www.mercurymarine.com.au
132-140 Frankston Road
Dandenong, Victoria 3164 Australia

www.mercurymarine.com
P.O. Box 1939
Fond du Lac, WI 54936-1939 USA

www.marinepower.com
(Parc Industriel de Petit-Rechain)
B-4800 Verviers, Belgium

©JULY 2010, Mercury Marine. All rights reserved. Printed in U.S.A.

English Version 90-8M0047659

MERCURY 75/90/115/125 115 Pro XS OptiMax 90-8M0047659 JULY 2010

MERCURY

Service Manual



75/90/115/125 115 Pro XS OptiMax

Direct Fuel Injection

Serial Number 0T801000 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.

© 2009, Mercury Marine

Mercury, Mercury Marine, MerCruiser, Mercury MerCruiser, Mercury Racing, Mercury Precision Parts, Mercury Propellers, Mariner, Quicksilver, #1 On The Water, Alpha, Bravo, Bravo Two, Pro Max, OptiMax, Sport-Jet, K-Planes, MerCathode, RideGuide, SmartCraft, Zero Effort, M with Waves logo, Mercury with Waves logo, VesselView, and SmartCraft logo are all registered trademarks of Brunswick Corporation. Mercury Product Protection logo 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.

APERÇU — Engine Manual — fichier complet disponible après achat

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.

APERÇU — Engine Manual — fichier complet disponible après achat

Manual Outline

1 - Important Information
- A - Specifications
- B - Maintenance
- C - General Information
- D - Outboard Installation

2 - Electrical
- A - Ignition
- B - Charging and Starting System
- C - Timing, Synchronizing, and Adjusting

3 - Fuel System
- A - Fuel Pump
- 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

6 - Lower Unit
- A - Gear Housing

7 - Attachments/Control Linkage
- A - Throttle Cable and Shift Bracket

APERÇU — Engine Manual — fichier complet disponible après achat

APERÇU — Engine Manual — fichier complet disponible après achat

Important Information

Section 1A - Specifications

1A

Table of Contents

75/90/115/115 Pro XS/125 OptiMax Master Specifications 1A-2
General Specifications....1A-2
Maintenance Specifications....1A-3
Ignition Specifications....1A-3
Charging and Starting Specifications....1A-4
Air Compressor Specifications....1A-4
Fuel System Specifications....1A-5
Installation Specifications....1A-5
Powerhead Specifications....1A-6
Mid-Section Specifications....1A-7
Gear Housing Specifications....1A-7
Power Trim Specifications....1A-8
Cooling Specifications....1A-8
Propeller Information Charts....1A-8
75 OptiMax....1A-8
90 OptiMax....1A-10
115 OptiMax....1A-11
115 Pro XS....1A-13
125 OptiMax....1A-13

APERÇU — Engine Manual — fichier complet disponible après achat 6/10

75/90/115/115 Pro XS/125 OptiMax Master Specifications

General Specifications

Model Specifications	
Kilowatts (Horsepower)	55.2 kW (75 hp)
	66.2 kW (90 hp)
	84.6 kW (115 hp)
	93.2 kW (125 hp)
Weight	
50.8 cm (20 in.)	163.3 kg (360 lb)
63.5 cm (25 in.)	168.7 kg (372 lb)
76.2 cm (30 in.)	N/A
Displacement (all hp)	1.5L (92.9 cu. in.)
RPM	
Idle	650 ± 25 RPM
WOT	5000–5750 RPM
Limiter	5800 RPM
Induction system	Throttle body aspiration
Fuel system	Computer controlled sequential multi-port electronic 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 reservoir capacity	4.72 liter (5 U.S. Quart)
External tank (optional)	11.4 liter (12 U.S. Quart)
Engine control system	SmartCraft propulsion control module (PCM)
Trim system	
Maximum tilt range	75°
Maximum trim range	20°

APERÇU — Engine Manual — fichier complet disponible après achat

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	4.72 liter (5 US qt)
External tank (optional)	11.4 liter (12 US qt)
Spark plug type	NGK PZFR6H or IZFR5J
Spark plug gap	0.8 mm (0.031 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)	20.6–41.3 kPa (3–6 psi)
At 5750 RPM (WOT)	75.8–96.5 kPa (11–14 psi)

Ignition Specifications

Ignition Specifications	
Type	Digital inductive
Firing order	1 - 2 - 3
Spark plug type	NGK PZFR6H or IZFR5J
Spark plug gap	0.8 mm (0.031 in.)
Spark plug lead resistance at 20 °C (68 °F)	1170–1330 ohms
Maximum timing	Not adjustable; controlled by PCM
Idle timing	Not adjustable; controlled by PCM
Throttle position sensor	
At idle	0.17–1.05 VDC
At wide-open throttle	3.76–4.64 VDC
Crankshaft position sensor	
Air gap (S/N 1785000 and above)	Not adjustable
Air gap (S/N 0G590000–0T178499)	5 mm (0.20 in.)
Resistance at 20 °C (68 °F)	300–350 ohms

APERÇU — Engine Manual — fichier complet disponible après achat 8/10

Charging and Starting Specifications

Charging and Starting Specifications	
Alternator output (regulated)	
Output at the battery at 2000 RPM	32–38 amps
Output at the alternator at 2000 RPM	52–60 amps
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	
Under load	200 amps
No load	65 amps
Average engine RPM when cranking	300–325 RPM
Starter solenoid current draw at 12.6 volts	
Pull in coil	40 amps
Hold in coil	10 amps
Start solenoid current draw	4 amps
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

Air Compressor Specifications

Air Compressor Specifications	
Air compressor type	Reciprocating piston
Air compressor output	(1.14:1 ratio with engine RPM) at idle - 655 kPa (95 psi)
Displacement	60 cc (3.66 cu. in.)
Cylinder bore	52.0 mm (2.0472 in.)
Cylinder bore taper (maximum)	0.025 mm (0.001 in.)
Cylinder bore out of round (maximum)	0.025 mm (0.001 in.)
Cylinder bore type	Cast iron
Stroke	27.9 mm (1.100 in.)
Piston type	Aluminum
Piston diameter	51.95 ± 0.01 mm (2.0453 ± 0.004 in.)
Ring end gap	
Top ring	0.15–0.3 mm (0.0059–0.0118 in.)
Middle ring	0.15–0.3 mm (0.0059–0.0118 in.)
Bottom ring	0.1–0.35 mm (0.0039–0.014 in.)
Reed stand open (maximum)	0.25 mm (0.01 in.)

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.

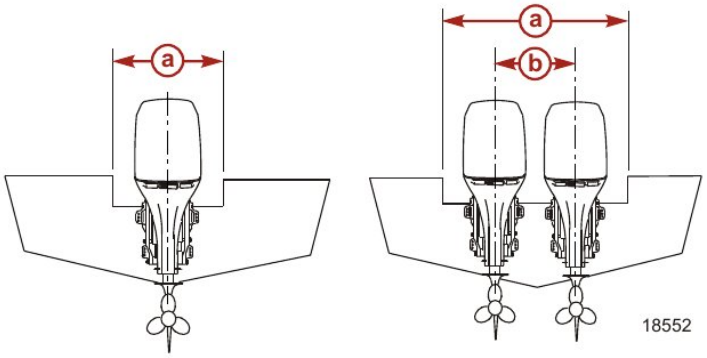
APERÇU — Engine Manual — fichier complet disponible après achat

Fuel System Specifications

Mechanical Fuel Pump Specifications	
Mechanical fuel pump pressure at idle[1]	
Normal	13.7–20.5 kPa (2–3 psi)
Minimum	6.8 kPa (1 psi)
Mechanical fuel pump pressure at WOT[1]	
Normal	41.0–54.8 kPa (6–8 psi)
Minimum	27.4 kPa (4 psi)
Maximum	68.5 kPa (10 psi)

Fuel System Specifications	
Fuel pressure	751.5 ± 6.9 kPa (109 ± 1 psi)
Air pressure	655.0 ± 6.9 kPa (95 ± 1 psi)
Fuel/air differential	96.5 ± 2.1 kPa (14 ± 0.3 psi)
High-pressure fuel pump amperage draw	10–14 amps
Low-pressure fuel pump amperage draw	1–2 amps
Low-pressure fuel pump output	137.9–206.8 kPa (20–30 psi)
Fuel pump ohm resistance	1.0–1.8 Ω
Fuel injector ohm resistance	1.8 ± 0.1 Ω
Direct injector ohm resistance	1.3 ± 0.3 Ω

Installation Specifications



a - Minimum transom opening
b - Engine centerline for dual engine - 66.0 cm (26 in.)

Minimum Transom Opening	
Single engine	84.8 cm (33-3/8 in.)
Dual engine	151.8 cm (59-3/4 in.)

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)

APERÇU — Engine Manual — fichier complet disponible après achat 10/10