MERCURY®

GO BOLDLY.™

8M0215993 623 eng

Operation and Maintenance Manual

V12 600hp Verado 48V

Scan for service and support information

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 before operating the outboard.

The Operation and Maintenance Manual contains specific instructions for using and maintaining your product. Keep this manual with the product for ready reference whenever you are on the water. This manual should stay with the outboard engine, if it is sold.

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 Buelow, 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 operating procedures.

Safety Alerts

Throughout this publication and on your power package, safety alerts labeled WARNING and CAUTION (accompanied by the symbol ⚠), are used to alert you to special instructions concerning a particular service or operation that may be hazardous if performed incorrectly or carelessly. Observe these alerts carefully.

These safety alerts alone cannot eliminate the hazards that they signal. Strict compliance to these special instructions when 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.

Additional Alerts

Additional alerts provide information that requires special attention:

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.*

California Proposition 65

California Proposition 65

WARNING: This product can expose you to chemicals including gasoline engine exhaust, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Notice to Users of This Manual

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. Mercury Marine strongly recommends 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.

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.

Warranty Message

The product you have purchased comes with a **Mercury Marine Limited Warranty**. The terms of the warranty are set forth in the Warranty Manual, which can be accessed any time on the Mercury Marine website, at http://www.mercurymarine.com/warranty-manual. 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, limitations, and waivers**, and other related information. Please review this important information.

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

This manual contains information required for the safe and proper operation, installation, and maintenance of the product. Use of the product not in accordance with any and all instructions for operation and maintenance outlined in this manual will be considered as improper, abnormal, abusive or non-acceptable use of the product and may result in the Mercury Marine Limited Warranty or legal guarantee (if and where applicable) being fully or partly void.

Copyright and Trademark Information

Identification Records

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.**

Please record the following applicable information:

Outboard		
Engine Model and Horsepower		
Engine Serial Number		
Gear Ratio		
Propeller Number	**Pitch**	**Diameter**
Watercraft Identification Number (WIN) or **Hull Identification Number (HIN)**		**Purchase Date**
Boat Manufacturer	**Boat Model**	**Length**
Exhaust Gas Emissions Certification Number (Europe Only)		

General Information

Transporting and Towing

Fuel and Oil

Features and Controls

Operation

Maintenance

Storage

Troubleshooting

Owner Service Assistance

Maintenance Log

GENERAL INFORMATION

Boater's Responsibilities

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

The operator may be subject to local boating license requirements, which may vary according to boating location.

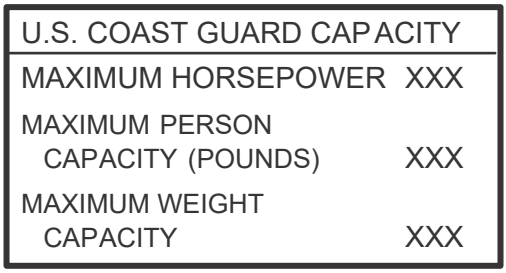
Be sure that at least one additional person onboard is instructed in the basics of starting and operating the outboard and boat handling in case the driver is unable to operate the boat.

Boat Horsepower Capacity

⚠ WARNING

Exceeding the boat's maximum horsepower rating can cause serious injury or death. Overpowering the boat can affect boat control and flotation characteristics or break the transom. Do not install an engine that exceeds the boat's maximum power rating.

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



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High-Speed and High-Performance Boat Operation

If your outboard is to be used on a high-speed or high-performance boat with which you are unfamiliar, we recommend that you do not operate it at its high-speed capability without first requesting an initial orientation and familiarization demonstration ride with your dealer or an operator experienced with your boat/outboard combination. For additional information, obtain a copy of our **Hi-Performance Boat Operation** booklet from your dealer, distributor, or Mercury Marine.

GENERAL INFORMATION

Propeller Selection

IMPORTANT: The installed propellers must allow the engine to reach engine rated speed (RPM) with the boat fully loaded to maximum capacity. Use the Multifunction Display (MFD) to verify engine RPM.

It is the responsibility of the boat manufacturer or the selling dealer to equip the engine with the correct propellers. Refer to the engine information data tag located on the engine for the specified engine rated speed (RPM).

If full throttle engine RPM is below the engine rated speed (RPM), the propellers will have to be changed to prevent loss of performance and possible engine damage.

After initial propeller selection, certain issues may require a propeller with a lower pitch. They include:

- Operating with increased load (additional passengers or gear)
- Shifting the center of gravity of the vessel
- The addition of towers or canvas
- Fouling of the hull and running gear
- High ambient temperatures
- Operating at high elevation

It is the responsibility of the boat owner to ensure that the correct propellers are installed at delivery and maintained over the life of the boat. Because of the many variables of boat design, only testing will determine the best propeller for a particular boat. If the engine is not able to reach the engine rated speed (RPM), contact the boatbuilder, boat dealer, or an authorized Mercury repair facility for assistance in propeller selection.

IMPORTANT: The propellers must be replaced as a matched pair.

To view the entire product offering and find the correct propeller that is best suited for a specific application, visit https://www.mercurymarine.com/en/us/propellers/selector/#/step-one or see your local authorized Mercury dealer.

Outboard Remote Control Models

The outboard must be equipped with a Mercury remote control designed for digital throttle and shift. Start-in-gear protection is provided by the remote control system.

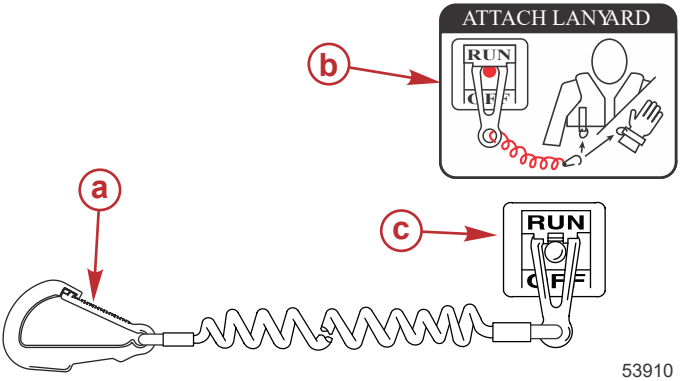
Lanyard Stop Switch

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

A decal near the lanyard stop switch is a visual reminder for the operator to attach the lanyard to their personal flotation device (PFD) or wrist.

GENERAL INFORMATION

The lanyard cord is usually 122–152 cm (4–5 feet) in length when stretched out, with an element on one end made to be inserted into the switch and a clip on the other end for attaching to the operator's PFD or wrist. The lanyard is coiled to make its at-rest condition as short as possible to minimize the likelihood of lanyard entanglement with nearby objects. Its stretched-out length is made to minimize the likelihood of accidental activation should the operator choose to move around in an area close to the normal operator's position. If it is desired to have a shorter lanyard, wrap the lanyard around the operator's wrist or leg, or tie a knot in the lanyard.



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

Read the following Safety Information before proceeding.

Important Safety Information: The purpose of a lanyard stop switch is to stop the engine when the operator moves far enough away from the operator's position to activate the switch. This would occur if the operator accidentally falls overboard or moves within the boat a sufficient distance from the operator's position. Falling overboard and accidental ejections are more likely to occur in certain types of boats such as low sided inflatables, bass boats, high performance boats, and light, sensitive handling fishing boats operated by a hand tiller. Falling overboard and accidental ejections are also likely to occur as a result of poor operating practices such as sitting on the back of the seat or gunwale at planing speeds, standing at planing speeds, sitting on elevated fishing boat decks, operating at planing speeds in shallow or obstacle infested waters, releasing your grip on a steering wheel or tiller handle that is pulling in one direction, drinking alcohol or consuming drugs, or daring high speed boat maneuvers.

GENERAL INFORMATION

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

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

⚠ WARNING

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

⚠ WARNING

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

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

- Occupants could be thrown forward due to unexpected loss of forward motion - a particular concern for passengers in the front of the boat who could be ejected over the bow and possibly struck by the gearcase or propeller.
- Loss of power and directional control in heavy seas, strong current, or high winds.
- Loss of control when docking.

KEEP THE LANYARD STOP SWITCH AND LANYARD CORD IN GOOD OPERATING CONDITION

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

Before each use, visually inspect the lanyard cord to ensure 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.

Protecting People in the Water

WHILE YOU ARE CRUISING

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

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

Whenever a boat is moving (coasting) and the outboard gear shift is in neutral position, 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 THE 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 the outboard into neutral and shut off the engine before allowing people to swim or be in the water near your boat.

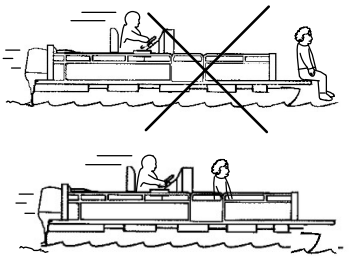
Passenger Safety Message - Pontoon Boats and Deck Boats

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 by the outboard.

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.



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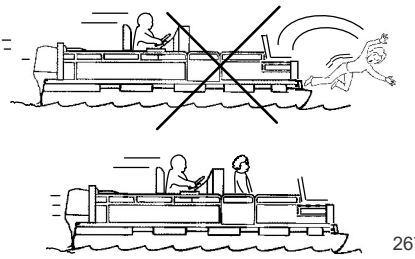
⚠ WARNING

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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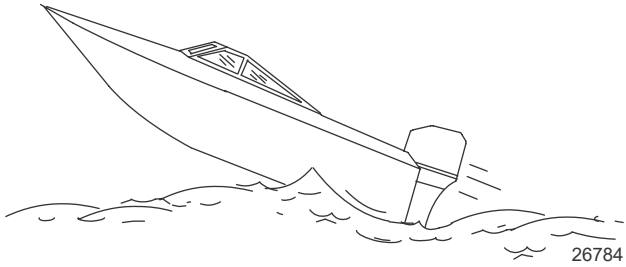
Wave and Wake Jumping

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



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

⚠ WARNING

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.

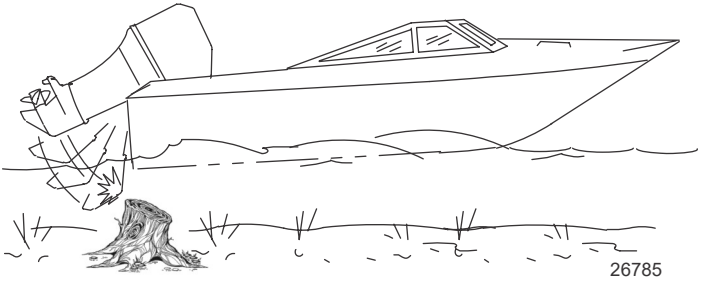
There is another less common hazardous result from allowing your boat to launch off a wave or wake. If the bow of your boat pitches down far enough while airborne, upon water contact it may penetrate under the water surface and submarine for an instant. This will bring the boat to a nearly instantaneous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

Impact with Underwater Hazards

Your outboard is equipped with a hydraulic trim and tilt system that also contains a shock absorbing feature. This feature helps the outboard withstand damage in the case of impact with an underwater object at low to moderate speeds. At higher speeds, the force of the impact may exceed the system's ability to absorb the energy of the impact and cause serious product damage.

No impact protection exists while in reverse. Use extreme caution when operating in reverse to avoid striking underwater objects.

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



⚠ WARNING

Avoid serious injury or death from all or part of an outboard or drive unit coming into the boat after striking a floating or underwater object. When operating in waters where objects may be at the surface or just under the surface of the water, reduce your speed and keep a vigilant lookout.

Examples of objects that can cause engine damage are dredging pipes, bridge supports, wing dams, trees, stumps, and rocks.

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

- Part of the outboard or the entire outboard could break loose and fly into the boat.
- The boat could move suddenly in a new direction. A sharp change in direction can cause occupants to be thrown out of their seats or out of the boat.
- The boat's speed could rapidly reduce. This will cause occupants to be thrown forward or even out of the boat.
- The outboard or boat could sustain impact damage.

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

The boat should also be checked for any hull fractures, transom fractures, or water leaks. If water leaks are discovered after an impact, immediately activate the bilge pump.

Operating a damaged outboard could cause additional damage to other parts of the outboard or could affect control of the boat. If continued running 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.

Exhaust Emissions

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.

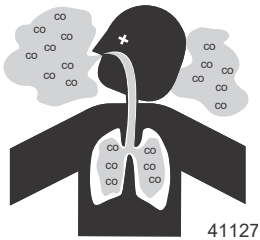
Early symptoms of carbon monoxide poisoning, which are similar to the symptoms of seasickness and intoxication, include headache, dizziness, drowsiness, and nausea.

⚠ 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



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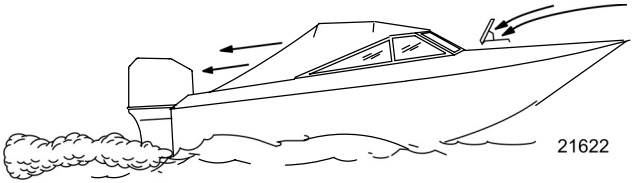
GENERAL INFORMATION

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:

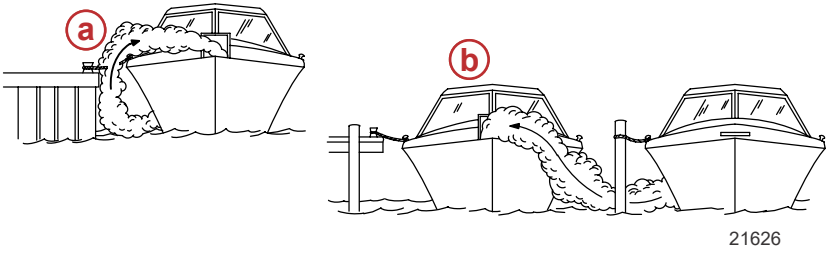


POOR VENTILATION

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

Although the occurrence is rare, on a very calm day, swimmers and passengers in an 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)

Selecting Accessories for Your Outboard

Genuine Mercury Precision or Quicksilver Accessories have been specifically designed and tested for your outboard. These accessories are available from Mercury Marine dealers.

IMPORTANT: Check with your dealer before installing accessories. The misuse of approved accessories or the use of nonapproved accessories can damage the product.

Some accessories not manufactured or sold by Mercury Marine are not designed to be safely used with your power package and may void warranty. Acquire and read the installation and operation manuals for each selected accessory.

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.

- Mercury Marine recommends 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).
- Some locations (states, territories, etc.) require a boating license or certificate. Always confirm licensing and certification requirements prior to boating in a new location.

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 propellers, thrust hubs, and appropriate wrenches
- ☐ 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.

- U.S. 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. It is strongly advised that everyone wear a life jacket at all times while in the boat.
- Use of personal flotation devices may be mandatory in areas outside of the U.S. Always check local laws and regulations before embarking.

Prepare other boat operators.

- Instruct at least one person onboard on the basics of starting and operating the engine and boat handling in case the driver becomes disabled or falls overboard.

Do not overload the boat.

- Most boats are rated and certified for maximum load (weight) capacities (refer to the boat's capacity plate). Know the boat's operating and loading limitations. Know if the boat will float if it is full of water. When in doubt, contact a Mercury Marine Authorized 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 human judgment and greatly reduce the ability to react quickly.

Know the 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 the wake.

Never drive the boat directly behind a water-skier.

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

Watch fallen skiers.

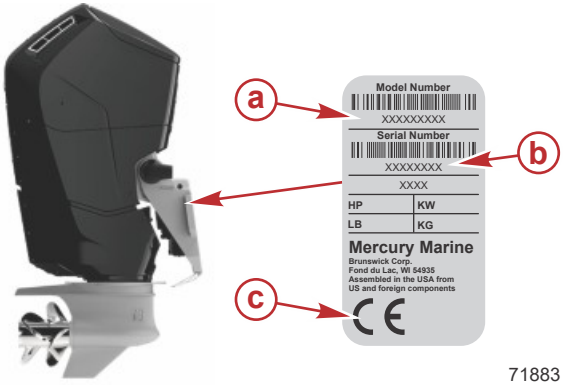
- When using a boat for waterskiing or similar activities, always keep a fallen or down skier on the operator's side of the boat while returning to attend to the skier. The operator should always have the down skier in sight and never back up to the skier or anyone in the water.

Report accidents.

- In the U.S., 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 $2,000.00 (lower amounts in some states and territories), or 4) there is complete loss of the boat. Seek further assistance from local law enforcement.
- Accident reporting requirements may vary in areas outside the U.S.

Recording Serial Number

It is important to record this number for future reference. The serial number is located on the outboard, as shown.



- **a -** Model designation
- **b -** Serial number
- **c -** Certified Europe insignia (as applicable)

Specifications

Attribute	V12 600hp Verado 48V
Horsepower	600
Kilowatts	447
Full throttle RPM range	5600–6400
Idle RPM in neutral gear*	700
Idle charge compensation**	700–825
Troll control RPM limit	700–1100
Number of cylinders	12
Displacement	7.6 L 7,556 cc (461 cid)
Cylinder bore	96 mm (3.8 in.)
Stroke	87 mm (3.4 in.)
Spark plug	NGK ILKAR7K11S or NGK ILKAR7G9
Spark plug gap	0.9 mm (0.035 in.)
Spark plug hex size	14 mm

Attribute	V12 600hp Verado 48V
Gearcase type	165 mm (6.5 in.) Contra-rotation dual prop
Gearcase lube capacity	2.8 L (3.0 US qt)
Transmission shift type	2-speed with wet clutches
Shift control—helm compatibility	DTS only
Transmission fluid capacity with filter change	6.6 L (7.0 US qt)
Transmission fluid capacity without filter change	5.7 L (6.0 US qt)
Overall gear ratio—forward	2.50:1
Recommended gasoline	Refer to **Fuel and Oil**
Recommended oil	Refer to **Fuel and Oil**
Engine oil capacity with oil filter replacement	13.25 L (14.0 US qt)
Required battery type and rating	Refer to **Engine Battery Specifications**

*Engine at normal operating temperature.

**The idle charge compensation may automatically increase the engine speed up to 825 RPM to compensate for a low battery charge condition. The increased idle RPM will charge the battery at a higher rate. Activating troll control (optional accessory) will override the idle charge compensation feature.

Engine Battery Specifications

IMPORTANT: Fathom design does not allow house loads on the cranking battery.

IMPORTANT: This engine requires a 12-volt absorbed glass mat (AGM) or lithium-ion marine cranking battery that meets the minimum ratings. Refer to Absorbed Glass Mat (AGM) Batteries and Lithium-Ion Batteries for specifications.

Do not use flooded (wet cell) lead acid batteries or gel cell lead acid batteries for cranking marine engines.

Each engine must be equipped with its own cranking battery.

If the boat application requires additional battery loads for boat accessories or marine electronics, install an auxiliary battery or batteries.

NOTE: *Do not use an engine cranking battery that does not meet the specified ratings. If a battery that does not meet the ratings is used, the electrical system may perform poorly.*

ABSORBED GLASS MAT (AGM) BATTERIES

12-Volt Absorbed Glass Mat (AGM) Battery Ratings*	
USA (SAE) cranking battery rating:	1000 minimum marine cranking amps (MCA) with a minimum reserve capacity of 100 minutes RC25 rating
International (EN) cranking battery rating:	800 minimum cold cranking amps (CCA) with a minimum of 65-amp hours (Ah)

*Battery manufacturers may rate and test their batteries to different standards. MCA, CCA, Ah, and reserve capacity (RC) are the ratings recognized by Mercury Marine. Manufacturers that use standards different than these, such as equivalent MCA, do not meet Mercury Marine battery requirements.

LITHIUM-ION BATTERIES

A lithium iron phosphate battery designed for engine cranking may be used with this engine. The battery used must meet the following specifications.

Parameter	Specification
Chemistry/format	Lithium iron phosphate designed for marine cranking use
Minimum cranking amps	800 A for 8 second minimum at 20 °F (-7 °C)
Peak charge acceptance	165 A 20-130 °F (-7-55 °C) for one minute
Max charge/alternator size	150 A 20-130 °F (-7-55 °C)
Max charge voltage/alternator output	14.8 V
Reserve capacity (RC25 at 80 °F)	135 minutes
Ingress protection (IP) rating	IP67 or greater

NOTE: *Use at temperatures below 32 °F (0 °C) may require optional equipment such as a battery heater not supplied by Mercury. Consult the battery manufacturer for assistance with cold weather use.*

At the time of publishing, the RELiON's® RB100-HP battery has been evaluated and meets these requirements for lithium-ion engine cranking batteries.

https://relionbattery.com/products/lithium/rb100-hp

Other lithium-ion cranking batteries may be used if their battery ratings and data sheet meet these specifications. Please contact the battery manufacturer for more information.

BATTERY INSTALLATION

⚠ WARNING

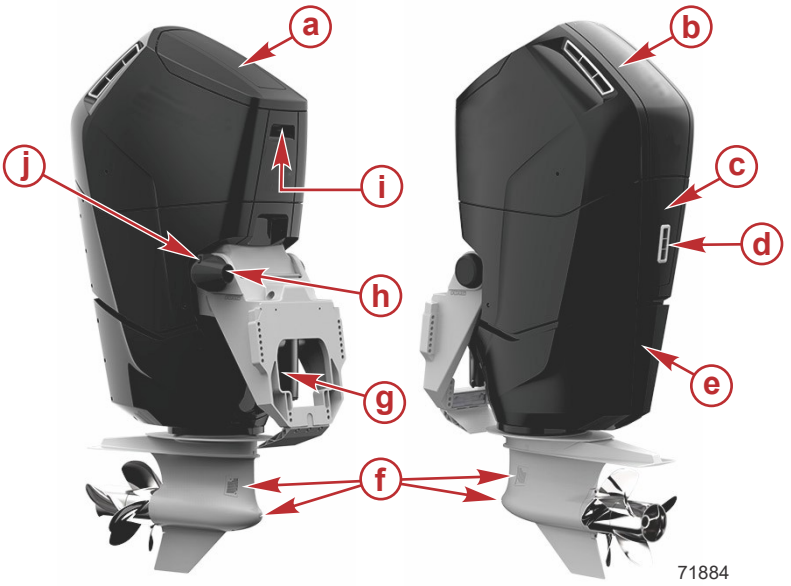
Failure to properly secure the battery leads can result in a loss of power to the Digital Throttle and Shift (DTS) system, leading to serious injury or death due to loss of boat control. Secure the battery leads to the battery posts with hex nuts to avoid loose connections.

Description	Nm	lb-in.	lb-ft
Battery hex nuts	13.5	120	–

IMPORTANT: Boating industry standards (BIA, ABYC, etc.), federal standards, and Coast Guard regulations must be adhered to when installing the battery. Ensure that the battery cable installation meets the pull test requirements and that the positive battery terminal is properly insulated in accordance with regulations.

It is recommended (required in some states) that the battery be installed in an enclosed case. Refer to local regulations.

Component Identification



- **a -** Hood
- **b -** Top cowl
- **c -** Mid cowl
- **d -** Exhaust relief
- **e -** Lower cowl
- **f -** Cooling water intake holes
- **g -** Manual tilt release (on trim cylinder)
- **h -** Rigging elbow
- **i -** Electronic hood latch release
- **j -** Auxiliary tilt switch

TRANSPORTING AND TOWING

Aquatic Invasive Species (AIS)

STOP AQUATIC HITCHHIKERS!™
Be A Good Steward. Clean. Drain. Dry.

For additional information, visit StopAquaticHitchhikers.org.

AIS and their spread can detrimentally impact the boating experience and the future of the boating lifestyle. Reducing the spread of AIS has led to significant national efforts to inspect boats moving between water bodies or across state and federal boundaries and could lead to delayed or denied access if AIS are suspected or found on board.

AIS include plant life such as Eurasian watermilfoil and water hyacinth, and animals such as spiny water flea, quagga, and zebra mussels. AIS may vary in size from microscopic, to easily visible to the naked eye, and can live in residual water or mud. These species damage ecosystems and negatively impact fishing by depleting natural food resources, altering the water environment, and changing the structure of the ecosystem.

The impact of AIS has already resulted in the limiting of boating access to many waterways throughout North America, the closure of public boat ramps, and the reduction of availability for fishing and boating across the United States. Many federal, state, and local agencies have enacted laws and regulations for inspections, permits, launch availability, and water access for vessels entering public waterways.

Boats and associated equipment are major contributors to the spread of AIS. Boats that have come into contact with AIS can become a means of transportation through attachment and entrapment.

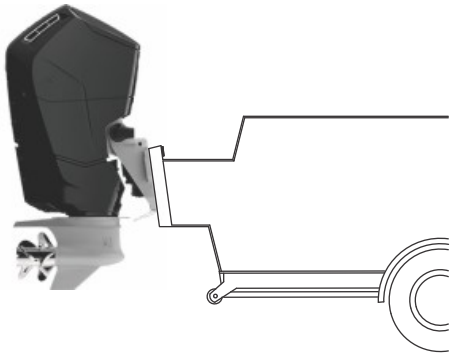
You should be aware that water passes in and out of the space under the lower cowls on your engine during normal operation of the boat. When flushing and cleaning your boat to control the spread of AIS, pay attention to this space by directing flushing water into the spaces under the lower cowl. The engine cooling system can be flushed by operating the engine with the appropriate flushing attachment and introducing heated water to the engine.

For more information about the control of AIS in your area, please contact your area wildlife conservation office or local governmental natural resources office.

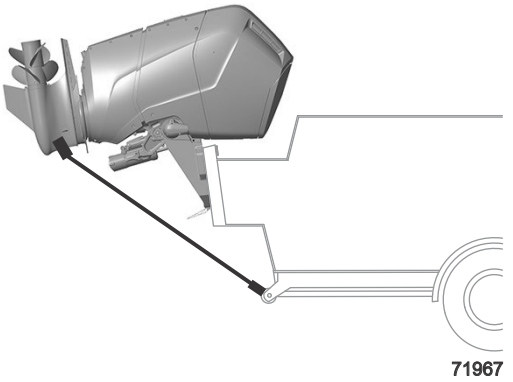
TRANSPORTING AND TOWING

Trailering Boat/Outboard

When transporting the boat on a trailer, the outboard should be positioned in the vertical operating position with no additional support required.



If additional ground clearance is required, the outboard should be tilted up as needed and supported with an accessory transom support device.



Additional clearance may be required for railroad crossings, driveways, and trailer bouncing. See your local dealer for recommendations.

IMPORTANT: Do not rely on the power trim/tilt system to maintain proper ground clearance for trailering. The power trim/tilt system is not intended to support the outboard for trailering.

Towing Boat Through Water

If the boat is being towed by another boat on the water, trim the drives up out of the water so the propellers are clear.

IMPORTANT: Do not use the drives as a rudder, transmission damage may occur.

FUEL AND OIL

Fuel Requirements

IMPORTANT: Use of improper gasoline can damage your engine. Engine damage resulting from the use of improper gasoline is considered misuse of the engine and will not be covered under the Limited Warranty or legal guarantee (if applicable).

FUEL RATINGS

Mercury outboard 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.

Fuel Additives

To minimize carbon deposit buildup in the engine, add Mercury or Quicksilver Quickleen Engine and Fuel System Cleaner to the engine's fuel at each tank throughout the boating season. Use the additive as directed on the container.

Low Permeation Fuel Hose Requirement

Required for outboards manufactured for sale, sold, or offered for sale in the United States.

- The Environmental Protection Agency (EPA) requires that any outboard manufactured after January 1, 2009, must use low permeation fuel hose for the primary fuel hose connecting the fuel tank to the outboard.
- Low permeation hose is USCG Type B1-15 or Type A1-15, defined as not exceeding 15 g/m²/24 h with CE 10 fuel at 23 °C as specified in SAE J 1527 - marine fuel hose.

Engine Oil Recommendations

Mercury or Quicksilver NMMA™ FC-W® certified 10W-30 Full Synthetic Marine Engine Oil is recommended.

In lieu of the recommended oil, the following may be used (listed in order of preference):

- Mercury or Quicksilver NMMA™ FC-W® certified 10W-30 Synthetic Blend Marine Engine Oil
- Mercury or Quicksilver NMMA™ FC-W® certified 10W-30 Marine Engine Oil
- If the recommended Mercury or Quicksilver NMMA™ FC-W® certified oils are not available, a major outboard manufacturer's brand of NMMA™ FC-W® certified 4-Stroke outboard oil of similar viscosity may be used.

FUEL AND OIL

IMPORTANT: Nondetergent oils, multiviscosity oils (other than Mercury or Quicksilver NMMA™ FC-W® certified oil or a major brand NMMA™ FC-W® certified oil), low quality oils, and oils that contain solid additives are not recommended.

Oil Volume:	**Oil Type:**
13.25 L (14.0 U.S. qt.)	10W-30

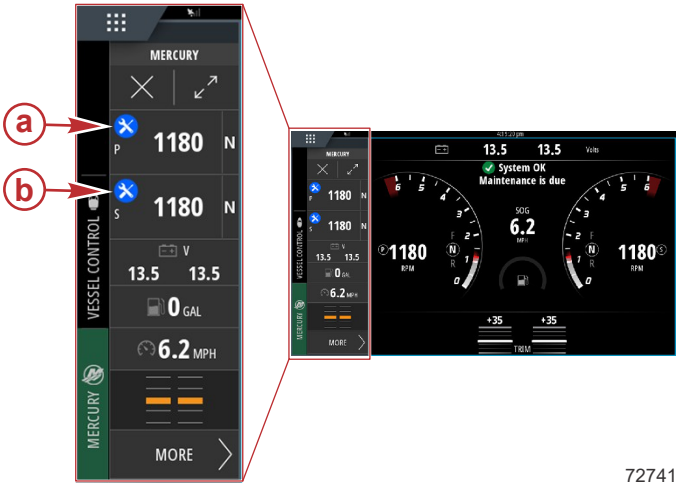
71968

Oil Life/Maintenance Monitor

The outboard is equipped with an oil life monitor that calculates the remaining oil life and notifies the user when an oil change is required. Oil change intervals will vary between 100–200 hours depending on engine duty cycle. Most users will be notified to change engine oil every 200 hours.

A maintenance icon will appear on the VesselView display to notify the user when an oil change is required. Select the desired engine to proceed to engine-specific data options.

72739



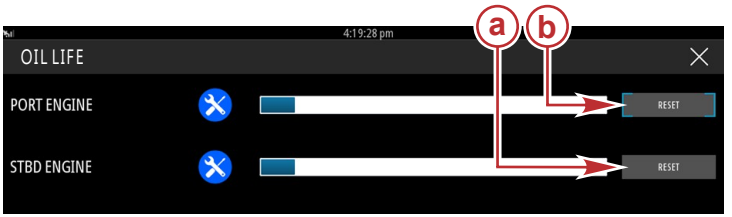
72741

Maintenance icons—dual-engine shown

a - Maintenance icon - port

b - Maintenance icon - starboard

1. Change the engine oil and complete any other scheduled maintenance, such as changing gearcase lubricant and transmission fluid. Maintenance should be performed within 10 engine hours of receiving the oil change notification (maintenance icon) in VesselView, or following extended storage (more than 90 days).
2. Upon changing the engine oil and completing other scheduled maintenance, reset the oil life/maintenance status. In the VesselView display, navigate to **MERCURY** -> **MORE** -> **OIL** -> **OIL LIFE**, and press the **RESET** button for each engine that has been serviced.



72742

OIL LIFE screen—dual-engine shown

a - Reset button - starboard
b - Reset button - port

NOTE: *The remaining oil life status can be viewed at any time by navigating to the OIL LIFE screen as described in step 2.*

Checking and Adding Engine Oil

Follow the instructions below to check the engine oil level, and to add engine oil if required. Refer to **Maintenance - Changing Engine Oil and Filter** for additional details.

NOTE: *Due to internal condensation, milky-colored oil may be observed during extended idle or low speed operation, especially in cold ambient conditions. Such milky oil/minor water accumulation is typically eliminated via 10–15 minutes of high speed or cruise speed operation, prior to overnight or extended shut down.*

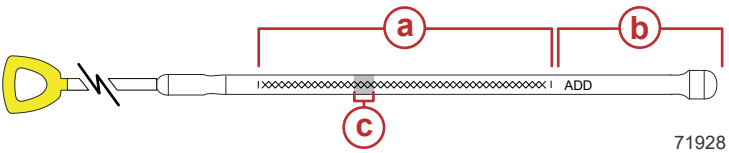
ELECTRONIC OIL LEVEL CHECK

The engine oil level may be checked electronically while the engine is idling in neutral as follows:

1. Confirm the vessel is not in shallow water and that there is no risk of bottoming out the propellers when trimming the engine.
2. Ensure that the joystick and Skyhook are not active, if equipped.
3. In the VesselView display, navigate to **MERCURY** -> **MORE** -> **OIL**.
4. Press the **OIL LEVEL CHECK** button.

- Do not trim the engine, shift out of neutral, activate the joystick/ Skyhook, or increase engine speed while the oil level check is in process.
- The Engine Control Module (ECM) will automatically trim the engine to the level position.
- The engine speed will slightly increase.

5. The oil level check may take up to one minute to complete; one of the following results will appear on the display:
   - **High:** The oil level is high. Change the engine oil and filter. Refer to **Maintenance - Changing Engine Oil and Filter** for details.
   - **Good:** No action is required. The oil level is in a safe operating range.
   - **Low:** The oil Level is low (bottom of dipstick crosshatch). Add 3.8 Liter (4.0 US qt) of the recommended oil.
   - **Critically Low:** The oil Level is critically low (below dipstick crosshatch). Add 4.7 Liter (5.0 US qt) of the recommended oil. Use the dipstick to manually check the oil. If necessary, add oil to reach the middle of the crosshatch/safe operating range. **Refer to Manual Oil Level Check**.
   - **Unavailable:** Unable to complete the oil level check, likely due to trimming, shifting, increasing speed, or activating the joystick/ Skyhook before the oil level measurement is complete. Repeat the measurement, but avoid trimming, shifting, increasing speed, or activating joystick/Skyhook.



a - Safe operating range
b - Add 3.8 Liter (4.0 US qt) of oil
c - Target oil level (1/2 to 2/3 above bottom of crosshatch)

MANUAL OIL LEVEL CHECK

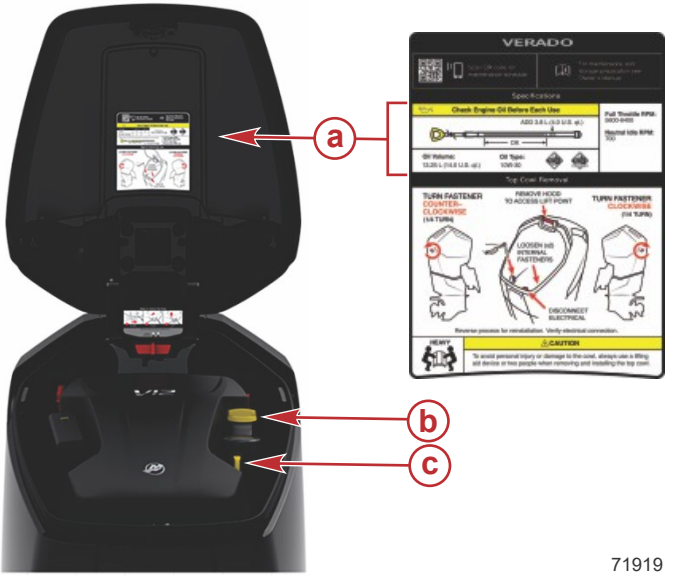
The engine oil level may be checked manually via the oil dipstick as follows:

IMPORTANT: Do not overfill. To avoid overfilling, the targeted level when adding oil should be 1/2 to 2/3 above the bottom of the dipstick crosshatch or ADD mark. The outboard must be in a vertical (not tilted) position when checking the engine oil. For accurate readings, check the oil only when the engine has not run for at least an hour.

1. With the engine off, trim/tilt the outboard to the vertical (not tilted) position. Refer to **Features and Controls - Power Trim and Tilt**.
2. Open the hood. Refer to **Maintenance - Hood Opening**.

FUEL AND OIL

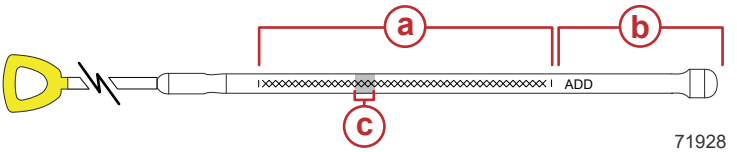
NOTE: *A quick reference decal which lists the type of oil to use is located on the underside of the hood.*



71919

- **a -** Decal
- **b -** Oil fill cap
- **c -** Dipstick

3. Remove the dipstick, wipe it clean, and install it fully into the dipstick tube.
4. Remove the dipstick and observe the oil level. The oil level should be within the safe operating range.



71928

- **a -** Safe operating range
- **b -** Add 3.8 Liter (4.0 US qt) of oil
- **c -** Target oil level (1/2 to 2/3 above bottom of crosshatch)

5. If the oil level is below the ADD mark, or is not visible on the dipstick, remove the oil fill cap and add 3.8 Liter (4.0 US qt) of the recommended oil.
6. Allow a few minutes for the oil to drain into the sump and insert the oil dipstick.

7. Remove the dipstick and observe the oil level. Add oil as necessary to reach the target oil level (1/2 to 2/3 above the bottom of the dipstick crosshatch or ADD mark).
8. Install the dipstick and oil fill cap hand-tight.
9. Close the hood.

FUEL AND OIL

Notes:

Electronic Remote Control (ERC)

Electric steering requires a Digital Throttle and Shift (DTS) electronic remote control (ERC). Because it is electronic, an ERC is capable of several features beyond the basic remote control functions of throttle and shift. These additional features are described in **Digital Throttle and Shift (DTS) Features**.

There are several DTS ERCs that can be used with electric steering, depending on the number of engines and the desired features. The following images show the current Mercury ERCs that will function with electric steering.

71712

Panel mount ERC - ES


71715

Single-engine console ERC - ES


71716

Dual-engine console ERC - no trim


71717

Dual-engine console ERC - with trim

Dual-engine console ERC - premier

Triple-engine console ERC - standard

Triple-engine console ERC - premier

Quad-engine console ERC - standard

Quad-engine console ERC - premier

Five or six-engine console ERC

The basic styles of ERC are panel mount (single-engine only), single-handle console (single-engine only), and dual-handle console (two or more engines).

PANEL MOUNT ERC

Panel mount ERCs control a single engine. There are several variations, but only one of these can be used with electric steering (ES).

71965

Ref	Control/LED	Function
a	Neutral (**N**) LED	Illuminates when the engine is in the neutral gear position. The light flashes when the engine is in throttle-only mode.
b	Brightness (**+** and **–**)	Increases and decreases the brightness settings for the lights on the ERC and Mercury helm components.
c	**THROTTLE ONLY**	Allows the boat operator to increase engine RPM without shifting into gear. Refer to **Throttle-Only Mode**.
d	**QUICK STEER** (if equipped)	Decreases the number of steering helm turns, lock-to-lock, for quicker response during docking. This feature also limits engine speed. Refer to **Quick Steer**.

FEATURES AND CONTROLS

Ref	Control/LED	Function
e	**ACTIVE TRIM** (if equipped)	The **ACTIVE TRIM** button turns the Active Trim feature **ON** or **OFF**. Refer to **Active Trim**.
	Profile ▲ and ▼	Changes the selected Active Trim profile.
	Active Trim LEDs (**1, 2, 3, 4, 5**)	Indicates the currently selected Active Trim profile. ***NOTE:*** *If the LED indicators are flashing, Active Trim is in setup mode.*
f	Lanyard stop switch (emergency stop)	In conjunction with the lanyard cord, shuts off the engine when the operator moves away from the ERC.
g	**START/STOP ENGINE**	Starts or stops the engine.
h	**UP** ▲ and **DN** ▼— trim control	Raises and lowers the engine/drive for best efficiency, or for conditions such as shallow water or trailering. Some boats are equipped with separately-mounted trim controls.
i	Mechanical lock bar	Pressing the mechanical lock bar allows the engine to shift. The mechanical lock bar must always be pressed when moving the control handle out of the neutral position.

FEATURES AND CONTROLS

SINGLE-HANDLE CONSOLE ERC

Single-handle console ERCs control a single engine. There are several variations, but only one of these can be used with electric steering (ES).

Ref	Control/LED	Function
a	Neutral (**N**) LED	Illuminates when the engine is in the neutral gear position. The light flashes when the engine is in throttle-only mode.
b	Brightness (**+** and **–**)	Increases and decreases the brightness settings for the lights on the ERC and Mercury helm components.
c	**TRANSFER**	Allows boat control to be transferred to a different helm. (The LED will be ON at the active helm.) Refer to **Helm Transfer**.
d	**THROTTLE ONLY**	Allows the boat operator to increase engine RPM without shifting into gear. Refer to **Throttle-Only Mode**.
e	**QUICK STEER** (if equipped)	Decreases the number of steering helm turns, lock-to-lock, for quicker response during docking. This feature also limits engine speed. Refer to **Quick Steer**.
f	**ACTIVE TRIM** (if equipped)	The **ACTIVE TRIM** button turns the Active Trim feature **ON** or **OFF**. Refer to **Active Trim**.
	Profile ▲ and ▼	Changes the selected Active Trim profile.
	Active Trim LEDs (**1, 2, 3, 4, 5**)	Indicates the currently selected Active Trim profile. ***NOTE:*** *If the LED indicators are flashing, Active Trim is in setup mode.*
g	**START/STOP ENGINE**	Starts or stops the engine.

Ref	Control/LED	Function
h	**UP** ▲ and **DN** ▼— trim control	Raises and lowers the engine/drive for best efficiency, or for conditions such as shallow water or trailering. Some boats are equipped with separately-mounted trim controls.
i	Mechanical lock bar	Pressing the mechanical lock bar allows the engine to shift. The mechanical lock bar must always be pressed when moving the control handle out of the neutral position.

DUAL-HANDLE CONSOLE ERC

Dual-handle console ERCs control two, three, four, five, or six-engines. Dual-engine ERCs are available with or without integral trim switches.

FEATURES AND CONTROLS

Premier ERCs have an integral, supplemental display, and are available for dual, triple, or quad-engine configurations. Refer to **ERC Supplemental Display** for details.

Dual-handle, quad-engine premier ERC shown, others similar

Ref	Control/LED	Function
a	Neutral (**N**) LEDs (one on each handle)	Illuminate when the engine is in the neutral gear position. The lights flash when the engine is in throttle-only mode.
b	Brightness (**+** and **–**)	Increases and decreases the brightness settings for the lights and display (if equipped) on the ERC and Mercury helm components.
c	**1 LEVER**	Enables the throttle and shift functions of all engines to be controlled by the port lever. Refer to **Single-Lever Mode**.
d	**TRANSFER**	Allows boat control to be transferred to a different helm. (The LED will be ON at the active helm.) Refer to **Helm Transfer**.
e	**THROTTLE ONLY**	Allows the boat operator to increase engine RPM without shifting into gear. Refer to **Throttle-Only Mode**.
f	**ACTIVE TRIM** (if equipped)	The **ACTIVE TRIM** button turns the Active Trim feature **ON** or **OFF**. Refer to **Active Trim**.
	Profile ▲ and ▼	Changes the selected Active Trim profile.
	Active Trim LEDs (**1, 2, 3, 4, 5**)	Indicates the currently selected Active Trim profile. ***NOTE:*** *If the LED indicators are flashing, Active Trim is in setup mode.*

Ref	Control/LED	Function
g	**START/STOP** individual engines	Press to start or stop the indicated engine, as equipped: **P** (port), **PC** (port center), **C** (center), **SC** (starboard center), **S** (starboard)
h	Display and display buttons (premier ERCs only)	Refer to **ERC Supplemental Display** for details.
i	**START/STOP - ALL ENGINES**	Starts or stops all engines. If some, but not all engines are running, pressing this button will stop all running engines. Refer to **Start/Stop All Engines**.
j	**UP ▲** and **DN ▼** —trim control (if equipped)	Raises and lowers the engines/drives for best efficiency, or for conditions such as shallow water or trailering. ***NOTE:*** *Trim switches for the individual engines are located on the front (bow side) of the ERC.* Some boats are equipped with separately-mounted trim controls.

ERC SUPPLEMENTAL DISPLAY

The ERC supplemental display will show the faults and the status of various features. Warnings for advanced features, such as Skyhook, Active Trim, and Charging Mode will appear on the ERC supplemental display. Visit mercurymarine.com for additional details.

- **a -** Port engine gear indicator
- **b -** Active Trim status
- **c -** Starboard engine gear indicator
- **d -** Display
- **e -** ENTER button
- **f -** Up/down selection buttons
- **g -** Menu button

ELECTRONIC REMOTE CONTROL (ERC) OPERATION

Operation of the 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 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 back to increase speed in reverse.

NOTE: *On panel mount and single-handle console ERCs, press the mechanical lock bar when moving the control handle out of the neutral position.*

71972

ERC HANDLE FRICTION AND DETENT ADJUSTMENT

The control handle friction adjustment screw can be used to increase or decrease the tension on the control handle. This will help prevent unwanted motion of the handle in rough water.

The detent adjustment screw can be used to increase or decrease the effort it takes to move the control handle out of the detent position.

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

FEATURES AND CONTROLS

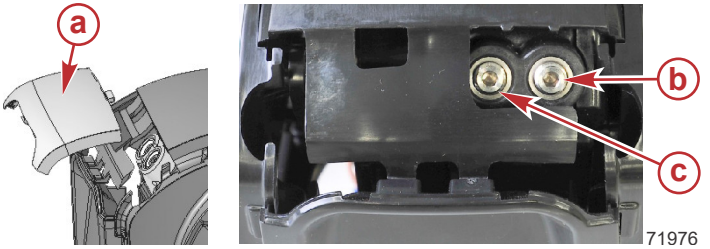
Remove the access cover from the front of the ERC to expose the adjustment screws. Using a hex wrench turn the desired screw clockwise to increase tension, or counterclockwise to decrease tension. Install the access cover after the desired tension is achieved.

71261

Panel mount ERC (ERC shown not installed, access cover removed)

a - Handle friction adjustment screw

b - Detent adjustment screw



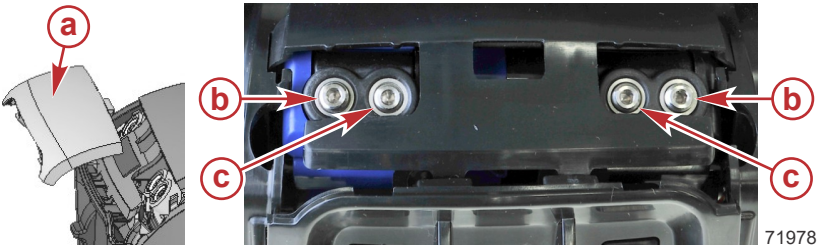
71976

Single-handle console ERC

a - Access cover

b - Detent adjustment screw

c - Handle friction adjustment screw



Dual-handle console ERC

- **a -** Access cover
- **b -** Detent adjustment screws
- **c -** Handle friction adjustment screws

ZERO EFFORT CONTROLS

Zero Effort controls allow the operator to control the shifting and throttle with separate control handles. Zero Effort controls are available in single, and multiple engine applications including shadow mode operation.

Active Trim

INTRODUCTION TO ACTIVE TRIM

Active Trim is Mercury Marine's patented GPS-based automatic trim system. This intuitive, hands-free system continually adjusts engine or drive trim for changes in operating conditions to improve performance, fuel economy, and ease of operation. It responds to boat maneuvers with precision and delivers a better overall driving experience. No knowledge of trimming an engine or drive is needed to take advantage of Active Trim.

- As the boat accelerates, the engine or drive will trim out.

- As the boat decelerates, for example, while making a turn, the engine or drive will trim in.
- Active Trim can be overridden at any time by using the regular, manual trim buttons.
- Active Trim allows the boat operator to compensate for changes in boat load, driver preferences, and weather conditions while maintaining full automatic control.

Modes of Operation

The Active Trim system has four modes of operation: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1. Idle speeds
Maintains the existing trim position.


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2. Acceleration (hole shot)
Tucks the engine or drive under to minimize bow rise and improve time-to-plane.


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3. Planing speeds
Progressively trims the engine or drive based on GPS speed to maintain the most efficient running attitude.

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4. Override
When the boat operator uses manual trim, the Active Trim system is immediately overridden, returning full control to the operator.

Setup and Configuration

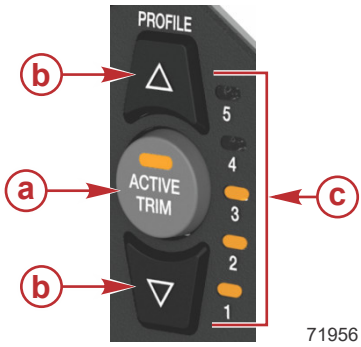
Refer to your authorized Mercury dealer for setup and configuration instructions.

ACTIVE TRIM ERC CONTROLS

IMPORTANT: Authorized Mercury dealers have the ability to disable the Active Trim feature. In this case, the Active Trim buttons and lights on the ERC will not function.

FEATURES AND CONTROLS

Use the buttons and lights on the ERC to control the Active Trim feature.



Active Trim controls on the ERC

Ref	Control/LED	Function
a	**ACTIVE TRIM** button	Turns the Active Trim feature on or off.
	System status light	Provides Active Trim status information: • A constant amber light indicates that the system is working normally. • A flashing amber light indicates that the Active Trim system is not controlling trim (user override). Press the **ACTIVE TRIM** button to resume Active Trim control. • A flashing red light indicates a problem with the system. Refer to **Active Trim Red Status Light**.
b	**PROFILE** select buttons (▲ and ▼)	Up (▲) - Changes the adjustable trim profile to a more aggressive trim curve (more trim angle).
		Down (▼) - Changes the adjustable trim profile to a less aggressive trim curve (less trim angle).
c	Selected profile indicator LEDs (1, 2, 3, 4, 5)	Indicates the adjustable profile currently engaged. 1 is the least aggressive trim profile; 5 is the most aggressive. ***NOTE:*** *If the LED indicators are flashing, Active Trim is in setup mode.*

ACTIVE TRIM OPERATION

- Active Trim automatically controls trim to maintain the optimum engine or drive position based on engine RPM and boat speed.
- Active Trim progressively trims out the engine or drive to maintain an efficient running attitude.

- Active Trim will maintain the last known trim position when operating at speeds in excess of 80 km/h (50 mph).
- Operation above 80 km/h (50 mph) may require trim adjustments using the panel mounted or control handle trim position switch.
- Active Trim will gradually return the engine or drive to the down position during deceleration.
- Active Trim will only function when the engine or drive is in the normal trim range.

GPS

Active Trim uses a GPS signal to determine vessel speed. The Active Trim system will not automatically control trim until the GPS unit has acquired a signal.

Resume Functionality

If the boat operator overrides the Active Trim system at planing speeds using the trim button, or exceeds 80 km/h (50 mph), the system will stop controlling the trim. Active Trim will resume automatically under the following conditions:

- Override occurred above 80 km/h (50 mph) and the boat operator then decelerates to below 80 km/h (50 mph).
- Override occurred above 80% of the rated engine RPM and the boat operator then decelerates to below 80% of the rated engine RPM.
- Override occurred in the cruising speed range and then the boat operator decelerates to idle. Active Trim will become active on the next acceleration.

Shallow Water Operation

Active Trim cannot detect water depth and will not trim up automatically in shallow water. The boat operator will need to override Active Trim by trimming the engine or drive manually or pressing the **Active Trim** button.

Trailer Position

Placing the engine or drive in trailer position—over 50% of the adapted trim range, will prevent Active Trim from engaging. Any time the engine or drive is trimmed above its normal range—to navigate shallow water, launch the boat from a trailer, or load the boat onto a trailer, for example—you must manually trim down before Active Trim will function. This safety feature is meant to prevent the engine or drive from automatically trimming down and hitting something.

SELECTING THE CORRECT PROFILE

With so many available trim profiles, it can be difficult to determine which profile is the correct one. In making this determination, it is important to understand what trim is, how it affects boat operation, and how boat loading can influence the required trim angle. Armed with a clear understanding of these concepts, selecting the correct trim profile becomes simple.

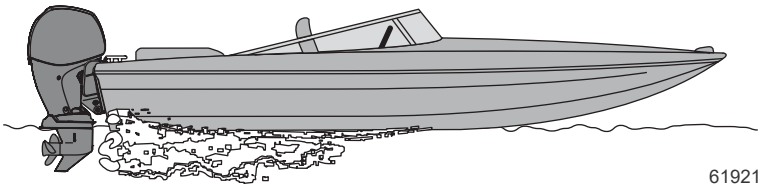
What Trim Is

The trim angle of an outboard or sterndrive is the angle between the boat bottom and the propeller shaft formed by moving the engine or sterndrive closer to the boat transom. This movement is called trimming in or down. Moving the engine or sterndrive further away from the transom is called trimming out or up. When a boat is cruising on plane and the trim is adjusted so that the propeller shaft is parallel to the surface of the water, that is said to be running at zero trim.

The term "trim" is generally used when referring to adjusting the outboard or sterndrive within the first 20° range of travel. This is the range used while operating your boat on plane. The term "tilt" is generally used when referring to adjusting the outboard or sterndrive further up or out of the water.

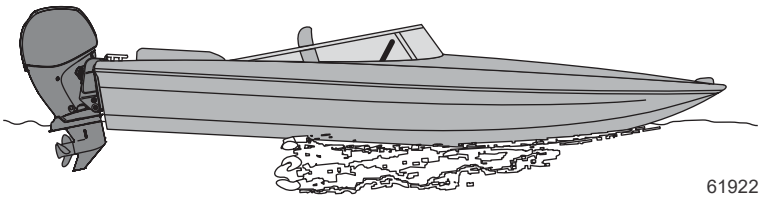
How Trim Affects Boat Operation

The trim angle of the outboard or sterndrive has a distinct effect on the planing angle of the boat, which in turn significantly alters the top speed and handling. The engine or drive should be trimmed in for best start-up acceleration and shortest time to plane. The engine or drive would then be trimmed out for peak performance. Active Trim automatically handles this transition for you.



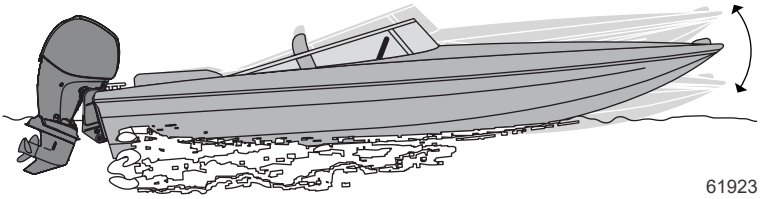
Engine or drive properly trimmed

If the engine or drive is trimmed in too far, the bow drops and the boat runs too wet. In this condition, top speed drops, fuel economy decreases, the boat may oversteer in one direction or the other (bow steering), and steering torque will increase (to the right with a right-hand rotation propeller). Occasionally, extreme trim down can cause a boat to list to the left (with a right-hand propeller).



Engine or drive trimmed in (bow too low)

If the engine or drive is trimmed out too far, the propeller may lose its hold on the water, fast V-bottom boats may start to walk from side to side (chine walking), steering torque will increase in the opposite direction to that when trimmed in, and getting on plane may be difficult or labored. Porpoising of the boat may also occur.



Engine or drive trimmed out (bow too high); porpoising

Boat Loading and Trim

Under normal loading and operating conditions while on plane, the boat bottom is roughly parallel to the surface of the water. Changing the loading of the boat will not change the trim angle as previously defined, but it will change the running attitude of the boat with respect to the surface of the water. Adding weight toward the stern of the boat will cause the bow to rise. Similarly, adding weight toward the bow of the boat will cause the bow to lower.

Changing the trim angle can compensate for a change in the running attitude of the boat. Increasing the trim angle will raise the bow of the boat, compensating for bow heavy loading. Decreasing the trim angle will lower the bow of the boat, compensating for stern heavy loading.

Choosing an Active Trim Profile

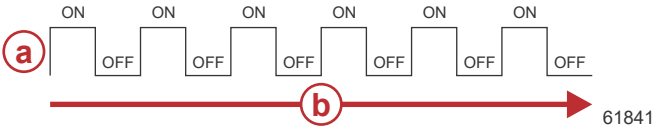
If Active Trim is configured properly, the normal setting for running on plane will be profile 2, 3, or 4. This allows the operator the flexibility to change the trim angle to compensate for variations in boat loading or other operating conditions. Selecting a higher number profile will raise the bow and selecting a lower number profile will lower the bow.

Use the preceding descriptions of trim in and trim out to help determine whether or not your boat is trimmed properly (refer to **How Trim Affects Boat Operation**). In general, this means you can increase the trim profile until the bow begins to porpoise (rise and fall), and then back off one level.

ACTIVE TRIM RED STATUS LIGHT

A flashing red light can indicate different things, depending on if it is a single or a double flash sequence.

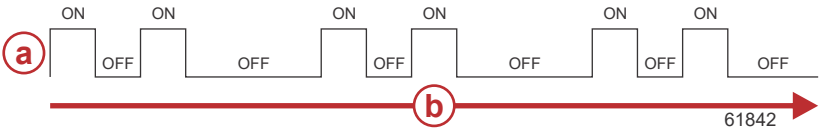
Single Flashing Red



a - Light (on or off)
b - Interval

Fault Condition	Description	Notes
GPS signal intermittent	GPS signal has achieved fix, but is dropping out intermittently.	Indicates loss of GPS signal.
GPS signal unavailable	GPS has not achieved fix since key on.	Indicates obstructed GPS antenna or weak signal.

Double Flashing Red



a - Light (on or off)
b - Interval

Fault Condition	Description	Notes
Trim up or trim down not achieved	The engine did not achieve its trim setpoint while attempting to trim up or down.	Indicates a problem with hydraulic pump operation, fuse, connection, trim sensor, or trim down circuit.

Adaptive Speed Control

This outboard package utilizes adaptive speed control which automatically adjusts the engine load (throttle) to maintain engine speed (RPM). For example, when the boat operator steers into a hard turn, which results in increased load on the engine and a loss of RPM, the propulsion control module (PCM) will open the throttle to maintain RPM through the turn, without the need for the operator to increase the remote control throttle handle. Another example is when cruising or utilizing the boat for tow sports, engine speed will remain constant, regardless of load changes due to waves, trim position, turning or load changes from tow sports. Adaptive speed control is active from idle RPM up to max rated RPM, however, can only maintain engine speed when the throttle is less than wide open.

Engine Synchronization (Multiple Engines)

Digital Throttle and Shift (DTS) engines have an automatic engine synchronization feature that engages automatically at key-up. Sync mode monitors the position of both ERC levers. If both levers are within 10% of one another, all engines synchronize to the starboard engine's RPM. The SmartCraft system will automatically disengage sync at the last 10% of the lever range to allow each engine the ability to reach the maximum available RPM. Sync mode cannot engage until its minimum RPM is met.

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 the transfer is requested again.*

Some fault codes may appear on the Mercury-approved multifunction display 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 the 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.

TRANSFER LIGHT AND SINGLE-HELM BOATS

IMPORTANT: On boats with a single-helm, the TRANSFER light is constantly on, whenever the ignition key switch is on. This is normal.

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REQUESTING HELM TRANSFER

NOTE: *Any movement of the joystick (if equipped) or ERC levers after pressing the transfer button terminates the helm transfer request. A single beep sounds and the transfer button light turns off signaling the end of the transfer request.*

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To request the transfer of vessel control from one helm to another:

1. All of the ignition keys must be in the **ON** position.
2. All of the vessel's ERC levers must be in the neutral position.
3. At the helm you are requesting to be made active, press the **TRANSFER** button once. The transfer light turns on and one beep will sound confirming the impending transfer.

NOTE: *If all ERC levers are not in neutral, the neutral lights will flash. Move all ERC levers to neutral and the neutral light will stop flashing.*

4. With the transfer light and neutral light on, press the **TRANSFER** button a second time to complete the helm transfer.
5. When the helm transfer is complete, another beep sounds. The transfer light stays on at the active helm location.

NOTE: *If the helm transfer is not completed in 10 seconds, the request is automatically cancelled and a double beep sounds. Control will remain at the existing active helm. Press the transfer button again to restart helm transfer.*

6. The helm where the transfer request was initiated is now active and controls the vessel.

HELM TRANSFER AND AUTOPILOT

Transferring control from an active helm to an inactive helm (from one station to another station) affects the functionality of autopilot modes. Some of the effects are listed.

- Auto heading mode will disengage when the ERC levers are moved to the neutral position. You must engage auto heading at the selected active helm.
- Requesting a helm transfer places the autopilot into standby mode. Any required inputs will need to be entered at the selected active helm.
- Skyhook will disengage when the transfer button is pressed the second time. Skyhook must be engaged at the selected active helm.
- If auto heading is activated, the helm transfer functionality is disabled. Turn this feature off and resume the transfer. At the selected active helm, engage auto heading.
- If route mode is activated, the helm transfer functionality is disabled. Turn this feature off and resume the transfer. At the selected active helm, engage route mode.
- Route mode (waypoint sequencing) control of the route and display of route data on your chartplotter does not automatically transfer to the chartplotter at the active helm. You must turn on the chartplotter at the selected active helm, input the waypoint route to be tracked, and engage route mode.

IMPORTANT: If faults are encountered while attempting to complete a helm transfer, all controlling modules for the engine and the joystick piloting system must be turned off. To turn these controlling modules off, turn both engines off and place both engine ERC handles in reverse full throttle for three seconds.

Quick Steer

Quick Steer is available on vessels equipped with Single Outboard Electric Steering. Electric steering versions of the panel mount and single-handle console ERCs have a button to enable the Quick Steer feature. This feature is meant to provide rapid steering and more precise throttle control when operating in tight quarters, such as when docking.

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- Quick Steer decreases the number of steering turns, lock-to-lock, at the helm to approximately quarter-turn each direction, while still providing full steering capacity.

- Quick steer limits engine speed.

Throttle and Shift Operation with Three or Four Engines

TRIPLE-ENGINE THROTTLE AND SHIFT OPERATION

Movement of the handles on the remote control allows the boat operator to control the engine throttle speed and gear shift positions of all three engines.

The throttle and shift function is dependent on what engines are running. Refer to the following table.

Port Engine	Center Engine	Starboard Engine	Control Handle Function
Running	Running	Running	Port engine throttle and shift = controlled by port control handle
			Starboard engine throttle and shift = controlled by starboard control handle
			Center engine throttle = shadows the engine with the lowest throttle setting until the port and starboard engine are within 10% of one another at which point all engines synchronize to the starboard engine's RPM.
			Center engine shift = neutral unless both engines are in the same gear
Running	Running	Off	Port and center engine throttle and shift = controlled by port control handle
Off	Running	Running	Starboard and center engine throttle and shift = controlled by starboard control handle
Running	Off	Running	Port engine throttle and shift = controlled by port control handle
			Starboard engine throttle and shift = controlled by starboard control handle
Running	Off	Off	Port engine throttle and shift = controlled by port control handle
Off	Off	Running	Starboard engine throttle and shift = controlled by starboard control handle
Off (ignition key switch turned **ON**)	Running	Off (ignition key switch turned **ON**)	Center engine throttle and shift = neutral/idle unless both control handles are in the same gear

Turning off one of the outer engines while underway will cause the center engine to go into forced neutral/idle. Operation to the center engine can be restored by moving the control handle of the functioning outer engine back into neutral position and then engaging. The center engine speed and gear shift will then be controlled by the functioning outer engine.

Turning off the center engine while underway will have no effect on the operation of the outer engines.

If a failure should occur while underway which causes one of the outer engines into forced neutral/idle condition, the center engine will also be forced to neutral/idle. Operation to the center engine can be restored by moving the control handle of the functioning outer engine back into neutral and then engaging.

QUAD-ENGINE THROTTLE AND SHIFT OPERATION

Movement of the handles on the remote control allows the boat operator to control the engine throttle speed and gear shift positions of all four engines.

The throttle and shift function is dependent on what engines are running. Refer to the following table.

Port Outer Engine	Port Inner Engine	Starboard Inner Engine	Starboard Outer Engine	Control Handle Function
Running	Running	Running	Running	Port inner and outer engines throttle and shift = controlled by port control handle
				Starboard inner and outer engines throttle and shift = controlled by starboard control handle
Running	Running	Off	Off	Port inner and outer engine throttle and shift = controlled by port control handle
Off	Off	Running	Running	Starboard inner and outer engine throttle and shift = controlled by starboard control handle
Off (ignition key switch turned **ON**)	Running	Running	Running	Port inner engine throttle and shift = controlled by port control handle
Running	Running	Running	Off (ignition key switch turned **ON**)	Starboard inner engine throttle and shift = controlled by starboard control handle

Port Outer Engine	Port Inner Engine	Starboard Inner Engine	Starboard Outer Engine	Control Handle Function
Off (ignition key switch turned **OFF**)	Running	Running	Running	Port inner engine throttle and shift = controlled by starboard control handle
Running	Running	Running	Off (ignition key switch turned **OFF**)	Starboard inner engine throttle and shift = controlled by port control handle
Running	Off	Off	Running	Port outer engine throttle and shift = controlled by port control handle
				Starboard outer engine throttle and shift = controlled by starboard control handle
Off (ignition key switch turned **ON**)	Running	Running	Off (ignition key switch turned **ON**)	Port inner engine throttle and shift = controlled by port control handle
				Starboard inner engine throttle and shift = controlled by starboard control handle

Turning off the starboard outer engine while underway will cause the starboard inner engine to go into forced neutral/idle. Operation to the inner engine can be restored by turning the starboard outer engine ignition key to the **ON** position and moving the starboard control handle back into neutral position and then engaging. The inner engine speed and gear shift will then be controlled by the starboard control handle.

Turning off the port outer engine while underway will cause the port inner engine to go into forced neutral/idle. Operation to the inner engine can be restored by turning the port outer engine ignition key to the **ON** position and moving the port control handle back into neutral position and then engaging. The inner engine speed and gear shift will then be controlled by the port control handle.

Turning off one of the inner engines while underway will have no effect on the operation of the outer engines.

If a failure should occur while underway which causes the starboard outer engines into forced neutral/idle condition, the inner starboard engine will also be forced to neutral/idle. Operation to the inner engine can be restored by moving the starboard control handle back into neutral and then engaging.

If a failure should occur while underway which causes the port outer engines into forced neutral/idle condition, the inner port engine will also be forced to neutral/idle. Operation to the inner engine can be restored by moving the port control handle back into neutral and then engaging.

Single-Lever Mode (Multiple Engines)

Dual-handle console ERCs feature the ability to command all engines with a single-lever. This feature simplifies engine management. Single-lever mode has no affect on the joystick function (if equipped).

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To engage single-lever mode:

1. Place both ERC levers in neutral.
2. Press **1 LEVER**. The single-lever light will turn on.
3. Place the port ERC lever into gear.
4. The RPM on all engines will increase and decrease in sync, while all drives remain in gear.

To disengage single-lever mode:

1. Place both ERC levers in neutral.
2. Press **1 LEVER**. The single-lever light will turn off.

Start/Stop All Engines

Dual-handle console ERCs have a **START/STOP ALL ENGINES** button, which allows starting or stopping all engines with a single button push. The exact behavior of the engines depends on:

1. How many engines are running when the button is pressed (none, all, or some)
2. Whether a particular engine's key switch is **ON** or **OFF**
3. What other actions the operator takes immediately after pressing the **START/STOP ALL ENGINES** button

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ENGINE INDICATOR LEDS

LEDs on the **START/STOP ALL ENGINES** button and the individual engine **START/STOP** buttons (on the aft end of the ERC) indicate the status of all engines.

NO ENGINES RUNNING - START ENGINES

When no engines are running (and no engine status LEDs are lit), press the **START/STOP ALL ENGINES** button to start all engines.

1. The LED on the **START/STOP ALL ENGINES** button turns on.
2. The engines will start according to the following sequence (as equipped):

a. Starboard outer engine - the LED on the starboard outer (**S**) button will light when the engine starts.
b. Port outer engine - the LED on the port outer (**P**) button will light when the engine starts.
c. Starboard inner engine - the LED on the starboard inner (**C** or **SC**) button will light when the engine starts.
d. Port inner engine - the LED on the port inner (**PC**) button will light when the engine starts.

Certain conditions will cause an engine to be skipped in the starting sequence. The starting sequence will ignore an engine and continue with any remaining engines, if:

1. SmartStart times out (around 8 seconds) for an engine
2. The ignition key switch is **OFF** for an engine (the starting sequence will proceed with no delay)

ALL ENGINES RUNNING - STOP ENGINES

When all engines are running (and all engine status LEDs are lit), press the **START/STOP ALL ENGINES** button to stop all engines. All engine status LEDs (individual and the **ALL ENGINES** LED) will turn off.

SOME (NOT ALL) ENGINES RUNNING - STOP ENGINES

When some but not all engines are running (and the corresponding engine status LEDs are lit), press the **START/STOP ALL ENGINES** button to stop all running engines. All engine status LEDs (individual and the **ALL ENGINES** LED) will turn off.

INTERRUPTING THE START ALL PROCESS

Pressing any **START/STOP** button or turning an ignition key switch during engine start up is not recommended.

Throttle-Only Mode

Placing the ERC in throttle-only mode will avoid unintended gear engagement. The engines or drives will turn using the steering wheel or the joystick and the RPM of the engines can be increased while in throttle-only mode, but the gear position will remain in neutral.

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To engage throttle-only mode:

1. Place both ERC levers into neutral.
2. Press **THROTTLE ONLY**. The throttle-only light will turn on and the neutral lights will blink.
3. Place either ERC lever into forward or reverse detent position. The warning horn will beep each time the levers are moved into or out of gear while in throttle-only mode, but the drive will remain in neutral.

NOTE: *Throttle-only mode also affects the joystick, if equipped. The drives will move and the RPM can be increased, but the gear position will remain in neutral.*

4. The RPM of the engines can be increased.

To disengage throttle-only mode:

1. Place both ERC levers into neutral. Throttle-only mode will not disengage unless the ERC levers are in neutral.

NOTE: *Pressing* ***THROTTLE ONLY*** *while the ERC levers are in gear will only turn off the throttle-only light. The engines will remain in throttle-only mode until the operator returns the levers to the neutral position.*

2. Press **THROTTLE ONLY**. The throttle-only light will turn off.
3. The neutral lights stop flashing and remain illuminated. Either the ERC levers or the joystick (if equipped) can now be used to control the boat's movement.

Warning System

WARNING HORN SIGNALS

When the key switch is turned to the **ON** position, the horn will turn on for a moment as a test to indicate the horn is working.

There are two types of warning horns to alert the operator of an active problem within the engine's operating system.

1. **Continuous six second beep:** Indicates a critical engine condition. Depending on the condition, the Engine Guardian system may engage and protect the engine by limiting power. You should return to port immediately and contact your servicing dealer.
2. **Intermittent short beeps for six seconds:** Indicates a noncritical engine condition. This condition does not require immediate attention. You may continue using your boat, however, depending on the nature of the problem, the engine's power may be limited by the Engine Guardian system. Refer to **Engine Guardian System**. You should contact your servicing dealer at your earliest convenience.

It is important to note that in either of the above scenarios, the horn will only sound one time. If you key the engine off and restart it, the horn will sound again, one time, if the fault is still present. For visual display of the specific engine functions and additional engine data, refer to **SmartCraft Product** information, following.

A few of the noncritical conditions indicated by the intermittent short beeps for six seconds can be corrected by the operator. These operator correctable conditions are as follows:

- Water in the boat-mounted fuel filter. Replace the filter. Refer to **Maintenance - Boat-Mounted Fuel Filter**.
- Cooling system (water pressure or engine temperature) problem. Stop the engine and check the water intake holes in the lower unit for obstruction.

- Low engine oil level. Refer to **Fuel and Oil - Checking and Adding Engine Oil**.

ENGINE GUARDIAN SYSTEM

The Engine Guardian system monitors the critical sensors on the engine for any early indications of problems. Engine Guardian is functional whenever your engine is operating, so you never have to be concerned about whether or not you are protected. The system will respond to a problem by sounding the warning horn for six seconds and/or reducing engine power in order to provide engine protection.

If Engine Guardian has been activated, reduce the engine speed. The problem will need to be identified and corrected. The system must be reset before the engine will operate at higher speeds. Moving the throttle lever back to the idle position will reset the Engine Guardian system. If the Engine Guardian system has determined the reset has not corrected the problem, Engine Guardian will remain activated, limiting the throttle. The problem must be identified and corrected before Engine Guardian will allow the engine to reach a normal operating RPM.

OVERSPEED REV LIMIT

The overspeed rev limit is set at an RPM greater than the operating range. In the event that the engine is operated at an RPM greater than or equal to the overspeed limit, the PCM does not allow the engine to maintain the power requested by the operator. Refer to **General Information - Specifications** to determine this engine's RPM limit.

Upon reaching the beginning of the overspeed rev limit, Engine Guardian will cut fuel to one bank of cylinders. If the operator does not reduce engine speed, Engine Guardian will cut the fuel to all cylinders until the engine speed has dropped below the rev limit. There is no audible warning while Engine Guardian overspeed limit is active.

SMARTCRAFT PRODUCT

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

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

EXHAUST GAS OVER TEMPERATURE

When the Engine Guardian system detects the exhaust gas temperature is high (fault code 2124-20), the warning horn will beep and the engine RPM will be limited. SmartCraft gauges that have the ability display text will alert the operator with a short text, long text, and the action that the operator should follow. This Guardian warning and engine power reduction can possibly be corrected by inspecting the gearcase water inlet for blockage and the cooling system water strainer for blockage. Refer to **Maintenance - Cooling System Water Strainer Inspection**.

SmartCraft Displayed Text	
Short text	Critical - Overtemp
Long text	Engine exhaust manifold is overheating
Action	Stop engine and check for plugged cooling system water strainer. If condition persists return to port immediately. Service engine before next use.

1. Stop the engine.
2. Check the gearcase water inlet for blockage.
3. Check the cooling system water strainer for blockage. Refer to **Maintenance - Cooling System Water Strainer Inspection**.
4. If there is no blockage and the condition persists, return to port immediately.

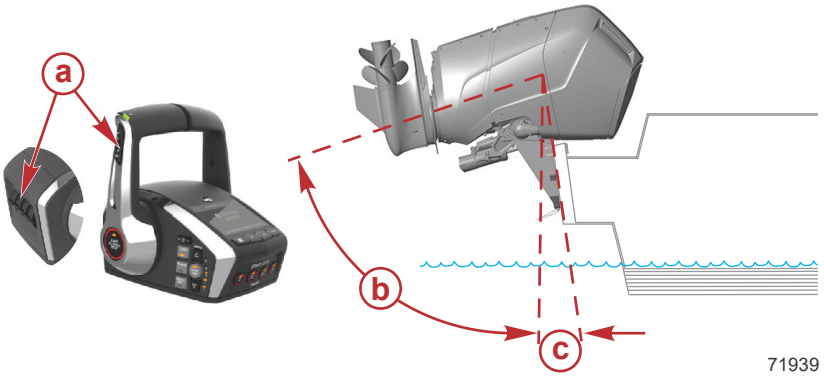
Power Trim and Tilt

The outboard has a trim/tilt control called power trim. This enables the operator to easily adjust the position of the outboard by pressing the trim switch. Moving the outboard in closer to the boat transom is called trimming in or down. Moving the outboard further away from the boat transom is called trimming out or up. The term trim generally refers to the adjustment of the outboard within the first 20° range of travel. This is the range used while operating the boat on plane. The term tilt is generally used when referring to adjusting the outboard further up out of the water. The outboard can be tilted up past the trim range for shallow water operation or loading the boat onto a trailer. With the engine turned off and ignition switch turned **ON**, the outboard can be tilted out of the water.

- Below 2000 RPM the engine can be trimmed or tilted to any range. Caution is advised when operating the engine past the trim range. Ensure the water pickups are submerged.
- While in the trim range and the engine is above 2000 RPM, you can only trim to the maximum trim range.

- If the engine is below 2000 RPM and is in the trailer range, advancing the throttle will allow the engine to achieve a maximum RPM of 4250. Engine operation in this capacity (above the normal 2000 limit) should only be used for loading or unloading the boat onto or off the trailer. It should not be used during normal boat operation.

NOTE: *Exceeding 4250 RPMs the engine PCM will begin Engine Guardian protection.*



a - Trim switch
b - Tilt range
c - Trim range

POWER TRIM OPERATION

With most boats, operating around the middle of the trim range will give satisfactory results. However, to take full advantage of the trimming capability there may be times when you choose to trim the outboard all the way in or out. Though these adjustments will improve performance, the operator must be aware of potential associated hazards.

⚠ WARNING

Operating the boat at high speeds with the outboard trimmed too far under can create excessive bow steer, resulting in the operator losing control of the boat. If experiencing poor handling due to excessive trim under, reduce the power gradually and trim the outboard out slightly before resuming high-speed operation.

⚠ WARNING

Operating the boat at high speeds with the outboard trimmed too far out can reduce stability at high speeds. Rapidly reducing boat speed to correct this instability may cause a sudden change of steering torque and additional boat instability. If experiencing poor handling due to excessive trim out, reduce the power gradually and trim the outboard in slightly before resuming high-speed operation.

Carefully consider the following:

1. Trimming in or down can:
   - Lower the bow.
   - Result in quicker planing off, especially with a heavy load or a stern heavy boat.
   - Generally improve the ride in choppy water.
   - In excess, can lower the bow of some boats to a point where 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 oversteering) if any turn is attempted, or if a significant wave is encountered.
2. Trimming out or up can:
   - Lift the bow higher out of the water.
   - Generally increase top speed.
   - Increase clearance over submerged objects or a shallow bottom.
   - In excess, can cause boat porpoising (bouncing) or propeller ventilation.
   - Cause engine overheating if any cooling water intake holes are above the waterline.

TILTING TO FULL UP POSITION

Tilt at Helm

NOTE: *The trim/tilt switch will remain active for 15 minutes after the ignition key switch has been turned off.*

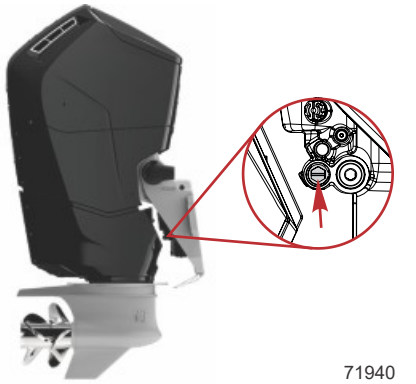
1. If the ignition key switch has been turned off for over 15 minutes, turn it to the **ON** position.
2. Press the trim/tilt switch to the **UP** position. The outboard will tilt up until the switch is released or it reaches its maximum tilt position.

Tilt at Engine

The cowl mounted auxiliary tilt switch can be used to tilt the outboard with the key switch in the **OFF** position. Refer to **Auxiliary Tilt Switch**.

MANUAL TILTING

If the outboard cannot be tilted using the power trim/tilt switch, the outboard can be manually tilted. To manually tilt the outboard, turn out the manual tilt release valve three turns counterclockwise. Tilt the outboard to the desired position and tighten the manual tilt release valve.



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NOTE: *The manual tilt release valve must be tightened before operating the outboard to prevent the outboard from tilting up during reverse operation.*

AUXILIARY TILT SWITCH

The auxiliary tilt switch is located on the starboard side of the engine near the rigging elbow. This switch can be used to tilt the outboard up or down using the power trim system.

71941

OPERATING IN SHALLOW WATER

When operating your boat in shallow water, you can tilt the outboard beyond the maximum trim range to prevent hitting bottom.

1. Reduce the engine speed below 2000 RPM.

2. Tilt the outboard up. Make sure all the cooling water intake holes stay submerged at all times.

- Below 2000 RPM the engine can be trimmed or tilted to any range. Caution is advised when operating the engine past the tilt range. Ensure the water pickups are submerged.
- If the engine is below 2000 RPM and is in the trailer range, advancing the throttle will allow the engine to achieve a maximum RPM of 4250. Engine operation in this capacity (above the normal 2000 limit) should only be used for loading or unloading the boat onto or off the trailer. It should not be used during normal boat operation.

NOTE: *Exceeding 4250 RPMs the engine PCM will begin Engine Guardian protection.*

Transmission and Steerable Gearcase

The outboard is equipped with a two-speed transmission that transfers maximum torque and acceleration to the steerable gearcase in first gear to get the boat on plane quickly before silently shifting into second gear. The gearcase turns independently underwater and reacts instantly to controls. There is no movement from the engine above the surface of the water.

Fathom 48V E-Power System

FATHOM SYSTEM OPERATION

The Fathom engine is equipped with a large dual-mode alternator capable of providing enough power for the entire boat, eliminating the need for a generator. In its 48V mode, the alternator provides electrical power for charging onboard Lithium-ion batteries. Battery power is then used to power 48V loads directly, or large AC loads (such as air conditioning) through an AC inverter.

In its 12V mode, the system charges 12V cranking batteries and provides low speed charging where 48V alternators are not capable. The system automatically changes between 12V and 48V mode based on engine RPM, battery state of charge, and other factors. While the engine(s) are off, the system continuously monitors power consumption and battery state-of-charge, and alerts the operator when battery charging is needed.

When charging is needed, the engines(s) may be started using the Fathom user interface or a dedicated Fathom start/stop switch. While in Charging Mode, the gear position is locked in neutral regardless of lever position, so the engines cannot be accidentally bumped into gear. Steering and other inputs are also locked out. When charging is complete, the engine is automatically turned off. The Fathom engine contains a sensor which does not allow the engine to be started in Charging Mode with the cowling removed.

By storing power in batteries, the user is able to enjoy long periods of AC operation without the engine running. It also allows the alternator to run at full output all the time, regardless of load, allowing for short charging times. The alternator also provides an enormous amount of power while underway, allowing the user to arrive at their destination fully charged and ready to go. There is no need to wait for batteries to charge before leaving the dock.

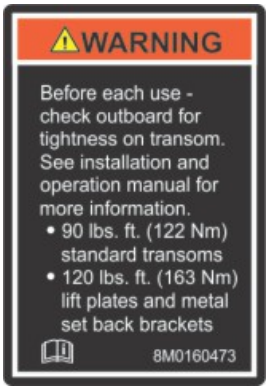
KEY SWITCH OPERATION

To allow the Fathom system to operate, the key switch must be in the **ACC** position and the system must be turned on using the Fathom user interface. Refer to the instructions provided with Fathom system for more information. The Fathom system may be turned off at any time by moving the key to the **OFF** position, or by using the engine stop switches or lanyard. Turning the key switch to the **ON** position will also terminate Fathom operation and put the engines into Propulsion Mode.

Notes:

Important Daily Inspection Before Each Use

Any outboard mounted on the boat must have the mounting hardware inspected and checked to ensure that the hardware has not become loose. A decal on the transom bracket reminds the owner to check the fasteners securing the outboard to the transom before each use.



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Prestarting Check List

- Operator knows safe navigation, boating, and operating procedures.
- An approved personal flotation device of suitable size for each person aboard and readily accessible (it is the law).
- A ring type life buoy or buoyant cushion designed to be thrown to a person in the water.
- Know your boat's maximum load capacity. Look at the boat capacity plate.
- Fuel supply OK.
- Arrange passengers and load in the boat so the weight is distributed evenly and everyone is seated in a proper seat.
- Tell someone where you are going and when you expect to return.
- It is illegal to operate a boat while under the influence of alcohol or drugs.
- Know the waters and area you will be boating; tides, currents, sand bars, rocks, and other hazards.
- Make inspection checks listed in **Maintenance - Inspection and Maintenance Schedule.**

Operating in Freezing Temperatures

If there is a chance of ice forming on the water, the outboard should be removed and drained completely of water. If ice should form at any level inside the outboard driveshaft housing between the water pump and the powerhead, it will block cooling water flow to the engine which may cause possible damage.

If the boat cannot be removed from the water during freezing temperatures, the outboard should be left in the full down position.

Operating in Saltwater or Polluted Water

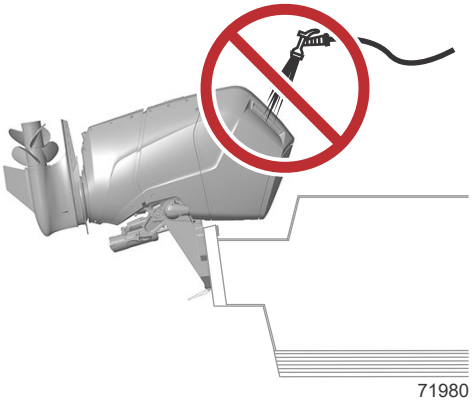
It is recommended that the internal water passages of the outboard are flushed with fresh water after each use in salt or polluted water. This will prevent a buildup of deposits from clogging the water passages. Refer to **Maintenance - Flushing the Cooling System**.

If the boat is kept moored in the water, always tilt the outboard so the gearcase is completely out of water (except in freezing temperatures) when not in use.

Wash the outboard exterior and flush out the exhaust outlet of the propellers and gearcase with fresh water after each use. Each month, spray Mercury or Quicksilver Corrosion Guard on external metal surfaces. Do not spray on corrosion control anodes as this will reduce the effectiveness of the anodes.

Description	Where Used	Part No.
Corrosion Guard	External metal surfaces	92-802878 55

IMPORTANT: Do not rinse the cowls with water when the outboard is in a tilted position, as this could allow water to enter the air intakes on the rear of the upper cowl. Always lower the outboard to a vertical position prior to rinsing the cowls.



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Operating at High Elevations

Your engine automatically compensates for high elevation changes. A different propeller pitch may help reduce some normal performance loss resulting from reduced oxygen in the air. Be sure to change propellers as a matched set. Consult your dealer for assistance.

Effects of Elevation and Weather on Performance

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

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

These conditions above reduce air density to the engine, which in turn lowers the following:

- Horsepower and torque throughout the RPM range
- Peak RPM
- Cranking compression

EXAMPLE: An engine running at an elevation of 8,000 feet will have over a 30% power loss while a loss of engine power on a hot and humid day could be as much as 14%. These losses apply to normally aspirated and supercharged engines.

Compensating for power robbing conditions:

- Switch to lower pitch propellers.

Some boat performance can be improved by dropping to lower pitch propellers, but engine performance will still remain lower. To optimize engine performance, prop the engine to allow it to operate at or near the top end of the recommended maximum RPM range at wide-open throttle with a normal boat load.

Other advantages to propeller changes:

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

Setting Trim Angle While Running Engine at Idle Speed

The exhaust relief hole on the outboard can become submerged on some boats if the engine is trimmed full in while running at idle speed. This may result in exhaust restriction, rough idle, excessive smoke, and fouled spark plugs. If this condition exists, trim the outboard up until the exhaust relief hole is out of the water.

a - Relief hole above waterline (correct)
b - Relief hole submerged (wrong)

Operating in the Event of Engine Failure (Multiple Engine Applications)

IMPORTANT: Steering may be limited with one or more engines not running.

If an engine fails and the operator is going to return to port on the other engines, the failed engine must be trimmed to the full up position to ensure that the remaining functional engines do not enter Engine Guardian protection due to the potential for drive collision.

Engine Break-in Procedure

IMPORTANT: Failure to follow the engine break-in procedures can result in poor performance throughout the life of the engine and can cause engine damage. Always follow break-in procedures.

1. For the first two hours of operation, run the engine at varied throttle settings up to 4500 RPM or three-quarter throttle. Changes in throttle should be gradual and extended time at idle should be avoided.
2. For the next eight hours of operation, avoid continuous operation at full throttle for more than five minutes at a time.

Ran Out of Fuel Condition—Priming the Fuel System

In the event the engine is run out of fuel, the fuel system must be primed after fuel supply is restored. The fuel supply module (FSM) is non-vented and in order to prime the system air must be purged while operating the fuel pumps.

IMPORTANT: Repeated key ON events without purging air can damage the fuel pumps and is not effective in priming the fuel system.

The objective is to purge the air entrained in the fuel system through the fuel injectors during engine cranking to allow fuel to enter the fuel module.

1. If possible, bring the engine to a vertical or close to vertical trim position.
2. Verify the vessel fuel supply line is connected to the outboard fuel system inlet fitting.
3. Turn the ignition key **ON**. The fuel pumps will run for approximately five seconds.
4. Turn the ignition key to the **START** position and release the key. The ECM controls the activation of the starter. The starter may continue cranking for up to eight seconds.

NOTE: *When priming the fuel system following a fuel runout, residual fuel may cause the engine to flare and stall which shortens the engine cranking event.*

5. Continue with the ignition key **ON** and **START** sequence until the engine continues to run.

IMPORTANT: Allow the starter motor to cool for 20 to 30 seconds between full eight second crank events. Limit the number of events to a maximum of 15 full eight second cranking events.

6. Once the engine starts, it may initially run rough at idle while the residual air is purged from the fuel system.
7. If the fuel system will not prime within 15 full eight second cranking events, contact an authorized Mercury Marine dealer to prime the fuel system with a fuel rail purge line.

Starting the Engine

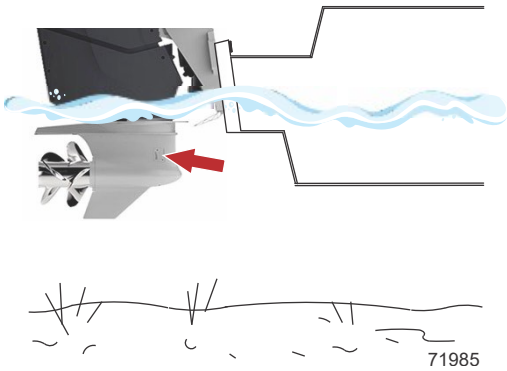
Before starting, read the **Prestarting Check List**, special operating instructions, **Engine Break-in Procedure**, **Gear Shifting** in this section, and the remote control features and operation in the **Features and Controls** section.

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.

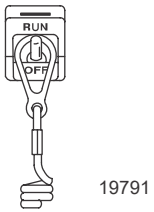
1. Check the engine oil level. Refer to **Maintenance - Checking Engine Oil Level**.

NOTE: *The engine electronically monitors engine oil level without user interaction.*

2. Verify the cooling water intake is submerged.



3. Set the lanyard stop switch to the **RUN** position. Refer to **General Information - Lanyard Stop Switch**.

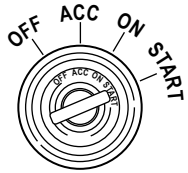


4. Shift the outboard to neutral (N) position.

a - Forward
b - Neutral
c - Reverse

NOTE: *Before starting an engine that has been run out of fuel, refer to the* ***Ran Out of Fuel Condition—Priming the Fuel System*** *procedure.*

5. Ignition key starting - Turn the ignition key to the **START** position and release the key. The electronic starting system will automatically crank the engine for starting. If the engine fails to start, the engine will stop cranking. Turn the key to the **START** position again until the engine starts.



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Gear Shifting

IMPORTANT: Observe the following:

- **Never shift the outboard into or out of gear unless the engine speed is at idle. Shifting at higher than engine idle speed could cause damage to the gearcase.**
- **Do not shift the outboard into reverse when the forward motion of the boat is greater than a no wake speed. Shifting into reverse at higher boat speeds could cause the engine to stall, and in some situations, this could cause water to be drawn into the cylinders, resulting in severe engine damage.**
- The outboard has three gear shift positions: forward (F), neutral (N), and reverse (R).

71972

- When shifting, always stop at the neutral position and allow the engine idle speed to stabilize before shifting into another gear.

- Panel mount and single-handle electronic remote controls require the operator to press the mechanical lock bar while moving the control handle out of the neutral position.

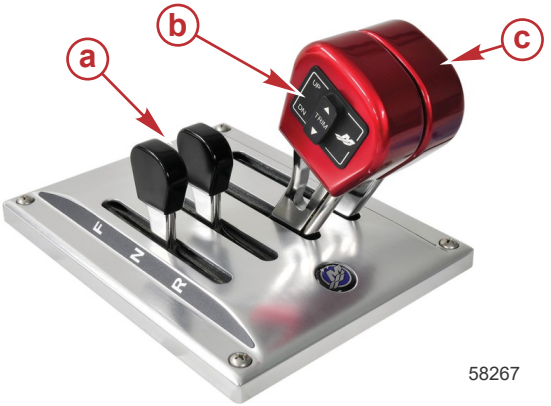
71988

a - Mechanical lock bar—panel mount ERC
b - Mechanical lock bar—single-handle ERC

- Always shift the outboard into gear with a quick motion.
- After shifting the outboard into gear, advance the lever further to increase speed.

ZERO EFFORT CONTROL GEAR SHIFTING

1. Verify the throttle lever is at the idle position.
2. Move the shift lever forward or reverse.
3. Advance the throttle lever to apply power.



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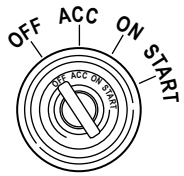
a - Shift levers in neutral position
b - Trim switch
c - Throttle levers at the idle position

Stopping the Engine

IMPORTANT: Turning key to the START position while the engine is running will result in engine shut down, while leaving the DTS system active. This will allow the use of the power trim/tilt from the remote control handle.

Reduce engine speed and shift outboard to neutral position. Turn ignition key to **OFF** position.

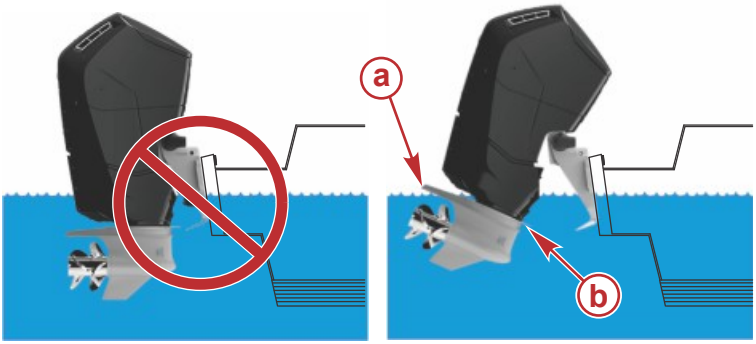


Proper Outboard Tilt Positioning During Periods of Non-Use

With the engine turned off, tilt the outboard up to a point where the trailing edge of the anti-ventilation plate is angled higher than the leading edge.

With the engine off, the outboard tilt angle will:

- Help to eliminate or reduce engine smoke on start-up. Tilting the outboard up, allows oil in the cylinders to run down cylinders and return to the oil sump. With the outboard level or tilted in, oil from the cylinder walls can run down to the bottom of the cylinder and form a puddle behind the piston/rings. The oil can then weep into the combustion chamber. When the engine is started, the oil in the combustion chamber will burn, creating smoke on start-up condition. As the engine runs, the smoke will gradually clear as the oil is consumed.
- Provides additional impact clearance for the gearcase/propeller, when the boat is at rest in shallow water. Tides and wave action can vary the waters depth and reduce the impact clearance between the gearcase/propeller and the bottom.



a - Trailing edge of anti-ventilation plate
b - Leading edge of anti-ventilation plate

Steering Failure—Single-Engine Applications

If the steering system fails on a single-engine boat, the gearcase can be steered using the following emergency procedure.

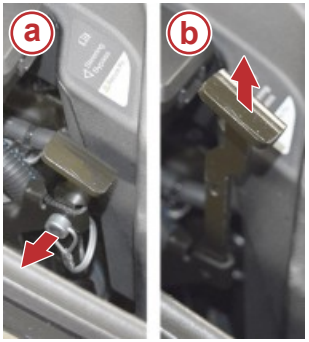
IMPORTANT: This procedure should only be performed on single-engine boats. On multiple engine boats, raise the propeller out of the water and use the other engines to return to port. Failure to raise the propeller out of the water on multiple engine applications can cause potential drive collision.

1. Turn off the engine, and open the hood. Refer to **Maintenance - Hood Opening**.
2. Locate the steering bypass lever on the starboard side of the engine.

72208

Steering bypass lever

3. Remove the pin and pull up on the bypass lever to open the bypass valve.



72209

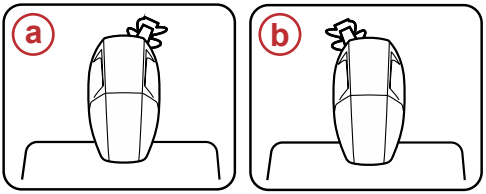
a - Remove pin
b - Pull lever up

4. Start the engine and use engine thrust to center the position of the drive.

⚠ CAUTION
Boat heading and velocity may change during this procedure. Maintain clearance to other boats or obstacles.

a. Verify the drive angle (use instrumentation or look at the drive).

b. If the drive is turned left (**a**), shift into reverse gear. If the drive is turned right (**b**) shift into forward gear.



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Top-down view from boat

a - Drive turned left, shift into reverse gear

b - Drive turned right, shift into forward gear

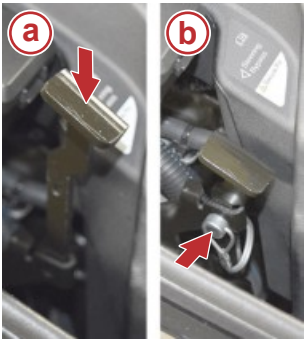
c. With the engine in gear at idle, apply a very brief 1/2- to full-throttle application, then immediately return the control to idle.

d. Verify the location of the drive. Repeat the brief throttle applications as necessary to turn the drive to the desired steering angle.

NOTE: *The engine can be operated at idle with the bypass lever in the up position. Push the bypass lever down if above-idle speed is needed.*

5. Return to port immediately.

6. Turn off the engine and push down on the bypass lever to close the valve. Secure the lever with the pin.



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a - Push lever down

b - Install pin

7. Contact an authorized Mercury Marine dealer for service.

Notes:

MAINTENANCE

Cleaning Care Recommendations

OUTBOARD CARE

To keep your outboard in the best operating condition, it is important that your outboard receive the periodic inspections and maintenance listed in the **Inspection and Maintenance Schedule**. We urge you to keep it maintained properly to ensure the safety of you and your passengers, and retain its dependability.

Record maintenance performed in the **Maintenance Log** at the back of this book. Save all maintenance work orders and receipts.

Selecting Replacement Parts For Your Outboard

We recommend using original Mercury Precision or Quicksilver replacement parts and Genuine Lubricants.

DO NOT USE CAUSTIC CLEANING CHEMICALS

IMPORTANT: Do not use caustic cleaning chemicals on the outboard power package. Some cleaning products contain strong caustic agents such as hull cleaners with hydrochloric acid. These cleaners can degrade some of the components they come in contact with including critical steering fasteners.

Damage to steering fasteners may not be obvious during visual inspection and this damage may lead to catastrophic failure. Some caustic cleaning chemicals may cause or accelerate corrosion. Exercise caution when using cleaning chemicals around the engine and follow the recommendations on the packaging of the cleaning product.

CLEANING GAUGES

IMPORTANT: Never use high-pressure water to clean gauges.

Routine cleaning of the gauges is recommended to prevent a buildup of salt and other environmental debris. Crystalized salt can scratch the gauge display lens when using a dry or damp cloth. Ensure that the cloth has a sufficient amount of fresh water to dissolve and remove salt or mineral deposits. Do not apply aggressive pressure on the display lens while cleaning.

When water marks cannot be removed with a damp cloth, mix a 50/50 solution of warm water and isopropyl alcohol to clean the display lens. **Do not use** acetone, mineral spirits, turpentine type solvents, or ammonia based cleaning products. The use of strong solvents or detergents may damage the coating, the plastics, or the rubber keys on the gauges. If the gauge has a sun cover available, it is recommended that the cover be installed when the unit is not in use to prevent UV damage to the plastic bezels and rubber keys.

CLEANING REMOTE CONTROLS

IMPORTANT: Never use high-pressure water to clean remote controls.

MAINTENANCE

Routine cleaning of the remote control external surfaces is recommended to prevent a buildup of salt and other environmental debris. Use a cloth towel which has a sufficient amount of fresh water to dissolve and remove salt or mineral deposits.

When water marks cannot be removed with a damp cloth, mix a 50/50 solution of warm water and isopropyl alcohol to clean the remote control. **Do not use** acetone, mineral spirits, turpentine type solvents, or ammonia based cleaning products. The use of strong solvents or detergents may damage the coating, the plastics, or the rubber components on the remote control.

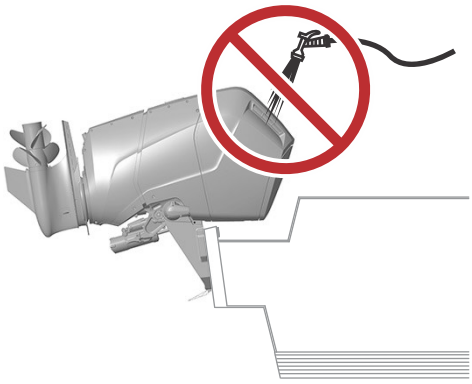
CLEANING CARE FOR COWLS

IMPORTANT: Dry wiping (wiping the plastic surface when it is dry) will result in minor surface scratches. Always wet the surface before cleaning. Do not use detergents containing hydrochloric acid. Follow the cleaning and waxing procedure.

Cleaning and Waxing Procedure

1. Before washing, rinse the cowls with clean water to remove dirt and dust that may scratch the surface.
2. Wash the cowls with clean water and a mild nonabrasive soap. Use a soft clean cloth when washing.
3. Dry thoroughly with a soft clean cloth.
4. Wax the surface using a nonabrasive automotive polish (polish designed for clear coat finishes). Remove the applied wax by hand using a clean soft cloth.
5. To remove minor scratches, use Mercury Marine Cowl Finishing Compound (92-859026K 1).

IMPORTANT: Do not rinse the cowls with water when the outboard is in a tilted position, as this could allow water to enter the air intakes on the rear of the upper cowl. Always lower the outboard to a vertical position prior to rinsing the cowls.



Do not rinse cowl while outboard is tilted

CLEANING CARE FOR THE POWERHEAD (SALTWATER USE)

If the outboard is operated in saltwater, remove the top cowl and flywheel cover. Inspect the powerhead and powerhead components for salt buildup. Wash off any salt buildup from the powerhead and powerhead components with fresh water. Keep water spray out of the air filter/intake and alternator. After washing, allow the powerhead and components to dry. Apply Quicksilver or Mercury Corrosion Guard spray on the external metal surfaces of the powerhead and powerhead components. Do not allow the Corrosion Guard spray to come in contact with the alternator drive belt or belt pulleys.

IMPORTANT: Do not allow lubricant or Corrosion Guard spray to come in contact with the alternator drive belt or the belt pulleys. The alternator drive belt could slip and be damaged if it becomes coated with any lubricant or Corrosion Guard spray.

Description	Where Used	Part No.
Corrosion Guard	External metal surfaces of the powerhead and powerhead components.	92-802878 55

Use of Anti-fouling Bottom Paint Prohibited

Some effective marine anti-fouling (bottom) paints use metals, such as copper, as the predominant biocide mixed into anti-fouling paints to prevent marine growth biofouling. The label of the paint may not reveal the actual contents or presence of a reactive metal used in the formula.

Mercury Marine has found that anti-fouling paints containing these metal compounds will create a galvanic corrosion cell with aluminum on our engines or drives. Mercury Marine does not approve of applying anti-fouling paint over the factory applied paint.

Due to the fact that the label does not accurately reveal if the paint contains a reactive metal, do not apply any anti-fouling paint on top of the Mercury factory finish.

Warranty: Mercury Marine will not cover corrosion damage on engine or drive parts that have marine anti-fouling paint applied.

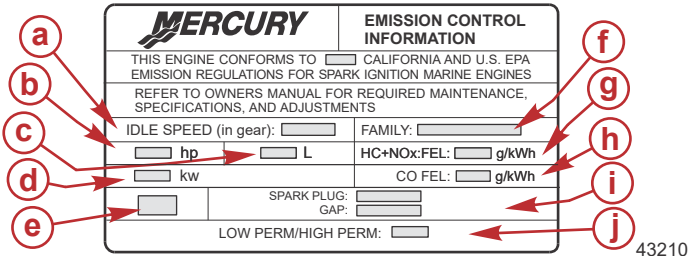
NOTE: *Sacrificial anodes should never be painted or have other types of coatings applied to them.*

EPA Emissions Regulations

All new outboards manufactured by Mercury Marine are certified to the United States Environmental Protection Agency, as conforming to the requirements of the regulations for the control of air pollution from new outboard motors. This certification is contingent on certain adjustments set to factory standards. For this reason, the factory procedure for servicing the product must be strictly followed and, wherever practicable, returned to the original intent of the design. **Maintenance, replacement, or repair of the emission control devices and systems may be performed by any marine spark ignition (SI) engine repair establishment or individual.**

EMISSION CERTIFICATION LABEL

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



- **a -** Idle speed
- **b -** Engine horsepower
- **c -** Piston displacement
- **d -** Engine power - kilowatts
- **e -** Date of manufacture
- **f -** US EPA engine family name
- **g -** Regulated emission limit for the engine family
- **h -** Regulated emission limit for the engine family
- **i -** Recommended spark plug and gap
- **j -** Percent of fuel line permeation

OWNER RESPONSIBILITY

The owner/operator is required to have routine engine maintenance performed to maintain emission levels within prescribed certification standards.

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

Inspection and Maintenance Schedule

Refer to the table below for proper inspection and maintenance intervals. After each use of the outboard be sure to adhere to the following:

- Flush the outboard cooling system if operating in salt, polluted, or muddy water. Refer to **Flushing the Cooling System**.
- Wash off all salt deposits and flush the exhaust outlet of the propeller and gearcase with fresh water if operating in saltwater.
- If operating in saltwater, inspect the powerhead and powerhead components for salt buildup. Refer to **Cleaning Care for the Powerhead (Saltwater Use)**.

Daily Check	Inspect	Replace
Check that the lanyard stop switch stops the engine.	X	
Inspect the fuel system for leaks. Refer to **Fuel System**.	X	
Inspect the tightness on transom. Refer to **Inspect Transom Tightness**.	X	
Check the propellers for damage.	X	
Inspect hydraulic hoses for leaks.	X	

200 Hour Maintenance (200 Hours or Before Long-Term Storage)	Inspect	Replace
Check that the lanyard stop switch stops the engine.	X	
Inspect the engine starting battery. Refer to **Battery Inspection**.	X	
Inspect the battery cables and clean power harness. Refer to **Battery Cables and Clean Power Harness**.	X	
Inspect the fuel system for leaks. Refer to **Fuel System**.	X	
Inspect the tightness on transom. Refer to **Inspect Transom Tightness**.	X	
Check the propellers for damage.	X	
Inspect hydraulic hoses for leaks.	X	
Inspect the corrosion control anodes. Refer to **Corrosion Control Anodes**.	X	
Change the engine oil and filter. Refer to **Changing Engine Oil and Filter**.*		X
Change the gearcase lubricant. Refer to **Gearcase Lubricant**.		X
Change the transmission fluid. Refer to **Transmission Fluid**.		X
Replace the boat-mounted fuel filter. Refer to **Fuel System**.		X

1000 Hour Maintenance	Inspect	Replace
Check that the lanyard stop switch stops the engine.	X	
Inspect the fuel system for leaks. Refer to **Fuel System**.	X	
Inspect the tightness on transom. Refer to **Inspect Transom Tightness**.	X	
Check the propellers for damage.	X	
Inspect hydraulic hoses for leaks.	X	
Inspect the corrosion control anodes. Refer to **Corrosion Control Anodes**.	X	

1000 Hour Maintenance	Inspect	Replace
Inspect the cooling system water strainer. Refer to **Cooling System Water Strainer Inspection**.	X	
Remove the propellers and grease splines. Refer to **Propeller Replacement**.	X	
Check the power trim fluid level—dealer service.	X	
Change the engine oil and filter. Refer to **Changing Engine Oil and Filter**.*		X
Change the gearcase lubricant. Refer to **Gearcase Lubricant**.		X
Change the transmission fluid. Refer to **Transmission Fluid**.		X
Replace the transmission filter—dealer service.		X
Replace the boat-mounted fuel filter. Refer to **Fuel System**.		X
Replace the accessory drive belt—dealer service.*		X
Replace the spark plugs—dealer service.		X
Replace the spark plug wires—dealer service.		X
Replace the water pump impeller—dealer service.		X
Replace the power steering fluid and filter—dealer service.		X

*Oil change and accessory drive belt maintenance intervals are based on total engine run hours, which includes time spent in Charging Mode and in Propulsion Mode.

Hood Opening

ELECTRIC HOOD OPENING

IMPORTANT: The hood uses a gas shock to hold it in the fully open position. The shock also aids hood opening, resulting in a force that may be unexpected by the operator. Keep your body and all objects clear of the hood while it is opening.

Press the electric hood latch release button to open the hood.

71951

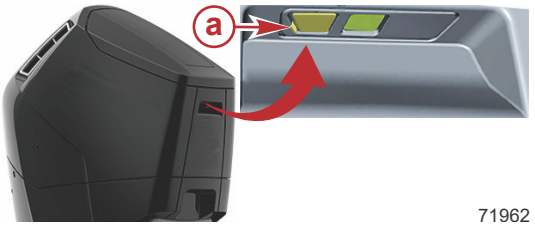
a - Hood
b - Electric hood latch release button

MANUAL HOOD OPENING

IMPORTANT: The hood uses a gas shock to hold it in the fully open position. The shock also aids hood opening, resulting in a force that may be unexpected by the operator. Keep your body and all objects clear of the hood while it is opening.

If the battery is discharged, the electric hood latch release button will not function. To manually open the hood:

1. Push the manual override access plug tab to remove the plug from the hood opening.

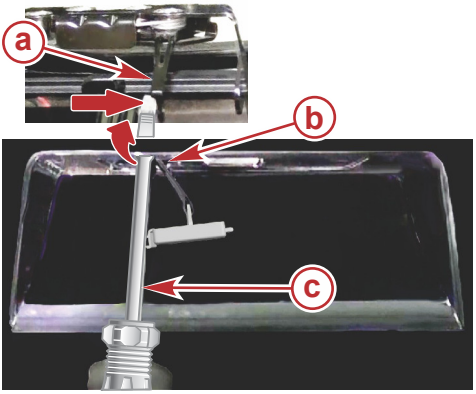


71962

a - Manual override access plug tab

2. Insert a flat-blade screwdriver into the manual override access hole, and open the latch by applying slight pressure to the latch with the screwdriver.

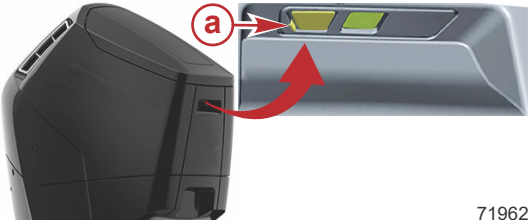
NOTE: A slight downward force applied to the top of the hood may be necessary to release pressure on the latch.



72016

a - Latch
b - Manual override access hole
c - Flat-blade screwdriver

3. Install the manual override access plug into the hood opening.

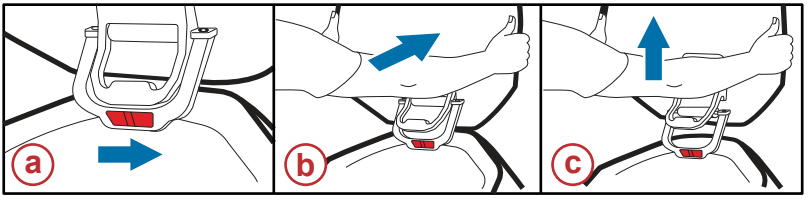


71962

a - Manual override access plug

Hood Removal

1. Open the hood. Refer to **Hood Opening**.
2. Slide the hood release lock bar to the right to unlock.
3. Push the hood back and lift upward off of the hood bracket.

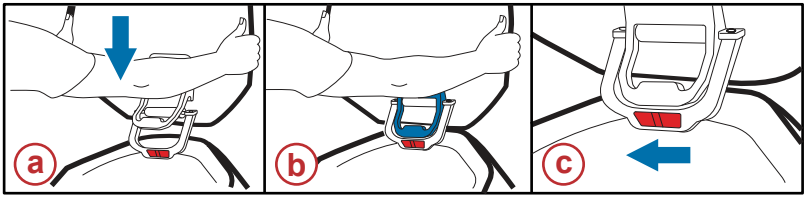


71952

a - Slide right
b - Push out
c - Lift off

Hood Installation

1. Lower the hood onto the hood bracket.
2. Pull the hood forward until the hood release tab is flush with the hood bracket.
3. Slide the hood release lock bar to the left to lock the hood onto the hood bracket.



71954

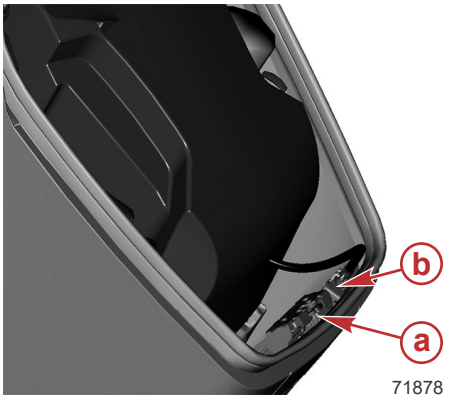
a - Install hood on bracket
b - Hood release tab flush with bracket
c - Slide left

4. Close the hood.

Top Cowl Removal and Installation

TOP COWL REMOVAL

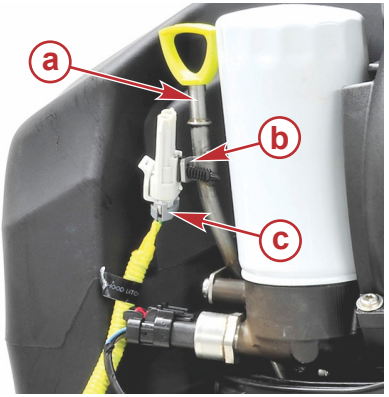
1. Remove the hood to access the lift point. Refer to **Hood Removal**, preceding.
2. Disconnect the battery cables from the battery.
3. Disconnect the electrical latch connector from the hood latch.



71878

a - Top cowl
b - Electrical latch connector

4. Stow the electrical latch connector in the bracket located on the oil dipstick tube.



71938

a - Oil dipstick tube
b - Bracket
c - Electrical latch connector

5. Using an M10 hex socket, and an 18 in. extension, loosen the two fasteners from inside the top cowl.

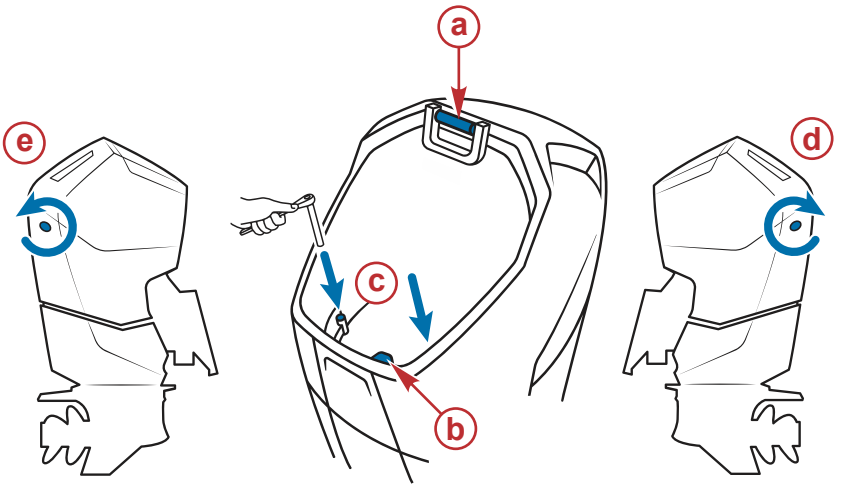
NOTE: *The two internal fasteners are self-contained and will remain with the top cowl after they are loose.*

6. Turn the port side latch hook fastener one quarter turn clockwise to release the port side latch hook.

NOTE: *Two clicks will indicate that the latch hook is released.*

7. Turn the starboard side latch hook fastener one quarter turn counterclockwise to release the starboard side latch hook.

NOTE: *Two clicks will indicate that the latch hook is released.*



- **a -** Lift point/handle
- **b -** Electrical latch connector
- **c -** Internal fasteners (2)—M10 socket with 18 in. extension required
- **d -** Port side latch hook fastener—clockwise
- **e -** Starboard side latch hook fastener—counterclockwise

⚠ CAUTION

The top cowl is heavy. To avoid personal injury or damage to the cowl, always use a lifting aid device or two people when removing and installing the top cowl.

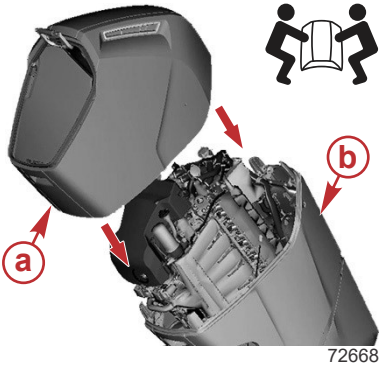
8. With two people or using a lifting aid device, lift the top cowl up and off of the middle cowl.
   a. With two people, one on each side of the engine, grab the top cowl with both hands and carefully guide the top cowl up and off of the middle cowl.
   b. If using a lifting device, connect a large lifting strap in a loop, through the lift point/handle. Secure the lifting strap onto the lifting device and slowly raise and guide the top cowl up and off of the middle cowl.

TOP COWL INSTALLATION

⚠ CAUTION

The top cowl is heavy. To avoid personal injury or damage to the cowl, always use a lifting aid device or two people when removing and installing the top cowl.

1. With two people or using a lifting aid device, lower the top cowl over the engine onto the middle cowl.
   a. With two people, one on each side of the engine, grab the top cowl with both hands and carefully lower and guide the top cowl onto the middle cowl.
   b. If using a lifting device, connect a large lifting strap in a loop, through the lift point/handle. Secure the lifting strap onto the lifting device and slowly lower and guide the top cowl onto the middle cowl.



72668

a - Top cowl
b - Middle Cowl

2. Verify the cowl is correctly aligned by checking the cowl gaps and flushness on the port and starboard side of the cowl. If there is misalignment, one side of the cowl will have a gap that is larger than the other side.

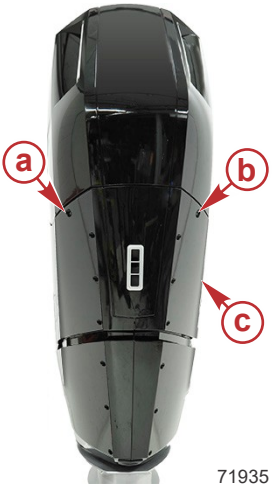
NOTE: *It may be necessary to slightly lift the larger gap side of the cowl to correctly position the alignment guides.*

3. Turn the port side latch hook fastener one quarter turn counterclockwise to secure the port side latch hook to the middle cowl.

NOTE: *Two clicks will indicate that the latch hook is engaged.*

4. Turn the starboard side latch hook fastener one quarter turn clockwise to secure the starboard side latch hook to the middle cowl.

NOTE: *Two clicks will indicate that the latch hook is engaged.*



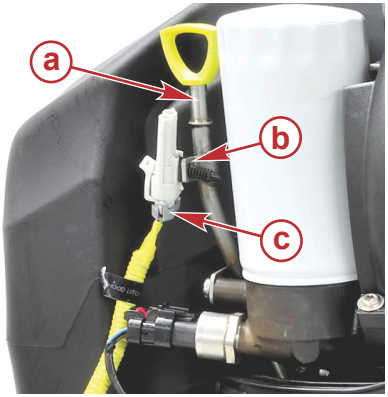
a - Port side latch hook fastener—counterclockwise
b - Starboard side latch hook fastener—clockwise
c - Middle cowl

5. Using an M10 hex socket, and an 18 in. extension, tighten the two internal fasteners to the specified torque.

a - Fastener (2)—M10 hex socket and 18 in. extension required
b - Top cowl

Description	Nm	lb-in.	lb-ft
Internal fasteners (2)	20	–	14.75

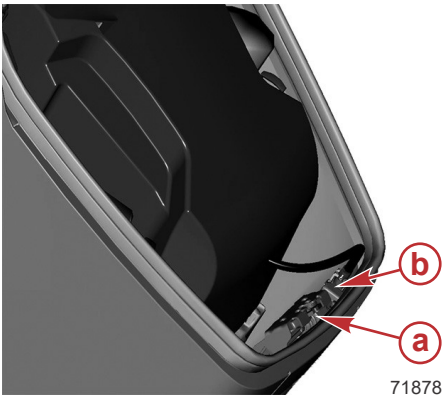
6. Remove the electrical latch connector from the bracket on the oil dipstick tube.



71938

a - Oil dipstick tube
b - Bracket
c - Electrical latch connector

7. Connect the electrical latch connector to the hood latch.



71878

a - Hood latch
b - Electrical latch connector

8. Install the hood. Refer to **Hood Installation**.

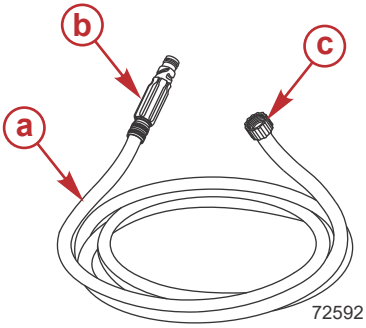
Flushing the Cooling System

Flush the internal water passages of the outboard with fresh water after each use in salt, polluted, or muddy water. This will help prevent a buildup of deposits from clogging the internal water passages.

TRADITIONAL FLUSHING

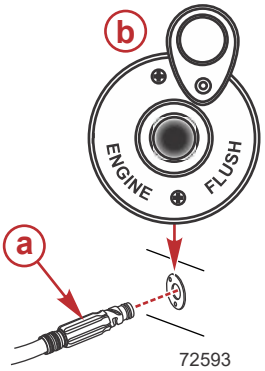
1. With the engine turned off, place the outboard in a convenient position.

2. Thread a water hose into the flush quick connector (5/8 in. garden hose recommended).



a - Water hose
b - Flush quick connector
c - To water tap

3. Locate the engine flush port on the boat transom and insert the flush quick connector.



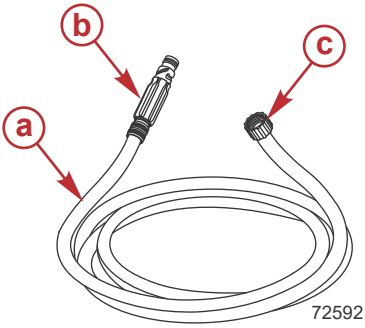
a - Flush quick connector
b - Engine flush port on transom

4. Turn on the water tap and let the water flush through the cooling system for about 15 minutes.
5. When flushing is complete, turn off the water and disconnect the water hose.

FLUSHING WITH AN AUTOMATIC OUTBOARD FLUSHING SYSTEM

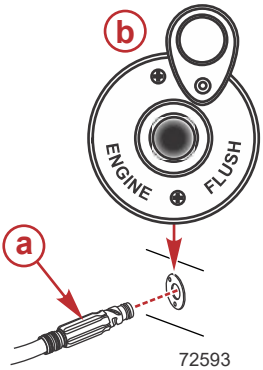
1. With the engines turned off, place the outboards in a convenient position.

2. Thread a water hose into the flush quick connector (5/8 in. garden hose recommended).



a - Water hose
b - Flush quick connector
c - To water tap

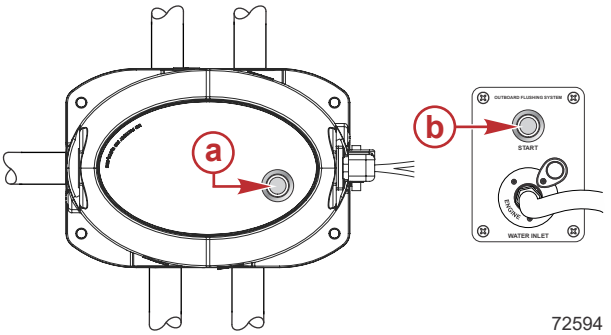
3. Locate the engine flush port on the boat transom and insert the quick-connect fitting.



a - Flush quick connector
b - Engine flush port on transom

4. Turn on the water tap.

5. Press the start button on the boat-mounted automatic outboard flushing system, or the remote-mounted button if equipped. See the user manual that comes with the unit for more details.



a - Start button on automatic outboard flushing system
b - Remote-mounted start button (if equipped)

6. Once the system has completed the flushing procedure, turn off the water tap and remove the water hose.

Fuel System

⚠ 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.

IMPORTANT: Use an approved container to collect and store fuel. Wipe up spilled fuel immediately. Material used to contain spilled fuel must be disposed of in an approved receptacle.

Before servicing any part of the fuel system:

1. Stop engine and disconnect the battery.
2. Perform fuel system service in a well-ventilated area.
3. Inspect any completed service work for signs of fuel leakage.

FUEL LINE INSPECTION

Visually inspect the fuel line for cracks, swelling, leaks, hardness, or other signs of deterioration or damage. If any of these conditions are found, the fuel line must be replaced.

BOAT-MOUNTED FUEL FILTER

The boat-mounted fuel filter can be serviced as a general maintenance item when the water-in-fuel alarm is activated.

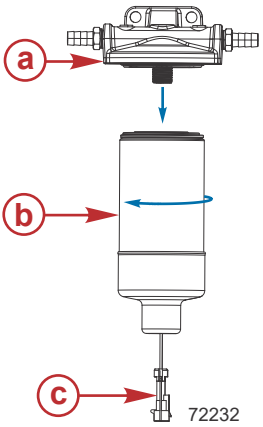
⚠ WARNING

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.

Removal

IMPORTANT: Use an approved container to collect and store fuel. Wipe up spilled fuel immediately. Material used to contain spilled fuel must be disposed of in an approved container.

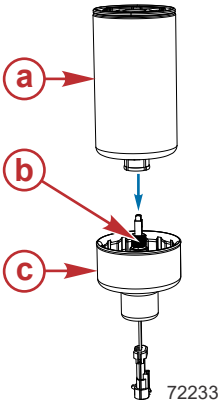
1. Verify the ignition key switch is in the **OFF** position and that the lanyard switch is positioned so the engine cannot start.
2. Shut off the fuel supply to the engine.
3. Locate the boat-mounted fuel filter.
4. Disconnect the water-in-fuel (WIF) sensor harness.



a - Fuel filter base
b - Fuel filter assembly
c - WIF sensor connection

5. Remove the filter assembly from the base by turning counterclockwise.
6. Empty the fuel filter contents into an approved container and dispose according to local regulations.
7. Remove the WIF sensor from the end of the fuel filter and retain for reuse.
   a. Remove the rubber boot from the bottom of the filter.

b. Remove the WIF sensor by turning counterclockwise.

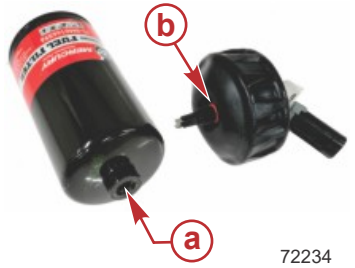


a - Fuel filter
b - WIF sensor
c - Rubber boot

8. Wipe up any spilled fuel.

Installation

1. Using a hex wrench, remove the plug from the end of the new fuel filter.
2. Verify that the O-ring is installed on the water-in-fuel (WIF) sensor. Lubricate the O-ring with clean engine oil.



a - Plug removed
b - WIF sensor O-ring

3. Thread the WIF sensor clockwise into the fuel filter and tighten to the specified torque.

Description	Nm	lb-in.	lb-ft
Water-in-fuel sensor	2.5	22	–

NOTE: *Temporarily invert the rubber boot to ease installation.*

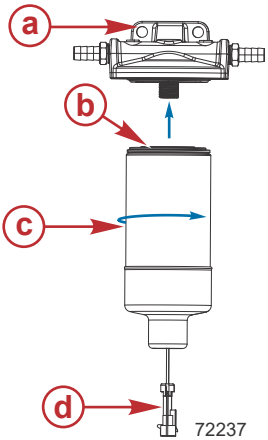
WIF sensor installed, rubber boot inverted

4. Push the rubber boot over the WIF sensor until the plastic cap within the boot is fully seated over the WIF sensor. Pull the remainder of the boot over the fuel filter.

72236

Rubber boot installed

5. Lightly lubricate the fuel filter O-ring with clean engine oil. Thread the fuel filter clockwise onto the fuel filter base until the O-ring makes contact with the base. Then tighten the filter another 2/3–1 turn.



72237

a - Fuel filter base
b - Lubricate fuel filter O-ring
c - Fuel filter assembly
d - WIF sensor connection

6. Connect the water-in-fuel sensor to the fuel filter sensor harness.
7. Before starting the engine:
   a. Prime the fuel system. Refer to **Filling the Fuel System**.
   b. Inspect the installation for fuel leakage. Repair any fuel leaks if necessary.

INLINE FUEL FILTER REMOVAL

This engine is equipped with an inline fuel filter installed in the fuel inlet hose, inside the rigging tube. The filter captures debris that may be in the fuel line after the vessel mounted fuel filtration system. This filter must be removed and discarded by an authorized dealer after the first 200 hours of operation.

FILLING THE FUEL SYSTEM

Turn the ignition key switch to the **RUN** position for approximately six seconds to operate the fuel pumps. Start and operate the engine to purge any remaining air from the fuel system. The engine may run rough while the air is purging through the fuel injectors. Purging air may take longer if the vessel mounted fuel filter is installed further away from the engine. Increasing the throttle during engine operation will purge air from the fuel system more quickly.

Inspect Transom Tightness

Inspect the outboard for tightness to the boat transom. If any looseness of the outboard or mounting fasteners exist, tighten the outboard mounting fasteners to the specified torque. When looking for signs of looseness, look for loss of outboard transom bracket material or paint caused by movement between the outboard mounting fasteners and the outboard transom brackets. Also look for signs of movement between the outboard transom brackets and the boat transom (lift plate/setback bracket).

Description	Nm	lb-in.	lb-ft
Outboard mounting locknuts and bolts - standard boat transom	122	–	90
Outboard mounting locknuts and bolts - metal lift plates and setback brackets	163	–	120

Battery Inspection

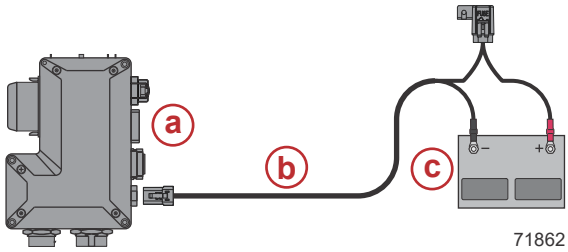
The battery should be inspected at periodic intervals to ensure proper engine starting capability.

IMPORTANT: Read the safety and maintenance instructions which accompany your battery.

1. Turn off the engine before servicing the battery.
2. Ensure the battery is secure against movement.
3. Battery cable terminals should be clean, tight, and correctly installed. Positive to positive and negative to negative.
4. Ensure the battery is equipped with a nonconductive shield to prevent accidental shorting of battery terminals.

Battery Cables and Clean Power Harness

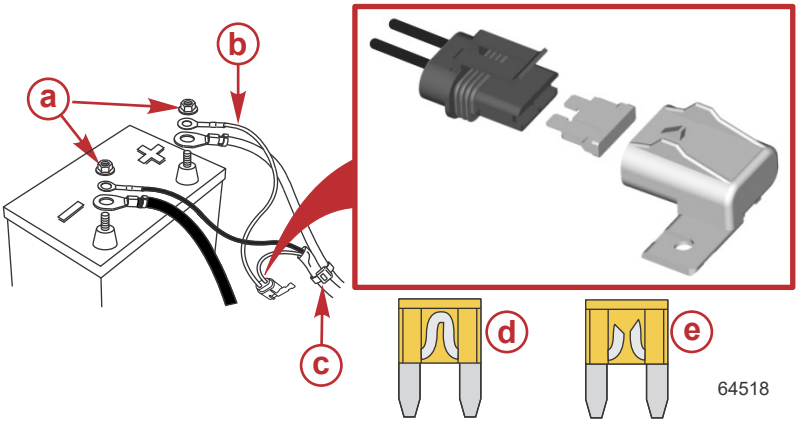
The battery cable connections should be checked often for corrosion or loose retaining hardware. Maintaining this electrical connection helps ensure that the engine operation and accessories functionality remains trouble-free. The engine starting battery cables and the clean power harness wires must be secured to the engine starting battery with nuts. Wing nuts are not acceptable. The clean power harness must be secured to one of the battery cables with a cable tie or other type of secure fastener.



- **a -** Engine rigging center
- **b -** 30-amp clean power harness
- **c -** Engine starting battery

If the clean power harness fuse is open, try to locate and correct the cause of the overload. If the cause is not found, the fuse may open again. Remove the clean power fuse and look at the silver band inside the fuse. If the band is broken (open), replace the fuse with the same rating (30-amp) and type fuse.

IMPORTANT: An ATC fuse has the fuse element enclosed or sealed inside the plastic housing. This type of fuse must be used for marine applications. Marine applications are exposed to environments that may have the potential to accumulate explosive vapors. ATO fuses have exposed elements and should never be used in marine applications.



- **a -** Nuts
- **b -** Clean power harness
- **c -** Cable tie
- **d -** Good fuse
- **e -** Open fuse

BATTERY CONNECTIONS

IMPORTANT: The engine electrical system is negative (–) ground.

When connecting the engine battery, hex nuts must be used to secure the battery leads to the battery posts. Tighten the hex nuts to the specified torque.

Description	Nm	lb-in.	lb-ft
Battery hex nuts	13.5	120	–

ORDER OF CONNECTION

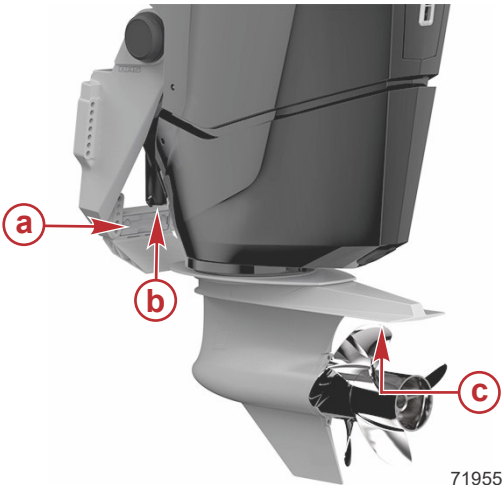
Connect the battery cables in the following order:

1. All jumpers between parallel, multiple battery packs
2. From the batteries to the positive (+) engine lead
3. From the batteries to the positive (+) clean power
4. From the batteries to the negative (–) engine lead
5. From the batteries to the negative (–) clean power
6. From the batteries or main ground (–) bus to the negative (–) starboard helm main power relay

Corrosion Control Anodes

The outboard has corrosion control anodes at different locations. Anodes help protect the outboard against galvanic corrosion by sacrificing its metal to be slowly eroded instead of the outboard metals.

Each anode requires periodic inspection, especially in saltwater, which will accelerate the corrosion. To maintain corrosion protection, always replace the anode before it is completely corroded. Never paint or apply a protective coating on the anode, as this will reduce the effectiveness of the anode.



Anode Locations

- **a -** Inner transom bracket
- **b -** Bottom of trim assembly
- **c -** Underside of anti-ventilation plate

Changing Engine Oil and Filter

The engine PCM is equipped with an oil life monitor that calculates the remaining oil life and notifies the user when an oil change is required. Oil change intervals will vary between 100–200 hours depending on engine duty cycle. Most users will be notified to change engine oil every 200 hours. Refer to **Fuel and Oil - Oil Life/Maintenance Monitor** for details on this feature.

ENGINE OIL CAPACITY

Engine oil capacity is approximately 13.3 liters (14.0 US qt).

IMPORTANT: Tilt the outboard out/up past vertical for approximately one minute to allow any trapped oil to drain back to the oil sump.

CHANGING ENGINE OIL

1. Tilt the outboard out/up past vertical for approximately one minute to allow any trapped oil to drain back to the oil sump.
2. Tilt the outboard to a vertical position.

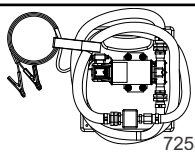
3. Open the hood. Refer to **Hood Opening**.

a - Hood
b - Oil fill cap
c - Dipstick

4. Remove the dipstick.
5. Install the fluid drain hose from the fluid transfer pump assembly onto the oil dipstick tube. The lock button on the fluid drain hose will snap into place.

a - Fluid drain hose
b - Lock button

NOTE: *A powered Mercury fluid transfer pump is recommended, as it is equipped with an appropriate fluid drain hose. If an alternative transfer pump is used, obtain a Mercury oil drain hose to adapt to the pump.*

Fluid Transfer Pump	8M0180953
 72539	Aids in the removal and addition of engine fluids.
Oil Drain Hose	8M0129230
 64627	Aids in the removal of engine oil without draining the crankcase. Connect to the crankcase oil pump.

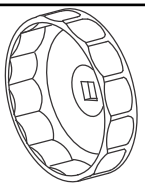
6. Place the fluid transfer pump drain tube into an appropriate container. The container should be large enough to hold more than 15 liters (15.85 US qt).
7. Extract the engine oil with the pump.
8. Allow the drain tube to completely drain before removing the pump assembly from the dipstick tube.
9. Press on the fluid drain hose lock button to release it from the dipstick tube.
10. Install the dipstick. Verify it is completely inserted.
11. Add the appropriate amount of engine oil. Refer to **Oil Filling**.

CHANGING OIL FILTER

1. Open the hood. Refer to **Hood Opening**.
2. Locate the oil filter and remove it by turning counterclockwise.

72264

a - Oil filter

Oil Filter Wrench	91-889277
 5221	Aids in the removal of the oil filter.

3. Clean the remaining oil from the filter mounting base area.
4. Apply a film of clean oil to the filter gasket.

IMPORTANT: Do not use grease on the filter gasket.

5. Install the new filter until the gasket contacts the base and then tighten 3/4 to 1 turn.

OIL FILLING

Remove the oil fill cap and add approximately 13.3 liter (14.0 US qt) of the recommended oil. This will bring the oil level within the operating range.

71992

a - Oil fill cap
b - Dipstick

NOTE: *It is not necessary to check the oil level immediately after changing the oil. The engine must be run for a while and then turned off for one hour or longer before checking the oil level. Refer to* ***Checking Engine Oil Level.***

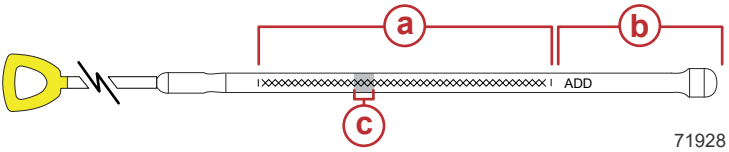
Checking Engine Oil Level

After the engine oil has been changed, the engine should be run for a few minutes and then turned off, allowing one hour or longer before checking the oil level.

IMPORTANT: For an accurate oil level reading, the engine must be vertical for several minutes before removing the dipstick.

1. Remove the dipstick, wipe it clean, and install it fully into the dipstick tube.

2. Remove the dipstick and observe the oil level. The oil level should be within the safe operating range.



a - Safe operating range
b - Add 3.8 Liter (4.0 US qt) of oil
c - Target oil level (1/2 to 2/3 above bottom of crosshatch)

3. If the oil level is below the ADD mark, or is not visible on the dipstick, remove the oil fill cap and add 3.8 Liter (4.0 US qt) of the specified outboard motor oil.
4. Allow a few minutes for the oil to drain into the sump and insert the oil dipstick.
5. Remove the dipstick and observe the oil level. Add oil as necessary to reach the target oil level (1/2 to 2/3 above the bottom of the dipstick crosshatch or ADD mark).
6. Install the dipstick and oil fill cap hand-tight.
7. Close the hood.

Gearcase Lubricant

GEARCASE LUBRICATION

When adding or changing gearcase lubricant, visually check for the presence of water in the lubricant. If water is present, it may have settled to the bottom and will drain out prior to the lubricant, or it may be mixed with the lubricant, giving it a milky colored appearance. If water is noticed, have the gearcase checked by your dealer. Water in the lubricant may result in premature bearing failure or, in freezing temperatures, will turn to ice and damage the gearcase.

Examine the drained gearcase lubricant for metal particles. A small amount of metal particles indicates normal gear wear. An excessive amount of metal filings or larger particles (chips) may indicate abnormal gear wear and should be checked by an authorized dealer.

RECOMMENDED GEARCASE LUBRICATION

Mercury or Quicksilver High Performance Gear Lubricant is recommended. If the recommended Mercury or Quicksilver lubricant is not available, SAE 90 API GL-4 gear oil is a suitable alternative.

GEARCASE LUBRICANT CAPACITY

NOTE: *Gearcase lubricant capacity applies to gearcases previously filled and drained and accounts for residual oil not drained. For new or rebuilt gearcases without residual oil, Method 2 using the fill/vent screws is the only recommended fill method.*

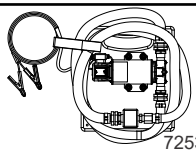
Gearcase Lubricant Capacity	2.8 L (3.0 US qt)

DRAINING AND FILLING THE GEARCASE USING FILL/EVACUATION TUBE—METHOD 1

Draining the Gearcase

1. Trim the engine out to approximately 30 degrees.
2. Open the hood. Refer to **Hood Opening**.
3. Remove the cap from the gearcase fill/evacuation tube and install the fluid drain hose from the fluid transfer pump assembly onto the tube. The lock button on the fluid drain hose will snap into place.

NOTE: *A powered Mercury fluid transfer pump is recommended, as it is equipped with an appropriate fluid drain hose. If an alternative transfer pump is used, obtain a Mercury fluid drain hose to adapt to the pump.*

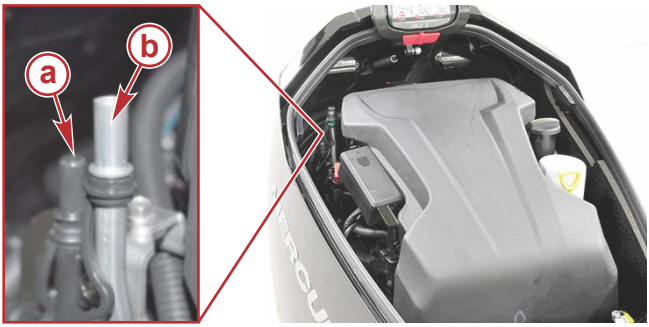
Fluid Transfer Pump	8M0180953
 72539	Aids in the removal and addition of engine fluids.

Fluid Drain Hose	8M0129230
 64627	Aids in the removal of engine fluids. Connect to a fluid transfer pump.

72281

a - Gearcase fill/evacuation tube
b - Fluid drain hose lock button

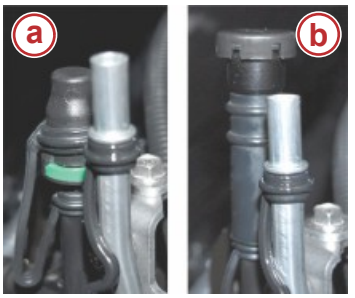
4. Remove the gearcase vent filter or cap from the vent tube. The vent tube is located behind the fill/evacuation tube.



72553

a - Gearcase vent tube
b - Gearcase fill/evacuation tube

NOTE: *Early engine models are equipped with a cap. Later engine models are equipped with a vent filter. Keep the vent filter dry after it is removed. Replace the vent filter if it gets submerged in any liquid, such as water or oil.*



72554

a - Gearcase vent tube with cap—early models

b - Gearcase vent tube with vent filter—late models

5. Place the fluid transfer pump drain tube into an appropriate container. The container should be large enough to hold at least 2.8 L (3.0 US qt).
6. Extract the gearcase lubricant with the pump.
7. Allow the drain tube to completely drain before removing the transfer pump assembly from the gearcase fill/evacuation tube.
8. Press on the fluid drain hose lock button to release it from the gearcase fill/evacuation tube.

Filling the Gearcase

1. Ensure that the engine is trimmed to the vertical operating position.
2. Place an overflow tube on the gearcase vent tube in case of an overfill.

NOTE: *A Mercury fluid drain hose can be used for this purpose.*

Fluid Drain Hose	8M0129230
 64627	Aids in the removal of engine fluids. Connect to a fluid transfer pump.

3. Fill a graduated cylinder with 2.8 L (3.0 US qt) of the specified gearcase lubricant.

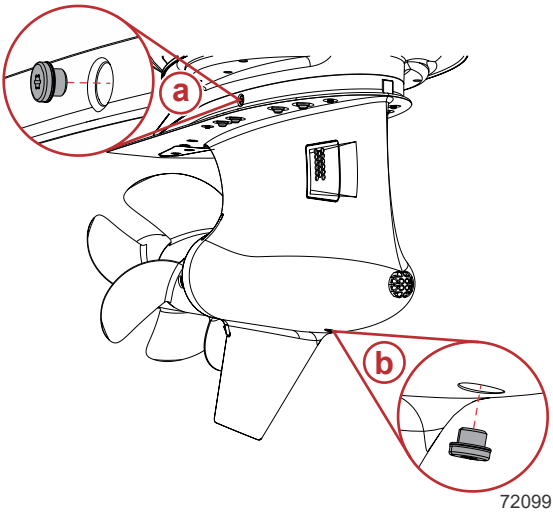
Description	Where Used	Part No.
High Performance Gear Lubricant	Gearcase	8M0222063

4. Using the fluid transfer pump or a gear lube pump, fill the gearcase through the fill/evacuation tube. Fill with the entire specified volume. If lubricant comes out of the gearcase vent tube before the entire volume is pumped in, stop filling; the system is full.

DRAINING AND FILLING THE GEARCASE USING GEARCASE SCREWS—METHOD 2

Draining the Gearcase

1. Trim the engine out to approximately 30 degrees.
2. Place a pan below the gearcase to capture the lubricant.
3. Remove the lower gearcase drain screw. Ensure that the gasket comes off with the screw and is not stuck in the housing.
4. Remove the top gearcase vent screw. Ensure that the gasket comes off with the screw and is not stuck in the housing.
5. Allow a sufficient amount of time for the gearcase to drain. Depending on the ambient air temperature, it may take 30 minutes for the gearcase to completely drain.



a - Gearcase vent screw and gasket
b - Gearcase drain screw and gasket

Filling the Gearcase

1. After the gearcase has been drained, ensure that the gearcase drain and vent screws are removed.
2. Install the lubrication fill connection to the lower gearcase drain port.
3. Pump the specified gear lubricant into the gearcase until it comes out of the top gearcase vent hole.

Description	Where Used	Part No.
High Performance Gear Lubricant	Gearcase	8M0222063

4. Ensure that the gasket is installed on the top vent screw.

IMPORTANT: Replace the gasket if damaged.

5. Install the top gearcase vent screw and tighten to the specified torque.

Description	Nm	lb-in.	lb-ft
Top gearcase vent screw	11.3	100	–

6. Ensure that the gasket is installed on the lower drain screw.

IMPORTANT: Replace the gasket if damaged.

7. Remove the lubricant fill connection and quickly install the lower gearcase drain screw. Tighten the screw to the specified torque.

Description	Nm	lb-in.	lb-ft
Lower gearcase drain screw	11.3	100	–

Transmission Fluid

RECOMMENDED TRANSMISSION FLUID

Mercury or Quicksilver Automatic Transmission Fluid is recommended. If the recommended Mercury or Quicksilver fluid is not available, use a Dexron III fluid listed in the ZF specification TE-ML 04D as an alternative.

TRANSMISSION FLUID CAPACITY

Transmission Fluid Capacity without filter change	5.7 L (6.0 US qt)

CHECKING THE TRANSMISSION FLUID LEVEL

1. Tilt the engine up to approximately 45 degrees. Then, trim down to the fully tucked vertical operating position. Refer to **Power Trim and Tilt**. This will ensure that any air pockets are purged.

NOTICE
Avoid damaging the engine and drive from overheating. Never start or run the power package without water circulating through the cooling system.

2. In the fully tucked position, start the engine and allow it to run at idle, in **NEUTRAL** for at least 90 seconds.
3. The fault status will indicate the transmission fluid level:
   a. **No fault** indicates that the transmission fluid level is adequate.
   b. **TransOilLevel_High** fault indicates that the transmission fluid level is too high. Stop the engine and change the transmission fluid. Refer to **Changing the Transmission Fluid**.
   c. **TransOilLevel_Critical_Low** fault indicates that the transmission fluid level is too low. Stop the engine and add the specified transmission fluid in 0.5 L (0.53 US qt) increments. Refer to **Adding Transmission Fluid**.

NOTE: Shifting loads within the boat can affect engine orientation, thus affecting fluid levels and fault status. Contact your local authorized Mercury dealer for assistance with questionable transmission fluid level results.

ADDING TRANSMISSION FLUID

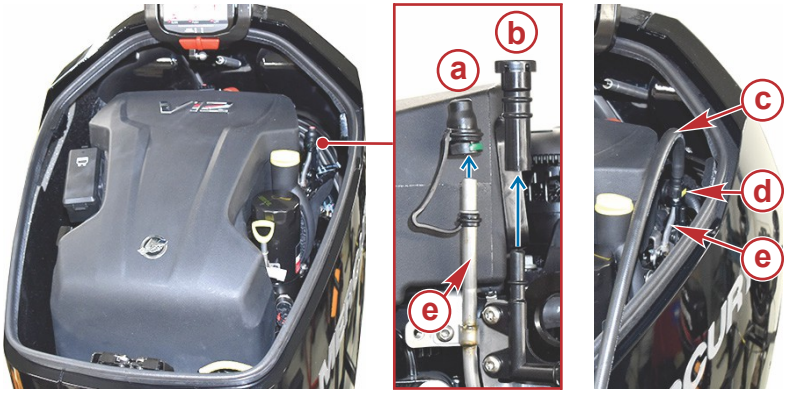
The following procedure should only be used in the event of a **TransOilLevel_Critical_Low** fault. Refer to **Changing the Transmission Fluid** for complete system draining and filling information.

1. Open the hood. Refer to **Hood Opening**.
2. Trim the engine to the vertical operating position.
3. Remove the transmission drain/fill cap.
4. Remove the transmission vent filter and store it in a dry location.

NOTE: Keep the transmission vent filter dry after it is removed. Replace the transmission vent filter if it gets submerged in any liquid, such as water or oil.

5. Attach a funnel to a fluid drain hose and install the assembly onto the transmission drain/fill tube (not the vent tube). The lock button on the fluid drain hose will snap into place.

Fluid Drain Hose	8M0129230
 64627	Aids in the removal of engine fluids. Connect to a fluid transfer pump.



74527

- **a -** Transmission drain/fill cap
- **b -** Transmission vent filter
- **c -** Fluid drain hose (attached to funnel)
- **d -** Lock button
- **e -** Transmission drain/fill tube

6. Fill a graduated cylinder with approximately 0.5 L (0.53 US qt) of the specified transmission fluid. Fill the transmission fluid through the drain/fill tube.

Description	Where Used	Part No.
Automatic Transmission Fluid	Transmission	8M0173229

7. Remove the fluid drain hose/funnel from the transmission drain/fill tube.
8. Install the transmission drain/fill cap.
9. Install the vent filter.
10. Close the hood.
11. Check the transmission fluid level. Refer to **Checking the Transmission Fluid Level**.

12. Repeat this **Adding Transmission Fluid** procedure until the **TransOilLevel_Critical_Low** fault does not occur. Do not add more than 1.9 L (2 US qt) without performing a complete fluid change.

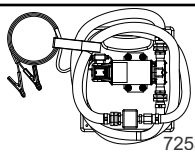
CHANGING THE TRANSMISSION FLUID

1. To prevent possible expulsion of transmission fluid in the event of a fouled vent or overfilled transmission:
   a. Tilt the engine up beyond 45 degrees. This ensures that the transmission fluid level is below the vent tube. Wait **one minute** for the fluid to settle before proceeding.
   b. Open the hood. Refer to **Hood Opening**.
   c. Remove the transmission vent filter. If the vent filter is fouled, this will allow any air pressure inside the transmission to be relieved before removing the cap on the drain/fill tube.

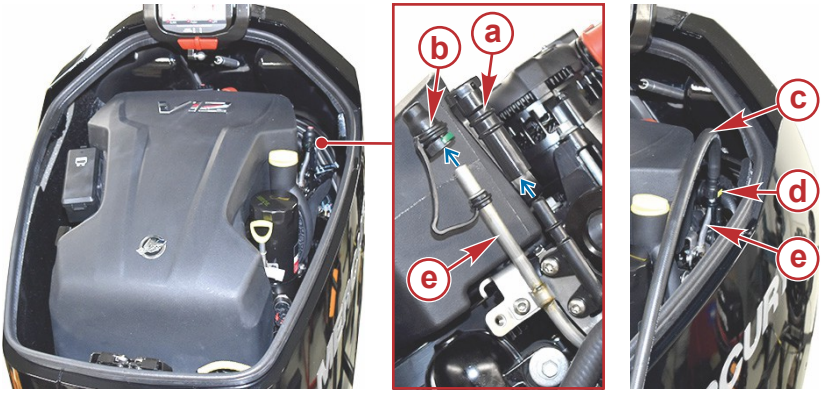
NOTE: *Keep the transmission vent filter dry after it is removed. Replace the transmission vent filter if it gets submerged in any liquid, such as water or oil.*

   d. Remove the cap from the transmission drain/fill tube.
2. Trim the engine down to the fully tucked vertical operating position.
3. Install the fluid drain hose from the fluid transfer pump assembly onto the transmission fill/drain tube (not the vent tube). The lock button on the fluid drain hose will snap into place.

NOTE: *A powered Mercury fluid transfer pump is recommended, as it is equipped with an appropriate fluid drain hose. If an alternative transfer pump is used, obtain a Mercury fluid drain hose to adapt to the pump.*

Fluid Transfer Pump	8M0180953
 72539	Aids in the removal and addition of engine fluids.

Fluid Drain Hose	8M0129230
 64627	Aids in the removal of engine fluids. Connect to a fluid transfer pump.



74526

a - Transmission vent filter (remove first)
b - Transmission drain/fill cap
c - Fluid drain hose (attached to fluid transfer pump assembly)
d - Lock button
e - Transmission drain/fill tube

4. Place the fluid transfer pump drain tube into an appropriate container. The container should be large enough to hold at least 6.75 liters (7 US qt).
5. Extract the fluid from the transmission with the pump.
6. Wait **10 minutes** for the transmission fluid to settle down into the sump, then extract again until empty. Dispose of the fluid according to local regulations.
7. Fill a graduated cylinder with approximately 5.7 L (6.0 US qt) of the specified transmission fluid. Using the fluid transfer pump, fill the transmission fluid through the drain/fill tube.

Description	Where Used	Part No.
Automatic Transmission Fluid	Transmission	8M0173229

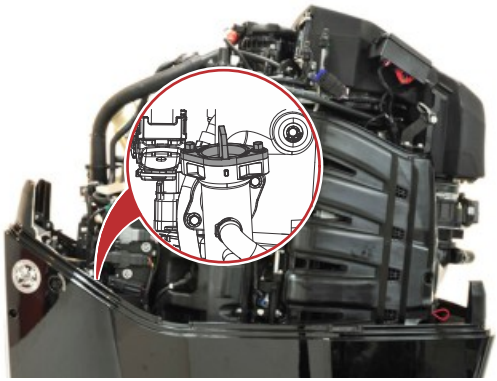
8. Remove the fluid transfer pump assembly from the drain/fill tube.
9. Install the transmission drain/fill cap.
10. Install the vent filter.

11. Close the hood.

Cooling System Water Strainer Inspection

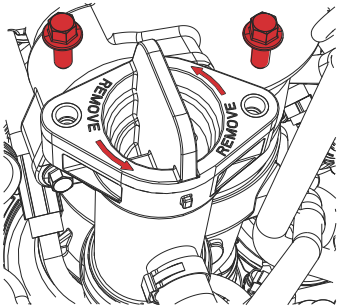
IMPORTANT: The water strainer is an integral component of the cooling system. It should be inspected every 1000 hours of operation.

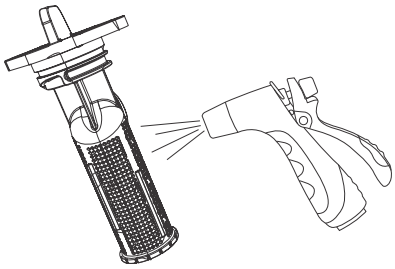
1. Remove the top cowl. Refer to **Top Cowl Removal and Installation**.
2. Locate the water strainer on the lower rear starboard side of the engine.



72548

3. Remove the two screws securing the water strainer cap. Turn the cap counterclockwise and pull the strainer up and out of the housing by hand or using a wrench.





72549

4. Inspect the strainer for debris, blockage, or accumulation of mineral deposits. Spray the strainer with fresh water or use a nylon bristle brush to help remove debris, blockage, or mineral deposits. If the strainer cannot be cleaned or is damaged, replace the strainer.
5. Insert the clean strainer into the fitting on the engine.
6. Secure the strainer cap with two screws. Tighten the screws to the specified torque.

Description	Nm	lb-in.	lb-ft
Water strainer screws (2)	10	88.5	–

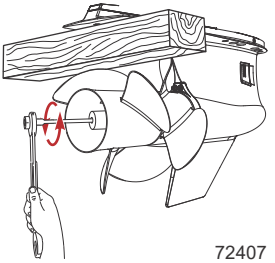
Propeller Replacement

PROPELLER REMOVAL

⚠ WARNING

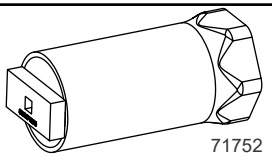
Rotating propellers can cause serious injury or death. Never operate the boat out of the water with a propeller installed. Before installing or removing a propeller, place the drive unit in neutral and activate the lanyard stop switch to prevent the engine from starting. Place a block of wood between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

1. Shift the outboard into neutral position.
2. Insert a block of wood between the propeller blades and the anti-ventilation plate, to prevent the propeller from turning during removal of the propeller nut.



72407

3. Use a 1-13/16 in. socket to loosen the propeller nut.
4. Pull the rear propeller straight off the shaft. If it is seized to the shaft and cannot be removed, have the propeller removed by an authorized dealer.
5. Remove the large propeller nut using a propeller nut tool.

Propeller Nut Tool	8M0171389
 71752	Aids in the removal and installation of the large propeller nut.

6. Pull the front propeller straight off of the shaft. If it is seized to the shaft and cannot be removed, have the propeller removed by an authorized dealer.

PROPELLER INSTALLATION

⚠ WARNING

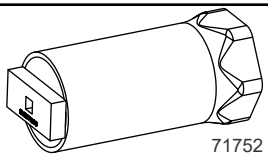
Accidental engine starting can cause serious injury or death. Remove the key from the ignition switch and engage the lanyard stop or E-stop switch to prevent the engine from starting when performing service or maintenance on the power package.

IMPORTANT: Mercury Marine V12 propellers are matched sets. Do not operate the engine without a front and rear propeller of the same pitch.

1. Apply a liberal amount of Extreme Grease to all splined, threaded, and tapered surfaces on the propeller shaft, thrust hubs, propeller nuts, and propeller hubs.

Description	Where Used	Part No.
Extreme Grease	Inner and outer propeller shaft splines, large thrust hub, small thrust hub, large propeller nut, small propeller nut, front propeller hub, rear propeller hub	8M0190472

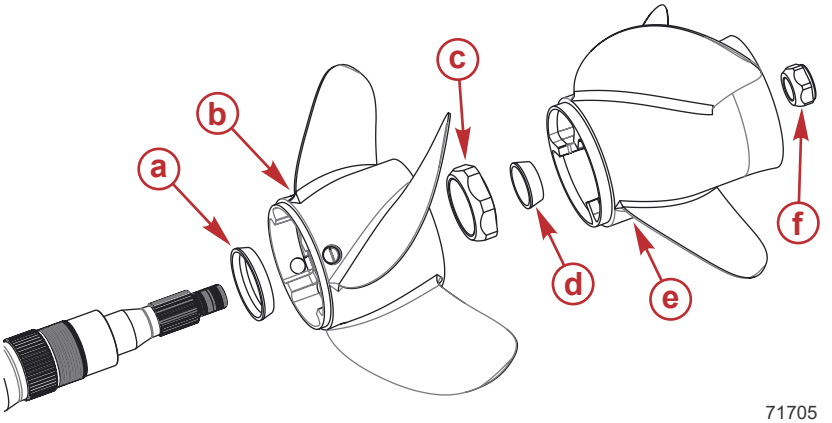
2. Slide the large thrust hub onto the outer propeller shaft with the tapered end of the hub facing rearward.
3. Align the splines of the front (4-blade) propeller with the splines on the shaft and slide the propeller into place on the outer shaft.
4. Insert a block of wood between the propeller blades and the anti-ventilation plate, to prevent the propeller from turning during tightening of the propeller nut.
5. Install the large propeller nut and tighten the nut to the specified torque using a propeller nut tool.

Propeller Nut Tool	8M0171389
 71752	Aids in the removal and installation of the large propeller nut.

Description	Nm	lb-in.	lb-ft
Large propeller nut	339	–	250

6. Slide the small thrust hub onto the inner propeller shaft with the tapered end of the hub facing rearward.

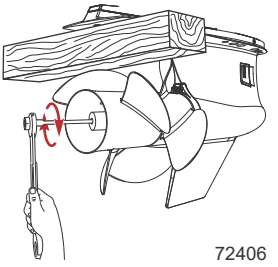
7. Align the splines of the rear (3-blade) propeller with the splines on the shaft and slide the propeller into place on the inner shaft.



a - Large thrust hub
b - Front (4-blade) propeller
c - Large propeller nut
d - Small thrust hub
e - Rear (3-blade) propeller
f - Small propeller nut

8. Insert a block of wood between the propeller blades and the anti-ventilation plate, to prevent the propeller from turning during tightening of the propeller nut.
9. Secure the propeller with the small propeller nut. Use a 1-13/16 in. socket to tighten the nut to the specified torque.

Description	Nm	lb-in.	lb-ft
Small propeller nut	135.6	–	100



Propeller installation with a block of wood between blades and anti-ventilation plate (typical)

DTS Wiring System

⚠ WARNING

Splicing or probing will damage the wire insulation allowing water to enter the wiring. Water intrusion may lead to wiring failure and loss of throttle and shift control. To avoid the possibility of serious injury or death from loss of boat control, do not splice or probe into any wire insulation of the DTS system.

- Verify the harnesses are not routed near sharp edges, hot surfaces, or moving parts.
- Verify all unused connectors and receptacles are covered with a weather cap.
- Verify the harnesses are fastened along the routing path.

Accessory Drive Belt

The accessory drive belt is located under the flywheel shroud–intake air induction plenum. The accessory drive belt inspection must be completed by an authorized Mercury dealer at the recommended interval. Refer to **Inspection and Maintenance Schedule**.

Fuses

IMPORTANT: An ATC fuse has the fuse element enclosed or sealed inside the plastic housing. This type of fuse must be used for marine applications. Marine applications are exposed to environments that may have the potential to accumulate explosive vapors. ATO fuses have exposed elements and should never be used in marine applications.

The electrical wiring circuits on the outboard are protected from overload with fuses. If a fuse is open, try to locate and correct the cause of the overload. If the cause is not found, the fuse may open again.

UPPER FUSE PANEL

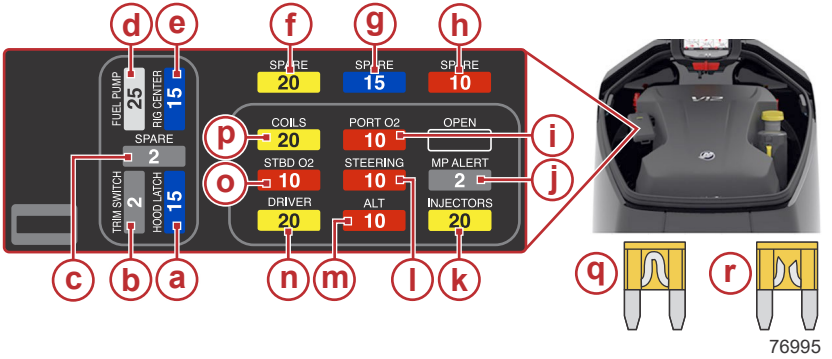
The upper fuse panel is equipped with 11 fuses and four spares. Refer to the following image for identification.

1. Open the hood. Refer to **Hood Opening**.
2. Locate the fuse holder on the starboard side of the engine. Remove the cover from the fuse holder.

NOTE: *A fuse identification decal is located on the fuse panel cover.*

3. Remove the suspected open fuse and look at the silver band inside the fuse. If the band is broken (open), replace the fuse.

IMPORTANT: Replace the fuse with a new fuse with the same amp rating.



- **a -** Hood latch - 15-amp
- **b -** Cowl trim switch - 2-amp
- **c -** Spare - 2-amp
- **d -** Fuel pump - 25-amp
- **e -** Rig center - 15-amp
- **f -** Spare - 20-amp
- **g -** Spare - 15-amp
- **h -** Spare - 10-amp
- **i -** Port O2 - 10-amp
- **j -** MP alert - 2-amp
- **k -** Fuel injector - 20-amp
- **l -** Steering - 10-amp
- **m -** Alternator- 10-amp
- **n -** Driver - 20-amp
- **o -** Starboard O2 - 10-amp
- **p -** Coils - 20-amp
- **q -** Good fuse
- **r -** Open fuse

RIG CENTER FUSE PANEL

The rig center fuse panel is equipped with five fuses. Refer to the following image for identification. Four spare fuses are attached to a harness on the inside of the rig center. A 30-amp spare fuse for the battery clean power is also included here.

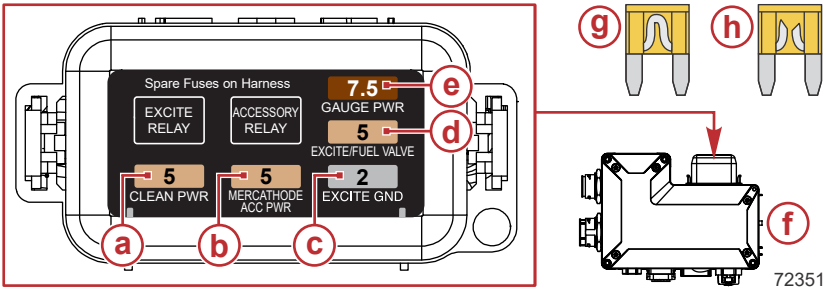
The electrical wiring circuits on the outboard are protected from overload with fuses. If a fuse is open, try to locate and correct the cause of the overload. If the cause is not found, the fuse may open again.

1. Locate the fuse holder on the boat-mounted rig center. Remove the cover from the fuse holder.

NOTE: A fuse identification decal is located on the fuse holder cover.

2. Remove the suspected open fuse and look at the silver band inside the fuse. If the band is broken (open), replace the fuse.

IMPORTANT: Replace the fuse with a new fuse with the same amp rating.

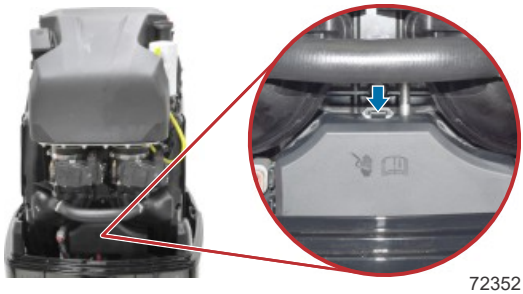


- **a -** Clean power - 5-amp
- **b -** Mercathode ACC power - 5-amp
- **c -** Excite ground - 2-amp
- **d -** Excite/fuel valve - 5-amp
- **e -** Gauge power - 7.5-amp
- **f -** Rig center
- **g -** Good fuse
- **h -** Open fuse

FUSES ON RIGGING PANEL

The rigging panel is equipped with three MRBF fuses, and two spares. Refer to the following image for identification.

1. Remove the top cowl. Refer to **Top Cowl Removal and Installation**.
2. Remove the rigging panel cover. Release by pressing down on the tab at the top of the cover.



Rigging panel cover

3. Remove the suspected open fuse and look at the silver band inside the fuse. If the band is broken (open), replace the fuse. To remove and replace the fuse:

IMPORTANT: Replace the fuse with a new fuse with the same amp rating.

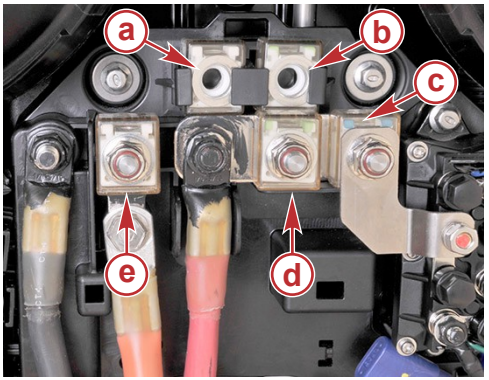
a. Remove the nut securing the fuse.

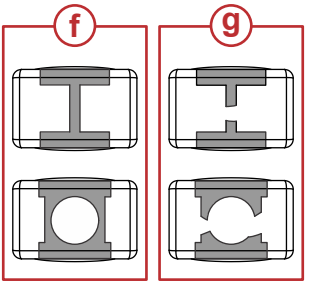
b. Remove the fuse.

c. Replace the fuse.

d. Replace the nut and tighten to the specified torque.

Description	Nm	lb-in.	lb-ft
Fuse nut	12	106	–





76993

a - Spare - 175-amp
b - Spare - 80-amp
c - Trim - 125-amp
d - Steering - 80-amp
e - Alternator - 175-amp
f - Good fuses
g - Open fuses

STORAGE

Storage Preparation

The major consideration in preparing your outboard for storage is to protect it from rust, corrosion, and damage caused by freezing of trapped water.

The following storage procedures should be followed to prepare your outboard for out of season storage or prolonged storage (90 days or longer).

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.

FUEL SYSTEM

IMPORTANT: Gasoline containing alcohol (ethanol or methanol) can cause a formation of acid during storage and can damage the fuel system. If the gasoline being used contains alcohol, it is advisable to drain as much of the remaining gasoline as possible from the fuel tank, remote fuel line, and engine fuel system.

IMPORTANT: This outboard is equipped with a closed fuel system. Fuel within the engine's fuel system, other than the fuel tank, will remain stable during normal storage periods without the addition of fuel treatment stabilizers.

Fill the fuel tank and engine fuel system with treated (stabilized) fuel to help prevent formation of varnish and gum. Proceed with the following instructions.

- Permanently installed fuel tank - Pour the required amount of Quickstor Fuel Stabilizer (follow instructions on container) into a separate container and mix with approximately one liter (one quart) of gasoline. Pour this mixture into fuel tank.

Description	Where Used	Part No.
Quickstor Fuel Stabilizer	Fuel tank	92-8M0047932

Protecting External Outboard Components

- Touch up any paint nicks. See your dealer for touch-up paint.
- Spray Quicksilver or Mercury Precision Lubricants Corrosion Guard on external metal surfaces (except corrosion control anodes).

Description	Where Used	Part No.
Corrosion Guard	External metal surfaces	92-802878 55

Protecting Internal Engine Components

Contact an authorized Mercury Marine dealer to execute the following:

IMPORTANT: Refer to the appropriate service manual for spark plug inspection, removal, and replacement procedures.

- Remove the high tension spark plug leads and spark plugs.

- Spray approximately 30 ml (1 fl oz) of Storage Seal Rust Inhibitor into each spark plug hole.

Description	Where Used	Part No.
Storage Seal Rust Inhibitor	Spark plug holes	92-858081K03

- Actuate key/push button start switch to crank the engine through one start cycle, which will distribute the storage seal throughout the cylinders.
- Install spark plugs and the high tension spark plug leads.

Engine Fluids

- Change the engine oil and filter.
- Change the transmission fluid.
- Change the gearcase lubricant.

Positioning Outboard for Storage

Store outboard in an upright (vertical) position to allow water to drain out of the outboard.

NOTICE

Storing the outboard in a tilted position can damage the outboard. Water trapped in the cooling passages or rain water collected in the propeller exhaust outlet in the gearcase can freeze. Store the outboard in the full down position.

Battery Storage

- Follow the battery manufacturer's instructions for storage and charging.
- Remove the battery from the boat and check water level. Charge if necessary.
- Store the battery in a cool, dry place.
- Periodically check the water level and charge the battery during storage.

TROUBLESHOOTING

Starter Motor Will Not Crank the Engine

POSSIBLE CAUSES

- Lanyard stop switch not in **RUN** position.
- Open clean power harness circuit fuse. Refer to **Maintenance** section.
- Remote control is not shifted to the neutral position.
- Shift actuator failure. Turn ignition key switch **OFF** to reset and then start the engine.
- Weak battery or battery connections are loose or corroded.
- Ignition key switch failure.
- Wiring or electrical connection faulty.
- Starter motor solenoid or starter relay failure.

Engine Will Not Start

POSSIBLE CAUSES

- Incorrect starting procedure. Refer to **Operation** section.
- Old or contaminated gasoline.
- Fuel is not reaching the engine.
    - Fuel tank is empty.
    - Fuel tank vent not open or restricted.
    - Fuel line is disconnected or kinked.
    - Fuel filter is obstructed. Refer to **Maintenance** section.
    - Fuel pump failure.
    - Fuel tank filter obstructed.
- Ignition system component failure.
- Spark plugs fouled or defective. Refer to **Maintenance** section.

Engine Starts But Will Not Shift Into Gear

- Throttle only mode is engaged.
- Transmission failure. Turn ignition key switch **OFF** to reset and then start the engine.

Engine Runs Erratically

POSSIBLE CAUSES

- Overheating—warning horn not working.
- Low oil pressure. Check oil level.
- Spark plugs fouled or defective. Refer to **Maintenance** section.
- Incorrect setup and adjustments.
- Fuel is being restricted to the engine.

a. Engine fuel filter is obstructed. Refer to **Maintenance** section.
b. Fuel tank filter obstructed.
c. Stuck anti-siphon valve located on permanently built-in type fuel tanks.
d. Fuel line is kinked or pinched.

- Fuel system is not primed.
- Fuel pump failure.
- Ignition system component failure.

Performance Loss

POSSIBLE CAUSES

- Overheating—warning horn not working.
- Low oil pressure. Check oil level.
- Throttle not opening fully.
- Damaged propeller or improper propeller size.
- Low water pressure.
- Low battery voltage.
- Worn, stretched or broken accessory belt.
- Boat overloaded or load improperly distributed.
- Excessive water in bilge.
- Boat bottom is dirty or damaged.
- Air filter or intake screen that is partially blocked with debris.

Cranking Battery Will Not Hold Charge

POSSIBLE CAUSES

- Battery connections are loose or corroded.
- Worn out or inefficient battery.
- Excessive use of electrical accessories.
- Defective alternator.
- Open circuit in the alternator fuse circuit on the rigging panel.
- Worn or stretched accessory belt.

OWNER SERVICE ASSISTANCE

Service Assistance

LOCAL REPAIR SERVICE

If you need service for your Mercury-outboard-powered boat, take it to your authorized dealer. Only authorized dealers specialize in Mercury 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 your power package.*

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 advise the local authorities and Mercury Marine of the model and serial numbers and to whom the recovery is to be reported. This information is maintained in a database at Mercury Marine to aid authorities and dealers in the recovery of stolen power packages.

ATTENTION REQUIRED AFTER SUBMERSION

1. Before recovery, contact an authorized Mercury dealer.
2. After recovery, immediate service by an authorized Mercury 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 lives. They are also expected to operate in both fresh and saltwater environments. These conditions require numerous special parts.

PARTS AND ACCESSORIES INQUIRIES

Direct any inquiries concerning genuine Mercury Precision Parts® or Quicksilver Marine Parts and Accessories® to a local authorized dealer. Dealers have the proper systems to order parts and accessories, if they are not in stock. **Engine model** and **serial number** are required to order correct parts.

OWNER SERVICE ASSISTANCE

RESOLVING A PROBLEM

Satisfaction with your Mercury 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 dealership. If you need additional assistance:

1. Talk with the dealership's sales manager or service manager.
2. If your question, concern, or problem cannot be resolved by your dealership, please contact the Mercury Marine Service Office for assistance. Mercury Marine will work with you and your dealership to resolve all problems.

The following information will be needed by the Customer Service:

- Your name and address
- Your daytime telephone number
- The model and serial numbers of your power package
- The name and address of your dealership
- The nature of the problem

CONTACT INFORMATION FOR MERCURY MARINE CUSTOMER SERVICE

For assistance, call, fax, or write to the geographic office in your area. Please include your daytime telephone number with mail and fax correspondence.

<table>
<tr><th colspan="3">United States, Canada</th></tr>
<tr><td>Telephone for Verado/SeaPro V12 Customers Only</td><td>English +1 920 924 1436</td><td rowspan="3">Mercury Marine
W6250 Pioneer Road
P.O. Box 1939
Fond du Lac, WI 54936-1939</td></tr>
<tr><td>Telephone</td><td>English +1 920 929 5040
Français +1 905 636 4751</td></tr>
<tr><td>Fax</td><td>English +1 920 929 5893
Français +1 905 636 1704</td></tr>
<tr><td>Website</td><td colspan="2">www.mercurymarine.com</td></tr>
</table>

<table>
<tr><th colspan="3">Australia, Pacific</th></tr>
<tr><td>Telephone</td><td>+61 3 9791 5822</td><td rowspan="2">Brunswick Asia Pacific Group
41–71 Bessemer Drive
Dandenong South, Victoria 3175
Australia</td></tr>
<tr><td>Fax</td><td>+61 3 9706 7228</td></tr>
</table>

OWNER SERVICE ASSISTANCE

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	

Asia, Singapore, Japan		
Telephone	+65 68058100	Mercury Marine Singapore Pte Ltd 11 Changi South Street 3, #01-02 Singapore, 486122
Fax	+65 68058138	

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	(920) 929-4894	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.

OWNER SERVICE ASSISTANCE

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	.

MAINTENANCE LOG

Maintenance Log

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

Date	Maintenance Performed	Engine Hours