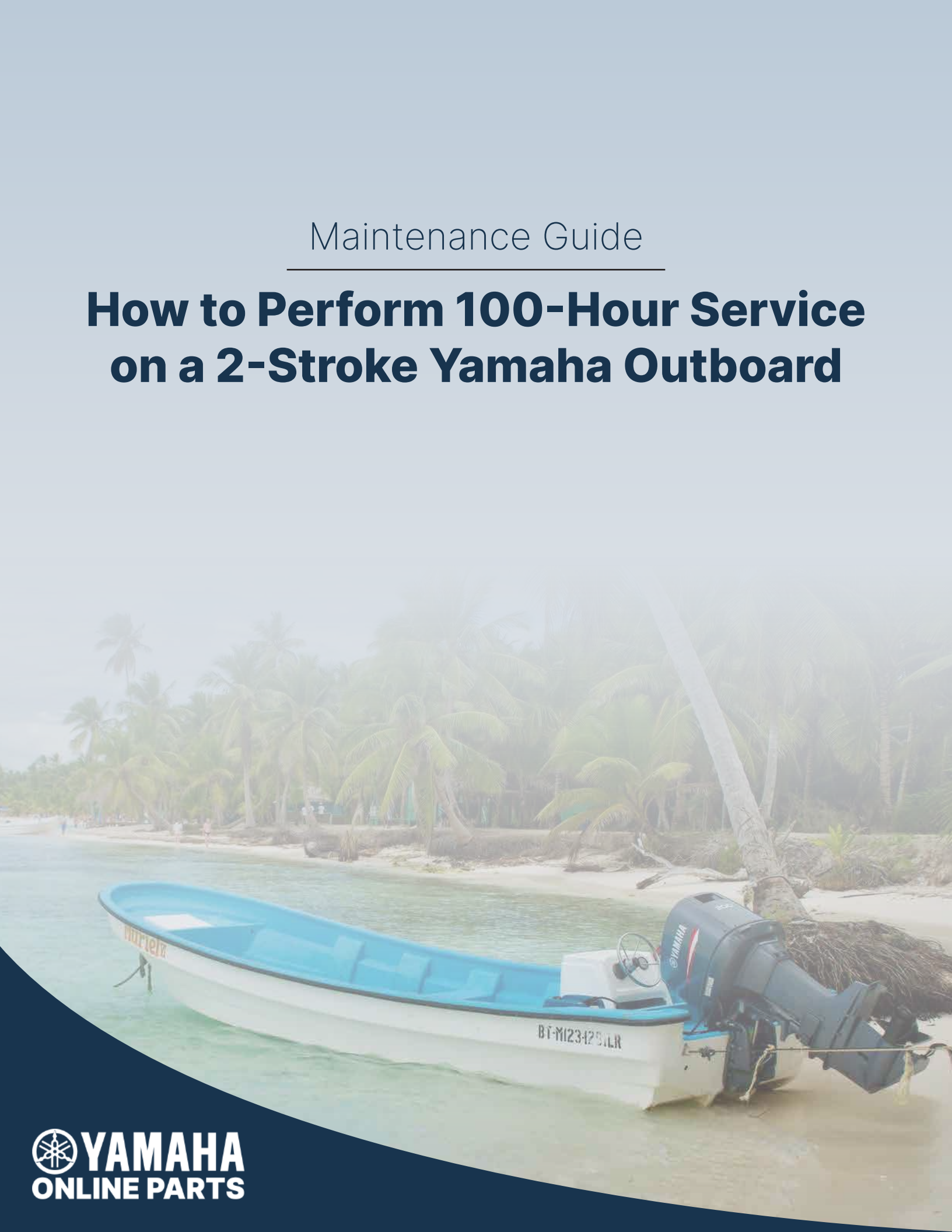
Maintenance Guide

How to Perform 100-Hour Service on a 2-Stroke Yamaha Outboard



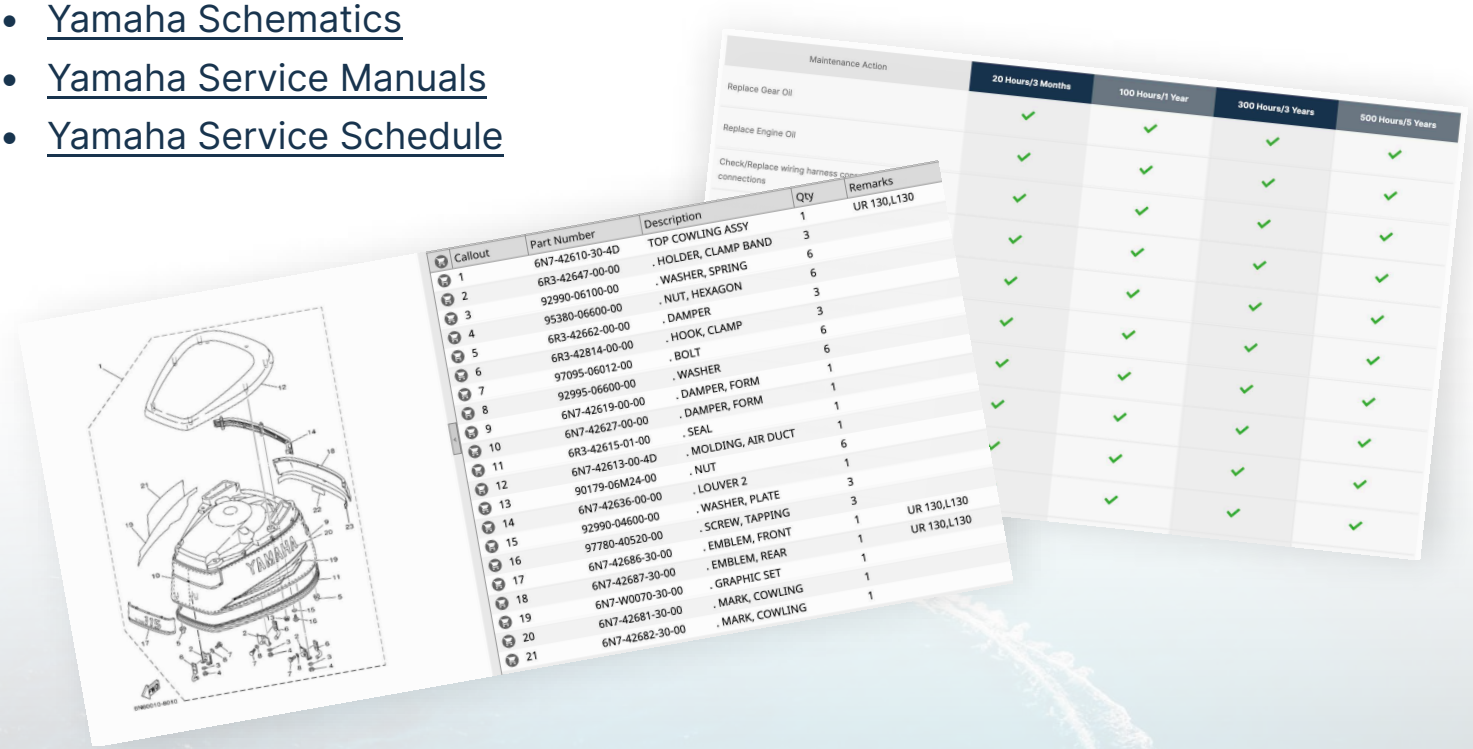
YAMAHA
ONLINE PARTS

Performing needed maintenance in a timely manner on your Yamaha outboard is the key to its overall longevity and reliability. Within this maintenance guide we'll explore the process of performing a 100-hour service, or annual service, on a two-stroke Yamaha outboard including the Saltwater Series II, HPDI, and inshore models. While this guide focuses on Yamaha outboards, the process is similar for other major manufacturers' outboards including Mercury, Suzuki, as well as for most other gasoline powered two-cycle outboard engines. In addition to being necessary for the longevity and reliability of your outboard, periodic maintenance also affords the engine owner or technician the opportunity for inspection that may uncover a small problem before becoming a large problem.

Too often boat owners are in a rush to complete a service that they don't give the proper attention to what the engine is telling them in the parts and fluids that are being changed out. This maintenance guide will teach you how to look for telltale signs of problems in the engine oil, lower unit oil, spark plugs, and filters you will be replacing as part of your service.

Yamaha 2-Stroke Maintenance Resources:

- Yamaha Schematics
- Yamaha Service Manuals
- Yamaha Service Schedule



Step 1: Two-Stroke Oil Tank Service

If your two-stroke Yamaha outboard has oil injection with a remote oil tank inside the boat, you will begin your service by accessing this tank. These remote tanks are not always situated in the easiest-to-reach places, so you may have to consider removing a livewell tub, cooler, or access panel to get to the tank. Loosen the tank from its bracket and locate the oil supply hose that comes from the pump on the tank and heads toward the engine. You should notice a small, white, inline filter that strains the two-stroke oil in route to the engine. This small filter is often overlooked, but without a steady supply of Yamalube two-stroke oil, your engine will quickly go into reduction mode, or worse. Cut the small zip ties that secure the oil line to the strainer and replace the strainer quickly before you drain oil all over the bilge. This process is a little messy, so a few petroleum sorbent pads can help avoid a mess. Having some good quality nitrile gloves on board the boat or around for your service is also a great idea. With the tank loosened from its bracket, it is a great time to use a small service flashlight to illuminate the bottom corners of the tank. The clear plastic will allow you to spot any debris or water deposits accumulated inside the tank. If found, you will need to remove the tank, drain, and clean. Debris is most often introduced from fill caps being left open, damaged fill cap o-rings, or dirty containers used to purchase bulk oil. When complete, reinstall the tank into the bracket and remove the cowling from your engine. Use the manual transfer switch on the side of the engine to verify oil is flowing through your new filter and the system is primed. You are now ready to begin your engine service.

Recommended Parts & Accessories for Two-Stroke Oil Tank Service:

Yamalube
2-Stroke Oil

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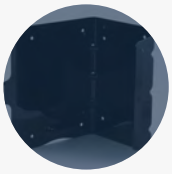


Yamaha Oil Tank
Sub Assembly Bracket

SHOP NOW

Yamaha Remote
Oil Tank Filter

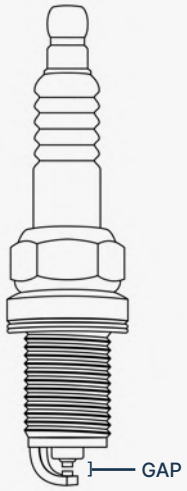
SHOP NOW

Step 2: Plugs & Compression

Begin this step by removing the plastic shrouding over your spark plugs and inspect the plug wires and boots. Any cut or abraded boots should be replaced. Yamaha engines come from the factory with NGK brand spark plugs, and Yamaha Online Parts carries a wide assortment of these OEM plugs. In most applications, the spark plugs come pre-gapped, but it is advisable to re-check gap to make sure that no plugs were damaged during manufacturing or shipment. Again, the information in your owner's manual is helpful – or you can consult the schematic data from Yamaha for more information. As you remove the old spark plugs, keep track of which plugs come from which cylinders. Note if the plug appears to be wet from water, oil, or gasoline. Note if the plug exhibits evidence of heavy carbon deposits, other fouling or rust – all indicative of other problems. If you were to take your engine to a dealer for the 100-hour service, this is the point at which they would perform a compression test by connecting a compression gauge to the cylinders individually and using the starter motor to turn the engine over and check its ability to pressurize the cylinder. If you are going to perform this test at home, you will either need a remote starter button, or a friend who can turn the ignition key with the kill lanyard removed. Repeat testing for all cylinders and compare results. Readings will vary from gauge to gauge, so the test is more about measuring the difference in readings with ideal results being less than 10 percent variance. With the compression test completed – or skipped – you can now begin installing your new spark plugs. For ease of removal and to reduce the risk of thread damage to the cylinder head, apply a drop of oil with the tip of your finger to the threads of the plug using care to avoid wetting the electrode or porcelain center of the plug. Thread the plugs into the cylinder head by hand using caution not to cross thread. NGK uses a crush washer that will press down and provide a tight seal as you tighten. Full torque is between 18-21 ft. lbs. Reinstall the plug wires or coils in the same order and use a small amount of dielectric grease on the tips of the plugs to prevent plugs from fusing to the boots. This product also works well for other electrical connections round the boat like those pesky navigation light and anchor light bulbs that are always subject to corrosion.

What's Spark Plug Gap?

A spark plug's tip temperature and the voltage necessary to fire the plug are directly affected by the gap setting. Most manufacturers set the gap from the factory for that plugs most popular application. Unfortunately, that plug may have hundreds of applications from automobiles to golf carts. Setting the gap for your particular engine is important as insufficient spark plug gap can cause pre-ignition, detonation and eve n engine damage. Too much gap can result in a higher rate of misfires, loss of power, plug fouling and poor fuel economy. NGK spark plugs come from the factory pre-gapped for your Yamaha outboard.



Recommended Parts & Accessories for Plugs and Compression Service:

NGK Spark Plugs

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Combustion Chamber Cleaner

SHOP NOW

Yamaha Marine Greases

SHOP NOW

Yamaha Fogging Oil

SHOP NOW

Step 3: Fuel System

Depending on your application and style of boat, you likely have a fuel-water separating filter aboard your vessel. If you have not seen one, simply follow the routing of your fuel hose from the engine rigging tube backward through the boat. These vary in shape and manufacturer, so be sure to order the identical replacement size from Yamaha or a suitable substitute. Use a filter wrench to loosen the existing filter element and use caution when removing it as it will be filled with gasoline. A clear plastic or glass container is helpful to dump the filter and examine the contents.

A small amount of debris is common, as is a small amount of water after the fuel has had a moment to settle. Larger amounts of water would warrant further investigation. If your filter's mounting location allows it, pre-fill the replacement filter with some gasoline to make re-priming the fuel system easier later. It is also advisable to use a small amount of grease to lubricate the o-ring prior to installation. Spin on and hand tighten only about a half turn to snug.

Move back to the engine and locate the filter element in the clear plastic bowl on the front of your block. Unplug the water-in-fuel sensor if applicable and spin the cup off the housing. Again, drain into your clear container and examine the fuel. If your main water separator was free from water, this filter should be as well. Inspect the o-ring on the top of the filter cup and lightly grease for ease of installation or replace if needed. Replace the filter element with a fresh one and reinstall the cup. Locate your engine's primer bulb and use the primer to pump up the fuel system. You should observe gasoline entering and filling the filter cup. Check for leaks and prime until the bulb becomes firm. As a tip, primer bulbs work best when the arrow points up, so use any extra hose in the line to help you tilt the bulb vertical.

Your Fuel-Water Separating Filter Had a Large Amount of Water in It?

The problem lies in the very physical nature of ethanol. Ethanol prefers to bond with water vs. the gasoline it has been introduced into and subsequently pumped into your boat's fuel tank. Through the natural process of condensation, being in a water environment and accidental introduction of water into the fuel system, water finds itself in the fuel tank.

If you are not running Yamalube Ring Free on a constant basis, the 100-hour service interval is a great time for a “shock treatment.” Yamalube Ring Free is a fuel system conditioner that also helps to remove carbon deposits. The standard dose is 1 oz per 10 gallons of gasoline, but if you are not running the product all the time, you can double that ratio for more cleaning power. Simply pour the Ring Free into the fuel tank fill and go run the boat. No additional work is needed. It is advisable to inspect your fuel tank fill’s o-ring for damage when you add Ring Free as a damaged o-ring can allow water from rain or boat washing into your fuel system.

If you will be storing your boat for the season after service is performed, a liberal application of Yamaha’s STOR-RITE Fogging Oil and the addition of Yamalube Fuel Stabilizer & Conditioner Plus to your fuel tank is highly recommended.

Recommended Parts & Accessories for Fuel System Service:

Yamaha Ring Free & Fuel Stabilizer

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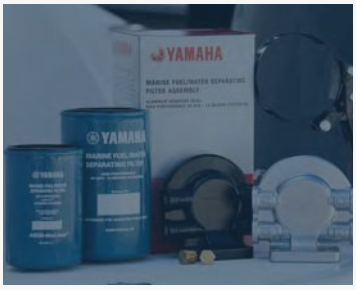

Yamaha Fuel/Water Separating Filters

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Yamaha Primer Bulbs

SHOP NOW

Yamaha Marine Greases

SHOP NOW

Yamaha Fogging Oil

SHOP NOW

Yamaha Primary Fuel Filters

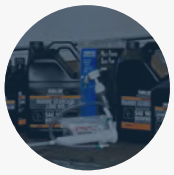
SHOP NOW

Step 4: Lower Unit

The lower unit gear lube is drained by first removing the lower drain screw, then the upper plug vent to allow air in. On most models, both plugs are clearly visible on the lower unit, but on models with low water pickups, the forward pickup will need to be removed to access the drain plug. Use a properly sized screwdriver assisted by a wrench if necessary to loosen these screws, which should be pretty tight. An impact driver and hammer may be needed depending on who serviced your engine last. The drain screw has a magnetic tip, so inspect the plug after removal to see if heavy deposits exist. Some fine shavings are normal, but chunks or a large quantity of metal is cause for further inspection. Have a drain pan ready and extra rags handy as gear lube will begin running down the skeg as soon as you remove the upper vent plug. Be sure to collect the fiber gaskets from both plugs after removal as these are not reusable and should be discarded.

Allow several minutes with the engine tilted all the way down to fully drain all the old gear oil. Like your engine oil, inspect the spent oil for evidence of water intrusion or other contamination or metal. If you have purchased one of PartsVu's handy lower unit oil change kits you will already have new gaskets, oil, and a pump. Screw the pump into the lower drain hole and then connect it to the quart of Yamalube gear lube. Begin pumping oil into the lower unit until oil begins to flow from the vent plug at the top. Stop pumping and wait a few minutes for all the air bubbles to work themselves out of the gearcase. After this brief pause, pump a few more pumps until clean gear oil without bubbles is flowing from the vent plug. HPDI owners need to pay special attention to this step as your engines require a little more care in getting a proper fill. With a fresh fiber gasket in place, install and torque the top vent plug. Unscrew your fill hose from the lower drain plug and quickly swap in the lower drain plug with a new gasket. Torque to spec and re-install the lower water pickup screen if applicable.

Recommended Parts & Accessories for Lower Unit Service:



Yamaha
Gear Lube Kits

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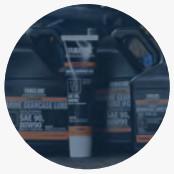

Yamaha
Gear Lube

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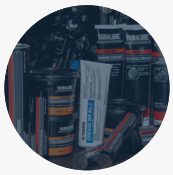

Yamaha
Marine Grease

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Yamaha Water
Pump Repair Kits

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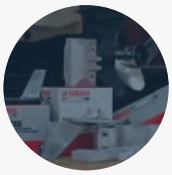

Yamaha
Zinc Anodes

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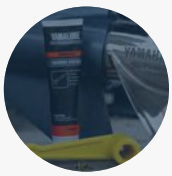
Step 5: Grease Points

It is advisable to grease your engine's grease fittings more frequently than a 100-hour or annual service, but if you haven't now is certainly the time. Make sure you have plenty of Yamalube marine grease loaded in your grease gun and start hitting those Zerk fittings. Note that fittings can be contaminated by salt – especially the ones near the steering tube – so replace them if they are too corroded to accept grease. Watch as you pump fresh grease into the fitting and see if old, dirty grease, water or both push out from the corresponding space. Ideally, these cavities are filled with clean grease all the time. A light coating of grease on the tip of the trim rams will reduce friction there as well.

Next, remove the cotter pin from the propeller and loosen the prop nut. Exercise extreme caution as the prop blades can be very sharp. With the nut loosened, remove the propeller and associated prop hardware to inspect the propeller shaft. Look for fishing line that may be behind the prop and near the prop shaft oil seals. Remove any fishing line present and if the seals are intact, apply a fresh coating of grease to the propeller shaft before reinstalling the prop. Tighten and use a new cotter pin to complete the installation. This is also a great time to inspect your external engine anodes. If they are worn beyond 50 percent, they are spent and should be replaced. On the powerhead itself, Yamashield Rust & Corrosion Protectant can be liberally applied to the metal surfaces – taking some care to avoid the air intake itself. If any salt residue exists in the engine pan, rinse with a light stream of freshwater and allow to dry prior to applying Yamashield. This product also works well on battery connections, fuel/water separator bases, and trailer parts.

Recommended Parts & Accessories for Greasing Points:



Propeller Wrench & Hardware

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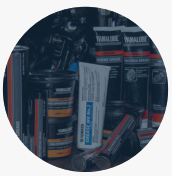

Yamaha Marine Grease

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Yamaha Grease Nipple

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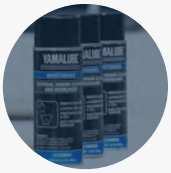

Yamalube Cleaner & Degreaser

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Yamaha Corrosion Inhibitors

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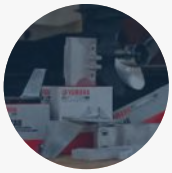

Yamaha Zinc Anodes

SHOP NOW

Step 6: Check Your Work

With all the work completed, now is the time to give the engine a final inspection prior to startup. Double check two-stroke oil level, confirm that all plastic covers are reinstalled, check your now empty gear lube container, and double-check prior to startup. If you are going to run your engine without taking the boat to the water, be sure to take proper safety precautions, and remove the lower unit intake grates for maximum water flow before installing your rabbit ears and garden hose. It is not recommended to run the engine on the flush attachment as the water pump will not receive proper water flow. Start the engine and let it idle to build temperature. Check again for any leaks. After running to your satisfaction, allow the engine to sit for a few minutes before re-checking the oil level with the dipstick.

Congratulations, your service is complete! Start looking forward to your next fun day on the water and have pride that the work you completed will extend the reliability of your Yamaha two-stroke outboard!

Want more information? Consult your owner's manual or consider purchasing a shop manual for your engine from us for more detail. Always use proper safety precautions including eye protection, and do not work beyond your comfortable skill level.