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MERCURY

115/135/150/150 Pro XS
175/175 Pro XS
2.5 Liter OptiMax

Serial Number 0G960500 and Above
90-8M0057453 MAY 2011

MERCURY

Service Manual



115/135/150/ 150 Pro XS 175/175 Pro XS 2.5 Liter OptiMax

Serial Number 0G960500 and Above

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.

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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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Manual Outline

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- B - Maintenance
- C - General Information
- D - Outboard Installation

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- B - Charging and Starting System
- C - Timing, Synchronizing, and Adjustments

3 - Fuel System
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- B - Fuel Injection System
- C - Oil Injection
- D - Emissions

4 - Powerhead
- A - Powerhead
- B - Cooling

5 - Mid-Section
- A - Clamp/Swivel Brackets and Driveshaft Housing
- B - Power Trim - Design I (Showa)
- C - Power Trim - Design II (Oildyne)

6 - Gear Housing
- A - Right-Hand (Standard Rotation) Non-Ratcheting
- B - Left-Hand (Counterrotation) Non-Ratcheting

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Important Information

Section 1A - Specifications

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General Specifications

Model Specifications		
Kilowatts (horsepower)		85.7 kW (115 hp)
		100.8 kW (135 hp)
		111.8 kW (150 hp)
		130.5 kW (175 hp)
Weight		
50.8 cm (20 in.)		163.3 kg (453 lb)
63.5 cm (25 in.)		209.6 kg (462 lb)
Displacement (all hp)		2.5 liter (153 in^3)
RPM		
Idle		550 ± 25 RPM
WOT	115/135	5000–5500 RPM
	150/175	5000–5750 RPM
	150 Pro XS/175 Pro XS	5500–6000 RPM
RPM limit (Guardian)	115/135/150/175	5800 RPM
	150 Pro XS/175 Pro XS	6300 RPM
Induction system		Throttle body aspiration
Fuel system		Computer controlled sequential multi-port electronic direct fuel injection
Ignition system		SmartCraft propulsion control module (PCM) digital inductive
Charging system		Regulated belt-driven 60 amp alternator
Exhaust system		Through the propeller
Cooling system		Water-cooled - thermostat with pressure control
Lubrication system		Multi-port oil injection
Engine oil reservoir capacity		0.71 liter (0.44 US quart)
External tank (optional)		11.4 liter (12 US quart)
Engine control system		SmartCraft propulsion control module (PCM)
Trim system		
Maximum tilt range		75°
Maximum trim range		20°

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Maintenance Specifications

Maintenance Specifications	
Recommended fuel type	Unleaded 87 octane minimum
Recommended oil	TC-W3 Premium Plus or OptiMax 2-Cycle Outboard Oil
Oil tank capacity	
Engine reservoir capacity	0.71 liter (0.44 US quart)
External tank	11.4 liter (12 US quart)
Spark plug type	
Model year 2000 (all models)	NGK PZFR6H or IZFR5J
Spark plug gap	0.8 mm (0.031 in.)
Model year 2001 and newer (all models)	NGK IZFR5G 11
Spark plug gap	1.1 mm (0.043 in.)
Model year 2007 and newer Pro XS	NGK IZFR6J
Spark plug gap	1.1 mm (0.043 in.)
Battery rating	1000 marine cranking amp (minimum) 800 cold cranking amp (minimum) 180 amp hours (minimum)
Gearcase capacity	665.0 ml (22.5 fl oz)
Water pressure	
at 625 RPM (idle) (115/135/150/150 Pro XS/175)	20.6–41.3 kPa (3–6 psi)
at 625 RPM (idle) (175 Pro XS)	27.6–41.3 kPa (4–6 psi)
at 5750 RPM (WOT)	75.8–96.5 kPa (11–14 psi)

Ignition Specifications

Ignition Specifications	
Type	Digital inductive
Spark plug type	
Model year 2000 (all models)	NGK PZFR6H or IZFR5J
Spark plug gap	0.8 mm (0.031 in.)
Model year 2001 and newer (all models)	NGK IZFR5G 11
Spark plug gap	1.1 mm (0.043 in.)
Model year 2007 and newer Pro XS	NGK IZFR6J
Spark plug gap	1.1 mm (0.043 in.)
Maximum timing	Not adjustable; PCM controlled
Idle timing	Not adjustable; PCM controlled
Throttle position sensor	
Model year 2000 at idle	4.0–4.7 VDC
Model year 2000 at WOT	0.4–1.3 VDC
Model year 2001 and newer at idle	0.4–1.3 VDC
Model year 2001 and newer at WOT	4.0–4.7 VDC

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Charging and Starting Specifications

Charging and Starting Specifications	
Alternator output (regulated)	
Output at the battery at 2000 RPM	32–38 A
Output at the alternator at 2000 RPM	52–60 A
Voltage set point	14.5 ± 0.25 volts
Regulator current draw[1].	
Ignition switch "OFF"	0.585 mA
Ignition switch "ON"	150.0 mA
Starter draw (0G960500–0T178499)	
Under load	165 A
No load	30 A
Starter draw (0T178500 and above)	
Under load	200 A
No load	65 A
Average engine RPM when cranking	300–325 RPM
Starter solenoid current at 12.6 volts (0T178500 and above)	
Pull in coil	40 A
Hold in coil	10 A
Start solenoid current draw	4 A
Starter brush length (minimum)	6.35 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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Fuel Rail Specifications

Fuel System Specifications	
Fuel pressure	
115/135/150/175	620.5 ± 14 kPa (90 ± 2 psi)
150 Pro XS/175 Pro XS	751.5 ± 14 kPa (109 ± 2 psi)
Air pressure	
115/135/150/175	551.5 kPa (80 psi)
150 Pro XS/175 Pro XS	655 ± 14 kPa (95 ± 2 psi)
Tracker valve spring pressure	
115/135/150/175	69 kPa (10 psi)
150 Pro XS/175 Pro XS	96.5 kPa (14 psi)
Fuel injector ohm resistance	1.8 ± 0.1 Ω
Direct injector ohm resistance	1.3 ± 0.3 Ω
Direct injector color	
115/135/150/175	Blue
150 Pro XS/175 Pro XS	Gray
Fuel rail water cooling	
115/135/150/150 Pro XS/175	Port fuel rail
175 Pro XS	None

Fuel System Specifications

Mechanical Fuel Pump Specifications	
Mechanical fuel pump pressure at idle[1.]	
Normal	13.8–20.7 kPa (2–3 psi)
Minimum	7 kPa (1 psi)
Mechanical fuel pump pressure at WOT[1.]	
Normal	41–55 kPa (6–8 psi)
Minimum	27.5 kPa (4 psi)
Maximum	69 kPa (10 psi)

1. Electric fuel pump pressure, if used in conjunction with engine mechanical fuel pump, must be limited to no more than 27.4 kPa (4 psi).

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