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INTRODUCTION

Welcome to the world of Yanmar Marine! Yanmar Marine offers engines, drive systems and accessories for all types of boats, from runabouts to sailboats, and from cruisers to mega yachts. In marine leisure boating, the worldwide reputation of Yanmar Marine is second to none. We design our engines to respect nature. This means quieter engines, with minimal vibrations, cleaner than ever. All of our engines designed after 1996 meet most of the present and future emission regulations, like BSO II, SAV, EPA II, IMO and RCD.

To help you enjoy your Yanmar 6LY3 engine for many years to come, please follow these recommendations:

- Read and understand this Operation Manual before you operate the machine to ensure that you follow safe operating practices and maintenance procedures.
- Keep this *Operation Manual* in a convenient place for easy access.
- If this Operation Manual is lost or damaged, order a new one from your authorized Yanmar marine dealer or distributor.

- Make sure this manual is transferred to subsequent owners. This manual should be considered a permanent part of the engine and remain with it.
- Constant efforts are made to improve the quality and performance of Yanmar products, so some details included in this *Operation Manual* may differ slightly from your engine. If you have any questions about these differences, please contact your authorized Yanmar marine dealer or distributor.
- The specifications and components (instrument panel, fuel tank, etc.) described in this manual may differ from ones installed on your vessel. Please refer to the manual provided by the manufacturer of these components.

RECORD OF OWNERSHIP

Take a few moments to record the information you need when you contact Yanmar for service, parts or literature.

Engine Model:	
Engine Serial No.:	
Date Purchased:	
Dealer:	
Dealer Phone:	



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SAFETY

Yanmar considers safety of great importance and recommends that anyone who comes into close contact with its products, such as those who install, operate, maintain or service Yanmar products, exercise care, common sense and comply with the safety information in this manual and on the machine's safety labels. Keep the labels from becoming dirty or torn and replace them if they are lost or damaged. Also, if you need to replace a part that has a label attached to it, make sure you order the new part and label at the same time.



This safety alert symbol appears with most safety statements. It means attention, become alert, your safety is involved! Please read and abide by the message that follows the safety alert symbol.

A DANGER

Danger (the word "DANGER" is in white letters with a red rectangle behind it) – indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Danger is limited to the most extreme situations.

0000001en

Warning (the word "WARNING" is in black letters with an orange rectangle behind it) – indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

Caution (the word "CAUTION" is in black letters with a yellow rectangle behind it) - indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

0000001en

CAUTION

Caution without the safety alert symbol indicates a potentially hazardous situation that can cause damage to the engine, personal property and / or the environment or cause the engine to operate improperly.

0000001enMarine

SAFETY PRECAUTIONS

Before You Operate

CAUTION



NEVER permit anyone to install or operate the engine without proper training.

- Read and understand this **Operation Manual before you** operate or service the engine to ensure that you follow safe operating practices and maintenance procedures.
- · Safety signs and labels are additional reminders for safe operating and maintenance techniques.
- See your authorized Yanmar marine dealer or distributor for additional training.

0000002enMarine



During Operation and Maintenance



Att

EXPLOSION HAZARD!

- Keep the area around the battery well-ventilated. While the engine is running or the battery is charging, hydrogen gas is produced which can be easily ignited.
- Keep sparks, open flame and any other form of ignition away while the engine is running or battery is charging.
- Failure to comply will result in death or serious injury.

0000003en



SCALD HAZARD!

- NEVER remove the fill cap if the engine is hot. Steam and hot engine coolant will spurt out and seriously burn you. Allow the engine to cool down before you attempt to remove the fill cap.
- Securely tighten the fill cap after you check the heat exchanger. Steam can spurt out during engine operation if the cap is loose.
- ALWAYS check the level of engine coolant by observing the reserve tank.
- Failure to comply will result in death or serious injury.

0000002en6LY3



FIRE AND EXPLOSION HAZARD!

- Diesel fuel is flammable and explosive under certain conditions.
- NEVER use diesel fuel as a cleaning agent.
- Failure to comply will result in death or serious injury.



DANGER



FIRE AND EXPLOSION **HAZARD!**

- Diesel fuel is flammable and explosive under certain conditions.
- · Only fill the fuel tank with diesel fuel. Filling the fuel tank with gasoline may result in a fire and will damage the engine.
- NEVER refuel with the engine running.
- Wipe up all spills immediately.
- · Keep sparks, open flames or any other form of ignition (match, cigarette, static electric source) well away when refueling.
- NEVER overfill the fuel tank.
- Fill the fuel tank. Store any containers containing fuel in a well-ventilated area, away from any combustibles or sources of ianition.
- Failure to comply will result in death or serious injury.



\Lambda DANGER

Att

EXPLOSION HAZARD!

- NEVER check the remaining battery charge by shorting out the terminals. This will result in a spark and may cause an explosion or fire. Use a hydrometer to check the remaining battery charge.
- If the electrolyte is frozen, slowly warm the battery before you recharge it.
- Failure to comply will result in death or serious injury.

0000007en

A DANGER



FIRE AND EXPLOSION HAZARD!

- Diesel fuel is extremely flammable and explosive under certain conditions.
- Before you operate the engine, check for fuel leaks. Replace rubberized fuel hoses every two years or every 2000 hours of engine operation, whichever comes first, even if the engine has been out of service. Rubberized fuel lines tend to dry out and become brittle after two years or 2000 hours of engine operation, whichever comes first.
- Failure to comply will result in death or serious injury.



DANGER A DANGER **CRUSH HAZARD!** FIRE AND EXPLOSION HAZARD! When you need to transport an • Diesel fuel is extremely engine for repair have a helper flammable and explosive under assist you attach it to a hoist certain conditions. and load it on a truck. · When you prime the fuel NEVER stand under hoisted system, operate the fuel engine. If the hoist mechanism priming lever of the fails, the engine will fall on mechanical fuel pump several you, causing serious injury or times until the fuel filter cup is death. filled with fuel. · Failure to comply will result in • NEVER open the air vent valve death or serious injury. while the fuel system is being primed. The fuel filter has an internal air bleed port. · Failure to comply will result in death or serious injury. 0000016en

6LY3 Operation Manual **YANMAR**.



SEVER HAZARD!

- Keep hands and other body parts away from moving / rotating parts such as the flywheel or PTO shaft.
- Wear tight fitting clothing and keep your hair short or tie it back while the engine is running.
- Remove all jewelry before you operate or service the engine.
- NEVER start the engine in gear. Sudden movement of the engine and / or vessel could cause death or serious personal injury.
- NEVER operate the engine without the guards in place.
- Before you start the engine make sure that all bystanders are clear of the area.
- Keep children and pets away while the engine is operating.
- Check before starting the engine that any tools or shop rags used during maintenance have been removed from the area.
- Failure to comply could result in death or serious injury.

0000002enMarine



EXHAUST HAZARD!

- NEVER operate the engine in an enclosed area such as a garage, tunnel, underground room, manhole or ship's hold without proper ventilation.
- NEVER block windows, vents, or other means of ventilation if the engine is operating in an enclosed area. All internal combustion engines create carbon monoxide gas during operation. Accumulation of this gas within an enclosure could cause illness or even death.
- Make sure that all connections are tightened to specifications after repair is made to the exhaust system.
- Failure to comply could result in death or serious injury.



SAFETY



A WARNING



EXPOSURE HAZARD!

- Wear personal protective equipment such as gloves, work shoes, eye and hearing protection as required by the task at hand.
- NEVER wear jewelry, unbuttoned cuffs, ties or loose fitting clothing when you are working near moving / rotating parts such as the flywheel or PTO shaft.
- ALWAYS tie back long hair when you are working near moving / rotating parts such as a flywheel or PTO shaft.
- NEVER operate the engine while wearing a headset to listen to music or radio because it will be difficult to hear the warning signals.
- Failure to comply could result in death or serious injury.

0000005enMarine



SUDDEN MOVEMENT HAZARD!

- Be sure the boat is in open water away from other boats, docks, and other obstructions before increasing rpm.
- Failure to comply could result in death or serious injury.

0000006enMarine



BURN HAZARD!

- Batteries contain sulfuric acid. NEVER allow battery fluid to come in contact with clothing, skin or eyes. Severe burns could result. ALWAYS wear safety goggles and protective clothing when servicing the battery. If battery fluid contacts the eyes and / or skin, immediately flush the affected area with a large amount of clean water and obtain prompt medical treatment.
- Failure to comply could result in death or serious injury.

0000007en



HIGH PRESSURE HAZARD!

- Avoid skin contact with high pressure diesel fuel spray caused by a fuel system leak such as a broken fuel injection line. High pressure fuel can penetrate your skin and result in serious injury. If you are exposed to high pressure fuel spray, obtain prompt medical treatment.
- NEVER check for a fuel leak with your hands. ALWAYS use a piece of wood or cardboard. Have your authorized Yanmar marine dealer or distributor repair the damage.
- Failure to comply could result in death or serious injury.

0000008enMarine

SAFETY



• Failure to comply could result in death or serious injury.

0000010en







SAFETY



FLYING OBJECT HAZARD!

- ALWAYS wear eye protection when servicing engine and when using compressed air or high-pressure water. Dust, flying debris, compressed air, pressurized water or steam may injure your eyes.
- Failure to comply may result in minor or moderate injury.

00000300

CAUTION

- · Only use diesel fuels recommended by Yanmar for the best engine performance, to prevent engine damage and to comply with EPA warranty requirements.
- · Only use clean diesel fuel.
- NEVER remove primary strainer from the fuel tank filler port. If removed, dirt and debris could get into the fuel system causing it to clog.

0000004enMarine

CAUTION

If any problem is noted during the visual check, the necessary corrective action should be taken before you operate the engine.

0000021en

CAUTION

Be sure to close the seacock.

Neglecting to close the seacock could allow water to leak into the boat and may cause it to sink.

0000152en

CAUTION

The illustrations and descriptions of optional equipment in this manual, such as the operator's console, are for a typical engine installation. Refer to the documentation supplied by the optional equipment manufacturer for specific operation and maintenance instructions.

0000018en

CAUTION

If any indicator illuminates during engine operation, stop the engine immediately. Determine the cause and repair the problem before you continue to operate the engine.



- If the vessel is equipped with a water lift (water lock) muffler, excessive cranking could cause seawater to enter the cylinders and damage the engine. If the engine does not start after cranking 15 seconds, close the thru-hull water intake valve to avoid filling the muffler with water. Crank for 15 seconds or until the engine starts. When the engine does start, stop the engine immediately and press the switch to the OFF position.
- Be sure to re-open the seacock and restart the engine. Operate the engine normally.

0000151en

CAUTION

NEVER hold the key in the START position for longer than 15 seconds or the starter motor will overheat.

0000007en

CAUTION

Observe the following environmental operating conditions to maintain engine performance and avoid premature engine wear:

- NEVER run the engine if the ambient temperature is above +40°C (+104°F) or below -16°C (+5°F)
 - If the ambient temperature exceeds +40°C (+104°F) the engine may overheat and cause the engine oil to break down.
 - If the ambient temperature falls below -16°C (+5°F) rubber components such as gaskets and seals will harden causing premature engine wear and damage.
 - See your authorized Yanmar marine engine dealer or distributor if the engine will be operated in either temperature extreme.
- See your authorized Yanmar marine dealer or distributor if you need to operate the engine at high altitudes. At high altitudes the engine will lose power, run rough, and produce exhaust gases that exceed the design specifications.

0000065enMarine

- Only use the engine coolant specified. Other engine coolants may affect warranty coverage, cause an internal buildup of rust and scale and / or shorten engine life.
- Prevent dirt and debris from contaminating engine coolant. Carefully clean the heat exchanger cap and the surrounding area before you remove the cap.
- NEVER mix different types of engine coolants. This may adversely affect the properties of the engine coolant.

0000006enTrans

CAUTION

- Only use the engine oil specified. Other engine oils may affect warranty coverage, cause internal engine components to seize, or shorten engine life.
- Prevent dirt and debris from contaminating engine oil. Carefully clean the oil cap / dipstick and the surrounding area before you remove the cap.
- NEVER mix different types of engine oil. This may adversely affect the lubricating properties of the engine oil.
- NEVER overfill. Overfilling may result in white exhaust smoke, engine overspeed or internal damage.

0000005en

CAUTION

- NEVER overfill the engine with engine oil.
- ALWAYS keep the oil level between upper and lower lines on the oil cap / dipstick.

0000015en

CAUTION

For maximum engine life, Yanmar recommends that when shutting the engine down, you allow the engine to idle, without load, for 5 minutes. This will allow the engine components that operate at high temperatures, such as the turbocharger (if equipped) and exhaust system, to cool slightly before the engine itself is shut down.

000008en

CAUTION

NEVER use an engine starting aid such as ether. Engine damage will result.



Make sure the engine is installed on a level surface. If a Yanmar Marine Engine is installed at an angle that exceeds the specifications stated in the Yanmar Marine Engine Operation Manual, engine oil may enter the combustion chamber causing excessive engine speed, white exhaust smoke and serious engine damage. This applies to engines that run continuously or those that run for short periods of time.

0000010enMarine

CAUTION

Be careful not to get any oil on the V-belt. Oil on the belt causes slipping and stretching. Replace the belt if it is damaged.

0000153en

CAUTION

If seawater is left inside of the engine, it may freeze and damage parts of the cooling system when the ambient temperature is below 0°C (32°F).

0000154en

CAUTION

New Engine Break In:

- On the initial engine start-up, check for proper engine oil pressure, diesel fuel leaks, engine oil leaks, coolant leaks, and for proper operation of the indicators and / or gauges.
- During the first 50 hours of operation operate your new engine under a substantial load at all times. For best break-in results operate the engine at various speeds.
- Operating the engine in NEUTRAL must be avoided. During the first 50 hours, avoid operation below 2000 rpm.
- During the break-in period, carefully observe the engine oil pressure and engine temperature.
- During the break-in period, check the engine oil and coolant levels frequently.

0000011enMarine

CAUTION

NEVER allow engine oil or diesel fuel oil to contact the flexible rubber mount. Oil makes rubber deteriorate.

SAFETY

CAUTION ALWAYS be environmentally responsible. Follow the guidelines of the

- EPA or other governmental agencies for the proper disposal of hazardous materials such as engine oil, diesel fuel and engine coolant. Consult the local authorities or reclamation facility.
- NEVER dispose of hazardous materials irresponsibly by dumping them into a sewer, on the ground or into ground water or waterways.
- · Failure to follow these procedures may seriously harm the environment.

0000013en

CAUTION

Protect the air cleaner, turbocharger (if equipped) and electric components from damage when you use steam or high-pressure water to clean the engine.

0000014en

CAUTION

If the alarm window with audible alarm fails to display and go out about three seconds later when the rocker switch is pushed to the ON position, see your authorized Yanmar marine dealer or distributor for service before operating the engine.

0000028enMarine

CAUTION

NEVER use the Emergency Stop switch for a normal engine shutdown. Use this switch only when stopping the engine suddenly in an emergency.

0000156en

CAUTION

Establish a periodic maintenance plan according to the engine application and make sure you perform the required periodic maintenance at intervals indicated. Failure to follow these guidelines will impair the engine's safety and performance characteristics, shorten the engine's life and may affect the warranty coverage on your engine.



It is important to perform daily checks as listed in the Operation Manual.

Periodic maintenance prevents unexpected downtime, reduces the number of accidents due to poor engine performance and helps extend the life of the engine.

0000060enMarine

CAUTION

If the fuel filter / water separator is positioned higher than the fuel level in the fuel tank, water may not drip out when the fuel filter / water separator drain cock is opened. If this happens, turn the air vent screw on the top of the fuel filter / water separator 2-3 turns counterclockwise.

Be sure to tighten the air vent screw after the water has drained out.

0000025en

CAUTION

- When the engine is operated in dusty conditions, clean the air cleaner element more frequently.
- NEVER operate the engine with the air cleaner or element(s) removed. This may allow foreign material to enter the engine and damage it.

0000026en

CAUTION

Clean or replace the air cleaner element if the air intake restriction exceeds the value listed in the Operation and Service Manuals.

0000046enMarine

CAUTION

NEVER turn off the battery switch (if equipped) or short the battery cables during operation. Damage to the electric system will result.

0000061en

CAUTION

NEVER move the adjustment nuts without using a hoist to take the pressure off the engine mount. Failure to comply may cause damage to the stud and nut threads.

0000084en

CAUTION

Excessive vibration may cause damage to the engine, marine gear, hull and onboard equipment. In addition, it causes noticeable passenger and crew discomfort. Carefully select engine mounts and propellers when you design Yanmar marine engine applications.



Sea trials can only be performed safely when the vessel is adequately manned. Do not attempt to single-hand a vessel while collecting and recording performance data.

0000086en

CAUTION

When you install instrument panels:

- Avoid wet locations
- Avoid locations subject to vibration
- Set meters at correct angle

Failure to follow these instructions may cause inaccurate or unreliable instrumentation.

0000087en

CAUTION

If you have an installation with two or three engines, and only one engine is operating, it is important to limit the amount of throttle applied to the running engine. If you observe black smoke or movement of the throttle does not increase engine RPM, you are overloading the engine that is running. Immediately throttle back to approximately 2/3 throttle or to a setting where the engine performs normally. Failure to do so may cause the running engine to overheat or cause excess carbon buildup which may shorten the engine's life.

0000150en

CAUTION

If you have an installation with two or three engines, and only one engine is operating, please note that if the propeller shaft thru-hull (stuffing box) is lubricated by engine water pressure and the engines are interconnected, care must be taken that water from the running engine does not enter the exhaust of the non-running engine(s). This water could cause seizure of the non-running engine(s). See your authorized Yanmar marine dealer or distributor for a complete explanation of this condition.



If you have an installation with two or three engines, and only one engine is operating, the water pickup (thru-hull) of the non-running engine(s) should be closed. This will prevent water from being forced past the seawater pump and eventually finding its way into the engine. The result of water entering the engine could cause seizure or other serious problems.



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PRODUCT OVERVIEW

YANMAR 6LY3 FEATURES AND APPLICATIONS

The engine is equipped with a marine gear. The marine gear output shaft connects with the propeller shaft. In order to obtain full performance from your engine, it is imperative that you check the size and structure of the hull and use a propeller of the appropriate size. As new boats are used, owners add additional equipment and completely fill the fuel and water tanks adding to the overall displacement (weight) of the vessel. Extra canvas enclosures, bottom paint, and bottom fouling can add additional hull resistance. It is recommended that a new vessel be propped so the engine can operate at 100-200 rpm above maximum rpm to allow for some added weight and hull resistance. Failure to do so can lead to reduced vessel performance. lead to increased smoke levels and cause permanent damage to your engine.

The engine must be installed correctly with the seawater or cooling water piping, exhaust gas piping and electrical wiring. Any auxiliary equipment attached to the engine should be easy to use and accessible for service. To handle the drive equipment, propulsion systems (including the propeller) and other onboard equipment be sure to observe the instructions and cautions given in the operation manuals supplied by the shipyard and equipment manufacturers.

The laws of some countries may require hull and engine inspections, depending on the use, size and cruising area of the boat. The installation, fitting and surveying of this engine all require specialized knowledge and engineering skills. See Yanmar's local subsidiary in your region or your authorized Yanmar marine dealer or distributor.

This engine is designed for pleasure boat applications. The engine is designed to be operated at: Maximum throttle for less than 5% of its total operation time (30 minutes out of every 10 hours). The engine should be operated at cruising speed for less than 90% of its total operation time (9 hours out of every 10 hours).

COMPONENT IDENTIFICATION

Operation Side



- 1. Oil Fill Cap
- 2. Coolant Fill Cap
- 3. Electronic Control Unit Cover Plate
- 4. Fuel Injection Pump
- 5. Lube Oil Cooler

- 6. Lube Oil Filter
- 7. Inter-Cooler
- 8. Flywheel
- 9. Air Intake Silencer
- 10. Turbocharger
- Figure 1



Non-Operation Side



- 1. Coolant Tank (Exhaust Manifold)
- 2. Dipstick
- 3. Fresh Water Cooler
- 4. Seawater Pump

- 5. Alternator
- 6. V-Belt
- 7. Fuel Filter
- 8. Fresh Water Pump
- Figure 2

LOCATION OF LABELS

Figure 3 shows the location of regulatory and safety labels on Yanmar 6LY3 series engines. Please replace if damaged or lost.



	Warning Label	S
No.	Description	Part Number
1	Hot Surface	128296-07300
2	Lifting Precautions	120324-07240
3	Engine Coolant Fill Cap	128296-07260
4	Rotating Parts	128296-07350
5	Fall Hazard	119578-07890

Figure 3

128296-07300



120324-07240



128296-07260



128296-07350





119578-07890



NAMEPLATE

The nameplate shown (Figure 4) is attached to the engine. Check the engine model, output, rpm and serial number on the nameplate.



Figure 4



FUNCTION OF MAJOR COMPONENTS

Name of part	Function
Fuel Filter	Removes dirt and water from fuel. Drain the filter periodically. The element (filter) should be replaced periodically. <i>See Replace the Fuel Filter Element on page 106.</i>
Fuel Feed Pump	Pumps fuel from tank to the fuel injection pump. Equipped with built-in centrifugal vane.
Engine Oil Fill Port	The fill port used to add engine lubricating oil.
Lubricating Oil Filter (At Full-flow and Bypass Sides)	Filters fine metal fragments and carbon from the lubricating oil. Filtered lube oil is distributed to the engine's moving parts.
Cooling Water System	There are two cooling systems: fresh water and seawater. The engine's combustion heat is cooled by the fresh water / coolant in a closed circuit. The fresh water is cooled by seawater using heat exchanger. The seawater also cools the lube oil of engine / marine gear and also intake air through coolers in an open circuit.
Fresh Water Cooler	The fresh water cooler is a heat exchanger to cool the fresh water by using seawater.
Fresh Water Pump	The centrifugal water pump circulates fresh cooling water inside the engine. The fresh water pump is driven by V-belt.
Seawater Pump	The rubber impeller type pump raises seawater for cooling. Never operate it without seawater, as this will damage the impeller.
Fresh Water / Coolant Fill Cap	The fill cap on the coolant tank covers the water supply port. The cap has a pressure regulating valve. When the cooling water temperature rises, the pressure rises inside the fresh water system.
Coolant Recovery Tank	The pressure regulating valve releases vapor and hot water overflow to the coolant recovery tank. When the engine stops and the cooling water cools, the pressure in the cooling water tank also drops very low. The fill cap valve then opens to send water back from the coolant recovery tank. This minimizes cooling water consumption. Fresh water / coolant level can easily be checked and refilled in this tank.
Oil Cooler	This heat exchanger cools high temperature lube oil with seawater.
Turbocharger	The pressurized intake air feeding device: the exhaust gas turbine is rotated by the exhaust gas, and the power is used to rotate the blower. This pressurizes the intake air for sending to the cylinder.
Inter-Cooler	This heat exchanger cools the pressurized intake air from the turbocharger with seawater.
Anti-Corrosion Anode	The metal area of the seawater cooling system is prone to electrical corrosion. The anti-corrosion anode is installed in the oil cooler, aftercooler, etc. to prevent this. The anti-corrosion anode is itself reduced over time by electrical corrosion, so it must be replaced at fixed intervals before it is completely consumed in order to ensure that the metal area of the seawater cooling system remains fully protected.
Nameplates	Nameplates are provided on the engine and the marine gear and include the model, serial number and other data.
Starter	Starter motor for the engine. Powered by the battery.
Alternator	Driven by V-belt and generates electricity and charges the battery.



ELECTRONIC CONTROL SYSTEM (ECS)

The control equipment consists of the Rocker Switch Panel, the Display, Engine Interface Module and the Control Head, which are connected by the wire harness to the Engine (electronic governor and marine gear) for remote control operation.

See Yanmar Electronic Control System Operation Manual for LY3 Engines for a more complete description of the electronic control system (ECS).



- 1. First Station Rocker Switch Panel
- 2. To Engine
- 3. Interface Module without Trolling Interface Module with Trolling (Optional)
- 4. To Engine
- 5. To Marine Gear

- 6. NMEA Tee and Terminators Kit
- 7. NMEA Tee Connector
- 8. Digital Display
- 9. Control Head (Shift and Throttle)

Figure 5

PRODUCT OVERVIEW

Display

The multi-function information display has the following function.

Refer to the *Electronic Control System* Manual for 6LY3, available as a separate volume, for details.

Display Function

Runtime Engine Data Tri-Screen (Figure 6)



Figure 6

This screen displays real time engine data and alarm indications.

Alarm Indicators (Figure 7)

Alarm window appears with an audible alarm when abnormal engine activity occurs.

Note: When starting the engine, make it a rule to check that when the rocker switch is pushed to the ON position, an alarm window with an audible rearm appears on the display and goes out about three seconds later. If the system does not function normally, contact your authorized Yanmar marine dealer and ask for diagnostics.



Figure 7

Alarm Log Screen (Figure 8)



Figure 8

Alarm Indicator Functions

Alarm indicators and buzzer come on when sensors detect an abnormality during engine operation. The alarm indicators are off during normal operation, but come on as follows when an abnormality arises:

- Cooling water temperature alarm indicator comes on when the fresh water gets too hot.
- Lube oil pressure alarm indicator comes on when the engine lube oil pressure drops.
- Electric charge alarm indicator comes on when there is a charging failure.
Rocker Switch Panel

The rocker switch panel has the following functions.

1st Station Panel (Figure 9)



Figure 9

- 1. To start and stop the engine:
 - To start the engine, push upper half of ENG ON switch (START).
 - To stop the engine, push bottom half of ENG ON switch (OFF).
- Note: The engine will take 2 to 7 seconds to stop running after the bottom of the rocker switch is pressed.
- 2. EMERGENCY STOP (Figure 9, (2))

IMPORTANT

Use this switch only in an emergency. Under normal circumstances, use the ENG ON switch (Figure 9, (1)) to stop the engine.

The engine shuts down suddenly when the upper half of the **EMERGENCY STOP** switch is pushed. Push the bottom half of the switch after the engine has shut down to return the switch to the center.

Note: Restarting the engine after using the EMERGENCY STOP switch may be slower or more difficult than normal starting.

3. Sub-Throttle Control (Figure 9, (3))

In the unlikely event that the throttle control fails, the sub-throttle indicator light will flash and the engine speed is controlled the sub-throttle. Engine speed rises when the sub-throttle knob is turned clockwise.

- When the sub-throttle indicator flashes, turn the sub-throttle knob counterclockwise to the end and turn the knob clockwise gradually until the sub-throttle indicator turns on (steady light).
- Each engine is controlled by a dedicated sub-throttle controller.

2nd Station Panel - Optional (Figure 10)



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Figure 10

- 1. ENGINE ON switch (Figure 10, (1)) is wired to 1st station panel.
- 2. Able to start and stop the engine from 2nd station panel.
- EMERGENCY STOP switch is wired in series with 1st station panel (Figure 10, (2)).

Control Head Shift and Throttle Functions

Use the two-lever control head (Figure 11, (4)) in the helm station for ahead (Figure 11, (1)), astern (Figure 11, (3)), neutral (Figure 11, (2)) and speed control in a twin installation.



Figure 11

Use the single-lever control head (Figure 12, (4)) in the helm station for ahead (Figure 12, (1)), astern (Figure 12, (3)), neutral (Figure 12, (2)) and speed control in a single installation.



Figure 12

Control Head Button Functions

- N (or NEUTRAL) Button If the associated control head lever is in the "Neutral Idle" position, pushing this button engages / disengages Neutral Throttle control, allowing throttle but no forward or reverse thrust. If the associated control head lever is in a "Gear Idle" position, pushing this button engages / disengages Split Range Throttle (SRT) (if installed).
- SELECT (or SEL) Button If the station is inactive, pushing this button activates the station (used in conjunction with two or more control stations).
- SYNC Button Pushing this button engages / disengages the Cruise Synchronization option (if installed) when the port and starboard control head levers are set to nearly the same positions.



Control Head Operation

Selecting Active Station:



Figure 13

- (a) **(Figure 13, (1))** shows a typical inactive station.
- (b) Press the SELECT button (Figure 13, (2)). The button lights (grayed in (Figure 13)) and the station select light flashes (star around light in (Figure 13,).
- (c) Move the handle(s) to forward or reverse throttle to match the handle location of the active station
 (Figure 13, (3)). The corresponding handle button lights glow steady (grayed in (Figure 13, (3))) and the station select light glows steady (grayed in (Figure 13, (3))).

Engaging / Disengaging Shift Disconnect Mode:



Figure 14

Engage:

- (a) Return the handle(s) to neutral. The neutral light(s) glow steady
 (Figure 14, (1)).
- (b) Press the NEUTRAL button(s) (Figure 14, (2)). The neutral light(s) flash (star around light(s) in (Figure 14, (2))).
- (c) Move the handle(s) to forward or reverse throttle (Figure 14, (3)) resulting in engine rpm control without engaging marine gear.

Disengage:

- (a) Return the handle(s) to neutral (Figure 14, (4)).
- (b) Press the NEUTRAL button(s)
 (Figure 14, (5)). The neutral light(s) glow steady (Figure 14, (5)).

Engaging / Disengaging Split Range Throttle (SRT)

Note: Split Range Throttle is not available if the boat is equipped with the Trolling option.

PRODUCT OVERVIEW

The Split Range Throttle control head mode gives you greater throttle sensitivity. In Split Range Throttle (SRT), moving an engine's control lever all the way to the "Full Forward" position will only produce the maximum percentage of wide open throttle selected in the "Features Selection" of the ECU program options. Typical Throttle Limit percentages for SRT are 5% to 50%, with 25% being the default value.



(c) If the system is shifted into neutral while in the Split Range Throttle engine mode, the N (Neutral) lamp will come on (steady) to indicate that the system is in neutral. When the lever is moved back into gear, the N (Neutral) lamp will resume flashing to indicate that the system is still in Split Range Throttle.

Disengage:

Return the engine lever to a Gear Idle position (Forward Idle or Reverse Idle) (Figure 15, (3)). Press the N (NEUTRAL) button next to the lever on the control head. The N (Neutral) lamp will stop flashing, indicating that the Split Range Throttle has been disengaged.

Figure 15

Engage:

- (a) Move the engine's lever to an ingear idle position (Forward Idle or Reverse Idle) (Figure 15, (1)) and press the N (NEUTRAL) button (Figure 15, (2)) next to this lever on the control head. The N (Neutral) lamp (Figure 15, (2)) will flash to indicate that the Split Range Throttle is engaged.
- (b) While in the Split Range Throttle, the system will shift normally but the throttle will be limited in both gears.



Engaging / Disengaging Cruise Synchronization



Figure 16

Engage:

- (a) Disengage any other engine mode being used.
- (b) Match all engine shift and throttle settings by moving the active port and starboard control head levers to within 10% of each other (Figure 16, (1)) and press the SYNC button (Figure 16, (2)) on the control head. The sync lamp flashes if the handles are not within 10% of each other (Figure 16, (3)). The sync lamp will stop flashing and remain continuously lit (Figure 16, (4)) when the levers are moved to within this 10% range.

A steady sync lamp confirms that the Cruise Sync is engaged. While the engines are synchronized, all engine speeds are matched any time the control levers are set to within 10% of each other and are above 20% throttle. Disengage:

Press the **SYNC** button on the control head.

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BEFORE YOU OPERATE

This section of the *Operation Manual* describes the diesel fuel, engine oil, and engine coolant specifications and how to replenish them. It also describes the daily engine checkout.

CAUTION



NEVER permit anyone to install or operate the engine without proper training.

- Read and understand this Operation Manual before you operate or service the engine to ensure that you follow safe operating practices and maintenance procedures.
- Safety signs and labels are additional reminders for safe operating and maintenance techniques.
- See your authorized Yanmar marine dealer or distributor for additional training.

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BEFORE YOU OPERATE



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DANGER



FIRE AND EXPLOSION HAZARD!

- Diesel fuel is flammable and explosive under certain conditions.
- · Only fill the fuel tank with diesel fuel. Filling the fuel tank with gasoline may result in a fire and will damage the engine.
- NEVER refuel with the engine running.
- Wipe up all spills immediately.
- · Keep sparks, open flames or any other form of ignition (match, cigarette, static electric source) well away when refueling.
- NEVER overfill the fuel tank.
- Fill the fuel tank. Store any containers containing fuel in a well-ventilated area, away from any combustibles or sources of ignition.
- Failure to comply will result in death or serious injury.

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BEFORE YOU OPERATE

\Lambda DANGER



FIRE AND EXPLOSION HAZARD!

- Diesel fuel is extremely flammable and explosive under certain conditions.
- Be sure to place the diesel fuel container on the ground when transferring the diesel fuel from the pump to the container. Hold the hose nozzle firmly against the side of the container while filling it. This prevents static electricity buildup which could cause sparks and ignite fuel vapors.
- NEVER place diesel fuel or other flammable material such as oil, hay or dried grass close to the engine during engine operation or shortly after shut down.
- Failure to comply will result in death or serious injury.

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FIRE AND EXPLOSION HAZARD!

- Diesel fuel is extremely flammable and explosive under certain conditions.
- When you prime the fuel system, operate the fuel priming lever of the mechanical fuel pump several times until the fuel filter cup is filled with fuel.
- NEVER open the air vent valve while the fuel system is being primed. The fuel filter has an internal air bleed port.
- Failure to comply will result in death or serious injury.



BEFORE YOU OPERATE



• Failure to comply could result in death or serious injury.



BURN HAZARD! Wait until the engine cools before you drain the engine coolant. Hot engine coolant may splash and burn you. • Failure to comply could result in death or serious injury. 0000016en **COOLANT HAZARD!** Wear eye protection and rubber gloves when you handle Long Life or Extended Life engine coolant. If contact with the eyes or skin should occur, flush eyes and wash immediately with clean water. • Failure to comply may result in minor or moderate injury. 0000005en

CAUTION

- Only use diesel fuels recommended by Yanmar for the best engine performance, to prevent engine damage and to comply with EPA warranty requirements.
- Only use clean diesel fuel.
- NEVER remove primary strainer from the fuel tank filler port. If removed, dirt and debris could get into the fuel system causing it to clog.

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CAUTION

- Only use the engine oil specified. Other engine oils may affect warranty coverage, cause internal engine components to seize, or shorten engine life.
- Prevent dirt and debris from contaminating engine oil.
 Carefully clean the oil cap / dipstick and the surrounding area before you remove the cap.
- NEVER mix different types of engine oil. This may adversely affect the lubricating properties of the engine oil.
- NEVER overfill. Overfilling may result in white exhaust smoke, engine overspeed or internal damage.

- Only use the engine coolant specified. Other engine coolants may affect warranty coverage, cause an internal buildup of rust and scale and / or shorten engine life.
- Prevent dirt and debris from contaminating engine coolant. Carefully clean the heat exchanger cap and the surrounding area before you remove the cap.
- NEVER mix different types of engine coolants. This may adversely affect the properties of the engine coolant.

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DIESEL FUEL

Diesel Fuel Specifications

Diesel fuel should comply with the following specifications. The table lists several worldwide specifications for diesel fuels.

DIESEL FUEL SPECIFICATION	LOCATION
No. 2-D, No. 1-D, ASTM D975-94	USA
EN590:96	European Union
ISO 8217 DMX	International
BS 2869-A1 or A2	United Kingdom
JIS K2204 Grade No.2	Japan

Additional Technical Fuel Requirements

- The fuel cetane number should be equal to 45 or higher.
- The sulfur content must not exceed 0.5% by volume. Less than 0.05% is preferred.
- NEVER mix kerosene, used engine oil, or residual fuels with the diesel fuel.
- Water and sediment in the fuel should not exceed 0.05% by volume.
- Keep the fuel tank and fuel-handling equipment clean at all times.
- Poor quality fuel can reduce engine performance and / or cause engine damage.
- Fuel additives are not recommended. Some fuel additives may cause poor engine performance. See your authorized Yanmar marine dealer or distributor for more information.
- Ash content not to exceed 0.01% by volume.
- · Carbon residue content not to exceed 0.35% by volume. Less than 0.1% is preferred.
- Total aromatics content should not exceed 35% by volume. Less than 30% is preferred.
- PAH (polycyclic aromatic hydrocarbons) content should be below 10% by volume.



Diesel Fuel Lines

Install the lines between the fuel tank and the fuel injection pump.

Be sure to install a drain cock (Figure 1, (6)) at the bottom of the fuel tank to remove water and contaminants.

Install a fuel filter / water separator (Figure 1, (3)) and a fuel filter between the fuel tank and the fuel injection pump.



Figure 1

Item	Description
1	Fuel Filter
2	Fuel Priming Pump
3	Fuel Filter / Water Separator
4	Fuel Return Line
5	Fuel Tank
6	Fuel Tank Drain Cock
7	Approximately 50 mm (1.96 in)
8	Fuel Shutoff Valve
9	Less Than 500 mm (19.68 in)
10	To Fuel Injection Pump

Filling the Fuel Tank

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FIRE AND EXPLOSION HAZARD!

- Diesel fuel is flammable and explosive under certain conditions.
- Only fill the fuel tank with diesel fuel. Filling the fuel tank with gasoline may result in a fire and will damage the engine.
- NEVER refuel with the engine running.
- Wipe up all spills immediately.
- Keep sparks, open flames or any other form of ignition (match, cigarette, static electric source) well away when refueling.
- NEVER overfill the fuel tank.
- Fill the fuel tank. Store any containers containing fuel in a well-ventilated area, away from any combustibles or sources of ignition.
- Failure to comply will result in death or serious injury.



FIRE AND EXPLOSION **HAZARD!**

- · Diesel fuel is extremely flammable and explosive under certain conditions.
- Be sure to place the diesel fuel container on the ground when transferring the diesel fuel from the pump to the container. Hold the hose nozzle firmly against the side of the container while filling it. This prevents static electricity buildup which could cause sparks and ignite fuel vapors.
- NEVER place diesel fuel or other flammable material such as oil, hay or dried grass close to the engine during engine operation or shortly after shut down.
- Failure to comply will result in death or serious injury.

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DANGER



FIRE AND EXPLOSION **HAZARD!**

- Diesel fuel is extremely flammable and explosive under certain conditions.
- · Before you operate the engine, check for fuel leaks. Replace rubberized fuel hoses every two years or every 2000 hours of engine operation, whichever comes first, even if the engine has been out of service. Rubberized fuel lines tend to dry out and become brittle after two years or 2000 hours of engine operation, whichever comes first.
- Failure to comply will result in death or serious injury.

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CAUTION

- · Only use diesel fuels recommended by Yanmar for the best engine performance, to prevent engine damage and to comply with EPA warranty requirements.
- Only use clean diesel fuel.
- NEVER remove primary strainer from the fuel tank filler port. If removed, dirt and debris could get into the fuel system causing it to clog.

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Filling the Fuel Tank (Continued)

- 1. Clean the area around the fuel cap.
- 2. Remove the fuel cap from the fuel tank.
- 3. Stop fueling when gauge shows fuel tank is full. NEVER overfill the fuel tank.
- Replace the fuel cap and hand-tighten. Over-tightening the fuel cap will damage it.

Bleeding the Fuel System



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The engine has an automatic air bleed system. Bleeding the fuel system is not required for normal engine operation.

The fuel system needs to be bled under certain conditions:

- Starting the engine for the first time
- After running out of fuel and fuel has been added to the fuel tank
- After fuel system maintenance such as changing the fuel filter and draining the fuel filter / water separator, or replacing a fuel system component

To bleed the fuel system:

- Loosen the air bleed screw at the top of the fuel / water separator 2 - 3 turns. When fuel with no air bubbles flows freely, tighten the air bleed screw.
- 2. Loosen the air bleed screw of the fuel filter 2 3 turns.
- 3. Move the knob on top of feed pump several times to feed fuel. Continue to move feed pump knob until fuel with no air bubbles flows freely.
- 4. Tighten the air bleed screw.

IMPORTANT

NEVER use the starter motor to crank the engine to bleed the fuel system. This may cause the starter motor to overheat and damage the coils, pinion and / or ring gear.

YANMAR. 6LY3 Operation Manual

ENGINE OIL

CAUTION

- Only use the engine oil specified. Other engine oils may affect warranty coverage, cause internal engine components to seize, or shorten engine life.
- Prevent dirt and debris from contaminating engine oil. Carefully clean the oil cap / dipstick and the surrounding area before you remove the cap.
- NEVER mix different types of engine oil. This may adversely affect the lubricating properties of the engine oil.
- NEVER overfill. Overfilling may result in white exhaust smoke. engine overspeed or internal damage.

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Engine Oil Specifications

Use an engine oil that meets or exceeds the following guidelines and classifications:

Service Categories

- API Service Categories CD or higher
- ACEA Service Categories E-3, E-4, and E-5
- JASO Service Category DH-1

Definitions

- API Classification (American Petroleum) Institute)
- ACEA Classification (Association des Constructeurs Européens d'Automobilies)

• JASO (Japanese Automobile Standards Organization)

Notes:

- 1. Be sure the engine oil, engine oil storage containers, and engine oil filling equipment are free of sediments and water.
- 2. Change the engine oil after the first 50 hours of operation and then at every 250 hours thereafter.
- 3. Select the oil viscosity based on the ambient temperature where the engine is being operated. See the SAE Service Grade Viscosity Chart (Figure 2).
- 4. Yanmar does not recommend the use of engine oil "additives."



Figure 2

Additional Technical Engine Oil **Requirements:**

The engine oil must be changed when the Total Base Number (TBN) has been reduced to 2.0. TBN (mgKOH/g) test method; JIS K-2501-5.2-2 (HCI), ASTM D4739 (HCI).

Engine Oil Viscosity

SAE 15W40 is the recommended oil viscosity.

If you operate your engine outside the SAE 15W40 ambient temperature limits, select the appropriate engine oil viscosity based on the ambient temperature and use the SAE Service Grade Viscosity Chart in **(Figure 2)**.

Checking Engine Oil

- 1. Make sure engine is level.
- 2. Remove dipstick (Figure 3, (3)) and wipe with clean cloth.
- 3. Fully reinsert dipstick.
- Remove dipstick. The oil level should be between upper (Figure 3, (4)) and lower (Figure 3, (5)) lines on the dipstick.
- 5. Fully reinsert dipstick.



Figure 3

Adding Engine Oil

- 1. Remove the yellow filler port cap (Figure 3, (2)) at the top of the rocker arm cover (Figure 3, (1)), and fill with engine oil.
- Fill with oil to the upper limit (Figure 3, (4)) on the dipstick (Figure 3, (3)). Insert the dipstick fully to check the level.

Engine Lube Oil Capacity (at rake 0 deg.)

Full: 18.8 L (19.9 quarts) Effective: 8 L (8.5 quarts)

- "Full" (Figure 3, (4)) means the oil amount at the upper limit on a dipstick.
- "Effective" means the difference between oil amount at upper limit and that at lower limit (Figure 3, (5)).
- 3. Tighten the filler port (Figure 3, (2)) cap securely by hand.

Selection of Marine Gear Oil

Refer to the instruction book for each marine gear.

ENGINE COOLANT



SCALD HAZARD!

- NEVER remove the fill cap if the engine is hot. Steam and hot engine coolant will spurt out and seriously burn you. Allow the engine to cool down before you attempt to remove the fill cap.
- · Securely tighten the fill cap after you check the heat exchanger. Steam can spurt out during engine operation if the cap is loose.
- ALWAYS check the level of engine coolant by observing the reserve tank.
- · Failure to comply will result in death or serious injury.

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COOLANT HAZARD!

- Wear eye protection and rubber gloves when you handle Long Life or Extended Life engine coolant. If contact with the eves or skin should occur, flush eyes and wash immediately with clean water.
- Failure to comply may result in minor or moderate injury.

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CAUTION

- · Only use the engine coolant specified. Other engine coolants may affect warranty coverage, cause an internal buildup of rust and scale and / or shorten engine life.
- Prevent dirt and debris from contaminating engine coolant. Carefully clean the heat exchanger cap and the surrounding area before you remove the cap.
- NEVER mix different types of engine coolants. This may adversely affect the properties of the engine coolant.

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Engine Coolant Specifications

Use a Long Life Coolant (LLC) that meets or exceeds the following guidelines and specifications:

Note: In the U.S., LLC is required for the warranty to be valid.

- ASTM D3306, D4985 (US)
- JIS K-2234 (Japan)
- SAE J814C, J1941, J1034 or J2036 (International)

Coolant (Fresh Water Cooling System)

IMPORTANT

Always add LLC to soft water - especially when operating in cold weather. Without LLC, cooling performance will decrease due to scale and rust in the cooling system. Water alone may freeze and form ice; it expands approximately 9% in volume.

Use the proper amount of coolant concentrate for the ambient temperature as specified by the LLC manufacturer. LLC concentration should be a minimum of 30% to a maximum of 60%. Too much LLC will decrease the cooling efficiency also.

Do not mix different types or brands of LLC or a harmful sludge may form.

Do not use hard water. Water should be clean and free from sludge or particles. Following the manufacturer's recommendations. Use the proper LLC which will not have any adverse effects on the materials (cast iron, aluminum, copper, etc.) of the engine's fresh water cooling system. See *Engine Coolant Specifications* on *page 47*.

Replace engine coolant periodically, according to the maintenance schedule in this Operation Manual.

Remove scale from the cooling system periodically by flushing the system.

Filling Heat Exchanger with Engine Coolant



- engine coolant by observing the reserve tank.
- Failure to comply will result in death or serious injury.

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This procedure is for filling the heat exchanger for the first time or refilling it after it is flushed. Note that a typical heat exchanger is shown (Figure 4).

- 1. Close the 4 water drain cocks/plugs (2 for engine coolant and 2 for seawater).
- Note: The drain cocks are opened before shipping from the production plant.



- 1. Fresh Water Drain Cock
- 2. Seawater Drain Cock

Figure 4





- 1. Fresh Water Pump
- 2. Coolant Tank
- 3. Seawater Drain Cock
- 4. Fresh Water Drain Cock
- 5. Seawater pump

Figure 5

 Remove the fill cap (Figure 6, (1)) on the heat exchanger (Figure 6, (3)) by turning the cap counterclockwise 1/3 of a turn.



Figure 6

3. Pour coolant mix slowly into the heat exchanger (Figure 6, (3)) so that air bubbles do not develop.

Pour until the coolant overflows from the filler port.

- 4. After filling the heat exchanger, replace fill cap and tighten it firmly (Figure 6, (1)). Failure to do so will cause coolant leakage. To replace the cap, align the tabs (Figure 6, (2)) on the bottom of the cap with the notches on the filler port and turn clockwise 1/3 of a turn.
- Remove the coolant recovery tank cap (Figure 7, (2)) and fill with coolant mix to the lower limit (Figure 7, (4)). Replace cap. Never fill to the upper limit (Figure 7, (3)).

Coolant recovery tank capacity: 0.8 L (1.7 pints)

6. Check the rubber hose (Figure 7, (1)) connecting the coolant recovery tank to the heat exchanger. Be sure the hose is securely connected and there is no looseness or damage.

If leaks develop in the hose or at the connection, an excessive amount of coolant will be lost.



Figure 7

When engine coolant is supplied for the first time or when it must be replaced, conduct a trial operation of the engine for about 5 minutes and check the quantity of engine oil and coolant.

CRANKING

When the engine has not been used for a long period of time, engine oil will not be distributed to all of the operating parts. Using the engine in this condition will lead to seizure.

After a long period of no use, distribute engine oil to each part by cranking. Perform in accordance with the following procedures before beginning operation.

- 1. Open seacock.
- 2. Open fuel tank cock.
- 3. Put remote control lever (Figure 8, (1)) in NEUTRAL (Figure 8, (2)). See Starting the Engine on page 64.



- 6. Turn the start switch to the ON position.
- 7. Push and hold the start switch for 15 seconds (cranking). Release the start switch and the engine stops. Wait for 15 seconds and repeat again for 15 seconds. This will distribute oil to the lubricated parts.
- 8. Push the **SELECT** button then push the N button and the N lamp flashes. Push the start switch to start the engine. Release the switch when the engine has started. Raise the engine speed gradually and check for abnormal sounds. Also check that sufficient seawater is being discharged from the outlet and that the color of the exhaust gas is normal. When you raise the engine speed, more coolant should be discharged from the outlet.

When engine coolant is supplied for the first time or when it must be replaced, conduct a trial operation of the engine for about 5 minutes and check the quantity of lubricating oil and coolant.



Figure 8

- 4. Press the battery switch.
- 5. Hold the stop lever of the governor to the stop position (gear case side) to stop fuel injection.



DAILY CHECKS

Before you head out for the day, make sure the Yanmar engine is in good operating condition. Make sure you check the following items.



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CAUTION

It is important to perform daily checks as listed in the Operation Manual.

Periodic maintenance prevents unexpected downtime, reduces the number of accidents due to poor engine performance and helps extend the life of the engine.

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Visual Checks

- 1. Check for engine oil leaks.
- 2. Check for fuel leaks.
- 3. Check for engine coolant leaks.
- 4. Check for damaged or missing parts.
- 5. Check for loose, missing, or damaged fasteners.
- 6. Check the electrical harnesses for cracks, abrasions, and damaged or corroded connectors.
- 7. Check hoses for cracks, abrasions, and damaged, loose or corroded clamps.
- 8. Check the fuel filter / water separator for presence of water and contaminants. If you find any water or contaminants, drain the fuel filter / water separator. See Drain Fuel Filter and Fuel Filter / Water Separator on page 99. If you have to drain the fuel filter / water separator frequently, drain the fuel tank and check for the presence of water in your fuel supply. See Drain the Fuel Tank on page 105.

If any problem is noted during the visual check, the necessary corrective action should be taken before you operate the engine.

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Check Diesel Fuel, Engine Oil, and Engine Coolant LevelsFollow

the procedures in Diesel Fuel on page 40, Engine Oil on page 44 and Engine Coolant on page 46 to check these levels.

Checking and Refilling Marine Gear Oil

Refer to the Operation Manual for the marine gear.

Checking the Control Head

Be sure to check that the control lever moves smoothly before use. If it is hard to operate, see your authorized Yanmar dealer or distributor.

Checking the Alarm Indicators

When operating the start switch on the rocker switch panel, check that there is no alarm message on the display and the alarm indicators work normally. See Display Function on page 28.

Preparing Fuel, Oil, and Coolant in Reserve

Prepare sufficient fuel for the day's operation. Always store engine oil and coolant in reserve (for at least one refill) on board, to be ready for emergencies.



This section of the *Operation Manual* describes the procedures for starting the engine, checking engine performance during operation, and shutting the engine down.

CAUTION



NEVER permit anyone to install or operate the engine without proper training.

- Read and understand this Operation Manual before you operate or service the engine to ensure that you follow safe operating practices and maintenance procedures.
- Safety signs and labels are additional reminders for safe operating and maintenance techniques.
- See your authorized Yanmar marine dealer or distributor for additional training.

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- the engine is hot. Steam and hot engine coolant will spurt out and seriously burn you. Allow the engine to cool down before you attempt to remove the fill cap.
- Securely tighten the fill cap after you check the heat exchanger. Steam can spurt out during engine operation if the cap is loose.
- ALWAYS check the level of engine coolant by observing the reserve tank.
- · Failure to comply will result in death or serious injury.

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DANGER



EXPLOSION HAZARD!

- Keep the area around the battery well-ventilated. While the engine is running or the battery is charging, hydrogen gas is produced which can be easily ignited.
- Keep sparks, open flame and any other form of ignition away while the engine is running or battery is charging.
- · Failure to comply will result in death or serious injury.



\Lambda DANGER



FIRE AND EXPLOSION HAZARD!

- Diesel fuel is flammable and explosive under certain conditions.
- Only fill the fuel tank with diesel fuel. Filling the fuel tank with gasoline may result in a fire and will damage the engine.
- NEVER refuel with the engine running.
- Wipe up all spills immediately.
- Keep sparks, open flames or any other form of ignition (match, cigarette, static electric source) well away when refueling.
- NEVER overfill the fuel tank.
- Fill the fuel tank. Store any containers containing fuel in a well-ventilated area, away from any combustibles or sources of ignition.
- Failure to comply will result in death or serious injury.

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A DANGER



FIRE AND EXPLOSION HAZARD!

- Diesel fuel is flammable and explosive under certain conditions.
- NEVER remove the fuel cap with the engine running.
- Failure to comply will result in death or serious injury.





FIRE AND EXPLOSION **HAZARD!**

- Diesel fuel is extremely flammable and explosive under certain conditions.
- Be sure to place the diesel fuel container on the ground when transferring the diesel fuel from the pump to the container. Hold the hose nozzle firmly against the side of the container while filling it. This prevents static electricity buildup which could cause sparks and ignite fuel vapors.
- NEVER place diesel fuel or other flammable material such as oil, hay or dried grass close to the engine during engine operation or shortly after shut down.
- · Failure to comply will result in death or serious injury.

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DANGER



FIRE AND EXPLOSION **HAZARD!**

- Diesel fuel is flammable and explosive under certain conditions.
- Before you operate the engine, check for fuel leaks. Replace rubberized fuel hoses every two years or every 2000 hours of engine operation, whichever comes first, even if the engine has been out of service. Rubberized fuel lines tend to dry out and become brittle after two years or 2000 hours of engine operation, whichever comes first
- Failure to comply will result in death or serious injury.

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SUDDEN MOVEMENT HAZARD!

- Be sure the boat is in open water away from other boats, docks, and other obstructions before increasing rpm.
- Failure to comply could result in death or serious injury.

0000006enMarine



WARNING



SEVER HAZARD!

- Keep hands and other body parts away from moving / rotating parts such as the flywheel or PTO shaft.
- Wear tight fitting clothing and keep your hair short or tie it back while the engine is running.
- Remove all jewelry before you operate or service the engine.
- NEVER start the engine in gear. Sudden movement of the engine and / or vessel could cause death or serious personal injury.
- NEVER operate the engine without the guards in place.
- Before you start the engine make sure that all bystanders are clear of the area.
- Keep children and pets away while the engine is operating.
- Check before starting the engine that any tools or shop rags used during maintenance have been removed from the area.
- Failure to comply could result in death or serious injury.

0000002enMarine



EXHAUST HAZARD!

- NEVER operate the engine in an enclosed area such as a garage, tunnel, underground room, manhole or ship's hold without proper ventilation.
- NEVER block windows, vents, or other means of ventilation if the engine is operating in an enclosed area. All internal combustion engines create carbon monoxide gas during operation. Accumulation of this gas within an enclosure could cause illness or even death.
- Make sure that all connections are tightened to specifications after repair is made to the exhaust system.
- Failure to comply could result in death or serious injury.





A WARNING



EXPOSURE HAZARD!

- Wear personal protective equipment such as gloves, work shoes, eye and hearing protection as required by the task at hand.
- NEVER wear jewelry, unbuttoned cuffs, ties or loose fitting clothing when you are working near moving / rotating parts such as the flywheel or PTO shaft.
- ALWAYS tie back long hair when you are working near moving / rotating parts such as a flywheel or PTO shaft.
- NEVER operate the engine while wearing a headset to listen to music or radio because it will be difficult to hear the warning signals.
- Failure to comply could result in death or serious injury.

0000005enMarine





HIGH PRESSURE HAZARD!

- Avoid skin contact with high pressure diesel fuel spray caused by a fuel system leak such as a broken fuel injection line. High pressure fuel can penetrate your skin and result in serious injury. If you are exposed to high pressure fuel spray, obtain prompt medical treatment.
- NEVER check for a fuel leak with your hands. ALWAYS use a piece of wood or cardboard. Have your authorized Yanmar marine dealer or distributor repair the damage.
- Failure to comply could result in death or serious injury.

0000008enMarine

A WARNING



BURN HAZARD!

- If you must drain the engine oil while it is still hot, stay clear of the hot engine oil to avoid being burned.
- ALWAYS wear eye protection.
- Failure to comply could result in death or serious injury.

0000011en

A WARNING



BURN HAZARD!

- Keep your hands, and other body parts, away from hot engine surfaces such as the muffler, exhaust pipe, turbocharger (if equipped) and engine block during operation and shortly after you shut the engine down. These surfaces are extremely hot while the engine is operating and could seriously burn you.
- Failure to comply could result in death or serious injury.

0000015en



BURN HAZARD!

- Wait until the engine cools before you drain the engine coolant. Hot engine coolant may splash and burn you.
- Failure to comply could result in death or serious injury.





- rubber gloves when you handle Long Life or Extended Life engine coolant. If contact with the eves or skin should occur, flush eyes and wash immediately with clean water.
- Failure to comply may result in minor or moderate injury.

0000005en

CAUTION

Observe the following environmental operating conditions to maintain engine performance and avoid premature engine wear:

- Avoid operating in extremely dusty conditions.
- · Avoid operating in the presence of chemical gases or fumes.

0000003enMarine

CAUTION

- Only use diesel fuels recommended by Yanmar for the best engine performance, to prevent engine damage and to comply with EPA warranty requirements.
- Only use clean diesel fuel.
- NEVER remove primary strainer from the fuel tank filler port. If removed, dirt and debris could get into the fuel system causing it to clog.

0000004enMarine

CAUTION

- Only use the engine oil specified. Other engine oils may affect warranty coverage, cause internal engine components to seize, or shorten engine life.
- Prevent dirt and debris from contaminating engine oil. Carefully clean the oil cap / dipstick and the surrounding area before you remove the cap.
- NEVER mix different types of engine oil. This may adversely affect the lubricating properties of the engine oil.
- NEVER overfill. Overfilling may result in white exhaust smoke, engine overspeed or internal damage.



NEVER hold the key in the START position for longer than 15 seconds or the starter motor will overheat.

0000007en

CAUTION

NEVER use an engine starting aid such as ether. Engine damage will result.

0000009en

CAUTION

- Only use the engine coolant specified. Other engine coolants may affect warranty coverage, cause an internal buildup of rust and scale and / or shorten engine life.
- Prevent dirt and debris from contaminating engine coolant. Carefully clean the heat exchanger cap and the surrounding area before you remove the cap.
- NEVER mix different types of engine coolants. This may adversely affect the properties of the engine coolant.

0000006enTrans

CAUTION

The illustrations and descriptions of optional equipment in this manual, such as the operator's console, are for a typical engine installation. Refer to the documentation supplied by the optional equipment manufacturer for specific operation and maintenance instructions.

0000018en

CAUTION

If any problem is noted during the visual check, the necessary corrective action should be taken before you operate the engine.

0000021en

CAUTION

If any indicator illuminates during engine operation, stop the engine immediately. Determine the cause and repair the problem before you continue to operate the engine.

0000029en

CAUTION

Clean or replace the air cleaner element if the air intake restriction exceeds the value listed in the Operation and Service Manuals.

0000046enMarine

NEVER turn off the batterv switch (if equipped) or short the battery cables during operation. Damage to the electric system will result.

0000061en

CAUTION

NEVER use the Emergency Stop switch for a normal engine shutdown. Use this switch only when stopping the engine suddenly in an emergency.

0000156ep

CAUTION

Be sure to close the seacock.

Neglecting to close the seacock could allow water to leak into the boat and may cause it to sink.

0000152en

CAUTION

Observe the following environmental operating conditions to maintain engine performance and avoid premature engine wear:

- NEVER run the engine if the ambient temperature is above +40°C (+104°F) or below -16°C (+5°F)
 - If the ambient temperature exceeds +40°C (+104°F) the engine may overheat and cause the engine oil to break down.
 - If the ambient temperature falls below -16°C (+5°F) rubber components such as gaskets and seals will harden causing premature engine wear and damage.
 - See your authorized Yanmar marine engine dealer or distributor if the engine will be operated in either temperature extreme.
- See your authorized Yanmar marine dealer or distributor if you need to operate the engine at high altitudes. At high altitudes the engine will lose power, run rough, and produce exhaust gases that exceed the design specifications.

0000065enMarine



Excessive vibration may cause damage to the engine, marine gear, hull and onboard equipment. In addition, it causes noticeable passenger and crew discomfort. Carefully select engine mounts and propellers when you design Yanmar marine engine applications.

0000085en

CAUTION

Sea trials can only be performed safely when the vessel is adequately manned. Do not attempt to single-hand a vessel while collecting and recording performance data.

0000086en

CAUTION

When you install instrument panels:

- Avoid wet locations
- Avoid locations subject to vibration
- Set meters at correct angle

Failure to follow these instructions may cause inaccurate or unreliable instrumentation.

0000087en

CAUTION

If you have an installation with two or three engines, and only one engine is operating, it is important to limit the amount of throttle applied to the running engine. If you observe black smoke or movement of the throttle does not increase engine RPM, you are overloading the engine that is running. Immediately throttle back to approximately 2/3 throttle or to a setting where the engine performs normally. Failure to do so may cause the running engine to overheat or cause excess carbon buildup which may shorten the engine's life.

0000150en

CAUTION

- If the vessel is equipped with a water lift (water lock) muffler, excessive cranking could cause seawater to enter the cylinders and damage the engine. If the engine does not start after cranking 15 seconds, close the thru-hull water intake valve to avoid filling the muffler with water. Crank for 15 seconds or until the engine starts. When the engine does start, stop the engine immediately and press the switch to the OFF position.
- Be sure to re-open the seacock and restart the engine. Operate the engine normally.

STARTING THE ENGINE

Before Starting the Engine

- 1. Open the seacock.
- 2. Open the fuel tank cock.
- 3. Set the control lever on the control head (Figure 1, (2)) in N (NEUTRAL) (Figure 1, (1)) position.



Figure 1

4. Turn ON the battery switch and the screen (Figure 2) pops up on the display. Then the screen will change to the engine data display mode.





5. Press the Eng ON (Figure 3, (1)) switch and the following changes occur:



Figure 3

 The needle appears in the engine tachometer on the display.



Figure 4

To Start the Engine

To start the engine, press START (upper half) of ENG ON switch (Figure 3, (1)).

If the Engine Fails to Start

CAUTION

NEVER hold the key in the START position for longer than 15 seconds or the starter motor will overheat.


Before pressing the start switch again, confirm that the engine has stopped completely. If the starter motor is operated before the engine has completely stopped, the starter motor pinion gear will be damaged.

Note: Hold the start switch for a maximum of 15 seconds in the START position. If the engine does not start the first time, press the rocker switch OFF and wait for about 15 seconds before trying again. After the engine has started, do not press the rocker switch off. (It should remain ON.)

CAUTION

- If the vessel is equipped with a water lift (water lock) muffler, excessive cranking could cause seawater to enter the cylinders and damage the engine. If the engine does not start after cranking 15 seconds, close the thru-hull water intake valve to avoid filling the muffler with water. Crank for 15 seconds or until the engine starts. When the engine does start, stop the engine immediately and press the switch to the OFF position.
- Be sure to re-open the seacock and restart the engine. Operate the engine normally.

0000151en

After the engine has started, check the following items at a low engine speed:

- 1. Check that the indicators on the display and the control head are normal.
- 2. Check for water or oil leakage from the engine.

- 3. Check that exhaust color, engine vibrations, and sound are normal.
- 4. When there are no problems, keep the engine at low speed to send engine oil to all parts of the engine.
- 5. Check that sufficient seawater is discharged from the seawater outlet pipe. Operation with inadequate seawater discharge will damage the impeller of the seawater pump. If seawater discharge is too small, stop the engine immediately. Identify the cause and repair.
 - Is the seacock open?
 - Is the inlet of the seacock on the hull bottom clogged?
 - Is the seawater suction hose broken, or does the hose suck in air due to a loose joint?
- Note: The engine will seize if it is operated when seawater discharge is too small or if load is applied without any warming up operation.

Shifting

WARNING

SUDDEN MOVEMENT **HAZARD!**

The boat will start to move when the marine gear is engaged:

- · Ensure the boat is clear of all obstacles forward and aft.
- Quickly shift to the FORWARD position then back to the **NEUTRAL** position.
- Observe whether the boat moves in the direction you expect.
- · Failure to comply could result in death or serious injury.

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Neutral

Be sure to set the control lever at N (NEUTRAL) position (Figure 5, (1)).

- Note: Clutch operation or the use of trolling during high speed will cause internal parts of the clutch to break or to wear excessively.
- 1. Before using the marine gear, be sure to move the control lever (throttle) to a low idle position (the detent position). Then move the control lever slowly to a higher speed position after completing clutch engagement.
- 2. When changing between FORWARD and REVERSE, bring the clutch to NEUTRAL and pause before slowly shifting to the desired position. Do not shift abruptly from FORWARD to **REVERSE** or vice versa.
- 3. Move the control lever accurately and fully into the FORWARD, NEUTRAL, and REVERSE positions.



Figure 5

Ahead

Gradually move the control lever in the F (forward) direction (Figure 5, (2)) to the position of the Forward Detent. The marine gear will shift into FORWARD. The engine will remain at idle. Pushing further on the control lever will increase the rpm up to a maximum of wide open throttle (WOT).

Astern

Gradually move the control lever in the R (reverse) direction to the position of the Reverse Detent. The marine gear will shift into REVERSE. The engine will remain at idle. Pulling further on the control lever will increase the rpm up to a maximum of wide open throttle (WOT).



CAUTIONS DURING OPERATION

CAUTION

If you have an installation with two or three engines, and only one engine is operating, please note that if the propeller shaft thru-hull (stuffing box) is lubricated by engine water pressure and the engines are interconnected, care must be taken that water from the running engine does not enter the exhaust of the non-running engine(s). This water could cause seizure of the non-running engine(s). See your authorized Yanmar marine dealer or distributor for a complete explanation of this condition.

0000157en

CAUTION

If you have an installation with two or three engines, and only one engine is operating, it is important to limit the amount of throttle applied to the running engine. If you observe black smoke or movement of the throttle does not increase engine RPM, you are overloading the engine that is running. Immediately throttle back to approximately 2/3 throttle or to a setting where the engine performs normally. Failure to do so may cause the running engine to overheat or cause excess carbon buildup which may shorten the engine's life.

0000150en

CAUTION

If you have an installation with two or three engines, and only one engine is operating, the water pickup (thru-hull) of the non-running engine(s) should be closed. This will prevent water from being forced past the seawater pump and eventually finding its way into the engine. The result of water entering the engine could cause seizure or other serious problems.

New Engine Break In:

- On the initial engine start-up, check for proper engine oil pressure, diesel fuel leaks, engine oil leaks, coolant leaks, and for proper operation of the indicators and / or gauges.
- During the first 50 hours of operation operate your new engine under a substantial load at all times. For best break-in results operate the engine at various speeds.
- · Operating the engine in NEUTRAL must be avoided. During the first 50 hours, avoid operation below 2000 rpm.
- During the break-in period, carefully observe the engine oil pressure and engine temperature.
- · During the break-in period, check the engine oil and coolant levels frequently.

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Note: Engine trouble can arise if the engine is operated for a long time under overloaded conditions with the control lever in the full throttle position (maximum engine speed position), exceeding the continuous rated output engine speed. Operate the engine at about 100 rpm lower than the full throttle engine speed.

Always be on the lookout for problems during engine operation.

Pay particular attention to the following:

1. Is sufficient seawater being discharged from the exhaust and seawater outlet pipe?

If the discharge is small, stop the engine immediately; identify the cause and repair.

- 2. Is the exhaust color normal? The continuous emission of black exhaust smoke indicates engine overloading. This shortens the engine's life and should be avoided.
- 3. Are there abnormal vibrations or noise?

CAUTION

Excessive vibration may cause damage to the engine, marine gear, hull and onboard equipment. In addition, it causes noticeable passenger and crew discomfort. Carefully select engine mounts and propellers when you design Yanmar marine engine applications.

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Depending on the hull structure, engine and hull resonance may suddenly become great at a certain engine speed range, causing heavy vibrations. Avoid operation in this speed range. If you hear any abnormal sounds, stop the engine and inspect.



4. Alarm buzzer sounds during operation.

CAUTION

If any alarm indicator with audible alarm sound appears on the display during engine operation, stop the engine immediately. Determine the cause and repair the problem before you continue to operate the engine.

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5. Is there water, oil, or fuel leakage, or are there any loose bolts?

Check the engine room periodically for any problems.

6. Is there sufficient diesel fuel in the diesel fuel tank?

Replenish diesel fuel before leaving the dock to avoid running out of fuel during operation.

- When operating the engine at low speed for long periods of time, race the engine once every 2 hours.
- Note: Racing the Engine: With the gear in NEUTRAL, accelerate from the low speed position to the high speed position and repeat this process about 5 times. This is done to clean out carbon from the cylinders and the fuel injection valve. Neglecting to race the engine will result in poor exhaust color and reduce engine performance.
- 8. If possible, periodically operate the engine at near maximum rpm, while underway.

This will generate higher exhaust temperatures, which will help clean out hard carbon deposits, maintaining engine performance and prolonging the life of the engine.

CAUTION

NEVER turn off the battery switch (if equipped) or short the battery cables during operation. Damage to the electric system will result.



SHUTTING DOWN THE **ENGINE**

Stop the engine in accordance with the following procedures:

Normal Shutdown

- 1. Return the control lever to NEUTRAL position. (The N light turns on.)
- 2. Cool the engine down at low speed (below 1000 rpm) for about 5 minutes.

CAUTION

For maximum engine life, Yanmar recommends that when shutting the engine down, you allow the engine to idle, without load, for 5 minutes. This will allow the engine components that operate at high temperatures, such as the turbocharger (if equipped) and exhaust system, to cool slightly before the engine itself is shut down.

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- 3. Push OFF (bottom half) of ENG ON switch (Figure 6, (3)). The engine shuts down within 2 to 7 seconds normally. The regular engine shutdown takes time because the controller is adjusted in the fuel injection timing to the most suitable position for the next start.
- 4. Turn the battery switch off.
- 5. Close the fuel tank cock.
- 6. Close the seacock.

CAUTION

Be sure to close the seacock.

Neglecting to close the seacock could allow water to leak into the boat and may cause it to sink.

0000152en



Figure 6

Emergency Shutdown

Electric Emergency Stop:

CAUTION

NEVER use the Emergency Stop switch for a normal engine shutdown. Use this switch only when stopping the engine suddenly in an emergency.

0000156en

Push the upper part of emergency stop switch (Figure 6, (1)) on the right of the panel and the engine shuts down immediately, without the time lag of regular engine shutdown. After shutdown push the bottom part of the emergency stop switch (Figure 6, (2)) to be returned to the former position.



ENGINE OPERATION

IMPORTANT

Use this switch only in an emergency. Under normal circumstances, use the OFF, ON, START switch (Figure 6, (1)) to stop the engine.

Note: Restarting the engine after using the emergency stop may be slower or more difficult than normal starting.

Mechanical Emergency Stop:

If for some reason you can't stop the engine by the stop switch on the panel, push down the stop lever (**Figure 7, (1)**) to the front side (**Figure 7, (2)**) to shut down the engine in an engine room. When pushing down the stop lever to the front side, the trouble indication of the governor pops up in the display. After the engine shutdown return the stop lever to the former position.

When pushing down the ON switch on the panel, check that the trouble indication does not appear in the display. (normal condition)



Figure 7

WARNING



SEVER HAZARD!

- Keep hands and other body parts away from moving / rotating parts such as the flywheel or PTO shaft.
- Wear tight fitting clothing and keep your hair short or tie it back while the engine is running.
- Remove all jewelry before you operate or service the engine.
- NEVER start the engine in gear. Sudden movement of the engine and / or vessel could cause death or serious personal injury.
- NEVER operate the engine without the guards in place.
- Before you start the engine make sure that all bystanders are clear of the area.
- Keep children and pets away while the engine is operating.
- Check the engine that any tools or shop rags used during maintenance have been removed from the area.
- Failure to comply could result in death or serious injury.

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This section of the *Operation Manual* describes the procedures for proper care and maintenance of the engine.

SAFETY PRECAUTIONS

Before You Operate



During Operation and Maintenance

EXPLOSION HAZARD! · Keep the area around the battery well-ventilated. While the engine is running or the battery is charging, hydrogen gas is produced which can be easily ignited. • Keep sparks, open flame and

- any other form of ignition away while the engine is running or battery is charging.
- · Failure to comply will result in death or serious injury.

0000003en



SCALD HAZARD!

- NEVER remove the fill cap if the engine is hot. Steam and hot engine coolant will spurt out and seriously burn you. Allow the engine to cool down before you attempt to remove the fill cap.
- Securely tighten the fill cap after you check the heat exchanger. Steam can spurt out during engine operation if the cap is loose.
- ALWAYS check the level of engine coolant by observing the reserve tank.
- Failure to comply will result in death or serious injury.

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A DANGER



FIRE AND EXPLOSION HAZARD!

- Diesel fuel is flammable and explosive under certain conditions.
- When you remove any fuel system component to perform maintenance (such as changing the fuel filter) place an approved container under the opening to catch the fuel.
- NEVER use a shop rag to catch the fuel. Vapors from the rag are flammable and explosive.
- Wipe up any spills immediately.
- Wear eye protection. The fuel system is under pressure and fuel could spray out when you remove any fuel system component.
- Failure to comply will result in death or serious injury.

0000009en

A DANGER



FIRE AND EXPLOSION HAZARD!

- Diesel fuel is flammable and explosive under certain conditions.
- NEVER use diesel fuel as a cleaning agent.
- Failure to comply will result in death or serious injury.

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- NEVER remove the fuel cap with the engine running.
- Failure to comply will result in death or serious injury.





A DANGER



FIRE AND EXPLOSION **HAZARD!**

- Diesel fuel is flammable and explosive under certain conditions.
- · Only fill the fuel tank with diesel fuel. Filling the fuel tank with gasoline may result in a fire and will damage the engine.
- NEVER refuel with the engine running.
- Wipe up all spills immediately.
- · Keep sparks, open flames or any other form of ignition (match, cigarette, static electric source) well away when refueling.
- NEVER overfill the fuel tank.
- Fill the fuel tank. Store any containers containing fuel in a well-ventilated area, away from any combustibles or sources of ignition.
- · Failure to comply will result in death or serious injury.



\Lambda DANGER



FIRE AND EXPLOSION HAZARD!

- Diesel fuel is extremely flammable and explosive under certain conditions.
- Before you operate the engine, check for fuel leaks. Replace rubberized fuel hoses every two years or every 2000 hours of engine operation, whichever comes first, even if the engine has been out of service. Rubberized fuel lines tend to dry out and become brittle after two years or 2000 hours of engine operation, whichever comes first.
- Failure to comply will result in death or serious injury.

0000015en



EXPLOSION HAZARD!

- NEVER check the remaining battery charge by shorting out the terminals. This will result in a spark and may cause an explosion or fire. Use a hydrometer to check the remaining battery charge.
- If the electrolyte is frozen, slowly warm the battery before you recharge it.
- Failure to comply will result in death or serious injury.

0000007en



CRUSH HAZARD!

- When you need to transport an engine for repair have a helper assist you attach it to a hoist and load it on a truck.
- NEVER stand under hoisted engine. If the hoist mechanism fails, the engine will fall on you, causing serious injury or death.
- Failure to comply will result in death or serious injury.

A DANGER



FIRE AND EXPLOSION **HAZARD!**

- Diesel fuel is flammable and explosive under certain conditions.
- If the unit has an electric fuel pump, when you prime the fuel system, turn the key switch to the ON position for 10 to 15 seconds to allow the electric fuel pump to prime the system.
- · If the unit has a mechanical fuel pump, when you prime the fuel system, operate the fuel priming lever of the mechanical fuel pump several times until the fuel filter cup is filled with fuel.
- NEVER open the air vent valve while the fuel system is being primed. The fuel filter has an internal air bleed port.
- · Failure to comply will result in death or serious injury.

0000010en



SEVER HAZARD!

- Keep hands and other body parts away from moving / rotating parts such as the flywheel or PTO shaft.
- Wear tight fitting clothing and keep your hair short or tie it back while the engine is running.
- Remove all jewelry before you operate or service the engine.
- NEVER start the engine in gear. Sudden movement of the engine and / or vessel could cause death or serious personal injury.
- NEVER operate the engine without the guards in place.
- Before you start the engine make sure that all bystanders are clear of the area.
- Keep children and pets away while the engine is operating.
- Check before starting the engine that any tools or shop rags used during maintenance have been removed from the area.
- Failure to comply could result in death or serious injury.

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A WARNING



EXHAUST HAZARD!

- NEVER operate the engine in an enclosed area such as a garage, tunnel, underground room, manhole or ship's hold without proper ventilation.
- NEVER block windows, vents, or other means of ventilation if the engine is operating in an enclosed area. All internal combustion engines create carbon monoxide gas during operation. Accumulation of this gas within an enclosure could cause illness or even death.
- Make sure that all connections are tightened to specifications after repair is made to the exhaust system.
- Failure to comply could result in death or serious injury.

000003en

AWARNING



ALCOHOL AND DRUG HAZARD!

- NEVER operate the engine while you are under the influence of alcohol or drugs.
- NEVER operate the engine when you are feeling ill.
- Failure to comply could result in death or serious injury.



A WARNING

EXPOSURE HAZARD!

- Wear personal protective equipment such as gloves, work shoes, eye and hearing protection as required by the task at hand.
- NEVER wear jewelry, unbuttoned cuffs, ties or loose fitting clothing when you are working near moving / rotating parts such as the flywheel or PTO shaft.
- ALWAYS tie back long hair when you are working near moving / rotating parts such as a flywheel or PTO shaft.
- NEVER operate the engine while wearing a headset to listen to music or radio because it will be difficult to hear the warning signals.
- · Failure to comply could result in death or serious injury.

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SUDDEN MOVEMENT **HAZARD!**

- Be sure the boat is in open water away from other boats, docks, and other obstructions before increasing rpm.
- Failure to comply could result in death or serious injury.

0000006enMarine

A WARNING



BURN HAZARD!

- Batteries contain sulfuric acid. **NEVER** allow battery fluid to come in contact with clothing, skin or eves. Severe burns could result. ALWAYS wear safety goggles and protective clothing when servicing the battery. If battery fluid contacts the eyes and / or skin, immediately flush the affected area with a large amount of clean water and obtain prompt medical treatment.
- Failure to comply could result in death or serious injury.





HIGH PRESSURE HAZARD!

- Avoid skin contact with high pressure diesel fuel spray caused by a fuel system leak such as a broken fuel injection line. High pressure fuel can penetrate your skin and result in serious injury. If you are exposed to high pressure fuel spray, obtain prompt medical treatment.
- NEVER check for a fuel leak with your hands. ALWAYS use a piece of wood or cardboard. Have your authorized Yanmar marine dealer or distributor repair the damage.
- Failure to comply could result in death or serious injury.

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SHOCK HAZARD!

- Turn off the battery switch (if equipped) or disconnect the negative battery cable before servicing the electrical system.
- Check the electrical harnesses for cracks, abrasions, and damaged or corroded connectors. ALWAYS keep the connectors and terminals clean.
- Failure to comply could result in death or serious injury.









- Only use diesel fuels recommended by Yanmar for the best engine performance, to prevent engine damage and to comply with EPA warranty requirements.
- · Only use clean diesel fuel.
- NEVER remove primary strainer from the fuel tank filler port. If removed, dirt and debris could get into the fuel system causing it to clog.

0000004enMarine

CAUTION

If any problem is noted during the visual check, the necessary corrective action should be taken before you operate the engine.

0000021en

CAUTION

Be sure to close the seacock.

Neglecting to close the seacock could allow water to leak into the boat and may cause it to sink.

0000152en

CAUTION

The illustrations and descriptions of optional equipment in this manual, such as the operator's console, are for a typical engine installation. Refer to the documentation supplied by the optional equipment manufacturer for specific operation and maintenance instructions.

0000018en

CAUTION

If any indicator illuminates during engine operation, stop the engine immediately. Determine the cause and repair the problem before you continue to operate the engine.

0000029en

CAUTION

- If the vessel is equipped with a water lift (water lock) muffler, excessive cranking could cause seawater to enter the cylinders and damage the engine. If the engine does not start after cranking 15 seconds. close the thru-hull water intake valve to avoid filling the muffler with water. Crank for 15 seconds or until the engine starts. When the engine does start, stop the engine immediately and press the switch to the OFF position.
- Be sure to re-open the seacock and restart the engine. Operate the engine normally.



Observe the following environmental operating conditions to maintain engine performance and avoid premature engine wear:

- NEVER run the engine if the ambient temperature is above +40°C (+104°F) or below -16°C (+5°F)
 - If the ambient temperature exceeds +40°C (+104°F) the engine may overheat and cause the engine oil to break down.
 - If the ambient temperature falls below -16°C (+5°F) rubber components such as gaskets and seals will harden causing premature engine wear and damage.
 - See your authorized Yanmar marine engine dealer or distributor if the engine will be operated in either temperature extreme.
- See your authorized Yanmar marine dealer or distributor if you need to operate the engine at high altitudes. At high altitudes the engine will lose power, run rough, and produce exhaust gases that exceed the design specifications.

0000065enMarine

CAUTION

- Only use the engine coolant specified. Other engine coolants may affect warranty coverage, cause an internal buildup of rust and scale and / or shorten engine life.
- Prevent dirt and debris from contaminating engine coolant. Carefully clean the heat exchanger cap and the surrounding area before you remove the cap.
- NEVER mix different types of engine coolants. This may adversely affect the properties of the engine coolant.

0000006enTrans

CAUTION

- Only use the engine oil specified. Other engine oils may affect warranty coverage, cause internal engine components to seize, or shorten engine life.
- Prevent dirt and debris from contaminating engine oil.
 Carefully clean the oil cap / dipstick and the surrounding area before you remove the cap.
- NEVER mix different types of engine oil. This may adversely affect the lubricating properties of the engine oil.
- NEVER overfill. Overfilling may result in white exhaust smoke, engine overspeed or internal damage.

- NEVER overfill the engine with engine oil.
- ALWAYS keep the oil level between upper and lower lines on the oil cap / dipstick.

0000015en

CAUTION

For maximum engine life, Yanmar recommends that when shutting the engine down, you allow the engine to idle, without load, for 5 minutes. This will allow the engine components that operate at high temperatures, such as the turbocharger (if equipped) and exhaust system, to cool slightly before the engine itself is shut down.

000008en

CAUTION

NEVER use an engine starting aid such as ether. Engine damage will result.

0000009en

CAUTION

Make sure the engine is installed on a level surface. If a Yanmar Marine Engine is installed at an angle that exceeds the specifications stated in the **Yanmar Marine Engine Operation** Manual, engine oil may enter the combustion chamber causing excessive engine speed, white exhaust smoke and serious engine damage. This applies to engines that run continuously or those that run for short periods of time.

0000010enMarine

CAUTION

Be careful not to get any oil on the V-belt. Oil on the belt causes slipping and stretching. Replace the belt if it is damaged.

0000153en

CAUTION

If seawater is left inside of the engine, it may freeze and damage parts of the cooling system when the ambient temperature is below 0°C (32°F).

0000154en

CAUTION

NEVER allow engine oil or diesel fuel oil to contact the flexible rubber mount. Oil makes rubber deteriorate.





- ALWAYS be environmentally responsible.
- Follow the guidelines of the EPA or other governmental agencies for the proper disposal of hazardous materials such as engine oil, diesel fuel and engine coolant. Consult the local authorities or reclamation facility.
- NEVER dispose of hazardous materials irresponsibly by dumping them into a sewer, on the ground or into ground water or waterways.
- Failure to follow these procedures may seriously harm the environment.

0000013en

CAUTION

Protect the air cleaner, turbocharger (if equipped) and electric components from damage when you use steam or high-pressure water to clean the engine.

0000014en

CAUTION

If the alarm window with audible alarm fails to display and go out about three seconds later when the rocker switch is pushed to the ON position, see your authorized Yanmar marine dealer or distributor for service before operating the engine.

0000028enMarine

CAUTION

NEVER use the Emergency Stop switch for a normal engine shutdown. Use this switch only when stopping the engine suddenly in an emergency.

0000156en

CAUTION

Establish a periodic maintenance plan according to the engine application and make sure you perform the required periodic maintenance at intervals indicated. Failure to follow these guidelines will impair the engine's safety and performance characteristics, shorten the engine's life and may affect the warranty coverage on your engine.

It is important to perform daily checks as listed in the Operation Manual.

Periodic maintenance prevents unexpected downtime, reduces the number of accidents due to poor engine performance and helps extend the life of the engine.

0000060enMarine

CAUTION

If the fuel filter / water separator is positioned higher than the fuel level in the fuel tank, water may not drip out when the fuel filter / water separator drain cock is opened. If this happens, turn the air vent screw on the top of the fuel filter / water separator 2-3 turns counterclockwise.

Be sure to tighten the air vent screw after the water has drained out.

0000025en

CAUTION

- When the engine is operated in dusty conditions, clean the air cleaner element more frequently.
- NEVER operate the engine with the air cleaner or element(s) removed. This may allow foreign material to enter the engine and damage it.

0000026en

CAUTION

Clean or replace the air cleaner element if the air intake restriction exceeds the value listed in the Operation and Service Manuals.

0000046enMarine

CAUTION

NEVER turn off the battery switch (if equipped) or short the battery cables during operation. Damage to the electric system will result.

0000061en

CAUTION

NEVER move the adjustment nuts without using a hoist to take the pressure off the engine mount. Failure to comply may cause damage to the stud and nut threads.

0000084en

CAUTION

Excessive vibration may cause damage to the engine, marine gear. hull and onboard equipment. In addition, it causes noticeable passenger and crew discomfort. Carefully select engine mounts and propellers when you design Yanmar marine engine applications.



Sea trials can only be performed safely when the vessel is adequately manned. Do not attempt to single-hand a vessel while collecting and recording performance data.

0000086en

CAUTION

When you install instrument panels:

- Avoid wet locations
- Avoid locations subject to vibration
- Set meters at correct angle

Failure to follow these instructions may cause inaccurate or unreliable instrumentation.

0000087en

CAUTION

If you have an installation with two or three engines, and only one engine is operating, it is important to limit the amount of throttle applied to the running engine. If you observe black smoke or movement of the throttle does not increase engine RPM, you are overloading the engine that is running. Immediately throttle back to approximately 2/3 throttle or to a setting where the engine performs normally. Failure to do so may cause the running engine to overheat or cause excess carbon buildup which may shorten the engine's life.

0000150en

CAUTION

If you have an installation with two or three engines, and only one engine is operating, please note that if the propeller shaft thru-hull (stuffing box) is lubricated by engine water pressure and the engines are interconnected, care must be taken that water from the running engine does not enter the exhaust of the non-running engine(s). This water could cause seizure of the non-running engine(s). See your authorized Yanmar marine dealer or distributor for a complete explanation of this condition.

If you have an installation with two or three engines, and only one engine is operating, the water pickup (thru-hull) of the non-running engine(s) should be closed. This will prevent water from being forced past the seawater pump and eventually finding its way into the engine. The result of water entering the engine could cause seizure or other serious problems.

0000158en

PRECAUTIONS

The Importance of Periodic Maintenance

Engine deterioration and wear occurs in proportion to length of time the engine has been in service and the conditions the engine is subject to during operation. Periodic maintenance prevents unexpected downtime, reduces the number of accidents due to poor machine performance and helps extend the life of the engine.



Performing Periodic Maintenance





EXHAUST HAZARD!

- NEVER operate the engine in an enclosed area such as a garage, tunnel, underground room, manhole or ship's hold without proper ventilation.
- NEVER block windows, vents, or other means of ventilation if the engine is operating in an enclosed area. All internal combustion engines create carbon monoxide gas during operation. Accumulation of this gas within an enclosure could cause illness or even death.
- Make sure that all connections are tightened to specifications after repair is made to the exhaust system.
- Failure to comply could result in death or serious injury.

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Perform periodic maintenance procedures in an open, level area free from traffic. If possible, perform the procedures indoors to prevent environmental conditions, such as rain, wind, or snow, from damaging the engine.

The Importance of Daily Checks

Periodic Maintenance Schedules assume that the daily checks are performed on a regular basis. Make it a habit of performing daily checks before the start of each operating day. *See Daily Checks on page 51.*

Keep a Log of Engine Hours and Daily Checks

Keep a log of the number of hours the engine is run each day and a log of the daily checks performed. Also note the date, type of repair (e.g., replaced alternator), and parts needed for any service needed between the periodic maintenance intervals. Periodic maintenance intervals are every 50, 250, 500, 1000 and 2000 engine hours. Failure to perform periodic maintenance will shorten the life of the engine.

Yanmar Replacement Parts

Yanmar recommends that you use genuine Yanmar parts when replacement parts are needed. Genuine replacement parts help ensure long engine life.

Tools Required

Before you start any periodic maintenance procedure make sure you have the tools you need to perform all of the required tasks.

Ask Your Authorized Yanmar Marine Dealer for Help

Our professional service technicians have the expertise and skills to help you with any maintenance or service related procedures you need help with.

Required EPA Maintenance -USA Only

To maintain optimum engine performance and compliance with the Environmental Protection Agency (EPA) Regulations, it is essential that you follow the Periodic Maintenance Schedule on page 93 and Periodic Maintenance Procedures which start on page 96.

EPA Installation Requirements -USA Only

The following are the installation requirements for the EPA. Unless these requirements are met, the exhaust gas emissions will not be within the limits specified by the EPA.

See Conditions to Ensure Compliance with EPA Emission Standards on page 112 for operating conditions.

Tightening Fasteners

Use the correct amount of torque when you tighten fasteners on the machine. Applying excessive torque may damage the fastener or component and not enough torque may cause a leak or component failure.

CAUTION

The tightening torque in the Standard Torque Chart should be applied only to the bolts with a "7" head. (JIS strength classification: 7T)

- Apply 60% torque to bolts that are not listed.
- Apply 80% torque when tightened to aluminum alloy.

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Thread size × Pitch (mm)		M6×1.0	M8×1.25	M10×1.5	M12×1.75	M14×1.5	M16×1.5
Tightening	in⋅lb	96.0 ± 9.0	-	-	-	-	-
Torque	ft∙lb	-	19.0 ± 2.1	37.0 ± 3.6	66.0 ± 7.2	103.0 ± 7.2	170.0 ± 7.2
	N∙m	11.0 ± 1.0	26.0 ± 3.0	50.0 ± 5.0	90.0 ± 10.0	140.0 ± 10.0	230.0 ± 10.0
	kgf∙m	1.1 ± 0.1	2.7 ± 0.3	5.1 ± 0.5	9.2 ± 1.0	14.3 ± 1.0	23.5 ± 1.0

STANDARD TORQUE CHART



PERIODIC MAINTENANCE SCHEDULE

Daily and periodic maintenance are important to keep the engine its best operating condition. The following is a summary of inspection and servicing items by inspection interval. Periodic maintenance intervals should vary depending on the uses, loads, fuels and lubricating oils used, and handling conditions, and are hard to establish definitively. The following should be treated only as a general standard only. *Periodic Maintenance Procedures* on page *96* gives a detailed explanation of which parts must be inspected and the procedure for doing so for each interval. Note: Schedule your own periodic inspection plan according to the operational conditions of your engine and inspect every item. Neglect of periodic inspections may lead to engine troubles and shorten the life of the engine. Inspection and servicing at 250 hours and thereafter require special knowledge and techniques. Consult your Yanmar dealer or distributor. Refer to the separate manual of marine gear for the periodical inspection.

			Periodic Maintenance Interval					
System	Item	Daily	Every 50 hrs. or one month whichever comes first	Every 250 hrs. or one year whichever comes first	Every 500 hrs. or 2 years whichever comes first	Every 1000 hrs. or 4 years whichever comes first	Every 2000 hrs. or 8 years whichever comes first	
Whole	Visual inspection of en exterior	0						
Fuel System	Check the fuel level, a	0						
	Drain the fuel tank			0				
	Drain the fuel filter an water separator		0					
	Replace the fuel filter			\diamond				
	Check the fuel injecto pattern			● ¹ (1st time)		● ¹		
	Overhaul and check fuel feed pump							•
	Replace rubber fuel hoses		Replace every 2 years or every 2000 hours, whichever comes first.					
Lubricating System	Check the engine oil level	Crankcase	0					
	Replace the engine oil	Crankcase		♦ (1st time)	\$			
	Replace the engine of element		♦ (1st time)	\$				
	Clean engine oil coole						•	

O: Check **\Contact** : Replace **\Contact** your authorized Yanmar marine dealer or distributor

		Daily	Periodic Maintenance Interval					
			Every	Every 250	Every 500	Every	Every	
			50 hrs. or	hrs. or one	hrs. or 2	1000 hrs.	2000 hrs.	
System	Item		one month	year	years	or 4 years	or 8 years	
			whichever	whichever	whichever	whichever	whichever	
			comes	comes	comes	comes	comes	
. "			TIrst	TIrst	TIrst	TIrst	first	
Cooling System	Segurator outlet	During						
	Seawaler oulier	Operation						
	Check coolant level	0						
	Check the seawater pump impeller			0	\diamond			
	Replace the engine coolant	Every year When long life coolant is used, replace every two years. See Filling Heat Exchanger with Engine Coolant on page 48.						
	Clean & check the seawater passages					•		
	Clean seawater and engine cooling system						•	
	Replace anode			\diamond				
Air Intake and	Clean the air intake silencer			0				
Exhaust System	Clean the exhaust/water mixing elbow			0				
	Clean the turbocharger blower			• ¹				
	Flush aftercooler			•				
Electrical	Check the alarm indicators	0						
System	Check the electrolyte level in the battery		0					
	Adjust / replace the tension of the alternator belt		0		0	\$		
	Check the wiring connectors			0				
Engine Cylinder Head and Block	Check for leakage of fuel, engine oil and engine coolant	O After starting						
	Tighten all major nuts and bolts			•				
	Adjust intake / exhaust valve clearance			(1st time)		•		
Miscellaneous Items	Check the electronic control system operation	0	O (1st time)					
	Adjust the propeller shaft alignment		(1st time)		•			
	Check / replace flexible engine mounts			0		\$		

O: Check ♦: Replace ●: Contact your authorized Yanmar marine dealer or distributor

1 For EPA requirements, see EPA Requirements on page 112.

Note: These procedures are considered normal maintenance and are performed at the owner's expense.



Inspection and Maintenance of EPA Emission-Related Parts

Parts	Interval	
Clean fuel injection nozzle	1500 hours	
Check fuel injection nozzle adjustment		
Check fuel injection pump adjustment		
Check turbocharger adjustment	3000 hours	
Check electronic engine control unit (ECU) and its associated sensors and actuators		

Note: The inspection and maintenance items shown above to be performed at your Yanmar dealer or distributor.



PERIODIC MAINTENANCE **PROCEDURES**

After Initial 50 Hours of Operation

Perform the following maintenance after the initial 50 hours of operation.

- Replace Engine Oil and Engine Oil Filter
- Check Electronic Control System Operation
- Adjust Propeller Shaft Alignment

Replace Engine Oil and Engine Oil Filter

The engine oil on a new engine becomes contaminated from the initial break-in of internal parts. It is very important that the initial oil change is performed as scheduled.

It is easiest and most effective to drain the engine oil after operation while the engine is still warm.



CAUTION

- Only use the engine oil specified. Other engine oils may affect warranty coverage, cause internal engine components to seize, or shorten engine life.
- Prevent dirt and debris from contaminating engine oil. Carefully clean the oil cap / dipstick and the surrounding area before you remove the cap.
- NEVER mix different types of engine oil. This may adversely affect the lubricating properties of the engine oil.
- NEVER overfill. Overfilling may result in white exhaust smoke, engine overspeed or internal damage.



procedures may seriously harm the environment.

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1. Remove the engine oil dipstick. Attach the oil drain pump and pump out the oil.

For easier draining, remove the engine oil fill cap (**Figure 1, (2)**) (yellow) at the top of the rocker arm cover.

- Remove the engine oil filter (Figure 1, (1)) with a filter wrench (turn counterclockwise).
- 3. Clean the filter installation face, attach the new full-flow oil filter, and tighten by hand until the seal touches.
- Turn the full-flow oil filter an additional 3/4 of a turn clockwise with the filter wrench.

Turn the bypass filter (Figure 1, (3)) an additional one turn clockwise with the filter wrench.



Figure 1

5. Fill with new engine oil. *See Adding Engine Oil on page 45.*

CAUTION

- NEVER overfill the engine with engine oil.
- ALWAYS keep the oil level between upper and lower lines on the oil cap / dipstick.

- 6. Perform a trial run and check for oil leaks.
- 7. Approximately 10 minutes after stopping the engine, remove the oil dipstick and check the oil level. Add oil if the level is too low.

When the following inspections are done and any problem is found, contact your Yanmar dealer.

1. Checking the control head:

Check that the control lever moves smoothly.

Check that the shifting and throttle are smooth.

2. Checking the alarm indicators:

When pressing the start switch to ON position on the rocker switch panel, check that the alarm window appears with the alarm sound for about 3 seconds then goes off (normal condition).

Check that there is no alarm message.

3. Checking the electrical harnesses:

Check for cracks, abrasions, and damaged, loose or corroded connectors.

Check the Electronic Control System Operation

The electric governor on the engine and the marine gear are connected to the control head, rocker switch panel and display through electric devices such as the Engine Interface Module.

Adjust the Propeller Shaft Alignment

The flexible engine mounts are compressed a little in the initial engine operation which may cause centering misalignment between the engine and the propeller shaft.

Check for any unusual noise and vibration in the engine / boat hull, while increasing and decreasing the engine speed gradually.

If there is unusual noise and / or vibration. this maintenance requires specialized knowledge and techniques. See your authorized Yanmar marine dealer or distributor to adjust the propeller shaft alignment.



Every 50 Hours of Operation

Perform the following maintenance every 50 hours or one month of operation, whichever comes first.

- Drain Fuel Filter and Fuel Filter / Water Separator
- Check Battery Electrolyte Level
- Adjust Alternator Belt Tension or Replace Alternator Belt

Drain Fuel Filter and Fuel Filter / Water Separator

A DANGER



FIRE AND EXPLOSION HAZARD!

- Diesel fuel is flammable and explosive under certain conditions.
- When you remove any fuel system component to perform maintenance (such as changing the fuel filter) place an approved container under the opening to catch the fuel.
- NEVER use a shop rag to catch the fuel. Vapors from the rag are flammable and explosive.
- Wipe up any spills immediately.
- Wear eye protection. The fuel system is under pressure and fuel could spray out when you remove any fuel system component.
- Failure to comply will result in death or serious injury.



CAUTION

If the fuel filter / water separator is positioned higher than the fuel level in the fuel tank, water may not drip out when the fuel filter / water separator drain cock is opened. If this happens, turn the air vent screw on the top of the fuel filter / water separator 2-3 turns counterclockwise.

Be sure to tighten the air vent screw after the water has drained out.

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CAUTION ALWAYS be environmentally responsible.

- Follow the guidelines of the EPA or other governmental agencies for the proper disposal of hazardous materials such as engine oil, diesel fuel and engine coolant. Consult the local authorities or reclamation facility.
- NEVER dispose of hazardous materials irresponsibly by dumping them into a sewer, on the ground or into ground water or waterways.
- · Failure to follow these procedures may seriously harm the environment.

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Drain the Fuel Filter



Figure 2

- 1. Close the fuel tank cock.
- 2. Loosen the drain plug (Figure 2, (1)). Drain off any water and dirt collected inside.

Drain the Fuel Filter / Water Separator



Figure 3

- Close the fuel tank drain cock.
- 2. Loosen the drain plug (Figure 3, (1)) at the bottom of the fuel filter / water separator and drain off any water and dirt.
- 3. Remove the center bolt (Figure 3, (2)) to disassemble the fuel filter / water separator.

Clean the element (Figure 3, (3)) inside with clean fuel.


PERIODIC MAINTENANCE

- 4. When a fuel filter or fuel filter / water separator is provided in the hull in addition to those installed on the engine, also drain and clean them or replace the element.
- 5. After reassembly of the fuel filter / water separator, be sure to bleed air from the fuel system. *See Bleeding the Fuel System on page 43.*

Check the Battery



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BURN HAZARD!

- Batteries contain sulfuric acid. NEVER allow battery fluid to come in contact with clothing, skin or eyes. Severe burns could result. ALWAYS wear safety goggles and protective clothing when servicing the battery. If battery fluid contacts the eyes and / or skin, immediately flush the affected area with a large amount of clean water and obtain prompt medical treatment.
- Failure to comply could result in death or serious injury.

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PERIODIC MAINTENANCE





Figure 4

1. Do not operate engine if battery has insufficient battery fluid as the battery will be destroyed.

Check the fluid level periodically. If the level is lower than the minimum fill level (Figure 4. (1)), fill with distilled water (Figure 4, (2)) (available in the market) up to the upper limit (Figure 4, (3)) of the battery. (Battery fluid tends to evaporate in high temperatures, especially in summer. In such cases, inspect the battery earlier than specified.)

2. If the starter rpm is too low and the engine cannot be started, measure the specific gravity of the battery with a hydrometer.

When the specific gravity of the fluid is over 1.27 at 20°C (68°F), it is fully charged. Fluid with a specific gravity of below 1.24 needs charging. If the specific gravity cannot be raised by charging, the battery must be replaced.

Note: The capacities of the standard alternator and the recommended battery assume only the power necessary for regular operation. If the power is also used for inboard lighting or other purposes, the generating and charging capacities may be insufficient. In such cases, see your authorized Yanmar marine dealer or distributor.



Adjust Alternator V-Belt Tension

When there is not enough tension in the V-belt, it will slip and the fresh water pump will fail to supply coolant. Engine overheating and seizure will result.

When there is too much tension in the V-belt, the belt will become damaged more quickly and the fresh water pump bearing may be damaged.



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Figure 5

- Check the tension of the V-belt by pressing on the middle of the belt (Figure 5, (1)) with your finger approximately 98N, 10kgf (22 lbf).
 With proper tension, the V-belt should deflect 8 - 10 mm (0.315 - 0.393 in).
- 2. If the V-belt deflection is out of the limit, adjust the V-belt tension. Loosen the adjuster bolt (Figure 5, (2)) and move the alternator (Figure 5, (3)) to adjust the V-belt tension.

CAUTION

Be careful not to get any oil on the V-belt. Oil on the belt causes slipping and stretching. Replace the belt if it is damaged.

- If the V-belt is damaged or worn, replace it. Loosen the adjuster bolt (Figure 5, (2)) and move the alternator (Figure 5, (3)). Remove belt from pulleys.
- 4. Install new belt per routing (Figure 5) and adjust the tension as shown in Step 2.

Every 250 Hours of Operation

Perform the following maintenance every 250 hours or one year of operation, whichever comes first.

- Check Fuel Injector Spray Pattern
- Adjust Intake / Exhaust Valve Clearance (1st Time)
- Drain the Fuel Tank
- Replace the Fuel Filter Element
- Replace the Engine Oil (Crankcase)
- Replace the Engine Oil Filter Element
- Check the Seawater Pump Impeller
- Replace the Anode
- Clean the Air Intake Silencer
- · Clean the Exhaust / Water Mixing Elbow
- Clean the Turbocharger Blower
- Flush the Aftercooler
- Check the Wiring Connectors
- Tighten All Major Nuts and Bolts
- Check or Replace the Flexible Engine Mounts
- Replace Engine Coolant

Check the Fuel Injector Spray Pattern

Inspection and adjustment are necessary to obtain optimal fuel injection to ensure the best possible engine performance. This inspection requires specialized knowledge and techniques. See your authorized Yanmar marine dealer or distributor to check the injection spray condition.

Adjust Intake / Exhaust Valve **Clearance (1st Time)**

Inspection and adjustment must be made to correct opening / closing timing lags of the intake / exhaust valves which might arise due to initial parts wear. This inspection requires specialized knowledge and techniques. See your authorized Yanmar marine dealer or distributor to adjust the intake / exhaust valve clearance.



PERIODIC MAINTENANCE

Drain the Fuel Tank



0000009en

CAUTION



- ALWAYS be environmentally responsible.
- Follow the guidelines of the EPA or other governmental agencies for the proper disposal of hazardous materials such as engine oil, diesel fuel and engine coolant. Consult the local authorities or reclamation facility.
- NEVER dispose of hazardous materials irresponsibly by dumping them into a sewer, on the ground or into ground water or waterways.
- Failure to follow these procedures may seriously harm the environment.

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Position an approved container under the fuel tank drain. Open the drain cock and let the water, dirt, etc. drain from the tank's bottom into the container. Drain until fuel with no water and dirt flows out. Close the drain cock. *See Filling the Fuel Tank on page 41.*

PERIODIC MAINTENANCE

Replace the Fuel Filter Element

When the engine is operated on light diesel oil, replace the fuel filter element every 250 hours or one year of operation.

- 1. Close the fuel tank drain cock.
- 2. Remove the center bolt (Figure 6, (1)) at the bottom of the filter and take out the filter element (Figure 6, (2)).
- 3. Replace the element with a new one and tighten the center bolt (Figure 6, (1)).





Replace the Engine Oil (Crankcase)

See Replace Engine Oil and Engine Oil Filter on page 96.

Replace the Engine Oil Filter Element

See Replace Engine Oil and Engine Oil Filter on page 96.

Check the Seawater Pump Impeller

Depending on use, the inside parts of the seawater pump deteriorate and discharge performance drops.

At the specified interval or when the volume of seawater discharged is reduced, inspect the seawater pump in accordance with the following procedures:

- 1. Loosen the side cover bolts and remove the side cover.
- 2. Illuminate the inside of the seawater pump with a flashlight and inspect.
- 3. If any of the following problems are found, disassembly and maintenance are necessary:
 - Impeller blades are cracked or nicked.
 - Edges or surfaces of the blades are marred or scratched.
 - Wear plate is damaged.
- 4. If no damage is found when inspecting the inside of the pump, reassemble the side cover.
- Note: Fit the O-ring to the groove on the joint face before replacing the side cover.



If a large amount of water leaks continuously from the water drain pipe beneath the seawater pump during operation, disassembly and maintenance (replacement of the lip seal) are necessary.

When disassembly and maintenance of the seawater pump are necessary, see your Yanmar dealer or distributor.

Note: The seawater pump turns in the direction as shown (Figure 7) and the impeller must be installed to run in this direction. If the impeller has been removed for any reason and must be reassembled, be very careful not to install it in the wrong direction. Additionally, if the engine is being turned manually, be careful to turn it in the correct direction. Incorrect turning will twist the impeller and damage it.



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Figure 7

Replace the Anode

The timing for replacing anode varies depending on the characteristics of the seawater and operational conditions.

Inspect the anode periodically and remove the corroded area on the surface.

Replace the anode when it has decreased to less than 1/2 of the original volume. If replacement of anode is neglected and operation is continued with a corroded anode, corrosion of the seawater cooling system will occur and water leakage or parts breakage will result.

The label (Figure 8) is stamped on the plugs which have the anode.



Figure 8

Be sure to close the seacock before removing the plug to replace the anode.

Clean the Air Intake Silencer

Disassemble the intake silencer and clean the inside thoroughly.

- 1. Take off the clamp and remove the muffler.
- 2. Clean the element with a neutral detergent.
- 3. Reassemble after the muffler is completely dry.

Clean the Exhaust / Water Mixing Elbow

The mixing elbow is attached to the turbocharger. The exhaust gas is mixed with seawater in the mixing elbow.

- 1. Clean dirt and scale out of the exhaust gas passage and seawater way in the mixing elbow.
- 2. Repair the crack or damage of the mixing elbow by welding, or replace if necessary.
- 3. Inspect the gasket and replace if necessary.

Clean the Turbocharger Blower

Contamination of the turbocharger blower causes blower revolutions to drop and engine output to fall.

If a drop of engine output is noted (by about 10%), clean the blower. This should only be done by a trained and gualified technician. See your authorized Yanmar marine dealer or distributor to clean the turbocharger blower.

Flush the Aftercooler

Contamination of the aftercooler causes the engine output to fall.

If a drop of engine output is noted (by about 10%), flush and clean the aftercooler

This should be done only by a trained and gualified technician. See your authorized Yanmar marine dealer or distributor to flush the aftercooler.

Check the Wiring Connectors

Check for any loose connections.

Tighten All Major Nuts and Bolts

After long period of usage, the major nuts and bolts of the engine may loosen. Tighten the major nuts and bolts to the standard tightening torques. This inspection requires specialized knowledge and techniques. See your authorized Yanmar marine dealer or distributor to tighten major nuts and bolts.

Check / Replace the Flexible Engine Mounts

The rubber tension of the flexible engine mounts is lost after many hours of use.

This leads to a drop in vibration absorption performance, and also causes centering misalignment of the propeller shaft.

- 1. Check if the rubber is cracked. If necessary, replace the flexible mount.
- 2. Check for abnormal noise or vibration while engine is running. If necessary, replace the flexible mount.

CAUTION

NEVER allow engine oil or diesel fuel oil to contact the flexible rubber mount. Oil makes rubber deteriorate.

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Replace Engine Coolant

Cooling performance drops when coolant is contaminated with rust and scale. The coolant must be replaced periodically because its properties deteriorate over time.

To drain the engine coolant, open the fresh water drain cocks (two places).

See *Engine Coolant on page 46* for coolant specifications.

• NEVER mix different types and / or colors of coolants.

Discard old coolant in an approved manner according to environmental laws.

Every 500 Hours of Operation

Perform the following maintenance every 500 hours or two years of operation, whichever comes first.

- Replace Seawater Pump Impeller
- Adjust the Propeller Shaft Alignment
- Check Alternator Belt Tension

Replace the Seawater Pump Impeller

Replace the used seawater pump impeller periodically. See your authorized Yanmar marine dealer or distributor.

Adjust the Propeller Shaft Alignment

The rubber tension of the flexible engine mounts is lost after many hours' use. This leads to a drop in vibration absorption performance, and also causes centering misalignment of the propeller shaft.

This maintenance requires specialized knowledge and techniques. See your authorized Yanmar marine dealer or distributor to adjust the propeller shaft alignment.

Check Alternator Belt Tension

Check the alternator belt tension. See Adjust Alternator V-Belt Tension on page 103.

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Every 1000 Hours of Operation

Perform the following maintenance every 1000 hours or four years of operation, whichever comes first.

- Check the Fuel Injector Spray Pattern
- Clean and Check the Water Passages
- Replace Alternator Belt
- Adjust Intake / Exhaust Valve Clearance
- Replace Flexible Engine Mounts

Check the Fuel Injector Spray Pattern

Adjustment is necessary to obtain the optimal fuel injection to ensure the best possible engine performance.

This inspection requires specialized knowledge and techniques. See your authorized Yanmar marine dealer or distributor to check the injection spray condition.

Clean and Check the Seawater Passages

When it is used for a long time, cleaning the seawater passages is periodically necessary because trash, scales, rust, and so on collect in the seawater passages and the cooling performance declines.

This maintenance requires specialized knowledge. See your authorized Yanmar marine dealer or distributor to clean and check the water passages.

Replace Alternator Belt

Replace the alternator belt with a new one every 1000 hours or four years, whichever comes first, even if there is no crack or damage in the surface.

See Adjust Alternator V-Belt Tension on page 103.

Adjust Intake / Exhaust Valve Clearance

Proper adjustment is necessary to maintain the correct timing for opening and closing the valves. Improper adjustment will cause the engine to run noisily, resulting in poor engine performance and engine damage. See your authorized Yanmar marine dealer or distributor to adjust the intake / exhaust valve clearance.

Replace Flexible Engine Mounts

Be sure to replace the Yanmar flexible engine mounts every 1000 hours or 4 years, whichever comes first.

The rubber tension of the flexible engine mounts is lost after many hours of use. This leads to a drop in vibration absorption performance, and also causes centering misalignment of the propeller shaft.

Every 2000 Hours of Operation

Perform the following maintenance every 2000 hours or eight years of operation, whichever comes first.

- Overhaul and Check Fuel Feed Pump
- Clean Engine Oil Cooler
- Clean Seawater and Engine Coolant System
- Replace Rubber Fuel Hoses

Overhaul and Check Fuel Feed Pump

Fuel feed pump must be overhauled and checked to ensure optimal engine performance.

This maintenance requires specialized knowledge. See your authorized Yanmar marine dealer or distributor to overhaul and check the fuel feed pump.

Clean Engine Oil Cooler

Rust and scale are deposited inside the seawater system during long use. These deposits lower cooling performance, so it is necessary to clean and maintain the engine oil cooler.

See your authorized Yanmar marine dealer or distributor to clean the engine oil cooler.

Clean Seawater and Engine Coolant System

Rust and scale are deposited inside the seawater and engine coolant system during long use. This lowers cooling performance, so it is necessary to clean and maintain the following parts in addition to replacing the coolant.

Relevant Coolant System Parts:

Seawater pump, engine oil cooler, aftercooler, fresh water pump, fresh water cooler, thermostat, etc.

See your authorized Yanmar marine dealer or distributor to clean the seawater and engine coolant systems.

Replace Rubber Fuel Hoses

Rubberized fuel hoses tend to dry out and become brittle after 2000 hours or 8 years of engine operation (whichever comes first).

See your authorized Yanmar marine dealer or distributor to replace the rubber fuel hoses.



EPA REQUIREMENTS

The EPA emission regulation is applicable only in USA.

EPA Certification Plates

The engine has the EPA Certification Plates (emission control label and recreational marine engine label) attached.

Those labels are attached to the top of the electronic control unit (ECU) cover plate (Figure 9).



VIOLATION OF FEDERAL LAW SUBJECT TO CIVIL PENALTY.

Figure 9

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Conditions to Ensure Compliance with EPA Emission Standards

This product is an EPA-approved engine.

The following are the conditions that must be met in order to ensure that the emissions during operation meet the EPA standards. Be sure to follow these:

The operating conditions should be as follows:

- 1. Ambient temperature: -20 40°C (-4 - 104°F)
- Relative humidity: 80% or lower
- 3. Permissible value for intake negative pressure: 3.9 kPa (400 mmAq) or lower
- 4. Permissible value for exhaust back pressure: 19.6 kPa (2000 mmAg) or lower

The fuel and lubricating oil used should be as follows:

- Diesel fuel oil: ASTM D975 No. 1-D or No. 2-D, or equivalent (minimum of cetane No. 45)
- Lubricating Oil: Type API, Class CD

Be sure to perform inspections as outlined in Periodic Maintenance Procedures on page 96 and keep a record of the results.

Pay particular attention to these important points:

- Replacing the engine oil
- Replacing the lube oil filter
- Replacing the fuel filter
- Cleaning the intake silencer (air cleaner)
- Note: Inspections are divided into two sections in accordance with who is responsible for performing the inspection: the user or the maker.



Inspection and Maintenance

See Inspection and Maintenance of EPA Emission-Related Parts on page 95 for the EPA emission-related parts. Inspection and maintenance procedures not shown in the Inspection and Maintenance of EPA Emission-Related Parts section are covered in Periodic Maintenance Schedule on page 93.

This maintenance must be performed to keep the emission values of your engine in the standard values during the warranty period. The warranty period is determined by the age of the engine or the number of hours of operation. See *Yanmar Co., Ltd. Limited Emission Control System Warranty* - USA Only on page 123.



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TROUBLESHOOTING

If a problem occurs, stop the engine immediately. Refer to the SYMPTOM column in the Troubleshooting Chart to identify the problem.

CAUTION

If the alarm window with audible alarm fails to display and go out about three seconds later when the rocker switch is pushed to the ON position, see your authorized Yanmar marine dealer or distributor for service before operating the engine.

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CAUTION

If any alarm indicator with audible alarm sound appears on the display during engine operation, stop the engine immediately. Determine the cause and repair the problem before you continue to operate the engine.

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TROUBLESHOOTING CHART

Symptom	Probable Cause	Measure	Reference			
Alarm indicators and alarm sound come on in the display during operation.	Shift to low speed operation immediately, and check which indicator has come on in the display. Stop the engine for inspection. If no abnormality is identified and there is no problem with operation, return to the port at lowest speed and request repairs.					
 Lube oil low pressure alarm indicator comes on. 	Engine lube oil level is low.	Check lube oil level. Add or replace.	Checking Engine Oil on page 45			
	Lube oil filter clogged.	Replace lube oil filter. Replace lube oil.	Replace Engine Oil and Engine Oil Filter on page 96			
 Marine gear lube oil pressure alarm indicator comes on. 	Marine gear lube oil is low.	Check the oil level and supply.	_			
 Coolant high temperature alarm indicator comes on. 	Coolant/fresh water in coolant tank is low.	Check coolant level and replenish.	Check Diesel Fuel, Engine Oil, and Engine CoolantLevels on page 52			
	Insufficient seawater causing temperature to rise.	 Check seawater system. 	_			
	 Contamination inside cooling system. 	See your authorized Yanmar marine dealer or distributor.	_			
Faulty Warning Devices	Do not operate the engine if alarm devices are not repaired. Serious accidents may result if difficulties are not spotted due to faulty alarm lamps.					
(1) When switch is turned	ON:					
Alarm buzzer sounds.	Circuit broken. Note: Alarm buzzer only sounds when there is an abnormality.	See your authorized Yanmar marine dealer or distributor.	_			
Alarm indicator comes on.	• Circuit broken. Note: Alarm indicator only comes on when there is an abnormality.	See your authorized Yanmar marine dealer or distributor.	_			
(2) When the rocker switch	returned to ON from START after e	engine starts:				
Buzzer keeps on sounding.	 Sensor switches faulty - if indicator does not come on. Short-circuit - if indicator does not come on. 	See your authorized Yanmar marine dealer or distributor.	_			
One of the alarm indicators comes on.	Sensor switches engine faulty.	 See your authorized Yanmar marine dealer or distributor. 	—			
 Battery low charge indicator comes on during operation. 	V-belt is loose or broken.	Replace V-belt; adjust tension.	Adjust Alternator V-Belt Tension on page 103			
	Battery defective.	Check battery fluid level, specific gravity. Replace.	Check the Battery on page 101			
	 Alternator power generation failure. 	See your authorized Yanmar marine dealer or distributor.	—			

TROUBLESHOOTING INFORMATION

If your engine does not operate properly, refer to the troubleshooting chart or see your authorized Yanmar marine dealer or distributor.

Supply the authorized Yanmar marine dealer or distributor with the following information:

- Model name and serial number of your engine
- Boat name, hull material, size (tons)
- Use, type of boating, number of hours run
- Total number of operation hours (refer to hourmeter), age of boat
- Operating conditions when the problem occurs:
 - Engine rpm
 - Color of exhaust smoke
 - Type of diesel fuel
 - Type of engine oil
 - Any abnormal noises or vibration
 - Operating environment such as high altitude or extreme ambient temperatures, etc.
- Engine maintenance history and previous problems
- Other factors that contribute to the problem



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LONG-TERM STORAGE

BEFORE YOU PLACE THE ENGINE IN LONG-TERM STORAGE

In cold temperatures or before long-term storage, be sure to drain the seawater from the cooling system.



CAUTION

If seawater is left inside of the engine, it may freeze and damage parts of the cooling system when the ambient temperature is below 0°C (32°F).

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LONG-TERM STORAGE

1. Loosen the seawater drain cocks (Figure 1, (1)) and (Figure 2, (1)) and drain the seawater.



Figure 1



Figure 2

If no liquid comes from the drain cocks, it may be necessary to use a stiff wire to remove any debris to allow drainage.

2. Loosen the 6 bolts attaching the side cover of the seawater pump, remove the cover and drain the water from inside.

Retighten the bolts when finished.

- 3. Close the drain cocks.
- Note: Do not drain coolant (fresh water cooling system). If the coolant is drained, the cooling system components could corrode.

Before placing the engine in storage, perform the following:

- 1. Clean the outside of the engine wiping off any dust or oil.
- 2. Drain the fuel or fill the tank completely to help prevent condensation inside the tank.
- 3. Refill the heat exchanger with engine coolant. See Filling Heat Exchanger with Engine Coolant on page 48.
- 4. Cover the turbocharger, exhaust pipe, etc. with vinvl sheets and seal them to prevent moisture from entering.
- 5. Completely drain the bilge. Put the boat in dry dock, if possible.
- 6. Waterproof the engine room to prevent rain and seawater from entering.
- 7. During long-term storage, charge the battery once a month to compensate for the battery's self-discharge.

RETURNING THE ENGINE TO SERVICE

- 1. Replace the engine oil and engine oil filter before running the engine.
- 2. Supply fuel if the fuel in the fuel tank was removed, and prime the fuel system.
- 3. Confirm that there is engine coolant in the engine.
- 4. Operate the engine at idle speed for one minute.
- 5. Check fluid levels and check engine for leaks.



SPECIFICATIONS

PRINCIPAL ENGINE SPECIFICATIONS

Engine Model		6LY3-ETP	6LY3-STP	6LY3-UTP	
Use		Pleasure Use			
Туре		Vertical water-cooled, 4-cycle diesel engine			
Aspiration		Turbocharger with Aftercooler			
Combustion System		Direct injection			
Number of Cylinders		6			
Bore x Stroke		105.9 × 110 mm (4.17 × 4.33 in)			
Displacement		5.813 L (6.14 qt)			
Continuouo Power	Output at Crankshaft	3198 min (rpm)			
Continuous Power	Engine / Speed	436 hp Metric	400 hp Metric	345 hp Metric	
	(Note 1 and Note 2)	321 kW	295 kW	254 kW	
	Output at Crankshaft Engine / Speed (Note 1 and Note 2)	3300 min (rpm)			
Eucl Stop Power		480 hp Metric	440 hp Metric	380 hp Metric	
Fuel Stop Fower		353 kW	324 kW	279 kW	
		at fuel inlet temp. 40°C (104°F)			
High Idling (Note 3)		3500 ± 25 min (rpm)			
Low Idling (Note 3)		700 ± 25 min (rpm)			
Installation		Flexible mounting			
Direction of Rotation	Crankshaft	Counterclockwise viewed from stern			
Cooling System		Liquid cooling with heat exchanger			
Lubrication System		Complete enclosed forced lubrication			
Coolant Capacity (Fresh)		Engine: 28 L (30 qt)			
		Coolant recovery tank: 1.5 L (1.6 qt)			
Engine Lubricating Oil Capacity	Rake Angle	0°			
	Total (Note 4)	18.8 L (19.9 qt)			
	Effective (Note 5)	8.0 L (8.5 qt)			



SPECIFICATIONS

Engine Model		6LY3-ETP	6LY3-STP	6LY3-UTP
Starting System	Туре	Electric		
	Starting Motor	DC 12V - 3kW		
	AC Generator	12V - 80A		
Turbocharger	Model	RHC7W (IHI made)		
	Туре	Water cooled		
	Overall Length	1300.4 mm (51.2 in)		
Engine Dimension	Overall Width	801.3 mm (31.5 in)		
	Overall Height	776.6 mm (30.6 in)		
Engine Dry Mass (Without Marine Gear)		640 kg (1410.96 lb)		
Recommended Battery Capacity		12V-150AH or more		

Notes:

- 1. Rating condition: ISO 8665. Temperature of fuel: 40°C (104°F) at fuel pump inlet.
- 2. 1 hp (metric horsepower) = 0.7355 kW
- 3. Fuel condition: Density at 15°C (59°F) = 0.860 g/cm³ (53.67 ft·lb³).
- 4. Fuel temperature at the inlet of the fuel injection pump.
- 5. The "Total Engine Lubricating Oil Capacity" includes oil in oil pan, channels, coolers and filter.
- 6. The "Effective Engine Lubricating Oil Capacity" indicates the difference in maximum scale of the dipstick and minimum scale.



EPA WARRANTY USA ONLY

YANMAR CO., LTD. LIMITED EMISSION CONTROL SYSTEM WARRANTY - USA ONLY

The following EPA Warranty only applies to engines built on or after January 01, 2006 and labeled with the proper nameplate (Figure 1).





THIS ENGINE IS CATEGORIZED AS A RECREATIONAL MARINE ENGINE UNDER 40 CFR PART 94. INSTALLATION OF THIS ENGINE IN ANY NONRECREATIONAL VESSEL IS A VIOLATION OF FEDERAL LAW SUBJECT TO CIVIL PENALTY.

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Figure 1



EPA WARRANTY USA ONLY

THIS EMISSION WARRANTY APPLIES TO THE ENGINES CERTIFIED TO UNITED STATES EPA 40 CFR 94 AND SOLD BY YANMAR THAT ARE INSTALLED IN VESSELS FLAGGED OR REGISTERED IN THE UNITED STATES.

Your Warranty Rights and Obligations:

Yanmar warrants to the first user and each subsequent purchaser the emission control system on your engine for periods of time listed below provided the engine has been installed according to Yanmar installation requirements and there has been no abuse, neglect, or improper maintenance of your Yanmar marine engine.

Yanmar warrants that the engine is designed, built and tested using genuine parts and equipped so as to conform to all applicable emission requirements of the U.S. Environmental Protection Agency and is free from defects in material and workmanship which would cause this engine to fail to conform to the applicable emission regulations over its limited emission control system warranty period.

Where a warrantable emissions condition exists, Yanmar will repair your engine at no charge to you for diagnosis, parts, and labor. Warranty service or repair will be provided at authorized Yanmar marine deals or distributors. It is recommended that any replacement parts used for maintenance, repair or replacement of emission control systems are Yanmar parts. The owner may elect to have maintenance, replacement or repair of the emission control components and systems performed by any repair establishment or individual and may elect to use parts other than Yanmar parts for such maintenance, replacement or repair. However, the cost of such service or parts and subsequent failures from such service or parts will not be covered under this emission control system warranty:

Warranty Period:

The warranty starts on either the date of delivery to the first end-user, or the date the unit is first leased, rented, or loaned.

- For Pleasure Use: The warranty period is five (5) years or 2000 hours of use, whichever occurs first. In the absence of a device to measure hours of use, the engine as a warranty period of five (5) years.
- 2. For Commercial Use: The warranty period is **five (5) years** or **5000 hours** of use, whichever occurs first. In the absence of a device to measure hours of use, the engine as a warranty period of **five (5) years**.



Warranty Coverage:

Repair or replacement of any warranted parts will be performed at an authorized Yanmar dealer or distributor. This limited emission control system warranty covers engine components that are a part of the emission control system of the engine as delivered by Yanmar to the original retail purchaser. Such components may include the following:

- 1. Fuel Injection System
- 2. Turbocharger System
- 3. Aftercooler
- 4. Electronic Engine Control Units and its associated Sensor and Actuators

Exclusions:

Failures other than those arising from defects in material and / or workmanship are not covered by this limited emissions warranty. This warranty does not extend to the following: malfunction caused by abuse, misuse, improper adjustment, modification, alteration, tampering, disconnection, improper or inadequate maintenance, improper storage or use of non-recommended fuels and lubricating oils, accident-caused damage, and replacement of expendable and / or consumable items made in connection with scheduled maintenance.

Owner's Responsibility:

As the Yanmar marine engine owner, you are responsible for the performance of the required maintenance listed in your *Operation Manual.* Yanmar recommends that you retain all documentation, including receipts, covering maintenance on your marine engine, but Yanmar cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance. Your engine is designed to operate on diesel fuel only. Use of any other fuel may result in your engine no longer operating in compliance with applicable emission requirements. You are responsible for initiating the warranty process. You must present your marine engine to an authorized Yanmar dealer or distributor as soon as a problem exists.

Customer Assistance:

If you have any questions regarding your warranty rights and responsibilities or would like information on the nearest authorized Yanmar dealer or distributor, you should contact Yanmar Marine USA Corporation for assistance.

Yanmar Marine USA Corporation

101 International Parkway Adairsville, GA 30103 USA

Telephone: 770-877-9894 Fax: 770-877-7567



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