Gasoline Engines - Sterndrive MPI Models

Identification Record

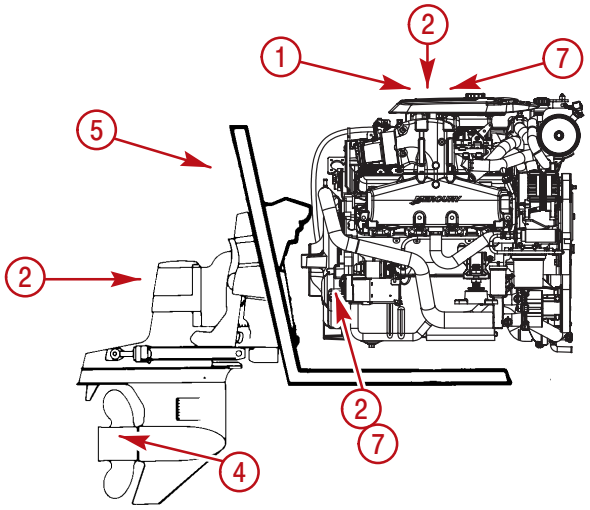
PLEASE RECORD THE FOLLOWING INFORMATION:

1.			
	Engine Model and Horsepower		Engine Serial Number
2.			
	Transom Assembly Serial Number (Sterndrive)	Gear Ratio	Sterndrive Unit Serial Number
3.			
	Transmission Model (Inboard)	Gear Ratio	Transmission Serial Number
4.			
	Propeller Number	Pitch	Diameter
5.			
	Hull Identification Number (HIN)		Purchase Date
6.			
	Boat Manufacturer	Boat Model	Length
7.			
	Exhaust Gas Emissions Certificate Number		

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

The description and specifications contained herein were in effect at the time this guide was approved for printing. Mercury Marine, whose policy is one of continuous improvement, reserves the right to discontinue models at any time, or to change specifications or designs, without notice and without incurring obligation.

Mercury Marine, Fond du Lac, Wisconsin, U.S.A. Printed in U.S.A.



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Welcome!

You have selected 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 and 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.

Thank you for purchasing one of our Mercury MerCruiser products. We sincerely hope your boating will be pleasant!

Mercury MerCruiser

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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* Sections 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.

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Mercury Marine products are designed and manufactured to comply with our own high quality standards, applicable industry standards and regulations, as well as certain emissions regulations. At Mercury Marine every engine is operated and tested before it is boxed for shipment to make sure that the product is ready for use. In addition, certain Mercury Marine products are tested in a controlled and monitored environment, for up to 10 hours of engine run time, in order to verify and make a record of compliance with applicable standards and regulations. All Mercury Marine product, sold as new, receives the applicable limited warranty coverage, whether the engine participated in one of the test programs described above or not.

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Read This Manual Thoroughly

IF YOU DON'T UNDERSTAND ANY PORTION, CONTACT YOUR DEALER FOR A DEMONSTRATION OF ACTUAL STARTING AND OPERATING PROCEDURES.

NOTICE

Throughout this publication, and on your power package, **WARNINGS** and **CAUTIONS**, accompanied by the International Hazard Symbol ⚠, may be used to alert the installer/user to special instructions concerning a particular service or operation that may be hazardous if performed incorrectly or carelessly. **Observe them carefully.**

These Safety Alerts alone cannot eliminate the hazards that they signal. Strict compliance with these special instructions while performing the service, plus common sense operation, are major accident prevention measures.

⚠ WARNING

WARNING - Hazards or unsafe practices which could result in severe personal injury or death.

⚠ CAUTION

CAUTION - Hazards or unsafe practices which could result in minor personal injury or product or property damage.

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

⚠ 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.

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⚠ WARNING

California Proposition 65 Warning

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

WARRANTY

GETTING TO KNOW YOUR POWER PACKAGE

ON THE WATER

SPECIFICATIONS

MAINTENANCE

STORAGE

TROUBLESHOOTING

CUSTOMER ASSISTANCE INFORMATION

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WARRANTY

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Warranty Information

Owner Warranty Registration

UNITED STATES AND CANADA ONLY

- It is important that your selling dealer fills out the Warranty Registration Card completely and mails it to the factory immediately upon sale of the new product.
- It identifies name and address of the original purchaser, product model and serial number(s), date of sale, type of use and selling dealer's code, name and address. The dealer also certifies that you are the original purchaser and user of the product.
- Upon receipt of the Warranty Registration Card at the factory, you will be issued a plastic Owner Warranty Registration Card which is your only valid registration identification. It must be presented to the servicing dealer should warranty service be required. Warranty claims will not be accepted without presentation of this card.
- A temporary Owner Warranty Registration Card will be presented to you when you purchase the product. It is valid only for 30 days from date of sale while your plastic Owner Warranty Registration Card is being processed. Should your product need service during this period, present the temporary registration card to the dealer. He will attach it to your warranty claim form.
- Because of your selling dealer's continuing personal interest in your satisfaction, the product should be returned to him for warranty service.
- If your plastic card is not received within 30 days from date of new product sale, please contact your selling dealer.
- The product warranty is not effective until the product is registered at the factory.
- NOTICE: Registration lists must be maintained by factory and dealer on marine products sold in the United States, should notification under the Federal Boat Safety Act be required.
- You may change your address at any time, including at time of warranty claim, by calling Mercury MerCruiser or sending a letter or fax with you name, old address, new address, and engine serial number to Mercury MerCruiser's warranty registration department. Your dealer can also process this change of information.

Mercury Marine
Attn: Warranty Registration Department
W6250 Pioneer Road
P.O. Box 1939
Fond du Lac, WI 54935-1939
Phone: 920-929-5054
Fax: 920-929-5893

International Owner Registration

OUTSIDE THE UNITED STATES AND CANADA

- 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.
- The Warranty Registration Card identifies your name and address, product model and serial number(s), 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.
- 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 form(s).
- 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.
- For further information concerning the Warranty Registration Card and its relationship to Warranty Claim processing, refer to the "International Warranty." Refer to "Table of Contents."

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.

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Warranty Policies

Mercury MerCruiser One Year Limited Warranty (Gasoline Fueled Products Only)

WHAT IS COVERED

Mercury Marine warrants its new products to be free of defects in material and workmanship during the period described below.

DURATION OF COVERAGE

This Limited Warranty provides coverage for either one (1) year from 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. Commercial users of these products receive warranty coverage of either one (1) year from the date of first retail sale, or the accumulation of 500 hours of operation, whichever occurs first. 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. 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 from one recreational use customer to a subsequent recreational use customer upon proper re-registration of the product. Unexpired warranty coverage cannot be transferred either to or from a commercial use customer.

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 (unless properly re-registered) 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 obtain warranty coverage. Mercury Marine reserves the right to make any 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. The warranty registration card is the only valid registration identification and must be presented to the dealer at the time warranty service is requested in order to obtain coverage.

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 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 which damages the Mercury product and was not manufactured or sold by us, jet pump impellers and liners, 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. Use of the product for racing or other competitive activity, or operating with a racing type lower unit, 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.

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.

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California Emissions Limited Warranty

The California Air Resources Board has promulgated air emissions regulations for inboard and sterndrive engines. The regulations apply to all inboard and sterndrive engines that were manufactured for the 2003 model year[1] and later. Mercury Marine, in compliance with those regulations, provides this limited warranty for the emission control systems (see the components of the emission control system listed following), and further warrants that the inboard or sterndrive engine was designed, built and equipped to conform with all applicable regulations adopted by the California Air Resources Board pursuant to its authority in Chapters 1 and 2, Part 5, Division 26 of the Health and Safety Code. For information regarding the limited warranty for the non-emissions related components of the inboard or sterndrive engine, please see the limited warranty statement for your engine.

WHAT IS COVERED

Mercury Marine warrants the components of the emissions control systems (see the components of the emission control system listed following) of its new, 2003 model year[1] and later California certified inboard and sterndrive engines, registered[2] to a California resident, to be free from defects in material or workmanship that cause the failure of a warranted part to be identical in all material respects to that part as described in the application of Mercury Marine for certification from the California Air Resources Board, for the period of time, and under the conditions identified below. The cost to diagnose a warranty failure is covered under the warranty (if the warranty claim is approved). Damage to other engine components caused by the failure of a warranted part will also be repaired under warranty.

DURATION OF COVERAGE

This limited warranty provides coverage for the components of the emissions control systems of new 2003-2008 model year[1] inboard and sterndrive engines for 2 years from either the date the product is first sold, or first put into service, whichever occurs first. Emission related normal maintenance items such as spark plugs and filters, that are on the warranted parts list (see following) are warranted up to their first required replacement interval only. (See Maintenance Schedule). 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. (See instructions on transfer of warranty).

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, please notify Mercury Marine and Mercury 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.

WHAT MERCURY WILL DO

Mercury Marine's sole and exclusive obligation under this warranty is limited to, at our expense and at our option, repairing or replacing defective 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.

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 Specifications), operation of the product in a manner inconsistent with the recommended operation procedures, 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, jet pump impellers and liners, operation with fuels, oils or lubricants which are not suitable for use with the product (see Specifications section), alteration or removal of parts, or water entering the engine through the fuel intake, air intake or exhaust system. Use of the product for racing or other competitive activity, or operating with a racing type lower unit, 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.

Non-warranty maintenance, replacement, or repair of emission control devices and systems may be performed by any marine engine repair establishment or individual. The use of non-Mercury parts for non-warranty maintenance or repairs will not be grounds for disallowing other warranty work. The use of add-on (as defined at section 1900 (b)(1) and (b)(10) of Title 13 of the California Code of Regulations) or modified parts not exempted by the California Air Resources Board may be grounds for disallowing a warranty claim, at the discretion of Mercury Marine. Failures of warranted parts caused by the use of a non-exempted add-on or modified part will not be covered.

[1] *Mercury Marine does not establish model years for the Mercury MerCruiser product line. In order to comply with CARB warranty regulations, and for that limited purpose only, model year shall have the same meaning as calendar year. As an example, 2003 model year products refers to products manufactured during calendar year 2003.*

[2] *Your dealer will register your engine for warranty coverage for you. The warranty registration process is not related in any way to the process of obtaining a license, title or registration from state boating authorities. You should ask your dealer to update your warranty registration information to reflect a change of address or a transfer of ownership. (This change may be made at any time.) See the Warranty Registration section of your manual or your dealer for more information.*

COMPONENTS OF THE EMISSIONS CONTROL SYSTEM

1. Fuel Metering System
    a. Carburetor and internal parts (and/or pressure regulator or fuel injection system)
    b. Intake valve(s)
2. Air Induction System
    a. Intake manifold
3. Ignition System
    a. Spark plugs
    b. Electronic ignition system
    c. Ignition coil and/or control module
    d. Ignition wires
4. Positive Crankcase Ventilation (PCV) System
    a. PCV Valve
    b. Oil filler cap
5. Exhaust System
    a. Exhaust manifold
    b. Exhaust elbow
    c. Intermediate exhaust elbow
    d. Lower exhaust pipe
    e. Tailpipe
    f. Exhaust valve
6. Miscellaneous Items Used in Above Systems
    a. Hoses, clamps, fittings, tubing, sealing gaskets or devices, and mounting hardware.
    b. Pulleys, belts, and idlers.
    c. Vacuum, temperature, check and time sensitive valves and switches
    d. Electronic controls.

DISCLAIMERS AND LIMITATIONS

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.

If you have any questions regarding your warranty rights and responsibilities, refer to Owner Service Assistance for contact information.

California Emission Control Warranty Statement

YOUR WARRANTY RIGHTS AND OBLIGATIONS

The California Air Resources Board is pleased to explain the emission control system warranty on your 2003 model year[1] and later inboard or sterndrive engine. In California, new inboard and sterndrive engines must be designed, built and equipped to meet the State's stringent anti-smog standards. Mercury Marine must warrant the emission control system on your inboard or sterndrive engine for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your inboard or sterndrive engine.

Your emission control system may include parts such as the carburetor or fuel injection system, the ignition system, and catalytic converter. Also included may be hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, Mercury Marine will repair your inboard or sterndrive engine at no cost to you; including diagnosis, parts and labor.

MANUFACTURER'S WARRANTY COVERAGE

For 2003-2008 spark-ignition inboard and sterndrive marine engines: Select emission control parts from model year[1] 2003-2008 inboard and sterndrive engines are warranted for 2 years. If any emission-related part on your engine is defective under warranty, the part will be repaired or replaced by Mercury Marine.

OWNER'S WARRANTY RESPONSIBILITIES

As the inboard or sterndrive engine owner, you are responsible for the performance of the required maintenance listed in your owner's manual. Mercury Marine recommends that you retain all receipts covering maintenance on your inboard or sterndrive engine, but Mercury Marine cannot deny warranty solely for the lack of receipts or your failure to ensure the performance of all scheduled maintenance.

As the inboard or sterndrive engine owner, you should however be aware that Mercury Marine may deny you warranty coverage if your inboard or sterndrive engine or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.

You are responsible for presenting your inboard or sterndrive engine to a Mercury Marine dealer authorized to service the product as soon as a problem exists. The warranty repairs will be completed in a reasonable amount of time, not to exceed 30 days.

If you have any questions regarding your warranty rights and responsibilities, refer to Owner Service Assistance for contact information.

[1] *Mercury Marine does not establish model years for the Mercury MerCruiser product line. In order to comply with CARB warranty regulations, and for that limited purpose only, model year shall have the same meaning as calendar year. As an example, 2003 model year products refers to products manufactured during calendar year 2003.*

0007

3 Year Limited Warranty Against Corrosion (Worldwide)

WHAT IS COVERED

Mercury Marine warrants that each new Mercury, Mariner, Mercury Racing, Sport Jet, M^2 Jet Drive, Tracker by Mercury Marine Outboard, 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 and 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 (noncommercial use) purchaser upon proper re-registration of the product.

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. The warranty registration card is the only valid registration identification and must be presented to the dealer at the time warranty service is requested in order to obtain coverage.

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 the 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 warranty period, even if the product is only occasionally used for such purposes.

0008

Transferable Warranty

The product 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.

Direct Sale By Owner

- The second owner can be registered as the new owner and retain the unused portion of the limited warranty by sending the former owner's plastic Owner Warranty Registration Card and a copy of the bill of sale to show proof of ownership. In the United States and Canada, mail to:

  Mercury Marine
  Attn: Warranty Registration Department
  W6250 Pioneer Road
  P.O. Box 1939
  Fond du Lac, WI 54935-1939

- A new Owner Warranty Registration Card will be issued with the new owner's name and address. Registration records will be changed on the factory computer registration file.
- There is no charge for this service.

Outside the United States and Canada, please contact the distributor in your country, or the Marine Power International Service Center closest to you, for the transferable warranty procedure that would apply to you.

0009

Mercury Product Protection Plan

United States And Canada Only

(Certain performance products, triple engine installations, and commercial applications are excluded.)

The Mercury Product Protection Plan provides coverage against unexpected mechanical and electrical breakdowns that may occur beyond the standard limited warranty.

The optional Mercury Product Protection Plan is the only Factory Plan available for your engine.

Two, three or four - year term plans can be purchased up to 12 months after the original engine registration date.

See your participating Mercury MerCruiser dealer for complete program details.

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California Emission Certification Label

Star Label

Your boat is labeled on the hull with one of the following star labels.

The Symbol for Cleaner Marine Engines Means:

Cleaner Air and Water - for a healthier lifestyle and environment.

Better Fuel Economy - burns up to 30-40 percent less gas and oil than conventional carbureted two-stroke engines, saving money and resources.

Longer Emission Warranty - Protects consumer for worry free operation.

ONE STAR - LOW EMISSION	
 mc79569	The one-star label identifies personal watercraft, outboard, sterndrive and inboard engines that meet the Air Resources Board's Personal Watercraft and Outboard marine engine 2001 exhaust emission standards. Engines meeting these standards have 75% lower emissions than conventional carbureted two-stroke engines. These engines are equivalent to the U.S. EPA's 2006 standards for marine engines.
TWO STARS - VERY LOW EMISSION	
 mc79570	The two-star label identifies personal watercraft, outboard, sterndrive and inboard engines that meet the Air Resources Board's Personal Watercraft and Outboard marine engine 2004 exhaust emission standards. Engines meeting these standards have 20% lower emissions that One Star - Low-Emission engines.
THREE STARS - ULTRA LOW EMISSION	
 mc79571	The three-star label identifies engines that meet the Air Resources Board's Personal Watercraft and Outboard marine engine 2008 exhaust emission standards or the Sterndrive and Inboard marine engine 2003 exhaust emission standards. Engines meeting these standards have 65% lower emissions than One Star - Low Emission engines.
FOUR STARS - SUPER ULTRA LOW EMISSION	
 mc79572	The Four Star label identifies engines that meet the Air Resources Board's Sterndrive and Inboard marine engine 2009 exhaust emission standards. Personal Watercraft and Outboard marine engines may also comply with these standards. Engines meeting these standards have 90% lower emissions than One Star - Low Emission engines.

NOTES:

GETTING TO KNOW YOUR POWER PACKAGE

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Features And Controls

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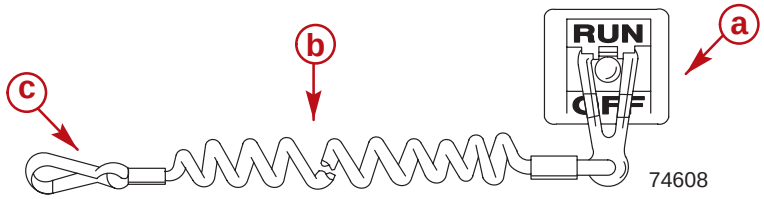
Lanyard Stop Switch

The purpose of a lanyard stop switch is to turn off the engine when the operator moves outside the operator's position (as in accidental ejection from the operator's position).



a - Stop switch
b - Lanyard
c - Clips to the operator

Accidental ejections, such as falling overboard, are more likely to occur in:

- low sided sport boats
- bass boats
- high performance boats

Accidental ejections can also occur from:

- poor operating practices
- sitting on the seat or gunwale at planing speeds
- standing at planing speeds
- operating at planing speeds in shallow or obstacle infested waters
- releasing your grip on the steering wheel that is pulling in 1 direction
- consuming alcohol or drugs
- high speed boating maneuvers

Some remote control units are equipped with a lanyard stop switch, if your remote control is not equipped with a lanyard stop switch one can be installed on the dashboard or side adjacent to the operator's position. The lanyard is a cord usually 4 - 5 ft (1.2 - 1.5 m) long when stretched out with an element on 1 end made to be inserted into the switch and a snap on the other end for attaching to the operator. The lanyard is coiled to make it as short as possible to minimize the likelihood of entanglement with nearby objects. It stretches to minimize the likelihood of accidental activation should the operator choose to move around in an area close to the normal operator's position. To shorten the lanyard, wrap it around the operator's wrist or leg, or tie a knot in the lanyard.

Activation of the lanyard stop switch will stop the engine immediately, but the 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.

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

Avoid contact with the boat hull and propeller from accidental ejection. Personal injury or death could occur. Always properly connect both ends of the lanyard stop switch.

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.

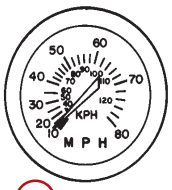
⚠ WARNING

Avoid abrupt deceleration of the boat from lanyard stop switch activation. Boat damage and personal injury or death could occur. NEVER leave the operator's station with the engine operating and in gear.

0012.2

Instrumentation

The following is a brief explanation of the instrumentation typically found on some boats. The owner/operator should be familiar with all instruments and their functions. Because of the large variety of instrumentation and manufacturers, you should have your boat dealer explain the particular gauges and normal readings for your boat.



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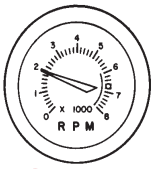

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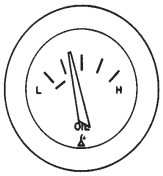
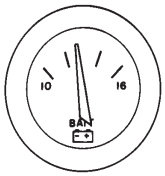


c 70516



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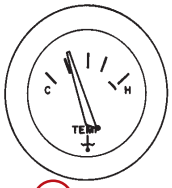

e 70518

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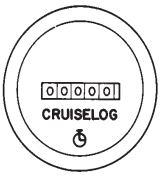

g 70521


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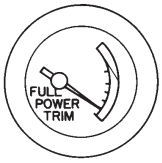


j 70520

a - Speedometer
b - Tachometer
c - Oil pressure gauge
d - Battery meter
e - Water temperature gauge
f - Fuel gauge
g - Hour meter
h - Bilge blower switch
i - Ignition switch
j - Power trim gauge

Speedometer: Indicates boat speed.

Tachometer: Indicates engine rpm.

Oil Pressure Gauge: Indicates engine oil pressure.

Battery Meter: Indicates battery voltage.

Water Temperature Gauge: Indicates engine operating temperature.

Fuel Gauge: Indicates quantity of fuel in tank.

Hour Meter: Records engine operating time.

Bilge Blower Switch: Operates bilge blower.

Ignition Switch: Allows operator to start and stop engine.

Power Trim Gauge: Indicates sterndrive unit angle (trim up/out and down/in). Sterndrive Models only.

0013

SMARTCRAFT PRODUCT

A Mercury SmartCraft System instrument package can be purchased for this product. A few of the functions the instrument package will display are engine rpm, coolant temperature, water pressure, battery voltage, fuel consumption and engine operating hours.

The SmartCraft Instrument package will also aid in Engine Guardian diagnostics. The SmartCraft Instrument package will display critical engine alarm data and potential problems.

Refer to the ***Mercury SmartCraft Operator's Supplement*** (90-10229023) for the warning functions monitored and basic operation of the SmartCraft Instrument package.

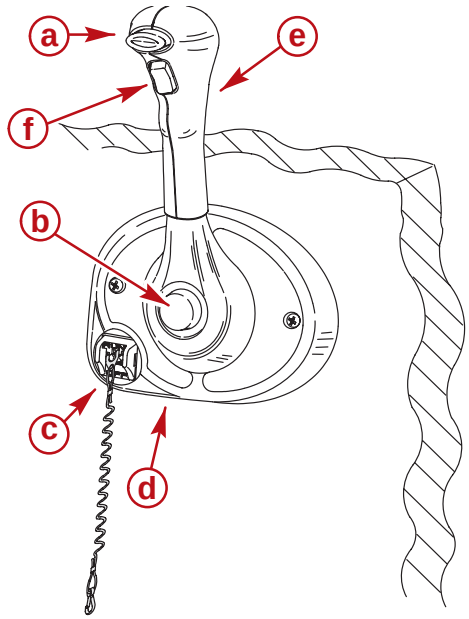
0014

Remote Controls

Your boat may be equipped with a Mercury Precision Parts or Quicksilver remote controls. All controls may not have all features shown. Consult your dealer for a description and/or demonstration of your remote control.

0015.02

PANEL MOUNTED



77019

a - Neutral lock button
b - Throttle only button
c - Lanyard stop switch
d - Control handle throttle friction screw
e - Control handle
f - Trim / tilt button

Neutral Lock Button - Prevents accidental shift and throttle engagement. Neutral lock button must be pushed IN to move the control handle out of NEUTRAL.

Throttle Only Button - Allows engine throttle advancement without shifting the engine. This is done by disengaging the shift mechanism from the control handle. The throttle only button can be depressed only when the remote control handle is in the NEUTRAL position, and should only be used to assist in starting the engine.

Lanyard Stop Switch - Turns the ignition OFF whenever the operator (when attached to the lanyard) moves far enough away from the operator's position to activate the switch. Refer to Lanyard Stop Switch for information on the use of this switch.

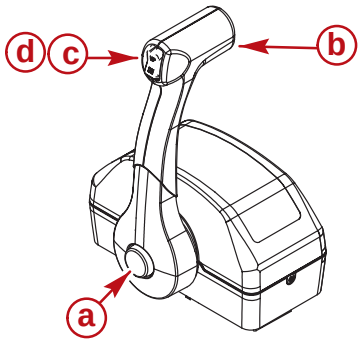
Control Handle Throttle Friction Screw - This screw (located behind the bezel cover) can be adjusted to increase or decrease the tension on the control handle. This will help prevent slipping of the remote control handle. Turn screw clockwise to increase tension and counterclockwise to decrease tension. Adjust to tension desired.

Control Handle - Operation of the shift and throttle are controlled by the movement of the control handle. Push the control handle forward from NEUTRAL with a quick firm motion to the first detent for FORWARD gear. Continue pushing forward to increase speed. Pull the control handle back from NEUTRAL with a quick firm motion to the first detent for REVERSE gear and continue pushing back to increase speed.

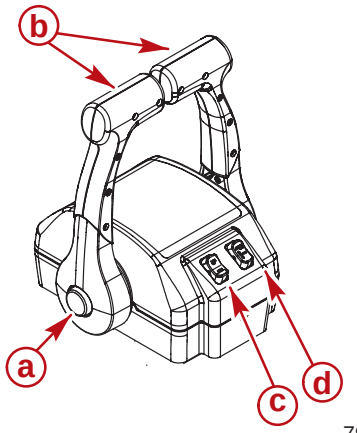
Trim/Tilt Button - Refer to Power Trim.

0242.00

CONSOLE MOUNTED



mc79503



79690

a - Throttle only button
b - Control handles
c - Power Trim switch
d - Trailer switch

Throttle Only Button - Allows engine throttle advancement without shifting the engine. This is done by disengaging the shift mechanism from the control handle. The throttle only button can be depressed only when the remote control handle is in the NEUTRAL position, and should only be used to assist in starting the engine.

Control Handle Tension Adjustment Screw - This screw can be adjusted to increase or decrease the tension on the control handle (cover must be removed to adjust). This will help prevent slipping of the remote control handle. Turn screw clockwise to increase tension and counterclockwise to decrease tension. Adjust to tension desired.

Control Handles - Operation of the the shift and throttle are controlled by the movement of the control handle. Push the control handle forward from NEUTRAL with a quick firm motion to the first detent for FORWARD gear and continue pushing forward to increase speed. Pull the control handle back from NEUTRAL with a quick firm motion to the first detent for REVERSE gear and continue pushing back to increase speed.

Power Trim Switch - See Power Trim section for detailed power trim operating procedures.

Trailer Switch - Used to raise drive unit for trailering, launching, beaching or shallow water operation. On the single remote control handle units, the trailering mode begins with the second click or when the Power Trim/ Trailer Switch is pressed all the way UP. See Power Trim for detailed trailer switch operation.

0169.02

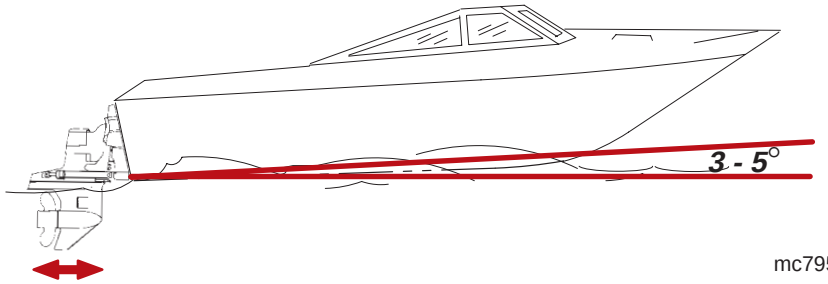
Power Trim

Power Trim allows the operator to adjust the sterndrive angle while underway to provide the ideal boat angle for varying load and water conditions. Also, the Power Trim system Trailering feature allows the operator to raise and lower the sterndrive unit for trailering, beaching, launching, and low speed operation (below 1200 rpm engine speed), shallow water operation.

⚠ CAUTION

Never trim the sterndrive unit UP/OUT using TRAILER switch while boat is underway at engine speeds above 1200 rpm. Use extreme caution when operating with sterndrive unit raised. Severe damage to the sterndrive unit may result if unit is raised beyond the gimbal ring support flanges at engine speeds above 1200 rpm.

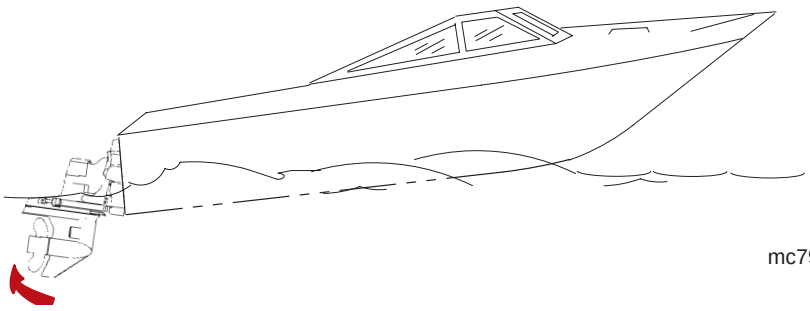
For best performance trim the sterndrive unit so that the boat bottom is at a 3-5 degree angle to the water.



mc79528

Trimming sterndrive unit UP/OUT can:

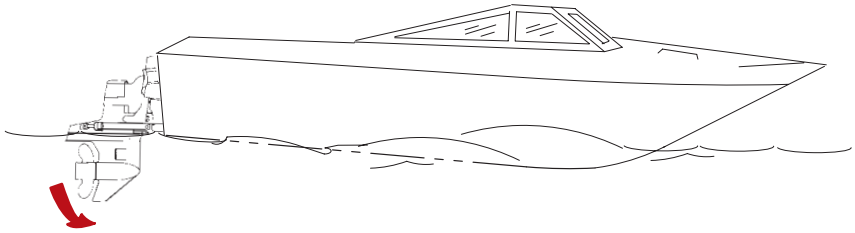
- Generally increase top speed
- Increase clearance over submerged objects or a shallow bottom
- Cause boat to accelerate and plane off slower
- In excess, cause boat porpoising (bouncing) or propeller ventilation
- Cause engine overheating if trimmed UP/OUT to a point where any cooling water intake holes are above the water line



mc79529

Trimming sterndrive 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.



mc79530

0170

SINGLE ENGINE TRIM/TRAILER

Single engine applications will have a button that can be pressed to trim the sterndrive unit up or down.

To raise the sterndrive unit for trailering, beaching, launching and low speed (below 1200 rpm), shallow water operation push the trim button to raise the sterndrive unit to the full UP/OUT position.

Some controls also have a trailer button that trims the sterndrive to a position suitable for trailer purposes only.

0171

DUAL ENGINE TRIM/TRAILER

⚠ 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.

Dual engine applications may have a single integral button to operate both sterndrive units simultaneously or may have separate buttons for each sterndrive unit.

Some controls also have a trailer button that trims the drives to a position suitable for trailer purposes only.

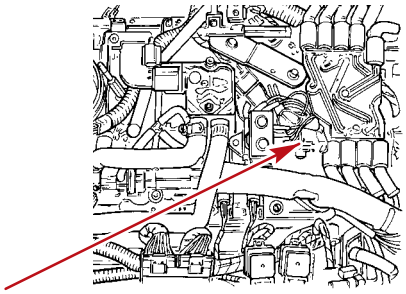
0018.01

Electrical System Overload Protection

If an electrical overload occurs, a fuse will blow or the circuit breaker will trip open. The cause must be found and corrected before replacing the fuse or resetting the circuit breaker.

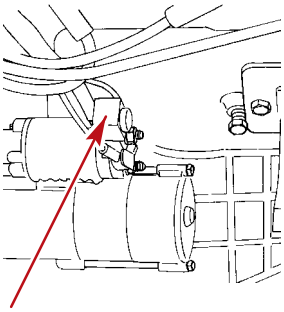
NOTE: *In an emergency, when the engine must be operated and the cause for the high current draw cannot be located and corrected, turn OFF or disconnect all accessories connected to the engine and instrumentation wiring. Reset the circuit breaker. If the breaker remains open, the electrical overload has not been eliminated. Further checks must be made on the electrical system. Contact your authorized Mercury MerCruiser dealer.*

1. A red circuit breaker provides protection for engine wiring harness and the instrumentation power lead. Reset by pushing the “RESET” button IN.



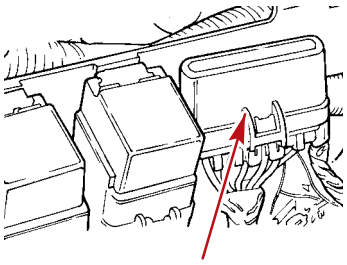
77906

2. A 90 amp fuse is located on the large post of the starter solenoid. This fuse is designed to protect the engine wiring harness if an electrical overload occurs.



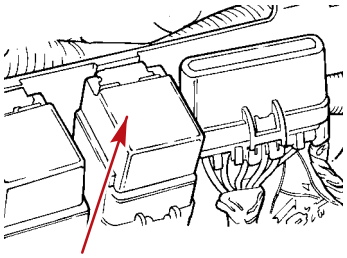
74907

3. Three fuses are located on the port side of the engine. These fuses control various EFI circuits.



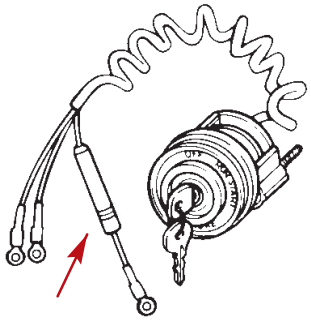
77602

4. The main power and fuel pump relays are located next to the fuses and control voltage to the engine with the ignition key in the ON position.



77602

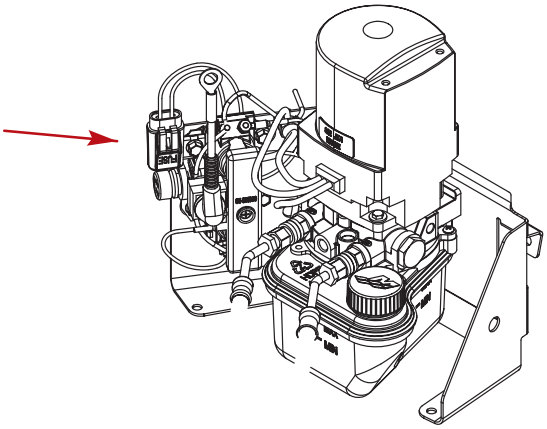
5. A 20 amp fuse may be located in the ignition switch I terminal lead to protect the electrical system. Check for blown fuse if the ignition key is turned to the START position and nothing happens (and circuit breaker is not tripped).



70525

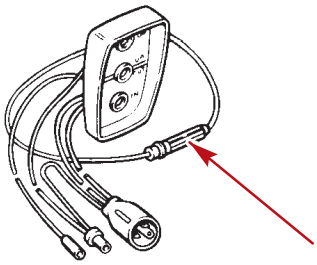
0172.03

6. The Power Trim System is protected from overload by a 110 amp fuse and a 20 amp in-line fuse on the power trim pump.



79779

7. The Quicksilver Three-Button Power Trim Control Panel is further protected by a 20 amp in-line fuse.



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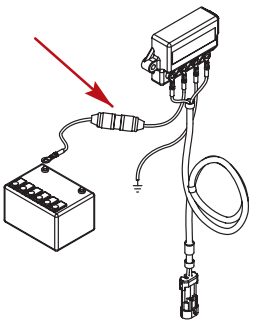
8. The Quicksilver MerCathode System has a 20 amp in-line fuse in the wire which connects to the positive (+) terminal on controller. If the fuse is blown, the system will not operate resulting in a loss of corrosion protection.



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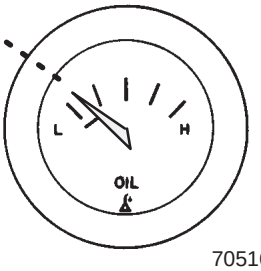
0020.03

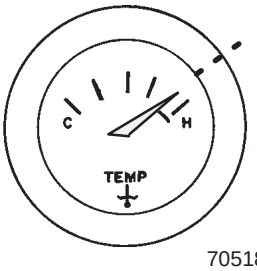
Audio Warning System

Your Mercury MerCruiser power package may be equipped with an Audio Warning System. The Audio Warning System will not protect the engine from damage. It is designed to warn the operator that a problem has occurred.



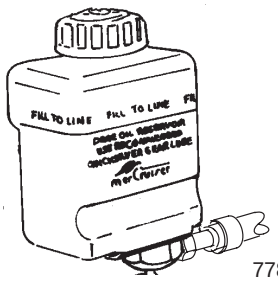
70516

Oil pressure gauge



70518

Engine temperature gauge



77807

Sterndrive oil reservoir

The audio warning system will sound with a continuous horn if one of the following occurs:

- Engine oil pressure too low
- Engine temperature too hot

The audio warning system will sound with an intermittent horn if the following occurs:

- Sterndrive oil level too low

⚠ CAUTION

Operation of the engine after the audio warning system alarm has sounded could result in damage to the power package. Do NOT operate engine once the alarm has sounded EXCEPT TO AVOID A HAZARDOUS SITUATION.

If the alarm sounds, stop the engine immediately. Investigate cause and correct it, if possible. If cause cannot be determined, consult your authorized Mercury MerCruiser dealer.

0128

TESTING THE AUDIO WARNING SYSTEM

1. Turn the ignition switch to the ON position without cranking the engine.
2. Listen for the audio alarm. The alarm will sound if the system is functioning correctly.

0021

Engine Guardian Strategy

IMPORTANT: Boat speed could be reduced to idle and may not respond to the throttle.

Engine Guardian Strategy is designed to help reduce the potential for engine damage by reducing engine power when a potential problem is sensed by the ECM. Engine Guardian monitors:

- Oil Pressure
- Coolant Temperature
- Seawater Pressure
- Engine Overspeed

Also the Engine Guardian Strategy will reduce engine power to 90 percent of maximum if any sensor on the power package fails.

For example, if the water inlet becomes partially blocked, Engine Guardian Strategy will reduce the available power level of the engine to help prevent damage from decreased water flow to the engine. If the debris passes through and full water flow is restored, engine power levels are restored to normal.

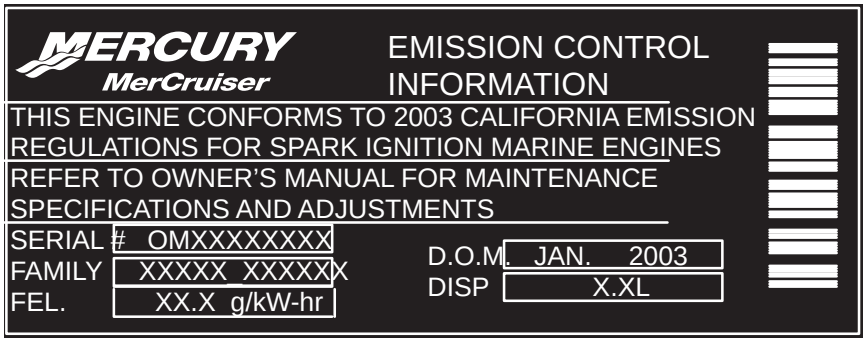
To avoid a possible recurrence of the problem you should contact an authorized Mercury MerCruiser dealer. The ECM stores the fault and with this information the technician will be able to more rapidly diagnose problems.

0220.01

Emissions Information

Emission Control Information Label

A tamper-resistant Emission Control Information label is affixed in a visible location to the engine at time of manufacture by MerCruiser. In addition to the required emissions statement, the label lists the engine serial number, family, FEL (emission level), date of manufacture (month, year), and the engine displacement. Please note that the low emissions certification will not affect the fit, function, or performance of the engines. Boat builders and Dealers may not remove the label or the part it is affixed to before sale. If modifications are necessary, contact Mercury MerCruiser about the availability of replacement decals before proceeding.



79706

"SERIAL#" - Engine Serial Number

"FAMILY" - Engine Family

"FEL." - Family Emission Limit

"D.O.M." - Date of Manufacture

"DISP" - Piston Displacement

Owner Responsibility

The owner/operator is not to modify the engine in any manner that would alter the horsepower or allow emissions levels to exceed their predetermined factory specifications.

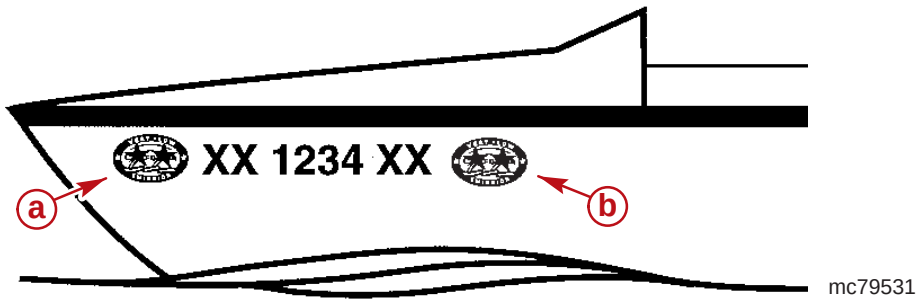
0221.01

Star Label

Beginning January 1, 2003, one 3-Star label will be included with each factory-certified MerCruiser engine.

All Mercury MerCruiser engines (500 hp and below) will have a 3-Star Ultra Low Emission rating. The 3-Star label identifies that these engines meet the California Air Resources Board's Sterndrive and Inboard marine engine 2003 exhaust emission standards. Engines meeting these standards have 65% lower emissions that One Star - Low Emission engines.

The 3-Star label will be affixed on the left side of the hull as shown.



mc79531

a - Recommended decal location
b - Secondary decal location

ONE STAR - LOW EMISSION	
 mc79569	The one-star label identifies personal watercraft, outboard, sterndrive and inboard engines that meet the Air Resources Board's Personal Watercraft and Outboard marine engine 2001 exhaust emission standards. Engines meeting these standards have 75% lower emissions than conventional carbureted two-stroke engines. These engines are equivalent to the U.S. EPA's 2006 standards for marine engines.
TWO STARS - VERY LOW EMISSION	
 mc79570	The two-star label identifies personal watercraft, outboard, sterndrive and inboard engines that meet the Air Resources Board's Personal Watercraft and Outboard marine engine 2004 exhaust emission standards. Engines meeting these standards have 20% lower emissions that One Star - Low-Emission engines.
THREE STARS - ULTRA LOW EMISSION	
 mc79571	The three-star label identifies engines that meet the Air Resources Board's Personal Watercraft and Outboard marine engine 2008 exhaust emission standards or the Sterndrive and Inboard marine engine 2003 exhaust emission standards. Engines meeting these standards have 65% lower emissions than One Star - Low Emission engines.
FOUR STARS - SUPER ULTRA LOW EMISSION	
 mc79572	The Four Star label identifies engines that meet the Air Resources Board's Sterndrive and Inboard marine engine 2009 exhaust emission standards. Personal Watercraft and Outboard marine engines may also comply with these standards. Engines meeting these standards have 90% lower emissions than One Star - Low Emission engines.

ON THE WATER

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3

0022

Safe Boating Suggestions

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

- **Know and obey all nautical rules and laws of the waterways.**

Mercury MerCruiser strongly recommends that all powerboat operators complete a boating safety course. Courses are offered in the U.S.A. by: The U.S. Coast Guard Auxiliary, The Power Squadron, The Red Cross and your state or provincial boating law enforcement agency. Inquiries may be made to the Boating Hotline at 1-800-368-5647 or the Boat U.S. Foundation at 1-800-336-BOAT.

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.

- **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 some suggestions of the types of safety equipment to carry when boating:

Approved fire extinguishers	Paddle or oar
Signal devices: flashlight, rockets or flares, flag and whistle or horn	Spare propeller, thrust hubs, and an appropriate wrench
Tools necessary for minor repairs	First aid kit and instructions
Anchor and extra anchor line	Water-proof storage containers
Manual bilge pump and extra drain plugs	Spare operating equipment, batteries, bulbs and fuses
Drinking water	Compass and map or chart of the area
Transistor radio	

- **Watch for signs of weather change and avoid foul weather and rough-sea boating.**
- **Tell someone where you are going and when you expect to return.**
- **Passenger boarding.** Stop the engine whenever passengers are boarding, unloading or are near the back (stern) of the boat. Shifting the drive unit into neutral is not sufficient.
- **Use personal flotation devices.** Federal Law requires that there be a U. S. Coast Guard approved, wearable-type life jacket (personal flotation device), correctly sized and readily accessible for every person on board, plus a throwable cushion or ring. We strongly advise that everyone wear a life jacket at all times while in the boat.
- **Prepare other boat operators.** Instruct at least 1 person on board in the basics of starting and operating the engine and boat handling in case the driver becomes disabled or falls overboard.
- **Do NOT overload your boat.** Most boats are rated and certified for maximum load (weight) capacities (refer to your boat capacity plate). Know your boat's operating and loading limitations. Know if your boat will float if full of water. When in doubt, contact your authorized Mercury MerCruiser dealer or the boat manufacturer.
- **Ensure that 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 backs of seats, gunwales, transom, bow, decks, raised fishing seats and any rotating fishing seat; anywhere that sudden 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. Ensure that all passengers have a proper seat and are in it before any boat movement.
- **Never be under the influence of alcohol or drugs while boating (it is the law).** They impair your judgment and greatly reduce your ability to react quickly.

- **Know your boating area and avoid hazardous locations.**
- **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 or planing transition speed. Watch out for others, the water and your wake.
- **Never drive your boat directly behind a water skier in case the skier falls.** As an example, your boat traveling at 25 MPH (40 km/h) will overtake a fallen skier who was 61 m (200 ft) in front of you in 5 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 attend to 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 or (4) there is complete loss of the boat. Seek further assistance from local law enforcement.

0023

Be Alert To Carbon Monoxide Poisoning

Carbon monoxide is present in the exhaust fumes of all internal combustion engines including 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.

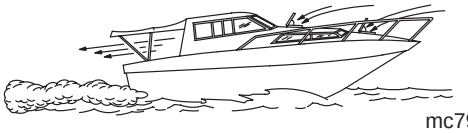
⚠ WARNING

Avoid prolonged exposure to carbon monoxide. Carbon monoxide poisoning can lead to unconsciousness, brain damage or death. Ensure that the boat, while at rest or underway, is well ventilated.

0024.01

GOOD VENTILATION

Ventilate the passenger area by opening the side curtains or forward hatches to remove fumes.



mc79553 Courtesy of ABYC

Example of desired air flow through the boat

0025.01

POOR VENTILATION

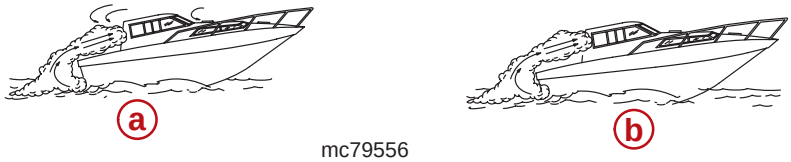
Under certain conditions, permanently enclosed or canvas enclosed cabins or cockpits with insufficient ventilation may draw in carbon monoxide. Install one or more carbon monoxide detectors in your boat.

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

mc79554 Courtesy of ABYC

Example of poor ventilation while a boat is stationary:

a - Operating the engine when the boat is moored in a confined space.
b - Mooring close to another boat with its engine operating.



mc79556 Courtesy of ABYC

Example of poor ventilation while a boat is moving:

a - Operating the boat with the trim angle of the bow too high.
b - Operating the boat with no forward hatches open (station wagon effect).

0026

Basic Boat Operation

0027.1

Launching And Boat Operation Care

⚠ CAUTION

To avoid possible ingestion of water that can damage engine components:

- **Do NOT turn the ignition key off when the engine is above idle speed.**
- **When launching your boat from a steep ramp, enter the water slowly.**
- **Do NOT use the lanyard stop switch to shut off the engine above idle speed.**
- **When coming off plane, if a large following wave may roll over the boat's transom, apply a short, light burst of throttle to minimize the wave action against the stern of the boat.**
- **Do NOT come off plane quickly, shift into reverse and shut off engine.**

IMPORTANT: Install bilge drain plug prior to launching boat.

0028.3

OPERATION CHART

Operation Chart			
BEFORE STARTING	**AFTER STARTING**	**WHILE UNDERWAY**	**AFTER STOPPING**
Install bilge drain plug.	Observe all gauges to check condition of engine. If not normal, stop engine.	Observe all gauges to check condition of engine. If not normal, stop engine.	Turn ignition key to OFF position.
Open engine hatch.	Check for fuel, oil, water, fluid and exhaust leaks.	Listen for the audio alarm.	Turn battery switch to OFF position.
Turn battery switch ON.	Check shift and throttle control operation.		Close fuel shut off valve.
Operate bilge blowers.	Check steering operation.		Close seacock.
Open fuel shut off valve.			Flush cooling system if in saltwater.
Open seacock.			Drain bilge.
Close the drain system.			
Place sterndrive unit in full DOWN/IN position.			
Perform all other checks specified by your dealer and/or boat builder.			
Listen for Audio Warning Alarm to sound when the ignition switch is in the ON position.			

0029

Starting And Stopping The Engine

NOTE: *Only perform those functions applicable to your power package.*

1. Check all items listed in Operation Chart.
2. Place the remote control handle in NEUTRAL.

⚠ CAUTION

Overheating from insufficient cooling water will cause engine and drive system damage. Ensure that there is sufficient water always available at water inlet holes during operation.

⚠ WARNING

Explosive gasoline fumes collect in the engine compartment. Avoid injury or property damage, operate the bilge blower for at least 5 minutes prior to starting the engine. If the boat is not equipped with a bilge blower, open the engine hatch and leave it open while starting the engine.

3. Position throttle setting as follows:
   a. COLD AND WARM ENGINE - Leave in the NEUTRAL/IDLE speed position.
   b. FLOODED ENGINE - Turn ignition switch to the ON position. Push the THROTTLE ONLY button and place the throttle lever at 50 percent position. Attempt to start engine. As soon as engine starts, return the throttle to the IDLE position.

IMPORTANT: Do NOT operate starter motor continuously for more than 30 seconds.

4. Turn ignition key to START. Release key when engine starts and allow switch to return to ON position.
5. If engine is cold, operate engine for 1 or 2 minutes at fast IDLE (1000 - 1500 rpm) or until engine temperature reaches 140 - 160 degrees F (60 - 71 degrees C).
6. Inspect the power package for fuel, oil, water and exhaust leaks.
7. To shift into gear, move control handle with a firm, quick motion forward to shift to FORWARD gear, or backward to shift to REVERSE. After shifting drive unit, advance throttle to desired setting.
8. Move the remote control handle to NEUTRAL/IDLE and allow the engine to slow to IDLE speed. If engine has been operated at high speed for a long period of time, allow the engine to cool at IDLE speed for 3 to 5 minutes.
9. Turn ignition key to the OFF position.

0173

Starting Engine After Stopped While In Gear

IMPORTANT: Avoid stopping the engine if the sterndrive unit is in gear. If the engine does stop, refer to the following procedure:

1. Push and pull repeatedly on the remote control handle until handle returns to the NEUTRAL/IDLE position. This may take several tries if the power package was operating above idle rpm when the engine stopped.
2. After the handle returns to the NEUTRAL/IDLE position, resume normal starting procedures.

0174

Trailering The Boat

Your boat can be trailered with the sterndrive unit in the UP or DOWN position. Adequate clearance is required between the road and sterndrive when transporting.

If adequate road clearance is a problem, place the sterndrive unit in full trailer position and support it with an optional trailer kit which is available from your authorized Mercury MerCruiser dealer.

0030

Freezing Temperature Operation

IMPORTANT: If the boat is operated during periods of freezing temperature, precautions must be taken to prevent freeze damage to the power package. Damage caused by freezing IS NOT covered by Mercury MerCruiser Limited Warranty.

0031

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 come into contact with your power package. Components on your engine will be damaged if submerged. Damage caused by submersion is not covered by the Mercury MerCruiser Limited Warranty.

0032

Protecting People In The Water

While You Are Cruising

It is very difficult for a person standing or floating in the water to take quick action to avoid a boat heading in his/her direction even at slow speed.

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 (coasting) in NEUTRAL/IDLE, 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 gear case or any solid device rigidly attached to a moving boat or gear case.

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

0033

High-Speed And High-Performance Boat Operation

If your boat is considered 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 demonstration ride with your dealer or an operator experienced with your boat. For additional information, refer to ***Hi-Performance Boat Operation*** booklet (90-849250-R2) from your dealer, distributor or Mercury Marine.

0131.02

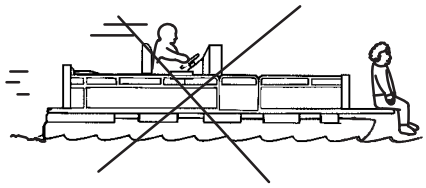
Passenger Safety Message - Pontoon And Deck Boats

⚠ WARNING

Avoid serious injury or death from falling over the front end of a pontoon or deck boat and coming in contact with the boat hull or propeller. Stay back from the front end of the deck and remain seated while the boat is in motion.

Whenever the boat is in motion, observe the location of all the passengers. Do not allow any passengers to stand or use seats other than those designated for traveling faster than idle speed. A sudden reduction in boat speed, such as the result of plunging into a large wave or wake, a sudden throttle reduction or a sharp change of boat direction, could throw them over the front of boat. Falling over the front of the boat between the two pontoons will position them to come into contact with the drive unit.

1. **Boats having an open front deck:**
   a. No one should ever be on the deck in front of the fence while the boat is in motion. Keep all passengers behind the front fence or enclosure.
   b. Persons on the front deck could easily be thrown overboard or persons dangling their feet over the front edge could get their legs caught by a wave and pulled into the water.



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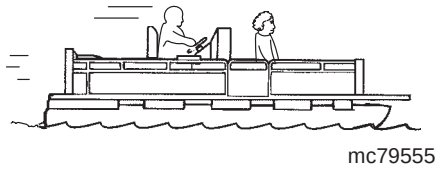
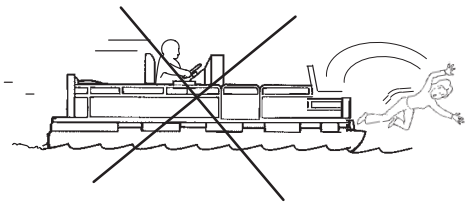


mc79555

Correct

2. **Boats with front-mounted, raised pedestal fishing seats:**
   a. These elevated fishing seats are not intended for use when the boat is traveling faster than idle or trolling speed. Sit only in seats designated for traveling at faster speeds.
   b. Any unexpected sudden reduction in boat speed could result in the elevated passenger falling over the front of the boat.



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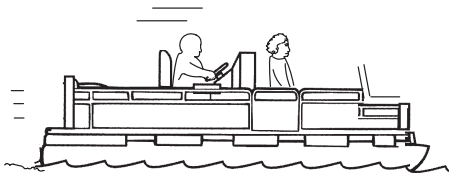

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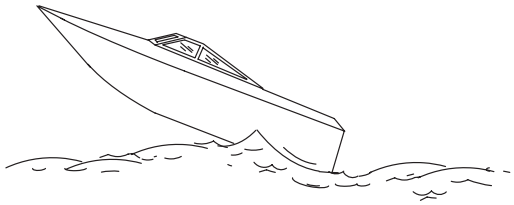
Correct

0034.01

Wave And Wake Jumping



mc79675

⚠ 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 a boat hand hold.

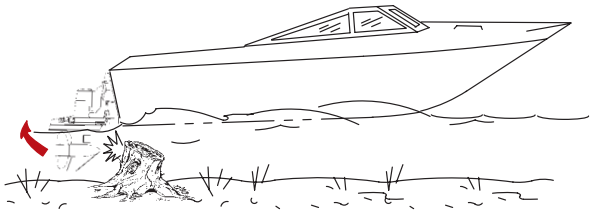
Operating recreational boats over waves and wakes is a natural part of boating. However, when this activity is done with enough speed to force the boat hull partially or completely out of the water, certain hazards arise, particularly when the boat re-enters the water.

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

There is another less common hazardous result from allowing your boat to launch off of 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 nearly to a stop in an instant and can send the occupants flying forward. The boat may also veer sharply to one side.

0035.02

Impact With Underwater Hazards



mc79680

Reduce speed and proceed with caution whenever you're driving a boat in shallow water or in areas where the waters are suspected of having underwater obstacles that could be struck by the underwater drive components, rudder or the boat bottom.

IMPORTANT: The most important thing you can do to help reduce injury or impact damage from striking a floating or underwater object is control the boat speed. Under these conditions, boat speed should be kept to a maximum speed of 24-40 km/h (15-25 mph).

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

- The boat could move suddenly in a new direction. Such a sharp change in direction or turn 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, even out of the boat.
- Impact damage to the underwater drive components, rudder and/or boat.

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

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

The boat should be checked for hull fractures, transom fractures and water leaks.

Operating with damaged underwater drive components, rudder or boat bottom could cause additional damage to other parts of the power package, or could affect control of the boat. If continued operation is necessary, do so at greatly reduced speeds.

⚠ WARNING

Avoid serious injury or death from loss of boat control. Continued boating with major impact damage can result in sudden component failure with or without subsequent impacts. Have the power package thoroughly inspected and any necessary repairs made.

0132

Drive Unit Impact Protection

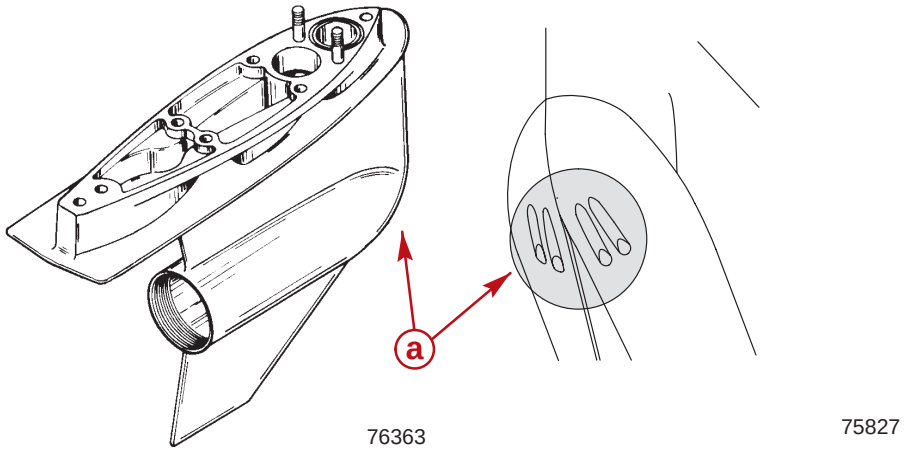
The power trim hydraulic system is designed to provide impact protection for the sterndrive unit. If a submerged object is struck while the boat is moving forward, the hydraulic system will cushion the kickup of the sterndrive unit as it clears the object, reducing damage to the unit. After the sterndrive unit has cleared the object, the hydraulic system allows the sterndrive unit to return to its original operating position, preventing loss of steering control and engine overspeed.

Use extreme caution when operating in shallow water or where underwater objects are known to be present. No impact protection is provided in REVERSE, use extreme care to prevent striking submerged objects while operating in REVERSE.

IMPORTANT: Impact protection system cannot be designed to ensure total protection from impact damage under all conditions.

0133

Operating With Low Water Inlets In Shallow Water



a - Low Water Inlets

⚠ CAUTION

Serious engine damage could occur by failing to follow these instructions. Sand, silt or mud could be sucked into the water inlets restricting or shutting off the water supply to the engine.

Extreme care should be exercised when operating a boat equipped with low water inlets while maneuvering in shallow water. Also, avoid beaching a boat with the engine operating.

0036

Conditions Affecting Operation

Weight Distribution (Passengers And Gear) Inside The Boat

Shifting weight to rear (stern):

- Generally increases speed and engine rpm
- Causes bow to bounce in choppy water
- Increases danger of following wave splashing into the boat when coming off plane
- At extremes, can cause the boat to porpoise

Shifting weight to front (bow):

- Improves ease of planing
- Improves rough water ride
- At extremes, can cause the boat to veer back and forth (bow steer)

0037

Bottom Of Boat

To maintain maximum speed, the boat bottom should be:

- Clean, free of barnacles and marine growth
- Free of distortion; nearly flat where it contacts the 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 the water inlets and cause the engine to overheat.

0038

Cavitation

Cavitation occurs when water flow cannot follow the contour of a fast-moving underwater object, such as a gear housing or a 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 the propeller. Common causes of cavitation are:

- Weeds or other debris snagged on the propeller
- Bent propeller blade
- Raised burrs or sharp edges on the propeller

0134

Ventilation

Ventilation is caused by surface air or exhaust gases that are introduced around the propeller resulting in propeller speedup and a reduction in boat speed. Excessive ventilation is annoying and usually caused by:

- Drive unit trimmed out too far
- A missing propeller diffuser ring
- A damaged propeller or gear housing, which allows exhaust gases to escape between propeller and gear housing
- Drive unit installed too high on transom

0039

Elevation And Climate

Elevation and climate changes will affect the performance of your power package. Loss of performance can be caused by:

- Higher elevations
- Higher temperatures
- Low barometric pressures
- High humidity

For you to have optimum engine performance under changing weather conditions, it is essential that the engine be propped to allow the engine to operate at or near the top end of the specified maximum rpm range with a normal boat load during your normal boating weather conditions.

In most cases, performance can be regained by changing to a lower pitch propeller.

0040

Propeller Selection

IMPORTANT: The engines covered in this manual are equipped with an rpm rev-limiter that is set to an upper (or limited) rpm amount. 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 drop into the recommended operating rpm range, normal engine operation resumes.

It is the responsibility of the boat manufacturer and/or the selling dealer to equip the power package with the correct propeller. Refer to ***Everything You Need To Know About Propellers*** (90-8614492).

Select a propeller that will allow the engine power package to operate at or near the top end of the recommended WOT operating rpm range with a normal load.

If full throttle operation is below the recommended range, the propeller must be changed to prevent loss of performance and possible engine damage. On the other hand, operating an engine above the recommended operating rpm range will cause higher than normal wear and/or damage.

After initial propeller selection, the following common problems may require that the propeller be changed to a lower pitch.

- Warmer weather and greater humidity cause a loss of rpm.
- Operating in a higher elevation causes a loss of rpm.
- Operating with a dirty boat bottom causes a loss of rpm.
- Operating with increased load (additional passengers, pulling skiers) causes a loss of rpm.

For better acceleration, such as is needed for water skiing, use the next lower pitch propeller. Do NOT operate at full throttle when using the lower pitch propeller, but not pulling skiers.

0042

Getting Started

0041

20-Hour Break-In Period

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

- Do NOT operate below 1500 rpm for extended periods of time for the first 10 hours. Shift into gear as soon as possible after starting and advance the throttle above 1500 rpm **if conditions permit safe operation.**
- Do NOT operate at one speed consistently for extended periods.
- Do not exceed 3/4 throttle during the first 10 hours. During the next 10 hours, occasional operation at full throttle is permissible (5 minutes at a time maximum).
- Avoid full throttle acceleration from IDLE speed.
- Do NOT operate at full throttle until the engine reaches normal operating temperature.
- Frequently check engine oil level. Add oil as needed. It is normal for oil consumption to be high during the break-in period.

0043

After Break-In Period

To help extend the life of your Mercury MerCruiser power package, the following recommendations should be considered;

- Ensure that propeller allows the engine to operate at or near the top of the specified WOT rpm range (Refer to Specifications and Maintenance) when at full throttle with a normal boat load.
- Operation at 3/4 throttle setting or lower is recommended. Refrain from prolonged operation at WOT rpm.
- Change the oil and oil filter. Refer to Specifications and Maintenance.

0044

End of First Season Checkup

At the end of the first season of operation, contact an authorized Mercury MerCruiser dealer to discuss and/or perform scheduled maintenance items. If you are in an area where the product is operated continuously, year-round, you should contact your dealer at the end of the first 100 hours of operation or once yearly, whichever occurs first.

SPECIFICATIONS

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4

0045

Specifications

Fuel Recommendations

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

FUEL RATINGS

Mercury MerCruiser engines will operate satisfactorily when using a major brand of unleaded gasoline meeting the following specifications:

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

Outside USA and Canada - having a posted pump Octane Rating of 90 RON minimum. Premium gasoline (98 RON) is also acceptable. If unleaded gasoline is not available, use a major brand of leaded gasoline.

0046

USING REFORMULATED (OXYGENATED) GASOLINES (USA ONLY)

This type of gasoline is required in certain areas of the USA. The 2 types of oxygenates used in these fuels is Alcohol (Ethanol) or Ether (MTBE or ETBE). If Ethanol is the oxygenate that is used in the gasoline in your area, refer to Gasolines Containing Alcohol.

These Reformulated Gasolines are acceptable for use in your Mercury MerCruiser engine.

0047

GASOLINES CONTAINING ALCOHOL

If the gasoline 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 gasoline 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 MerCruiser 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 boat's fuel system components (fuel tanks, fuel lines, and fittings). Be aware that gasolines containing alcohol may cause increased:

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

⚠ 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.

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

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

0048.01

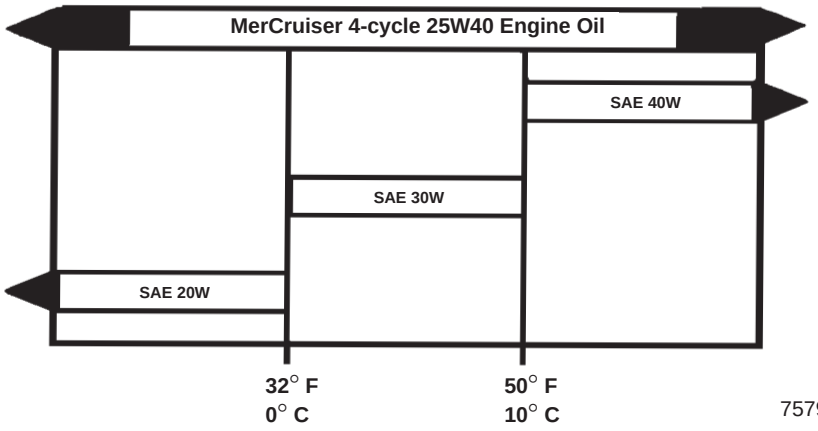
Engine Oil

To help obtain optimum engine performance and to provide maximum protection, we strongly recommend the use of MerCruiser 4-cycle 25W40 Engine Oil. This oil is a special blend of 25-weight and 40-weight oils for marine engines. If not available, a good grade, straight weight, detergent automotive oil of correct viscosity, with an API classification of SJ, CF-2, CH-4 may be used.

In those areas where MerCruiser 4-cycle 25W40 Engine Oil or a recommended straight weight oil are not available, a multi-viscosity 20W40 or, a less preferable choice, 20W50, with API service ratings of SJ, CF-2, CH-4 may be used.

IMPORTANT: The use of non-detergent oils, multi-viscosity oils (other than MerCruiser 4-cycle 25W40 Engine Oil or a good quality 20W40 or 20W50), synthetic oils, low quality oils or oils that contain solid additives are specifically not recommended.

The chart below is a guide to engine oil selection.



0049

Engine Specifications

0222.1

Models	4.3L MPI	5.0L MPI	350 MAG MPI Horizon	350 MAG MPI	MX 6.2 MPI	MX 6.2 MPI Horizon
Horsepower[1]	220	260	300	300	320	320
Kilowatts[1]	164	194	224	224	238	238
Displacement	4.3 liter (262 cid)	5.0 liter (305 cid)	5.7 liter (350 cid)		6.2 liter (377 cid)	
Specified WOT rpm Range[2]	4400-4800	4600-5000			4800-5200	
Idle rpm in NEUTRAL[2]	600[3]					
Minimum Oil Pressure @ 2000 rpm[4]	124 kPa (18 psi)					
Minimum Oil Pressure @ Idle[4]	41 kPa (6 psi)					
Thermostat, Seawater Cooled Models	71 degrees C (160 degrees F)					
Thermostat, Closed Cooled Models	77 degrees C (170 degrees F)					
Timing @ Idle[3]	Not Adjustable					
Firing Order	1-6-5-4-3-2	1-8-4-3-6-5-7-2				
Electrical System	12-Volt Negative (–) Ground					
Alternator Rating - Hot Operating Amps	65 amp					
Alternator Rating - Cold Operating Amps	72 amp					
Recommended Battery Rating (Minimum)	750 cca, 950 mca, or 180 Ah					
Spark Plug Type	AC Platinum (AC 41-932)					
Spark Plug Gap	1.5 mm (0.060 in.)					

1 Performance obtained and corrected in accordance with SAE J1228 Crankshaft Power.

2 Measured using an accurate service tachometer, with engine at normal operating temperature.

3 Idle speed and timing on EFI models is not adjustable.

4 Oil pressure must be checked with engine at normal operating temperature.

0051.02

Fluid Specifications

IMPORTANT: All capacities are approximate fluid measures.

0052

ENGINE

IMPORTANT: It may be necessary to adjust oil levels depending on installation angle and cooling systems (heat exchanger and fluid lines).

All Models	Capacity Liters (U.S. qts)	Fluid Type
Engine Oil (With Filter) [1]	5.20 (5-1/2)	Quicksilver 4-Cycle 25W-40 Marine Engine Oil
Seawater Cooling System [2]	20 (21)	Propylene Glycol and Purified Water
Closed Cooling System	19 (20)	Mercury Extended Life Coolant/Antifreeze or Extended Life Ethylene Glycol 5/100 Antifreeze/Coolant mixed 50/50 with Purified Water

[1] Always use the dipstick to determine the exact quantity of oil or fluid required.

[2] Seawater Cooling System capacity information is for winterization use only.

0135

STERNDRIVES

NOTE: *Oil capacity includes Drive Lube Monitor.*

Model	Capacity ml (oz)	Fluid Type
Alpha One	1892 (64)	High Performance Gear Lube
Bravo One	2603 (88)	
Bravo Two	3076 (104)	
Bravo Three	2839 (96)	

MAINTENANCE

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0054

Owner/Operator Responsibilities

It is the operator's responsibility to perform all safety checks, to ensure that all lubrication and maintenance instructions are complied with for safe operation and to return the unit to an authorized Mercury MerCruiser dealer for a periodic checkup.

Normal maintenance service and replacement parts are the responsibility of the owner/operator and as such, are not considered defects in workmanship or material within the terms of the warranty. Individual operating habits and usage contribute to the need for maintenance service.

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 MerCruiser dealer for service aids.

0055

Dealer Responsibilities

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

- Ensure that the boat is properly equipped.
- Prior to delivery, make certain that the Mercury MerCruiser power package and other equipment are in proper operating condition.
- Make all necessary adjustments for maximum efficiency.
- Familiarize the customer with the on-board equipment.
- Explain and demonstrate the operation of the power package and boat.
- Provide you with a copy of a Predelivery Inspection Checklist.
- Your selling dealer should fill out the Warranty Registration Card completely and mail it to the factory immediately upon sale of the new product.

0056.1

Maintenance

⚠ WARNING

Avoid injury or death and power package damage from an electrical shock, fire or explosion. Always disconnect both battery cables from the battery before servicing the power package.

⚠ CAUTION

Fuel vapors can be present in the engine compartment. Avoid injury or power package damage caused by fuel vapors or explosion. Always ventilate the engine compartment prior to servicing the power package.

IMPORTANT: Refer to MAINTENANCE CHART for complete listing of all scheduled maintenance to be performed. Some listings can be done by owner/operator, while others should be performed by an authorized Mercury MerCruiser dealer. Before attempting maintenance or repair procedures not covered in this manual, it is recommended that a Mercury MerCruiser Service Manual be purchased and read thoroughly.

NOTE: *Maintenance points are color coded for ease of identification. See the decal on engine for identification.*

- Blue-Coolant
- Yellow-Engine Oil
- Orange-Fuel
- Black-Gear Lube Oil

0057

Do-It-Yourself Maintenance Suggestions

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

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

- Do NOT attempt any repairs unless you are aware of the Cautions, Warnings and procedures required. Your safety is our concern.
- If you attempt to service the product yourself, we suggest you order the service manual for that model. The service 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.
- There are special tools and equipment that are 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.
- Also, if you partially disassemble an engine or drive assembly and are unable to repair it, the dealer's mechanic must reassemble 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 to request the repair procedure. It is difficult for them to diagnose a problem over the telephone.

Your authorized dealer is there to service your power package. They have qualified factory-trained mechanics.

It is recommended 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.

0058

Inspection

Inspect your 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.

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

Check plug leads and electrical leads for damage.

Remove and inspect the propeller. If badly nicked, bent or cracked, contact your authorized Mercury MerCruiser dealer.

Repair nicks and corrosion damage on power package exterior finish. Contact your authorized Mercury MerCruiser dealer.

0136.01

Sterndrive Maintenance Chart

Routine Maintenance *	Each day start	Each day end	Weekly	Every two months
Check the crankcase oil (interval can be extended based on experience).	★			
If operating in salt, brackish or polluted waters, flush the cooling system after each use.		★		
Check the drive unit oil level, the trim pump oil level, and the power steering pump or compact hydraulic steering fluid level.	★			
Check the water inlets for debris or marine growth. Check the seawater strainer and clean. Check the coolant level.			★	
Inspect the drive unit anodes and replace if 50 percent eroded.			★	
Lubricate the propeller shaft and retorque the nut (if operating in only freshwater, this maintenance may be extended to every four months).				★
Operating in saltwater or brackish or polluted water only: treat the power package with Corrosion Guard.				★
Check the battery connections and the fluid level.				★
Ensure that the gauges and the wiring connections are secure. Clean the gauges.[1]				★ or 50 hours

* Only perform maintenance which applies to your particular power package

[1] If operating in saltwater, interval is reduced to every 25 hours or 30 days whichever occurs first

0137.03

Sterndrive Maintenance Chart (continued)

Scheduled Maintenance *	Every 100 hours or annually ◆	Every 200 hours or 3 years ◆	Every 300 hours or 3 years ◆	Every 2 years	Every 5 years
Touch-up paint the power package.	★				
Change the crankcase oil and filter.	★				
Change the drive unit oil and retorque the connection of the gimbal ring to the steering shaft.	★				
Replace the water separating fuel filter and the boost pump pre-filter.	★				
Check the steering system and the remote control for loose, missing or damaged parts. Lubricate the cables and the linkages.	★				
Inspect the U-joints, the splines and the bellows. Check the clamps. Check the engine alignment. Lubricate the U-joint splines and cross bearing.[1]		★			
Lubricate the gimbal bearing and the engine coupler.		★[8]			
Check the continuity circuit for loose or damaged connections. Test the MerCathode® unit output on Bravo Models.	★				
Check the engine mount for tightness and retorque if necessary.			★		
Check the distributor cap, if equipped. 3.0L Models: check the spark plugs and wires.			★		
Clean the flame arrestor, IAC muffler, and the crankcase ventilation hoses. Inspect the PCV valve.	★				

* Only perform maintenance which applies to your particular power package

◆ Whichever occurs first

8 Lubricate the engine coupler every 50 hours if operated at idle for prolonged periods of time

1 The U-joints on transom serial number 0M750000 – 0M752024 do not have grease fittings and require no additional lubrication

0138.01

Sterndrive Maintenance Chart (continued)

Scheduled Maintenance *	Every 100 hours or annually ◆	Every 200 hours or 3 years ◆	Every 300 hours or 3 years ◆	Every 2 years	Every 5 years
Check the electrical system for loose, damaged, or corroded fasteners.			★		
Inspect the condition and the tension of the belts.	★				
Check the cooling system and the exhaust system hose clamps for tightness. Inspect both systems for damage or leaks.			★		
Disassemble and inspect the seawater pump and replace worn components.			★		
Clean the seawater section of the closed cooling system. Clean, inspect, and test the pressure cap.			★		
Replace the coolant.				♠	★
Drive shaft extension models: Lubricate the driveshaft U-joints, and tailstock input and output bearings.	★				
Inspect the exhaust system components and verify that the flapper valves are not missing or worn.			★		

* Only perform maintenance which applies to your particular power package

◆ Whichever occurs first

♠ Interval will be reduced if not using extended life coolant

0166

Maintenance Record

Date	Hour Meter Reading	Serviced By	Maintenance Performed

0062

Engine Oil

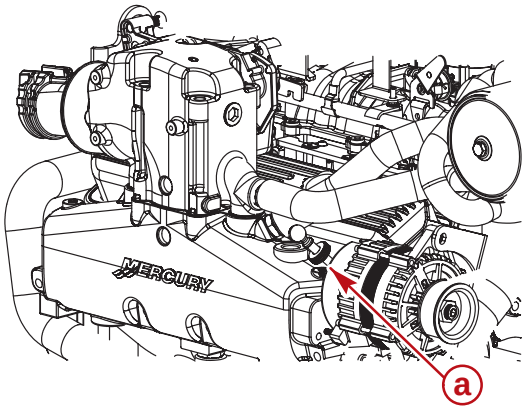
⚠ CAUTION

ENVIRONMENTAL HAZARD! Discharge of oil or oil waste into the environment is restricted by law. Do NOT spill oil or oil waste into the environment when using or servicing your boat. Contain and dispose of oil or oil waste as defined by local authorities.

0063.15

Checking

1. Stop the engine. Allow approximately 5 minutes for the oil to drain into the oil pan. The boat must be at rest in the water.



78645

a - Dipstick tube

2. Remove the dipstick. Wipe clean and reinstall fully into the dipstick tube.

IMPORTANT: Add the specified engine oil to bring the level up to, but not over, the FULL or "OK RANGE" mark on the dipstick.

3. Remove the dipstick and observe the oil level. Oil level must be between FULL or OK RANGE and ADD. Fill as necessary with specified fluid.

NOTE: *Adding 0.95 liters (1 quart) of engine oil will raise the level from the ADD mark to the top of the OK range.*

All Models	Capacity Liters (U.S. qts)	Fluid Type
Engine Oil (With Filter) [1]	5.25 (5-1/2)	4-Cycle 25W-40 Marine Engine Oil

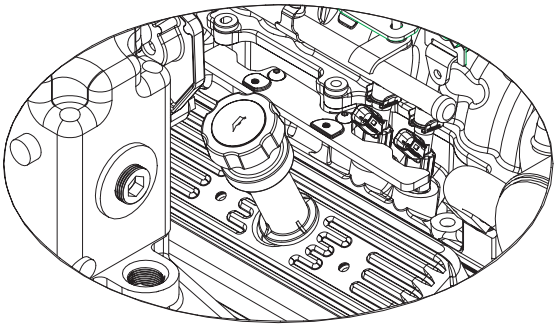
[1] Always use dipstick to determine exact quantity of oil or fluid required.

0064.12

Filling

IMPORTANT: Do not overfill the engine with oil.

1. Remove oil fill cap.



77843

IMPORTANT: Add the specified engine oil to bring the level up to, but not over, the FULL or "OK RANGE" mark on the dipstick.

2. Add the specified engine oil to bring the level up to, but not over, the FULL or OK RANGE mark on the dipstick. Refer to Specifications.

All Models	Capacity Liters (U.S. qts)	Fluid Type
Engine Oil (With Filter) [1]	5.25 (5-1/2)	4-Cycle 25W-40 Marine Engine Oil

[1] Always use the dipstick to determine the exact quantity of oil or fluid required.

3. Replace the fill cap.

0065

Changing Oil and Filter

Refer to the Maintenance schedule for the change interval. Engine oil should be changed before placing the boat in storage.

IMPORTANT: Change engine oil when the engine is warm from operation. Warm oil flows more freely, carrying away more impurities. Use only recommended engine oil (refer to Specifications).

0066

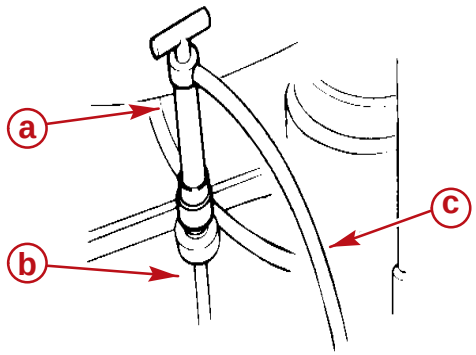
QUICK DRAIN OIL

1. Remove the bilge drain plug.
2. Pull tether through the bilge drain.
3. Place the oil drain hose in a suitable container.
4. Remove the drain plug from the oil drain hose.
5. After oil has drained completely, install the drain plug in the oil drain hose.
6. Push the hose through bilge drain and install the plug.
7. Proceed to ALL MODELS.

0067.01

ENGINE OIL PUMP

1. Loosen the oil filter to vent the system.
2. Remove the dipstick.
3. Install the oil pump onto the dipstick tube.



70571

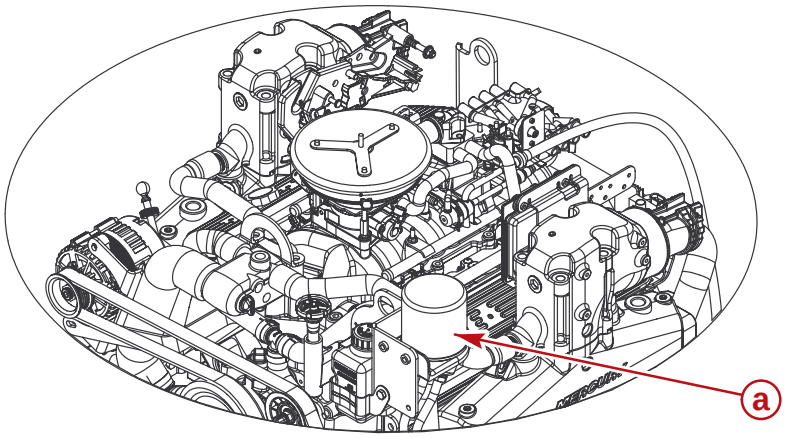
a - Typical oil pump
b - Dipstick tube
c - Oil drain hose

4. Insert the hose end of the crankcase oil pump onto an appropriate container and, using the handle, pump until the crankcase is empty.
5. Remove the pump.
6. Install the dipstick.
7. Proceed to ALL MODELS.

0068.08

ALL MODELS

1. Remove and discard oil filter.



79099

a - Oil filter

2. Coat sealing ring on new filter with engine oil and install.
3. Tighten oil filter securely (following filter manufacturer's instructions). Do NOT overtighten.
4. Remove oil fill cap.

IMPORTANT: Always use dipstick to determine exactly how much oil is required.

5. Add recommended engine oil to bring level up to the bottom of the OK RANGE on the dipstick.
6. With the boat at rest in the water, check the oil level and add specified fluid to bring the oil level up to, but not over, the FULL or OK RANGE.

NOTE: *Adding 0.95 liters (1 quart) of engine oil will raise the level from the ADD mark to the top of the OK range.*

All Models	Capacity Liters (U.S. qts)	Fluid Type
Crankcase Oil (With Filter) [1]	5.25 (5-1/2)	4-Cycle 25W-40 Marine Engine Oil

[1] Always use dipstick to determine exact quantity of oil or fluid required.

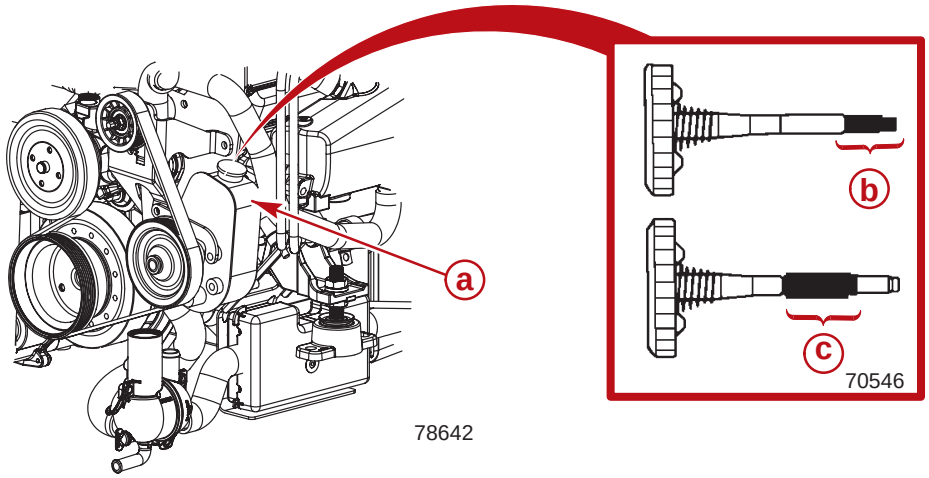
7. Start engine and check for leaks.

0139.2

Power Steering Pump Fluid

Checking

1. Stop the engine and center the sterndrive unit.
2. Remove the fillcap/dipstick and observe the level.
   a. Proper fluid level with engine at normal operating temperature should be between the full HOT and ADD marks.
   b. Proper fluid level with engine cold should be between the full COLD mark and the end of the dipstick.



a - Power steering pump
b - Cold range
c - Warm range

3. Fill to FULL line with specified fluid.

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

0140

Filling

1. Remove the fill cap/dipstick and observe the level.
2. Add Quicksilver Power Trim and Steering Fluid or Dexron III Automatic Transmission Fluid (ATF) to bring the fluid level up to the proper level.
3. Reinstall the fill cap/dipstick.

0141

Changing

Power Steering fluid does not require changing.

0071.2

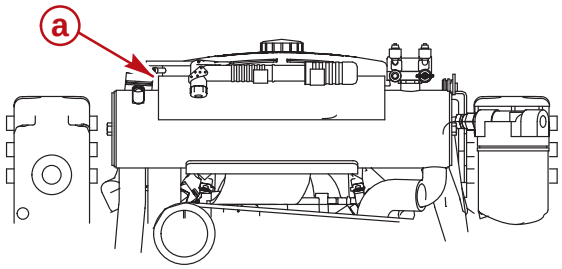
Engine Coolant - Closed Cooled Models Only

Checking

⚠ CAUTION

Allow the engine to cool down 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 to allow any pressure to escape slowly, then push down and turn the cap all the way off.

1. Remove the cap from the heat exchanger and observe the fluid level.



77955

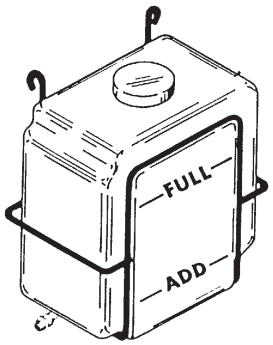
a - Heat exchanger cap

2. The coolant level in the heat exchanger should be at the bottom of the filler neck.

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

3. With the engine at normal operating temperature, check the coolant level in the coolant recovery bottle.

4. The coolant level should be between the ADD and FULL marks.



72520

5. Add the specified fluid as necessary.

Description	Where Used	Part Number
Mercury Extended Life Coolant/Antifreeze or Extended Life Ethylene Glycol 5/100 Antifreeze/Coolant mixed 50/50 with Purified Water	Closed Cooling System	92-877770K1

0072

Filling

1. Remove the fill cap from the coolant recovery bottle.
2. Fill to the FULL line with the specified coolant.

Description	Where Used	Part Number
Mercury Extended Life Coolant/Antifreeze or Extended Life Ethylene Glycol 5/100 Antifreeze/Coolant mixed 50/50 with Purified Water	Closed Cooling System	92-877770K1

3. Install the fill cap onto the coolant recovery bottle.

0073

Changing

Contact your authorized Mercury MerCruiser dealer.

0142.01

Drive Unit Oil

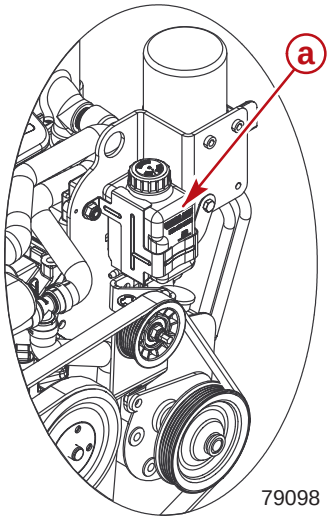
⚠ CAUTION

ENVIRONMENTAL HAZARD! Discharge of oil or oil waste into the environment is restricted by law. Do NOT spill oil or oil waste into the environment when using or servicing your boat. Contain and dispose of oil or oil waste as defined by local authorities.

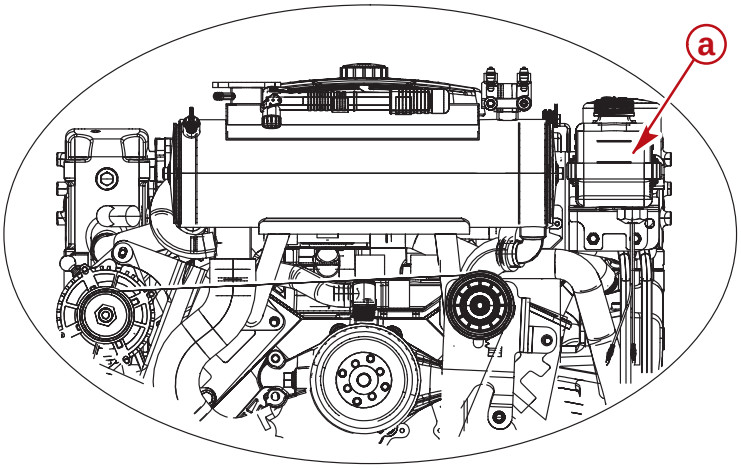
Checking

NOTE: *Oil level will fluctuate during operation. Oil level should be checked with the engine cold, before starting.*

1. Check the gear lube oil level. Keep the oil level at or near FULL line in the drive lube monitor. If any water is visible at the bottom of the monitor or appears at the oil fill/drain plug and/or if oil appears discolored, contact your authorized Mercury MerCruiser dealer immediately. Both conditions may indicate a water leak somewhere in the sterndrive unit.



Seawater cooled models



Closed cooled models

a - Gear lube monitor

Description	Where Used	Part Number
High Performance Gear Lube	Gear lube monitor	92-802854A1

0143

Filling

IMPORTANT: If more than 2 fl. oz. (59ml) of Quicksilver High Performance Gear Lube is required to fill the monitor, a seal may be leaking. Damage to the sterndrive unit may occur due to lack of lubrication. Contact your authorized Mercury MerCruiser dealer.

1. Remove the gear lube monitor cap.
2. Fill to full line with specified fluid.

Description	Where Used	Part Number
High Performance Gear Lube	Gear lube monitor	92-802854A1

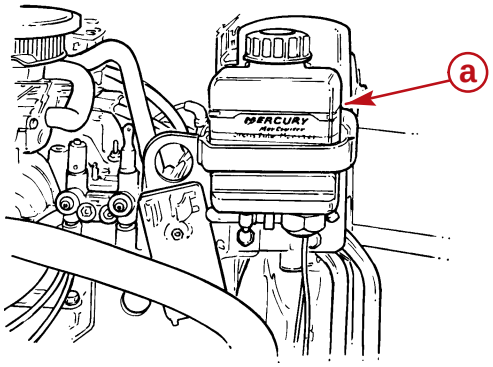
3. Replace the cap.

NOTE: *When filling the entire sterndrive unit refer to Changing Sterndrive Unit Oil instructions.*

0144

Changing

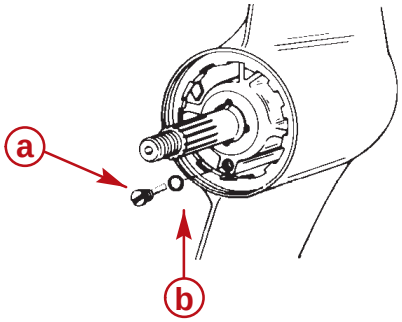
1. Remove the gear lube monitor from the bracket.



77813

a - Gear lube monitor

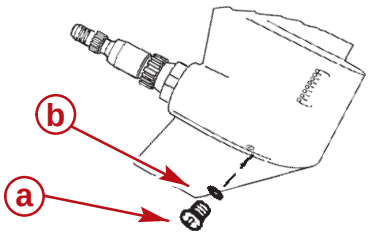
2. Empty the contents into a suitable container.
3. Install the monitor in the bracket.
4. **Bravo One Models:** Remove the propeller, place the sterndrive unit in full trim limit IN position, remove the oil fill/drain screw and sealing washer and drain the oil.



70568

a - Oil fill/drain
b - Sealing washer

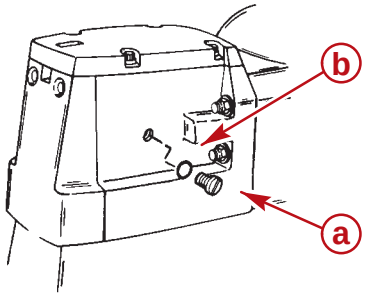
5. **All Other Models:** Place the sterndrive unit in full trim limit OUT position, remove the oil fill/drain screw and sealing washer and drain the oil.



72522

a - Oil fill/drain
b - Sealing washer

6. Remove the oil vent screw and sealing washer. Allow the oil to drain completely.



77106

a - Oil vent screw
b - Sealing washer

IMPORTANT: If any water drained from the oil fill/drain hole, or if the oil appears milky, the sterndrive unit is leaking and should be checked immediately by your authorized Mercury MerCruiser dealer.

7. Lower the sterndrive unit so that the propeller shaft is level. Fill the sterndrive unit, through the oil fill/drain hole, with specified gear lube until an air-free stream of lubricant flows from oil vent hole.

Description	Where Used	Part Number
High Performance Gear Lube	Gear lube monitor	92-802854A1

IMPORTANT: Use only Quicksilver High Performance Gear Lube in sterndrive unit.

8. Install the oil vent screw and sealing washer.
9. Continue to pump gear lube into the gear lube monitor circuit until the gear lube appears in the gear lube monitor.
10. Fill the monitor so that the oil level is in the operating range. Do NOT overfill. Ensure that the rubber gasket is inside the cap and install. Do NOT overtighten.

Description	Where Used	Part Number
High Performance Gear Lube	Gear lube monitor	92-802854A1

11. Remove the pump from the oil fill/drain hole. Quickly install the sealing washer and oil fill/drain screw. Tighten securely.
12. Reinstall the propeller. Refer to Propellers.
13. Recheck the oil level after the first use.

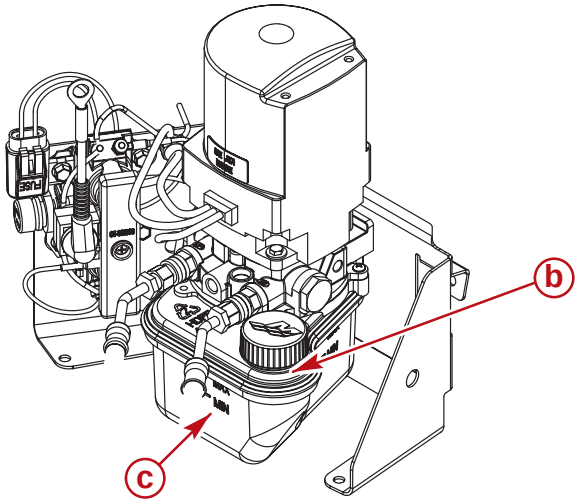
IMPORTANT: Oil level in the gear lube monitor will rise and fall during sterndrive operation; always check the oil level when the sterndrive is cool and the engine is shut down.

0145.05

Power Trim Pump Fluid

Checking

1. Place the sterndrive unit in full DOWN/IN position.
2. Remove the fill cap from the reservoir.



a - Fill cap (top and underneath side views)
b - Reservoir fill neck
c - “MIN” and “MAX” lines

3. Observe the oil level. Level must be between the “MIN” and “MAX” lines on the reservoir.
4. Fill as necessary with the specified fluid.

Description	Where used	Part number
Power Trim And Steering Fluid	Power trim pump	92-802880A1

0146.01

Filling

1. Remove the fill cap from the reservoir.
2. Add lubricant to bring level between the “MIN” and “MAX” lines on the reservoir.

Description	Where used	Part number
Power Trim And Steering Fluid	Power trim pump	92-802880A1

3. Install the fill cap.

0147

Changing

Power Trim fluid does not require changing unless it becomes contaminated with water or debris. Contact your authorized Mercury MerCruiser dealer.

0076

Battery

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

⚠ WARNING

Avoid serious injury from fire or explosion. Do NOT use jumper cables and a booster battery to start engine. Do NOT recharge a weak battery in the boat. Remove battery and recharge in a ventilated area away from fuel vapors, sparks or flames.

⚠ WARNING

Batteries contain acid which can cause severe burns. Avoid contact with skin, eyes and clothing. If electrolyte is spilled or splashed on any part of the body, immediately flush the exposed area with liberal amounts of water and obtain medical aid as soon as possible.

Safety glasses and rubber gloves are recommended when handling batteries or filling with electrolyte.

0077

Multiple EFI Engine Battery Precautions

Alternators: Alternators are designed to charge the battery that supplies electrical power to the engine that the alternator is mounted on. When batteries for 2 different engines are connected, 1 alternator will supply all of the charging current for both batteries. Normally, the other engine's alternator will not be required to supply any charging current.

EFI Electronic Control Module (ECM): The ECM requires a stable voltage source. During multiple engine operation, an onboard electrical device may cause a sudden drain of voltage at the engine's battery. The voltage may go below the ECM's minimum required voltage. Also, the alternator on the other engine may now start charging. This could cause a voltage spike in the engine's electrical system.

In either case, the ECM could shut off. When the voltage returns to the range that the ECM requires, the ECM will reset itself. The engine will now operate normally. This ECM shut down usually happens so fast that the engine just appears to have an ignition miss.

Batteries: Boats with multi-engine EFI power packages require each engine be connected to its own battery. This ensures that the engine's Electronic Control Module (ECM) has a stable voltage source.

Battery Switches: Battery switches should always be positioned so each engine is operating off of its own battery. Do NOT operate engines with switches in **BOTH** or **ALL** position. In an emergency, another engine's battery can be used to start an engine with a dead battery.

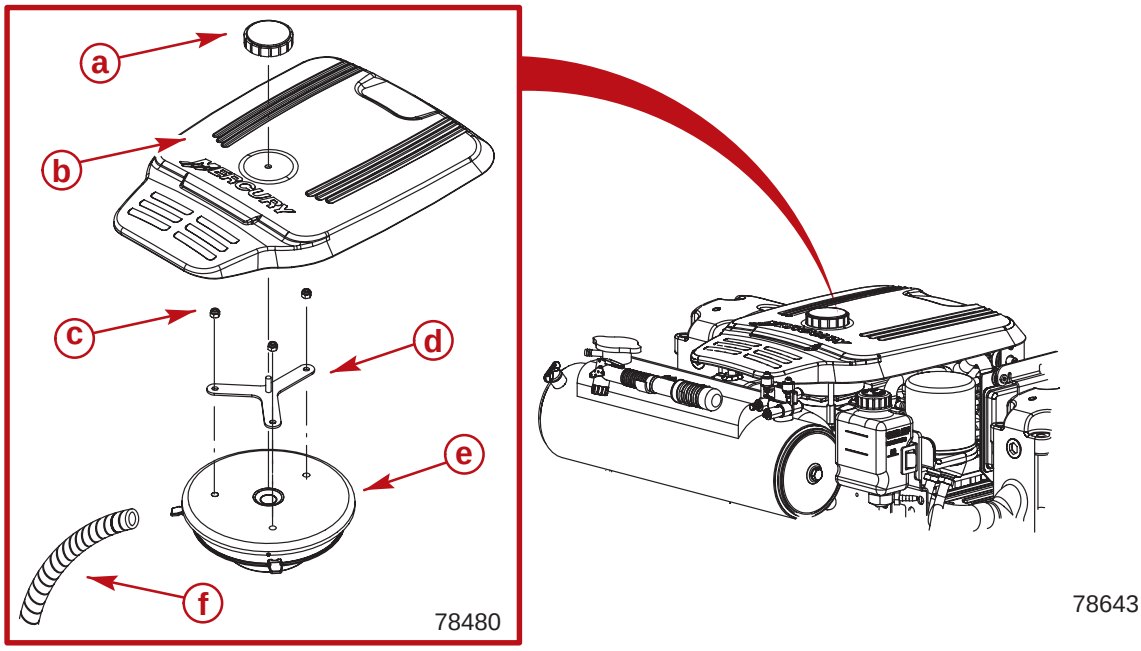
Battery Isolators: Isolators can be used to charge an auxiliary battery used for powering accessories in the boat. They should not be used to charge the battery of another engine in the boat unless the type of isolator is specifically designed for this purpose.

Generators: The generator's battery should be considered another engine's battery.

Flame Arrestor and Related Components

Cleaning

1. Remove the engine cover.
2. Remove the crankcase ventilation hose from the fitting on the side of the flame arrestor housing.
3. Remove the flame arrestor.



a - Engine cover knob
b - Engine cover
c - Nuts, flame arrestor
d - Cover mount bracket
e - Flame arrestor
f - Crankcase ventilation hose

4. Clean the flame arrestor in water or steam. Dry with compressed air or allow to air dry completely.
5. Clean the crankcase ventilation hoses. Dry with compressed air or allow to air dry completely.
6. Inspect the crankcase ventilation hoses for cracks or deterioration and replace if necessary.
7. Install flame arrestor and crankcase ventilation hoses.
8. Install the flame arrestor bracket and tighten the nuts.

Description	Nm	lb-in.	lb-ft
Flame Arrestor Bracket Nuts	12		9

9. Install the engine cover.

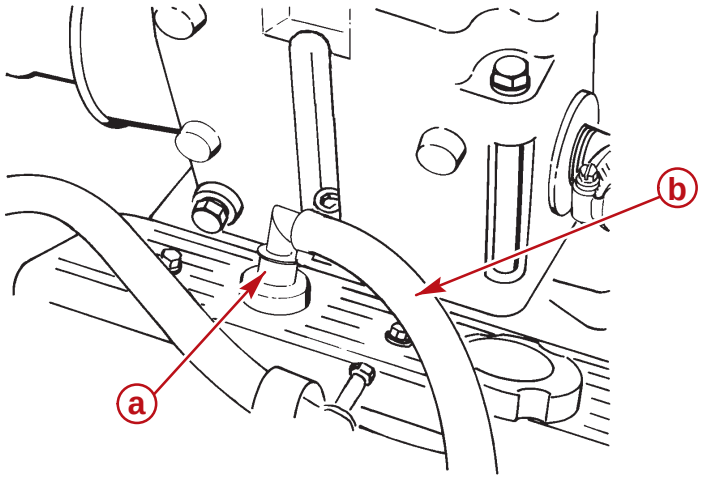
0167

Positive Crankcase Ventilation Valve (PCV)

CHANGING

IMPORTANT: Use only Mercury MerCruiser replacement parts to ensure compliance with emission regulations.

1. Remove PCV valve from port valve cover.



71925

a - PCV valve
b - Hose

2. Disconnect it from the hose and discard the valve.
3. Install a new PCV valve in valve cover and reconnect the hose.
4. Ensure valve is tightly seated in valve cover.

0075.2

Water Separating Fuel Filter

Changing

⚠ WARNING

Avoid Fire or Explosion: The fuel injection system is pressurized during operation. Use care when removing the water separating fuel filter. Fuel could spray on the hot engine causing fire or explosion. Allow the engine to cool down before attempting to remove the water separating fuel filter in the following procedure. Also, hold a clean shop towel over the water separating fuel filter when removing it, to help avoid fuel spraying on the engine.

⚠ WARNING

Be careful when changing the water separating fuel filter. Gasoline is extremely flammable and highly explosive under certain conditions. Ensure the ignition key is OFF. Do NOT smoke or allow spark or open flame in the area when changing the fuel filter. Wipe up any spilled fuel immediately.

⚠ WARNING

Ensure that no fuel leaks exist before closing the engine hatch.

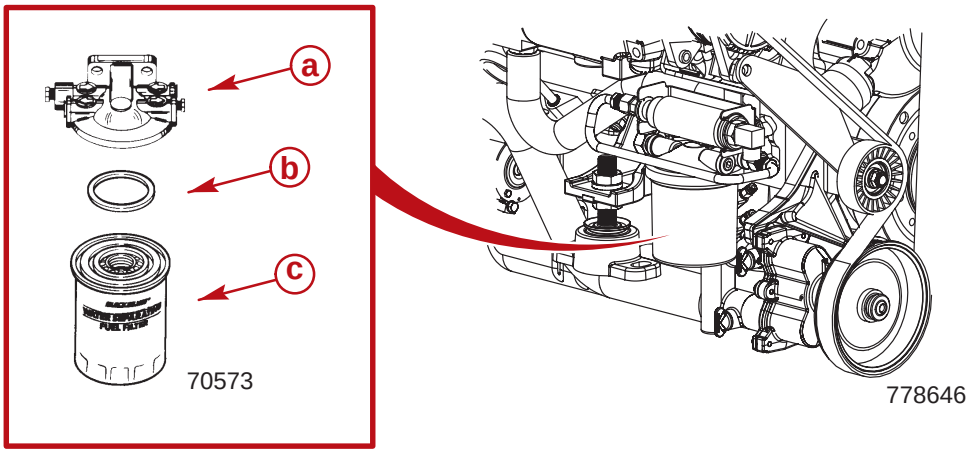
1. Allow the engine to cool down.

NOTE: *Mercury MerCruiser recommends that the engine be shut off for 12 hours prior to filter removal.*

2. Wrap the water separating fuel filter with a cloth to help catch any fuel spills or spray.
3. Remove and discard the water separating fuel filter and sealing ring from the mounting bracket.
4. Coat the sealing ring on the new filter with engine oil.

Description	Where Used	Part Number
Engine Oil	Filter sealing ring	Obtain Locally

5. Thread filter onto bracket and tighten securely by hand. Do NOT use a filter wrench.



a - Fuel filter base
b - Sealing ring
c - Fuel filter

6. Supply cooling water to the engine.
7. Start engine. Check the filter connection for gasoline leaks. If leaks exist, recheck filter installation. If leaks continue, stop engine immediately and contact your authorized Mercury MerCruiser dealer.

0078

Lubrication

0148.02

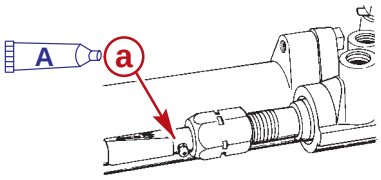
Steering System

⚠ WARNING

Do not grease steering cable while extended. Hydraulic lock could occur and cause loss of steering control.

1. **If Steering Cable Has Grease Fittings:** Turn steering wheel until steering cable is fully retracted into cable housing. Apply approximately 3 pumps of grease from a typical hand-operated grease gun.

NOTE: *If steering cable does not have grease fitting, inner wire of cable cannot be greased.*

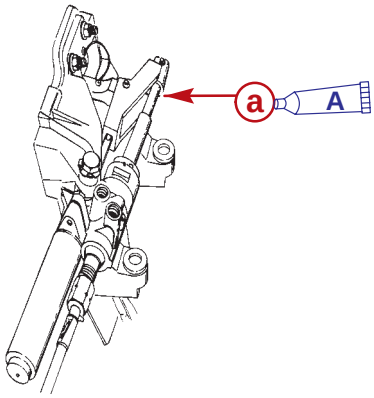


71903

a - Steering cable grease fitting

Description		Where used	Part number
A	Special Lubricant 101	Steering cable	92-802865A1

2. Turn steering wheel until steering cable is fully extended. Lightly lubricate the exposed part of cable.

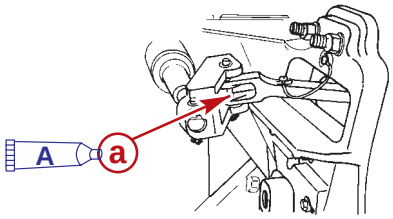


71901

a - Extended steering cable

Description		Where used	Part number
A	Special Lubricant 101	Steering cable	92-802865A1

3. Lubricate the steering system pivot points.



71904

a - Steering system pivot points

Description		Where Used	Part Number
A	SAE 30W Engine Oil	Pivot points	Obtain Locally

4. On dual engine boats: Lubricate the tie bar pivot points.

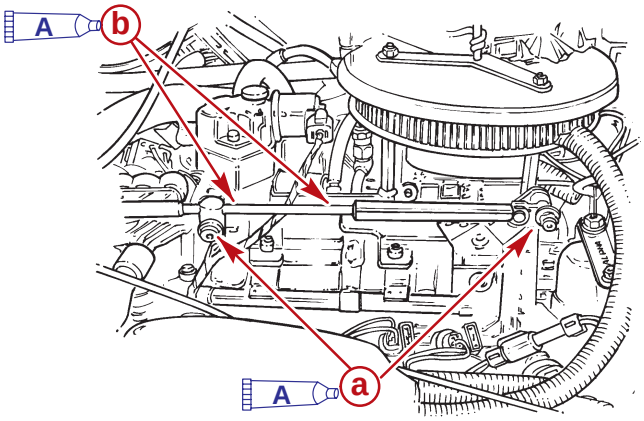
Description	Where Used	Part Number
SAE 30W Engine Oil	Pivot points	Obtain Locally

5. Upon first starting engine, turn steering wheel several times to starboard and then port to ensure that the steering system operates properly before getting underway.

0079

Throttle Cable

1. Lubricate the pivot points and the guide contact surfaces.



78033

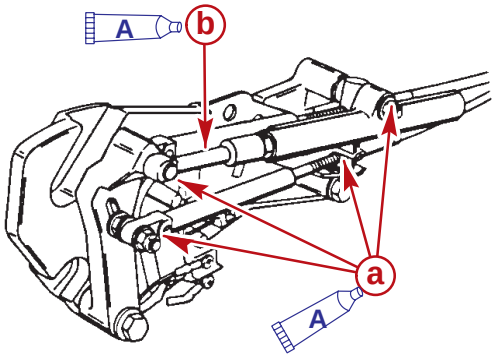
a - Pivot points
b - Guide contact surfaces

Description		Where Used	Part Number
A	Engine Oil	Pivot points, guide contact surfaces	Obtain Locally

0080

Shift Cable - Typical

1. Lubricate the pivot points and the guide contact surfaces.



71357

Typical

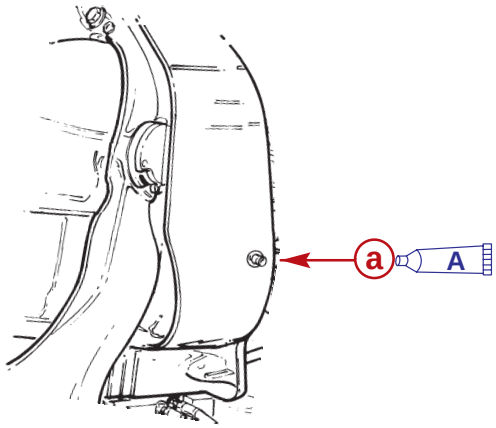
a - Pivot points
b - Guide contact surfaces

Description		Where Used	Part Number
A	Engine Oil	Pivot points, guide contact surfaces	Obtain Locally

0149.01

Sterndrive Unit and Transom Assembly

1. Lubricate gimbal bearing by applying approximately 8-10 pumps of grease from a typical hand-operated grease gun.



77068

a - Gimbal bearing grease fitting

Description	Where Used	Part Number

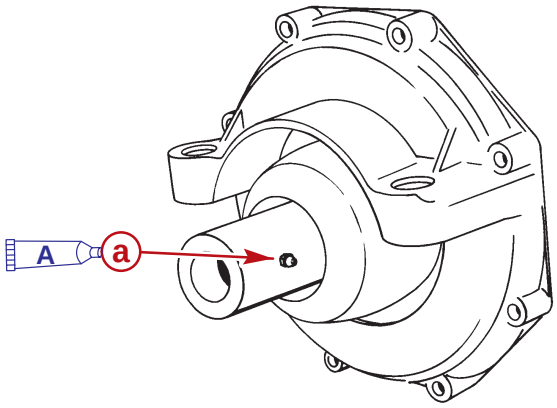
2. For propeller shaft lubrication, refer to Propeller.

0150

Engine Coupler

1. Lubricate engine coupler splines through grease fittings on coupler by applying approximately 8-10 pumps of grease from a typical hand-operated grease gun.

NOTE: *If the boat is operated at idle for prolonged periods of time, coupler should be lubricated* ***Bravo Models*** *- every 50 hours;* ***Alpha Models*** *- every 150 hours.*



71569

a - Engine coupler grease fitting

Description		Where Used	Part Number
A	Engine Coupler Spline Grease	Coupler	92-802869A1

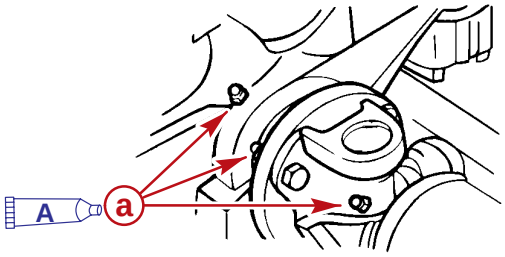
NOTE: **Alpha Models** - *Your power package is equipped with a sealed engine coupler and Perm-a-Lube U-joints. The sealed coupler and shaft splines can be lubricated without removing the sterndrive unit. The Perm-a-Lube U-joints do not require lubrication.*

NOTE: **Bravo Models** - *Your power package is equipped with a sealed engine coupler. The sealed coupler and shaft splines can be lubricated without removing the sterndrive unit. The crosses and bearings on the sterndrive U-joint will need to be lubricated through the grease fittings. Apply Quicksilver U-joint and Gimbal Bearing Grease from a typical hand-operated grease gun until a small amount of grease begins to push out. The sterndrive unit must be removed to grease these fittings.*

0151

Drive Shaft Extension Models

1. Lubricate drive shaft grease fittings, at transom end, by applying approximately 10 - 12 pumps of grease from a typical hand-operated grease gun.

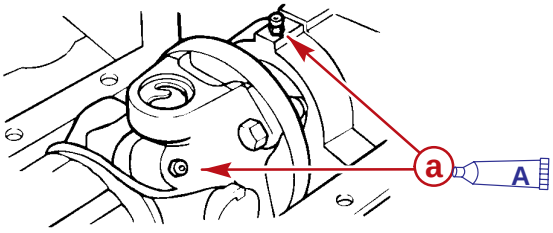


71346

a - Grease fitting locations

Description		Where Used	Part Number
A	U-joint and Gimbal Bearing Grease	Drive shaft U-joints	92-802870A1

2. Lubricate drive shaft grease fittings, at engine end, by applying approximately 3 - 4 pumps of grease from a typical hand-operated grease gun.



71347

a - Grease fitting locations

Description		Where Used	Part Number
A	U-joint and Gimbal Bearing Grease	Drive shaft U-joints	92-802870A1

0152

Propellers

0153

Alpha

⚠ WARNING

Avoid Injury: Remote Control must be in NEUTRAL and ignition key removed from switch before removing and/or installing propeller.

⚠ WARNING

Avoid Injury: Place a block of wood between anti-ventilation plate and propeller to protect hands from propeller blades and to prevent propeller from rotating when removing propeller nut.

⚠ CAUTION

Avoid Injury: Periodically check propeller nut for tightness during boating season. A minimum of 55 lb-ft (75 Nm) torque is required.

0154

REMOVAL

1. Place wood block between propeller blade and anti-ventilation plate to prevent rotation. Straighten bent tabs on tab washer.
2. Turn propeller shaft nut counterclockwise to remove nut.
3. Slide tab washer, drive sleeve, propeller and thrust hub off propeller shaft.

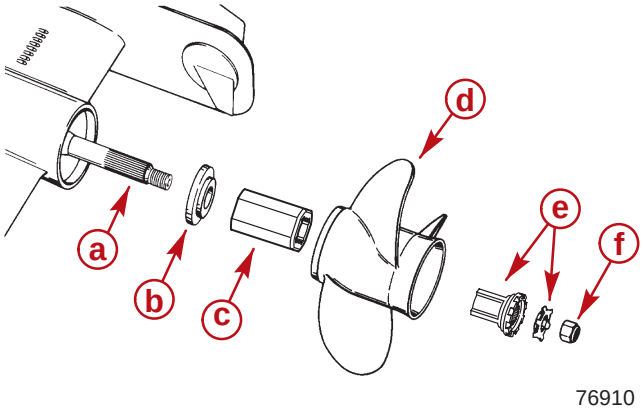
0155

REPAIR

Some damaged propellers can be repaired. Contact your authorized Mercury MerCruiser dealer.

0156.01

INSTALLATION



a - Propeller shaft
b - Thrust hub
c - Flo-Torque II drive hub
d - Propeller
e - Drive sleeve
f - Locking tab washer
g - Propeller nut

IMPORTANT: If reusing tab washer, carefully inspect tabs for cracks or other damage. Replace tab washer if condition is questionable.

1. Apply a liberal coat of one of the following lubricants to the propeller shaft.

Description	Where used	Part number
Anti-Corrosion Grease	Propeller shaft	92-802867A1
Special Lubricant 101		92-802865A1
2-4-C with Teflon		92-802859A1

2. Slide thrust hub onto propeller shaft, with stepped side toward propeller hub.
3. Install Flo-Torque II Drive Hub into propeller.

NOTE: *The drive sleeve is tapered and will slide fully into the propeller as the nut is tightened and properly torqued.*

4. Align splines and place propeller on propeller shaft.
5. Install drive sleeve and locking tab washer.
6. Install and torque the propeller nut.

Description	Nm	lb-in.	lb-ft
Propeller nut[1]	75		55

[1] The propeller torque stated is a minimum torque value.

7. Bend three tabs on the tab washer down into the grooves in spline washer. After the first use, bend the three tabs straight and retorque the propeller nut. Bend tabs back down into spline washer. Check propeller at least after 20 hours of operation. Do not operate with loose propeller.

0157

Bravo One and Two

REMOVAL

⚠ WARNING

Avoid Injury: Remote Control must be in NEUTRAL and ignition key removed from switch before removing and/or installing propeller.

⚠ WARNING

Avoid Injury: Place a block of wood between anti-ventilation plate and propeller to protect hands from propeller blades and to prevent propeller from rotating when removing propeller nut.

1. Place wood block between propeller blade and anti-ventilation plate to prevent rotation. Straighten bent tabs on tab washer.
2. Turn propeller shaft nut counterclockwise to remove nut.
3. Slide tab washer, spline washer, propeller and thrust hub off propeller shaft.

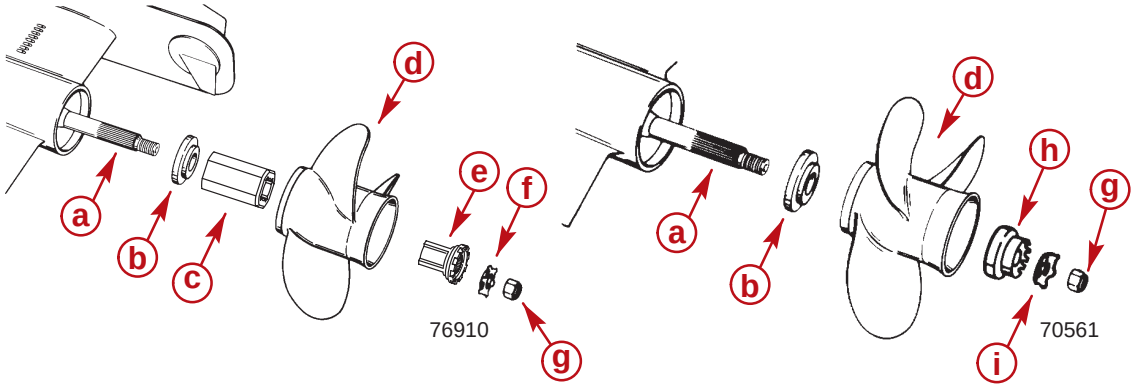
0155

REPAIR

Some damaged propellers can be repaired. Contact your authorized Mercury MerCruiser dealer.

0158

INSTALLATION



Bravo One

- **a -** Propeller shaft
- **b -** Thrust hub
- **c -** Flo-Torque II drive hub
- **d -** Propeller
- **e -** Drive sleeve

Bravo Two

- **f -** Locking tab washer
- **g -** Propeller nut
- **h -** Spline washer
- **i -** Tab washer

IMPORTANT: If reusing tab washer, carefully inspect tabs for cracks or other damage. Replace tab washer if condition is questionable.

1. Apply a liberal coat of one of the following lubricants to the propeller shaft.

Description	Where Used	Part Number
Anti-Corrosion Grease	Propeller shaft	92-802867A1
Special Lubricant 101		92-802865A1
2-4-C with Teflon		92-802859A1

2. Slide thrust hub into propeller hub with stepped side toward propeller hub.
3. **Bravo One:** Install Flo-Torque II Drive Hub into propeller.

NOTE: *The drive sleeve is tapered and will slide fully into the propeller as the nut is tightened and properly torqued.*

4. Align splines and place propeller on propeller shaft.
5. Install final attaching hardware.
   a. **Bravo One:** Install drive sleeve adapter and locking tab washer.
   b. **Bravo Two:** Install spline washer and tab washer.

⚠ CAUTION

Avoid Injury: Periodically check propeller nut for tightness during boating season. A minimum of 55 lb-ft (75 Nm) torque is required.

6. Install and torque the propeller nut.

Description	Nm	lb-in.	lb-ft
Propeller Nut[1]	75		55

[1] The propeller torque stated is the minimum torque value.

7. Bend 3 tabs on the tab washer down into the grooves in spline washer. After the first use, bend the 3 tabs straight and retorque the propeller nut. Bend tabs back down into spline washer. Check propeller at least after 20 hours of operation. Do NOT operate with loose propeller.

0159.01

Bravo Three

REMOVAL

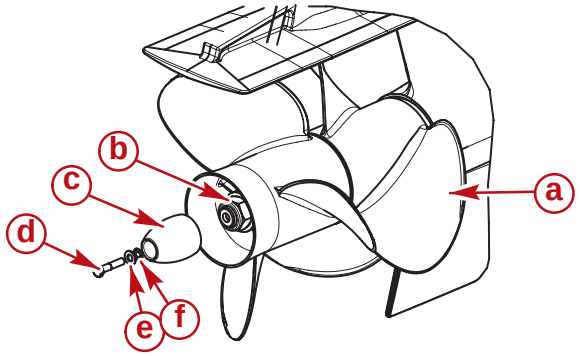
⚠ WARNING

Avoid Injury: Remote Control must be in NEUTRAL and ignition key removed from switch before removing and/or installing propeller.

⚠ WARNING

Avoid Injury: Place a block of wood between anti-ventilation plate and propeller to protect hands from propeller blades and to prevent propeller from rotating when removing propeller nut.

1. Place wood block between propeller blades and anti-ventilation plate to prevent rotation.
2. Remove the bolt and washers securing the propeller nut anode.
3. Remove the propeller nut anode.



79161

a - Propeller
b - Propeller shaft nut
c - Propeller shaft anode
d - Propeller shaft anode screw
e - Flat washer
f - Star washer

4. Turn aft propeller shaft nut (1-7/16 in. or 37 mm) counterclockwise to remove nut.
5. Slide propeller and thrust hub off propeller shaft.
6. Turn front propeller shaft nut (2-3/4 in. or 70 mm) counterclockwise to remove nut.
7. Slide propeller and thrust hub off propeller shaft.

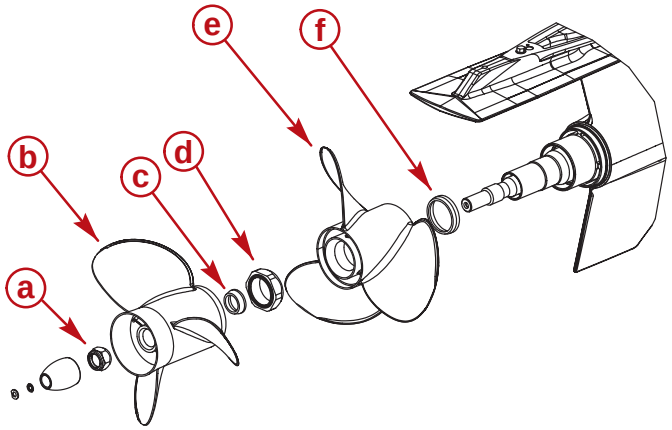
0155

REPAIR

Some damaged propellers can be repaired. Contact your authorized Mercury MerCruiser dealer.

0160.01

INSTALLATION



77107

a - Rear propeller nut
b - Rear propeller
c - Rear propeller thrust hub
d - Front propeller nut
e - Front propeller
f - Front propeller thrust hub

1. Apply a liberal coat of one of the following lubricants to the propeller shaft.

Description	Where Used	Part Number
Anti-Corrosion Grease	Propeller shaft	92-802867A1
Special Lubricant 101		92-802865A1
2-4-C with Teflon		92-802859A1

2. Slide forward thrust hub onto propeller shaft with tapered side toward propeller hub (toward end of shaft).
3. Align splines and place propeller on propeller shaft.
4. Install and torque the propeller nut. Check propeller at least every 20 hours of operation and retorque as needed.

Description	Nm	lb-in.	lb-ft
Forward Propeller Nut[1]	136		100

[1] The propeller torque stated is the minimum torque value.

5. Slide aft thrust hub onto propeller shaft, with tapered side toward propeller hub (toward end of shaft).
6. Align splines and place propeller on propeller shaft.

⚠ CAUTION

Avoid Injury: Periodically check propeller nut for tightness during boating season. A minimum of 60 lb-ft (81 Nm) torque is required.

7. Install and torque the propeller nut. Check propeller at least every 20 hours of operation and retorque as needed.

Description	Nm	lb-in.	lb-ft
Aft Propeller Nut[1]	81		60

[1] The propeller torque stated is the minimum torque value.

8. Install the propeller shaft anode over the propeller shaft nut.
9. Place the flat washer onto the propeller shaft anode screw.
10. Place the star washer onto the propeller shaft anode screw.

NOTE: *If the propeller shaft anode is removed after initial installation and is to be reinstalled, it will be necessary to apply Loctite Thread Locker 271 to the threads of the propeller shaft anode screw.*

11. Secure the propeller shaft anode to the propeller shaft using the propeller shaft anode screw and washers. Torque the screw.

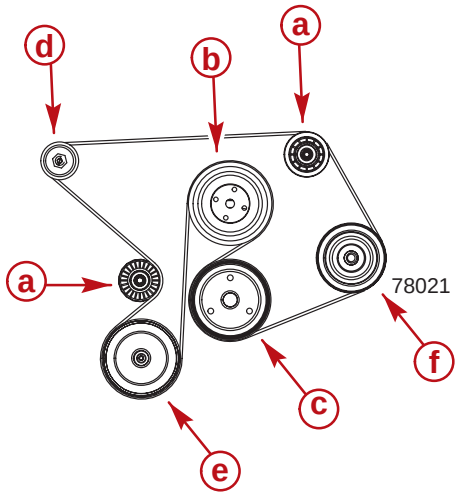
Description	Nm	lb-in.	lb-ft
Propeller shaft anode screw 0.3125-18 x 1.5 in. (38 mm) long	27		20

0081.1

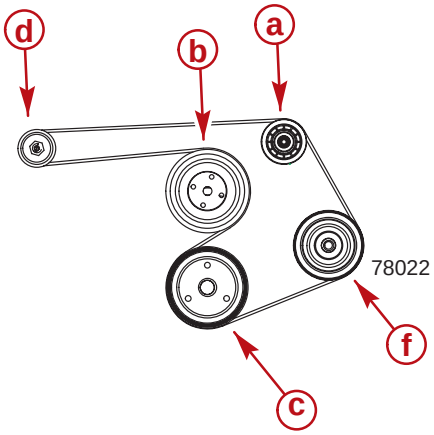
Serpentine Drive Belt

⚠ WARNING

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



With a seawater pump



Without a seawater pump

- **a** - Idler pulley
- **b** - Water circulating pump pulley
- **c** - Crankshaft pulley
- **d** - Alternator pulley
- **e** - Seawater pump pulley
- **f** - Power steering pump pulley

0082.03

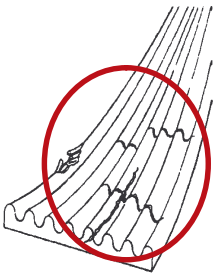
Checking

1. Inspect the drive belt for proper tension and for the following:

- Excessive wear
- Cracks

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.

- Fraying
- Glazed surfaces
- Proper tension - 13 mm (1/2 in.) deflection, with moderate thumb pressure, on the belt at the location that has the longest distance between 2 pulleys.



75130

0083.04

Replacing and / or Adjusting Tension

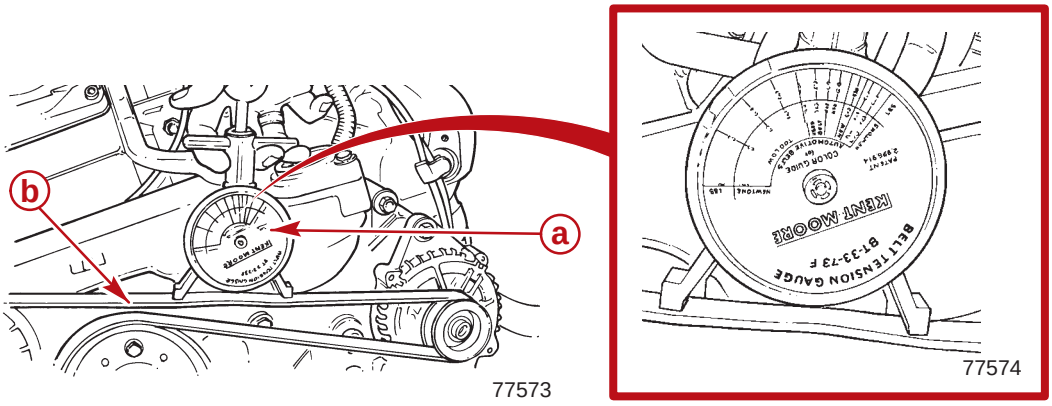
IMPORTANT: If a belt is to be reused, it should be installed in the same direction of rotation as before.

NOTE: *The upper, left (port) idler pulley is the belt adjustment pulley.*

NOTE: *Belt deflection is to be measured on the belt at the location that has the longest distance between two (2) pulleys.*

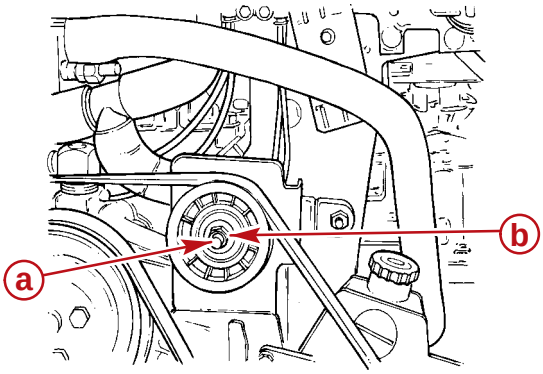
1. Loosen the 5/8 in. locking nut on the adjustment stud.
2. Turn the adjustment stud and loosen the belt.
3. If necessary, remove the old serpentine drive belt.
4. If necessary, install the new serpentine drive belt onto the pulleys.
5. Put a wrench on the adjustment stud 5/8 in. locking nut.
6. Use a 5/16 in. socket and tighten adjusting the stud to adjust the belt deflection.
7. Using 1 of the 2 methods following, check for correct deflection.
   a. Push down with moderate thumb pressure on the longest stretch of belt. Proper deflection is 13 mm (1/2 in.).

b. Attach the Kent Moore Belt Tension Gauge to the belt. The gauge has different ranges for new and used belts.



a - Kent Moore Tension Gauge
b - Serpentine belt

8. While holding the adjustment stud at the correct belt tension, tighten the 5/8 in. locking nut.



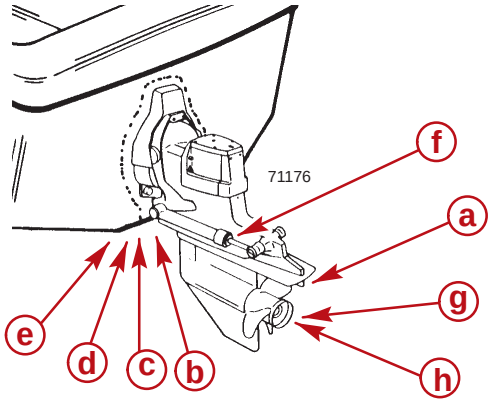
a - 5/8 in. locking nut
b - 5/16 in adjusting stud

9. Operate the engine for a short period of time and recheck the belt adjustment.

Corrosion Protection

Whenever 2 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.

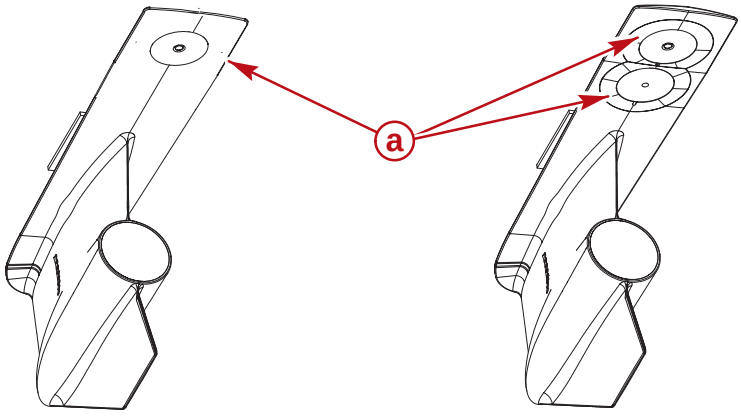
To help control the effects of galvanic corrosion, Mercury Mercruiser sterndrive units come withe several sacrificial anodes and other corrosion protection devices. For a more comprehensive explanation of corrosion and corrosion protection refer to the ***Marine Corrosion Protection Guide*** (90-88181301).



a - Gearcase anodic plate
b - Ventilation plate anode
c - Drive mounted anodic block
d - MerCathode system
e - Anode kit
f - Trim cylinder anodes
g - Bearing carrier anode
h - Propshaft anode

IMPORTANT: Replace sacrificial anodes if eroded 50 percent or more.

Gearcase Anodic Plate - Is mounted on the underside of the lower gearcase and serves as a sacrificial anode.

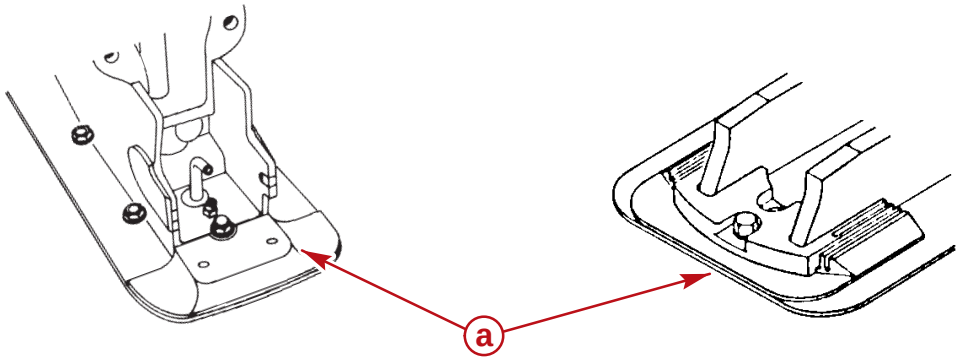


Alpha, Bravo One Brave Two Models

All Bravo Three Models

a - Anode

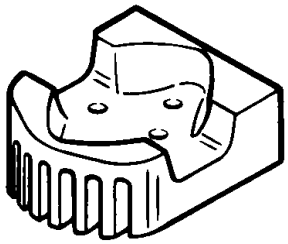
Ventilation Plate Anode - Is mounted on the front of the geargase and serves as a sacrificial anode.



Alpha Models **All Bravo Models**

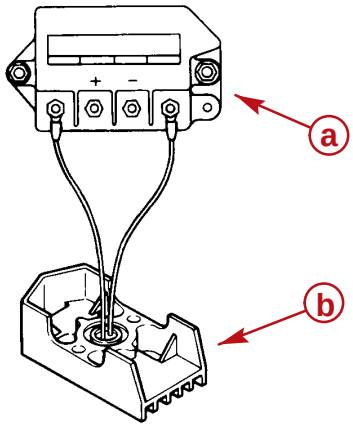
a - Anode

Drive Mounted Anodic Block (if equipped) - Is mounted to underside of gimbal housing and serves as a sacrificial anode.



70576

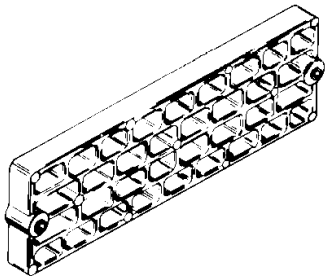
MerCathode System (if equipped) - Electrode assembly replaces Anodic block. System should be tested to ensure adequate output. The test should be performed where boat is moored, using Quicksilver Reference Electrode and Test Meter. Contact your authorized Mercury MerCruiser dealer.



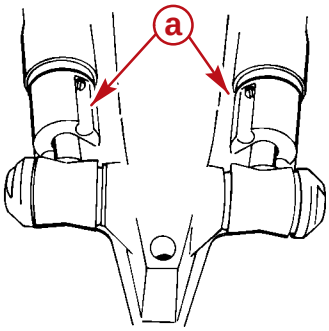
70578

a - Mercathode controller
b - Anodic block

Anode Kit (if equipped) - Mounted to boat transom. Acts as a sacrificial anode.



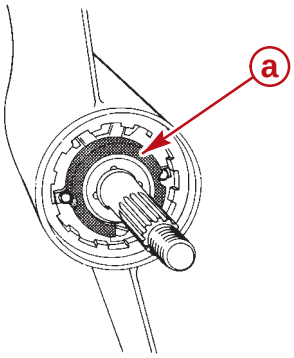
Trim Cylinder Anodes - are mounted on each trim cylinder.



71966

a - Trim cylinder anodes

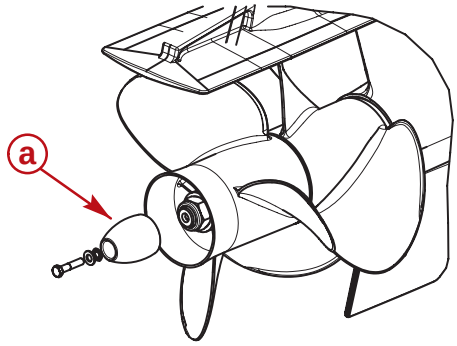
Bearing Carrier Anode (Alpha and Bravo One Models) - is located in front of the propeller, between the front side of the propeller and the gear housing.



72032

a - Bearing carrier anode

Propshaft Anode (Bravo Three Only) - is located in front of the propeller, between the front side of the propeller and the gear housing.



79161

a - Propshaft anode

In addition to the corrosion protection devices, the following steps should be taken to inhibit corrosion:

1. Paint your power package, refer to Painting Your Power Package.
2. Spray power package components on inside of boat annually with Corrosion Guard to protect finish from dulling and corrosion. External power package components may also be sprayed.
3. All lubrication points, especially steering system, shift and throttle linkages, should be kept well lubricated.
4. Flush cooling system periodically, preferably after each use.

0162.01

Painting Your Power Package

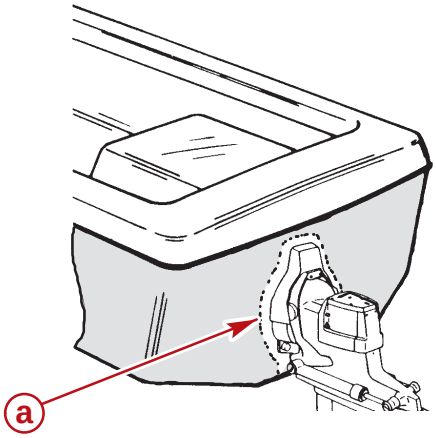
IMPORTANT: Corrosion damage that results from the improper application of anti-fouling paint will not be covered by the limited warranty.

1. **Painting Boat Hull or Boat Transom:** Anti-fouling paint may be applied to boat hull and boat transom but you must observe the following:

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

IMPORTANT: If anti-fouling protection is required for boat hull or boat transom, copper base paints, if not prohibited by law, can be used. If using copper based anti-fouling paints, observe the following:

- **Avoid any electrical interconnection between the Mercury MerCruiser Product, Anodic Blocks, or MerCathode System and the paint by allowing a minimum of 40 mm (1-1/2 in.) UNPAINTED area on transom of the boat around these items.**



71176

a - Unpainted area on transom

2. **Painting Sterndrive Unit or Transom Assembly:** Sterndrive unit and transom assembly should be painted with a good quality marine paint or an anti-fouling paint that DOES NOT contain copper, or any other material that could conduct electrical current. Do not paint drain holes, anodes, MerCathode system, and items specified by boat manufacturer.

0163

Emissions (Europe Only)

The following information applies only to engines with a special emissions kit installed. If the kit has been installed, your engine complies with SAV1 Regulations.

0164

Emissions Testing

Your engine is equipped with special design features and special tuning to minimize the emission output from the engine. You should follow:

- Recommended maintenance schedules particularly as to the ignition system.
- Proper engine tuning procedures to ensure these features remain in good operating order.
- Proper steps to maintain the engine within specifications.

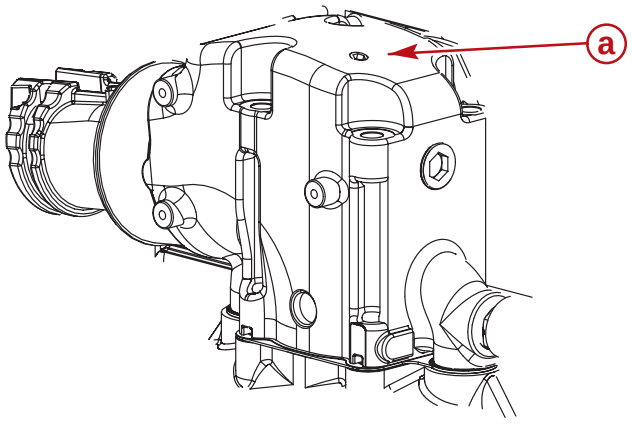
Use only Mercury MerCruiser replacement parts to ensure compliance with emission regulations.

0165.1

Installing Test Probes

IMPORTANT: The testing dealer or agency will be equipped with the appropriate test equipment and adapters for this engine. The test probes should be installed as follows:

1. Remove plugs from the top of both exhaust elbows.

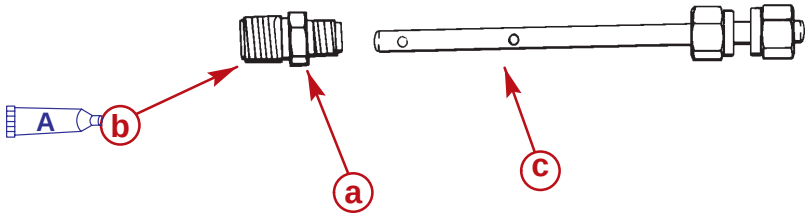


78645

a - Exhaust elbow plug

2. Apply sealant to the threads of the adapter fitting that go into the exhaust elbow.

3. Install fittings into elbows. Tighten fittings securely.

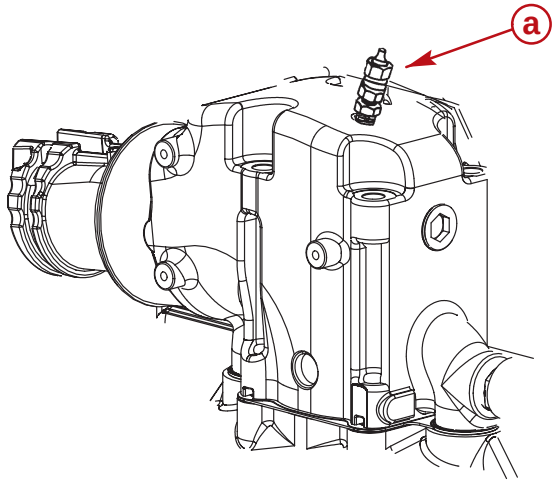


71926

a - Adapter fitting
b - Elbow side
c - Probe

Description		Where Used	Part Number
A	Pipe Sealant with Teflon	Adapter fitting threads	92-809822

4. Insert exhaust probes into fittings and tighten securely.



78645

a - Test probes installed

The testing agency will connect their adapters and test equipment to the probes to conduct the test. Once the test is complete, they should remove the test probes and fittings, apply Quicksilver Perfect Seal to the threads of both plugs and reinstall them into elbows.

STORAGE

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0084

Cold Weather Or Extended Storage

IMPORTANT: Mercury MerCruiser strongly recommends that this service should be performed by an authorized Mercury MerCruiser dealer. Damage caused by freezing IS NOT covered by the Mercury MerCruiser Limited Warranty.

⚠ CAUTION

Seawater section of cooling system MUST BE COMPLETELY drained for winter storage, or immediately after cold weather use, if the possibility of freezing temperatures exist. Failure to comply may result in trapped water causing freeze and/or corrosion damage to engine. Damage caused by freezing is NOT covered by the Mercury MerCruiser Limited Warranty.

IMPORTANT: Mercury MerCruiser recommends that propylene glycol antifreeze (a nontoxic and environmentally safe) antifreeze be used in the seawater section of the cooling system for cold weather or extended storage. Make sure that the propylene glycol antifreeze contains a rust inhibitor and is recommended for use in marine engines. Be certain to follow the propylene glycol manufacturer's recommendations.

0085.01

Preparing Your Power Package For Storage

1. Fill the fuel tanks with fresh gasoline (that does not contain alcohol) and a sufficient amount of Quicksilver Gasoline Stabilizer for Marine Engines to treat the gasoline. Follow instructions on the container.
2. **If the boat is to be placed in storage with fuel containing alcohol in fuel tanks (if fuel without alcohol is not available):** Fuel tanks should be drained as low as possible and Quicksilver Gasoline Stabilizer for Marine Engines added to any fuel remaining in the tank. Refer to Fuel Requirements for additional information.

NOTE: *If desired, a portable fuel tank can be used to perform the remainder of the power package lay up procedures. Add an appropriate amount of Gasoline Stabilizer to the portable tank.*

3. Flush the cooling system.

4. Operate the engine sufficiently to bring it up to normal operating temperature and allow fuel with Quicksilver Gasoline Stabilizer to circulate through the fuel system. Shut off engine.
5. Drain the engine.
6. Ensure that the sterndrive vent holes and water drain holes and passages are unobstructed and open (refer to Draining - Sterndrive).
7. For additional assurance against freezing and rust, after draining fill the cooling system with a mixture of propylene glycol and tap water mixed to manufacturer's recommendation to protect engine to the lowest temperature to which it will be exposed during cold weather or extended storage.

⚠ CAUTION

Sterndrive should be stored in full DOWN position. Universal Joint bellows may develop a set if unit is stored in raised position and may fail when unit is returned to service.

8. Store boat with drive unit in full DOWN/IN position.

0086

FUEL SYSTEM

⚠ WARNING

The fuel injection system is pressurized. Avoid serious injury from an explosion. Use care when removing water separating fuel filter. Allow engine to cool down before removing the water separating fuel filter. Also, hold a clean shop towel over the water separating fuel filter when removing it, to help avoid fuel spraying on the engine.

⚠ WARNING

Fuel vapors can be present in the engine compartment. Avoid injury or power package damage caused by fuel vapors or explosion. Always ventilate the engine compartment prior to servicing the power package.

1. In a 23 liter (6 U.S. gal.) remote fuel tank mix:
   a. 19 liter (5 U.S. gal) regular unleaded 87 octane (90 RON) gasoline
   b. 1.89 liter (2 U.S. qts.) Premium Plus 2-Cycle TC-W3 Outboard Oil
   c. 150ml (5 ounces) Fuel System Treatment and Stabilizer or 30 ml (1 ounce) Fuel System Treatment and Stabilizer Concentrate.

Description	Where Used	Part Number
Mercury Fuel System Treatment and Stabilizer	Fuel system	92-802875A1
Mercury Fuel System Treatment and Stabilizer Concentrate	Fuel system	92-802876A1
Premium Plus 2-Cycle TC-W3 Outboard Oil	Fuel system	92-802824A1

2. Allow the engine to cool down.

IMPORTANT: Immediately wipe up any fuel spills or sprays.

3. Close the fuel shut off valve, if equipped. Disconnect and plug the fuel inlet fitting if not equipped with a fuel shut off valve.
4. Connect the remote fuel tank (with the fogging mixture) to the fuel inlet fitting.

IMPORTANT: Supply cooling water to the engine.

5. Start and operate the engine at 1300 rpm for 5 minutes.
6. After specified operating time is complete, slowly return throttle to idle rpm and shut engine off.

IMPORTANT: Ensure that some fogging mixture remains in the engine. Do NOT allow the engine's fuel system to become completely dry.

7. Remove and discard the water separating fuel filter.
8. Install a new filter.

0087

BATTERY

Follow the battery manufacturer's instructions for storage.

0088

Draining Instructions

⚠ CAUTION

Ensure that boat is out of the water or seacock is closed and bilge pump is operating before beginning procedure. Excess water in bilge can damage engine or cause boat to sink.

⚠ CAUTION

Do NOT operate engine with drain system open. Excess water in bilge can damage engine or cause boat to sink.

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

Your power package is equipped with a drain system. Refer to Identification on the following page to determine which instructions apply to your power package.

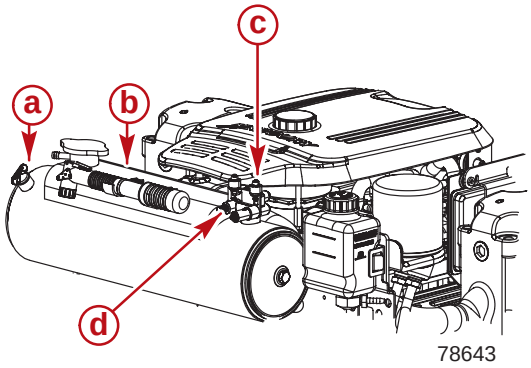
The power package should be drained before flushing or prior to extended or cold weather storage.

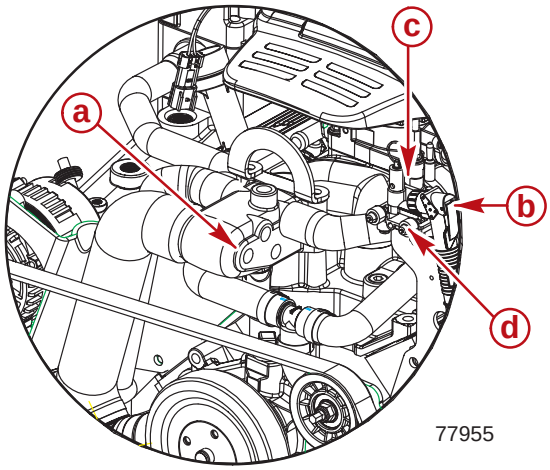
IMPORTANT: The engine must not be operating at any point during this procedure.

0179.1

Identification

AIR ACTUATED SINGLE POINT DRAIN SYSTEM



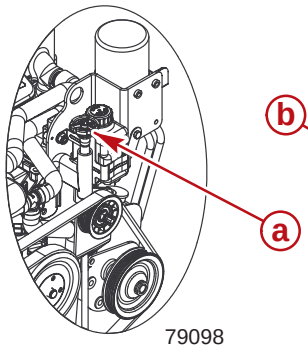


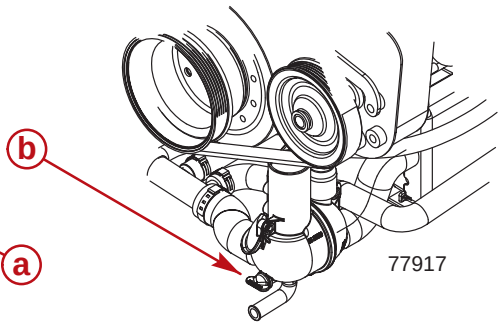
Closed cooled models **Seawater cooled models**

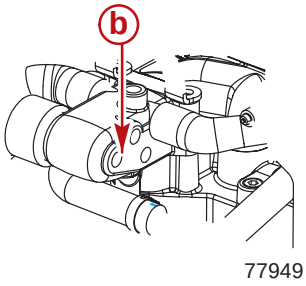
- **a** - Blue drain plug location
- **b** - Blue air pump
- **c** - Air manifold
- **d** - Green indicators

0188.1

MANUAL SINGLE POINT DRAIN SYSTEM



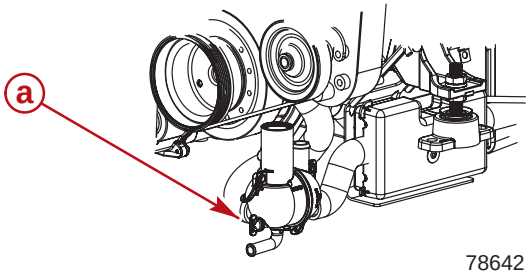


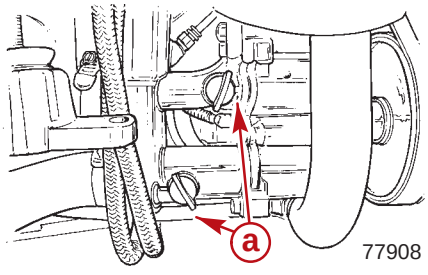


- **a** - Blue handle
- **b** - Blue drain plug location

0180.1

3 POINT MANUAL DRAIN SYSTEM

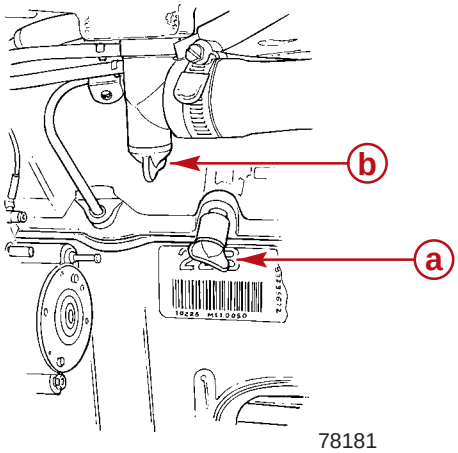




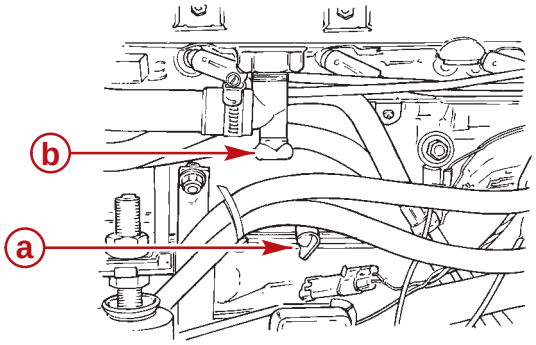
- **a** - Blue drain plug

0181.1

MULTI-POINT DRAIN (MPD) SYSTEM

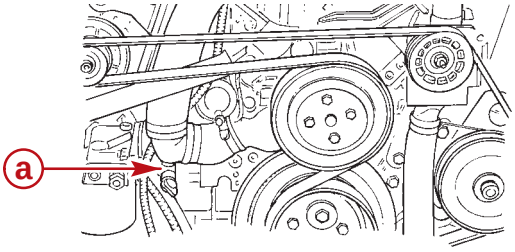


78181

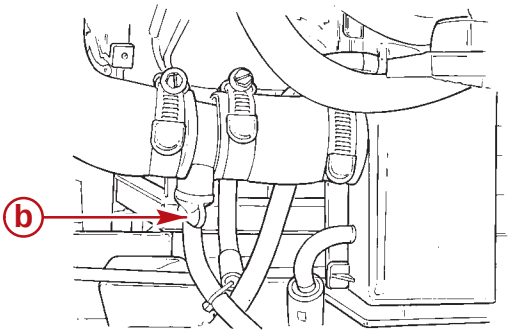


78178

a - Side of cylinder block
b - Bottom of exhaust manifolds

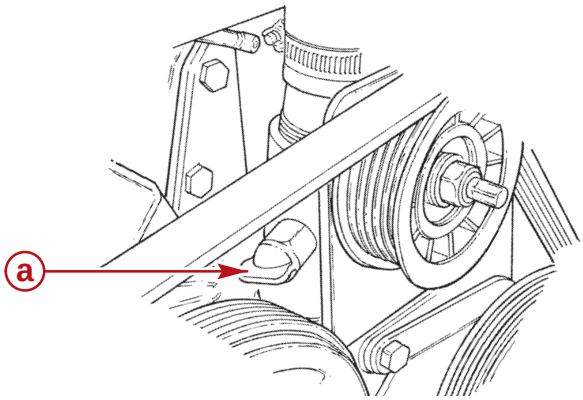


78182



78179

a - Water circulating pump hose
b - Fuel cooler to thermostat housing



78180

a - Check valve

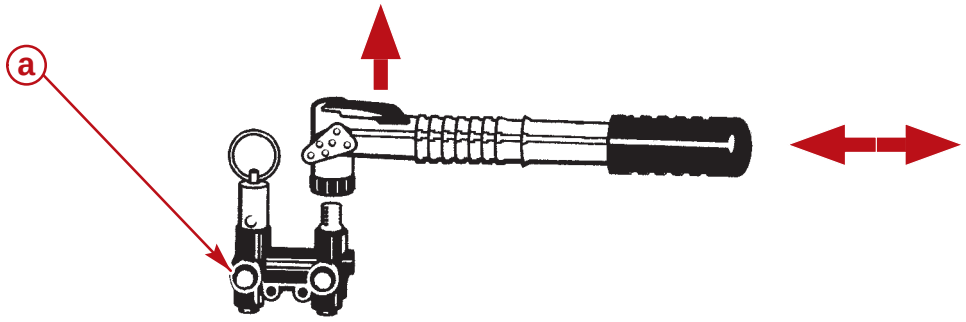
0182.1

Boat In Water

AIR ACTUATED SINGLE POINT DRAIN SYSTEM

NOTE: *This procedure is written for the air pump that is attached to the engine. However, any air source can be used.*

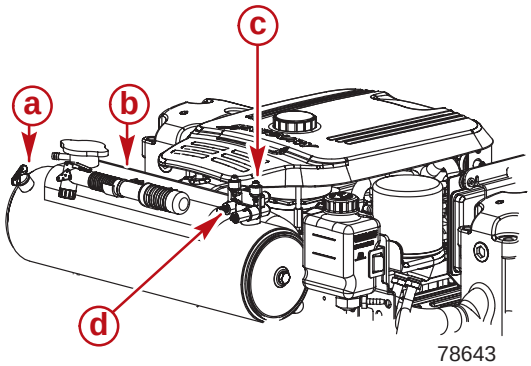
1. Close the seacock.
2. Remove the blue air pump from the engine.
3. Ensure that lever on top of pump is flush with the handle (horizontal).
4. Install air pump on the fitting in the air manifold.



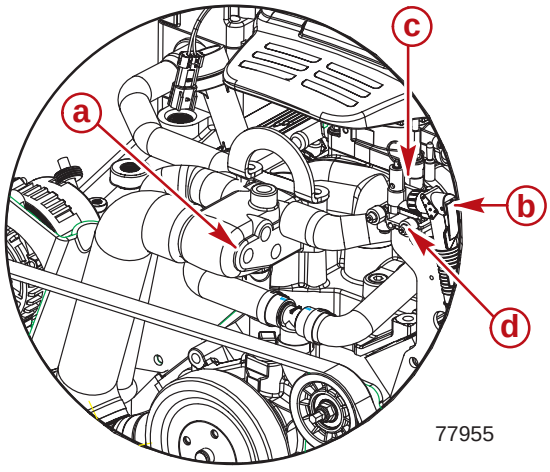
77638

a - Green indicators

5. Pull lever on air pump up (vertical) to lock pump on the fitting.
6. Pump air into the system until both green indicators extend and water drains from both sides of the engine. The port side will begin draining before the starboard side.
7. **Immediately** remove the blue drain plug from the side of the thermostat housing or the heat exchanger. This must be removed within 30 seconds to properly vent the cooling system.



78643

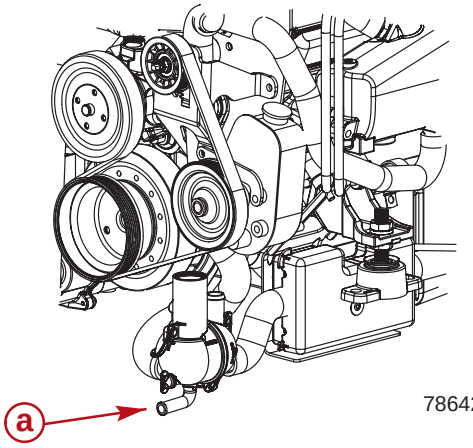


77955

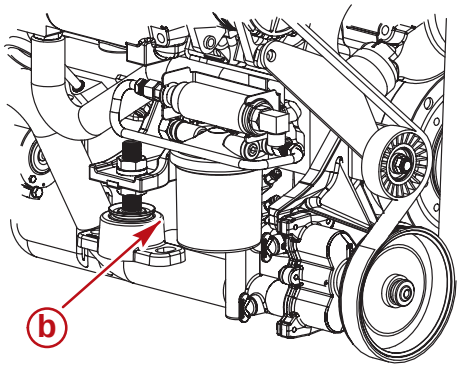
Closed cooled models | **Seawater cooled models**

a - Blue drain plug location
b - Blue air pump
c - Air manifold
d - Green indicators

8. Verify that water is draining from each opening. If not, use the 3 Point Manual Drain System instructions.



78642



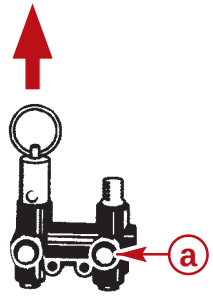
78646

a - Port side drain location
b - Starboard side drain location

9. Allow the system to drain for a minimum of 5 minutes. Add air as necessary to keep the green indicators extended.
10. Crank engine over slightly with starter motor to purge any water trapped in seawater pump. Do NOT allow engine to start.
11. Reinstall the blue drain plug in the thermostat housing.
12. Remove the air pump from the air manifold and return it to the mounting bracket.
13. Mercury MerCruiser recommends leaving the drain system open while transporting the boat or while performing other maintenance. This helps ensure that all water is drained.

IMPORTANT: Mercury MerCruiser recommends that propylene glycol (a nontoxic and environmentally safe) antifreeze be used in the seawater section of the cooling system for cold weather or extended storage. Make sure that the propylene glycol antifreeze contains a rust inhibitor and is recommended for use in marine engines. Be certain to follow the propylene glycol manufacturer's recommendations.

14. Before launching boat, pull up on manual release valve. Verify that green indicators are no longer extended.



77638

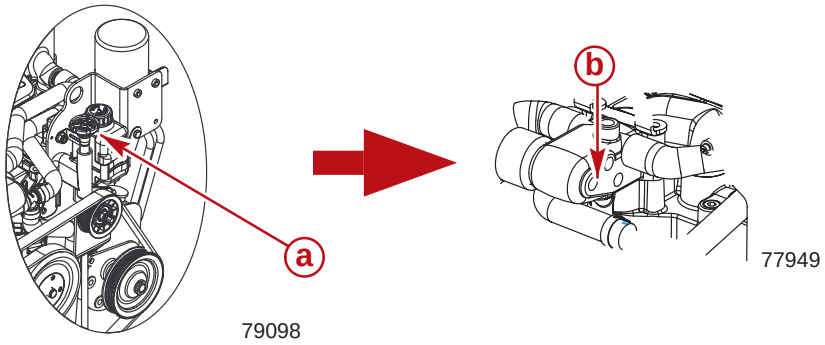
a - Green indicators

15. Open the seacock prior to operating the engine.

0189.1

MANUAL SINGLE POINT DRAIN SYSTEM

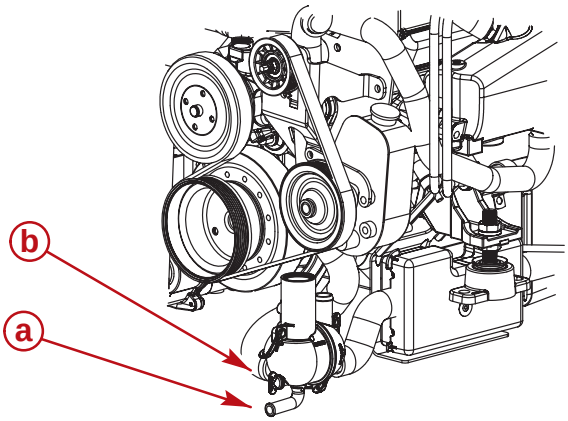
1. Close the seacock.
2. Rotate blue handle COUNTERCLOCKWISE until it stops (approximately 2 turns). The red on the handle shaft indicates that the drain system is open. Do NOT force handle as this will create new threads.
3. **Immediately** remove the blue drain plug from the side of the thermostat housing. This must be removed within 30 seconds to properly vent the cooling system.



79098 77949

a - Blue handle
b - Blue drain plug location

4. Visually verify that water is draining. If water does not drain, remove blue drain plug from distribution housing and drain manually.



78642

a - Drain location - orange or red
b - Blue drain plug

5. Allow the system to drain for a minimum of 5 minutes. Mercury MerCruiser recommends leaving the drain system open while transporting the boat or while performing other maintenance.
6. Reinstall the blue drain plug in the thermostat housing.
7. Close the drain system by rotating the blue handle CLOCKWISE until it stops and install the blue drain plug, if removed. The handle is fully seated when no red is visible. Do NOT overtighten the handle as this will create new threads.

IMPORTANT: Mercury MerCruiser recommends that propylene glycol (a nontoxic and environmentally safe) antifreeze be used in the seawater section of the cooling system for cold weather or extended storage. Make sure that the propylene glycol antifreeze contains a rust inhibitor and is recommended for use in marine engines. Be certain to follow the propylene glycol manufacturer's recommendations.

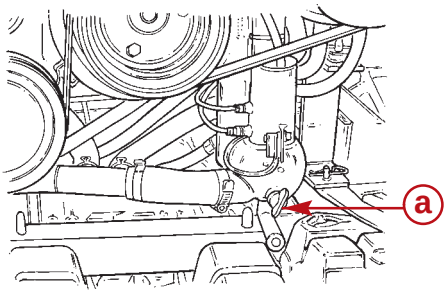
8. Open the seacock prior to operating the engine.

0183

3 POINT MANUAL DRAIN SYSTEM

NOTE: *Use this procedure if your engine is not equipped with an air actuated single point drain system or if the single point drain system fails.*

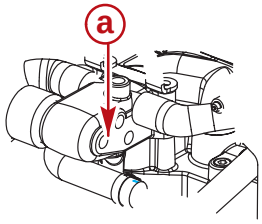
1. Close the seacock.
2. Remove the blue drain plug from the distribution housing (lower front, port side).



77917

a - Blue drain plug

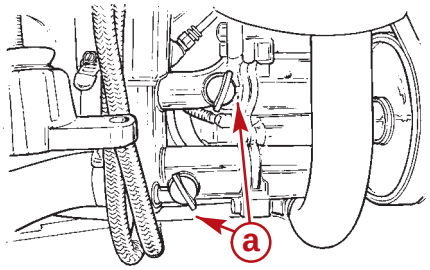
3. **Immediately** remove the blue drain plug from the side of the thermostat housing. This must be removed within 30 seconds to properly vent the cooling system.



77949

a - Blue drain plug location

4. Remove the 2 blue drain plugs from the seawater pickup pump (front, starboard side).



77908

a - Blue drain plugs

5. Verify that water is draining from each opening.
6. Allow the system to drain for a minimum of 5 minutes. Mercury MerCruiser recommends leaving the drain system open while transporting the boat or while performing other maintenance.
7. Crank engine over slightly with starter motor to purge any water trapped in seawater pickup pump. Do NOT allow engine to start.
8. Prior to launching boat or starting the engine, close the drain system by installing the 4 blue drain plugs.

IMPORTANT: Mercury MerCruiser recommends that propylene glycol (a nontoxic and environmentally safe) antifreeze be used in the seawater section of the cooling system for cold weather or extended storage. Make sure that the propylene glycol antifreeze contains a rust inhibitor and is recommended for use in marine engines. Be certain to follow the propylene glycol manufacturer's recommendations.

9. Open the seacock prior to operating the engine.

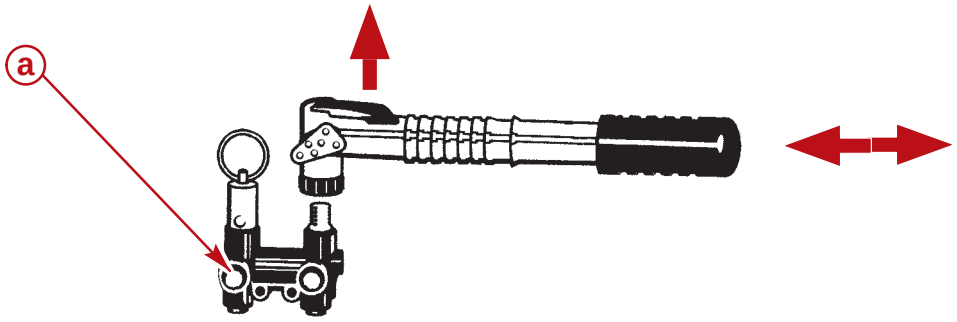
0184.1

Boat Out Of The Water

AIR ACTUATED SINGLE POINT DRAIN SYSTEM

NOTE: *This procedure is written for the air pump that is attached to the engine. However, any air source can be used.*

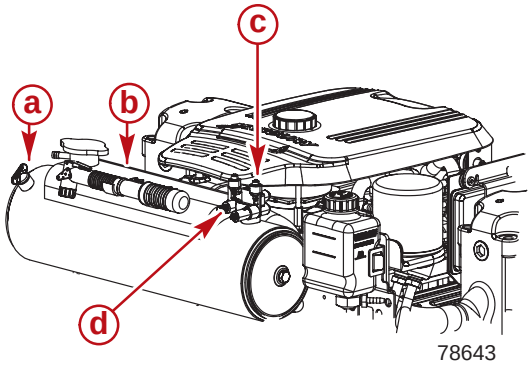
1. Place the boat on a level surface to ensure complete draining of system.
2. Remove the blue air pump from the engine.
3. Ensure that lever on top of pump is flush with the handle (horizontal).
4. Install air pump on the fitting in the air manifold.



77638

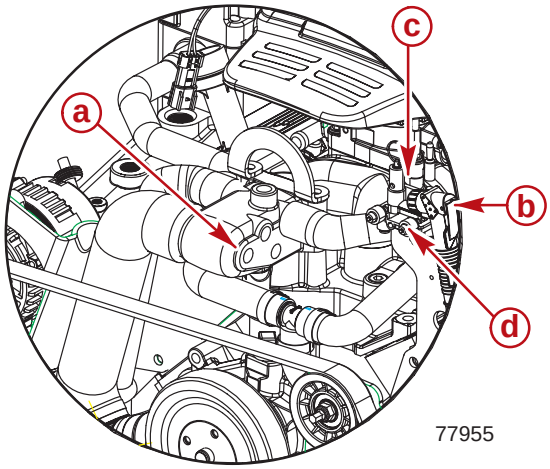
a - Green indicators

5. Pull lever on air pump up (vertical) to lock pump on the fitting.
6. Pump air into the system until both green indicators extend and water drains from both sides of the engine. The port side will begin draining before the starboard side.



78643

Closed cooled models

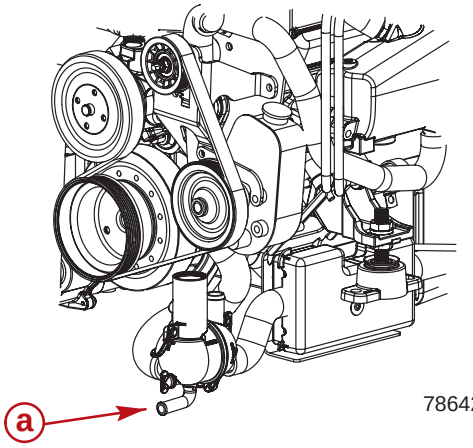


77955

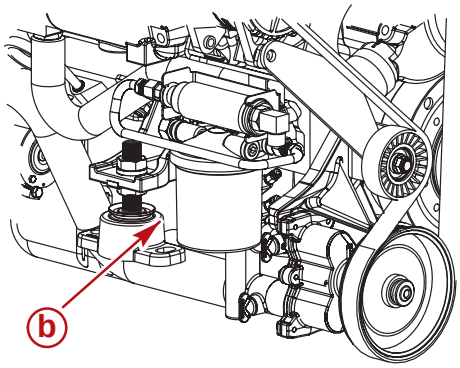
Seawater cooled models

a - Blue drain plug location
b - Blue air pump
c - Air manifold
d - Green indicators

7. Verify that water is draining from each opening. If not, use the 3 Point Manual Drain System.



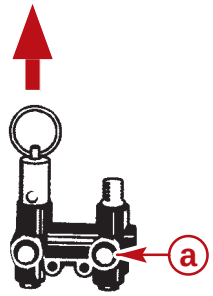
78642



78646

a - Port side drain location
b - Starboard side drain location

8. Allow the system to drain for a minimum of 5 minutes. Add air as necessary to keep the green indicators extended.
9. Crank engine over slightly with starter motor to purge any water trapped in seawater pump. Do NOT allow engine to start.
10. Remove the air pump from the air manifold and return it to the mounting bracket.
11. Mercury MerCruiser recommends leaving the plugs out while transporting the boat or while performing other maintenance to ensure that all water is drained.
12. Before launching boat, pull up on the manual release valve. Verify that the green indicators are no longer extended.



77638

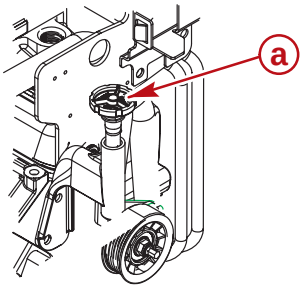
a - Green indicators

IMPORTANT: Mercury MerCruiser recommends that propylene glycol (a nontoxic and environmentally safe) antifreeze be used in the seawater section of the cooling system for cold weather or extended storage. Make sure that the propylene glycol antifreeze contains a rust inhibitor and is recommended for use in marine engines. Be certain to follow the propylene glycol manufacturer's recommendations.

0190.1

MANUAL SINGLE POINT DRAIN SYSTEM

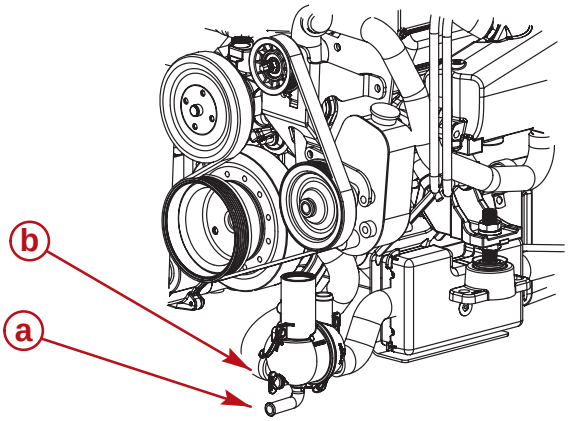
1. Place the boat on a level surface to ensure complete draining of system.
2. Rotate blue handle COUNTERCLOCKWISE until rotation stops (approximately 2 turns). The red on the handle shaft indicates that the drain system is open. Do NOT force handle as this will create new threads.



77947

a - Blue handle

3. Visually verify that water is draining. If water does not drain, remove blue drain plug from distribution housing and allow to drain manually.



78642

a - Drain location - orange or red
b - Blue drain plug

4. Allow the system to drain for a minimum of 5 minutes. Mercury MerCruiser recommends leaving the plugs out while transporting the boat or while performing other maintenance to ensure that all water is drained.
5. Close the drain system by rotating the blue handle CLOCKWISE until it stops or installing the blue drain plug. The handle is fully seated when no red is visible. Do NOT overtighten handle as this will create new threads.

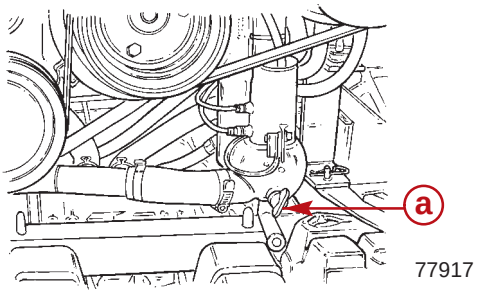
IMPORTANT: Mercury MerCruiser recommends that propylene glycol (a nontoxic and environmentally safe) antifreeze be used in the seawater section of the cooling system for cold weather or extended storage. Make sure that the propylene glycol antifreeze contains a rust inhibitor and is recommended for use in marine engines. Be certain to follow the propylene glycol manufacturer's recommendations.

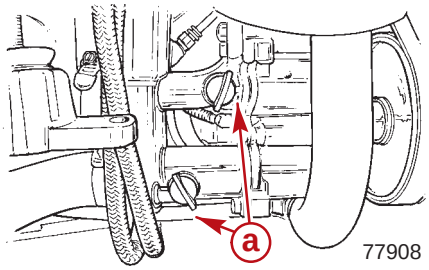
0185

3 POINT MANUAL DRAIN SYSTEM

NOTE: *Use this procedure if your engine is not equipped with an air actuated single point drain system or if the single point drain system fails.*

1. Place the boat on a level surface to ensure complete draining of system.
2. Remove 3 blue drain plugs: 1 from the distribution housing (lower front, port side) and 2 from the seawater pickup pump (front, starboard side).





a - Blue drain plug

3. Verify that water is draining from each opening.
4. Allow the system to drain for a minimum of 5 minutes. Mercury MerCruiser recommends leaving the plugs out while transporting the boat or while performing other maintenance to ensure that all water is drained.
5. Crank engine over slightly with starter motor to purge any water trapped in seawater pickup pump. Do NOT allow engine to start.

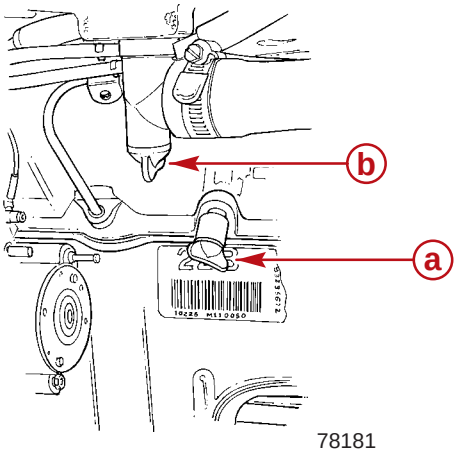
IMPORTANT: Mercury MerCruiser recommends that propylene glycol (a nontoxic and environmentally safe) antifreeze be used in the seawater section of the cooling system for cold weather or extended storage. Make sure that the propylene glycol antifreeze contains a rust inhibitor and is recommended for use in marine engines. Be certain to follow the propylene glycol manufacturer's recommendations.

6. Prior to launching boat or starting the engine, close the drain system by re-installing the 3 blue drain plugs.

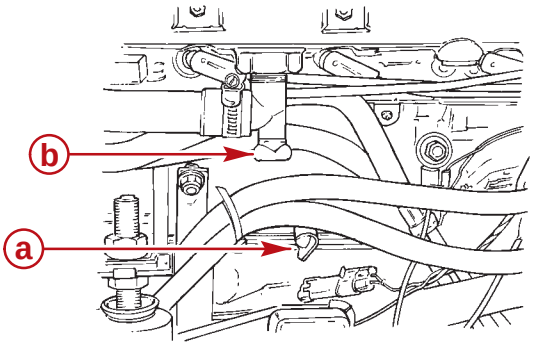
0186.1

MULTI-POINT DRAIN (MPD) SYSTEM

1. Place the boat on a level surface to ensure complete draining of system.
2. Remove blue drain plugs from the following locations. It may be necessary to clean out drain holes using a stiff piece of wire. Do so until the entire system is drained.
   a. Port and starboard side of cylinder block.
   b. Bottom of exhaust manifolds.



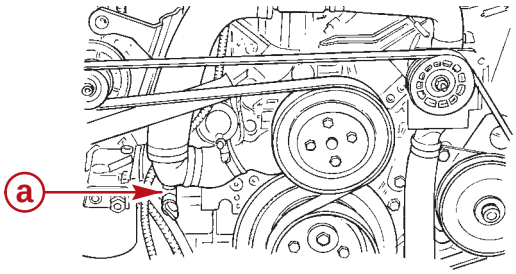
78181



78178

a - Side of cylinder block
b - Bottom of exhaust manifolds

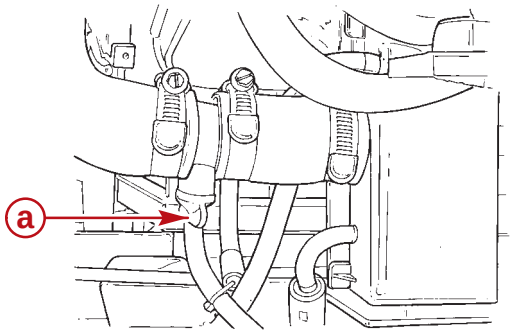
   c. Water circulating pump hose.



78182

a - Water circulating pump drain plug

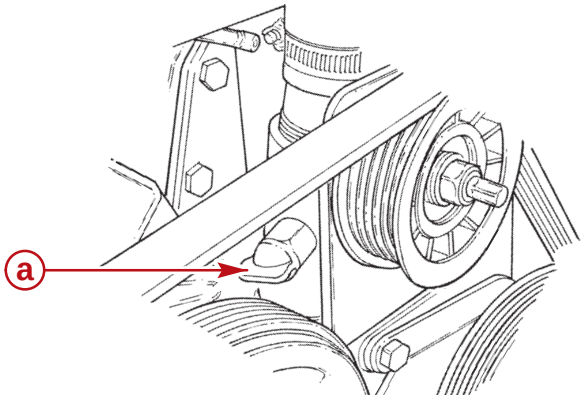
d. Fuel cooler to thermostat housing hose.



78179

a - Drain plug

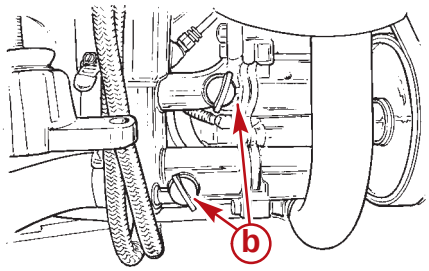
e. Check valve.



78180

a - Drain plug

3. On models with seawater pickup pump, remove the 2 blue drain plugs. If your seawater pickup pump does not have blue drain plugs or you are unable to access them, loosen clamps and remove both hoses.



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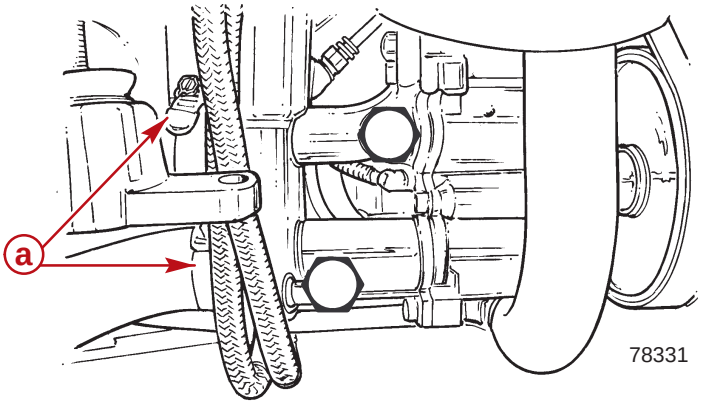


78331

a - Hose clamps
b - Blue drain plugs

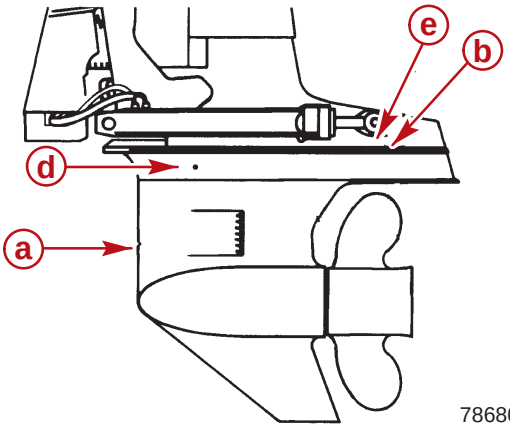
4. Crank engine over slightly with starter motor to purge any water trapped in seawater pickup pump. Do NOT allow engine to start.
5. After cooling system has been drained completely, install drain plugs, reconnect hoses and tighten all hose clamps securely.

   IMPORTANT: Mercury MerCruiser recommends that propylene glycol (a nontoxic and environmentally safe) antifreeze be used in the seawater section of the cooling system for cold weather or extended storage. Make sure that the propylene glycol antifreeze contains a rust inhibitor and is recommended for use in marine engines. Be certain to follow the propylene glycol manufacturer's recommendations.

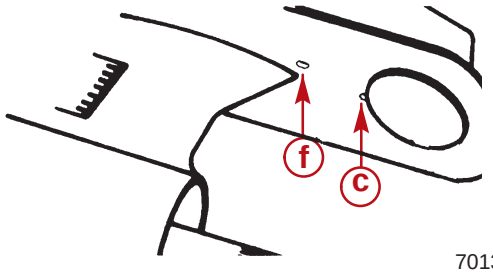
0187.1

All Models

1. Using a piece of wire, check water drain holes in sterndrive unit to ensure that they are open.



78680



70134

Sterndrive unit water drain holes

- **a** - Speedometer pitot tube
- **b** - Trim tab cavity vent hole
- **c** - Trim tab cavity drain passage
- **d** - Gear housing water drain hole (1 each - port and starboard)
- **e** - Gear housing cavity vent hole
- **f** - Gear housing cavity drain hole

2. For additional assurance against freezing and corrosion, fill the cooling system with a mixture of propylene glycol antifreeze and tap water mixed to manufacturer's recommendation to protect engine to the lowest temperature to which it will be exposed during cold weather or extended storage.
   a. Remove thermostat housing or hose and fill with propylene glycol coolant until block and head are full. If thermostat housing was removed, reinstall and tighten cover bolts securely.

0191.1

Flushing The Power Package

Your boat could come equipped with a combination of any of 3 different types of water pickups: through the hull, through the transom and through the sterndrive. The flushing procedures for these systems are separated into 2 categories: sterndrive water pickups and alternative water pickups. Consult your authorized Mercury MerCruiser dealer for further explanation.

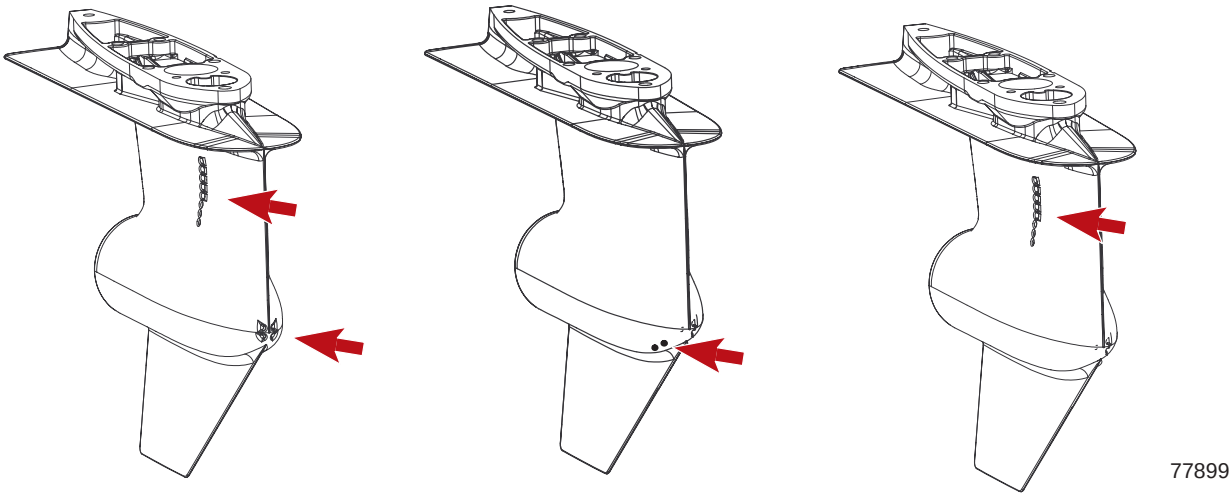
IMPORTANT: Bravo models equipped with closed cooling require dual water pickups and must be equipped with a through the hull or through the transom pickup in addition to the sterndrive water inlets.

IMPORTANT: Alpha engines with the sterndrive water inlet blocked off at the gimbal housing and using a through the hull water inlet need a supply of cooling water available to both the sterndrive unit and to the engine during operation.

0192

Sterndrive Water Pickups

There are 3 types of water pickups available on Mercury MerCruiser sterndrives: low water, dual water and side pickups. Dual water pickups require the flushing attachment (44357Q2) and the flush seal kit (881150Q1), low water pickups require the flushing attachment (849996T1) and side pickups require the flushing attachment (44357Q2).

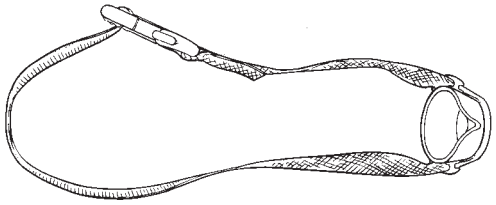


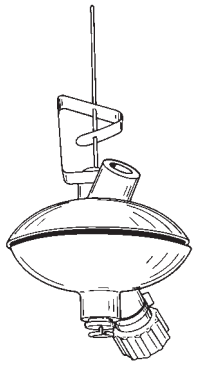
77899

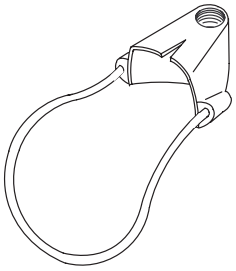
Dual water pickup **Low water pickup** **Side pickup**

0193

FLUSHING ATTACHMENTS

Dual Water Pick-Up Flush Gear Case Seal Kit	91-881150Q1
Description: Use to block-off the front water inlet holes on the dual water inlet gear cases.	 77977

Flushing Device	91-44357Q2
Description: Attaches to the drive unit water intakes, provides a fresh water connection when flushing the cooling system or operating the engine.	 73440

Flushing Kit	91-849996T1
Description: Use for flushing drives with low water inlet gear cases.	 78135

0194.2

NOTE: *Flushing is needed only for salty, brackish, mineral laden or polluted water applications. Flushing is recommended after each outing for best results.*

⚠ CAUTION

If flushing with the boat in the water, seawater can flow into the engine causing engine damage. Water inlet must be closed when flushing the engine.

1. Drain the seawater section of the cooling system.
2. **Seawater cooled Models:** Proceed to Step 4. or Step 5.
3. **Closed Cooled models could require a through the hull or through the transom water inlet and sterndrive water inlets. Verify your model as follows:**
   a. If you have a Bravo sterndrive unit and closed cooling (equipped with a heat exchanger on the front of the engine), verify that a hose is connected between the transom and the y-fitting and between the sea strainer and the y-fitting.
   b. If there is a hose running to the transom, shut the seacock located in the hose between the sea strainer and the y-fitting. Proceed to Step 4. or Step 5.
   c. If there is not a hose running to the transom, refer to Alternative Water Pickups.
4. If flushing the cooling system with boat in water:
   a. Raise sterndrive unit to TRAILER position.
   b. Install appropriate flushing attachments over water intake openings in the gear housing.
   c. Lower sterndrive unit to full DOWN/IN position.
5. If flushing cooling system with boat out of water:
   a. Lower sterndrive unit to full DOWN/IN position.

⚠ WARNING

Contact with moving drive components and the propeller can cause personal injury or death. To avoid possible injury , remove the propeller and ensure that no people or animals are in the area of the drive unit while flushing.

   b. Remove propeller.
   c. Install appropriate flushing attachments over water intlets in gear housing.
6. Connect hose between flushing attachment and water source.
7. With sterndrive unit in normal operating position, partially open water source (about 1/2 maximum).

8. Place sterndrive in NEUTRAL, idle speed position and start engine.

⚠ CAUTION

Suction created by the seawater pickup pump may collapse the flushing water hose causing the engine to overheat. Avoid engine damage from overheating, Do NOT operate the engine above 1500 rpm.

9. Slowly advance throttle until engine reaches 1300 rpm (+/–100 rpm).

⚠ CAUTION

Engine overheating can cause engine damage. To avoid, observe the water temperature gauge and ensure that the engine is operating in the normal range.

10. Observe the water temperature gauge to ensure that the engine is operating in the normal range.
11. Operate engine with sterndrive in NEUTRAL for about 10 minutes or until discharge water is clear.
12. Slowly return throttle to idle speed position.
13. Stop engine.
14. Shut off water and remove flushing attachment.
15. Remove the seawater inlet hose from the seawater pump and plug the hose to prevent water from siphoning into the engine.
16. Tag the ignition switch with an appropriate tag requiring the seawater inlet hose to be reconnected prior to operating engine.

0195.2

Alternative Water Pickups

IMPORTANT: Two water sources are needed for this procedure.

NOTE: *Flushing is needed only for salty, brackish, mineral laden or polluted water applications. Flushing is recommended after each outing for best results.*

1. Drain the seawater section of the cooling system.

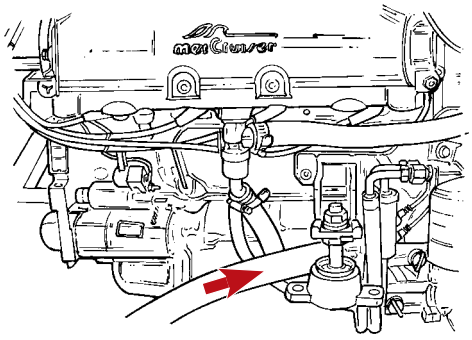
IMPORTANT: Engines with the sterndrive water inlet blocked off at the gimbal housing and using a through the hull water inlet need a supply of cooling water available to both the sterndrive unit and to the engine during operation.

2. If flushing cooling system with boat in water:
   a. Raise sterndrive unit to TRAILER position.
   b. Install appropriate flushing attachment over the water intake openings in the gear housing.
   c. Lower sterndrive unit to full DOWN/IN position.
   d. Proceed to Step 4.
3. If flushing cooling system with boat out of water:
   a. Lower sterndrive unit to full DOWN/IN position.

⚠ WARNING

Contact with moving drive components and the propeller can cause personal injury or death. To avoid possible injury , remove the propeller and ensure that no people or animals are in the area of the drive unit while flushing.

   b. Remove propeller.
   c. Install appropriate flushing attachments over water inlets gear housing.
4. Connect hose between flushing attachment and water source.
5. Disconnect the water inlet hose (upper hose) from the aft side of the seawater pump.



77945

6. Plug the seawater inlet hose or close the seacock to prevent water from siphoning into the boat.

7. Using a suitable adapter, connect the flushing hose from the water source to the water inlet of the seawater pump.

⚠ CAUTION

Overheating from insufficient cooling water will cause engine and drive system damage. Ensure that there is sufficient water always available at water inlet holes during operation.

8. With sterndrive unit in normal operating position, partially open the 2 water sources (about 1/2 maximum).
9. Place sterndrive in NEUTRAL, idle speed position and start engine.

⚠ CAUTION

Suction created by the seawater pickup pump may collapse the flushing water hose causing the engine to overheat. Avoid engine damage from overheating, Do NOT operate the engine above 1500 rpm.

10. Slowly advance throttle until engine reaches 1300 rpm (+/–100 rpm).

⚠ CAUTION

Engine overheating can cause engine damage. To avoid, observe the water temperature gauge and ensure that the engine is operating in the normal range.

11. Observe the water temperature gauge to ensure that the engine is operating in the normal range.
12. Operate engine with sterndrive in NEUTRAL for about 10 minutes or until discharge water is clear.
13. Slowly return throttle to idle speed position.
14. Stop engine.
15. Shut off water and remove flushing attachments.
16. **If the boat is out of the water:** Install the water inlet hose to the aft side of the seawater pump. Tighten the hose clamp securely.
17. **If the boat is in the water:** Tag the ignition switch with an appropriate tag requiring the seawater inlet hose to be reconnected prior to operating engine.

0101

Power Package Recommissioning

1. Ensure that all cooling system hoses are connected properly and hose clamps are tight.

⚠ CAUTION

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

2. Install a fully-charged battery. Clean the battery cable clamps and terminals and reconnect cables (see CAUTION listed above). Tighten each cable clamp securely when connecting.
3. Coat the terminal connections with a battery terminal anti-corrosion agent.
4. Perform all the checks in the BEFORE STARTING column of the Operations Chart.

⚠ CAUTION

Overheating from insufficient cooling water will cause engine and drive system damage. Ensure that there is sufficient water always available at water inlet holes during operation.

5. Start the engine and closely observe instrumentation to ensure that all systems are functioning correctly.
6. Carefully inspect the engine for fuel, oil, fluid, water and exhaust leaks.
7. Inspect the steering system, shift and throttle control for proper operation.

NOTES:

TROUBLESHOOTING

Table of Contents

7

0102

Diagnosing EFI Problems

Your authorized Mercury MerCruiser dealer has the proper service tools for diagnosing problems on Electronic Fuel Injection (EFI) Systems. The Electronic Control Module (ECM) on these engines has the ability to detect some problems with the system when they occur, and store a Trouble Code in the ECM's memory. This code can then be read later by a service technician using a special diagnostic tool.

0103

Troubleshooting Charts

Starter Motor Will Not Crank Engine, Or Cranks Slow

Possible Cause	Remedy
Battery switch turned off.	Turn switch on.
Remote control not in neutral position.	Position control lever in 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.
Bad battery.	Test and replace if bad.

0104

Engine Will Not Start Or Is Hard To Start

Possible Cause	Remedy
Lanyard stop switch activated	Check lanyard stop switch.
Improper starting procedure.	Read starting procedure.
Empty fuel tank or fuel shut off valve closed.	Fill tank or open valve.
Engine flooded.	Do NOT attempt to start engine for at least 5 minutes. Refer to Basic Boat Operation.
Faulty ignition system component.	Service ignition system.
Clogged fuel filter.	Replace filter.
Stale or contaminated fuel.	Drain tank. Fill with fresh fuel.
Fuel line or tank vent line kinked or clogged.	Replace kinked lines or blow out lines with compressed air to remove obstruction.
EFI system fault.	Have EFI System checked by an authorized Mercury MerCruiser dealer.
Faulty wire connections.	Check wire connections.

0105

Engine Runs Rough, Misses And/Or Backfires

Possible Cause	Remedy
Clogged fuel filter.	Replace filter.
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 dirty.	Clean Flame Arrestor.
Faulty ignition system component.	Service ignition system.
Idle speed too low.	Have EFI system checked by an authorized Mercury MerCruiser dealer.
EFI System fault.	Have EFI System checked by an authorized Mercury MerCruiser dealer.

0106

Poor Performance

Possible Cause	Remedy
Throttle not fully open.	Inspect throttle cable and linkages for proper operation.
Damaged or improper 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.
Flame arrestor dirty.	Clean flame arrestor.
Boat bottom fouled or damaged.	Clean or repair as necessary.
Ignition problem.	See Engine Runs Rough, Misses or Backfires.
Engine overheating.	See Excessive Engine Temperature.
EFI system fault.	Have EFI System checked by an authorized Mercury MerCruiser dealer.

0107.2

Excessive Engine Temperature

Possible Cause	Remedy
Water inlet or seacock closed.	Open.
Drive belt loose or in poor condition.	Replace or adjust belt.
Seawater pickups or sea strainer obstructed.	Remove obstruction.
Faulty thermostat.	Replace.
Coolant level low in closed cooling section.	Check for cause of low coolant level and repair. Fill system with proper coolant solution.
Heat Exchanger Cores plugged with foreign material	Clean Heat Exchanger.
Loss of pressure in closed cooling section.	Check for leaks. Clean, inspect and test pressure cap.
Faulty seawater pickup pump.	Repair.
Seawater discharge restricted or plugged.	Clean exhaust elbows.

0108

Insufficient Engine Temperature

Possible Cause	Remedy
Faulty thermostat.	Replace.

0109

Low Engine Oil Pressure

Possible Cause	Remedy
Insufficient oil in crankcase.	Check and add oil.
Excessive oil in crankcase (causing it to become aerated).	Check and remove required amount of oil. Check for cause of excessive oil (improper filling).
Diluted or improper viscosity oil.	Change oil and oil filter, using correct grade and viscosity oil. Determine cause for dilution (excessive idling).

0111

Battery Will Not Come Up On Charge

Possible Cause	Remedy
Excessive current draw from battery.	Turn off non-essential accessories.
Alternator drive belt loose or in poor condition.	Replace and/or adjust.
Unacceptable battery condition.	Test battery.
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.

0112

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.
Obstruction in shift or throttle linkages.	Remove obstruction.
Loose or missing shift and throttle linkages.	Check all throttle linkages. If any are loose or missing, see authorized Mercury MerCruiser dealer immediately.
Shift or throttle cable kinked.	Straighten cable or have authorized Mercury MerCruiser dealer replace cable if damaged beyond repair.

0175

Steering Wheel Turns Hard Or Jerky

Possible Cause	Remedy
Low power steering pump fluid level.	Check for leak. Refill system with fluid.
Drive belt loose or in poor condition.	Replace and/or adjust.
Insufficient lubrication on steering components.	Lubricate.
Loose or missing steering fasteners or parts.	Check all parts and fasteners if any are loose or missing, see authorized Mercury MerCruiser dealer immediately.
Contaminated power steering fluid.	See authorized Mercury MerCruiser dealer.

0176

Power Trim Does Not Operate (Motor Doesn’t Operate)

Possible Cause	Remedy
Blown 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 connection. Repair or replace wiring.

0177

Power Trim Does Not Operate (Motor Operates But Sterndrive Unit Does Not Move)

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

CUSTOMER ASSISTANCE INFORMATION

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Owner Service Assistance

Local Repair Service

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

* Quicksilver parts and accessories are engineered and built by Mercury Marine, specifically for Mercury MerCruiser® sterndrives and inboards.

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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 Regional Service Center. Outside the United States and Canada, contact the nearest Marine Power International Service Center.

0115

Stolen Power Package

If your power package is stolen, immediately advise the local authorities and Mercury Marine of the model and serial numbers and to whom the recovery is to be reported. This information is placed into a file at Mercury Marine to aid authorities and dealers in recovery of stolen power packages.

0116

Attention Required After Submersion

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

0117

Replacement Service Parts

⚠ WARNING

Electrical, ignition and fuel system components on Mercury MerCruiser Engines and Sterndrives are designed and manufactured to comply with U.S. Coast Guard Rules and Regulations to minimize risks of fire or explosion.

Use of replacement electrical, ignition or fuel system components, which do not comply to these rules and regulations, could result in a fire or explosion hazard and should be avoided.

When servicing the electrical, ignition and fuel systems, it is extremely important that all components are properly installed and tightened. If not, any electrical or ignition component opening would permit sparks to ignite fuel vapors from fuel system leaks, if they existed.

Marine engines are expected to operate at or near full throttle for most of their life. They are also expected to operate in both 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 MerCruiser marine engines to provide long life and dependable performance.

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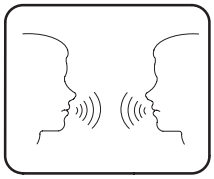
PARTS AND ACCESSORIES INQUIRIES

All inquiries concerning Quicksilver 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 should he not have them in stock. Only authorized dealers can purchase genuine Quicksilver parts and accessories from the factory. Mercury Marine does not sell to unauthorized dealers or retail customers. When inquiring on parts and accessories, the dealer requires the **engine model** and **serial numbers** to order the correct parts.

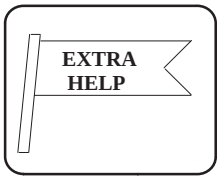
0119

Resolving A Problem

Satisfaction with your Mercury MerCruiser product is very important to your dealer and to us. If you ever have a problem, question or concern about your power package, contact your dealer or any authorized Mercury MerCruiser dealership. 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 numbers for your power package
- The name and address of your dealership
- Nature of problem

Mercury Marine Service Offices are listed on the next page.

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Mercury Marine Service Offices

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

Telephone 	Fax 	Mail 
United States		
(405) 743-6566	(405) 743-6570	Mercury MerCruiser 3003 N. Perkins Rd. Stillwater, OK 74075
Canada		
(905) 567-MERC (6372)	(905) 567-8515	Mercury Marine Ltd. 2395 Meadowpine Blvd. Mississauga, Ontario Canada L5N 7W6
Australia, Pacific		
9 (61) (3) 791-5822	9 (61) (3) 793-5880	Mercury Marine Australia 132-140 Frankston Road Dandenong,Victoria 3164 Australia
Europe, Middle East, Africa		
(32) (87) 32 • 32 • 11	(32) (87) 31 • 19 • 65	Marine Power - Europe, Inc. Parc Industriel de Petit-Rechain B-4800 Verviers Belgium
Mexico, Central America, South America, Caribbean		
(305) 385-9585	(305) 385-5507	Mercury Marine - Latin America & Caribbean 9010 S.W. 137th Ave. Suite 226 Miami, FL 33186 U.S.A.
Japan		
81-53-423-2500	81-53-423-2510	Mercury Marine - Japan 283-1 Anshin-cho Hamamatsu Shizuoka, 435-0005 Japan
Asia, Singapore		
5466160	5467789	Mercury Marine Singapore 72 Loyang Way Singapore 508762

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Customer Service Literature

English Language

English language publications are available from:

Mercury Marine
Attn: Publications Department
W6250 West Pioneer Road
P.O. Box 1939
Fond du Lac, WI 54935-1939

Outside the United States and Canada, contact the nearest Mercury Marine or Marine Power International Service Center for further information.

When ordering be sure to:

- List your product, model, year and serial numbers.
- Check the literature and quantities you want.
- Enclose full remittance in check or money order (NO COD).

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Other Languages

To obtain an Operation, Maintenance and Warranty Manual in another language, contact the nearest Mercury Marine or Marine Power International Service Center for information. A list of part numbers for other languages is provided with your power package.

Andre sprog

Kontakt det nærmeste Mercury Marine eller Marine Power International servicecenter for oplysninger om hvordan du kan anskaffe en Betjenings– og vedligeholdelsesmanual på et andet sprog. En liste med reservedelsnumre for andre sprog leveres sammen med din power–pakke.

Andere talen

Voor het verkrijgen van een Handleiding voor gebruik en onderhoud in andere talen dient u contact op te nemen met het dichtstbijzijnde internationale servicecentrum van Mercury Marine of Marine Power voor informatie hierover. Een lijst met onderdeelnummers voor andere talen wordt bij uw motorinstallatie geleverd.

Muut kielet

Saadaksesi Käyttö– ja huolto–ohjekirjoja muilla kielillä, ota yhteys lähimpään Mercury Marine tai Marine Power International huoltokeskukseen, josta saat lähempiä tietoja. Moottorisi mukana seuraa monikielinen varaosanumeroluettelo.

Autres langues

Pour obtenir un Manuel d’utilisation et d’entretien dans une autre langue, contactez le centre de service après–vente international Mercury Marine ou Marine Power le plus proche pour toute information. Une liste des numéros de pièces en d’autres langues accompagne votre bloc–moteur.

Andere Sprachen

Um eine Betriebs– und Wartungsanleitung in einer anderen Sprache zu erhalten, wenden Sie sich an das nächste Mercury Marine oder Marine Power International Service Center. Eine Liste mit Teilenummern für Fremdsprachen ist im Lieferumfang Ihres Motors enthalten.

Altre lingue

Per ottenere il manuale di funzionamento e manutenzione in altra lingua, contattate il centro assistenza internazionale Mercury Marine o Marine Power più vicino. In dotazione con il gruppo motore, viene fornito l'elenco dei codici prodotto dei componenti venduti all'estero.

Andre språk

Ytterligere informasjon om bruks– og vedlikeholdshåndbok på andre språk kan fås ved henvendelse til nærmeste internasjonale servicecenter for Mercury Marine eller Marine Power. En liste over delenumre for andre språk følger med aggregatet.

Outros Idiomas

Para obter um Manual de Operação e Manutenção em outro idioma, contate o Centro de Serviço Internacional de "Marine Power" (Potência Marinha) ou a Mercury Marine mais próxima para obter informações. Uma lista de números de referência para outros idiomas é fornecida com o seu pacote de propulsão.

Otros idiomas

Para obtener un Manual de operación y mantenimiento en otro idioma, póngase en contacto con el centro de servicio más cercano de Mercury Marine o Marine Power International para recibir información. Con su conjunto motriz se entrega una lista de los números de pieza para los otros idiomas.

Andra språk

För att få Instruktions– och underhållsböcker på andra språk, kontakta närmaste Mercury Marine eller Marine Power International servicecenter, som kan ge ytterligare information. En förteckning över artikelnummer på andra språk medföljer ditt kraftpaket.

Αλλες γλώσσες

Για να αποκτήσετε ένα Εγχειρίδιο Λειτουργίας και Συντήρησης σε άλλη γλώσσα, επικοινωνήστε με το πλησιέστερο Διεθνές Κέντρο Σέρβις της Mercury Marine ή της Marine Power για πληροφορίες. Το πακέτο ισχύος σας συνοδεύεται από έναν κατάλογο αριθμών παραγγελίας για άλλες γλώσσες.

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Ordering Literature

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

Model _____ Horsepower_____
Serial Number_____ Year_____

United States and Canada

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 54935-1939

Outside The United States and Canada

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.

Please return with payment to:

Mercury Marine
Attn: Publications Department
W6250 West Pioneer Road
P.O. Box 1939
Fond du Lac, WI 54935-1939

Ship To: (Please Print Or Type - This Is Your Shipping Label)

Name_____

Address_____

City_____State_____ZIP_____

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