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.

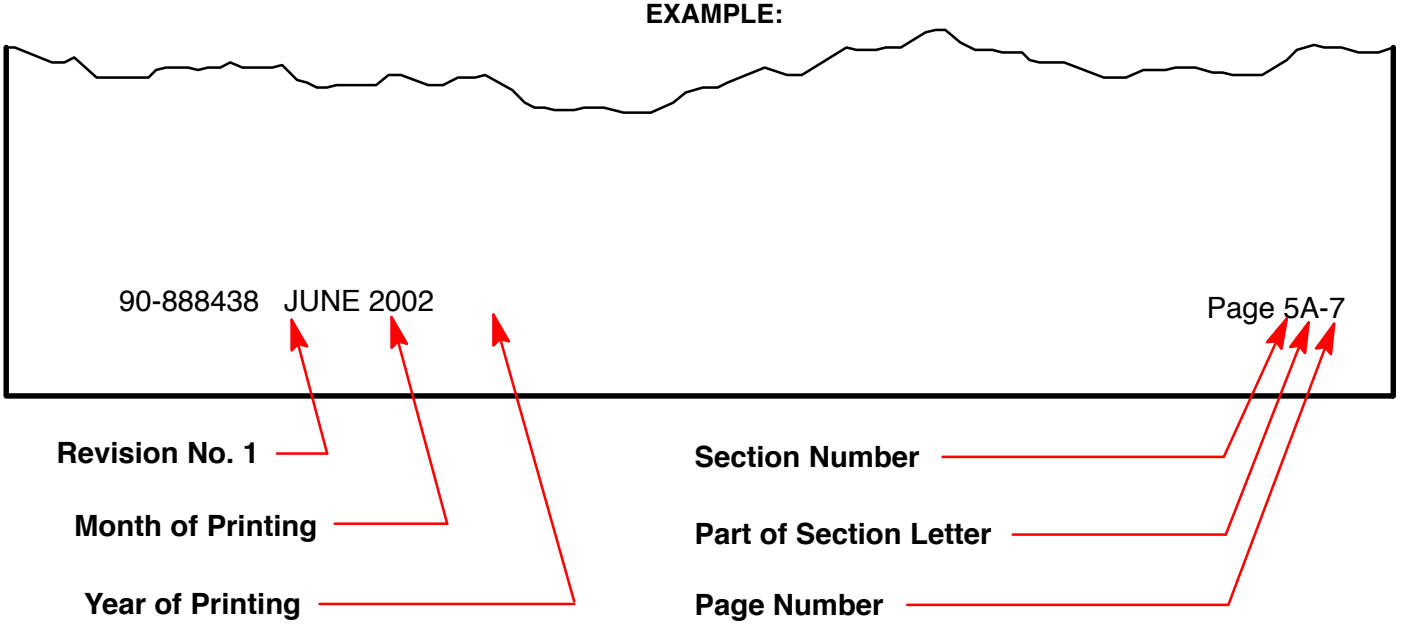
We reserve the right to make changes to this manual without prior notification.

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:



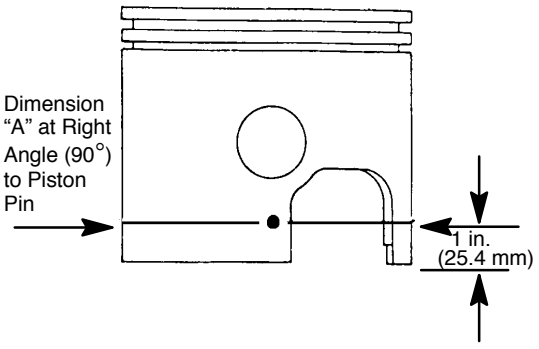
IMPORTANT INFORMATION

Section 1A - Specifications

1 A

Table of Contents

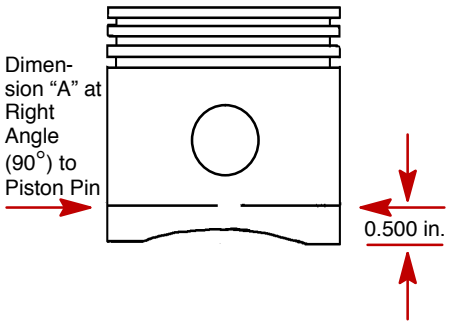
Master Specifications

Model 250 Optimax Jet		
HORSEPOWER (KW)	**Model 250** **Full Throttle RPM** **Idle RPM (In Gear)** **RPM Limiter**	250 (186.4) 5375±250 900 - 1100 5850
JET DRIVE WEIGHT	**Powerhead** **Pump Unit**	312 (141.5 kg) 122 (55.3 kg)
CYLINDER BLOCK	**Type** **Displacement** **Thermostat**	V-6 Cylinder, Two Cycle 185.9 cu. in. (3047 cc) 60° Vee None
STROKE	**Length (All Models)**	3.00 in. (76.2 mm)
CYLINDER BORE	**Diameter (Std)** **Diameter 0.015 in. Oversize** **Diameter 0.030 in. Oversize** **Taper/Out of Round/Wear Maximum** **Bore Type**	3.6265 in. (92.1131 mm) 3.6415 in. (92.4941 mm) 3.6565 in. (92.875 mm) 0.003 in. (0.076 mm) Cast Iron
CRANKSHAFT	**Maximum Runout**	0.002 in. (0.0508 mm)
PISTON	**Piston Type** **Diameter Standard** **Diameter 0.015 in. Oversize** **Diameter 0.030 in. Oversize**	Aluminum 3.6210 in. ± .0005 in. (91.9734 mm ± 0.0127 mm) 3.6360 in. ± 0.0005 in. (89.0905 mm ± 0.0127 mm) 3.6510 in. ± 0.0005 in. (92.7354 mm ± 0.0127 mm)
PISTON DIAMETER		3.6210 in. ± .0005 in. (91.9734 mm ± .0127 mm) **Using a micrometer, measure dimension "A" at location shown. Dimension "A" should be 3.6205 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 250 Optimax Jet		
DIRECT INJECTION	**Float Adjustment (Vapor Separator)**	
	Float Level	Preset @ Factory
	Injectors	
	– All Models (Quantity)	6
	– Injectors are Crank Angle Driven by ECM	
	– #1 Cylinder	WHITE/BROWN + RED/BLUE Leads
	– #2 Cylinder	WHITE/RED + RED/BLUE Leads
	– #3 Cylinder	WHITE/ORANGE + RED/BLUE Leads
	– #4 Cylinder	WHITE/YELLOW + RED/BLUE Leads
	– #5 Cylinder	WHITE/DK BLUE + RED/BLUE Leads
	– #6 Cylinder	WHITE/PURPLE + RED/BLUE Leads
	Line Pressure @ Injectors	90 ± 2 psi (613.5 ± 13.8 kPa)
	Air Pressure	80 ± 2 psi (544.0 ± 13.8 kPa)
	High Pressure Electric Fuel Pump Amperage Draw	6-9 amperes
	Low Pressure Electric Fuel Pump Amperage Draw	1-2 amperes
	Low Pressure Electric Fuel Pump Output	6-10 psi (41.37-68.95 kPa)
	Fuel Lift Electric Fuel Pump Output	1-10 psi (68.5 kPa)
	Amperage Draw	1-3 amperes
	Fuel Injector Ohm Resistance	1.8 ± 0.1 Ω
	Direct Injector Ohm Resistance	1.3 ± 0.3 Ω
	Fuel/Air Differential	10 psi (68.5 kPa)
FUEL SYSTEM	**Fuel**	Gasoline with Oil Injection
	Recommended Gasoline	Unleaded 87 Octane Minimum
	Recommended Oil	Optimax/DFI 2-Cycle Outboard Oil or TC-W3 Premium Plus 2 Cycle Outboard Oil
	Gasoline/Oil Ratio	
	– @ Idle	300-400:1
	– @ WOT	50:1

Model 250 Optimax Jet Compressor		
STARTING SYSTEM	**Electric Start – All Models** **Solenoid Driven Bendix** **Starter Draw (Under Load)** **Starter Draw (No Load)** **Minimum Brush Length** **Battery Rating**	 170 Amperes 60 Amperes 0.25 in. (6.35 mm) 1000 (Minimum) Marine Cranking Amps 750 (Minimum) Cold Cranking Amps 105 (Minimum) Ampere Hours
IGNITION SYSTEM	**Type** **Firing Order** **Spark Plug Type** **Spark Plug Gap** **Maximum Timing** **Idle Timing** **Throttle Position Sensor** **@ Idle** **@ WOT** **Crank Position Sensor**	Digital Inductive 1-2-3-4-5-6 NGK PZFR5F-11 0.043 in. (1.1 mm) Not Adjustable; Controlled by ECM Not Adjustable; Controlled by ECM 0.4-1.3 VDC 4.0-4.7 VDC Not Adjustable
CHARGING SYSTEM	**Alternator Output (Regulated)** **Voltage Output** **Regulator Current Draw** **Battery Rating**	32 - 38 Amperes @ 2000 RPM @ Battery* 48 - 58 Amperes @ 2000 RPM @ Alternator 14.05 to 15.1 Volts @ 77° F 0.15 mA (Ignition Switch Off) 30.0 mA (Ignition Switch On) 1000 (minimum) Marine Cranking Amps 750 (minimum) Cold Cranking Amps 105 (minimum) Ampere Hours

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

Model 250 Optimax Jet		
Air Compressor	Type Compressor Output	Reciprocating Piston (1 to 1 ratio with engine RPM) @ Idle – 80 psi (551.6 kPa) @ W.O.T. – 110 psi (758.4 kPa)
Cylinder Block	Displacement	7.07 cu. in. (116 cc)
Cylinder Bore	Diameter (Standard) Taper/Out-of-Round/Wear Maximum Bore Type	2.5591 in. (65.0 mm) 0.001 in. (0.025 mm) Cast Iron
Stroke	Length	1.374 in. (34.9 mm)
Piston	Piston Type	Aluminum
Piston Diameter		2.5578 ± .0004 in. (64.97 ± 0.010 mm)
Piston Ring	End Gap Top Ring Middle Ring Bottom Ring	 0.0059 - 0.0098 in. (0.15 - 0.25 mm) 0.0059 - 0.0098 in. (0.15 - 0.25 mm) 0.0039 - 0.014 in. (0.10 - 0.35 mm)
Reeds	Reed 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 Nm)
Inlet Screen Screw (8 mm)	16.5 lb. ft. (22.4 Nm)
Reverse Gate Stop Screw	120 lb. in. (13.6 Nm)
Steering Lever Screw	15 lb. ft. (20.3 Nm)
Pinion Shaft Housing Screw	15 lb. ft. (20.3 Nm)
Drive Housing Cover Nuts	35 lb. ft. (47.5 Nm)
Nozzle to Stator Bolts	35 lb. ft. (47.5 Nm)
Stator Bolts	35 lb. ft. (47.5 Nm)
Rudder Pivot Bolt	50 lb. ft. (68 Nm)
Reverse Gate Pivot Bolt	80 lb. ft. (108.5 Nm)
Impeller Gear Nut	90 lb. ft. (122 Nm)
Impeller Nut	150 lb. ft. (203.4 Nm)

POWERHEAD

Special Items	Torque
Vapor Separator	140 lb. in. (15.8 Nm)
Air Handler Assembly	100 lb. in. (11.3 Nm)
Crank Case Cover Bolts M8x1.25x35 (14 ea)	20.8 lb. ft. (28.3 Nm)
Crank Case Cover Bolts M10x1.5x80 (8 ea)	30 lb. ft. (40.6 Nm) Then Turn Additional 90°
Expansion Chamber Nuts	20 lb. ft. (27.1 Nm)
Connecting Rod Screws	*30 lb. ft. (40.6 Nm) Then Turn Additional 90°
Spark Plug	20 lb. ft. (27.1 Nm)
Cylinder Head	*20 lb.ft. (27.1 Nm) Then Turn Additional 90°
Adaptor Plate to Powerhead	35 lb. ft. (47.5 Nm)
Powerhead to Drive Housing Nuts	35 lb. ft. (47.5 Nm)
Flywheel Nut	125 lb. ft. (169.5 Nm)

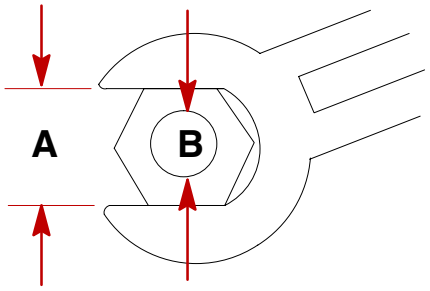
***NOTE:** Screws should not be reused after removal*

Standard Hardware

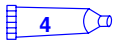
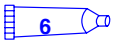
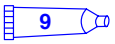
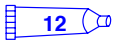
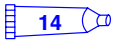
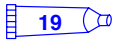
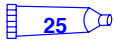
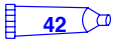
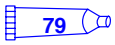
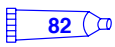
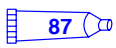
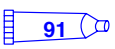
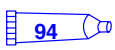
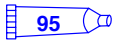
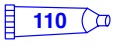
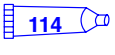
Screw or Nut Size	Torque
6 - 32	9 lb. in. (1.0 Nm)
8 - 32	20 lb. in. (2.3 Nm)
10 - 24	30 lb. in. (3.4 Nm)
10 - 32	35 lb. in. (3.9 Nm)
12 - 24	45 lb. in. (5.0 Nm)
1/4 - 20	70 lb. in. (7.8 Nm)
5/16 - 18	160 lb. in. (18.1 Nm)
3/8 - 16	270 lb. in. (30.4 Nm)

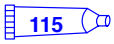
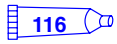
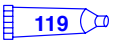
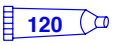
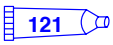
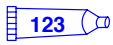
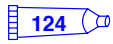
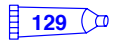
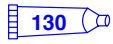
Metric Hardware

A	B	Torque Specification		
		lb. in.	lb. ft.	Nm
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



Mercury/Quicksilver Lubricants and Sealants

Tube Ref. #	Description	Container Size	Mercury Part Number	Quicksilver Part Number
	Needle Bearing Assy. Lubricant	8 oz (226.8 g) tube	92-802868A1	N/A
	Dielectric Grease	8 oz (226.8 g) can	92-823506-1	92-823506-1
	Loctite 271 – Thread Locker	10 ml tube	92-809819	92-809819
	Loctite 567 PST Pipe Sealant	50 ml tube	92-809822	92-809822
	Loctite Master Gasket Kit		92-12564-2	92-12564-2
	2 Cycle Premium Outboard Oil	1 US qt (0.94 L)	92-802813A1	92-802813Q1
	Perfect Seal	16 oz (0.45 kg) can	92-34227-1	92-34227-1
	Liquid Neoprene	8 oz (226.8 g) can	92-25711-3	92-25711-3
	Bellows Adhesive	1.5 oz (42.5 g) tube	N/A	92-86166Q1
	Loctite 680 Retaining Compound	10 ml tube	92-809833	92-809833
	Special Lubricant 101	8 oz (226.8 g) tube	92-802865A1	92-802865Q1
	U-Joint and Gimbal Bearing Grease		92-802870A1	92-802870Q1
	Loctite 222 Thread Locker	10 ml tube	92-809818	92-809818
	Loctite 242 Thread Locker	10 ml tube	92-809821	92-809821
	4 Cycle 25W40 Engine Oil		92-802837A1	92-802837Q1
	Premium Gear Lubricant	1 US qt (0.94 L)	92-802846A1	92-802846Q1
	High Performance Gear Lube	1 US qt (0.94 L)	92-802854A1	92-802854Q1
	Engine Coupler Spline Grease	14 oz (0.39 kg) cartridge	92-802869A1	92-802869Q1
	Anti-Corrosion Grease	8 oz (226.8 g) tube	92-802867A1	92-802867Q1
	2-4-C with Teflon	8 oz (226.8 g) tube	92-802859A1	92-802859Q1
	4 Stroke 10W30 Outboard Oil	1 US qt (0.94 L)	92-802833A1	92-802833Q1
	Power Trim & Steering Fluid	8 oz (226.8 g)	92-802880A1	92-802880Q1

Tube Ref. #	Description	Container Size	Mercury Part Number	Quicksilver Part Number
	Premium Plus 2 Cycle TC-W3 Outboard Oil	1 US qt (0.94 L)	92-802824A1	92-802824Q1
	RTV 587 Silicone Sealer	3 oz (85.05 g)	92-809825	92-809825
	Loctite 7649 Primer N	4.5 oz (127.57 g)	92-809824	92-809824
	Storage Seal Rust Inhibitor	12 oz (325 ml) spray can	92-802878-56	92-802878Q56
	Corrosion Guard	12 oz (325 ml) spray can	92-802878 55	92-802878Q55
	15W40 4-cycle Diesel Engine Oil	1.06 US gal.(4 L)	92-877695K1	92-877695Q1
	Extended Life Antifreeze/Coolant	1 US gal. (3.78 L)	92-877770K1	92-877770K1
	Marine Engine Coolant	1.33 US gal. (5 L)	NA	92-813054A2
	Fuel System Treatment and Stabilizer Concentrate	16 oz (437 ml)	92-802876A1	92-802876Q1
	Heat Transfer Compound	1.5 oz (42.5 g) tube	92-805701 1	
	Liquid Gasket		92-808137	NA
	T442 Sealant		92-862258	NA
	Loctite 5900 Ultra Black RTV Silicone Sealant	13 oz (371 g) tube	92-809826	NA
	Loctite Gasket Remover	18 oz (532 ml) spray can	92-809828 1	NA
	Sealer Kit, Two Part Epoxy		NA	92-65150 1
	Dexron III Automatic Transmission Fluid		Obtain Locally	Obtain Locally
	Loctite 592		Obtain Locally	Obtain Locally
	Loctite Quick Tite		Obtain Locally	Obtain Locally
	Isopropyl Alcohol		Obtain Locally	Obtain Locally
	Hot Glue		Obtain Locally	Obtain Locally
	Loctite 609		Obtain Locally	Obtain Locally
	Loctite 405		Obtain Locally	Obtain Locally

Tube Ref. #	Description	Container Size	Mercury Part Number	Quicksilver Part Number
	Cyanacrylate Adhesive		Obtain Locally	Obtain Locally
	3M Permabond #3M08155		Obtain Locally	Obtain Locally
	Loctite 262		Obtain Locally	Obtain Locally
	Loctite 290		Obtain Locally	Obtain Locally