NOTE: The following applies to CE-marked products only.

Declaration of Conformity—Mercury MerCruiser

This sterndrive or inboard engine when installed in accordance to Mercury MerCruisers' instructions complies with the requirements of the following directives by meeting the associated standards, as amended:

Recreational Craft Propulsion Engines with the Requirements of Directive 94/25/EC as amended by 2003/44/EC

Name of engine manufacturer: Mercury Marine MerCruiser
Address: 3003 N. Perkins Road
Town: Stillwater, OK **Post Code:** 74075 **Country:** USA

Name of Authorized Representative: Brunswick Marine in EMEA Inc.
Address: Parc Industriel de Petit-Rechain
Town: Verviers **Post Code:** 4800 **Country:** Belgium

Name of Notified Body for exhaust emission assessment: Det Norske Veritas AS
Address: Veritasveien 1
Town: Hovik **Post Code:** 1322 **Country:** Norway **ID Number:** 0575

Conformity assessment module used for exhaust emissions: ☐ B+C ☐ B+D ☐ B+E ☐ B+F ☐ G ☒ H
or engine type approved according to: ☐ stage II of Directive 97/68/EC ☐ Directive 88/77/EC
Other Community Directives applied: Electromagnetic Compatibility Directive 89/336/EC

Description of Engines and Essential Requirements

Engine Type	Fuel Type	Combustion Cycle
☐ z or sterndrive without integral exhaust	☐ Diesel	☐ 2 stroke
☒ Inboard engine	☒ Petrol	☒ 4 stroke

Identification of Engines Covered by This Declaration of Conformity

Name of engine family	Unique engine identification number: starting serial number	EC Module H certificate number
Tow Sports 5.7 MPI	**0W307898**	**RCD-H-1**
Scorpion 350	**0W307898**	**RCD-H-1**
Scorpion 377	**0W307898**	**RCD-H-1**

Essential requirements	standards	other normative document/ method	technical file	Please specify in more detail (* = mandatory standard)
Annex 1.B—Exhaust Emissions				
B.1 engine identification	☐	☐	☒	
B.2 exhaust emission requirements	☒*	☐	☐	* EN ISO 8178-1:1996
B.3 durability	☐	☐	☒	
B.4 owner's manual	☒	☐	☐	ISO 8665: 1995
Annex 1.C—Noise Emissions	see Declaration of Conformity of the craft in which the engines have been installed			

This declaration of comformity is issued under the sole responsibility of the manufacturer. I declare on behalf of the engine manufacturer that the engines will meet the exhaust emission requirements of Directive 94/25/EC as amended by Directive 2003/44/EC when installed in a recreational craft, in accordance with the engine manufacturer's supplied instructions and that these engines must not be put into service until the recreational craft into which they are to be installed has been declared in conformity with the relevant provisions of the above mentioned Directives.

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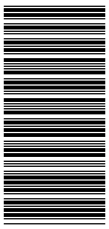

Name / function:
Mark Schwabero, President, Mercury Marine

Signature and title:

Date and place of issue: July 24, 2008
Stillwater, Oklahoma, USA

Regulatory contact:
Regulations and Product Safety Department
Mercury Marine
W6250 W. Pioneer Road
Fond du Lac, WI 54936
USA

Identification Record

Please record the following information:

Engine Model and Horsepower		**Engine Serial Number**
Transom Assembly Serial Number (Sterndrive)	**Gear Ratio**	**Sterndrive Unit Serial Number**
Transmission Model (Inboard)	**Gear Ratio**	**Transmission Serial Number**
Propeller Number	**Pitch**	**Diameter**
Hull Identification Number (HIN)		**Purchase Date**
Boat Manufacturer	**Boat Model**	**Length**

The serial numbers are the manufacturer's keys to numerous engineering details that 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.

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

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.

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.

Read This Manual Thoroughly

IMPORTANT: If you don't understand any portion of this manual, contact your dealer for a demonstration of actual starting and operating procedures.

Notice

Throughout this publication, and on your power package, dangers, warnings, cautions, and notices, 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 warn of. Strict compliance with these special instructions while performing the service, plus common sense operation, are major accident prevention measures.

⚠ DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Indicates a situation which, if not avoided, could result in engine or major component failure.

IMPORTANT: Identifies information essential to the successful completion of the task.

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

⚠ WARNING

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

⚠ WARNING

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

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Warranty Registration: United States and Canada

To ensure that your warranty coverage begins promptly, your selling dealer should fill out the Warranty Registration Card completely and mail it to the factory immediately upon sale of the new product.

The Warranty Registration Card identifies the 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. A temporary Owner Warranty Registration Card will be presented to you when you purchase the product.

Upon receipt of the Warranty Registration Card at the factory, Mercury MerCruiser will send you an owner resource guide that includes your warranty registration confirmation. If you do not receive your owner resource guide within 60 days from date of new product sale, please contact your selling dealer.

Because of your selling dealer's ongoing interest in your satisfaction, the product should be returned to him for warranty service.

The product warranty is not effective until the product is registered at the factory.

NOTE: *Registration lists must be maintained by the factory and dealer on marine products sold in the United States in the event that a safety recall notification under the Federal Boat Safety Act is 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 to Mercury MerCruiser's warranty registration department with your name, old address, new address, and engine serial number. Your dealer can also process this change of information.

United States customers or dealers may contact:
Mercury Marine
Attn: Warranty Registration Department
W6250 Pioneer Road
P.O. Box 1939
Fond du Lac, WI 54936-1939
920-929-5054
Fax 920-929-5893

Canadian customers or dealers may contact:
Mercury Marine Canada Limited
2395 Meadowpine Blvd.
Mississauga,
Canada, L5N 7W6
Fax 1-800-663-8334

Warranty Registration: Outside the United States and Canada

To ensure that your warranty coverage begins promptly, your selling dealer should fill out the warranty registration card completely and mail it to the distributor responsible for administering the warranty registration and claim program for your area.

The warranty registration card identifies your name and address, product model and serial numbers, date of sale, type of use, and the selling distributor's and dealer's code number, name, and address. The distributor or 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 or dealer. This card represents your factory registration identification. Keep the card; if you ever need warranty service on this product, your dealer may ask you for the warranty registration card to verify date of purchase and to use the information on the card to prepare the warranty claim forms.

In some countries, the distributor will issue a permanent (plastic) warranty registration card to you within 30 days after receiving the factory copy of the warranty registration card from your distributor or dealer. If you receive a plastic warranty registration card, you may discard the purchaser's copy that you received from the distributor or dealer when you purchased the product. Ask your distributor or 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. See Table of Contents.

NOTE: *Registration lists must be maintained by the factory and dealer on marine products sold in the United States in the event of a safety recall notification under the Federal Boat Safety Act.*

Transfer of Warranty

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

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

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

In Canada mail to:
Mercury Marine Canada Limited
2395 Meadowpine Blvd.
Mississauga,
Canada, L5N 7W6
Fax 1-800-663-8334

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

There is no charge for this service.

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

Mercury Product Protection Plan: United States and Canada

(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.

One-, two-, three-, four-, or five- 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.

Mercury MerCruiser Limited Warranty (Gasoline-Fueled Products Only)

Mercury MerCruiser 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 following.

Duration of Coverage

Warranty Period for Recreational Use
The warranty period begins on 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. Products installed by an Installation Quality Certified Installer receive one (1) year of additional warranty coverage. 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. The warranty period is specific to the model covered; see your model for the base coverage period:

Coverage for Horizon Inboard Models, and Vazer 100 Sterndrive Models
The Limited Warranty for Horizon Inboard Models and Vazer 100 Models is four (4) years when installed by an Installation Quality Certified Installer or three (3) years for non-certified installations.

Coverage for SeaCore Sterndrive Models
The Limited Warranty for SeaCore Sterndrive Models is four (4) years when installed by an Installation Quality Certified Installer or three (3) years for non-certified installations.

Coverage for Tow Sports Inboard Models
The Limited Warranty for Tow Sports 5.7 TKS models is two (2) years when installed by an Installation Quality Certified Installer or one (1) year for non-certified installations.
The Limited Warranty for all other Tow Sports Inboard models is three (3) years when installed by an Installation Quality Certified Installer or two (2) years for non-certified installations.

Coverage for All Other Models
The Limited Warranty for all other Gasoline Sterndrive and Inboard models except those described above is two (2) years when installed by an Installation Quality Certified Installer or one (1) year for non-certified installations.

Warranty Period for Commercial Use
The warranty period begins on the date the product is first sold to a commercial-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 for 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-related or employment-related use of the product, or any use of the product that 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.

Transfer of Coverage
Unexpired warranty coverage can be transferred from one recreational-use customer to a subsequent recreational-use customer upon proper reregistration of the product. Unexpired warranty coverage cannot be transferred either to or from a commercial-use customer.

Termination of Coverage
Warranty coverage is terminated for used product obtained in any of the following ways:

- Repossession from a retail customer
- Purchase at auction
- Purchase from a salvage yard
- Purchase from an insurance company that obtained the product as a result of an insurance claim

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 pre-delivery inspection process specified by Mercury Marine 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 reregistered) may void the warranty at the sole discretion of Mercury Marine. Routine maintenance must be performed according to the maintenance schedule in the Operation, Maintenance & Warranty manual in order to obtain warranty coverage. Mercury Marine reserves the right to make any warranty coverage contingent upon proof of proper maintenance.

What Mercury Marine Will Do
Mercury Marine'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 remanufactured parts, or refunding the purchase price of the Mercury Marine product. Mercury Marine 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 Marine 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 Marine dealer authorized to service the product. If the purchaser cannot deliver the product to such a dealer, written notice must be given to Mercury Marine. Mercury Marine will then arrange for the inspection and any covered repair. The purchaser in that case shall pay for all related transportation charges and travel time. If the service provided is not covered by this warranty, the purchaser shall pay for all related labor and material and any other expenses associated with that service. The purchaser shall not, unless requested by Mercury Marine, ship the product or parts of the product directly to Mercury Marine. Proof of registered ownership 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 the following:

- Routine maintenance items
- 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, Maintenance & Warranty manual)
- Operation of the product in a manner inconsistent with the recommended operation and duty cycle section of the Operation, Maintenance & Warranty 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 that was not manufactured or sold by Mercury Marine and that damages the Mercury product
- Jet pump impellers and liners
- Operation with fuels, oils, or lubricants that are not suitable for use with the product (see the Operation, Maintenance & Warranty 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
- Operating the boat with the engine over trimmed

Use of the product for racing or other competitive activity, or operating with a racing-type lower unit at any point, even by a previous 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 or replacement of boat partitions or other material in order to gain 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. If such affirmation, representation, or warranty is made, it 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.

3-Year Limited Warranty Against Corrosion

3-YEAR LIMITED WARRANTY AGAINST CORROSION

What Is Covered

Mercury Marine warrants that each new Mercury, Mariner, Mercury Racing, Sport Jet, M^2 Jet Drive, Tracker by Mercury Marine Outboard, 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. Warranty coverage is terminated for used product repossessed from a retail customer, purchased at auction, from a salvage yard, or from an insurance company that obtained the product as a result of an insurance claim.

Condition 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, Maintenance & Warranty manual must be in use on the boat, and routine maintenance outlined in the Operation, Maintenance & Warranty manual must be timely performed (including without limitation the replacement of sacrificial anodes, use of specified lubricants, and touch-up of nicks and scratches) in order to maintain warranty coverage. Mercury Marine reserves the right to make warranty coverage contingent upon proof of proper maintenance.

What Mercury Will Do

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

How to Obtain Warranty Coverage

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

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.

Global Warranty Charts

Warranty for Consumer Applications

Engine Model	Region	Standard Factory Limited Warranty by Certification Status of Boat Manufacturer		Consumer Limited Corrosion Warranty
		Not Certified	Installation Quality Certified	
Scorpion 350	The Americas (excluding Brazil)	1 years	2 years	3 years
	Brazil	2 years	2 years	2 years
	Europe, Middle East, Africa	2 years	3 years	3 years
	Australia, New Zealand	3 years	3 years	3 years
	Japan	1 year	1 year	1 year
	South Pacific	2 years	2 years	2 years
	Other Asia	1 year	1 year	1 year
Scorpion 377	The Americas (excluding Brazil)	2 years	3 years	3 years
	Brazil	2 years	2 years	2 years
	Europe, Middle East, Africa	2 years	3 years	3 years
	Australia, New Zealand	3 years	3 years	3 years
	Japan	1 year	1 year	1 year
	South Pacific	2 years	2 years	2 years
	Other Asia	1 year	1 year	1 year

Warranty for Commercial Applications

Engine Model	Region	Standard Factory Limited Warranty by Certification Status of Boat Manufacturer		Commercial Limited Corrosion Warranty
		Not Certified	Installation Quality Certified	
Scorpion 350 Scorpion 377	The Americas (excluding Brazil)	1 year	1 year	1 year
	Brazil	2 years	2 years	2 years
	Europe, Middle East, Africa	1 year or 500 hours	1 year or 500 hours	1 year or 500 hours
	Australia, New Zealand			
	Japan			
	South Pacific			
	Other Asia			

Warranty for Government Applications

Engine Model	Region	Standard Factory Limited Warranty by Certification Status of Boat Manufacturer		Government Limited Corrosion Warranty
		Not Certified	Installation Quality Certified	
Scorpion 350 Scorpion 377 HO	**The Americas (excluding Brazil)**	1 year	1 year	3 years
	Brazil	2 years	2 years	2 years
	Europe, Middle East, Africa	1 year or 500 hours	1 year or 500 hours	1 year or 500 hours
	Australia, New Zealand			
	Japan			
	South Pacific			
	Other Asia			

Mercury Installation Quality Certification Program

15502

Mercury MerCruiser products installed by a Mercury Installation Quality Certified Manufacturer are Installation Quality certified products and may receive an additional one (1) year of limited warranty coverage.

The Installation Quality Certification program was developed to recognize MerCruiser boatbuilder customers who have achieved higher manufacturing standards. It is the first and only comprehensive manufacturer-installation certification program in the industry.

The program has three goals:

1. To enhance overall product quality.
2. To improve the boat ownership experience.
3. To enhance overall customer satisfaction.

The certification process is designed to review all facets of manufacturing and engine installation. The program is composed of design, manufacturing and installation review stages with which builders must comply. Certification applies leading-edge methodologies to create:

- Efficiencies and best practices specific to engine installation.
- World-class assembly and component specifications.
- Efficient installation processes.
- Industry standard end-of-line test procedures

Boat builders that successfully complete the program and meet all certification requirements earn Installation Quality System Certified Manufacturer status and receive an additional one (1) year of Mercury limited factory warranty coverage on all MerCruiser-powered boats that are registered on and after the boat builder's certification date for all worldwide registrations.

Mercury has designated a section of our Website to promote the Installation Quality Certification Program and communicate its benefits to consumers. For a current list of MerCruiser-powered boat brands that have earned Installation Quality Certification, visit www.mercurymarine.com/mercruiser_warranty.

Emission Control Warranty Information

Important Information

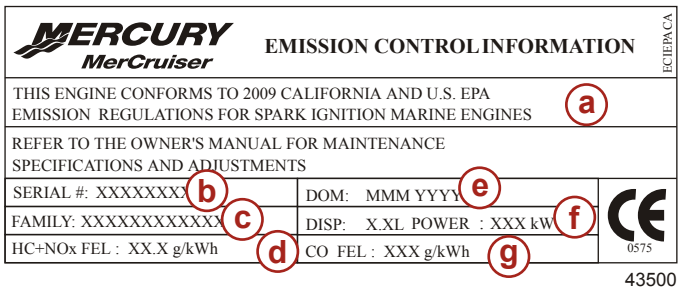
To identify the applicable emission control warranty coverage for a particular product, refer to the **Emission Control Information** label affixed to the engine.

Engines designated as exempt from either Federal EPA or California emission control regulations are not covered by a separate emission control component warranty. The product's Mercury MerCruiser manufacturer's warranty is not affected by the engine's designation under Federal EPA or California emission control regulations.

For a list of typical emission control related engine components, refer to **Emission Control System Components** in the warranty section of your owners manual.

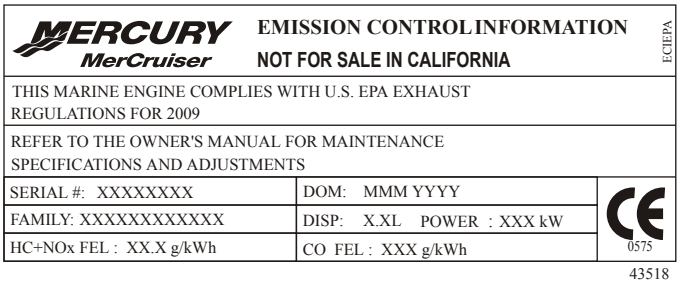
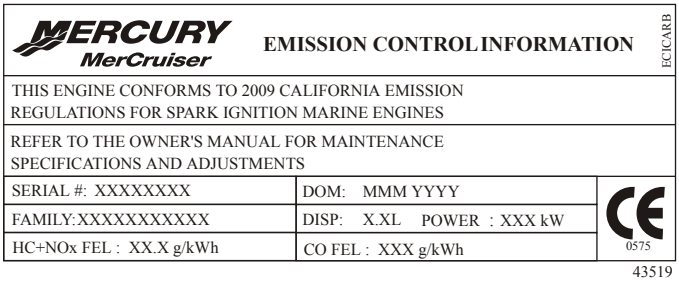
Emission Control Information Label

A tamper-resistant emission control information (ECI) label is affixed to the engine in a visible location at the time of manufacture by Mercury MerCruiser. Please note that the low emissions certification will not affect the fit, function, or performance of the engine. Boatbuilders 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. In addition to the required emissions statement, the label lists the engine serial number, family, applicable emission standard, date of manufacture (month, year), and engine displacement.



- **a -** Applicable standard
- **b -** Engine serial number
- **c -** Engine family name
- **d -** Hydrocarbons plus oxides of nitrogen family emission limit
- **e -** Date of manufacture
- **f -** Engine displacement, engine power
- **g -** Carbon monoxide family emission limit

IMPORTANT: A CE mark in the lower right corner of the Emission Control Information label indicates that an EU Declaration of Conformance applies. Refer to the front page of this manual for further information.
IMPORTANT: Engines designated as exempt from either Federal EPA or California emission control regulations are not covered by a separate emission control component warranty. The product's Mercury MerCruiser manufacturer's warranty is not affected by the engine's designation under Federal EPA or California emission control regulations.

ECI Label	Standard of Compliance
	Indicates a marine engine compliant with United States EPA exhaust emission regulations for 2009. This marine engine is not for sale in California.
	Indicates a marine engine compliant with California CARB exhaust emission regulations for 2009

ECI Label	Standard of Compliance
MERCURY MerCruiser **EMISSION CONTROL INFORMATION** ECIEPACA THIS ENGINE CONFORMS TO 2009 CALIFORNIA AND U.S. EPA EMISSION REGULATIONS FOR SPARK IGNITION MARINE ENGINES REFER TO THE OWNER'S MANUAL FOR MAINTENANCE SPECIFICATIONS AND ADJUSTMENTS SERIAL #: XXXXXXXX — DOM: MMM YYYY FAMILY: XXXXXXXXXXXX — DISP: X.XL POWER : XXX kW HC+NOx FEL : XX.X g/kWh — CO FEL : XXX g/kWh CE 0575 43520	Indicates a marine engine compliant with California CARB and U.S. EPA regulations for 2009
MERCURY MerCruiser **EMISSION CONTROL INFORMATION** **NOT FOR SALE IN CALIFORNIA** ECIEXEMP THIS ENGINE IS EXEMPT UNDER 40 CFR 1068.255 FROM EMISSION STANDARDS AND RELATED REQUIREMENTS REFER TO THE OWNER'S MANUAL FOR MAINTENANCE SPECIFICATIONS AND ADJUSTMENTS SERIAL #: XXXXXXXX — DOM: MMM YYYY FAMILY: XXXXXXXXXXXX — DISP: X.XL POWER : XXX kW HC+NOx FEL : XX.X g/kWh — CO FEL : XXX g/kWh CE 0575 43521	Indicates a marine engine exempt under 40 CFR 1068.255 from United States EPA exhaust emission regulations for 2010. This marine engine is not for sale in California.
MERCURY MerCruiser **EMISSION CONTROL INFORMATION** ECICARBX THIS ENGINE CONFORMS TO 2010 CALIFORNIA EMISSION REGULATIONS FOR SPARK IGNITION MARINE ENGINES. THIS ENGINE IS EXEMPT UNDER 40 CFR 1068.255 FROM EMISSION STANDARDS AND RELATED REQUIREMENTS. REFER TO THE OWNERS MANUAL FOR MAINTENANCE SPECIFICATIONS AND ADJUSTMENTS. SERIAL #: XXXXXXXX — DOM: MMM YYYY FAMILY: XXXXXXXXXXXX — DISP: X.XL POWER : XXX kW HC+NOx FEL : XX.X g/kWh — CO FEL : XXX g/kWh CE 0575 43522	Indicates a marine engine compliant with 2010 California emission regulations and exempt under 40 CFR 1068.255 from United States EPA exhaust emission regulations
MERCURY MerCruiser **EMISSION CONTROL INFORMATION** ECISERV THIS ENGINE DOES NOT COMPLY WITH U.S. EPA NONROAD EMISSION REQUIREMENTS. SELLING OR INSTALLING THIS ENGINE FOR ANY PURPOSE OTHER THAN TO REPLACE A NONROAD ENGINE BUILT BEFORE JANUARY 1, 2010 MAY BE A VIOLATION OF FEDERAL LAW SUBJECT TO CIVIL PENALTY. SERIAL #: XXXXXXXX — DOM: MMM YYYY FAMILY: XXXXXXXXXXXX — DISP: X.XL POWER : XXX kW HC+NOx FEL : XX.X g/kWh — CO FEL : XXX g/kWh CE 0575 43499	Indicates a service marine engine that can replace a marine engine built prior to January 1, 2010.

Owner Responsibility

The operator must have routine engine maintenance performed to maintain emission levels within prescribed certification standards.

The operator may not modify the engine in any manner that alters the horsepower or allows emissions levels to exceed factory specifications.

U.S. EPA Emissions Limited Warranty

Consistent with the obligations created by 40 CFR Part 1045, Subpart B, Mercury Marine provides an emission warranty of three years or 480 hours of engine use whichever occurs first to the retail purchaser, that the engine is designed, built, and equipped so as to conform at the time of sale with applicable regulations under section 213 of the Clean Air Act, and that the engine is free from defects in materials and workmanship which cause the engine to fail to conform with applicable regulations.

Emission Control System Components

The emission-related warranty covers all components whose failure would increase an engine's emission of any regulated component including the following list of components:

1. Fuel metering system

a. Carburetor and internal parts (or fuel pressure regulator or fuel injection system)
b. Air/fuel ratio feedback and control system
c. Cold start enrichment system
d. Intake valves

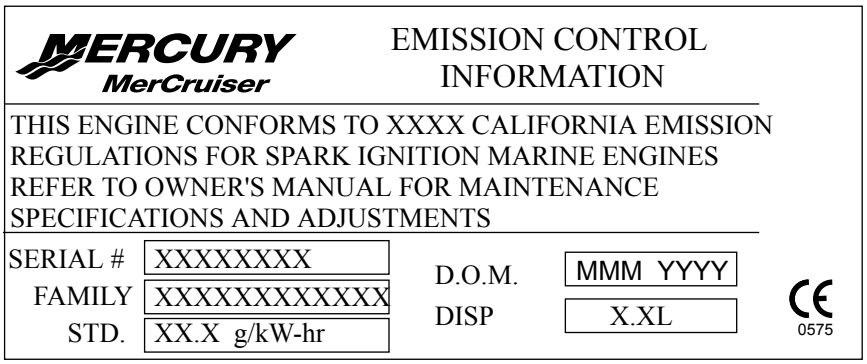
2. Air induction system
   a. Controlled hot air intake system
   b. Intake manifold
   c. Air filter
   d. Turbo charger systems
   e. Heat riser valve and assembly
3. Ignition system
   a. Spark plugs
   b. Magneto or electronic ignition system
   c. Spark control system
   d. Ignition coil or control module
   e. Ignition wires
4. Lubrication system
   a. Oil pump and internal parts
   b. Oil injectors
   c. Oil meter
5. Positive crankcase ventilation (PCV) system
   a. PCV valve
   b. Oil filler cap
6. Exhaust system
   a. Exhaust manifold
   b. Exhaust elbow
   c. Intermediate exhaust elbow
   d. Lower exhaust pipe
   e. Tailpipe
7. Catalysts or thermal reactor system
   a. Catalytic converter
   b. Thermal reactor
   c. Exhaust manifold
   d. Exhaust valves
8. 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

NOTE: *The EPA emission-related warranty does not cover components whose failure would not increase an engine's emissions on any regulated pollutant.*

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 Mercury MerCruiser. In addition to the required emissions statement, the label lists the engine serial number, family, STD (emission standard/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. Boatbuilders 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.

NOTE: *When the CE mark is present in the lower right corner of the Emission Control Information Label on the engine, the Declaration of Conformance applies. Refer to the front page of this manual for further information.*



Emission Control Label—California Emissions–Compliant

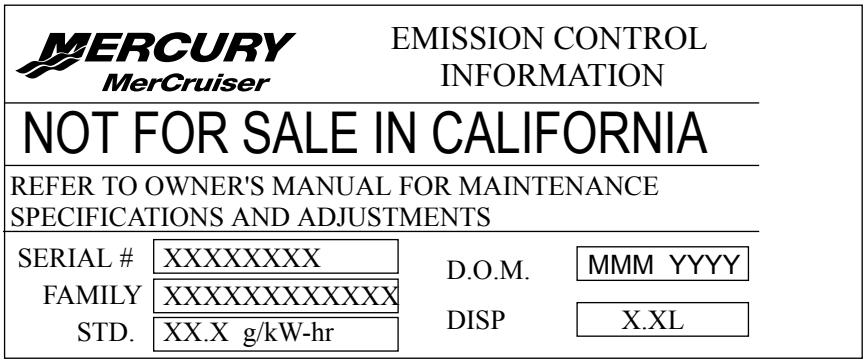
"SERIAL#"—Engine Serial Number

"FAMILY"—Engine Family

"STD."—Emissions Standard

"D.O.M."—Date of Manufacture

"DISP"—Piston Displacement



Emission Control Label—Not for Sale in California

"SERIAL#"—Engine Serial Number

"FAMILY"—Engine Family

"STD."—Emissions Standard

"D.O.M."—Date of Manufacture

"DISP"—Piston Displacement

Owner Responsibility

The operator must have routine engine maintenance performed to maintain emission levels within prescribed certification standards.

The operator may not modify the engine in any manner that alters the horsepower or allows emissions levels to exceed their factory specifications.

Emission Certification Star Label

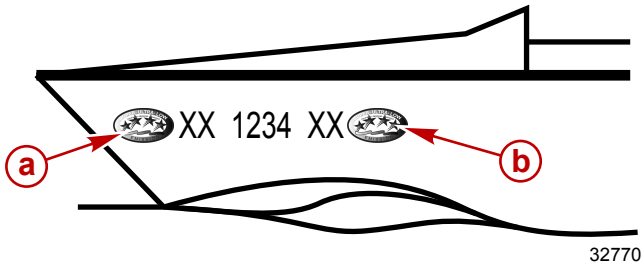
Your boat is labeled on the hull with one of the following star labels. The Symbol for Cleaner Marine Engines Means:

1. Cleaner Air and Water - for a healthier lifestyle and environment.
2. Better Fuel Economy - burns up to 30-40 percent less gas and oil than conventional carbureted two-stroke engines, saving money and resources.
3. Longer Emission Warranty - Protects consumer for worry free operation.

Beginning January 1, 2003, one Three-Star or Four-Star label will be included with each factory-certified Mercury MerCruiser engine.

All Mercury MerCruiser engines (500 hp and below) will have a Three-Star Ultra Low Emission rating or Four-Star Super Ultra Low Emission rating. The Star label identifies that these engines meet the California Air Resources Board's Sterndrive and Inboard marine engine 2007 and later exhaust emission standards. Engines meeting these standards have 65-90% lower emissions than One-Star – Low Emissions engines.

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



32770

a - Recommended location
b - Secondary location

One Star - Low emission	
 mc79569-1	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	
 42145	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 than One Star - Low-Emission engines.
Three Stars - Ultra Low emission	
 42146	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	
 42155	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.

Hang Tag

The dealer must mark the appropriate box on one hang tag to match the Star label affixed to the boat. The dealer is responsible for displaying the hang tag in a visible location on the boat on display in California. Failure to properly display the hang tag could result in a citation and possible fine to the dealer from the California Air Resources Board.

If in California, the dealer must place the hang tag in a visible location in the boat prior to displaying the boat.

Hang tag front side

43291

Hang tag back side

Notes:

Section 2 - Getting to Know Your Power Package

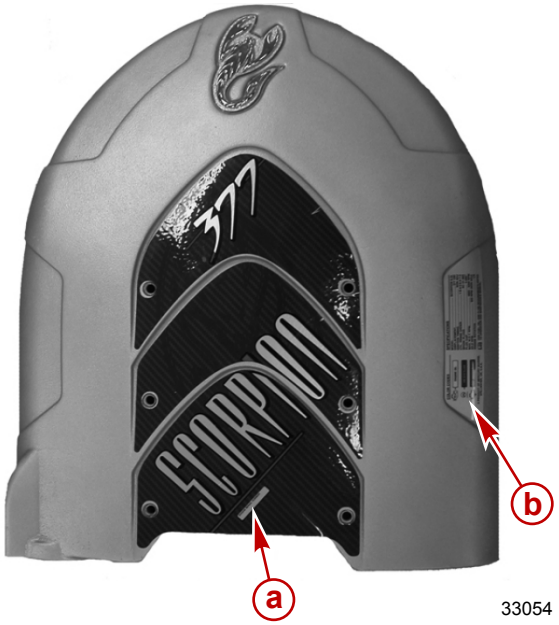
Table of Contents

Identification

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

Engine Serial Number Decal

The serial number and specifications decals are located on the engine cover (plenum).

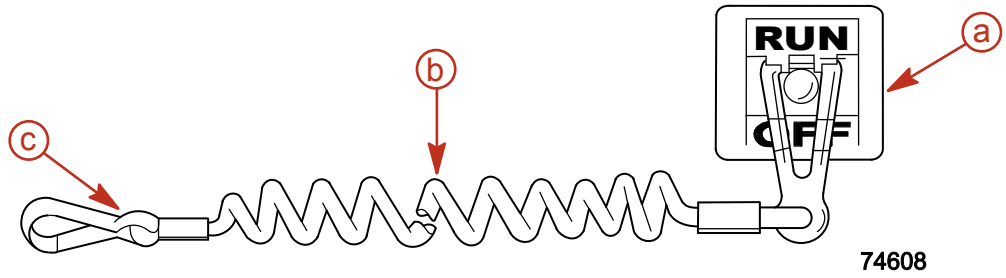


a - Engine serial number
b - Specifications label

The engine serial number is also stamped in the engine block.

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 one direction
- consuming alcohol or drugs
- high speed boating maneuvers

The lanyard is a cord usually between 122 and 152 cm (4 and 5 ft) in length when stretched out, with an element on one 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 its at-rest condition as short as possible to minimize the likelihood of lanyard entanglement with nearby objects. Its stretched-out length is made to minimize the likelihood of accidental activation should the operator choose to move around in an area close to the normal operator's position. If it is desired to have a shorter lanyard, wrap the lanyard 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

If the operator falls out of the boat, stop the engine immediately to reduce the possibility of serious injury or death from being struck by the boat. Always properly connect the operator to the stop switch using a lanyard.

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

⚠ WARNING

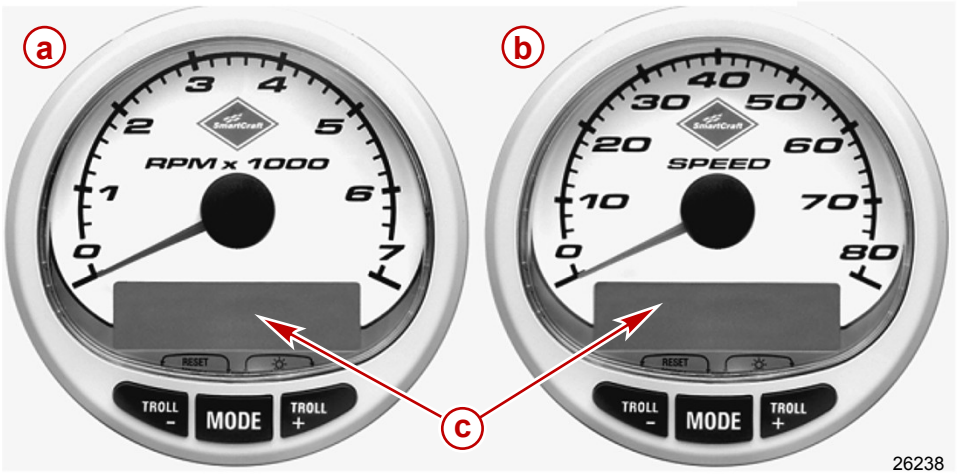
Avoid serious injury or death from deceleration forces resulting from accidental or unintended stop switch activation. The boat operator should never leave the operator's station without first disconnecting the stop switch lanyard from the operator.

Instrumentation

Digital Gauges

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, oil pressure (requires a SmartCraft oil pressure sender kit), battery voltage, fuel consumption, and engine operating hours.

SmartCraft digital gauges also feature troll control. This allows a vessel to maintain a constant speed with an engine speed between 500 and 1200 RPM.



SmartCraft gauges

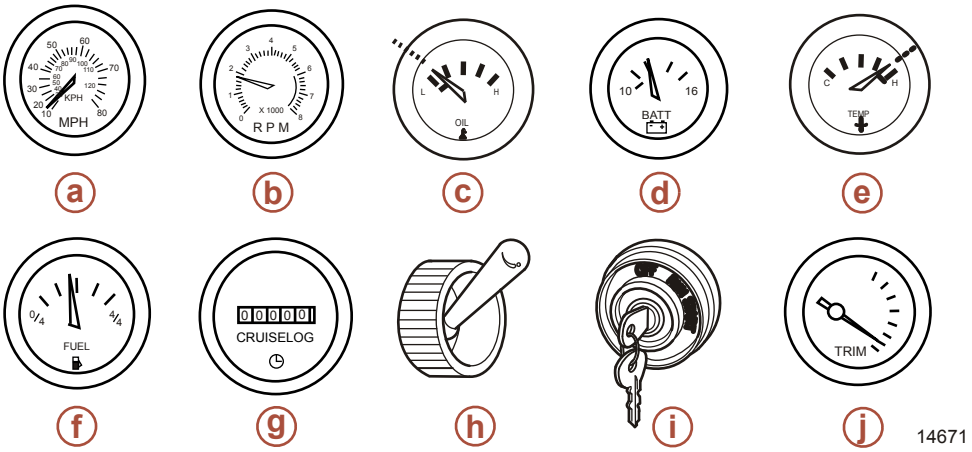
a - Tachometer
b - Speedometer
c - LCD system view display

The SmartCraft instrument package also aids in Engine Guardian diagnostics. The SmartCraft Instrument package displays critical engine alarm data and potential problems.

Refer to the manual with your gauge package for the warning functions monitored by and basic operation of the SmartCraft instrument package.

Analog Gauges

The following is a brief explanation of the instrumentation typically found on some boats. The owner and 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.

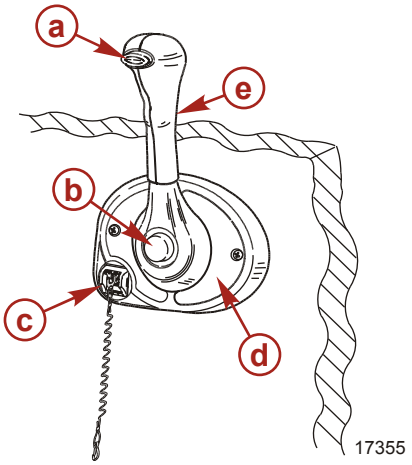


Reference	Gauge	Function
a	Speedometer	Indicates boat speed.
b	Tachometer	Indicates engine RPM.
c	Oil pressure gauge	Indicates engine oil pressure.
d	Voltmeter	Indicates battery voltage.
e	Coolant temperature gauge	Indicates engine operating temperature.
f	Fuel gauge	Indicates quantity of fuel in tank.
g	Hour meter	Records engine operating time.
h	Bilge blower switch	Operates the bilge blower.
i	Ignition switch	Allows the operator to start and stop engine.
j	Power trim gauge	Indicates sterndrive angle (trim up [out] and down [in]).

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.

Panel Mount Features



a - Neutral lock button
b - Throttle only button
c - Lanyard stop switch
d - Control handle tension adjustment screw
e - Control handle

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

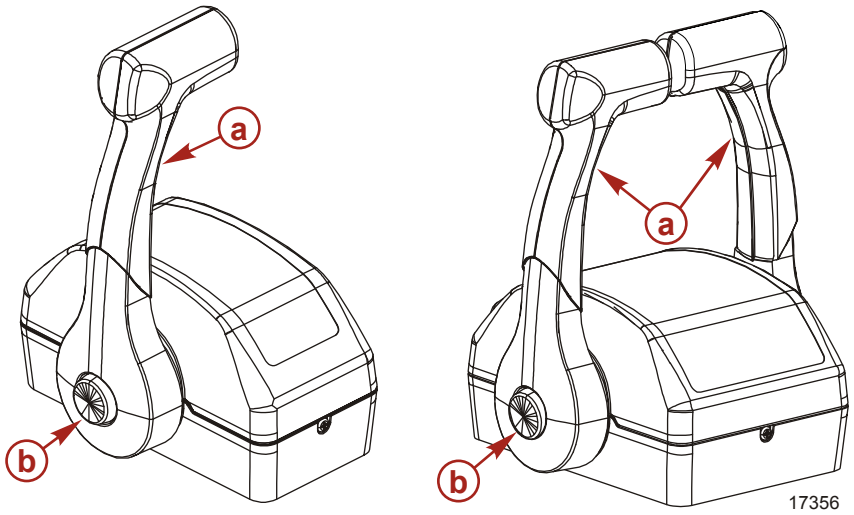
Throttle Only Button - Allows engine throttle advancement without shifting the engine. This is done by disengaging the shift mechanism from the control handle. The throttle only button can be depressed only when the remote control handle is in the neutral position, and should only be used to assist in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

Control Handle Tension Adjustment Screw - (not visible) This screw is used to adjust the effort required to move the remote control handle. Refer to instructions provided with remote control for complete adjustment instructions.

Console Mount Features



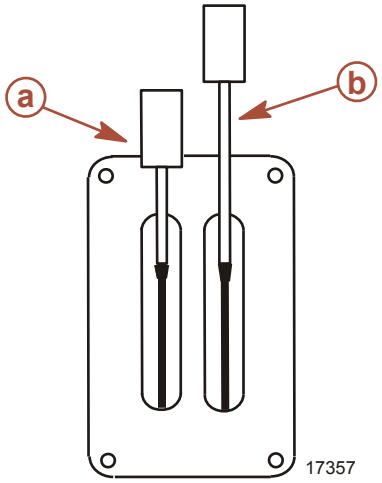
a - Throttle Only Button
b - Control Handle

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.

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.

Control Handle Tension Adjustment Screw - (not visible) This screw is used to adjust the effort required to move the remote control handle. Refer to instructions provided with remote control for complete adjustment instructions.

Zero Effort Features



a - Shift lever
b - Throttle lever

Shift Lever - Shift functions are controlled by the movement of the shift lever. Shift into reverse by moving the shift lever to its aft position. Shift into neutral by moving the shift lever to its center position. Shift into forward by moving the shift lever to its forward position.

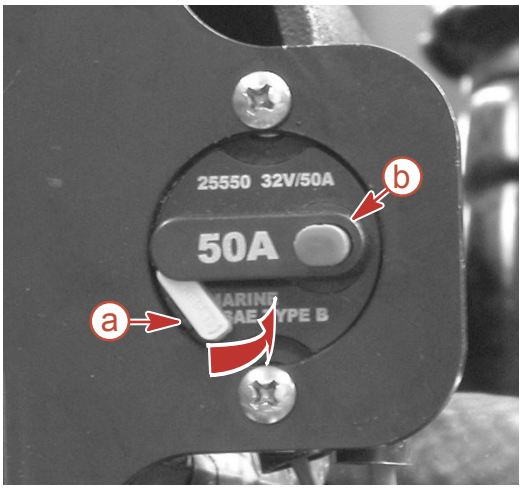
Throttle Lever - Throttle functions are controlled by the movement of the throttle lever. Increase the RPM by moving the throttle lever forward. Achieve Wide Open Throttle (WOT) by placing the throttle lever in its full forward position. Decrease RPM by moving the throttle lever back. Achieve minimum RPM (idle) by placing the throttle lever in its full aft position.

Electrical System Overload Protection

If an electrical overload occurs, a fuse will blow or the circuit breaker will trip open. Find and correct the cause 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 dealer.*

1. A circuit breaker protects the engine wiring harness and the instrumentation power lead. Test the circuit breaker by pushing the red button. If the circuit breaker is functioning properly, the yellow lever will appear. Reset after testing, or if tripped, by pushing the yellow lever back into the housing.



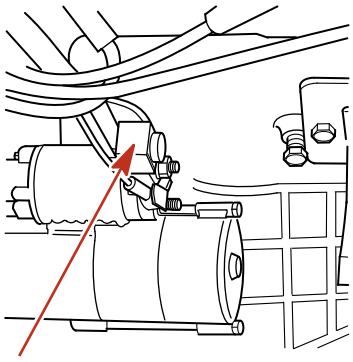
22529

Yellow lever style circuit breaker-typical

a - Yellow lever-shown tripped

b - Red test button

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



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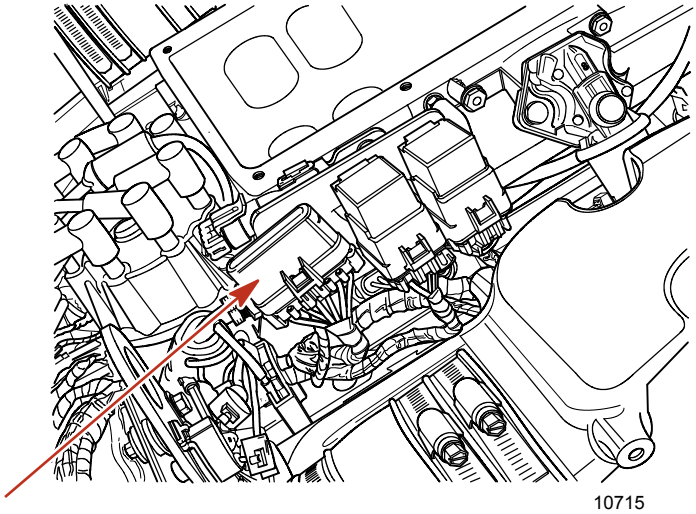
3. Four fuses are located on the port side of the engine. These fuses protect the main power, fuel pump, ignition, and accessory circuits.



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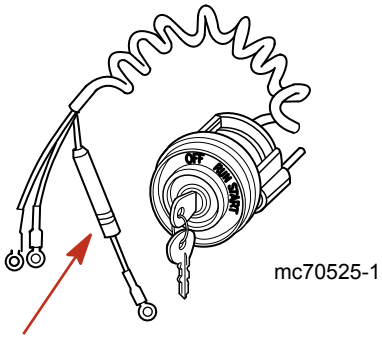
4. A 20 amp fuse may be located in the ignition switch "I" terminal lead to protect the electrical system. Check for blown fuse if the ignition key is turned to the "START" position and nothing happens (and circuit breaker is not tripped).



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Audio Warning System

IMPORTANT: The audio warning system alerts the operator that a problem has occurred. It does not protect the engine from damage.

IMPORTANT: If the audio warning sounds, stop the engine immediately if doing so will not place you or others in a hazardous situation. Investigate and if possible, correct the cause of the malfunction. If you cannot determine or correct the cause, consult your authorized Mercury MerCruiser dealer. Operating the vessel with a critical fault malfunction may cause engine, drive, and control system damage.

The Mercury MerCruiser power package may be equipped with an audio warning system. Most faults cause the warning horn circuit to activate. How the warning horn activates depends on the severity and cause of the fault.

These SmartCraft instruments will display malfunction fault code information:

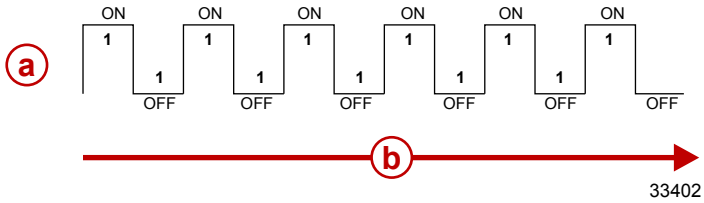
- VesselView
- System tachometer
- System speedometer

The warning horn has three modes:

- Caution
- Severe
- Onboard Diagnostics Marine (OBDM) fault

Caution

If a caution is detected, the audio warning system will sound for six one-second intervals.



a - Horn (on or off)
b - Time (in seconds)

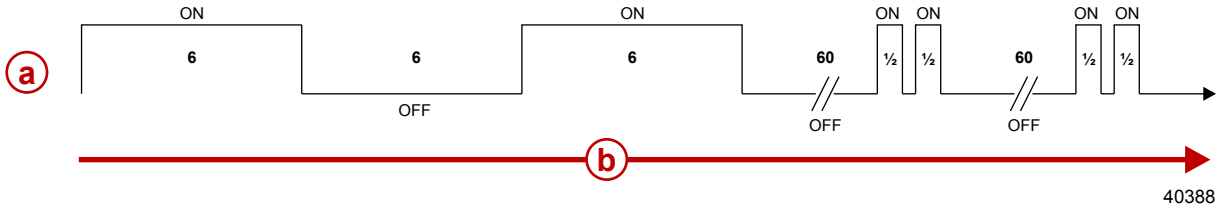
Examples of a caution fault include:

- Drive oil is low (sterndrive models only)
- Sensor failure

Severe

IMPORTANT: If you experience a severe fault, contact your authorized Mercury MerCruiser dealer.

If a severe fault is detected, the audio warning system sounds for six seconds, turns off for six seconds, and sounds for six more seconds. Then the audio warning system sounds for two half-second intervals every sixty seconds.



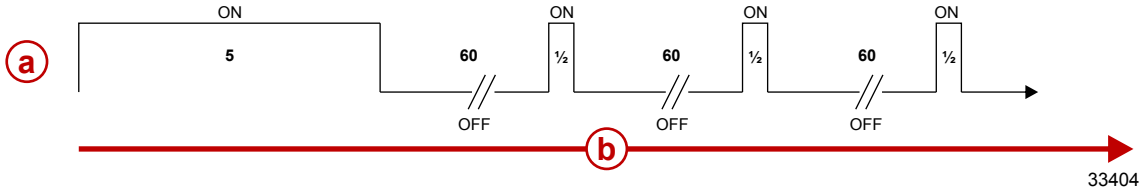
a - Horn (on or off)
b - Time (in seconds)

Examples of a severe fault include:

- Transmission fluid temperature is too hot (Inboard only)
- Engine oil pressure is too low
- Engine temperature is too hot
- Seawater pressure is too low
- Transmission pressure is low (Inboard only)

OBDM (On-Board Diagnostics Marine)

If an OBDM fault is detected, the audio warning system sounds with one five-second horn, then one short, ½-second horn every 60 seconds for certain faults related to the Emissions Control (EC) or the fuel system. Contact your authorized Mercury MerCruiser dealer for assistance.



a - Horn (on or off)
b - Time (in seconds)

NOTE: *Refer to the appropriate engine service manual for a detailed list and explanation of fault codes.*

OBDM Malfunction Indicator Lamp (MIL)

Boats powered by Emissions Control (EC) catalyzed engines may be equipped with a MIL (service engine light).

- The engine will default to horn notification for OBDM faults if a MIL is not installed.

- The MIL will remain illuminated while the fault is active.

43566

Service Engine Light

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.

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
- Exhaust Manifold Temperature (8.1 and 496 models only)

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 dealer. The ECM stores the fault and with this information the technician will be able to more rapidly diagnose problems.

Warning Horn Signals

Most faults will cause the warning horn circuit to activate. How the warning horn activates depends on how serious the problem is. There are four warning horn states:

- Caution - horn signal varies with product line and calibration. Minimal guardian.
- Warning - horn signal varies with product line and calibration.
- Severe - horn is beeping constantly.
- Critical - horn is beeping constantly and guardian will be at forced idle.

In addition, depending on the gauge package, there will be warning icons and fault messages on the dash mounted gauges.

Notes:

Section 3 - On the Water

Table of Contents

Safe Boating Suggestions

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

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

- We recommend that all powerboat operators complete a boating safety course. In the US, the U.S. Coast Guard Auxiliary, the Power Squadron, the Red Cross, and your state or provincial boating law enforcement agency provide courses. For more information in the US, call the Boat U.S. Foundation at 1-800-336-BOAT (2628).

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
  - Signal devices: flashlight, rockets or flares, flag and whistle or horn
  - Tools necessary for minor repairs
  - Anchor and extra anchor line
  - Manual bilge pump and extra drain plugs
  - Drinking water
  - Transistor radio
  - Paddle or oar
  - Spare propeller, thrust hubs, and an appropriate wrench
  - First aid kit and instructions
  - Water-proof storage containers
  - Spare operating equipment, batteries, bulbs and fuses
  - Compass and map or chart of the area
  - Personal flotation device (1 per person on board)

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 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 the boat is 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 40 km/h (25 MPH) 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.

Carbon Monoxide Exposure

Be Alert To Carbon Monoxide Poisoning

Carbon monoxide (CO) is a deadly gas that is present in the exhaust fumes of all internal combustion engines, including the engines that propel boats, and the generators that power boat accessories. By itself, CO is odorless, colorless, and tasteless, but if you can smell or taste engine exhaust, you are inhaling CO.

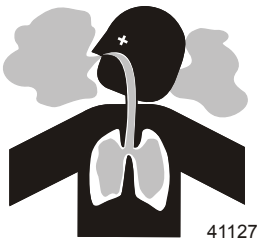
Early symptoms of carbon monoxide poisoning, which are similar to the symptoms of seasickness and intoxication, include headache, dizziness, drowsiness, and nausea.

⚠ WARNING

Inhaling engine exhaust gases can result in carbon monoxide poisoning, which can lead to unconsciousness, brain damage, or death. Avoid exposure to carbon monoxide.

Stay clear from exhaust areas when engine is running. Keep the boat well-ventilated while at rest or underway.

Stay Clear of Exhaust Areas

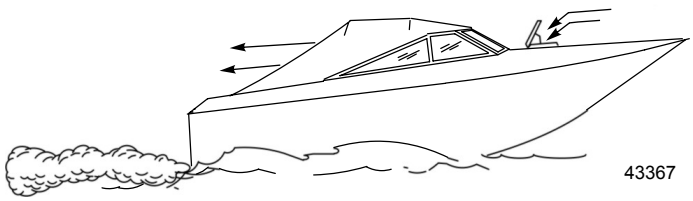


Engine exhaust gases contain harmful carbon monoxide. Avoid areas of concentrated engine exhaust gases. When engines are running, keep swimmers away from the boat, and do not sit, lie, or stand on swim platforms or boarding ladders. While underway, do not allow passengers to be positioned immediately behind the boat (platform dragging, teak/body surfing). This dangerous practice not only places a person in an area of high engine exhaust concentration, but also subjects them to the possibility of injury from the boat propeller.

Good Ventilation

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

Example of desired air flow through the boat:

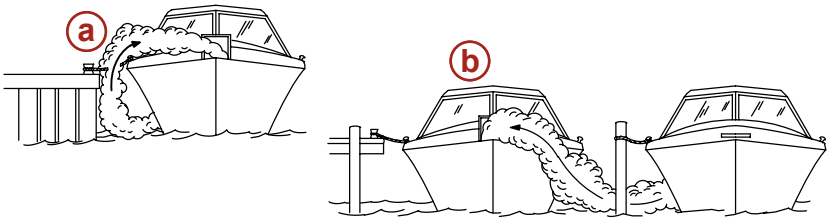


Poor Ventilation

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

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

1. Examples of poor ventilation while the boat is stationary:



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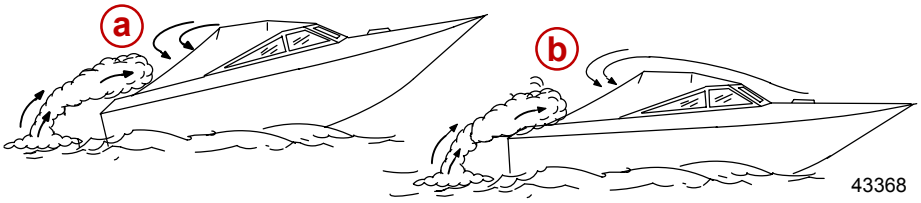
a - Operating the engine when the boat is moored in a confined space

b - Mooring close to another boat that has its engine operating

2. Examples of poor ventilation while the boat is moving:



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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)

Basic Boat Operation

Launching and Boat Operation

IMPORTANT: Install bilge drain plug prior to launching boat.

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 the "OFF" position.
Open engine hatch.	Check for fuel, oil, water, fluid and exhaust leaks.	Listen for the audio alarm.	Turn battery switch to the "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, if equipped.
Open fuel shut off valve.			Flush cooling system if in saltwater.
Open seacock, if equipped.			Drain bilge.
Close the drain system.			
Check the engine oil.			
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.			

Starting and Stopping the Scorpion Engine

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

Starting the Engine

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

NOTICE

Without sufficient cooling water, the engine, the water pump, and other components will overheat and suffer damage. Provide a sufficient supply of water to the water inlets during operation.

⚠ WARNING

Explosive fumes contained in the engine compartment can cause serious injury or death from fire or explosion. Before starting the engine, operate the bilge blower or vent the engine compartment for at least five minutes.

3. Turn ignition key to "START". Release key when engine starts and allow switch to return to "ON" position. Allow engine to warm up (6-10 minutes on first start of the day). The engine will typically idle at 900-1000 RPM until warm, and then return to the normal idle RPM of approximately 650 RPM.

   NOTE: *If the engine has not run for a long period of time it may require a couple of attempts.*
4. If engine does not start after 3 attempts:
   a. Push the **throttle only** button and position the remote control handle/throttle lever to the 1/4 throttle position.
   b. Turn ignition key to "START". Release key when engine starts and allow switch to return to "ON" position.
5. If engine does not start after step 4:
   a. Move the remote control handle/throttle lever to full throttle position, then return to 1/4 throttle.
   b. Turn ignition key to "START". Release key when engine starts and allow switch to return to "ON" position.
6. Inspect the power package for fuel, oil, water and exhaust leaks.
7. Move control handle with a firm, quick motion forward to shift to forward gear, or backward to shift to reverse. After shifting, advance throttle to desired setting.

NOTICE

Shifting into gear at engine speeds above idle will damage the gearcase. Shifting into gear when the engine is not running can cause misalign the clutch, preventing proper shifting. Always shift the gearcase into gear when the engine is operating at idle. If you must shift while the engine is not operating, rotate the propeller shaft in the appropriate direction during shifting.

Stopping the Engine

1. 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.
2. Turn ignition key to the "OFF" position.

Throttle-Only Operation

1. Refer to **Remote Controls** section for remote control features.
2. Move the control lever to the idle/neutral position.
3. Depress and hold the throttle only button, and move the control lever to the idle/forward or idle/reverse position.
4. Advancing the control lever beyond the idle/forward or idle/reverse position will cause engine speed to increase.
   IMPORTANT: Moving the control lever back to the idle/neutral position will disengage the throttle only button and allow the engine to shift into gear.
5. Throttle only mode is deactivated by moving the control lever to the idle/neutral position. Moving the control lever from the idle/neutral position to the idle/forward or idle/reverse position without pressing the throttle only button will shift the unit into the chosen gear.

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.

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.

Protecting People in the Water

While You Are Cruising

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

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

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

While Boat Is Stationary

⚠ WARNING

A spinning propeller, a moving boat, or any solid device attached to the boat can cause serious injury or death to swimmers. Stop the engine immediately whenever anyone in the water is near your boat.

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

High-Speed and High-Performance 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.

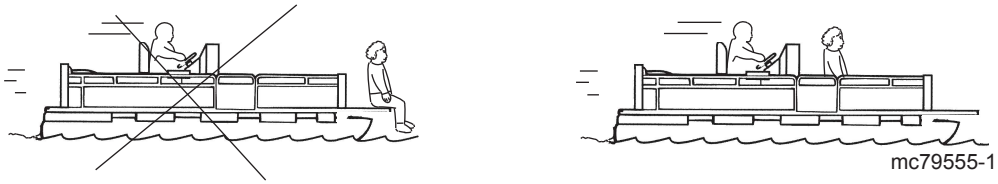
Passenger Safety in Pontoon Boats and Deck Boats

Whenever the boat is in motion, observe the location of all 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 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 be run over.

Boats Having an Open Front Deck

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.

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.



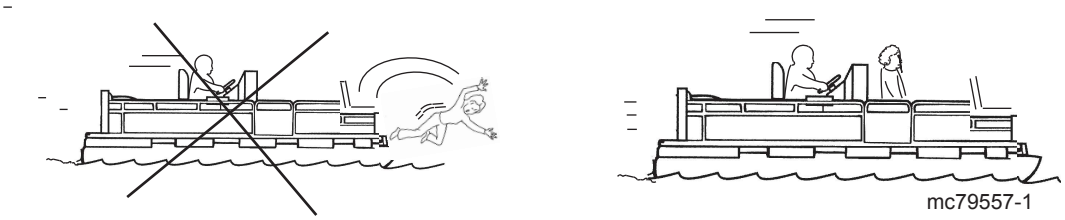
⚠ WARNING

Sitting or standing in an area of the boat not designed for passengers at speeds above idle can cause serious injury or death. Stay back from the front end of deck boats or raised platforms and remain seated while the boat is in motion.

Boats With Front-Mounted, Raised Pedestal Fishing Seats

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.

Any unexpected, sudden reduction in boat speed could result in the elevated passenger falling over the front of the boat.



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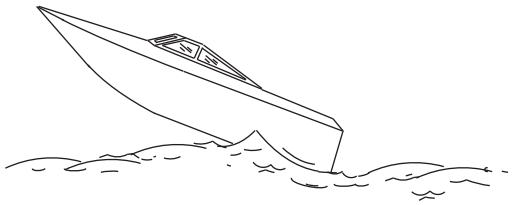
Wave and Wake Jumping

⚠ WARNING

Wave or wake jumping can cause serious injury or death from occupants being thrown within or out of the boat. Avoid wave or wake jumping whenever possible.



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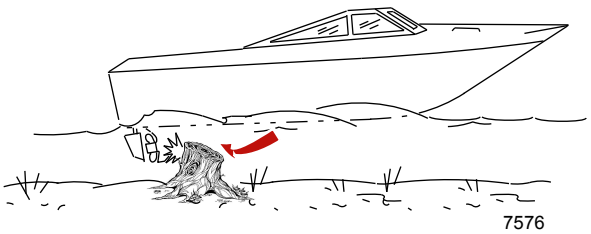
Operating recreational boats over waves and wakes is a natural part of boating. However, when this activity is done with enough speed to force the boat hull partially or completely out of the water, certain hazards arise, particularly when the boat re-enters the water.

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.

Impact with Underwater Hazards

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.



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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 to 40 km/h (15 to 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

Operating a boat or engine with impact damage can result in product damage, serious injury, or death. If the vessel experiences any form of impact, have an authorized Mercury Marine dealer inspect and repair the vessel or power package.

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)

The Bottom of the 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.

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 increases propeller speed while reducing boat speed. 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

Ventilation

Ventilation is caused by surface air or exhaust gases that are introduced around the propeller resulting in propeller speed-up and a reduction in boat speed. Air bubbles strike the propeller blade and cause erosion of the blade surface. If allowed to continue, eventual blade failure (breakage) will occur. Excessive ventilation is 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

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, recommended RPM can be achieved by changing to a lower pitch propeller.

Propeller Selection

IMPORTANT: The engines covered in this manual are equipped with an RPM rev-limiter that is set to an upper RPM limit. This limit, which is slightly above the normal operating range of the engine, helps prevent damage from excessive engine RPM. Once the RPM returns to the recommended operating RPM range, normal engine operation resumes.

The boat manufacturer and the selling dealer are responsible for equipping the power package with the correct propeller. Refer to Mercury Marine's web page **http://www.mercurymarine.com/everything_you_need_to_know_about_propellers6**.

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 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 waterskiing, use the next lower pitch propeller. When not pulling skiers, do not operate at full throttle when using the lower pitch propeller.

Getting Started

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.

After Break-In Period

To help extend the life of your Mercury MerCruiser power package, follow these recommendations:

- Ensure that propeller allows the engine to operate at or near the top of the specified WOT RPM range. Refer to **Specifications** and **Maintenance**.
- Operate the engine at 3/4 throttle or lower. Refrain from prolonged operation at wide-open-throttle RPM.
- Change the engine oil and oil filter. Refer to **Maintenance**.
- Change the transmission oil and filter. Refer to **Maintenance** (ZF Transmission models).[1.]

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.

1. Require fluid and filter change after the first 25 hours and then every 100 hours.

Section 4 - Specifications

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Fuel Requirements

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.

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.

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 increase:

- Corrosion of metal parts
- Deterioration of rubber or plastic parts
- Fuel permeation through rubber fuel lines
- Difficulty starting and operating the engine

⚠ WARNING

Fuel leakage is a fire or explosion hazard, which can cause serious injury or death. Periodically inspect all fuel system components for leaks, softening, hardening, swelling, or corrosion, particularly after storage. Any sign of leakage or deterioration requires replacement before further engine operation.

Because of possible adverse effects of alcohol in gasoline, we recommend only alcohol-free gasoline when possible. If the only fuel available contains alcohol or if you do not know whether the fuel contains alcohol, inspect for leaks and abnormalities more frequently.

IMPORTANT: When operating a Mercury MerCruiser engine on gasoline containing alcohol, do not store the gasoline in the fuel tank for long periods. Whereas cars normally consume alcohol-blend fuels before they can absorb enough moisture to cause trouble, 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.

Engine Oil

To help obtain optimum engine performance and to provide maximum protection, we recommend using the following oil:

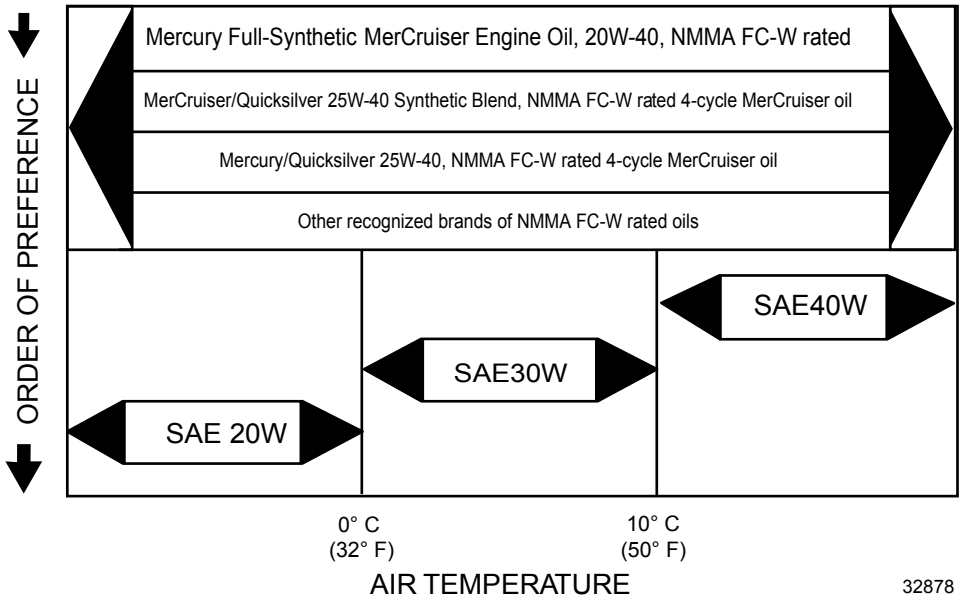
Application	Recommended Oil
All MerCruiser engines	Mercury MerCruiser Full-Synthetic Engine Oil, 20W-40, NMMA FC-W rated

If the Mercury MerCruiser Full-Synthetic, 20W-40 oil is unavailable, you can use the following lubricants, listed in order of recommendation:

1. Mercury/Quicksilver 25W-40 Synthetic Blend, NMMA FC-W–rated 4-cycle MerCruiser oil
2. Mercury/Quicksilver 25W-40, NMMA FC-W–rated 4-cycle MerCruiser oil

3. Other recognized brands of NMMA FC-W–rated 4-cycle oils
4. A good-grade, straight-weight detergent automotive oil per the operating chart below.

NOTE: *We do not recommend non-detergent oils, multi-viscosity oils (other than as specified), non FC-W–rated synthetic oils, low-quality oils, or oils that contain solid additives.*



Engine Specifications

Models	Scorpion 350	Scorpion 377
Power	246 kW (330 hp)	254 kW (340 hp)
Displacement	5.7 L (350 cid)	6.2 L (377 cid)
Specified WOT RPM range	4800–5200	
Idle RPM in neutral	650	
Minimum oil pressure at idle	41 kPa (6 psi)	
Thermostat	71° C (160° F)	
Timing at idle	Not adjustable	
Firing order	1-8-4-3-6-5-7-2	
Electrical system	12 V negative (–) ground	
Alternator rating	65 A	
Recommended battery rating (minimum)	750 CCA, 950 MCA, or 180 Ah	
Spark plug type	AC Platinum (AC 41-993)	
Spark plug gap	1.50 mm (0.060 in.)	1.0 mm (0.040 in.)
Emission control system	Electronic engine control (EC)	

Fluid Specifications

Engine

IMPORTANT: All capacities are approximate fluid measures.

All Models	Capacity	Fluid Type
Engine oil (with filter)	4.25 L (4.5 US qt)	Mercury MerCruiser Full-Synthetic Engine Oil, 20W-40
Seawater cooling system (winterization only)	20 L (21 US qt)	Propylene Glycol and purified water

Transmission

Model	Capacity	Fluid Type
71C In-Line	1.66 L (1.75 US qt)	Dexron lll Automatic Transmission Fluid
45C In-Line	1.94 L (66 oz)	Dexron lll Automatic Transmission Fluid
RV-36 V-drive (gear box only)	0.5 L (0.75 US qt)	SAE 30 Heavy Duty Motor Exxon Spartan, EP-68 Gear Oil, APG-80 Gear Oil

NOTE: *Refer to manufacturers owners manual for information concerning remote V-drive fluid capacities.*

NOTE: *Walters V-drive applications have two fluid service points: the transmission and the gear box.*

Section 5 - Maintenance

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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.

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.

Maintenance

⚠ WARNING

Performing service or maintenance without first disconnecting the battery can cause product damage, personal injury, or death due to fire, explosion, electrical shock, or unexpected engine starting. Always disconnect the battery cables from the battery before maintaining, servicing, installing, or removing engine or drive components.

⚠ WARNING

Fuel vapors trapped in the engine compartment may be an irritant, cause difficulty breathing, or may ignite resulting in a fire or explosion. Always ventilate the engine compartment before servicing the power package.

IMPORTANT: Refer to the maintenance schedule for the complete listing of all scheduled maintenance to be performed. A repair shop or person of the owner's choosing may maintain, replace, or repair emission control devices and systems. Certain other items should be performed only by an authorized Mercury MerCruiser dealer. Before attempting maintenance or repair procedures not covered in this manual, we recommend that you purchase a Mercury MerCruiser service manual and read it thoroughly.

NOTE: *Maintenance points are color-coded for ease of identification.*

Maintenance Point Color Codes	
Yellow	Engine oil
Black	Drive lube
Brown	Power steering fluid
Blue	Drain or flush

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.

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.

Maintenance Schedule—Inboard

Routine Maintenance

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

Task Interval	Maintenance to Be Performed
Each day start	• Check the engine oil level. You can extend this interval based on experience with the product. • Check the transmission fluid level.
Each day end	• If operating in saltwater, brackish water, or polluted water, flush the seawater section of the cooling system after each use.
Weekly	• Check the water inlets for debris or marine growth. • Check and clean the seawater strainer, if equipped. • Check the coolant level. • Check the transmission fluid.
Every two months or 50 hours	• If operating in saltwater, brackish water, or polluted water, apply Corrosion Guard to the power package. • Check the battery connections and the fluid level. • Ensure that the gauges and the wiring connections are secure. Clean the gauges. If operating in saltwater, reduce this interval to every 25 hours or 30 days, whichever occurs first.

Scheduled Maintenance

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

Task Interval	Maintenance to Be Performed
After the initial 20-hour break-in period	Change the engine oil and filter. • Change the engine oil and filter. • Change the transmission fluid and filter. ZF Marine requires changing the transmission fluid and filter maintain warranty.

Task Interval	Maintenance to Be Performed
Every 100 hours or annually (whichever occurs first)	• Touch up the paint on the power package. • Change the engine oil and filter. • Change the transmission fluid (ZF Transmission Models). • Replace the water-separating fuel filter element. • Clean the flame arrestor, IAC muffler (MPI engines), and the crankcase ventilation hoses. Inspect the PCV valve, if equipped. On MerCruiser V6 models, the PCV valve is a non-serviceable, internal component of the valve cover assembly. • Inspect the condition and the tension of the belts. • Check the coolant level and antifreeze concentration for adequate freeze protection. Correct if necessary. Refer to the **Specifications** section.
Every 300 hours or 3 years (whichever occurs first)	• Check the engine mounts for tightness and tighten to specifications if necessary. • Check the electrical system for loose, damaged, or corroded fasteners. • 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. • Inspect the exhaust system components. If the package was equipped with water shutters (flapper valves), verify that they are not missing or worn.
Every 5 years	• Replace the coolant/anitifreeze. Replace every two years if not using extended-life coolant/ antifreeze.

Maintenance Log

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

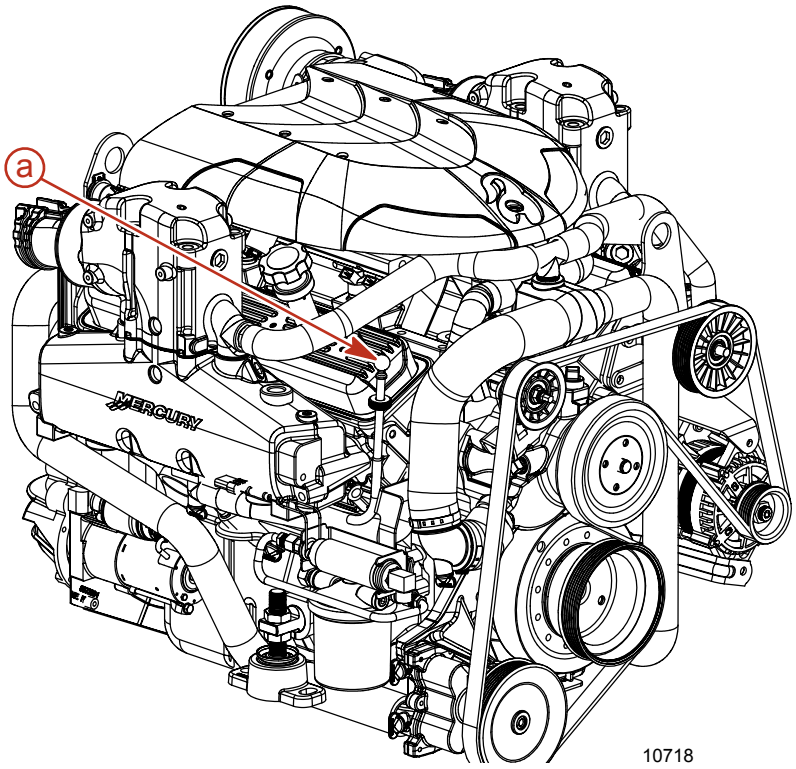
Date	Maintenance Performed	Engine Hours

Engine Oil

Checking

NOTICE
Discharge of oil, coolant, or other engine/drive fluids into the environment is restricted by law. Use caution not to spill oil, coolant, or other fluids into the environment when using or servicing your boat. Be aware of the local restrictions governing the disposal or recycling of waste, and contain and dispose of fluids as required.

1. Stop the engine. Allow approximately five minutes for the oil to drain into the oil pan. The boat must be at rest in the water.
2. Remove the dipstick. Wipe clean and reinstall fully into the dipstick tube. Wait 60 seconds to allow trapped air to vent.
   NOTE: *Ensure that dipstick is installed with oil level indication marks facing the rear of the engine (flywheel end).*



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a - Dipstick tube

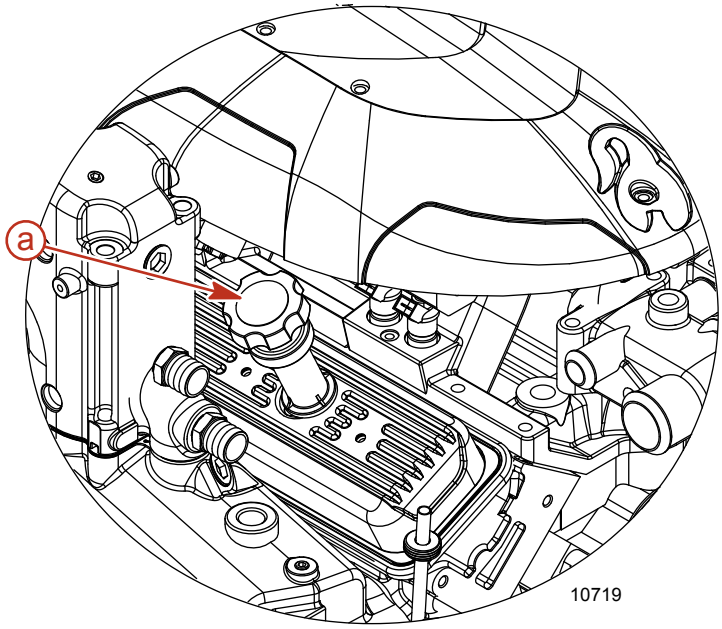
IMPORTANT: Add the specified engine oil to bring the level up to, but not over, the full or OK range mark on the dipstick.

3. Remove the dipstick and observe the oil level. Oil level must be between full or OK range and add. Reinstall dipstick into dipstick tube.

Filling

IMPORTANT: Do not overfill the engine with oil.
IMPORTANT: Always use the dipstick to determine the exact quantity of oil or fluid required.

1. Remove oil fill cap.



a - Oil fill cap

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. Recheck oil level.
3. Replace the fill cap.

Models	Capacity	Fluid Type
Engine oil (with filter)	4.25 L (4.5 US qt)	Mercury MerCruiser Full-Synthetic Engine Oil, 20W-40

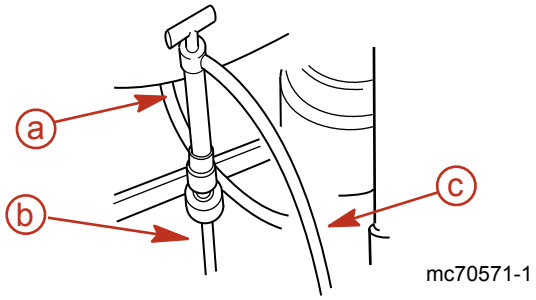
Changing Oil and Filter

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).

Engine Oil Drain Pump

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

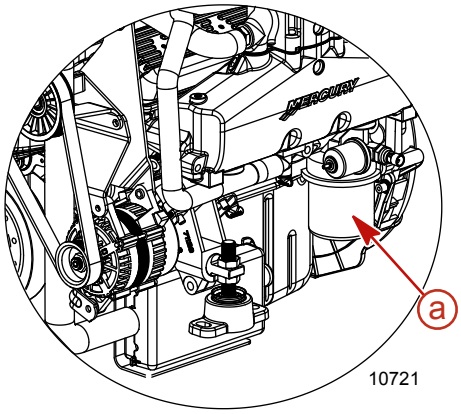


a - Typical oil pump
b - Dipstick tube
c - Oil drain hose

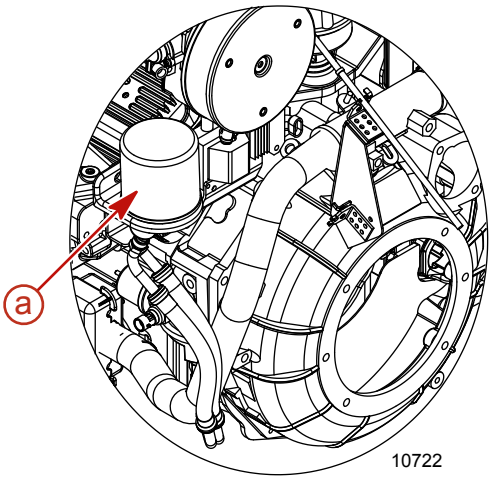
4. Insert the hose end of the crankcase oil pump onto an appropriate container and, using the handle, pump until the crankcase is empty.
5. Remove the pump.
6. Install the dipstick.

Changing Filter

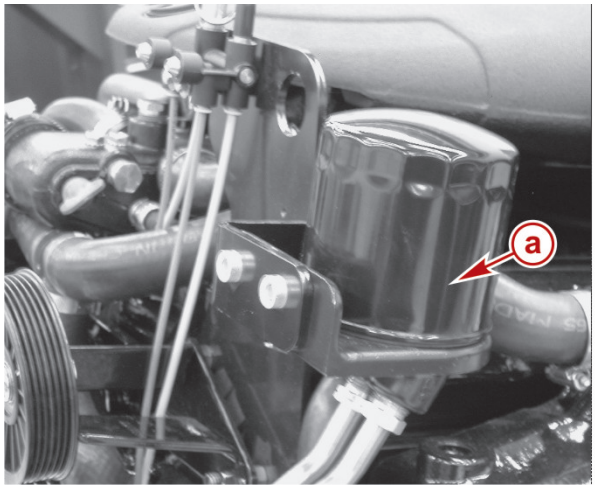
1. Remove and discard oil filter.



In-line exhaust



V-drive exhaust



In-line exhaust with remote oil filter

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 L (1 qt) of engine oil will raise the level from the add mark to the top of the OK range.*

Models	Capacity	Fluid Type
Engine oil (with filter)	4.25 L (4.5 US qt)	Mercury MerCruiser Full-Synthetic Engine Oil, 20W-40

7. Start the engine, run the engine for three minutes, and check for leaks. 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.

Transmission Fluid

Checking While the Engine is Warm

1. Velvet Drive Transmissions - Stop the engine and immediately check fluid level by turning T-handle counterclockwise, to remove dipstick. Fluid level should be up to full mark. If low, add specified fluid through dipstick tube on transmissions.

2. ZF Marine Transmissions - Stop the engine and remove the dipstick to check level. If fluid is below top (full) line, add specified fluid through dipstick hole. Do not overfill. Reinstall dipstick with cap fully seated.
3. Walter V-Drive Transmissions - Stop the engine and remove the dipstick to check the level. If the fluid is below the top (full) line, add the specified fluid through the breather elbow. Do not overfill. Reinstall the dipstick with the cap fully seated.

Checking While Engine is Cold

NOTE: *Cold fluid level check: To ease checking the fluid level, the dipstick can be marked or scribed with a cold level mark.*

1. Follow the procedure for the warm fluid level check, then allow the boat to sit overnight.
   IMPORTANT: Be sure to push the dipstick all the way down into the dipstick tube when checking the fluid level.
2. Remove the dipstick, wipe clean and reinsert.
3. Remove the dipstick, observe the fluid level and mark the cold fluid level.
4. Reinstall the dipstick, tighten the T-handle securely. Do not overtighten.

Changing

Contact your authorized Mercury MerCruiser dealer.

IAC Muffler

Changing

Contact your authorized Mercury MerCruiser dealer.

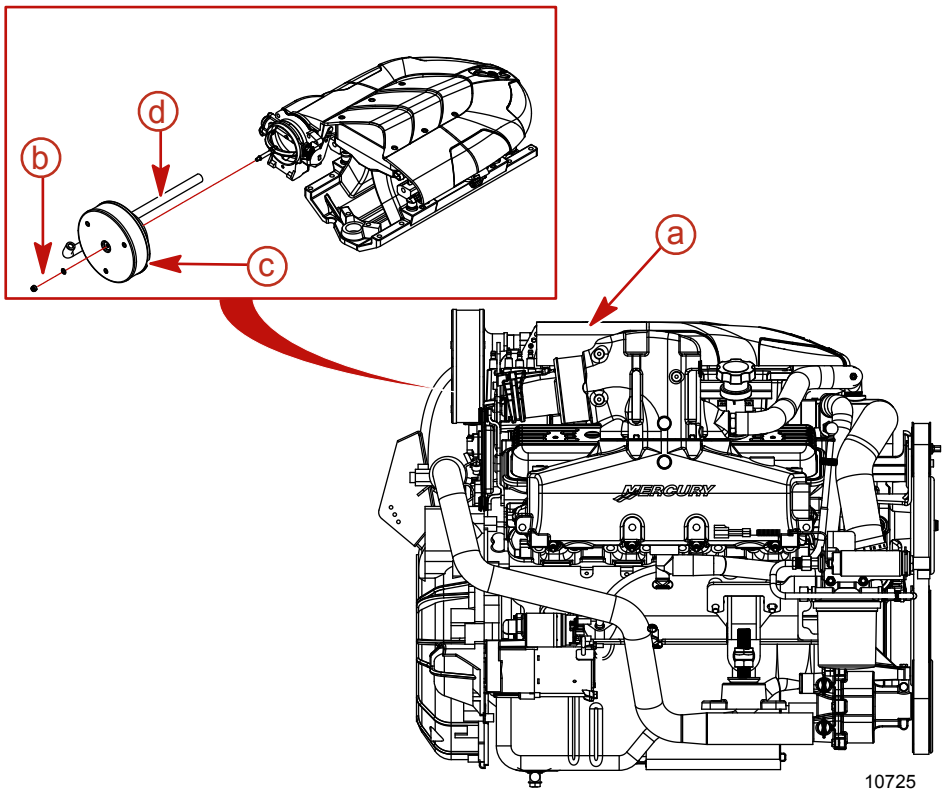
Cleaning the Flame Arrestor

⚠ WARNING

Fuel is flammable and explosive. Ensure that the key switch is off and the lanyard is positioned so that the engine cannot start. Do not smoke or allow sources of spark or open flame in the area while servicing. Keep the work area well ventilated and avoid prolonged exposure to vapors. Always check for leaks before attempting to start the engine, and wipe up any spilled fuel immediately.

1. Remove the engine cover.
2. Disconnect and remove the crankcase ventilation hose from the fitting on the flame arrestor and valve cover.

3. Remove the flame arrestor.



a - Plenum
b - Flame arrestor and washer
c - Flame arrestor
d - Crankcase ventilation hose

4. Clean the flame arrestor with solvent. Dry with compressed air or allow to air dry completely.
5. Clean the crankcase ventilation hose with warm water and a mild detergent. Dry with compressed air or allow to air dry completely.
6. Inspect the crankcase ventilation hose for cracks or deterioration. Replace if necessary.
7. Install the flame arrestor and flame arrestor bracket. Torque the flame arrestor bracket nuts to specification.

Description	Nm	lb-in.	lb-ft
Flame arrestor bracket nut	12	106	

8. Connect the crankcase ventilation hose to the fitting on the flame arrestor and valve cover.
9. Install the engine cover.

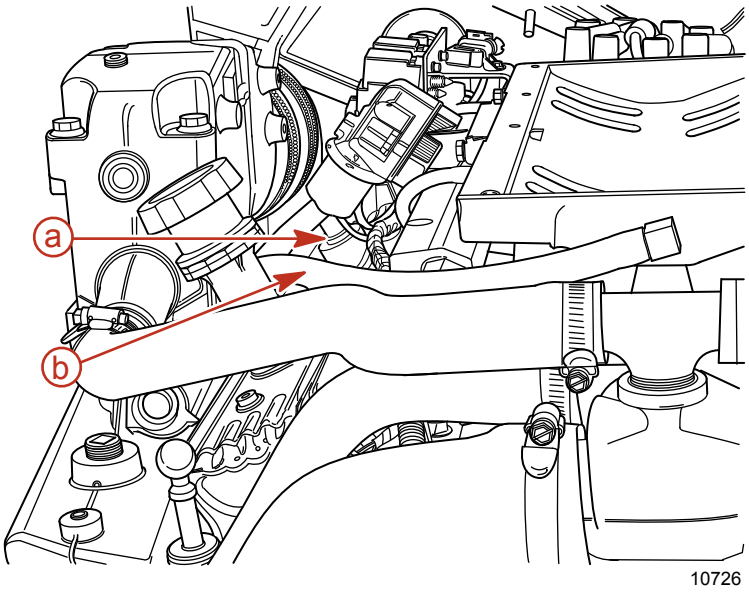
Positive Crankcase Ventilation Valve (PCV)

Changing

NOTE: *We recommend the use of Mercury MerCruiser replacement parts to ensure compliance with emission regulations.*

NOTE: *On V6 models the PCV valve is non-serviceable and is an internal component of the valve cover.*

1. Remove the PCV valve from the port valve cover.



a - PCV valve
b - Hose

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

Changing Water Separating Fuel Filter

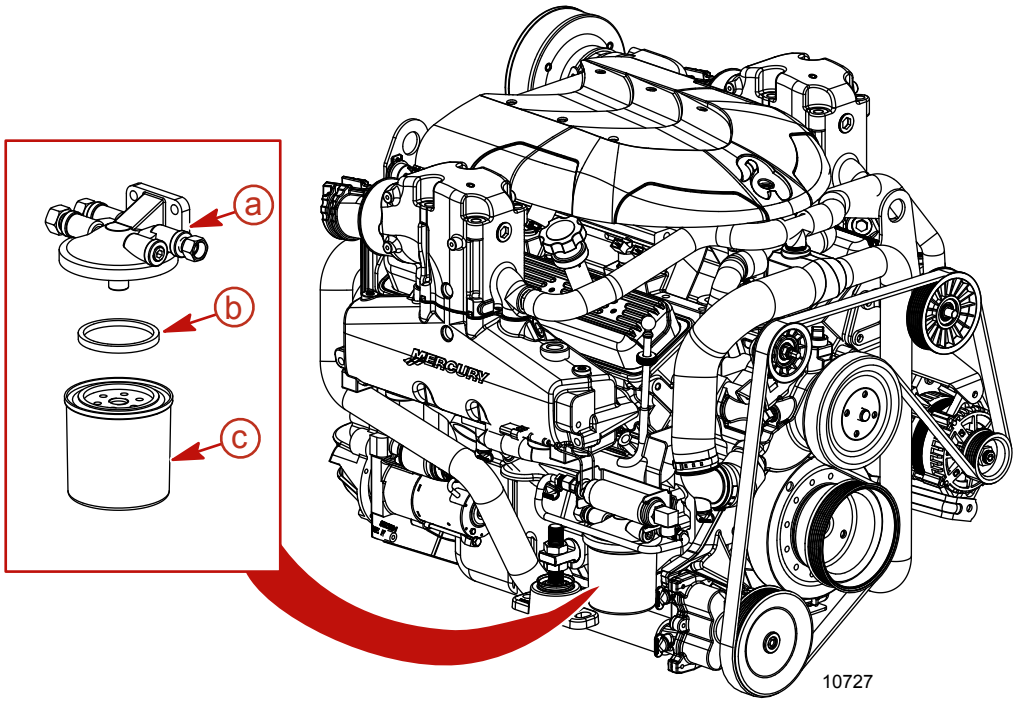
⚠ WARNING

Fuel is flammable and explosive. Ensure that the key switch is off and the lanyard is positioned so that the engine cannot start. Do not smoke or allow sources of spark or open flame in the area while servicing. Keep the work area well ventilated and avoid prolonged exposure to vapors. Always check for leaks before attempting to start the engine, and wipe up any spilled fuel immediately.

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

Tube Ref. No.	Description	Where Used	Part No.
	Synthetic Blend MerCruiser Engine Oil SAE25W-40	Filter sealing ring	92-883725K01

6. Thread filter onto the mounting bracket and tighten securely by hand. Do not use a filter wrench.



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

7. Open fuel supply valve, if equipped.
8. Ensure that engine compartment is properly ventilated.
9. Supply cooling water to the engine.
10. Start the engine. Check for gasoline leaks around the fuel filter assembly. If leaks exist, stop the engine immediately. Recheck the filter installation, clean spilled fuel and properly ventilate the engine compartment. If leaks continue, stop engine immediately and contact your authorized Mercury MerCruiser dealer.

In-line Fuel Filter

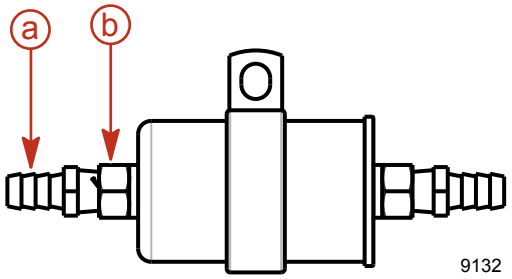
⚠ WARNING

Fuel is flammable and explosive. Ensure that the key switch is off and the lanyard is positioned so that the engine cannot start. Do not smoke or allow sources of spark or open flame in the area while servicing. Keep the work area well ventilated and avoid prolonged exposure to vapors. Always check for leaks before attempting to start the engine, and wipe up any spilled fuel immediately.

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. Close fuel supply valve, if equipped.
3. Wrap the water separating fuel filter with a cloth to help catch any fuel spills or spray.
4. Remove and discard the in-line fuel filter.
5. Select appropriate size connector for the fuel line and install the connector on the new filter.
6. Apply sealant to the male pipe threads on the connectors.

Tube Ref No.	Description	Where Used	Part No.
9	Loctite 567 PST Pipe Sealant	Male threads	92-809822

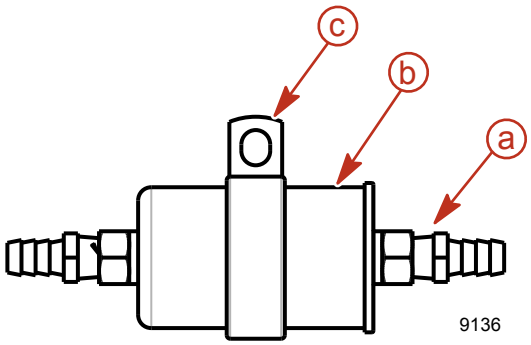
7. Torque each connector using a backup wrench on the hex fitting nearest to the connector.



a - Connector
b - Hex fitting

Description	Nm	lb. in.	lb. ft.
Connectors	19-27		14-20

8. Insert filter into mounting clip.

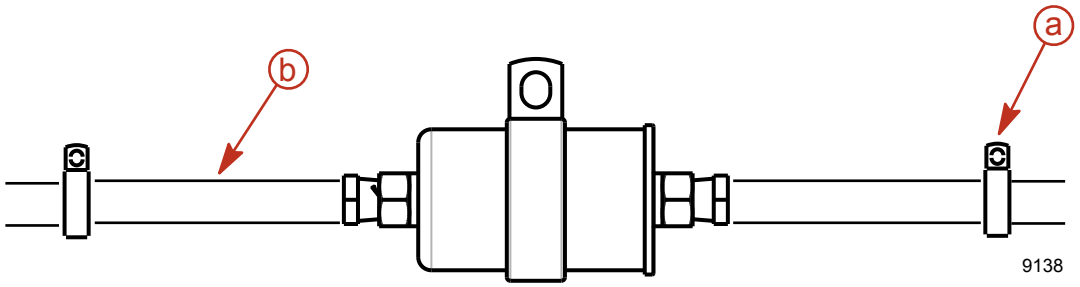


a - Connectors
b - In-line filter
c - Mounting clip

9. Install and torque screw and washer through the mounting clip into the stringer.

Description	Nm	lb. in.	lb. ft.
Mounting clip screw	12.2		9

10. Insert the hoses onto the barb fittings and fasten using hose clamps.



a - Fuel line stringer clips
b - Fuel line

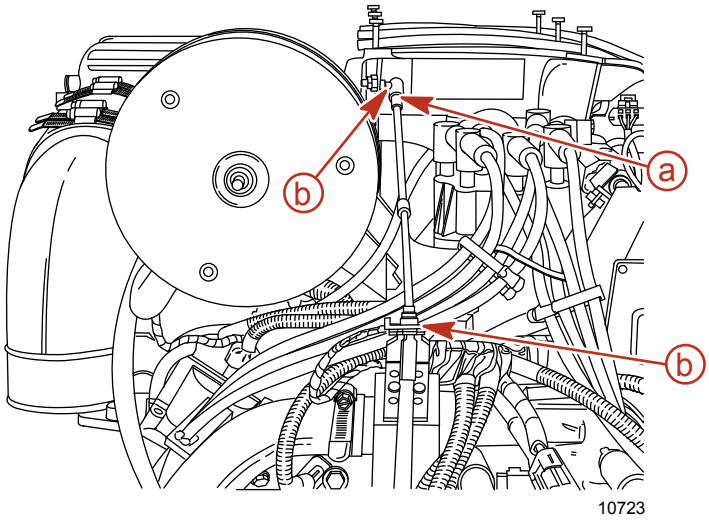
Description	Nm	lb. in.	lb. ft.
Hose clamps	3.4-6.8	30-60	

11. Open fuel supply valve, if equipped.
12. Ensure that engine compartment is properly ventilated.
13. Supply cooling water to the engine.
14. Start the engine. Check for gasoline leaks around the fuel filter assembly. If leaks exist, stop the engine immediately. Recheck the filter installation, clean spilled fuel and properly ventilate the engine compartment. If leaks continue, stop engine immediately and contact your authorized Mercury MerCruiser dealer.

Lubrication

Throttle Cable

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



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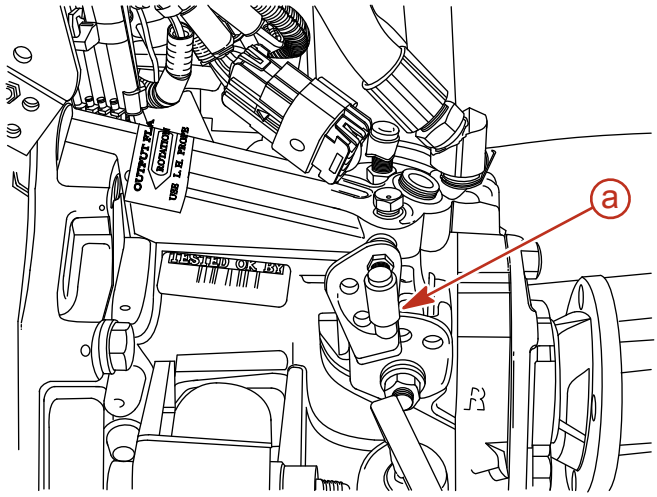
a - Pivot points
b - Guide contact surfaces

Tube Ref. No.	Description	Where Used	Part No.
	Synthetic Blend MerCruiser Engine Oil SAE25W-40	Throttle cable pivot points & guide contact surfaces	92-883725K01

Transmission Linkage

IMPORTANT: The poppet ball must be centered in the detent hole for each F-N-R position.

1. Lubricate the detent ball and the holes in the shift lever.



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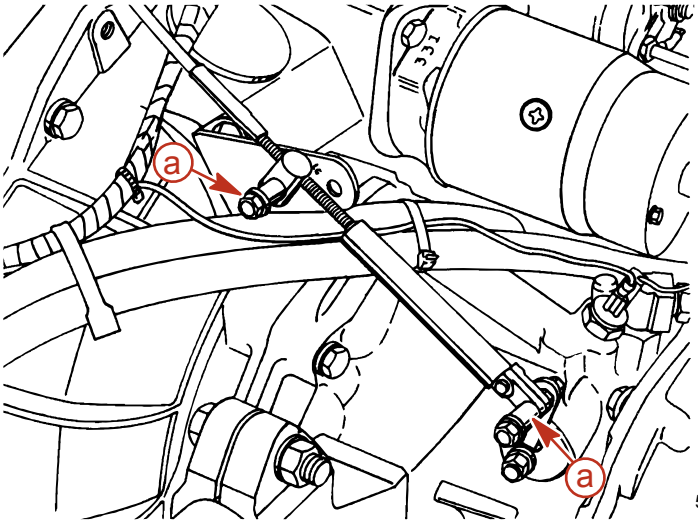
In-Line Transmission

Tube Ref. No.	Description	Where Used	Part No.
	Synthetic Blend MerCruiser Engine Oil SAE25W-40	Detent ball and shift lever holes	92-883725K01

2. Lubricate the shift cable pivot points.



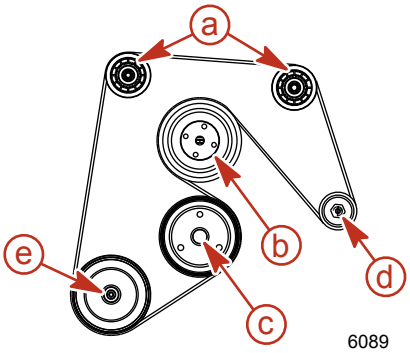
a - Pivot points

Tube Ref. No.	Description	Where Used	Part No.
	Synthetic Blend MerCruiser Engine Oil SAE25W-40	Shift cable pivot points	92-883725K01

Serpentine Drive Belt

⚠ WARNING

Inspecting the belts with the engine running may cause serious injury or death. Turn off the engine and remove the ignition key before adjusting tension or inspecting belts.



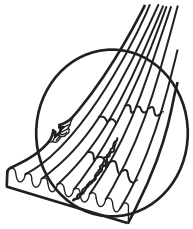
a - Idler pulley
b - Circulating pump pulley
c - Crankshaft pulley
d - Alternator pulley
e - Seawater pump pulley

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 two pulleys.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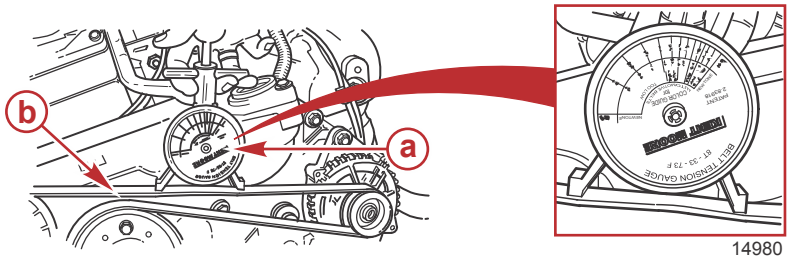
Replacing Belt and/or Adjusting Tension

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

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

1. Loosen the 16 mm (5/8 in.) locking nut on the adjustment stud.
2. Turn the adjustment stud and loosen the belt.
3. If a new serpentine drive belt is required, remove the old belt and install a new belt onto the pulleys.
4. Put a wrench on the adjustment stud 16 mm (5/8 in.) locking nut.
5. Use a 8 mm (5/16 in.) socket and tighten adjusting the stud to adjust the belt deflection.
6. Using one 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.



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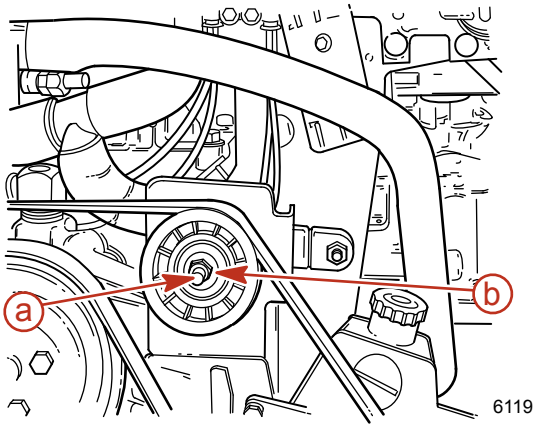
a - Kent Moore© Tension Gauge
b - Serpentine belt

7. While holding the adjustment stud at the correct belt tension, tighten the 16 mm (5/8 in.) locking nut.



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a - 8 mm (1/16 in.) adjusting stud
b - 16 mm (5/8 in.) locking nut

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

Flushing The Power Package—Tow Sports

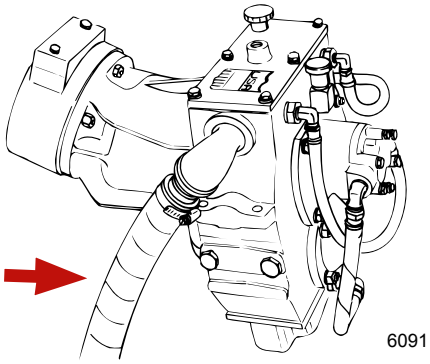
The Boat Out of the Water

IMPORTANT: Flushing the power package is most effective when performed with the boat out of the water.
IMPORTANT: Flushing is needed If the engine package has been operated in salty, brackish, mineral-laden or polluted water. For best results flushing is recommended after each outing and before cold weather and extended storage.

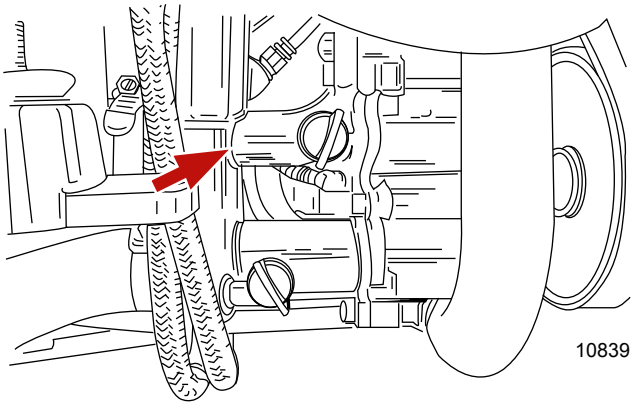
⚠ WARNING

Rotating propellers can cause serious injury or death. Never operate the boat out of the water with a propeller installed. Before installing or removing a propeller, place the drive unit in neutral and engage the lanyard stop switch to prevent the engine from starting. Place a block of wood between the propeller blade and the anti-ventilation plate.

1. **Models with Walter V-Drive Transmissions:**
   a. Close the seacock, if equipped, and then disconnect the seawater inlet hose from the transmission seawater inlet fitting.
   b. If not equipped with a seacock, disconnect the seawater inlet hose from the transmission seawater inlet fitting and plug the seawater inlet hose.



   c. Using appropriate connector, connect the flushing water hose to the transmission seawater inlet fitting.
   d. Proceed to step 3
2. **All other models:**
   a. Close the seacock, if equipped, and then disconnect the seawater inlet hose from the seawater pump inlet fitting..
   b. If not equipped with a seacock, disconnect the seawater inlet hose from the seawater pump and plug the hose.



   c. Using a suitable adapter, connect the flushing hose from the water source to the water inlet of the seawater pump.
   d. Proceed to step 3.

NOTICE

Flushing the engine when it is not operating will result in water collecting in the exhaust system, damaging the engine. Do not supply flush water for more than 15 seconds without the engine operating.

3. Completely open the water source to provide maximum water supply.
4. Place the remote control in the neutral idle speed position.
5. Immediately start the engine.

NOTICE

Operating the engine out of the water at high speeds creates suction, which can collapse the water supply hose and overheat the engine. Do not operate the engine above 1400 RPM out of the water and without sufficient cooling water supply.

6. Depress the throttle only button and slowly advance the throttle until the engine reaches 1300 RPM (± 100 RPM).
7. Observe the water temperature gauge to ensure that the engine is operating in the normal range.
8. Operate the engine with the transmission in neutral for a minimum of 10 minutes.
9. *For power packages operated in salty, brackish, mineral-laden or polluted water:* Continue to operate the engine until the discharge water is clear.
10. Slowly return the throttle to idle speed position.

NOTICE

Flushing the engine when it is not operating will result in water collecting in the exhaust system, damaging the engine. Do not supply flush water for more than 15 seconds without the engine operating.

11. Stop the engine.
12. Immediately shut off the supply water and remove the flushing attachment.
13. Install the water inlet hose to the seawater inlet of the seawater pump or V-Drive water inlet.
14. Tighten hose clamp securely.
15. Attach to the next engine, if equipped, and repeat procedure.

The Boat In the Water

IMPORTANT: Flushing the power package is most effective when performed with the boat out of the water.
IMPORTANT: Flushing is needed If the engine package has been operated in salty, brackish, mineral-laden or polluted water. For best results flushing is recommended after each outing and before cold weather and extended storage.

NOTICE

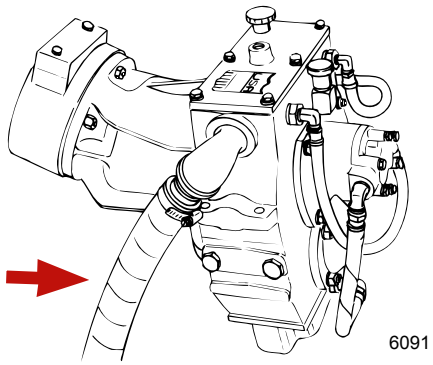
Disconnecting the seawater inlet hose will cause water to enter the bilge resulting in engine damage. Close the seacock before disconnecting the seawater inlet hose. Plug the seawater inlet hose immediately after disconnecting it.

1. **Models with Walter V-Drive Transmissions:**
   a. Close the seacock, if equipped, and then disconnect the seawater inlet hose from the transmission seawater inlet fitting.

NOTICE

Disconnecting the seawater inlet hose will cause water to enter the bilge resulting in engine damage. Close the seacock before disconnecting the seawater inlet hose. Plug the seawater inlet hose immediately after disconnecting it.

   b. If not equipped with a seacock, disconnect the seawater inlet hose from the transmission seawater inlet fitting and immediately plug the seawater inlet hose to prevent water from siphoning into the engine or boat.

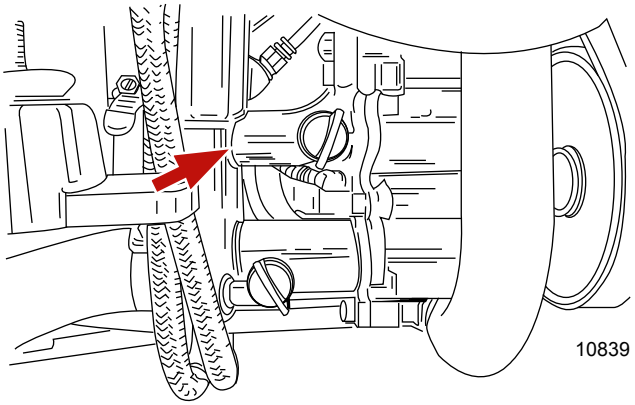


   c. Using suitable adapter, connect the flushing water hose to the transmission seawater inlet fitting.
   d. Proceed to step 3
2. **All other models:**
   a. Close the seacock, if equipped, and then disconnect the seawater inlet hose from the seawater pump inlet fitting.

NOTICE

Disconnecting the seawater inlet hose will cause water to enter the bilge resulting in engine damage. Close the seacock before disconnecting the seawater inlet hose. Plug the seawater inlet hose immediately after disconnecting it.

b. If not equipped with a seacock, disconnect the seawater inlet hose from the seawater pump inlet fitting and immediately plug the seawater inlet hose to prevent water from siphoning into the engine or boat.



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

d. Proceed to step 3.

NOTICE

Flushing the engine when it is not operating will result in water collecting in the exhaust system, damaging the engine. Do not supply flush water for more than 15 seconds without the engine operating.

3. Completely open the water source to provide maximum water supply.
4. Place the remote control in the neutral idle speed position.
5. Immediately start the engine.

NOTICE

Operating the engine out of the water at high speeds creates suction, which can collapse the water supply hose and overheat the engine. Do not operate the engine above 1400 RPM out of the water and without sufficient cooling water supply.

6. Depress the throttle only button and slowly advance the throttle until the engine reaches 1300 RPM (± 100 RPM).
7. Observe the water temperature gauge to ensure that the engine is operating in the normal range.
8. Operate the engine with the transmission in neutral for a minimum of 10 minutes.
9. *For power packages operated in salty, brackish, mineral-laden or polluted water:* Continue to operate the engine until the discharge water is clear.
10. Slowly return the throttle to idle speed position.

NOTICE

Flushing the engine when it is not operating will result in water collecting in the exhaust system, damaging the engine. Do not supply flush water for more than 15 seconds without the engine operating.

11. Stop the engine.
12. Immediately shut off the water supply and remove the flushing attachment.
13. Remove the flushing connector from the water inlet.
14. Tag the ignition switch with an appropriate tag requiring the seacock to be opened or the seawater inlet hose to be reconnected prior to operating the engine.
15. Repeat the flushing procedure on the next engine, if equipped.

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

Recharging a weak battery in the boat, or using jumper cables and a booster battery to start the engine, can cause serious injury or product damage from fire or explosion. Remove the battery from the boat and recharge in a ventilated area away from sparks or flames.

⚠ WARNING

An operating or charging battery produces gas that can ignite and explode, spraying out sulfuric acid, which can cause severe burns. Ventilate the area around the battery and wear protective equipment when handling or servicing batteries.

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 two different engines are connected, one 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, and the engine will operate normally. The ECM shuts off and resets itself so quickly that the engine may only seem to have an ignition miss.

Batteries: Boats with multiengine EFI power packages require each engine be connected to its own battery. This ensures that the engine's 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.

Notes:

Section 6 - Storage

Table of Contents

6

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 temperatures is not covered by the Mercury MerCruiser Limited Warranty.

NOTICE

Water trapped in the seawater section of the cooling system can cause corrosion or freeze damage. Drain the seawater section of the cooling system immediately after operation or before any length of storage in freezing temperatures. If the boat is in the water, keep the seacock closed until restarting the engine to prevent water from flowing back into the cooling system. If the boat is not fitted with a seacock, leave the water inlet hose disconnected and plugged.

NOTE: *As a precautionary measure, attach a tag to the key switch or steering wheel of the boat reminding the operator to open the seacock or unplug and reconnect the water inlet hose before starting the engine.*

IMPORTANT: Mercury MerCruiser requires that propylene glycol antifreeze, mixed to the manufacturers instructions, be used in the seawater section of the cooling system for freezing temperatures or extended storage. Ensure 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.

Preparing 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 Mercury/Quicksilver Gasoline Stabilizer for Marine Engines added to any fuel remaining in the tank. Refer to **Fuel Requirements** for additional information.
3. Flush the cooling system. Refer to the **Maintenance** section.
4. Operate the engine sufficiently to bring it up to normal operating temperature and allow fuel with Mercury/Quicksilver Gasoline Stabilizer to circulate through the fuel system. Shut off the engine.
5. Change the oil and oil filter.
6. Prepare the engine and fuel system for storage. Refer to **Engine and Fuel System Preparation**.
7. Drain the engine seawater cooling system. Refer to **Draining the Seawater System**.

NOTICE

Water trapped in the seawater section of the cooling system can cause corrosion or freeze damage. Drain the seawater section of the cooling system immediately after operation or before any length of storage in freezing temperatures. If the boat is in the water, keep the seacock closed until restarting the engine to prevent water from flowing back into the cooling system. If the boat is not fitted with a seacock, leave the water inlet hose disconnected and plugged.

8. For additional assurance against freezing and rust, after draining, fill the seawater cooling system with propylene glycol mixed to the manufacturer's recommendation to protect engine to the lowest temperature to which it will be exposed during freezing temperatures or extended storage.
9. Store the battery according to the manufacturer's instructions.

Engine and Fuel System Preparation

⚠ WARNING

Fuel is flammable and explosive. Ensure that the key switch is off and the lanyard is positioned so that the engine cannot start. Do not smoke or allow sources of spark or open flame in the area while servicing. Keep the work area well ventilated and avoid prolonged exposure to vapors. Always check for leaks before attempting to start the engine, and wipe up any spilled fuel immediately.

⚠ WARNING

Fuel vapors trapped in the engine compartment may be an irritant, cause difficulty breathing, or may ignite resulting in a fire or explosion. Always ventilate the engine compartment before 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 octain (90 RON) gasoline
   b. 1.89 liter (2 U.S. qts.) Premium Plus 2-Cycle TC-W3 Outboard Oil
   c. 150 ml (5 ounces) Fuel System Treatment and Stabilizer or 30 ml (1 ounce) Fuel System Treatment and Stabilizer Concentrate

Tube Ref No.	Description	Where Used	Part No.
115	Premium Plus 2-cycle TC-W3 Outboard Oil	Fuel system	92-858026K01
124	Fuel System Treatment & Stabilizer	Fuel system	92-8M0047932

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 engines fuel system to become completely dry.
7. Replace the water separating fuel filter element. Refer to Section 5 for proper procedure.

Draining the Seawater System

⚠ CAUTION

Water can enter the bilge when the drain system is open, damaging the engine or causing the boat to sink. Remove the boat from the water or close the seacock, disconnect and plug the seawater inlet hose, and ensure the bilge pump is operational before draining. Do not operate the engine with the drain system open.

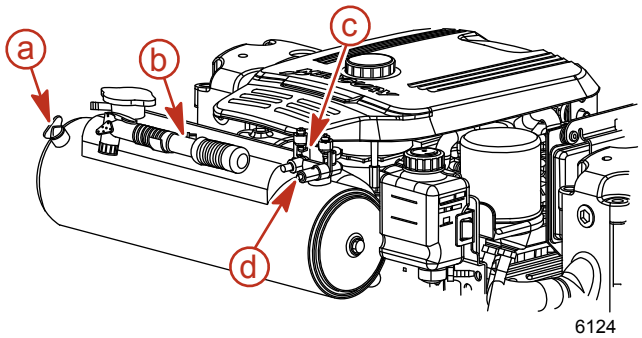
IMPORTANT: Only drain the seawater section of the closed cooling system.
IMPORTANT: The boat must be as level as possible to ensure complete draining of the cooling system.

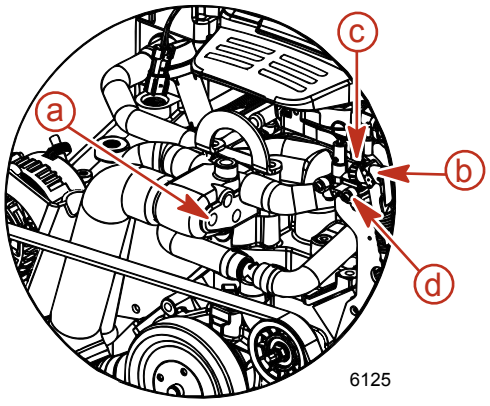
Your power package is equipped with a drain system. Refer to **Drain System Identification** to determine which instructions apply to your power package.

IMPORTANT: The engine must not be operating at any point during the draining procedure.
IMPORTANT: Mercury MerCruiser requires that propylene glycol antifreeze, mixed to the manufacturer's instructions, be used in the seawater section of the cooling system for freezing temperatures or extended storage. Ensure 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.

Drain System Identification

Air Actuated Single Point Drain System

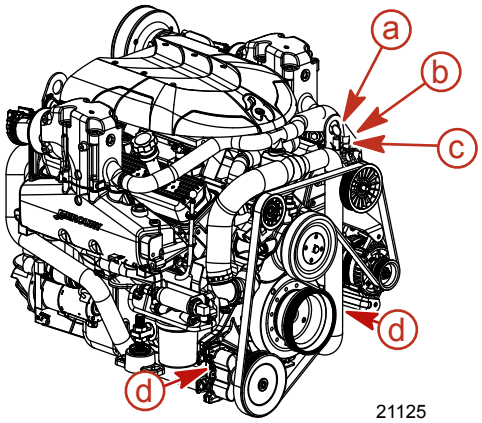




Closed Cooled Models

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

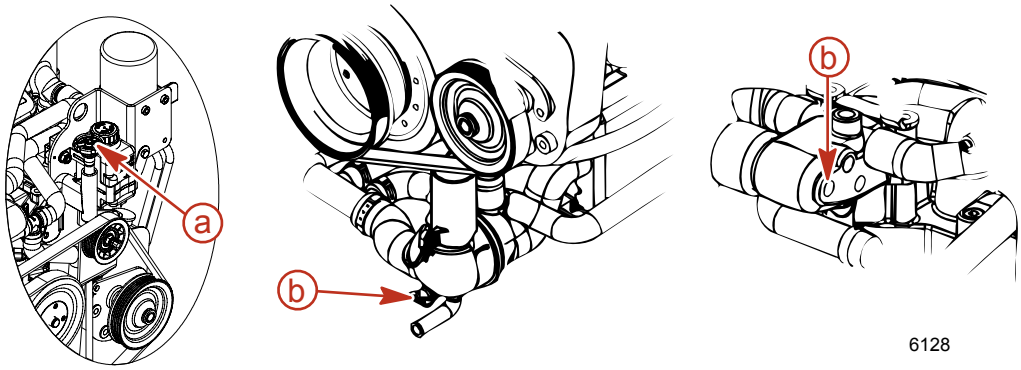
Seawater Cooled Models



Scorpion Models

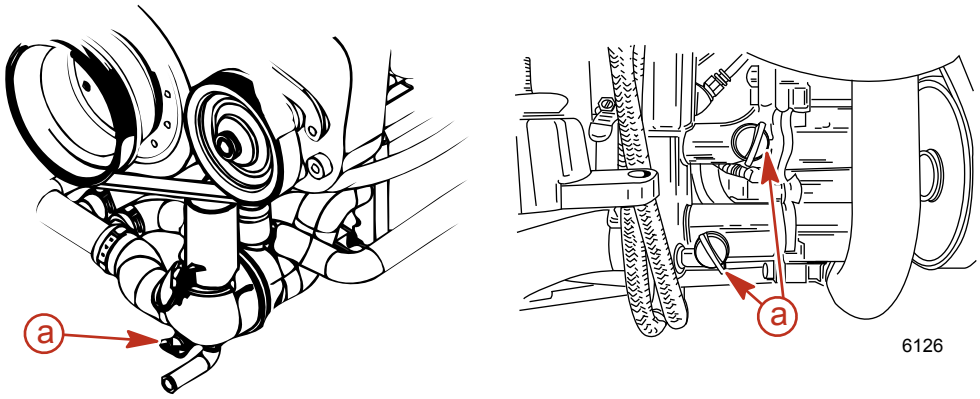
a - Blue air pump
b - Air manifold
c - Green indicators
d - Blue drain plug locations

Manual Single Point Drain System



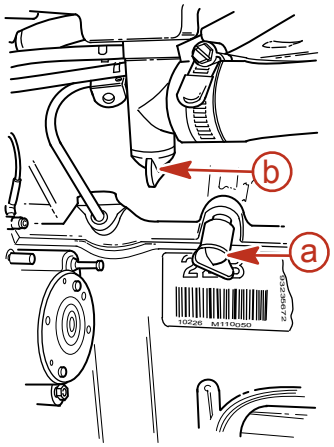
a - Blue handle
b - Blue drain plug location

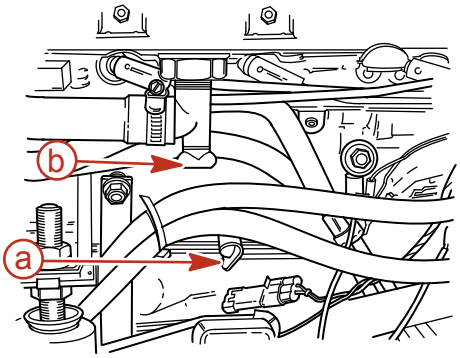
Three Point Manual Drain System



a - Blue drain plug

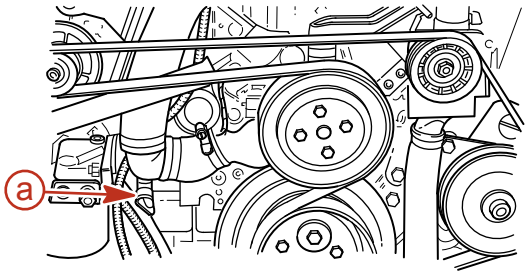
Multi-Point Drain (MPD) System

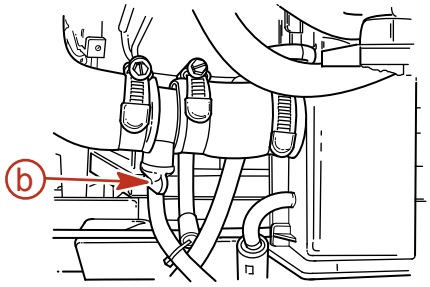




6129

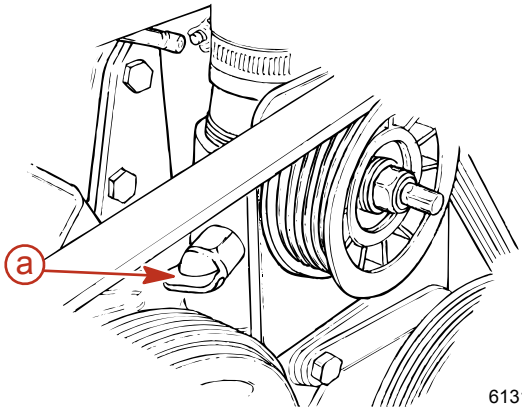
a - Side of cylinder block
b - Bottom of exhaust manifolds





6130

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



6131

a - Check valve (if equipped)

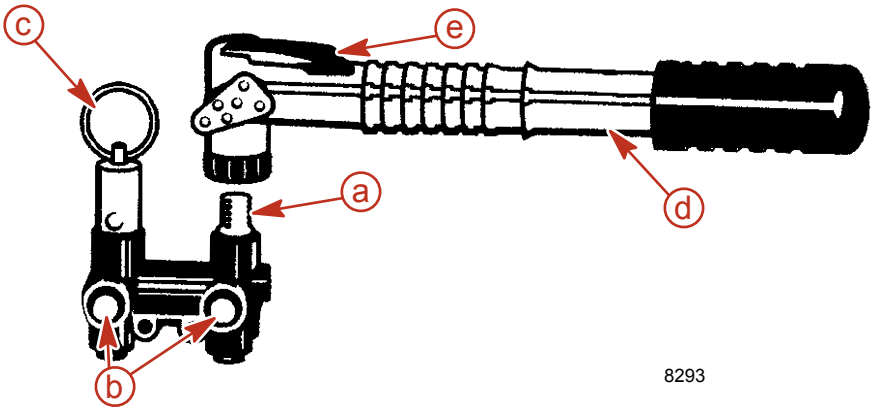
Air-Actuated Single-Point Drain System

Boat in the Water

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 (if equipped) or remove and plug the water inlet hose.
2. Remove the air pump from the engine.
3. Ensure that the lever on top of the pump is flush with the handle (horizontal).
4. Install the air pump on the actuator fitting.

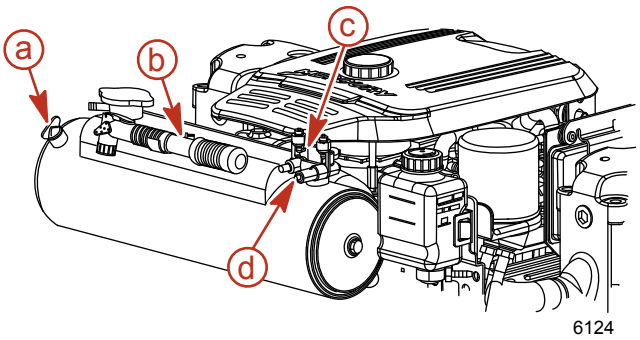
5. Pull lever on air pump (vertical) to lock pump on the fitting.



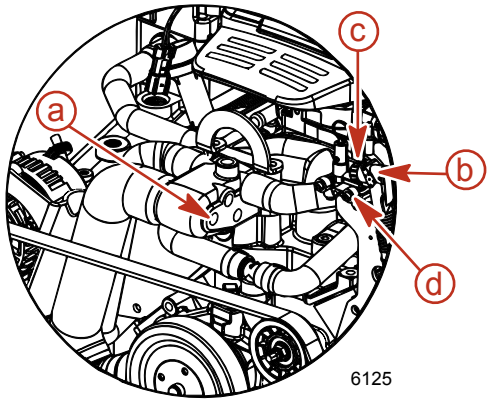
8293

a - Actuator fitting
b - Green indicators
c - Manual release valve
d - Air pump
e - Lever (locking)

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.



6124

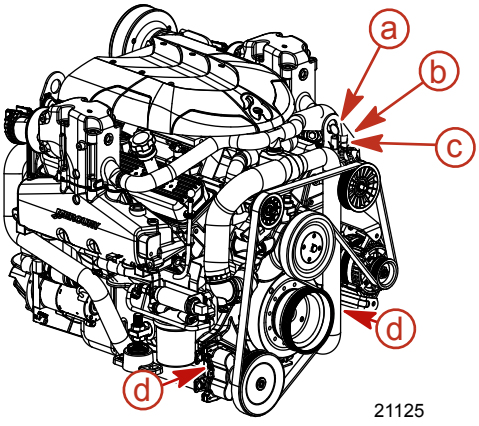


6125

Closed Cooled Models

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

Seawater Cooled Models

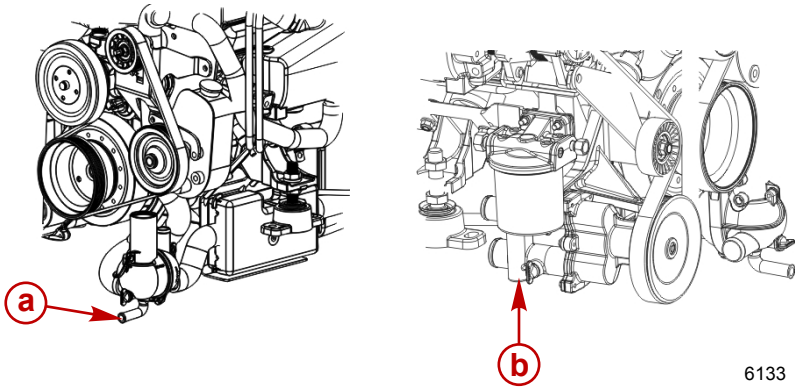


21125

Scorpion Models

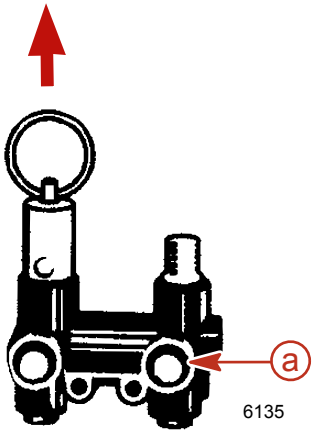
a - Blue air pump
b - Air manifold
c - Green indicators
d - Blue drain plug locations

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



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

9. Allow the system to drain for a minimum of five minutes. Pump air as necessary to keep the green indicators extended.
10. Crank the engine over slightly with the starter motor to purge any water trapped in the seawater pump. Do not allow engine to start.
11. Reinstall the blue drain plug in the thermostat housing or heat exchanger.
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.
14. Before launching the boat, pull up on the manual release valve. Verify that the green indicators are no longer extended.



a - Green indicators

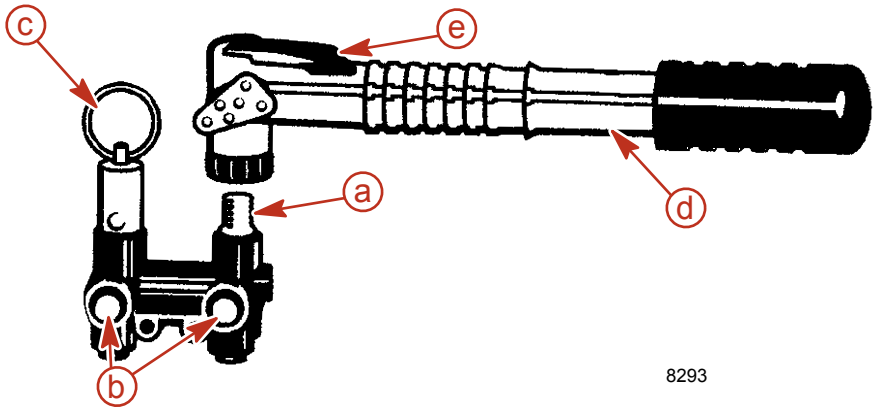
15. Open the seacock, if equipped, or unplug and reconnect the water inlet hose prior to operating the engine.

Boat out of the Water

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 lever surface to ensure complete draining of system.
2. Remove the air pump from the engine.
3. Ensure that the lever on top of the pump is flush with the handle (horizontal).
4. Install the air pump on the actuator fitting.

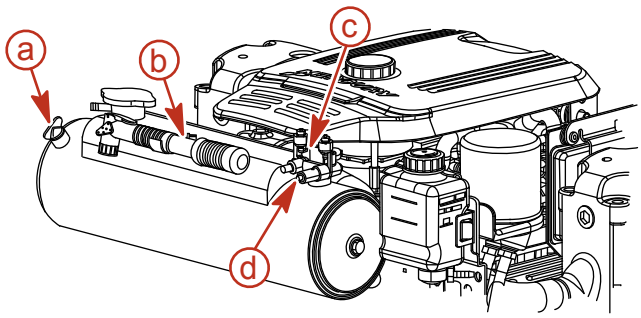
5. Pull lever on air pump (vertical) to lock pump on the fitting.



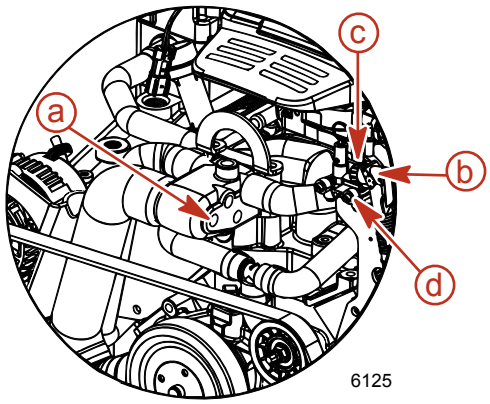
8293

a - Actuator fitting
b - Green indicators
c - Manual release valve
d - Air pump
e - Lever (locking)

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.



6124

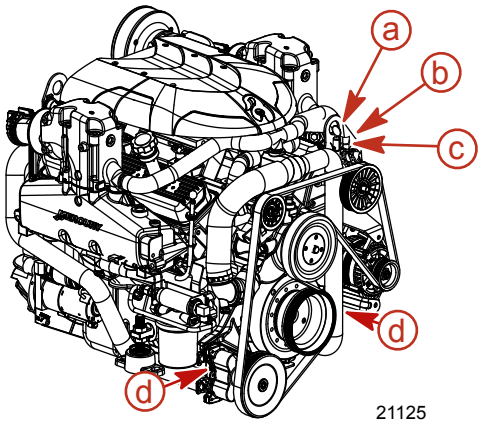


6125

Closed Cooled Models

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

Seawater Cooled Models

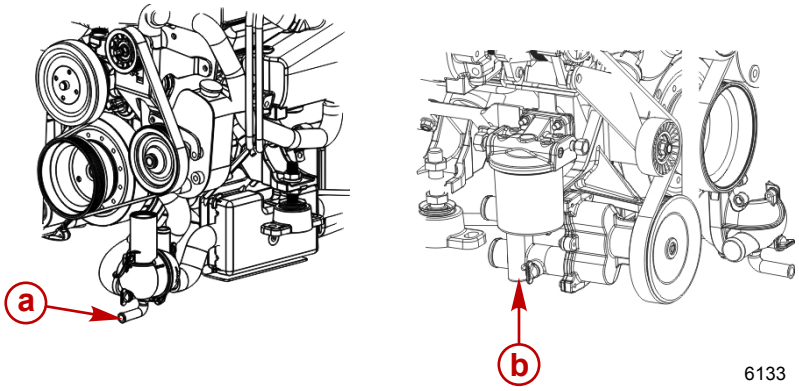


21125

Scorpion Models

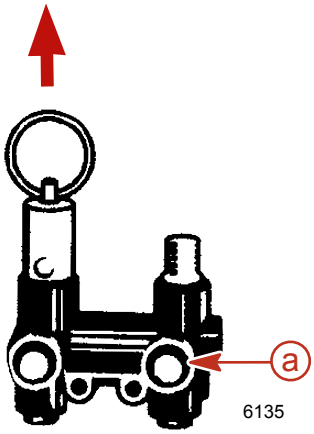
a - Blue air pump
b - Air manifold
c - Green indicators
d - Blue drain plug locations

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



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

8. Allow the system to drain for a minimum of five minutes. Pump air as necessary to keep the green indicators extended.
9. Crank the engine over slightly with starter motor to purge any water trapped in the 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 drain system open while transporting the boat or while performing other maintenance. This helps ensure that all water is drained.
12. Before launching the boat, pull up on the manual release valve. Verify that the green indicators are no longer extended.



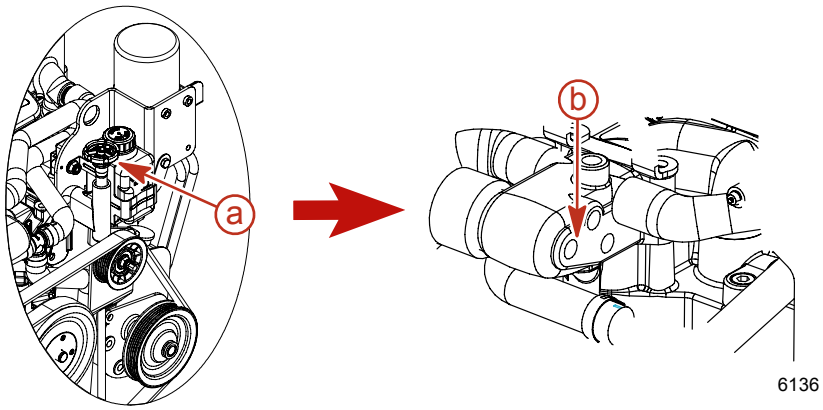
a - Green indicators

Manual Single-Point Drain System

Boat in the Water

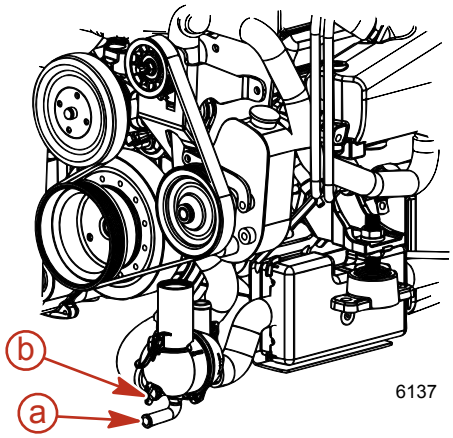
1. Close the seacock (if equipped) or remove and plug the water inlet hose.
2. Rotate the blue handle counterclockwise until it stops (approximately two turns). The red on the handle shaft indicates that the drain system is open. Do not force the handle as this will create new threads.

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.



a - Blue handle
b - Blue drain plug location

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

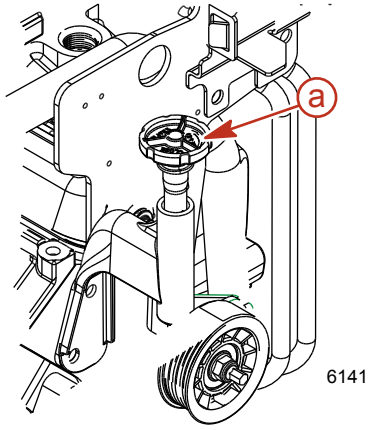


a - Drain location - orange or red
b - Blue drain plug

5. Allow the system to drain for a minimum of five minutes. We recommend leaving the drain system open while transporting the boat or 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 action will create new threads.
8. Open the seacock (if equipped) or unplug and reconnect the water inlet hose before operating the engine.

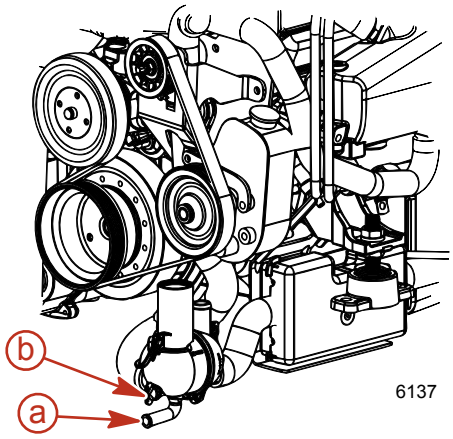
Boat out of the Water

1. Place the boat on a level surface to ensure complete draining of system.
2. Rotate the blue handle counterclockwise until it stops (approximately two turns). The red on the handle shaft indicates that the drain system is open. Do not overtighten the handle, as this action will create new threads.



a - Blue handle

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



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

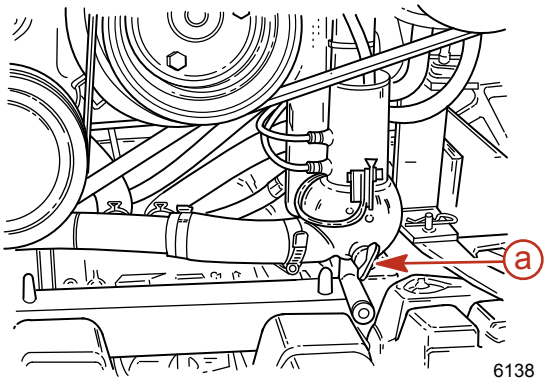
4. Allow the system to drain for a minimum of five minutes. We recommend leaving the plugs out while transporting the boat or performing other maintenance to ensure that all water is drained.
5. Close the drain system by rotating the blue handle clockwise until it stops or installing the blue drain plug.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

Three-Point Manual Drain System

Boat in the Water

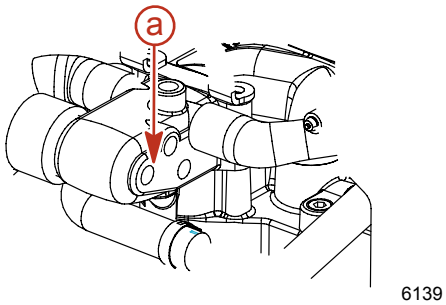
NOTE: *Use this procedure if your engine is not equipped with an air-actuated single-point drain system or if the air-actuated single point drain system fails.*

1. Close the seacock (if equipped) or remove and plug the water inlet hose.
2. Remove the blue drain plug from the distribution housing (lower front, port side).



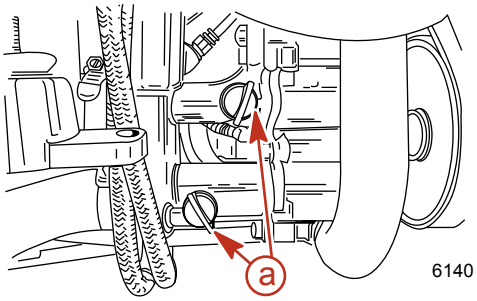
a - Blue drain plug

3. To properly vent the cooling system, remove the blue drain plug from the side of the thermostat housing within 30 seconds.



a - Blue drain plug location

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



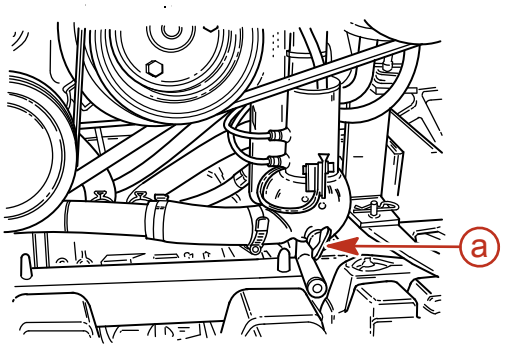
a - Blue drain plugs

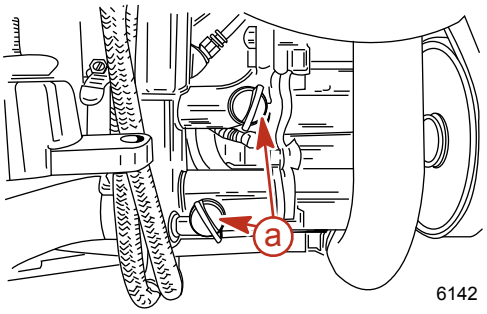
5. Verify that water is draining from each opening.
6. Allow the system to drain for a minimum of five minutes. We recommend leaving the drain system open while transporting the boat or performing other maintenance to ensure that all water is drained.
7. Crank the engine over slightly with starter motor to purge any water trapped in the seawater pickup pump. Do not allow the engine to start.
8. Before launching the boat or starting the engine, close the drain system by installing the four blue drain plugs.
9. Open the seacock, if equipped, or unplug and reconnect the water inlet hose prior to operating the engine.

Boat out of the Water

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 the system.
2. Remove three blue drain plugs: one from the distribution housing (lower front, port side) and two from the seawater pickup pump (front, starboard side).





a - Blue drain plug

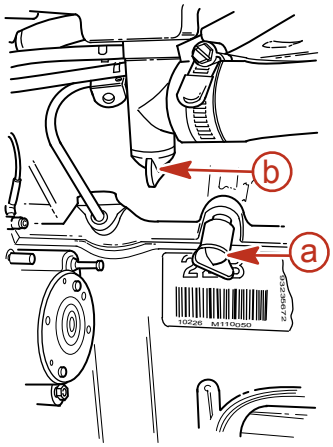
3. Verify that water is draining from each opening.
4. Allow the system to drain for a minimum of five minutes. We recommend leaving the drain system open while transporting the boat or performing other maintenance to ensure that all water is drained.
5. Crank the engine over slightly with starter motor to purge any water trapped in the seawater pickup pump. Do not allow the engine to start.
6. Before launching the boat or starting the engine, close the drain system by installing the three blue drain plugs.

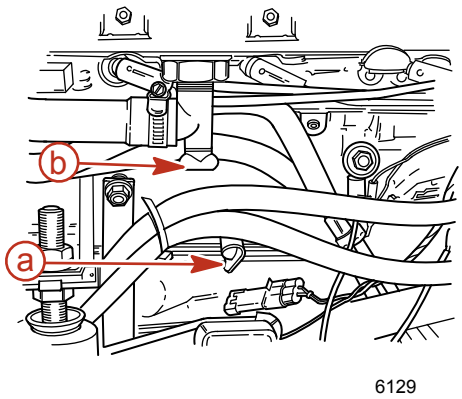
Multi-Point Drain (MPD) System

Boat out of the Water

1. Place the boat on a level surface to ensure complete draining of the system.
2. Remove the blue drain plugs from the following locations. If necessary, clean out the 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

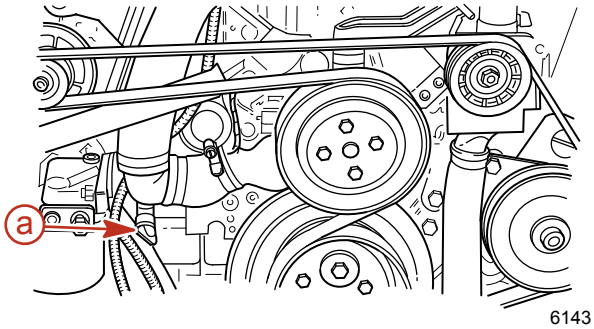




6129

a - Cylinder block drain plug
b - Exhaust manifold drain plug

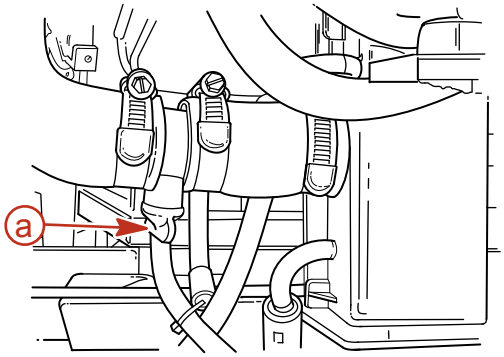
c. Water-circulating pump hose



6143

a - Drain plug

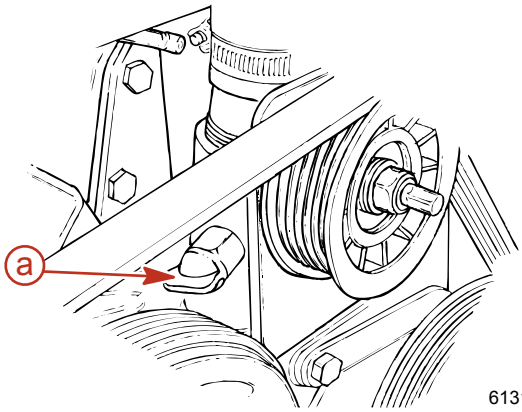
d. Fuel-cooler-to-thermostat-housing hose



6144

a - Drain plug

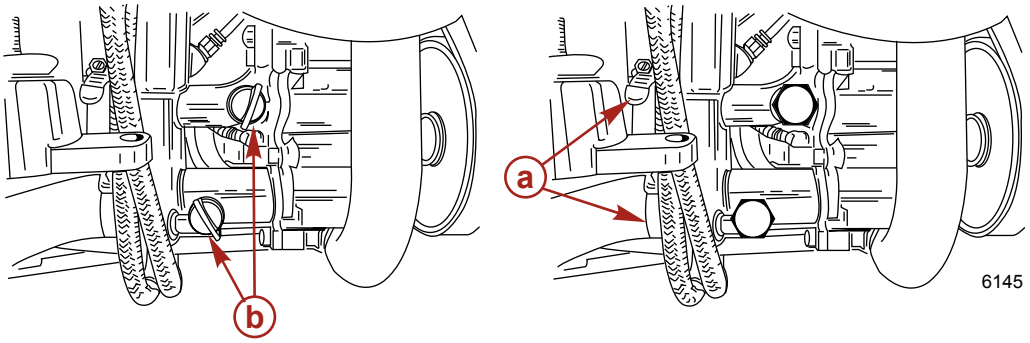
e. Check valve



6131

a - Drain plug (if equipped)

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

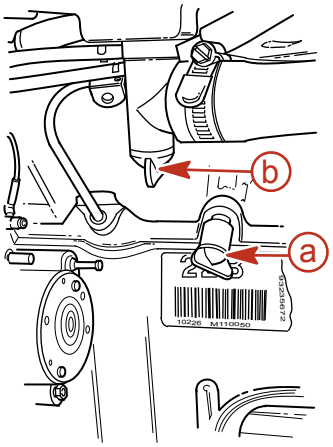


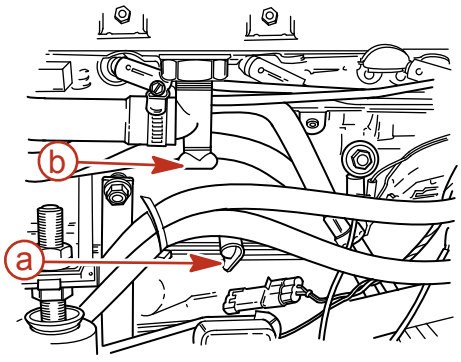
a - Hose clamps
b - Blue drain plugs

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

Boat in the Water

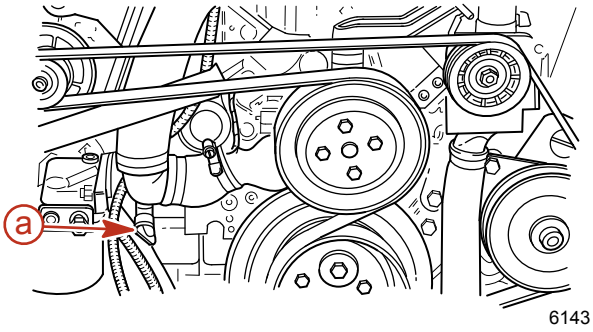
1. Close the seacock (if equipped) or remove and plug the water inlet hose.
2. Remove the blue drain plugs from the following locations. If necessary, clean out the drain holes using a stiff piece of wire. Do so until the entire system is drained.
   a. Port and starboard side of cylinder block
   b. Bottom of exhaust manifolds





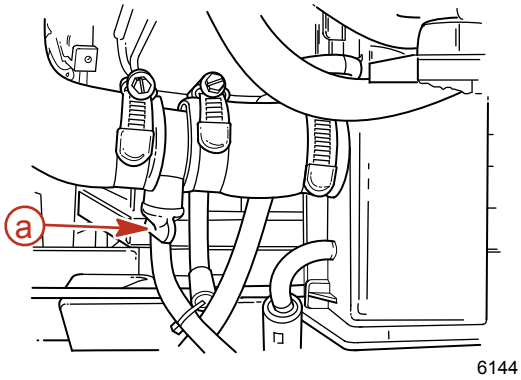
a - Cylinder block drain plug
b - Exhaust manifold drain plug

   c. Water-circulating pump hose



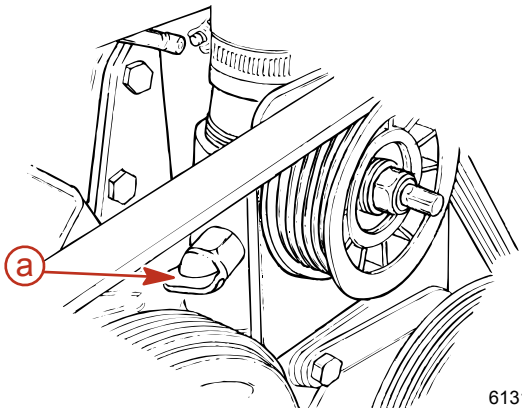
a - Drain plug

d. Fuel-cooler-to-thermostat-housing hose



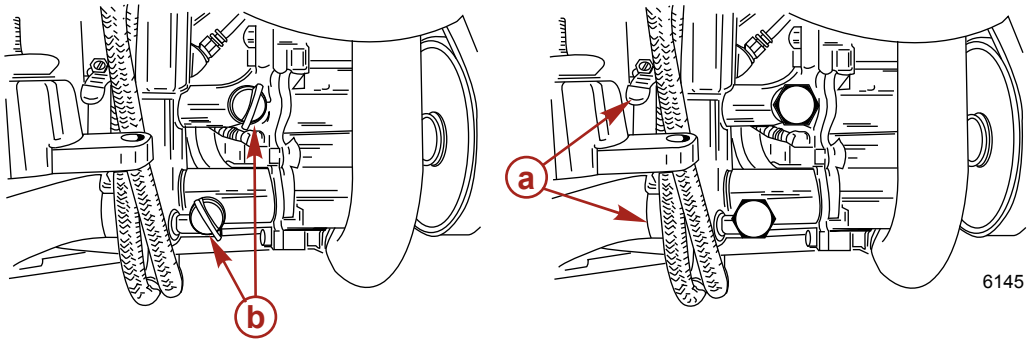
a - Drain plug

e. Check valve



a - Drain plug (if equipped)

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



a - Hose clamps
b - Blue drain plugs

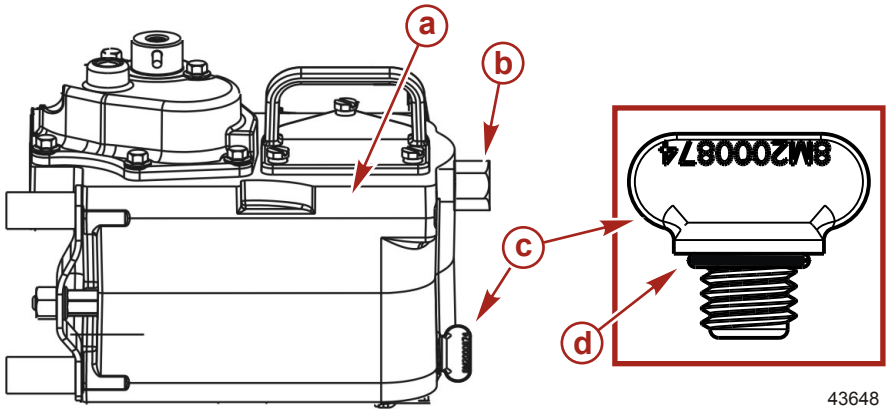
4. Crank the engine over slightly with the starter motor to purge any water trapped in the seawater pickup pump. Do not allow the engine to start.
5. Before launching the boat or starting the engine, close the drain system by installing the blue drain plugs.
6. Open the seacock, if equipped, or unplug and reconnect the water inlet hose before operating the engine.

Draining Water from the Gen III Cool Fuel Module

Mercury MerCruiser recommends draining the Gen III Cool Fuel module if it is equipped with a drain plug.

1. Remove the drain plug from the Gen III Cool Fuel module and allow the water to completely drain from the module.
2. Inspect the drain plug and the O-ring for damage. Replace if needed.

3. Place the O-ring on the drain plug and install the drain plug in the module drain hole. Tighten the drain plug to finger-tight.



a - Gen III Cool Fuel module
b - Fuel inline fitting
c - Drain plug
d - O-ring

Battery Storage

Whenever the battery will be stored for an extended period of time, be sure the cells are full of water and the battery is fully charged and in good operating condition. It should be clean and free of leaks. Follow the battery manufacturer's instructions for storage.

Recommissioning the Power Package

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

⚠ CAUTION

Disconnecting or connecting the battery cables in the incorrect order can cause injury from electrical shock or can damage the electrical system. Always disconnect the negative (-) battery cable first and connect it last.

2. Install a fully charged battery. Clean the battery cable clamps and terminals and reconnect cables. Tighten each cable clamp securely when connecting.
3. Coat the terminal connections with a battery terminal anticorrosion agent.
4. Perform all the checks in the before starting column of the **Operation Chart**.

NOTICE

Without sufficient cooling water, the engine, the water pump, and other components will overheat and suffer damage. Provide a sufficient supply of water to the water inlets 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.

Section 7 - Troubleshooting

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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.

Engine Guardian System

The Engine Guardian System monitors the critical sensors on the engine for any early indications of problems. The system will respond to a problem by emitting a continuous beep and/or reducing engine power in order to provide engine protection.

If Guardian System has been activated, reduce throttle speed. The horn will turn off when throttle speed is within the allowable limit. Consult an authorized Mercury MerCruiser dealer for assistance.

Starter Motor Will Not Crank Engine, Or Cranks Slow

Possible Cause	Remedy
Battery switch turned off.	Turn the switch on.
Remote control not in neutral position.	Position the control lever in neutral.
Open circuit breaker or blown fuse.	Check and reset the 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 all faulty connections.
Bad battery or low battery voltage.	Test the battery and charge if necessary; replace if bad.
Lanyard stop switch activated.	Check the lanyard stop switch.

Engine Will Not Start or Is Hard to Start

Possible Cause	Remedy
Lanyard stop switch activated.	Check the lanyard stop switch.
Improper starting procedure.	Read the starting procedure.
Insufficient fuel supply.	Fill fuel tank or open valve.
Faulty ignition system component.	Service the ignition system.
Clogged fuel filter.	Replace fuel filter.
Stale or contaminated fuel.	Drain fuel 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.
Faulty wire connections.	Check wire connections.
EFI system fault.	Have EFI System checked by an authorized Mercury MerCruiser dealer.

Engine Runs Rough, Misses, 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.

Poor Performance

Possible Cause	Remedy
Throttle not fully open.	Inspect the throttle cable and linkages for proper operation.
Damaged or improper propeller.	Replace the 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 the 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.

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 (if equipped) low in closed cooling section.	Check for cause of low coolant level and repair. Fill system with proper coolant solution.
Heat Exchanger or Fluid Cooler plugged with foreign material	Clean Heat Exchanger, Engine Oil Cooler, and Transmission Oil Cooler (if equipped).
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.

Insufficient Engine Temperature

Possible Cause	Remedy
Faulty thermostat.	Replace.

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).

Battery Will Not Recharge

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, replace if necessary.
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.
Faulty alternator	Test alternator output, replace if necessary.

Remote Control Is Difficult to Move, Has Excessive 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.

Steering Wheel Jerks or Is Difficult to Turn

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.

Section 8 - Customer Assistance Information

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8

Owner Service Assistance

Local Repair Service

If you need service for your Mercury MerCruiser–powered boat, take it to your authorized dealer. Only authorized dealers specialize in Mercury MerCruiser products and have factory-trained mechanics, special tools and equipment, and genuine Quicksilver parts and accessories to properly service your engine.

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

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.

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 maintained in a database at Mercury Marine to aid authorities and dealers in recovery of stolen power packages.

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 reduce the possibility of serious engine damage.

Replacement Service Parts

⚠ WARNING

Avoid fire or explosion hazard. Electrical, ignition, and fuel system components on Mercury Marine products comply with federal and international standards to minimize risk of fire or explosion. Do not use replacement electrical or fuel system components that do not comply with these standards. When servicing the electrical and fuel systems, properly install and tighten all components.

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. Exercise care when replacing marine engine parts, because specifications are different from those of the standard automotive engine. For example, one of the most important special replacement parts, is the cylinder head gasket. Marine engines cannot use steel-type automotive head gaskets because saltwater is highly corrosive. A marine engine head gasket uses special materials to resist corrosion.

Because marine engines must be capable of running at or near maximum RPM much of the time, they also have special valve springs, valve lifters, pistons, bearings, camshafts and other heavy-duty moving parts.

Mercury MerCruiser marine engines have other special modifications to provide long life and dependable performance.

Parts and Accessories Inquiries

Direct any inquiries concerning Quicksilver replacement parts and accessories to your local authorized dealer. The dealer has the necessary information to order parts and accessories for you if they are not 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.

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 you need additional assistance:

1. Talk with the dealership's sales manager or service manager. Contact the owner of the dealership if the sales manager and service manager have been unable to resolve the problem.
2. If your question, concern, or problem 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 Customer Service:

- 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

Contact Information for Mercury Marine Customer Service

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

Telephone	Fax	Mail
+1 920 929 5040	+1 920 906 6033	Mercury Marine W6250 West Pioneer Road P.O. Box 1939 Fond du Lac, WI 54936-1939
+1 905 567 6372 (MERC)	+1 905 567 8515	Mercury Marine Ltd. 2395 Meadowpine Blvd. Mississauga, Ontario L5N 7W6 Canada
+61 3 9791 5822	+61 3 9793 5880	Mercury Marine – Australia 132-140 Frankston Road Dandenong, Victoria 3164 Australia
+ 32 87 32 32 11	+32 87 31 19 65	Marine Power – Europe, Inc. Parc Industriel de Petit-Rechain B-4800 Verviers, Belgium
+954 744 3500	+954 744 3535	Mercury Marine – Latin America & Caribbean 11650 Interchange Circle North, Miramar, FL 33025 U.S.A.
+81 53 423 2500	+81 53 423 2510	Mercury Marine – Japan 283-1 Anshin-cho Hamamatsu, Shizuoka 435-0005 Japan
+65 6546 6160	+65 6546 7789	Mercury Marine – Singapore 29, Loyang Drive Singapore, 508944

Ordering Literature

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

- Model
- Serial number
- Horsepower
- Year built

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 us at:
Mercury Marine Publications
P.O. Box 1939
Fond du Lac, WI 54936-1939
(920) 929 5110
Fax (920) 929 4894

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.

Print or type your mailing address, which be used as your shipping label, and include your order and payment. Mail to:
Mercury Marine
Attn: Publications Department
W6250 West Pioneer Road
P.O. Box 1939
Fond du Lac, WI 54936-1939
USA

Section 9 - Checklists

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9

Predelivery Inspection (PDI)

IMPORTANT: This checklist is for packages that are not equipped with Axius. For engine packages equipped with Axius, use the Axius-specific checklist, which appears in Section 5 of the Axius Operation Manual.
Perform these tasks before the Customer Delivery Inspection (CDI).

N/A	Check/ Adjust	Item
☐	☐	Service bulletin updates or repairs completed
	☐	Drain plug installed and drain valves closed
☐	☐	Seawater inlet valve open
	☐	Engine mounts tight
☐	☐	Engine alignment
☐	☐	Drive unit fasteners tightened to specifications
☐	☐	Power trim cylinders fasteners tight
	☐	Battery of proper rating, fully charged, secured, with protective covers in place
	☐	All electrical connections tight
	☐	Exhaust system hose clamps tight
	☐	All fuel connections tight
	☐	Correct propeller selected, installed, and tightened to specifications
	☐	Throttle, shift and steering system fasteners tightened to specifications
☐	☐	Test OBDM warning system and MIL (light) operation (EC models only)
	☐	Steering operation throughout range
	☐	Throttle plates open and close completely
	☐	Crankcase oil level
☐	☐	Power trim oil level
☐	☐	Sterndrive unit oil level
☐	☐	Power steering fluid level
☐	☐	Closed Cooling fluid level
☐	☐	Transmission fluid level
☐	☐	V-engines: serpentine belt tension
☐	☐	Alternator belt tension (3.0L)
☐	☐	Power steering pump belt tension (3.0L)
☐	☐	SmartCraft gauges calibrated, if equipped
☐	☐	Warning system operation
☐	☐	Trim limit switch operation

Predelivery Inspection Checklist, Continued

N/A	Check/ Adjust	Item
		On-the-Water Test
☐	☐	Engine alignment (Inboard models only)
	☐	Starter neutral safety switch operation
	☐	E-stop switch/lanyard stop switch operation (all helms)
	☐	Seawater pump operation
	☐	Operation of instruments
	☐	Fuel, oil, and water leaks
	☐	Exhaust leaks
	☐	Ignition timing
	☐	Forward, neutral, and reverse gear operation
	☐	Steering operation throughout range
	☐	Acceleration from idle RPM is normal
	☐	WOT_____ RPM within specification (in forward gear)
☐	☐	EC models: run two full operating cycles (key on/off) to WOT with engine at normal operating temperature while monitoring engine with G3 CDS to verify engine goes into closed-loop engine control.
☐	☐	Power trim operation
☐	☐	Boat handling
		After On-the-Water Test
	☐	Propeller nut tightened to specification
	☐	Fuel, oil, coolant, water and fluid leaks
	☐	Oil and fluid levels
	☐	Apply Quicksilver Corrosion Guard to engine package
	☐	Operation, Maintenance & Warranty manual in boat
		If Boat Is Registered to a Resident of California
☐	☐	CARB hang tag in boat
☐	☐	CARB decal properly affixed to boat hull

Customer Delivery Inspection (CDI)

IMPORTANT: This checklist is for packages that are not equipped with Axius. For engine packages equipped with Axius, use the Axius-specific checklist, which appears in Section 5 of the Axius Operation Manual.
Perform these tasks after the Predelivery Inspection (PDI).
This inspection must take place in the presence of the customer.

N/A	Completed	Item
	☐	Operation and maintenance manual—provide and review with customer. Emphasize the importance of safety warnings and Mercury engine testing procedures.
	☐	Approve the external appearance of the product (paint, cowl, decals, etc.)
	☐	Warranty—provide and explain the limited warranty to the customer. Explain dealer services.
☐	☐	Explain the optional Mercury Product Protection Plan (North America only)
		Operation of equipment—explain and demonstrate:
	☐	E-stop switch / lanyard stop switch operation (all helms)
	☐	Cause and effect of steering torque or pull; instruct on using a firm steering grip; explain boat spin-out and how to trim for neutral steering.
☐	☐	U.S. Coast Guard capacity plate
	☐	Proper seating
	☐	Importance of personal flotation devices (PFDs or life vests) and throwable PFDs (throw cushions)

N/A	Completed	Item
☐	☐	Functions of SmartCraft accessories (if applicable)
	☐	Off-season storage and maintenance schedule
	☐	Engine (starting, stopping, shifting, using throttle)
	☐	Boat (lights, battery switch location, fuses/breakers)
☐	☐	Trailer (if applicable)
		Registration:
	☐	Complete and submit warranty registration—provide the customer with a copy.