



ZT350 **series**

OPERATION MANUAL

P/N: 0AZTD-G00101

YANMAR
®

**STERN-
DRIVE**

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INTRODUCTION

Welcome to the world of Yanmar Marine! Yanmar Marine offers engines, stern-drive systems and accessories for all types of vessels, from runabouts to sailboats, and from cruisers to mega yachts. In marine leisure boating, the worldwide reputation of Yanmar Marine is second to none.

Yanmar stern-drives are designed for a wide range of applications and are designed to reduce vibration and make your cruising more pleasurable.

To help you enjoy your Yanmar Marine products for many years to come, please follow these recommendations:

- Read and understand this *Operation Manual* before you operate your vessel to ensure that safe operating practices and maintenance procedures are followed.
 - 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 vessel 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 stern-drive. If you have any questions about these differences, please contact your authorized Yanmar Marine dealer or distributor.

INTRODUCTION

RECORD OF OWNERSHIP

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

Stern-Drive Model:_____

Stern-Drive Transom Assembly Serial No.:_____

Stern-Drive Unit Serial No.:_____

Stern-Drive Gear Ratio:_____

Date Purchased:_____

Engine Model:_____

Engine Horsepower:_____

Propeller Number:_____

Propeller Pitch:_____

Propeller Diameter:_____

Hull Identification Number (HIN):_____

Boat Manufacturer:_____

Boat Model:_____

Dealer:_____

Dealer Phone:_____

SAFETY

Yanmar considers safety of great importance and recommends that anyone that 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 engine and stern-drive'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.

SAFETY PRECAUTIONS

DANGER

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

WARNING

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

CAUTION

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

NOTICE

Indicates a situation which can cause damage to the engine and stern-drive, personal property and / or the environment or cause the equipment to operate improperly.

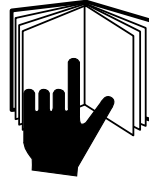
General Information

There is no substitute for common sense and careful practices. Improper practices or carelessness can cause burns, cuts, mutilation, asphyxiation, other bodily injury or death. This information contains general safety precautions and guidelines that must be followed to reduce risk to personal safety. Special safety precautions are listed in specific procedures. Read and understand all of the safety precautions before operation or performing repairs or maintenance.

Before You Operate

DANGER

The safety messages that follow have DANGER level hazards. These safety messages describe a hazardous situation which, if not avoided, will result in death or serious injury.



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

- Read and understand this *Operation Manual* before you operate or service the engine or stern-drive 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.

During Operation and Maintenance

DANGER

The safety messages that follow have **DANGER** level hazards. These safety messages describe a hazardous situation which, if not avoided, *will* result in death or serious injury.

Fire Hazard



Ensure that appropriate fire detection and extinguishing equipment are installed and checked periodically for proper operation.

Crush Hazard



ALWAYS use lifting equipment with sufficient capacity to lift the stern-drive.

NEVER stand under a hoisted stern-drive. If the hoist mechanism fails, the stern-drive will fall on you, causing serious injury or death.

NEVER support the stern-drive with equipment not designed to support the weight of the stern-drive such as wooden pieces, blocks or by only using a jack.

WARNING

The safety messages that follow have **WARNING** level hazards. These safety messages describe a hazardous situation which, if not avoided, *could* result in death or serious injury.

Explosion Hazard



While the engine is running or the battery is charging, hydrogen gas is being produced and can be easily ignited. Keep the area around the battery well-ventilated and keep sparks, open flame and any other form of ignition out of the area.

Fire Hazard



Undersized wiring systems can cause an electrical fire.

WARNING

Sever Hazard



NEVER service the stern-drive while under tow or if the engine is running at idle speed. The propeller may rotate under these

circumstances.

If the vessel has more than one engine, NEVER service a stern-drive if either of the engines are running. In multi-engine configurations, the propeller for an engine that is shut down may rotate if any of the other engines are running.

Rotating parts can cause severe injury or death. NEVER wear jewelry, unbuttoned cuffs, ties or loose-fitting clothing, and ALWAYS tie long hair back when working near moving / rotating parts such as the flywheel or PTO shaft. Keep hands, feet and tools away from all moving parts.

To prevent accidental equipment movement, NEVER start the engine in gear.

Before starting the engine, ALWAYS make sure that all bystanders are clear of the area. Keep children and pets away while the engine is operating.

Always remove any tools or shop rags used during maintenance from the area before operation.

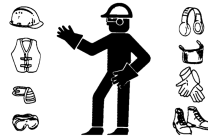
Stop the engine before you begin to service the stern-drive and secure the propeller so it will not turn.

Alcohol and Drug Hazard



NEVER operate the engine while under the influence of alcohol or drugs or when feeling ill.

Exposure Hazard



ALWAYS wear personal protective equipment including appropriate clothing, gloves, work shoes, eye and hearing protection as required by the task at hand.

Entanglement Hazard



NEVER leave the key in the key switch when servicing the engine or stern-drive. Someone may accidentally start the engine and not realize you are servicing it.

NEVER operate or service the engine while wearing a headset to listen to music or the radio because it will be difficult to hear the warning signals.

Burn Hazard



Some of the engine and stern-drive surfaces become very hot during operation and shortly after shutdown. Keep hands and other body parts away from hot surfaces.

⚠ WARNING**Exhaust Hazard**

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 and special precautions are required to avoid carbon monoxide poisoning.

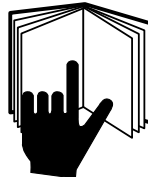
Electrical Shock Hazard

ALWAYS turn off the battery switch (if equipped) or disconnect the negative battery cable before servicing the equipment.

ALWAYS keep the electrical connectors and terminals clean. Check the electrical harnesses for cracks, abrasions, and damaged or corroded connectors.

⚠ CAUTION

The safety messages that follow have **CAUTION** level hazards. These safety messages describe a hazardous situation which, if not avoided, *could* result in minor or moderate injury.



NEVER permit anyone to install or operate the stern-drive or engine without proper training. Safety signs and labels are additional

reminders for safe service and

maintenance techniques. Read and understand this *Operation Manual* before you operate or service the stern-drive to ensure that you follow safe servicing practices and maintenance procedures.

Poor Lighting Hazard

Ensure that the work area is adequately illuminated. ALWAYS install wire cages on portable safety lamps.

Tool Hazard

ALWAYS use tools appropriate for the task at hand and use the correct size tool for loosening or tightening machine parts.

Flying Object Hazard

ALWAYS wear eye protection when servicing the stern-drive or when using compressed air or high-pressure water. Dust, flying debris, compressed air, pressurized water or steam may injure your eyes.

⚠ CAUTION

Slipping and Tripping Hazard



Ensure that adequate floor space is set aside for servicing the stern-drive. The floor space must be flat and free of holes.

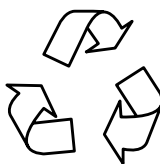
Keep the floor free of dust, mud, spilled liquids and parts to help prevent slipping and tripping.

⚠ NOTICE

The safety messages that follow have **NOTICE level hazards**.

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

Periodic maintenance prevents unexpected downtime, reduces the number of accidents due to poor engine or stern-drive performance and can help extend the life of the engine and stern-drive.



ALWAYS be environmentally responsible. Follow the guidelines of the EPA or other governmental agencies for the proper disposal of hazardous materials such as lubrication oil, diesel fuel and engine coolant. Consult the local authorities or reclamation facility.

NEVER dispose of hazardous materials by dumping them into a sewer, on the ground or into ground water or waterways.

Before operating the engine, check stern-drive oil level.

If the stern-drive oil temperature is too high, stop engine immediately and check the stern-drive oil level and check the oil cooler for proper coolant and water flow.

Always tighten components to the specified torque. Loose parts can cause equipment damage or cause it to operate improperly.

Only use replacement parts specified. Other replacement parts may affect warranty coverage.

NEVER attempt to modify the stern-drive's design or safety features.

Failure to comply may impair the stern-drive's safety and performance characteristics and shorten the stern-drive's life. Any alterations to this stern-drive may affect the warranty coverage of your stern-drive.

▲ NOTICE

NEVER use the stern-drive lifting eye to lift the engine and stern-drive as an assembly. Use the engine lifting eyes to lift the engine and stern-drive. Only use the stern-drive lifting eye to lift the stern-drive as a separate component.

The anode of the stern-drive is only calculated for the stern-drive. Changing the material of the propeller may require additional anodes to be installed on the stern-drive.

Anytime the boat is left in the water and the engine is not running, the drive must be left in the fully down position. This will keep the anodes in the water and will keep the exhaust pipe engaged with the exhaust port of the drive.

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PRODUCT OVERVIEW

OVERVIEW

Owner / Operator Responsibilities

The operator must, and assumes all responsibility to:

- Read and understand the operation manual prior to operating the stern drive;
- Perform all safety checks as necessary to ensure safe operation;
- Comply with and follow all lubrication and maintenance instructions and recommendations; and
- Have an authorized Yanmar Marine dealer / distributor perform periodic checkups.

Conducting normal maintenance service and replacing consumable parts as necessary is the responsibility of the owner / operator and necessary to provide the best durability, performance and dependability of the stern drive while keeping your overall operating expenses to a minimum. Individual operating habits and usage may increase the frequency of performing maintenance service condition. Monitor conditions frequently to determine if the maintenance intervals suggested in the manual are frequent enough for stern drive.

NOTICE: *The anode of the stern-drive is only calculated for the stern-drive. Changing the material of the propeller may require additional anodes to be installed on the stern-drive.*

New Stern-Drive Break-In:

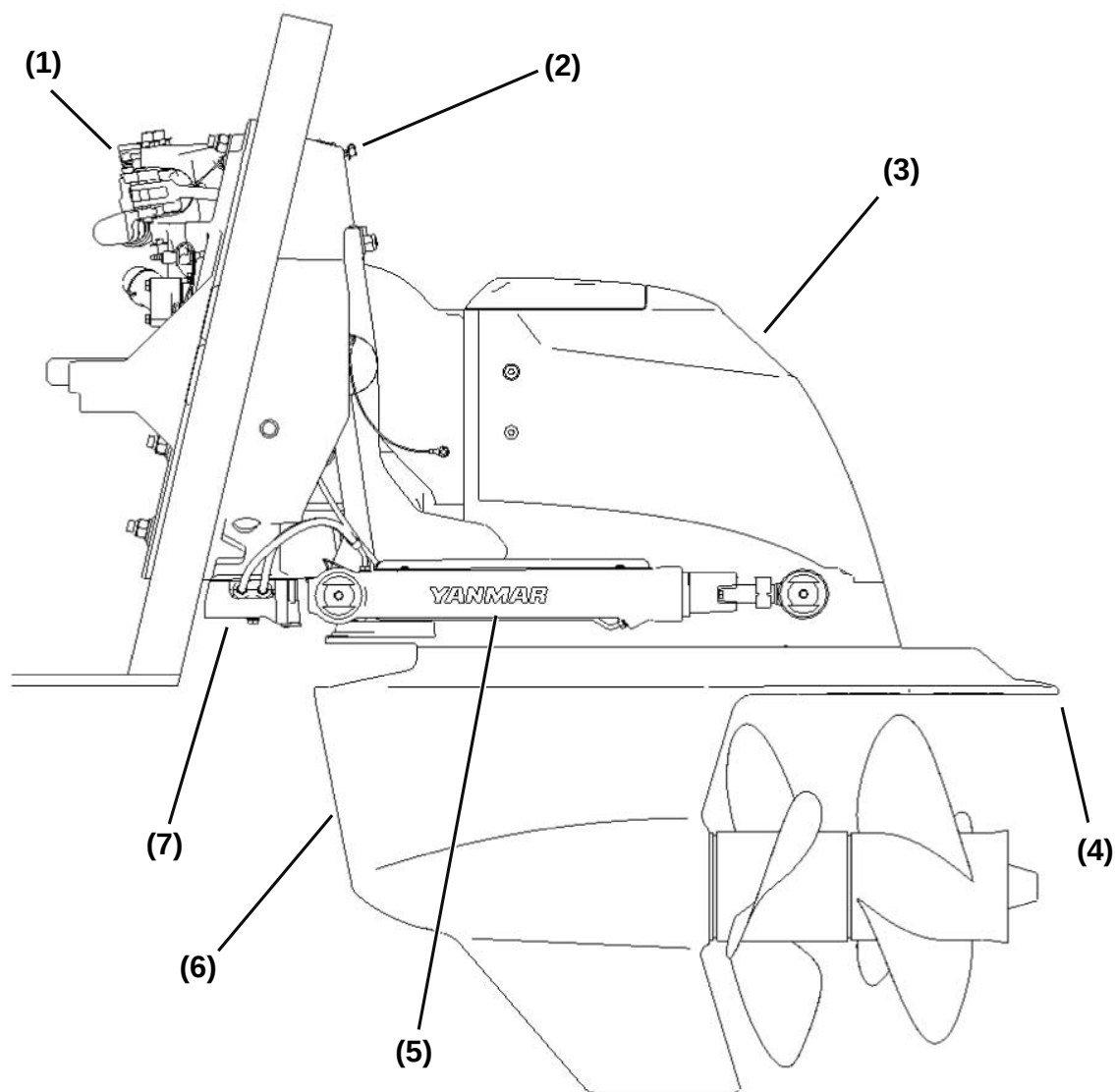
- On the initial engine start-up, allow the engine to idle for approximately 15 minutes while you check for proper stern-drive function and stern-drive oil leaks.
- During the break-in period, carefully observe stern-drive indicators (if any) for proper stern-drive function.
- During the break-in period, check the stern-drive oil levels frequently.

Dealer / Distributor Responsibilities

In general, a dealer's responsibilities to the customer include predelivery inspection and preparation such as:

- Ensure that the vessel is properly equipped.
- Prior to delivery, make certain that the Yanmar stern-drive and other equipment are in proper operating condition.
- Make all necessary adjustments for maximum efficiency.
- Familiarize the customer with the on-board equipment.
- Explain and demonstrate the operation of the stern-drive and vessel.

COMPONENT IDENTIFICATION



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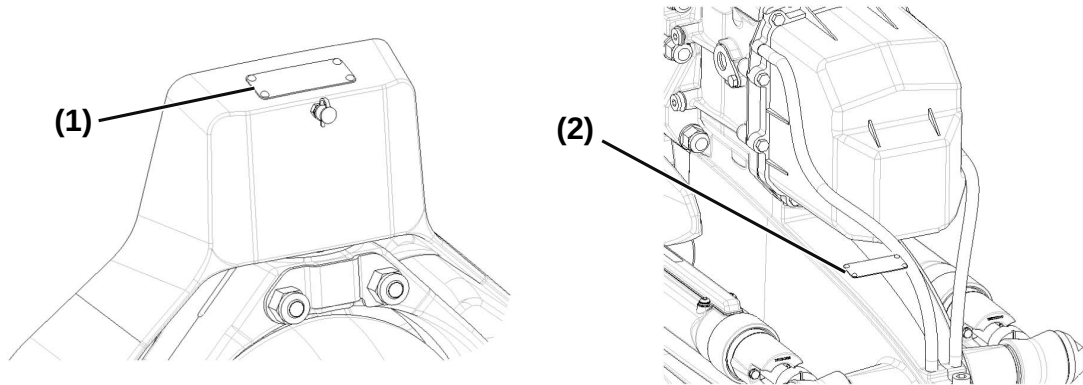
Figure 1

- 1 – Steering System Location**
- 2 – Transom Assembly**
- 3 – Drive Unit**
- 4 – Antiventilation Plate**

- 5 – Trim Cylinder**
- 6 – Speedometer Pitot Hole**
- 7 – Y-CaPS Electrode**

Location of Serial Numbers

The serial numbers are the manufacturer's keys to numerous engineering details which apply to your Yanmar stern-drive. When contacting Yanmar about service, **always specify model and serial numbers.**



0006017

Figure 2

- 1 – Transom Assembly Serial Number**
- 2 – Drive Unit Serial Number**

CORROSION PROTECTION

Galvanic Corrosion

Galvanic corrosion results whenever two or more dissimilar metals (like those found on the stern-drive) are submerged in a conductive solution, such as saltwater, polluted water or water with a high mineral content because a chemical reaction takes place causing electrical current to flow between the metals. The electrical current flow causes the metal that is most chemically active, or anodic, to erode. If not controlled, galvanic corrosion may corrode stern-drive components.

NOTICE: *The anode of the stern-drive is only calculated for the stern-drive. Changing the material of the propeller may require additional anodes to be installed on the stern-drive.*

Corrosion Control

It is the boat designer's responsibility and/or the re-powering engineer's responsibility to design the proper systems and equipment to control and reduce the possibility of galvanic corrosion.

To help control the effects of galvanic corrosion, Yanmar Marine ZT350 stern-drives come with several anodes and an electronic anticorrosion system (Y-CaPS) that protect the stern-drive in moderate corrosive conditions. However, it is essential that the owner/operator frequently monitor the anodes for wear, inspect the stern drive for corrosion and replace the anodes often enough to provide a sacrificial surface for the electrical current to attack. Galvanic isolators are also available from the aftermarket (not supplied by Yanmar) to block stray current while still providing a path to ground for dangerous shock currents.

The rate of corrosion depends on numerous factors, such as:

- the number, size and location of anodes on the stern-drive and vessel;

- the marina environment such as stray current in the water, fresh or salt water and use and isolation of shore power;
- improper application of marine paint or antifouling paint;
- failure to repaint damaged areas; and
- how the vessel is bonded.

Please check with the boat builder, dealer or other professional to determine if your vessel and/or stern drive is adequately protected from galvanic corrosion.

If anodes erode quickly or if signs of corrosion are evident, the owner should take immediate corrective action. Yanmar recommends consulting an engineer specializing in marine electricity and corrosion control to determine the best way to correct the rapid erosion of the anodes.

Shore Power

Vessels that are connected to shore power require additional protection to prevent destructive low voltage galvanic currents from passing through the shore power ground wire. Galvanic isolators are available from the aftermarket (not supplied by Yanmar) to block these currents while still providing a path to ground for dangerous shock currents. **NOTICE:** *If the AC shore power ground is not isolated from the boat ground, the Y-CaPS and anodes may be unable to neutralize the increased galvanic potential. Corrosion damage that results from the improper system design or application is not covered by the Yanmar limited warranty.*

Underwater Drive Coating

The lower gear case coating may be damaged when hit by objects in the water, or when having deposits removed from it. The underwater coating must be inspected at least once per year and when it is believed that an object was hit that may have caused damage. Repair and repaint damaged areas immediately.

Observe the following precautions when applying antifouling or marine paint to the transom of the boat hull:

- ALWAYS follow the paint/coating manufacturer's directions for surface preparation and application.
- ALWAYS use a high quality primer and topcoat paint specifically designed for aluminum outboards or stern-drives.
- NEVER paint the anodes installed on the stern-drive.
- NEVER paint the Y-CaPS reference electrode and / or anode.
- NEVER wash the stern-drive with a high pressure washer. This could damage the coating on the reference wire.
- NEVER paint the stern-drive with a material that contains copper or tin.
- NEVER paint over drain holes, anodes, Y-CaPS or other items specified by the anode Manufacturer.

Contact your authorized Yanmar Marine dealer or distributor for assistance.

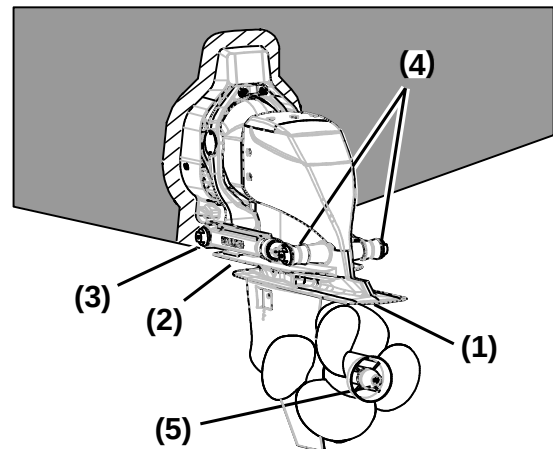
NOTICE: Galvanic corrosion damage, normal maintenance and consumable parts are not covered by the Yanmar Limited Warranty.

Additional Protection

In addition to the corrosion protection devices, take these steps to inhibit corrosion:

1. Paint the stern-drive. See *Touching-Up the Stern-Drive Paint and Spray with Corrosion Guard on page 46.*
2. Spray stern-drive components on the inside of the vessel annually with Corrosion Guard to protect the finish from dulling and corrosion. External stern-drive components may also be sprayed.
3. Keep all lubrication points, especially the steering system, shift and throttle linkages, well-lubricated.
4. Flush the coolant system periodically, preferably after each use.
NOTICE: Replace anodes if eroded 50 percent or more.

NOTICE: Anytime the boat is left in the water and the engine is not running, the drive must be left in the fully down position. This will keep the anodes in the water and will keep the exhaust pipe engaged with the exhaust port of the drive.



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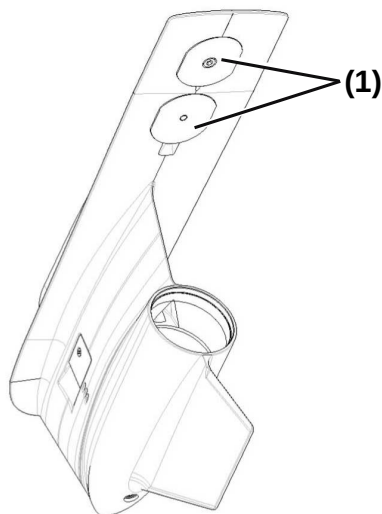
Figure 3

- 1 – Gear Housing Anodic Plates**
- 2 – Ventilation Plate Anode**
- 3 – Y-CaPS Electrode**
- 4 – Trim Cylinder Anodes**
- 5 – Propeller Shaft Anodes**

PRODUCT OVERVIEW

Gear Housing Anodic Plates

The gear housing anodic plates are installed on the underside of the antiventilation plate.



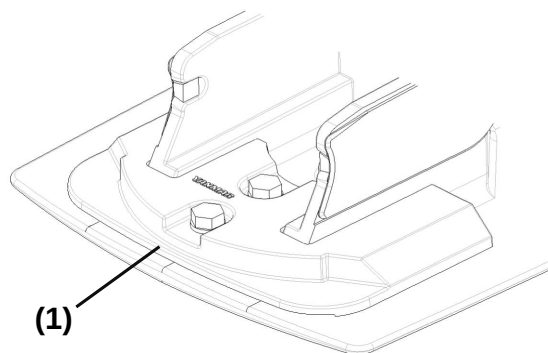
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Figure 4

1 – Gear Housing Anodic Plates

Ventilation Plate Anode

The ventilation plate anode is installed on the front of the drive shaft housing on top of the ventilation plate.



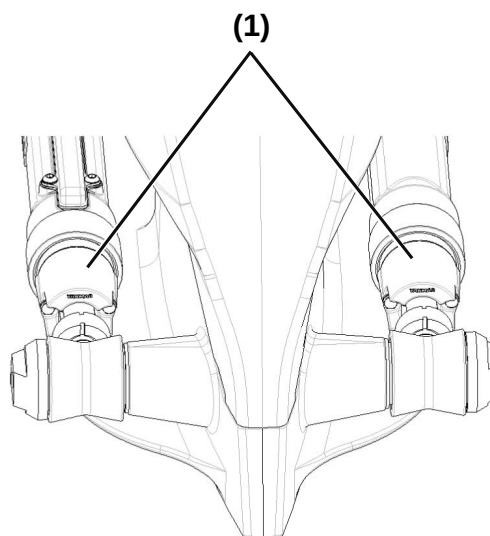
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Figure 5

1 – Ventilation Plate Anode

Trim Cylinder Anodes

The trim cylinder anodes are installed on each trim cylinder.



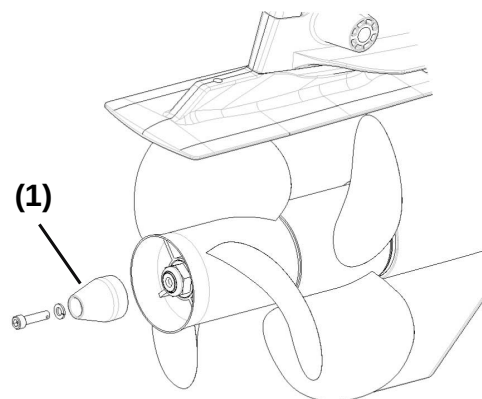
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Figure 6

1 – Trim Cylinder Anodes

Propeller Shaft Anode

The propeller shaft anode is located behind the aft propeller.



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Figure 7

1 – Propeller Shaft Anode

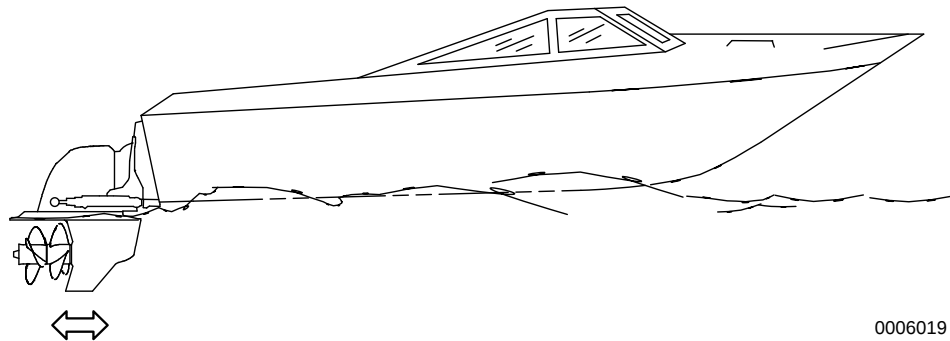
FEATURES AND CONTROLS

Remote Controls

The Yanmar ZT350 can be controlled mechanically with push-pull cables or electronically. Please refer to the Yanmar *Engine Operation Manual* or the *Electronic Control System Operation Manual* (if so equipped).

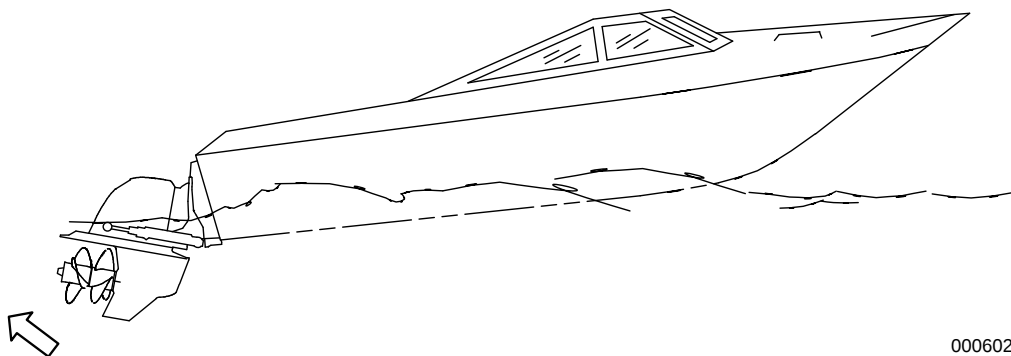
Power Trim

The power trim is used to accelerate the vessel onto plane, reach the desired engine rpm or vessel speed, and improve the performance of the vessel when there is a change in water or boating conditions. The performance of the vessel depends on load weight and distribution. Distribute the weight evenly, from bow to stern and from port to starboard. Trimming will not improve the vessel's performance due to an imbalanced load.



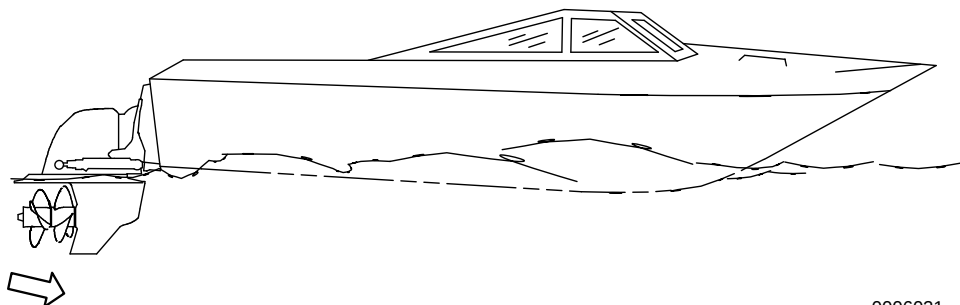
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Figure 8



0006020

Figure 9



0006021

Figure 10

Stern-Drive Trim Angle

Trim angle is the angular relationship between the stern-drive and the transom of the vessel. Vessel trim while underway greatly affects vessel performance and efficiency. For best results, the vessel should be on plane and trimmed to reduce the wet surface. With less vessel in the water, both speed and fuel economy increase. The power trim should be adjusted continuously for best results.

If the stern-drive is trimmed in “bow-down” (**Figure 10**) too far (stern-drive is closer to the transom), the speed drops, fuel economy decreases and the vessel may not handle correctly. However, it does provide better acceleration from a standstill, and because it forces the bow down, visibility is improved.

If the stern-drive is trimmed out “bow-up” (**Figure 9**) too far (stern-drive is away from the transom), steering torque may increase, the vessel may be difficult to get on a plane and may bounce.

Trim and Tilt / Trailing Switch

Raising and lowering of the stern-drive is controlled by the combination trim and tilt / trailing switch.

The trim portion of the switch operates the trim system in either the “bow-up” or “bow-down” directions.

The tilt portion (or trailing portion) of the switch operates the tilt system for trailing, beaching, launching and shallow water operation (low-speed below 1200 rpm).

CAUTION! Never raise the stern-drive into the tilt / trailing range when the engine is operating above 1200 rpm. Damage to the stern-drive may result.

The switch is located on the remote control handle or on the vessel's dash panel.

Single stern-drive applications will have one switch.

Dual stern-drive applications can have either one integral switch to operate both stern-drives or may have a separate switch for each stern-drive. **CAUTION! Always raise and lower dual stern-drives evenly together. Damage to the tie bar connecting the two stern-drives together could result from twisting or binding if the stern-drives are raised or lowered separately.**

Electrical System

The power trim pump's electrical system is protected by either a 1A in-line fuse (**Figure 11, (1)**) or an auto-reset circuit breaker (**Figure 11, (2)**) located within the trim motor. In the event of an electrical overload, the fuse will blow out or the circuit breaker will shut off. Correct the cause of the electrical overload before operating the trim system. If the electrical overload problem still exists, contact your authorized Yanmar Marine dealer or distributor.

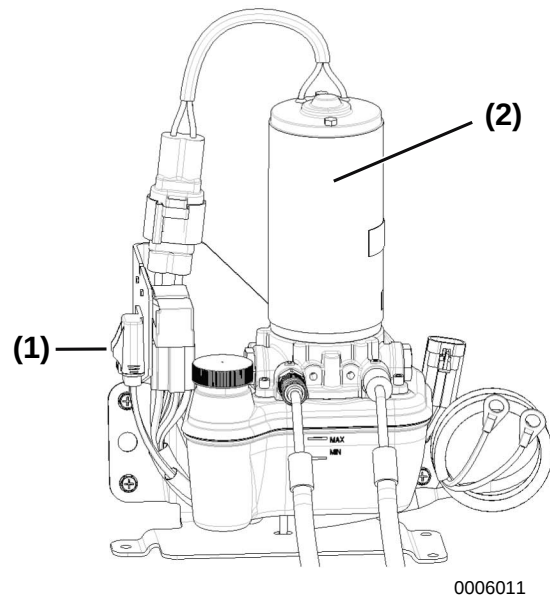


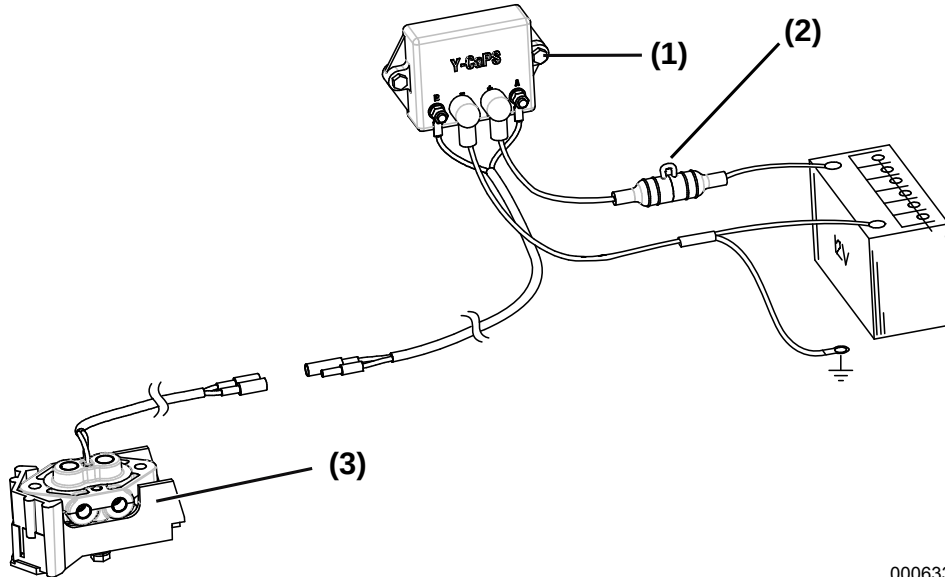
Figure 11
1 – 1A Fuse Holder
2 – Auto-Reset Circuit Breaker

PRODUCT OVERVIEW

Yanmar Cathodic Protection System

The Yanmar Cathodic Protection System (Y-CaPS) has a 20A in-line fuse (Figure 12, (2)) in the wire which connects to the positive (+) terminal on the controller. If the fuse blows, the system will not operate resulting in a loss of corrosion protection.

Test Y-CaPS to ensure adequate output. The test should be performed where the vessel is moored, using a reference electrode and test meter. Contact your authorized Yanmar Marine dealer or distributor for assistance, if necessary.



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Figure 12

1 – Y-CaPS Controller
2 – 20A In-Line Fuse Holder

3 – Electrode

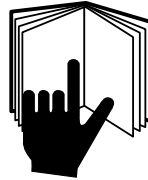
STERN-DRIVE OPERATION

This section of the *Operation Manual* describes the procedures for proper operation of the stern-drive.

Before you operate the ZT350, read the following safety information and review the *Safety* on page 3.

DANGER

The safety messages that follow have DANGER level hazards. These safety messages describe a hazardous situation which, if not avoided, will result in death or serious injury.



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

- Read and understand this *Operation Manual* before you operate or service the engine or stern-drive 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.

⚠ WARNING

The safety messages that follow have **WARNING** level hazards. These safety messages describe a hazardous situation which, if not avoided, *could* result in death or serious injury.

Explosion Hazard



While the engine is running or the battery is charging, hydrogen gas is being produced and can be easily ignited. Keep the area around

the battery well-ventilated and keep sparks, open flame and any other form of ignition out of the area.

Sever Hazard

To prevent accidental equipment movement, **NEVER** start the engine in gear.

Before starting the engine, **ALWAYS** make sure that all bystanders are clear of the area. Keep children and pets away while the engine is operating.

Alcohol and Drug Hazard



NEVER operate the engine while under the influence of alcohol or drugs or when feeling ill.

Entanglement Hazard

NEVER operate the engine while wearing a headset to listen to music or the radio because it will be difficult to hear the warning signals.

⚠ CAUTION

The safety messages that follow have **CAUTION** level hazards. These safety messages describe a hazardous situation which, if not avoided, *could* result in minor or moderate injury.



NEVER permit anyone to install or operate the stern-drive without proper training. Safety signs and labels are additional reminders for safe service and maintenance

techniques.

Read and understand this *Operation Manual* before you operate or service the stern-drive to ensure that you follow safe servicing practices and maintenance procedures.

PROPELLER SELECTION

The propeller converts the engine's power into the thrust needed to propel the vessel. Careful selection of your propeller is very important to proper vessel operation. Propellers are identified by two numbers, such as 15.75 x 20 left-hand and stainless steel propeller. In the number sequence, the first number is the diameter of the propeller and the second is the pitch. Left-hand is counterclockwise rotation for front propeller. Right-hand is clockwise rotation for rear propeller.

Pitch is the angle of the blades expressed in the theoretical distance a propeller travels in each revolution. If for example the pitch is 20, each revolution of the propeller pushes the vessel 20 in. through the water. A 28 pitch is considered "higher" pitched and a 20 pitch propeller is considered "lower" pitched. A smaller pitch propeller should be selected for water skiing or for heavy loads.

Keep these guidelines in mind when selecting a propeller:

- **NOTICE:** *NEVER attempt to change propellers until after determining the average load and individual requirements.* Your Yanmar Marine dealer or distributor is most qualified to help you select a propeller.
- Engine rpm must be within the recommended operating range. Refer to the *Engine Operator's Manual*.

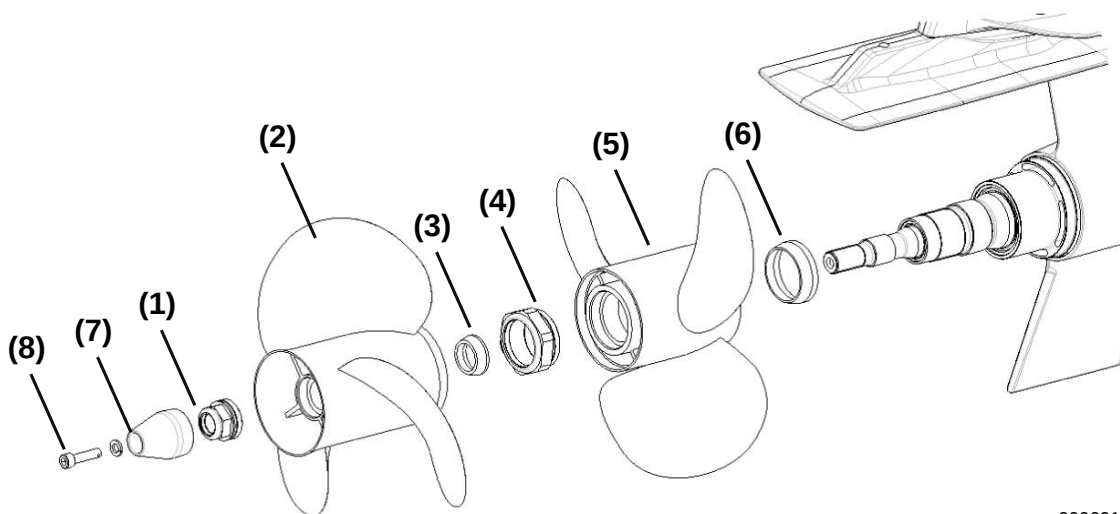
WARNING! To prevent accidental start-up, complete the following before installing or removing the propeller:

- **Put the remote control to the NEUTRAL position.**
- **Put the main switch to the OFF position and remove the key.**

WARNING! NEVER use your hand to hold the propeller when loosening the nut. Put a wood block between the antiventilation plate and the propeller blade to prevent the propeller from turning.

Problems associated with propellers include ventilation, cavitation and blow-out. These problems have similar symptoms and are best diagnosed by an expert. If a propeller related problem develops, see your Yanmar Marine dealer or distributor.

INSTALLING THE PROPELLERS



0006015

Figure 1

- | | |
|--------------------------------------|--|
| 1 – Rear Propeller Nut | 5 – Front Propeller |
| 2 – Rear Propeller | 6 – Front Propeller Thrust Hub |
| 3 – Rear Propeller Thrust Hub | 7 – Propeller Shaft Anode |
| 4 – Front Propeller Nut | 8 – Propeller Shaft Anode Bolt and Washer |

1. Apply a liberal coat of lubricant to the propeller shaft. Recommended lubricants are shown in the table below.

Description	Where Used
Urea Grease Water Resistant Type, NLGI #2	Propeller Shaft
Lithium Grease With PTFE	

2. Slide the forward thrust hub onto the propeller shaft with the tapered side toward the propeller hub (toward end of propeller shaft).
3. Align the splines and place the propeller on the propeller shaft.
4. Install and torque the front propeller nut. Check the propeller at least every 20 hours.

Front Propeller Nut Torque	
N·m	lb-ft
135	99

5. Slide the aft thrust hub onto the propeller shaft, with the tapered side toward the propeller hub (toward end of shaft).
6. Align the splines and place the propeller on the propeller shaft.
7. Install and torque the rear propeller nut. Check the propeller at least every 20 hours.

Rear Propeller Nut Torque	
N·m	lb-ft
80	59

8. Install the propeller shaft anode bolt with a washer. Torque the bolt.

Propeller Shaft Anode Bolt Torque	
N·m	lb-ft
30	22

REMOVING THE PROPELLER

WARNING! The Remote Control must be in NEUTRAL and the starter key removed from the switch before removing and / or installing the propeller.

1. Place a wood block between the propeller blades and the antiventilation plate to prevent rotation.**WARNING! Place a block of wood between the antiventilation plate and the propeller to protect hands from propeller blades and to prevent the propeller from rotating when removing the propeller nut.**
2. Turn the rear propeller nut (36 mm [1-7/16 in.]) counterclockwise to remove the nut.
3. Slide the propeller and the thrust hub off the propeller shaft.
4. Turn the front propeller nut (70 mm [2-3/4 in.]) counterclockwise to remove the nut.
5. Slide the propeller and the thrust hub off the propeller shaft.

DAILY CHECKS

All stern-drives have been submitted to a test run before shipment.

Visual checks for leakage should be made from time to time.

Before operating the stern-drive, make sure it is in good operating condition. Make sure you check the following items and have any repairs completed before you operate the stern-drive.

NOTICE: *Anytime the boat is left in the water and the engine is not running, the drive must be left in the fully down position. This will keep the anodes in the water and will keep the exhaust pipe engaged with the exhaust port of the drive.*

Visual Checks

CAUTION! If any problem is noted during the visual check, the necessary corrective action should be taken before you operate the stern-drive.

1. Check for oil leaks.
2. Check for damaged or missing parts.
3. Check for loose, missing or damaged fasteners.
4. Check the electrical harnesses for cracks, abrasions, and damaged or corroded connectors.

Check the Stern-Drive Oil Level

Description	Where Used
GL-5 Hypoid Gear Oil	Oil Reservoir

Note: The oil level will rise and fall during operation. Check the oil level before starting, when the engine is cold.

1. Check the stern-drive oil level (**Figure 2**). Keep the oil level at or near the OPERATING RANGE (full) line on the oil reservoir.
2. The oil level is low if it is below the ADD line on the oil reservoir. Fill as needed with the specified oil. See *Fill the Stern-Drive with Oil* on page 27.

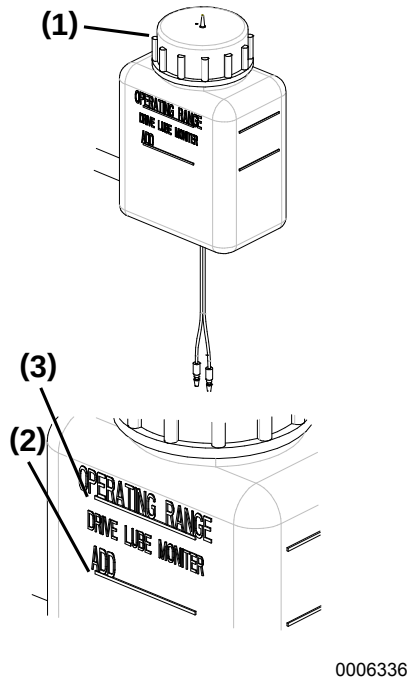


Figure 2

- 1 – Oil Reservoir
- 2 – ADD Line
- 3 – OPERATING RANGE Line

NOTICE: If any water is visible at the bottom of the oil reservoir or appears at the oil fill / drain plug and / or if oil appears discolored, contact your authorized Yanmar Marine dealer or distributor immediately. Both conditions may indicate a water leak somewhere in the stern-drive.

Fill the Stern-Drive with Oil

See *Changing the Stern-Drive Oil* on page 46 when filling the entire stern-drive.

NOTICE: If more than 60 ml (2 fl oz) of gear oil is required to fill the reservoir, a seal may be leaking. Damage to the stern-drive may occur because of lack of lubrication. Contact your authorized Yanmar Marine dealer or distributor.

1. Remove the oil reservoir cap (**Figure 3, (1)**).
2. Fill the oil reservoir to the OPERATING RANGE (**Figure 3, (2)**) (full) line with specified fluid. **NOTICE:** Do not overfill.

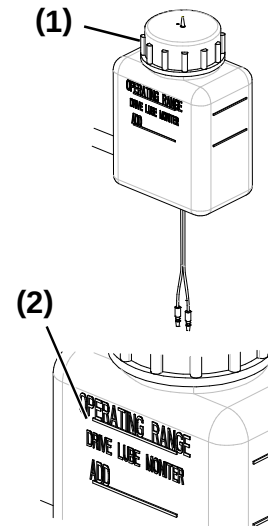


Figure 3

- 1 – Oil Reservoir Cap
- 2 – OPERATING RANGE Line

Description	Where Used
GL-5 Hypoid Gear Oil	Oil Reservoir

3. When replacing the cap, ensure that the rubber gasket is inside the oil reservoir cap and install the cap. Do not over-tighten.

STERN-DRIVE OPERATION

Check the Power Trim Pump Fluid

NOTICE: ALWAYS check the oil level with stern-drive in the full DOWN / TRIM-IN position.

1. Place the stern-drive in full DOWN / TRIM-IN position.
2. Observe the oil level in the reservoir. The oil level should be maintained within the MIN and MAX lines on the reservoir (**Figure 4, (2)**).

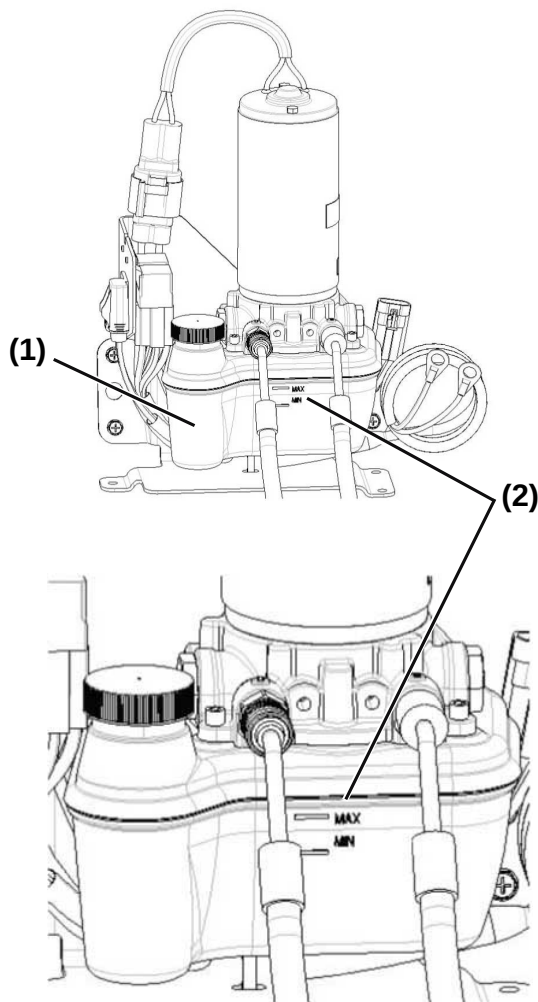


Figure 4

- 1 – Reservoir
2 – MIN and MAX Lines

3. The oil level is low if it is below the MIN line (**Figure 4, (1)**) on the reservoir. Fill as necessary with the specified fluid. See *Fill the Power Trim Pump Fluid* on page 28.

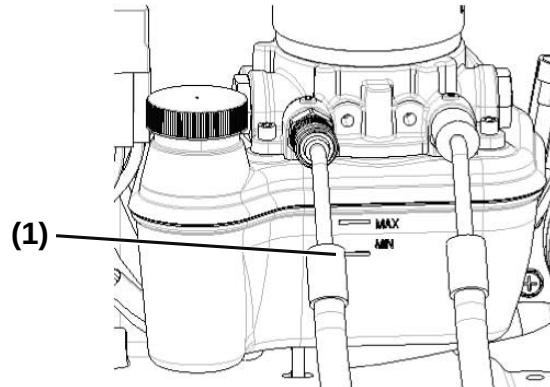


Figure 5

- 1 – MIN Line

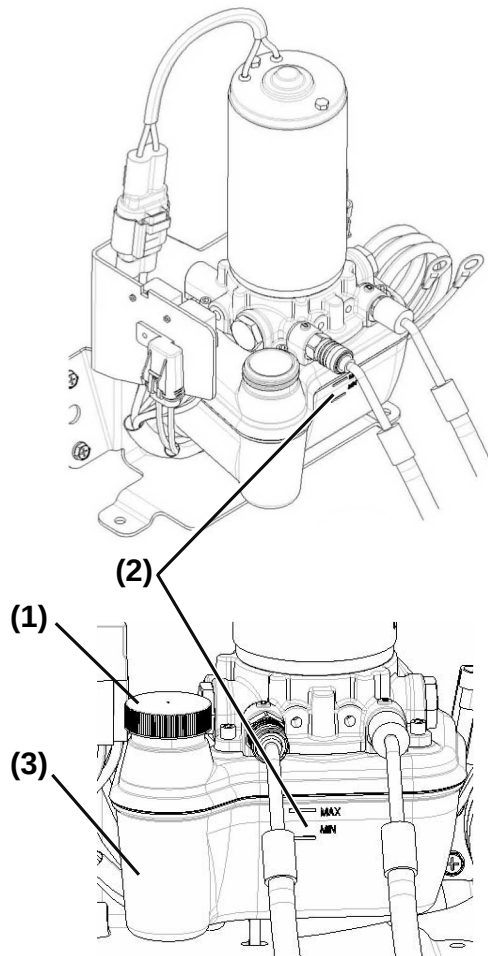
Fill the Power Trim Pump Fluid

Note: The power trim fluid does not require changing unless it becomes contaminated with water or debris. Contact your authorized Yanmar Marine dealer or distributor if the power trim fluid needs to be changed.

1. Place the stern-drive in the full DOWN / TRIM-IN position.
2. Unscrew and remove the fill cap (**Figure 6, (1)**) assembly from the reservoir (**Figure 6, (3)**) with specified fluid.

Description	Where Used
Dextron 3 Automatic Transmission Fluid	Power Trim Pump

3. Add oil to bring the oil level to within the MIN and MAX lines on the reservoir (**Figure 6, (2)**).



0006014

Figure 6

- 1 – Fill Cap Assembly
- 2 – MIN and MAX Lines
- 3 – Reservoir

4. Install the fill cap assembly.

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MAINTENANCE

This section of the *Operation Manual* describes the procedures for proper care and maintenance of the stern-drive.

Before you operate the ZT350, read the following safety information and review the *Safety* on page 3.

DANGER

The safety messages that follow have DANGER level hazards. These safety messages describe a hazardous situation which, if not avoided, will result in death or serious injury.

Crush Hazard



ALWAYS use lifting equipment with sufficient capacity to lift the stern-drive.

NEVER stand under a hoisted stern-drive. If the hoist mechanism fails, the stern-drive will fall on you, causing serious injury or death.

NEVER support the stern-drive with equipment not designed to support the weight of the stern-drive such as wooden pieces, blocks or by only using a jack.

WARNING

The safety messages that follow have **WARNING** level hazards. These safety messages describe a hazardous situation which, if not avoided, *could* result in death or serious injury.

Sever Hazard



NEVER service the stern-drive while under tow or if the engine is running at idle speed. The propeller may rotate under these

circumstances.

If the vessel has more than one engine, NEVER service a stern-drive if either of the engines are running. In multi-engine configurations, the propeller for an engine that is shut down may rotate if any of the other engines are running.

Rotating parts can cause severe injury or death. NEVER wear jewelry, unbuttoned cuffs, ties or loose-fitting clothing, and ALWAYS tie long hair back when working near moving / rotating parts such as the flywheel or PTO shaft. Keep hands, feet and tools away from all moving parts.

Always remove any tools or shop rags used during maintenance from the area before operation.

Stop the engine before you begin to service the stern-drive and secure the propeller so it will not turn.

Entanglement Hazard



NEVER leave the key in the key switch when servicing the engine or stern-drive.

Someone may accidentally start the engine and not

realize you are servicing it.

CAUTION

The safety messages that follow have **CAUTION** level hazards. These safety messages describe a hazardous situation which, if not avoided, *could* result in minor or moderate injury.

Flying Object Hazard

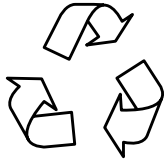


ALWAYS wear eye protection when servicing the engine or when using compressed air or high-pressure water. Dust, flying debris, compressed air, pressurized water or steam may injure your eyes.

▲ NOTICE

The safety messages that follow have **NOTICE** level hazards.

Only use replacement parts specified. Other replacement parts may affect warranty coverage.



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 by dumping them into a sewer, on the ground or into ground water or waterways.

PERIODIC MAINTENANCE

CAUTION! *Establish a periodic maintenance plan according to the stern-drive application and make sure to perform the required periodic maintenance at the intervals indicated. Failure to follow these guidelines will impair the stern-drive's safety and performance characteristics, shorten the stern-drive's life and may affect the stern-drive warranty coverage. See your authorized Yanmar Marine dealer or distributor for assistance when checking items marked with a ●.*

The Importance of Periodic Maintenance

Stern-drive deterioration and wear occur in proportion to the length of time the stern-drive has been in service and the conditions it is subjected to during operation. Periodic maintenance prevents unexpected downtime, reduces the number of accidents due to poor performance and helps extend the life of the stern-drive.

Performing Periodic Maintenance

WARNING! *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.*

The Importance of Daily Checks

The Periodic Maintenance Schedule assumes that daily checks are performed on a regular basis. Make a habit of performing daily checks before the start of each operating day.

Yanmar Replacement Parts

Yanmar recommends using genuine Yanmar parts when replacement parts are necessary. Genuine replacement parts help ensure long life.

Tools Required

Before starting any periodic maintenance procedure, make sure to have the tools needed to perform all of the required tasks on hand.

Ask Your Authorized Yanmar Marine Dealer or Distributor for Help

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

TIGHTENING FASTENERS

Use the correct amount of torque when tightening fasteners. Applying excessive torque may damage the fastener or component and too little torque may cause a leak or component failure.

TORQUE CHARTS

Standard Torque Values

Nominal Designation of Screw Thread	Standard Tightening Torque
M5	3.5 ± 0.5 N·m 2.6 ± 0.4 lb-ft
M6	6.0 ± 1.0 N·m 4.4 ± 0.6 lb-ft
M8	15 ± 2.0 N·m 11 ± 1.5 lb-ft
M10	30 ± 2.0 N·m 22 ± 1.5 lb-ft
M12	45 ± 2.0 N·m 33 ± 1.5 lb-ft

Torque Specifications

Item	Size	Torque	
Nut for U-Bolt of Gimbal Ring	M10 x 1.5	50 ± 5 N·m	37 ± 4 lb-ft
Bolt for Anode of Cylinder Part	10-32 UNF	3.5 ± 0.5 N·m	2.6 ± 0.4 lb-ft
Bolt for Rear Cover	M8 x 1.25	6.0 ± 1.0 N·m	4.4 ± 0.7 lb-ft
Plug	M10 x 1.5	15 ± 2.0 N·m	11 ± 1.5 lb-ft
Bolt for Valve Assembly	M12 x 1.25	6.0 ± 1.0 N·m	4.4 ± 0.7 lb-ft
Bolt for Rear of Inner Propeller Shaft	1 - 14 UNS	80 ± 5.0 N·m	59 ± 3.7 lb-ft
Bolt for Rear of Outer Propeller Shaft	2-1/8 - 16 UNS	135 ± 5.0 N·m	100 ± 3.7 lb-ft

PERIODIC MAINTENANCE TABLE

○: Check or Clean ◇: Replace ●: Contact your authorized Yanmar Marine dealer or distributor						
	Daily <i>See Daily Checks on page 26</i>	Weekly	Every 50 Hours	Every 100 Hours	Every 250 Hours	Every Year
Check the Stern-Drive Oil Level (Reservoir), Fill if Necessary	Before Operation ○					
Check the Trim Pump Oil Level, Fill if Necessary	Before Operation ○					
Check the Power Steering Fluid, Fill if Necessary	Before Operation ○					
Check the Water Inlets for Debris or Marine Growth, Clean if Necessary		○				
Check the Seawater Inlet Hole, Clean if Necessary		○				
Inspect the Anodes and Replace if 50 percent eroded		○				
Replenish The Oil In Stern-Drive		First Time Only ○				
Lubricate the Propeller Shaft and Retorque the Nut*				○		
Touch-Up the Stern-Drive Paint and Spray with Corrosion Guard					○	○
Change the Stern-Drive Oil			First Time Only ◇		◇**	◇**
Retorque the Gimbal Ring to Steering Shaft Connection				○		○
Inspect the Bellows and the Clamps				○		○

○: Check or Clean ◇: Replace ●: Contact your authorized Yanmar Marine dealer or distributor						
	Daily <i>See Daily Checks on page 26</i>	Weekly	Every 50 Hours	Every 100 Hours	Every 250 Hours	Every Year
Check the Engine Alignment				●		●
Lubricate the Unit Bearing (Gimbal Housing)				○		○
Lubricate the Engine Coupler***			○	○		○
Check the Circuit for Loose or Damaged Connections				○		○
Test the Y-CaPS Output on ZT350				○		○
Check the Steering System for Loose, Missing or Damaged Parts				○		○
Check the Remote Control for Loose, Missing or Damaged Parts				○		○
Lubricate the Cables and the Linkages				○		○
Retorque the Rear Engine Mounts					○	○

* If operating in only freshwater, this maintenance may be extended to every four months.

** Every 250 hours or every year, whichever comes first.

*** Lubricate engine coupler every 50 hours if operated at idle for prolonged periods of time.

GENERAL INSPECTION

Inspect the stern-drive at regular intervals to help maintain top operating performance and correct potential problems before they occur.

Check for loose, damaged or missing parts, hoses and clamps. Tighten or replace as needed.

Check the electrical connections and leads for damage and corrosion.

Remove and inspect the propeller. If it is badly nicked, bent or cracked, contact your authorized Yanmar Marine dealer or distributor.

Repair nicks and corrosion damage on stern-drive exterior finish. NEVER use paint containing copper or tin. This will damage the stern-drive and void the warranty. Use a high quality primer and topcoat paint specifically designed for aluminum outboards or stern-drives. Follow the manufacturer's directions for surface preparation and application.

POWER TRIM PUMP FLUID

Power trim fluid does not require changing unless it becomes contaminated with water or debris. Contact your authorized Yanmar Marine dealer or distributor if the power trim fluid needs to be changed.

PERIODIC MAINTENANCE PROCEDURES

Weekly

Perform the following procedures on a weekly basis.

- **Checking the Water Inlets**
- **Checking the Seawater Inlet Hole**
- **Inspecting the Anodes**
- **Checking the Oil Level**

Checking the Water Inlets

Check the water inlets for debris or marine growth. Clean if necessary.

Checking the Seawater Inlet Hole

Check the seawater inlet hole. Clean if necessary.

Inspecting the Anodes

Inspect the anodes and replace if 50% corroded. *See Corrosion Protection on page 14.*

Checking the Oil Level

Check the stern-drive oil level within one week of the first use as follows:

1. Remove the oil vent plug and gasket (**Figure 1, (1)**).

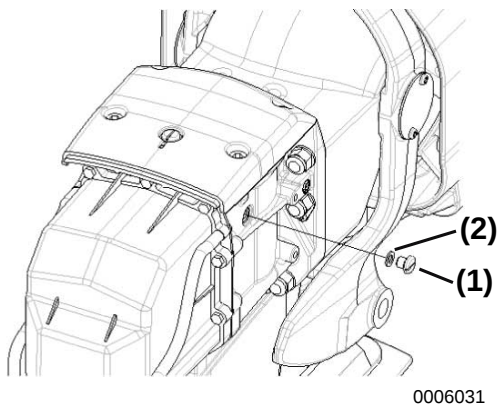


Figure 1

- 1 – Oil Vent Plug**
- 2 – Gasket**

2. If necessary, add oil until an air-free stream of oil flows from the oil vent hole.

3. Install the oil vent plug and gasket. Torque the oil vent plug.

Oil Vent Plug Torque	
N·m	lb·ft
15	11

After Initial 50 Hours of Operation

Perform the following procedures after the first 50 hours of operation.

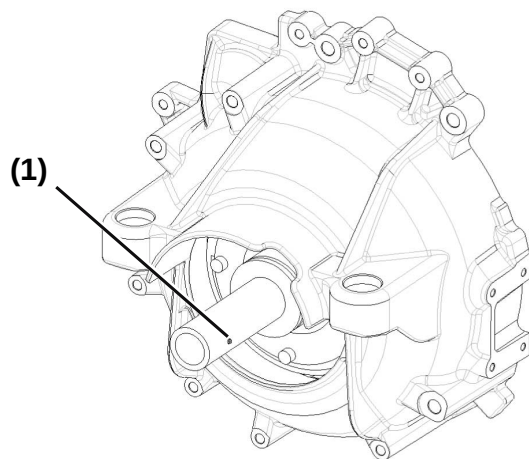
- **Lubricating the Engine Coupler**
- **Changing the Stern-Drive Oil**

Lubricating the Engine Coupler

Lubricate the engine coupler every 50 hours if operated at idle for prolonged periods of time.

Note: The stern-drive may be equipped with a sealed engine coupler. The sealed coupler and shaft splines can be lubricated without removing the stern-drive.

Apply approximately 8 to 10 pumps of grease to the engine coupler grease fitting (**Figure 2, (1)**) to lubricate the engine coupler splines through the grease fittings, if equipped. Use a typical hand-operated grease gun to apply the grease.



0006033

Figure 2
1 – Engine Coupler Grease Fitting

Description	Where Used
Multi-Purpose Heavy-Duty Type Lithium Grease, NLGI #2	Coupler

Note: Lubricate the coupler on the ZT350 model every 50 hours if the vessel is operated at idle for prolonged periods of time.

Changing the Stern-Drive Oil

See Changing the Stern-Drive Oil on page 46.

Every 50 Hours of Operation

Perform the following maintenance every 50 hours of operation.

- **Lubricate the Engine Coupler**

Lubricate the Engine Coupler

Lubricate the engine coupler every 50 hours if operated at idle for prolonged periods of time. *See Lubricating the Engine Coupler on page 40.*

Every 100 Hours of Operation

Perform the following maintenance every 100 hours of operation.

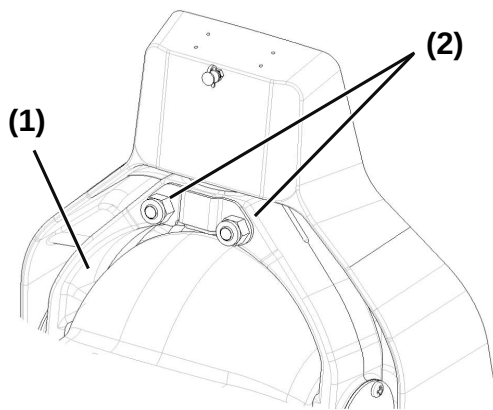
- **Lubricating the Propeller Shaft and Retorquing the Nut**
- **Retorquing the Gimbal Ring to Steering Shaft Connection**
- **Inspecting the Bellows and the Clamps**
- **Checking the Engine Alignment**
- **Lubricating the Unit Bearing (Gimbal Housing)**
- **Lubricating the Engine Coupler**
- **Checking the Circuit for Loose or Damaged Connections**
- **Testing the Y-CaPS Output**
- **Checking the Steering System for Loose, Missing or Damaged Parts**
- **Lubricating the Drive Unit and Universal-Joint Shaft Spines and O-Rings**
- **Torqueing the Rear Engine Mount Bolts**
- **Checking the Remote Control for Loose, Missing or Damaged Parts**
- **Lubricating the Cable and the Linkages**

Lubricating the Propeller Shaft and Retorquing the Nut

If operating in only freshwater, this maintenance may be extended to every four months. *See Installing the Propellers on page 24.*

R retorquing the Gimbal Ring to Steering Shaft Connection

Torque the gimbal ring locknuts for the steering shaft connection.



0006035

Figure 3

- 1 – Gimbal Ring
- 2 – Locknuts

Gimbal Ring Locknut Torque	
N·m	lb·ft
50	37

Inspecting the Bellows and the Clamps

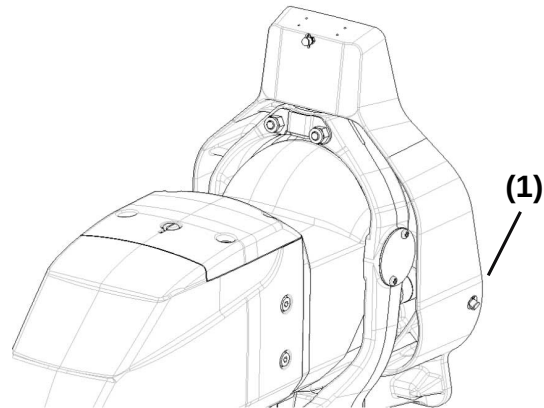
See *General Inspection* on page 38.

Checking the Engine Alignment

See your authorized Yanmar Marine dealer or distributor.

Lubricating the Unit Bearing (Gimbal Housing)

Apply approximately 8 to 10 pumps of grease to the unit bearing (gimbal housing) grease fitting (**Figure 4, (1)**) to lubricate the unit bearing (gimbal housing). Use a typical hand-operated grease gun to apply the grease.



0006032

Figure 4

- 1 – Unit Bearing (Gimbal Housing) Grease Fitting

Description	Where Used
Urea Grease Water Resistant Type, NLGI #2	Unit Bearing (Gimbal Housing)

Lubricating the Engine Coupler

See *Lubricating the Engine Coupler* on page 40.

Checking the Circuit for Loose or Damaged Connections

Check the electrical connections and leads for damage and corrosion.

Testing the Y-CaPS Unit Output

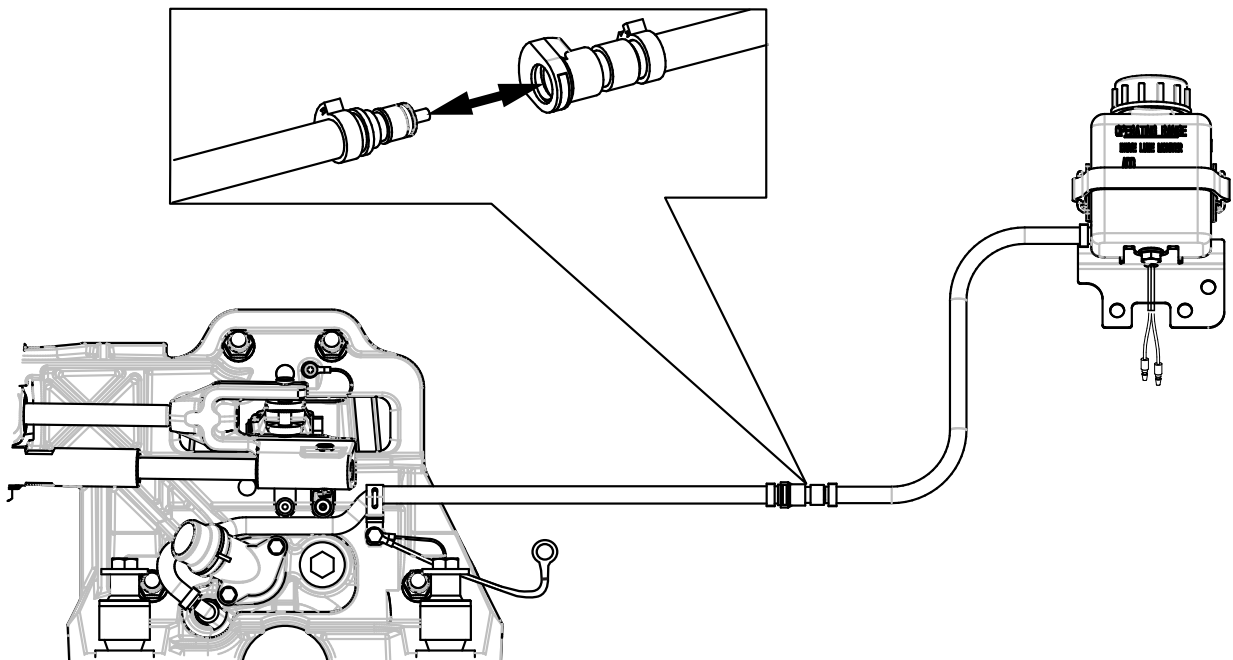
See *Yanmar Cathodic Protection System* on page 20.

Checking the Steering System for Loose, Missing or Damaged Parts

Check the steering system and tighten any loose parts, replace any missing or damaged parts.

Lubricating the Drive Unit and Universal-Joint Shaft Splines and O-Rings

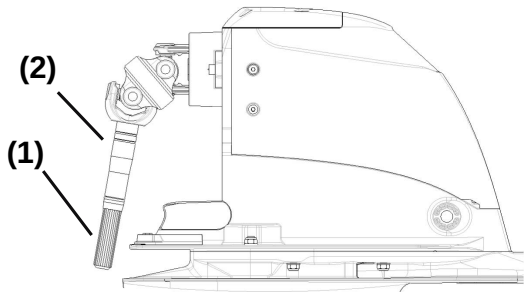
When you remove the stern-drive unit from the transom assembly, you should first remove the quick connect fitting. This will prevent oil leaks from the reservoir tank.



0006509

Figure 5

Remove the drive unit and lubricate the universal-joint shaft splines (**Figure 6, (1)**) and the O-rings (**Figure 6, (2)**).



0006004

Figure 6

- 1 – Universal-Joint Shaft Splines
- 2 – Universal-Joint O-Rings

Description	Where Used
Multi-Purpose Heavy-Duty Type Lithium Grease, NLGI #2	Universal-Joint Shaft Splines and O-Rings

MAINTENANCE

Torquing the Rear Engine Mount Bolts

Note: Refer to the Engine Installation Manual and / or Operation Manual for front engine mount information.

Torque the rear engine mount bolts.

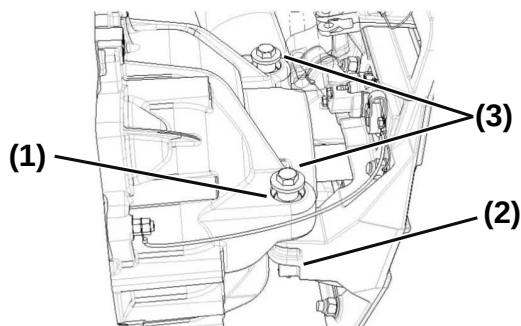


Figure 7

- 1 – Rear Engine Mount
- 2 – Transom Plate Mount
- 3 – Bolts

Engine Rear Mount Bolt Torque	
N·m	lb-ft
45	33

Checking the Remote Control for Loose, Missing or Damaged Parts

See Remote Controls on page 17.

Lubricating the Shift Cable and the Linkages

CAUTION! NEVER grease the steering cable while extended. Hydraulic lock could occur and cause loss of steering control.

Grease the steering cable grease fitting.

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

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

Description	Where Used
Lithium Grease With PTFE	Steering Cable

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

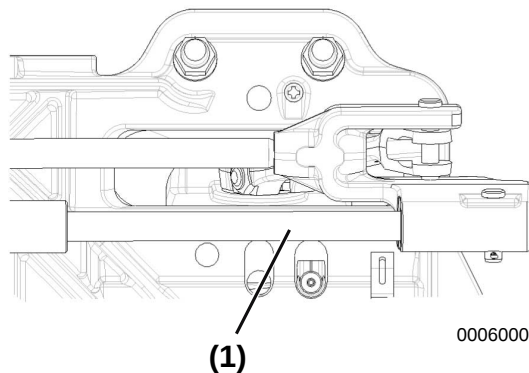


Figure 8

- 1 – Extended Steering Cable

Description	Where Used
Urea Grease Water Resistant Type, NLGI #2	Steering Cable

3. Lubricate the steering system clevis pin.

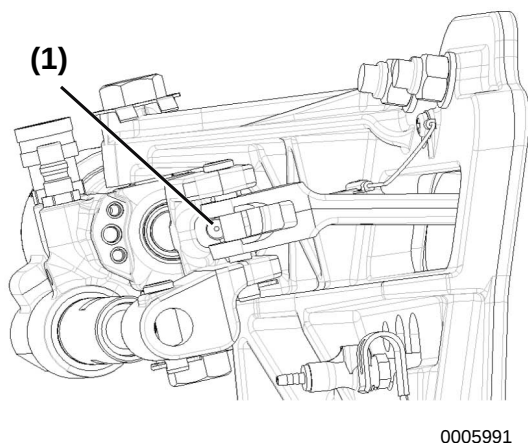


Figure 9
1 – Steering System Clevis Pin

Description	Where Used
Urea Grease Water Resistant Type, NLGI #2	Clevis Pin

4. On dual engine vessels, lubricate the tie bar clevis pin.

Description	Where Used
Urea Grease Water Resistant Type, NLGI #2	Clevis Pin

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

Lubricating the Shift Cable (Typical)

Lubricate the shift cable pivot points (**Figure 10, (1)**) and the guide contact surfaces (**Figure 10, (2)**).

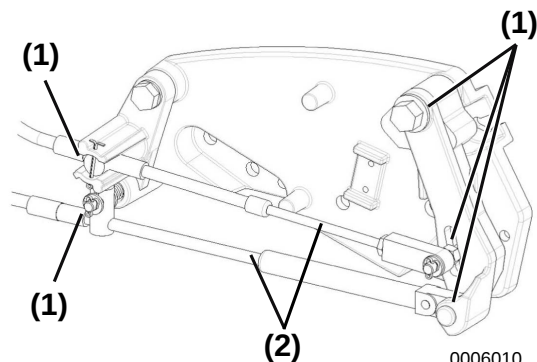


Figure 10
1 – Shift Cable Pivot Points
2 – Guide Contact Surfaces

Description	Where Used
SAE 30W Engine Oil	Shift Cable Pivot Points
Lithium Grease With PTFE	Guide Contact Surfaces and Cable End

Every 250 Hours of Operation

Perform the following maintenance every 250 hours of operation.

- **Touching-Up the Stern-Drive Paint and Spray with Corrosion Guard**
- **Retorquing the Rear Engine Mounts**
- **Changing the Stern-Drive Oil**

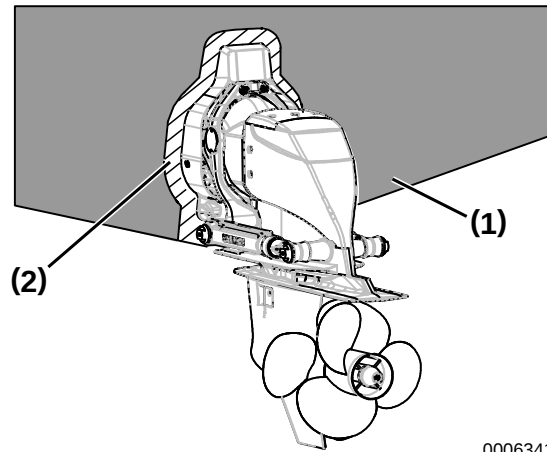
Touching-Up the Stern-Drive Paint and Spray with Corrosion Guard

Corrosion damage that results from improper application of anti-fouling paint will not be covered by the warranty.

Painting vessel hull or vessel transom:
Anti-fouling paint may be applied to the vessel hull and the vessel transom.

NOTICE: *NEVER paint the anodes or Y-CaPS electrode. Painting these components will render them ineffective as galvanic corrosion inhibitors.*

NOTICE: *Use copper-based paint as anti-fouling protection for the vessel hull or vessel transom, as long as it is not prohibited by law in the area where the vessel will be operated. If using copper- or tin-based anti-fouling paint, avoid an electrical interconnection between the Yanmar Product, Anodic Blocks, or Y-CaPS and the paint by allowing a minimum of 40 mm (1-1/2 in.) of UNPAINTED area on the transom of the vessel and around these items.*



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Figure 11

- 1 – Painted Vessel Transom**
- 2 – Minimum 40 mm (1-1/2 in.) of unpainted area around transom assembly**

NOTICE: *The drive unit and transom assembly can be painted with a good quality marine paint or an anti-fouling paint that does not contain copper or any other material that could conduct electrical current. NEVER paint drain holes, anodes, Y-CaPS or items specified by the vessel manufacturer.*

NOTICE: *NEVER wash the stern-drive with a power washer because it can damage the coating on the reference wire and increase corrosion.*

Retorquing the Rear Engine Mounts

See Torqueing the Rear Engine Mount Bolts on page 44.

Changing the Stern-Drive Oil

Note: The Stern-Drive oil must be changed every 250 hours or every year, whichever comes first.

NOTICE: *ALWAYS be environmentally responsible. Follow the guidelines of the EPA or other governmental agencies for the proper disposal of hazardous materials such as lubrication oil, diesel fuel and engine coolant. Consult the local authorities or reclamation facility.*

1. Remove the oil reservoir from the bracket (**Figure 12, (4)**).

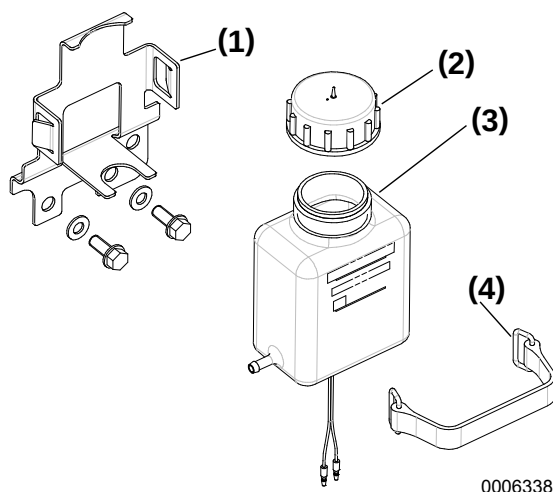


Figure 12

- 1 – Bracket
- 2 – Oil Reservoir Cap
- 3 – Oil Reservoir
- 4 – Retaining Strap

2. Empty the contents into a container large enough to hold the drained gear oil.
3. Install the oil reservoir (**Figure 12, (3)**) in the bracket.
4. Place the stern-drive in full trim limit OUT position.
5. Remove the oil fill / drain plug and gasket (**Figure 13**).

6. Drain the oil.

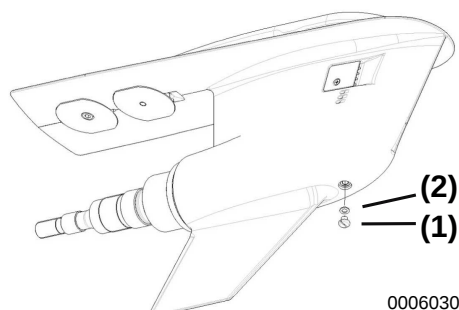


Figure 13

- 1 – Oil Fill / Drain Plug
- 2 – Gasket

7. Remove the oil vent plug and gasket (**Figure 14, (1)**). Allow the oil to drain completely.

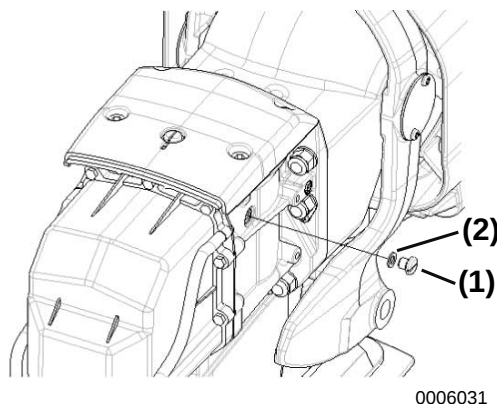


Figure 14

- 1 – Oil Vent Plug
- 2 – Gasket

NOTICE: *If any water drains from the oil fill / drain hole, or if it appears milky, the stern-drive may be leaking and should be checked immediately by your authorized Yanmar Marine dealer or distributor.*

MAINTENANCE

8. Remove the case plate cover, filter cover, magnet and filter. Clean or replace the filter and magnet.

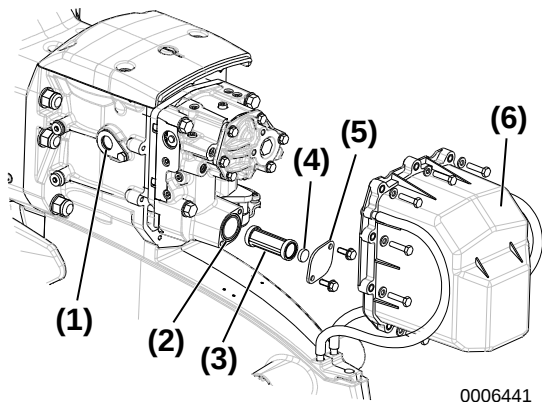


Figure 15

- 1 – Oil Level Sight Glass
- 2 – Filter Opening
- 3 – Filter
- 4 – Magnet
- 5 – Filter Cover
- 6 – Case Plate Cover

9. Lower the stern-drive so that the propeller shaft is level. Fill the stern-drive through the oil fill / drain hole with the specified oil until an air-free stream of oil flows from the filter opening. Install the filter, magnet, filter cover and case plate cover.
10. Continue to fill the stern-drive with oil through the oil fill / drain hole until an air-free stream of oil flows from the oil vent hole.
11. Install the oil vent plug and gasket. Torque the oil vent plug.

Oil Vent Plug Torque	
N·m	lb-ft
15	11

12. Continue to pump gear oil into the oil reservoir circuit until the gear oil appears in the oil reservoir.

13. Fill the oil reservoir so that the oil level is within the operating range.

NOTICE: NEVER overfill.

Model	Capacity	Fluid Type
ZT350	2500 mL (85 oz)	GL-5 Hypoid Gear Oil

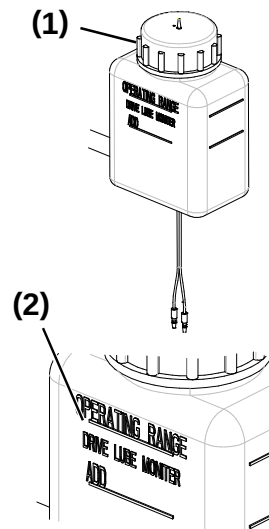


Figure 16

- 1 – Oil Reservoir Cap
- 2 – OPERATING RANGE Line

14. Ensure that the rubber gasket is inside the cap and install the cap. NEVER over-tighten.
15. Remove the pump from the oil fill / drain hole. Quickly install the gasket and oil fill / drain plug. Torque the oil fill / drain plug.

Oil Fill / Drain Plug Torque	
N·m	lb-ft
15	11

16. Check the oil level in the oil reservoir after first use.

17. Check the stern-drive oil level within one week of the first use as follows:

- a. Remove the oil vent plug and gasket (**Figure 17, (1)**).

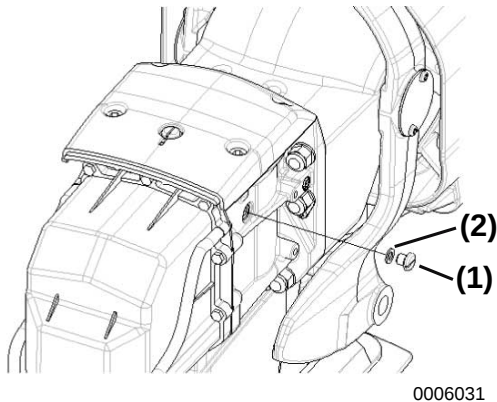


Figure 17

1 – Oil Vent Plug
2 – Gasket

- b. If necessary, add oil until an air-free stream of oil flows from the oil vent hole.
- c. Install the oil vent plug and gasket. Torque the oil vent plug.

NOTICE: *Oil level in the oil reservoir will rise and fall during stern-drive operation; always check the level when the stern-drive is cool and the engine is shut down.*

Every Year

Perform the following maintenance every year of operation.

- **Retorquing the Gimbal Ring to Steering Shaft Connection**
- **Inspecting the Bellows and the Clamps**
- **Checking the Engine Alignment**
- **Lubricating the Unit Bearing (Gimbal Housing)**
- **Lubricating the Engine Coupler**
- **Checking the Circuit for Loose or Damaged Connections**
- **Testing the Y-CaPS Unit Output**
- **Checking the Steering System for Loose, Missing or Damaged Parts**
- **Checking the Remote Control for Loose, Missing or Damaged Parts**
- **Lubricating the Cable and the Linkages**
- **Touching-Up the Stern-Drive Paint and Spray with Corrosion Guard**
- **Changing the Stern-Drive Oil**
- **Retorquing the Rear Engine Mounts**

Retorquing the Gimbal Ring to Steering Shaft Connection

See Retorquing the Gimbal Ring to Steering Shaft Connection on page 42.

Inspecting the Bellows and the Clamps

See General Inspection on page 38.

Checking the Engine Alignment

See Checking the Engine Alignment on page 42.

Lubricating the Unit Bearing (Gimbal Housing)

See Lubricating the Unit Bearing (Gimbal Housing) on page 42.

Lubricating the Engine Coupler

See Lubricating the Engine Coupler on page 40.

Checking the Circuit for Loose or Damaged Connections

See Checking the Circuit for Loose or Damaged Connections on page 42.

Testing the Y-CaPS Unit Output

See Yanmar Cathodic Protection System on page 20.

Checking the Steering System for Loose, Missing or Damaged Parts

See Checking the Steering System for Loose, Missing or Damaged Parts on page 42.

Checking the Remote Control for Loose, Missing or Damaged Parts

See Remote Controls on page 17.

Lubricating the Cable and the Linkages

See Lubricating the Shift Cable (Typical) on page 45.

Touching-Up the Stern-Drive Paint and Spray with Corrosion Guard

See Touching-Up the Stern-Drive Paint and Spray with Corrosion Guard on page 46.

Changing the Stern-Drive Oil

See Changing the Stern-Drive Oil on page 46.

Retorquing the Rear Engine Mounts

See Torqueing the Rear Engine Mount Bolts on page 44.

TROUBLESHOOTING

No.	Problem	Possible Cause	Action	Reference Page
1	Remote Control Operates Hard, Binds, Has Excessive Free Play or Makes Unusual Sounds	Insufficient lubrication on the shift and throttle (if applied) linkage fasteners.	Lubricate.	44
		Obstruction in the shift or throttle (if applied) linkages.	Remove the obstruction.	44
		Loose or missing shift and throttle linkages.	Check all throttle linkages. If any are loose or missing, see your authorized Yanmar Marine dealer or distributor immediately.	
		Shift or throttle (if equipped) cable is kinked.	Straighten the cable or have your authorized Yanmar Marine dealer or distributor replace the cable if damaged beyond repair.	44
2	Steering Wheel Turns Hard or Jerky	Low power steering pump fluid level.	Check for leaks. Refill the system with fluid.	—
		Stern-drive belt is loose or in poor condition.	Replace and / or adjust.	—
		Insufficient lubrication on the steering components.	Lubricate.	
		Insufficient lubrication on the transom gimbal housing assembly and swivel shaft.	Lubricate.	42
		Loose or missing steering fasteners or parts.	Check all parts and fasteners. If any are loose or missing, see your authorized Yanmar Marine dealer or distributor immediately.	42
		Contaminated power steering fluid.	See your authorized Yanmar Marine dealer or distributor.	—

TROUBLESHOOTING

No.	Problem	Possible Cause	Action	Reference Page
3	Power Trim Does Not Operate (Electric Motor Does Not Operate)	Blown fuse.	Replace the fuse.	19
		Circuit breaker is tripped.	Wait until the breaker cools down and the breaker is restored.	19
		Loose or dirty electrical connections or damaged wiring.	Check all associated electrical connections and wires (especially battery cables). Clean and tighten faulty connection. Repair or replace wiring.	19
4	Power Trim Does Not Operate (Electric Motor Operates but Stern-drive Does Not Move)	Trim pump oil level is low.	Fill pump with oil.	28
		Stern-drive binding in gimbal ring.	Check for obstruction. See your authorized Yanmar Marine dealer or distributor.	—

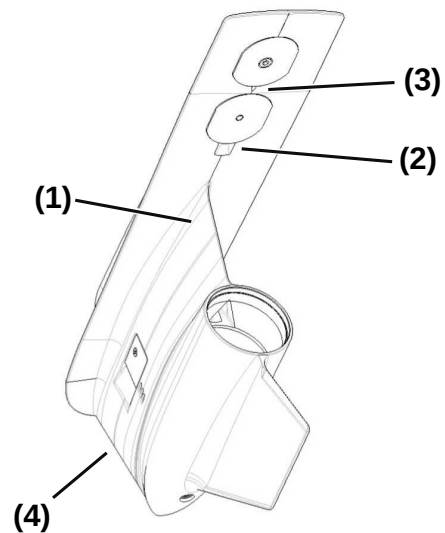
LONG-TERM STORAGE

COLD WEATHER (FREEZING TEMPERATURE), SEASONAL AND EXTENDED STORAGE

NOTICE: *Yanmar strongly recommends that this service be performed by an authorized Yanmar Marine dealer or distributor. Damage caused by freezing IS NOT covered by the Yanmar Warranty.*

Stern-Drive Lay Up

1. Use a piece of wire to check the water drain passages in the drive unit to ensure that they are open.



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Figure 1

- 1 – Under Side of Gear Housing**
 - 2 – First Anode Cavity Drain Passage**
 - 3 – Second Anode Cavity Drain Passage**
 - 4 – Speedometer Pitot Hole**
2. Change the stern-drive oil. See *Changing the Stern-Drive Oil* on page 46.
 3. Perform all other checks, inspections, lubrication and fluid changes.

LONG-TERM STORAGE

4. **CAUTION!** *The stern-drive should be stored in the FULL DOWN / TRIM-IN position. The universal joint bellows may develop a set if the unit is stored in the raised position and may fail when the stern-drive is returned to service.* Place the stern-drive in the full DOWN / TRIM-IN position.

Stern-Drive Recommissioning

1. Carefully inspect the stern-drive for leaks.
2. Check the steering system, shift and throttle control for proper operation.