merCruiser

SERVICE MANUAL

Number 7

MARINE ENGINES

GM V-6 Cylinder

Printed in U.S.A.

90-12410 2-1293

Models Covered in This Manual

MODEL	SERIAL NUMBER
MCM 185R 229 CID (3.8L)	6289593 - 6919655
MCM 185MR 262 CID (4.3L)	6919656-OA483580
MCM 185 Alpha I	OA483581 - OB455459
MCM 175 Alpha I	OB455460 - OB773242
MCM 4.3 Litre Alpha I	OB773243 - OF000000
Sea Ray (Note 1) 4.3L-2 Alpha I	OB785483 - B921276
MCM 205MR	6919687 - OA483776
MCM 205 Alpha I	OA483777 - OB775129
MCM 4.3 Litre LX Alpha I	OB775130 - OF000000
Sea Ray (Note 1) 4.3L-4 Alpha I	OB785981 - B922330

NOTE 1: Sea Ray to MerCruiser cross references are;
4.3L-2 same as MCM 4.3 Litre
4.3L-4 same as MCM 4.3 Litre LX

IMPORTANT: Refer to engine identification, page 2.

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

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 servere 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.

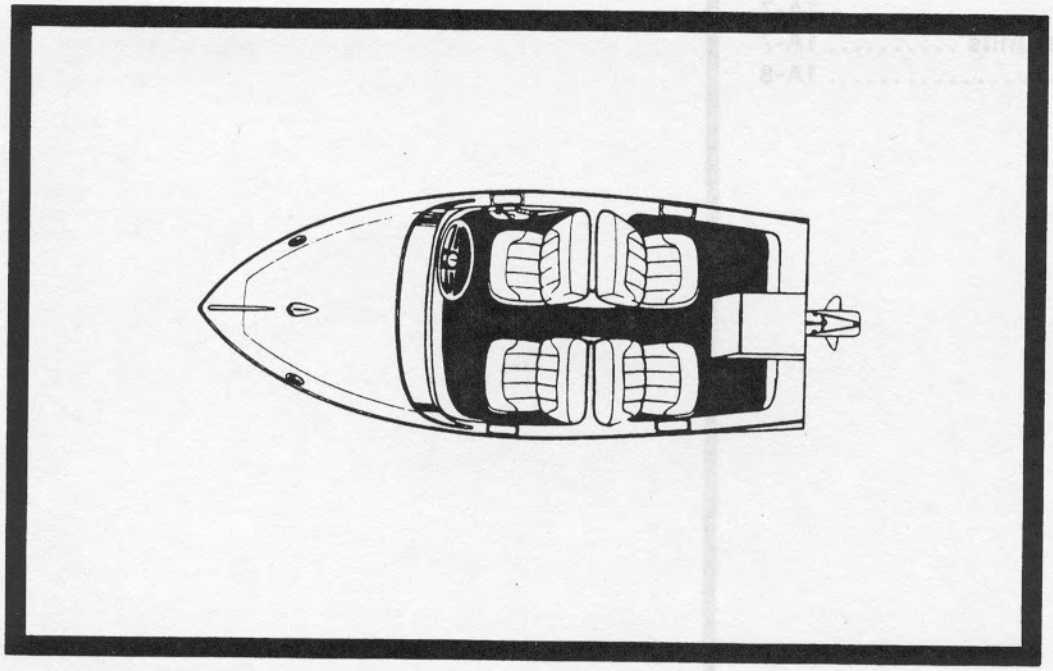
Failure to use recommended Quicksilver service replacement parts can result in poor engine performance and/or durabilty, rapid corrosion of parts subjected to salt water and possibly complete failure of the engine.

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.

Service Manual Outline

IMPORTANT INFORMATION

1
A



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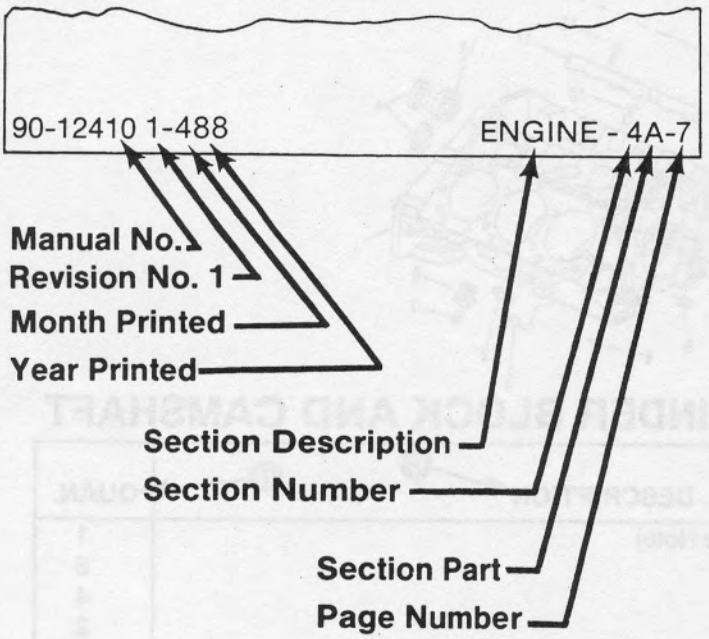
How to Use This Manual

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.

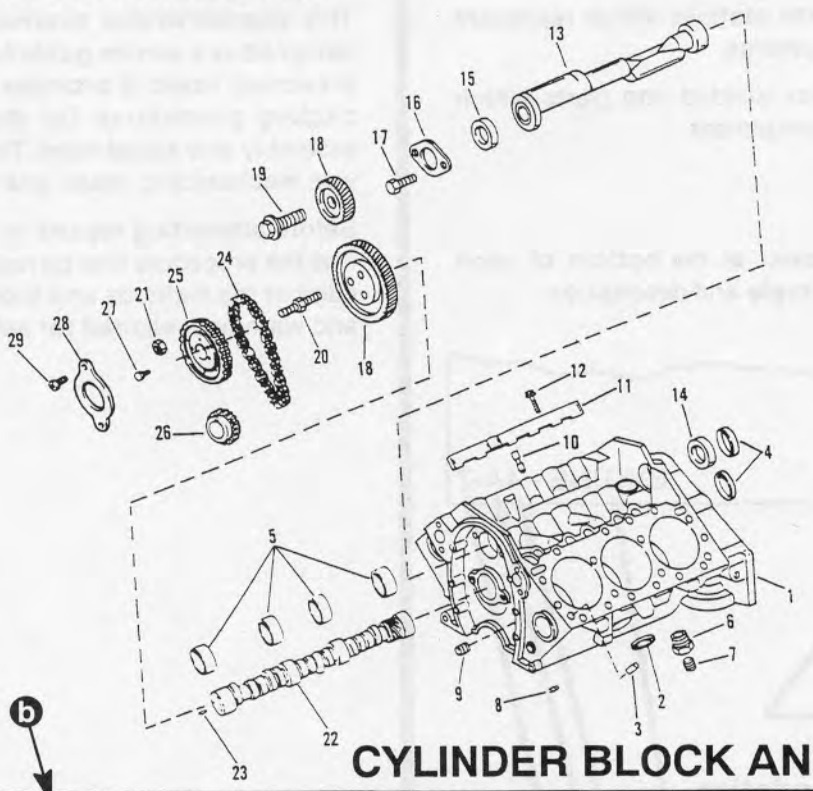


Introduction

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.

How To Read Parts Manual



CYLINDER BLOCK AND CAMSHAFT

PART NO. (a)	REF. NO. (b)	DESCRIPTION (c)	QUAN. (d)
● 841-824146	1	CYLINDER BLOCK (See Note)	1
19-34270	2	EXPANSION PLUG	8
17-35465	3	DOWEL PIN	4
22-72640	4	EXPANSION PLUG	2
23-85674	5	BEARING UNIT (SET)	1
22-48556	6	BUSHING	2
22-32802	7	PIPE PLUG	1
22-42796	8	BY-PASS VALVE	1
19-816565	9	PLUG	1
811844	10	LIFTER	12
● 824331	11	RETAINER	2
● 10-824332	12	SCREW	4
● 824148	13	BALANCED SHAFT	1
● 31-824150	14	BEARING (REAR)	1

(e) NOTE: 841-824146 Cylinder Block includes only standard pistons, piston rings, crankshaft bearings and camshaft bearings.

A. **Part Number:** For part ordering - Note N.S.S. for Reference Numbers, (not shown above) - means Not Sold Separately by Mercury Marine, however, in some cases, the G.M. Part Number (for the item) is given in the Description Column.

B. **Reference Number:** For part Shown on exploded parts view.

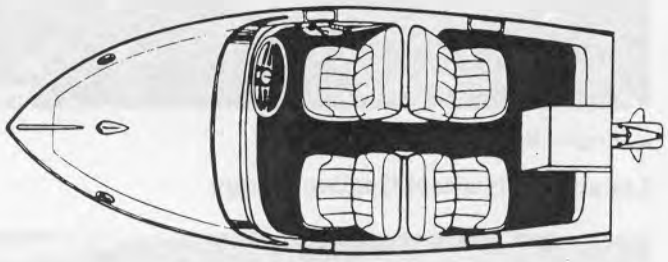
C. **Description:** This is the most important column because it gives:
1) Description of Part: Ref. No. 1 is a Cylinder Block Assembly, No. 13 is the Balanced Shaft, etc.
2) What parts are included with a certain part: Notice how the Description of Part, for Ref. Nos. 1, and 10 through 13, are at the left side of the column. Description of Part for Ref. Nos. 2 thru 9 are indented under "Cylinder Block". If Ref. No. 1 (Cylinder Block) was ordered, all indented parts (Ref. Nos. 2 thru 9) would come with the part. Ref. Nos. 10 thru 14 would not come with Ref. No. 1 and would have to be ordered separately. If 2 Cylinder Blocks were listed, both cylinder blocks would come with the indented parts. In some cases, an indented part will have another part indented under it. The second indented part will come with the first indented part.
3) Serial number break: If serial number information is listed, check product serial number to ensure that correct part is ordered.
4) Special information: Many times special information will be shown after description such as; L.H. Rotation, R. H. Rotation, Filter up, Filter Down, etc. This will help in selecting the correct part.

D. **Quantity:** Quantity that has to be ordered.

E. **Special Information Block:** Additional information, part numbers for gasket sets, etc.

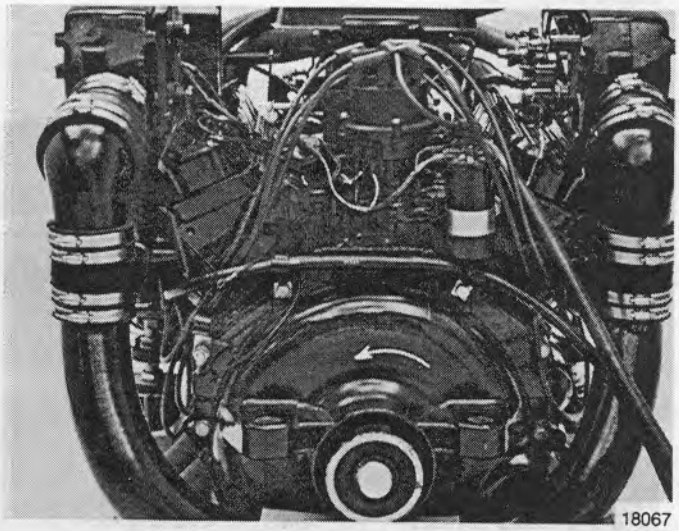
Directional References

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.


18067

Engine Identification

Serial Number Locations

185R (229 CID) 3.8 LITER


15768

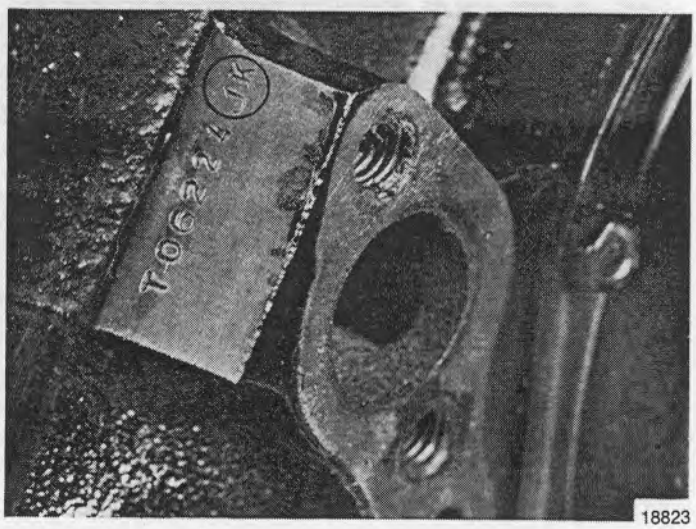
a - Engine Specifications and Serial Number Decal

Location: Rocker Arm Cover


16727

a - Engine Serial Number Plate

Location: Flywheel Casting Flange



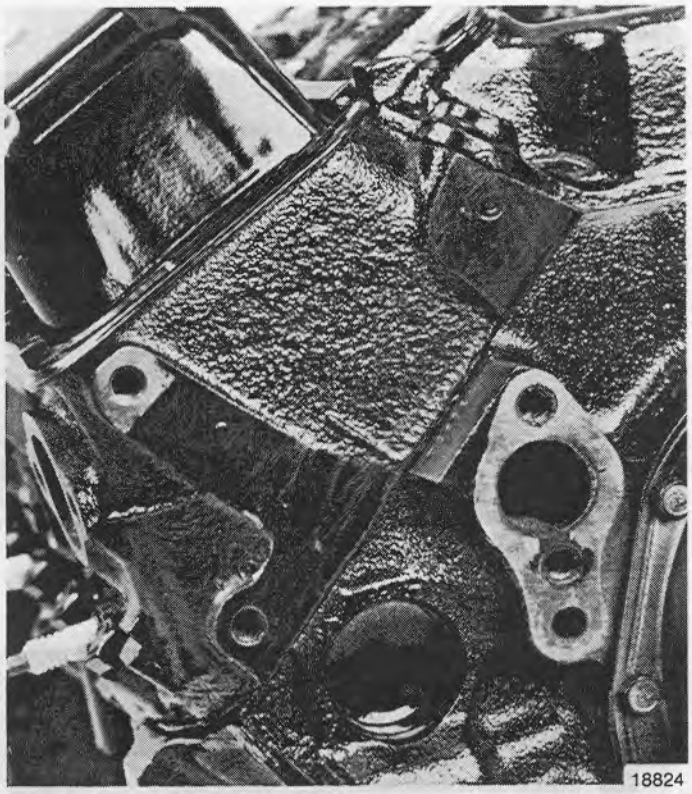
18823

Engine Designation
Last Two Letters = JK
Designate 185R Engine

Location: Water Pump Boss

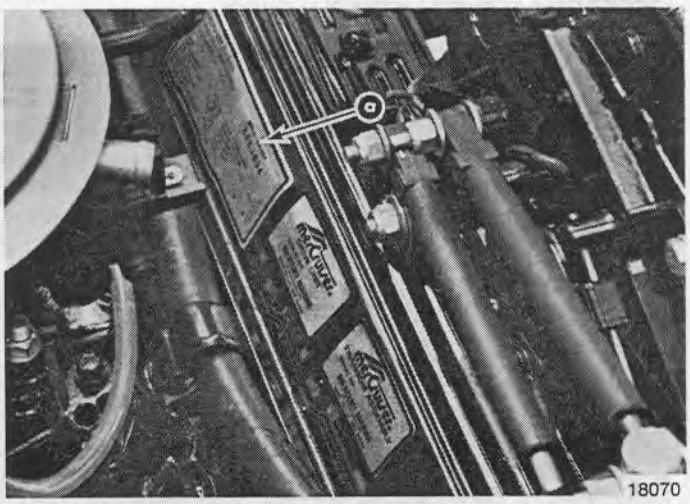
Cylinder Head Identification

185R (229 CID)



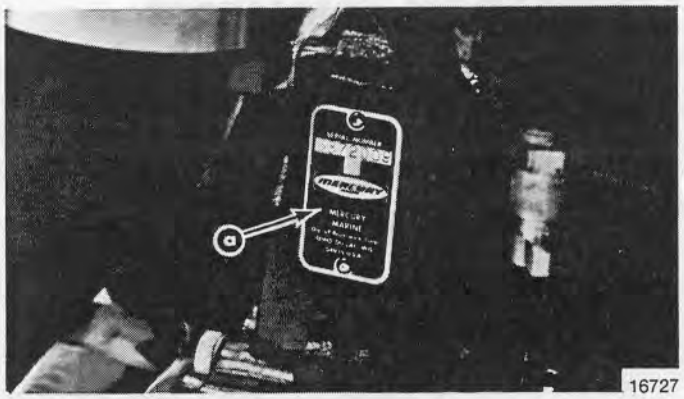
185MR-205MR

(262 CID) 4.3 LITER



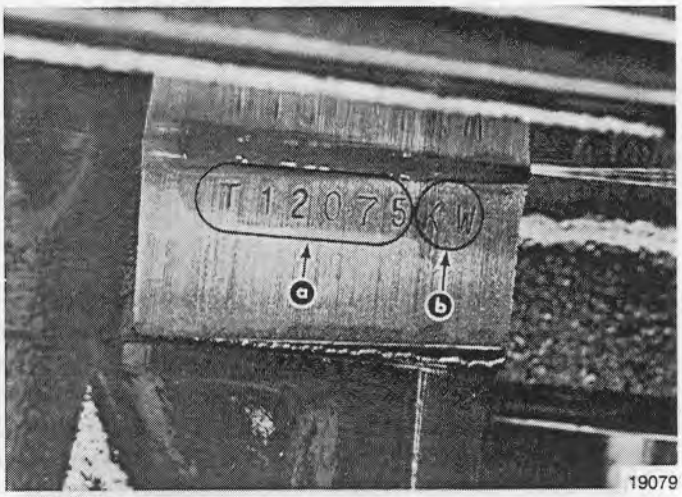
a - Engine Specifications and Serial Number Decal

Location: Rocker Arm Cover

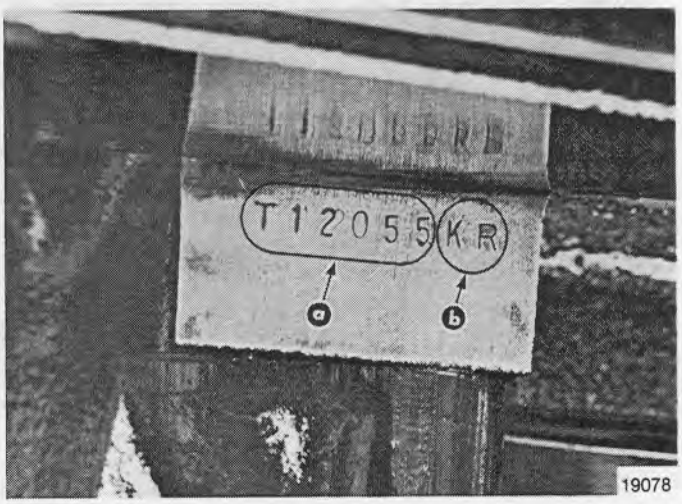


a - Engine Serial Number Plate

Location: Flywheel Casting Flange

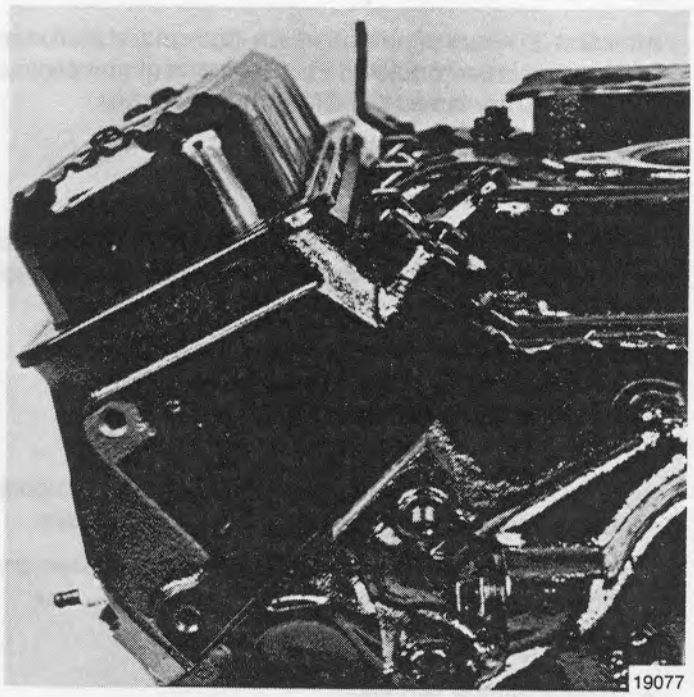


Engine Designation
Last Two Letters = KW
Designate 185MR Engine
KP Letters designates 175, 4.3 Liter



Last Two Letters = KR
Designate 205MR, 4.3 Litre LX Engines

Location: Water Pump Boss



Propeller Information

Order publication P/N 90-86144 "What You Should Know About Quicksilver Propellers . . . and Boat Performance Information".

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

It is the responsibility of the boat 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 throtle (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 recommended 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 300 to 500 RPM will be achieved 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

For a book entitled "Hi-Performance Boat Operation", which is written by Marine Engineers order publication P/N 90-86168.

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 in the following information.

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.

20-Hour Checkup

After first 20 hours of operation, an Authorized MerCruiser Dealer should be contacted for the following maintenance. The boat owner is responsible for any charges.

- Change crankcase oil and filter.
- Check all fluid levels.
- Cooling Systems - Inspect all hoses for damage and deterioration; check all hose clamps for adequate tightness.
- Check carburetor adjustment.
- Inspect ignition system and timing.
- Check for loose, missing or damaged parts.
- Check shift and throttle cable adjustments - Lubricate and inspect for loose, damaged or missing parts.
- Steering System - Lubricate and inspect for loose, damaged or missing parts.
- Inspect all drive belts.
- Check engine alignment.
- Complete Engine Exhaust System – Inspect for damage and deterioration; check all hose clamps for adequate tightness.
- Retorque gimbal ring clamping U-bolt to 55 lb. ft. (74 N•m).

Water Testing New Engines

Care must be exercised during the first 20 hours of operation on new MerCruisers 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.

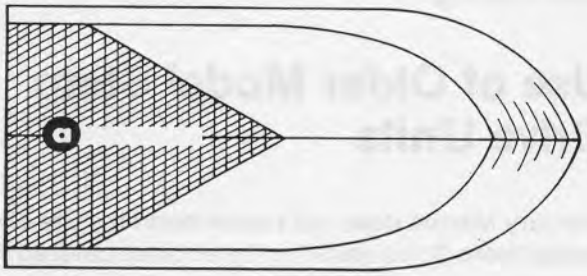
1. Start engine and run at idle RPM until normal operating temperature is reached.
2. Run boat up on plane.
3. Advance engine RPM (in 200 RPM increments) until engine reaches its maximum rated RPM.

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

Boat and Engine Performance

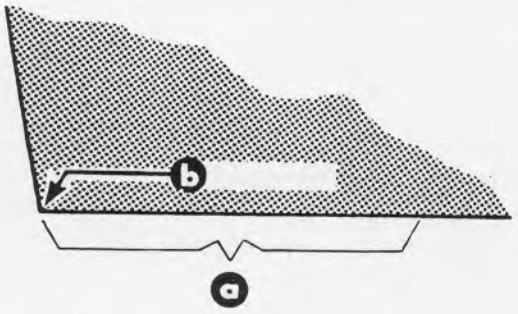
Boat Bottom

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

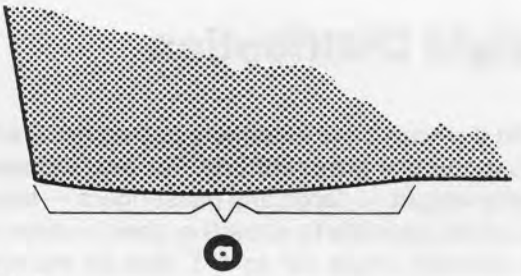
For best speed and minimum spray the corner between the bottom and the transom should be sharp.



a - Flat
b - Sharp Corner

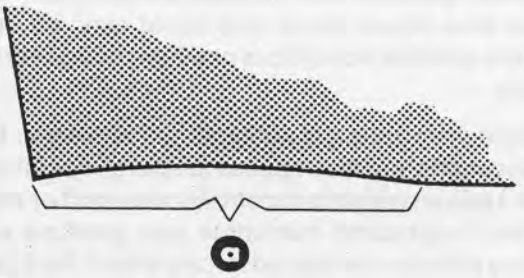
A "rocker" is the reverse of a hook. The bottom is convex or bulged in the fore-and-aft direction. It can cause the boat to porpoise.

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



a - Rocker

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, but it helps planing and reduces any porposing (rythmical bouncing) tendency. A slight hook is often built in by the manufacturer. A hook can also be caused by not trailering or storing the boat with support directly under the transom.



a - Hook

Marine Fouling

Fouling is an unwanted buildup (usually animal-vegetable-derived) occuring on the boats 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. So it's important to keep the hull as clean as possible in all water conditions to maximize boat performance.

Special hull treatments, such as antifouling paint, will reduce the rate of bottom fouling. However, due to the fact that drive units (outboard or stern drive) are made primarily of aluminum, be sure to select an antifouling paint having a copper-free, organo-tin base. The BIS (Tri Butyl Tin) Adipate (TBTA) base paint will not set up a galvanic corrosion "cell" as it is completely compatible with aluminum and avoids any electrolysis problems connected with many other paints. Applied according to instruction, it is also very effective.

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°). But 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 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 looses performance the bilge should be checked 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.

Use of Older Model Stern Drive Units

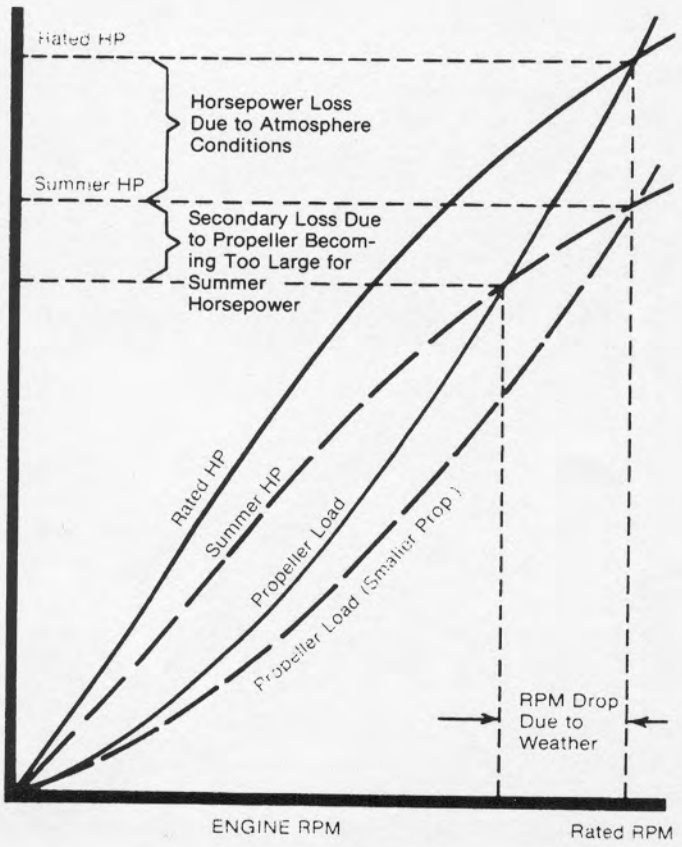
Mercury Marine does not recommend the use of older model Stern Drive units for the engines covered in this manual.

IMPORTANT: Use of an older model Stern Drive unit on a new model will result in a spline failure to coupling and/or yoke.

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 annoying when an engine is propped out on a cool, dry day in spring and later, on a hot, sultry day in August, doesn't have its old zip. (See chart)

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. The experienced marine dealer or a Quicksilver Propeller Repair Station can determine how much diameter to remove from a lower-pitch propeller for specific high-elevation locations. In some cases, a gear-ratio change to the drive unit to more reduction is possible and very beneficial. It is a known fact that weather conditions exert a profound effect on 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.



MAINTENANCE

1

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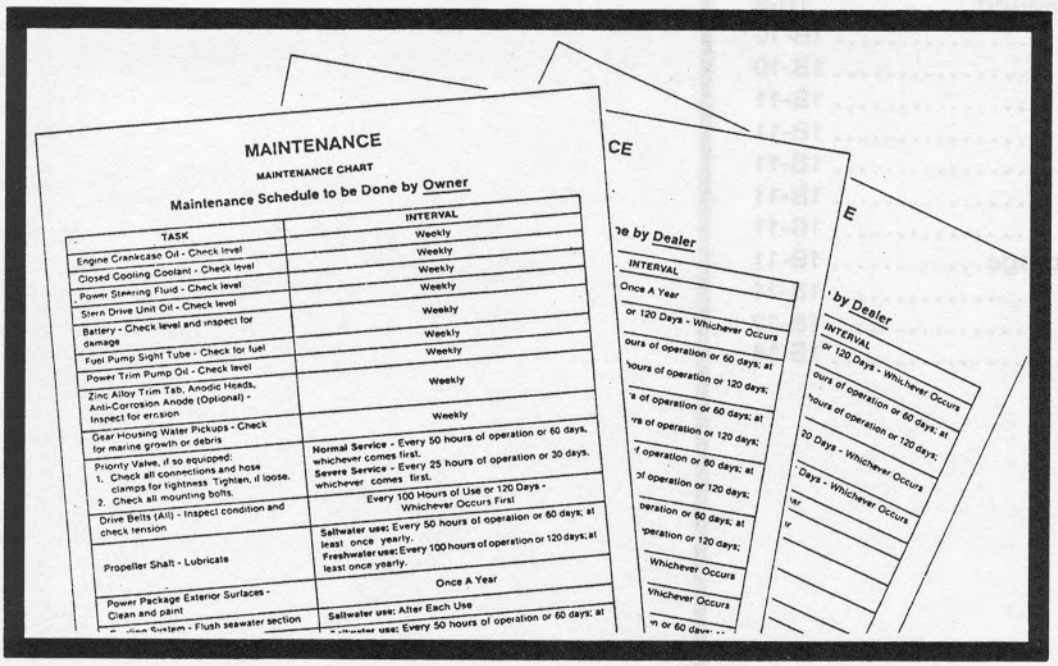

MAINTENANCE

MAINTENANCE CHART

Maintenance Schedule to be Done by Owner

TASK	INTERVAL
Engine Crankcase Oil - Check level	Weekly
Closed Cooling Coolant - Check level	Weekly
Power Steering Fluid - Check level	Weekly
Stern Drive Unit Oil - Check level	Weekly
Battery - Check level and inspect for damage	Weekly
Fuel Pump Sight Tube - Check for fuel	Weekly
Power Trim Pump Oil - Check level	Weekly
Zinc Alloy Trim Tab, Anodic Heads, Anti-Corrosion Anode (Optional) - Inspect for erosion	Weekly
Gear Housing Water Pickups - Check for marine growth or debris	Weekly
Priority Valve, if so equipped: 1. Check all connections and hose clamps for tightness. Tighten, if loose. 2. Check all mounting bolts.	**Normal Service** - Every 50 hours of operation or 60 days, whichever comes first. **Severe Service** - Every 25 hours of operation or 30 days, whichever comes first.
Drive Belts (All) - Inspect condition and check tension	Every 100 Hours of Use or 120 Days - Whichever Occurs First
Propeller Shaft - Lubricate	**Saltwater use:** Every 50 hours of operation or 60 days; at least once yearly. **Freshwater use:** Every 100 hours of operation or 120 days; at least once yearly.
Power Package Exterior Surfaces - Clean and paint	Once A Year
[illegible] System - Flush seawater section	**Saltwater use:** After Each Use **Saltwater use:** Every 50 hours of operation or 60 days; at

CE

ne by Dealer

INTERVAL

Once A Year

or 120 Days - Whichever Occurs

ours of operation or 60 days; at

hours of operation or 120 days;

s of operation or 60 days; at

rs of operation or 120 days;

f operation or 60 days; at

of operation or 120 days;

peration or 60 days; at

peration or 120 days;

Whichever Occurs

Whichever Occurs

m or 60 days; at

E

by Dealer

INTERVAL

or 120 Days - Whichever Occurs

ours of operation or 60 days; at

hours of operation or 120 days;

20 Days - Whichever Occurs

Days - Whichever Occurs

Index

MAINTENANCE

MAINTENANCE CHART

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Priority Valve, if so equipped: 1. Check all connections and hose clamps for tightness. Tighten, if loose. 2. Check all mounting bolts.	**Normal Service** - Every 50 hours of operation or 60 days, whichever comes first. **Severe Service** - Every 25 hours of operation or 30 days, whichever comes first.
Drive Belts (All) - Inspect condition and check tension	Every 100 Hours of Use or 120 Days - Whichever Occurs First
Propeller Shaft - Lubricate	**Saltwater use:** Every 50 hours of operation or 60 days; at least once yearly. **Freshwater use:** Every 100 hours of operation or 120 days; at least once yearly.
Power Package Exterior Surfaces - Clean and paint	Once A Year
Cooling System - Flush seawater section	**Saltwater use:** After Each Use
Power Package Exterior Surfaces - Spray with rust preventive	**Saltwater use:** Every 50 hours of operation or 60 days; at least once yearly. **Freshwater use:** Every 100 hours of operation or 120 days; at least once yearly.

MAINTENANCE
(Continued)

MAINTENANCE CHART
(Continued)

Maintenance Schedule to be Done by Dealer

TASK	INTERVAL
Ignition System - Check timing; adjust if needed	Once A Year
Crankcase Oil and Oil Filter - Change	Every 100 Hours of Use or 120 Days - Whichever Occurs First, or Once Yearly
Steering System - Lubricate and inspect for loose, damaged or missing parts	**Saltwater use:** Every 50 hours of operation or 60 days; at least once yearly. **Freshwater use:** Every 100 hours of operation or 120 days; at least once yearly.
Electrical System (Entire) - Check for loose or damaged wiring	**Saltwater use:** Every 50 hours of operation or 60 days; at least once yearly. **Freshwater use:** Every 100 hours of operation or 120 days; at least once yearly.
Cooling System Hoses and Clamps - Inspect for damage and deterioration. Check clamps for tightness.	**Saltwater use:** Every 50 hours of operation or 60 days; at least once yearly. **Freshwater use:** Every 100 hours of operation or 120 days; at least once yearly.
Engine Exhaust System - Inspect for damage, deterioration and restrictions. Check clamps for tightness.	**Saltwater use:** Every 50 hours of operation or 60 days; at least once yearly. **Freshwater use:** Every 100 hours of operation or 120 days; at least once yearly.
Ignition System - Clean and completely inspect condition	Every 100 Hours of Use or 120 Days - Whichever Occurs First, or Once Yearly.
Flame Arrestor and Crankcase Ventilation Hose - Clean and inspect	Every 100 Hours of Use or 120 Days - Whichever Occurs First, or Once Yearly
Continuity Circuit - Check components for loose connections, broken or frayed wires	**Saltwater use:** Every 50 hours of operation or 60 days; at least once yearly. **Freshwater use:** Every 100 hours of operation or 120 days; at least once yearly.
Shift and Throttle Cable and Linkage - Lubricate and inspect for loose, damaged or missing parts	**Saltwater use:** Every 50 hours of operation or 60 days; at least once yearly. **Freshwater use:** Every 100 hours of operation or 120 days; at least once yearly.

MAINTENANCE
(Continued)

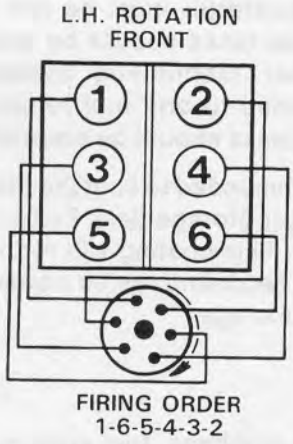
MAINTENANCE CHART
(Continued)

Maintenance Schedule to be Done by Dealer

TASK	INTERVAL
Stern Drive Unit Oil - Change	Every 100 Hours of Use or 120 Days - Whichever Occurs First, or Once Yearly
Transom Gimbal Housing Assembly Swivel Shaft and Gimbal Bearing - Lubricate	**Saltwater use:** Every 50 hours of operation or 60 days; at least once yearly. **Freshwater use:** Every 100 hours of operation or 120 days; at least once yearly.
Engine Coupling, Stern Drive Unit Universal Joint Shaft Splines and Cross Bearings - Lubricate*	Every 100 Hours of Use or 120 Days - Whichever Occurs First, or Once Yearly
Engine Alignment - Check	Every 100 Hours of Use or 120 Days - Whichever Occurs First, or Once Yearly
Fuel Filters - Replace	Once A Year
Steering Head and Remote Control - Inspect and lubricate	Once A Year
Quicksilver MerCathode System - Test output	Once A Year
Closed Cooling Coolant - Test for alkalinity	Once A Year
Heat Exchanger - Clean seawater section	Once A Year
Closed Cooling Coolant - Replace	Every 2 Years
Carburetor - Inspect and adjust	Once A Year

Specifications

MODEL	MCM 185 (229 CID)	MCM 185/175/ 4.3L (262 CID)	MCM 205/ 4.3LX (262 CID)
Horsepower (Kilowatts)	185 (138 kw)	185 (138 kw)	205 (153 kw)
Number of Cylinders	V-6		
Displacement	229 CID (3.8 L)	262 CID (4.3L)	
Bore/ Stroke	3.736 in. (95mm) 3.480 in. (88.4mm)	4.000 in./3.480 in. (101.6mm)/(88.4mm)	
Compression Ratio	8.5:1	9.3:1	
Compression Pressure	155 PSI (1069 kPa)	180 PSI (1241 kPa)	
Idle RPM (In Forward Gear)	650 – 700 RPM		
Max. RPM (at W.O.T.)	4400 – 4800 RPM		
Oil PSI (at 2000 RPM)	30 – 55 PSI (207 – 379 kPa)		
Min. Oil PSI (at Idle)	4 PSI (28 kPa)		
Fuel Pump PSI (at 1000 RPM)	3 – 7 PSI (21 – 48 kPa)		
Electrical System	12-Volt Negative Ground		
Min. Battery Cold Cranking Amps	Min. 450 Amps/90Ah Cold Cranking Amps		
Firing Order	1-6-5-4-3-2		
Spark Plug Type	AC-MR43T/Champion RV15YC4		
Spark Plug Gap	.035 in. (0.9mm)		
Breaker Point Gap	.020 in. (0.51mm)	N/A	
Dwell	34° – 38°	N/A	
Breaker Point Spring Tension	20-27 oz. (567-765 g.)	N/A	
Timing (at Idle RPM)	8° BTDC		
Preliminary Idle Mixture	2 – 3 Turns	1-1/4 Turns	Rochester 2 – 3 Turns Weber 1-1/4 – 1-1/2 Turns
Thermostat	143° F (62° C)		
Crankcase with Filter	4.5 U.S. Quarts (4.3L)		
Standard Cooling System	14 U.S. Quarts (13L)		
Closed Cooling System	20 U.S. Quarts (19L)		



Engine Firing Order

Fuel, Oil, Fluid and Coolant Specifications

FUEL REQUIREMENTS

IMPORTANT: Use of improper gasoline can damage engine seriously. Engine damage resulting from use of improper gasoline is considered misuse of engine, and damage caused thereby will not be covered under the limited warranty.

USA AND CANADA

The use of any good grade unleaded regular or premium gasolines with a minimum posted octane rating of 87 (R + M/2), are satisfactory for use in you engine. In areas where unleaded regular or premium gasolines are not available, a good grade **leaded** regular with a minimum posted octane rating of 89 (R + M/2) may be used. However, gasolines containing alcohol, either methyl alcohol (methanol) or ethyl alcohol (ethanol) may cause increased:

All areas other than USA and Canada should use 92RON rating or higher fuels (leaded or unleaded).

- Corrosion of metal parts.
- Deterioration of elastomer and plastic parts.
- Fuel permeation through flexible fuel lines.
- Wear and damage of internal engine parts.
- Starting and operating difficulties.

Some of these adverse effects are due to the tendency of gasolines containing alcohol to absorb moisture from the air, resulting in a phase of water and alcohol separating from the gasoline in the fuel tank.

The adverse effects of alcohol are more severe with methyl alcohol (methanol) and are worse with increasing alcohol content.

⚠WARNING

FIRE AND EXPLOSION HAZARD: Fuel leakage from any part of the fuel system can be a fire and explosion hazard which can cause serious bodily injury or death. Careful periodic inspection of the entire fuel system is mandatory, particularly after storage. All fuel components including fuel tanks, whether plastic, metal or fiberglass, fuel lines, primer bulbs, fittings, fuel filters and carburetors should be inspected for leakage, softening, hardening, swelling or corrosion. Any sign of leakage or deterioration necessitates replacement before further engine operation.

Because of the possible adverse effects of alcohol in gasoline, it is recommended that only alcohol-free gasoline be used where possible. If only fuel containing alcohol is available, or if the presence of alcohol is unknown, increased inspection frequency for leaks and abnormalities is required.

IMPORTANT: When operating a MerCruiser engine on gasoline containing alcohol, storage of gasoline in the fuel tank for long periods of time should be avoided. Long periods of storage, common to boats, create unique problems. In cars, alcohol-blend fuels normally are consumed before they can absorb enough moisture to cause trouble, but boats often sit idle long enough for phase separation to occur. In addition, internal corrosion may take place during storage if alcohol has washed protective oil films from internal components.

GASOLINE/ALCOHOL BLENDS

Many new motor vehicle owner manuals are warning about the potential damage from using gasoline containing alcohol, especially **METHANOL.** They cite possible fuel system damage and performance problems. These are just two of the hazards that may be caused by alcohol. These same problems as well as the additional safety risk of fire and explosion from fuel system leaks apply to marine engines. **METHANOL** is more severe in its bad effects than is **ETHANOL.** Alcohol also is more severe in older engines, since newer engine components are more resistant to alcohol.

EFFECTS OF GASOLINE/ALCOHOL BLENDS ON MARINE ENGINES

Corrosion of metals may result from use of alcohol-gasoline blends. Portable or permanently installed fuel tanks of metal or fiberglass, fuel filters, fuel lines and float bowls may be affected by alcohol blended fuels. Many fiberglass fuel tanks are slowly dissolved by alcohol, leading immediately to filter and carburetor plugging and eventually to fuel tank failure.

Fuels containing alcohol will absorb moisture from the air. At first, this moisture will remain in solution, but once the water content of the fuel has built up to about one-half of one percent, it will separate out (phase separation), taking the alcohol with it. This alcohol-water mixture settles to the bottom of the fuel tank and if this mixture gets into the engine, the engine can be seriously damaged, internally, as it may wash the protective film of oil off the bore of any cylinder that it enters. Before the engine can be restarted, it is necessary to remove the separated alcohol and water layer, flush out the fuel system with clean fuel, and remove and dry the spark plugs.

BOAT/MOTOR STORAGE

When operating a MerCruiser on gasoline containing alcohol, storage of gasoline in the fuel tank for long periods of time should be avoided.

Long periods of storage, common to boats, create unique problems. In cars, gasoline/alcohol blend fuels normally are consumed before they can absorb enough moisture to cause trouble; but, boats often sit idle long enough for phase separation to occur. In addition, internal corrosion may occur during storage, if alcohol has washed protective oil films from internal components.

COLD WEATHER or EXTENDED STORAGE

If boat is to be placed in cold weather or extended storage, carburetor(s) must be run dry at idle RPM. Permanent fuel tanks should be drained completely, and Quicksilver "Marine Fuel System Treatment and Stabilizer" added to any fuel remaining in the tank. Portable fuel tanks should be emptied completely.

It also is recommended to coat the internal engine parts with Quicksilver Storage Seal. Follow the directions on the container. This coating will reduce possibilities of internal parts becoming rusted from moisture accumulation during storage.

WARRANTY

Performance problems, fuel system or other damage resulting from the use of gasoline-alcohol blended fuels is not the responsibility of Mercury Marine and will not be covered under our warranty.

CONTINUING EVALUATIONS

The effects of gasoline blended with ETHANOL and METHANOL are still being evaluated by the United States Coast Guard, the National Marine Manufacturers Association (NMMA), Mercury Marine, and other engine and boat manufacturers.

We have recommended pump posting of alcohol content of gasoline. Further, we recommend using gasoline known not to contain any METHANOL or ETHANOL, when possible.

TEST FOR ALCOHOL CONTENT IN GASOLINE

The following is an acceptable and widely used field procedure for the detection of alcohol in gasoline. Use any small transparent bottle or tube that can be capped, and is, or can be provided with graduations or a mark at about 1/3 full. A pencil mark on a piece of adhesive tape may be used.

1. Fill the container with water to the mark.
2. Add fuel almost to fill the container, leaving some air space; then, cap the container. The proportions of fuel to water are not critical, but there should be 2-3 times as much fuel as water.
3. Shake container vigorously and allow it to sit upright for up to about 3-5 minutes. **If the volume of water appears to have increased, alcohol is present.** If you are not sure, there is no need for concern. If the dividing line between water and fuel becomes cloudy, use the middle of the cloudy band.

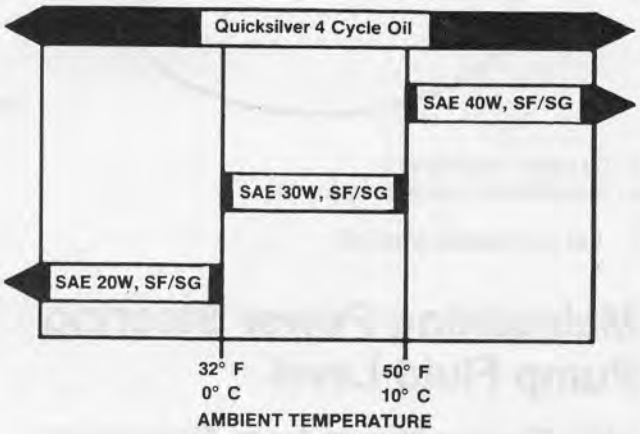
CRANKCASE OIL

To help obtain optimum engine performance and to provide maximum protection, we strongly recommend the use of Quicksilver 4-Cycle Marine Engine Oil. If not available, a good grade, straight weight, detergent automotive oil of correct viscosity, with an API classification of SF or SG, may be used.

The chart below is a guide to crankcase oil selection. Oil filter should always be changed with oil.

In those areas where recommended straight weight oil is not available, a multi-viscosity 20W-40 (SF) or, as a second but less preferable choice, 20W-50 (SF) may be used.

IMPORTANT: The use of non-detergent oils, multi-viscosity oils (other than 20W-40 or 20W-50), low quality oils or oils which contain solid additives specifically are not recommended.



Power Steering Fluid

IMPORTANT: Use only Quicksilver Power Trim and Steering Fluid, or automatic transmission fluid (ATF), Dexron II, in Power Steering System.

Coolant

⚠CAUTION

Alcohol or Methanol base anti-freeze, or plain water, are not recommended for use in fresh water section of cooling system at any time.

We recommend that the coolant section of Closed Cooling System be filled with a 50/50 mixture of ethylene glycol anti-freeze and water. In areas where the possibility of freezing DOES NOT exist, it is permissible to use a solution of rust inhibitor and water (mixed to manufacturer's recommendations).

MerCruiser engines can use any type of permanent anti-freeze or any brand anti-freeze solution that meets G.M. specification 1825M.

Priority Valve, if so equipped

Maintenance inspection is the owner's responsibility and must be performed at intervals specified, following:

Normal Service - Every 50 hrs. of operation or 60 days (whichever comes first)
Severe Service - Every 25 hrs. of operation or 30 days (whichever comes first)

NOTE: Operation in salt water is considered "Severe Service."

1. Check all connections and hose clamps for adequate tightness. Tighten, if loose.
2. Check all mounting bolts and tighten if necessary.
3. Be sure to check reservoir oil level periodically.

Maintaining Crankcase Oil Level

Overfilled Engine Crankcase

Overfilled crankcases (oil level being too high) can cause a fluctuation or drop in oil pressure and rocker arm "clatter," on MerCruiser engines. The over-full condition results in the engine crankshaft splashing and agitating the oil, causing it to foam (become aerated). The aerated oil causes the hydraulic valve lifters to "bleed down." This, in turn, results in rocker arm "clatter" and loss of engine performance, due to the valves not opening properly.

Care must be taken when checking engine oil level. Oil levell must be maintained between the "ADD" mark and the "FULL" mark on the dipstick. To ensure that you are not getting "false reading," make sure the following steps are done before checking the oil level.

- Boat "at rest" in the water, OR
- If boat is on a trailer, raise or lower bow until the boat is setting at the approximate angle that it would be if setting "at rest" in the water.
- Allow sufficient time for oil to drain into the crankcase if engine has just been run or oil has just been added.

Checking Engine Oil Level/Filling

1. Stop engine and allow boat to come to a rest.
2. Allow oil to drain back into oil pan - approximately 5 minutes.
3. Remove dipstick. Wipe clean and reinstall. Push dipstick all-the-way into dipstick tube.
4. Remove dipstick and note the oil level.
5. Oil level must be between the "FULL" and "ADD" marks.

6. If oil level is below "ADD" mark, proceed to 7 and 8.
7. Remove oil filler cap from valve rocker arm cover.
8. Add required amount of oil to bring level up to, but not over, the "FULL" mark on dipstick.

Changing Oil and Filter

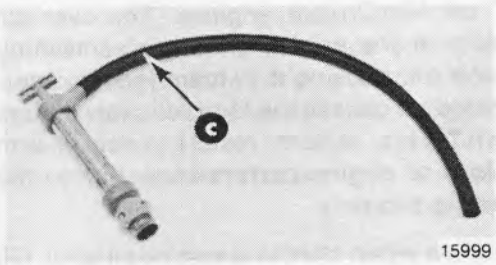
1. Start engine and run until it reaches normal operating temperatures.

IMPORTANT: Change oil when engine is warm from operation, as it flows more freely, carrying away more impurities.

2. Stop engine.
3. Remove drain plug from oil pan.

NOTE: If drain plug is not accessible because of boat construction, oil may be removed thru dipstick tube, using a Quicksilver Crankcase Oil Pump (see "Quicksilver Accessory Guide").

4. After oil has drained completely, reinstall drain plug and tighten securely.



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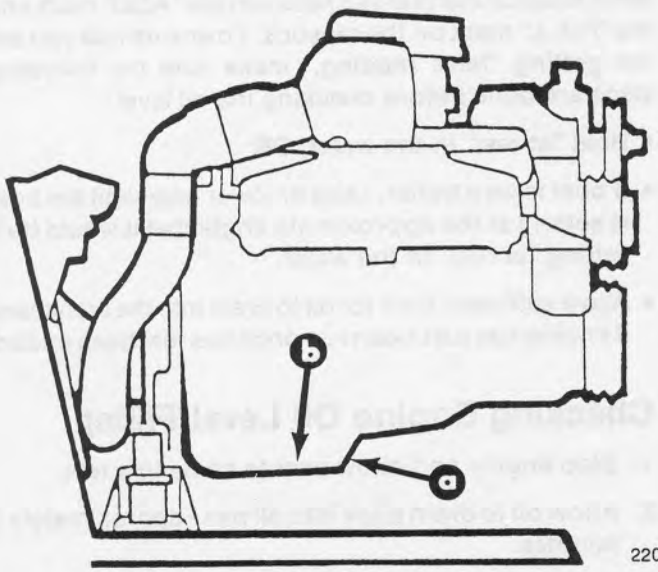

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a - Drain Plug
b - Oil Pan
c - Quicksilver Crankcase Oil Pump

5. Remove and discard oil filter and its sealing ring.
6. Coat sealing ring on new filter with engine oil, and install new filter. Tighten filter securely (following filter manufacturer's instructions). But do not overtighten.

50617

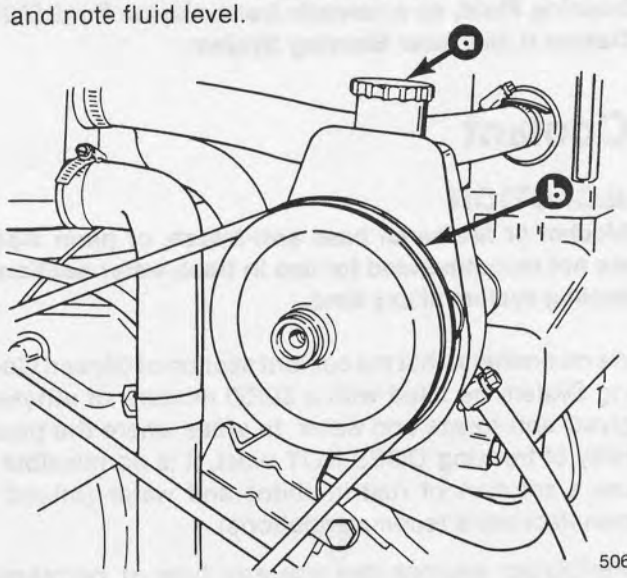
a - Oil Filter - hand tighten
b - Sealing Ring - coat with engine oil

7. Fill crankcase with oil.

Maintaining Power Steering Pump Fluid Level

With Engine Warm from Operation

1. Stop engine and position drive unit so that it is straight back.
2. Remove fill cap/dipstick from Power Steering pump and note fluid level.



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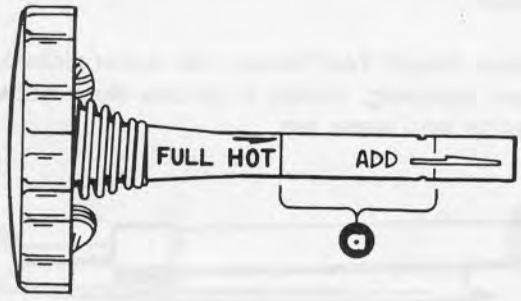
a - Fill Cap/Dipstick
b - Power Steering Pump

3. Level should be between the "FULL HOT" mark and "ADD" mark on dipstick.



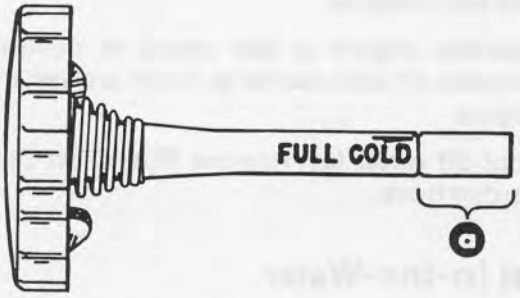
22023

a - Proper Fluid Level with Engine Warm

4. If level is low (below "ADD" mark), but fluid is still visible in pump reservoir, add required amount of fluid thru fill cap opening, to bring level up to "FULL HOT" mark on dipstick - do not overfill.
5. If fluid is not visible in reservoir, a leak exists in Power Steering System.

With Engine Cold

1. Stop engine and position drive unit so that it is straight back.
2. Remove fill cap/dipstick from Power Steering pump and note fluid level.
3. Level should be between "FULL COLD" mark and bottom of dipstick.



22023

a - Proper Fluid Level with Engine Cold

4. If fluid level is below bottom of dipstick, but fluid is still visible in pump reservoir, add required amount of fluid thru fill cap opening, to bring level up to "FULL COLD" mark on dipstick - Do not overfill.
5. If fluid is not visible in reservoir, a leak exists in Power Steering System.

Filling and Bleeding Power Steering System

IMPORTANT: Power Steering system must be filled exactly as explained, following, to be sure that all air is bled from the system. All air must be removed, or fluid in pump may foam during operation and be discharged from pump reservoir. Foamy fluid also may cause Power Steering system to become spongy, which may result in poor boat control.

1. Position drive unit so that it is straight back. Check fluid level with fill cap/dipstick. Add fluid as required, to bring level up to "FULL-COLD" mark on dipstick.

IMPORTANT: Use only Quicksilver Power Trim and Steering Fluid, or Dexron II automatic transmission fluid (ATF), in power steering system.

2. Turn steering wheel back-and-forth to end of travel in each direction several times; then, recheck fluid level and add fluid, if necessary.
3. Install fill cap/dipstick.

⚠CAUTION

DO NOT operate engine without water being supplied to seawater pickup pump in stern drive unit, or pump impeller may be damaged and subsequent overheating damage to engine may result.

4. Start engine and run at fast idle (1000-1500 RPM) until engine reaches normal operating temperature. During this time, turn steering wheel back-and-forth to end of travel in each direction several times.
5. Position drive unit so that it is straight back and stop engine. Remove fill cap from pump. Allow any foam in pump reservoir to disperse; then, check fluid level and add fluid, as required, to bring level up to "FULL-HOT" mark on dipstick. Do not overfill. Reinstall fill cap securely.

IMPORTANT: Drive unit must be positioned straight back and Power Steering fluid must be hot to accurately check fluid level.

6. If fluid is still foamy (in Step 5), repeat Steps 4 and 5 until fluid does not foam and level remains constant.

Maintaining Coolant Level

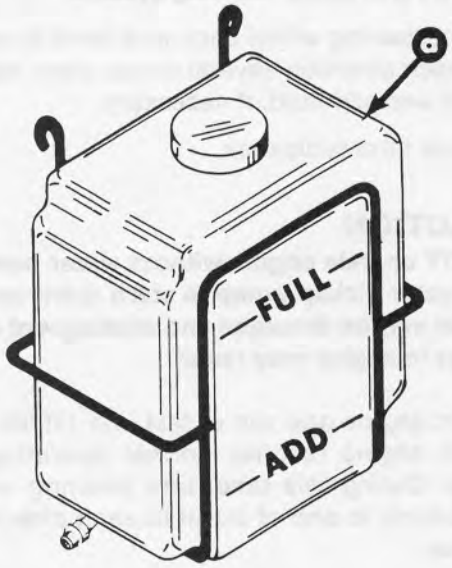
⚠WARNING

Allow engine to cool down before removing pressure cap. Sudden loss of pressure could cause hot coolant to boil and discharge violently. After engine has cooled down, turn cap 1/4-turn to allow any pressure to escape slowly; then, push down and turn cap all-the way off.

1. Coolant level in heat exchanger should be within 1 in. (25mm) from bottom of filler neck.

IMPORTANT: When reinstalling pressure cap, be sure to tighten it until it contacts stop on filler neck.

2. Coolant level should be between the "ADD" and "FULL" mark on coolant recovery reservoir with engine at normal operating temperature.



27022

a - Coolant Recovery Reservoir

Flushing Cooling System

⚠CAUTION

DO NOT run engine above 1500 RPM when flushing, as suction created by seawater pickup pump in drive unit may collapse garden hose and cause engine and/or drive unit to overheat.

Boat Out-of-Water

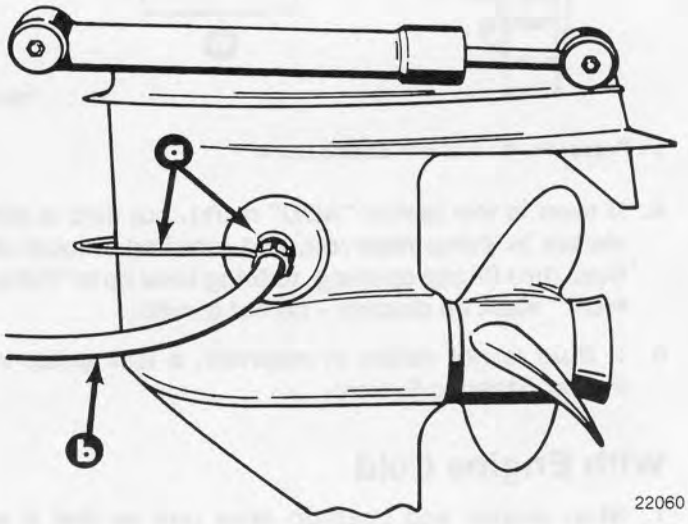
⚠WARNING

When flushing cooling system, be certain that area in vicinity of propeller is clear and that no person(s) is nearby.

⚠WARNING

If engine is to be tested on land, propeller must be removed.

1. Install Flush-Test Device over water pickup holes in gear housing. Attach a garden hose between the device and water tap.



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a - Flush-Test Device
b - Garden Hose - (Do Not Use Full Water Tap Pressure

2. Partially open water tap (approximately 1/2 maximum capacity). Do not use full city water pressure.
3. Place remote control in neutral, idle speed position and start engine.
4. Operate engine at idle speed in neutral for 10 minutes, or until discharge water is clear; then, stop engine.
5. Shut off water tap. Remove Flush-Test Device and garden hose.

Boat In-the-Water

1. Raise drive unit to full "Up" position.
2. Install Flush-Test Device over water pickup holes in gear housing. Attach a garden hose between the device and water tap.
3. Lower drive unit to full "In" position.
4. Follow Steps 2 thru 4 under "Boat Out-of-Water".
5. Shut-off water tap.
6. Raise drive unit to full "Up" position - Remove Flush-Test Device and garden hose.