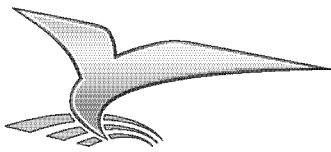


YAMAHA

SERVICE MANUAL

BY series
4BY
6BY



BY series

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4BY
6BY

P/N:0BBY0-G00100

YAMAHA
®

**MARINE
ENGINES**

BY SERVICE MANUAL

This *Service Manual* has been developed for the exclusive use of service and repair professionals such as Yanmar authorized Distributors and Yanmar authorized Dealers. It is written with these professionals in mind and may not contain the necessary detail or safety statements that may be required for a non-professional to perform the service or repair properly and / or safely. Please contact an authorized Yanmar repair or service professional before working on your Yanmar product.

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**California
Proposition 65 Warning**

Diesel engine exhaust and some of its constituents are known to the state of California to cause cancer, birth defects, and other reproductive harm.

**California
Proposition 65 Warning**

Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer and reproductive harm.
Wash hands after handling.

0406

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Section 1

INTRODUCTION

This manual gives specific instructions for the proper repair of Yanmar BY series marine engines.

Please follow the procedures carefully to ensure quality service.

Yanmar recommends that you read this *Service Manual* completely before starting with repairs, as some of the procedures described are rather complex.

Along with standard tools, Yanmar recommends the use of special tools necessary to perform repairs correctly.

Yanmar products are continuously undergoing improvement. This *Service Manual* has been checked carefully in order to avoid errors. However Yanmar is not liable for any misrepresentations, errors of description or omissions. Contact an authorized Yanmar marine dealer or distributor for any questions you have regarding this *Service Manual*.

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Section 2

SAFETY

Yanmar is concerned for your safety and the condition of your marine engine. Safety statements are one of the primary ways to call your attention to the potential hazards associated with Yanmar marine engines. Follow the precautions listed throughout the manual before operation, during operation and during periodic maintenance procedures for your safety, the safety of others and to protect the performance of your marine engine. 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.

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.

000001en

WARNING

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.

000001en

CAUTION

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.

000001en


CAUTION

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

000001en

SAFETY PRECAUTIONS

! DANGER




SCALD HAZARD!

- NEVER remove the coolant filler cap if the engine is hot. Steam and hot engine coolant will escape and seriously burn you. Allow the engine to cool before attempting to remove the filler cap.
- Securely tighten the filler cap after checking the coolant level. Steam can escape during engine operation if the cap is loose.
- Failure to comply will result in death or serious injury.

000002enMarine

! 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.

000003en

! DANGER



CRUSH HAZARD!

- ALWAYS use the engine lifting eyes when lifting the marine engine. The lifting eyes are engineered to lift the weight of the marine engine only.
- ALWAYS use lifting equipment with sufficient capacity to lift the marine engine. Additional equipment is necessary to lift the marine engine and marine gear together.
- NEVER stand under hoisted marine engine. If the hoist mechanism fails, the marine engine will fall on you, causing serious injury or death.
- Failure to comply will result in death or serious injury.

0000026en

! DANGER




CRUSH HAZARD!

- NEVER stand under hoisted engine. If the hoist mechanism fails, the engine will fall on you, causing death or serious injury.
- Failure to comply will result in death or serious injury.

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! DANGER




FIRE HAZARD!

- Keep fire extinguishers handy in case of fire. Clearly indicate the location of the fire extinguishers with a safety sign.
- Ensure that the type of fire extinguishers are appropriate for material that might catch fire. Check with local authorities.
- Have all fire extinguishers checked periodically for proper operation and / or readiness.
- Post evacuation routes prominently. Periodically conduct fire drills.
- Ensure that appropriate fire detection and extinguishing equipment are installed and checked periodically for proper operation. Check with local authorities.
- Failure to comply will result in death or serious injury.

0000018en

! 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

! 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.

0000011en

! 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.

0000012en

! DANGER**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.

000007en

! 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 500 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 500 hours of engine operation, whichever comes first.
- Failure to comply will result in death or serious injury.

000015enBY

! DANGER

NEVER start the engine unless the air filter is installed.

Failure to comply will result in death or serious injury.

0000025en

! 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.

000005en

! DANGER



FIRE AND EXPLOSION HAZARD!

- Only use the key switch to start the engine.
- NEVER jump-start the engine. Sparks caused by shorting the battery to the starter terminals may cause a fire or explosion.
- Failure to comply will result in death or serious injury.

000004en

! DANGER




CRUSH HAZARD!

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

000008en

! DANGER



FIRE HAZARD!

Hot engine surfaces, such as the exhaust pipe and turbocharger can cause material such as oil and grease to ignite.

- ALWAYS ensure the exhaust pipe, turbocharger, and heat shields are absolutely free of oil and grease. Clean all grease and oil from the exterior surfaces of the exhaust pipe and turbocharger housing before installing.
- ALWAYS install new gaskets and seals for the turbocharger lubrication lines, and check after installation for leaks.
- NEVER install a heat shield that is oily. ALWAYS replace it with a new one.
- Failure to comply will result in death or serious injury.

0000034en

! WARNING



ALCOHOL AND DRUG HAZARD!

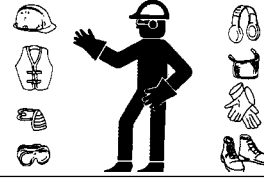
- NEVER operate the engine while you are under the influence of alcohol or drugs.
- NEVER operate the engine when you are feeling ill.
- Failure to comply could result in death or serious injury.

000004en

⚠ 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.

000002enMarine

⚠ 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.


000005enMarine

⚠ WARNING

To prevent possible eye injury, always wear **SAFETY GLASSES** while servicing the engine.

0000013en

⚠ WARNING




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.

000008enMarine

⚠ WARNING




ENTANGLEMENT HAZARD!

- Stop the engine before you begin to service it.
- NEVER leave the key in the key switch when you are servicing the engine. Someone may accidentally start the engine and not realize you are servicing it. This could result in a serious injury.
- If you must service the engine while it is operating, remove all jewelry, tie back long hair, and keep your hands, other body parts and clothing away from moving / rotating parts.
- Failure to comply could result in death or serious injury.

0000010en

⚠ WARNING



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.

000009en

⚠ 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

⚠ WARNING**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

⚠ WARNING**SUDDEN MOVEMENT HAZARD!**

- Shift the marine gear into the NEUTRAL position any time the engine is at idle.
- Failure to comply could result in death or serious injury.

0000023en

⚠ WARNING**BURN HAZARD!**

- Keep your hands and other body parts away from hot engine surfaces such as the muffler, exhaust pipe, turbocharger 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.

0000015enBY

⚠ WARNING**FUME / BURN HAZARD!**

- Always read and follow safety related precautions found on containers of hazardous substances like parts cleaners, primers, sealants and sealant removers.
- Failure to comply could result in death or serious injury.

0000014en

⚠ WARNING**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**BURN HAZARD!**

- Handle hot components with heat-resistant gloves.
- Failure to comply could result in death or serious injury.

0000110en

⚠ 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.

0000003en

⚠ WARNING

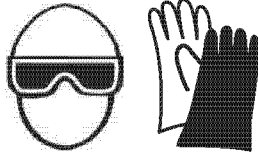


BURN HAZARD!

- 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

⚠ CAUTION



COOLANT HAZARD!

- Wear eye protection and rubber gloves when you handle Long 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.

0000005enMarine

⚠ CAUTION**FLYING OBJECT HAZARD!**

- **ALWAYS** wear eye protection when servicing the 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.

000003en

⚠ CAUTION**POOR LIGHTING HAZARD!**

- Ensure that the work area is adequately illuminated.
- Use task lighting to illuminate areas that need additional illumination.
- Always place wire cage on portable safety lamps.
- Failure to comply may result in minor or moderate injury.

0000023en

⚠ CAUTION**TOOL HAZARD!**

- Use tools appropriate for the task at hand.
- Use the correct size tool for loosening or tightening machine parts.
- Failure to comply may result in minor or moderate injury.

0000024en

⚠ CAUTION

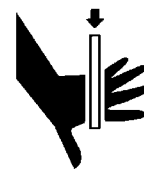
Be sure to secure the engine solidly to prevent injury or damage to parts due to the engine falling during work on the engine.

000009en

⚠ CAUTION**RISK OF CRUSH INJURY**

The starter motor is very heavy. Use care when removing the starter motor.

0000032en

⚠ CAUTION**PINCH HAZARD!**

Use care not to catch finger between belt and pulley while installing belt. Failure to comply may result in minor or moderate injury.

0000034en

CAUTION

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

0000021en

CAUTION

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

0000015enBY

CAUTION

- Only use the engine oil specified. Other engine oils may affect warranty coverage, cause internal engine components to seize and / or shorten engine life.
- Prevent dirt and debris from contaminating the engine oil. Carefully clean the 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.

000005enBY

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 filler 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.

000006enMarine

CAUTION

NEVER engage the starter motor while the engine is running. This may damage the starter motor pinion and / or ring gear.

0000012en

CAUTION

Keep the piston pin parts, piston assemblies, and connecting rod assemblies together to be returned to the same position during the reassembly process. Label the parts using an appropriate method.

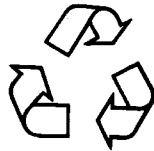
0000088en

CAUTION

DO NOT remove special tools until high-pressure pump is installed. If the special tools are removed, the drive sprocket will no longer be held in the correct position for reassembly.

0000200en

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

Do not reverse the positive (+) and negative (-) ends of the battery cable. The alternator diode and stator coil will be damaged.

0000050en

CAUTION

If the oil pump must be replaced, replace it as an assembly only. Do not replace individual components.

0000030en

CAUTION

Identify all parts and their location using an appropriate method. It is important that all parts are returned to the same position during the reassembly process.

0000080en

CAUTION

Do not remove the positive (+) battery cable from alternator terminal B while the engine is operating. Damage to the alternator will result.

0000037en

CAUTION

Never use a steel wire brush to clean fuel injectors. Damage to the nozzle and other components is likely to result.

0000172en

CAUTION

Do not turn the battery switch OFF while the engine is operating. Damage to the alternator will result.

0000038en

CAUTION

Ensure that no fuel enters the cylinder from the disconnected fuel system components.

If fuel runs into the combustion chamber, it must be removed immediately using a pump.

Failure to do so could cause hydraulic lock resulting in engine damage.

0000182en

CAUTION

Do not operate the engine if the alternator is producing unusual sounds. Damage to the alternator will result.

0000039en

CAUTION

NEVER hold the key in the START position for longer than 10 seconds or the starter motor will overheat.

0000201en

CAUTION

Do not use a high-pressure wash directly on the alternator. Water will damage the alternator and result in inadequate charging.

0000049en

CAUTION

NEVER operate the engine with the batteries disconnected. Damage to the alternator will result.

0000185en

CAUTION

Any part which is found defective as a result of inspection or any part whose measured value does not satisfy the standard or limit must be replaced.

0000119en

CAUTION

Immediately cap or plug all openings to prevent contamination of system.

0000199en

CAUTION

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

0000009en