Service Manual Outline

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.

Cleanliness and Care of Mercury Jet Unit

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.

Personnel should not work on or under a powerhead which is suspended. Powerheads should be attached to work stands, or lowered to ground as soon as possible.

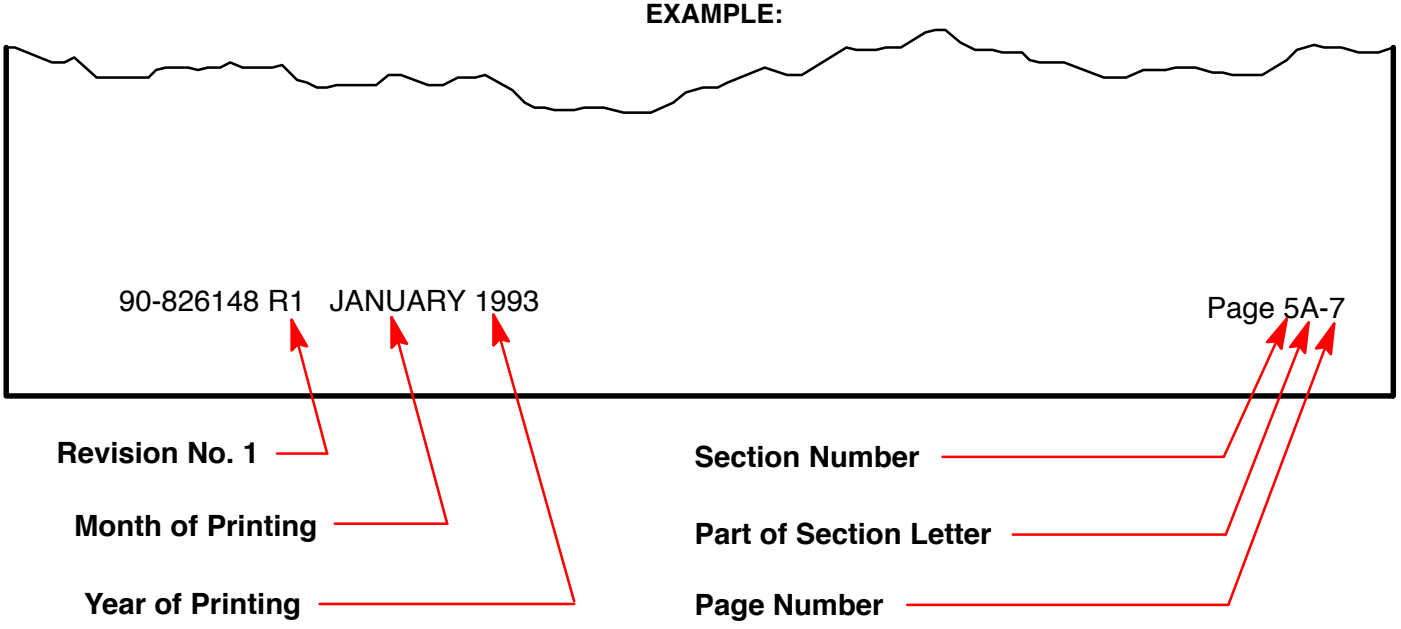
We reserve the right to make changes to this manual without prior notification.

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

Page Numbering

Two number groups appear at the bottom of each page. The example below is self-explanatory.

EXAMPLE:



IMPORTANT INFORMATION

Section 1A - Specifications

1 A

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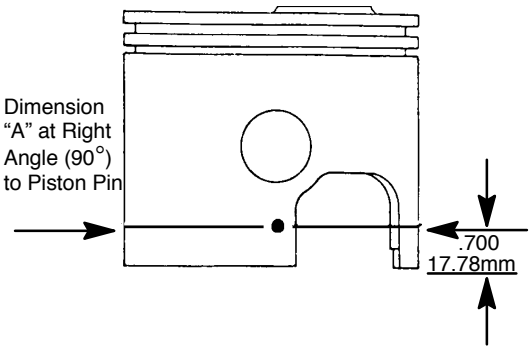
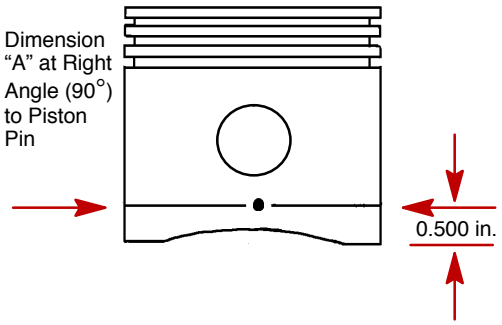
Master Specifications

Model 200 Optimax Jet Drive		
HORSEPOWER (KW)	**Model 200** **Full Throttle RPM** **Idle RPM (In Gear)** **RPM Limiter** **All Models**	200 (149.1) 5150 - 5650 900 - 1000 Refer to System Information in the Digital Diagnostic Terminal (DDT) for latest information
JET DRIVE WEIGHT	**Powerhead** **Pump Unit**	257 (116.6 kg) 110 (49 kg)
CYLINDER BLOCK	**Type** **Displacement**	V-6 Cylinder, Two Cycle, Direct Injected 153 cu. in. (2508 cc) 60° Vee
STROKE	**Length (All Models)**	2.65 in. (67.3 mm)
CYLINDER BORE	**Diameter (Std)** **Diameter 0.015 in. Oversize** **Taper/Out of Round/Wear Maximum** **Bore Type**	3.501 in. (88.925 mm) 3.516 in. (89.306 mm) 0.003 in. (0.076 mm) Cast Iron
CRANKSHAFT	**Maximum Runout**	0.006 in. (0.152 mm)
PISTON	**Piston Type** **Diameter Standard** **Diameter 0.015 in. Oversize**	Aluminum 3.4925 in. ± .0005 in. (88.7095 mm ± 0.0127 mm) 3.5075 in. ± 0.0005 in. (89.0905 mm ± 0.0127 mm)
PISTON DIAMETER		3.4925 in. ± .0005 in. (88.7095 mm ± .0127 mm) **Using a micrometer, measure dimension "A" at location shown. Dimension "A" should be 3.4925 in. ± .0005 for a STANDARD size piston (new) Dimension "A" will be 0.001 – 0.0015 less if coating is worn off piston (used)**
REEDS	**Reed Stand 0pen (Max.)**	0.020 in. (0.50 mm)

Model 200 Optimax Jet Drive		
DIRECT INJECTION	**Injectors** **– Quantity** **– Injectors are Crank Angle Driven by ECM** **– #2 Cylinder** **– #4 Cylinder** **– #6 Cylinder** **– #1 Cylinder** **– #3 Cylinder** **– #5 Cylinder** **Fuel Line Pressure @ Injectors** **Air Pressure** **High Pressure Electric Fuel Pump Amperage Draw** **Low Pressure Electric Fuel Pump Amperage Draw** **Low Pressure Electric Fuel Pump Output** **Fuel Lift Electric Fuel Pump Output** **Fuel Lift Electric Fuel Pump Amperage Draw** **Fuel Injector Ohm Resistance** **Direct Injector Ohm Resistance** **Fuel/Air Differential**	 6 RED/WHT + RED/BLU Leads YEL/WHT + RED/BLU Leads PPL/WHT + RED/BLU Leads BRN/WHT + RED/BLU Leads ORG/WHT + RED/BLU Leads BLU/WHT + RED/BLU Leads 89 ± 2 psi (613.5 ± 13.8 kPa) 79 ± 2 psi (544.0 ± 13.8 kPa) 5 – 9 Amperes 1 – 2 Amperes 6 – 9 psi (41.37 – 62.04 kPa) 1 – 10 psi (6.89 – 68.94 kPa) 1 – 2 Amperes 1.8 ± 0.1 Ω 1.3 ± 0.3 Ω 10 psi (68.5 kPa)
FUEL SYSTEM	**Fuel** **Recommended Gasoline** **Recommended Oil** **Gasoline/Oil Ratio** **– @ Idle** **– @ WOT**	Gasoline w/Oil Injection Unleaded 87 Octane Minimum Quicksilver TC-W3 Premium Plus 2 Cycle Outboard Oil 300 – 400:1 40:1

Model 200 Optimax Jet Drive		
STARTING SYSTEM	**Electric Start – All Models** **Starter Draw (Under Load)** **Starter Draw (No Load)** **Minimum Brush Length** **Battery Rating**	 170 Amperes 60 Amperes 0.25 in. (65.4 mm) 1000 (Minimum) Marine Cranking Amps 750 (Minimum) Cold Cranking Amps 105 (Minimum) Ampere Hours
IGNITION SYSTEM	**Type** **Spark Plug Type** **Spark Plug Gap** **Maximum Timing** **Idle Timing** **Throttle Position Sensor** **@ Idle** **@ WOT** **Crank Position Sensor** **Air Gap** **Firing Order**	Digital Inductive NGK PZFR5F-11 0.040 in. (1.0 mm) Not Adjustable; Controlled by ECM Not Adjustable; Controlled by ECM 0.19 – 1.0 VDC 3.45 – 4.63 VDC 0.025 in. – 0.040 in. (0.635 mm – 1.01 mm) 1-2-3-4-5-6
CHARGING SYSTEM	**Alternator Output (Regulated)** **Brush Length** **Voltage Output** **Regulator Current Draw**	32 - 38 Amperes @ 2000 RPM @ Battery* 52 - 60 Amperes @ 2000 RPM @ Alternator Std Exposed Length: 0.413 in. (10.5 mm) Min. Exposed Length: 0.059 in. (1.5 mm) 13.5 to 15.1 Volts 0.15 mA (Ign. Switch Off) 30.0 mA (Ign. Switch On)

*Amperage listed is when battery is in a discharged state. If battery is fully charged, amperage readings will be less.

Model 200 Optimax Jet Drive		
AIR COMPRESSOR	**Type**	Reciprocating Piston (1 to 1 ratio with engine RPM)
	Compressor Output	@ Idle – 80 psi @ W.O.T. – 110 psi
	Cylinder Block Displacement	7.07 cu. in. (116 cc)
	Cylinder Bore	
	Diameter (Standard)	2.5591 in. (65.0 mm)
	Taper/Out-of-Round/ Wear Maximum	0.001 in. (0.025 mm)
	Bore Type	Cast Iron
	Stroke Length	1.374 in. (34.9 mm)
	Piston Type	Aluminum
	Piston Diameter	2.5578 ± .0004 in. (64.97 ± 0.010 mm)
		
	Piston Ring End Gap	
	Top Ring	0.0059 – 0.0098 in. (0.15 – 0.25 mm)
	Middle Ring	0.0059 – 0.0098 in. (0.15 – 0.25 mm)
	Bottom Ring	0.0039 – 0.014 in. (0.10 – 0.35 mm)
	Reeds	
	Stand Open	0.010 in. (0.25 mm)

Torque Chart

PUMP UNIT

Special Items	Torque
Inlet Screen Screw (6 mm)	75 lb. in. (8.5 N·m)
Ride Plate Screw	75 lb. in. (8.5 N·m)
Reverse Gate Stop Screw	120 lb. in. (13.6 N·m)
Impeller Shaft Cover Screw	15 lb. ft. (20.3 N m)
Steering Lever Screw	15 lb. ft. (20.3 N m)
Pinion Shaft Housing Screw	15 lb. ft. (20.3 N m)
Inlet Screen Screw (8 mm)	16.5 lb. ft. (22.4 N m)
Drive Housing Cover Nuts	35 lb. ft. (47.5 N·m)
Nozzle to Stator Bolts	35 lb. ft. (47.5 N·m)
Stator Bolts	35 lb. ft. (47.5 N·m)
Rudder Pivot Bolt	50 lb. ft. (68 N·m)
Reverse Gate Pivot Bolt	80 lb. ft. (108.5 N·m)
Impeller Gear Nut	90 lb. ft. (122 N·m)
Impeller Nut	150 lb. ft. (203.4 N·m)

POWERHEAD

Special Items	Torque
Reed Block Screws	90 lb. in. (10.2 N m)
Vapor Separator	140 lb. in. (15.8 N m)
Air Handler Assembly	14.5 lb. ft. (19.7 N m)
Crank Case Cover Bolts .312-18x1-1/4 (6 ea)	15 lb. ft. (20.3 N m)
Crank Case Cover Bolts 3/8-16x3-1/4 (8 ea)	37 lb. ft. (50.2 N m)
Expansion Chamber Nuts	20 lb. ft. (27.1 N·m)
Connecting Rod Screws	*20 lb. ft. (27.1 N·m) Then Turn Additional 90°
Spark Plug	20 lb. ft. (27.1 N m)
Cylinder Head	*30 lb.ft. (40.6 N·m) Then Turn Additional 90°
Port Fuel Rail Nut	35 lb. ft. (47.5 N m)
Starboard Fuel Rail Nut	20 lb. ft. (27.1 N m)
Starboard Fuel Rail Spacer	35 lb. ft. (47.5 N m)
Strainer Fitting	40 lb. ft. (54 N m)
Adaptor Plate to Powerhead	35 lb. ft. (47.5 N·m)
Powerhead to Drive Housing Nuts	35 lb. ft. (47.5 N·m)
Flywheel Nut	125 lb. ft. (169.5 N·m)

***NOTE:** Screws should not be reused after removal*

Standard Hardware

Screw or Nut Size	Torque
6 - 32	9 lb. in. (1.0 N·m)
8 - 32	20 lb. in. (2.3 N·m)
10 - 24	30 lb. in. (3.4 N·m)
10 - 32	35 lb. in. (3.9 N·m)
12 - 24	45 lb. in. (5.0 N·m)
1/4 - 20	70 lb. in. (7.8 N·m)
5/16 - 18	160 lb. in. (18.1 N·m)
3/8 - 16	270 lb. in. (30.4 N·m)

Metric Hardware

A	B	Torque Specification		
		lb. in.	lb. ft.	N·m
8 mm	M5	36	3	4
10 mm	M6	70	6	8
12 mm	M8	156	13	18
14 mm	M10	312	26	36
17 mm	M12	372	31	42