

IMPORTANT INFORMATION

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Tune-Up Specifications		
Model	MCM 4.3L	MCM 4.3LX
Propshaft Horsepower Ratings (Kilowatts)	155 (115)	175 (130)
Number of Cylinders	6	
Displacement	262 Cu. In. (4.3 L)	
Bore/Stroke	4.00/3.48 In. (101.6/88.4 mm)	
Compression Ratio	9.3:1	
Compression Pressure	180 PSI (1241 kPa)	
Idle RPM (in Forward Gear)	650-700	
Max. RPM (at W.O.T.)	4400-4800	
	30-55 PSI (207-379 kPa)	
	4 PSI (28 kPa)	
	3-7 PSI (21-48 kPa)	
	Negative (-) Ground	

MAINTENANCE

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Maintenance Schedules

Maintenance Intervals

Maintenance intervals and the tasks to be performed, as shown in this current schedule, or as found in a previously printed schedules, are generally based on an average boating application and environment. However, individual operating habits and personal maintenance preferences can have an impact on the suggested intervals. In consideration of these factors, MerCruiser has adjusted some maintenance intervals and corresponding tasks to be performed. In some cases, this may allow for more individual tasks to be performed in a single visit to the serving dealer, rather than multiple visits. Therefore, it is very important that the boat owner and servicing dealer discuss the current Maintenance Schedule and develop appropriate maintenance intervals to coincide with the individual operating habits, environment, and maintenance requirements.

Alpha Models

SCHEDULED MAINTENANCE THAT CAN BE PERFORMED BY OWNER/OPERATOR

NOTE: Only perform maintenance which applies to your particular power package.

Task	Interval
Engine Crankcase Oil - Check level	Weekly
Closed Cooling Coolant - Check level	
Power Steering Fluid - Check level	
Stern Drive Unit Oil - Check level	
Battery - Check level and inspect for damage	
Fuel Pump Sight Tube (If so Equipped) - Check that no fuel is present	
Power Trim Pump Oil - Check level	
Anodes - Inspect for erosion	
Gear Housing Water Pickups - Check for marine growth or debris	
Drive Belt(s) - Inspect condition and check tension	Every 100 hours of operation or 120 days. Whichever occurs first.
Propeller Shaft - Lubricate	Saltwater Use: Every 50 hours of operation or 60 days, Whichever occurs first.
Power Package - Exterior Surfaces - Spray with rust preventative	Freshwater Use: Every 100 hours of operation or 120 days, Whichever occurs first.
Power Package Exterior Surfaces - Clean and paint	Once a year
Cooling System - Flush seawater section	Saltwater Use: After every use.

SCHEDULED MAINTENANCE THAT CAN BE PERFORMED BY DEALER

NOTE: Only perform maintenance which applies to your particular power package.

Task	Interval
Seawater Pickup Pump - Disassemble and inspect	Whenever insufficient seawater flow is suspected. (If operating temperature exceeds normal range.)
Crankcase Oil and Filter Change	End of first boating season and thereafter, every 100 hours of operation or once yearly, whichever occurs first.
Ignition system - Clean and Inspect condition.	
Flame Arrestor and Crankcase Ventilation Hose - Clean and Inspect.	
Positive Crankcase Ventilation (PCV) Valve (If Equipped) - Change	
Stern Drive unit Oil - Change	
Gimbal Ring Clamping Screws Retorque to 50-55 ft. lb. (67-74 N·m)	
Rear Engine Mounts Check torque to 30-40 ft. lb. (47-54 N·m)	
Gimbal Bearing - Lubricate	
Cooling System - Clean and Inspect	
Steering System - Lubricate and inspect for loose, damage or missing parts.	
Electrical System - Check for loose or damaged wiring.	
Closed Cooling System Pressure Cap - Clean, inspect and test .	
Cooling System Hoses and Clamps - Inspect for damage and deterioration. Check clamps for tightness.	
Continuity Circuit - Check components for loose connections, broken or frayed wires.	
Shift and Throttle Cable and Linkage - Lubricate and inspect for loose, damaged or missing parts.	
Engine Exhaust System - Inspect externally for damage, deterioration and restrictions. Check for tightness.	
Ignition System - Check Timing and adjust as needed.	

SCHEDULED MAINTENANCE THAT CAN BE PERFORMED BY DEALER (CONTINUED)

NOTE: Only perform maintenance which applies to your particular power package.

Task	Interval
Steering Head and Remote Control - Inspect and lubricate.	End of first boating season and thereafter, every 100 hours of operation or once yearly, whichever occurs first.
Carburetor (If Equipped) - Inspect and adjust.	
Throttle Body (EFI Models) - Inspect.	
Fuel Filters - Replace.	Once a Year
Quicksilver Mercathode System - Test output.	
Closed Cooling Coolant - Test for Alkalinity	
Heat Exchanger - Clean seawater section.	
Drive Unit Bellows and Clamps - Inspect.	
Engine Alignment - Check.	End of first boating season and thereafter, Saltwater Use: Every 300 hours of operation or once yearly, whichever occurs first Freshwater Use: Every 300 hours of operation or once every two years, whichever occurs first.
Engine Coupling Universal Joint Shaft Splines - Lubricate.	
Universal Joint Cross Bearings- Inspect.	
Closed Cooling Coolant - Replace.	Every Two Years

Bravo Models

SCHEDULED MAINTENANCE THAT CAN BE PERFORMED BY OWNER/OPERATOR

NOTE: Only perform maintenance which applies to your particular power package.

Task	Interval
Engine Crankcase Oil - Check level	Weekly
Closed Cooling Coolant - Check level	
Power Steering Fluid - Check level	
Stern Drive Unit Oil - Check level	
Battery - Check level and inspect for damage	
Fuel Pump Sight Tube (If so Equipped) - Check that no fuel is present	
Power Trim Pump Oil - Check level	
Anodes - Inspect for erosion	
Gear Housing Water Pickups - Check for marine growth or debris	
Drive Belt(s) - Inspect condition and check tension	Every 100 hours of operation or 120 days. Whichever occurs first.
Propeller Shaft - Lubricate	Saltwater Use: Every 50 hours of operation or 60 days, Whichever occurs first. Freshwater Use: Every 100 hours of operation or 120 days, Whichever occurs first.
Power Package - Exterior Surfaces - Spray with rust preventative	
Power Package Exterior Surfaces - Clean and paint	Once a year
Cooling System - Flush seawater section	Saltwater Use: After every use.

SCHEDULED MAINTENANCE THAT SHOULD BE PERFORMED BY A DEALER (CONTINUED)

NOTE: Only perform maintenance which applies to your particular power package.

Task	Interval
Seawater Pickup Pump - Disassemble and inspect	Whenever insufficient seawater flow is suspected. (If operating temperature exceeds normal range.)
Crankcase Oil and Filter Change	End of first boating season and thereafter, every 100 hours of operation or once yearly, whichever occurs first.
Ignition system - Clean and Inspect condition.	
Flame Arrestor and Crankcase Ventilation Hose - Clean and Inspect.	
Positive Crankcase Ventilation (PCV) Valve (If So Equipped) - Change	
Stern Drive unit Oil - Change	
Gimbal Ring Clamping Screws - Retorque to 40 ft. lb. (54 N·m)	
Rear Engine Mounts - Check torque to 30-40 ft. lb. (47-54 N·m)	
Gimbal Bearing - Lubricate	
Cooling System - Clean and Inspect	
Engine Alignment - Check	
Engine Coupling Universal Joint Shaft Splines - Lubricate	
Steering System - Lubricate and inspect for loose, damage or missing parts.	
Electrical System - Check for loose or damaged wiring.	
Cooling System Hoses and Clamps - Inspect for damage and deterioration. Check Clamps for tightness.	
Closed Cooling System Pressure Cap - Clean, inspect and test .	
Continuity Circuit - Check components for loose connections, broken or frayed wires.	
Shift and Throttle Cable and Linkage - Lubricate and inspect for loose, damaged or missing parts	
Engine Exhaust System - Inspect externally for damage, deterioration and restrictions. Check for tightness.	
Ignition System - Check Timing and adjust as needed.	

SCHEDULED MAINTENANCE THAT SHOULD BE PERFORMED BY A DEALER (CONTINUED)

NOTE: Only perform maintenance which applies to your particular power package.

Task	Interval
Steering Head and Remote Control - Inspect and Lubricate.	End of first boating season and thereafter, every 100 hours of operation or once yearly, whichever occurs first.
Carburetor (If Equipped) - Inspect and adjust.	
Throttle Body (EFI Models) - Inspect	
Fuel Filters - Replace	Once a Year
Quicksilver Mercathode System - Test output.	
Closed Cooling Coolant - Test for Alkalinity	
Heat Exchanger - Clean seawater section.	
Drive Unit Bellows and Clamps - Inspect	
Universal Joint Cross Bearings- Inspect	End of first boating season and thereafter, every 200 hours of operation or once yearly, whichever occurs first.
Closed Cooling Coolant - Replace	Every Two Years

Tune-Up Specifications

MODEL	MCM 4.3L	MCM 4.3 LX
Propshaft Horsepower Ratings (Kilowatts) ¹	155 (115)	175 (130)
Number Of Cylinders	6	
Displacement	262 Cu. In. (4.3L)	
Bore/Stroke	4.00/3.48 (101.6/88.4 mm)	
Compression Ratio	9.3:1	
Compression Pressure	180 PSI (1241 kPa)	
Idle RPM In Neutral ²	650-700	
Max RPM (at W.O.T.)	4400-4800	
Oil Pressure (at 2000 RPM)	30-55 PSI (207-379 kPa)	
Min. Oil Pressure	4 PSI (28 kPa)	
Fuel Pump Pressure	3-7 PSI (21-48 kPa)	
Electrical System	12 Volt Negative (-) Ground	
Min. Battery Cold Cranking Amperes	375 cca/475 mca/90 Ah	
Firing Order	1-6-5-4-3-2	
Spark Plug Type	AC-MR43T / Champion RV15YC4 / NGK BR6FS	
Spark Plug Gap	.040 In. (1 mm)	
Timing Thunderbolt IV Models ³	8° BTDC	
Thunderbolt V Models ³	10° BTDC	
Preliminary Idle Mixture	1-1/4 Turn	
Thermostat	143° F (62° C)	

¹ Power Rated in Accordance with NMMA (National Marine Manufacturers' Association) rating procedures.

² Measured using an accurate service tachometer and fuel injection engine at operating temperature.

³ Timing must be set using a special procedure as outlined in the appropriate Service Manual. Timing cannot be properly set using the conventional method.

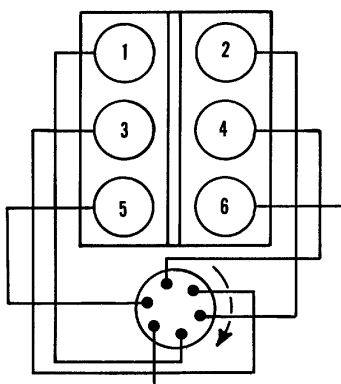
Tune-Up Specifications

MODEL	MCM 4.3LX GEN + ALPHA AND BRAVO (2 BBL)	MCM 4.3LXH GEN + ALPHA AND BRAVO (4 BBL)	MCM 262 MAGNUM EFI GEN + ALPHA AND BRAVO
Propshaft Ratings HP.(KW) ¹	190 (142)	205 (153)	205 (153)
Displacement	262 CID (4.3L)		
Bore/Stroke In. (mm)	4.00 x 3.48 (101.6 x 88.4)		
Compression Ratio	9.4:1		
Compression Pressure	180 PSI (1241 kPa)		
Idle RPM In Neutral ²	650		600
Maximum RPM (at W.O.T.)	4400-4800		
Oil Pressure (at 2000 RPM)	30-55 PSI (207-379 kPa)		
Minimum Oil Pressure (at Idle)	4 PSI (28 kPa)		
Fuel Pump Pressure	3-7 PSI (21-48 kPa)		
Fuel Pressure (Running) (E.F.I. Only)	Does Not Apply		30 PSI (207 kPa)
Electrical System	12 V Negative (-) Ground		
Minimum Battery Requirements	550 cca / 700 mca / 120 Ah		
Firing Order	1-6-5-4-3-2		
Spark Plug Type	AC - MR43LTS Champion RS12YC NGK BPR6EFS		
Spark Plug Gap	.045 (1.1 mm)		
Timing (at Idle RPM) ³	10° BTDC		8° BTDC
Preliminary Idle Mixture	1-1/4 Turns		Does Not Apply
Thermostat	160° F (71° C)		

¹ Power Rated in Accordance with NMMA (National Marine Manufacturers' Association) rating procedures.

² Measured using an accurate service tachometer and fuel injection engine at operating temperature.

³ Timing must be set using a special procedure as outlined in the appropriate Service Manual. Timing cannot be properly set using the conventional method.



Firing Order
1-6-5-4-3-2

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Fluid Capacities

NOTICE

All capacities are approximate fluid measures.

MCM (Stern Drive) Model	All Models
Crankcase Oil ¹ (with filter)	4-1/2 U.S. Qts. (4.3 L)
Seawater Cooling System ²	15 U.S. Qts. (14.1 L)
Closed Cooling System	20 U.S. Qts. (19 L)

¹Always Use Dipstick to Determine Exact Quantity of Oil Required

²Seawater Cooling System Capacity Information is for Winterization Use Only

20-Hour Break-In Period

IMPORTANT: The first 20 hours of operation is the engine break-in period. Correct break-in is essential to obtain minimum oil consumption and maximum engine performance. During this break-in period, the following rules must be observed:

- Do not operate below 1500 RPM for extended periods of time for first 10 hours. Shift into gear as soon as possible after starting and advance throttle above 1500 RPM if conditions permit safe operation.
- Do not operate at one speed consistently for extended periods.
- Do not exceed 3/4 throttle during first 10 hours. During next 10 hours, occasional operation at full throttle is permissible (5 minutes at a time maximum).
- Avoid full throttle acceleration from idle speed.
- Do not operate at full throttle until engine reaches normal operating temperature.
- Frequently check crankcase oil level. Add oil if needed. It is normal for oil consumption to be high during break-in period.
- After 20-hour break-in period, drain crankcase oil and replace oil filter (see "Maintenance"). Fill crankcase with correct oil (see "Specifications").

Fuel, Oil, Fluid, and Coolant Specifications

Fuel

CAUTION

Use of improper gasoline can damage the engine seriously. Engine damage that results from use of improper gasoline is considered misuse of the engine and is not covered under MerCruiser Warranty.

USA and Canada

Fuel having a posted pump Octane Rating of 87(R + M)/2 minimum. Premium gasoline [92 (R + M)/2] is also acceptable. DO NOT use leaded gasoline.

Outside USA and Canada

Fuel having a posted pump Octane Rating of 92 RON minimum. Premium gasoline (98 RON) is also acceptance. If unleaded is not available, use a major brand of leaded gasoline.

Gasolines containing alcohol, either methyl alcohol (methanol) or ethyl alcohol (ethanol) may cause increased:

- 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 system 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 requires replacement before further engine operation.

Because of 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.

WARNING

Avoid gasoline fire or explosion. Improper installation of brass fittings or plugs into fuel pump or fuel filter base can crack casting and/or cause a fuel leak.

IMPORTANT: When operating a MerCruiser engine on gasoline containing alcohol, storage of gasoline in the fuel tank for long periods 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 take place. In addition, internal corrosion may take place during storage if alcohol has washed protective oil films from internal components.

NO LEAD GASOLINE

U.S. Environmental Protection Agency (EPA) and Canadian government regulations require the removal of lead (anti-knock compound) from all gasoline because lead emission in exhaust is a health hazard.

In order to maintain octane ratings, many gasoline manufacturers are adding ethyl alcohol (ethanol) or methyl alcohol (methanol) to the gasoline to replace the lead.

The use of any good grade unleaded regular or premium gasolines with a minimum posted octane rating [(A.K.I.) Anti-Knock Index] of 87, are satisfactory for use in your engine. In areas where unleaded regular or premium gasolines are not available, a good grade **leaded** regular with a minimum posted octane rating (A.K.I.) of 89 may be used.

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 inboard engines. METHANOL is more severe in its bad effect than is ETHANOL. Alcohol is also more severe in older engines since newer engines have materials which 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 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), bringing 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 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, 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 take place. In addition, internal corrosion may take place during storage if alcohol has washed protective oil films from internal components.

WINTER STORAGE

If boat is to be placed in winter storage, carburetors must be run dry at idle RPM. Permanent fuel tanks should be drained completely and Quicksilver Gasoline Stabilizer and Conditioner added to any fuel remaining in the tank. Portable fuel tanks should be emptied completely.

WARRANTY

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

CONTINUING EVALUATIONS

The effects of gasoline 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.

Procedure

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 to 3 times as much fuel as water.
3. Shake container vigorously and allow it to sit **upright for 3 to 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.

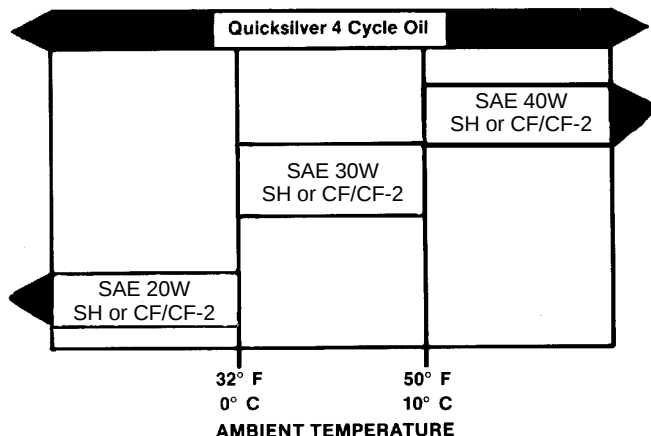
Crankcase Oil

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 following chart 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 SG) or, as a second but less preferable choice, 20W-50 (SF or SG) 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.



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Power Steering Fluid

Use Quicksilver Power Trim and Steering Fluid, or automatic transmission Fluid (ATF), Dexron, Dexron II or Dexron III.

Coolant for Closed Cooling System

⚠ CAUTION

Alcohol or Methanol base antifreeze 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 Quicksilver Pre-Mixed Engine Coolant. 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 V-6 engines can use any type of permanent antifreeze or any brand antifreeze solution that meets GM specification 1825M.

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 level must be maintained between the ADD mark and the FULL mark on the dipstick. To ensure that you are not getting a "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

IMPORTANT: ENGINE CRANKCASE OIL MUST BE CHECKED AT INTERVALS SPECIFIED IN "MAINTENANCE SCHEDULE" CHART. It is normal for an engine to use a certain amount of oil in the process of lubrication and cooling of the engine. The amount of oil consumption is greatly dependent upon engine speed, with consumption being highest at wide-open-throttle and decreasing substantially as engine speed is reduced.

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 Steps 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 or from oil drain hose.

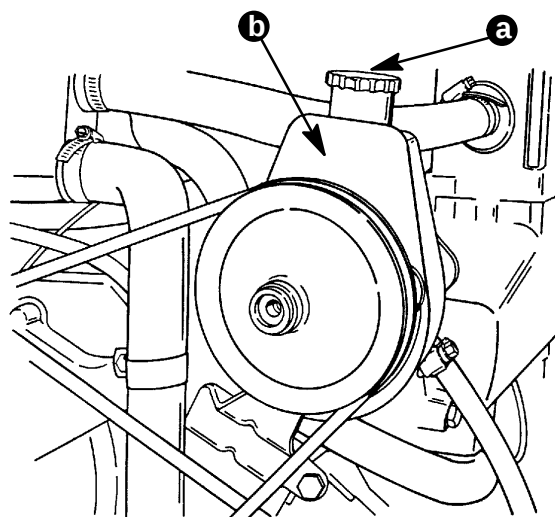
NOTE: If drain plug is not accessible because of boat construction, oil may be removed through dipstick tube, using a Quicksilver Crankcase Oil Pump.

4. After oil has drained completely, reinstall drain plug (if removed) and tighten securely.
5. Remove and discard oil filter and its sealing ring.
6. Coat sealing ring on new filter with engine oil, and install. Tighten filter securely (following filter manufacturer's instructions). Do not over-tighten.
7. Fill crankcase with oil.
8. Start engine and check for leaks.

Maintaining Power Steering Pump Fluid Level

With Engine Warm

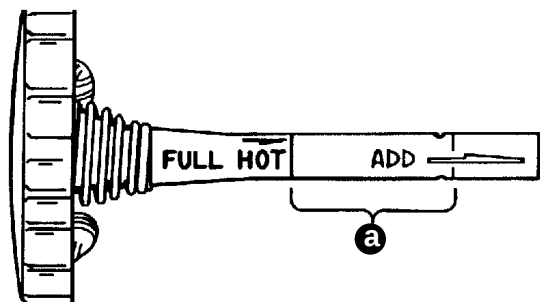
1. Stop engine and position drive unit so that it is straight back.
2. Remove fill cap/dipstick from power steering pump and note fluid level.



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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.



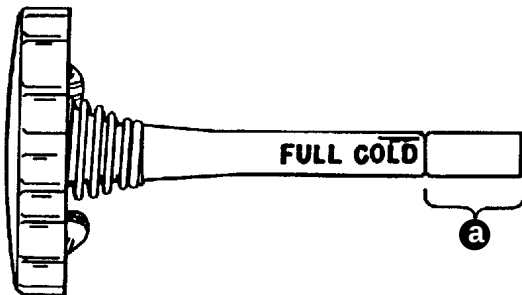
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- a - Proper Fluid Level With Engine Warm

4. If level is below ADD mark, but fluid is still visible in pump reservoir, add required amount of Quicksilver Power Trim and Steering Fluid or automatic transmission fluid (ATF), Dexron, or Dexron II, through fill cap opening, to bring level up to FULL mark on dipstick. DO NOT OVERFILL.
5. If fluid is not visible in reservoir, a leak exists in the power steering system. Find cause and correct.

With Engine Cold

1. With engine stopped, 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.



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a - Proper Fluid Level With Engine Cold

4. If level is below bottom of dipstick, but fluid is still visible in pump reservoir, add required amount of Quicksilver Power Trim and Steering Fluid or automatic transmission fluid (ATF), Dexron, Dexron II, or Dexron III through fill cap opening, to bring level up to FULL COLD mark on dipstick. DO NOT OVERFILL.

If fluid is not visible in reservoir, a leak exists in the power steering system. Find cause and correct.

Filling and Bleeding Power Steering System

IMPORTANT: Power steering system must be filled exactly as explained in the 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. With engine stopped, position drive unit so that it is straight back. Remove fill cap/dipstick from power steering pump. Add Quicksilver Power Trim and Steering Fluid or automatic transmission fluid (ATF), Dexron, Dexron II, or Dexron III as required, to bring level up to FULL COLD mark on dipstick.

IMPORTANT: Use only Quicksilver Power Trim and Steering Fluid or automatic transmission fluid (ATF), Dexron, Dexron II and Dexron III 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 vented fill cap.

CAUTION

DO NOT operate engine without water being supplied to seawater pickup pump, 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 Closed Cooling Coolant Level

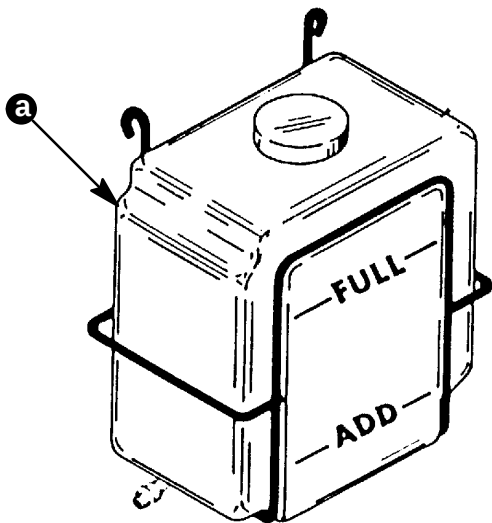
⚠ WARNING

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, 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 full (to 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 marks on coolant recovery reservoir with the engine at normal operating temperature.



72520

a - Coolant Recovery Reservoir

Flushing Cooling System

If engine is operated in salty, polluted, or mineral-laden water, flush cooling system (preferably after each use) to reduce corrosion and prevent the accumulation of deposits in the system. Thoroughly flush cooling system prior to storage.

⚠ WARNING

When flushing cooling system with boat out of the water, be certain that area in vicinity of propeller is clear and that no person is standing nearby. As a precautionary measure, it is recommended that propeller be removed.

⚠ CAUTION

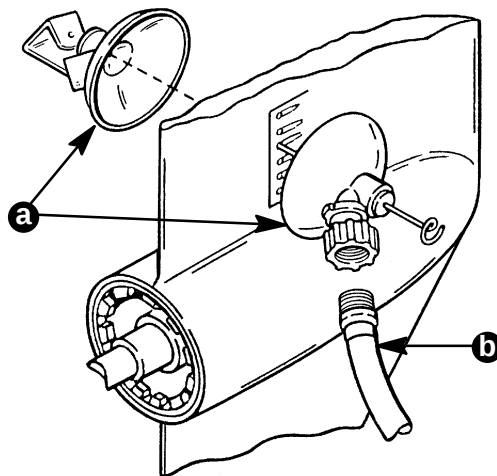
To prevent engine or stern drive unit damage **DO NOT** run engine or drive unit without water being supplied to water intake openings on gear housing, and to seawater pickup pump if so equipped.

1. Follow instructions appropriate to your model:

NOTE: If flushing cooling system with boat in water, raise drive unit to trailer position and install flushing attachment. Lower drive unit to full IN/DOWN position.

a. All Models:

- (1) Install Quicksilver Flushing Attachment (or equivalent) over water intake openings in gear housing.
- (2) Connect hose between flushing attachment and water tap.



72012

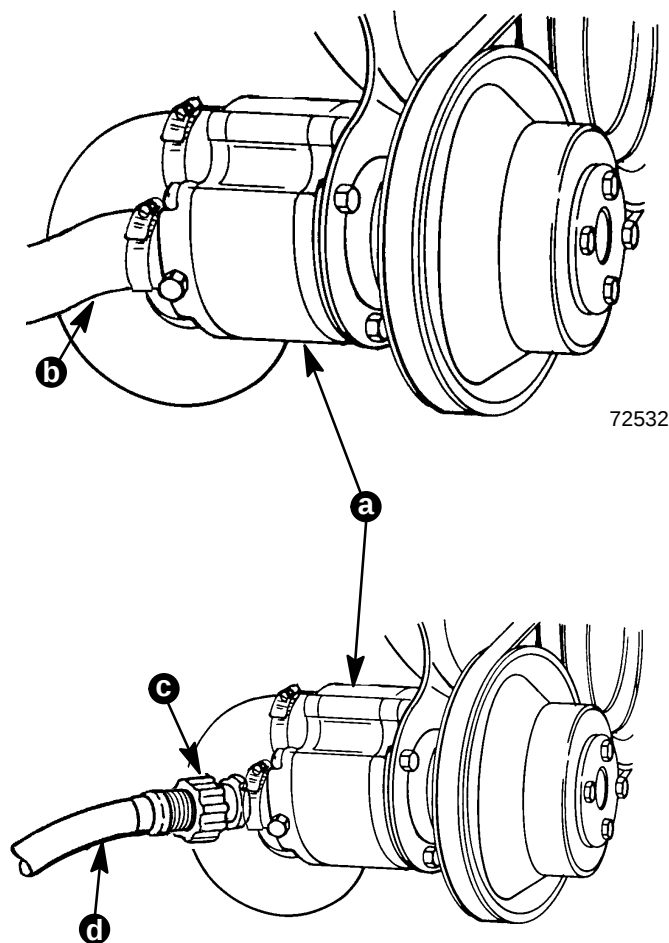
a - Quicksilver Flushing Attachment
b - Garden Hose

- b. **Models Equipped with Belt Driven Seawater Pickup Pump:** In addition to supplying water to the drive (as previously outlined for "All Models"), perform the following.

⚠ CAUTION

If cooling system is to be flushed with boat in the water, seacock (if so equipped) must be closed, or water inlet hose must be disconnected and plugged to prevent water from flowing into boat.

- (1) Close seacock (if so equipped) or disconnect and plug seawater inlet hose.
- (2) Loosen hose clamp and remove seawater inlet hose at location shown. Connect an additional tap water hose to inlet fitting using an appropriate adaptor.

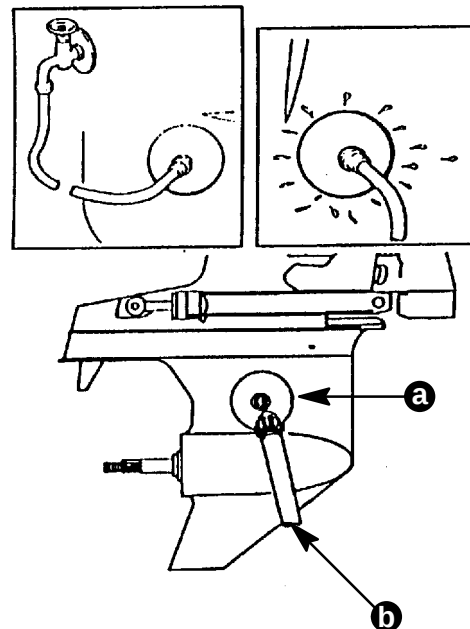


72532

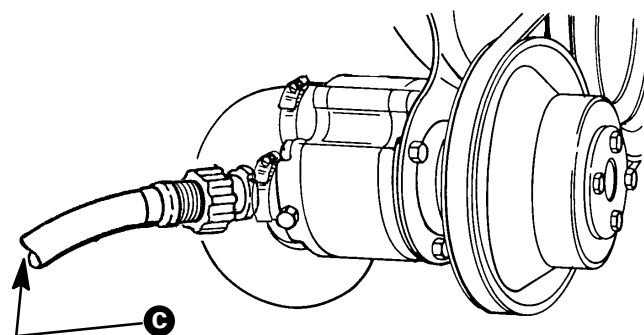
71843

- a - Seawater Pickup Pump
b - Seawater Inlet Hose
c - Adaptor
d - Tap Water Hose

2. Partially open water tap(s) (approximately 1/2 maximum capacity) and allow drive unit and cooling system to fill completely. Do not use full tap water pressure.



72672



- a - Quicksilver Flushing Attachment
b - Water To Drive Unit
c - Water To Seawater Pump (If So Equipped)

NOTE: Drive unit is full when water is discharged out of drive unit, and/or seawater section of closed cooled system is full when water is discharged through propeller.

⚠ CAUTION

Do not run engine above 1500 RPM when flushing. Suction created by seawater pickup pump may collapse flushing hose, causing engine to overheat.

3. Place remote control lever in NEUTRAL position and start the engine.

⚠ CAUTION

Watch temperature gauge at dash to ensure the engine does not overheat.

4. Operate engine at idle speed in NEUTRAL gear for 10 minutes or until discharge water is clear, then stop engine.
5. Shut off water tap(s).
6. Follow instructions appropriate to your model:

NOTE: If flushing cooling system with boat in water, raise drive unit to trailer position, to remove flushing attachment. Lower drive unit to full IN/DOWN position after completion.

- a. **All Models:** Remove hose and flushing attachment from drive unit.
- b. **Models Equipped with Belt Driven Seawater Pickup Pump:** Remove hose and flushing attachment from pump inlet.

7. Follow instructions "a" or "b."

⚠ CAUTION

If boat is in the water, seacock (if so equipped) must remain closed until engine is to be restarted, to prevent contaminated water from flowing back into cooling system. If boat is not fitted with a seacock, water inlet hose must remain disconnected and plugged, to prevent water from flowing into cooling system and/or boat. As a precautionary measure, attach a tag to the ignition switch or steering wheel with the warning that the seacock must be opened or the water inlet hose reconnected prior to starting the engine.

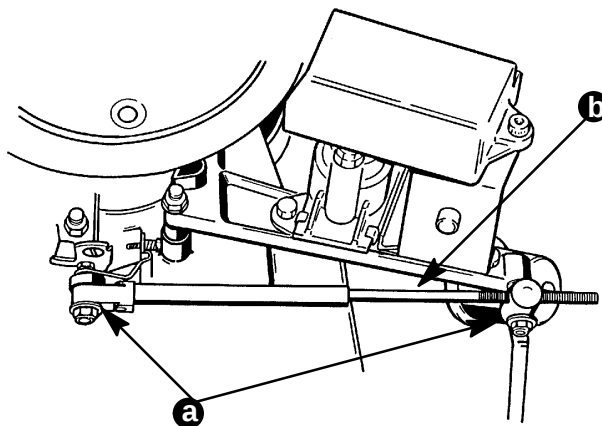
- a. **If equipped with seacock:** Observing precaution above, open seacock.
- b. **If NOT equipped with seacock:** Observing precaution above, remove plug from seawater inlet hose and reconnect seawater inlet hose. Tighten hose clamps securely.

Lubrication

Lubricate pivot points with SAE 30W motor oil and cable guide contact surfaces with Quicksilver 2-4-C Marine Lubricant.

Throttle Cable

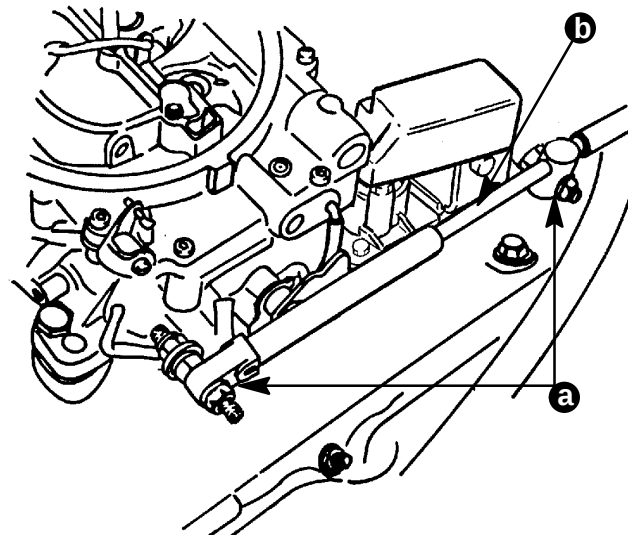
2 BARREL CARBURETOR



72013

- a - Pivot Points
b - Guide Contact Surface

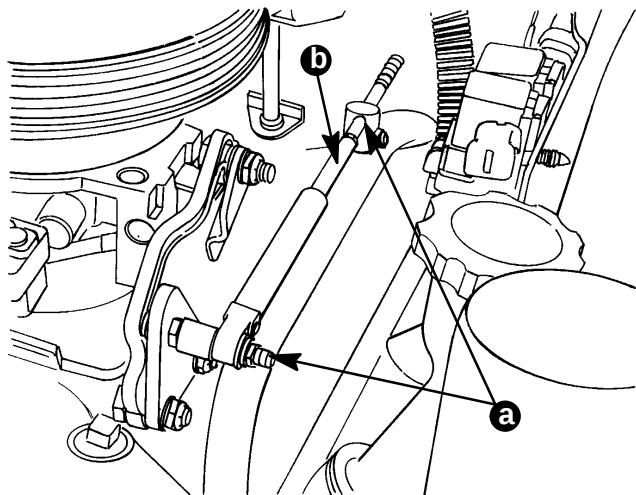
4 BARREL CARBURETOR



72014

- a - Pivot Points
b - Guide Contact Surface

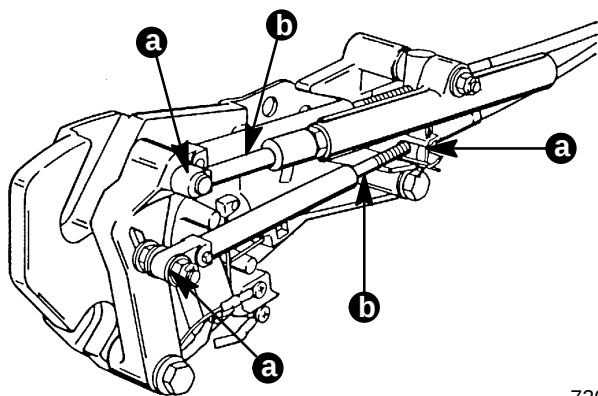
THROTTLE BODY FUEL INJECTION



74912

- a - Pivot Points
- b - Guide Contact Surface

Shift Cable



72015

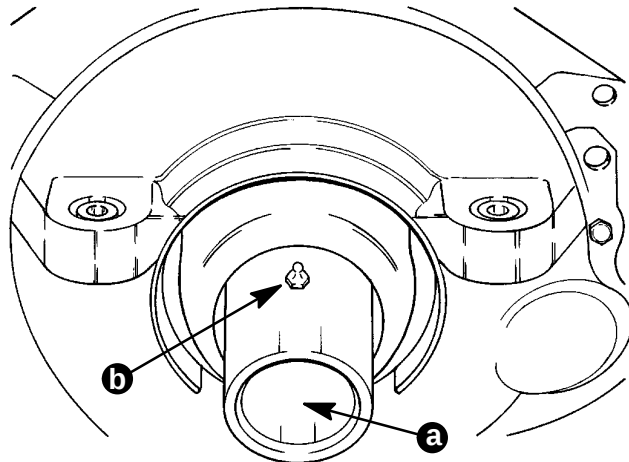
- a - Pivot Points
- b - Guide Contact Surface

Engine Coupler/U-Joint Shaft Splines

Lubricate coupler and splines with Quicksilver Engine Coupler Spline Grease (92- 816391A4).

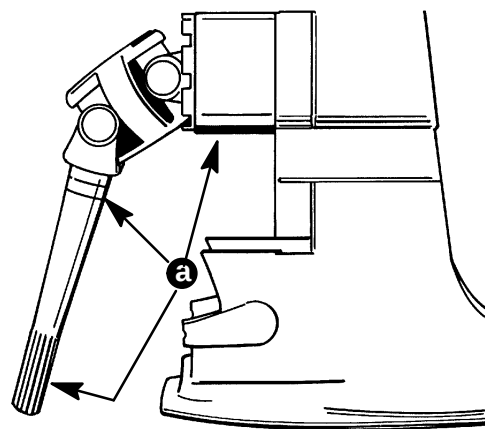
IMPORTANT: Stern Drive Unit does not have to be removed to grease coupler.

NOTE: Refer to MerCruiser Stern Drive Service Manual for stern drive unit removal and installation if necessary.



72017

- a - Quicksilver Engine Coupler Spline Grease
- b - Use Grease Fitting if Drive is Installed



72530

- a - Quicksilver Engine Coupler Spline Grease (If Drive Has Been Removed)

Audio Warning System

Maintenance

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

Fresh Water Areas - Every 50 Hours of operation or 60 days (whichever comes first)

Salt Water Areas - Every 25 hours of operation or 30 days (whichever comes first)

NOTE: Operation in salt water is considered severe service.

1. Check buzzer mounting screws, heat switch and oil pressure switch for adequate tightness. Tighten, if loose, but DO NOT over-tighten.
2. Check all wiring connections to be sure that they are tight and sealed where necessary.

Cold Weather or Extended Storage

Precautions

WARNING

BE CAREFUL while working on fuel system; gasoline is extremely flammable and highly explosive under certain conditions. Be sure that ignition key is OFF and do not smoke or allow sources of spark and/or open flames in the area.

WARNING

To prevent a potential fire hazard, be sure that engine compartment is well ventilated and that there are no gasoline vapors present during starting or fogging of engine.

CAUTION

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

CAUTION

Seawater section of cooling system MUST BE COMPLETELY drained for winter storage, or immediately after cold weather use, if the possibility of freezing temperatures exists. Failure to comply may result in trapped water causing freeze and/or corrosion damage to engine.

CAUTION

If boat is in the water, seacock (water inlet valve), if so equipped, must be closed until engine is to be re-started, to prevent water from flowing back into cooling system and/or boat. If boat is not fitted with a seacock, water inlet hose must be disconnected and plugged to prevent water from flowing back into cooling system and/or boat. As a precautionary measure, attach a tag to the ignition switch or steering wheel of the boat with the warning that the seacock must be opened or the water inlet hose reconnected prior to starting engine.

IMPORTANT: Observe the following information to ensure complete draining of cooling system.

- Engine must be as level as possible.
- A wire should be repeatedly inserted into all drain holes to ensure there are no obstructions in passages. Remove petcock, if necessary, to insert wire completely into drain hole.

IMPORTANT: To prevent threads in manifolds, elbows and cylinder blocks from rusting out during storage, reinstall plugs using Quicksilver Perfect Seal on threads. Never leave drain plugs out during storage.

NOTE: If possible, place a container under drains and hoses to prevent water from draining into boat.

CAUTION

If engine is equipped with Closed Cooling System, Closed Cooling section must be kept filled with a solution of ethylene glycol antifreeze and water (mix antifreeze to manufacturer's recommended proportions to protect engine to lowest temperature to which it will be exposed). **DO NOT USE PROPYLENE GLYCOL** antifreeze in closed cooling section. Seawater section, however, must be drained completely.

CAUTION

A discharged battery can be damaged by freezing.

Layup

NOTICE

Refer to "Cold Weather or Extended Storage," "Precautions," in this section, **BEFORE** proceeding.

1. Fill fuel tank(s) with fresh gasoline that does not contain alcohol and a sufficient amount of Quicksilver Gasoline Stabilizer and Conditioner to treat the gasoline.

IMPORTANT: If boat is to be placed in storage (with fuel containing alcohol in fuel tanks), carburetors or vapor separator tanks must be run dry at idle RPM. Fuel tanks should be drained completely and Quicksilver Gasoline Stabilizer

and Conditioner added to any fuel remaining in the tank. Also, refer to "Fuel Specifications," see Table of Contents.

2. Replace all fuel filters
3. Start engine and check for fuel leaks.
4. Run engine sufficiently to heat it to normal operating temperature; shut off engine and change oil and filter.
5. If boat has been operated in salty, polluted or mineral-laden waters, flush cooling system.
6. Prepare fuel system for extended storage as follows:

a. For engines with carburetors:

Remove flame arrestor assembly and restart engine. While operating engine at fast idle (1000-1500 RPM), fog internal surfaces of induction system and combustion chambers by squirting approximately 8 ounces (227 grams) of Quicksilver Storage Seal or SAE 20W engine oil into carburetor bores. Stall engine by squirting last 2 ounces (57 grams) of Storage Seal or oil rapidly into carburetor. Turn ignition to OFF.

b. For fuel injected engines with VST:

WARNING

Fuel injection system is pressurized. A special procedure must be used to remove this pressure before removing the plug from vapor separator tank. **DO NOT** attempt to remove plug without having pressure removed. Fuel could spray on hot engine causing fire or explosion.

- (1) Relieve fuel pressure from system. Refer to "Fuel Pressure Relief Procedure" in Section 5C.
- (2) Remove plug from top of vapor separator tank.
- (3) Add approximately 1 fluid ounce (30 ml) of Quicksilver 2-Cycle Outboard Oil to fuel in the vapor separator tank.
- (4) Shut off the fuel supply to the engine's fuel pump.
- (5) Start engine and run at idle speed until the vapor separator tank and fuel injection system is empty.

- (6) Reinstall the plug in top of vapor separator tank.
- c. **For fuel injected engines with Cool Fuel system:**
 - (1) Fill fuel tank(s) with fresh gasoline (that does not contain alcohol) and a sufficient amount of Quicksilver Gasoline Stabilizer for Marine Engines to treat gasoline. Follow instructions on container.
 - (2) **If boat is to be placed in storage with fuel containing alcohol in fuel tanks (if fuel without alcohol is not available):** Fuel tanks should be drained completely and Quicksilver Gasoline Stabilizer for Marine Engines added to any fuel remaining in the tank. Refer to "FUEL REQUIREMENTS" for additional information.
 - (3) Prepare fuel system for extended storage as follows:
 - (4) Allow engine to cool down.
 - (5) Remove the water separating fuel filter.
 - (6) Pour out a small amount of fuel into a suitable container, then add approximately 2 fluid ounces (60 ml) of Quicksilver 2-Cycle Outboard Oil to fuel in the water separating fuel filter.
 - (7) Install water separating fuel filter.
 - (8) Shut off the fuel supply to the engine.
 - (9) Start and run engine at idle speed for two minutes.
 - (10) Stop engine, remove and discard new water separating fuel filter and in line fuel filter.
 - (11) Install new filters.
 - (12) Close fuel shut-off valve, if so equipped.
7. Close fuel shutoff valve, if so equipped.
8. Clean flame arrestor and crankcase ventilation hoses and reinstall.
9. Lubricate all items outlined in "Lubrication."
10. Drain seawater section of cooling system, as outlined in "Draining Instructions" following.
11. **Closed Cooling System Models:** Test coolant to ensure that it will withstand lowest temperature expected during storage.
12. Service batteries.

13. Clean outside of engine and repaint any areas required with Quicksilver Primer and Spray Paint. After paint has dried, spray Quicksilver Corrosion and Rust Preventive Type II or wipe down with Quicksilver Storage Seal or SAE 20W engine oil.
14. For drive unit, refer to appropriate stern drive manual.

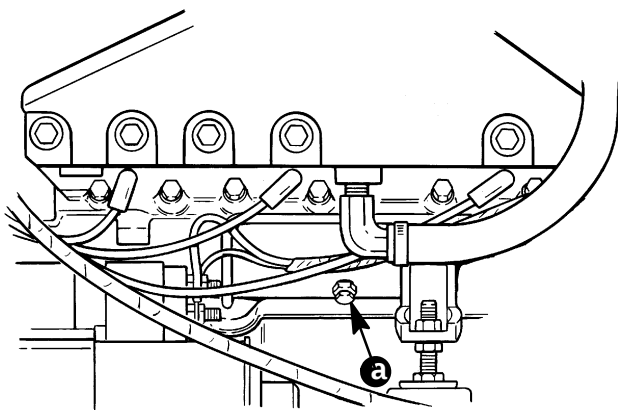
Draining Instructions

Draining Seawater (Raw-Water) Cooled Models

NOTICE

Refer to "Cold Weather or Extended Storage," "Precautions," in this section, **BEFORE** proceeding.

1. Engine must be as level as possible to ensure complete draining of cooling system.
2. Remove drain plugs (port and starboard) from cylinder block.



72993

Starboard Side Shown (Port Similar)

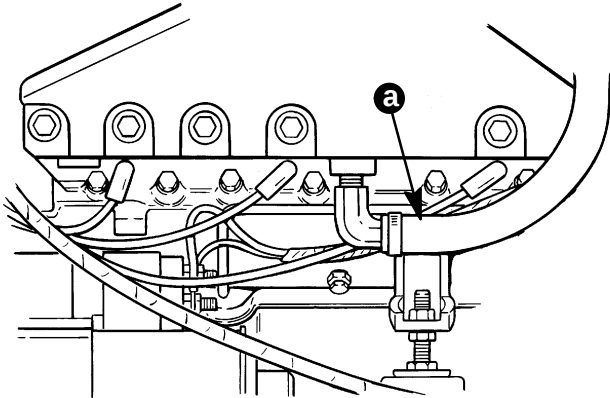
a - Drain Plug (Port and Starboard)

3. Repeatedly clean out drain holes using a stiff piece of wire. Do this until entire system is drained.

NOTE: It may be necessary to lift, bend, or lower hoses to allow water to drain completely when hoses are disconnected.

4. Remove hose from bottom of port and starboard manifolds. Some models may have drain plugs in elbows.

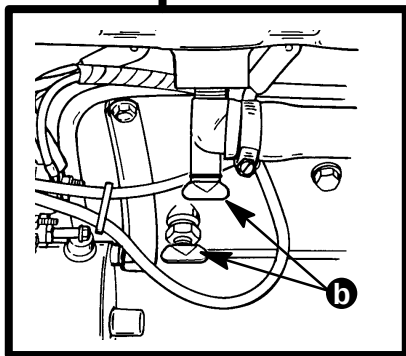
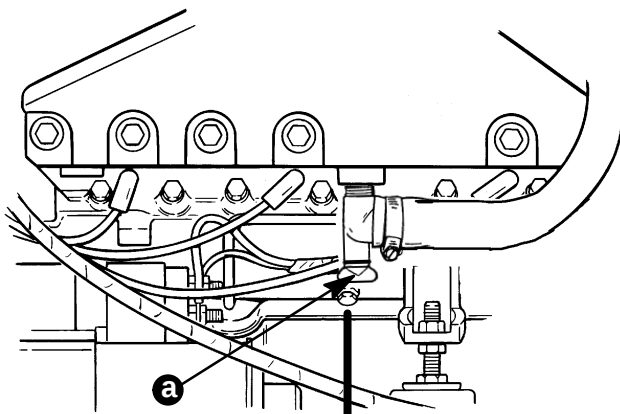
NOTE: With the engine level, sufficient draining of manifolds will occur when exhaust manifold to thermostat housing hoses are removed.



72993

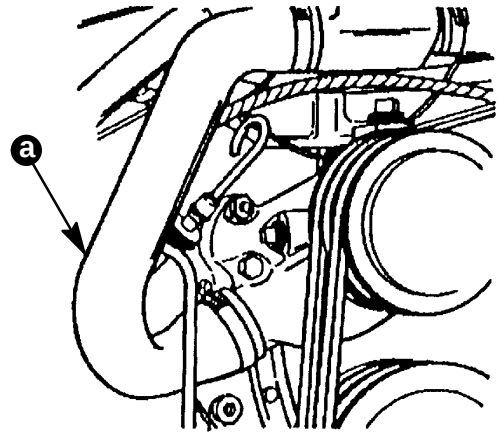
Starboard Side Shown (Port Similar)

a - Bottom Hose, Exhaust Manifold to Thermostat Housing



a - Drain Plug Located In Exhaust Manifold Elbow
b - Later Models Are Equipped With Thumbscrew Drain Plug.

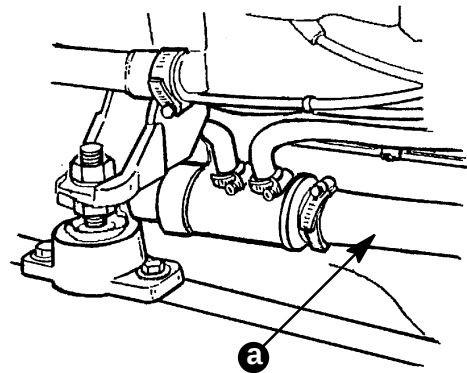
5. Remove the engine water circulating pump hose as shown.



72587

a - Hose, Water Circulating Pump to Thermostat Housing

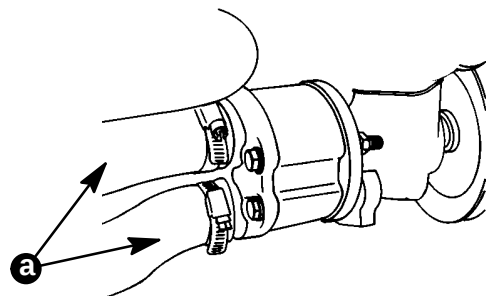
6. Remove the power steering fluid cooler seawater hose, as shown.



72588

a - Hose, Seawater Pump to Cooler

7. Bravo models need to remove both hoses from seawater pump.

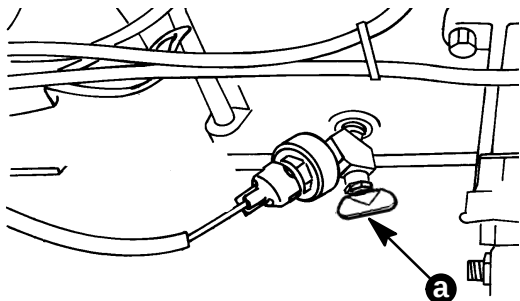


71170

a - Seawater Inlet And Outlet Hoses

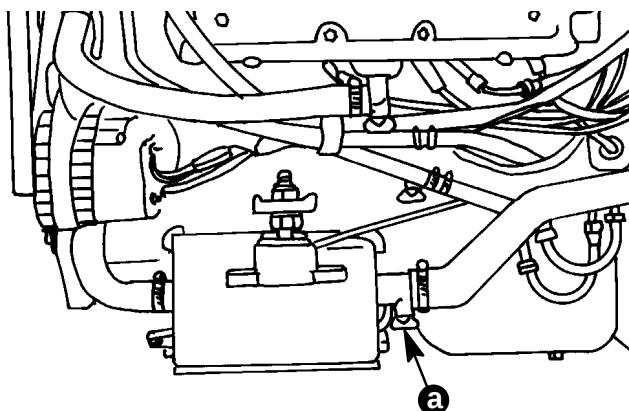
8. For 1996 and newer models, the additional following steps must be performed:

- a. Remove the drain plug from the Y-fitting form the port side of the block.

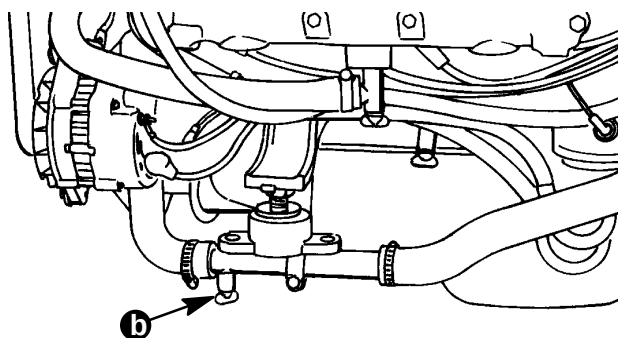


a - Drain Plug

- b. Remove the drain plug from the water tube (carburetor models) or Cool Fuel system (fuel injection models).



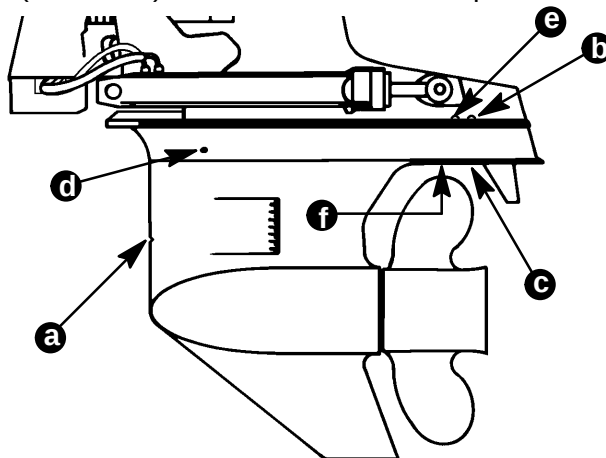
75081



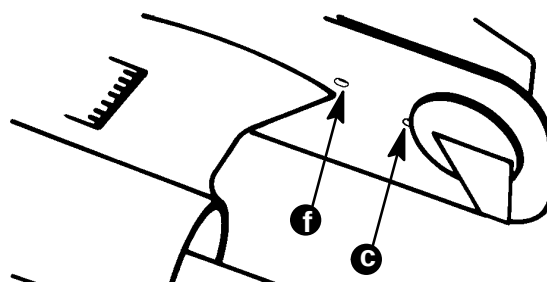
75018

- a - Drain Plug (Cool Fuel System - Fuel Cool System)
b - Drain Plug (Water Tube - Carburetor Models)

9. Insert a small wire (repeatedly) to make sure that vent holes and water drain holes and passages (as shown) are unobstructed and open.



71216



70134

- a - Speedometer Pitot Tube
b - Trim Tab Cavity Vent Hole
c - Trim Tab Cavity Drain Passage
d - Gear Housing Water Drain Hole (One Each - Port and Starboard)
e - Gear Housing Cavity Vent Hole
f - Gear Housing Cavity Drain Hole

10. Crank engine over SLIGHTLY, with starter motor, to purge any water trapped in seawater pickup pump. DO NOT ALLOW ENGINE TO START.

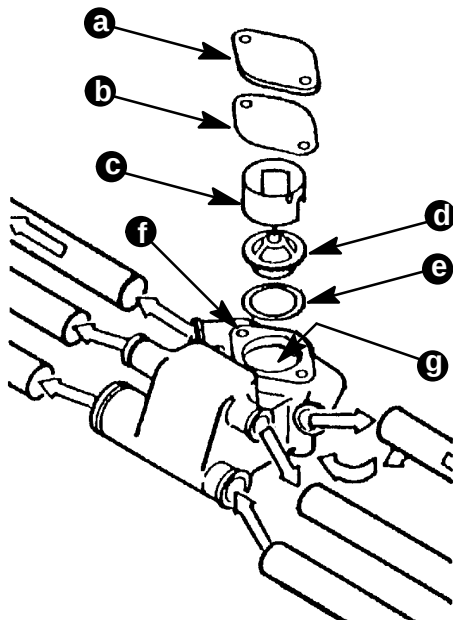
CAUTION

If boat is in the water or is to remain in the water, seacock (if so equipped) must remain closed until engine is to be restarted, to prevent water from flowing back into cooling system. If boat is not fitted with a seacock, seawater inlet hose must remain disconnected and plugged, to prevent water from flowing into cooling system and/or boat. As a precautionary measure, attach a tag to the ignition switch or steering wheel with the warning that the seacock must be opened or the seawater inlet hose reconnected prior to starting the engine.

11. After cooling system has been drained completely, coat threads of drain plugs with Quicksilver Perfect Seal and reinstall. Tighten drain plugs securely. Reconnect hoses and tighten all hose clamps securely. **If NOT equipped with seacock:** seawater inlet hose must remain disconnected and plugged until engine is to be restarted.

IMPORTANT: MerCruiser recommends that propylene glycol antifreeze (nontoxic and biodegradable, which makes it friendly to lakes and rivers) be used in sea-water section of the cooling system for cold weather or extended storage. Make sure that the propylene glycol antifreeze contains a rust inhibitor and is recommended for use in marine engines. Be certain to follow the propylene glycol manufacturer's recommendations.

12. For additional assurance against freezing and rust, remove the thermostat cover and thermostat. Fill the engine seawater cooling system with a mixture of antifreeze and tap water mixed to manufacturer's recommendation to protect engine to the lowest temperature to which it will be exposed during cold weather or extended storage. Using a new gasket, reinstall thermostat and cover. Tighten cover bolts to 30 lb. ft. (41 N·m).

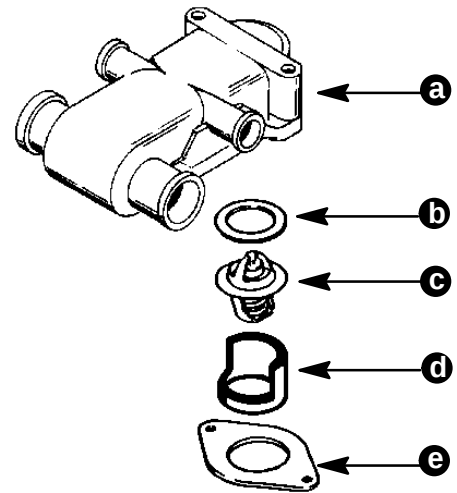


72589

6 - Hole Thermostat Housing

- a - Cover
- b - Gasket
- c - Spacer
- d - Thermostat
- e - O-Ring
- f - Housing
- g - Fill Here

NOTE: Hoses shown removed only to indicate flow. Do not remove hoses.



74493

4 - Hole Thermostat Housing

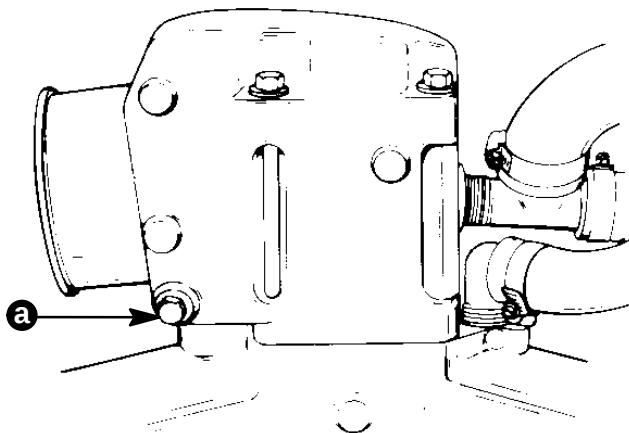
- a - Thermostat Housing
- b - Rubber Gasket
- c - Thermostat
- d - Diverter
- e - Gasket

Draining Seawater Section of Closed Cooled (Coolant) Models

NOTICE
Refer to "Cold Weather or Extended Storage," "Precautions," in this section, **BEFORE** proceeding.

1. Close seacock (if so equipped) or disconnect and plug seawater inlet hose.
2. Check that engine is as level as possible to ensure complete draining of cooling system.

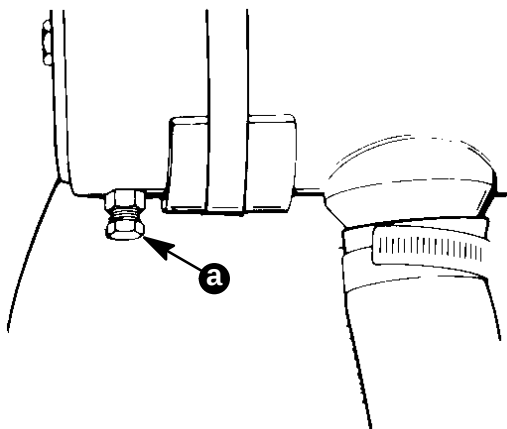
3. If equipped, remove drain plugs from port and starboard exhaust elbows.



71330

a - Drain Plug (Port and Starboard)

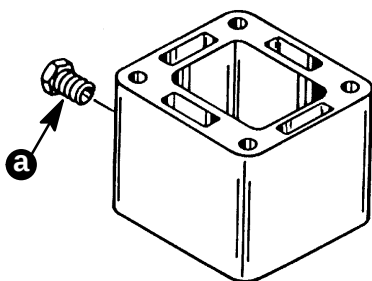
4. Remove drain plug from heat exchanger.



70583

a - Drain Plug

5. If equipped with 3 in. (76 mm) or 6 in. (152 mm) risers, remove drain plug as shown from port and starboard risers.



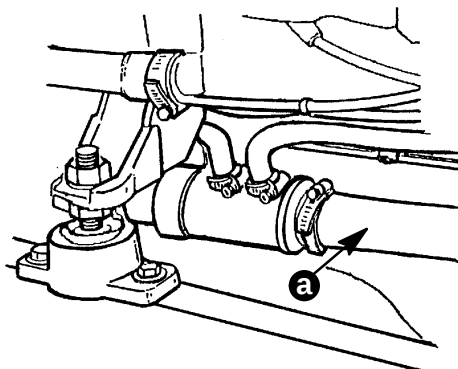
73175

b - Drain Plug (Removed)

6. Repeatedly clean out drain holes using a stiff piece of wire. Do this until entire system is drained.

NOTE: It may be necessary to lift, bend, or lower hoses to allow water to drain completely when hoses are disconnected.

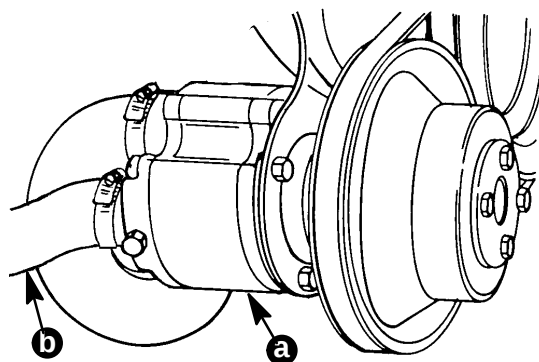
7. Remove the power steering fluid cooler seawater hose, as shown.



72588

a - Hose, Seawater Pump to Cooler

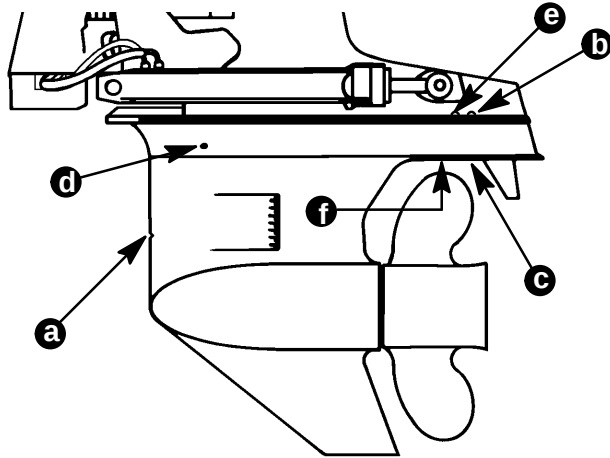
8. Remove belt driven seawater pump inlet hose as shown (if so equipped).



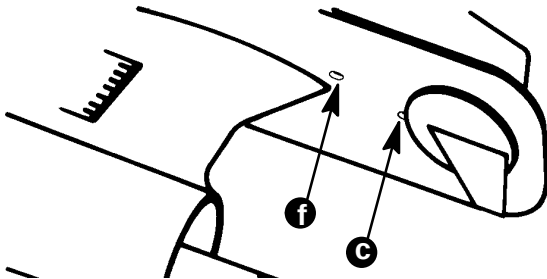
72532

a - Seawater Pickup Pump
b - Seawater Inlet Hose

9. Insert a small wire (repeatedly) to make sure that vent holes and water drain holes and passages (as shown) are unobstructed and open.



71216



70134

- a - Speedometer Pitot Tube
- b - Trim Tab Cavity Vent Hole
- c - Trim Tab Cavity Drain Passage
- d - Gear Housing Water Drain Hole (One Each - Port and Starboard)
- e - Gear Housing Cavity Vent Hole
- f - Gear Housing Cavity Drain Hole

10. Crank engine over SLIGHTLY with starter motor to purge any water trapped in seawater pickup pump. DO NOT ALLOW ENGINE TO START.

⚠ CAUTION

If boat is in the water or is to remain in the water, seacock (if so equipped) must remain closed until engine is to be restarted, to prevent water from flowing back into cooling system. If boat is not fitted with a seacock, seawater inlet hose must remain disconnected and plugged, to prevent water from flowing into cooling system and/or boat. As a precautionary measure, attach a tag to the ignition switch or steering wheel with the warning that the seacock must be opened or the seawater inlet hose reconnected prior to starting the engine.

11. After seawater section of cooling system has been drained completely, coat threads of drain

plugs with Quicksilver Perfect Seal and reinstall. Tighten drain plugs securely. Reconnect hoses and tighten all hose clamps securely. **If NOT equipped with seacock:** seawater inlet hose must remain disconnected and plugged until engine is to be restarted.

Recommissioning

NOTICE

Refer to "Cold Weather or Extended Storage," "Precautions," in this section, **BEFORE** proceeding.

1. Check that all cooling system hoses are connected and tight and all petcocks and drain plugs are installed and tight.
2. **If equipped with seacock:** Open seacock.
3. Inspect all drive belts.
4. Perform all lubrication and maintenance specified for completion "At Least Once Yearly" in maintenance chart, except items which were performed at time of engine layup.
5. For drive unit, refer to appropriate stern drive manual.

⚠ CAUTION

When installing battery (in next step), be sure to connect POSITIVE battery cable to POSITIVE (+) battery terminal FIRST, and NEGATIVE (-) battery cable to NEGATIVE (-) battery terminal LAST. If battery cables are reversed, or connection order is reversed, damage to electrical system WILL result.

6. Install fully charged battery. Clean battery cable clamps and terminals to help retard corrosion.
7. Start engine and closely observe instrumentation to ensure that all systems are functioning properly.
8. Carefully inspect entire engine for fuel, oil, water and exhaust leaks.
9. Check fuel pump sight tube.
10. Check steering system and shift and throttle controls for proper operation.

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