0.0008 in. (0.02 mm) 0.0002 - 0.0017 in. (0.005 - 0.0043 mm)

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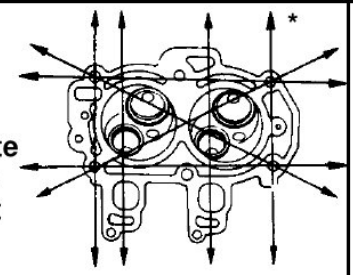
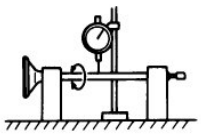
CONNECTING ROD	**Rod Clearance (Big End)**	0.0008 - 0.0018 in. (0.021 - 0.045 mm)
CYLINDER HEAD	**Warp Limit**  *** Lines indicate straight edge measurement**	0.004 in. (0.1 mm)
RINGS	**Ring End Gap (Installed)** **Top** **Middle** **Bottom (Oil Ring)** **Wear Limit** **Side Clearance:** **Top** **Middle** **Wear Limit**	 0.006 - 0.012 in. (0.15 - 0.03 mm) 0.006 - 0.012 in. (0.15 - 0.03 mm) 0.008 - 0.028 in. (0.20 - 0.70 mm) 0.020 in. (0.50 mm) 0.002 - 0.003 in. (0.04 - 0.08 mm) 0.001 - 0.003 in. (0.03 - 0.07 mm) 0.020 in. (0.50 mm)
VALVES	**Valve/Valve Seat/Valve Guides:** **Valve Clearance (cold) Intake** **Exhaust** **Valve Dimensions:** **"A" Head Diameter** **Intake** **Exhaust** **"B" Face Width** **Intake** **Exhaust** **"C" Seat Width** **Intake** **Exhaust** **"D" Margin Thickness** **Intake** **Exhaust** **Stem Outside Diameter** **Intake** **Exhaust** **Guide Inside Diameter** **Intake** **Exhaust** **Stem To Guide Clearance** **Intake** **Exhaust** **Stem Runout Limit (max.)** 	 0.0059 - 0.0079 in. (0.15 - 0.20 mm) 0.0079 - 0.0098 in. (0.20 - 0.25 mm) 1.020 - 1.028 in. (25.9 - 26.1 mm) 0.862 - 0.870 in. (21.9 - 22.1 mm) 0.079 - 0.124 in. (2.00 - 3.14 mm) 0.079 - 0.124 in. (2.00 - 3.14 mm) 0.024 - 0.031 in. (0.6 - 0.8 mm) 0.024 - 0.031 in. (0.6 - 0.8 mm) 0.020 - 0.035 in. (0.5 - 0.9 mm) 0.020 - 0.035 in. (0.5 - 0.9 mm) 0.2156 - 0.2161 in. (5.475 - 5.490 mm) 0.2150 - 0.2156 in. (5.460 - 5.475 mm) 0.2165 - 0.2170 in. (5.500 - 5.512 mm) 0.2165 - 0.2170 in. (5.500 - 5.512 mm) 0.0004 - 0.0015 in. (0.010 - 0.037 mm) 0.0010 - 0.0020 in. (0.025 - 0.052 mm) 0.0006 in. (0.016 mm)

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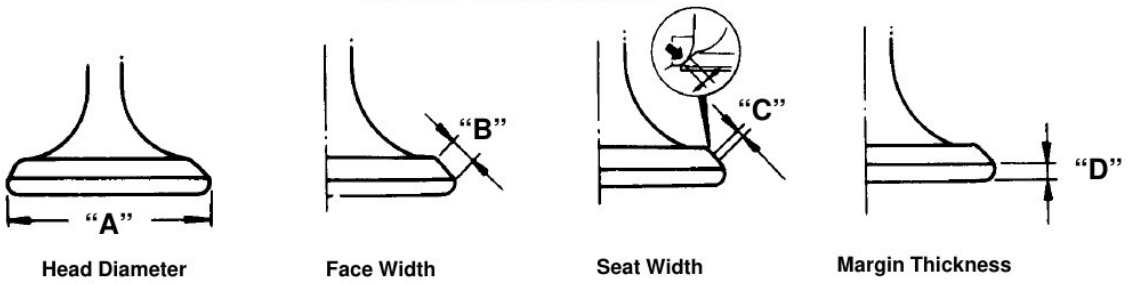
Valve Dimensions



Head Diameter | Face Width | Seat Width | Margin Thickness

VALVE SPRING	**Set Length (Valve Closed)** **Intake** **Exhaust** **Compressed Pressure (Installed)** **Intake** **Exhaust** **Tilt Limit (Intake and Exhaust)** **Direction Of Winding (Intake and Exhaust)**	0.960 in. (24.4 mm) 0.960 in. (24.4 mm) 19.8 - 22.0 lbs. (9.0 - 10.0 kg) 19.8 - 22.0 lbs. (9.0 - 10.0 kg) 0.043 in. (1.1 mm) Left Hand
CAMSHAFT	**Camshaft Dimensions** **Intake "A"** **Intake "B"** **Exhaust "A"** **Exhaust "B"** **Camshaft Runout**	0.966 - 0.970 in. (24.541 - 24.641 mm) 0.793 - 0.797 in. (20.137 - 20.237 mm) 0.968 - 0.972 in. (24.578 - 24.678 mm) 0.794 - 0.798 in. (20.178 - 20.278 mm) 0.004 in. (0.1mm)
CAM BELT	**Cam Belt Type** **Belt Slack**	Cogged Belt 0 - 0.4 in. (0-10 mm)

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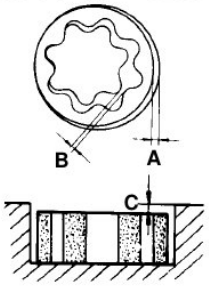
LUBRICATION SYSTEM	**Pump Type** **Oil Filter Type** **Recommended Oil** **API Rating** **Engine Oil Pan Capacity** **Oil Pump:** **Outer Rotor to Housing "A"** **Inner Rotor to Outer Rotor "B"** **Rotor to Housing "C"** **Relief Valve Operating Pressure** 	Torochoid Type Reusable Quicksilver SAE 10W-30, 25W-40 SH, SG, SF, CF-4, CE, CD, CDII 1 Quart (1 Liter) 0.0024 - 0.0043 in. (0.06 - 0.11 mm) 0.0008 - 0.0059 in. (0.02 - 0.15 mm) 0.0008 - 0.0028 in. (0.02 - 0.07 mm) 55 - 64 PSI (3.88 - 4.50 kg/cm^2) 388- 450 kPa
MID SECTION	**Transom Height - Short Shaft** **- Long Shaft** **Steering Pivot Range** **Tilt Pin Positions** **Total Tilt Angle** **Allowable Transom Thickness**	15 in. (38 cm) 20 in. (51 cm) 78° 3 + 3 Shallow Water 78° 2-3/8 in. (60.3mm)
GEAR HOUSING	**Gear Ratio** **Gearcase Capacity** **Lubricant Type** **Forward Gear - No. of Teeth-Type** **Pinion Gear - No. of Teeth-Type** **Pinion Height** **Forward Gear Backlash** **Reverse Gear Backlash** **Water Pressure** **With Thermostat** **– @ W.O.T** **– @ Idle**	2.0:1 6.8 fl. oz. (200 ml) Quicksilver Gear Lube Premium Blend 26 Spiral/Bevel 13 Spiral/Bevel Floating No Adjustment No Adjustment 5 - 7 PSI @ 5000 RPM 1/2 - 1-1/2 PSI @ 750 RPM

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