Thank You

for your purchase of one of the finest marine power packages available. It incorporates numerous design features to assure operating ease and durability.

With proper care and maintenance, you will thoroughly enjoy using this product for many boating seasons. To ensure maximum performance and carefree use, we ask that you thoroughly read this manual.

The Operation, Maintenance & Warranty Manual contains specific instructions for using and maintaining your product. We suggest that this manual remain with the product for ready reference whenever you are on the water.

Again, thank you for purchasing one of our Mercury Marine products. We sincerely hope your boating will be pleasant!

Mercury Racing,
N7480 County Road "UU"
Fond du Lac, WI 54935-9585

7406

Warranty Message

The product you have purchased comes with a limited warranty from Mercury Marine; the terms of the warranty are set forth in the **Warranty Information** section of this manual. The warranty statement contains a description of what is covered, what is not covered, the duration of coverage, how to best obtain warranty coverage, important disclaimers and limitations of damages, and other related information. Please review this important information.

⚠ WARNING

The operator (driver) is responsible for the correct and safe operation of the boat, the equipment aboard and the safety of all occupants aboard. We strongly recommend that the operator read this Operation, Maintenance and Warranty Manual and thoroughly understand the operational instructions for the power package and all related accessories before the boat is used.

⚠ WARNING

The engine exhaust from this product contains chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.

Safety Alerts and Notices

Throughout this publication, "Warnings" and "Cautions," accompanied by the international HAZARD symbol ⚠, are used to alert the technician to special instructions concerning a particular service or operation that may be hazardous if performed incorrectly or carelessly. Observe these safety alerts carefully.

These safety alerts alone can not eliminate the hazards they signal. Strict compliance to these special instructions when performing the service, and common sense operation are major accident prevention measures.

⚠ WARNING

WARNING - indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

⚠ CAUTION

CAUTION - indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury or property damage. It may also be used to alert against unsafe practices.

IMPORTANT: Indicates information or instructions that are necessary for a particular step or action.

NOTE: *Indicates information that helps in the understanding of a particular step or action.*

Copyright and Trademark Information

Litho in U.S.A.

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WARRANTY INFORMATION

Warranty Registration United States And Canada

Outside United States and Canada - Check with your local distributor.

1. You may change your address at any time, including at time of warranty claim, by calling Mercury Marine or sending a letter or fax with your name, old address, new address, and engine serial number to Mercury Marine's warranty registration department. Your dealer can also process this change of information.
   Mercury Marine
   Attn.: Warranty Registration Department
   W6250 W. Pioneer Road
   P.O. Box 1939
   Fond du Lac, WI 54936-1939
   920-929-5054
   Fax 920-929-5893

NOTE: *Registration lists must be maintained by Mercury Marine and any dealer on marine products sold in the United States, should a safety recall notification under the Federal Safety Act be required.*

2. At the time of sale, the dealer should complete the warranty registration and immediately submit it to Mercury Marine via MercNET, E-mail, or mail. Upon receipt of this warranty registration, Mercury Marine will record the registration.

IMPORTANT: Your warranty coverage begins at the time of sale, but warranty claims cannot be processed until the product is registered with Mercury Marine.

3. Upon processing the warranty registration, Mercury Marine will send the purchaser a Mercury Owner Resource Guide. The back page of this guide contains your warranty registration information and should be saved. If this registration verification is not received within 30 days, please contact your selling dealer immediately.

Warranty Registration Outside The United States And Canada

1. It is important that your selling dealer fills out the Warranty Registration Card completely and mails it to the distributor or Marine Power Service Center responsible for administering the warranty registration/claim program for your area.
2. The Warranty Registration Card identifies your name and address, product model and serial numbers, date of sale, type of use and the selling distributor's/dealer's code number, name and address. The distributor/dealer also certifies that you are the original purchaser and user of the product.

3. A copy of the Warranty Registration Card, designated as the Purchaser's Copy, MUST be given to you immediately after the card has been completely filled out by the selling distributor/dealer. This card represents your factory registration identification, and should be retained by you for future use when required. Should you ever require warranty service on this product, your dealer may ask you for the Warranty Registration Card to verify date of purchase and to use the information on the card to prepare the warranty claim forms.
4. In some countries, the Marine Power Service Center will issue you a permanent (plastic) Warranty Registration Card within 30 days after receiving the Factory Copy of the Warranty Registration Card from your distributor/dealer. If you receive a plastic Warranty Registration Card, you may discard the Purchaser's Copy that you received from the distributor/dealer when you purchased the product. Ask your distributor/dealer if this plastic card program applies to you.

IMPORTANT: Registration lists must be maintained by the factory and dealer in some countries by law. It is our desire to have ALL products registered at the factory should it ever be necessary to contact you. Make sure your dealer/distributor fills out the warranty registration card immediately and sends the factory copy to the Marine Power International Service Center for your area.

5. For further information concerning the Warranty Registration Card and its relationship to Warranty Claim processing, refer to the International Warranty.

Mercury Racing Demonstrator Policy

Mercury Racing products used by a dealer, boat builder, their representatives or agents for personal, recreational or promotional purposes, or products that accumulate more than 10 hours of demonstration run time MUST BE REGISTERED as a demonstrator by the dealer, boat builder or person(s) using those products. The "Date of Sale" will be the date the product was first put into service.

Warranty coverage can be transferred to the retail customer by contacting Mercury Racing Technical Service. The retail purchaser of these products MUST be informed that the product was previously used and registered as a demonstrator along with the actual run time on the product.

Transfer Of Warranty

The limited warranty is transferable to a subsequent purchaser, but only for the remainder of the unused portion of the limited warranty. This will not apply to products used for commercial applications.

WARRANTY INFORMATION

To transfer the warranty to the subsequent owner, send or fax a copy of the bill of sale or purchase agreement, new owner's name, address and engine serial number to Mercury Marine's warranty registration department. In the United States and Canada, mail to:

Mercury Marine
Attn: Warranty Registration Department
W6250 W. Pioneer Road
P.O. Box 1939
Fond du Lac, WI 54936-1939
920-929-5054
Fax 920-929-5893

Upon processing the transfer of warranty, Mercury Marine will send registration verification to the new owner of the product by mail.

There is no charge for this service.

For products purchased outside the United States and Canada, contact the distributor in your country, or the Marine Power Service Center closest to you.

Mercury Racing Division One Year Limited Warranty

WHAT IS COVERED

Mercury Marine warrants its new products (and remanufactured products sold under the trade name "Pacemaker") to be free of defects in material and workmanship during the period described below.

DURATION OF COVERAGE

This Limited Warranty provides coverage for one (1) year from either the date the product is first sold to a recreational use retail purchaser, or the date on which the product is first put into service, whichever occurs first. The repair or replacement of parts, or the performance of service under this warranty, does not extend the life of this warranty beyond its original expiration date. Unexpired warranty coverage can be transferred to a subsequent purchaser upon proper re-registration of the product.

WARRANTY INFORMATION

CONDITIONS THAT MUST BE MET IN ORDER TO OBTAIN WARRANTY COVERAGE

Warranty coverage is available only to retail customers that purchase from a Dealer authorized by Mercury Marine to distribute the product in the country in which the sale occurred, and then only after the Mercury Marine specified pre-delivery inspection process is completed and documented. Warranty coverage becomes available upon proper registration of the product by the authorized dealer. Inaccurate warranty registration information regarding recreational use, or subsequent change of use from recreational to commercial may void the warranty at the sole discretion of Mercury Marine. Routine maintenance outlined in the **Operation and Maintenance Manual** must be timely performed in order to maintain warranty coverage. Mercury Marine reserves the right to make warranty coverage contingent upon proof of proper maintenance.

WHAT MERCURY WILL DO

Mercury's sole and exclusive obligation under this warranty is limited to, at our option, repairing a defective part, replacing such part or parts with new or Mercury Marine certified re-manufactured parts, or refunding the purchase price of the Mercury product. Mercury reserves the right to improve or modify products from time to time without assuming an obligation to modify products previously manufactured.

HOW TO OBTAIN WARRANTY COVERAGE

The customer must provide Mercury with a reasonable opportunity to repair and reasonable access to the product for warranty service. Warranty claims shall be made by delivering the product for inspection to a Mercury dealer authorized to service the product. If purchaser cannot deliver the product to such a dealer, written notice must be given to Mercury. We will then arrange for the inspection and any covered repair. Purchaser in that case shall pay for all related transportation charges and/or travel time. If the service provided is not covered by this warranty, purchaser shall pay for all related labor and material, and any other expenses associated with that service. Purchaser shall not, unless requested by Mercury, ship the product or parts of the product directly to Mercury. Proof of registered ownership must be presented to the dealer at the time warranty service is requested in order to obtain coverage.

WARRANTY INFORMATION

WHAT IS NOT COVERED

This limited warranty does not cover routine maintenance items, tune ups, adjustments, normal wear and tear, damage caused by abuse, abnormal use, use of a propeller or gear ratio that does not allow the engine to run in its recommended wide-open-throttle RPM range (see the **Operation and Maintenance Manual**), operation of the product in a manner inconsistent with the recommended operation/duty cycle section of the **Operation and Maintenance Manual**, neglect, accident, submersion, improper installation (proper installation specifications and techniques are set forth in the installation instructions for the product), improper service, use of an accessory or part not manufactured or sold by us, operation with fuels, oils or lubricants which are not suitable for use with the product (see the **Operation and Maintenance Manual**), alteration or removal of parts, water entering the engine through the fuel intake, air intake or exhaust system, or damage to the product from insufficient cooling water caused by blockage of the cooling system by a foreign body, running the engine out of water, mounting the engine too high on the transom, or running the boat with the engine trimmed out too far. The commercial use of the product, defined as any work or employment related use of the product, or any income generating use of the product, even if such use is only occasional, will void the warranty. Use of the product for racing or other competitive activity, at any point, even by a prior owner of the product, voids the warranty. Expenses related to haul-out, launch, towing, storage, telephone, rental, inconvenience, slip fees, insurance coverage, loan payments, loss of time, loss of income, or any other type of incidental or consequential damages are not covered by this warranty. Also, expenses associated with the removal and/or replacement of boat partitions or material caused by boat design for access to the product are not covered by this warranty.

No individual or entity, including Mercury Marine authorized dealers, has been given authority by Mercury Marine to make any affirmation, representation or warranty regarding the product, other than those contained in this limited warranty, and if made, shall not be enforceable against Mercury Marine. For additional information regarding events and circumstances covered by this warranty, and those that are not, see the **Warranty Coverage** section of the **Operation and Maintenance Manual**, incorporated by reference into this warranty.

WARRANTY INFORMATION

DISCLAIMERS AND LIMITATIONS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY DISCLAIMED. TO THE EXTENT THAT THEY CANNOT BE DISCLAIMED, THE IMPLIED WARRANTIES ARE LIMITED IN DURATION TO THE LIFE OF THE EXPRESS WARRANTY. INCIDENTAL AND CONSEQUENTIAL DAMAGES ARE EXCLUDED FROM COVERAGE UNDER THIS WARRANTY. SOME STATES/ COUNTRIES DO NOT ALLOW FOR THE DISCLAIMERS, LIMITATIONS AND EXCLUSIONS IDENTIFIED ABOVE, AS A RESULT, THEY MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER LEGAL RIGHTS WHICH VARY FROM STATE TO STATE AND COUNTRY TO COUNTRY.

PRODUCTS SOLD TO GOVERNMENT AGENCIES

Contact the Mercury Racing Sales Department for a copy of the Government Agencies Warranty Packet Kit which explains the conditions required for government agencies to receive warranty when purchasing Mercury Racing Outboard or Sterndrive product.

Mercury Racing Sales Department
N7840 County Road UU
Fond du Lac, WI 54935
920-921-5330
Fax 920-921-6533

3 Year Limited Warranty Against Corrosion

WHAT IS COVERED: Mercury Marine warrants that each new Mercury, Mariner, Mercury Racing, Sport Jet, M^2 Jet Drive, Tracker by Mercury Marine Outboard, Mercury MerCruiser Inboard or Sterndrive Engine (Product) will not be rendered inoperative as a direct result of corrosion for the period of time described below.

DURATION OF COVERAGE: This limited corrosion warranty provides coverage for three (3) years from either the date the product is first sold, or the date on which the product is first put into service, whichever occurs first. The repair or replacement of parts, or the performance of service under this warranty does not extend the life of this warranty beyond its original expiration date. Unexpired warranty coverage can be transferred to subsequent (non-commercial use) purchaser upon proper re-registration of the product.

WARRANTY INFORMATION

CONDITIONS THAT MUST BE MET IN ORDER TO OBTAIN WARRANTY COVERAGE: Warranty coverage is available only to retail customers that purchase from a Dealer authorized by Mercury Marine to distribute the product in the country in which the sale occurred, and then only after the Mercury Marine specified pre-delivery inspection process is completed and documented. Warranty coverage becomes available upon proper registration of the product by the authorized dealer. Corrosion prevention devices specified in the Operation and Maintenance Manual must be in use on the boat, and routine maintenance outlined in the Operation and Maintenance Manual must be timely performed (including without limitation the replacement of sacrificial anodes, use of specified lubricants, and touch-up of nicks and scratches) in order to maintain warranty coverage. Mercury Marine reserves the right to make warranty coverage contingent upon proof of proper maintenance.

WHAT MERCURY WILL DO: Mercury's sole and exclusive obligation under this warranty is limited to, at our option, repairing a corroded part, replacing such part or parts with new or Mercury Marine certified re-manufactured parts, or refunding the purchase price of the Mercury product. Mercury reserves the right to improve or modify products from time to time without assuming an obligation to modify products previously manufactured.

HOW TO OBTAIN WARRANTY COVERAGE: The customer must provide Mercury with a reasonable opportunity to repair, and reasonable access to the product for warranty service. Warranty claims shall be made by delivering the product for inspection to a Mercury dealer authorized to service the product. If purchaser cannot deliver the product to such a dealer, written notice must be given to Mercury. We will then arrange for the inspection and any covered repair. Purchaser in that case shall pay for all related transportation charges and/or travel time. If the service provided is not covered by this warranty, purchaser shall pay for all related labor and material, and any other expenses associated with that service. Purchaser shall not, unless requested by Mercury, ship the product or parts of the product directly to Mercury. Proof of registered ownership must be presented to the dealer at the time warranty service is requested in order to obtain coverage.

WARRANTY INFORMATION

WHAT IS NOT COVERED: This limited warranty does not cover electrical system corrosion; corrosion resulting from damage, corrosion which causes purely cosmetic damage, abuse or improper service; corrosion to accessories, instruments, steering systems; corrosion to factory installed jet drive unit; damage due to marine growth; product sold with less than a one year limited Product warranty; replacement parts (parts purchased by customer); products used in a commercial application. Commercial use is defined as any work or employment related use of the product, or any use of the product which generates income, for any part of the warranty period, even if the product is only occasionally used for such purposes.

Corrosion damage caused by stray electrical currents (on-shore power connections, nearby boats, submerged metal) is not covered by this corrosion warranty and should be protected against by the use of a corrosion protection system, such as the Mercury Precision Parts or Quicksilver MerCathode system and/or Galvanic Isolator. Corrosion damage caused by improper application of copper base anti-fouling paints is also not covered by this limited warranty. If anti-fouling protection is required, Tri-Butyl-Tin-Adipate (TBTA) base anti-fouling paints are recommended on Outboard and MerCruiser boating applications. In areas where TBTA base paints are prohibited by law, copper base paints can be used on the hull and transom. Do not apply paint to the outboard or MerCruiser product. In addition, care must be taken to avoid an electrical interconnection between the warranted product and the paint. For MerCruiser product, an unpainted gap of at least 38 mm (1.5 in.) should be left around the transom assembly. Refer to the Operation and Maintenance Manual for additional details.

For additional information regarding events and circumstances covered by this warranty, and those that are not, see the Warranty Coverage section of the Operation and Maintenance Manual, incorporated by reference into this warranty.

DISCLAIMERS AND LIMITATIONS:

THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY DISCLAIMED. TO THE EXTENT THAT THEY CANNOT BE DISCLAIMED, THE IMPLIED WARRANTIES ARE LIMITED IN DURATION TO THE LIFE OF THE EXPRESS WARRANTY. INCIDENTAL AND CONSEQUENTIAL DAMAGES ARE EXCLUDED FROM COVERAGE UNDER THIS WARRANTY. SOME STATES/COUNTRIES DO NOT ALLOW FOR THE DISCLAIMERS, LIMITATIONS AND EXCLUSIONS IDENTIFIED ABOVE, AS A RESULT, THEY MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER LEGAL RIGHTS WHICH VARY FROM STATE TO STATE AND COUNTRY TO COUNTRY.

GENERAL INFORMATION

Boater's Responsibilities

The operator (driver) is responsible for the correct and safe operation of the boat and safety of its occupants and general public. It is strongly recommended that each operator (driver) read and understand this entire manual before operating the power package.

Be sure at least one additional person on board is instructed in the basics of starting and operating the power package, and boat handling in case the driver is unable to operate the boat.

Before Operating Your Boat

Read this manual carefully. Safety and operating information that is practiced along with using good common sense can help prevent personal injury and product damage. If you have any questions, contact your dealer.

This manual as well as safety labels posted on the engine package use safety alerts to draw your attention to special safety instructions that must be followed.

⚠ WARNING

WARNING - indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

⚠ CAUTION

CAUTION - indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury or property damage. It may also be used to alert against unsafe practices.

IMPORTANT: Indicates information or instructions that are necessary for proper operation and/or maintenance.

NOTE: *Indicates information that helps in the understanding of a step or action.*

Boat Horsepower Capacity

⚠ WARNING

Avoid serious injury, death or property damage from overpowering a boat. Using a power package that exceeds the maximum horsepower limit of a boat can:

- **Cause loss of boat control.**
- **Place too much weight at the transom altering the designed flotation characteristics of the boat**
- **Cause the boat to break apart, particularly around the transom area.**

Do not overpower or overload your boat. Most boats will carry a required capacity plate indicating the maximum acceptable power and load as determined by the manufacturer following certain federal guidelines. If in doubt, contact your dealer or the boat manufacturer.

U.S. COAST GUARD CAPACITY	
MAXIMUM HORSEPOWER	XXX
MAXIMUM PERSON CAPACITY (POUNDS)	XXX
MAXIMUM WEIGHT CAPACITY	XXX

ob00306

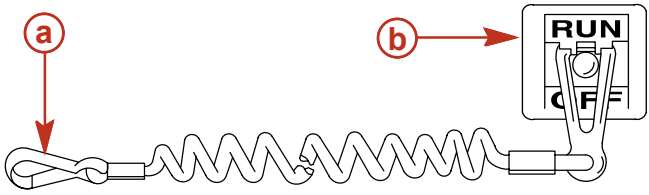
High-Speed and High-Performance Boat Operation

If your power package is to be used on a high speed or high performance boat with which you are unfamiliar, we recommend that you never operate it at its high speed capability without first requesting an initial orientation and familiarization demonstration ride with your dealer or an operator experienced with your boat/power package combination. For additional information, obtain a copy of our **Hi-Performance Boat Operation** booklet from your dealer, distributor, or Mercury Marine.

Lanyard Stop Switch

The purpose of a lanyard stop switch is to turn off the engine when the operator moves far enough away from the operator's position (as in accidental ejection from the operator's position) to activate the switch. A lanyard stop switch can be installed as an accessory - generally on the dashboard or side adjacent to the operator's position.

While activation of the lanyard stop switch will stop the engine immediately, a boat will continue to coast for some distance depending upon the velocity and degree of any turn at shut down. However, the boat will not complete a full circle. While the boat is coasting, it can cause injury to anyone in the boat's path as seriously as the boat would when under power.



ob00310

a - Lanyard cord
b - Lanyard stop switch

We strongly recommend that other occupants be instructed on proper starting and operating procedures should they be required to operate the engine in an emergency (e.g. if the operator is accidentally ejected).

⚠ WARNING

Should the operator fall out of the boat, the possibility of serious injury or death from being run over by the boat can be greatly reduced by stopping the engine immediately. Always properly connect both ends of the stop switch lanyard to the stop switch and the operator.

⚠ WARNING

Avoid serious injury or death from deceleration forces resulting from accidental or unintended stop switch activation. The boat operator should never leave the operator's station without first disconnecting the stop switch lanyard from the operator.

Accidental or unintended activation of the switch during normal operation is also a possibility. This could cause any, or all, of the following potentially hazardous situations:

- Occupants could be thrown forward due to unexpected loss of forward motion - a particular concern for passengers in the front of the boat who could be ejected over the bow and possibly struck by the gear case or propeller.

- Loss of power and directional control in heavy seas, strong current or high winds.
- Loss of control when docking.

Trailering Boat

The boat can be trailered with the drive unit in up or down position. Adequate road clearance is required between road and gear housing skeg when trailering with the drive unit in down position.

If adequate road clearance is a problem, place drive unit in full up position.

Protecting People In The Water

WHILE YOU ARE CRUISING

It is very difficult for a person in the water to take quick action to avoid a boat heading in their direction, even at slow speeds.

Always slow down and exercise extreme caution any time you are boating in an area where there might be people in the water.

Whenever a boat is moving (even coasting) and the gear shift is in neutral, there is sufficient force by the water on the propeller to cause the propeller to rotate. This neutral propeller rotation can cause serious injury.

WHILE BOAT IS STATIONARY

⚠ WARNING

Stop your engine immediately whenever anyone in the water is near your boat. Serious injury to the person in the water is likely if contacted by a rotating propeller, a moving boat, a moving gearcase, or any solid device rigidly attached to a moving boat or gearcase.

Shift into neutral and shut off the engine before allowing people to swim or be in the water near your boat.

Exhaust Emissions

BE ALERT TO CARBON MONOXIDE POISONING

Carbon monoxide is present in the exhaust fumes of all internal combustion engines. This includes the outboards, sterndrives and inboard engines that propel boats, as well as the generators that power various boat accessories. Carbon monoxide is a deadly gas that is odorless, colorless and tasteless.

Early symptoms of carbon monoxide poisoning which should not be confused with seasickness or intoxication, include headache, dizziness, drowsiness, and nausea.

⚠ WARNING

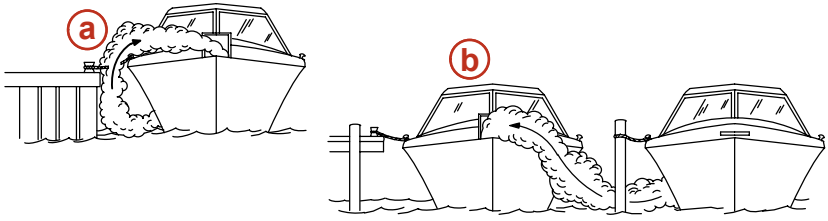
Avoid the combination of a running engine and poor ventilation. Prolonged exposure to carbon monoxide in sufficient concentration can lead to unconsciousness, brain damage, or death.

POOR VENTILATION

Under certain running and/or wind conditions, permanently enclosed or canvas enclosed cabins or cockpits with insufficient ventilation may draw in carbon monoxide. Install one or more carbon monoxide detectors in your boat.

Although the occurrence is rare, on a very calm day, swimmers and passengers in an enclosed area of a stationary boat that contains or is near a running engine may be exposed to a hazardous level of carbon monoxide.

While Boat Is Stationary

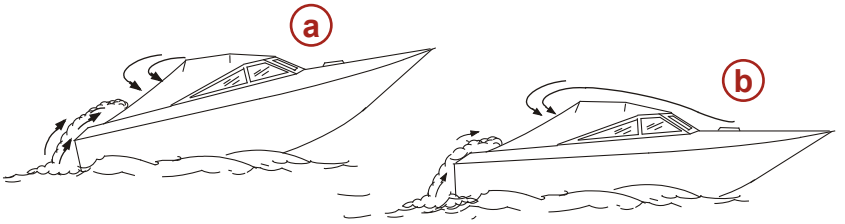


ob00317

a - Running the engine when the boat is moored in a confined space.

b - Mooring close to another boat that has its engine running.

While Boat is Moving



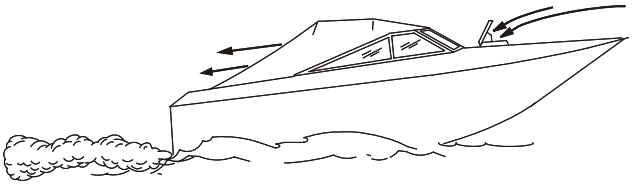
5449

a - Running the boat with the trim angle of the bow too high.

b - Running the boat with no forward hatches open (station wagon effect).

GOOD VENTILATION

Ventilate passenger area, open side curtains, or forward hatches to remove fumes.



5448

Wave And Wake Jumping

Operating recreational boats over waves and wake is a natural part of boating. However, when this activity is done with sufficient speed to force the boat hull partially or completely out of the water, certain hazards arise, particularly when the boat re-enters the water.

5450

The primary concern is the boat changing direction while in the midst of the jump. In such case the landing may cause the boat to veer violently in a new direction. Such a sharp change in direction can cause occupants to be thrown out of their seats, or out of the boat.

⚠ WARNING

Avoid serious injury or death from being thrown within or out of a boat when it lands after jumping a wave or wake. Avoid wave or wake jumping whenever possible. Instruct all occupants that if a wake or wave jump occurs, get low and hang on to any boat hand hold.

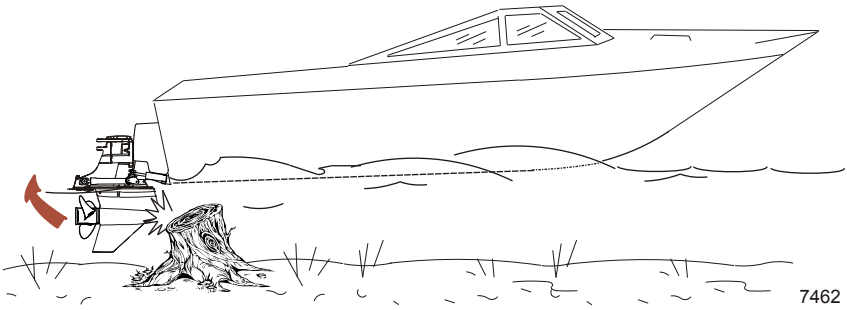
There is another less common hazardous result from allowing your boat to launch off a wave or wake. If the bow of your boat pitches down far enough while airborne, upon water contact it may penetrate under the water surface and submarine for an instant. This will bring the boat to a nearly instantaneous stop and can send the occupants flying forward. The boat may also steer sharply to one side.

Impact With Underwater Hazards

⚠ WARNING

Avoid serious injury or death. When operating in shallow water or areas with underwater obstacles, maintain a minimum and safe speed.

Reduce speed and proceed with caution whenever you drive a boat in shallow water areas, or in areas where you suspect underwater obstacles may exist which could be struck by the sterndrive or the boat bottom. The most important thing you can do to help reduce injury or impact damage from striking a floating or underwater object is to control the boat speed. Under these conditions, boat speed should be kept to a minimum planing speed 24 to 40 km/h (15 to 25 MPH)



Striking a floating or underwater object could result in an infinite number of situations. Some of these situations could result in the following:

- Part of the sterndrive or the entire sterndrive could break loose and fly into the boat.
- The boat could move suddenly in a new direction. Such a sharp change in direction can cause occupants to be thrown out of their seats or out of the boat.
- A rapid reduction in speed. This will cause occupants to be thrown forward, or even out of the boat.
- Impact damage to the sterndrive and/or boat.

Keep in mind, the most important thing you can do to help reduce injury or impact damage during an impact is control the boat speed. Boat speed should be kept to a minimum planing speed when driving in waters known to have underwater obstacles.

⚠ WARNING

Avoid serious injury or death from loss of boat control. Continuing to operate a boat with impact damage can result in sudden component failure.

After striking a submerged object, stop the engine as soon as possible and inspect it for any broken or loose parts. If damage is present or suspected, the sterndrive should be taken to an authorized dealer for a thorough inspection and necessary repair.

The boat should also be checked for any hull fractures, transom fractures, or water leaks.

Operating a damaged sterndrive could cause additional damage to other parts of the sterndrive, or could affect control of the boat. If continued running is necessary, do so at greatly reduced speeds.

Safe Boating Suggestions

In order to safely enjoy the waterways, familiarize yourself with local and other governmental boating regulations and restrictions, and consider the following suggestions.

Use flotation devices. Have an approved personal flotation device of suitable size for each person aboard (it is the law) and have it readily accessible.

Do not overload your boat. Most boats are rated and certified for maximum load (weight) capacities (refer to your boat capacity plate). If in doubt, contact your dealer or the boats manufacturer.

GENERAL INFORMATION

Perform safety checks and required maintenance. Follow a regular schedule and ensure that all repairs are properly made.

Check safety equipment on-board. Here are suggestions of the types of safety equipment to carry when boating:

- Approved fire extinguisher; paddle or oar.
- Signal devices: flashlight, rockets or flares, flag and whistle or horn.
- Spare propeller, thrust hubs and an appropriate wrench.
- Tools for necessary minor repairs; first aid kit and book.
- Anchor, extra anchor line; water-proof storage containers.
- Manual bilge pump and extra drain plugs; compass and map or chart of area.
- Spare operating equipment; batteries, bulbs, fuses, etc.
- Transistor radio and drinking water.

Know signs of weather change and avoid foul weather and rough-sea boating.

Tell someone where you are going and when you expect to return.

Know and obey all nautical rules and laws of the waterways. Boat operators should complete a boating safety course. Courses are offered in the U.S.A. by:

1. The U.S. Coast Guard Auxiliary
2. The Power Squadron
3. The Red Cross
4. Your state boating law enforcement agency

Direct all inquiries to the Boating Hotline, 1-800-368-5647 or the Boat U.S. Foundation information number 1-800-336-BOAT.

We strongly recommend that all powerboat operators attend one of these courses.

You should also review the NMMA Sources of Waterway Information booklet. It lists regional sources of safety, cruising and local navigation and is available at no charge by writing to:

Sources of Waterway Information

National Marine Manufacturers Association

410 N. Michigan Avenue

Chicago, IL 60611 U.S.A.

Make sure everyone in the boat is properly seated. Do not allow anyone to sit or ride on any part of the boat that was not intended for such use. This includes the back of seats, gunwales, transom, bow, decks, raised fishing seats, any rotating fishing seat; or anywhere that an unexpected acceleration, sudden stopping, unexpected loss of boat control, or sudden boat movement could cause a person to be thrown overboard or into the boat.

Never be under the influence of alcohol or drugs while boating (it is the law). Alcohol or drug use impairs your judgment and greatly reduces your ability to react quickly.

Know your boating area and avoid hazardous locations.

Prepare other boat operators. Instruct at least one other person on board in the basics of starting and operating the power package, and boat handling, in case the driver becomes disabled or falls overboard.

Passenger boarding. Stop the engine whenever passengers are boarding, unloading, or are near the back (stern) of the boat. Just shifting the power package into neutral is not sufficient.

Be alert. The operator of the boat is responsible by law to maintain a proper lookout by sight and hearing. The operator must have an unobstructed view particularly to the front. No passengers, load, or fishing seats should block the operators view when operating the boat above idle speed.

Never drive your boat directly behind a water skier in case the skier falls. As an example, your boat traveling at 40 km/h (25 MPH) will overtake a fallen skier 61 m (200 ft.) in front of you in five seconds.

Watch fallen skiers. When using your boat for water skiing or similar activities, always keep a fallen or down skier on the operator's side of the boat while returning to assist the skier. The operator should always have the down skier in sight and never back up to the skier or anyone in the water.

Report accidents. Boat operators are required by law to file a Boating Accident Report with their state boating law enforcement agency when their boat is involved in certain boating accidents. A boating accident must be reported if:

1. There is loss of life or probable loss of life
2. There is personal injury requiring medical treatment beyond first aid
3. There is damage to boats or other property where the damage value exceeds $500.00
4. There is complete loss of the boat

IMPORTANT: Seek further assistance from local law enforcement for a complete list of rules and regulations.

Stolen Power Package

If your power package is stolen, immediately advise the local authorities and Mercury Marine of the model and serial number(s) and to whom the recovery is to be reported. This **Stolen Power Package** information is placed into a file at Mercury Marine to aid authorities and dealers in recovery of stolen engines.

SPECIFICATIONS

Engine Identification

Model:	**HP525 EFI**
Displacement:	**502 C.I.D.**
Max WOT RPM:	**4800 - 5200**
Spark Plugs:	**NGK BPR6ES**
Spark Plug Gap:	**0.035 Inch**
Spark Timing:	****non-adjustable**
Fuel Octane:	**87 (R+M)/2 or 92 RON International**
Engine Oil:	****Quicksilver 25W40**
Engine Coolant:	**Dex-Cool ®**

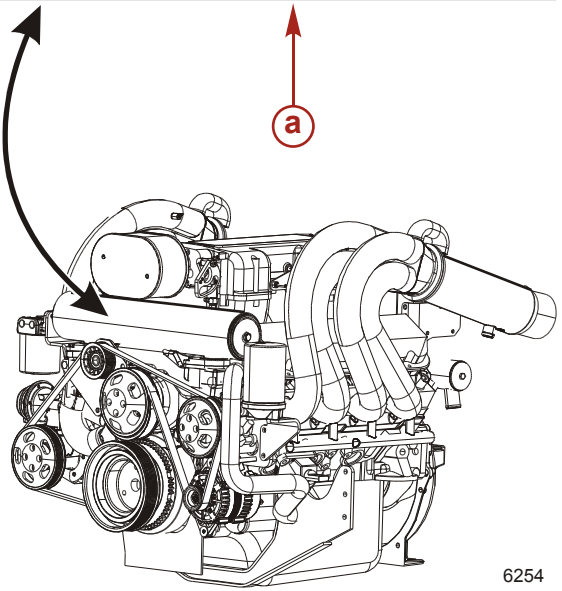
****see owner's manual**

SERIAL NUMBERS

ENGINE ☐

DRIVE ☐

TRANSOM ☐



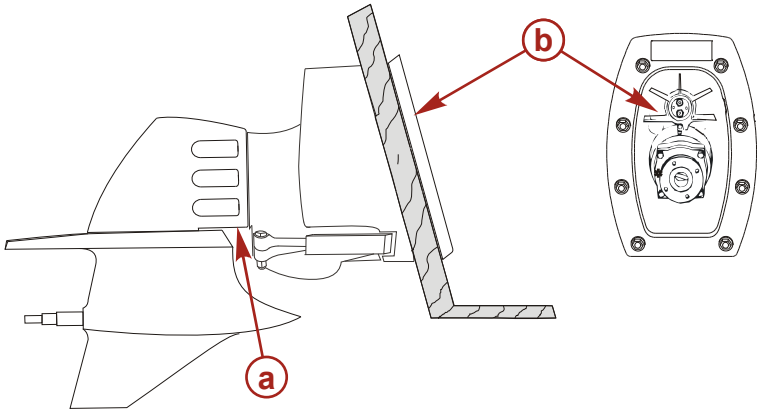
a - Engine identification placard

MODEL YEAR IDENTIFICATION

- Power steering reservoir located on port side of engine.
- Block pressure reading is capable of indicating 690 kPa (100 psi) maximum.
- Guardian function will limit engine power.
- Lubricant bottle low warning indication functions.
- Enhanced PCM high altitude calibration.
- Oil drain hose kit provided with every engine.

SPECIFICATIONS

DRIVE UNIT AND TRANSOM ASSEMBLY IDENTIFICATION



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a - Drive unit identification tag location (bottom side)

b - Transom assembly identification tag location (inside through transom plate)

SERIAL NUMBERS RECORD

- ☐ **Engine Model/Horsepower:** _____
- ☐ **Engine Serial Number**[1.] **:** _____
- ☐ **Transom Assembly Serial Number:** _____
- ☐ **Sterndrive Serial Number & Gear Ratio**[2.] **:** _____
- ☐ **Propeller Number & Pitch:** _____
- ☐ **Running Rotation**[3.] **:** _____
- ☐ **Hull Identification Number:** _____
- ☐ **Boat Model & Length:** _____

The serial numbers are the manufacturer's keys to numerous engineering details that apply to your Mercury Marine power package. When contacting your authorized Mercury Marine dealer about service, always specify model and serial numbers.

1. The engine serial number is printed on the placard located on the heat exchanger.
2. The gear ratio is stamped on the the bolt located next to the serial number label.
3. The running rotation is stamped on the back of the strut.

SPECIFICATIONS

Fuel Requirements

Use a major brand of unleaded gasoline, preferably without alcohol. Mercury Marine recommends fuels that contain fuel injector cleaner for added internal cleanliness.

⚠ 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 entire fuel system is mandatory, particularly after storage. All fuel components should be inspected for leakage, softening, hardening, swelling or corrosion. Any sign of leakage or deterioration requires replacement before further engine operation.

⚠ CAUTION

Use of improper fuel can seriously damage your engine. Engine damage resulting from use of improper fuel is considered misuse of the engine and damage caused thereby will not be covered under the Mercury Racing limited warranty.

OCTANE REQUIREMENTS (U.S./CANADA)

FUEL TYPE	MINIMUM POSTED OCTANE
Unleaded regular or premium[1.]	(R+M) ÷ 2 = 87 or RON = 92*

NOTE: **Research Octane Number*

OCTANE REQUIREMENTS (OUTSIDE THE U.S./CANADA)

FUEL TYPE	MINIMUM POSTED OCTANE
Unleaded regular or premium [2.]	(R+M) ÷ 2 = 87 or RON = 92*

NOTE: **Research Octane Number*

1. The use of premium unleaded fuels with octane ratings higher than (R+M) ÷ 2 = 87 are acceptable to use but will not give any increase in performance or durability.
2. Mercury Racing does not recommend using leaded gasoline. Leaded gasoline is acceptable in areas where unleaded gasoline is not available; however, lead particles may build up in the exhaust passages and/or the combustion chambers.

USING REFORMULATED (OXYGENATED) FUELS (USA ONLY)

This type of fuel is required in certain areas of the U.S. The two types of oxygenates used in these fuels are alcohol (Ethanol) or Ether (MTBE or ETBE). If Ethanol is the oxygenate that is used in the gasoline in your area, refer to the **Fuel Containing Alcohol** section.

These reformulated fuels are acceptable for use in your Mercury engine.

FUEL CONTAINING ALCOHOL

If the fuel in your area contains either methanol (methyl alcohol) or ethanol (ethyl alcohol), you should be aware of certain adverse effects that can occur. These adverse effects are more severe with methanol. Increasing the percentage of alcohol in the fuel can also worsen these adverse effects.

Some of these adverse effects are caused because the alcohol in the fuel can absorb moisture from the air, resulting in a separation of the water/ alcohol from the gasoline in the fuel tank.

The fuel system components on your Mercury engine will withstand up to 10% alcohol content in the gasoline. We do not know what percentage your boat's fuel system will withstand. Contact your boat manufacturer for specific recommendations on the boats fuel system components (fuel tanks, fuel lines, and fittings).

Fuel containing alcohol may increase:

- Corrosion of metal parts.
- Deterioration of rubber or plastic parts.
- Fuel permeation through rubber fuel lines.
- Starting and operating difficulties.

⚠ CAUTION

When operating a Mercury engine with fuel containing alcohol, avoid storing the fuel in the fuel tank for long periods of time. Long storage periods, common to boats, create unique problems. In cars, alcohol-blend fuels are normally consumed before they can absorb enough moisture to cause trouble. However, 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.

IMPORTANT: Because of possible adverse effects of alcohol in gasoline, it is recommended that only alcohol-free fuel be used where possible.

SPECIFICATIONS

If only fuel containing alcohol is available, or if the presence of alcohol is unknown, increased inspection frequency for leaks and abnormalities is required.

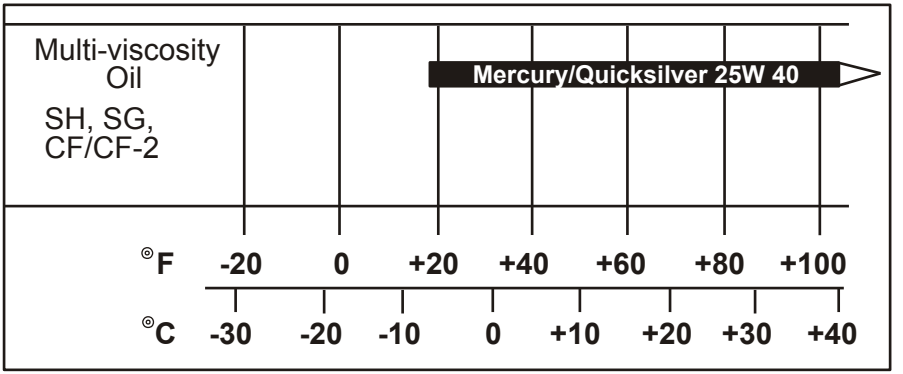
Crankcase Oil

Preferred Oils	API Classification
Mercury 4-cycle Marine Engine Oil 25W-40	SH,SG,CF/CF-2
Oil Filter Should Always Be Changed With Oil	

IMPORTANT OIL PRACTICES

Do Not Use
• Straight weight oils
• Non-detergent oils
• Oils containing solid additives
• Multi-viscosity oils other than the ones recommended
• Low quality oils
Do Not Mix
• Different brands of oils, straight weight or multi-viscosity
• Different weights of straight weight or different weights of multi-viscosity oils.

TEMPERATURE/OIL VISCOSITY CHART



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SPECIFICATIONS

Capacities

Model	HP525 EFI
Crankcase Oil Capacity with New Filter[1.]	7.6 L (8 U.S. qts)
Drive Unit Oil Capacity	4 L (4.25 U.S. qts)
Transom Bearing Cavity and Reservoir	0.47 L (0.5 U.S. qts)
Transmission[1]	1.9 L (2 U.S. qts)
Closed Cooling System	13 L (14 U.S. qts)

Engine Specifications

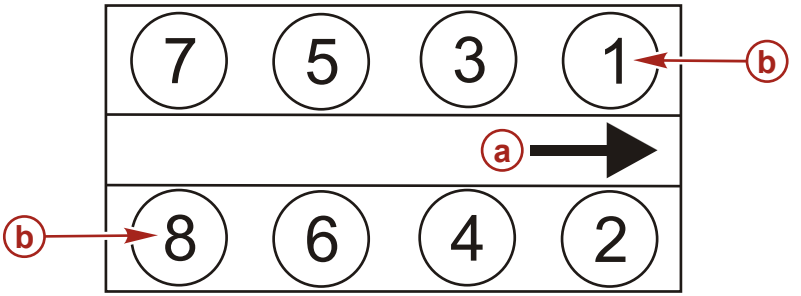
Model	HP525 EFI
Displacement	8.2 liter (502 cid)
Crankshaft horsepower[1.]	525
Crankshaft Kilowatts	391
Maximum RPM @ WOT[2.]	4800-5200 RPM
Idle RPM in gear	700 RPM
Idle RPM out of gear	750 RPM
Fuel pump pressure at key up	276 kPa (40 psi)
Fuel pump pressure at WOT	262 kPa (38 psi)
Minimum oil pressure @ stable idle RPM (HOT)	Minimum - 138 kPa (20 psi)
Minimum oil pressure @ WOT RPM (HOT)	Minimum - 241 kPa (35 psi)
Engine oil temperature (Maximum allowable)	104 °C (220 °F)
Coolant thermostat	71 °C (160 °F)
Minimum sea water pressure @ 5000 RPM	138 kPa (20 psi)
Fuel requirements	Refer to fuel or oil requirements in the **Specifications** section
Oil requirements	

1. Always use dipstick to determine exact quantity of oil required.
1. Kilowatts/horsepower rating is in compliance with the SAE J1228/ISO 3046 Standard. Usable power will be reduced by gear losses.
2. Engines are equipped with an ignition system that has a built-in 5400 RPM rev limiter. Engine is performing normally if it will not exceed this RPM.

SPECIFICATIONS

ENGINE SPECIFICATIONS

Model	HP525 EFI
Spark Plug Type	NGK BR9ECS (Only)
Spark Plug Gap	0.9 mm (0.035 in.)
Firing Order	1-8-4-3-6-5-7-2
Ignition timing	Non-adjustable
Electrical system	12-Volt Negative (-) Ground
Alternator	65 amps / 917 watts
Recommended battery rating	Minimum 750 cca, 950 mca, or 180 Ah



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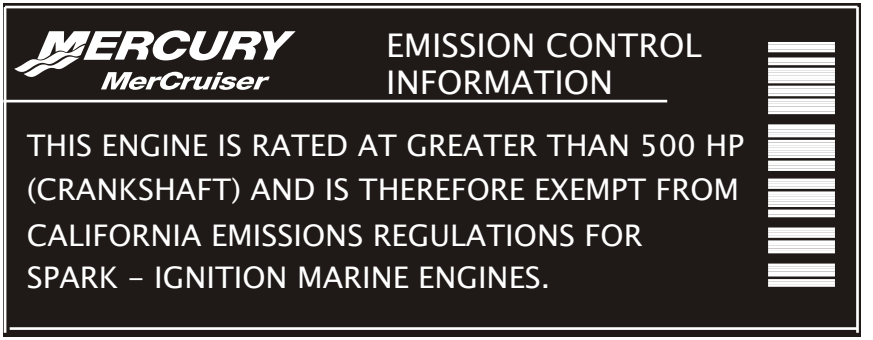
a - Front of engine and boat
b - Firing order 1-8-4-3-6-5-7-2

California Emissions Regulations

An emission certification label, showing emission levels and engine specifications directly related to emissions, is placed on the engine at the time of manufacture.



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Engine Break-in

⚠ CAUTION
Severe damage to the engine can result by not complying with the Engine Break-in Procedure.

5 Hr. Break-in Procedure
• Allow engine to warm-up for 30- 60 seconds.
• Do not exceed 3/4 throttle.
• Avoid full throttle acceleration from idle speed.
• Always vary throttle setting.
• Run engine the majority of time between 3000 - 4500 RPM.
• Frequently check engine oil level. Add oil if needed. It is normal for oil consumption to be high during break-in period.

After Break-In Period

To help extend the life of your power package, Mercury Marine recommends the following:

After 5 hr. Break-in
• Use a propeller that allows the engine to operate at or near the top of the maximum RPM range (See **Specifications** section) when at full throttle with a normal boat load.
• Do not advance the throttle until the engine runs smoothly at idle and water temperature reaches a minimum of 54 °C (130 °F). Do not operate at full throttle until the engine oil temperature reaches 60 °C (140 °F).
• Follow the maintenance schedule in this manual.

OPERATION

Instrumentation

Mercury Racing requires that the following critical engine functions be monitored:

- Oil pressure
- Engine RPM
- Oil temperature
- Water temperature
- System voltage
- Guardian fault messages

The use of SmartCraft instrumentation will display all of the above critical engine functions as well as others not listed. SmartCraft instrumentation will also display information about power train sensor faults and Guardian activation.

Warning System

⚠ CAUTION

Avoid engine damage. Do not operate the engine after a continous horn is heard, EXCEPT TO AVOID A HAZARDOUS SITUATION.

The warning system incorporates a warning horn, which is located inside the remote control or is part of the key switch wiring harness. When the key switch is turned to the "ON" position, the warning horn will sound for a moment as a test to tell you the system is working.

The warning system signals, which include audible and visual indicators involving the horn and gauges, identify the potential problems listed in the chart below.

ENGINE GUARDIAN SYSTEM

The Engine Guardian System monitors the critical sensors on the engine for any early indications of problems. The system responds to a problem by emitting a continuous or intermittent horn and, under certain circumstances, reduces engine power to provide engine protection. When the key switch is turned "ON", the system monitors horn beeps once to verify horn operation.

If the Propulsion Control Module (PCM) detects a fault signal from an engine sensor, it records a fault code.

1. The horn warning can be stopped by turning the engine off. If the horn continues to sound on restart, the system detected a fault again. See your Mercury Marine dealer to correct the problem.

2. On restart, if the beeping stops, see your authorized Mercury Marine dealer to diagnose and clear the fault..

NOTE: *The following Table lists only the possible problem areas and not specific error codes recorded by the PCM. Use a Digital Diagnostic Terminal (DDT) or Computer Diagnostic System (CDS) to extract specific problem codes from the PCM.*

Problem	Horn	Monitor Display	Guardian Activated	Engine Power Reduced By
Battery range high or low	Steady Horn	Yes	Yes	10%
Low Seawater Pressure	Steady Horn	Yes	Yes	10%
Guardian Envoked	Steady Horn	Yes	No	
Low Oil Pressure	Steady Horn	Yes	Yes	10%
Engine Overspeed	Steady Horn	Yes	No	
Coolant Overheat	Steady Horn	Yes	Yes	10%
PCM Error	Steady Horn	Yes	Yes	Forced Idle
Crankshaft Sensor Problem	Steady Horn	Yes	Yes	10%
Coil Pack Failure	5 Beeps-3 Sec. Long	Yes	No	
Fuel Injector Failure	5 Beeps-3 Sec. Long	Yes	No	
Fuel Pump Failure	5 Beeps-3 Sec. Long	Yes	No	
Idle Air Control Failure	5 Beeps-3 Sec. Long	Yes	No	
MAP Sensor Error	5 Beeps-3 Sec. Long	Yes	No	
Oil Temperature High	5 Beeps-3 Sec. Long	Yes	No	
Oil Temperature Sensor Failure	3 Beeps-1.5 Sec. Long	Yes	No	
Cam Sensor	3 Beeps-1.5 Sec. Long	Yes	No	

Problem	Horn	Monitor Display	Guardian Activated	Engine Power Reduced By
Oil Pressure Sensor Failure	3 Beeps-1.5 Sec. Long	Yes	Yes	10%
Fuel Pressure Sensor Failure	3 Beeps-1.5 Sec. Long	Yes	No	
Block Pressure Sensor Failure	3 Beeps-1.5 Sec. Long	Yes	No	
Charge Temperature Sensor Failure	3 Beeps-1.5 Sec. Long	Yes	No	
CAN Bus Problem	3 Beeps-1.5 Sec. Long		No	
Coolant Temperature Sensor	3 Beeps-1.5 Sec. Long	Yes	No	
Throttle Position Sensor	3 Beeps-1.5 Sec. Long	Yes	Yes	10%
Low Sensor Power	3 Beeps-1.5 Sec. Long	Yes	No	
Low Drive Lube[1.]	2 Beeps-1 Sec. Long	Yes	No	

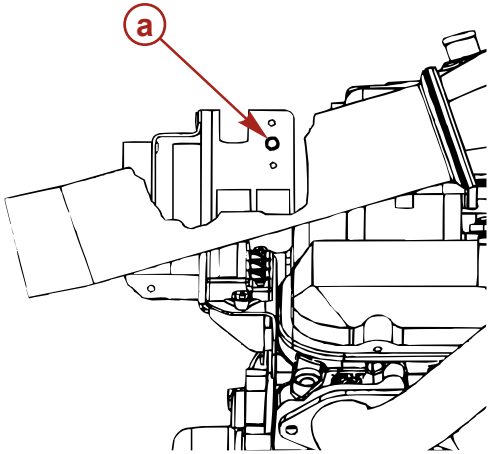
Electrical System Overload Protection

If an electrical overload occurs, a fuse or circuit breaker opens. Locate and correct the problem before replacing the fuse or resetting circuit breaker.

1. This message refers to Transmission Fluid Overheat when the SSM VI Drive is installed. Check the transmission fluid level if this message is displayed.

OPERATION

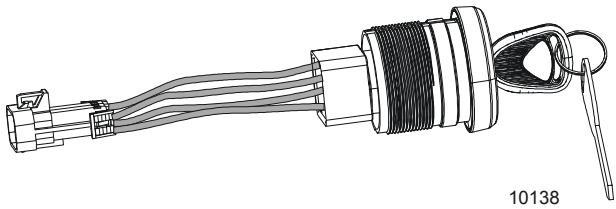
A circuit breaker protects the engine wiring harness and instrumentation power lead. Reset by pushing the reset button.



a - Reset button

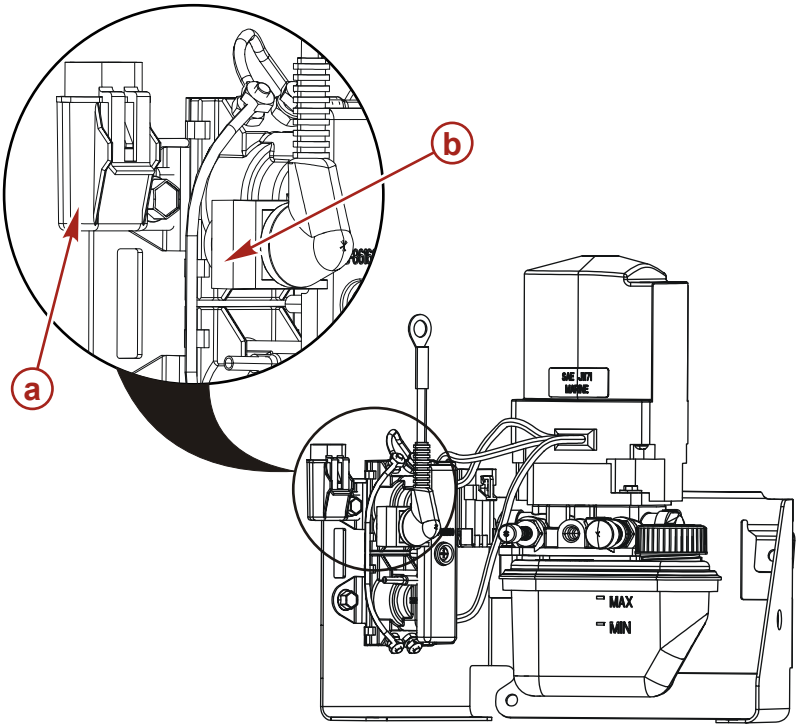
In an emergency, if you cannot locate and correct the cause of the high current draw, and you must operate the engine; perform the following:

1. Turn "OFF" or disconnect all accessories connected to the engine and instrumentation wiring and reset the circuit breaker.
2. If the breaker opens again, an electrical overload is still present. Inspect the electrical system.
3. There may be a 20 amp fuse is located in ignition switch "I" terminal lead to protect the electrical system. Check for open fuse or circuit breaker if the key is turned to "START" and nothing happens (and the 50 amp circuit breaker is not open).



a - Ignition switch "I" terminal lead

4. The power trim pump is internally protected from thermal overload. If it overheats, it will shut off, allowing itself to cool and reset. However, we recommend that additional overload protection is installed along with the power trim pump. The power trim system should be protected from overload by a 90 amp fuse in the main power feed to the pump and a 20 amp in-line fuse on the power trim control circuit.



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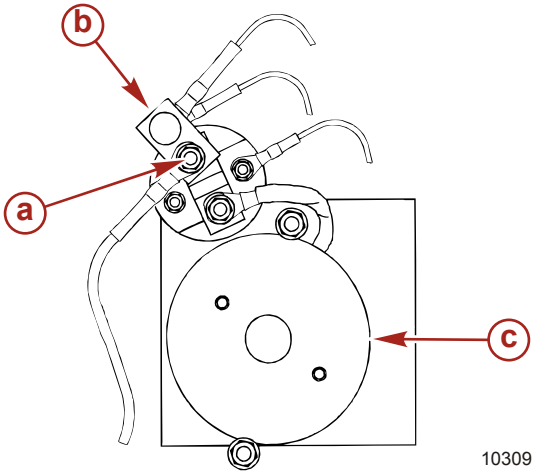
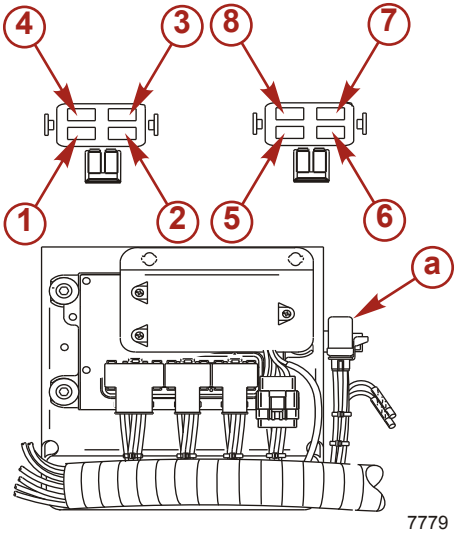
a - Fuses

5. A 90 amp fuse is located on the starter.



a - Positive battery cable
b - 90 amp fuse
c - Starter motor

6. Eight fuses are located at the upper rear of the engine in two fuse holders (four fuses in each holder).



a - Fuse holder (2)

Fuse Holder - C8	Fuse Holder - C7
(1) - 20 amp - RED/GRN to RED/WHT fuel injection / tachometer	(5) - 30 amp - RED/BLK to RED/PNK fuel pump
(2) - 20 amp -RED/GRN to RED/YEL coils	(6) - 15 amp - RED/PPL to RED/PPL constant power
(3) - 15 amp - PPL/WHT to PPL key switch	(7) - 15 amp - RED/PPL to RED/BLU diagnostic
(4) - 20 amp - RED/BLU to RED/ORN hour meter/ECU	(8) - 5 amp - RED/PPL to RED/BLK CAN positive

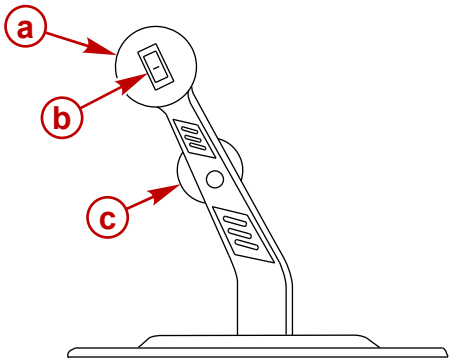
Remote Controls (Console Mounted Zero Effort)

1. Control the throttle by moving the longer control lever(s) or, to increase speed, push the control lever forward. Detents give the movement of the lever a notched, precise feel. The detents also help hold the lever at the desired engine RPM to reduce operator fatigue.

⚠ CAUTION

Avoid possible engine damage. Never shift the unit into or out of gear unless the engine is at idle RPM.

2. Control shifting by moving the shorter control lever(s). This control shifts the unit into gear with full lever movement. Move the lever forward to engage the forward gear. Move lever backward to engage reverse gear. Place the lever in the center position to shift to neutral. Shifting should occur only with the engine at idle speed. Always move to the desired gear position with a quick, firm motion. The control handle should be adjusted by your dealer to engage forward, reverse, and neutral when the lever is at the appropriate detent.



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a - Throttle control lever
b - Shift control lever
c - Power trim switch

3. See **Power Trim** section for detailed power trim operating procedures.

Power Trim

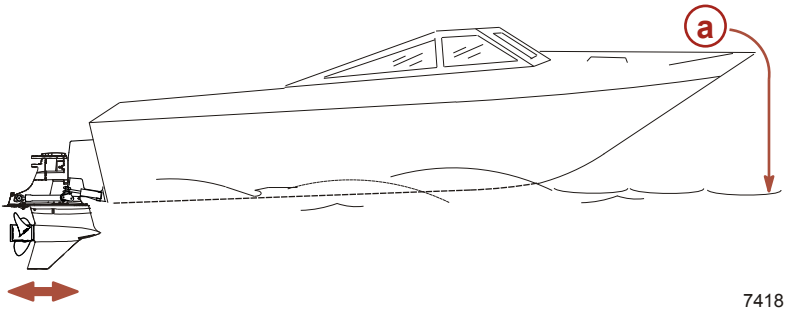
Power Trim allows the operator to adjust the drive angle while underway to provide the ideal boat angle for varying load and water conditions.

⚠ CAUTION

Avoid excessive wear on the U-joint/input shaft. The VI drive does not have a trim limit switch. Depressing the trim or trailer buttons allows the drive to be tilted to its full extension without stopping at a preset trim limit. The drive's position should be monitored with the trim gauge(s) so that the drive is not trimmed excessively.

OPERATION

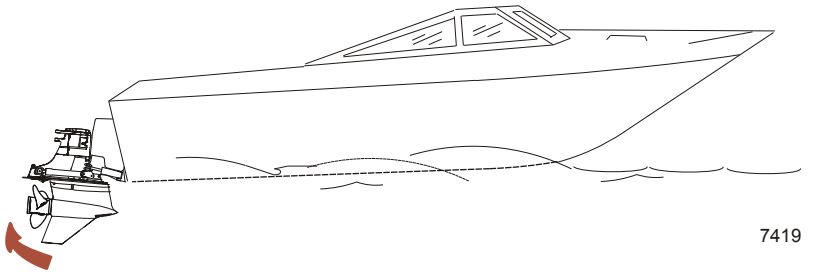
In most cases, best overall performance is obtained with the drive unit adjusted so the boat bottom will run at a 3° to 5° angle to the water.



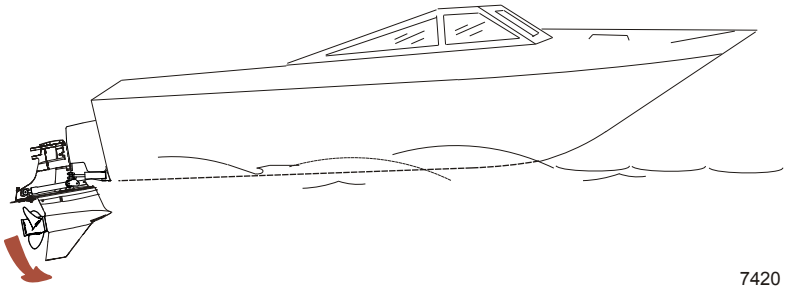
a - Boat bottom at 3° to 5° angle with water

Trimming Drive Unit Up/Out Can:

- Generally increase top speed.
- Increase clearance over submerged objects or a shallow bottom.
- Cause the boat to accelerate and plane off slower.
- In excess, cause boat porpoising (bouncing) or propeller ventilation.



Trimming Drive Unit Down/In Can:



- Help the boat accelerate and plane off quicker.
- Generally improve the ride in choppy water.
- In most cases, reduce boat speed.
- If in excess, lower the bow of some boats to a point at which they begin to plow with their bow in the water while on plane. This can result in an unexpected turn in either direction, called bow steering or over steering. if any turn is attempted or if a significant wave is encountered.

Power Trim Sender Conversion Module (If Installed)

- Trim limit is determined by the sender.
- Trailer position is achieved by trimming up with key in the "OFF" position.

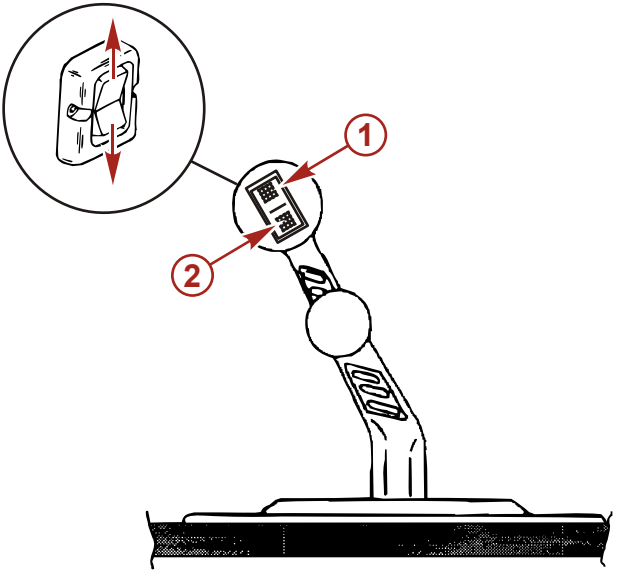
ZERO EFFORT CONTROL WITH INTEGRAL TRIM SWITCH

The VI drive does not have an electrical trim limit switch or trim position sender. Therefore the following precautions must be observed.

⚠ CAUTION

Avoid twisting or binding dual engine tie bars. Damage to the tie bar and sterndrives could occur. Always raise or lower the sterndrive units evenly.

NOTE: *The word trim is usually considered the first 20° up/out movement from vertical position.*



a - **Trailering and trimming up/out position -** Press (top) up/out portion of switch until drive unit reaches desired trim/trailering position.

b - **Trim drive unit in/down position -** Press (bottom) in/down portion of switch until drive unit reaches desired trim position.

Starting, Shifting and Stopping

⚠ WARNING

Avoid fire or explosion. Before starting the engine, operate the bilge blower for at least five minutes to remove any explosive fumes from the engine compartment. If the boat is not equipped with a bilge blower, open the engine hatch and leave it open while starting the engine.

NEW ENGINES OR ENGINES COMING OUT OF STORAGE

See **Power Package Recommissioning.**

OPERATION

IMPORTANT: Observe the following:

- **Do not start the engine without supplying water to the seawater pickup pump (to prevent pump or engine damage).**
- **Do not operate the starter motor continuously for more than 30 seconds.**
- **Never shift the drive unit unless the engine is at idle RPM.**

Perform the following as appropriate:

☐ Check all items listed in **Operation Chart.**

☐ Perform any other necessary checks, as indicated by your dealer, or specified in your boat owner's manual.

☐ Place the drive unit in full the down/in position.

☐ Place the control handle in neutral.

COLD OR WARM ENGINE

EFI engines require no throttle advance to start. The boat can be operated after the engine has started and is idling smoothly.

IMPORTANT: If the engine has not been operated for more than 24 hours, Mercury Marine recommends priming the engine oil system.

NOTE: *Engines that have not been started for extended periods or have had fuel filter changes may not stay running on the first few initial attempts to start. Do not advance the throttle to keep the engine running. Continue to restart the engine until it idles smoothly which means the fuel system is primed. Allow the engine to warm up to 54 °C (130 °F) before advancing the throttle. Do not operate at full throttle until the engine reaches an oil temperature of 60 °C (140 °F).*

FLOODED ENGINE

Move control/throttle lever to half throttle. Be prepared to decrease engine speed to 1000 - 1500 RPM as soon as engine starts.

STARTING

- Turn key switch to "START." Release key when engine starts and allow switch to return to "RUN" position.
- Check the oil pressure gauge immediately after the engine starts. If oil pressure is not within the specified range, see **Specifications**, stop the engine immediately, and determine cause.
- If engine is cold, make sure engine is idling smoothly before operating boat.
- After the engine has warmed up, check the water temperature gauge to ensure that the engine temperature is not abnormally high. If it is, stop the engine immediately and determine cause.

- Ensure that the charging system is functioning correctly.
- Observe the power package for fuel, oil, water, and exhaust leaks.

SHIFTING

- To shift the drive unit into gear, move the control/shift lever with a firm, quick motion forward to shift to forward gear, or backward to shift to reverse. After shifting the drive unit, advance the throttle to the desired setting.

STOPPING

- To shift the drive unit out of gear, move the control/shift lever to neutral and allow the engine to drop to idle speed. If the engine has been operating at high speed for a long period of time, allow the engine to cool by running at idle speed for three to five minutes.
- Turn key switch to "OFF."

IMPORTANT: Starting procedure if engine is shut off or stops with drive unit in gear.

1. **Pull/push remote control handle to neutral-lock position (it will be necessary to exert force to move handle).**
2. **Turn key to "START" position, momentarily, to release clutch from gear.**
3. **Resume normal starting procedure.**

Operation Chart

1. **Before Starting**
   - ☐ Open the engine hatch.
   - ☐ Turn battery switch "ON," if equipped.
   - ☐ Operate bilge blowers, if equipped.
   - ☐ Open fuel shut off valve.
   - ☐ Open seacock, if equipped.
   - ☐ Perform all other checks specified by your dealer and/or boat builder.
2. **After Starting**
   - ☐ Observe all gauges to check condition of engine. If not normal, stop engine.
   - ☐ Check for fuel, oil, water, fluid and exhaust leaks, etc.
   - ☐ Check shift and throttle control operation.
   - ☐ Check steering operation.

3. **While Underway**
   - ☐ Observe all gauges to monitor engine condition.
4. **After Stopping**
   - ☐ Shift to neutral. Turn ignition key "OFF."
   - ☐ Turn battery switch "OFF," if equipped.
   - ☐ Close fuel valve.
   - ☐ Close seacock.
   - ☐ Flush cooling system if in saltwater area.

Freezing Temperature Operation

IMPORTANT: If boat is operated in freezing temperatures, ensure that closed coolant is rated for the temperature range in which it is to be used. The seawater section of the engine must be drained after use to prevent freezing. Damage caused by freezing is not covered by Mercury Racing's Limited Warranty.

Drain Plug and Bilge Pump

The engine compartment in your boat is a natural place for water to collect. For this reason, boats are normally equipped with a drain plug and/or a bilge pump. It is very important to check these items on a regular basis to ensure that the water level does not rise to come in contact with your power package. Engine components will be damaged if submerged. Damage caused by submersion is not covered by the Mercury Racing Limited Warranty.

The bilge drain can be used to change crankcase oil. Refer to the **Maintenance** section.

Launching And Boat Operation Care

⚠ CAUTION

Avoid product damage.

The following situations could cause water to enter the engine through the exhaust system, which could cause engine component failure:

- **Unloading a boat from a trailer**
- **Slowing down rapidly or stopping suddenly**
- **Backing up rapidly**

In any of the situations described in the preceding caution, water entering the engine could cause severe damage to internal parts. Refer to **Attention Required After Submersion** in the **General Information** section of this manual.

CONDITIONS AFFECTING OPERATION

Weight Distribution

Positioning of weight (passengers and gear) inside the boat has the following effects:

Shifting weight to rear (stern) may:

- Increase speed and engine RPM.
- Cause the boat to porpoise.
- Cause the bow to bounce in choppy water.
- Increase the danger of a following wave splashing into the boat when coming off plane.

Shifting weight to front (bow) may:

- Improve ease of planing.
- Improve rough water ride.
- Cause the boat to veer back and forth (bow steer).

Bottom Of Boat

To maintain maximum speed, ensure that the bottom of the boat is:

- Clean and free of barnacles and marine growth.
- Free of distortion and nearly flat where it contacts the water.
- Straight and smooth both fore and aft.

Marine vegetation may accumulate when the boat is docked, clogging water inlets and causing the engine to overheat. This growth must be removed before operation.

Cavitation

Cavitation occurs when water flow cannot follow the contour of a fast-moving, underwater object, such as a gear housing or propeller. Cavitation permits the propeller to speed up, but the boat speed to reduce. Cavitation can seriously erode the surface of the gear housing or propeller. Common causes of cavitation are:

- Weeds or other debris snagged on propeller or gear housing.
- Bent propeller blade or damaged gear housing skeg.
- Raised burrs or sharp edges on propeller or gear housing.

Ventilation

Ventilation occurs when surface air or exhaust gases surround the propeller, causing propeller speed-up (slippage) and a decrease in boat speed. Excessive ventilation is annoying and usually caused by:

- A drive unit trimmed out too far.

- A damaged propeller or gear housing, allowing exhaust gases to escape between propeller and gear housing.
- A drive unit installed too high on the transom.

Propeller Selection

IMPORTANT: Choosing the correct propeller allows the engine to run at its specified maximum wide-open-throttle RPM. Use an accurate service tachometer to verify engine operating RPM.

It is the boat manufacturer and/or the selling dealer's responsibility to equip the power package with the correct propeller(s). Specified engine wide-open-throttle (WOT) and operating RPM range are listed in **Specifications.**

IMPORTANT: All Mercury Racing engines have a RPM rev-limiter that is set to an upper (or limited) RPM. This limit is slightly above the normal operating range of the engine and is designed to help prevent damage from excessive engine RPM. Once the RPM drops into the recommended operating RPM range, normal engine operation resumes.

Select a propeller that allows the engine to operate in the upper half of the recommended full throttle RPM range with the boat normally loaded (refer to **Specifications**).

If full throttle operation is below the recommended range, change the propeller to prevent loss of performance and possible engine damage. On the other hand, operating an engine above the recommended operating RPM range causes higher than normal wear or damage. Generally, there is a 200 - 300 RPM change between propeller pitches.

RPM loss may require changing to a lower pitch propeller due to the following conditions:

- Operating in warmer weather and greater humidity.
- Operating in a higher elevation.
- Operating with a damaged propeller or dirty boat bottom.
- Operating with increased load (additional passengers, pulling skiers, etc.).

Conditions That Lower Engine Performance

The following conditions lower engine performance and cannot be compensated by the engine fuel or electronic management systems.

- Above sea level elevations
- High temperature.
- Low barometric pressure.

- High humidity.

The conditions listed above reduce air density to the engine which in turn reduces the following:

- Boost pressure on supercharged engines
- Horsepower and torque throughout the RPM range
- Peak RPM
- Cranking compression

EXAMPLE: An engine running at an elevation of 2,438 m (8,000 ft) will have over a 30% power loss while engine power on a hot and humid day can be reduced by as much as 14%. These losses apply to both normally aspirated and supercharged engines.

Compensating for power robbing conditions:

- Switch to a lower pitch propeller.
- Change the gear ratio.

Some boat performance can be regained by dropping to a lower pitch propeller, but engine performance will remain lower. In some cases, a gear ratio reduction may be more beneficial. To optimize engine performance, prop the engine to allow it to allow operation at or near the top end of the recommended maximum RPM range at wide open throttle with a normal boat load.

Other advantages to propeller or gear ratio changes:

- Reduces the possibility of detonation.
- Enhances overall reliability and durability of the engine.

MAINTENANCE

Service Responsibilities

OWNER/OPERATOR RESPONSIBILITIES

It is the owner/operator's responsibility to perform the following:

- Perform all safety checks.
- Make sure lubrication and maintenance instructions are complied with for safe operation.
- Return the unit to an authorized Mercury Marine dealer for a periodic checkup.
- Normal maintenance service and replacement parts.

Proper maintenance and care of your power package will ensure optimum performance and dependability, and will keep your overall operating expenses at a minimum. See your authorized Mercury Marine dealer for service aids.

DEALER RESPONSIBILITIES

In general, a dealer's responsibilities to the customer include predelivery inspection and preparation. These include:

- Completing a Warranty Registration Card and mailing it to the factory immediately upon sale of the new product.
- Properly equipping the boat.
- Making certain that the Mercury Marine power package and other equipment are in proper operating condition prior to delivery.
- Making all necessary adjustments for maximum efficiency.
- Familiarizing the customer with the on-board equipment.
- Explaining and demonstrating the operation of the power package and boat.
- Providing you with a copy of a **Predelivery Inspection Checklist** prior to delivery.

Replacement Service Parts

⚠ WARNING

Avoid fire or explosion hazard. Electrical, ignition and fuel system components on Mercury Marine gasoline power packages are designed and manufactured to comply with U.S. Coast Guard rules and regulations to minimize risks of fire or explosion.

Do not use replacement electrical, ignition or fuel system components, which do not comply to these rules and regulations.

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 would permit sparks to ignite fuel vapors from fuel system leaks, if they existed.

Marine engines are expected to operate at or near full throttle for most of their life. They are also expected to operate in fresh and saltwater environments. These conditions require numerous special parts. Care should be exercised when replacing marine engine parts, as specifications are quite different from those of the standard automotive engine.

For example, one of the most important, and probably the least suspected special replacement part, is the cylinder head gasket. Since saltwater is highly corrosive, the steel-type automotive head gasket cannot be used. A marine engine head gasket uses special materials to resist corrosive action.

Since marine engines must be capable of running at or near maximum RPM much of the time, special valve springs, valve lifters, pistons, bearings, camshafts and other heavy-duty moving parts are required for long life and peak performance.

These are but a few of the many special modifications that are required in Mercury Marine engines to provide long life and dependable performance.

Do-It-Yourself Maintenance Suggestions

If you are one of those persons who likes to do-it-yourself, here are some suggestions for you.

- Present-day marine equipment, such as your Mercury Marine power package, are highly technical pieces of machinery. Electronic ignition and special fuel delivery systems provide greater fuel economies, but are more complex for the untrained mechanic.

- Do not attempt any repairs that are not covered in this manual unless you are aware of the precautions (Cautions and Warnings) and procedures required. Your safety is of our concern.
- If you attempt to service the product yourself, we suggest you order the service manual for that model. This manual outlines the correct procedures to follow. It is written for the trained mechanic, so there may be procedures you don't understand. Do not attempt repairs if you do not understand the procedures.
- Special tools and equipment may be required to perform some repairs. Do not attempt these repairs unless you have these special tools and/or equipment. You can cause damage to the product in excess of the cost a dealer would charge you for the repair.
- If you partially disassemble an engine or drive assembly and are unable to repair it, the dealer's mechanic must re-assemble the components and test to determine the problem. This will cost you more than taking it to the dealer immediately upon having a problem. It may be a very simple adjustment to correct the problem.
- Do not telephone the dealer, service office or the factory to attempt for them to diagnose a problem or request the repair procedure. It is difficult for them to diagnose a problem over the telephone.
- Your authorized Mercury Marine dealer is there to service your power package. They have qualified factory-trained mechanics.

Mercury Marine recommends that you have the dealer do periodic maintenance checks on your power package. Have them winterize it in the fall and service it before the boating season. This will reduce the possibility of any problems occurring during your boating season when you want trouble-free boating pleasure.

IMPORTANT: Refer to *Maintenance Charts* (on following pages) for complete listing of all scheduled maintenance to be performed. Some listings can be done by the owner/operator, while others should be performed by an authorized Mercury Marine dealer. Before attempting maintenance or repair procedures not covered in this manual, Mercury Marine recommends purchasing a Mercury Marine Service Manual.

Servicing High Horsepower Engines

All high performance engines require frequent maintenance and inspection schedules due to the extreme duty cycles and related stress these products endure. Failure to follow the detailed maintenance and service schedule as written and supplied by Mercury Marine could lead to catastrophic engine failure and increased owner expense.

MAINTENANCE

Maintenance Charts

ENGINE AND TRANSMISSION

Interval	Task
Saltwater use: After each use.	Cooling system - Flush seawater section.
Check prior to every use and every 3 hours of operation.	Engine crankcase oil - Check level
	Engine, drive, transom, and propeller - Inspect
	Transmission fluid - Check level
	Power steering fluid - Check level
Weekly	Battery - Check level and inspect for damage
Every 25 hours of operation or once a season, whichever occurs first.	Crankcase oil and filter - Change
	Check the oil level in the sea pump fuel pump. Inspect for water contamination
Every 50 hours of operation or once yearly, whichever occurs first.	Transmission fluid - Change
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.	Cooling system hoses and clamps - Inspect for damage and deterioration. Check clamps for tightness.
	Electrical system - Check for loose or damaged wiring.
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
	Engine alignment - Check
	Serpentine belt - Inspect condition and check tension
	Replace positive crankcase ventilation (PCV) valve.
	Replace idle air control (IAC) filter.

Interval	Task
Every 100 hours of operation or once a season, and whenever insufficient seawater flow is suspected (if operating temperature exceeds normal range).	Seawater pickup pump - disassemble and inspect
Once a year	Power package exterior surfaces - Clean and paint
	Fuel filters - Replace
	Oil cooler - Clean seawater section.
Every 200 hours of operation	Ignition System - Check condition of Ignition cables and replace spark plugs.
Every 5 years	Replace closed cooling system coolant with Dexcool or equivalent.

DRY SUMP SIX (VI) DRIVE, TRANSOM, TRIM & STEERING SYSTEMS MAINTENANCE SCHEDULE

Interval	Task
Check prior to use and every 3 hours of operation.	Drive, Transom, and Propeller - Inspect
	Lower Gear Housing Oil - Check level
	Power Trim Pump Oil - Check level and inspect for any water contamination. Replace fluid if necessary.
	Gear Housing Water Pickups - Check for marine growth or debris.
Weekly	Anodes - Inspect for erosion
Initial break-in at 25 hours.	Lower Gear Housing Oil Filter and Oil - Change the oil and filter.
Every 25 hours of operation or every 90 days, whichever occurs first.	Tie-bar Mounting Bracket Nuts - Inspect and tighten to specifications as needed.
	Propeller Shaft - Lubricate
	Propeller Nut - Torque to specification.
	Sterndrive - Inspect, clean, and spray with rust preventative.

Interval	Task
Every 50 hours of operation or once a season, whichever occurs first.	Perform 25 Hour Maintenance Items.
	Sterndrive Unit Input Splines (Internal and External) - Lubricate with Optimol Paste White T Grease.
	Drive input shaft U-joint crosses-Inspect and lubricate
	Drive Mounting Nuts - Tighten to 136 Nm (100 lb. ft.)
Saltwater Use: Every 50 hours or 60 days of operation, whichever occurs first. **Freshwater Use:** Every 100 hours or 120 days of operation, whichever occurs first.	Steering System - Inspect for loose, damaged or missing parts. Lubricate the steering cylinder pivot points.
Every 100 hours of operation or once a season, whichever occurs first.	Peform 25 and 50 Hour Maintenance Items.
	Drive Unit Bellows and Clamps - Inspect
	Lower Gear Housing Oil - Change the oil.
	Driveline Models - Lubricate and inspect the engine to transom driveshaft U-joint crosses and slip joint.
	Steering head and remote control - Inspect and lubricate
Every 200 hours of operation or at re-build.	Lower Gear Housing Oil Filter and Oil - Change the oil and filter.
Every 200 hours of operation or once a year, whichever occurs first.	Peform 25, 50, and 100 Hour Maintenance Items.
	Transom Input Shaft Bearing Housing (Driveline Models Only) - Change the oil.

Checking Fluids

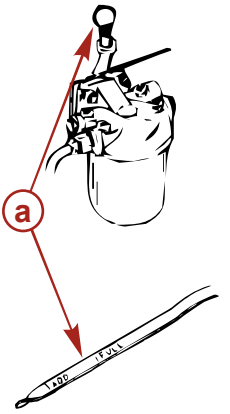
CRANKCASE OIL

The engine crankcase oil must be checked at the intervals specified in the **Maintenance Chart.**

NOTE: *Oil consumption is greatly dependant on engine speed, consumption is highest at wide-open-throttle and decreases substantially as engine speed is reduced. It is common for big block high performance engines to use up to one quart of oil in one to five hours if the engine is operated continuously at the upper end of the RPM range.*

Stop engine. Allow approximately five minutes for the oil to drain into the oil pan. The boat must be at rest in the water.

1. Remove the dipstick, wipe it clean, and re-install the dipstick.
2. Remove the dipstick and check the oil level. The oil level must be between the "FULL" and "ADD" mark.



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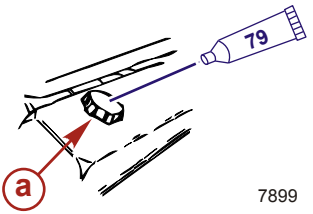
a - Dipstick with "FULL" and "ADD" marks

IMPORTANT: Do not overfill crankcase oil.

3. If the oil level is below the "ADD" mark, remove the oil filler cap, (port or starboard). Add the specified oil to bring the level up to, but not over, the "OK" range mark on the dipstick.



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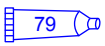
a - Filler cap

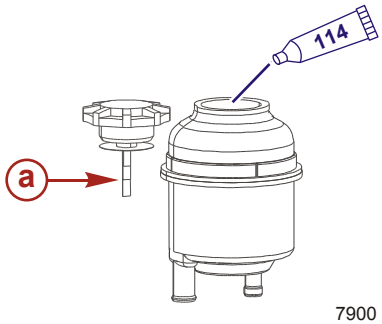
Tube Ref No.	Description	Where Used	Part No.
	MerCruiser 4-cycle 25W40 Engine Oil	Engine crankcase	92-802837A1

POWER STEERING PUMP

Stop the engine and position the drive unit straight back.

IMPORTANT: If fluid is not visible in the reservoir, contact your authorized Mercury MerCruiser dealer.

1. Remove the fill cap/dipstick and observe the level. The oil level must be at the lower mark when the engine is cold and at the upper mark when the engine is warm.



a - Dipstick lower mark

Tube Ref No.	Description	Where Used	Part No.
114	Power Trim and Steering Fluid	Power steering pump	92-802880A1

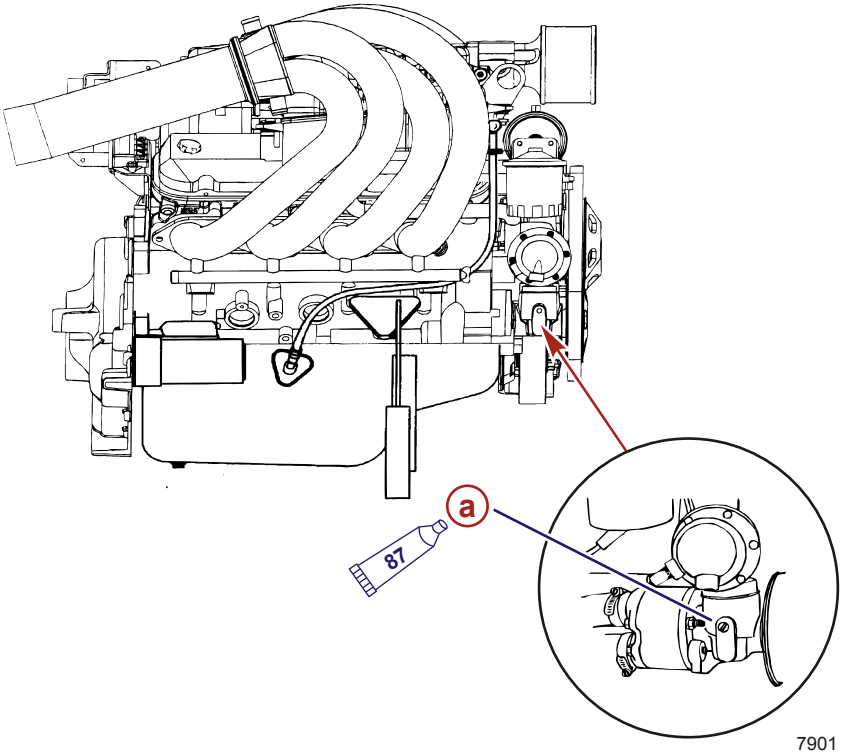
2. Add power steering fluid if required.
3. Re-install the fill cap/dipstick.

SEAWATER/FUEL PUMP OIL

IMPORTANT: Oil must be changed at specified intervals. Refer to *Maintenance Chart* for specific requirements. Use only High Performance Gear Lube in pump.

1. Remove fill screw (top) and check oil level.

2. Oil must come up to fill hole. If oil level is low, contact your authorized Mercury MerCruiser dealer for appropriate service. Do not operate engine if this oil level is low.



a - Fill screw

Tube Ref No.	Description	Where Used	Part No.
87	High Performance Gear Lubricant	Seawater/fuel pump	92-802854A1

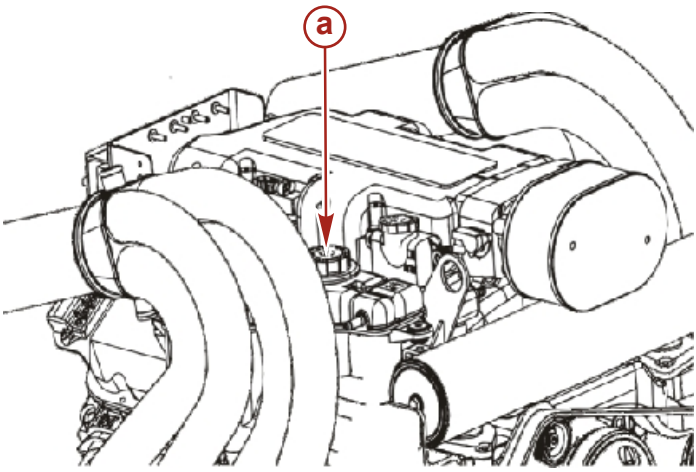
ENGINE COOLANT

⚠ WARNING

Allow the engine to cool before removing the pressure cap. A sudden loss of pressure could cause hot coolant to boil and discharge violently. After the engine has cooled, turn the cap 1/4 turn and allow the pressure to escape slowly, then remove the cap.

IMPORTANT: Check engine coolant before starting engine.

1. Check coolant level in coolant reservoir. Coolant should be at the full line marked on the reservoir with the engine cold. Add specified coolant as required.



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a - Coolant reservoir cap

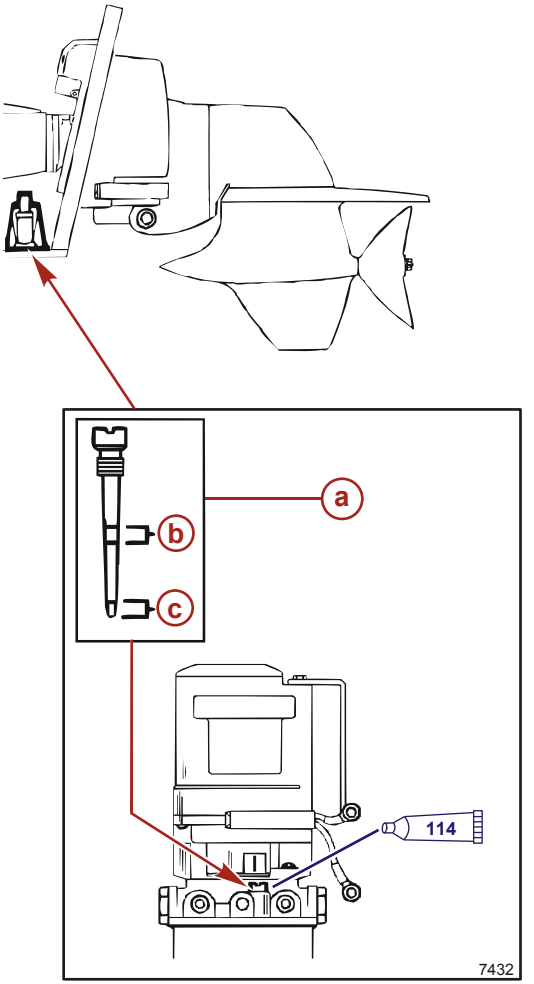
2. If coolant is low,inspect coolant recovery system for leaks.
3. Inspect the cap for damage and replace if necessary.

CHECKING POWER TRIM PUMP FLUID

IMPORTANT: Check oil level with sterndrive unit in the full down position. Use only Mercury Quicksilver Power Trim and Steering Fluid, SAE 10W-30, or 10W-40 engine oil in power trim system.

1. Raise and lower drive unit (to the full up position) 6 to 10 times to purge air from system.

2. Check oil level with dipstick (drive unit remains in the full down position).



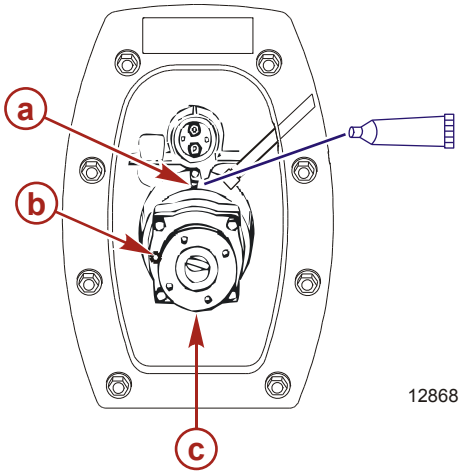
a - Dipstick
b - "FULL" mark
c - "ADD" mark

Tube Ref No.	Description	Where Used	Part No.
114	Power Trim and Steering Fluid	Power trim pump	92-802880A1

3. Oil level should be maintained at the "FULL" mark on the dipstick.

CHECKING TRANSOM INPUT SHAFT HOUSING GEAR LUBE (DRIVE-LINE MODELS ONLY)

1. Remove the plug from the input shaft housing front cover. Gear lube level should be to the bottom of the cover plug hole. If not, remove the pipe plug from the top of the input shaft housing.



a - Top pipe plug hole
b - Bottom pipe plug hole

Tube Ref No.	Description	Where Used	Part No.
	Torco MTF Gear Oil	Transom input shaft housing	Obtain Locally

2. Fill the input shaft housing through the top pipe plug hole with Torco MTF Gear Lube until gear lube flows from pipe plug hole (do not overfill).
3. Install the pipe plugs into the input shaft housing and tighten securely.

CHECKING DRIVE UNIT GEAR LUBE

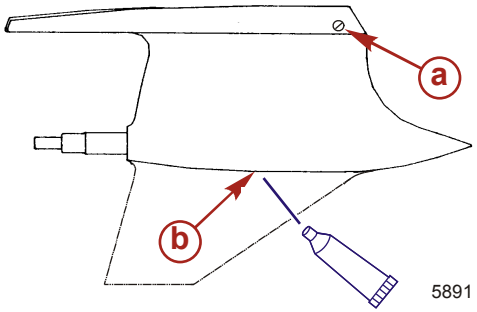
⚠ WARNING

Avoid damage to the sterndrive assembly. Do not overfill the Dry Sump Six (VI) Drive.

IMPORTANT: Fill dry sump drive with TORCO MTF gear lube.

NOTE: *The VI Drive dry sump drive is filled with Torco MTF gear lube at the factory. Check the drive unit gear lube level before and after the first sea trial.*

1. Remove the upper vent plug from the gearcase. The gear lube level should be to the bottom of the vent plug hole.



a - Top vent plug
b - Lower fill plug

2. If gear lube level is low, remove the lower fill plug from the gearcase and fill until gear lube comes out of the top vent plug opening.
3. Install the upper vent plug.
4. Remove filler tube and install the lower fill plug.

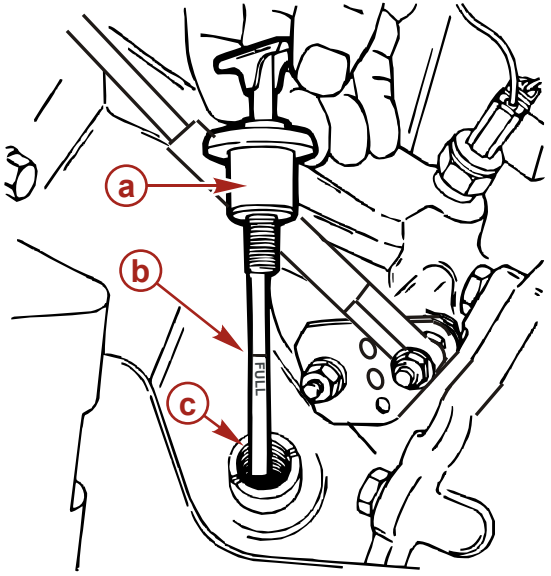
CHECKING TRANSMISSION FLUID LEVEL

IMPORTANT: The first time the transmission fluid is checked, the boat should be on a trailer or in a sling with the engine level. Add fluid until the dipstick reads "FULL," then put the boat in the water and re-check the fluid level. Mark the dipstick at the new fluid level and use this mark when checking the fluid with the boat in the water.

NOTE: *If the engine has not been run for more than two weeks, fluid can drain out of the transmission pistons and change the fluid level by as much as one quart.*

1. Operate the engine for at least two minutes at idle, shifting the transmission from forward to reverse several times.

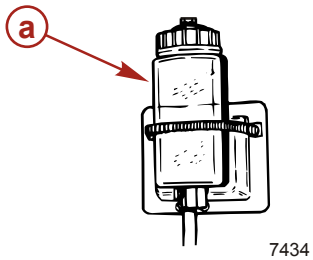
2. Shut the engine off and check dipstick level. Add fluid as necessary. Use only Type F or Type FA fluid in this transmission.



6790

a - Dipstick
b - "FULL" mark
c - Dipstick tube

3. Do not use the transmission expansion bottle as a fluid reservoir. The bottle is only to be used for fluid expansion and overflow.



7434

a - Transmission expansion bottle

Changing Fluids

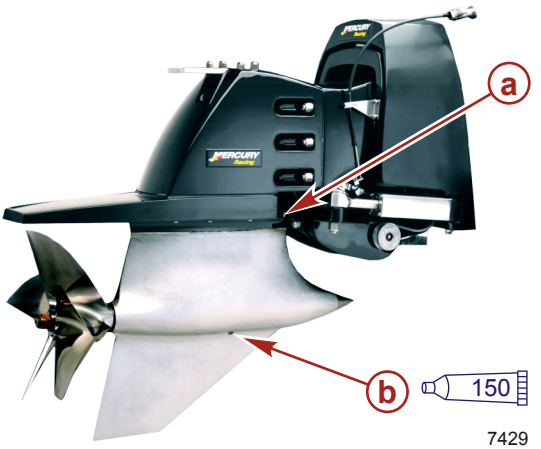
CHANGING DRIVE UNIT GEAR LUBE

IMPORTANT: Use only Torco MTF gear lube in drive unit.

1. Remove propeller, place drive unit so propeller shaft is level.
2. Remove fill/drain screw and sealing washer, and vent screw and sealing washer from gear housing.

IMPORTANT: If any water drained, or if gear lube appears milky, drive unit is leaking and should be checked immediately by your Authorized Mercury MerCruiser Dealer.

3. Fill drive unit, through fill/drain hole, with Torco MTF Gear Lube until an air-free stream of lubricant flows from gear lube level hole of gear housing.

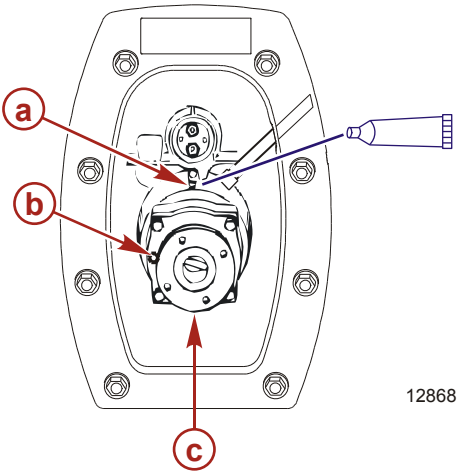


a - Top vent screw
b - Fill/drain screw

Tube Ref No.	Description	Where Used	Part No.
	Torco MTF Gear Oil	Drive unit	Obtain Locally

4. Install vent screw and washer and remove tube from fill/drain hole. Quickly install sealing washer and fill/drain screw. Tighten securely.

5. Remove pipe plugs from input shaft housing. Allow gear lube to drain completely.



a - Top pipe plug (fill)
b - Side pipe plug (check level)
c - Bottom pipe plug (drain)

Tube Ref No.	Description	Where Used	Part No.
	Torco MTF Gear Oil	Input shaft housing	Obtain Locally

6. Re-install bottom pipe plug.
7. Fill input shaft housing with Torco MTF Gear Lube through top plug opening until gear lube flows from side plug opening.
8. Install pipe plugs into input shaft housing.

⚠ WARNING

Avoid damage to the sterndrive assembly. Do not overfill the Dry Sump Six (VI) Drive.

IMPORTANT: Re-check input shaft housing gear lube level after first use, gear lube should be to the side plug level. Gear lube level will rise and fall during drive operation; check level when drive is cool and engine is shut down.

9. See **Propellers** to reinstall the propeller.

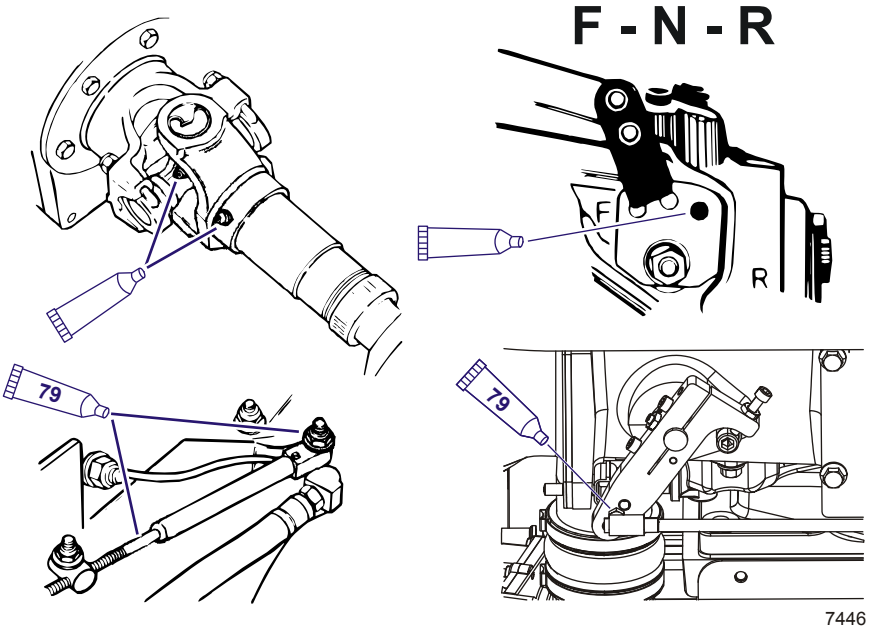
Lubrication

Lubricate the following grease fittings with Optimal PD-2:

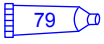
- Engine driveshaft.
- Transmission shift lever - Lubricate poppet ball.

Lubricate pivot points with SAE 25W40 motor oil:

- Shift cable.
- Throttle linkage and cable - Lubricate cable and swivels.



Tube Ref. No.	Description	Where Used	Part No.
	Optimal Longtime PD2 Extreme Pressure Grease	Engine drive shaft and transmission shift lever	92-848767

Tube Ref No.	Description	Where Used	Part No.
 79	MerCruiser 4-cycle 25W40 Engine Oil	Shift cable and throttle linkage	92-802837A1

MAINTENANCE

Propellers

⚠ WARNING

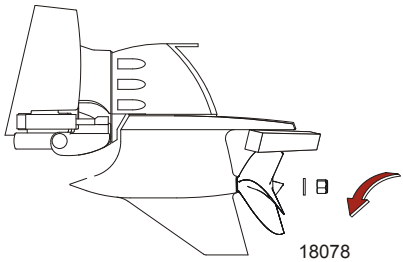
Avoid serious injury or death. Place the remote control in neutral and remove the ignition key from the switch before removing and/or installing the propeller. Place a block of wood between the anti-ventilation plate and the propeller to protect hands from propeller blades and to prevent the propeller from rotating when removing the propeller nut.

⚠ CAUTION

Avoid propeller/sterndrive damage or injury. Periodically check propeller nut for tightness during boating season. A minimum of 136 Nm (100 lb-ft) torque is required.

REMOVAL

1. Place a wood block between the propeller blade and the anti-ventilation plate to prevent rotation.
2. Turn the propeller shaft nut counter-clockwise to remove the nut.
3. Slide washer and propeller off propeller shaft.

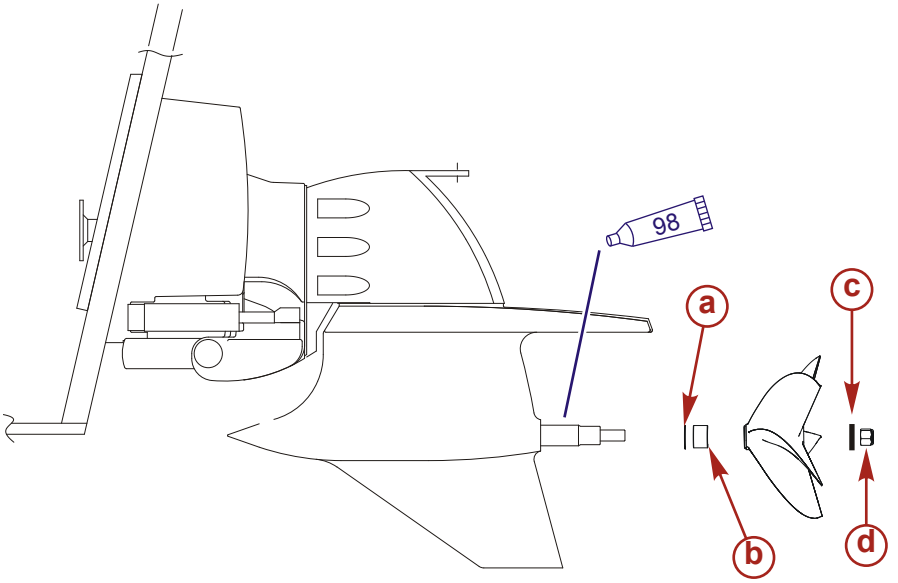


NOTE: *Some damaged propellers can be repaired. See your dealer.*

INSTALLATION

1. Apply a liberal coat of Optimal Longtime PD2 Extreme Pressure Grease to propeller shaft.
2. Align splines and install propeller, washer and propeller nut.
3. Ensure that the plastic bushing and plastic bushing retainer are properly installed in the propeller hub.

4. Place wood block between the propeller blade and anti-ventilation plate to prevent rotation and tighten the propeller nut. After first use, re-tighten propeller nut. Check propeller at least every 20 hours of operation. Do not operate with a loose propeller.



a - Plastic bushing retainer
b - Plastic bushing
c - Washer
d - Prop nut

Tube Ref No.	Description	Where Used	Part No.
98	Optimol White T Grease	Propshaft	92-847206

Description	Nm	lb. in.	lb. ft.
Propeller nut	136		100

Flushing Cooling System

⚠ WARNING

Avoid possible death or serious injury. Always remove the propeller before flushing the cooling system.

⚠ CAUTION

Avoid engine damage from overheating. If the engine is operated above 1500 RPM during flushing, suction created by the seawater pickup pump may collapse the flushing water hose causing the engine to overheat.

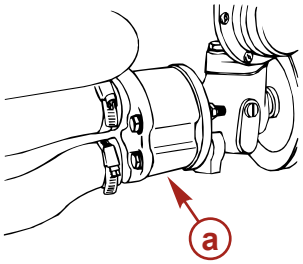
NOTE: *To prevent silt and/or salt buildup in cooling system, flush with freshwater at specified intervals.*

1. Disconnect water inlet hose from seawater pickup pump and install flushing hose from water tap to seawater pickup pump connector.
2. With drive unit in normal operating position, partially open water tap (about 1/2 maximum).
3. Place remote control in neutral position, and start engine. Operate engine at idle speed, in neutral, for about 10 minutes or until discharge water is clear.
4. Stop engine, shut off water, and remove flushing attachment.
5. Re-install water inlet hose to seawater pickup pump.

Seawater Pump Impeller Inspection

Service should be performed by an authorized Mercury MerCruiser dealer.

1. Inspect seawater pump impeller if insufficient seawater flow occurs (if operating temperature exceeds normal range).



8022

a - Seawater pump

Cleaning Seawater (Raw Water) Section of the Coolers

⚠ CAUTION

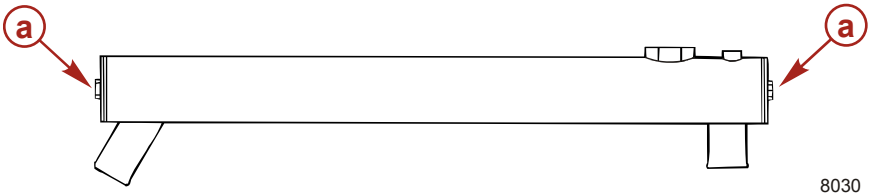
Avoid seawater entry into the boat. When cleaning engine oil or power steering coolers with the boat in the water, be sure to close off the water supply from the seawater pump to the cooler or water may enter the boat when end plates or hoses are removed.

The seawater section of oil cooler should be cleaned at least once a year or whenever decreased cooling efficiency is noticed.

ENGINE OIL COOLER

NOTE: *The engine oil cooler is located on the top rear portion of the engine.*

1. Remove end plates and gaskets.



a - End plates (2)

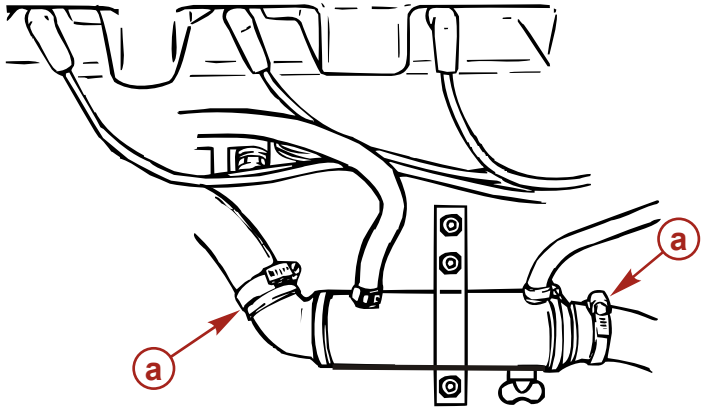
2. Clean oil cooler with a suitable brush.
3. Flush passages with fresh water.
4. Inspect gaskets for deterioration and replace if necessary.
5. Install gaskets and end plates. Tighten screws securely.

POWER STEERING COOLER

NOTE: *The power steering cooler is located on the lower port side of the engine.*

1. Loosen water hose clamps and remove hoses if it is necessary to inspect or clean cooler.

IMPORTANT: If the oil hoses need to be removed from the cooler, be prepared to cap or plug them to avoid draining the power steering reservoir.



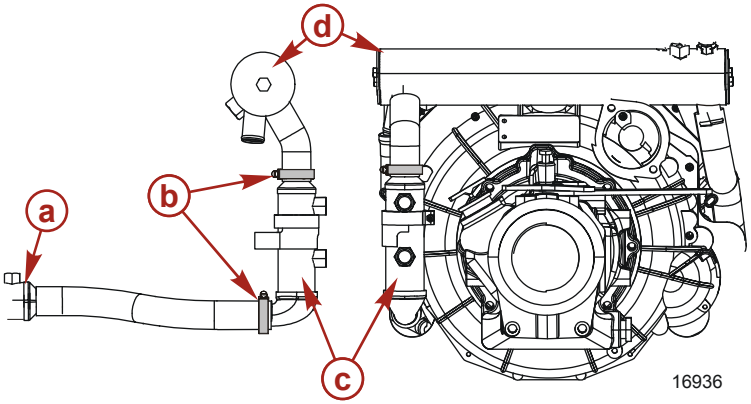
a - Hose clamps (2)

2. Re-install cooler and tighten hose clamps securely.
3. Check power steering fluid level.
4. Start engine and inspect cooling system for leaks.

TRANSMISSION COOLER

NOTE: *The transmission cooler is located on the lower rear port side of the engine, next to the flywheel.*

1. Loosen the hose clamps and remove the water hoses to inspect and clean the cooler.



a - Power steering cooler
b - Hose clamps
c - Transmission cooler
d - Engine oil cooler

2. Clean the oil cooler with a suitable brush.
3. Flush the cooler with fresh water.
4. Drain the water from the cooler and hoses completely.
5. Install the hoses and clamps. Tighten the screws securely.

Changing Positive Crankcase Ventilation Valve

This engine is equipped with a positive crankcase ventilation valve (PCV). This valve should be changed every 100 hours of operation or at least once a year, whichever occurs first.

- Pull valve out of intake manifold and remove valve from hose.
- Install new PCV valve into hose, and install into intake manifold.
- Ensure that the valve is tightly seated in manifold.

Use only Mercury MerCruiser replacement parts.

Serpentine Drive Belt

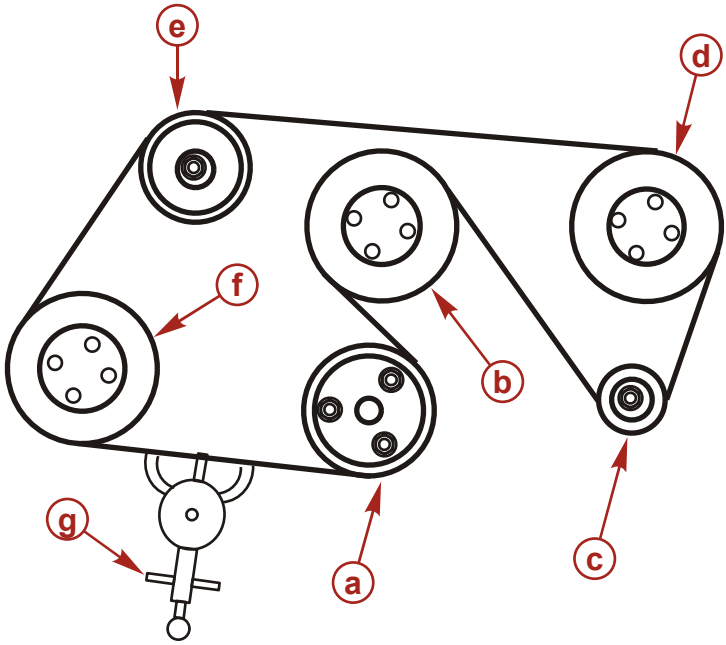
DRIVE BELT ROUTING AND TENSION

⚠ WARNING

Avoid possible serious injury. Make sure engine is shut off and ignition key is removed before inspecting belt.

IMPORTANT: Drive belt must be routed as shown or damage may result.

1. Loosen the 5/8 in locking nut on adjustment stud. Leave the wrench on the adjustment nut.
2. Install the belt tension gauge onto the belt.
3. Use a 5/16 in socket and tighten adjusting stud until the belt tension conforms to the correct setting on the gauge.
4. Hold the adjustment stud and tighten the 5/8 in locking nut.
5. Remove the belt tension gauge from the belt.
6. Run the engine for a short period of time and re-check tension.



6163

a - Crankshaft pulley
b - Circulating pump pulley
c - Alternator pulley
d - Power steering pulley (Non-power steering models have an idler pulley)
e - Idler pump
f - Seawater pump pulley
g - Belt tension gauge

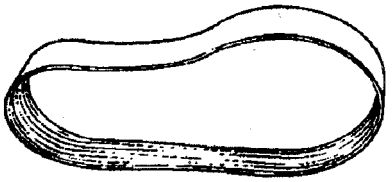
Description	N	lb.
New Belt	489	110
Used Belt	400	90

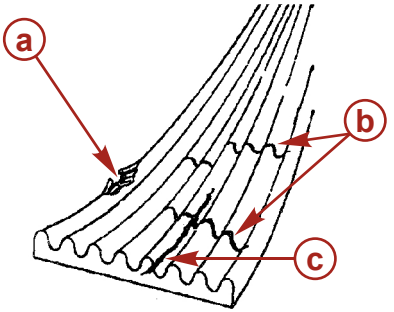
INSPECTING BELT

NOTE: *Minor, transverse cracks (across the belt width) may be acceptable. Longitudinal cracks (in the direction of belt length) that join transverse cracks are not acceptable.*

The belt will have to be replaced for the following conditions:

- Excessive wear
- Cracks or fraying
- Glazed surfaces





6164

a - Fraying
b - Transverse cracks
c - Longitudinal cracks

Fuel Filters

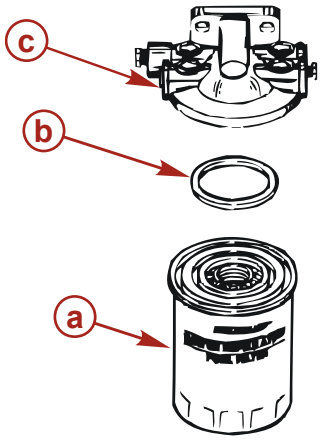
⚠ WARNING

Explosion Hazard. Avoid personal injury, death, or property damage. Adhere to the following procedures when working with fuel or components of the fuel system:

- **Disconnect the negative battery lead or turn the battery switch(es) to the off position and remove any other possible sources of spark.**
- **Extinguish all open flames.**
- **Work in a well-ventilated area and avoid prolonged exposure to fuel vapors.**
- **Clean up any fuel spills immediately.**

WATER SEPARATOR

1. Remove water separating fuel filter (by turning counterclockwise) and sealing ring from mounting bracket and discard.



6152

a - Water seperating fuel filter
b - Sealing ring
c - Mounting bracket

2. Coat sealing ring on new filter with motor oil.
3. Thread filter clockwise onto bracket and tighten securely by hand.

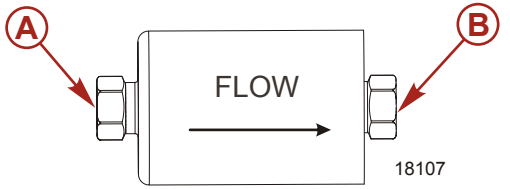
IMPORTANT: Do not use a filter wrench.

4. Start and run engine. If the engine stops or will not start, it may be necessary to prime the fuel system (see *Priming the Fuel System Prior to Starting* in the **Cold Weather or Extended Storage** section of this manual.)
5. Check filter connection for gasoline leaks. If leaks exist, re-check filter installation.
6. If leaks continue, stop engine immediately and contact your authorized Mercury MerCruiser dealer.

FUEL FILTER

1. Apply a drop of oil on the threads of the filter.

2. Install the fuel filter as shown. Tighten the fittings carefully, do not overtighten. Wipe away any excess oil.



a - From fuel pump **b -** To fuel rails

3. Check filter connection for gasoline leaks. If leaks exist, re-check filter installation.

Corrosion and Corrosion Protection

Whenever two or more dissimilar metals (like those found on the sterndrive) are submerged in a conductive solution, such as saltwater, polluted water, or water with a high mineral content, a chemical reaction takes place causing electrical current to flow between metals. The electrical current flow causes the metal that is most chemically active, or anodic, to erode. This is known as galvanic corrosion and, if not controlled, it will in time cause the need for replacement of power package components exposed to water.

Refer to the Quicksilver booklet, **Everything You Need to Know About Marine Corrosion** for more corrosion information.

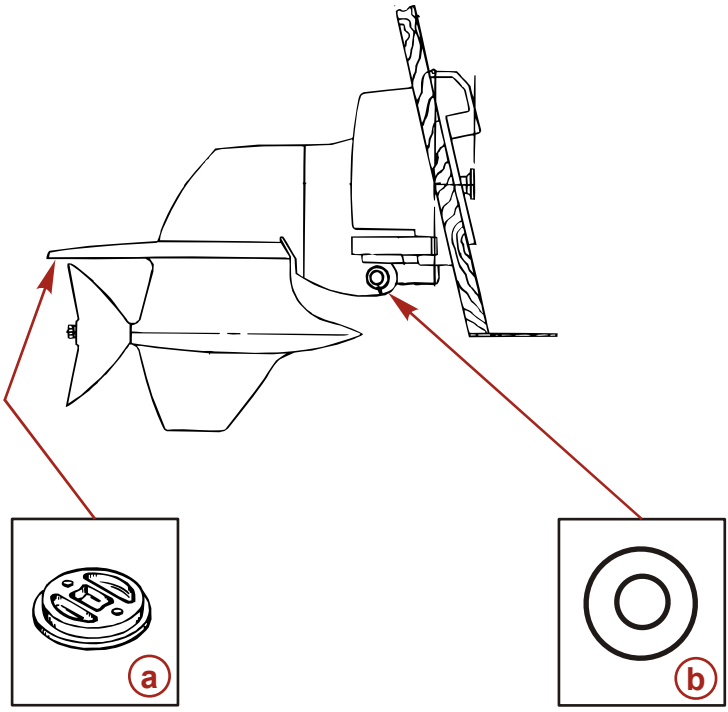
⚠ CAUTION

Avoid corrosion damage. Do not use magnesium anodes in salt water. They will provide overprotection, resulting in a different electrochemical reaction that will create hydrogen on the metal surface of the drive, under the paint. This causes the paint to blister and peel completely from the surface of the overprotected drive.

IMPORTANT: Mercury recommends that a Anti-Corrosion Kit be installed whenever using a stainless steel propeller, or if the boat is equipped with stainless steel components (immersed below the waterline) that are connected into the engine ground system. If a boat is equipped with stainless steel after planes, a large anode should be installed on each to handle the increased galvanic corrosion potential.

Replace sacrificial anodes if eroded 50% or more.

Mercury Marine recommends using anodes sold through Mercury Precision Parts only. Some other manufacturers of aluminum anodes use alloys that are insufficiently pure to adequately protect critical drive components for the duration of the anodes' expected life.



a - VI Drive - An anode is mounted to the underside of the anti-ventilation plate and is retained by two nuts.

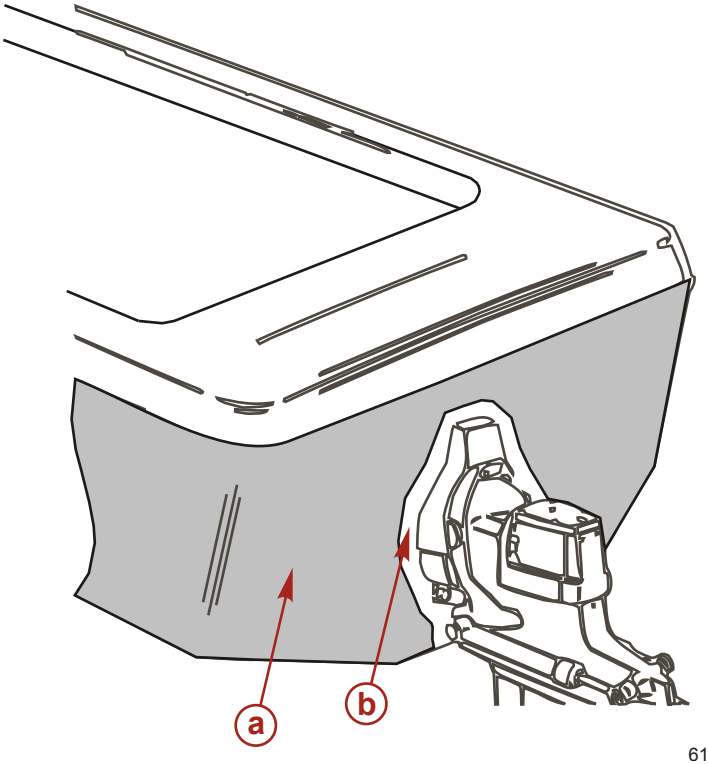
b - VI Drive - There are additional anodes on the trim cylinder pins.

In addition to the corrosion protection devices, follow these steps to inhibit corrosion:

1. **Painting Boat Hull or Boat Transom**

a. If anti-fouling protection is required for boat hull or boat transom, copper or tin base paints can be used unless otherwise prohibited by law.

b. If using copper or tin based anti-fouling paints, avoid any electrical interconnection between the Mercury Marine Product, anodic blocks, and the paint by allowing a minimum of 40 mm (1.5 in.) unpainted area on the transom of the boat around these items.



6118

a - Anti-fouling paint
b - Unpainted area

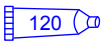
IMPORTANT: Corrosion damage that results from the improper application of anti-fouling paint will not be covered by the limited warranty.

NOTE: *Do not paint anodes as this will render them ineffective as galvanic corrosion inhibitors.*

2. **Painting Drive Unit or Transom Assembly**

- Paint the drive unit and transom assembly with a good quality marine paint or an anti-fouling paint that does not contain copper, tin, or any other material that could conduct electrical current. Do not paint drain holes, anodes, or items specified by the boat manufacturer.

3. **Additional Corrosion Prevention Tips**
   - Spray the power package components on the inside of the boat every two to three weeks with Corrosion Guard to protect the finish from dulling and corrosion. External power package components may also be sprayed.

Tube Ref No.	Description	Where Used	Part No.
	Corrosion Guard	Power package	92-802878-5 5

- All lubrication points, especially the steering system and shift and throttle linkages, should be kept well lubricated.
- Flush the cooling system after each use.

Battery

All lead acid batteries discharge when not in use. Recharge every 30 to 45 days, or when specific gravity drops below battery manufacturer's specifications.

Refer to specific instructions and warnings accompanying your battery. If this information is not available, observe the following:

⚠ WARNING

Observe the following when jump starting, charging or handling a battery:

- **Do not use jumper cables and a booster battery to start engine.**
- **When charging batteries, ensure battery compartment or area where batteries are located, is well-vented.**
- **Do not recharge a weak battery in the boat.**
- **Remove battery and recharge in a ventilated area away from fuel vapors, sparks or flames.**
- **Hydrogen gases that escape from the battery during charging are explosive.**
- **Batteries contain acid that can cause severe burns - Avoid contact with skin, eyes and clothing.**
- **Batteries produce hydrogen and oxygen gases when being charged.**
- **This explosive gas escapes fill/vent cell caps and may form an explosive atmosphere around the battery for several hours after it has been charged.**
- **Sparks or flames can ignite the gas and cause an explosion which may shatter the battery and could cause blindness or other serious injury.**

Bottom of Boat

To maintain maximum speed, ensure that the boat bottom is:

- Clean, free of barnacles and marine growth.
- Free of distortion, nearly flat where it contacts water.
- Straight and smooth, fore and aft.

Marine vegetation may accumulate when the boat is docked. This growth must be removed before operation; it may clog water inlets and cause the engine to overheat.

Inspection and Maintenance

Inspect the power package often and at regular intervals to help maintain its top operating performance, and correct potential problems before they occur. The entire power package should be checked carefully, including all accessible engine parts.

1. Check for loose, damaged or missing parts, hoses and clamps; tighten or replace as required.

2. Check plug leads and electrical leads for damage.
3. Remove and inspect the propeller. If nicked, bent or cracked, see your authorized Mercury Marine dealer.
4. Repair nicks and corrosion damage on the power package's exterior finish. Use Quicksilver spray paints - see your authorized Mercury Marine dealer.

Attention Required After Submersion

- Before recovery, contact an authorized Mercury Marine dealer.
- After recovery, immediate service by an authorized Mercury Marine dealer is required to prevent serious damage to power package.

COLD WEATHER OR EXTENDED STORAGE

Power Package Lay-up

IMPORTANT: This service should be performed by an authorized Mercury Marine dealer.

⚠ CAUTION

Avoid engine or sterndrive damage; Do not operate the engine without water flowing through the seawater pickup pump. The pump impeller can be damaged and damage to the engine or sterndrive unit may result.

IMPORTANT: Before starting the engine, attach a water source to the seawater pickup pump. Follow all warnings and flushing attachment procedures stated in the *Flushing Cooling System* section of this manual.

Refer to **Flushing Cooling System** to prepare the engine for flushing. Cooling system flushing and the fuel system storage procedures are performed together.

⚠ WARNING

Avoid Fire or Explosion. Ensure that the engine compartment is well ventilated and no gasoline vapors are present during the following operation.

Prepare the fuel system for extended storage by:

1. Mixing the following in a 23 liter (6 U.S. gal) remote outboard fuel tank:
   - 19 liter (5 U.S. gal) premium unleaded 92 octane (R+M)/2 (98 RON) gasoline.
   - 1.89 liter (64 fl oz) Premium Plus 2-cycle TC-W3 outboard oil.
   - 150 ml (5 fl oz) Fuel System Treatment and Stabilizer or 30 ml (1 fl oz) Fuel System Treatment and Stabilizer Concentrate.
2. Close the fuel shutoff valve located between the fuel tank and the water separating fuel filter.
3. Disconnect and plug the boat's fuel line from the water separating fuel filter inlet.
4. Connect the remote outboard fuel tank to the inlet of the water separating fuel filter.

5. Have the engine ready for flushing as explained in the **Flushing Cooling System** section of this manual (cooling system flushing and the fuel system storage procedures are performed together). Start and run the engine at 1000 RPM for a minimum of five minutes or longer (if required) to complete the fuel system preperation and the cooling system flushing.
6. After the specified running time is complete, slowly return the throttle to idle RPM and shut off the engine.

IMPORTANT: Maintain an adequate supply of the fuel/fogging mixture in the remote 23 liter (6 U.S. gal) tank to complete the fuel system treatment and flushing procedure. Do not let the remote tank or fuel system run dry.

7. If fuel in the main tank(s) contains alcohol, (if fuel without alcohol is not available) drain the fuel tank(s) completely and add Gasoline Stabilizer and Conditioner to any fuel remaining in the tank(s) before storage.
8. Close the fuel shut off valve, if equipped.
9. Change the engine oil and oil filter.

⚠ CAUTION

Avoid damage to the sterndrive unit. Always store the sterndrive unit in the full down position. The universal joint bellows may develop a set if unit is stored in raised position and may fail when unit is returned to service.

10. Place the drive unit in the full down position.

Draining Instructions

⚠ CAUTION

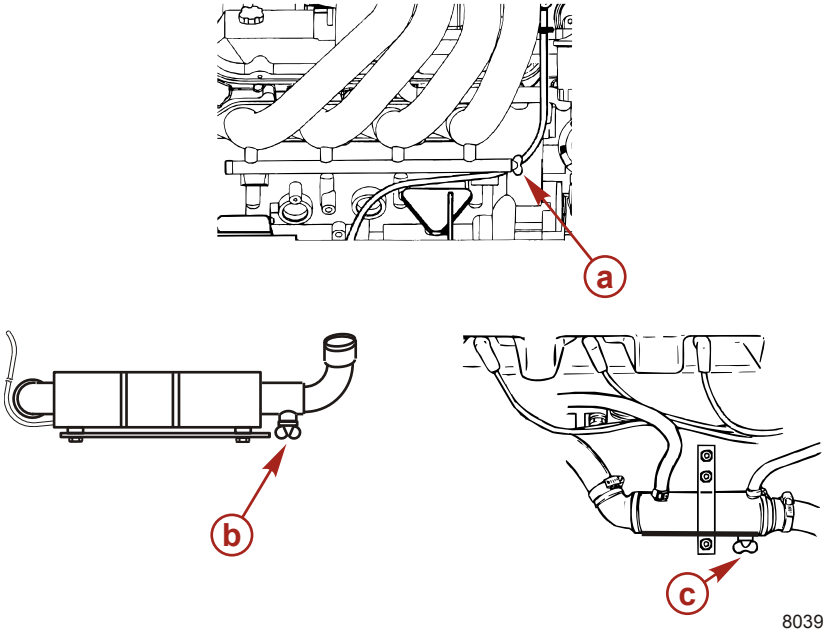
To prevent damage from freezing temperatures, remove and plug the seawater inlet hose. This prevents a siphoning action that may occur, allowing seawater to flow into the drain holes or hoses.

Completely drain the cooling system for winter storage, or immediately after cold weather use, if the possibility of freezing temperatures exist. Failure to comply may result in trapped water causing freezing and/or corrosion damage to the engine.

IMPORTANT: The boat must be as level as possible to ensure complete draining of cooling system.

1. Remove the following drain plugs:

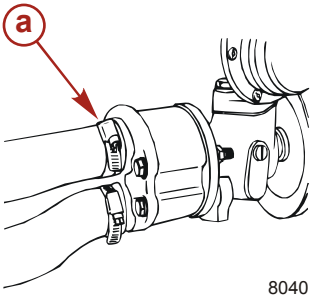
- End of exhaust manifold balance rail (plastic wingnut plugs, port and starboard)
- Fuel cooler (plastic wingnut plug, below engine front)
- Bottom of power steering cooler (plastic wingnut plug)



a - Exhaust manifold balance rail wingnut
b - Fuel cooler wingnut
c - Power steering cooler wingnut

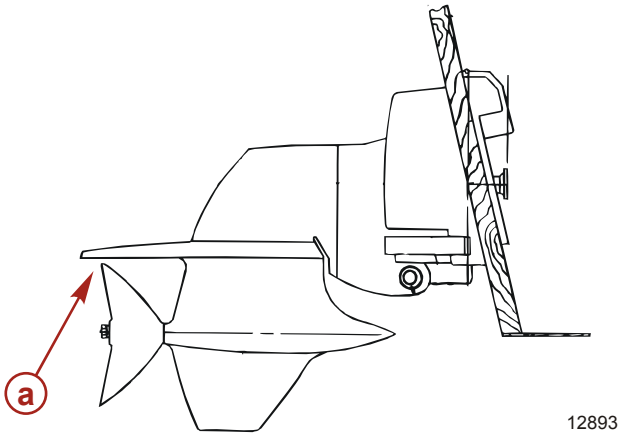
2. Repeatedly clean out drain holes using a stiff piece of wire. Do this until entire system is drained.
3. Loosen hose clamp and remove the hose from inlet fitting of seawater pickup pump.

NOTE: *Lift or bend hoses to allow water to drain completely.*



a - Hose clamp

4. After draining seawater cooling system, install drain plugs (Perfect Seal is not required on wing nut type plugs), reconnect hoses and tighten all hose clamps securely.
5. Make sure the following passages are open and unobstructed:



a - Speedometer pitot tube
b - Trim tab cavity vent hole
c - Trim tab cavity drain passage

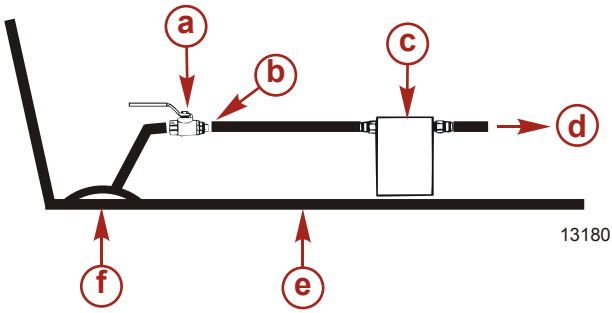
6. For additional assurance against freezing and rust in the engine seawater cooling system when storing for winter or long periods of non use, perform the following steps:

IMPORTANT: A nontoxic and environmentally safe ethylene glycol antifreeze containing a rust inhibitor must be used when preparing the seawater section of the cooling system for cold weather or extended storage. Be certain to follow the manufacturer's recommendations.

COLD WEATHER OR EXTENDED STORAGE

NOTE: If the boat is in the water during the following procedure, the seawater shut off valve must be closed and the hose removed from the engine side of the valve to avoid water entering the boat.

a. Remove seawater inlet hose leading to the seawater pump and place the hose into a container of ethylene glycol antifreeze to protect engine to the lowest temperature to which it will be exposed during cold weather or extended storage.



a - Seawater shut off valve
b - Disconnect hose here and place into container of antifreeze
c - To the seawater pump

b. Operate engine at idle until antifreeze is expelled from the exhaust manifolds of the engine.

c. Stop the engine and reconnect the pickup hose.

7. Perform all checks, inspections, lubrication, and fluid changes outlined in the **Maintenance Chart** under at least once a year.

Battery Winter Storage

Follow the battery manufacturer's instructions for storage.

Power Package Recommissioning

⚠ WARNING

To prevent possible injury or damage to equipment, do not install the battery until all engine maintenance has been performed.

1. Ensure that all cooling system hoses are connected properly and hose clamps are tight, all removed drain plugs have been installed and are tight.

COLD WEATHER OR EXTENDED STORAGE

⚠ CAUTION

When installing the battery, be sure to connect the POSITIVE (+) battery cable to the POSITIVE (+) battery terminal and the NEGATIVE (-) battery cable to the Negative (-) battery terminal. If battery cables are reversed, electrical system damage will result.

2. Install fully-charged battery. Clean battery cable clamps and terminals and reconnect cables. Tighten each cable clamp securely when connecting.
3. Coat battery terminal connections with a anti-corrosion agent.
4. Perform all checks in **Operation Chart** in the *Before Starting* column.
5. Refer to **Flushing Cooling System** before starting engine.
6. Supply water to engine cooling system.

STARTING WITHOUT PRIMING THE FUEL SYSTEM

IMPORTANT: The throttle must not be advanced until the engine idles and runs smoothly and the water temperature reaches a minimum of 54 °C (130 °F). Advancing the throttle prematurely while the PCM is in its rich running mode will result in poor engine starting and performance.

1. Connect the main permanent fuel line to the engine.
2. Do not advance the throttle until the engine idles and runs smoothly and the water temperature reaches a minimum of 54 °C (130 °F).
3. Crank the engine over for 10 seconds at a time and stop.
4. Repeat cranking procedure until the engine starts and runs smoothly. Observe instrumentation to insure all systems are functioning.
5. Inspect engine for fuel, oil, fluid, water and exhaust leaks.
6. Check steering system, shift and throttle control for proper operation.

COLD WEATHER OR EXTENDED STORAGE

PRIMING THE FUEL SYSTEM PRIOR TO STARTING

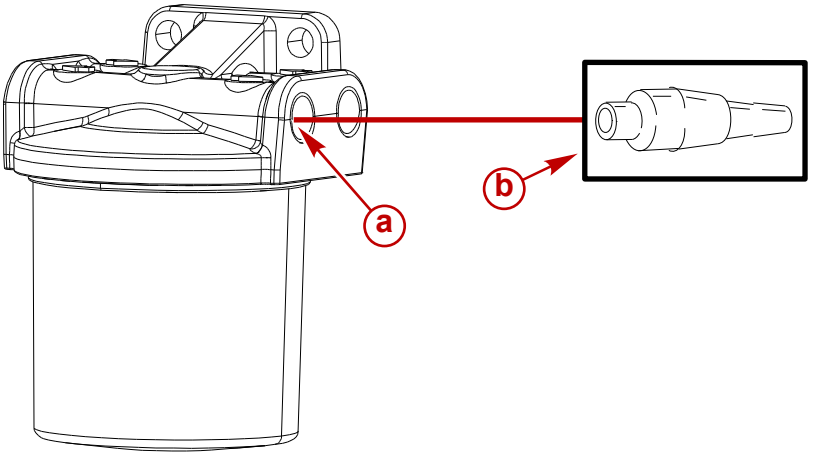
⚠ WARNING

Avoid fire or explosion. Gasoline is extremely flammable and highly explosive. Ensure key switch is "OFF." Do not smoke or allow a spark or open flame in area when removing or installing fuel components. Wipe up any spilled fuel immediately.

⚠ CAUTION

Apply Loctite Pipe Sealant with Teflon to the threads of the fuel inlet connector. Do not use Teflon tape. To prevent cracking the casting and/or fuel leaks, turn the inlet connector in by hand finger-tight, then tighten it an additional 1-3/4 to 2-1/2 turns with a wrench. Do not overtighten. Inspect for leaks.

1. Remove the plug from the water separating fuel filter as shown following and install a barbed fitting into the water separating fuel filter.



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a - Water seperating fuel filter plug
b - Barbed fitting

2. Attach an outboard type portable fuel tank with primer bulb to the barbed fitting with a hose clamp.
3. Squeeze the primer bulb until the bulb becomes firm.

NOTE: *Do not turn the key switch to the "START" position during the following priming procedure.*

4. Cycle the ignition key switch to the "RUN" position for three seconds and then "OFF."
5. Repeat steps three and four, one to two more times. The object of this procedure is to prime the fuel system but not to the point of having the system completely full and the primer bulb hard and under pressure.
6. With the primer bulb soft, remove the remote fuel line and fitting from the water separating fuel filter.

⚠ WARNING

Avoid fuel spillage and fire hazard. When removing the remote fuel tank line from the engine connection, ensure that the primer bulb is soft. If the primer bulb is hard, pressurized fuel will be sprayed in the engine compartment.

7. Re-install the plug in the water separating fuel filter using Loctite Pipe Sealant with Teflon on the threads.
8. Attempt to start the engine by turning the key switch to the "START" position for a maximum of 15 seconds or until the engine starts and runs smoothly. Do not advance the throttle until the water temperature has reached a minimum of 54 °C (130 °F).

IMPORTANT: The throttle must not be advanced until the engine idles and runs smoothly and the water temperature has reached a minimum of 54 °C (130 °F). Advancing the throttle prematurely while the ECM is in its rich running mode will result in poor engine starting and performance.

9. Inspect engine for fuel, oil, fluid, water and exhaust leaks.
10. Check steering system, shift and throttle control for proper operation.

TROUBLESHOOTING

Engine Will Not Crank

Possible Causes	Remedy
Battery switch turned "OFF."	Turn switch "ON."
Gearshift not in neutral position.	Position control lever to neutral.
Open circuit breaker or blown fuse.	Check and reset circuit breaker or replace fuse.
Loose or dirty electrical connections or damaged wiring.	Check all electrical connections and wires (especially battery cables). Clean and tighten faulty connection.
Defective battery.	Test and replace if defective.
Defective starter.	Test and replace if defective.
Flywheel ring gear is damaged.	Confirm diagnostic and replace flywheel.
Engine is seized.	Check to see if engine can be rotated by hand with the spark plugs removed. If not, then determine cause.
Faulty ignition switch.	Test wire with a remote starter switch at the starter motor.

TROUBLESHOOTING

Engine Cranks But Will Not Start

Possible Cause	Remedy
Improper starting procedure	Read starting procedure
Low battery voltage	Charge the battery
Empty fuel tank or fuel shut off valve closed	Fill tank or open valve
Faulty fuel pump, wiring, fuel pump fuse, 50 amp circuit breaker or a fuel pump relay	Replace faulty component
Faulty ignition system component	Service ignition system
Lanyard Stop Activated	Reset
Obstructed fuel filter	Replace filters
Stale or contaminated fuel	If contaminated, drain tank and fill with fresh fuel
Fuel line or tank vent line kinked or restricted	Replace kinked lines or blow out lines with compressed air to remove obstruction
Crankshaft position sensor faulty	Test and replace if faulty
Faulty fuel pressure regulator diaphragm	Test and replace if faulty. Do not attempt to start the engine if the fuel pressure regulator diaphragm is ruptured.

TROUBLESHOOTING

Engine Hard to Start, Runs Rough, Misses, and/or Backfires

Possible Cause	Remedy
Faulty ignition system component.	Service ignition system.
Clogged fuel filter.	Replace filters.
Stale or contaminated fuel.	If contaminated, drain tank. Fill with fresh fuel.
Kinked or clogged fuel line or fuel tank vent line.	Replace kinked lines or blow out lines with compressed air to remove obstruction.
Flame arrestor plugged.	Clean or replace the flame arrestor.
Rev limiter engaging at wide-open-throttle.	Change to propeller with more pitch.
Idle speed too low.	If contaminated, drain tank and fill with fresh fuel.

Low Engine Coolant (Closed Cooling) Temperature

Possible Cause	Remedy
Faulty thermostat.	Replace.

Poor Performance

Possible Cause	Remedy
Throttle not fully open.	Inspect throttle cable and linkages for proper operation.
Damaged or wrong propeller.	Replace propeller.
Excessive bilge water.	Drain and check for cause of entry.
Boat overloaded or load improperly distributed.	Reduce load or redistribute load more evenly.
Boat bottom fouled or damaged.	Clean or repair as necessary.
Flame arrestor dirty.	Change or clean flame arrestor.

Insufficient Engine Temperature

Possible Cause	Remedy
Faulty water thermostat.	Replace water thermostat.
Faulty gauge or sender.	Test with shop gauge; test sender.
Faulty oil thermostat.	Replace.

Excessive Engine Temperature

Possible Cause	Remedy
Seacock closed.	Open.
Serpentine belt loose or in poor condition.	Replace or adjust belt.
Insufficient coolant in closed cooling system.	Add coolant and check for leaks.
Recirculating pump defective.	Replace.
Seawater pickups obstructed.	Inspect.
Faulty thermostat.	Replace.
Oil cooler cores plugged with foreign material.	Clean cooler cores.
Faulty seawater pickup pump.	Repair.
Seawater discharge restricted or plugged.	Clean exhaust elbows.
Faulty gauges or senders.	Test with shop gauges; test senders.
Aerated water supply to water pick-up.	Place water pick-up in a non-aerated water supply.

TROUBLESHOOTING

Low Engine Oil Pressure

Possible Cause	Remedy
Insufficient oil in system.	Check and add oil.
Excessive oil in system (causing it to become aerated).	Check and bring oil to required level. Check for cause of excessive oil (improper filling, defective fuel pump, etc.).
Diluted or improper viscosity oil.	Change oil and oil filter, using correct grade and viscosity oil. Determine cause for dilution (excessive idling, faulty fuel pump, etc.).
Faulty gauge or sender.	Test with mechanical shop gauge; test sender.
Excessive oil temperature.	Faulty oil thermostat.
Engine mechanical: oil pump, excessive bearing clearance, etc.	Repair as necessary.

Battery Will Not Come Up On Charge

Possible Cause	Remedy
Excessive current draw from battery.	Turn off non-essential accessories.
Loose or dirty electrical connections or damaged wiring.	Check all associated electrical connections and wires (especially battery cables). Clean and tighten faulty connections. Repair or replace damaged wiring.
Alternator drive belt loose or in poor condition.	Replace and/or adjust.
Defective battery.	Test battery.

Power Trim Does Not Operate (Motor Doesn't Run)

Possible Cause	Remedy
Open fuse.	Replace fuse.
Loose or dirty electrical connections or damaged wiring.	Check all associated electrical connections and wires (especially battery cables). Clean and tighten faulty connections. Repair or replace damaged wiring.

TROUBLESHOOTING

Power Trim Does Not Operate (Motor Runs But Drive Unit Does Not Move)

Possible Cause	Remedy
Trim pump oil level low.	Fill pump with oil.
Drive binding in gimbal ring.	Check for obstruction.

Remote Control Operates Hard, Binds, Has Excessive Free-Play or Makes Unusual Sounds

Possible Cause	Remedy
Insufficient lubrication on shift and throttle linkage fasteners.	Lubricate.
Loose or missing shift and throttle linkage fasteners.	Check all linkages. If any are loose or missing, see authorized Mercury Marine dealer immediately.
Shift or throttle cable kinked.	Replace cable.
Friction adjustment excessive.	Adjust friction.

Steering Wheel Turns Hard or Jerky

Possible Cause	Remedy
Low power steering pump fluid level.	Refill system with fluid and check for leaks.
Sepentine belt loose or damaged.	Replace and/or adjust.
Insufficient lubrication on steering system components.	Lubricate.
Loose or missing steering fasteners or parts.	Check all parts and fasteners. If any are loose or missing, see authorized Mercury Marine dealer immediately.
Contaminated power steering fluid.	Drain and replace.

OWNER SERVICE ASSISTANCE

Local Repair Service

Always return your outboard to your local authorized dealer should the need for service arise. Only he has the factory trained mechanics, knowledge, special tools, equipment, and genuine parts and accessories to properly service your engine should the need occur. He knows your engine best.

Service Away From Home

If you are away from your local dealer and the need arises for service, contact the nearest authorized dealer. Refer to the Yellow Pages of the telephone directory. If, for any reason, you cannot obtain service, contact the nearest Mercury Marine Service Office.

Parts And Accessories Inquiries

All inquiries concerning genuine replacement parts and accessories should be directed to your local authorized dealer. The dealer has the necessary information to order parts and accessories for you. When inquiring on parts and accessories, the dealer requires the model and serial number to order the correct parts.

Service Assistance

Satisfaction with your Sterndrive or Inboard product is very important to your dealer and to us. If you ever have a problem, question or concern about your Sterndrive or Inboard product, contact your dealer or any authorized Mercury Marine dealer. If additional assistance is required, take these steps.

1. Talk with the dealership's sales manager or service manager. If this has already been done, then contact the owner of the dealership.
2. Should you have a question, concern, or problem that cannot be resolved by your dealership, please contact Mercury Marine Service Office for assistance. Mercury Marine will work with you and your dealership to resolve all problems.

The following information will be needed by the service office:

- Your name and address
- Daytime telephone number
- Model and serial number of your outboard
- The name and address of your dealership
- Nature of problem

OWNER SERVICE ASSISTANCE

Mercury Mercruiser Service Offices

For assistance, call, fax, or write. Please include your daytime telephone number with mail and fax correspondence.

United States		
Telephone	Fax	Mercury MerCruiser 3003 N. Perkins Road Stillwater, OK 74075
(405) 743-6566	(405) 743-6570	
United States (Mercury Racing)		
Telephone	Fax	Mercury Racing N7480 County Rd. UU Fond du Lac, WI 54935-9585
(920) 924-2088	(920) 924-2096	
Canada		
Telephone	Fax	Mercury Marine Ltd. 2395 Meadowpine Blvd. Mississauga, Ontario L5N 7W6 Canada
(905) 567-6372	(905) 567-8515	
Australia, Pacific		
Telephone	Fax	Mercury Marine Australia 132-140 Frankston Road Dandenong, Victoria 3164 Australia
(61) (3) 9791-5822	(61) (3) 9793-5880	

OWNER SERVICE ASSISTANCE

Europe, Middle East, Africa		
Telephone	Fax	Marine Power - Europe, Inc. Parc Industriel de Petit-Rechain B-4800 Verviers, Belgium
(32) (87) 32 • 32 • 11	(32) (87) 31 • 19 • 65	
Mexico, Central America, South America, Caribbean		
Telephone	Fax	Mercury Marine 11650 Interchange Circle North Miramar, FL 33025 U.S.A.
(954) 744-3500	(954) 744-3535	
Japan		
Telephone	Fax	Mercury Marine - Japan 283-1 Anshin-cho Hamamatsu Shizuoka, 435-0005 Japan
81-53-423-2500	81-53-423-2510	
Asia, Singapore		
Telephone	Fax	Mercury Marine- Singapore 72 Loyang Way Singapore, 508762
5466160	5467789	

ORDERING LITERATURE

United States and Canada

Before ordering literature, please have the following information about your power package available:

Engine Model:		**Horsepower:**	
Serial Number:		**Model year:**	

For information on additional literature that is available for your particular Mercury/MerCruiser power package and how to order that literature contact your nearest dealer or contact:

MERCURY MARINE		
Telephone	**Fax**	**Mail**
(920) 929-5110	(920) 929-4894	Mercury Marine Attn: Publications Department P.O. Box 1939 Fond du Lac, WI 54936-1939

Outside The United States and Canada

Before ordering literature, please have the following information about your power package available:

Engine Model:		**Horsepower:**	
Serial Number:		**Model year:**	

Contact your nearest dealer or Marine Power Service Center for information on additional literature that is available for your particular Mercury/MerCruiser power package and how to order that literature.

MAINTENANCE LOG

Maintenance Log

Record all maintenance performed on your outboard here. Be sure to save all work orders and receipts.

Date	Maintenance Performed	Engine Hours