MERCURY
MerCruiser

SERVICE MANUAL

Number 24

MARINE ENGINES

GM V-8
305 CID (5.0L) / 350 CID (5.7L)

Printed in U.S.A.

90-861327--1 1099

MerCruiser #24 GM V-8
305 CID (5.0L) / 350 CID (5.7L)

90-861327--1

MerCruiser #24 GM V-8
305 CID (5.0L) / 350 CID (5.7L)

90-861327--1

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.

MODELS COVERED

Service Manual Outline

Table of Contents

IMPORTANT INFORMATION

Section 1A - General Information

Section 1B - Maintenance

Section 1C - Troubleshooting

REMOVAL AND INSTALLATION

Section 2A - MCM Models

SECTION 2B - MIE Models

ENGINE

Section 3A - 350 cid / 5.0L/ 305 cid / 5.7L Engines

ELECTRICAL SYSTEMS

Section 4A - Starting System

Section 4B - Ignition System

Section 4C - Charging System

Section 4D - Instrumentation

Section 4E - Wiring Diagrams

FUEL SYSTEM

Section 5A - Fuel Delivery System For Carbureted Engines

Section 5B - Mercarb® 2 Barrel Carburetor

Section 5C - Fuel Delivery System For Electronic Fuel Injection

Section 5D - Fuel Injection Descriptions And System Operation

Section 5E - Fuel Injection Disassembly And Reassembly

Section 5F - Fuel Injection System Troubleshooting

Section 5G - Diagnostics

COOLING SYSTEM

Section 6A - Seawater Cooled Models

Section 6B - Closed Cooled Models

EXHAUST SYSTEM

Section 7A - General

Section 7B - Manifolds, Elbows And Risers

Section 7C - Collectors

DRIVES

Section 8A - Velvet Drive In-Line And V-Drive Transmission

Section 8B - Velvet Drive 5000 Series Transmissions

Section 8C - Hurth Transmissions

Section 8D - Drive Shaft / Propeller Shaft Models

POWER STEERING SYSTEM

Section 9A - Pump And Related Components

IMPORTANT INFORMATION

Section 1A - General Information

1 A

Table of Contents

Introduction

This comprehensive overhaul and repair manual is designed as a service guide for the models previously listed. It provides specific information, including procedures for disassembly, inspection, assembly and adjustment to enable dealers and service mechanics to repair and tune these engines.

Before attempting repairs or tune-up, it is suggested that the procedure first be read through to gain knowledge of the methods and tools used and the cautions and warnings required for safety.

How to Use This Manual

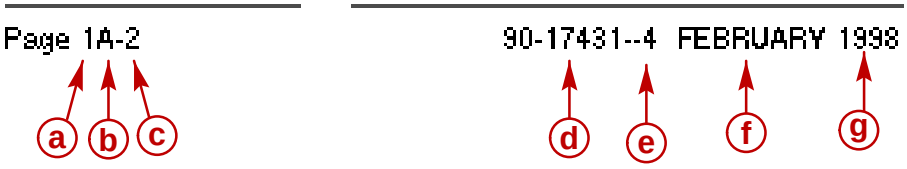
This manual is divided into sections which represent major components and systems.

Some sections are further divided into parts which more fully describe the component.

Sections and section parts are listed on the “Service Manual Outline” page following “V-8 Models Covered in This Manual” page.

Page Numbering

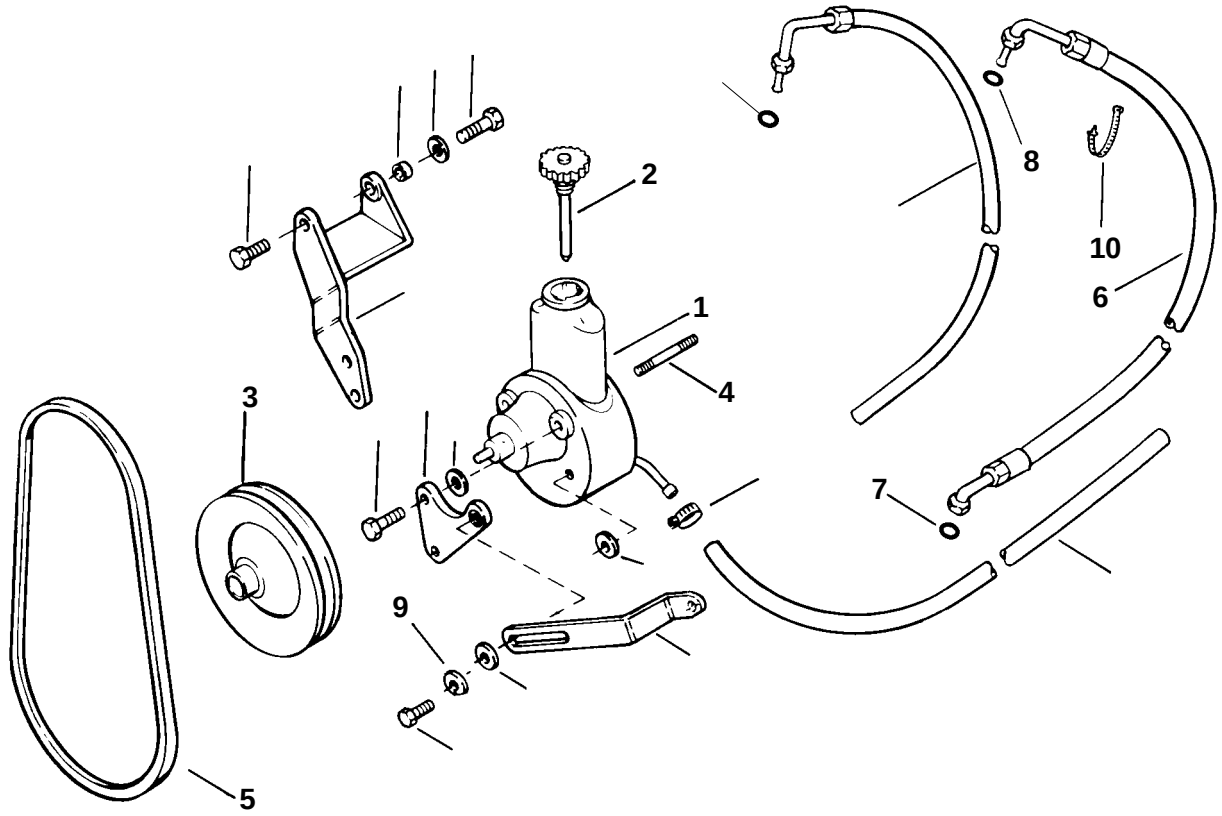
Two number groups appear at the bottom of each page. Following is an example and description.



a - Section Number
b - Section Part
c - Page Number
d - Manual Part Number
e - Revision Number
f - Month Printed
g - Year Printed

How to Read a Parts Manual

Power Steering Pump Assembly



REF. NO.	PART NO.	SYM.	QTY.	DESCRIPTION
1	90507A12		1	PUMP ASSEMBLY–Power Steering
2	36- 95805		1	CAP
3	73873A1		1	PULLEY
4	16- 41877		1	STUD
5	57- 65607T		1	V-BELT
6	32- 806684		1	HOSE–Pressure **(FITTINGS ON BOTH ENDS)**
7	25- 89879		1	O-RING
8	25- 806232		1	O-RING
9	13- 35048		1	LOCKWASHER (3/8 in.)
10	61990		1	CABLE TIE

REF. NO. : Number shown next to part on exploded view

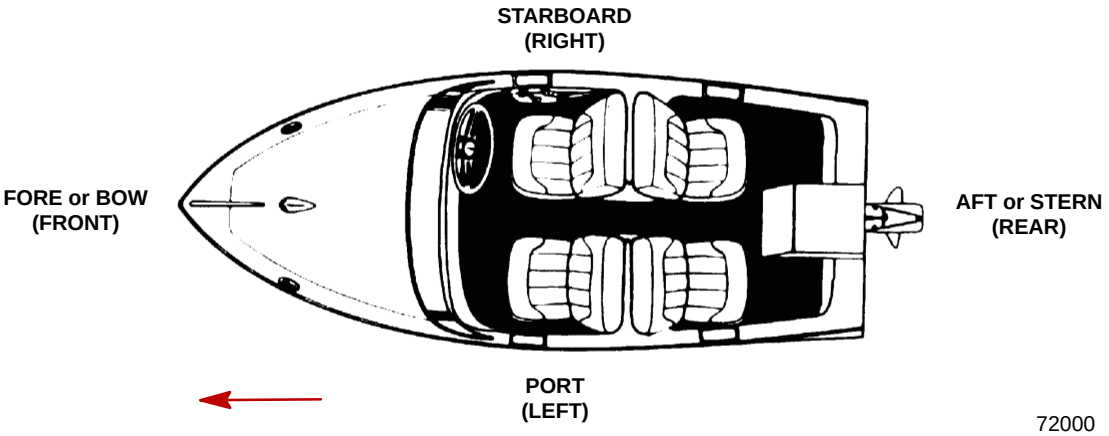
PART NO. : Mercury Part Number for ordering. If NSS (not sold separately) sometimes GM part number will be given in description column.

QTY. : The quantity that must be ordered.

DESCRIPTION : Description of part, what parts are included with a part (all indented items come with the main item above the indented parts), serial number information, and special information.

Directional References

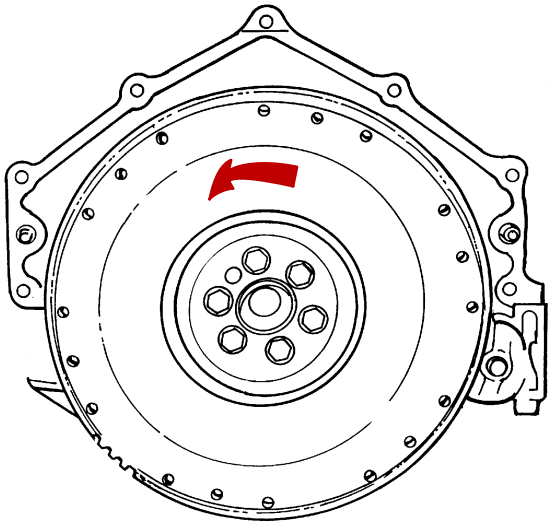
Front of boat is bow; rear is stern. Starboard side is right side; port side is left side. In this maintenance manual, all directional references are given as they appear when viewing boat from stern looking toward bow.



72000

Engine Rotation

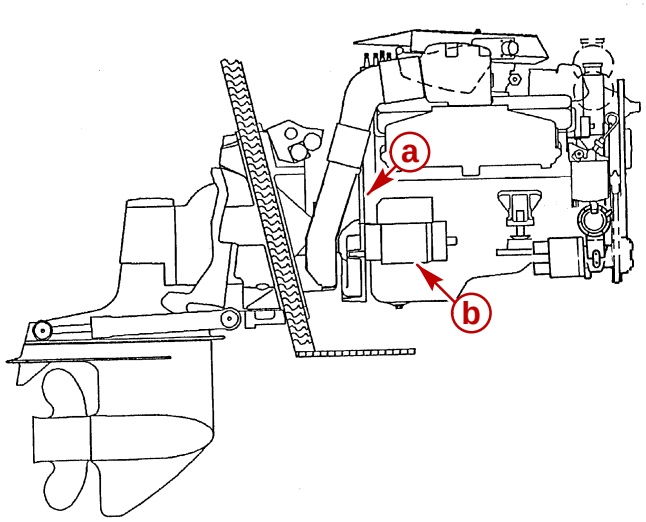
Engine rotation is determined by observing flywheel rotation from the rear (stern end) of the engine looking forward (toward water pump end). Propeller rotation is not necessarily the same as engine rotation. When ordering replacement engine, short blocks or parts for engine, be certain to check engine rotation. Do not rely on propeller rotation in determining engine rotation.



72001

Standard Left Hand Rotation

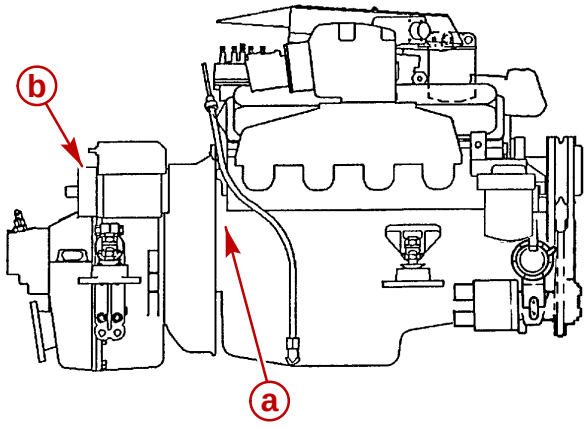
Engine Serial Number Locations



72923

Sterndrive (MCM)

a - Serial Number Plate
b - Starter Motor



72924

Inboard (MIE)

a - Serial Number Plate
b - Starter Motor

Propeller Information

Refer to the “Propeller” section in appropriate Mercury MerCruiser Sterndrive Service Manual, or order publication 90-86144-92, “Everything you need to know about propellers.”

Changing diameter, pitch or coupling of a propeller will affect engine rpm and boat performance. The blade configuration also will affect performance. Two like propellers, same pitch and diameter, from two different manufacturers will perform differently.

1. It is the responsibility of the boat manufacturer and/or selling dealer to equip the boat with the correct propeller to allow the engine to operate within its specified rpm range at wide-open-throttle (WOT).

Because of the many variables of boat design and operation, only testing will determine the best propeller for the particular application.

To test for correct propeller, operate boat (with an average load onboard) at WOT and check rpm with an accurate tachometer. Engine rpm should be near top of the specified range so that, under heavy load, engine speed will not fall below specifications.

If engine exceeds the specified rpm, an increase in pitch and/or diameter is required.

If engine is below rated rpm, a decrease in pitch and/or diameter is required.

Normally, a change of approximately 150 rpm will be achieved for each single inch of pitch change of a propeller.

⚠ CAUTION

If a propeller is installed that does not allow engine rpm to reach the specified full-throttle rpm range, the engine will "labor" and will not produce full power. Operation under this condition will cause excessive fuel consumption, engine overheating and possible piston damage (due to detonation). Conversely, installing a propeller, allowing engine to run above the specified rpm limit, will cause excessive wear on internal engine parts which will lead to premature engine failure.

Water Testing New Engines

Use care during the first 20 hours of operation on new Mercury MerCruiser engines or possible engine failure may occur. If a new engine has to be water-tested at full throttle before the break-in period is complete, follow this procedure.

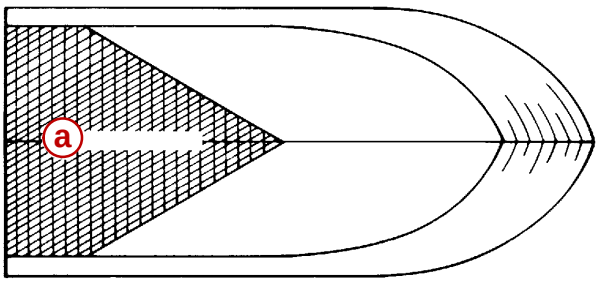
1. Start engine and run at idle rpm until normal operating temperature is reached.
2. Run boat up on plane.
3. Advance engine rpm (in 200 rpm increments) until engine reaches its maximum rated rpm.

IMPORTANT: Do not run at maximum rpm for more than 2 minutes.

Boat and Engine Performance

Boat Bottom

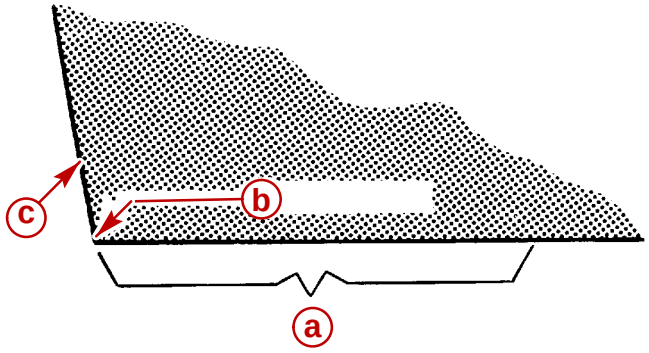
For maximum speed, a boat bottom should be as flat as possible in a fore-aft direction (longitudinally) for approximately the last 5 ft (1.5 m).



72002

a - Critical Bottom Area

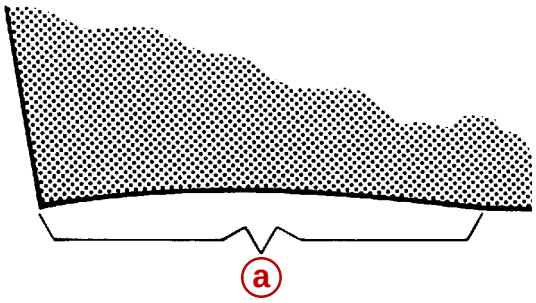
For best speed and minimum spray, the corner between the bottom and the transom should be sharp.



72003

a - Bottom
b - Corner
c - Transom

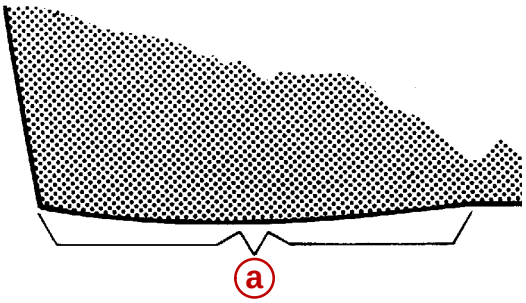
The bottom is referred to as having a “hook” if it is concave in the fore-and-aft direction. A hook causes more lift on the bottom near the transom and forces the bow to drop. This increases wetted surface and reduces boat speed. A hook, however, aids in planing and reduces any porpoising (rhythmical bouncing) tendency. A slight hook is often built in by the manufacturer. A hook also can be caused by incorrect trailering or storing the boat with support directly under the transom.



72004

a - Hook

A “rocker” is the reverse of a hook. The bottom is convex or bulged in the fore-and-aft direction. It can cause the boat to porpoise.



72005

a - Rocker

Any hook, rocker or surface roughness on the bottom, particularly in the critical center-aft portion will have a negative effect on speed, often several miles per hour on a fast boat.

Marine Fouling

Fouling is an unwanted build-up (usually animal-vegetable-derived) occurring on the boat's bottom and drive unit. Fouling adds up to drag, which reduces boat performance. In fresh water, fouling results from dirt, vegetable matter, algae or slime, chemicals, minerals and other pollutants. In salt water, barnacles, moss and other marine growth often produce dramatic build-up of material quickly. Therefore, it is important to keep the hull as clean as possible in all water conditions to maximize boat performance.

Antifouling paint, if required, may be applied to boat hull observing the following precautions.

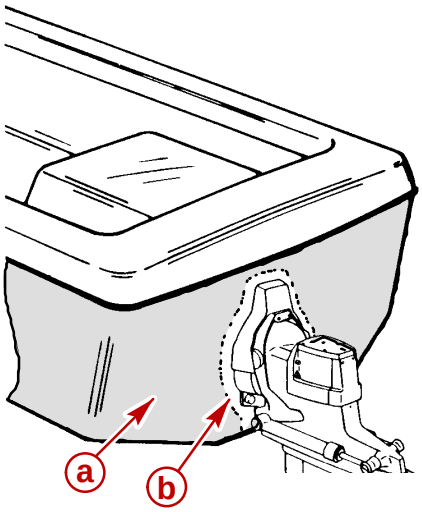
IMPORTANT: DO NOT paint anodes or MerCathode System reference electrode and anode, as this will render them ineffective as galvanic corrosion inhibitors.

⚠ CAUTION

Avoid corrosion damage. Do not apply antifouling paint to Mercury MerCruiser drive unit or transom assembly.

IMPORTANT: If antifouling protection is required, Tri-Butyl-Tin-Adipate (TBTA) base antifouling paints are recommended on Mercury MerCruiser boating applications. In areas where Tri-Butyl-Tin-Adipate base paints are prohibited by law, copper base paints can be used on boat hull and boat transom. Corrosion damage that results from the improper application of antifouling paint will not be covered by the limited warranty. Observe the following:

Avoid an electrical interconnection between the Mercury MerCruiser Product, Anodic Blocks, or MerCathode System and the paint by allowing a minimum of 1 in. (26mm) UNPAINTED area on transom of the boat around these items.



71176

a - Antifouling Paint
b - MINIMUM 1 inch (26 mm) Unpainted Area.

Weight Distribution

Weight distribution is extremely important; it affects a boat's running angle or attitude. For best top speed, all movable weight - cargo and passengers - should be as far aft as possible to allow the bow to come up to a more efficient angle (3 to 5 degrees). On the negative side of this approach is the problem that, as weight is moved aft, some boats will begin an unacceptable porpoise.

Secondly, as weight is moved aft, getting on plane becomes more difficult.

Finally, the ride in choppy water becomes more uncomfortable as the weight goes aft. With these factors in mind, each boater should seek out what weight locations best suit his/her needs.

Weight and passenger loading placed well forward increases the "wetted area" of the boat bottom and, in some cases, virtually destroys the good performance and handling characteristics of the boat. Operation in this configuration can produce an extremely wet ride, from wind-blown spray, and could even be unsafe in certain weather conditions or where bow steering may occur.

Weight distribution is not confined strictly to fore and aft locations, but also applies to lateral weight distribution. Uneven weight concentration to port or starboard of the longitudinal centerline can produce a severe listing attitude that can adversely affect the boat's performance, handling ability and riding comfort. In extreme rough water conditions, the safety of the boat and passengers may be in jeopardy.

Water in Boat

When a boat loses performance, check bilge for water. Water can add considerable weight to the boat, thereby decreasing the performance and handling.

Make certain that all drain passages are open for complete draining.

Elevation and Climate

Elevation has a very noticeable effect on the wide-open-throttle power of an engine. Since air (containing oxygen) gets thinner as elevation increases, the engine begins to starve for air. Humidity, barometric pressure and temperature do have a noticeable effect on the density of air. Heat and humidity thin the air. This phenomenon can become particularly apparent when an engine is propped out on a cool dry day in spring and later, on a hot, humid day in August, does not have the same performance.

Although some performance can be regained by dropping to a lower pitch propeller, the basic problem still exists. The propeller is too large in diameter for the reduced power output. A Quicksilver Propeller Repair Station or experienced marine dealer can determine how much diameter to remove from a lower-pitch propeller for specific high-elevation locations. In some cases, installing high altitude gears in the drive unit is possible and very beneficial. Weather conditions may effect the power output of internal combustion engines. Therefore, established horsepower ratings refer to the power that the engine will produce at its rated rpm under a specific combination of weather conditions.

THIS PAGE IS INTENTIONALLY BLANK

IMPORTANT INFORMATION

Section 1B - Maintenance

1 B

Table of Contents

Tools

Description	Part Number
Timing Light	91-99379
Quicksilver Scan Tool	91-823686A2

Lubricants / Sealants / Adhesives

Description	Part Number
Quicksilver Liquid Neoprene	92-25711--3
Quicksilver 2-4-C Marine Lubricant With Teflon	92-825407A3
Loctite Pipe Sealant With Teflon	Obtain Locally
Quicksilver U-Joint and Gimbal Bearing Grease	92-828052A2