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MERCURY

75/90/115 FourStroke EFI
80/100/115 FourStroke EFI (EU)

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MERCURY

Service Manual



75/90/115 FourStroke EFI

80/100/115 FourStroke EFI (EU)

Starting Serial Number 1B366823 (US)
Starting Serial Number 0P459572 (Bel)

Notice to Users of This Manual

Throughout this publication, dangers, warnings, cautions, and notices (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

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Indicates a situation which, if not avoided, could result in engine or major component failure.

IMPORTANT: Identifies information essential to the successful completion of the task.

NOTE: *Indicates information that helps in the understanding of a particular step or action.*

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

Alpha, Axius, Bravo One, Bravo Two, Bravo Three, Circle M with Waves Logo, K-planes, Mariner, MerCathode, MerCruiser, Mercury, Mercury with Waves Logo, Mercury Marine, Mercury Precision Parts, Mercury Propellers, Mercury Racing, MotorGuide, OptiMax, Quicksilver, SeaCore, Skyhook, SmartCraft, Sport-Jet, Verado, VesselView, Zero Effort, Zeus, and #1 On the Water are registered trademarks of Brunswick Corporation. Mercury Product Protection is a registered service mark of Brunswick Corporation.

It is assumed that these personnel are familiar with marine product servicing procedures. Furthermore, it is assumed that they have been trained in the recommended service procedures of Mercury Marine Power Products, including 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 marine trade of all conceivable procedures and of the possible hazards and/or results of each method. 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.

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.

Refer to dealer service bulletins, operation maintenance and warranty manuals, and installation manuals for other pertinent information concerning the products described in this manual.

Precautions

It should be kept in mind, while working on the product, that the electrical and ignition systems 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 into the cylinders which could cause extensive internal damage when the engine is started.

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 reuse, care should be taken to select a replacement that matches the original.

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Replacement Parts

Use of parts other than the recommended service replacement parts will void the warranty on those parts that are damaged as a result.

⚠ WARNING

Avoid fire or explosion hazard. Electrical, ignition, and fuel system components on Mercury Marine products comply with federal and international standards to minimize risk of fire or explosion. Do not use replacement electrical or fuel system components that do not comply with these standards. When servicing the electrical and fuel systems, properly install and tighten all components.

Cleanliness and Care of Product

A Mercury Marine Power Product is a combination of many machined, honed, polished, and lapped surfaces with tolerances measured in the ten thousands of an inch/mm. When any product component is serviced, care and cleanliness are important. 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 an engine that is suspended. Engines should be attached to work stands, or lowered to ground as soon as possible.

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Important Information

Section 1A - Master Specifications

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General Specifications

Model Specifications	
Kilowatts (horsepower)	85.7 kW (115 hp) 74.5 kW (100 hp) 67.1 kW (90 hp) 59.6 kW (80 hp) 52.1 kW (70 hp)
Weight	
50.8 cm (20 in.)	181 kg (399 lb)
63.5 cm (25 in.)	185 kg (407 lb)
Displacement (all hp)	1.7 L (105.6 cu in.)
Full throttle RPM	
75/90, EU 80/100	5000–6000 RPM
115	5800–6400 RPM
Idle RPM (all models)	700 ± 50 RPM
Induction system	Natural aspiration
Fuel system	Computer controlled sequential multiport electronic fuel injection
Ignition system	SmartCraft electronic control module (ECM) digital inductive
Charging system	Regulated belt driven 50 amp alternator
Exhaust system	Through propeller
Cooling system	Water cooled - thermostat with pressure control
Lubrication system	Integrated dry sump
Capacity	5.0 Liter (5.2 US qt)
Engine control system	SmartCraft ECM
Trim system	
Maximum tilt range	73° (–5° to 68°)
Maximum trim range	20° (–5° to 15°)

Fuel System Specifications

Fuel System Specifications	
Type of fuel	Automotive unleaded with a minimum pump posted octane rating of 87 (90 RON)
High-pressure fuel pump	
Engine not running	350 ± 32 kPa (50.7 ± 4.6 psi)
Engine running	Pressure dependent on manifold vacuum pressure
Fuel filtration (inlet/high pressure)	20 microns
Fuel lift pump vacuum (maximum)	10.16 kPa (3.00 Hg)
Idle air control duty cycle at idle	25–33
MAP sensor at idle	38–43 kPa (11.2–12.7 Hg)
MAP sensor at WOT	95–100 kPa (28–29.5 Hg)

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Ignition Specifications

Ignition Specifications	
Full throttle RPM	
75/90, EU 80/100	5000–6000
115	5800–6400
Idle RPM (all models)	700 ± 50
Ignition type	Digital inductive
Spark plug type	NGK LFR4A-E
Spark plug gap	0.8 mm (0.032 in.)
Spark plug hex size	16 mm (5/8 in.)
Spark plug torque	27 Nm (20 lb-ft)
Spark plug hole size	14 mm
Firing order	1-3-4-2
Ignition timing at Idle	Not adjustable; controlled by ECM
Ignition timing at WOT	Not adjustable; controlled by ECM
ECM overspeed limiter	
75/90, EU 80/100	Activates at 6100 RPM
115	Activates at 6500 RPM

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Charging and Starting Specifications

Charging and Starting Specifications	
Alternator output (regulated)	
Output at the battery at 1000 RPM	24 A
Output at the battery at 3000 RPM	40 A
Output at the alternator at 1000 RPM	33 A
Output at the alternator at 3000 RPM	49 A
Voltage set point	14.5 ± 0.25 V
Regulator current draw[1]	
Ignition switch "OFF"	1.0 mA
Ignition switch "ON"	350 mA
Starter draw	
Under load	200 A
No load	65 A
Average engine RPM when cranking	320 RPM
Starter solenoid current draw at 12.6 V	
Pull in coil	40 A
Hold in coil	10 A
Start solenoid current draw at 12.6 V	4.5 A
Minimum brush length	6.54 mm (0.25 in.)
Battery rating (minimum)	
Marine cranking amperes	1000
Cold cranking amperes	800
Ampere hour (Ah)	180

1. All model alternator specifications require an amperage draw of less than 1.0 mA with the ignition key in the "OFF" position and an amperage draw of not more than 350.0 mA with key in the "ON" position.

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Cylinder Block/Crankcase Specifications

Cylinder Block/Crankcase Specifications	
Number of cylinders	4
Displacement	1.7 liters (105.6 CID)
Compression ratio	10:1
Standard bore	82.0 mm (3.228 in.)
Stroke	82.0 mm (3.228 in.)
Cylinder bore maximum taper (service)	0.0762 mm (0.003 in.)
Cylinder bore maximum out of round (service)	0.0762 mm (0.003 in.)
Cylinder block main bearing	65.997–66.013 mm (2.5982–2.5989 in.)
Crankshaft main bearing journal - Grade A	59.993–60.001 mm (2.3619–2.3622 in.)
Crankshaft main bearing journal - Grade B	59.985–59.993 mm (2.3616–2.3619 in.)
Crankshaft pin journal - Grade C	49.982–50.00 mm (1.9678–1.968 in.)
Crankshaft pin journal - Grade D	49.982–49.991 mm (1.9677–1.9681 in.)
Bottom main bearing width	31.4–31.6 mm (1.236–1.244 in.)
Crankshaft end play	0.08–0.19 mm (0.003–0.007 in.)
Crankshaft runout	0.05 mm (0.002 in.)
Crankshaft main bearing oil clearance (without expansion)	0.014–0.042 mm (0.0005–0.0016 in.)
Connecting rod bearing oil clearance (without expansion)	0.020–0.050 mm (0.0008–0.0019 in.)
Connecting rod wrist pin bore diameter	22.005–22.014 mm (0.8663–0.8666 in.)
Connecting rod crankshaft pin diameter - Grade I	53.000–53.009 mm (2.0866–2.0869 in.)
Connecting rod crankshaft pin diameter - Grade 0	53.009–53.018 mm (2.0869–2.0873 in.)
Piston skirt standard diameter	81.975 mm (3.2273 in.)
Piston wrist pin bore diameter	22.004–22.011 mm (0.8662–0.8665 in.)
Wrist pin diameter	21.997–22.000 mm (0.8660–0.8661 in.)
Top ring groove width	1.22–1.25 mm (0.048–0.049 in.)
Middle ring groove width	1.21–1.23 mm (0.047–0.048 in.)
Oil ring groove width	2.03–2.05 mm (0.079–0.080 in.)
Top ring thickness	1.19 mm (0.047 in.)
Middle ring thickness	1.19 mm (0.047 in.)
Oil ring thickness	1.98 mm (0.078 in.)
Top ring side clearance	0.04–0.08 mm (0.001–0.003 in.)
Middle ring side clearance	0.04–0.08 mm (0.001–0.003 in.)
Oil ring side clearance	0.05–0.17 mm (0.002–0.006 in.)
Top ring end gap	0.27–0.42 mm (0.010–0.016 in.)
Middle ring end gap	0.42–0.62 mm (0.016–0.024 in.)
Oil ring end gap	0.2–0.7 mm (0.007–0.027 in.)
Thermostat	
Start to open temperature	46.1–51.7 °C (115–125 °F)
Full open temperature	65.5 °C (150 °F)
Piston height at full open temperature	7.62 mm (0.300 in.)

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