8_9.9 Fourstroke Cover.qxd 2/24/2004 10:30 AM Page 1

MERCURY

8/9.9 FourStroke

Serial Number 0R042475 & Above
90-892248 FEBUARY 2004

MERCURY
Service Manual



8/9.9 FourStroke

Serial Number 0R042475 & Above

MERCURY

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APERÇU — Engine Manual — fichier complet disponible après achat

Manual Outline

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

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

3 - Fuel System
- A - Fuel Pump
- B - Carburetor
- C - Emissions

4 - Powerhead
- A - Cylinder Head
- B - Cylinder Block/Crankcase
- C - Oil Pump
- D - Cooling System

5 - Mid-Section
- A - Clamp/Swivel Bracket and Driveshaft Housing
- B - Clamp/Swivel Bracket and Driveshaft Housing (Power Tilt Models)
- C - Power Tilt

6 - Lower Unit
- A - Gear Housing (Non - Bigfoot)
- B - Gear Housing (Bigfoot)

7 - Attachments
- A - Throttle and Shift Linkage
- B - Tiller Handle

8 - Manual Starter
- A - Recoil Starter

9 - Wire Diagrams
- A - Wiring Schematics

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Notice to Users of This Manual

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 - indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING - indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

⚠ CAUTION

CAUTION - indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury or property damage. It may also be used to alert against unsafe practices.

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.

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

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

Electrical, ignition and fuel system components on Mercury Marine Power Products are designed and manufactured to comply with U.S. Coast Guard Rules and Regulations to minimize risks of fire or explosion.

Use of replacement electrical, ignition or fuel system components, which do not comply to these rules and regulations, could result in a fire or explosion hazard and should be avoided.

When servicing the electrical, ignition and fuel systems, it is extremely important that all components are properly installed and tightened. If not, any electrical or ignition component opening would permit sparks to ignite fuel vapors from fuel system leaks, if they existed.

Cleanliness and Care of Product

A Mercury 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 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

Important Information

Section 1A - Specifications

1 A

Table of Contents

8/9.9 Master Specifications.....1A-2
Model Specifications.....1A-2
Ignition Specifications.....1A-3
Charging and Starting Specifications.....1A-3
Fuel Pump Specifications.....1A-4
Cooling System Specifications.....1A-4
Carburetor Specifications.....1A-4
Cylinder Head Specifications.....1A-5
Cylinder Block Specifications.....1A-6
Oil Pump Specifications.....1A-6
Piston Specifications.....1A-7
Power Tilt Specifications.....1A-7
Gearcase Specifications (Non-Bigfoot) 1A-8
Gearcase Specifications (Bigfoot).....1A-8
Propeller Chart.....1A-8
Mercury/Mariner 8 (2 Cyl., 4 Stroke).....1A-8
Mercury/Mariner 9.9 (2 Cyl., 4 Stroke) 1A-9
Mercury/Mariner 9.9 Bigfoot (2 Cyl., 4 Stroke) 1A-9

APERÇU — Engine Manual — fichier complet disponible après achat 5/10

8/9.9 Master Specifications

Model Specifications

Model Specifications	
Kilowatts (Horsepower)	5.9 kW (8 hp) 7.4 kW (9.9 hp)
Weight (Non-Bigfoot Models)	
MH	38.1 kg (84 lb.)
MLH	39.0 kg (86 lb.)
EH	41.3 kg (91 lb.)
ELH	42.2 kg (93 lb.)
MRC	36.3 kg (80 lb.)
ELRC	40.8 kg (90 lb.)
Weight (Bigfoot Models)	
MLH	43.5 kg (96 lb.)
MXLH	44.9 kg (99 lb.)
ELH	46.7 kg (103 lb.)
EXLH	48.1 kg (106 lb.)
ELHPT	50.3 kg (111 lb.)
EXLHPT	51.7 kg (114 lb.)
ELRC	44.9 kg (99 lb.)
EXLRC	46.7 kg (103 lb.)
ELPT	48.9 kg (108 lb.)
EXLRCPT	50.3 kg (111 lb.)
Recommended RPM Range @ WOT	5000 - 6000 RPM
Fuel	Automotive Unleaded - Minimum 87 Octane
Oil Type	
All Temperatures	10W-30
Alternate Oil Viscosity Above 4° C (40° F)	25W-40
Oil Capacity	800 ml (27.0 fl. oz.)

APERÇU — Engine Manual — fichier complet disponible après achat

Ignition Specifications

Ignition Specifications @ 20° C (68° F)	
Ignition Type	Capacitor Discharge Ignition
Spark Plug Type	NGK DCPR6E
Spark Plug Gap	0.8 - 0.9 mm (0.031 - 0.035 in.)
Firing Order	1 - 2 (Lost Spark)
Ignition Timing @ Idle	0° - 10° B.T.D.C.
Ignition Timing @ WOT	30° B.T.D.C
ECM RPM Limiter	
RPM Over Speed	6250 RPM
Low Oil	3000 RPM
Ignition Charge Coil	295 Ohms ± 20%
Crank Position Sensor	185 Ohms ± 20%
Ignition Coil	
Primary	0.30 Ohms ± 15%
Secondary	8.50 Ohms ± 15%

Charging and Starting Specifications

Charging and Starting Specifications @ 20° C (68° F)	
Alternator Type	Single Phase
Alternator Resistance	0.72 Ohms ± 20%
Alternator Output	12V - 6 Amps (Rectified) @ 5000 RPM
Starter	
Type	Bendix
Output	0.4 kW @ 12V
Brush Length	4.0 - 7.5 mm (0.157 - 0.295 in.)
Commutator Diameter	19.7 - 20.0 mm (0.775 - 0.787 in.)
Commutator Under Cut	0.5 - 0.8 mm (0.0197 - 0.0315 in.)
Amperage (No Load)	13
Amperage (Loaded - 750 RPM Cranking)	40 - 46
Fuse Capacity	20 Amps
Fuse Type	Mini (ATO)
Battery (Minimum Requirements)	
Above 0° C (32° F)	465 Marine Cranking Amps (MCA) or 350 Cold Cranking Amps (CCA)
Below 0° C (32° F)	1000 Marine Cranking Amps (MCA) or 775 Cold Cranking Amps (CCA)

APERÇU — Engine Manual — fichier complet disponible après achat 7/10

Fuel Pump Specifications

Fuel Pump Specifications	
Fuel Pump Type	Plunger, diaphragm
Fuel Pump Operation	Mechanical
Fuel Pressure @ Idle (950 RPM)	30 kPa (4.35 PSI)
Fuel Pressure @ WOT (5500 RPM)	32 kPa (4.64 PSI)
Vacuum @ Idle (950 RPM)	22 kPa (3.2 PSI)
Vacuum @ WOT (5500 RPM)	38 kPa (5.5 PSI)

Cooling System Specifications

Cooling System Specifications	
Thermostat	
Start To Open Temperature	60° ± 1.5° C (140° ± 3° F)
Full Open Temperature	75° ± 1.5° C (167° ± 3° F)
Valve Lift	3 mm (0.12 in.)

Carburetor Specifications

Carburetor Specifications 8 HP	
Venturi	12 mm (0.47 in.)
Throttle Bore	23 mm (0.91 in.)
Main Jet	#76
Main Air Jet	#150
Main Nozzle I.D.	2.3 mm (0.09 in.)
Slow Jet	#39
Slow Air Jet	#90
Idle Speed	900 RPM
Float Level (Flange To Float Bottom)	9.0 mm (0.35 in.)

Carburetor Specifications 9.9 HP	
Venturi	17 mm (0.67 in.)
Throttle Bore	23 mm (0.91 in.)
Main Jet	#92
Main Air Jet	#135
Main Nozzle I.D.	2.6 mm (0.10 in.)
Slow Jet	#39
Slow Air Jet	#70
Idle Speed	900 RPM
Float Level (Flange To Float Bottom)	9.0 mm (0.35 in.)

APERÇU — Engine Manual — fichier complet disponible après achat

Cylinder Head Specifications

Cylinder Head Specifications	
Camshaft	
Run-Out Limit	0.1 mm (0.0039 in.)
Cam Lobe Height (Intake And Exhaust)	23.39 - 23.63 mm (0.92 - 0.93 in.)
Upper Bearing O.D.	17.95 - 17.98 mm (0.7067 - 0.7079 in.)
Lower Bearing O.D.	15.95 - 15.97 mm (0.6280 - 0.6287 in.)
Valve Spring Free Length	33.6 - 35 mm (1.323 - 1.378 in.)
Valve Spring Tilt Limit	1.1 mm (0.043 in.)
Valve Guide I.D.	
Intake	5.51 - 5.55 mm (0.2169 - 0.2185 in.)
Exhaust	5.51 - 5.57 mm (0.2169 - 0.2193 in.)
Valve Stem O.D.	
Intake Valve	5.46 - 5.48 mm (0.2150 - 0.2157 in.)
Exhaust Valve	5.44 - 5.46 mm (0.2142 - 0.2150)
Valve Stem Run-Out (Maximum)	
Intake and Exhaust	0.016 mm (0.0006 in.)
Valve Stem to Valve Guide Clearance	
Intake	0.008 - 0.07 mm (0.0003 - 0.0028 in.)
Exhaust	0.025 - 0.057 mm (0.0010 - 0.0022 in.)
Valve Seat Angles	
First	30°
Second	45°
Third	60°
Valve Stem Seal Color	
Intake	Black
Exhaust	Green
Valve Seat Width (Intake and Exhaust)	1.0 - 2.0 mm (0.0394 - 0.0787 in.)
Valve to Rocker Arm Clearance	
Intake	0.13 - 0.17 mm (0.005 - 0.007 in.)
Exhaust	0.18 - 0.22 mm (0.007 - 0.009 in.)
Rocker Arm I.D.	13.01 - 13.04 mm (0.5122 - 0.5134 in.)
Rocker Arm Shaft O.D.	12.95 - 12.99 mm (0.5098 - 0.5114 in.)
Cylinder Head Warp Limit	0.1 mm (0.004 in.)
Cylinder Head Camshaft Bearing I.D. (Upper)	18.01 - 18.03 mm (0.7090 - 0.7096 in.)

APERÇU — Engine Manual — fichier complet disponible après achat 9/10

Cylinder Block Specifications

Cylinder Block Specifications	
Cylinder Bore	
Standard	55 mm (2.1654 in.)
Oversize	55.5 mm (2.185 in.)
Maximum taper/out of round	0.06 mm (0.0024 in.)
Stroke	44 mm (1.73 in.)
Displacement	209 ml (12.8 cu. in.)
Number of Cylinders	2
Rotation	Clockwise
Crankshaft	
Run Out	0.05 mm (0.002 in.)
Crank Pin Journal (Standard)	26.98 mm (1.0622 in.)
Crank Pin Journal (Service Limit)	26.95 mm (1.0610 in.)
Main Bearing (Standard)	29.99 mm (1.1807 in.)
Main Bearing (Service Limit)	29.97 mm (1.1799 in.)
Main Bearing Oil Clearance (Standard)	0.012 - 0.044 mm (0.0005 - 0.0118 in.)
Main Bearing Oil Clearance (Service Limit)	0.06 mm (0.0024 in.)
Crankshaft to Connecting Rod Side Clearance	0.01 - 0.6 mm (0.0004 - 0.0236 in.)
Connecting Rod	
Wrist Pin I.D. (Standard)	14.01 mm (0.5516 in.)
Wrist Pin I.D. (Service Limit)	14.04 mm (0.5528 in.)
Crank Pin Oil Clearance (Standard)	0.015 - 0.041 mm (0.0006 - 0.0016 in.)
Crank Pin Oil Clearance (Service Limit)	0.060 mm (0.0024 in.)

Oil Pump Specifications

Oil Pump Specifications	
Oil Pump Type	Trochoid
Engine Oil Pressure @ 75° C (167° F)	
@ 950 RPM	100 kPa (14.5 PSI) or greater
@ 5000 RPM	330 kPa (48 PSI) or greater
Outer Rotor to Pump Housing (Maximum clearance)	0.36 mm (0.0142 in.)
Inner Rotor to Outer Rotor (Maximum clearance)	0.16 mm (0.0063 in.)
Outer Rotor to Oil Pump Cover (Maximum clearance)	0.11 mm (0.0043 in.)
Outer Rotor Height	9.96 mm (0.392 in.)
Oil Pump Housing Inside Diameter (Maximum)	29.04 mm (1.1433 in.)
Oil Pump Housing to Camshaft	0.02 - 0.05 mm (0.0008 - 0.002 in.)

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