



merCruiser
SERVICE
MANUAL

Number 8

MARINE ENGINES
Mercury Marine 4 Cylinder

Models Covered in This Manual

| MODEL | SERIAL NUMBER |
|----------------------------|--------------------|
| MCM 170 MR | 6916779-0A475151 |
| MCM 170 Alpha One | 0A475152-0B434940 |
| MCM 165 Alpha One | 0B434941-0B774251 |
| MCM 3.7 Litre Alpha One | 0B774252 and Above |
| MCM 190 MR | 6917368-0A475551 |
| MCM 190 Alpha One | 0A475552-0B436390 |
| MCM 180 Alpha One | 0B436391-0B775248 |
| MCM 3.7 Litre LX Alpha One | 0B775249 and Above |

IMPORTANT: Refer to engine identification, page 1A-2.

NOTICE

Refer to Appropriate Stern Drive service manual for transom assembly and Stern Drive unit repair.

Service Manual Outline

Section 1 - Important Information

- A - Important Information
- B - Maintenance
- C - Troubleshooting

Section 2 - Removal & Installation

- A - 4 Cyl. 224 CID (3.7L)

Section 3 - Engine Mechanical

- A - 4 Cyl. 224 CID (3.7L)

Section 4 - Electrical Systems

- A - Starting System
- B - Ignition System
- C - Charging Systems
- D - Instrumentation
- E - Wiring Diagrams

Section 5 - Fuel Systems

- A - Fuel Delivery System
- B - Fuel Pump
- C - Carburetor

Section 6 - Cooling & Exhaust

- A - Cooling System
- B - Exhaust System

Section 7 - Power Steering

- A - Power Steering

Notice

Throughout this publication, "Dangers," "Warnings" and "Cautions" 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

CAUTION — Hazards or unsafe practices which could result in minor personal injury of 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 product's 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 time of publication.

It should be kept in mind, while working on the product, that the electrical system and ignition system is 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 that, during any maintenance procedure, replacement fasteners must have the same measurements and strength as those removed, whether metric or customary. Numbers on the heads of the metric bolts and on surfaces of metric nuts indicate their strength. Customary bolts use radial lines for this purpose, while most customary 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 re-use 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.

Replacement Parts

⚠WARNING

Electrical, ignition and fuel system components on MerCruiser Engines and Stern Drives 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.

Engine Mechanical Components

Many of the engine mechanical components are designed for marine applications. Unlike automotive engines, marine engines are subjected to extended periods of heavy load and wide-open-throttle operation, therefore, require heavy-duty components. Special marine engine parts have design and manufacturing specifications which are required to provide long life and dependable performance. Marine engine parts also must be able to resist the corrosive action of salt or brackish water that will rust or corrode standard automotive parts within a short period of time.

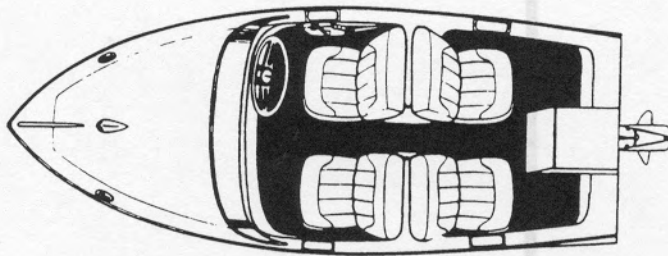
Failure to use recommended Quicksilver service replacement parts can result in poor engine performance and/or durability, rapid corrosion of parts subjected to salt water and possibly complete failure of the engine.

Use of parts other than recommended service replacement will void the warranty on those parts which are damaged as a result of the use of other than recommended parts.

IMPORTANT INFORMATION

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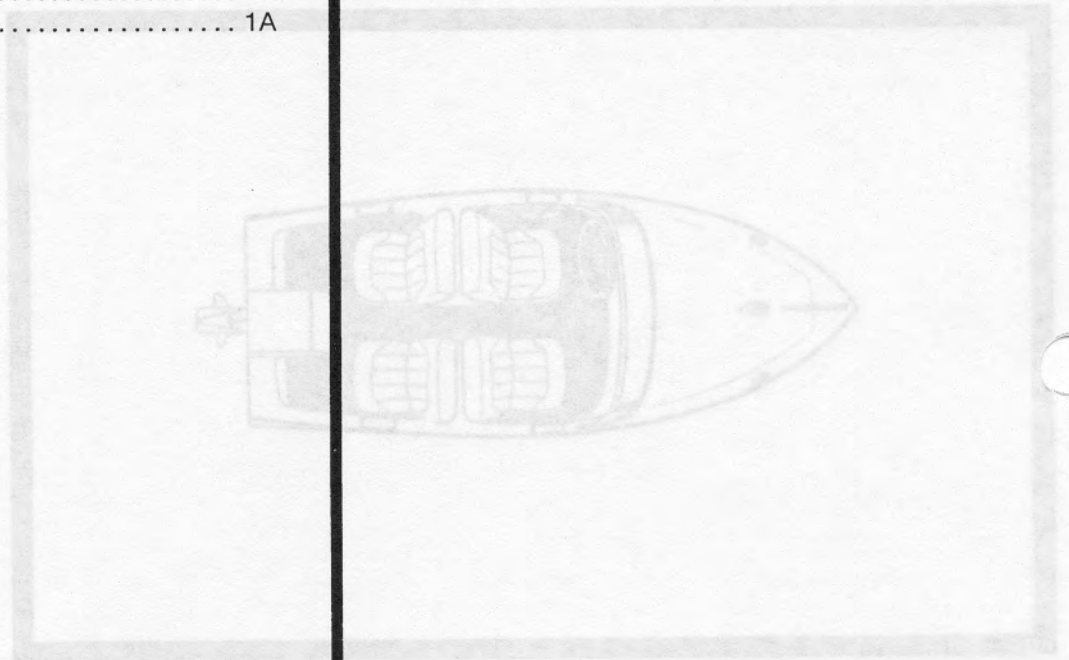
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IMPORTANT
INFORMATION



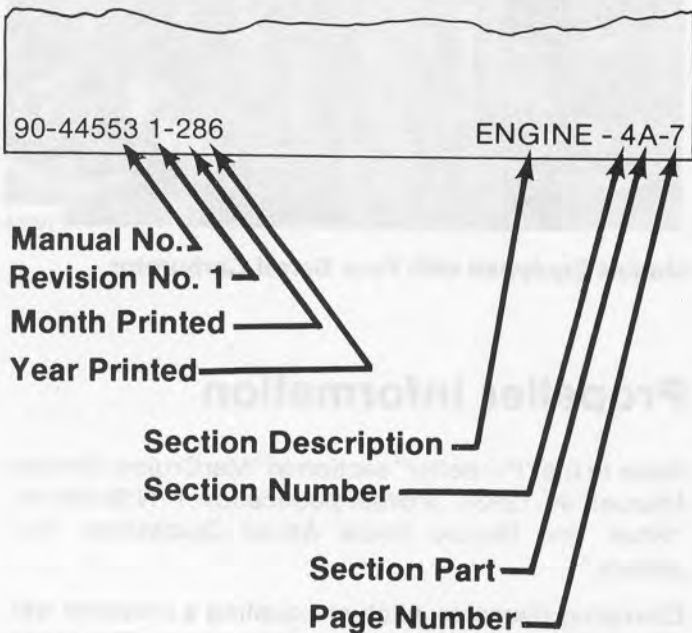
How to Use This Manual

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.

Page Numbering

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



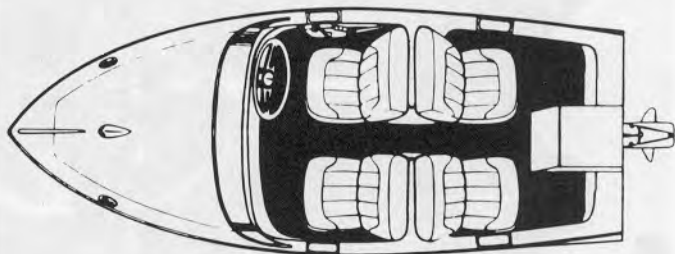
Introduction

This comprehensive overhaul and repair manual is designed as a service guide for the MerCruiser 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.

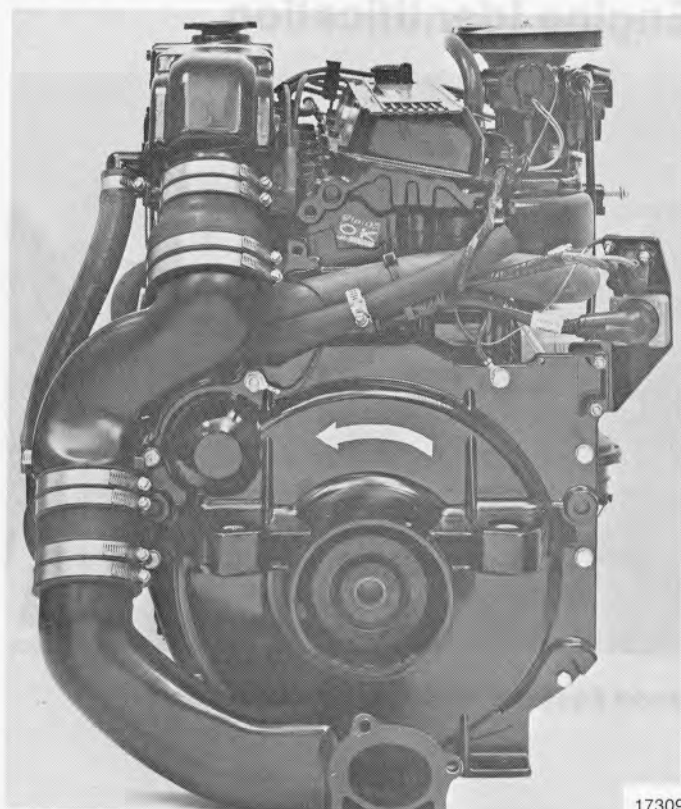
Directional References

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.



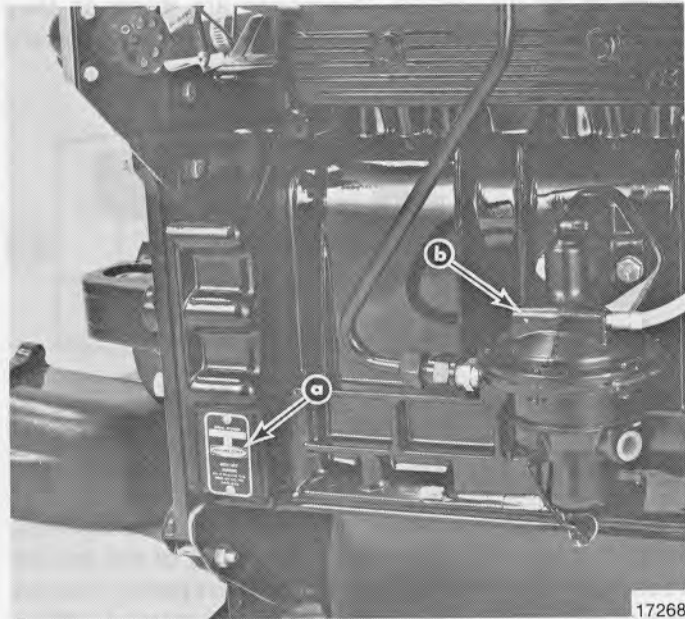
Engine Rotation

Engine rotation is determined by observing flywheel rotation from the rear (stern drive end) of the engine looking forward (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.



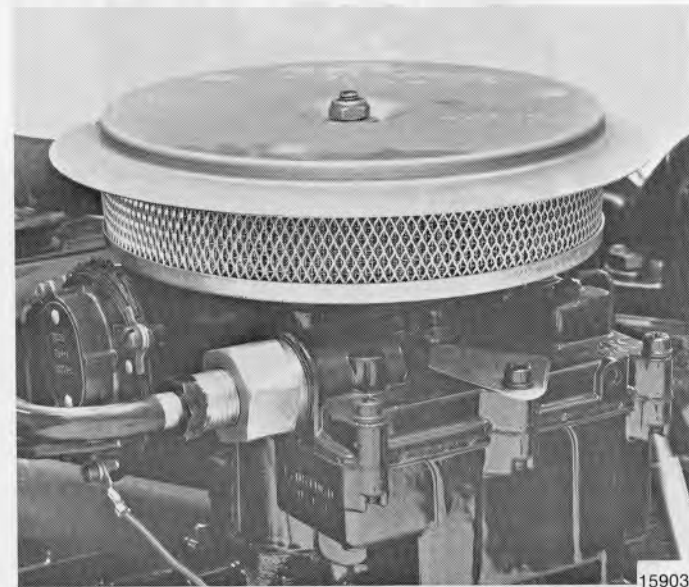
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Serial Number Location (All Models)

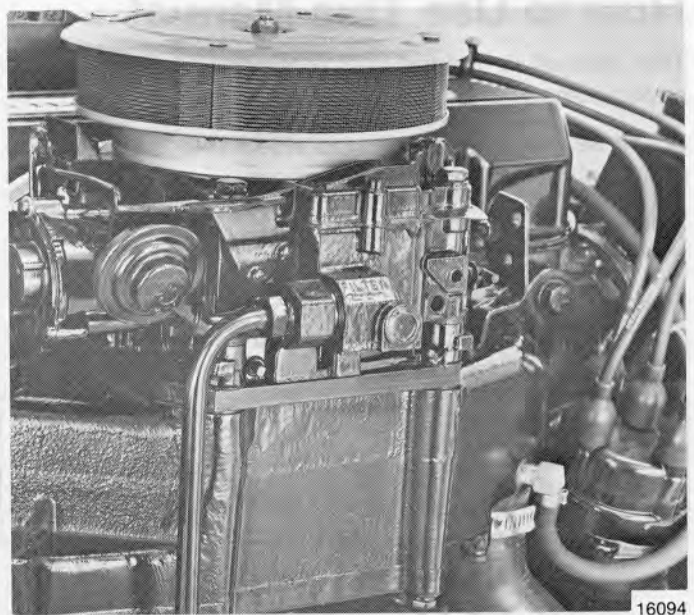


- a - Serial Number Plate
- b - Fuel Pump

Engine Identification



Model Equipped with Two Barrel Carburetor



Models Equipped with Four Barrel Carburetor

Propeller Information

Refer to the "Propeller" section in "MerCruiser Service Manual" 90-12934, or order publication, P/N 90-86144, "What You Should Know About Quicksilver Propellers."

Changing diameter, pitch or coupling 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 also will perform differently.

It is the responsibility of the boat manufacturer and/or selling dealer to equip the boat with the correct propeller, to allow the boat motor to operate within its specified RPM range at wide open throttle (W.O.T).

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 W.O.T. 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 propeller pitch and/or diameter is required.

If engine is below specified RPM, a decrease in propeller pitch and/or diameter is required.

Normally a change of approximately 300 to 500 RPM will occur for each single pitch change of 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). On the other hand, installation of a propeller, that allows engine to run above the specified RPM limit, will cause excessive wear on internal engine parts which will lead to premature engine failure.

Hi-Performance Boating

Written by Marine Engineers, order publication P/N 90-86168, entitled "Hi-Performance Boat Operation".

Engine 20-Hour Break-In Period

IMPORTANT: Proper break-in is essential to obtaining minimum oil consumption, maximum engine performance and service.

The first 20 hours of operation is the engine (new or rebuilt) break-in period. During this period, it is extremely important that the engine is operated, as outlined following.

1. Do not operate engine below 1500 RPM for extended periods of time during the first 10 hours. During this period, shift into gear as soon as possible after starting engine and advance throttle so that RPM is above 1500 (provided that conditions permit safe operation at this speed).
2. Do not operate at any one constant speed for extended periods of time.
3. Do not exceed 3/4 of full throttle during the first 10 hours of operation. During the next 10 hours, occasional operation at full throttle (5 minutes at-a-time maximum) is permissible.
4. Avoid full throttle acceleration from stopped position.
5. Do not operate at full throttle until engine reaches normal operating temperature.

6. Observe instrumentation carefully. If an abnormal reading occurs, stop engine immediately and determine cause.
7. Frequently check crankcase oil level and add oil, if necessary. It is normal for oil consumption to be somewhat high during the break-in period.
8. At end of 20-hour break-in period, drain break-in oil from crankcase and replace oil filter. Fill crankcase with correct grade and viscosity oil.

Water Testing New Engines

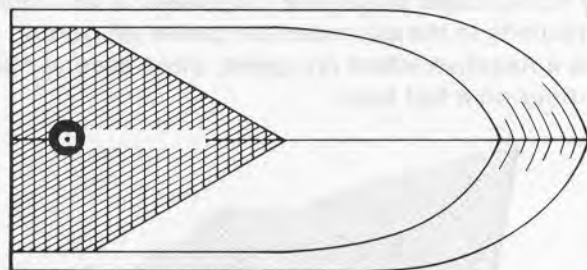
Use care during the first 20 hours of operation on new MerCruiser engines, or possible engine failure may occur. If a new engine has to be water-tested at full throttle before the break-in period is complete, follow this procedure.

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. (1.5m).



a - Critical Bottom Area



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