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 Outboard Motor

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 an outboard which is suspended. Outboards 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.

SECTION 1A – GENERAL INFORMATION AND SPECIFICATIONS

1 A

Table of Contents

How To Use This Manual

The manual is divided into SECTIONS (shown right) which represents major components and systems.

Some SECTIONS are further divided into PARTS. Each PART has a title page. A **Table of Contents** for the particular PART is printed on the back of the title page.

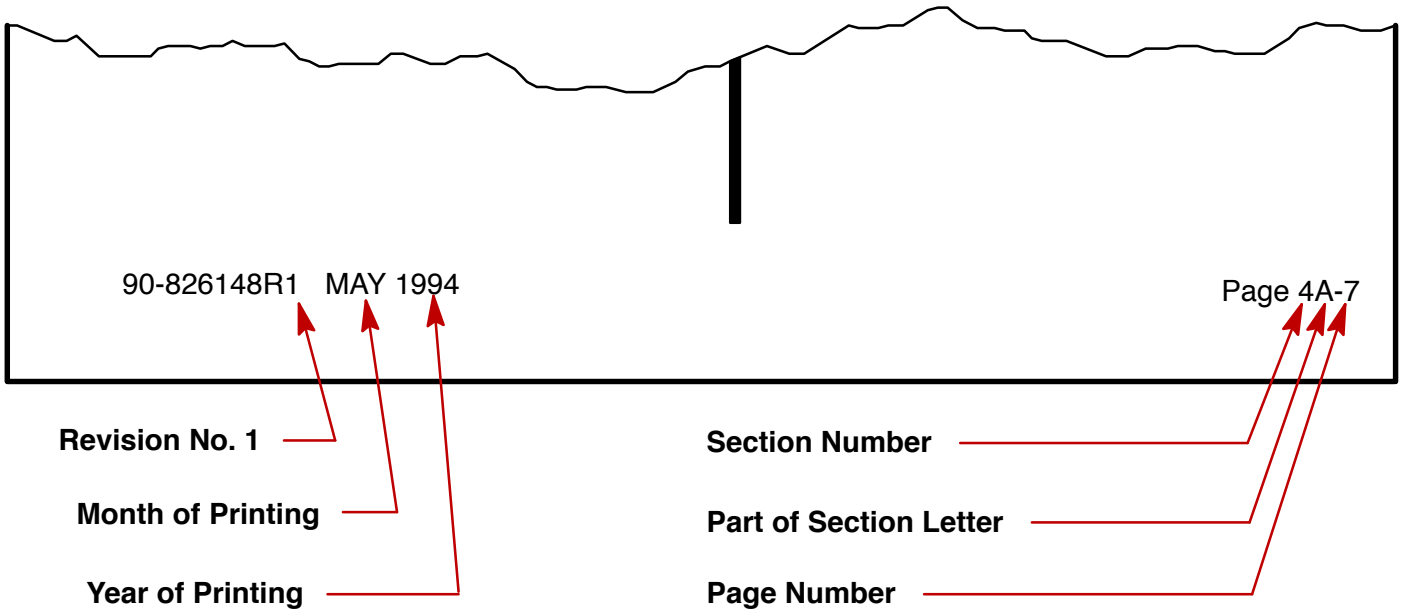
SECTIONS and PARTS are listed on the **Service Manual Outline** sheet which immediately follows the cover of this book.

Section	Section Heading
1	General Information/Specifications
2	Electrical and Ignition
3	Fuel System and Carburetion
4	Powerhead
5	Jet Pump
6	Sport Jet Installation

Page Numbering

Two number groups appear at the bottom of each page. The example below is self-explanatory.

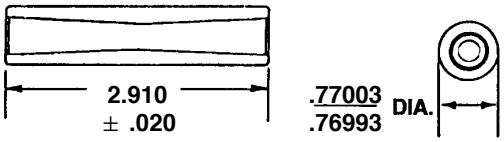
EXAMPLE:



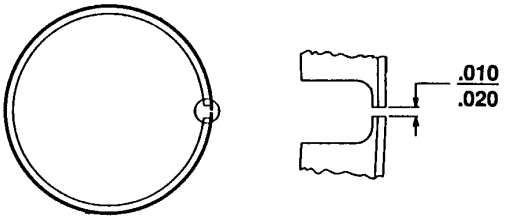
Master Specifications

		120
HORSEPOWER (KW)	**Model 120**	120 (89.5)
PH / PUMP WEIGHT		260 lbs.
CYLINDER BLOCK	**Type** **Displacement**	4 Cylinder In-Line 102.9 cu. in. (1687 cc)
STROKE	**Length**	2.876 in. (73.05 mm)
CYLINDER BORE	**Diameter (Standard)** **Taper/Out of Round Max.** **Bore Type**	3.375 in. (85.7 mm) 0.0015 Cast Iron
PISTON	**Piston Type** **Standard** **0.015 in. (0.378 mm) Oversize** **0.030 in. (0.752 mm) Oversize**	Aluminum Diameter 3.3700 (85.598 mm) Diameter 3.3850 (85.979 mm) Diameter 3.4000 (86.360 mm)
REEDS	**Reed Stand Open (Max.)**	0.010 (0.254 mm)

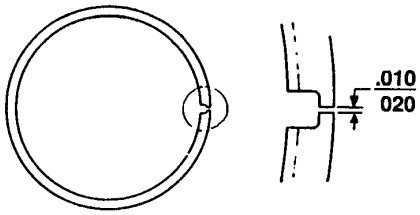
PUMP HOUSING	**Gear Ratio** **Drive Housing Capacity** **Stator Capacity** **Pinion Height** **Gear Backlash**	1.25:1 750 cc 500 cc 0.025 in. (0.64 mm) 0.007 in. - 0.009 in. (0.177 mm - 0.228 mm)
FUEL SYSTEM	**Fuel** **Recommended Gasoline** **Recommended Oil** **Gasoline/Oil Ratio** **Fuel Pressure- @ Idle** **- @ WOT**	Gasoline and Oil Automotive Lead-Free: 87 octane minimum Quicksilver TC-W 3 or TC-W II Outboard Oil Variable ratio oil injection 3.5 PSI 6 PSI
STARTING SYSTEM	**Electric Start- Starter Draw** **Under Load** **No Load** **Battery Rating (minimum)**	 110 - 200 Amperes 80 - 165 Amperes 670 Marine Cranking Amps (MCA) or 520 Cold Cranking Amps (CCA)
IGNITION SYSTEM	**Type** **Spark Plug Type** **Spark Plug Gap** **Optional (Resistor Plug)**	Capacitor discharge Champion L77JC4 .040 (1.0 mm) QL77JC4
CHARGING SYSTEM	**Alternator Output (Regulated)**	15 Amp
CARBURETOR	**Idle RPM** **Wide Open Throttle (WOT) RPM** **Idle Mixture Screw Adjustment (Preset – Turns Out)** **– All Carbs** **Float Setting** **Main Jet** **– Model 120** **– Carb #1** **– Carb #2**	950 - 1100 RPM 4700 - 5300 1-1/2 turn out from a lightly seated position Set parallel to body flange .088 .090
TIMING	**Maximum BTDC** **@ Cranking Speed** **@ 5000 RPM** **Firing Order** **– Model 120**	 32° BTDC 30° BTDC 1-3-2-4



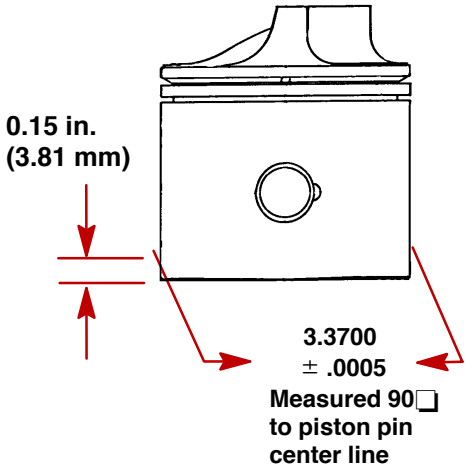
PISTON PIN

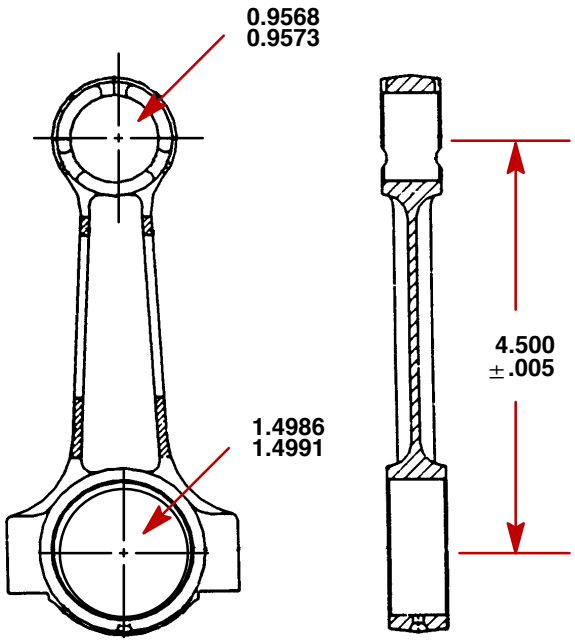


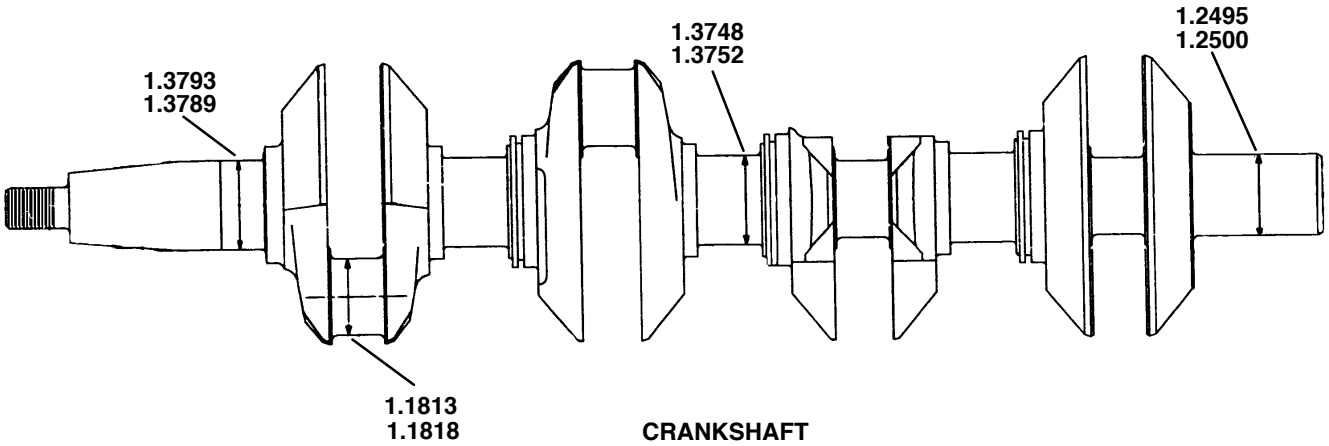
TOP PISTON RING



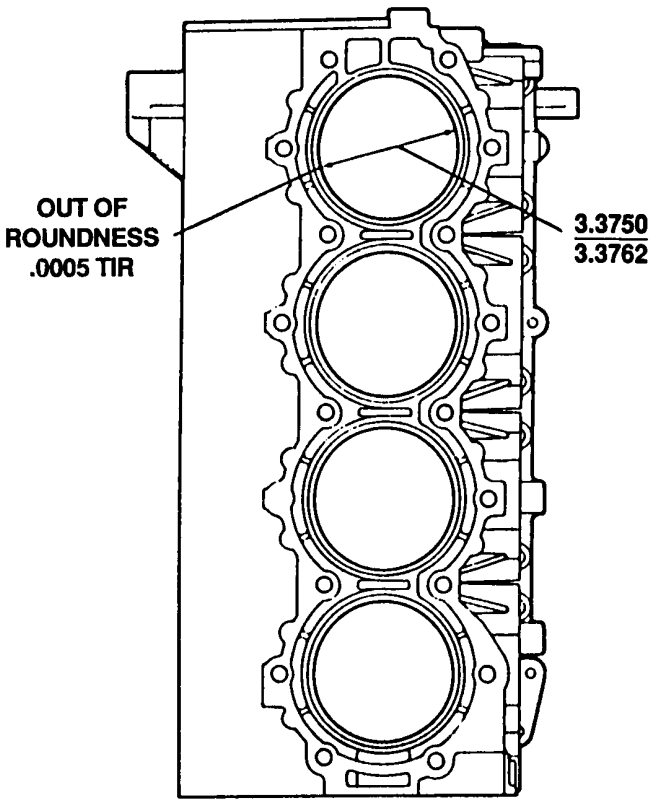
BOTTOM PISTON RING



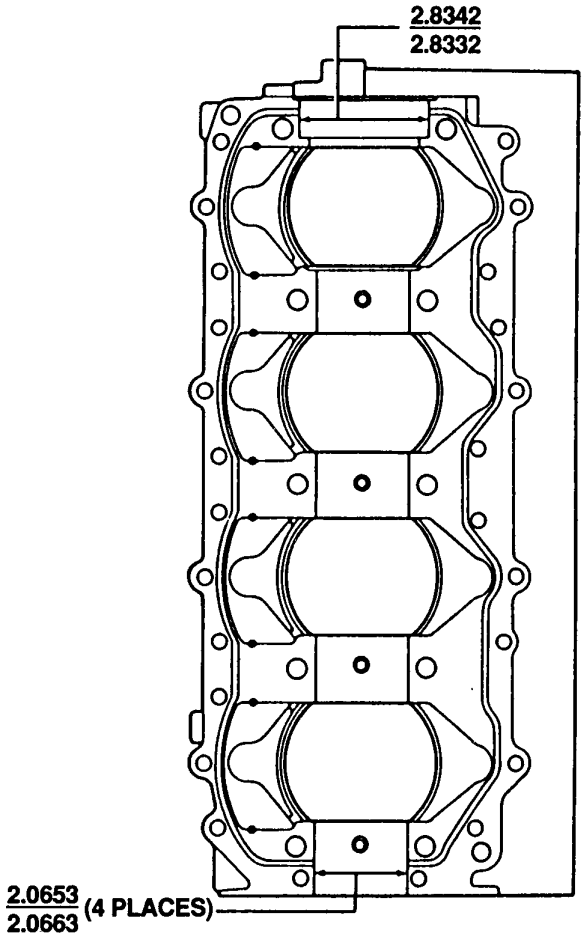




CRANKSHAFT



CYLINDER



Torque Chart

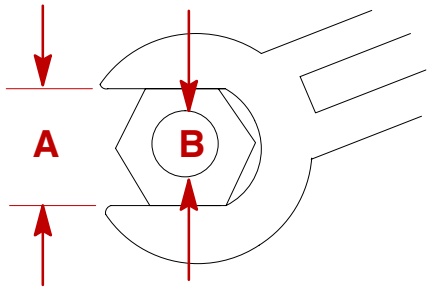
Special Items	Torque
Impeller Shaft Nut	150 lb. ft. (203 N·m)
Drive Housing Cover Bolts	35 lb. ft. (47.5 N·m)
Stator Bolts	35 lb. ft. (47.5 N·m)
Nozzle to Stator Bolts	35 lb. ft. (47.5 N·m)
Rudder Pivot Bolt	20 lb. ft. (27.1 N·m)
Reverse Gate Pivot Bolt	20 lb. ft. (27.1 N·m)
Powerhead to Drive Housing (M8 Nut)	20 lb. ft. (27.1 N·m)
Powerhead to Drive Housing (M10 Nut)	35 lb. ft. (47.5 N·m)
Steering Cable Mounting Bracket	200 lb. in. (22.6 N·m)
Steering Lever Screw	180 lb. in. (20.2 N·m)
Reverse Gate Stop Screw	120 lb. in. (13.6 N·m)
Shift Bracket Screw	50 lb. in. (5.6 N·m)
Inlet Screen Screw	75 lb. in. (8.5 N·m)
Ride Plate Screw	75 lb. in. (8.5 N·m)
Drive Shaft Nut	90 lb. in. (122 N·m)
Cylinder Head	225 lb. in. (25.4 N·m) Then Turn Additional 90❑
Flywheel Nut	125 lb. ft. (169.47 N·m)
Main Bearing Bolts	270 lb. in. (30.4 N·m)
Connecting Rod Screws	120 lb. in. (13.6 N·m) Then Turn Additional 90❑
Transfer Port Cover	80 lb. in. (9.03 N·m)
Exhaust Manifold	115 lb. in. (13 N·m)
Carburetor Fuel Bowl Screw	30 lb. in. (3.5 N·m)

Standard Hardware

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

Metric Hardware

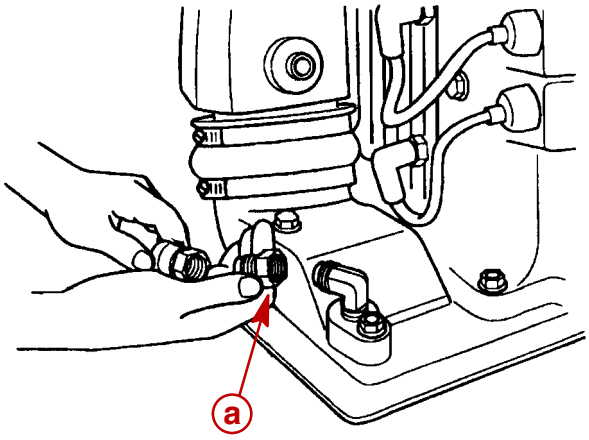
A	B	Torque Specification		
		lb. in.	lb. ft.	N·m
8 mm	M5	36	3	4
10 mm	M6	70	6	8
12 mm	M8	156	13	18
14 mm	M10	312	26	36
17 mm	M12	372	31	42



Flushing Cooling System

Flushing the cooling system is essential after each use in salt water, after the boat has run aground, or when the overheat warning horn sounds (debris in jet powerhead). We recommend using Dealer Kit (P/N 22-820573) to flush the cooling system.

1. Disconnect the inlet water hose at the rear starboard corner of the pump housing. Install the Dealer Kit and attach water hose.



a - Dealer Flushing Kit (22-820573)

2. Turn water on and flush engine block for at least 10 minutes.
3. Remove water hose and dealer flushing kit. Re-install water inlet hose.
4. Flush outer surfaces of water outlet nozzle with water stream.

Following Complete Submersion

Submerged engine treatment is divided into three distinct problem areas. The most critical is submersion in salt water; the second is submersion while running; the third is submersion in fresh water with special instructions.

SALT WATER SUBMERSION (SPECIAL INSTRUCTIONS)

Due to the corrosive effect of salt water on internal engine components complete disassembly is necessary before any attempt is made to start the engine.

SUBMERGED WHILE RUNNING (SPECIAL INSTRUCTIONS)

When an engine is submerged while running, the possibility of internal engine damage is greatly increased. If, after engine is recovered and with spark plugs removed, engine fails to rotate freely when turning flywheel, the possibility of internal damage (bent connecting rod and/or bent crankshaft) exists. If this is the case the powerhead must be disassembled.

SUBMERGED ENGINE (FRESH WATER) PLUS SPECIAL INSTRUCTIONS

1. Recover engine as quickly as possible.
2. Flush exterior of engine with fresh water to remove mud, weeds, etc. DO NOT attempt to start engine if sand has entered powerhead, as powerhead will be severely damaged. Disassemble powerhead if necessary to clean components.
3. Remove spark plugs and get as much water as possible out of powerhead by rotating flywheel.
4. Pour alcohol into carburetor throat (alcohol will absorb water). Again rotate flywheel.
5. Pour alcohol into spark plug openings and again rotate flywheel.
6. Pour engine oil into throats of carburetors while rotating flywheel to distribute oil throughout crankcase.
7. Pour approximately one teaspoon of engine oil into each spark plug opening. Rotate flywheel to distribute oil in cylinders.
8. Remove and clean carburetors and fuel pump assembly.
9. Reinstall spark plugs, carburetors and fuel pump.
10. Attempt to start engine, using a fresh fuel source. If engine starts it should be run for at least one hour to eliminate any water in engine.
11. If engine fails to start determine cause (fuel, electrical or mechanical). Engine should be run within two hours after recovery from water as serious internal damage may occur. If unable to start engine in this period disassemble engine and clean all parts and apply oil as soon as possible.

Out-of-Season Storage

⚠ WARNING

As a safety precaution, when boat is in storage, remove positive (+) battery cable. This will eliminate possibility of accidental starting of engine and resultant overheating and damage to engine from lack of water.

In preparing for out-of-season storage, two precautions must be considered: 1) The engine must be protected from physical damage caused by freezing trapped water and 2) the engine must be protected from rust, corrosion and dirt.

The following storage procedures should be followed to prepare the Sport Jet for out-of-season storage or prolonged storage (two months or longer).

⚠ CAUTION

Never start or run the Sport Jet (even momentarily) out of the water. Damage to the pump and engine will occur.

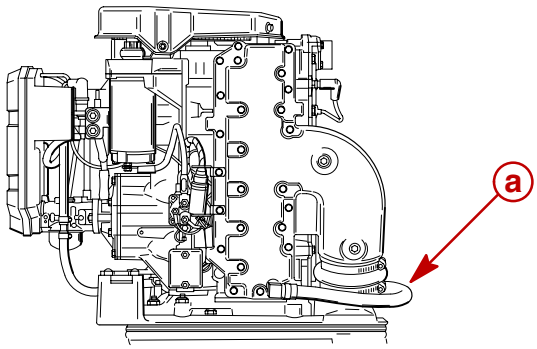
FUEL SYSTEM

IMPORTANT: Gasoline containing alcohol (ethanol or methanol) can cause a formation of acid during storage and can damage the fuel system. If the gasoline being used contains alcohol, it is advisable to drain as much of the remaining gasoline as possible from the fuel tank, remote fuel line, and engine fuel system.

Fill the fuel system (tank, hoses, fuel pump, and carburetors) with treated (stabilized) fuel to help prevent formation of varnish and gum. Proceed with the following instructions.

- Portable Fuel Tank: Pour the required amount of Quicksilver Gasoline Stabilizer (follow instructions on container) into fuel tank. Tip fuel tank back and forth to mix stabilizer with the fuel.
- Permanently Installed Fuel Tank: Pour the required amount of Quicksilver Gasoline Stabilizer (follow instructions on container) into a separate container and mix with approximately one quart (one liter) of gasoline. Pour this mixture into fuel tank.
- Place the Sport Jet in the water. Run the engine for ten minutes to allow treated fuel to reach the carburetors.

1. With Sport Jet in the water, start the engine and let it warm up to operating temperature.
2. Disconnect the fuel line. When the engine starts to stall quickly spray Quicksilver Storage Seal into each carburetor throat. Continue to spray until engine dies from lack of fuel.
3. Remove spark plugs and inject a five second spray of Quicksilver Storage Seal around the inside of each cylinder. Manually turn engine over several times to distribute Storage Seal throughout cylinders. Reinstall spark plugs.
4. Drain and refill drive housing unit and stator assembly with Quicksilver Hi Performance Gear Lube as explained in “**Jet Pump**” section (see **Table of Contents**).
5. Clean engine thoroughly including all accessible powerhead parts and spray with Corrosion and Rust Preventive.
6. Remove water inlet hose and drain any trapped water. Reconnect hose.



a - Water Inlet Hose

7. Lubricate all lubrication points.
8. To prevent freeze damage, drain the speedometer system of water completely before storage. Remove tubing from speedometer fitting and blow through tubing to remove water.
9. Store battery as outlined in **Out-of-Season Battery Storage** following:

IMPORTANT: Check and refill housings with Quicksilver Hi Performance Gear Lube before storage to protect against possible water leakage into housings which is caused by loose lubricant vent plug or loose grease fill plug. Inspect gaskets under lubricant vent and fill plugs replacing any damaged gaskets before reinstalling plugs.

Out-of-Season Battery Storage

1. Remove battery as soon as possible and remove all grease, sulfate and dirt from top surface.
2. Cover plates with distilled water, but not over 3/16 in. (5 mm) above perforated baffles.
3. Cover terminal bolts well with grease.
4. Store battery in a cool, dry place in a dry carton or box.
5. Remove battery from storage every 60 days. Check water level and place on charge for 5 to 6 hours at 6 amperes. DO NOT fast charge.

⚠ CAUTION

A discharged battery can be damaged by freezing.