

Thank You

for your purchase of one of the finest power packages available. You have made a sound investment in boating pleasure. Your power package has been manufactured by Mercury Marine, a world leader in marine technology and manufacturing since 1939. These years of experience have been committed to the goal of producing the finest quality products. This led to Mercury Marine's reputation for strict quality control, excellence, durability, lasting performance and being the best at providing after the sale support.

Please read this manual carefully before operating your power package. This manual has been prepared to assist you in the operation, safe use and care of your power package.

All of us at Mercury Marine took pride in building your power package and wish you many years of happy and safe boating. Again, thank you for your confidence in Mercury Marine.




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

7406

Safety Alerts and Notices

WARNING

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

Throughout this publication, dangers, warnings, cautions, and notices, accompanied by the international HAZARD symbol , are used to alert the technician to special instructions concerning a particular service or operation that may be hazardous if performed incorrectly or carelessly. These safety alerts follow ANSI standard Z535.6-2006 for product safety information in product manuals, instructions, and other collateral materials. **Observe these safety alerts carefully.**

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

DANGER

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

WARNING

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

CAUTION

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

NOTICE

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

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

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

 **WARNING**

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

Copyright and Trademark Information

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EMISSIONS INFORMATION

Star Label




Outboards are labeled on the cowl with one of the following star labels.

The Symbol for Cleaner Marine Engines Means:

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

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

Longer Emission Warranty - Protects consumer for worry free operation.

 <p>22531</p>	<p>One Star - Low Emission</p> <p>The One Star label identifies engines that meet the Air Resources Board's 2001 exhaust emissions standards. Engines meeting these standards have 75% lower emissions than conventional carbureted two-stroke engines. These engines are equivalent to the U.S. EPA's 2006 standards for marine engines.</p>
 <p>22532</p>	<p>Two Stars - Very Low Emission</p> <p>The Two Star label identifies engines that meet the Air Resources Board's Personal Watercraft and Outboard marine engine 2004 exhaust emissions standards. Engines meeting these standards have 20% lower emissions than One Star - Low Emission engines.</p>
 <p>22533</p>	<p>Three Stars - Ultra Low Emission</p> <p>The Three Star label identifies engines that meet the Air Resources Board's Personal Watercraft and Outboard marine engine 2008 exhaust emissions standards or the Sterndrive and Inboard marine engine 2003-2008 exhaust emission standards. Engines meeting these standards have 65% lower emissions than One Star - Low Emission engines.</p>

EMISSIONS INFORMATION



Four Stars - Super Ultra Low Emission

The Four Star label identifies engines that meet the Air Resources Board's Stern-drive and Inboard marine engine 2009 exhaust emission standards. Personal Watercraft and Outboard marine engines may also comply with these standards. Engines meeting these standards have 90% lower emissions than One Star - Low Emission engines.

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.**

EMISSIONS INFORMATION

EMISSION CERTIFICATION LABEL

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

The diagram shows a rectangular label with the Mercury logo on the left and the title "EMISSION CONTROL INFORMATION" on the right. The label contains the following text and fields:

- THIS ENGINE CONFORMS TO CALIFORNIA AND U.S. EPA EMISSION REGULATIONS FOR SPARK IGNITION MARINE ENGINES
- REFER TO OWNERS MANUAL FOR REQUIRED MAINTENANCE, SPECIFICATIONS, AND ADJUSTMENTS
- IDLE SPEED (in gear): FAMILY:
- hp cc FEL: g/kWh
- TIMING (IN DEGREES):
- SPARK PLUG:
- GAP:
- COLD VALVE CLEARANCE (mm) INTAKE:
- EXHAUST:

Callouts a-i point to the following fields:

- a: Idle speed
- b: Engine horsepower
- c: Piston displacement
- d: Date of manufacture
- e: Valve clearance (if applicable)
- f: Family number
- g: Maximum emission output for the engine family
- h: Timing specification
- i: Recommended spark plug and gap

21096

- a** - Idle speed
- b** - Engine horsepower
- c** - Piston displacement
- d** - Date of manufacture
- e** - Valve clearance (if applicable)
- f** - Family number
- g** - Maximum emission output for the engine family
- h** - Timing specification
- i** - Recommended spark plug and gap

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 emissions levels to exceed their predetermined factory specifications.

Warranty Coverage

Mercury Racing does not offer a warranty with this power package.

GENERAL INFORMATION

Boater's Responsibilities

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

Before Operating Your Outboard

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

This manual as well as safety labels posted on the outboard use the following safety alerts to draw your attention to special safety instructions that should be followed.

DANGER

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WARNING

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NOTICE

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GENERAL INFORMATION

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. If in doubt, contact your dealer or the boat manufacturer.

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

26777

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 never operate it at its high speed capability without first requesting an initial orientation and familiarization demonstration ride with your dealer or an operator experienced with your boat/outboard combination. For additional information, obtain a copy of our **Hi-Performance Boat Operation** booklet from your dealer, distributor, or Mercury Marine.

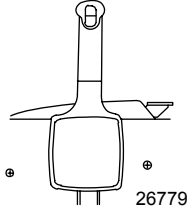
Outboard Remote Control Models

The remote control connected to your outboard must be equipped with a start in neutral only protection device. This prevents the engine from starting when the shift is actuated in any position other than neutral.

GENERAL INFORMATION

⚠ WARNING

Starting the engine with the drive in gear can cause serious injury or death. Never operate a boat that does not have a neutral-safety-protection device.



Remote Steering Notice

Fasten the steering cables to the steering arms utilizing a secure method that will not work loose and vibrate off, enabling the steering cables to disengage.

⚠ WARNING

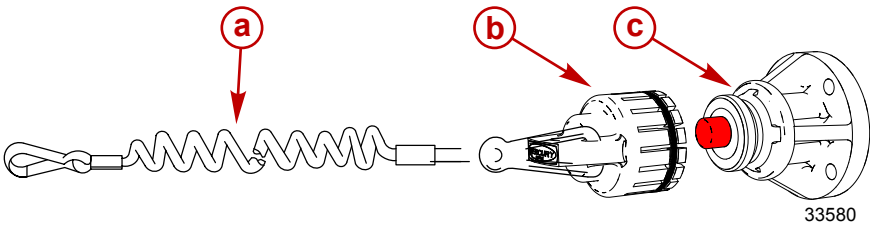
Damaged or loose steering components can lead to loss of steering control, which can cause serious injury or death. Properly secure all steering components to prevent them from becoming loose or disengaged. All steering hardware and fastening components must be appropriate for the application.

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.

GENERAL INFORMATION

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



a - Lanyard cord

b - Lanyard stop switch cap

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 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 (e.g. if the operator is accidentally ejected).

WARNING

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

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.

GENERAL INFORMATION

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

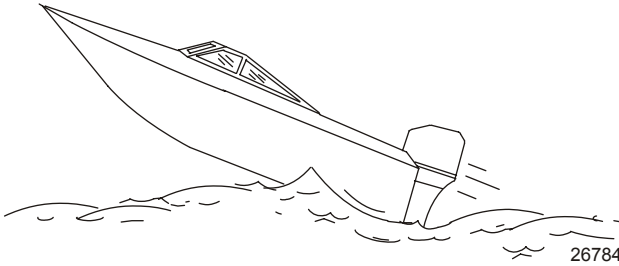
Passenger Safety Message

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 within or out of the boat.

GENERAL INFORMATION

Wave and Wake Jumping

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



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

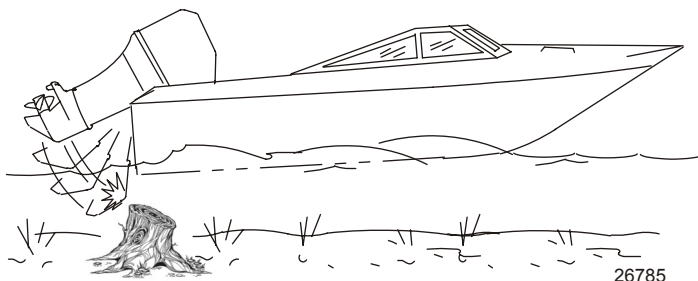
Wave or wake jumping can cause serious injury or death from occupants being thrown within or out of the boat. Avoid wave or wake jumping whenever possible.

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.

GENERAL INFORMATION

Impact with Underwater Hazards

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



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

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

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

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.

GENERAL INFORMATION

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

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

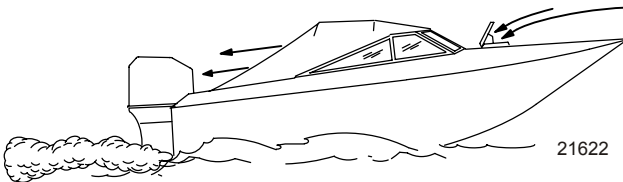
Early symptoms of carbon monoxide poisoning which should not be confused with seasickness or intoxication, include headache, dizziness, drowsiness, and nausea.

⚠ WARNING

Carbon monoxide poisoning can lead to unconsciousness, brain damage, or death. Keep the boat well ventilated while at rest or underway and avoid prolonged exposure to carbon monoxide.

GOOD VENTILATION

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



Example of desired air flow through the boat

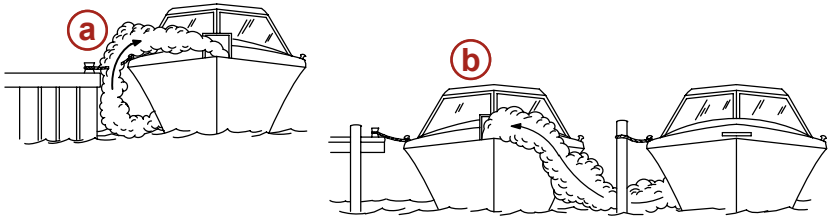
GENERAL INFORMATION

POOR VENTILATION

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

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

WHILE BOAT IS STATIONARY



21626

- a** - Running the engine when the boat is moored in a confined space
- b** - Mooring close to another boat that has its engine running

WHILE BOAT IS MOVING



21628

- a** - Running the boat with the trim angle of the bow too high
- b** - Running the boat with no forward hatches open

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.

GENERAL INFORMATION

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

Some accessories not manufactured or sold by Mercury Marine are not designed to be safely used with your outboard or outboard operating system. Acquire and read the installation, operation, and maintenance manuals for all your selected accessories.

Safe Boating Suggestions

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

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

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

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

Know and obey all nautical rules and laws of the waterways. Boat operators should complete a boating safety course. Courses are offered in the U.S.A. by 1) The U.S. Coast Guard Auxiliary, 2) The Power Squadron, 3) The Red Cross and 4) your state boating law enforcement agency. Inquiries may be made to the Boating Hotline, 1-800-368-5647 or the Boat U.S. Foundation information number 1-800-336-BOAT.

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

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

GENERAL INFORMATION

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

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

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

Never drive your boat directly behind a water skier in case the skier falls. As an example, your boat traveling at 40 km/h (25 MPH) will overtake a fallen skier 61 m (200 ft.) in front of you in 5 seconds.

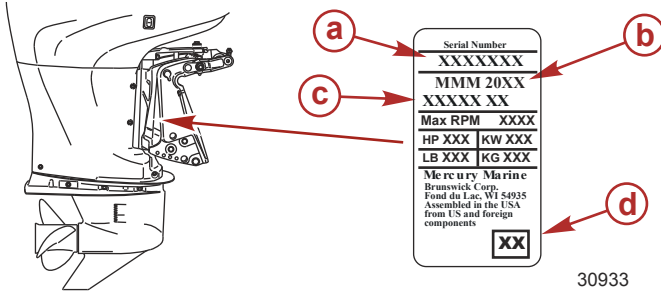
Watch fallen skiers. When using your boat for water skiing or similar activities, always keep a fallen or down skier on the operator's side of the boat while returning to assist the skier. The operator should always have the down skier in sight and never back up to the skier or anyone in the water.

Report accidents. Boat operators are required by law to file a Boating Accident Report with their state boating law enforcement agency when their boat is involved in certain boating accidents. A boating accident must be reported if 1) there is loss of life or probable loss of life, 2) there is personal injury requiring medical treatment beyond first aid, 3) there is damage to boats or other property where the damage value exceeds \$500.00 or 4) there is complete loss of the boat. Seek further assistance from local law enforcement.

GENERAL INFORMATION

Recording Serial Number

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



a - Serial number

b - Month and year of manufacture

c - Model designation

d - Year manufactured

60 FourStroke EFI Formula Race Engine Specifications

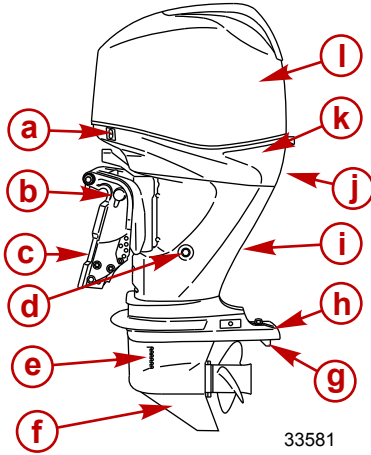
Model	60
Horsepower	60
Kilowatts	44.7
Full Throttle RPM Range	5500–6000 RPM
Number of Cylinders	4
Idle Speed in Forward Gear	Controlled by ECM
Piston Displacement	995 cc (61 cu. in.)
Cylinder Bore	65 mm (2.559 in.)
Stroke	75 mm (2.953 in.)
Valve Clearance (Cold)	
Intake Valve	0.15-0.25 mm (0.006-0.010 in.)
Exhaust Valve	0.25-0.35 mm (0.010-0.014 in.)
Recommended Spark Plug	Champion RA8HC
Spark Plug Gap	1.0 mm (0.040 in.)
Recommended Gasoline	Refer to Fuel and Oil

GENERAL INFORMATION

Model	60
Recommended Engine Oil	Mercury or Quicksilver NMMA FC-W certified synthetic blend 25W-40-4-Stroke Outboard Oil Refer to Fuel and Oil
Engine Oil Capacity	3.0 Liter (3 Quarts)
Recommended Gearcase Oil	High Performance Gear Lube
Gearcase Lubricant Capacity 87.3 mm (3-7/16 in.) Diameter Gearcase	340 ml (11.5 fl. oz.)
Gear Ratio	1.83:1
Battery Rating	
Operation Above 0 °C (32 °F)	465 Marine Cranking Amps (MCA) or 350 Cold Cranking Amps (CCA)
Operation Below 0 °C (32 °F)	1000 Marine Cranking Amps (MCA) or 750 Cold Cranking Amps (CCA)
Amp Hours (Ah)	70-100

GENERAL INFORMATION

Component Identification



33581

- a** - Auxiliary tilt switch
- b** - Tilt support knob
- c** - Transom brackets
- d** - Oil drain plug
- e** - Primary cooling water intake
- f** - Gearcase

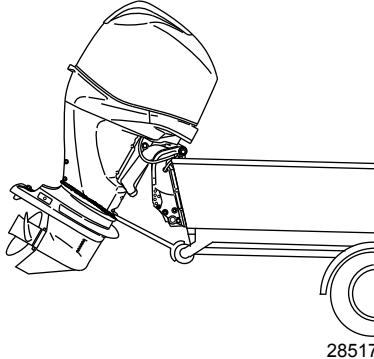
- g** - Trim tab
- h** - Anti-ventilation plate
- i** - Driveshaft housing
- j** - Water pump indicator hole
- k** - Bottom cowling
- l** - Top cowling

TRANSPORTING

Trailing Boat/Outboard

Trailer your boat with the outboard tilted down in a vertical operating position.

If additional ground clearance is required, the outboard should be tilted up using an accessory outboard support device. Refer to your local dealer for recommendations. Additional clearance may be required for railroad crossings, driveways and trailer bouncing.



28517

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

TRANSPORTING

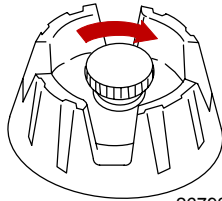
Transporting Portable Fuel Tanks

WARNING

Avoid serious injury or death from a gasoline fire or explosion. Follow the transporting instructions supplied with the portable fuel tank. Transport the fuel tank in a well ventilated area away from open flame or sparks.

MANUAL VENTING TYPE FUEL TANK

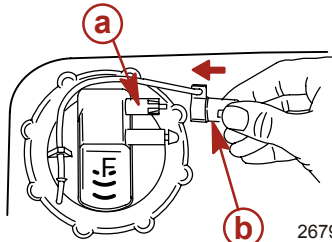
Close fuel tank air vent when transporting tank. This will prevent escape of fuel or vapors from tank.



26793

AUTO-VENTING TYPE FUEL TANK

1. Disconnect the remote fuel line from tank. This will close the air vent and prevent escape of fuel or vapors from tank.
2. Install tether cap over the fuel line connector stem. This will protect the connector stem from being accidentally pushed-in, thus, allowing fuel or vapor to escape.



26794

a - Connector stem

b - Tether cap

FUEL AND OIL

Fuel Recommendations

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

FUEL RATINGS

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

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

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

USING REFORMULATED (OXYGENATED) GASOLINES (USA ONLY)

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

These reformulated gasolines are acceptable for use in your Mercury Marine engine.

GASOLINES CONTAINING ALCOHOL

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

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

FUEL AND OIL

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

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

WARNING

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

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

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

FUEL AND OIL

Filling Fuel Tank

WARNING

Avoid serious injury or death from a gasoline fire or explosion. Use caution when filling fuel tanks. Always stop the engine and do not smoke or allow open flames or sparks in the area while filling fuel tanks.

Fill fuel tanks outdoors away from heat, sparks, and open flames.

Remove portable fuel tanks from boat to refill them.

Always stop engine before refilling tanks.

Do not completely fill the fuel tanks. Leave approximately 10% of the tank volume unfilled. Fuel will expand in volume as its temperature rises and can leak under pressure if the tank is completely filled.

PORTABLE FUEL TANK PLACEMENT IN THE BOAT

Place the fuel tank in the boat so the vent is higher than the fuel level under normal boat operating conditions.

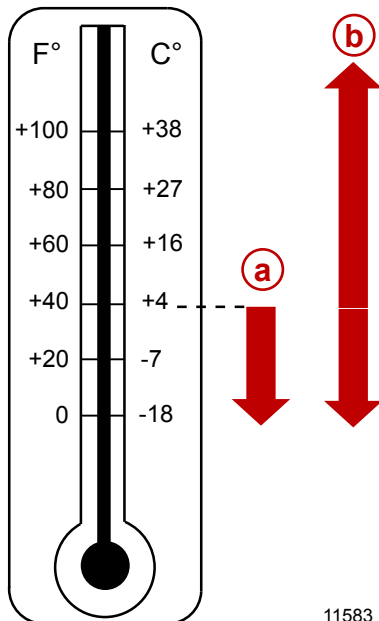
Engine Oil Recommendations

We recommend the use of Mercury or Quicksilver NMMA FC-W certified synthetic blend 25W-40 4-Stroke Outboard Oil for general, all-temperature use. If SAE 10W-30 oil is preferred, use Mercury or Quicksilver NMMA FC-W certified 10W-30 4-Stroke Outboard Oil. If the recommended Mercury or Quicksilver NMMA FC-W certified outboard oils are not available, a major brand of NMMA FC-W certified 4-stroke outboard oil of similar viscosity may be used.

When operating in temperatures above 4 °C (40° F), we encourage the use of NMMA FC-W certified synthetic blend 25W-40 4-Stroke Outboard Oil.

FUEL AND OIL

IMPORTANT: The use of non detergent oils, multi-viscosity oils (other than Mercury or Quicksilver NMMA FC-W certified oil or a major brand NMMA FC-W certified oil), synthetic oils, low quality or oils that contain solid additives are not recommended.



Recommended SAE Viscosity for Engine Oil

- a** - NMMA FC- W certified 10W-30 outboard oil may be used at temperatures below 4 °C (40 °F)
- b** - NMMA FC-W certified synthetic blend 25W-40 outboard oil may be used in all temperatures.

Checking and Adding Engine Oil

IMPORTANT: Do not overfill. Be sure that the outboard is upright (not tilted) when checking oil.

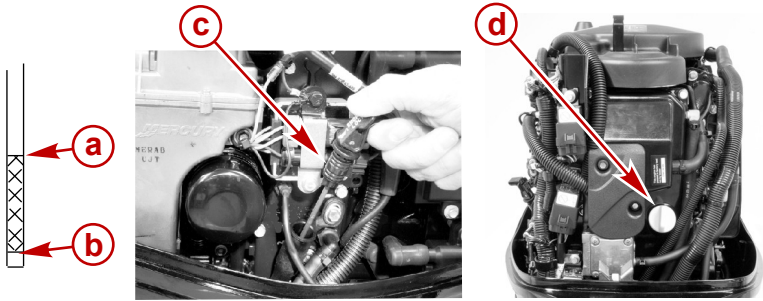
1. Turn the engine off. Have the outboard in a level operating position. Remove the top cowl.
2. Flip the handle up and pull out the dipstick. Wipe it with a clean rag or towel and push it back in all the way.

FUEL AND OIL

3. Pull the dipstick back out again and observe the oil level. If the oil level is low, remove the oil filler cap and fill to (but not over) the upper oil level with the recommended oil.

IMPORTANT: Inspect oil for signs of contamination. Oil contaminated with water will have a milky color to it; oil contaminated with fuel will have a strong fuel smell. If contaminated oil is noticed, have the engine checked by your dealer.

4. Push the dipstick back in all the way, then flip the handle down to lock the dipstick in place. Reinstall the oil filler cap and hand tighten securely.



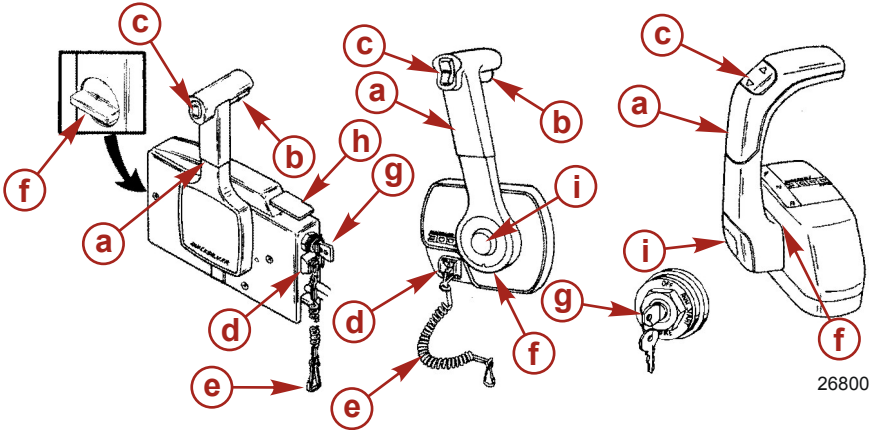
a - Full mark
b - Add mark

c - Dipstick
d - Oil filler cap

FEATURES AND CONTROLS

Remote Control Features

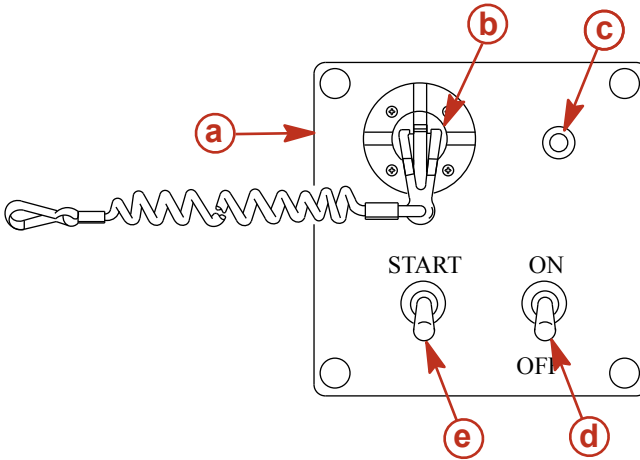
Your boat may be equipped with one of the Mercury Precision or Quicksilver remote controls shown. If not, consult your dealer for a description of the functions and operations of the remote control.



- a** - Control handle - forward, neutral, reverse
- b** - Neutral release lever
- c** - Lanyard stop switch - Refer to **General Information - Lanyard Stop Switch**
- d** - Trim/tilt switch (if equipped) - Refer to **Features and Controls - Power Trim and Tilt**
- e** - Lanyard - Refer to **General Information - Lanyard Stop Switch**
- f** - Throttle friction adjustment - Console controls require cover removal for adjustment
- g** - Ignition key switch - "OFF," "ON," "START"
- h** - Fast idle lever - Refer to **Operation - Starting the Engine**
- i** - Throttle only button - Refer to **Operation - Starting the Engine**

FEATURES AND CONTROLS

Warning Light and Guardian



rob7

- a** - Ignition module
- b** - Lanyard stop switch cap and stop switch
- c** - Ignition/warning light
- d** - Ignition switch
- e** - Start switch

When the ignition switch is toggled to the "ON" position, the warning light will turn on for a moment as a test to ensure it is working.

The Engine Guardian System monitors the critical sensors on the engine for any early indications of problems. The system will respond to a problem using the ignition/warning light and/or reducing engine power in order to provide engine protection. Refer to **Overspeed Rev Limit** for instructions on resetting the Engine Guardian System.

Light Mode	Problem	Guardian	Monitor Display
None	Warning Light Failure	No	Yes
Single Blink	Power Up/System Check	No	Yes

FEATURES AND CONTROLS

Light Mode	Problem	Guardian	Monitor Display
10 Blinks Every 4 Minutes	Air Compressor Temperature Sensor Failure	No	Yes
	Block Water Pressure Sensor Failure	Power Limit	Yes
	Head Temperature Sensor Failure	Power Limit	Yes
	Throttle Position Sensor Failure	Power Limit	Yes
4 Blinks Every 2 Minutes	Low Oil in Engine Oil Tank	No	No
	Water In Fuel	No	Yes
Continual Blinking	Direct Injector or Fuel Injector Failure	No	Yes
	Ignition Coil Failure	No	Yes
Single Continuous Blink (Warning Light Remains On)	Air Compressor Temperature Overheat	Power Limit	No
	Battery Voltage Out of Limits	No	Yes
	Critically Low Oil in Engine Oil Tank	Power Limit	Yes
	Engine Coolant Overheat	Power Limit	No
	High/Low Input Air Temperature	Power Limit	Yes
	Low Block Water Pressure	No	No
	MAP Sensor Failure	Power Limit	Yes
	Oil Pump Electrical Failure	No	Yes
	Overspeed	Power Limit	No

FEATURES AND CONTROLS

SMARTCRAFT PRODUCT

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

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

Refer to the **Mercury SmartCraft Operator's Supplement** provided with the power package for the warning functions monitored on your power package and basic operation of the SmartCraft Instrument package.

Overspeed Rev Limit

The PCM does not allow the engine to exceed the rev limit. Refer to **Specifications** to determine this engine's RPM limit.

Upon reaching the rev limit, the Engine Guardian System activates the ignition/warning light. If the operator does not reduce engine speed within five seconds, the Engine Guardian System reduces available engine power.

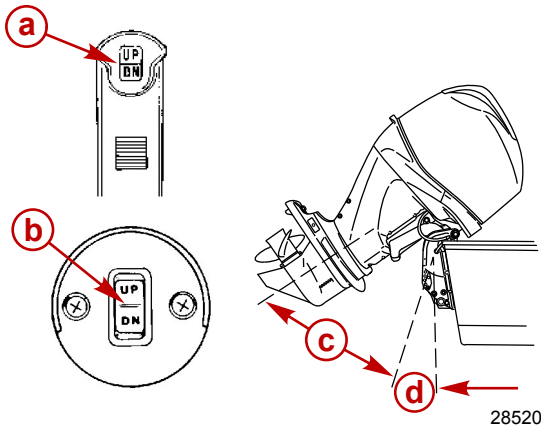
To reset the Engine Guardian System protection:

1. Completely reduce throttle for two to three seconds.
2. Re-engage the throttle. If the engine does not respond, repeat step one.

FEATURES AND CONTROLS

Power Trim and Tilt

Your 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 your boat on plane. The term tilt is generally used when referring to adjusting the outboard further up out of the water. With the engine turned off, the outboard can be tilted out of the water. At low idle speed, the outboard can also be tilted up past the trim range to permit, for example, shallow water operation.



- a** - Remote control trim switch
- b** - Panel mount trim switch
- c** - Tilt range of travel
- d** - Trim range of travel

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 your outboard all the way in or out. Along with an improvement in some performance aspects comes a greater responsibility for the operator, and this is being aware of some potential control hazards.

FEATURES AND CONTROLS

The most significant control hazard is a pull or torque that is felt on the steering wheel or tiller handle. This steering torque results from the outboard trimmed so that the propeller shaft is not parallel to the water surface.

WARNING

Trimming the outboard beyond a neutral steering condition may result in a pull on the steering wheel or tiller handle and loss of boat control. Maintain control of the boat if trimming beyond a neutral steering condition.

Consider the following lists carefully.

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
- Increase steering torque or pull to the right (with the normal right hand rotation propeller)
- 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 over-steering) if any turn is attempted, or if a significant wave is encountered.

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. Install the trim limit pin in a position that prevents excessive trim under and operate the boat in a safe manner.

- In rare circumstances, the owner may decide to limit the trim in. This is accomplished by repositioning the tilt stop pins into the desired adjustment holes in the transom brackets.

Trimming out or up can:

- Lift the bow higher out of the water

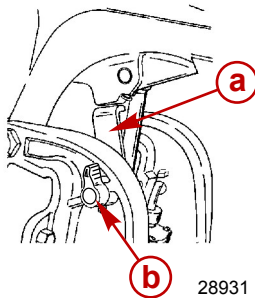
FEATURES AND CONTROLS

- Generally increase top speed
- Increase clearance over submerged objects or a shallow bottom
- Increase steering torque or pull to the left at a normal installation height (with the normal right hand rotation propeller)
- In excess can cause boat porpoising (bouncing) or propeller ventilation
- Cause engine overheating if any cooling water intake holes are above the water line

TILTING OPERATION

To tilt outboard, shut off the engine and press the trim/tilt switch or auxiliary tilt switch to the up position. The outboard will tilt up until the switch is released or it reaches its maximum tilt position.

1. Press the knob in and rotate it to engage the tilt support lever.
2. Lower outboard to rest on the tilt support lever.
3. To disengage the tilt support lever, raise the outboard off the support lever and rotate the lever down. Lower the outboard.



a - Tilt support lever

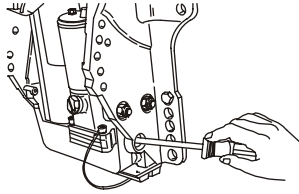
b - Knob

MANUAL TILTING

If the outboard cannot be tilted using the power trim/tilt switch, the outboard can be manually tilted.

FEATURES AND CONTROLS

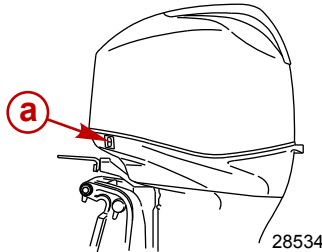
1. Turn out the manual tilt release valve three turns counterclockwise. This allows manual tilting of the outboard. Tilt the outboard to the desired position and tighten the manual tilt release valve.



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

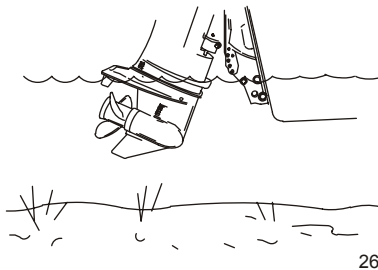
The auxiliary tilt switch can be used to tilt the outboard up or down using the power trim system.



a - Auxiliary tilt switch

SHALLOW WATER OPERATION

When operating the boat in shallow water, the outboard can be tilted beyond the maximum trim range to prevent hitting bottom.



FEATURES AND CONTROLS

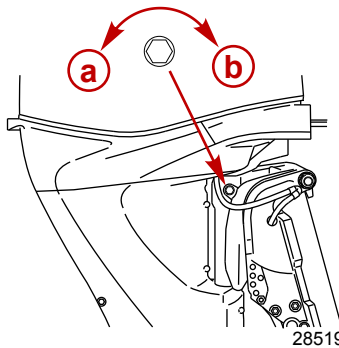
1. Reduce engine speed below 2000 RPM.
2. Tilt outboard up, keeping the water intake holes submerged at all times.
3. Operate the engine at slow speed only. If engine speed exceeds 2000 RPM, the outboard will automatically return down to the maximum trim range.

Steering Friction Adjustment

WARNING

Insufficient friction adjustment can cause serious injury or death due to loss of boat control. When setting the friction adjustment, maintain sufficient steering friction to prevent the outboard from steering into a full turn if the tiller handle or steering wheel is released.

Steering Friction Adjustment - Adjust this screw to achieve the desired steering friction (drag) on the steering wheel. Turn screw clockwise to tighten friction or turn counterclockwise to loosen friction.



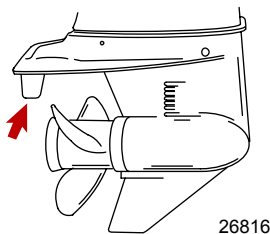
a - Loosen friction

b - Tighten friction

FEATURES AND CONTROLS

Trim Tab Adjustment

Propeller steering torque will cause your boat to pull in one direction. This steering torque is a normal result from your outboard not trimmed with the propeller shaft parallel to the water surface. The trim tab can help to compensate for this steering torque in many cases and can be adjusted within limits to reduce any unequal steering effort.



NOTE: *Trim tab adjustment will have little effect reducing steering torque if the outboard is installed with the anti-ventilation plate approximately 50 mm (2 in.) or more above the boat bottom.*

MODELS WITHOUT POWER TRIM

Operate your boat at normal cruising speed trimmed to desired position by installing the tilt pin in the desired tilt pin hole. Turn your boat left and right and note the direction the boat turns more easily.

If adjustment is necessary, loosen trim tab bolt and make small adjustments at a time. If the boat turns more easily to the left, move the trailing edge of trim tab to the left. If the boat turns more easily to the right move the trailing edge of trim tab to the right. Retighten bolt and retest.

MODELS WITH POWER TRIM

Operate your boat at normal cruising speed, trimmed to desired position. Turn your boat left and right and note the direction the boat turns more easily.

If adjustment is necessary, loosen trim tab bolt and make small adjustments at a time. If the boat turns more easily to the left, move the trailing edge of trim tab to the left. If the boat turns more easily to the right move the trailing edge of trim tab to the right. Retighten bolt and retest.

OPERATION

Pre-Starting 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 boats' 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

When using your outboard or having your outboard moored in freezing or near freezing temperatures, keep the outboard tilted down at all times so the gearcase is submerged. This prevents trapped water in gearcase from freezing and causing possible damage to the water pump and other components.

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 the water level inside the outboard driveshaft housing, it will block water flow to the engine causing possible damage.

Operating in Saltwater or Polluted Water

We recommend that you flush the internal water passages of your outboard 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**.

OPERATION

If you keep your boat 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 propeller and gearcase with fresh water after each use. Each month, spray Mercury Precision or Quicksilver Corrosion Guard on external metal surfaces. Do not spray on corrosion control anodes as this will reduce the effectiveness of the anodes.

Pre-Starting Instructions

1. Check the engine oil level.

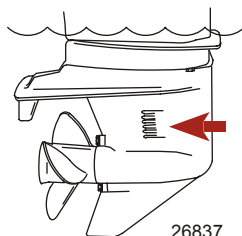


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2. Make sure the cooling water intake is submerged.

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.



26837

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.

OPERATION

1. For the first hour of operation, run the engine at varied throttle settings up to 3500 RPM or at approximately half throttle.
2. For the second hour of operation, run the engine at varied throttle settings up to 4500 RPM or at three-quarter throttle, and during this period of time, run it at full throttle for approximately one minute every ten minutes.
3. For the next eight hours of operation, avoid continuous operation at full throttle for more than five minutes at a time.

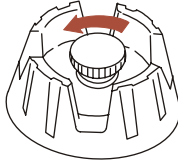
Starting the Engine

Before starting, read and perform the **Pre-Starting Check List**, special operating instructions, **Pre-Starting Instructions**, and the **Engine Break-In Procedure**.

NOTICE

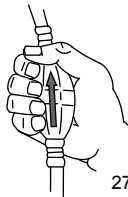
Without sufficient cooling water, the engine, the water pump, and other components will overheat and suffer damage. Provide a sufficient supply of water to the water inlets during operation.

1. Open fuel tank vent screw (in filler cap) on manual venting type fuel tanks.



19748

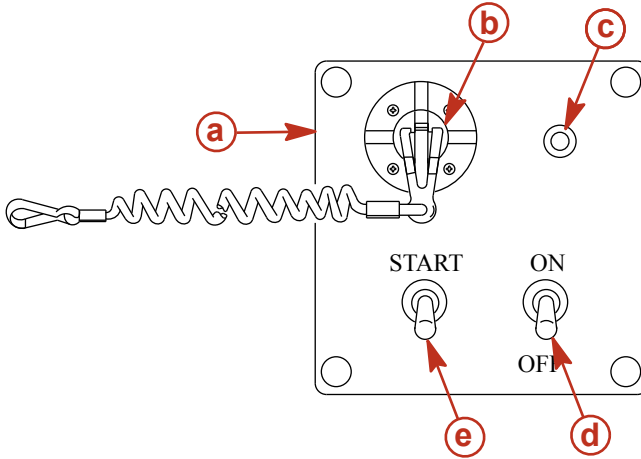
2. Position the fuel line primer bulb so the arrow on the side of the bulb is pointing up. Squeeze the fuel line primer bulb several times until it feels firm.



27348

OPERATION

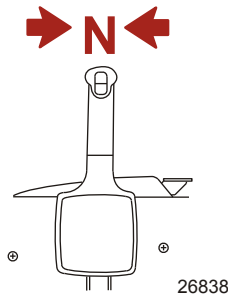
3. Install the lanyard stop switch cap onto the stop switch. See **General Information - Lanyard Stop Switch**.



rob7

- a** - Ignition module
- b** - Lanyard stop switch cap and stop switch
- c** - Ignition/warning light
- d** - Ignition switch
- e** - Start switch

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

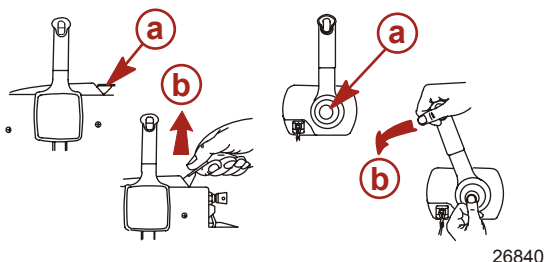


5. Toggle the ignition switch to "ON."

NOTE: The red ignition/warning light illuminates when the harness is energized and ready to start the engine, or if the engine goes into Guardian mode. Since this system does not include a warning horn, the red ignition/warning light acts as a visible warning system.

OPERATION

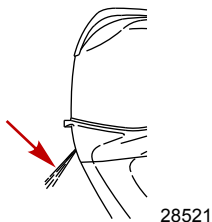
6. Move the throttle-only lever to the fully closed position or press the throttle-only button.



a - Fully closed position

b - Maximum fast idle speed position

7. **Starting a flooded engine** - Advance the throttle-only lever or control handle to the maximum throttle-only position and continue to crank the engine for starting. Immediately reduce engine speed after engine starts.
8. Toggle the start switch to "START." If the engine fails to start in ten seconds, release the start switch, wait 30 seconds and try again.
9. After the engine starts, check for a steady stream of water flowing out of the water pump indicator hole.



IMPORTANT: If no water is coming out of the water pump indicator hole, stop engine and check cooling water intake for obstruction. No obstruction may indicate a water pump failure or blockage in the cooling system. These conditions will cause the engine to overheat. Have the outboard checked by your dealer. Operating the engine while overheated will cause engine damage.

WARMING UP ENGINE

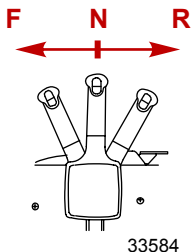
Before beginning operation, allow the engine to warm up at idling speed for three minutes.

OPERATION

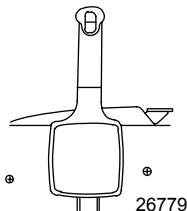
Gear Shifting

IMPORTANT: Observe the following:

- Never shift outboard into gear unless engine speed is at idle.
- Do not shift outboard into reverse when the engine is not running.
- Your outboard has three gear shift positions to provide operation: forward, neutral (out of gear), and reverse.



- When shifting, always stop at the neutral position and allow the engine speed to return to idle.

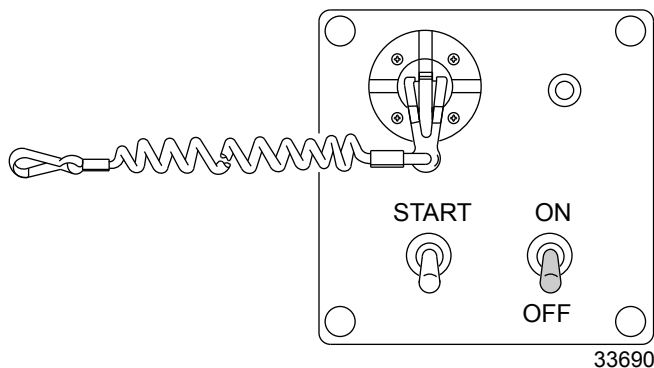


- Always shift the outboard into gear with a quick motion.
- After shifting the outboard into gear, advance the remote control lever to increase speed.

OPERATION

Stopping The Engine

1. Reduce engine speed and shift outboard to neutral position.
Toggle ignition switch to the "OFF" position.

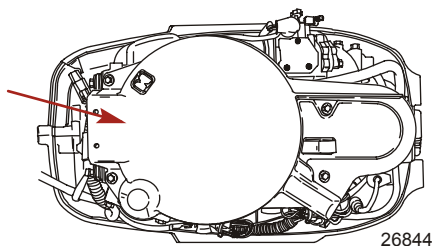


Emergency Starting

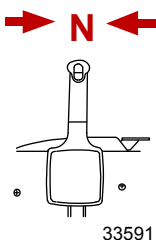
If the starter system fails, use the spare starter rope (provided) and follow procedure.

NOTE: EFI models - Engine must have a fully charged battery to start the engine.

1. Remove flywheel cover or manual starter assembly.



2. Shift outboard to neutral ("N") position.

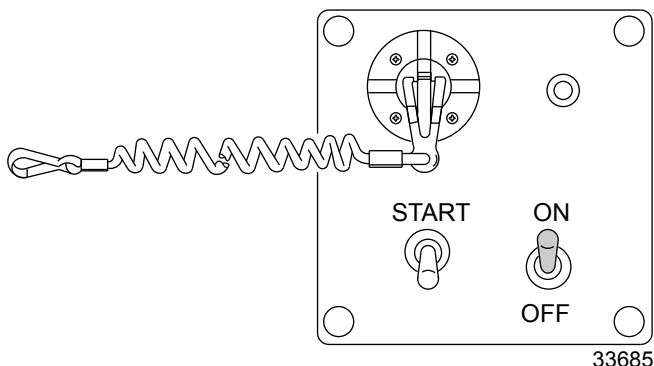


OPERATION

⚠ WARNING

The neutral-speed-protection device is inoperative when starting the engine with the emergency starter rope. Set the engine speed at idle and the gear shift in neutral to prevent the outboard from starting in gear.

3. Toggle the ignition switch to the "ON" position.



⚠ WARNING

High voltage is present any time the key is turned on, especially when starting or operating the engine. Do not touch ignition components or metal test probes and stay clear of spark plug leads when performing live tests.

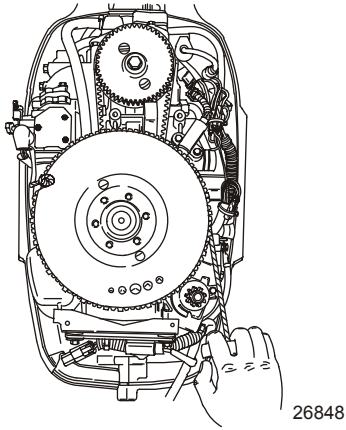
⚠ WARNING

The exposed moving flywheel can cause serious injury. Keep your hands, hair, clothing, tools, and other objects away from engine when starting or running the engine. Do not attempt to reinstall the flywheel cover or top cowl when engine is running.

4. Place the starter rope knot into the flywheel notch and wind the rope clockwise around the flywheel.

OPERATION

5. Pull the starter rope to start the engine.



MAINTENANCE

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.

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.**

MAINTENANCE

EMISSION CERTIFICATION LABEL

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

The image shows a rectangular label for a Mercury outboard motor. The label is divided into several sections. At the top left is the Mercury logo. To the right of the logo is the heading "EMISSION CONTROL INFORMATION". Below the logo and heading, there is text stating "THIS ENGINE CONFORMS TO [] CALIFORNIA AND U.S. EPA EMISSION REGULATIONS FOR SPARK IGNITION MARINE ENGINES" and "REFER TO OWNERS MANUAL FOR REQUIRED MAINTENANCE, SPECIFICATIONS, AND ADJUSTMENTS". The label contains several fields for engine specifications, each with a red circle and a letter pointing to it: 'a' points to the "IDLE SPEED (in gear):" field; 'b' points to the "hp" field; 'c' points to the "cc" field; 'd' points to the "TIMING (IN DEGREES):" field; 'e' points to the "COLD VALVE CLEARANCE (mm)" field; 'f' points to the "FAMILY:" field; 'g' points to the "FEL: g/kWh" field; 'h' points to the "TIMING (IN DEGREES):" field; and 'i' points to the "SPARK PLUG: GAP:" field. The label also includes fields for "INTAKE:" and "EXHAUST:". The number "21096" is printed in the bottom right corner of the label.

- a** - Idle speed
- b** - Engine horsepower
- c** - Piston displacement
- d** - Date of manufacture
- e** - Valve clearance (if applicable)
- f** - Family number
- g** - Maximum emission output for the engine family
- h** - Timing specification
- i** - Recommended spark plug and gap

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 emissions levels to exceed their predetermined factory specifications.

Inspection and Maintenance Schedule

BEFORE EACH USE

- Check engine oil level. See **Fuel and Oil - Checking and Adding Engine Oil**.
- Check that lanyard stop switch stops the engine.
- Visually inspect the fuel system for deterioration or leaks.
- Check outboard for tightness on transom.
- Check steering system for binding or loose components.

MAINTENANCE

- Check steering arm and cable fasteners for proper tightness. See **Steering Arm Installation**.
- Check propeller blades for damage.

AFTER EACH USE

- Flush out the outboard cooling system if operating in salt or polluted water. See **Flushing the Cooling System**.
- Wash off all salt deposits and flush out the exhaust outlet of the propeller and gearcase with fresh water if operating in salt water.

EVERY 100 HOURS OF USE OR ONCE YEARLY, WHICHEVER OCCURS FIRST

- Lubricate all lubrication points. Lubricate more frequently when used in salt water. See **Lubrication Points**.
- Change engine oil and replace the oil filter. The oil should be changed more often when the engine is operated under adverse conditions such as extended full throttle operation. See **Changing Engine Oil**.
- Inspect thermostat visually for corrosion and broken spring. Make sure thermostat closes completely at room temperature.¹
- Check engine fuel filter for contaminants. See **Fuel System**.
- Check engine timing setup.¹
- Check corrosion control anodes. Check more frequently when used in salt water. See **Corrosion Control Anodes**.
- Drain and replace gearcase lubricant. See **Gearcase Lubrication**.
- Lubricate splines on the driveshaft.¹
- Check power trim fluid. See **Checking Power Trim Fluid**.
- Inspect battery. See **Battery Inspection**.
- Check control cable adjustments.¹
- Inspect timing belt. See **Timing Belt Inspection**.
- Check tightness of bolts, nuts, and other fasteners.

1. These items should be serviced by an authorized dealer.

MAINTENANCE

EVERY 300 HOURS OF USE OR THREE YEARS

- Replace spark plugs at first 300 hours or third year. After that, inspect spark plugs every 300 hours or three years. Replace spark plugs as needed. See **Spark Plug Inspection and Replacement**.
- Replace water pump impeller (more often if overheating occurs or reduced water pressure is noted).¹.
- Check and adjust valve clearance, if necessary.¹.

BEFORE PERIODS OF STORAGE

- Refer to Storage procedure. See **Storage** section.

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.

IMPORTANT: The engine must be run during flushing in order to open the thermostat and circulate water through the water passages.

WARNING

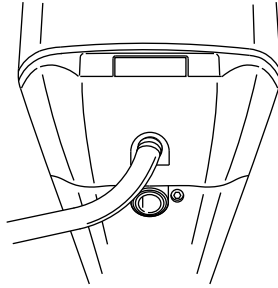
Rotating propellers can cause serious injury or death. Never operate the boat out of the water with a propeller installed. Before installing or removing a propeller, place the drive unit in neutral and engage the lanyard stop switch to prevent the engine from starting. Place a block of wood between the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

1. Place the outboard in either the operating position (vertical) or in a tilted position.
2. Remove the propeller. Refer to **Propeller Replacement**.
3. Thread a water hose into the rear fitting. Partially open the water tap (1/2 maximum). Do not open the water tap all the way as this allows a high pressure flow of water.

IMPORTANT: Do not run engine above idle when flushing.

MAINTENANCE

4. Shift the outboard into neutral. Start the engine and flush the cooling system for at least five minutes. Keep the engine speed at idle.
5. Stop the engine. Turn off the water and remove the hose. Reinstall the propeller.



28518

Top Cowl Removal and Installation

REMOVAL

1. Pull out the rear lock lever and remove the top cowl.



28439

INSTALLATION

1. Lower the top cowl over the engine.

MAINTENANCE

2. Bring the front of the cowl down first and engage the front hook. Lower the cowl into its seated position and apply downward pressure to the back of the cowl to lock it in place. Gently pull up on the back of cowl to make sure it is securely fastened.



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Exterior Care

Your outboard is protected with a durable baked enamel finish. Clean and wax often using marine cleaners and waxes.

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. Add water, as necessary, to keep the battery full.
3. Make sure the battery is secure against movement.
4. Battery cable terminals should be clean, tight, and correctly installed. Positive to positive and negative to negative.
5. Make sure the battery is equipped with a non-conductive shield to prevent accidental shorting of battery terminals.

MAINTENANCE

Fuel System

WARNING

Fuel is flammable and explosive. Ensure 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.

Before servicing any part of the fuel system, stop engine and disconnect the battery. Drain the fuel system completely. Use an approved container to collect and store fuel. Wipe up any spillage immediately. Material used to contain spillage must be disposed of in an approved receptacle. Any fuel system service must be performed in a well-ventilated area. Inspect any completed service work for sign of fuel leakage.

FUEL LINE INSPECTION

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

ENGINE FUEL FILTER

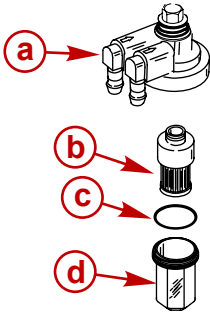
Check the fuel filter for water accumulation or sediment. If water is in the fuel, remove the sight bowl and drain the water. If the filter appears to be contaminated, remove and replace.

REMOVAL

1. Read the preceding fuel system servicing information and warning.
2. Pull out the filter assembly from mount. Hold onto the cover to prevent it from turning and remove the sight bowl. Empty contents into an approved container.

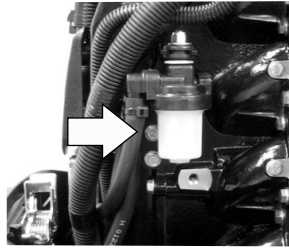
MAINTENANCE

3. Inspect the filter element. If replacement is necessary, replace the filter assembly.



a - Cover

b - Filter element



28414

c - O-ring seal

d - Sight bowl

INSTALLATION

IMPORTANT: Visually inspect for fuel leakage from the filter by squeezing the primer bulb until firm, forcing fuel into the filter.

1. Push the filter element into the cover.
2. Place the O-ring seal into its proper position on the sight bowl and screw the sight bowl hand-tight into the cover.
3. Push the filter assembly back into the mount.

Corrosion Control Anode

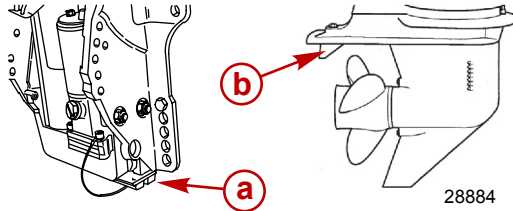
Your outboard has corrosion control anodes at different locations. An anode helps protect the outboard against galvanic corrosion by sacrificing its metal to be slowly corroded instead of the outboard metals.

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

MAINTENANCE

ANODE LOCATION - MODELS WITH 87.3 MM (3-7/16 IN.) GEARCASES

One of the anodes is the trim tab installed on the gearcase. Another anode is installed on the bottom of the transom bracket assembly.



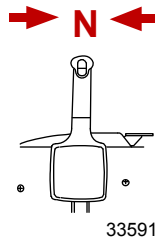
- a** - Anode on the transom bracket assembly
- b** - Trim tab

Propeller Replacement - 87.3 mm (3 - 7/16 in.) Diameter Gearcase

WARNING

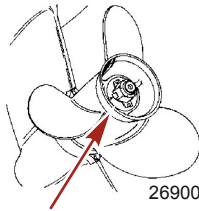
Rotating propellers can cause serious injury or death. Never operate the boat out of the water with a propeller installed. Before installing or removing a propeller, place the drive unit in neutral and engage the lanyard stop switch to prevent the engine from starting. Place a block of wood between the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

1. Shift the outboard to the neutral ("N") position and engage the lanyard stop switch.

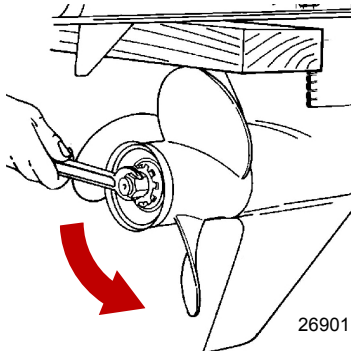


MAINTENANCE

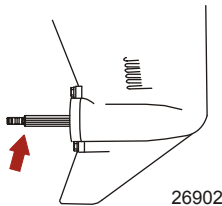
2. Straighten the bent tabs on the propeller nut retainer.




3. Place a block of wood between the gearcase and propeller to keep the propeller from turning. Remove the propeller nut.
4. Pull the propeller straight off the shaft. If the propeller is seized to the shaft and cannot be removed, have the propeller removed by an authorized dealer.




5. Coat the propeller shaft with Quicksilver or Mercury Precision Lubricants Anti-Corrosion Grease or 2-4-C Marine Lubricant with Teflon.



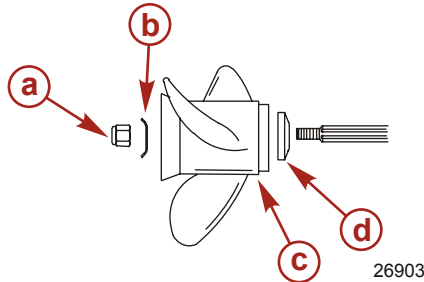
Tube Ref No.	Description	Where Used	Part No.
 94	Anti-Corrosion Grease	Propeller shaft	92-802867Q 1

MAINTENANCE

Tube Ref No.	Description	Where Used	Part No.
 95	2-4-C Marine Lubricant with Teflon	Propeller shaft	92-802859A 1

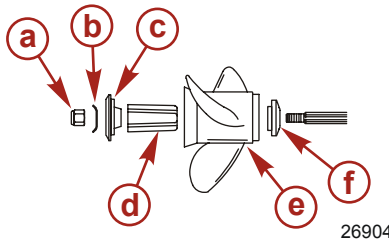
IMPORTANT: To prevent the propeller hub from corroding and seizing to the propeller shaft (especially in salt water), always apply a coat of the recommended lubricant to the entire propeller shaft at the recommended maintenance intervals, and each time the propeller is removed.

- Flo-Torq I Drive Hub Propellers - Install the forward thrust hub, propeller, propeller nut retainer, and propeller nut onto the shaft.



- a** - Propeller nut
- b** - Propeller nut retainer
- c** - Propeller
- d** - Forward thrust hub

- Flo-Torq II Drive Hub Propellers - Install the forward thrust hub, propeller, replaceable drive sleeve, rear thrust hub, propeller nut retainer, and propeller nut onto the shaft.



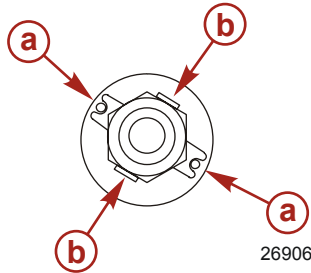
- a** - Propeller nut
- b** - Propeller nut retainer
- c** - Rear thrust hub
- d** - Replaceable drive sleeve
- e** - Propeller
- f** - Forward thrust hub

MAINTENANCE

- Place the propeller nut retainer over the pins. Place a block of wood between the gearcase and the propeller and tighten the propeller nut to the specified torque.

Description	Nm	lb. in.	lb. ft.
Propeller nut	75		55

- Align the flat sides of the propeller nut with the tabs on the propeller nut retainer. Secure the propeller nut by bending the tabs up and against the flats on the propeller nut.



a - Pins

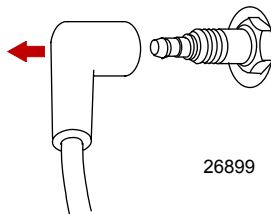
b - Tabs

Spark Plug Inspection and Replacement

⚠ WARNING

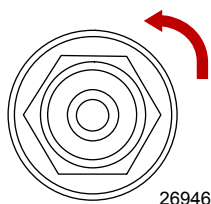
Damaged spark plug boots may emit sparks which can ignite fuel vapors under the engine cowl, resulting in serious injury or death from a fire or explosion. To avoid damaging the spark plug boots, do not use any sharp object or metal tool to remove the spark plug boots.

- Remove the spark plug boots. Twist the rubber boots slightly and pull off.

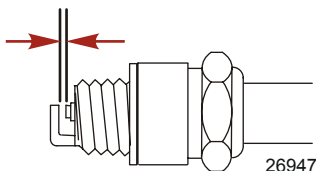


MAINTENANCE

- Remove the spark plugs to inspect. Replace spark plug if electrode is worn or the insulator is rough, cracked, broken, blistered, or fouled.



- Set the spark plug gap to specification.



Spark Plug	
Spark plug gap	1.0 mm (0.040 in.)

- Before installing spark plugs, clean off any dirt on the spark plug seats. Install plugs finger-tight, and then tighten 1/4 turn or torque to specifications.

Description	Nm	lb. in.	lb. ft.
Spark plug	27		20

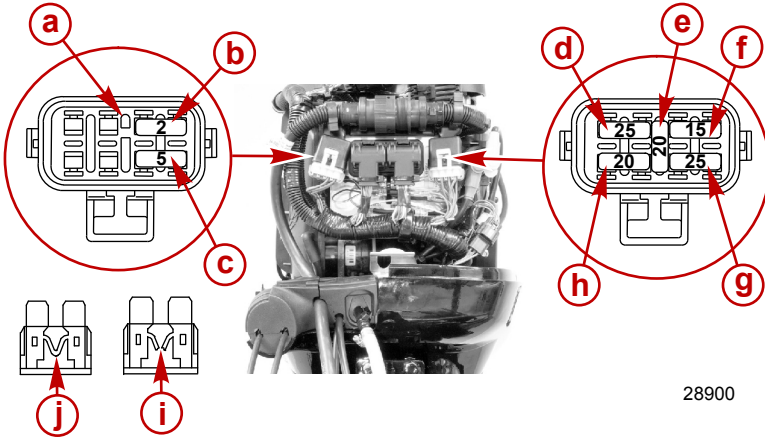
Fuse Replacement

IMPORTANT: Always carry spare 20 amp fuses.

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

MAINTENANCE

Open the fuse holder and look at the silver colored band inside the fuse. If band is broken, replace the fuse. Replace fuse with a new fuse with the same rating.



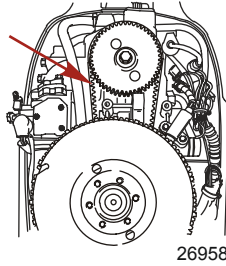
- a** - Spare fuse slot
- b** - Diagnostic circuit 4 pin connector - 2 amp fuse
- c** - SmartCraft data bus circuit - 5 amp fuse
- d** - Main circuit - 25 amp fuse
- e** - Spare 20 amp fuse
- f** - Main relay/accessories - 15 amp fuse
- g** - Ignition coil circuit - 25 amp fuse
- h** - Fuel pump/idle air control/fuel injector circuits - 20 amp fuse
- i** - Blown fuse
- j** - Good fuse

Timing Belt Inspection

1. Inspect the timing belt and have it replaced by an authorized dealer if any of the following conditions are found.
 - a. Cracks in the back of the belt or in the base of the belt teeth.
 - b. Excessive wear at the roots of the cogs.
 - c. Rubber portion swollen by oil.
 - d. Belt surfaces roughened.



MAINTENANCE

e. Signs of wear on edges or outer surfaces of belt.





Lubrication Points

1. Lubricate the following with Quicksilver or Mercury Precision Lubricants Anti-Corrosion Grease or 2-4-C with Teflon.

Tube Ref No.	Description	Where Used	Part No.
 94	Anti-Corrosion Grease	Propeller shaft	92-802867Q 1
 95	2-4-C with Teflon	Propeller shaft	92-802859A 1

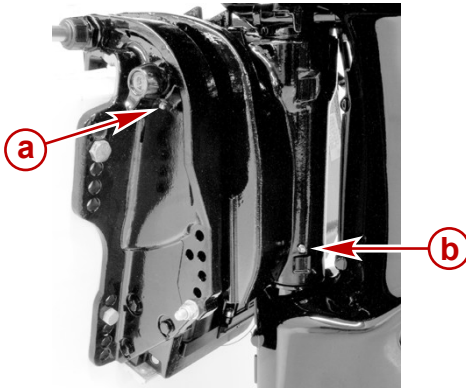
2. Lubricate the following with Quicksilver or Mercury Precision Lubricants 2-4-C with Teflon or Special Lubricant 101.

Tube Ref No.	Description	Where Used	Part No.
 95	2-4-C with Teflon	Tilt support lever, swivel bracket, tilt tube	92-802859A 1
 34	Special Lubricant 101	Tilt support lever, swivel bracket, tilt tube, co-pilot shaft	92-802865Q0 2

- Tilt support lever - Lubricate through fitting.

MAINTENANCE

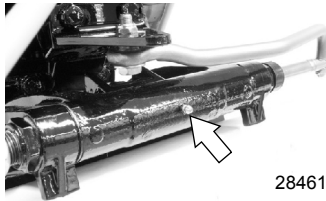
- Swivel bracket - Lubricate through fitting.



28466

- a** - Tilt support lever
- b** - Swivel bracket

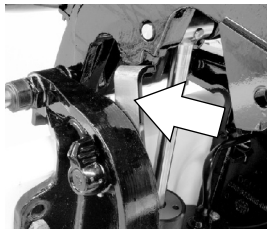
- Tilt tube - Lubricate through fitting.



28461

Checking Power Trim Fluid

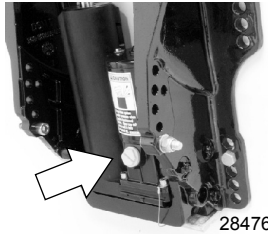
1. Tilt the outboard to the full up position and engage the tilt support lock.




28474

MAINTENANCE

- Remove the fill cap and check the fluid level. The fluid level should be even with the bottom of the fill hole. Add Quicksilver or Mercury Precision Lubricants Power Trim & Steering Fluid. If not available, use automotive (ATF) automatic transmission fluid.



Tube Ref No.	Description	Where Used	Part No.
 114	Power Trim and Steering Fluid	Power trim reservoir	92-858074K0 1

Changing Engine Oil

ENGINE OIL CAPACITY

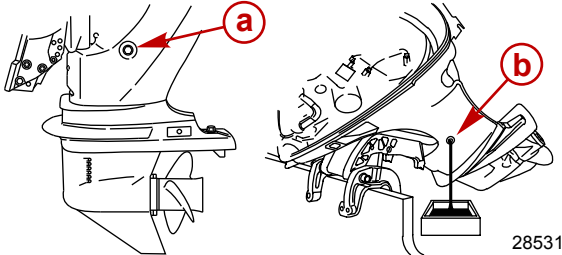
	Capacity	Fluid Type
Engine oil	3.0 Liter (3 U.S. Quarts)	Mercury Precision Parts or Quicksilver Synthetic Blend 25W-40 4-Stroke Outboard Oil
		Mercury Precision Parts or Quicksilver 10W-30 4-Stroke Outboard Oil

OIL CHANGING PROCEDURE

- Tilt the outboard up to the trailer position.

MAINTENANCE

2. Turn the outboard so the drain hole is facing downward. Remove the drain plug and drain the engine oil into an appropriate container. Lubricate the seal on the drain plug with oil and reinstall.

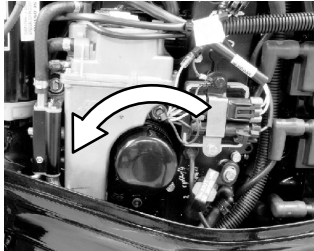


a - Drain plug

b - Drain hole

CHANGING OIL FILTER

1. Place a rag or towel below the oil filter to absorb any spilled oil.
2. Unscrew the old filter by turning the filter to the left.
3. Clean the mounting base. Apply a film of clean oil to the filter gasket. Do not use grease. Screw the new filter on until the gasket contacts the base, then tighten $3/4$ to 1 turn.



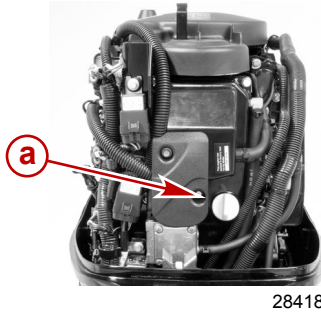
28417

OIL FILLING

1. Remove the oil fill cap and add oil to the proper operating level.

MAINTENANCE

2. Idle the engine for five minutes and check for leaks. Stop the engine and check the oil level on the dipstick. Add oil if necessary.



a - Oil fill cap

Gearcase Lubrication - For 87.3 mm (3-7/16 in.) Diameter Gearcase

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.

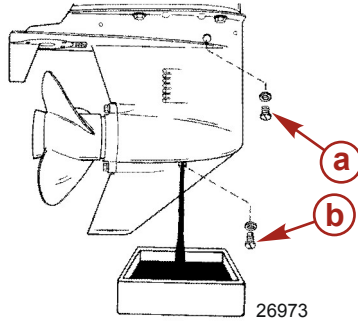
Examine the drained gearcase lubricant for metal particles. A small amount of fine metal particles indicates normal gear wear. An excessive amount of metal filings or larger particles (chips) may indicate abnormal gear wear and should be checked by an authorized dealer.

DRAINING GEARCASE

1. Place outboard in a vertical operating position.
2. Place a drain pan below outboard.

MAINTENANCE

3. Remove vent plug and fill/drain plug and drain lubricant.



a - Vent plug

b - Fill/drain plug

GEARCASE LUBRICANT CAPACITY

Gearcase lubricant capacity is approximately 340 ml (11.5 fl. oz.).

CHECKING GEARCASE LUBRICANT LEVEL AND REFILLING GEARCASE

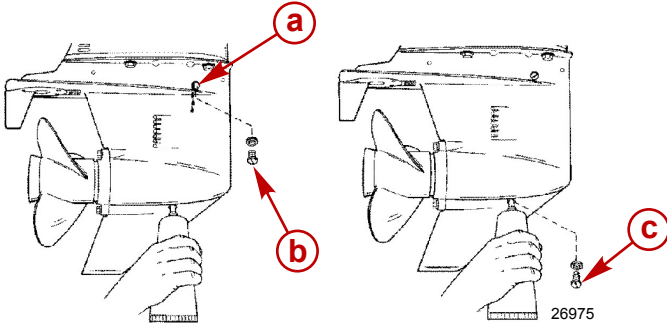
1. Place outboard in a vertical operating position.
2. Remove vent plug.
3. Place lubricant tube into the fill hole and add lubricant until it appears at the vent hole.

IMPORTANT: Replace sealing washers if damaged.

4. Stop adding lubricant. Install the vent plug and sealing washer before removing the lubricant tube.

MAINTENANCE

5. Remove lubricant tube and reinstall cleaned fill/drain plug and sealing washer.



- a** - Vent hole
b - Vent plug

- c** - Fill/drain plug

Submerged Outboard

A submerged outboard will require service within a few hours by an authorized dealer once the outboard is recovered from the water. This immediate attention by a servicing dealer is necessary once the engine is exposed to the atmosphere to minimize internal corrosion damage to the engine.

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 (two months 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.


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

- **Portable Fuel Tank** - Pour the required amount of gasoline stabilizer (follow instructions on container) into fuel tank. Tip fuel tank back and forth to mix stabilizer with the fuel.
- **Permanently Installed Fuel Tank** - Pour the required amount of gasoline stabilizer (follow instructions on container) into a separate container and mix with approximately one quart (one liter) of gasoline. Pour this mixture into fuel tank.
- Remove the fuel filter sight bowl and empty contents in a suitable container. Refer to **Maintenance - Fuel System** for removal and installation of filter. Add 3 cc (1/2 tsp.) of gasoline stabilizer into the fuel filter sight bowl and reinstall.
- Place the outboard in water or connect flushing attachment for circulating cooling water. Run the engine for 15 minutes to fill the engine fuel system.

STORAGE

Protecting External Outboard Components

- Lubricate all outboard components listed in **Maintenance - Inspection and Maintenance Schedule**.
- 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).

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

Protecting Internal Engine Components

- Remove the spark plugs and add approximately 30 ml (1 oz.) of engine oil or inject a five second spray of storage seal into each spark plug hole.
- Rotate the flywheel manually several times to distribute the oil in the cylinders. Reinstall spark plugs.
- Change the engine oil.

Gearcase

- Drain and refill the gearcase lubricant (refer to **Maintenance - Gearcase Lubrication**).

Positioning Outboard for Storage

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

STORAGE

- Remove the battery from the boat and check water level. Recharge if necessary.
- Store the battery in a cool, dry place.
- Periodically check the water level and recharge the battery during storage.

TROUBLESHOOTING

Starter Motor Will Not Crank The Engine (Electric Start Models)

POSSIBLE CAUSES

- Blown fuse in the starting circuit. Refer to **Maintenance** section.
- Outboard is not shifted to neutral position.
- Weak battery or battery connections are loose or corroded.
- Ignition key switch failure.
- Wiring or electrical connection faulty.
- Starter motor or starter solenoid failure.

Engine Will Not Start

POSSIBLE CAUSES

- Lanyard stop switch cap installed on stop switch.
- Incorrect starting procedure. Refer to **Operation** section.
- Old or contaminated gasoline.
- Engine flooded. Refer to **Operation** section.
- Fuel is not reaching the engine.
 - a. Fuel tank is empty.
 - b. Fuel tank vent not open or restricted.
 - c. Fuel line is disconnected or kinked.
 - d. Primer bulb not squeezed.
 - e. Primer bulb check valve is faulty.
 - f. Fuel filter is obstructed. Refer to **Maintenance** section.
 - g. Fuel pump failure.
 - h. Fuel tank filter obstructed.
- Blown fuse. Refer to **Maintenance** section.
- Ignition system component failure.
- Spark plugs fouled or defective. Refer to **Maintenance** section.

TROUBLESHOOTING

Engine Runs Erratically

POSSIBLE CAUSES

- Guardian System activated. Refer to **Features & Controls - Warning System**.
- 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 pump failure.
- Ignition system component failure.
- Fuel injection component failure (EFI Models).

Performance Loss

POSSIBLE CAUSES

- Engine Guardian System activated. Refer to **Features & Controls - Warning System**.
- Throttle not fully open.
- Damaged or improper size propeller.
- Incorrect engine timing, adjustments, or setup.
- Boat overloaded or load improperly distributed.
- Excessive water in bilge.
- Boat bottom is dirty or damaged.

Battery Will Not Hold Charge

POSSIBLE CAUSES

- Battery connections are loose or corroded.
- Low electrolyte level in battery.
- Worn out or inefficient battery.

TROUBLESHOOTING

- Excessive use of electrical accessories.
- Defective rectifier, alternator, or voltage regulator.

OWNER SERVICE ASSISTANCE

Local Repair Service

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

Service Away from Home

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

Parts and Accessories Inquiries

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

Service Assistance

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

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

The following information will be needed by the service office:

- Your name and address
- Daytime telephone number

OWNER SERVICE ASSISTANCE

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

Mercury Marine Service Offices

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

United States		
Telephone	Fax	Mercury Marine W6250 W. Pioneer Road P.O. Box 1939 Fond du Lac, WI 54936-1939
(920) 929-5040	(920) 929-5893	
United States (Mercury Racing)		
Telephone	Fax	Mercury Racing N7480 County Rd. UU Fond du Lac, WI 54935-9585
(920) 924-2088	(920) 924-2096	
Canada		
Telephone	Fax	Mercury Marine Ltd. 2395 Meadowpine Blvd. Mississauga, Ontario L5N 7W6 Canada
(905) 567-6372	(905) 567-8515	
Australia, Pacific		
Telephone	Fax	Mercury Marine Australia 132-140 Frankston Road Dandenong, Victoria 3164 Australia
(61) (3) 9791-5822	(61) (3) 9793-5880	

OWNER SERVICE ASSISTANCE

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

OUTBOARD INSTALLATION

Installation Information

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. If in doubt, contact your dealer or the boat manufacturer.

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

26777

START IN GEAR PROTECTION

WARNING

Starting the engine with the drive in gear can cause serious injury or death. Never operate a boat that does not have a neutral-safety-protection device.

The remote control connected to the outboard must be equipped with a start in neutral only protection device. This prevents the engine from starting in gear.

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.

OUTBOARD INSTALLATION

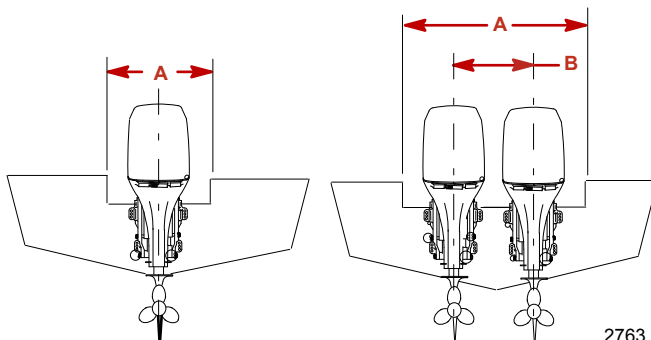
IMPORTANT: Check with your dealer before installing accessories. The misuse of approved accessories or the use of non-approved accessories can damage the product.

Some accessories not manufactured or sold by Mercury Marine are not designed to be safely used with your outboard or outboard operating system. Acquire and read the installation, operation, and maintenance manuals for all your selected accessories.

ELECTRIC FUEL PUMP

If an electric fuel pump is used, the fuel pressure must not exceed 27.58 kPa (4 psi) at the engine. If necessary, install a pressure regulator to regulate the pressure.

INSTALLATION SPECIFICATIONS



a - Minimum transom opening

b - Engine centerline for dual engines

Minimum Transom Opening	
Single engine (remote)	48.3 cm (19 in.)
Single engine (tiller)	76.2 cm (30 in.)
Dual engines	101.6 cm (40 in.)

Engine Centerline	
Minimum	66 cm (26 in.)

OUTBOARD INSTALLATION

LIFTING OUTBOARD

Use the lifting eye on the engine.



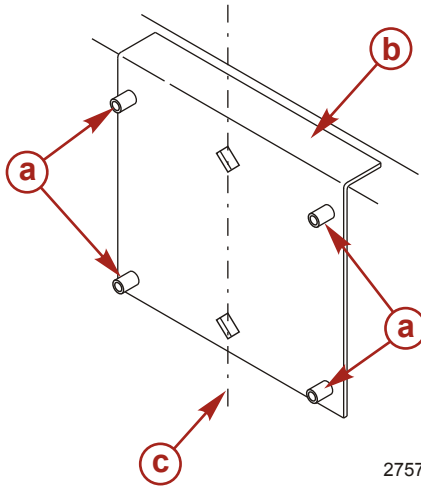
28510

OUTBOARD INSTALLATION

Installing Outboard

DRILLING OUTBOARD MOUNTING HOLES

1. Mark four mounting holes on the transom using the transom drill fixture.



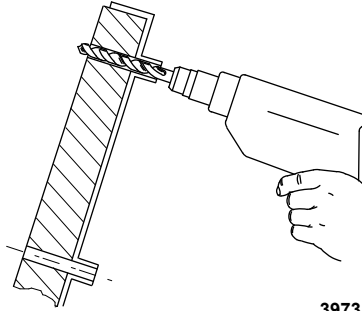
2757

- a** - Drill guide holes
- b** - Transom drilling fixture
- c** - Transom center line

Transom Drilling Fixture	91-98234A2
<p>5489</p>	Aids in engine installation by acting as a template for engine mounting holes.

OUTBOARD INSTALLATION

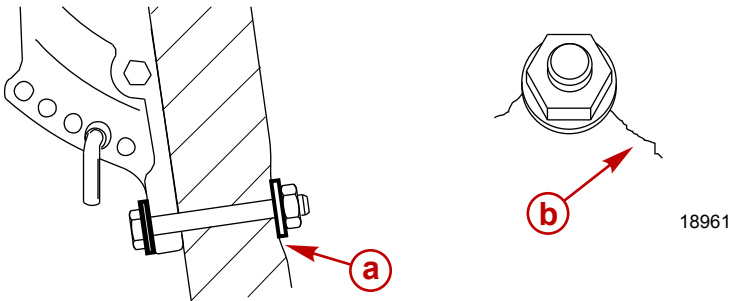
2. Drill four 13.5 mm (17/32 in.) mounting holes.



3973

CHECKING BOAT TRANSOM CONSTRUCTION

IMPORTANT: Determine the strength of the boat transom. The outboard mounting locknuts and bolts should be able to hold 75 Nm (55 lb. ft.) of torque without the boat transom yielding or cracking. If the boat transom yields or cracks under this torque, the construction of the transom may not be adequate. The boat transom must be strengthened or the load carrying area increased.



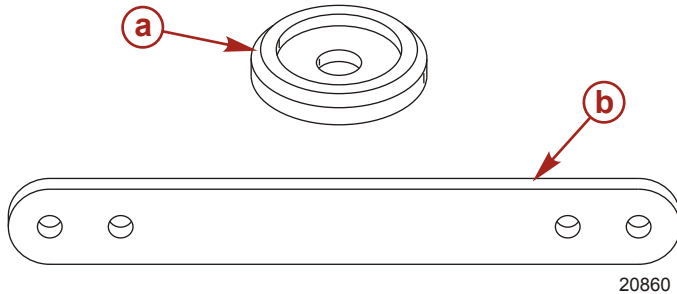
18961

- a** - Transom yielding under bolt torque
- b** - Transom cracking under bolt torque

When first determining transom strength, use a dial torque wrench. If the bolt or nut continues to turn without the torque reading on the dial increasing, it is an indication that the transom is yielding. The load area can be increased by using a larger washer or a transom reinforcement plate.

OUTBOARD INSTALLATION

NOTE: The inside holes on the transom reinforcement plate are for the lower transom bolts and the outside holes are for the upper transom bolts.



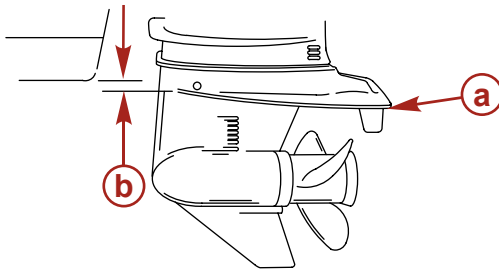
- a** - Large transom washer
- b** - Transom reinforcement plate

20860

Description	Part Number
Large transom washer	67-896392
Transom reinforcement plate	67-896305

FASTENING THE OUTBOARD TO THE TRANSOM

1. Install the outboard so that the anti-ventilation plate is in-line or within 25 mm (1 in.) below the bottom of the boat.



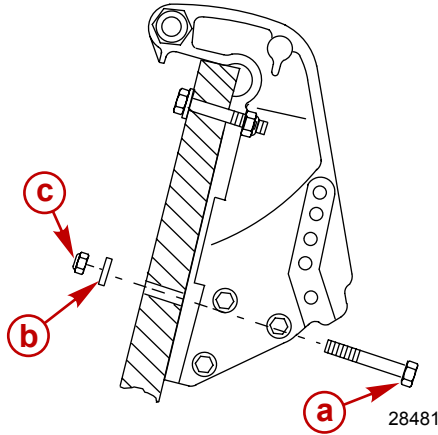
- a** - Anti-ventilation plate
- b** - 25 mm (1 in.)

8045

2. Apply marine sealer to the shanks of bolts, not the threads.
3. Fasten the outboard with the provided mounting hardware. Tighten the locknuts to the specified torque.

OUTBOARD INSTALLATION

NOTE: For a more accurate torque, turn/tighten the mounting locknuts rather than turning the mounting bolts.



- a** - 1/2 in. diameter bolt (4)
- b** - Flat washer (4)
- c** - Locknut (4)

Description	Nm	lb. in.	lb. ft.
Outboard mounting locknuts and bolts	75		55

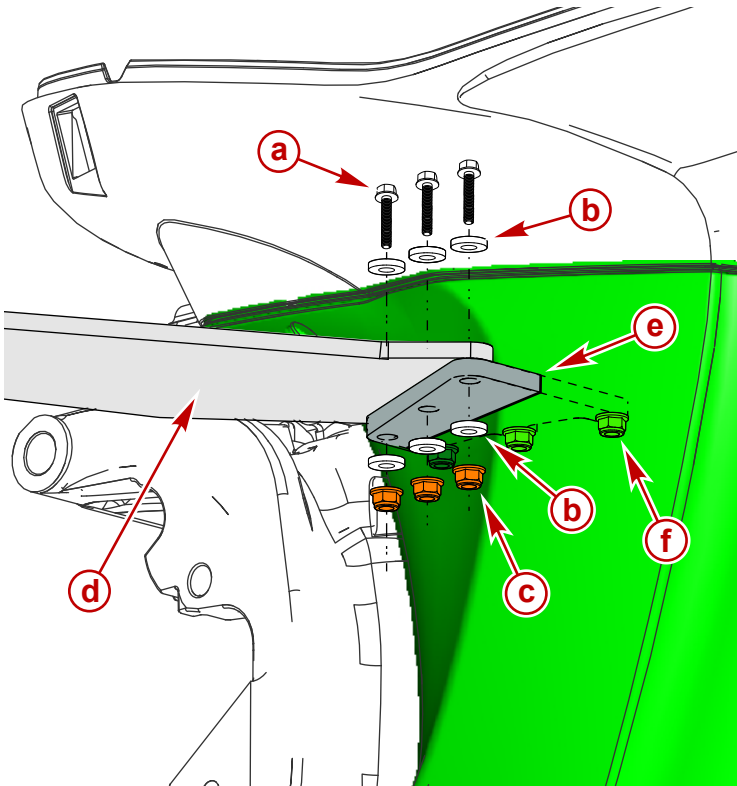
Steering Arm Installation

IMPORTANT: Fasten the steering arms using the provided hardware. The locknuts must never be replaced with common nuts (non-locking) as they will work loose and vibrate off, freeing the steering arms.

OUTBOARD INSTALLATION

⚠ WARNING

Damaged or loose steering components can lead to loss of steering control, which can cause serious injury or death. Properly secure all steering components to prevent them from becoming loose or disengaged. All steering hardware and fastening components must be appropriate for the application.



Port Side Shown

- a** - Flanged hexhead bolt (6) (10-824459-40)
- b** - Hardened flat washer (12) (12-847541)
- c** - Nylon insert locknut (6) (11-826365)
- d** - Steering arm
- e** - Steering adapter plate
- f** - Nylon insert locknut (factory installed)

OUTBOARD INSTALLATION

Description	Nm	lb. in.	lb. ft.
Nylon insert locknut (6) (11-826365)	27–34		20–25
Nylon insert locknut (f) (factory installed)	27–34		20–25

1. Assemble the steering arm to the steering adapter plate (as shown) with three flanged hexhead bolts, six hardened flat washers, and three nylon insert locknuts.

IMPORTANT: The steering arms are stamped "STARBOARD UP" and "PORT UP" near the cable bearing assembly of each arm. Verify that the steering arms are in the correct location before installing.

2. Assemble the starboard steering arm to the steering adapter plate the same as the port side.
3. Tighten all locknuts to the specified torque.

IMPORTANT: Before each use, check the steering arm, steering adapter plate, bearing assembly, and cable fasteners for proper tightness.

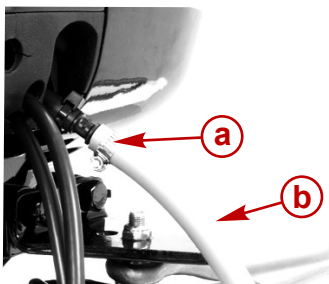
Fuel Hose Connection - Remote Control Models

REMOTE FUEL HOSE SIZE

Minimum fuel hose inside diameter (ID) is 8 mm (5/16 in.). Use a separate fuel hose/fuel tank pickup for each engine.

FUEL HOSE CONNECTION

Fasten the remote fuel hose to the fitting with a metal hose clamp or the plastic type hose clamp that is provided with the outboard.



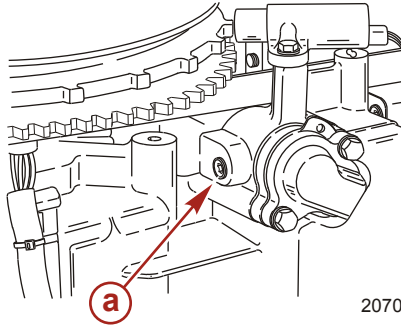
28511

- a** - Hose clamp
- b** - Remote fuel hose

OUTBOARD INSTALLATION

Water Pressure Hose Connection

1. Remove the water pressure access plug.



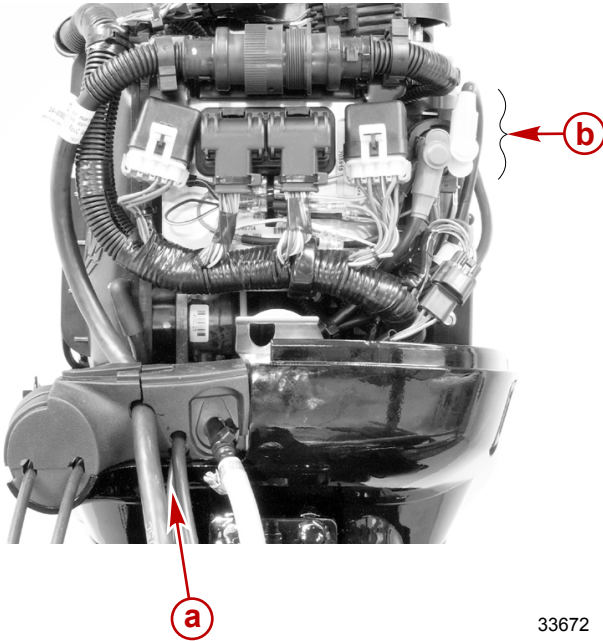
20708

a - Water pressure access plug

2. Apply pipe sealant to the threads of the water pressure gauge hose fitting.
3. Install the hose fitting into the water pressure access port (where the plug resided).

OUTBOARD INSTALLATION

4. Thread the water pressure gauge hose through the bottom cowl along side the main engine harness.



33672

a - Hole in bottom cowl where main engine harness is routed.

b - Approximate location of water pressure access port.

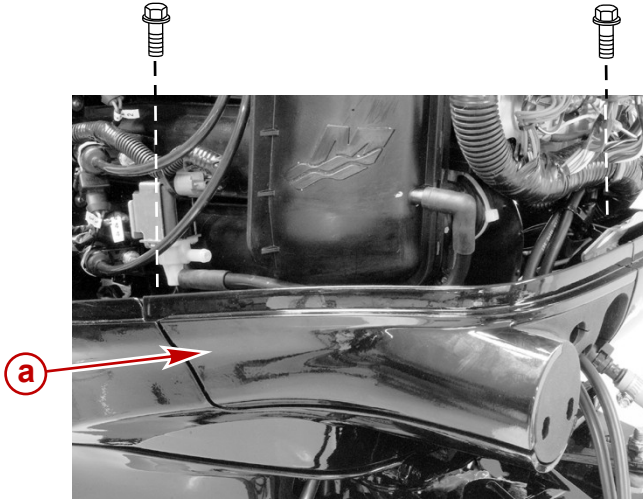
5. Install the water pressure gauge hose to the hose fitting.
6. Secure the hose along side the engine to prevent flow restrictions.

OUTBOARD INSTALLATION

Electrical Connections and Control Cable Installation

REMOTE WIRING HARNESS

Remove the access cover.



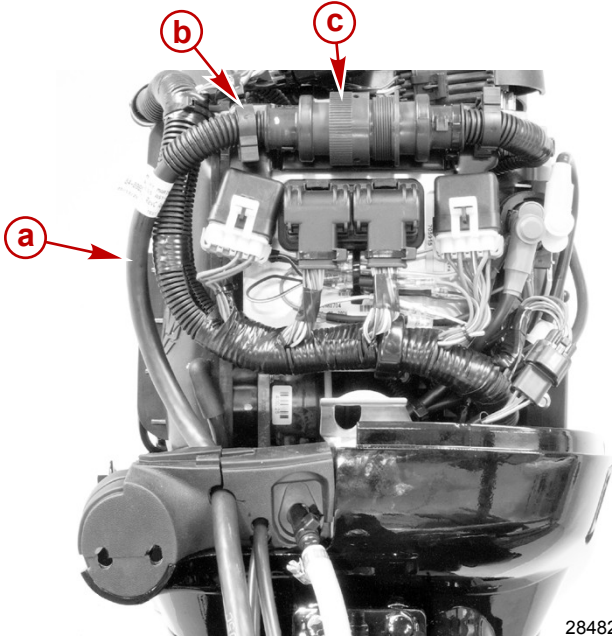
28505

a - Access cover

Route the remote wiring harness through the rubber grommet.

OUTBOARD INSTALLATION

Connect the 14 pin connector to the engine harness and fasten the harness with the retainer.



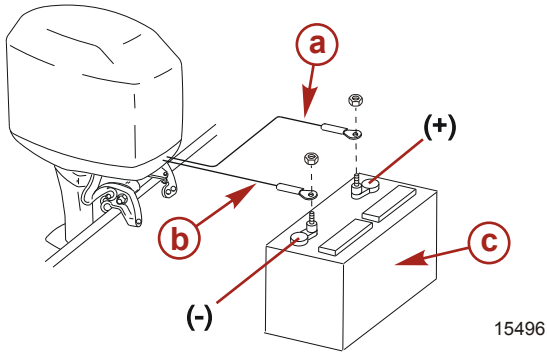
28482

- a** - Remote wiring harness
- b** - Retainer
- c** - 14 pin connector

OUTBOARD INSTALLATION

BATTERY CABLE CONNECTIONS

Single Outboard

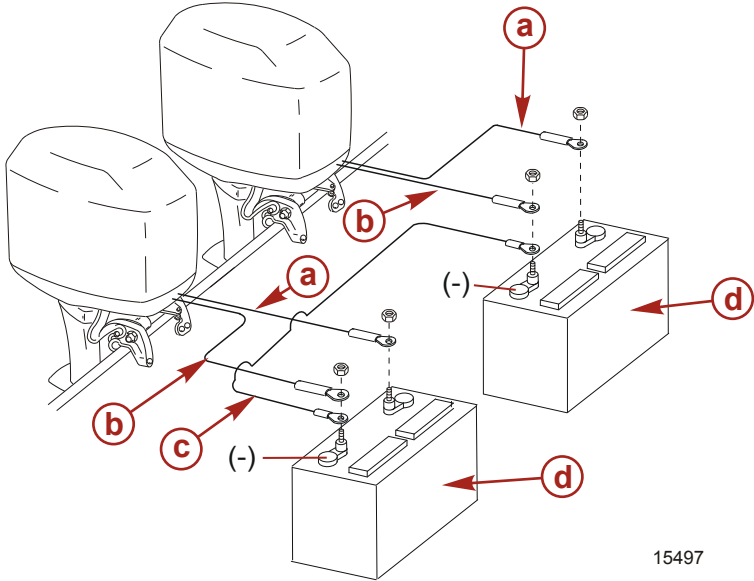


- a** - Red sleeve - Positive (+)
- b** - Black sleeve - Negative (-)
- c** - Cranking battery

OUTBOARD INSTALLATION

Dual Outboards

Connect a common ground cable (wire size same as engine battery cables) between negative (-) terminals on starting batteries.



15497

- a** - Red sleeve - Positive (+) **c** - Ground cable
b - Black sleeve - Negative (-) **d** - Cranking battery (-)

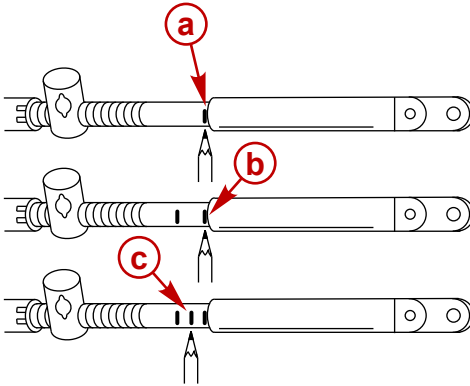
SHIFT CABLE INSTALLATION

Install the cables into the remote control following the instructions provided with the remote control.

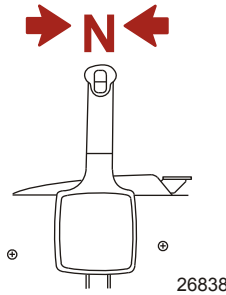
1. Locate the center point of the slack or lost motion that exists in the shift cable as follows:
 - a. Move the remote control handle from neutral into forward and advance the handle to full speed position. Slowly return the handle back to neutral. Place a mark ("a") on the cable next to the cable end guide.
 - b. Move the remote control handle from neutral into reverse and advance the handle to full speed position. Slowly return the handle back to neutral. Place a mark ("b") on the cable next to the cable end guide.

OUTBOARD INSTALLATION

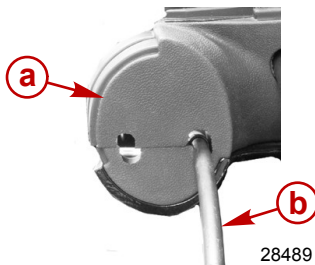
c. Make a center mark ("c"), midway between marks ("a" and "b"). Align the cable end guide with this center mark when installing cable to the engine.



2. Manually shift the outboard into neutral. The propeller will rotate freely.
3. Position the remote control handle into neutral.



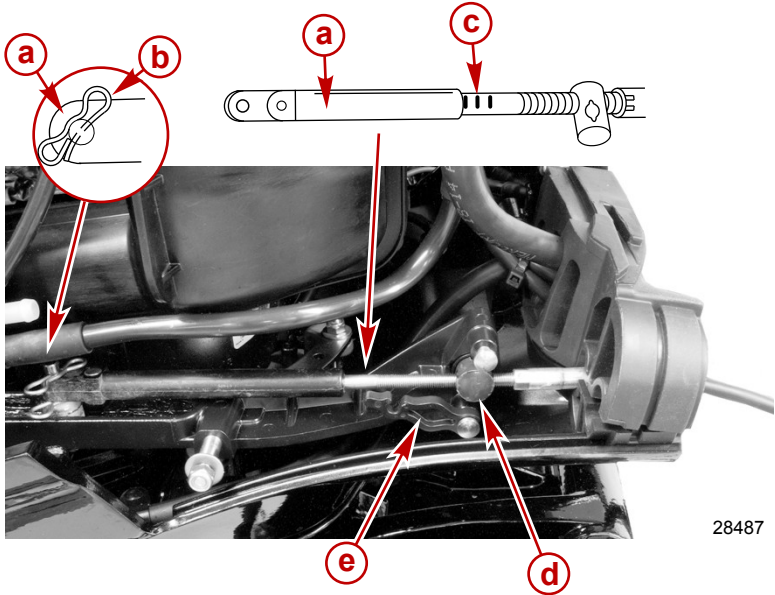
4. Fit the throttle cable through the rubber grommet.



- a** - Rubber grommet
- b** - Shift cable

OUTBOARD INSTALLATION

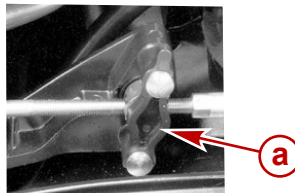
5. Attach the shift cable to the shift lever with a cotter pin retainer.
6. Adjust the cable barrel so the center mark on the cable is aligned with the end guide when the cable barrel is placed in the barrel receptacle.



28487

- a** - Cable end guide
- b** - Cotter pin retainer
- c** - Center mark
- d** - Cable barrel
- e** - Barrel latch

7. Place the cable barrel into the barrel receptacle.
8. Lock in barrel in place with the barrel latch.



28488

- a** - Barrel latch

9. Check shift cable adjustments as follows:

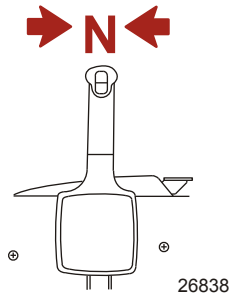
OUTBOARD INSTALLATION

- a. Shift remote control into forward. The propeller shaft should be locked in gear. If not, adjust the barrel closer to the cable end guide.
- b. Shift remote control into reverse while turning propeller. The propeller shaft should be locked in gear. If not, adjust the barrel away from the cable end guide. Repeat steps a through c.
- c. Shift remote control back to neutral. The propeller shaft should turn freely without drag. If not, adjust the barrel closer to the cable end guide. Repeat steps a through c.

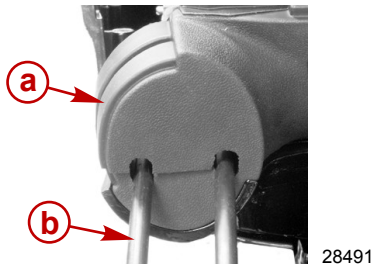
THROTTLE CABLE INSTALLATION

Install the cables into the remote control following the instructions provided with the remote control.

1. Position the remote control into neutral.



2. Fit the throttle cable through the rubber grommet.



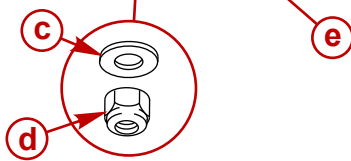
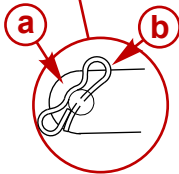
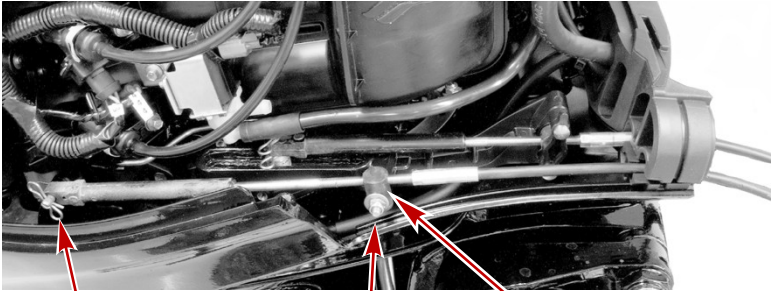
a - Rubber grommet

b - Throttle cable

3. Attach the throttle cable to the throttle lever with a cotter pin retainer.
4. Adjust cable barrel until the barrel slips onto the mounting stud.

OUTBOARD INSTALLATION

5. Fasten the throttle cable to the mounting stud with a flat washer and locknut. Tighten the locknut to the specified torque.



- a** - Throttle cable
- b** - Cotter pin retainer
- c** - Flat washer

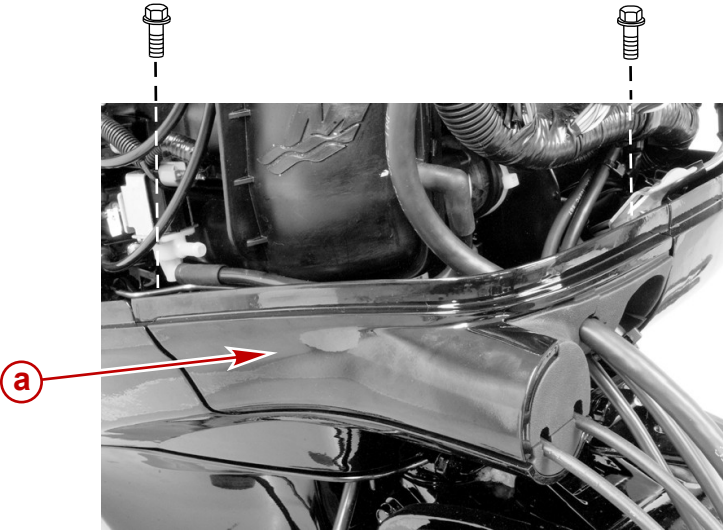
- d** - Locknut
- e** - Cable barrel

28494

Description	Nm	lb. in.	lb. ft.
Throttle cable locknut	6	53	

OUTBOARD INSTALLATION

6. Reinstall the access cover with two bolts. Tighten the bolts to the specified torque.



a - Access cover

28500

Description	Nm	lb. in.	lb. ft.
Access cover bolt	10	89	

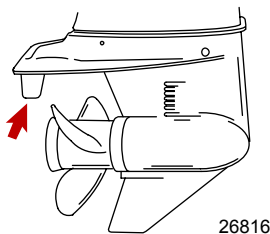
Propeller Installation

See **Maintenance - Propeller Replacement.**

OUTBOARD INSTALLATION

Trim Tab Adjustment

Propeller steering torque will cause your boat to pull in one direction. This steering torque is a normal thing that results from your outboard not being trimmed so the propeller shaft is parallel to the water surface. The trim tab can help compensate for this steering torque in many cases and can be adjusted within limits to reduce any unequal steering effort.



NOTE: Trim tab adjustment will have little effect reducing steering torque if the outboard is installed with the anti-ventilation plate approximately 50 mm (2 inches) or more above the boat bottom.

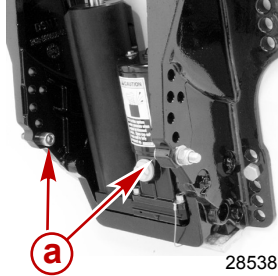
Operate your boat at normal cruising speed, trimmed to the desired position. Turn your boat left and right and note the direction the boat turns more easily.

If adjustment is necessary, loosen trim tab bolt and make small adjustments at a time. If the boat turns more easily to the left, move the trailing edge of trim tab to the left. If the boat turns more easily to the right, move the trailing edge of trim tab to the right. Retighten bolt and retest.

OUTBOARD INSTALLATION

Trim-In Stop Adjustment - Power Trim Models

If an adjustment is required to the trim-in stop, reposition the tilt stop pins in the desired holes. Tighten the tilt stop pins to the specified torque.



a - Tilt stop pins

Description	Nm	lb. in.	lb. ft.
tilt stop pins	24.4		18

