MERCURY®

8.2 MAG/H.O./SeaCore Models (ECT)

OPERATION &

MAINTENANCE

MANUAL

8M0113923 1215 eng

Welcome

You have selected one of the finest marine power packages available. It incorporates numerous design features to ensure operating ease and durability.

With proper care and maintenance, you will 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 and Maintenance 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 products. We sincerely hope your boating will be pleasant!

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

Name / function:
John Pfeifer, President,
Mercury Marine



Read This Manual Thoroughly

IMPORTANT: If you do not understand any portion of this manual, contact your dealer. Your dealer can also provide a demonstration of actual starting and operating procedures.

Notice

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

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

⚠ WARNING
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.*

IMPORTANT: 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 and Maintenance 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.

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

Descriptions and specifications contained herein were in effect at the time this was approved for printing. Mercury Marine, whose policies are based on continuous improvement, reserves the right to discontinue models at any time or to change specifications or designs without notice and without incurring obligation.

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Warranty Message

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

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Identification Records

Please record the following applicable information:

MerCruiser		
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**
Exhaust Gas Emissions Certification Number (Europe Only)		

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Additional Operation Instructions for Axius Systems

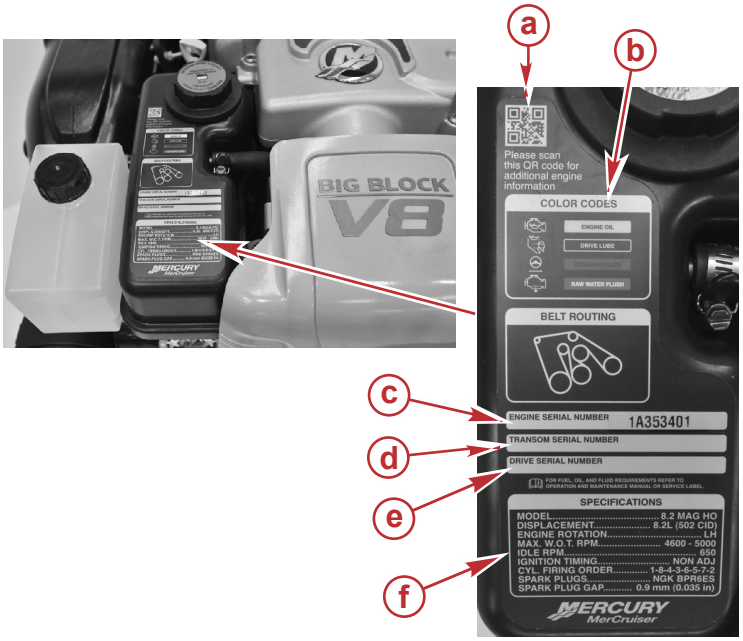
If your boat has DTS engines equipped with an Axius system, refer also to the **Axius Operation Manual** included with the boat.

Identification

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

Information Decal

The information decal is located on the coolant reservoir.



a - Quick response code
b - Service point information
c - Engine serial number
d - Transom serial number
e - Sterndrive serial number
f - Specifications

50314

Quick Response (QR) Code

Scan the QR code link with a smartphone to access additional product information.



50444

QR code

Engine Serial Number

The engine serial number stamp is located on the starboard side of the engine block next to the flywheel housing cover.

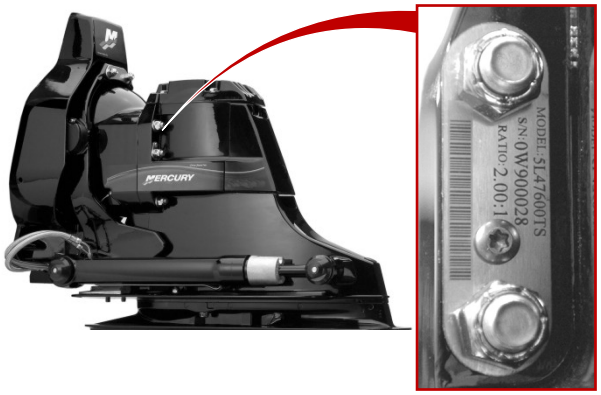


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a - Flywheel housing cover
b - Engine serial number stamp
c - Engine block

Bravo Sterndrive Serial Number and Identification

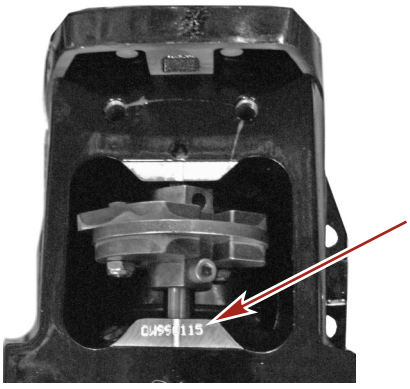
The Bravo sterndrive serial number, gear ratio, model number, and bar code are embedded in the ground plate on the port side of the sterndrive.



33533

Bravo sterndrive information on ground plate

The serial number is also stamped on the driveshaft housing behind the back cover. This is used as a permanent reference for authorized MerCruiser dealers.



44426

Bravo sterndrive serial number stamping

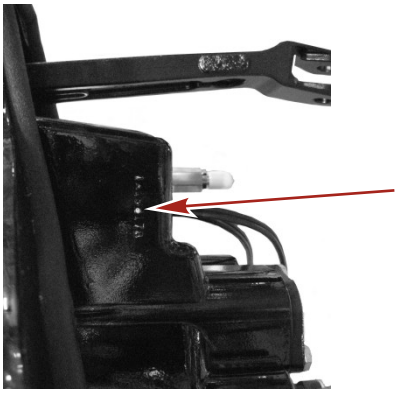
Bravo Transom Serial Number

The Bravo transom serial number is stamped in the transom assembly decal.



53651

The serial number is also stamped on the gimbal housing. This is used as a permanent reference for authorized MerCruiser dealers.



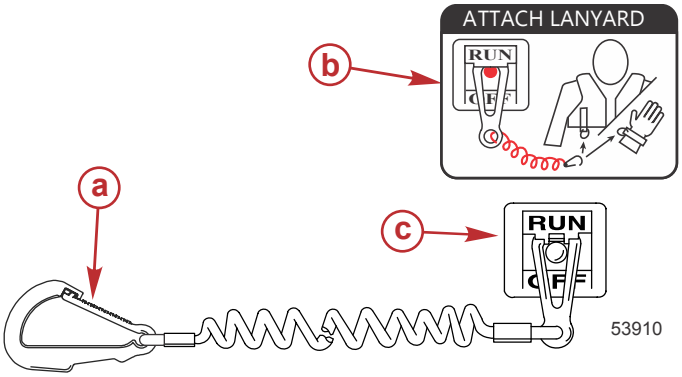
44425

Serial number location on gimbal housing

Lanyard Stop Switch

A lanyard switch is designed to shut down the engine in the event the operator unexpectedly moves away from the helm, as may happen in an accidental ejection. The lanyard is connected to the operator's personal flotation device or wrist.

A decal near the lanyard stop switch reminds the operator to attach the lanyard to his or her personal flotation device or wrist.



53910

a - Lanyard cord clip
b - Lanyard decal
c - Lanyard stop switch

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
- Carelessness caused by consuming alcohol or drugs
- High-speed boating maneuvers

The lanyard is a cord usually between 122 and 152 cm (4 and 5 ft) long 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 operator's normal position. The operator can shorten the lanyard by wrapping the lanyard around his wrist, or by tying 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 its velocity. While the boat is coasting, it can cause injury to anyone in the boat's path as it would under power.

Instruct all passengers on the proper starting and operating procedures should they be required to operate the boat in an emergency.

⚠ 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.

Keep the Lanyard Stop Switch and Lanyard Cord in Good Operating Condition

Before each use, ensure that the lanyard stop switch works properly. Start the engine, and then stop it by pulling the lanyard cord. If the engine does not stop, have the switch repaired before operating the boat.

Before each use, inspect the lanyard cord to ensure that it is in good working condition and that there are no breaks, cuts, or wear to the cord. Check that the clips on the ends of the cord are in good condition. Replace any damaged or worn lanyard cords.

Instrumentation

VesselView

Your power package may have a SmartCraft VesselView display. VesselView is a comprehensive boat information center that can display information for up to four gasoline or diesel engines. It continuously monitors and reports basic operating data, such as information on fuel, oil, water and waste tanks, and will alert the operator if certain problems arise.

VesselView can be fully integrated with a vessel’s global positioning system (GPS) or other NMEA-compatible devices to provide up-to-the-minute navigation, speed, and fuel-to-destination information.

Front Controls



52293

- **a -** Touch screen
- **b -** Mark–Menu button
- **c -** Standby–Auto button
- **d -** Exit button
- **e -** Rotary knob (press for enter function)
- **f -** Goto–Pages button
- **g -** In/out zoom, man overboard (MOB) button
- **h -** Power/brightness
- **i -** Card reader door

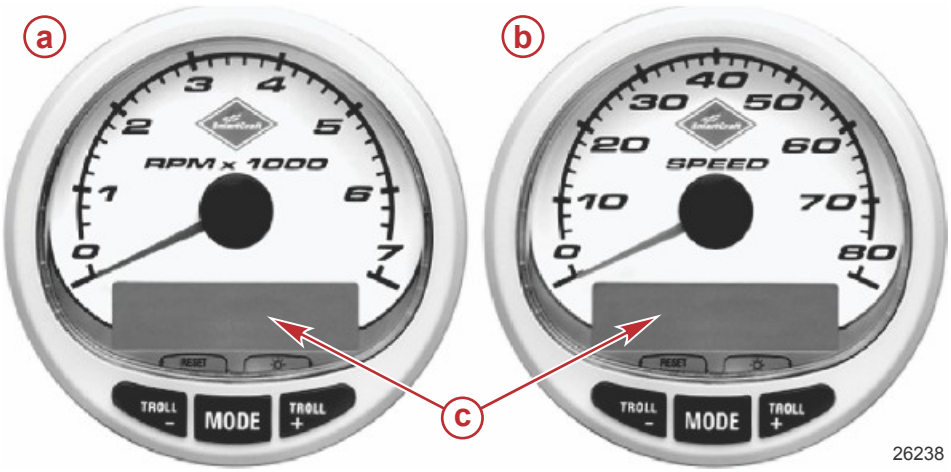
Troll Control Speed Range Specification

Troll Control Speed Range Specification	
DTS Engine Model	**RPM**
8.2 Mag with Emissions Control	650–1200
8.2 Mag H.O. with Emissions Control	650–1200

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 the specified RPM range.



SmartCraft gauges

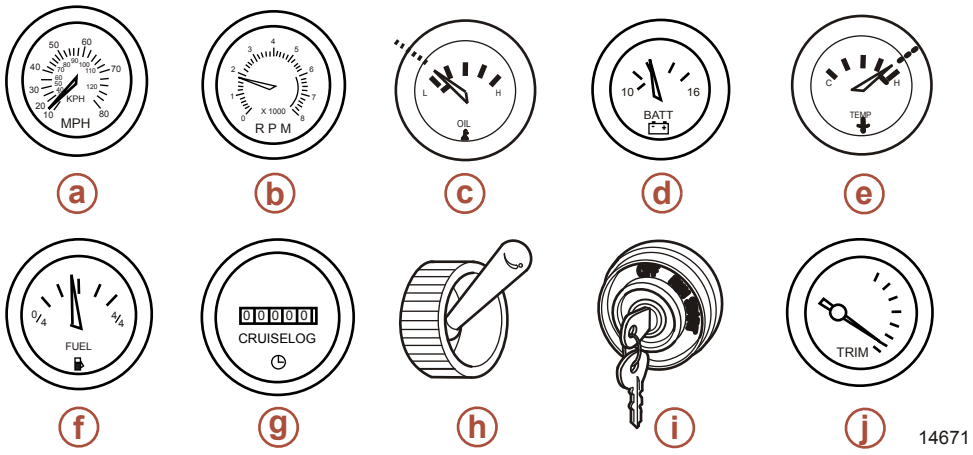
- **a -** Tachometer
- **b -** Speedometer
- **c -** LCD system view display

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.



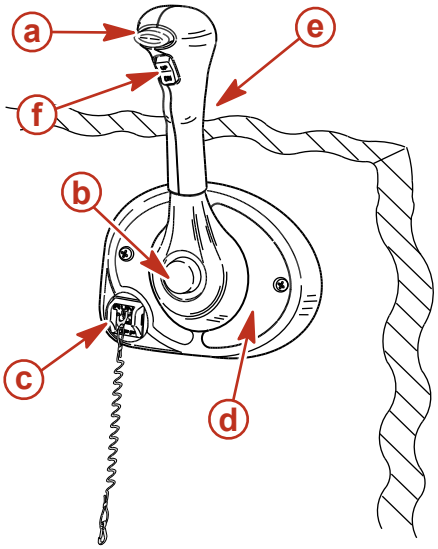
Reference	Gauge	Function
a	Speedometer	Indicates boat speed.
b	Tachometer	Indicates engine RPM.
c	Oil pressure gauge	Indicates engine oil pressure.
d	Voltmeter	Indicates battery voltage.
e	Coolant temperature gauge	Indicates engine operating temperature.
f	Fuel gauge	Indicates quantity of fuel in tank.
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 (Non-DTS Models)

Remote Controls

Your boat may be equipped with 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



mc77019-1

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

Neutral lock button - Prevents accidental shift and throttle engagement. Neutral lock button must be pushed into 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.

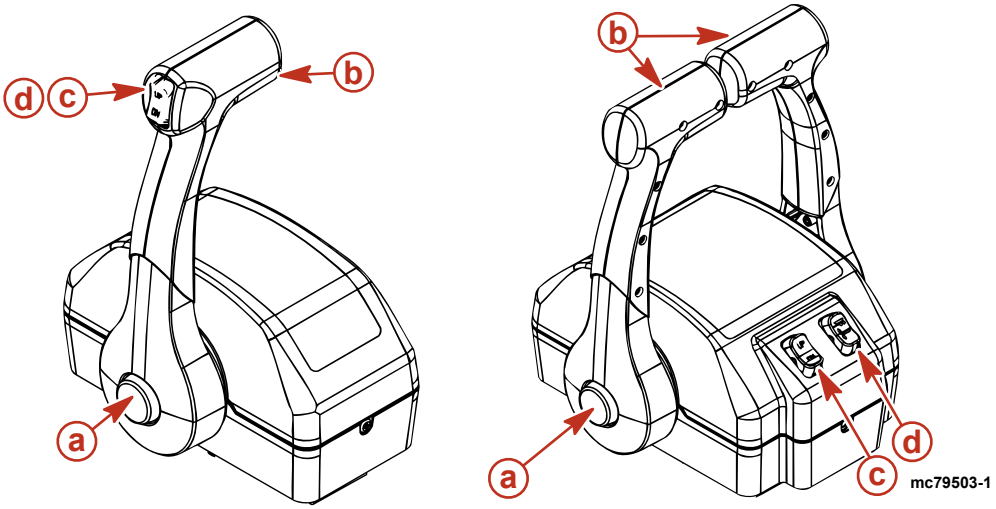
Lanyard stop switch - Turns the ignition off whenever the operator (when attached to the lanyard) moves far enough away from the operator's position to activate the switch. Refer to **Lanyard Stop Switch** for information on the use of this switch.

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.

Trim/tilt button - Refer to **Power Trim**.

Console Mount Features



mc79503-1

- **a -** Throttle only button
- **b -** Control handle
- **c -** Power trim switch
- **d -** Trailer switch

Throttle only button - Allows engine throttle advancement without shifting the engine. This is done by disengaging the shift mechanism from the control handle. The throttle only button can be depressed only when the remote control handle is in the neutral position.

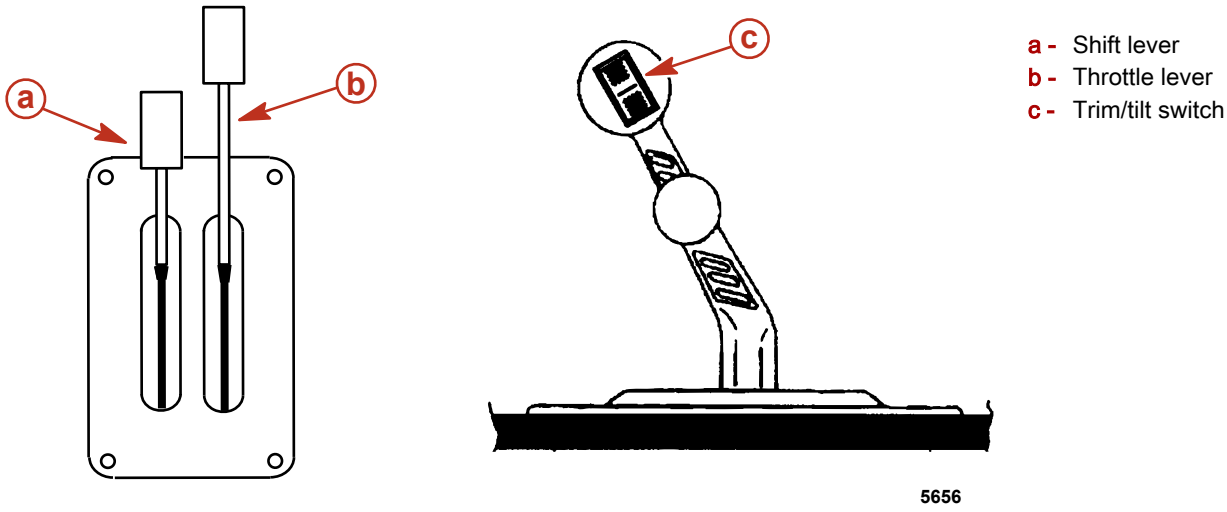
Control handles - Operation of the shift and throttle are controlled by the movement of the control handle. Push the control handle forward from neutral with a quick firm motion to the first detent for forward gear and continue pushing forward to increase speed. Pull the control handle back from neutral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

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

Trailer switch - Used to raise drive unit for trailering, launching, beaching or shallow water operation. See **Power Trim** for detailed trailer switch operation.

Zero Effort Features



a - Shift lever
b - Throttle lever
c - Trim/tilt switch

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.

Trim/tilt switch - Refer to **Power Trim**.

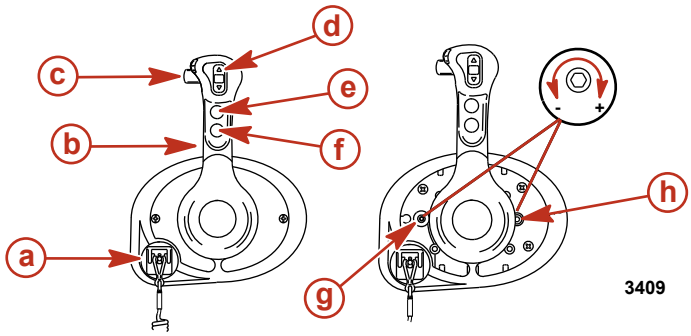
Remote Controls (DTS Models)

Remote Controls

IMPORTANT: Your boat must be equipped with a Mercury Marine electronic remote control. Start in gear protection is provided by this control system and prevents the engine from starting when the control is actuated in forward or reverse. Refer to the Mercury Precision Parts/Quicksilver Accessories Guide.

The digital throttle and shift (DTS) system required to operate this engine package provides start and stop functions, throttle control, shift control, start in gear protection, and emergency lanyard stop functions. The DTS system works with specialized helm components such as a command module kit and electronic remote control. Consult your dealer for a description and/or demonstration of your remote control.

Panel Mount Features



a - Lanyard stop switch
b - Control handle
c - Shift lock
d - Trim/tilt switch
e - Throttle only button
f - Start/stop button
g - Detent tension adjustment screw
h - Control handle friction adjustment screw

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.

Shift lock - Pressing the shift lock allows the engine to shift. The shift lock must always be pressed when moving the control handle out of the neutral position.

Trim/tilt switch (if equipped) - Refer to **Power Trim**.

Throttle only button - Allows engine throttle advancement without shifting the engine. The throttle only button can be depressed only when the remote control is in the neutral position, and should only be used to assist in starting or warming up the engine.

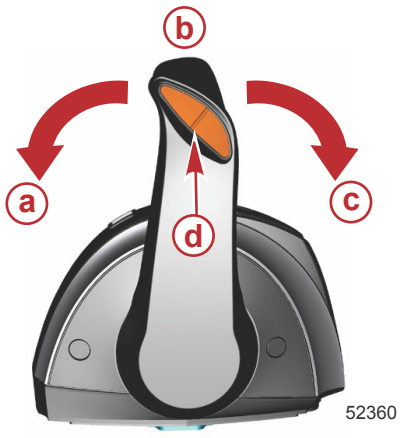
Start/stop button - Allows the boat operator to start or stop the engine without using the ignition key.

Detent tension adjustment screw - This screw can be adjusted to increase or decrease the effort required to move the control handle out of the detent positions (cover must be removed). Turning the screw clockwise will increase tension.

Control handle friction adjustment screw - This screw can be adjusted to increase or decrease the tension on the control handle (cover must be removed). This will help prevent unwanted motion of the handle in rough water. Turn the screw clockwise to increase tension and counterclockwise to decrease tension.

DTS Slim Binnacle Single Handle Console Features and Operation

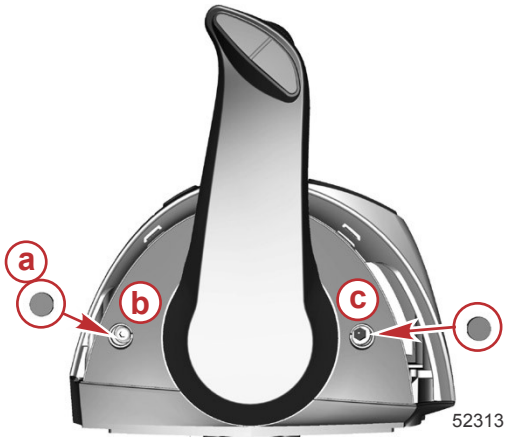
1. Operation of shift and throttle is controlled by the movement of the control handle. Push the control handle forward from neutral to the first detent for forward gear. Continue pushing forward to increase speed. Pull the control handle back from neutral to the first detent for reverse gear. Continue pushing back to increase speed.
2. Trim Switch (if equipped) - When the power trim switch is activated on the ERC handle, the DTS command module senses a closed circuit for either up or down trim. The DTS command module formulates a signal and sends it to the PCM. The PCM closes the ground circuit to the up or down trim relay.



a - Forward
b - Neutral
c - Reverse
d - Trim switch

3. Detent tension adjustment screw - This screw can be adjusted to increase or decrease the effort to move control handle out of detent positions. Turning screw clockwise will increase tension. Adjust to tension desired.

4. Control handle tension adjustment screw - This screw can be adjusted to increase or decrease the tension on the control handle. This will help prevent unwanted motion of the remote control handle in rough water. Turn screw clockwise to increase tension and counterclockwise to decrease tension. Adjust to tension desired.



a - Caps (2)
b - Detent tension adjustment
c - Control handle tension adjustment

NOTE: *The control handle tension and detent tension screws may require periodic maintenance adjustment.*

Special Digital Throttle and Shift (DTS) Features

The DTS system features several alternate operational modes for the electronic remote control (ERC) levers.



Slim binnacle ERC

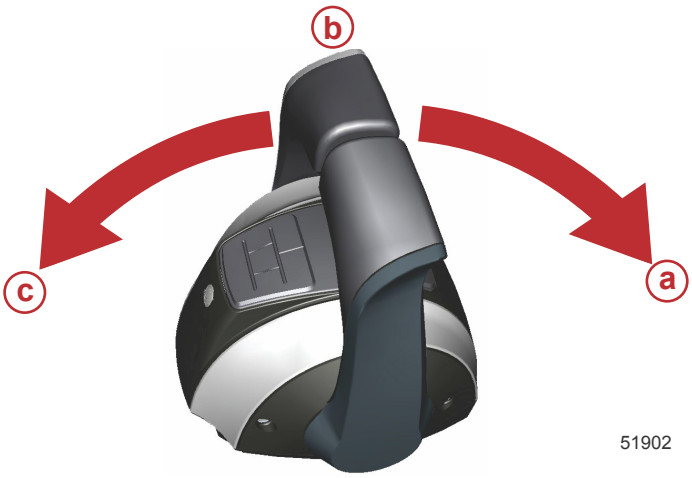
Item	Control	Function
a	Trim control (handle)	Raises and lowers the engine for best efficiency, or for conditions such as shallow water, trailering, etc.
b	"Stop/Start"	Allows the operator to start or stop the engine without the use of the key switch. The key switch must be in the run position for the start/stop switch to function.
c	"Transfer"	Allows boat control to be transferred to a different helm.
d	"Throttle-only"	Allows the boat operator to increase engine RPM for warm-up without shifting the transmission into gear.
e	"+"	Increases brightness settings for CAN pad, VesselView and SmartCraft gauges.
f	"–"	Decreases brightness settings for CAN pad, VesselView and SmartCraft gauges.
g	"Dock"	Reduces control lever operation throttle capacity to approximately 50% of normal control lever throttle demand.
h	Neutral light	Illuminates when the drive is in the neutral gear position. The lights flash when the engine is in throttle only mode.

Dual-Handle Electronic Remote Control (ERC)—Operation and Adjustment

Operation

The electronic remote control (ERC) handle controls the shift and throttle operation. Push the control handle forward from neutral to the first detent for forward gear. Continue pushing the handle forward to increase speed. Pull the control handle from the forward position to the neutral position to decrease speed and eventually stop. Pull the control handle back from neutral to the first detent for reverse gear. Continue pulling the handle back to increase speed in reverse.

NOTE: *In certain modes, the gear position is determined by the electronic shift control (ESC), not the position of the ERC levers. When using the joystick or while in Skyhook, the computer controls the shifting in and out of gears even though the handles are in neutral.*



a - Forward
b - Neutral
c - Reverse

The amount of force needed to move the handles and to move the handles through the detents is adjustable to help prevent unwanted motion.

Adjustment

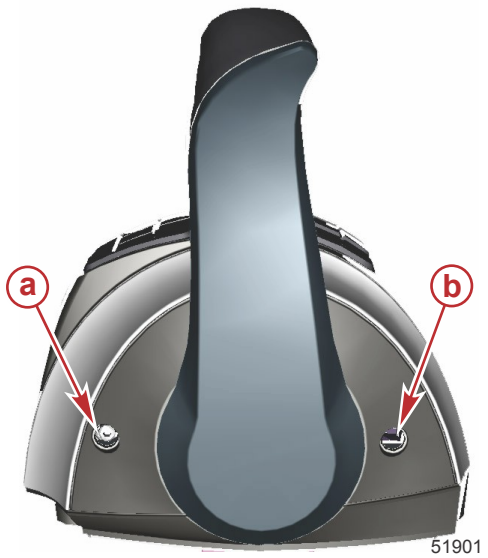
NOTE: *The control handle tension and detent tension may require periodic maintenance using the adjustment screws.*

To adjust the handle detent tension:

1. Remove the side cover plugs of the handle that needs adjustment.
2. Turn the adjustment screw clockwise to increase tension on the control handle and counterclockwise to decrease tension.
3. Adjust to the tension desired.

To adjust handle tension:

1. Remove the side cover plugs of the handle that needs adjustment.
2. Turn the adjustment screw clockwise to increase tension on the control handle and counterclockwise to decrease tension.
3. Adjust to the tension desired.



a - Detent tension adjustment screw
b - Handle tension adjustment screw

Special Digital Throttle and Shift (DTS) Features

The DTS system features several alternate operational modes for the electronic remote control (ERC) levers. Any of the listed features can operate simultaneously.



Dual-engine ERC

Item	Control	Function
a	Trim control (handle)	Raises and lowers the engines for best efficiency, or for conditions such as shallow water, trailering, etc.
b	Trim control (CAN pad)	Raises and lowers all the engines.
c	"NEUTRAL" lights	Illuminate when the drive is in the neutral gear position. The lights flash when the engine is in throttle only mode.
d	"TRANSFER"	Allows boat control to be transferred to a different helm. Refer to **Helm Transfer**.
e	"DOCK"	Available with joystick operation and the control levers. Joystick operation reduces throttle capacity to approximately 70% of normal joystick throttle demand. Control lever operation reduces throttle capacity to approximately 50% of normal control lever throttle demand.
f	"+"	Increases brightness settings for CAN pad, VesselView and SmartCraft gauges.
g	"THROTTLE ONLY"	Allows the boat operator to increase engine RPM for warm-up without shifting the transmission into gear.
h	"–"	Decreases brightness settings for CAN pad, VesselView and SmartCraft gauges.
i	"1 LEVER"	Enables the throttle and shift functions of both engines to be controlled by the port lever.
j	"SYNC"	Turns off or on the auto-synchronization feature.

NOTE: *Not all functions may be active.*

Dock

Dock mode is available with joystick operation and remote control lever operation. Dock mode reduces throttle capacity to approximately 70% of normal joystick throttle demand, allowing finer control of engine power in close quarter situations. If more power is needed for vessel maneuvering when environmental conditions require more thrust, use the electronic remote control levers.



"DOCK" button

Throttle Only

NOTE: *The joystick can become active when it is moved any time the engines are running and the ERC levers are in the neutral position. Throttle only mode should be used to disable the joystick if the captain is not in command at the helm. Placing the ERC in throttle only will avoid unintended gear engagement. The engines will turn using the steering wheel or the joystick and the RPM of the engines can be increased while in the throttle only mode, but the gear position will remain in neutral.*



"THROTTLE ONLY" button

To engage throttle only mode:

1. Place both ERC levers in neutral.
2. Press the "THROTTLE ONLY" button. The button light will turn on and the neutral lights will blink.
3. Place either ERC lever into gear. The warning horn will beep each time the levers are moved in and out of gear while in throttle only, but will remain in neutral.
4. The RPM of the engines can be increased.
5. Throttle only mode also affects the joystick. The engines will move and the RPM can be increased, but will remain in neutral.

NOTE: *Pressing the "THROTTLE ONLY" button while the ERC levers are not in the neutral position, turns the button light off and remains in throttle only mode. You must place the ERC levers into the neutral position to disengage throttle only mode.*

To disengage throttle only mode:

1. Place both ERC levers into neutral. Throttle only will not disengage unless the ERC levers are in neutral.
2. Press the "THROTTLE ONLY" button. The button light will turn off.
3. The neutral lights stop flashing and remain illuminated. The joystick can now be used.

1 Lever

The outboard joystick system features the ability to command both engines with a single lever on a dual-engine application. This feature simplifies engine management during rough sea conditions by allowing you to use a single lever to command both engines simultaneously. It has no affect on the joystick function. It is not the same as the system feature called Sync.



"1 LEVER" button

To engage 1 Lever mode:

1. Place both ERC levers in neutral.
2. Press the "1 LEVER" button. The button light will turn on.
3. Place the starboard ERC lever into gear.
4. When the handle is moved, the engines RPM and gear position is synchronized.

To disengage 1 lever mode:

1. Place both ERC levers in neutral.
2. Press the "1 LEVER" button. The button light turns off.

Sync

Sync is an automatic engine synchronization feature that is always on unless it is turned off. Sync monitors the position of both ERC levers. When both levers are within 10% of one another, the port engine synchronizes to the starboard engine's RPM. The SmartCraft system will automatically disengage sync after 95% of throttle position range to allow each engine the ability to reach maximum available RPM. Sync cannot engage until the engines are at a minimum speed.

The indicator light on the "SYNC" button is on when both engines are on. The light is yellow at idle and 95% of throttle and when the engines are not synchronized. The light turns red when the engines are synchronized.



"SYNC" button

The RPM display of VesselView also shows an orange icon under the RPM numbers if the engines RPMs differ more than 10% of each other, and the icon turns red when they are synchronize.

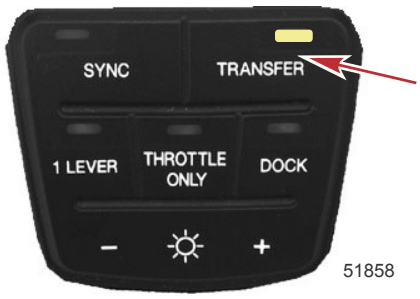
To disengage sync mode:

1. Place the ERC levers in any detent.
2. Press the "SYNC" button. The button light turns off.

To engage Sync mode, press the "SYNC" button at any time.

Transfer (Boats equipped with dual helms)

The "TRANSFER" button allows the boat operator to transfer control of the boat from the active helm to the inactive helm on boats equipped with dual helms. Refer to **Helm Transfer**.



"TRANSFER" button

Helm Transfer

Some boats are designed to allow control of the vessel from more than one location. These locations are commonly referred to as helms or stations. Helm transfer is a term used to describe the method of transferring control from one helm (or station) to another helm.

⚠ WARNING

Avoid serious injury or death from loss of boat control. The boat operator should never leave the active station while engine is in gear. Helm transfer should only be attempted while both stations are manned. One-person helm transfer should only be performed while engine is in neutral.

The helm transfer function allows the boat operator to select which helm is in control of the vessel. Before a transfer can be initiated the ERC levers at the active helm and at the helm intended for the transfer must be in the neutral position.

NOTE: *If you attempt to transfer helm control when the ERC levers are not in neutral, a beep will sound and the helm transfer will not succeed until the levers at the helms are moved to neutral and transfer is requested again.*

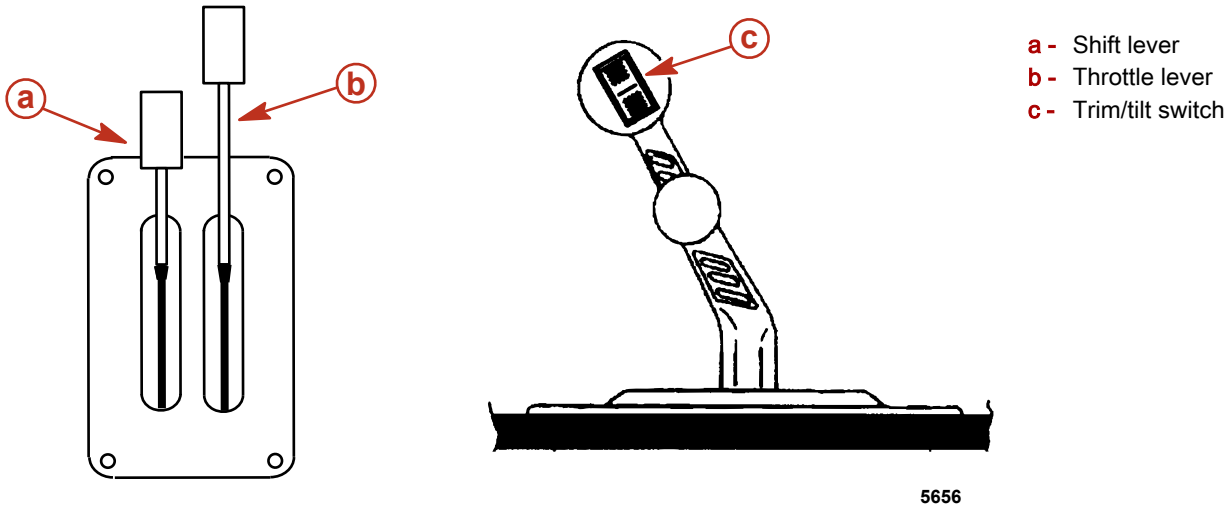
Some fault codes may appear on VesselView if other control or navigation functions are attempted after the helm transfer procedure is started. To remove the fault codes it may be necessary to cycle the key switch off and on, and then restart the helm transfer procedure. Ensure that other control and navigation inputs are performed after helm transfer is complete to avoid setting fault codes.

NOTICE

The ERC levers must be in neutral to perform a helm transfer. While in neutral your vessel could drift and collide with objects nearby resulting in damage. Keep an adequate look out while performing the helm transfer.

To avoid damage, use extra care when attempting a helm transfer while the vessel is close to docks, piers, or other fixed items or when near other vessels.

Zero Effort Features



a - Shift lever
b - Throttle lever
c - Trim/tilt switch

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.

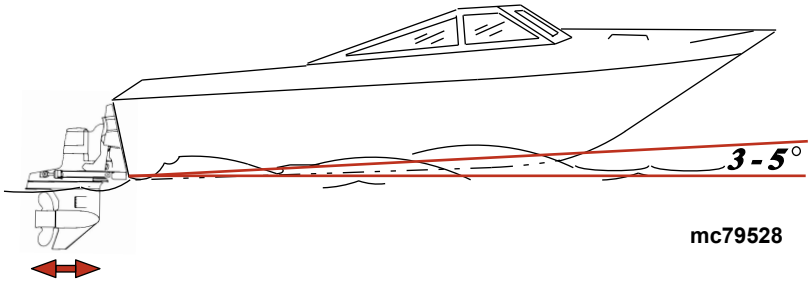
Trim/tilt switch - Refer to **Power Trim**.

Power Trim

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

⚠ WARNING
Excessive trim can cause serious injury or death at high speeds. Use caution when trimming the sterndrive, and never trim out beyond the gimbal ring support flanges while the boat is underway or at engine speeds above 1200 RPM.

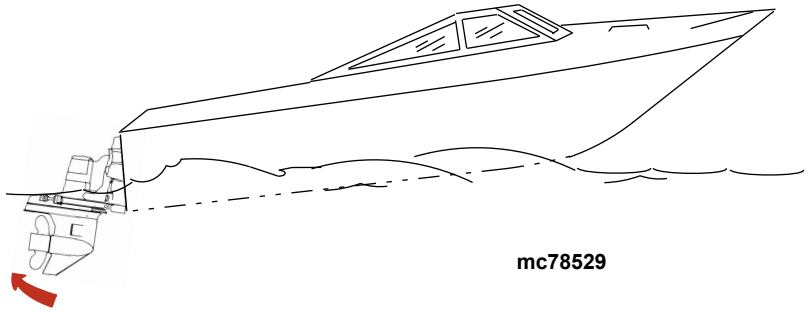
For best performance trim the sterndrive unit so that the boat bottom is at a 3–5° angle to the water.



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Trimming sterndrive unit up/out can:

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

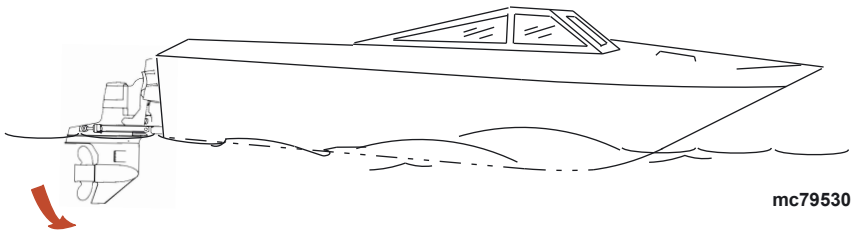


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Trimming sterndrive unit down/in can:

- Help the boat accelerate and plane off quicker
- Generally improve the ride in choppy water
- In most cases, reduce boat speed

- If in excess, lower the bow of some boats to a point at which they begin to plow with their bow in the water while on plane. This can result in an unexpected turn in either direction called bow steering or over steering if any turn is attempted or if a significant wave is encountered.



Single Engine Trim/Trailer

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

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

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

NOTE: *The DTS control system limits the extent to which the sterndrive unit can be trimmed up/out when engine speed is above 3500 RPM.*

Dual Engine Trim/Trailer

NOTICE
If using external tie bars, raising or lowering the drives independently of each other can damage the drive and steering systems. If using an external tie bar, raise and lower all drives together as a unit.

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

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

Trim without Key

Trim without key is a method of allowing trim operation after the ignition key switch is turned off. The command module and PCM remain powered and are able to process trim requests for up to 15 minutes after the key switch is turned off. The command module does not process any requests other than trim during this period. Once the 15 minute period expires, the command module sends a command through the CAN lines to shut down the PCM. On multi-engine applications, the timeout is managed separately for each engine.

The trim without key period may be ended at any time by moving the control handle to wide-open throttle reverse (WOTR) with the key off. To end the 15 minute period for the center engine in a shadow mode application, ensure all ignition key switches are in the "OFF" position and both remote control handles are in the wide-open throttle reverse (WOTR) position.

Trim Delta

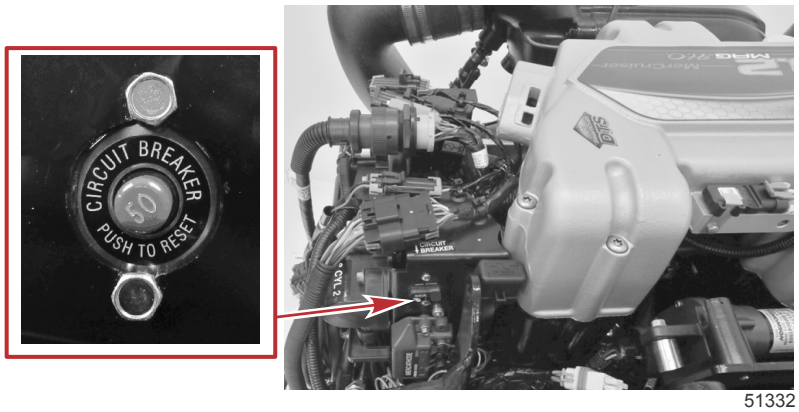
Trim delta controls the distance between the individual adjacent drive angles when trimming. The trim delta limit is preset, and will not allow extreme drive angle differences that could damage tie bars. If the maximum trim delta limit is met, the drive furthest in the trim process "up or down", will stop trimming until the adjacent drive is back within the delta limit. Once the drive or drives are back within this delta window, the trim process will continue.

Electrical System Overload Protection

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

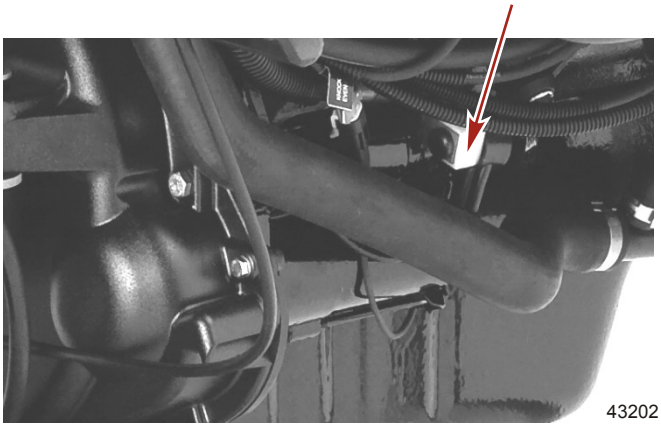
NOTE: *In an emergency, when you must operate the engine and cannot locate the cause for the high current draw, turn off or disconnect all accessories connected to the engine and instrumentation wiring. Reset the circuit breaker. If the breaker remains open, the electrical overload has not been eliminated. Contact your authorized dealer as soon as possible.*

The circuit breaker provides protection for the engine wiring harness and the instrumentation power lead. To reset the circuit breaker, push the red button. The circuit breaker is located at the starboard rear of the engine in the electrical center.

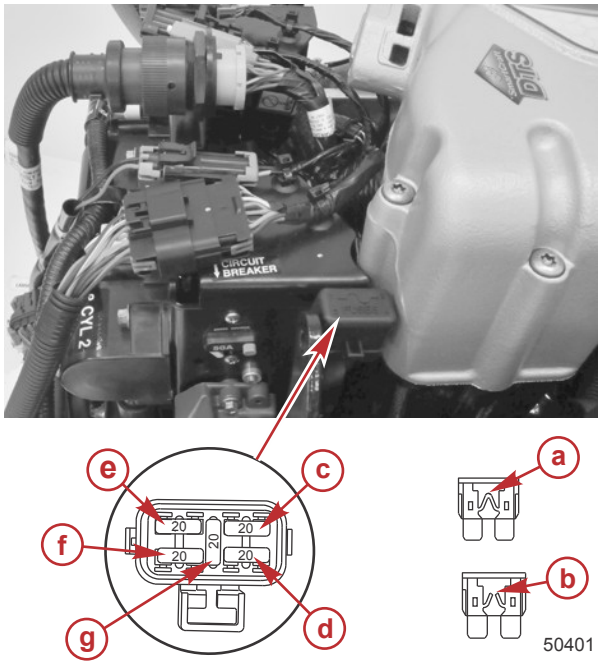


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A 90-amp fuse, located on the large post of the starter solenoid, protects the engine wiring harness if an electrical overload occurs.


43202

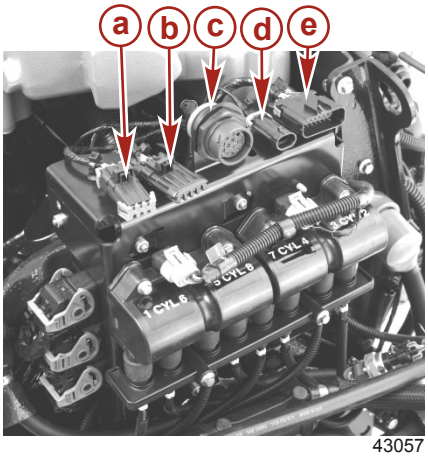
Four fuses protect the main power, fuel pump, ignition, and accessory circuits. Four 10-amp fuses protect the O_2 sensors. These fuses are located near the 14-pin harness connector.



50401

- **a -** Good fuse
- **b -** Bad fuse
- **c -** Alternator and fuel pump circuit - 20-amp fuse
- **d -** Power to 14-pin helm harness - 20-amp fuse
- **e -** ECM driver power, fuel pump relay, coils, and start relay (DTS) - 20-amp fuse
- **f -** Trim down relay (DTS), trim up relay, and injectors circuit - 20-amp fuse
- **g -** Spare fuse

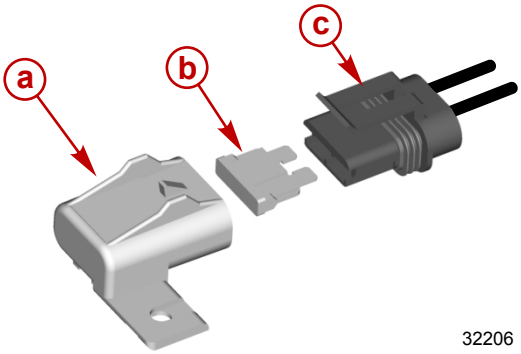
The clean power harness connected to the engine starting battery minimizes voltage drop to the electrical system and is protected by a 5-amp fuse.



43057

a - Paddle wheel and tank level connector
b - Diagnostic connector
c - 14-pin harness connector
d - Clean power harness connector
e - Transom harness connector

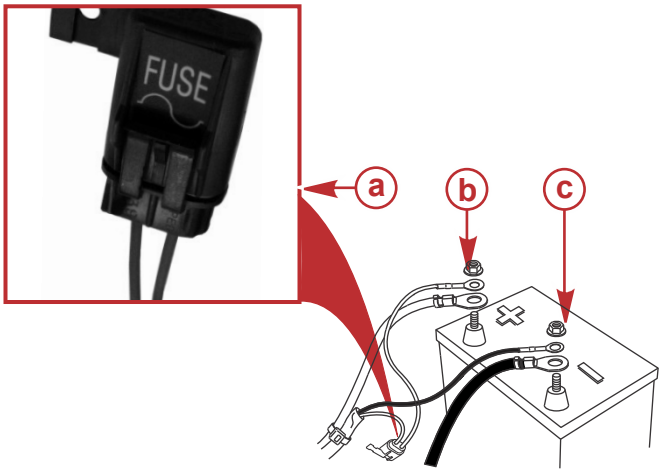
A 15-amp accessory fuse protects the accessory circuits. This fuse is located on the rear of the engine.



32206

a - Fuse cover
b - 15-amp fuse
c - Accessory harness

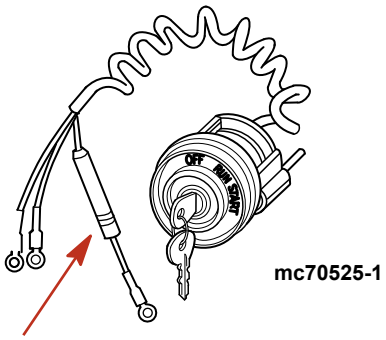
The emissions control system is protected by a 5-amp fuse located in the clean power harness.



43608

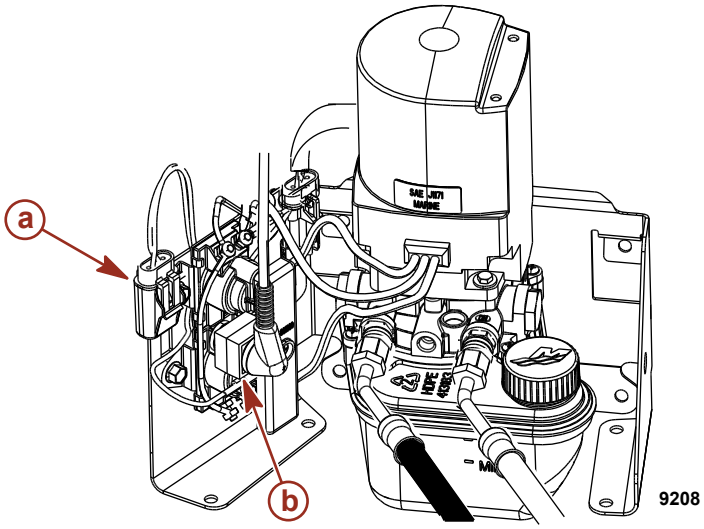
a - 5-amp fuse
b - Positive (+) battery terminal (harness lead with fuse)
c - Negative (–) battery terminal

A 20-amp fuse may be located in the ignition switch "I" terminal lead to protect the electrical system. Check for an open fuse or an open circuit breaker if the ignition key is turned to the "START" position and nothing happens.



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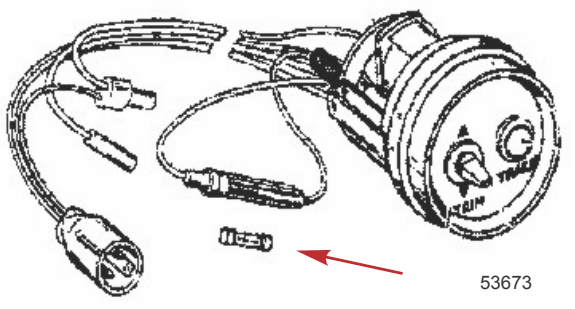
The power trim system is protected from overload by both a 110-amp fuse and a 20-amp spade fuse on the power trim pump. The trim pump may also have an in-line circuit protection device in the power trim positive lead near the battery switch or battery connection.



9208

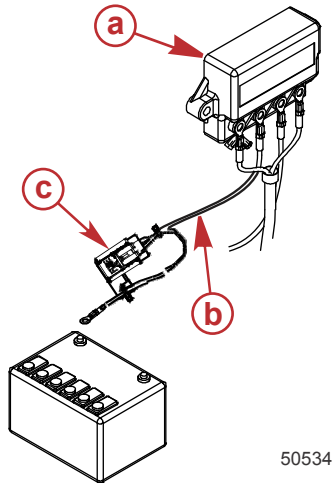
a - 20-amp spade fuse
b - 110-amp fuse

The power trim control panel is protected by a 20-amp in-line fuse.



53673

The MerCathode has a 5-amp fuse that connects to the positive (+) terminal on the controller. If the fuse is open, the system will not operate, resulting in a loss of corrosion protection.



50534

a - MerCathode
b - Red/purple wire
c - 5-amp fuse

Visual and Audio Warning Systems

Service Engine Light and OBD-M MIL Kit

Boats powered by emissions control technology (ECT) catalyzed engines must be equipped with a SmartCraft-enabled gauge capable of displaying the service engine icon, or a dash-mounted service engine light. Malfunction indicator lamp (MIL) kits containing a dash-mounted service engine light and a special harness that connects to the engine harness may be purchased separately.

The service engine icon or MIL will provide a visual indication of a malfunction with the engine's emission control system and will remain illuminated while the OBD-M fault is active.



47594

SC 1000 gauge and service engine light

Testing the OBD-M Malfunction Indicator Lamp (MIL)

1. Turn the ignition switch to the on position without cranking the engine.
2. The service engine icon and MIL will remain illuminated for four seconds if the visual indication system is functioning correctly.

Audio Warning System

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

Most faults cause the warning horn circuit to activate. How the warning horn activates depends on the severity of the problem.

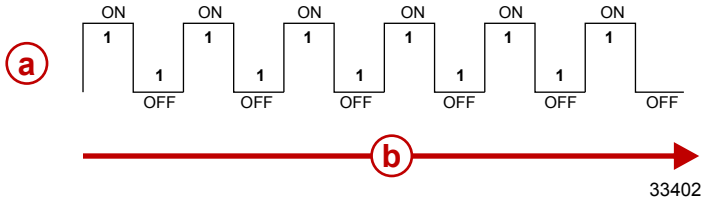
There are two warning horn states:

- Caution
- Critical

There is also an alarm that sounds if the helm has not been properly configured using the G3 service tool.

Caution

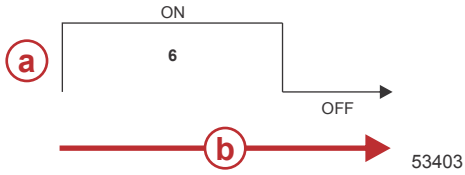
If a caution state is detected, the audio warning system will sound for six one-second intervals.



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

Critical

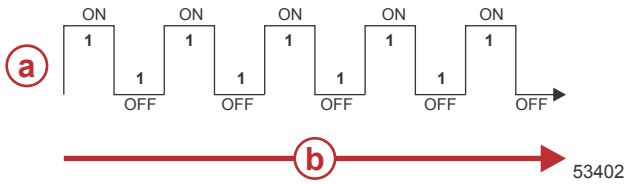
If a critical state is detected, the audio warning system sounds for six seconds and then turns off.



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

Nonconfigured Alarm–DTS Only

If the helm has not been properly configured using the G3 service tool, the audio warning system will sound for five one-second intervals.



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

Testing the Audio Warning System

1. Turn the key 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.

Guardian Strategy

The MerCruiser Engine Guardian system reduces the potential for engine damage by restricting engine power when the PCM detects a potential problem. Below are some examples of what Engine Guardian monitors:

- Oil pressure
- Engine overspeed
- Exhaust manifold temperature

IMPORTANT: Engine Guardian can reduce power anywhere from 100% to idle, depending on the severity of the problem. If forced to idle, boat speed might not respond to throttle operation.

The PCM stores the fault for diagnostics. For example, if the water inlet becomes partially blocked, Engine Guardian reduces 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 Guardian restores engine power to normal.

Notes:

Section 2 - On the Water

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Additional Operation Instructions for Axius Systems

If your boat has DTS engines equipped with an Axius system, refer also to the **Axius Operation Manual** included with the boat.

Safe Boating Recommendations

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 U.S., 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 U.S., 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 onboard.

- 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
  - ☐ Radio
  - ☐ Paddle or oar
  - ☐ Spare propeller, thrust hubs, and an appropriate wrench
  - ☐ First aid kit and instructions
  - ☐ Waterproof storage containers
  - ☐ Spare operating equipment, batteries, bulbs, and fuses
  - ☐ Compass and map or chart of the area
  - ☐ Personal flotation device (one per person onboard)

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 onboard, 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 one person onboard 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's capacity plate). Know your boat's operating and loading limitations. Know if your boat will float if it is full of water. When in doubt, contact your authorized Mercury Marine 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. Passengers should not sit or ride 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 operate a boat while under the influence of alcohol or drugs. It is the law.

- Alcohol or drugs can 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 operator's 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.

- Your boat traveling at 40 km/h (25 mph) will overtake a fallen skier who is 61 m (200 ft) in front of you in five seconds.

Watch fallen skiers.

- When using your boat for waterskiing 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.

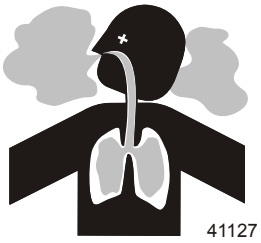
Early symptoms of carbon monoxide poisoning, which are similar to the symptoms of seasickness and intoxication, include headache, dizziness, drowsiness, and nausea.

⚠ 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

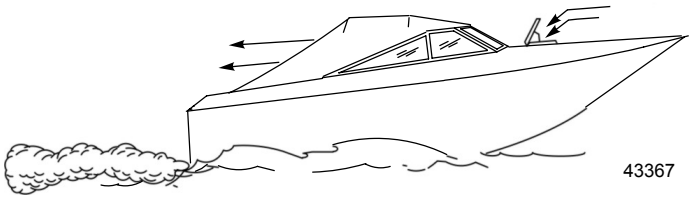


Engine exhaust gases contain harmful carbon monoxide. Avoid areas of concentrated engine exhaust gases. When engines are running, keep swimmers away from the boat, and do not sit, lie, or stand on swim platforms or boarding ladders. While underway, do not allow passengers to be positioned immediately 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:

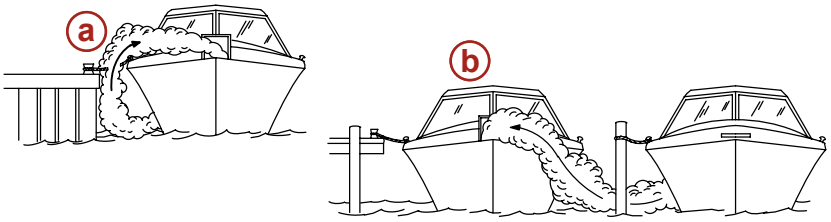


Poor Ventilation

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.

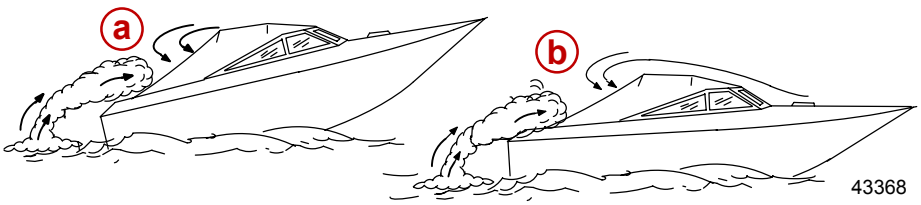
1. Examples of poor ventilation while the boat is stationary:



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:



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 (Non-DTS Models)

Launching and Boat Operation

IMPORTANT: Install the bilge drain plug prior to launching the boat.

Follow these guidelines when operating your boat to avoid possible water ingestion:

- Do not turn the key off when the engine is above idle speed.
- Do not use the lanyard stop switch to shut off the engine when operating above idle speed.
- Enter the water slowly when launching your boat from a steep ramp.
- Do not shift into reverse while on plane.
- When coming off plane, avoid impact with large following waves by applying short, light bursts of power to minimize the wave action against the stern of the boat.
- Do not come off plane quickly and immediately shut of the engine.

Operation Chart

Operation Chart			
Before Starting	**After Starting**	**While Underway**	**After Stopping**
Install the bilge drain plug.	Observe all gauges to check condition of engine. If not normal, stop the engine.	Observe all gauges to check condition of engine. If not normal, stop the engine.	Turn the ignition key to the "OFF" position.

Operation Chart			
Before Starting	**After Starting**	**While Underway**	**After Stopping**
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.			
Place sterndrive unit in full down (in) position.			
Check the engine oil.			
Perform all other checks specified by your dealer or boat builder.			
Listen for audio warning alarm to sound when the ignition switch is in the "ON" position.			

Starting and Stopping the 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).
4. If engine does not start after three 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 drive system. Shift the drive into gear only when the engine is operating at idle.

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 3–5 minutes.

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

Starting the Engine After It Has Been Stopped While In Gear

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

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

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.

Trailering the Boat

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

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

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.

Basic Boat Operation (DTS Models)

Launching and Boat Operation

IMPORTANT: Install the bilge drain plug prior to launching the boat.

Follow these guidelines when operating your boat to avoid possible water ingestion:

- Do not turn the key off when the engine is above idle speed.
- Do not use the lanyard stop switch to shut off the engine when operating above idle speed.
- Enter the water slowly when launching your boat from a steep ramp.
- Do not shift into reverse while on plane.
- When coming off plane, avoid impact with large following waves by applying short, light bursts of power to minimize the wave action against the stern of the boat.
- Do not come off plane quickly and immediately shut of the engine.

Operation Chart

Operation Chart			
Before Starting	**After Starting**	**While Underway**	**After Stopping**
Install the bilge drain plug.	Observe all gauges to check condition of engine. If not normal, stop the engine.	Observe all gauges to check condition of engine. If not normal, stop the engine.	Turn the ignition key to the "OFF" position.

Operation Chart			
Before Starting	**After Starting**	**While Underway**	**After Stopping**
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.			
Place sterndrive unit in full down (in) position.			
Check the engine oil.			
Perform all other checks specified by your dealer or boat builder.			
Listen for audio warning alarm to sound when the ignition switch is in the "ON" position.			

Starting and Stopping the Engine

NOTE: *Perform only 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.

NOTE: *MerCruiser DTS models are equipped with SmartStart. The SmartStart feature incorporates push button starting. Rather than holding the start button or key switch to start the engine and then releasing it when the engine starts, SmartStart completely controls the starting process. When the start button is pushed, the DTS system signals the engine PCM to start the engine. If the engine does not start, the starting process times out after eight seconds or when the engine reaches 400 RPM. Attempting to start the engine with the engine already running will turn the engine off.*

3. Turn ignition key to "RUN" position.
4. Turn the ignition key switch to the "START" position then release, or depress the start/stop button and release. If the engine is cold, allow the engine to operate at idle for 6-10 minutes or until the engine temperature reaches 60 °C (140 °F).
5. If the engine does not start after three attempts:
   a. Push the throttle-only button and position the remote control handle or throttle lever to the 1/4 throttle position.
   b. Turn the ignition key to "START." Release key when the engine starts and allow the switch to return to the "ON" position.
6. If the engine does not start after step 5:
   a. Move the remote control handle.throttle lever to the full throttle position, then return to 1/4 throttle.
   b. Turn the ignition key to "START." Release key when the engine starts and allow the switch to return to the "ON" position.
7. Inspect the power package for fuel, oil, water, and exhaust leaks.

8. Move the 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 drive system. Shift the drive into gear only when the engine is operating at idle.

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. The engine can be stopped by any one of the following 4 methods:
   a. Move the ignition key switch to the "ACCESSORY" or "OFF" position. The engine will stop and the control system will be deactivated.
   b. Depress the start/stop button, if equipped. The engine will stop and the control system will remain active.
   c. Momentarily move the ignition key switch to the "START" position, then release immediately. The control system will recognize that the engine is running and will stop the engine. The control system will remain active. Moving the ignition key switch to the "START" position again will issue a start request to the control system and the control system will start the engine, if appropriate.
   d. Activate the lanyard stop switch, if equipped. The engine will stop, but the control system will remain active. The control system will not allow the engine to start if the lanyard stop switch is activated.

Throttle Only Operation

NOTE: *When operating in throttle only (neutral) mode, the DTS control system will not allow the engine speed to increase above 3500 RPM.*

Zero effort remote controls: Zero effort remote controls have separate throttle control and shift control levers. Advancing the throttle control lever beyond the idle position while the shift control lever is in the neutral position will cause engine speed to increase, but only up to the maximum neutral engine speed of 3500 RPM.

⚠ WARNING

The Digital Throttle and Shift (DTS) Zero Effort control can shift the engine or transmission at speeds greater than idle, causing unexpected boat movement, which may result in injury, death, or property damage due to loss of boat control. Always place the throttle control lever in the idle position before moving the shift control lever into forward or reverse gear position.

Panel mount and console mount remote controls: Panel mount and console mount remote controls are equipped with a throttle only button. To activate throttle only mode:

1. Refer to **Remote Controls** section for remote control features.
2. Move the control lever to the idle/neutral position.
3. Depress the throttle only button, and move the control lever to the idle/forward or idle/reverse position. The DTS control system will sound two beeps on the audio warning horn to indicate throttle only mode is active. On console mount remote controls, the neutral light will begin to blink.
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 deactivate the throttle only mode 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.

Trailering the Boat

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

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

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 and you are unfamiliar with its operation, 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 (90-849250R03) from your dealer, distributor, or Mercury Marine.

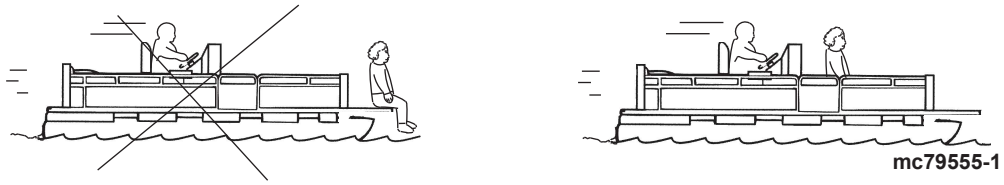
Passenger Safety in Pontoon Boats and Deck Boats

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 the 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.

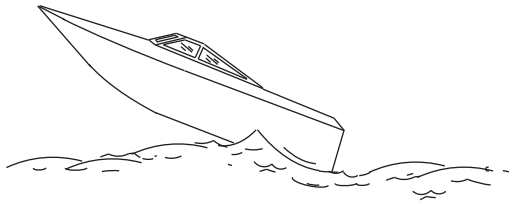


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Wave and Wake Jumping

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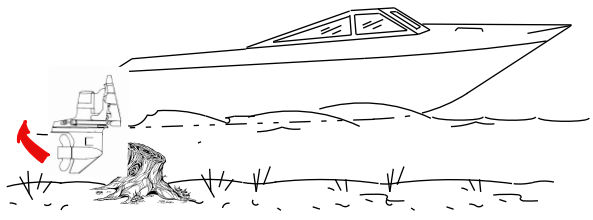
Operating recreational boats over waves and wakes is a natural part of boating. However, when this activity is done with enough speed to force the boat hull partially or completely out of the water, certain hazards arise, particularly when the boat reenters the water.

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 24–40 km/h (15–25 mph).

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

- The boat could move suddenly in a new direction. Such a sharp change in direction or turn can cause occupants to be thrown out of their seats or out of the boat.
- A rapid reduction in speed. This will cause occupants to be thrown forward, even out of the boat.
- Impact damage to the underwater drive components, rudder, and/or boat.

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

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

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

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

⚠ WARNING

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.

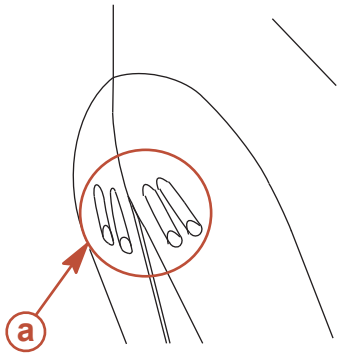
Drive Unit Impact Protection

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

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

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

Operating with Low Water Inlets in Shallow Water



a - Low water inlets

NOTICE

Operating in shallow water can cause severe engine damage due to clogged water inlets. Ensure that the water inlets on the gearcase do not ingest sand, silt, or other debris, which can restrict or stop cooling water supply to the engine.

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

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 https://www.mercurymarine.com/en/us/propellers/selector/#/step-one.

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 (five 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 the Break-In Period

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

- Ensure that the propeller allows the engine to operate at or near the top of the specified wide-open throttle (WOT) RPM range. Refer to **Specifications** and **Maintenance**.
- Operate the engine at 3/4 throttle or lower. Refrain from prolonged operation at WOT RPM.

End of First Season Checkup

At the end of the first season of operation, contact an authorized Mercury MerCruiser dealer to discuss 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.

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Section 3 - Specifications

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3

Fuel Requirements

NOTICE
Running out of fuel can damage catalyst components. Do not allow the fuel tanks to become empty during operation.

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 will not be covered under the limited warranty.

Fuel Ratings

Mercury MerCruiser engines will operate satisfactorily with any major brand of unleaded gasoline that meets the following specifications:

USA and Canada - A posted pump octane rating of 87 (R+M)/2, minimum, for all models. Premium gasoline 91 (R+M)/2 octane is also acceptable for all models. **Do not** use leaded gasoline.

Outside USA and Canada - A posted pump octane rating of 91 RON, minimum, for all models. Premium gasoline (95 RON) is also acceptable for all models. **Do not** use leaded gasoline.

Using Reformulated (Oxygenated) Gasoline (USA Only)

Reformulated gasoline is required in certain areas of the USA and is acceptable for use in your Mercury Marine engine. The only oxygenate currently in use in the USA is alcohol (ethanol, methanol, or butanol).

Gasoline Containing Alcohol

Bu16 Butanol Fuel Blends

Fuel blends of up to 16.1% butanol (Bu16) that meet the published Mercury Marine fuel rating requirements are an acceptable substitute for unleaded gasoline. Contact your boat manufacturer for specific recommendations on your boat's fuel system components (fuel tanks, fuel lines, and fittings).

Methanol and Ethanol Fuel Blends

IMPORTANT: The fuel system components on your Mercury Marine engine will withstand up to 10% alcohol (methanol or ethanol) content in the gasoline. Your boat's fuel system may not be capable of withstanding the same percentage of alcohol. Contact your boat manufacturer for specific recommendations on your boat's fuel system components (fuel tanks, fuel lines, and fittings).

Be aware that gasoline containing methanol or ethanol may cause increased:

- Corrosion of metal parts
- Deterioration of rubber or plastic parts
- Fuel permeation through the rubber fuel lines
- Likelihood of phase separation (water and alcohol separating from the gasoline in the fuel tank)

⚠ 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.

IMPORTANT: If you use gasoline that contains or might contain methanol or ethanol, you must increase the frequency of inspection for leaks and abnormalities.
IMPORTANT: When operating a Mercury Marine engine on gasoline containing methanol or ethanol, do not store the gasoline in the fuel tank for long periods. Cars normally consume these blended fuels before they can absorb enough moisture to cause trouble; boats often sit idle long enough for phase separation to take place. Internal corrosion may occur during storage if alcohol has washed protective oil films from internal components.

Engine Specifications

8.2 MAG ECT, 8.2 MAG H.O. ECT—Including SeaCore Models

NOTE: *Performance specifications are obtained and corrected in accordance with SAE J1228/ISO 8665 Crankshaft Power.*
All measurements are taken with the engine at normal operating temperature.
RPM range is measured using an accurate service tachometer with the engine at normal operating temperatures.
Oil pressure must be checked with the engine at normal operating temperature.

NOTE: *Oil pressure specifications are for reference and may vary.*

		8.2 MAG ECT	8.2 MAG H.O. ECT
Propeller shaft power		283 kW (380 hp)	320 kW (430 hp)
Displacement		8.2L (502 cid)	
Alternator amperage	Hot	72 A	
	Cold	65 A	
RPM	WOT	4600–5000	
	Rev limiter	5150	5150
Idle RPM	Mechanical	650	
	DTS		
Minimum oil pressure	At 2000 RPM	207 kPa (30 psi)	
	At idle	103 kPa (15 psi)	
Thermostat		76 °C (170 °F)	
Timing at idle		Not adjustable	
Firing order		1-8-4-3-6-5-7-2	
Minimum battery rating	Non-DTS models	750 CCA, 950 MCA, 180 Ah	
	DTS models	800 CCA, 1000 MCA, 190 Ah	
Spark plug type		NGK BPR6ES	
Spark plug gap		0.83 mm (0.033 in.)	
Emission control system		Electronic engine control (EC), heated oxygen sensor (HO2S), catalyst	

Engine Oil

For optimum engine performance and maximum protection, use the following oil:

Application	Recommended Oil
All MerCruiser engines	Mercury/Quicksilver 25W-40 Synthetic Blend Engine Oil, NMMA FC-W Catalyst Compatible rated

IMPORTANT: Lubrication requirements for catalyzed engines differ from the requirements for noncatalyzed engines. Some marine-grade lubricants contain high levels of phosphorus. Although these high-phosphorus lubricants may allow acceptable engine performance, exposure over time will damage the catalyst. Catalysts damaged by lubricants containing high levels of phosphorus may not be covered by the MerCruiser Limited Warranty.

If Mercury/Quicksilver 25W-40 Synthetic Blend Engine Oil is unavailable, use the following lubricants, listed in order of recommendation.

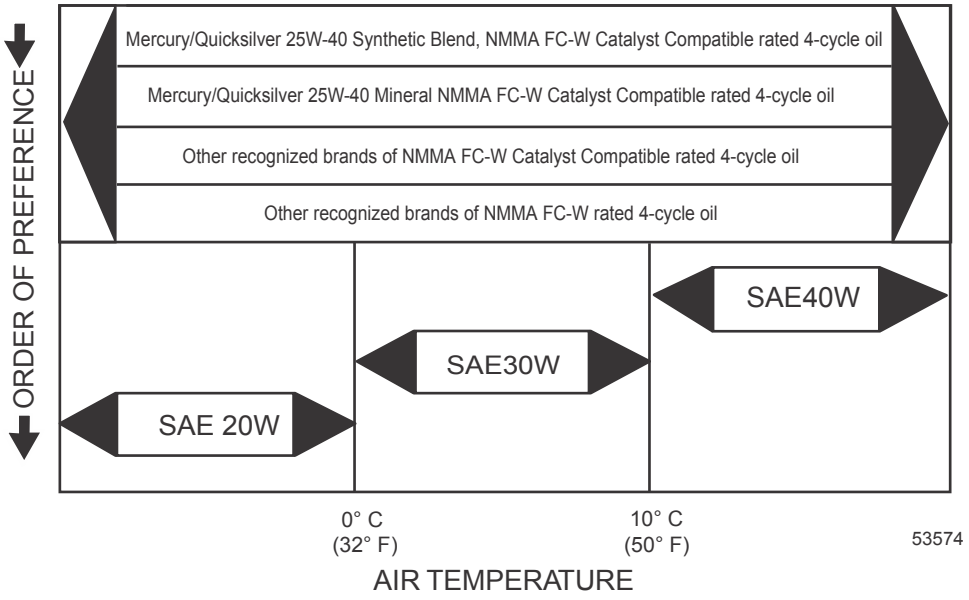
1. Mercury/Quicksilver 25W-40 Mineral NMMA FC-W Catalyst Compatible.

IMPORTANT: If you are servicing a catalyst engine, use the following oils for short periods of time only.

2. Other recognized brands of NMMA FC-W Catalyst Compatible rated 4-cycle oil.
3. Other recognized brands of NMMA FC-W rated 4-cycle oils.
4. A good-grade, straight-weight detergent automotive oil according to the last row of the operating chart below.

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

Use the following information for selecting the type of oil according to the order of preference.



Preventing Contamination of the Emissions Control System

Catalysts and oxygen sensors can become contaminated, leading to component failure. Phosphorus, found in some marine-grade oils, and other compounds will damage or destroy a catalyst's ability to clean the exhaust. Catalyst-friendly oils, like Mercury Synthetic Blend Engine Oil or Mercury 25W-40 mineral oil, prevents this damage. Approved oils must be used in MerCruiser engines with emissions control.

Acetoxy silicone sealants and other compounds in the exhaust stream can damage oxygen sensors and catalysts. Do not use nonapproved compounds and sealants. Oxime silicone sealants and Loctite 587 High Performance Blue can be safely used with catalyzed engines.

Fiberglass, a silica-based material, can contaminate the catalyst and the oxygen sensors. To reduce the possibility that the engine will ingest harmful fiberglass and thereby poison the emission control components, protect the engine from fiberglass dust and debris during construction and clean-up.

Fluid Specifications

Engine

IMPORTANT: All capacities are approximate fluid measures.

All Models	Capacity	Fluid Type
Engine oil (with filter)	6.5 L (7 US qt)	Mercury/Quicksilver 25W-40 Synthetic Blend NMMA FC-W Catalyst Compatible
Seawater cooling system (winterization use only)	20 L (21 US qt)	Propylene glycol and purified water
Closed cooling system	17.4 L (18.4 US qt)	Mercury Extended Life Coolant Antifreeze or extended life ethylene glycol 5/100 antifreeze mixed 50/50 with purified water

NOTICE

Using propylene glycol antifreeze in the closed cooling system can damage the cooling system or the engine. Fill the closed cooling system with an ethylene glycol antifreeze solution suitable to the lowest temperature to which the engine will be exposed.

Bravo Sterndrives

NOTE: *Oil capacity includes gear lube monitor.*

Model	Capacity	Fluid Type
Bravo One	3209 ml (108-1/2 oz)	High Performance Gear Lubricant
Bravo Two	3682 ml (124-1/2 oz)	
Bravo Three (single seawater pickup)	3445 ml (116-1/2 oz)	
Bravo Three (dual seawater pickup)	3209 ml (108-1/2 oz)	

Power-Assisted Steering and Power Trim Fluids

Approved Power-Assisted Steering Fluids

Description	Part Number
Power Trim and Steering Fluid	92-858074K01

Approved Power Trim Fluids

Description	Part Number
Power Trim and Steering Fluid	92-858074K01
SAE Engine Oil 10W-30	Obtain locally
SAE Engine Oil 10W-40	

Notes:

Section 4 - Maintenance

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Additional Operation Instructions for Axius Systems

If your boat has DTS engines equipped with an Axius system, refer also to the **Axius Operation Manual** included with the boat.

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 onboard 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, special fuel delivery and exhaust systems provide greater performance, fuel economy, and lower exhaust emissions. 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.

MerCruiser Gas Sterndrive Inspection and Maintenance Schedule

New sterndrive installations may require as much as 470 mL (16 fl oz) of gear lube added to the monitor bottle during the break-in period (20 hours of running time). It is important to monitor and maintain the gear lube level during the break-in period. During the initial drive installation, air may be trapped in the top of the driveshaft housing. This void is filled from the gear lube monitor during the sterndrive break-in period. As the air is purged from the sterndrive through the monitor bottle, the lube level in the bottle will drop.

Daily Checks

- Check the engine oil level
- Check the power steering fluid level
- Check the power trim pump fluid level
- Check the sterndrive gear oil level
- Check the lanyard stop switch

After Each Use

- Flush the engine with fresh water, brackish or saltwater use only

Weekly Checks

- Check the seawater inlets for marine growth
- Clean the seawater strainer, if equipped
- Check the coolant level, if equipped
- Inspect the anodes
- Verify the operation of the MerCathode module, if equipped

Every Two Months or 50 Hours

- Lubricate the engine coupler [1.]

Annually or 100 Hours

- Lubricate the engine coupler [1.]
- Lubricate the propeller shaft splines
- Clean the gauges and check wire connection—dealer item
- Check the torque of the proper nut

1. Power packages that are used extensively at idle or trolling speeds must have the coupler lubricated every 50 hours.

- Check the battery condition and connections—dealer item
- Touch up any paint nicks and spray the power package with Corrosion Guard
- Change the engine oil and filter
- Change the sterndrive gear oil
- Check the closed cooling fluid level and concentration for freeze protection, if equipped
- Replace the water-separating fuel filter
- Clean the crankcase vent—8.2L only
- Clean the IAC muffler—8.2L only
- Clean the flame arrestor—8.2L only
- Inspect the condition of the accessory drive belt—dealer item
- Tighten the connection of the gimbal ring to the steering shaft—dealer item
- Check the steering system for loose components—dealer item
- Check the remote control system for loose components—dealer item
- Check the MerCathode module operation for proper protection and check the continuity circuit—dealer item
- Replace the PCV valve
- Jackshaft models—check U-joints and tailstock bearings—dealer item
- Spray the power package with Corrosion Guard
- Inspect anodes, if equipped

Three Years or 300 Hours

- Inspect the spark plugs and spark plug wires [2.]
- Clean the flame arrestor and crankcase vent hoses
- Check the engine mount fasteners for tightness and tighten to the specified torque—dealer item
- Check the electrical system for loose, damaged, or corroded fasteners—dealer item
- Check the exhaust and cooling system hose clamps for tightness. Inspect for damage or leaks—dealer item.
- Inspect and clean seawater side of closed cooling system, if equipped—dealer item
- Clean, inspect, and test the closed cooling pressure cap, if equipped—dealer item
- Inspect seawater pump. Replace worn components—dealer item.
- Inspect the exhaust system. If the power package is equipped with water shutters, verify they are not missing or damaged —dealer item.
- Check the engine alignment—dealer item
- Inspect the gimbal housing bellows and verify clamp tightness—dealer item
- Inspect the gimbal bearing for roughness—dealer item
- Lubricate the engine coupler—dealer item
- Replace the vent valve on each exhaust elbow, port and starboard, if equipped—dealer item

Five Years or 500 Hours

- Replace the antifreeze—replace the antifreeze every two years if not using extended life antifreeze—dealer item

Engine Oil

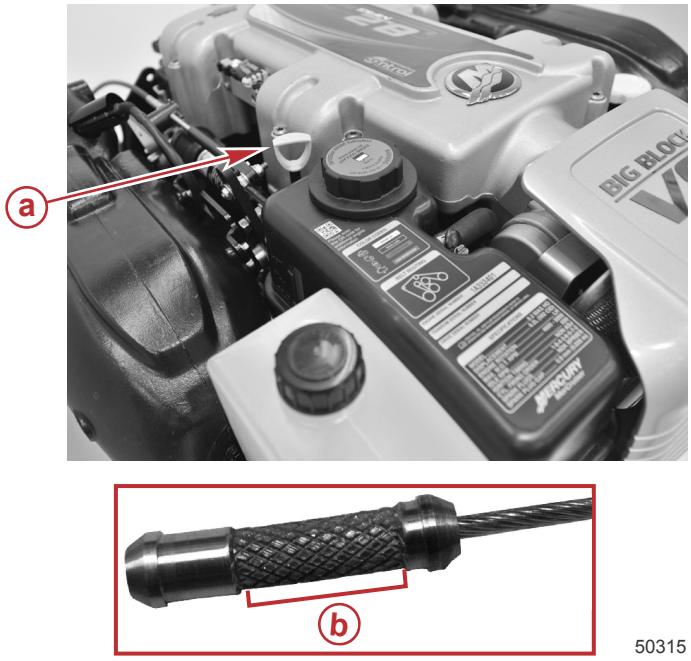
NOTICE
Discharge of oil, coolant, or other engine/drive fluids into the environment is restricted by law. Use caution not to spill oil, coolant, or other fluids into the environment when using or servicing your boat. Be aware of the local restrictions governing the disposal or recycling of waste, and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

Checking

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. Inspect the condition of the spark plugs and spark plug wires. Replace as necessary. If the condition of these components is satisfactory, repeat the inspection every 100 hours or once a year, whichever occurs first.

2. Remove the dipstick. Wipe clean and install fully into the dipstick tube. Wait 60 seconds to allow trapped air to vent.



50315

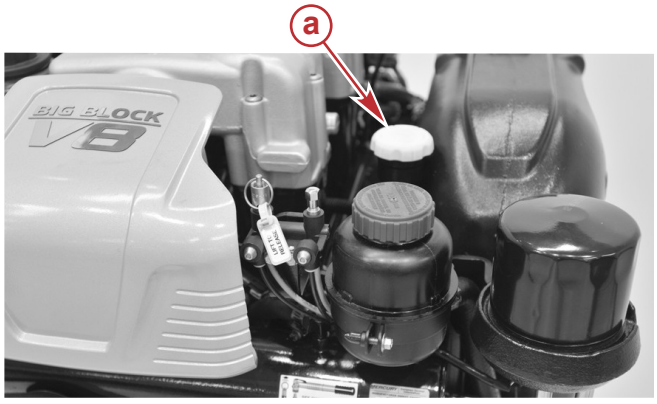
a - Oil dipstick handle
b - Operating range

3. Remove the dipstick and observe the oil level. Oil level must be in the operating range. Install the dipstick into the dipstick tube.

Filling

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

1. Remove oil fill cap.



50316

a - Oil fill cap

2. Add the specified engine oil to bring the level up to, but not over, the operating range mark on the dipstick. Check the oil level.
3. Replace the fill cap.

All Models	Capacity	Fluid Type
Engine oil (with filter)	6.5 Liter (7 US qt)	Mercury 25W-40 Synthetic Blend 4-Stroke Engine Oil

Changing Oil and Filter

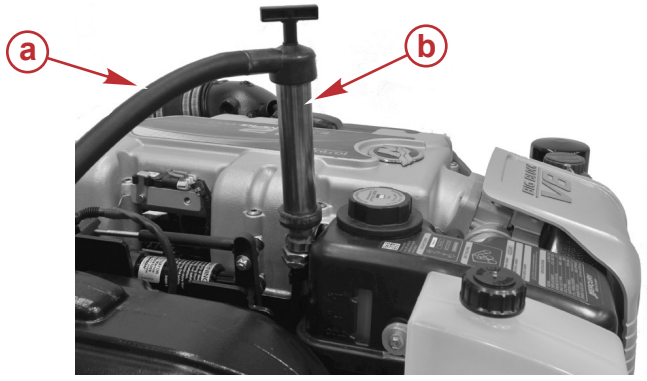
See **Maintenance Schedule** for the change interval. Engine oil should be changed before placing the boat in storage.

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 the Specifications section).

Oil Removal with Drain Pump

1. Loosen the oil filter to vent the system.

2. Remove the dipstick.
3. Install the oil drain pump onto the dipstick tube.



50335

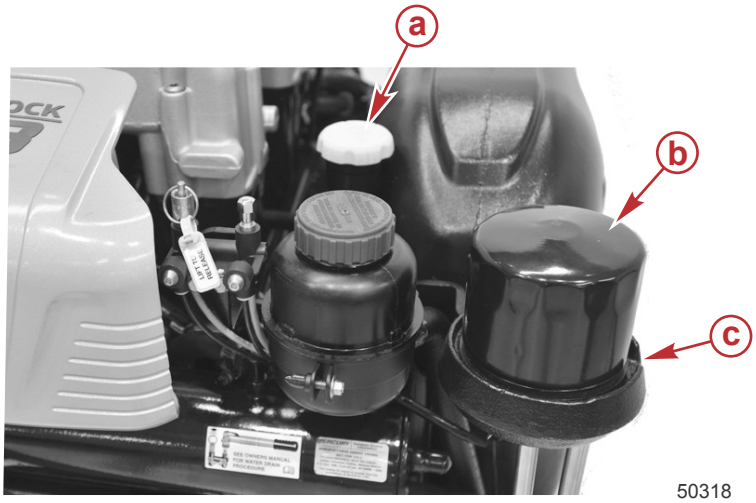
a - Oil drain hose
b - Oil drain pump

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

Changing the Oil Filter

NOTE: *Keep oil off the exhaust manifold and also the serpentine belt.*

1. Remove and discard the oil filter. If any oil escapes from the oil filter, it will exit the oil drain slot. Place a container below the oil drain slot to catch any oil.



50318

a - Oil fill cap
b - Oil filter
c - Oil drain slot

2. Coat the sealing ring on the new filter with engine oil.
3. Install and tighten the oil filter securely following the filter manufacturer's instructions. Do not overtighten.
4. Remove the oil fill cap.
5. Use the dipstick to determine the amount of engine oil required. Replace the dipstick.
6. Add the required amount of the recommended oil to bring the level up to the bottom of the OK range on the dipstick.
7. With the boat at rest in the water, repeat steps 5 and 6 if necessary.

   NOTE: *Adding 0.95 L (1 US qt) of engine oil raises the level from the bottom of the operating range to the top of the operating range.*

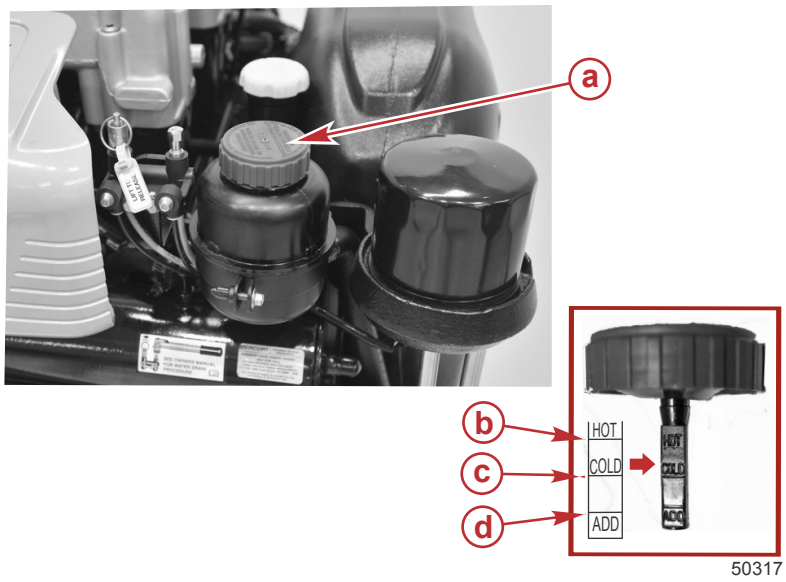
All Models	Capacity	Fluid Type
Engine oil (with filter)	6.5 L (7 US qt)	Mercury 25W-40 Synthetic Blend 4-Stroke Engine Oil

8. Start the engine and operate for three minutes, checking for leaks.
9. Stop the engine and allow the oil to drain into the oil pan for approximately five minutes with the boat at rest in the water.

Power-Assisted Steering Fluid

Checking

1. Stop the engine and center the sterndrive unit.
   IMPORTANT: If fluid is not visible on the fill cap dipstick, contact your authorized Mercury MerCruiser dealer.
2. Remove the fill cap from the power steering fluid reservoir and observe the level. The oil level should be at the full mark on the dipstick.



a - Fill cap
b - Full mark (engine hot)
c - Full mark (engine cold)
d - Add mark

3. Add the specified fluid if necessary. Refer to **Filling**.

Filling

1. Remove the fill cap and dipstick and observe the fluid level.
2. Add the specified fluid to bring the fluid level up to the proper level.

Tube Ref No.	Description	Where Used	Part No.
114	Power Trim and Steering Fluid	Power-assisted steering system	92-858074K01
28	Dexron III Automatic Transmission Fluid	Power-assisted steering system	Obtain Locally

3. Install the fill cap and dipstick.

Changing

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

Closed Cooling System

Coolant Requirement

NOTICE
Using propylene glycol antifreeze in the closed cooling system can damage the cooling system or the engine. Fill the closed cooling system with an ethylene glycol antifreeze solution suitable to the lowest temperature to which the engine will be exposed.

NOTE: *All factory-installed closed cooling systems come filled with Extended Life Coolant. This antifreeze requires draining and replacing every five years or 1000 hours of operation, whichever comes first. The color of this antifreeze is orange. Any "top-off" fluid used must be Extended Life Coolant.*

Tube Ref No.	Description	Where Used	Part No.
122	Extended Life Antifreeze/Coolant	Closed cooling system	92-877770K1

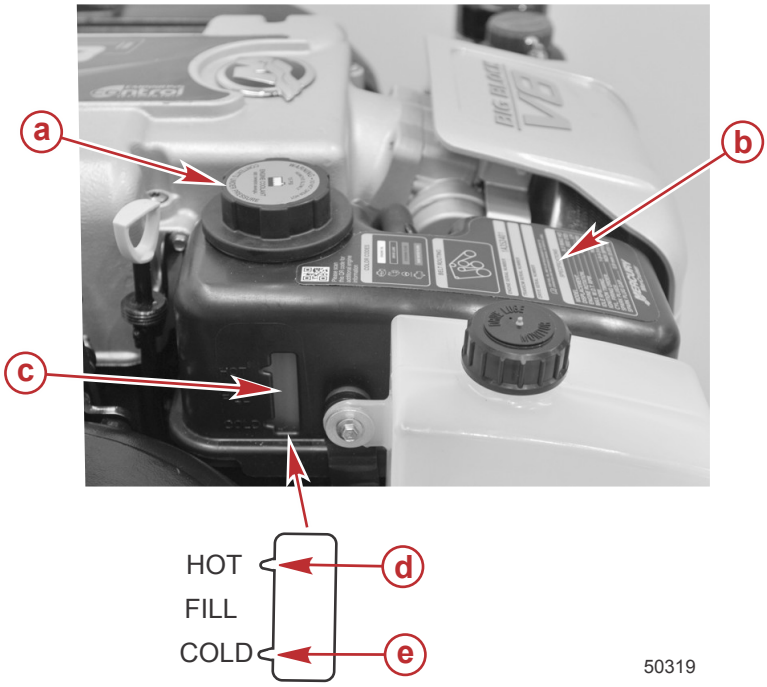
Checking Coolant Level

⚠ CAUTION

A sudden loss of pressure can cause hot coolant to boil and discharge violently resulting in serious injury from burns. Allow the engine to cool down before removing the coolant pressure cap.

IMPORTANT: When reinstalling the coolant reservoir cap, ensure that it is tightened securely.

The coolant level should be at the full mark on the coolant reservoir with the engine cold.



a - Coolant reservoir cap
b - Coolant reservoir
c - Sight window
d - Full mark (engine hot)
e - Full mark (engine cold)

Filling the Closed Cooling System

IMPORTANT: The engine must be cooled to ambient temperature to correctly perform the following procedure.

NOTICE

Using propylene glycol antifreeze in the closed cooling system can damage the cooling system or the engine. Fill the closed cooling system with an ethylene glycol antifreeze solution suitable to the lowest temperature to which the engine will be exposed.

The coolant section of the closed cooling system must be filled with a 50/50 mixture of Extended Life Antifreeze/Coolant and distilled water.

Tube Ref No.	Description	Where Used	Part No.
122	Extended Life Antifreeze/Coolant	Closed cooling system	92-877770K1

NOTE: *The coolant section capacity is approximately 17.4 Liter (18.4 US qt).*

	8.2 (502 cid)
Closed cooling system	17.4 Liter (18.4 US qt)

⚠ CAUTION

A sudden loss of pressure can cause hot coolant to boil and discharge violently resulting in serious injury from burns. Allow the engine to cool down before removing the coolant pressure cap.

IMPORTANT: When filling the coolant section after it has been completely drained, the engine should be level or slightly lower at the flywheel end.

1. Remove the coolant reservoir cap from the coolant reservoir.
2. Fill the reservoir to the full mark with the recommended coolant solution.

3. Replace the pressure cap.

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.

4. Supply cooling water to the engine.
5. With the engine running, check the hose connections, fittings, and gaskets for leaks. Also observe the engine temperature gauge to ensure that the engine operating temperature is normal. If the gauge indicates excessive temperature, stop the engine immediately and determine the cause.

⚠ CAUTION
A sudden loss of pressure can cause hot coolant to boil and discharge violently resulting in serious injury from burns. Allow the engine to cool down before removing the coolant pressure cap.

6. After the engine has cooled completely, recheck the coolant level and add coolant, if necessary.
7. If the reservoir was completely emptied of coolant, a significant amount of air remains in the cooling system. Refill the reservoir to the full mark, repeat the warm-up/cool-down cycle, and check the coolant level again.
8. Maintain the coolant level in the reservoir at or near the full mark with the engine cold.

Draining

Contact your authorized Mercury MerCruiser dealer.

Cleaning

Contact your authorized Mercury MerCruiser dealer.

Sterndrive Gear Lube

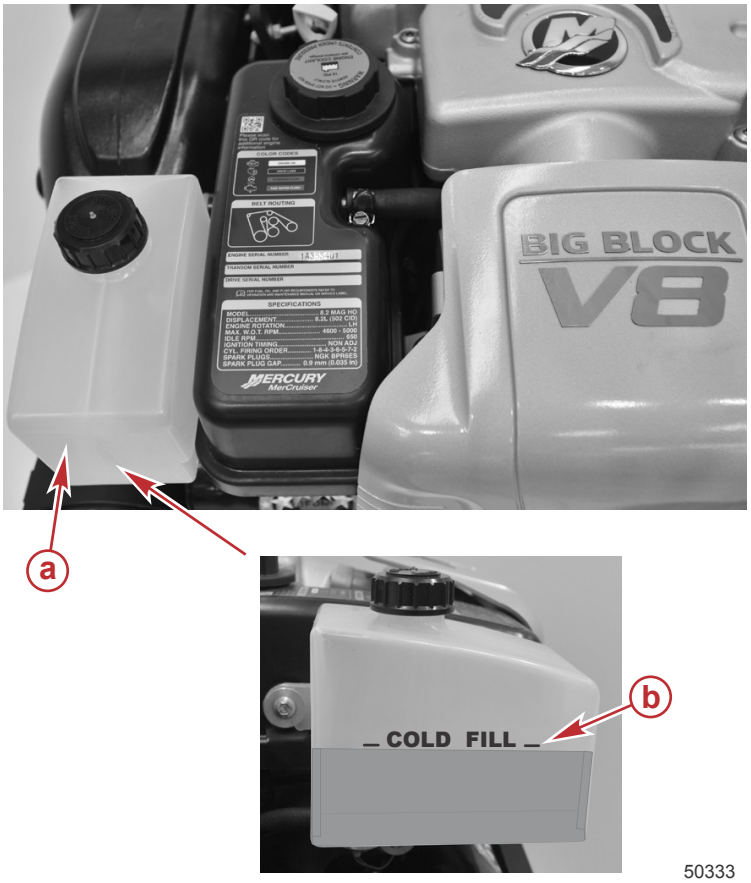
Checking

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.

NOTE: *The oil level fluctuates during operation, so check with the engine cold before starting.*

1. Check the gear lube level. Keep the gear lube at the recommended level.

2. Inspect the lubricant condition. If any water is visible at the bottom of the gear lube monitor, if water appears at the fill and drain plug hole, or if the gear lube appears discolored, contact your authorized Mercury MerCruiser dealer immediately. These conditions can indicate a water leak in the sterndrive.



a - Gear lube monitor
b - Recommended gear lube level

Filling

New installations may require as much as 470 mL (16 fl oz) of gear lube added to the monitor bottle during the break-in period (20 hours of running time). It is important to monitor and maintain the gear lube level during the break-in period.

IMPORTANT: The gear lube monitor must be checked and filled if necessary at the beginning of each day when the engine is cold. If the gear lube alarm sounds during the day's activity, add the appropriate amount of gear lube to the monitor bottle.

NOTE: *If filling the entire sterndrive, see* ***Changing****.*

1. Remove the gear lube monitor cap.
2. Fill the monitor with the specified fluid until the gear lube is at the recommended level. Do not overfill.

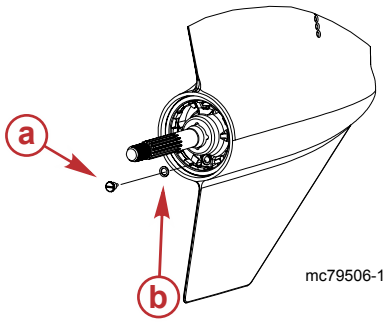
Tube Ref No.	Description	Where Used	Part No.
87	High Performance Gear Lubricant	Gear lube monitor	92-858064K01

3. Replace the cap.

Changing

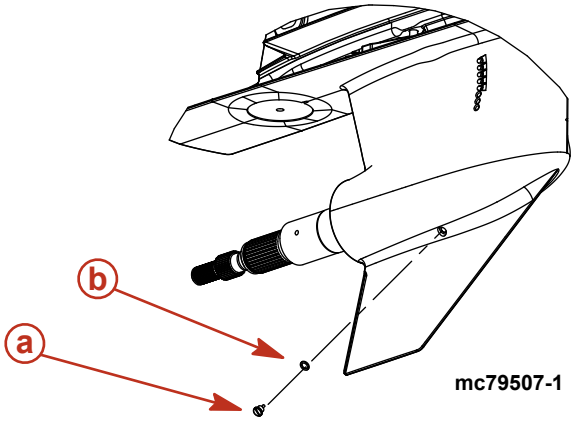
1. Remove the gear lube monitor from the bracket.
2. Empty the contents into a suitable container.
3. Install the gear lube monitor in the bracket.
4. Bravo One models:
   a. Remove the propeller.
   b. Position the sterndrive unit to the full down position.
   c. Remove the oil fill and drain screw and sealing washer.

d. Drain the fluid into a suitable container.



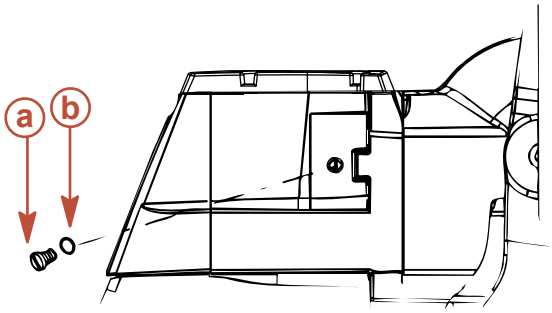
a - Oil fill and drain screw
b - Sealing washer

5. All other models:
   a. Place the sterndrive unit in full trim out position.
   b. Remove the oil fill and drain screw and sealing washer.
   c. Drain the fluid into a suitable container.



a - Oil fill and drain screw
b - Sealing washer

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



a - Oil vent screw
b - Sealing washer

IMPORTANT: If any water drains from the unit, or if the fluid appears milky, the sterndrive unit is leaking. See your authorized Mercury MerCruiser dealer.

7. Lower the sterndrive unit so the propeller shaft is level.
   IMPORTANT: Use only Mercury/Quicksilver High Performance Gear Lubricant in the sterndrive unit.
8. Fill the sterndrive unit through the oil fill and drain hole with specified gear lubricant until an air-free stream of lubricant flows from the oil vent hole.

Tube Ref No.	Description	Where Used	Part No.
87	High Performance Gear Lubricant	Sterndrive unit	92-858064K01

9. Install the oil vent screw and sealing washer.
10. Continue to pump gear lubricant into the drive through the oil fill and drain hole until gear lubricant appears in the gear lube monitor.
11. Fill the monitor so that the oil level is in the operating range. Do not overfill.
12. Ensure that the rubber gasket is inside the cap and install. Do not overtighten.

NOTE: *Oil capacities include the gear lube monitor.*

Model	Capacity	Fluid Type
Bravo One	3209 ml (108-1/2 oz)	High Performance Gear Lubricant
Bravo Two	3682 ml (124-1/2 oz)	
Bravo Three (single seawater pickup)	3445 ml (116-1/2 oz)	
Bravo Three (dual seawater pickup)	3209 ml (108-1/2 oz)	

13. Remove the pump from the oil fill and drain hole. Quickly install the sealing washer and screw. Tighten securely.
14. Install the propeller. Refer to **Propellers**.
15. Check the oil level after the first use.

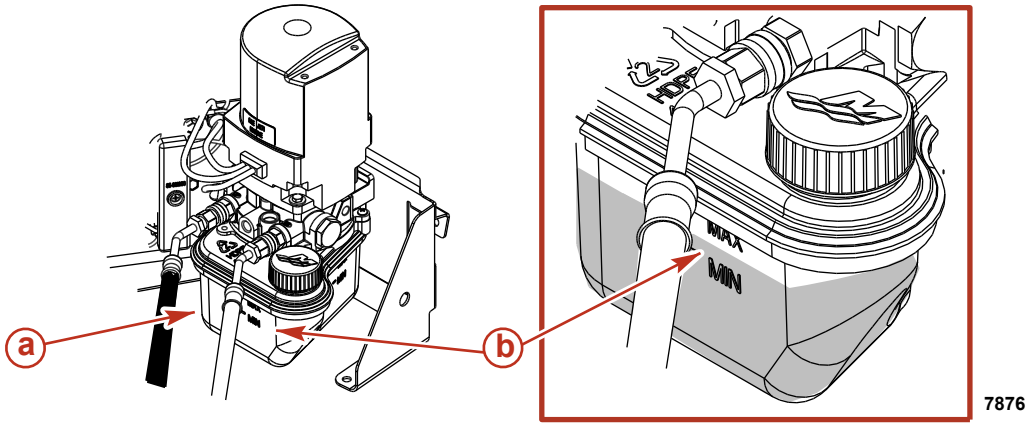
IMPORTANT: Oil level in the gear lube monitor rises and falls during operation. Always check the oil level when the sterndrive is cool and the engine is off.

Power Trim Fluid

Checking

IMPORTANT: Check the oil level with the sterndrive unit in the full down/in position only.

1. Place the sterndrive unit in full down/in position.
2. Observe the oil level. Level must be between the "MIN" and "MAX" lines on the reservoir.



a - Reservoir
b - "MIN" and "MAX" lines

3. Fill as necessary with the specified fluid.

Tube Ref No.	Description	Where Used	Part No.
114	Power Trim and Steering Fluid	Power trim pump	92-858074K01

Filling

1. Remove the fill cap from the reservoir.

   NOTE: *Fill cap is vented.*
2. Add lubricant to bring level to the within the "MIN" and "MAX" lines on the reservoir.

Tube Ref No.	Description	Where Used	Part No.
114	Power Trim and Steering Fluid	Power trim pump	92-858074K01

3. Install the cap.

Changing

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

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 ECMs 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.

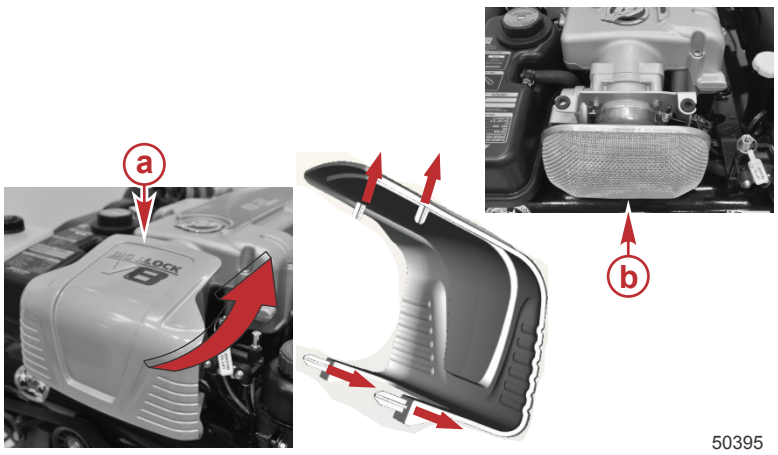
Generators: The generator's battery should be considered another engine's battery.

Cleaning the Flame Arrestor

⚠ WARNING

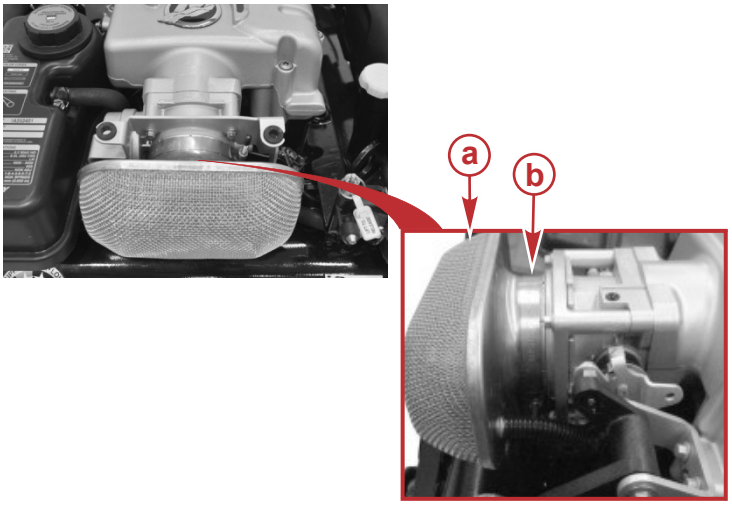
Fuel is flammable and explosive. Ensure that the key switch is off and the lanyard is positioned so that the engine cannot start. Do not smoke or allow sources of spark or open flame in the area while servicing. Keep the work area well ventilated and avoid prolonged exposure to vapors. Always check for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

1. Gently lift the top back edge of the silencer and pull forward to remove.



a - Silencer
b - Flame arrestor

2. Loosen the flame arrestor clamp and remove the flame arrestor.



50396

a - Flame arrestor
b - Flame arrestor clamp

3. Clean the flame arrestor with solvent and dry with compressed air or set aside and allow to air dry completely.
4. Install the flame arrestor and tighten the clamp to the specified torque.

Description	Nm	lb-in.	lb-ft
Flame arrestor clamp	6.2	55	–

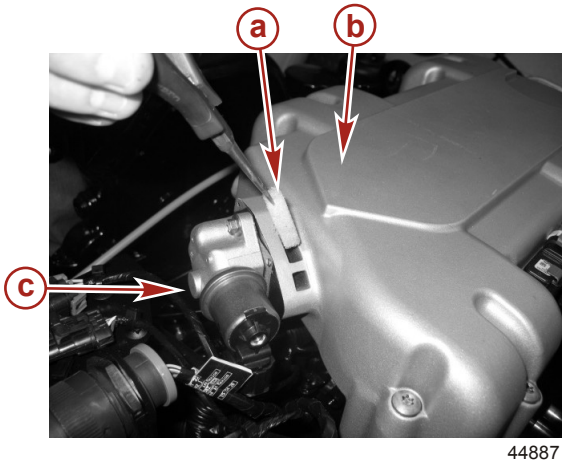
5. Install the silencer.

Cleaning the IAC Muffler (Non-DTS Models Only)

⚠ 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. Locate the idle air control valve (IAC) on the rear of the engine.
2. Remove the IAC muffler from the slot in the plenum.



44887

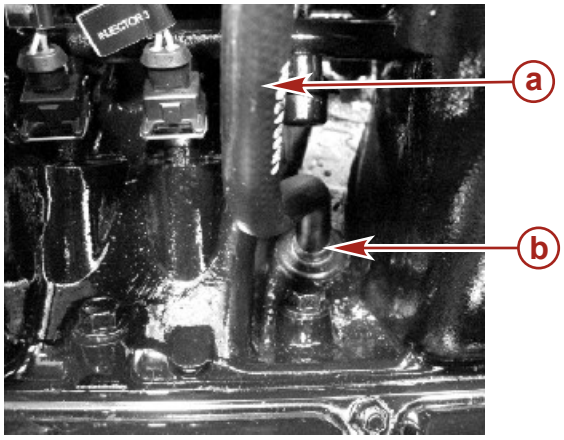
a - IAC muffler
b - Plenum
c - IAC

3. Inspect the muffler for holes, cracks, or deterioration. Replace if damaged.
   IMPORTANT: Do not use a cleaner that contains methyl ethyl ketone and do not use cleaner on electrical connections.
4. Clean the muffler with warm water and mild detergent. Replace if necessary.
5. Allow the IAC muffler to dry completely before use.
6. Install the IAC muffler.

Changing the Positive Crankcase Ventilation Valve (PCV)

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

1. Pull the PCV valve out of the intake manifold and remove the PCV valve from the hose.



a - Hose from plenum to PCV valve
b - PCV valve

43215

2. Inspect the PCV valve and replace if necessary.
3. Install the PCV valve into the intake manifold.
4. Ensure that the PCV valve is tightly seated into the intake manifold.

We recommend the use of Mercury MerCruiser replacement parts.

Water-Separating Fuel Filter

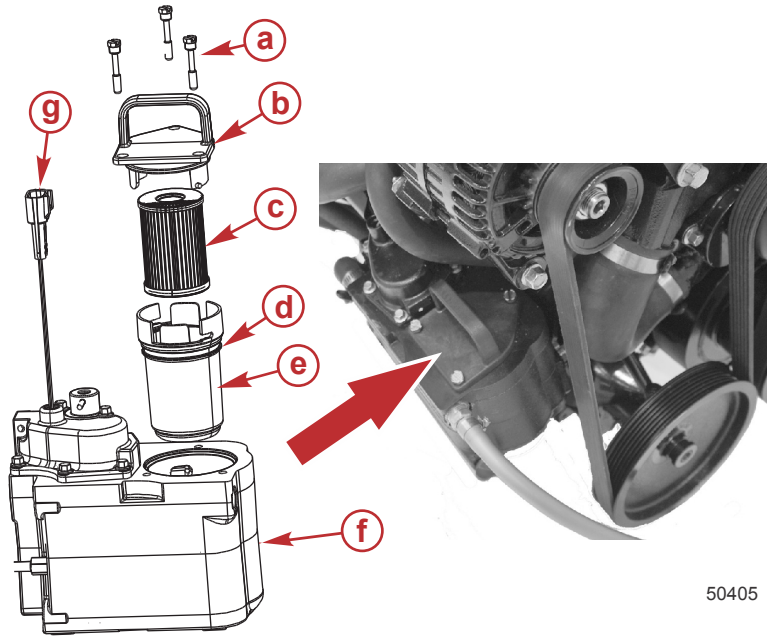
⚠ WARNING

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.

⚠ CAUTION

Failure to release pressure from the fuel system will result in fuel spraying out, which can cause a fire or explosion. Allow the engine to cool completely and release all fuel pressure before servicing any part of the fuel system. Always protect eyes and skin from pressurized fuel and vapors.

Removal and Installation



a - Filter assembly retaining screw
b - Filter cap
c - Fuel filter element
d - O-ring
e - Filter cup
f - Cool Fuel Module
g - Cool Fuel Module harness

Removal

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. Disconnect the Cool Fuel Module harness from the engine wiring harness.
4. Turn the key switch to the start position and allow the starter to operate for five seconds.
5. Turn key switch to off position.
6. Loosen each filter assembly retaining screw until the screw is disengaged from the Cool Fuel Module. Do not remove the filter assembly retaining screws from the filter cap.
7. Unseat the filter assembly by grasping the filter cap handle and pulling upward. Do not remove the filter assembly from the Cool Fuel Module at this time.
8. Allow any fuel that may be in the filter assembly to drain out through the bottom of the filter assembly and into the Cool Fuel Module filter reservoir.
9. Remove the filter cup from the filter cap by grasping the filter cap and rotating it in a clockwise direction while holding the filter cup stationary.
10. Remove the used water-separating fuel filter element from the filter cup, place it in a clean, approved container.
11. Dispose of any water or debris that may be in the filter cup.

Installation

1. Install a new water-separating fuel filter element into the filter cup. Push the element into the cup until completely seated.
2. Install new O-ring on the filter cup.
3. Attach the filter cap to the filter cup by grasping the filter cap and rotating it in a counterclockwise direction while holding the filter cup stationary, until the filter cap locks securely into place.
4. Install the fuel filter assembly slowly into the Cool Fuel Module to prevent spilling fuel, and align the screws retained in the filter cap with the screw holes in the Cool Fuel Module. Tighten the filter assembly retaining screws until hand-tight.
5. Ensure that the filter cap is firmly seated against the Cool Fuel Module and torque each filter assembly retaining screw.

Description	Nm	lb-in.	lb-ft
Filter assembly retaining screw	6	53	–

6. Open the fuel supply valve, if equipped.
7. Reconnect the Cool Fuel Module harness to the engine wiring harness.
8. Properly ventilate the engine compartment.

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.

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. Check 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

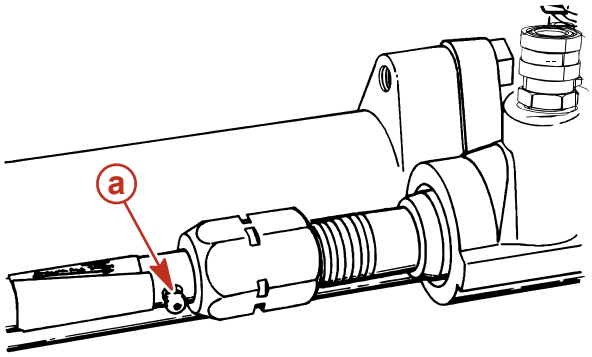
Steering System

⚠ WARNING

Incorrect cable lubrication can cause hydraulic lock, leading to serious injury or death from loss of boat control. Completely retract the end of the steering cable before applying lubricant.

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

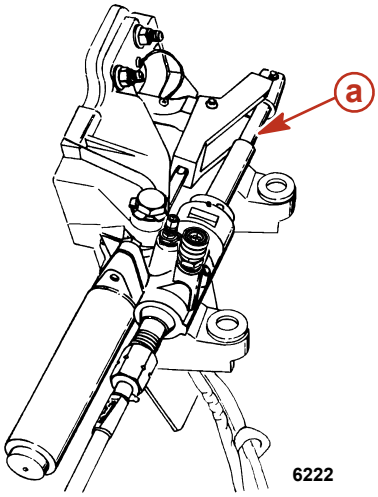
1. **If the steering cable has grease fittings:** Turn the steering wheel until the steering cable is fully retracted into the cable housing. Apply approximately three pumps of grease from a typical hand-operated grease gun.



a - Steering cable grease fitting

Tube Ref No.	Description	Where Used	Part No.
	Extreme Grease	Steering cable grease fitting	8M0071842

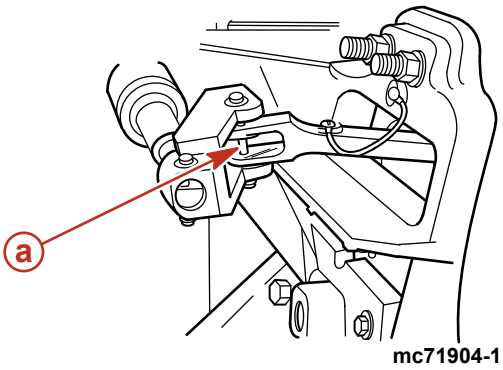
2. Turn the steering wheel until the steering cable is fully extended. Lightly lubricate the exposed part of the cable.



a - Extended steering cable

Tube Ref No.	Description	Where Used	Part No.
	Extreme Grease	Steering cable	8M0071842

3. Lubricate the steering pin.



a - Steering pin

Tube Ref No.	Description	Where Used	Part No.
139	Mercury 25W-40 Synthetic Blend 4-Stroke Engine Oil	Steering pin	92-8M0078629

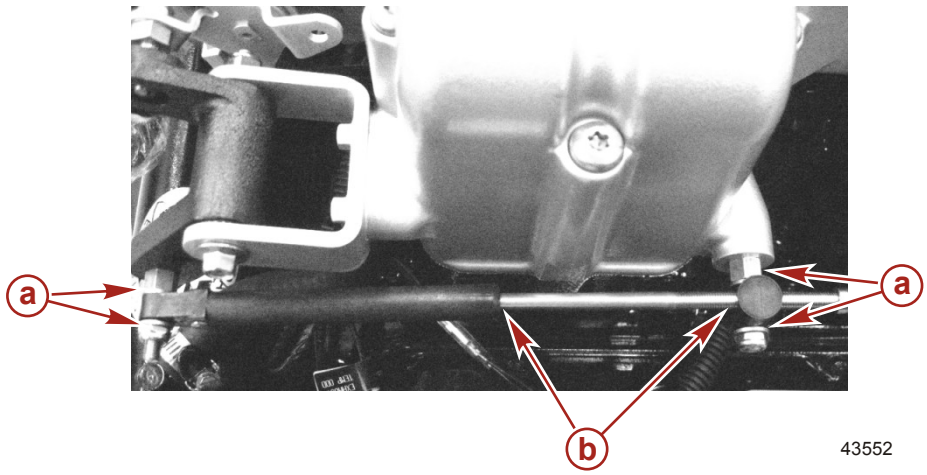
4. On dual engine boats: Lubricate the tie bar pivot points.

Tube Ref No.	Description	Where Used	Part No.
139	Mercury 25W-40 Synthetic Blend 4-Stroke Engine Oil	Tie bar pivot points	92-8M0078629

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

Throttle Cable

Lubricate the pivot points and the guide contact surfaces.

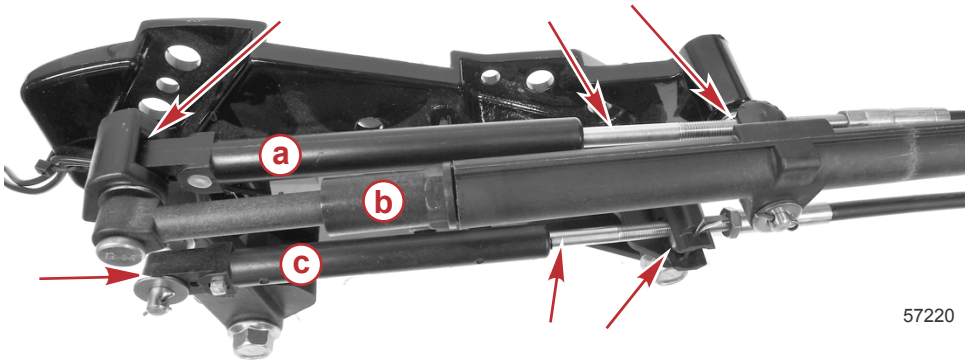


a - Pivot points
b - Guide contact surfaces

Tube Ref No.	Description	Where Used	Part No.
139	Mercury 25W-40 Synthetic Blend 4-Stroke Engine Oil	Throttle cable pivot points and guide contact surfaces	92-8M0078629

Shift Plate Control Cable Lubrication

Lubricate the points shown in the following illustration with oil at least once a year, more often if the product is operated in saltwater.

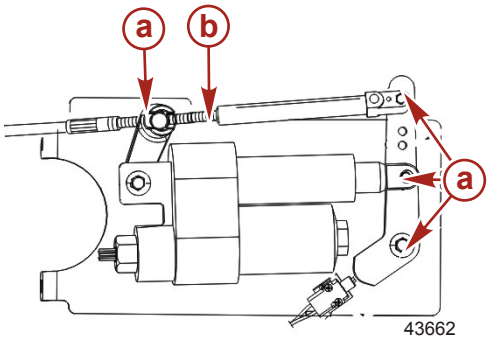


Alpha shift plate shown, Bravo shift plate similar

- **a -** Remote control shift cable
- **b -** Shift assist assembly
- **c -** Intermediate shift cable

Shift Cable - DTS

Lubricate the pivot points and the guide contact surfaces.

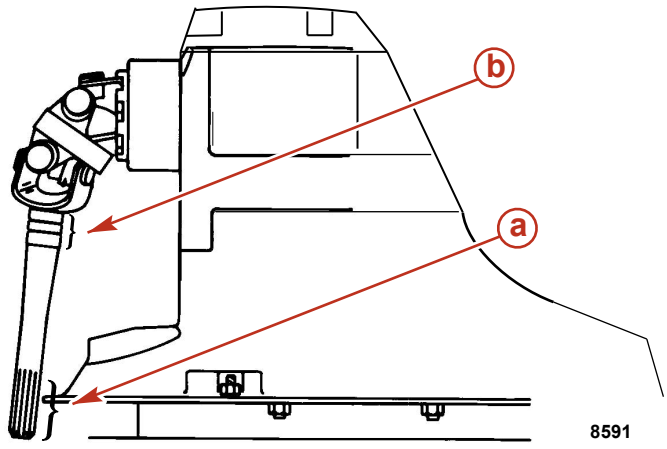


- **a -** Pivot points
- **b -** Guide contact surfaces

Tube Ref No.	Description	Where Used	Part No.
139	Mercury 25W-40 Synthetic Blend 4-Stroke Engine Oil	Shift cable pivot points and guide contact surfaces	92-8M0078629

Driveshaft U-joint Splines and O-Rings (Sterndrive Unit Removed)

1. Apply grease to the driveshaft U-joint splines and O-rings.



- **a -** Driveshaft U-joint splines
- **b -** O-rings (3)

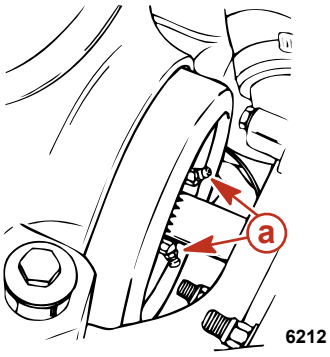
Tube Ref No.	Description	Where Used	Part No.
	Extreme Grease	Driveshaft U-joint splines and O-rings	8M0071842

2. For propeller shaft lubrication, refer to **Propellers**.

Engine Coupler

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

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



Bravo drive coupler

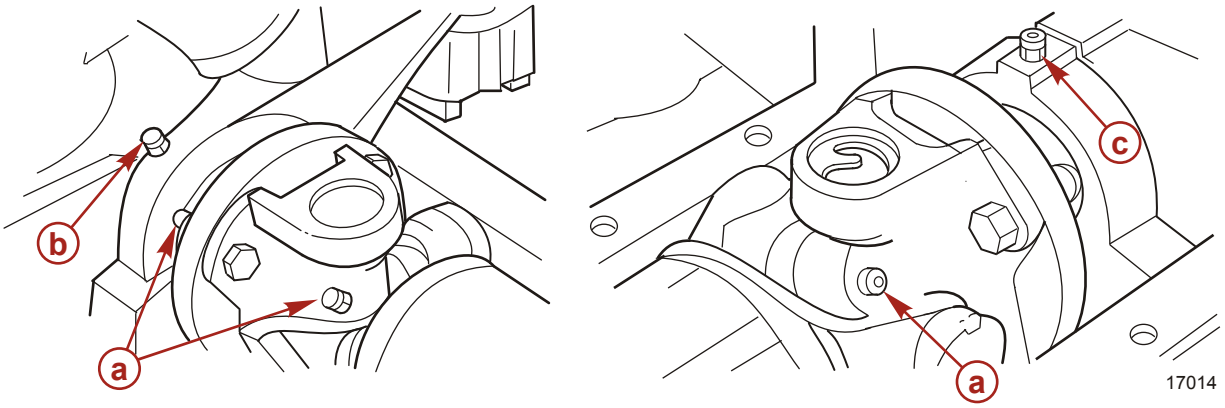
a - Grease fitting

Tube Ref No.	Description	Where Used	Part No.
	Extreme Grease	Engine coupler splines	8M0071842

NOTE: *The coupler and shaft splines can be lubricated without removing the sterndrive unit. Apply lubricant from a typical hand-operated grease gun until a small amount of grease begins to push out.*

Driveshaft Extension Models

1. Lubricate the transom end grease fitting and engine end grease fitting by applying approximately 10–12 pumps of grease from a typical hand-operated grease gun.
2. Lubricate the driveshaft grease fittings by applying approximately 3–4 pumps of grease from a typical hand-operated grease gun.



a - Driveshaft grease fittings
b - Transom end grease fitting
c - Engine end grease fitting

Tube Ref No.	Description	Where Used	Part No.
	Extreme Grease	Transom end grease fitting, engine end grease fitting, driveshaft grease fittings	8M0071842

Propellers

Propeller Repair

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

Bravo One Propeller Removal

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

Bravo One Propeller Installation

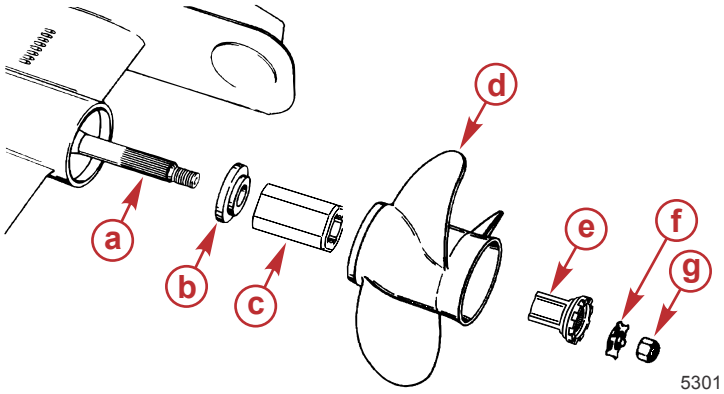
IMPORTANT: The selected propeller's rotation must match the forward gear direction of propeller shaft rotation.

1. Liberally lubricate the propeller shaft spline with one of the following Quicksilver lubricants.

Tube Ref No.	Description	Where Used	Part No.
95	2-4-C with PTFE	Propeller shaft splines	92-802859A 1
	Extreme Grease	Propeller shaft splines (saltwater only)	8M0071842

NOTE: *Extreme Grease is for saltwater applications only.*

2. Install the propeller with the attaching hardware as shown.
3. Tighten the propeller nut to the specified torque.



Typical Bravo One models

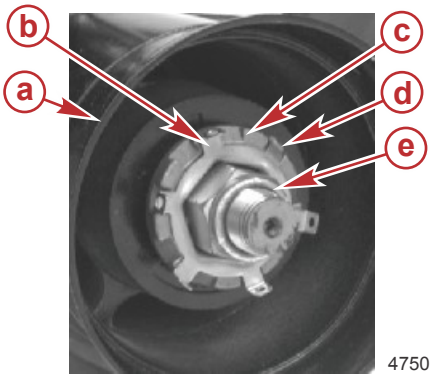
- **a -** Propeller shaft splines
- **b -** Forward thrust hub
- **c -** Flo-Torque II drive hub
- **d -** Propeller
- **e -** Drive sleeve adapter
- **f -** Tab washer
- **g -** Propeller nut

NOTE: *The specified torque is a minimum torque value.*

Description	Nm	lb-in.	lb ft
Bravo One propeller nut	136	–	100
	Then align tabs with grooves		

4. **Models equipped with the tab washer**: Continue to tighten the propeller nut until the three tabs on the tab washer align with the grooves on the spline washer.

5. Bend the three tabs down into the grooves.



a - Propeller
b - Tab washer
c - Drive sleeve adapter
d - Tab bent down
e - Propeller nut

Bravo Two Propeller Removal

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

Bravo Two Propeller Installation

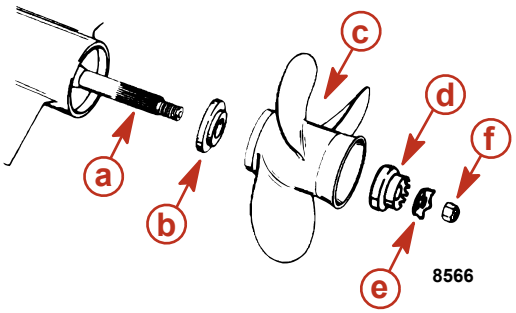
IMPORTANT: The selected propeller's rotation must match the forward gear direction of propeller shaft rotation.

1. Liberally coat the propeller shaft spline with one of the following Quicksilver lubricants.

Tube Ref No.	Description	Where Used	Part No.
95	2-4-C with PTFE	Propeller shaft splines	92-802859A 1
	Extreme Grease	Propeller shaft splines (saltwater only)	8M0071842

NOTE: *Extreme Grease is for saltwater applications only.*

2. Install the propeller with the attaching hardware as shown.
3. Tighten the propeller nut to the specified torque.



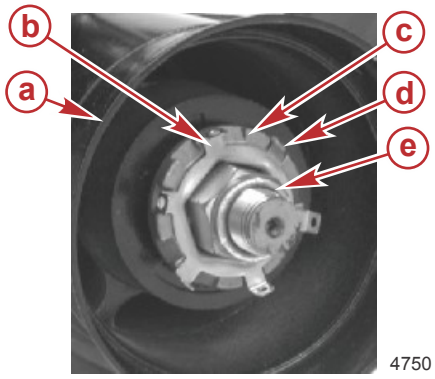
Bravo Two
a - Propeller shaft splines
b - Forward thrust hub
c - Propeller
d - Spline washer
e - Tab washer
f - Propeller nut

NOTE: *The torque stated is a minimum torque value.*

Description	Nm	lb-in.	lb ft
Bravo Two propeller nut	81	–	60
	Then align tabs with grooves		

4. Continue to tighten the propeller nut until the three tabs on the tab washer align with the grooves on the spline washer.

5. Bend the three tabs down into the grooves.



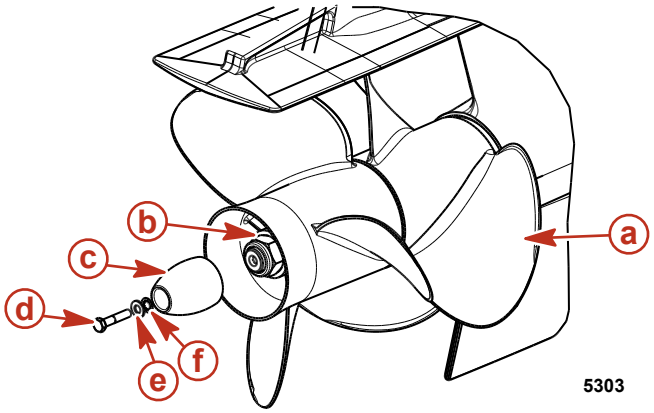
a - Propeller
b - Tab washer
c - Drive sleeve adapter
d - Tab bent down
e - Propeller nut

Bravo Three Propeller Removal

⚠ 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.

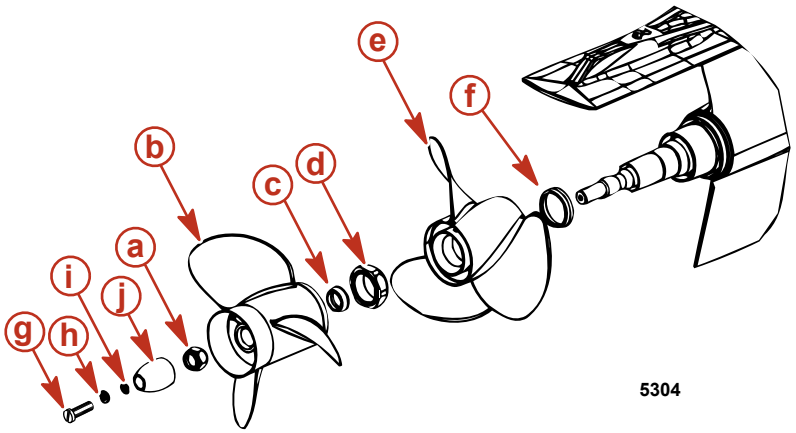
1. Place a wood block between the propeller blades and the anti-ventilation plate to prevent rotation.
2. Remove the bolt and washers securing the propeller shaft anode.
3. Remove the propeller shaft anode.



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

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

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

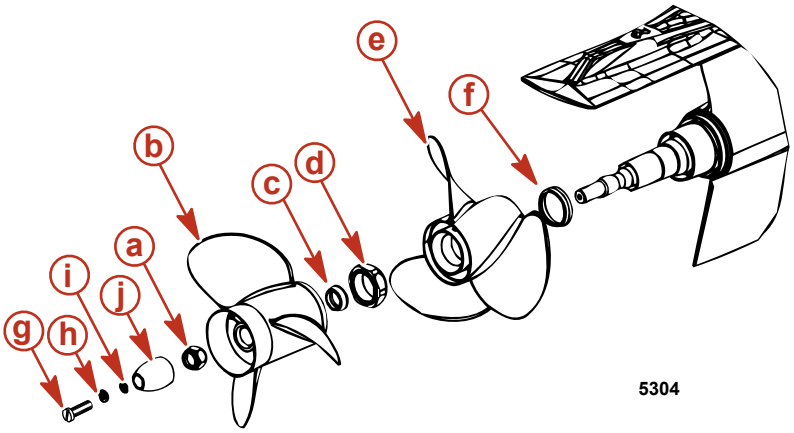


a - Rear propeller nut
b - Rear propeller
c - Rear propeller thrust hub
d - Front propeller nut
e - Front propeller
f - Front propeller thrust hub
g - Propeller shaft anode screw
h - Flat washer
i - Star washer
j - Propeller shaft anode

Bravo Three Propeller Installation

NOTICE

Operating the engine with a loose propeller can damage the propeller, the drive, or drive components. Always tighten the propeller nut or nuts to specification and check for tightness periodically and at the required maintenance interval.



- **a -** Rear propeller nut
- **b -** Rear propeller
- **c -** Rear propeller thrust hub
- **d -** Front propeller nut
- **e -** Front propeller
- **f -** Front propeller thrust hub
- **g -** Propeller shaft anode screw
- **h -** Flat washer
- **i -** Star washer
- **j -** Propeller shaft anode

1. Slide the front propeller thrust hub onto the propeller shaft with the outside taper facing toward the propeller hub (toward end of propeller shaft).
2. Apply a liberal amount of one of the following lubricants to the propeller shaft.

Tube Ref No.	Description	Where Used	Part No.
	Extreme Grease	Propeller shaft	8M0071842
95	2-4-C with PTFE	Propeller shaft	92-802859A 1

3. Align the splines and install the front propeller onto the propeller shaft.
4. Install the front propeller nut and tighten to the specified torque. Check the propeller every 20 hours of operation and tighten to the specified torque as needed.

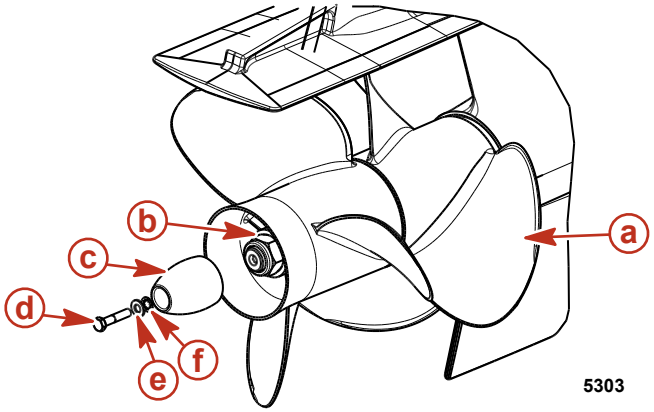
Description	Nm	lb-in.	lb-ft
Front propeller nut	136	–	100

5. Slide the rear thrust hub onto the propeller shaft with the outside taper facing toward the propeller hub (toward end of propeller shaft).
6. Align the splines and install the rear propeller onto the propeller shaft.
7. Install the rear propeller nut and tighten to the specified torque. Check the propeller every 20 hours of operation and tighten to the specified torque as needed.

Description	Nm	lb-in.	lb-ft
Rear propeller nut	81	–	60

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

11. Apply Loctite 271 Threadlocker onto the propeller shaft anode screw threads.



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

Tube Ref No.	Description	Where Used	Part No.
7	Loctite 271 Threadlocker	Propeller shaft anode screw threads	92-809819

12. Secure the propeller shaft anode to the propeller shaft with the propeller shaft anode screw and washers. Tighten the anode screw to the specified torque.

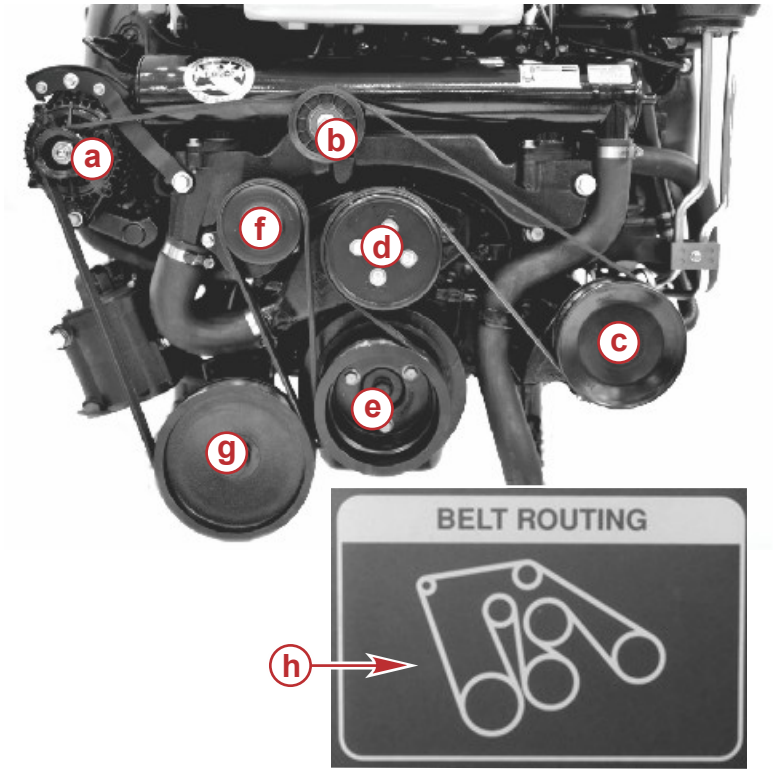
Description	Nm	lb-in.	lb-ft
Propeller shaft anode screw 38 mm (0.3125-18 x 1.5 in.) long	27	–	20

Serpentine Drive Belt

Inspection

⚠ WARNING

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



- **a -** Alternator pulley
- **b -** Idler pulley
- **c -** Power steering pump pulley
- **d -** Water circulating pump pulley
- **e -** Crankshaft pulley
- **f -** Tensioner pulley
- **g -** Seawater pump pulley
- **h -** Belt routing diagram

Checking

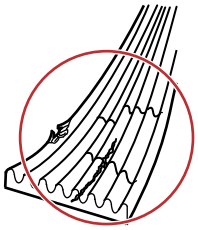
Inspect the drive belt for:

- Proper belt tension deflection
- Excessive wear
- Cracks
- Fraying
- Glazed surfaces
- Proper tension

Use moderate thumb pressure on the belt at the location with the longest distance between two pulleys.

Description	
Deflection	13 mm (1/2 in.)

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.*



21062

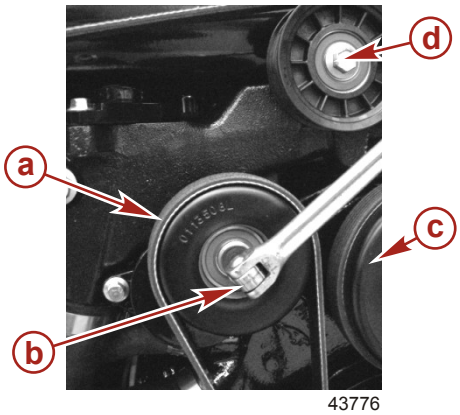
Replacing

IMPORTANT: If reusing a belt, install it in the same direction of rotation as before.

The belt tensioner operates within the limits of movement provided by the cast stops when the belt length and geometry are correct. If the tensioner contacts either of the cast stops during operation, check the mounting brackets and the belt length. Loose brackets, bracket failure, accessory drive component movement, incorrect belt length, or belt failure can cause the tensioner to contact the cast stops. See your authorized MerCruiser dealer for service if these conditions exist.

⚠ CAUTION
Rapid release of the belt tensioner, or allowing the tensioner to snap back quickly, could cause injury or product damage. Relieve the spring tension slowly.

1. Use a breaker bar and appropriate socket to relieve the tensioner. Rotate the tensioner away from the belt until it stops.
2. Remove the belt from the idler pulley and slowly relieve the tension on the breaker bar.

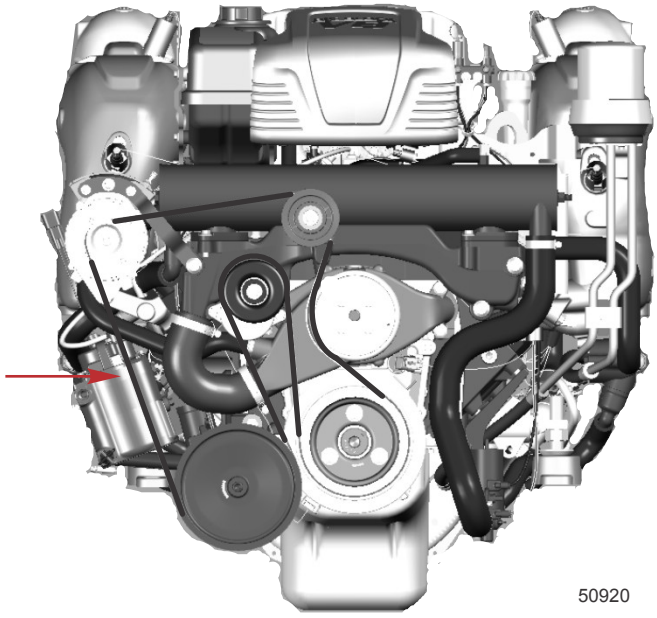


43776

a - Tensioner pulley
b - Socket and breaker bar
c - Water circulating pump pulley
d - Idler pulley

3. Remove the belt and route the replacement belt according to the belt routing diagram.
4. Carefully release the tensioner and ensure that the belt stays positioned properly.
5. Check the belt tension.

NOTE: *Proper tension is a measurement of deflection with moderate thumb pressure on the belt at the location that has the longest distance between two pulleys.*



Deflection measurement point

Description	
Deflection	13 mm (½ in.)

Corrosion Protection

Corrosion Information

Whenever two or more dissimilar metals are submerged in a conductive solution, such as saltwater, polluted water or water with a high mineral content, a chemical reaction takes place causing electrical current to flow between metals. The electrical current flow causes the metal that is most chemically active, or anodic, to erode. This is known as galvanic corrosion. For more information contact your authorized Mercury MerCruiser dealer.

Maintaining Ground Circuit Continuity

The transom assembly and sterndrive are equipped with a ground wire circuit to ensure good electrical continuity between the engine, transom assembly, and sterndrive components. Good continuity is essential for the MerCathode System to function effectively.

MerCathode System Battery Requirements

The Mercury MerCruiser MerCathode system requires a minimum battery charge of 12.6 volts at all times to maintain functionality.

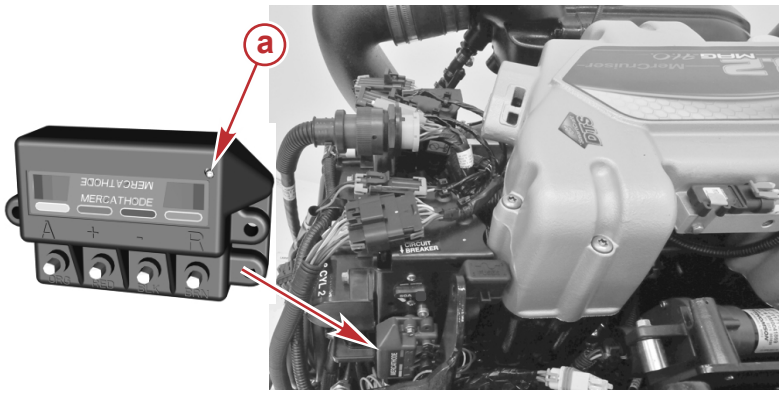
Boats equipped with a MerCathode system that use shore power, and are not run for a long period of time, must use a battery charger to maintain a minimum battery charge of 12.6 volts or above.

Boats equipped with a MerCathode system that do not have access to shore power must be operated often enough to maintain a minimum battery charge of 12.6 volts or above at all times.

MerCathode Theory of Operation

The MerCathode system provides corrosion protection by impressing a reverse blocking current that stops the destructive flow of galvanic currents. The MerCathode controller will regulate output to maintain 0.94 volts at the reference electrode.

A constant LED indicates that the system is operating correctly. A flashing LED indicates that a fault has occurred, or that an abnormal condition exists.



57169

a - LED

IMPORTANT: When a boat or new drive is first put into service the LED may initially indicate that the protective current is not being supplied through the MerCathode anode. This condition is normal, and, in such cases, the LED may flash for a period. The light from the LED will become steady after the boat is moored for a period of eight hours without operation.

MerCathode LED Codes

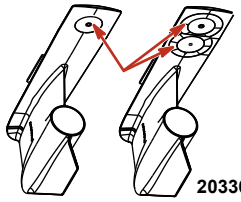
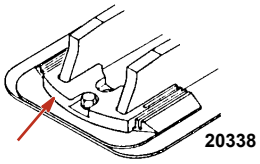
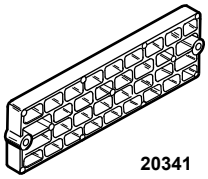
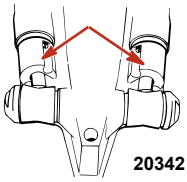
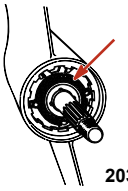
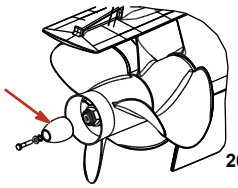
MerCathode LED	Definition	Required Action
On (no flash)	No fault. The controller is working properly.	No action is necessary. This is the normal LED indication for a properly functioning MerCathode system.
2 flashes per second	Reference voltage is below 0.84 V.	This may be normal. Monitor the LED over time. If the flashing continues, contact your local Mercury Service dealer for assistance.
1 flash every 4 seconds	Reference voltage is above 1.04 V.	Contact your local Mercury Service dealer for assistance.
1 long flash every 10 seconds	Shorted or open reference terminal.	Contact your local Mercury Service dealer for assistance.
2 long flashes every 10 seconds	Shorted or open anode terminal.	Contact your local Mercury Service dealer for assistance.
1 long flash every 60 seconds	Open anode and reference terminals, or the boat is out of the water/dry docked.	• If the boat is out of the water, no action is necessary; this is a normal LED flash sequence. • If the boat is in the water, contact your local Mercury Service dealer for assistance.
LED not on	Controller is not operating or is faulty.	• Check the battery voltage; it must be 12.6 V or higher. • Check the 5-amp fuse in the controller wire harness. • If further assistance is required, contact your local Mercury Service dealer.

Anodes and MerCathode System Locations

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

The following sacrificial anodes are installed at different locations on your power package. These anodes help protect against galvanic corrosion by sacrificing their metal to be slowly eroded instead of the metal components on the power package.

MerCathode system—Electrode assembly replaces the anode block. System should be tested to ensure adequate output. The test should be performed where boat is moored, using Quicksilver reference electrode and test meter.

Description	Location	Figure
Gearcase anode plate	Mounted on the underside of the lower gearcase.	 20336
Ventilation plate anode	Mounted on the front of the gearcase.	 20338
MerCathode system	The MerCathode electrode is mounted to the underside of the gimbal housing. The MerCathode controller is mounted on the engine or on the boat transom. The controller harness connects to the electrode harness.	 20340
Anode kit (if equipped)	Mounted to the boat transom.	 20341
Trim cylinder anodes	Mounted on each of the trim cylinders.	 20342
Bearing carrier anode (Bravo One)	Located in front of the propeller, between the front side of the propeller and the gear housing.	 20343
Propshaft anode (Bravo Three)	Located behind the aft propeller.	 20344

Power Package Exterior Surfaces

1. Spray the entire power package at recommended intervals with Corrosion Guard. Follow the instructions on the can for proper application.

Tube Ref No.	Description	Where Used	Part No.
120	Corrosion Guard	Painted surfaces	92-802878 55

2. Clean the entire power package. External surfaces that have become bare should be repainted with the recommended primer and spray paint at recommended intervals.

Description		Part Number
Mercury Light Gray Primer	Painted surfaces	92-802878 52
Mercury Phantom Black		92-802878Q 1

Boat Bottom Care

To achieve maximum performance and fuel economy, the boat bottom must be kept clean. Accumulation of marine growth or other foreign matter can greatly reduce boat speed and increase fuel consumption. To ensure best performance and efficiency, periodically clean the boat bottom in accordance with manufacturer's recommendations.

In some areas, it may be advisable to paint the bottom to help prevent marine growth. Refer to the following information for special notes about the use of antifouling paints.

Antifouling Paint

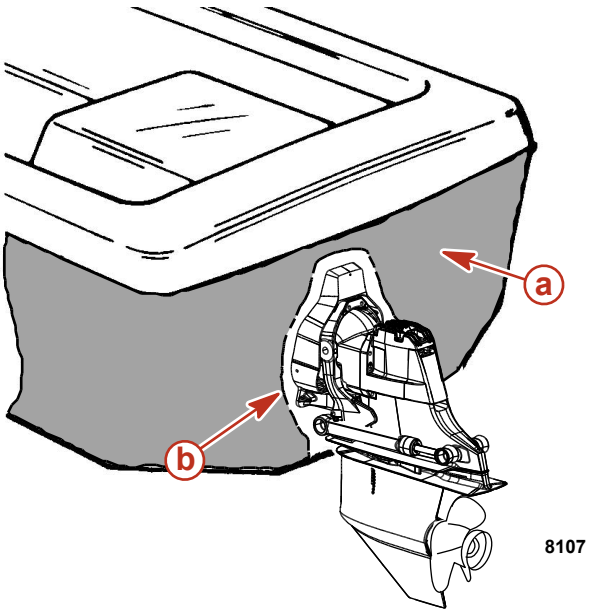
IMPORTANT: Corrosion damage that results from the improper application of antifouling paint will not be covered by the limited warranty.

You may apply antifouling paint to the boat hull and boat transom but you must observe the following precautions:

IMPORTANT: Do not paint or pressure-wash the anodes or the MerCathode system reference electrode and anode. Doing so will render them ineffective as inhibitors of galvanic corrosion.

IMPORTANT: If antifouling protection is required for the boat hull or boat transom, you can use copper-based paint if it is not prohibited by law. If you are using copper based antifouling paint, observe the following precaution:

- **Avoid an electrical interconnection between the Mercury MerCruiser product, anodic blocks, or MerCathode system and the paint by allowing a minimum of 40 mm (1-1/2 in.) unpainted area on transom of the boat around these items.**



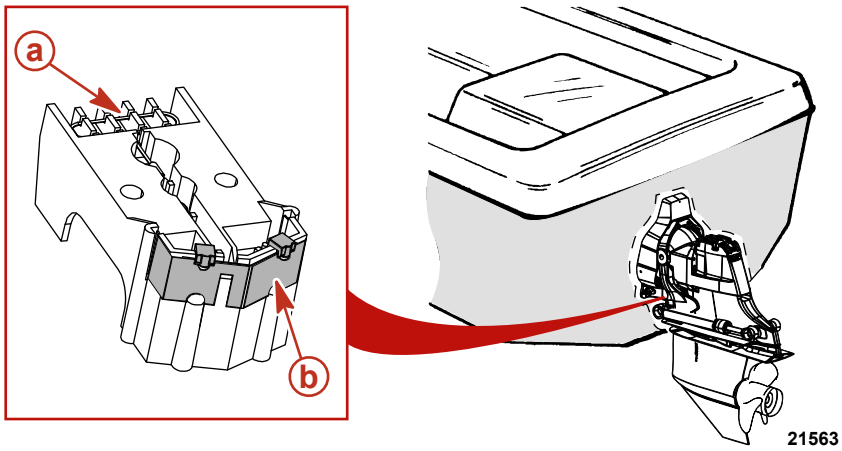
a - Painted boat transom

b - Minimum 40 mm (1-1/2 in.) unpainted area around transom assembly

NOTE: Sterndrive and transom assembly can be painted with a good marine paint or an antifouling paint that does not contain copper or any other material that could conduct electrical current. Do not paint drain holes, anodes, the MerCathode system, or items specified by the boat manufacturer.

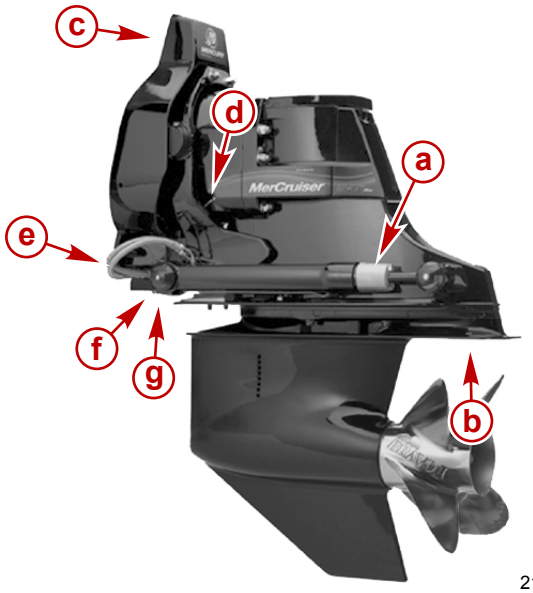
NOTICE
Washing the MerCathode assembly can damage components and lead to rapid corrosion. Do not use any cleaning equipment such as brushes or high-pressure washers to clean the MerCathode assembly.

Do not power-wash a sterndrive that has a MerCathode assembly. Doing so can damage the coating on the reference wire of the MerCathode assembly and increase corrosion.



a - Reference electrode
b - Anode plate

Sterndrive Surface Care



Standard Bravo sterndrive

a - Sacrificial trim cylinder anode
b - Sacrificial anodic plate
c - Steering lever ground wire
d - Ground wire between the gimbal ring and bell housing
e - Stainless steel hoses
f - Ground wire between the gimbal housing and trim cylinder
g - Ground wire between the gimbal ring and gimbal housing

We recommend the following maintenance items to help keep your sterndrive corrosion-free:

- Maintain a complete paint covering on the sterndrive.
- Check the finish regularly. Prime and paint nicks and scratches using Mercury enamel paint and touch up paint. Use only tin-based antifouling paint or its equivalent on or near aluminum surfaces below the waterline.
- If bare metal is showing, apply two coats of paint.

Description	Where used	Part number
Mercury Phantom Black	Bare metal	92- 802878-1

- Spray all electrical connections with sealant.

Tube Ref No.	Description	Where Used	Part No.
25	Liquid Neoprene	All electrical connections	92- 25711 3

- Inspect the sacrificial trim tab or anode plate if equipped, at regular intervals and replace it before it is half gone. If a stainless steel propeller is installed, additional anodes or a MerCathode system will be required.
- Inspect the propeller shaft for fishing line, which can cause corrosion on a stainless steel shaft.
- Remove the propeller at least every 60 days and lubricate the propeller shaft.
- Do not use lubricants containing graphite on or near the aluminum in saltwater.

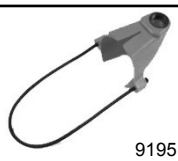
- Do not paint trim tabs or the mounting surface.

Flushing the Seawater System—Sterndrive Models

General Information—Bravo Sterndrive

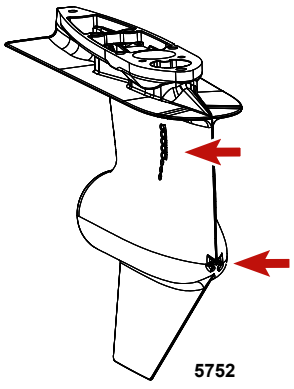
Your boat could be equipped with a combination of any of three different types of water pickups: through-the-hull, through-the-transom, and through-the-sterndrive. The flushing procedures for these systems are separated into two categories: sterndrive water pickups and alternative water pickups.

Flushing Attachments

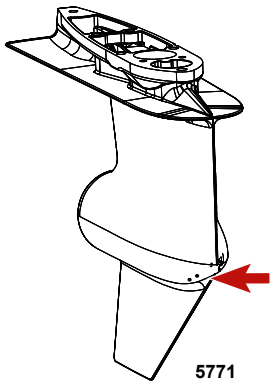
Flushing Device	91-44357Q 2
 9192	Attaches to the water intakes; provides a fresh water connection when flushing the cooling system or operating the engine.
Dual Water Pickup Flush Gearcase Seal Kit	91-881150K 1
 9194	Blocks off the front water inlet holes on the dual water inlet gearcases.
Flushing Kit	91-849996T 1
 9195	Use for flushing gearcases with low water inlets.

Sterndrive Water Pickups

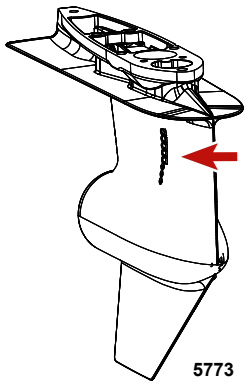
There are three types of water pickups available on Mercury MerCruiser sterndrives: low water, dual water, and side pickups. Dual water pickups require the flushing attachment (44357Q 2) and the flush seal kit (881150K 1), low water pickups require the flushing attachment (849996T 1), and side pickups require the flushing attachment (44357Q 2).



Dual water pickup



Low water pickup



Side pickup

Boat Out of the Water—Bravo Sterndrive

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

1. Lower the sterndrive to full down/in position.

⚠ 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.

2. Remove the propeller. Refer to the appropriate Mercury MerCruiser sterndrive service manual.
3. Install the appropriate flushing attachment over the water inlet holes in the gear housing.
4. Connect the water supply hose to the water source.

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.

5. With the sterndrive in the normal operating position, completely open the water source to provide maximum water supply.
6. Place the remote control in the neutral idle speed position.
7. 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.

8. Press the throttle only button and slowly advance the throttle until the engine reaches 1300 RPM (± 100 RPM).
9. Observe the water temperature gauge to ensure that the engine is operating in the normal range.
10. Operate the engine with the sterndrive in neutral for a minimum of 10 minutes.
11. **For power packages operated in saltwater, brackish water, mineral-laden water, or polluted water,** continue to operate the engine until the discharge water is clear.
12. Slowly return the throttle to idle speed position.
13. Stop the engine.
14. Immediately shut off the supply water and remove the flushing attachment.
15. Install the propeller. Refer to the appropriate Mercury MerCruiser sterndrive service manual.

Boat in the Water—Bravo Sterndrive

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

1. Raise the sterndrive to the trailer position.
2. Install the appropriate flushing attachment over the water inlet holes in the gear housing.
3. Lower the sterndrive to the full down/in position.
4. Connect the water supply hose to the water source.

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.

5. With the sterndrive in the normal operating position, completely open the water source to provide maximum water supply.
6. Place the remote control in the neutral idle speed position.
7. Immediately start the engine.
8. Press the throttle only button and slowly advance the throttle until the engine reaches 1300 RPM (± 100 RPM).
9. Observe the water temperature gauge to ensure that the engine is operating in the normal range.
10. Operate the engine with the sterndrive in neutral for a minimum of 10 minutes.
11. **For engine packages operated in saltwater, brackish water, mineral-laden water, or polluted water,** continue to operate the engine until the discharge water is clear.

12. Slowly return the throttle to the idle speed position.
13. Stop the engine.
14. Immediately shut off the supply water. Do not remove the flushing attachment from the sterndrive at this time.

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.

15. Close the seacock, if equipped, then disconnect the seawater inlet hose to prevent water from siphoning into the engine or boat.
16. If not equipped with a seacock, disconnect the seawater inlet hose from the seawater pump, and immediately plug the hose to prevent water from siphoning into the engine or boat.
17. Raise the sterndrive to the trailer position.
18. Remove the flushing attachment from the sterndrive.
19. Tag the ignition switch with an appropriate tag requiring the seacock to be opened or the seawater inlet hose to be reconnected before operating the engine.

Boat Out of the Water—Alternative Water Pickups

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

1. Lower the sterndrive to the full down/in position.

⚠ 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.

2. Remove the propeller. Refer to the appropriate Mercury MerCruiser sterndrive service manual.
3. Close the seacock, if equipped.
4. If not equipped with a seacock, disconnect the seawater inlet hose from the seawater pump.
5. Using a suitable adapter, connect the flushing hose from the water source to the water inlet of the seawater pump.

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.

6. With the sterndrive in the normal operating position, completely open the water source to provide maximum water supply.
7. Place the remote control in the neutral idle speed position.
8. 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.

9. Press the throttle only button and slowly advance the throttle until the engine reaches 1300 RPM (± 100 RPM).
10. Observe the water temperature gauge to ensure that the engine is operating in the normal range.
11. Operate the engine with the sterndrive in neutral for a minimum of 10 minutes.
12. **For engine packages operated in saltwater, brackish water, mineral-laden water, or polluted water,** continue to operate the engine until the discharge water is clear.
13. Slowly return the throttle to the idle speed position.
14. Stop the engine.
15. Immediately shut off the supply water and remove the flushing attachment.
16. Install the water inlet hose to the seawater inlet of the seawater pump. Tighten the hose clamp securely.
17. Install the propeller. Refer to the appropriate Mercury MerCruiser sterndrive service manual.

Boat in the Water—Alternative Water Pickups

IMPORTANT: Flushing the power package is most effective when performed with the boat and sterndrive out of the water.

IMPORTANT: Flushing is needed if the engine package has been operated in saltwater, brackish water, mineral-laden water, or polluted water. For best results flushing is recommended after each outing and before cold weather and extended storage.

1. Lower the sterndrive to the full down/in position.

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.

2. Close the seacock, if equipped, then disconnect the seawater inlet hose to prevent water from siphoning into the engine or boat.
3. If not equipped with a seacock, disconnect the seawater inlet hose from the seawater pump and immediately plug the hose to prevent water from siphoning into the engine or boat.
4. Using a suitable adapter, connect the flushing hose from the water source to the water inlet of the seawater pump.

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.

5. With the sterndrive in the normal operating position, completely open the water source to provide maximum water supply.
6. Place the remote control in the neutral idle speed position.
7. 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.

8. Press the throttle only button and slowly advance the throttle until the engine reaches 1300 RPM (± 100 RPM).
9. Observe the water temperature gauge to ensure that the engine is operating in the normal range.
10. Operate the engine with the sterndrive in neutral for a minimum of 10 minutes.
11. **For engine packages operated in saltwater, brackish water, mineral-laden water, or polluted water,** continue to operate the engine until the discharge water is clear.
12. Slowly return the throttle to the idle speed position.
13. Stop the engine.
14. Immediately shut off the supply water and remove the flushing attachment.
15. Tag the ignition switch with an appropriate tag requiring the seacock to be opened or the seawater inlet hose to be reconnected before operating the engine.

SeaCore Power Package Flushing Procedure

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

IMPORTANT: Flushing the SeaCore power package with the boat and sterndrive in the water is less effective. Flushing the SeaCore power package is most effective when performed with the boat and sterndrive out of the water, such as on a boat lift or trailer.

Models Using the Sterndrive Water Pickup

IMPORTANT: The system is designed to flush the Bravo sterndrive and the engine with one water source. Do not block or remove the inlet water hose from the sterndrive to the engine.

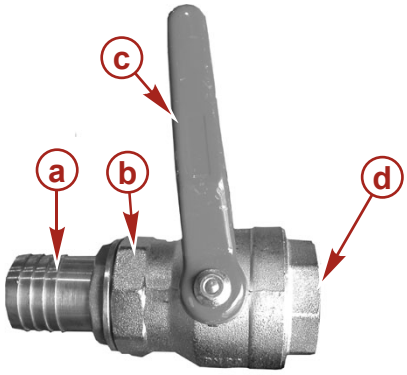
NOTE: *Engines with the sterndrive water inlet blocked off at the gimbal housing: Refer to* ***Alternative Water Pickups****.*

⚠ 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.

IMPORTANT: Do not allow the engine to pull air or seawater from alternative water pickup sources during the flushing procedure. If equipped, ensure that all alternative water inlet hoses are plugged at both ends.

1. Remove the boat from the water.

2. Close the seacock, if equipped.

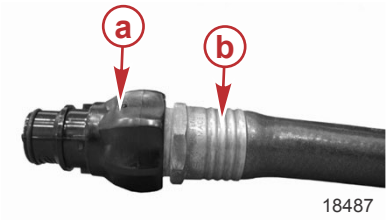


18510

For visual clarity, the seacock shown is not installed

a - Hose fitting to engine
b - Seacock
c - Handle (closed position)
d - To water source pickup attachment

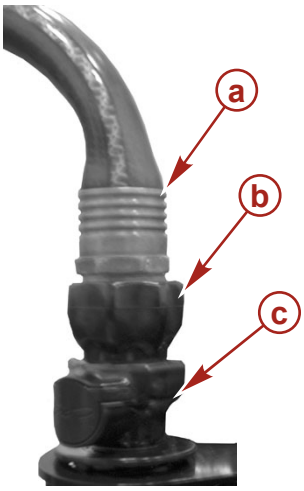
3. If equipped with an alternative water pickup and not equipped with a seacock, disconnect the water hose from the alternative water pickup and plug both ends, excluding the Bravo sterndrive.
4. Ensure that the inlet water hose from the sterndrive to the engine is connected.
5. Remove the quick-connect fitting from the parts bag supplied with the engine.
6. Attach the quick-connect fitting to a water hose.



18487

a - Quick connect fitting (water hose end)
b - Water hose

7. Snap the quick-connect fitting with the water hose into the flush socket on the engine.



18489

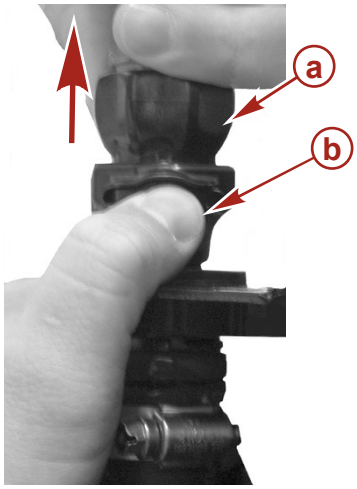
a - Water hose
b - Quick-connect fitting (water hose end)
c - Flush socket

8. Open the water source of the water hose to a full flow.
9. Allow the water to flush the sterndrive for 30 seconds.
10. Place the remote control in neutral idle speed position and start engine.

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.

11. Operate the engine at idle speed in neutral gear. Do not exceed 1200 RPM.
12. Monitor the engine temperature while operating the engine.
13. Flush the engine for 5–10 minutes or until discharge water is clear.
14. Shut off the engine.

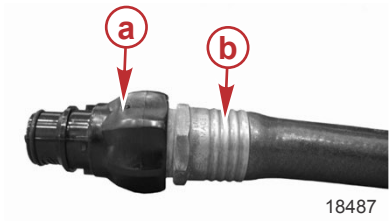
15. Turn off the water source.
16. Disconnect the quick-connect fitting and water hose from the flush socket on the engine by pressing the release button on the flush socket.



18488

a - Quick-connect fitting (water hose end)
b - Flush socket release button

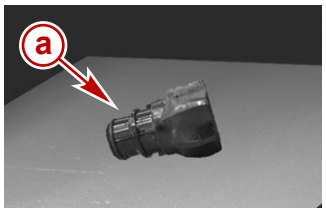
17. Remove the quick-connect fitting from the water hose.



18487

a - Quick-connect fitting (water hose end)
b - Water hose

18. Retain the quick-connect fitting with the water hose end for repeated use by storing it separately in a storage compartment on the boat for easy access.
IMPORTANT: Do not store the quick-connect fitting in the flush socket on the engine. Doing so would allow the seawater pump to suck air during engine operation causing an overheating problem. Damages due to engine overheating are not covered by Mercury MerCruiser Warranty.



25900

Quick-connect fitting stored in the boat
a - Quick-connect fitting (water hose end)

19. Insert the dust cover in the flush socket on the engine.



43065

Dust cover installed in the flush socket
a - Dust cover
b - Flush socket

IMPORTANT: If the unit is to be stored in the water, the seacock should remain closed until time of usage. If unit is to be stored out of the water, open the seacock.

20. Open the seacock, if equipped, or reconnect the alternative water inlet source prior to operating the engine.

Section 5 - Storage

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5

Cold Weather or Extended Storage

Reformulated (Oxygenated) Gasolines (U.S.A. Only)

This type of gasoline is required throughout most of the U.S.A. There are two types of oxygenates used in fuels: alcohol (ethanol) or ether (MTBE or ETBE). Gasoline containing ethanol is especially subject to absorbing atmospheric moisture, forming gums or solids, or it may separate into a layer of fuel floating on top of a layer of water and alcohol. To reduce the potential for separation, storage should be in containers that prevent oxidation or water vapors mixing. If ethanol is used in the gasoline in your area, refer to **Fuel Containing Alcohol**.

Fuels for your Mercury Marine engine may contain up to 10% of ethanol or ether.

Fuel Containing Alcohol

Fuels containing either methanol (methyl alcohol) or ethanol (ethyl alcohol) may cause certain adverse effects. 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 (phase) of the water/alcohol from the gasoline in the fuel tank.

The fuel system components on your Mercury Marine engine will withstand up to 10% alcohol content in the gasoline. We do not know what percentage your boat's fuel system will withstand. Contact your boat manufacturer for specific recommendations on the boat's fuel system components (fuel tanks, fuel lines, and fittings). Be aware that gasolines containing alcohol may cause increased:

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

⚠ WARNING

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, only alcohol-free gasoline should be used. If only fuel containing alcohol is available, or if the presence of alcohol is unknown, increased inspection frequency for leaks and abnormalities is required.

IMPORTANT: When operating a Mercury Marine engine on gasoline containing alcohol, storage of gasoline in the fuel tank for long periods should be avoided. Long periods of storage, common to boats, create unique problems. In cars, alcohol-blend fuels normally are consumed before they can absorb enough moisture to cause problems. Conversely, boats may not be used for days, weeks, or months, long enough for phase separation to take place. In addition, internal corrosion may take place during storage if alcohol has washed protective oil films from internal components.

IMPORTANT: 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 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.

Preparing Power Package for Storage—MPI Models

Multipoint fuel injection (MPI) systems must have a special mix of fuel, stabilizer, and lubricant, completely fill the fuel delivery system. This fuel mix stabilizes the fuel and lubricates the fuel pumps, fuel pressure regulator, fuel injectors and, reduces internal oxidation of the fuel system metal components.

IMPORTANT: This special fuel mix can be used on Mercury Marine catalyzed gasoline engines.

Special Fuel Mix

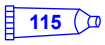
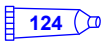
⚠ WARNING

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. Fill a 23 liter (6 US gal) remote fuel tank with 19 L (5 US gal) regular unleaded 87 octane (90 RON) gasoline.
2. Pour into the remote fuel tank 1.89 L (2 US qt) of Premium Plus 2-Cycle TC-W3 Outboard Oil and 29.5 ml (1 oz) of Mercury Quickstor Fuel Stabilizer.

Tube Ref No.	Description	Where Used	Part No.
	Premium Plus 2-Cycle TC-W3 Outboard Oil	Fuel system	92-858026K01
	Quickstor Fuel Stabilizer	Fuel system	92-8M0047932

3. Install the remote fuel tank cap and ensure the added ingredients are thoroughly mixed with the fuel.

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.

NOTICE

Running out of fuel can damage catalyst components. Do not allow the fuel tanks to become empty during operation.

1. Check the antifreeze concentration where applicable. Refer to the **Specifications** section.
2. Before adding Mercury Quickstor Fuel Stabilizer to the fuel in the tank, determine the type of fuel that is in the fuel tanks and proceed with the following:
   a. Vessels using fuel without alcohol—fill the vessel fuel tanks with fresh gasoline that does not contain alcohol and add a sufficient amount of Mercury Quickstor Fuel Stabilizer to treat the gasoline. Follow the instructions on the container.
   b. Vessels using fuel containing alcohol—drain the fuel tanks as low as possible and add a sufficient amount of Mercury Quickstor Fuel Stabilizer to treat the remaining gasoline. Follow the instructions on the container.
3. Flush the cooling system. Refer to the **Maintenance** section.
4. Supply cooling water to the engine. Refer to the **Maintenance** section.
5. Close the fuel shut off valve, if equipped, or disconnect and plug the boat fuel tank hose.
6. Connect the remote fuel tank with the special fuel mix to the fuel inlet fitting.
7. Start the engine and run the engine at 1300 RPM for five minutes. This is usually enough time for the special fuel mix to circulate through the fuel system. Check to ensure there are no oil leaks. Shut the engine off.
   IMPORTANT: Do not allow the engine to run out of fuel.
8. Disconnect the special fuel mix hose from the inlet fitting. Connect the boat fuel tank hose to the inlet fitting. Open the fuel shut off valve, if equipped.
9. Change the oil and oil filter.
10. Replace the water separating fuel filter element where applicable.
11. 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.

12. Fill the seawater cooling system with propylene glycol mixed to the manufacturer's recommendation to protect the engine to the lowest temperature to which it will be exposed during freezing temperatures or extended storage. This will also prevent the formation of exfoliating rust in the cooling system passages.
13. Store the battery according to the manufacturer's instructions.

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

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.

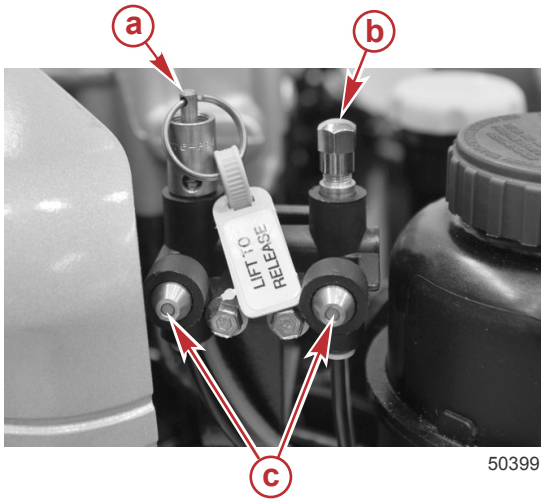
IMPORTANT: Only drain the seawater section of the closed cooling system.
IMPORTANT: The boat must be as level as possible to ensure complete draining of the cooling system.

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

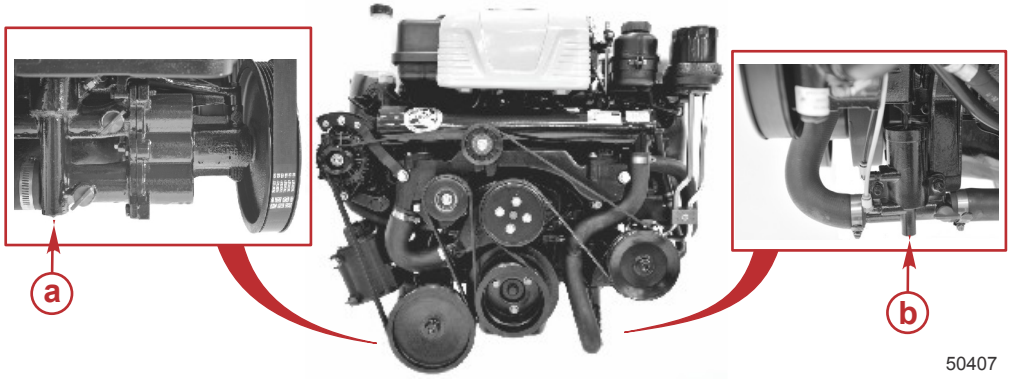
IMPORTANT: The engine must not be operating at any point during the draining procedure.

Drain System Identification

Air-Actuated Single-Point Drain System

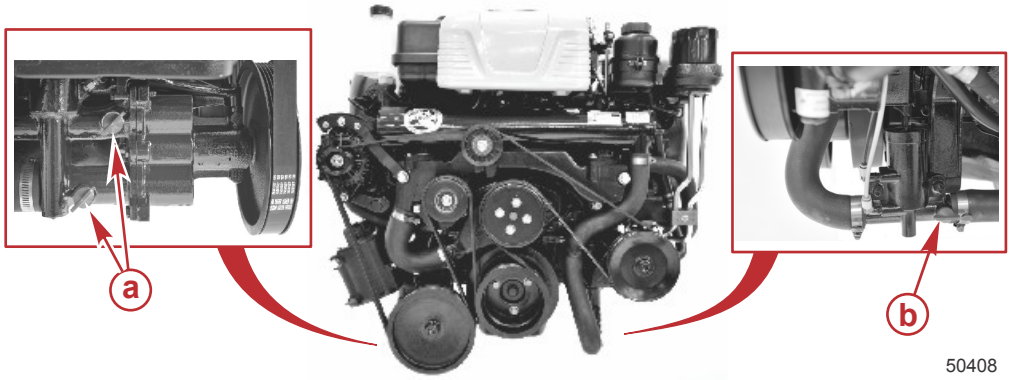


a - Manual pressure release valve
b - Threaded cap for air connection
c - Green indicators



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

Manual Drain System



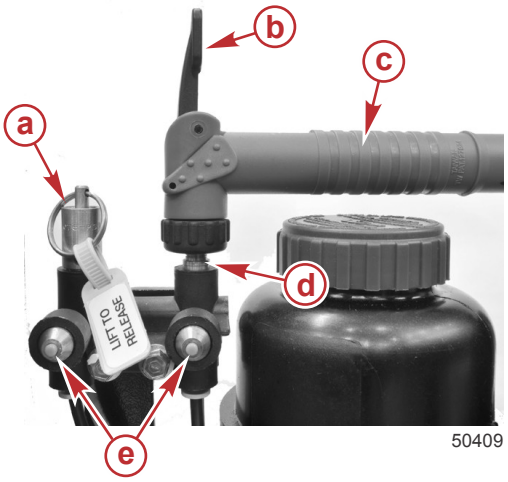
a - Starboard side blue drain plugs
b - Port side blue drain plug

Air-Actuated Single-Point Drain System

Boat in the Water

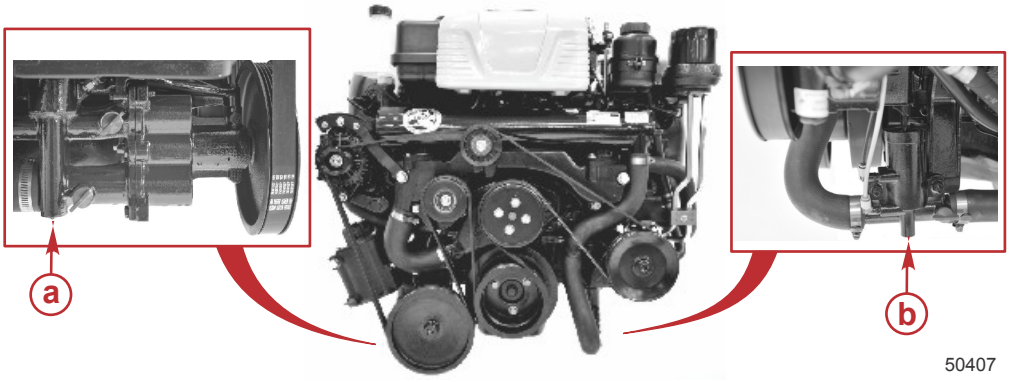
NOTE: *This procedure is written for the air pump that was shipped with the engine from the factory. However, any air source can be used.*

1. Close the seacock (if equipped) or remove and plug the water inlet hose.
2. Obtain the air pump.
3. Remove the threaded cap from the air connection.
4. Ensure that the lever on top of the air pump is against the handle (horizontal).
5. Install the air pump on the air connection.
6. Pull the lever on the air pump (vertical) to seal the pump to the connection.
7. 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.



a - Manual release valve
b - Air pump lever (locked)
c - Air pump
d - Air connection
e - Green indicators extended

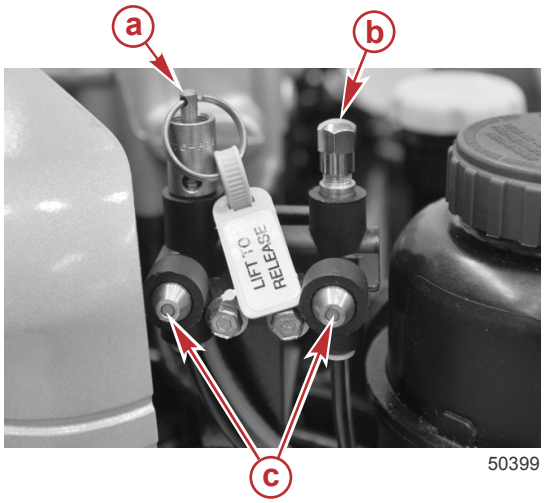
8. Verify that water is draining from each opening. If not, use the **Manual Drain System** instructions.



a - Starboard side air-actuated drain location
b - Port side air-actuated 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. For DTS engines, pull the lanyard stop switch (if equipped), or disable the ignition circuit by pulling the fuse marked "CD."
11. Crank the engine over slightly with the starter motor to purge any water trapped in the seawater pump. Do not allow the engine to start.
12. Remove the air pump from the air connection 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.



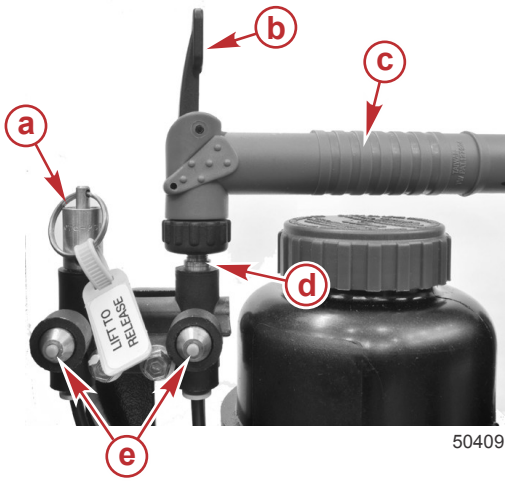
a - Manual pressure release valve
b - Threaded cap for air connection
c - Green indicators

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

Boat Out of the Water

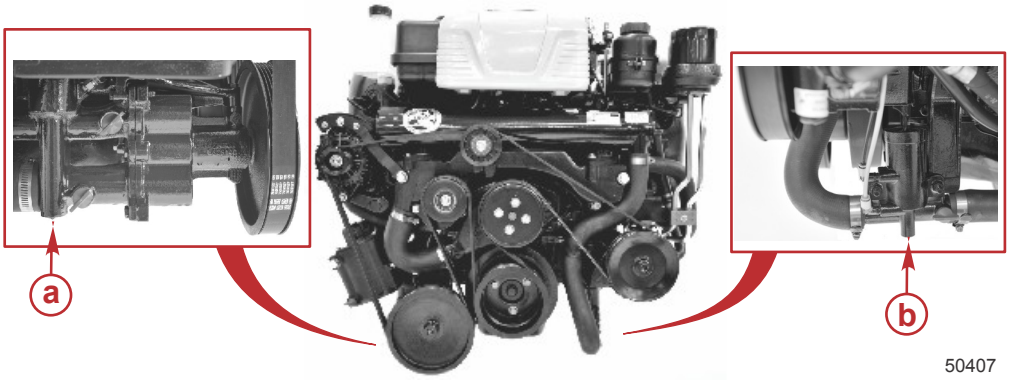
NOTE: *This procedure is written for the air pump that is attached to the engine. However, any air source can be used.*

1. Place the boat on a level surface and ensure that the boat is level.
2. Obtain the air pump.
3. Ensure that the lever on top of the pump is flush with the handle (horizontal).
4. Install the air pump on the air connection.
5. Pull the lever on the air pump (vertical) to seal the pump to the air connection.
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.



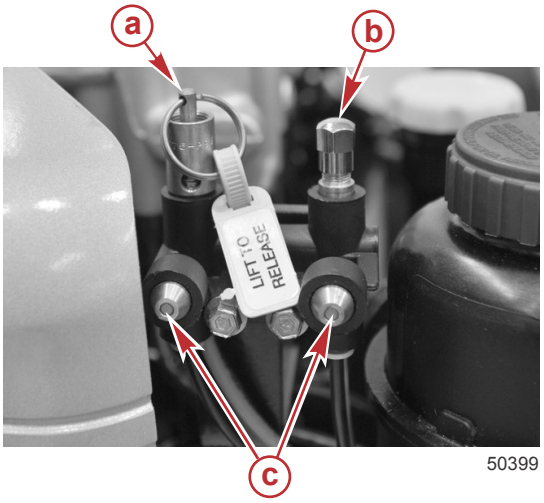
a - Manual release valve
b - Air pump lever (locked)
c - Air pump
d - Air connection
e - Green indicators extended

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



a - Starboard side air-actuated drain location
b - Port side air-actuated 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. For DTS engines, pull the lanyard stop switch (if equipped), or disable the ignition circuit by pulling the fuse marked "CD."
10. Crank the engine over slightly with the starter motor to purge any water trapped in the seawater pump. Do not allow the engine to start.
11. Remove the air pump from the air manifold and return it to the mounting bracket.
12. 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.
13. Before launching the boat, pull up on the manual release valve. Verify that the green indicators are no longer extended.



a - Manual pressure release valve
b - Threaded cap for air connection
c - Green indicators

Manual Drain System

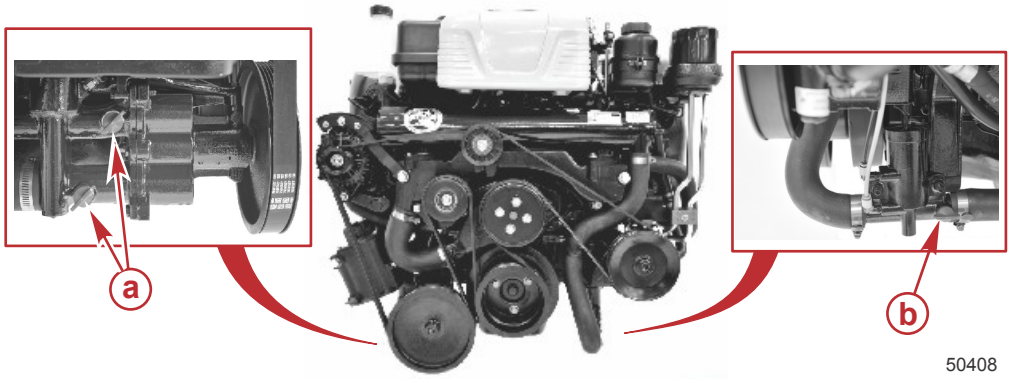
Boat in the Water

NOTE: *Use this procedure if the air-actuated single-point drain system fails.*

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

1. Close the seacock (if equipped) or remove and plug the water inlet hose.

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



a - Starboard side blue drain plugs
b - Port side blue drain plug

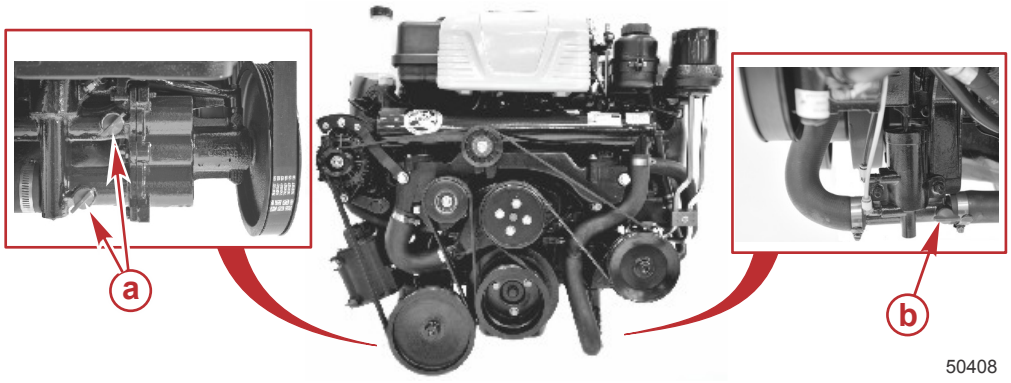
3. Verify that water is draining from each opening.
4. Allow the system to drain for a minimum of five minutes. Mercury MerCruiser recommends leaving the drain system open while transporting the boat or while performing other maintenance to ensure that all water is drained.
5. For DTS engines, pull the lanyard stop switch (if equipped), or disable the ignition circuit by pulling the fuse marked "CD."
6. 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.
7. Prior to launching the boat or starting the engine, close the drain system by installing the four blue drain plugs.
8. 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 the air-actuated single-point drain system fails.*

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

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



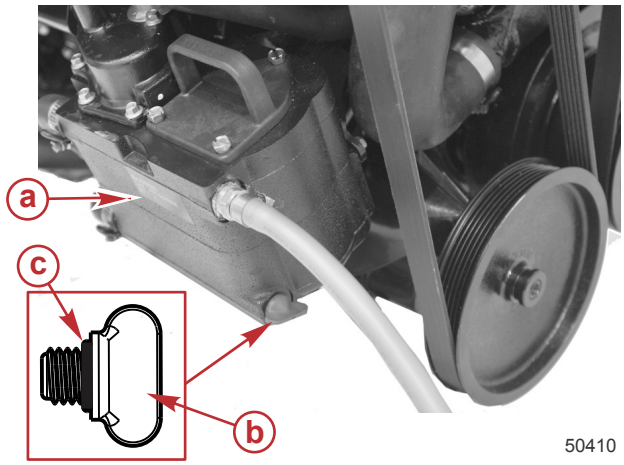
a - Starboard side blue drain plugs
b - Port side blue drain plug

4. Verify that water is draining from each opening.
5. Allow the system to drain for a minimum of five minutes. Mercury MerCruiser recommends leaving the drain system open while transporting the boat or while performing other maintenance to ensure that all water is drained.
6. For DTS engines, pull the lanyard stop switch (if equipped), or disable the ignition circuit by pulling the fuse marked "CD."
7. 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.
8. Prior to launching the boat or starting the engine, close the drain system by installing the two blue drain plugs.

Draining Water from the Cool Fuel Module

Mercury MerCruiser recommends draining the Gen 3 Cool Fuel Module if it is equipped with a drain plug.

1. Remove the drain plug from the Gen 3 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 apply Perfect Seal to the threads. Install the drain plug in the module drain hole. Tighten the drain plug to finger-tight.



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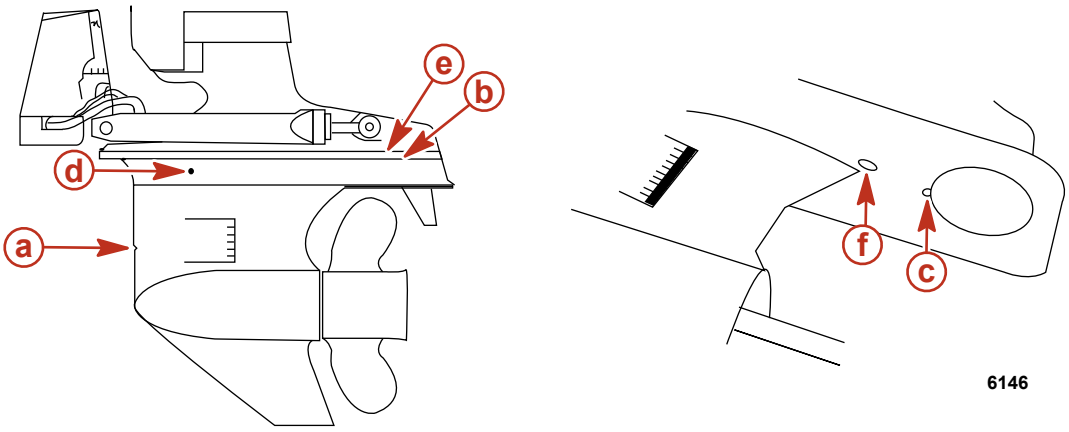
a - Gen 3 Cool Fuel Module
b - Drain plug
c - O-ring

Tube Ref No.	Description	Where Used	Part No.
19	Perfect Seal	Drain plug threads	92-34227Q02

Draining the Sterndrive

NOTE: *This procedure is needed only for salty, brackish, mineral-laden, or polluted water applications; and for freezing temperatures or extended storage.*

1. Insert a small wire repeatedly to ensure that vent holes, water drain holes, and passages are unobstructed and open.



6146

Sterndrive water drain holes

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

NOTICE

The universal joint bellows may develop a set when stored in a raised or up position, causing the bellows to fail when returned to service and allowing water to enter the boat. Store the sterndrive in the full down position.

2. Lower the sterndrive unit to the full down/in position.
3. For additional assurance against freezing and rust, after draining, fill the 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.
   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.

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 the 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 **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.

Notes:

Section 6 - Troubleshooting

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6

Diagnosing EFI Problems

Your authorized Mercury MerCruiser dealer has the proper service tools for diagnosing problems on electronic fuel injection (EFI) systems. The engine 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 ECMs memory. This code can then be read later by a service technician using a special diagnostic tool.

Diagnosing DTS Problems

Your authorized Mercury MerCruiser dealer has the proper service tools for diagnosing problems on digital throttle and shift (DTS) systems. The engine control module (ECM)/propulsion control module (PCM) on these engines has the ability to detect some problems with the system when they occur, and store a Trouble Code in the ECM/PCMs memory. This code can then be read later by a service technician using a special diagnostic tool.

Additional Operation Instructions for Axius Systems

If your boat has DTS engines equipped with an Axius system, refer also to the **Axius Operation Manual** included with the boat.

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.

Troubleshooting Charts

Starter Motor Will Not Crank Engine, or Cranks Slowly

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 fuse.	Check and reset the main power circuit breaker or replace the fuse. Check the 5-amp fuse on the power harness connected to the battery, and replace if necessary.
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.	Drain fuel 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 the 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 nonessential 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 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.

Power Trim Does Not Operate (Motor Does Not Operate)

Possible Cause	Remedy
Blown fuse.	Replace fuse. Fuses may be located near the dash trim switch, at the trim pump, in the positive (red) power trim battery lead near the battery switch, or a combination of these.
Loose or dirty electrical connections or damaged wiring.	Check all associated electrical connections and wires (especially battery cables). Clean and tighten faulty connection. Repair or replace wiring.

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

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

Notes:

Section 7 - Customer Assistance Information

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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. 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 inform 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. 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 about 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 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 a 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 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 the 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.

United States, Canada		
Telephone	English +1 920 929 5040 Français +1 905 636 4751	Mercury Marine W6250 Pioneer Road P.O. Box 1939 Fond du Lac, WI 54936-1939
Fax	English +1 920 929 5893 Français +1 905 636 1704	
Website	www.mercurymarine.com	

Australia, Pacific		
Telephone	+61 3 9791 5822	Brunswick Asia Pacific Group 41–71 Bessemer Drive Dandenong South, Victoria 3175 Australia
Fax	+61 3 9706 7228	

Europe, Middle East, Africa		
Telephone	+32 87 32 32 11	Brunswick Marine Europe Parc Industriel de Petit-Rechain B-4800 Verviers, Belgium
Fax	+32 87 31 19 65	

Mexico, Central America, South America, Caribbean		
Telephone	+1 954 744 3500	Mercury Marine 11650 Interchange Circle North Miramar, FL 33025 U.S.A.
Fax	+1 954 744 3535	

Japan		
Telephone	+072 233 8888	Kisaka Co., Ltd. 4-130 Kannabecho Sakai-shi Sakai-ku 5900984 Osaka, Japan
Fax	+072 233 8833	

Asia, Singapore		
Telephone	+65 65466160	Brunswick Asia Pacific Group T/A Mercury Marine Singapore Pte Ltd 29 Loyang Drive Singapore, 508944
Fax	+65 65467789	

Customer Service Literature

English Language

English language publications are available from:
Mercury Marine
Attn: Publications Department
W6250 Pioneer Road
P.O. Box 1939
Fond du Lac, WI 54936-1939

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

When ordering be sure to:

- List your product, model, year, and serial numbers.
- Check the literature and quantities you want.

- Enclose full remittance in check or money order (NO COD).

Other Languages

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

Ordering Literature

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

Model		Serial Number	
Horsepower		Year	

United States and Canada

For additional literature for your Mercury Marine power package, contact your nearest Mercury Marine dealer or contact:

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

Outside the United States and Canada

Contact your nearest Mercury Marine authorized service center to order additional literature that is available for your particular power package.

Submit the following order form with payment to:	Mercury Marine Attn: Publications Department W6250 Pioneer Road P.O. Box 1939 Fond du Lac, WI 54936-1939
Ship To: (Copy this form and print or type–This is your shipping label)	
Name	
Address	
City, State, Province	
ZIP or postal code	
Country	

Quantity	Item	Stock Number	Price	Total
			.	.
			.	.
			.	.
			.	.
			.	.
			Total Due	.

Section 8 - Checklists

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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

Section 9 - Maintenance Log

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Scheduled Maintenance Log

100 Hours		
Actual Hours		
Service Notes		
Dealer Name	Signature	Date

200 Hours		
Actual Hours		
Service Notes		
Dealer Name	Signature	Date

300 Hours		
Actual Hours		
Service Notes		
Dealer Name	Signature	Date

400 Hours		
Actual Hours		
Service Notes		
Dealer Name	Signature	Date

500 Hours		
Actual Hours		
Service Notes		
Dealer Name	Signature	Date

600 Hours		
Actual Hours		
Service Notes		
Dealer Name	Signature	Date

Vessel Maintenance Notes

Record all general maintenance performed on your power package here. Save all work orders and receipts.			
Date	Engine Hours	Maintenance Completed	Servicing Dealer



www.mercurymarine.com.au
41-71 Bessemer Drive
Dandenong South, Victoria 3175 Australia

www.mercurymarine.com
P.O. Box 1939
Fond du Lac, WI 54936-1939 USA

www.brunswick-marine.com
Parc Industriel de Petit-Rechain
B-4800 Verviers, Belgium

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