2

MAINTENANCE

GENERAL INFORMATION (WHAT EVERYONE SHOULD KNOW ABOUT MAINTENANCE)

At Seloc, we estimate that 75% of engine repair work can be directly or indirectly attributed to lack of proper care for the engine. This is especially true of care during the off-season. There is no way on this green earth for a mechanical engine, particularly an outboard motor, to be left sitting idle for an extended period of time, say for six months, and then be ready for instant, satisfactory service.

Imagine, if you will, leaving your car or truck for six months, and then expecting to turn the key, having it roar to life, and being able to drive off in the same manner as a daily occurrence. Not likely, eh?

Therefore it is critical for an outboard engine to either be run (at least once a month), preferably, in the water and properly maintained between uses or for it to be specifically prepared for storage and serviced again immediately before the start of the season.

Only through a regular maintenance program can the owner expect to receive long life and satisfactory performance at minimum cost.

Many times, if an outboard is not performing properly, the owner will "nurse" it through the season with good intentions of working on the unit once it is no longer being used. As with many New Year's resolutions, the good intentions are not completed and the outboard may lie for many months before the work is begun or the unit is taken to the marine shop for repair.

Imagine, if you will, the cause of the problem being a blown head gasket. And let us assume water has found its way into a cylinder. This water, allowed to remain over a long period of time, will do considerably more damage than it would have if the unit had been disassembled and the repair work performed immediately. Therefore, if an outboard is not functioning properly, do not stow it away with promises to get at it when you get time, because the work and expense will only get worse, the longer corrective action is postponed. In the example of the blown head gasket, a relatively simple and inexpensive repair job could very well develop into major overhaul and rebuild work.

Maintenance Equals Safety

OK, perhaps no one thing that we do as boaters will protect us from risks involved with enjoying the wind and the water on a powerboat. But, each time we perform maintenance on our boat or motor, we increase the likelihood that we will find a potential hazard before it becomes a problem. Each time we service and inspect our boat and motor, we decrease the possibility that it could leave us stranded on the water.

In this way, performing boat and engine service is one of the most important ways that we, as boaters, can help protect ourselves, our boats, and the friends and family that we bring aboard.

Outboards On Sail Boats

Owners of sailboats pride themselves in their ability to use the wind to clear a harbor or for movement from Port A to Port B, or maybe just for a day sail on a lake. For some, the outboard is carried only as a last resort-in case the wind fails completely, or in an emergency situation or for ease of docking.

Therefore, in some cases, the outboard is stowed below, usually in a very poorly ventilated area, and subjected to moisture and stale air-in short, an excellent environment for "sweating" and corrosion.

If the owner could just take the time at least once every month, to pull out the outboard, clean it up, and give it a short run, not only would he/she have "peace of mind" knowing it will start in an emergency, but also maintenance costs will be drastically reduced.

Maintenance Coverage In This Manual

At Seloc, we strongly feel that every boat owner should pay close attention to this section. We also know that it is one of the most frequently used portions of our manuals. The material in this section is divided into sections to help simplify the process of maintenance. Be sure to read and thoroughly understand the various tasks that are necessary to keep your outboard in tip-top shape.

Topics covered in this section include:

1. General Information (What Everyone Should Know About Maintenance)-an introduction to the benefits and need for proper maintenance; a guide to tasks that should be performed before, and after, each use.
2. Lubrication Service-after the basic inspections that you should perform each time the motor is used, the most frequent form of periodic maintenance you will conduct will be the Lubrication Service. This section takes you through each of the various steps you must take to keep corrosion from slowly destroying your motor before your very eyes.
3. Engine Maintenance-the various procedures that must be performed on a regular basis in order to keep the motor and all of its various systems operating properly.
4. Boat Maintenance-the various procedures that must be performed on a regular basis in order to keep the boat hull and its accessories looking and working like new.
5. Tune-Up-also known as the pre-season tune-up, but don't let the name fool you. A complete tune-up is the best way to determine the condition of your outboard while also preparing it for hours and hours of hopefully trouble-free enjoyment.
6. Winter Storage and Spring Commissioning Checklists-use these sections to guide you through the various parts of boat and motor maintenance that protect your valued boat through periods of storage and return it to operating condition when it is time to use it again.
7. Specification Charts-located at the end of the section are quick-reference, easy to read charts that provide you with critical information such as General Engine Specifications, Maintenance Intervals, Lubrication Service (intervals and lubricant types) and Capacities.

Engine Identification

◆ **See Figures 1 and 2**

From 1992-01 Johnson and Evinrude produced an extremely large number of models with regards to horsepower ratings, as well a large number of trim and option variances on each of those models. In this manual, we've included all of the V4, V6 and V8 models (all of which are 2-stroke motors). We chose to do this because of the many similarities these motors have to each other. But, enough differences exist that many procedures will apply only to a sub-set of these motors. When this occurs, we'll either refer to the differences within a procedure or, if the differences are significant, we'll break the motors out and give separate procedures. In order to prevent confusion, we try to sort and name the models in a way that is most easily understood.

In many cases, it is simply not enough to refer to a motor as a 90 or 115 hp model, since in these years Evinrude/Johnson produced two very different 2-cylinder motors with that rating (the 1632cc, 90 degree, cross-charged V4, and the 1726cc, 60 degree, loop-charged V4). To simplify the identification of these motors we'll refer to them either as 1632cc 90CV4 versus 1726cc 60LV4 or we'll use the complete model horsepower range plus the cubic centimeter rating, 65 Jet-115 Hp (1632cc) versus 75-115 Hp (1726cc). To further confuse the issue, many of the 60LV4 models were available either with carburetion or with FICHT Fuel Injection (FFI).

Across that same year span, Evinrude/Johnson sold various Jet models, that although badged with a certain Jet horsepower rating, were built on platforms that, except for the jet drive, were identical to higher horsepower motors. This is because of the difference in the way Jet horsepower ratings are determined. Usually, we'll identify these motors by the ratings found on the engine cases, but let's take a moment to review the platforms from which they are derived, as procedures other than those involving the drive unit should be the same on these models. Two Jet models were produced on the 1632cc 90 CV4 platform, the 65 Jet, which is actually a 90 hp motor and the 80 Jet which is actually a 115 hp motor. One Jet model was produced on the 1726cc 60 LV4 platform, the 80 Jet which is actually a 115 hp motor. And, finally, the 105 Jet is actually a 150 hp (2589cc) 90 LV4 motor.

These sometimes confusing similarities or discrepancies in hp ratings and engine platforms makes proper engine identification important for everything from ordering parts to even just using the procedures in this manual. You'll notice that in all cases, we've chosen to include the cubic centimeter designation, and we'd suggest that you get in the habit on including that designation whenever you are searching for parts or information on your motor. At the end of the day, the combination of the horsepower rating on the casing and the cubic centimeter rating will normally give you the information you need.

Throughout this manual we will make reference to motors the easiest way possible. In some cases procedures will apply to all motors, in other cases, they will apply to all V4 or all V6 motors. When it is necessary to distinguish between different types of motors with the same number of cylinders, we'll differentiate using the Hp rating or, since different motors may have the same rating, we'll use the Hp rating plus the size. In many cases, for motors of a given design, 90 degree loop charged (both V6 and V8), 60 degree loop charged (both V4 and V6), or 90 degree cross-charged (both V4 and V6), the mechanical procedures will be similar or the same across different Hp ratings of the same engine family. So it won't be uncommon to see a title or a procedure refer to a range of horsepower motors, including motors of with a different number of cylinders. In fact, most of the V4 motors are simply V6 models with 2 less cylinders (with the same size pistons, bores and basic crankshaft dimensions). By the same logic, the V8 motors are V6 models with 2 extra cylinders.

To help with proper engine identification, all of the engines covered by this manual are listed in the General Engine and General Engine System Specifications charts at the end of this section. In these charts, the engines are listed with their respective engine families, by horsepower rating, engine configuration (number of cylinders, degree of V and cross- or loop- charged), and years of production and displacement (cubic inches and cubic centimeters or CCs).

But, whether you are trying to tell which version of a particular horsepower rated motor you have in order to follow the correct procedure or are trying to order replacement parts, the **absolute best** method is to start by referring to the engine serial number tag. For all models covered by this manual an ID tag (1, in the accompanying figure) is located on the port side of the engine clamp or swivel/tilt brackets. Most models are also equipped with an Emissions Control Information label (2, in the accompanying figure) as well.

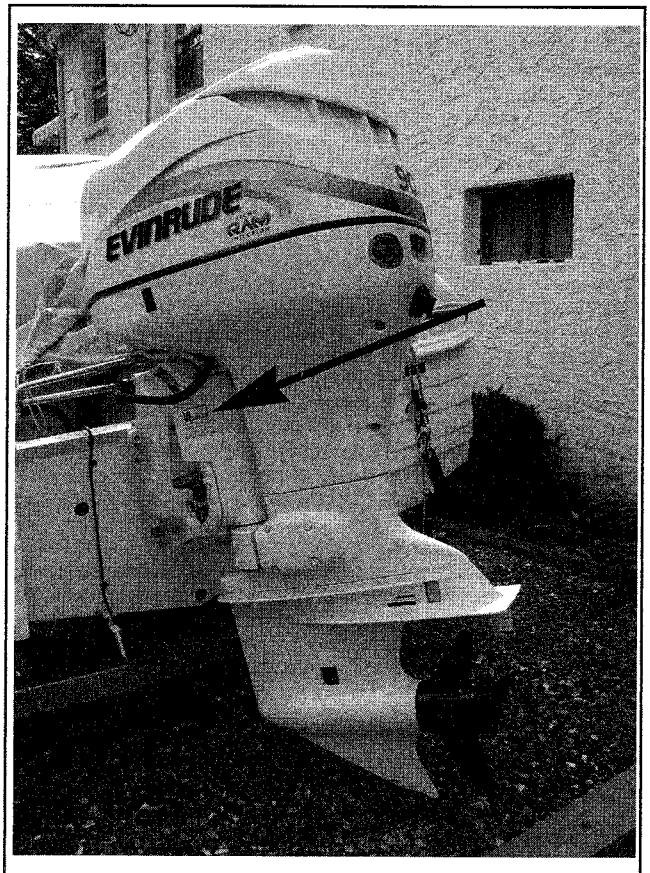


Fig. 1 A model ID tag and an emission control label are found on the port side of most engine transom/swivel/tilt brackets

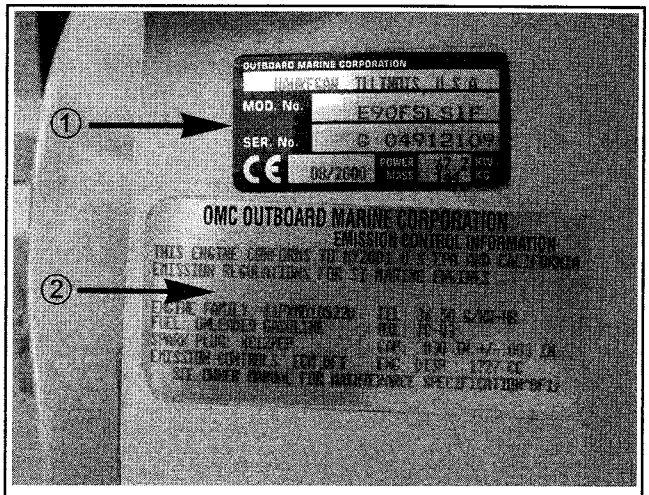


Fig. 2 The model ID tag (1) and emission label (2) provide critical information to identify and service the engine

ENGINE SERIAL NUMBERS

◆ **See Figure 2**

The engine serial numbers are the manufacturer's key to engine changes. These alpha-numeric codes identify the year of manufacture, the horsepower rating, lower unit shaft length and various model/option differences (such as tiller electric, remote electric or FICHT or commercial models). If any correspondence or parts are required, the engine serial number must be used for proper identification.

Remember that the serial number establishes the model-year for which the engine was produced, and is often not the year of first installation.

The engine serial number tag contains information such as the plant in which the motor was produced, the model number or code, the serial number (a unique sequential identifier given ONLY to that one motor) as well as other useful information such as weight (mass) in Kilograms (kg).

■ We're not quite sure what to tell you about engine weight. If you need to determine how much your engine or rig (boat, motor, trailer) weighs, there's really no substitute for a calibrated truck scale. In working on this text, we've noticed multiple instances when various published weights did not agree, for instance, take a 90 hp FICHT motor we used during the teardown. Published weight for this motor was 349 lbs. (158kg) in the factory service information, but it was also listed in a leading boating magazine and in the Evinrude brochure as 362 lbs. (164kg). Of course, a close look at the model label in the accompanying figure shows a measurement of 144kg (318 lbs.). One possible explanation for these differences could be dry vs. w/ fluids. Although we'd normally recommend trusting a label over the printed word, we think you should be conservative when safety is concerned and use the highest published number in this case, until a scale proves it otherwise.

The emissions control information label states that the motor is in compliance with EPA emissions regulations for the model year of that engine. And, more importantly, it gives tune-up specifications that are vital to proper engine performance (that minimize harmful emissions). The specifications on this label may reflect changes that are made during production runs and are often not later reflected in a company's service literature. For this reason, specifications on the label always supercede those of a print manual. Typical specifications that are found on this label will include:

- Spark plug type and gap.

■ Evinrude/Johnson did NOT publish tune-up specifications such as spark plug type and gap for most FICHT motors, saying even in the factory literature to refer to the emission control label. If you find the label missing on your motor, check with your local parts supplier about ordering a replacement.

- Fuel/2-stroke engine oil recommendations.
- Idle speed settings
- Engine ignition timing (such as wide-open throttle and/or idle timing) specification (for carbureted motors only)
- Engine displacement (in Cubic Inches or Cubic Centimeters, as noted on the label)

■ **Most idle and timing functions are handled by the Engine Control Module (ECM) on Direct Fuel Injection (DFI) models, also known as FICHT or FICHT Fuel Injection (FFI) engines. For this reason, the emission control label may just list "Emission Controls: ECM, DFI" instead of idle and timing specs.**

Deciphering The Model Code on 1992-98 Engines

◆ **See Figure 3**

Engines built for the 1992-98 model years (and all Evinrude/Johnson engines built back through 1980) will contain an 8-12 digit code for identification. If the code begins with A, B, C, H, S, T or V, it represents a model variation (a model built for use in certain countries or specifically for a boat-builder to include with their new boat). If one of these alphas is not present, the code should start with **J** (for Johnson) or **E** (for Evinrude). The next one, two or three digits will be numbers, representing the horsepower rating. The digit following the horsepower rating will be a one, two or three digit alpha code identifying the various trim/model types (such as **TE** for tiller electric or **FS** for FICHT fuel injection, w/ power trim/tilt). Following the model identifier may be a single alpha identifier (L, Y, X or Z) representing lower unit shaft length (a lack of this identifier would represent a 15 in. shaft length). Next, a two-digit, alpha identifier is used for the year. And lastly, the manufacturer internally uses a single check digit to designate the model run.

Refer to the accompanying illustration to interpret the various alpha identifiers found throughout the model code.

■ **Starting in 1980, Evinrude/Johnson began using the word INTRODUCES as an easy way to decipher model years. The 10 letters of that word correspond to the digits 1-9 and 0, in that order. The first letter I represents a 1, the second letter N represents a 2 and so on until S which represents a 0. When deciphering a model code, each of the two alpha identifiers correspond to the last two digits of the model year. A 1998 model would therefore be EC, a 1996 would be ED, and so on. For quick deciphering, right out the word INTRODUCES and then number the letters from 1-9 and then 0. Just remember that the letters of the model code that represent the model year are usually NOT the 2 last letters of the code, since there is normally a model suffix in the code. This means that the model code identifiers are usually the 2nd and 3rd letters from the end of the code.**

Deciphering The Model Code on 1999-01 Engines

◆ **See Figure 4**

Engines built for the 1999-01 model years contain a simplified version of the model code (when compared with earlier models) containing only 7-8 digits. In all cases, the identifier should start with a single alpha representing Johnson (J) or Evinrude (E). The next one, two or three digits will be numbers, representing the horsepower rating. The digit following the horsepower rating will be a single one or two digit alpha/numeric code identifying design features/model types (such as **W** for commercial models, **T** for tiller steering or **F** for FICHT fuel injection). Following the design feature/model identifier may be a single alpha identifier (L, Y, X or Z) representing lower unit shaft length (a lack of this identifier would represent a 15 in. shaft length). Next, a two-digit, alpha identifier is used for the year and is deciphered in the same manner as all Evinrude/Johnson models numbers since 1980. Finally, a single check digit, MAY be used internally by the manufacturer to designate the model run.

Refer to the accompanying illustration to interpret the various alpha digits found throughout the model code.

Before/After Each Use

As stated earlier, the best means of extending engine life and helping to protect yourself while on the water is to pay close attention to boat/engine maintenance. This starts with an inspection of systems and components before and after each time you use your boat.

A list of checks, inspections or required maintenance can be found in the Maintenance Intervals Chart at the end of this section. Some of these inspections or tasks are performed before the boat is launched, some only after it is retrieved and the rest, both times.

VISUALLY INSPECTING THE BOAT AND MOTOR

◆ **See Figures 5 and 6**

Before each launch and immediately after each retrieval, visually inspect the boat and motor as follows:

1. **Check the fuel and oil levels** according to the procedures in this manual. Do NOT launch a boat without properly topped off fuel and oil tanks (on oil injected motors). It is not worth the risk of getting stranded or of damage to the motor. Likewise, upon retrieval, check the oil and fuel levels while it is still fresh in your mind. This is a good way to track fuel consumption (one indication of engine performance). Compare the fuel consumption to the oil consumption (a dramatic change in proportional use may be an early sign of trouble).
2. **Check for signs of fuel or oil leakage.** Probably as important as making sure enough fuel and oil is onboard, is the need to make sure that no dangerous conditions might arise due to leaks. Thoroughly check all hoses, fittings and tanks for signs of leakage. Oil leaks may prevent proper oiling of the powerhead and, although all VRO2 and FICHT systems have warning systems, reduced oiling could damage the powerhead or, if the system fails completely, could strand the boat. Fuel leaks can cause a fire hazard, or worse, an explosive condition. This check is not only about properly maintaining your boat and motor, but about helping to protect your life.
3. **Inspect the boat hull and engine cases** for signs of corrosion or damage. Don't launch a damaged boat or motor. And don't surprise yourself dockside or at the launch ramp by discovering damage that went unnoticed last time the boat was retrieved. Repair any hull or case damage now.
4. **Check the battery** connections to make sure they are clean and tight. A loose or corroded connection will cause charging problems (damaging the system or preventing charging). There's only one thing worse than a dead battery dockside or on the launch ramp and that's a dead battery in the middle of a bay, river or heavens, the ocean. Whenever possible, make a quick visual check of battery electrolyte levels (keeping an eye on the level will give some warning of overcharging problems). This is especially true if the engine is operated at high speeds for extended periods of time.
5. **Check the propeller (impeller on jet drives) and lower unit.** Make sure the propeller shows no signs of damage. A broken or bent propeller may allow the engine to over-rev and it will certainly waste fuel. The lower unit should be checked before and after each use for signs of leakage. Check the lower unit oil for signs of contamination if any leakage is noted. Also, visually check behind the propeller for signs of entangled rope or fishing lines that could cut through the lower gearcase propeller shaft seal. This is a common cause of lower unit lubricant leakage, and eventually, water contamination that can lead to lower unit failure. Even if no lower unit leakage is noted when the boat is first retrieved, check again next time before launching. A nicked seal might not seep fluid right away when still swollen from heat immediately after use, but might begin seeping over the next day, week or month as it sat, cooled and dried out.
6. **Check all accessible fasteners for tightness.** Make sure all easily accessible fasteners appear to be tight. This is especially true for the propeller nut, any anode retaining bolts, all steering or throttle linkage fasteners and the engine mounting bolts. Don't risk loosing control or becoming stranded due to loose fasteners. Perform these checks before heading out, and immediately after you return (so you'll know if anything needs to be serviced before you want to launch again.)
7. **Check operation of all controls including the throttle/shifter, steering and emergency stop/start switch and/or safety lanyard.** Before launching, make sure that all linkage and steering components operate properly and move smoothly through their range of motion. All electrical switches (such as power trim/tilt) and especially the emergency stop system(s) must be in proper working order. While underway, watch for signs that a system is not working or has become damaged. With the steering, shifter or throttle, keep a watchful eye out for a change in resistance or the start of jerky/notchy movement.
8. **Check the water pump intake grate and water indicator.** The water pump intake grate should be clean and undamaged before setting out. Remember that a damaged grate could allow debris into the system that could destroy the impeller or clog cooling passages. Once underway, make

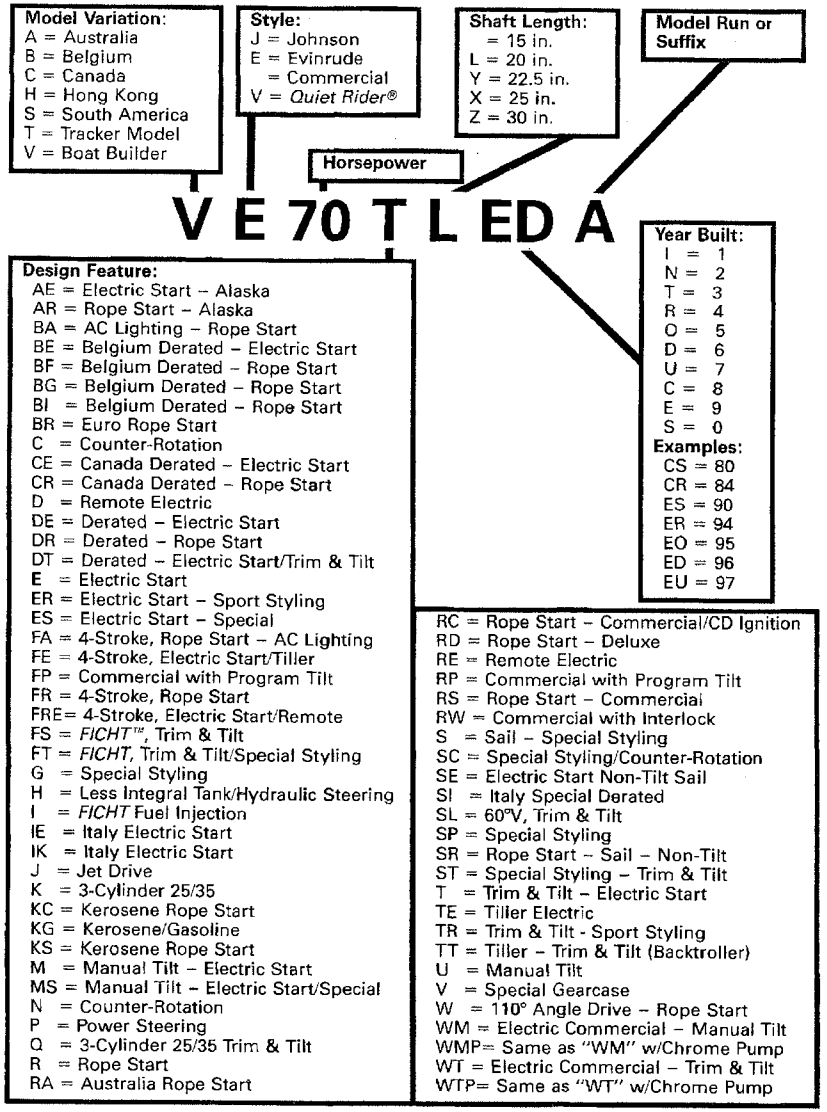


Fig. 3 Model codes-1992-98 models

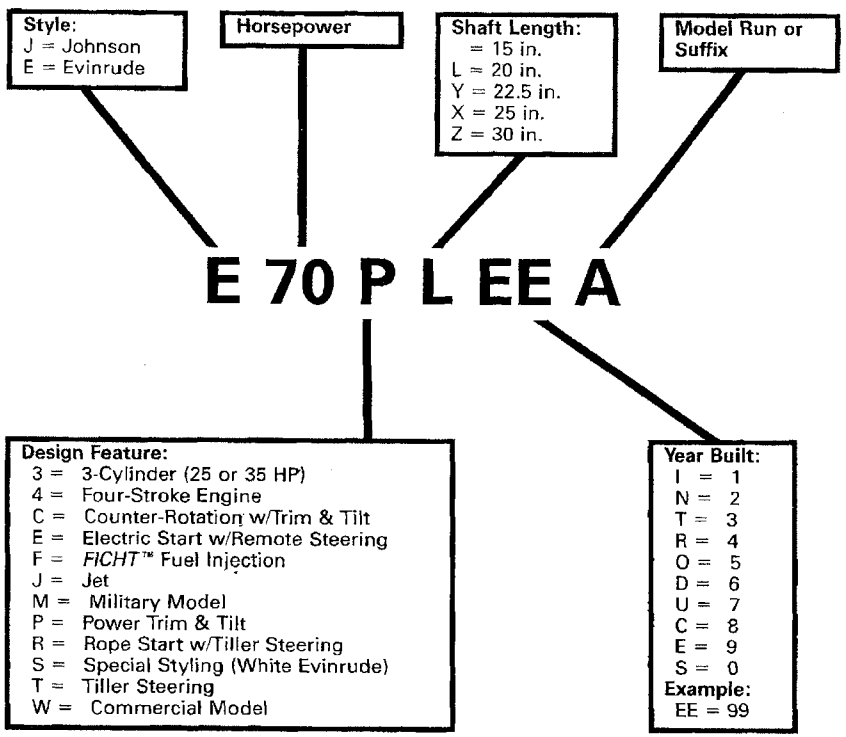


Fig. 4 Model codes-1999-01 models

sure the cooling indicator stream is visible at all times. Make periodic checks, including one final check before the motor is shut down each time. If a cooling indicator stream is not present at any point, troubleshoot the problem before further engine operation.

9. **If equipped, check the power steering belt and fluid level.** A quick visual inspection of the power steering belt and fluid level at the end of each day will warn of problems that should be fixed before the next launch.

10. **If used in salt, brackish or polluted waters thoroughly rinse the engine (and hull), then flush the cooling system** according to the procedure in this section.

■ **Even if used in fresh water, it is never a bad idea to flush the system with fresh clean water from a garden hose. Keep in mind that sand, silt or other debris may be picked up by the cooling system during normal motor operation. Removing this debris before it can build-up and clog the engine is wise service.**

11. **Inspect all anodes** after each use for signs of wear, damage or to make sure they just plain didn't fall off (especially if you weren't careful about checking all the accessible fasteners the last time you launched).

12. **On FICHT Fuel Injection (FFI) models, be sure to shut the battery switch off** if the engine is not going to be run for a couple of weeks or more. The Engine Management Module (EMM) on FFI motors covered will continue to draw a small amount of current from the battery, even when the motor is shut off. In order to prevent a slow drain of the entire battery, either periodically recharge the battery, or isolate it by disconnecting the cables or shutting off the battery switch when the boat is dockside or on the trailer.

13. **For Pete's sake, make sure the plug is in!** We shouldn't have to say it, but unfortunately we do. If you've been boating for any length of time, you've seen or heard of someone whose backed a trailer down a launch ramp, forgetting to check the transom drain plug before literally submerging the boat. Always make sure the transom plug is installed and tight before a launch.

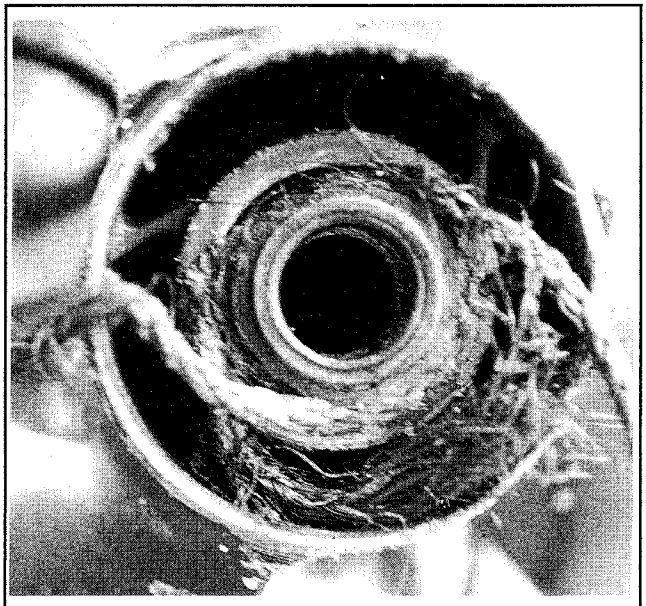


Fig. 5 Rope and fishing line entangled behind the propeller can cut through the seal, allowing water to enter and lubricant to escape

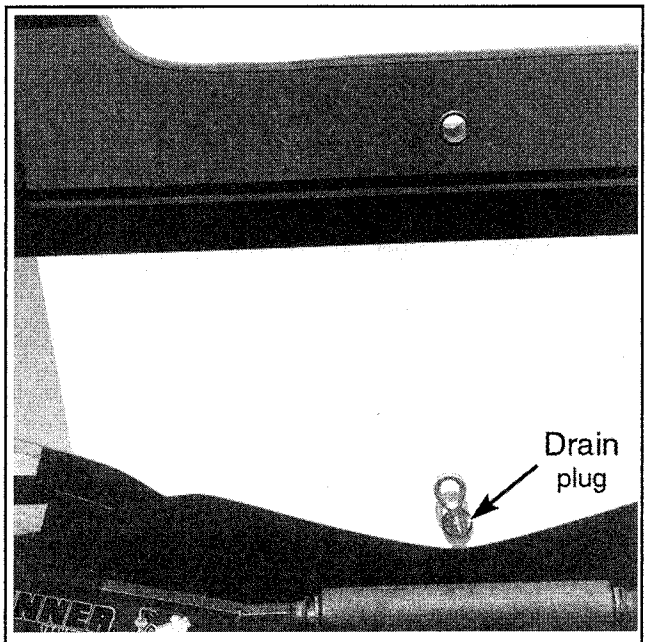


Fig. 6 Always make sure the transom plug is installed and tightened securely before a launch

LUBRICATION SERVICE

An outboard motor's greatest enemy is corrosion. Face it, oil and water just don't mix and, as anyone who has visited a junkyard knows, metal and water aren't the greatest of friends either. To expose an engine to a harsh marine environment of water and wind is to expect that these elements will take their toll over time. But, there is a way to fight back and help prevent the natural process of corrosion that will destroy your beloved boat motor.

Various marine grade lubricants are available that serve two important functions in preserving your motor. Lubricants reduce friction on metal-to-metal contact surfaces and, they also displace air and moisture, therefore slowing or preventing corrosion damage. Periodic lubrication services are your best method of preserving an outboard motor.

Lubrication takes place through various forms. For all engines, internal moving parts are lubricated by 2-stroke engine oil, through oil contained in the fuel/oil mixture. Pay close attention to the oil level in the tank on oil injected models, or to the oil/fuel mixing process on pre-mix motors. Also, the lower unit is filled with gear oil that lubricates the driveshaft, propshaft, gears and other internal gearcase components. The gear oil should be periodically checked and replaced following the appropriate Engine Maintenance procedures. Perform services based on time or engine use, as outlined in the Maintenance Intervals chart at the end of this section.

✳✳ WARNING

If equipped with power trim/tilt, maintaining proper fluid level is necessary for the built-in impact protection system. Incorrect fluid level could lead to significant lower unit damage in the event of an impact.

On motors equipped with power trim/tilt, the fluid level and condition in the reservoir should be checked periodically to ensure proper operation. Also, on these motors, correct fluid level is necessary to ensure operation of the motor impact protection system.

Most other forms of lubrication occur through the application of grease (Evinrude/Johnson Triple-Guard, Evinrude/Johnson EP/Wheel bearing grease, Evinrude/Johnson Starter Pinion Lube, or their equivalents) to various points on the motor. These lubricants are either applied by hand (an old toothbrush can be helpful in preventing a mess) or using a grease gun to pump the lubricant into grease fittings (also known as zerk fittings). When using a grease gun, do not pump excessive amounts of grease into the fitting. Unless otherwise directed, pump until either the rubber seal (if used) begins to expand or until the grease just begins to seep from the joints of the component being lubricated (if no seal is used).

To ensure your motor is getting the protection it needs, perform a visual inspection of the various lubrication points at least once a week during regular seasonal operation (this assumes that the motor is being used at least once a week). Follow the recommendations given in the Lubrication Chart at the end of this section and perform the various lubricating services at least every 60 days when the boat is operated in fresh water or every 30 days when the boat is operated in salt, brackish or polluted waters. We said **at least** meaning you should perform these services more often, as discovered by your weekly inspections.

■ **Jet drive models require one form of lubrication every time that they are used. The jet drive bearing should be greased, following the procedure given in this section, after every day of boating. But don't worry, it only takes a minute once you've done it before.**

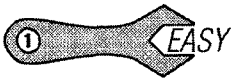
Electric Starter Motor Pinion

Periodic lubrication of the starter motor pinion is required on all electric start models, except 60 degree 75-115 Hp (1726cc) V4 and 105 Jet-175 Hp (2589cc) V6 motors.

RECOMMENDED LUBRICANT

Use Evinrude/Johnson Starter Pinion Lube, General Electric Versalube or an equivalent lubricant.

LUBRICATION



◆ **See Figures 7 and 8**

The starter pinion is the gear and slider assembly located on the top of the starter motor as it is mounted to the engine. When power is applied to the starter, the gear on the pinion assembly slides upward to contact and mesh with the gear teeth on the outside of the flywheel. Periodically, apply a small amount of lubricant to the sliding surface of the starter pinion in order to prevent excessive wear or possible binding on the shaft.

■ **On models that require periodic lubrication, easy access is normally provided to the starter pinion. Though, it is possible that a flywheel cover may need to be removed on a few models.**

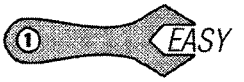
Engine Cover Latches

For some reason, not all Evinrude/Johnson factory literature mentions the periodic lubrication of the engine cover latches (including one of the author's own motors and owner's manual). But, most motors are equipped with a grease fitting for each cover latch and/or exposed metal-to-metal contact surfaces that will benefit from periodic lubrication).

RECOMMENDED LUBRICANT

Use Evinrude/Johnson Triple-Guard, or equivalent water-resistant marine grease for lubrication.

LUBRICATION



◆ **See Figures 9 and 10**

Although the sliding surfaces of all cover latches can benefit from an application of grease, the design of the latches used on some motors (those equipped with grease fittings) makes periodic greasing necessary to prevent the latches from binding or wearing. Most 65 Jet-115 Hp (1632cc) 90CV4 motors are equipped with 3 grease fittings on the engine case, 2 fittings on the lower outside of one end of the case, and one fitting at the other end. Other models, such as most 75-115 Hp (1726cc) V4 and 105 Jet-175 Hp (2589cc) V6 motors have a single grease fitting on each latch (located facing upward, inside of the engine covers).

Depending on the latch type, either apply a small amount of grease to the metal surfaces using an applicator brush or use a grease gun to pump grease into the zerk fitting facing outward from the latch assembly.

Jet Drive Bearing

◆ **See Figure 11**

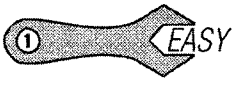
Jet drive models covered by this manual require special attention to ensure that the driveshaft bearing remains properly lubricated.

After each day of use, the jet drive bearing should be properly lubricated using a grease gun. Also, after every 30 hours of fresh water operation or every 15 hours of salt/brackish/polluted water operation, the drive bearing grease must be replaced. Follow the appropriate procedure:

RECOMMENDED LUBRICANT

Use Evinrude/Johnson EP/Wheel Bearing grease or equivalent water-resistant NLGI No. 1 lubricant.

DAILY BEARING LUBRICATION



◆ **See Figures 12 and 13**

A grease fitting is located under a vent hose on the lower port side of the jet drive. Disconnect the hose from the fitting, then use a grease gun to apply enough grease to the fitting to **just** fill the vent hose. Pump grease into the fitting until the old grease just starts to come out from the passages through the hose coupling and then reconnect the hose to the fitting.

■ **Do not attempt to just grasp the vent hose and pull, as it is a tight fit and when it does come off, you'll probably go flying if you didn't prepare for it. The easier method of removing the vent hose from the fitting is to deflect the hose to one side and snap it free from the fitting.**

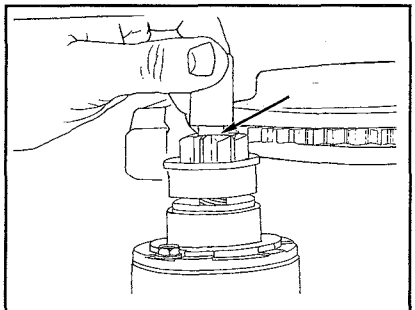


Fig. 7 Apply lubricant to the sliding surface of the electric starter pinion

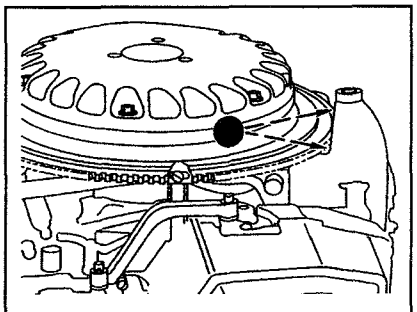


Fig. 8 In most cases, models that require periodic lubrication provide easy access to the starter pinion

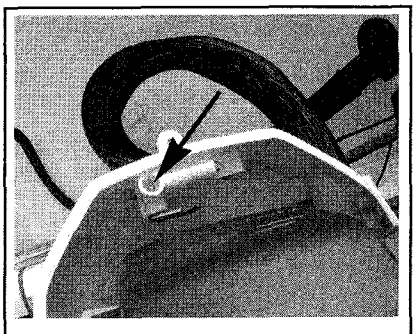


Fig. 9 If equipped, use the grease fittings normally found at the front ...

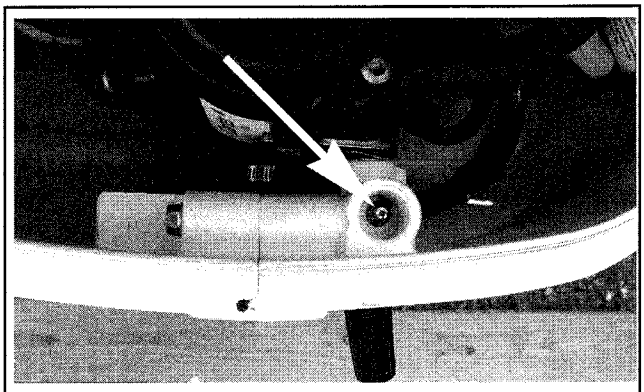


Fig. 10. ... and rear of the engine covers to lubricate the engine cover latches

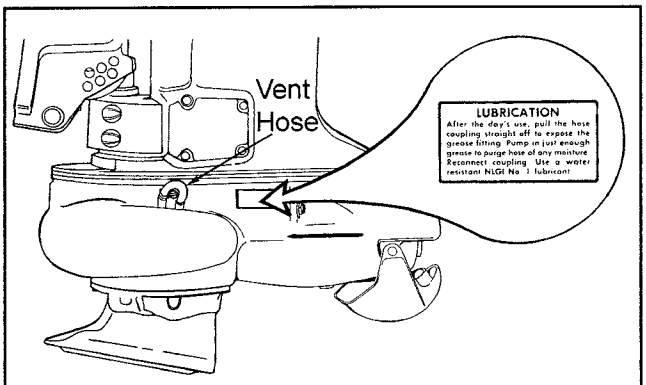


Fig. 11 Jet drive models require lubrication of the bearing after each day of use, a label on the housing usually reminds the owner

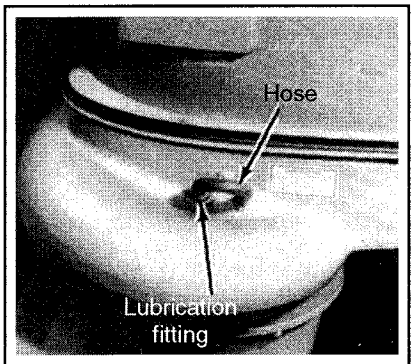


Fig. 12 The jet drive lubrication fitting is found under the vent hose

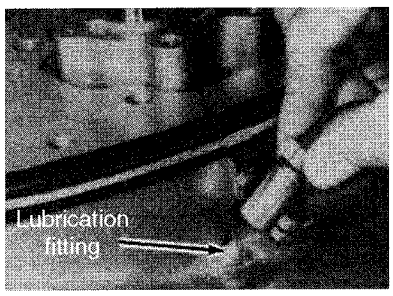


Fig. 13 Attach a grease gun to the fitting for lubrication

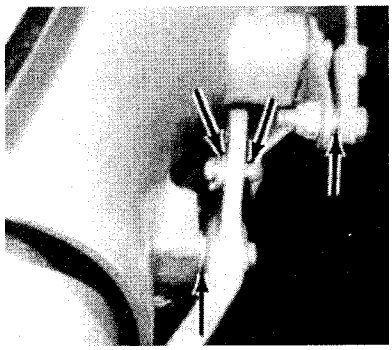


Fig. 14 Coat the pivot points of the jet linkage with grease periodically

GREASE REPLACEMENT

EASY

◆ **See Figures 12, 13 and 14**

A grease fitting is located under a vent hose on the lower port side of the jet drive. This grease fitting is utilized at the end of each day's use to add fresh grease to the jet drive bearing. But, every 30 or 15 days (depending if use is in fresh or salt/brackish/polluted waters), the grease should be completely replaced. This is very similar to the daily greasing, except that a lot more grease it used. Disconnect the hose from the fitting (by deflecting it to the side until it snaps free from the fitting), then use a grease gun to apply enough grease to the fitting until grease exiting the assembly fills the vent hose. Then, continue to pump grease into the fitting to force out all of the old grease (you can tell this has been accomplished when fresh grease starts to come out of the vent instead of old grease, which will be slightly darker due to minor contamination from normal use). When nothing but fresh grease comes out of the vent the fresh grease has completely displaced the old grease and you are finished. Be sure to securely connect the vent hose to the fitting.

Each time this is performed, inspect the grease for signs of moisture contamination or discoloration. A gradual increase in moisture content over a few services is a sign of seal wear that is beginning to allow some seepage. Very dark or dirty grease may indicate a worn seal (inspect and/or replace the seal, as necessary to prevent severe engine damage should the seal fail completely).

■ **Keep in mind that some discoloration of the grease is expected when a new seal is broken-in. The discoloration should go away gradually after one or two additional grease replacement services.**

Whenever the jet drive bearing grease is replaced, take a few minutes to apply some of that same water-resistant marine grease to the pivot points of the jet linkage.

Power Trim/Tilt Reservoir

◆ **See Figure 15**

✳✳ WARNING

When equipped with power trim/tilt, proper fluid level is necessary for the built-in impact protection system. Incorrect fluid level could lead to significant lower unit damage in the event of an impact.

RECOMMENDED LUBRICANT

The power trim/tilt reservoir must be kept full of Evinrude/Johnson Power Trim/Tilt and Power Steering Fluid.

CHECKING FLUID LEVEL/CONDITION

EASY

◆ **See Figure 15**

The fluid in the power trim/tilt reservoir should be checked periodically to ensure it is full and is not contaminated.

To check the fluid, tilt the motor upward to the full tilt position and manually engage the tilt support, for safety and to prevent damage.

Remove the filler cap (they are usually threaded in position and equipped with a flat to accept a bladed screwdriver) and make a visual inspection of the fluid. It should seem clear and not milky.

The level is correct if, with the motor at full tilt, the level is even with the bottom of the filler cap hole.

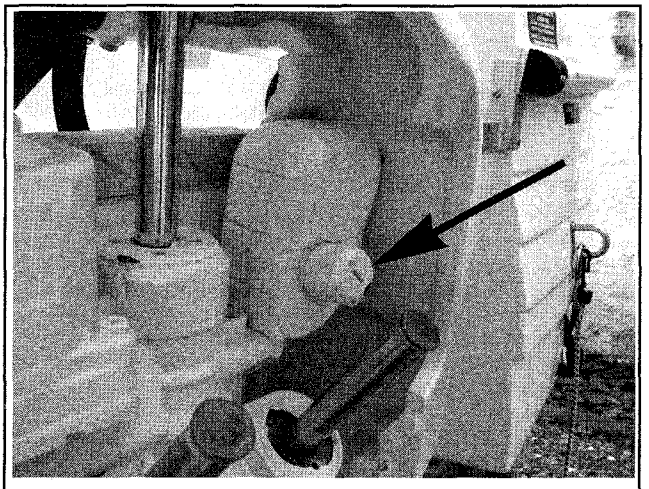


Fig. 15 Maintaining the proper power trim/tilt fluid level is critical to protecting the engine in case of an impact

Power Steering Fluid Reservoir

◆ **See Figure 16**

Some models are equipped with a power steering system consisting of a belt, pump and reservoir. The fluid level should be checked periodically (ideally with each outing, but at **minimum** at least every 30 days.

✳✳ CAUTION

Remember, steering a boat is a matter of safety, don't risk poor performance or failure of the system due to something as silly a low fluid level.

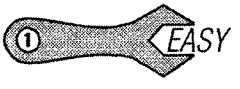
✳✳ WARNING

Should the pump lose pressure or become inoperative on the water, shut the engine off and cut the drive belt free of the pulleys. This will allow normal "non-power" steering operation (which might be a little slow and heavy, but predictable) and will prevent serious and permanent damage which can occur to the pump if it is run low on fluid/pressure.

RECOMMENDED LUBRICANT

The power trim/tilt reservoir must be kept full of Evinrude/Johnson Power Trim/Tilt and Power Steering Fluid or with Dexron II (or latest superceding) automatic transmission fluid.

CHECKING FLUID LEVEL/CONDITION



◆ **See Figure 16**

■ **The system should be completely drained (by disconnecting a fluid fitting or line, especially at the filter, if equipped) and the fluid should be completely changed every 500 hours.**

The fluid in the power steering reservoir should be checked periodically to ensure it is full and is not contaminated. To check the fluid, the motor must be in the normal, fully vertical position (trimmed level with the ground, NOT the gauge). Remove the engine top case for access to the reservoir (usually located near the top of the motor), then unthread the dipstick. Wipe the dipstick off and insert it back into the reservoir, but DO NOT thread it back into position, instead let it sit for a second on top of the threads, then withdraw the dipstick. Hold the dipstick vertically, with the bottom downward, to prevent a false high reading by fluid running up the stick if it was tilted

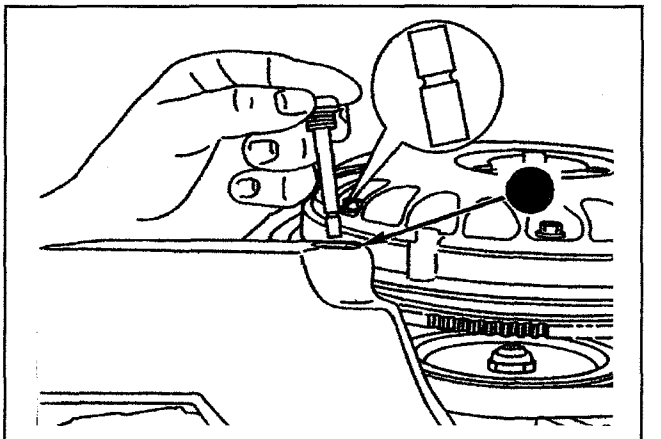


Fig. 16 Check the power steering fluid level periodically to ensure safe, trouble-free system operation

past vertical. Then read the dipstick by looking at the highest wet line across the surface of the dipstick. Fluid should be kept at the full mark. If not, add **just** enough fluid to top it off to the full mark, NOT above. While checking the level, also take note of the fluid condition. It should seem clear and not milky.

■ **If the fluid level is low, thoroughly inspect the system for signs of leakage and repair, as necessary).**

CHANGING FLUID AND FILTER

◆ **See Figure 17**

Every 500 hours of operation or anytime the fluid inspection shows signs of contamination; the system should be completely emptied and refilled using fresh fluid. Most systems are also equipped with an inline power steering fluid filter to help keep the fluid free of particles and contamination. The filter should be changed anytime the fluid is changed. When equipped, the filter is a convenient way of draining the system, as it is normally mounted inline, beneath the reservoir. Once the lines are disconnected they can be pointed downward to ensure thorough system draining. Keep in mind that the bottom filter line must be positioned downward at a point lower than the lowest point in the system in order to ensure draining, this might necessitate placing an additional length of line on it, or following it downward to disconnect it at the other end.

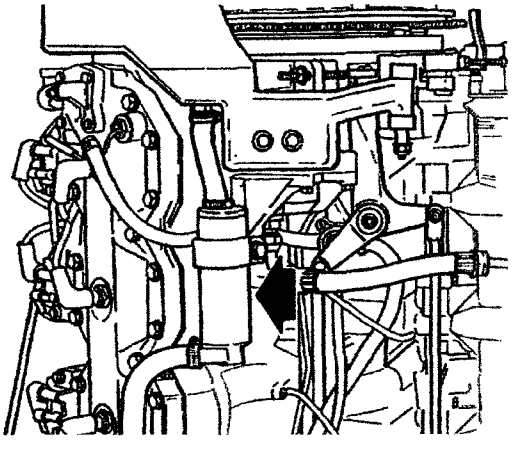


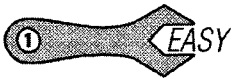
Fig. 17 Most power steering systems utilize an inline filter that must be changed whenever the fluid is replaced

Linkage, Cables and Shafts (Shift, Carburetor and/or Throttle Shaft)

RECOMMENDED LUBRICANT

Use Evinrude/Johnson Triple-Guard, or equivalent water-resistant marine grease for lubrication.

LUBRICATION



◆ **See Figures 18, 19, 20, 21, 22, 23, 24, 25 and 26**

Every Johnson and Evinrude outboard uses some combination of cables and/or linkage in order to actuate the throttle plate (of the carburetors or throttle bodies) and the lower unit shifter. Because linkage and cables contain moving parts that work in contact with other moving parts, the contact points can become worn and loose if proper lubrication is not maintained. These small parts are also susceptible to corrosion and breakage if they are not protected from moisture by light coatings of grease. Periodically apply a light coating of suitable water-resistant marine grease on each of these surfaces where either two moving parts meet or where a cable end enters a housing. For more details on grease points refer to the accompanying illustrations.

■ **On most models, including the 60 degree 75-115 Hp (1726cc) V4 and 105 Jet-175 Hp (2589cc) V6 motors, as well as many of the large 90LV6/LV8 motors, the lower engine covers must be removed for access to some of the cable/linkage greasing points. For details, please refer to the Engine Covers (Top and Lower Cases) procedure found in the Engine Maintenance section.**

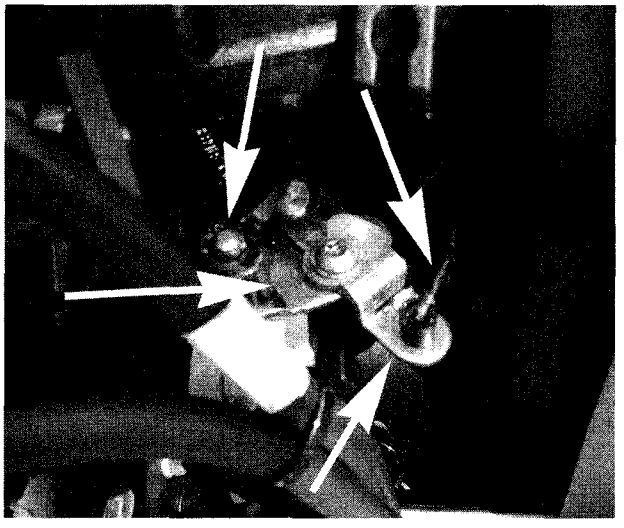


Fig. 18 All engines contain cable throttle and shift linkage...

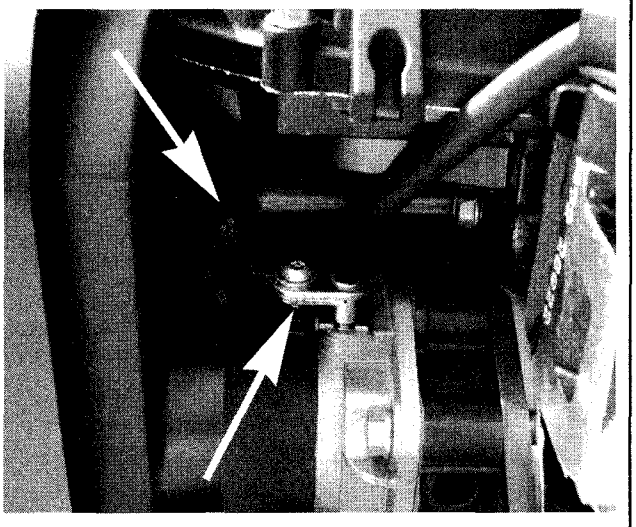


Fig. 19 ... whose metal-to-metal contact points should be periodically coated with grease

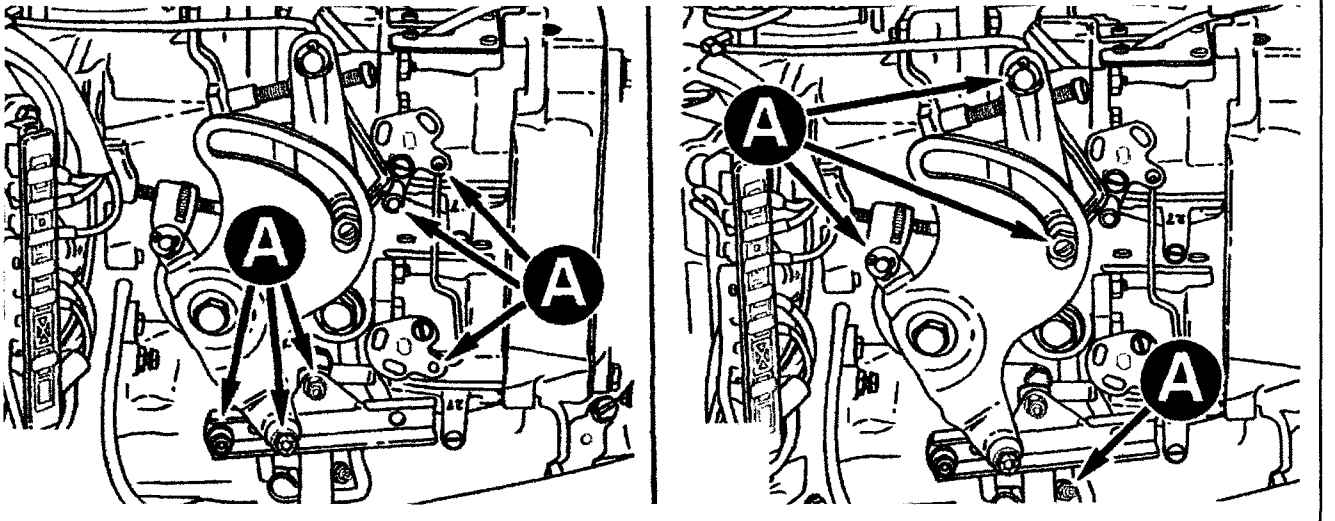


Fig. 20 Carburetor, throttle and shift linkage lubrication points-65 Jet-115 Hp (1632cc) V4 motors

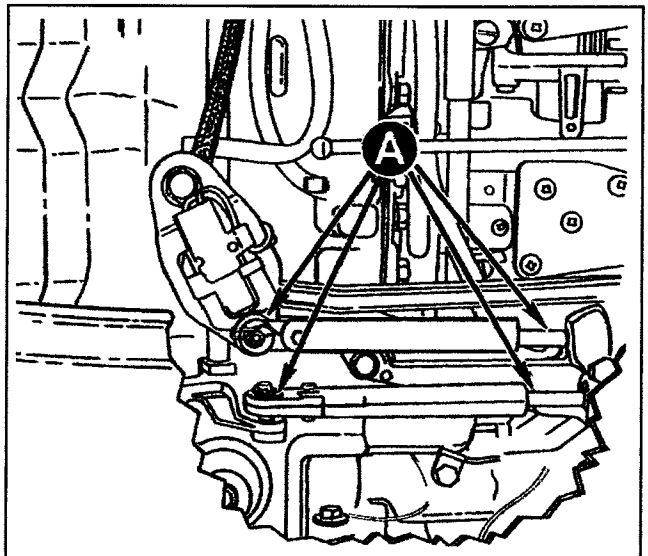


Fig. 21 Throttle and shift linkage lubrication points-75-115 Hp (1726cc) V4 and 105 Jet-175 Hp (2589cc) V6 motors (carbureted shown, FICHT very similar)

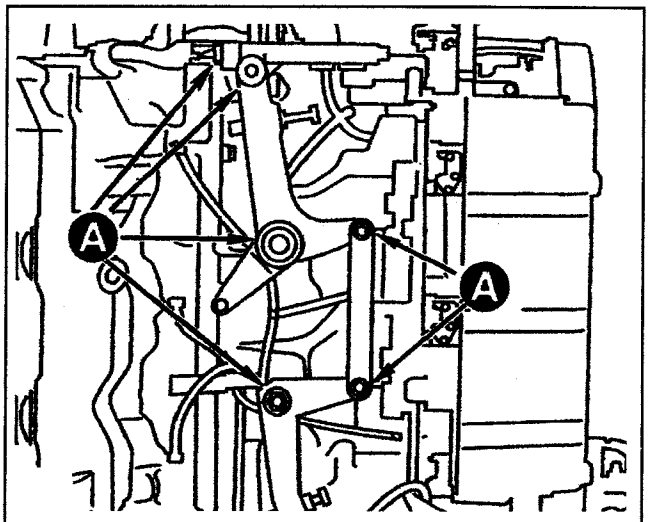


Fig. 22 Throttle and spark advance lubrication points-carbureted 120-300 Hp (2000/3000/4000cc) V4/V6/V8 Motors

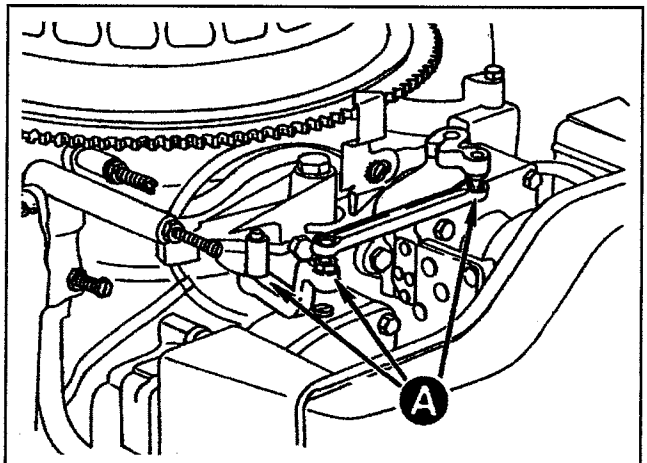


Fig. 23 Carburetor lubrication points-carbureted 120-300 Hp (2000/3000/4000cc) V4/V6/V8 Motors

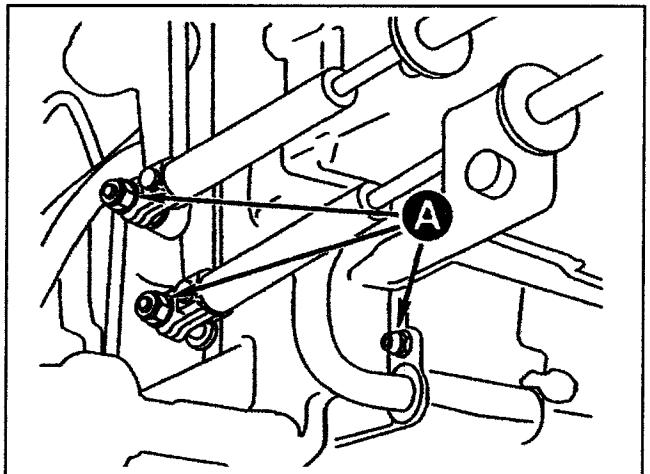


Fig. 24 Control and shift cable lubrication points- carbureted 120-300 Hp (2000/3000/4000cc) V4/V6/V8 Motors

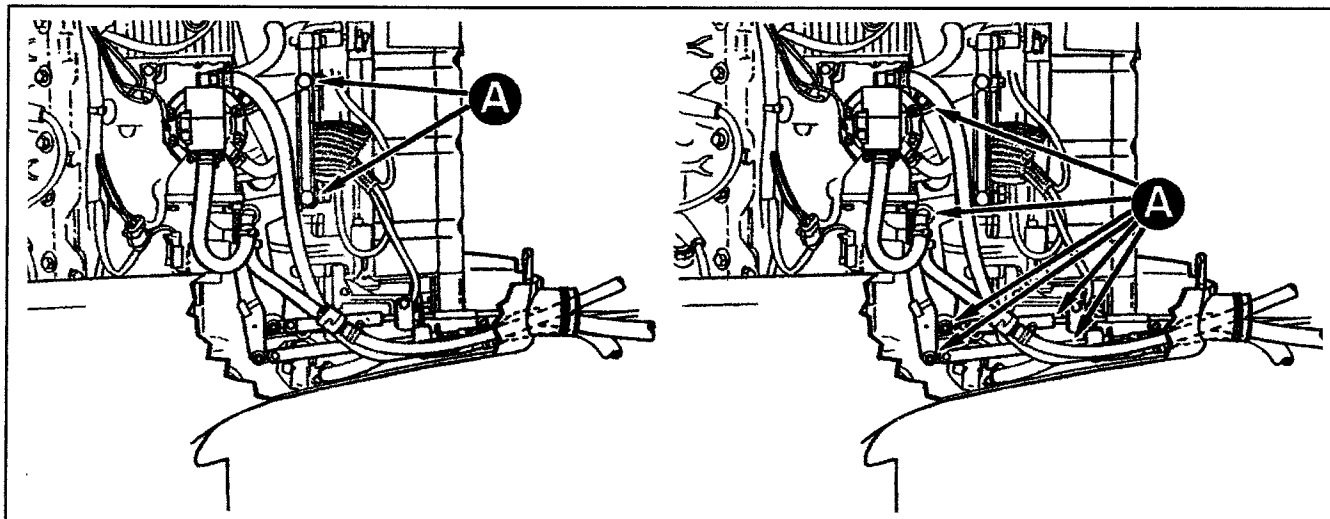


Fig. 25 Throttle and shift linkage lubrication points-200-250 hp V6 FICHT motors

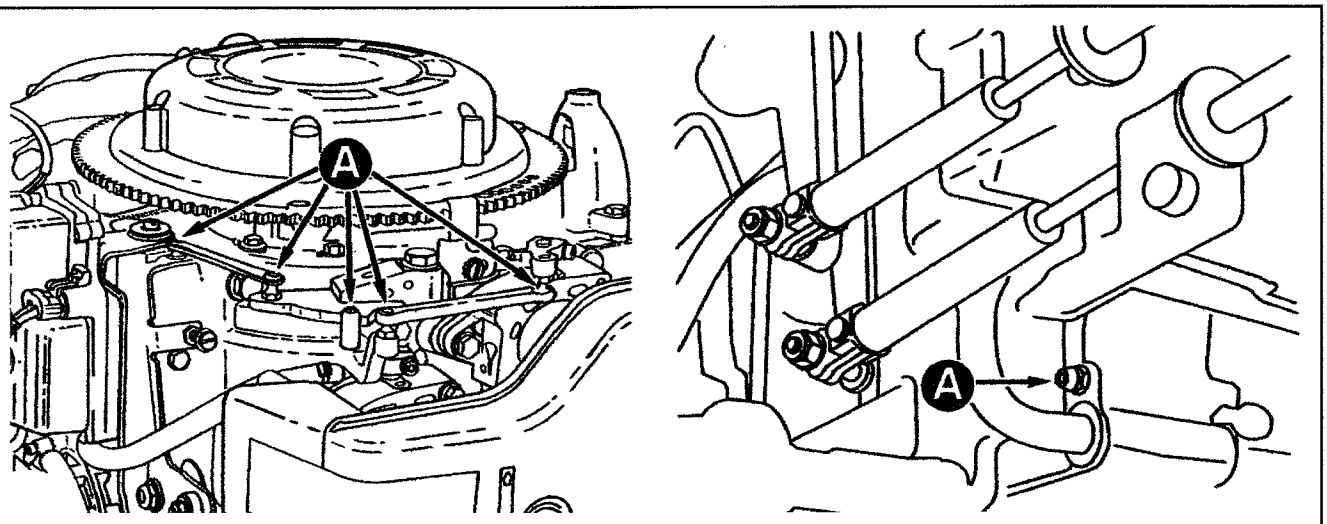


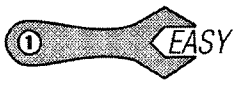
Fig. 26 Throttle and shift linkage lubrication points-200-250 hp V6 FICHT motors

Steering Arm (Cable Ram/Tiller Arm)

◆ **See Figures 27 and 28**

RECOMMENDED LUBRICANT

Use Evinrude/Johnson Triple-Guard, or equivalent water-resistant marine grease for lubrication.



LUBRICATION

◆ **See Figures 27 and 28**

All motors covered within are equipped with a tiller control and/or a remote control assembly. On models equipped with a tiller, the arm's pivot point (where it attaches to the engine) should be lubricated periodically. On models with remote controls, the steering arm should be given a light coating of fresh lubricant to prevent corrosion or scoring.

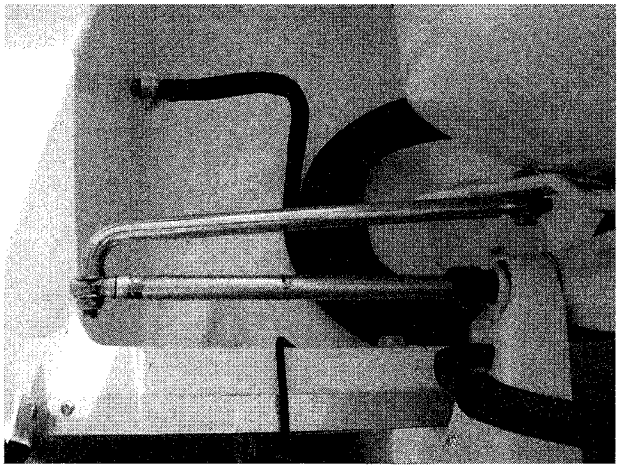


Fig. 27 On remote models, the steering arm (cable ram) must be greased periodically to prevent corrosion and ensure smooth operation

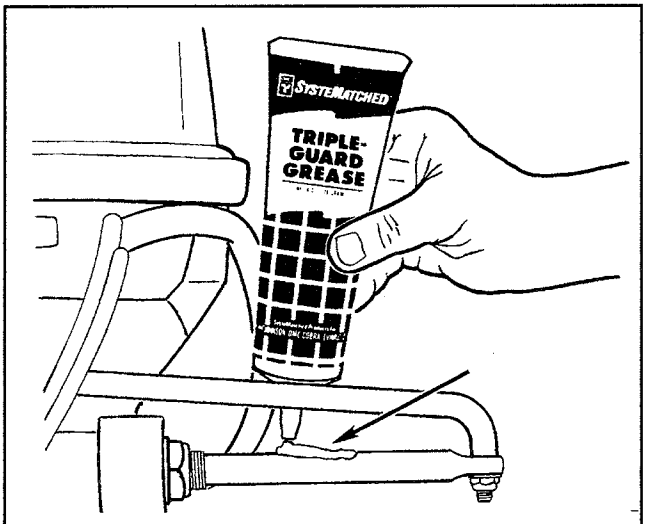


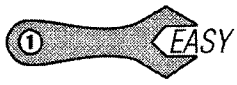
Fig. 28 Apply a light coating of water-resistance marine grease to the steering cable ram

Swivel Bracket and Tilt Support

◆ **See Figures 29 and 30**

RECOMMENDED LUBRICANT

Use Evinrude/Johnson Triple-Guard, or equivalent water-resistant marine grease for lubrication.



LUBRICATION

◆ **See Figures 29 and 30**

All Evinrude/Johnson V-motors are equipped with a grease fitting on the lower portion of the swivel bracket. Use a grease gun to apply fresh water-resistant marine grease until a small amount of lubricant begins to seep from the swivel bracket. It is important to keep this system corrosion free in order to prevent corrosion that would lead to excessive resistance or even binding that might cause dangerous operational conditions.

■ **The grease fitting for the swivel bracket is often located behind the tilt support (trailering) bracket. In these cases, the fitting is normally hidden when the bracket is stowed and accessible when the bracket is engaged to hold the motor in the full tilt position.**

The pivot points of the integral support (trailering) bracket should also be lubricated periodically to ensure smooth operation and to prevent corrosion. Since they are normally not equipped with a grease fitting, pump a small amount of grease out of the grease gun and spread it by hand or using an old toothbrush.

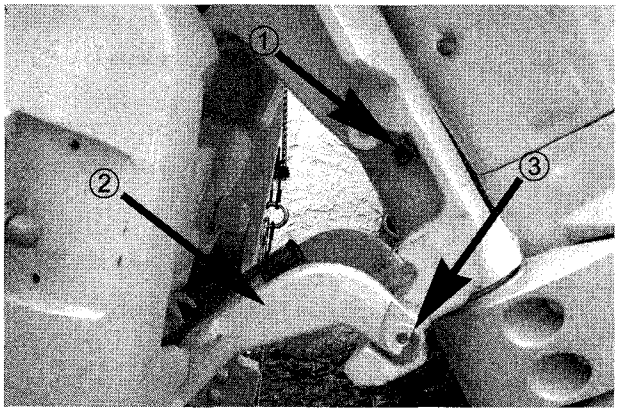


Fig. 29 The swivel bracket grease fitting (1), is usually hidden by the tilt bracket (2). Be sure to grease the pivot points of the tilt bracket (3)...

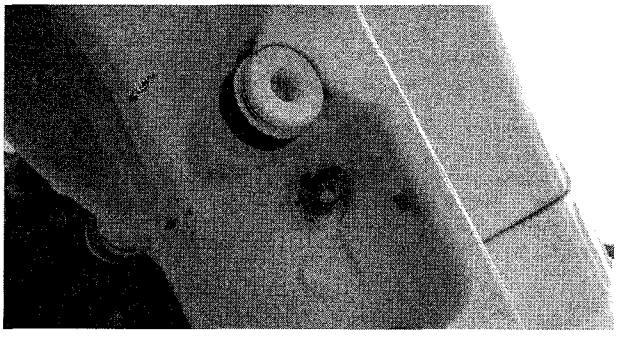


Fig. 30 ... then apply grease to the swivel bracket through the fitting

Tilt Tube Assembly

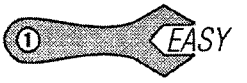
◆ **See Figure 31**

The tilt tube assembly must be greased periodically to prevent corrosion or binding, ensuring reliable and trouble-free operation.

RECOMMENDED LUBRICANT

Use Evinrude/Johnson Triple-Guard, or an equivalent water-resistant marine grease for lubrication.

LUBRICATION



◆ **See Figure 31**

Most Evinrude/Johnson motors have 2 grease fittings on the front of the tilt tube, facing the boat's transom. Apply a water-resistant marine grade grease to the fitting(s) until a small amount of grease seeps from the joints.

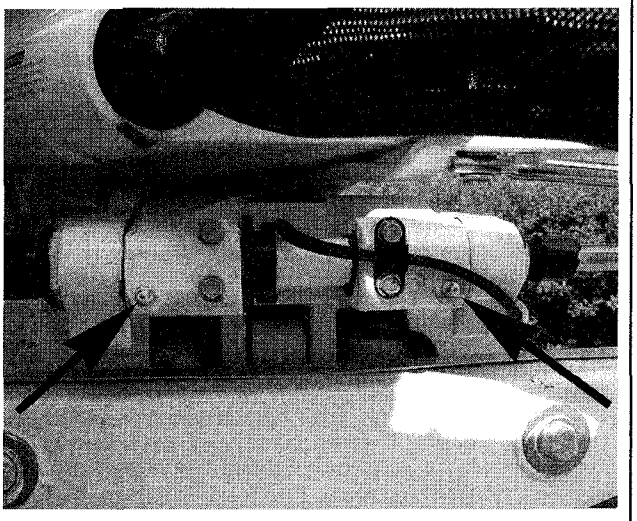
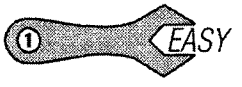


Fig. 31 Using a grease gun, lubricate both tilt tube assembly zerk fittings (normally there are 2 on the tilt tube, facing the transom)

ENGINE MAINTENANCE

Engine Covers (Top and Lower Cases)

REMOVAL & INSTALLATION



◆ **See Figures 32, 33 and 34**

Removal of the top cover is necessary for the most basic of maintenance and inspection procedures. The cover should come off before and after each use in order to perform these basic safety checks. The lower covers do not need to be removed nearly as often, but on models where they are easily removed, they should be removed at least seasonally for service and inspection procedures, especially linkage/cable lubrication procedures.

■ **On most models, including the 60 degree 75-115 Hp (1726cc) V4 and 105 Jet-175 Hp (2589cc) V6 motors, as well as many of the large 90LV6/LV8 motors, the lower engine covers must be removed for access to some of the cable/linkage greasing points.**

On all models, the top cover is attached by some type of lever and latch assembly. No tools are necessary to remove the cover itself. The exact shape and design of the levers vary somewhat from model-to-model, though they are usually located on the engine cover at the front and the aft portions of the split line between the top cover and the lower cases.

For most models, the cover latches must be pulled outward slightly or otherwise removed from a bushing or snap fixture that holds them in the locked position when closed. Once the end of the lever is freed, it is rotated 45-90° from the locked position to a top cover released position. With all of the levers released, most top covers will simply lift straight off the outboard.

No matter what design is used, once installed be certain that the cover is fully seated and mounted tightly to the lower cases in order to prevent the possibility of it coming loose in service. Make sure that the levers are secured once they are returned to the locked position.

■ **Cover screws on most Evinrude/Johnson V outboards are usually retained by various hex-head bolts, but some models may use Phillips, Slotted head, or even star-headed Torx® screws. Be sure to use only the proper-sized socket or driver on fastener heads.**

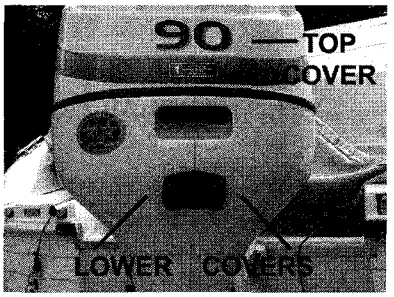


Fig. 32 Outboards are protected by a top and either 1 or 2 lower engine covers

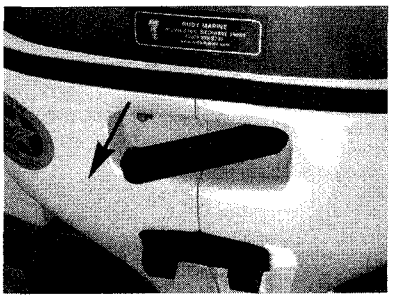


Fig. 33 Release top cover latches by pulling outward on one end...

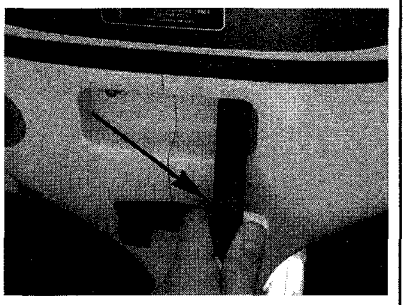


Fig. 34 ...then rotating the lever to release the latch

The lower covers of most motors are screwed or bolted together by fasteners found around the perimeter of one or both sides of the cover. However, the 65 Jet-115 Hp (1632cc) V4 motors are equipped with 1-piece covers that are not designed for easy removal. On the other hand, this cover is a low-rise component that should not interfere with service procedures. For this reason, the cover is not usually removed except during a complete overhaul where the powerhead is removed from the lower unit.

In most cases, some of the engine wiring and the fuel or oil lines must be disconnected in order to remove the lower case(s) completely from the outboard. But, some models may be equipped with removable panels or covers that allow most lines and wiring to remain connected and intact. Some lower cover designs utilize cutouts at the cover split-lines through which cables are passed.

**** WARNING**

It is especially important that you take note how each hose and wire is routed before disconnecting or moving them during service. Unless the person who worked on the motor previously made a mistake (which could cause damage and the need for repairs), all hoses and wires should already be routed in a manner that will prevent interference with and damage from moving components. Unless there are signs of damage from contact with components wires and hoses should be returned to the exact same positions as noted during disassembly. Don't be afraid to grab a digital camera and take pictures as your as disassembling. If you are unsure how a wire or hose was routed, work slowly, checking the positioning as the covers are installed to prevent damage.

75-175 Hp (1726/2589cc) V4/V6 Motors

Carbureted Motors

◆ **See Figures 32, 33, 34 and 35**

1. Disconnect the negative battery cable for safety.
2. Release the top cover latches, then carefully lift the cover from the outboard. Make sure the top cover seal remains in the groove on the top cover.

■ **Whenever the top cover is removed, be sure to perform a quick visual check of the seal and replace the seal if it is damaged or worn beyond use.**

3. For 1995 and later models, loosen and remove the screw fastening the fuel and electric cover to the front side of the port side lower cover. Remove the fuel and electric cover, positioning it aside with the screw so neither are lost or separated.

■ **Be sure to take note of the fuel and oil hose positioning before removing them from the bracket.**

4. Remove the fuel and oil hoses from the connector, then remove the bolt securing the fuel and oil fitting bracket (retainer) to the lower engine cover. Remove the fitting bracket.
5. If necessary, disconnect the battery cables at the starter solenoid and starter flange.
6. If necessary for access, remove the rubber retainers and the air silencer.
7. Note the harness positioning, then disengage the power trim/tilt wiring connector.
8. Locate and remove the bolts from the perimeter of the starboard lower cover.

■ **There are usually 4 bolts securing the lower cover halves, but, check the covers carefully before attempting to separate them. If the covers seem unwilling to separate, make sure that there are no additional fasteners either around the perimeter or inside the cover.**

9. Carefully pull the starboard cover free of the outboard.
10. Note the wire positioning/routing, then tag and disconnect the 3 bullet connectors for the trim/tilt switch and remove the port cover.

■ **The lower covers contain various flange seals. Make sure all seals are in good condition or replace them before reinstallation.**

11. Installation is essentially the reverse of the removal. During installation, be sure to reconnect all wiring, fuel and oil connectors. Make sure all hoses and wiring are positioned as noted during removal to prevent any pinching or damage by the covers themselves or by other moving parts once the motor is returned to service. Always tighten the retaining bolts securely, but be careful not to overtighten and crack the delicate covers.

FICHT Motors

◆ **See Figures 32 thru 40**

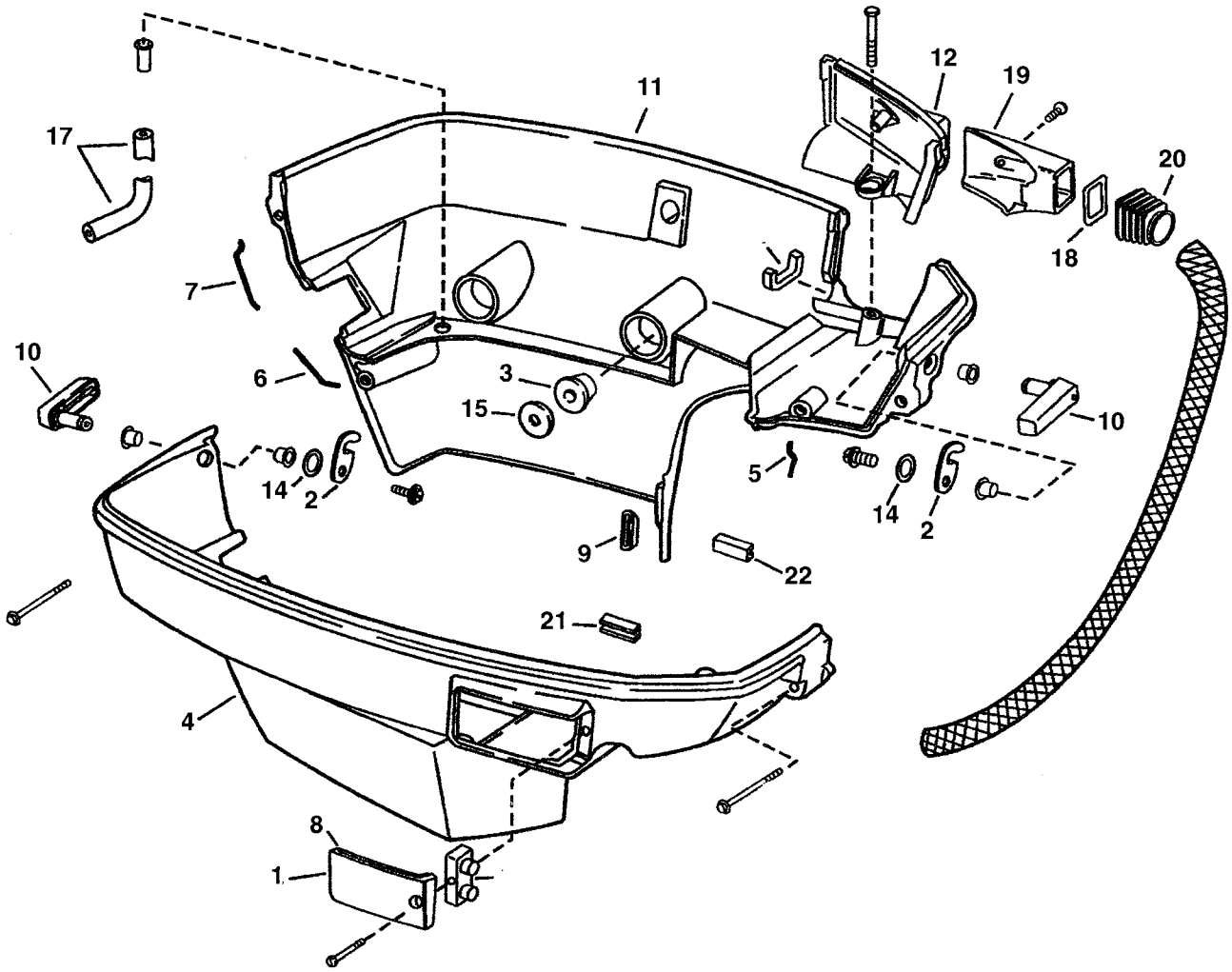
1. Disconnect the negative battery cable for safety.
2. Release the top cover latches, then carefully lift the cover from the outboard. Make sure the top cover seal remains in the groove on the top cover.

■ **Whenever the top cover is removed, be sure to perform a quick visual check of the seal and replace the seal if it is damaged or worn beyond use.**

3. Loosen and remove the 3 screws fastening the cable entry cover to the front corner of the starboard side lower cover. Remove the cover for access to the fuel and oil hoses.

■ **Be sure to take note of the fuel and oil hose positioning before removing them from the bracket.**

4. Remove the fuel and oil hoses from the rubber grommet.
5. Note the harness positioning, then disengage the power trim/tilt wiring connector.



1 Anchor block cover
2 Front and rear hook
3 Lower cover mount
4 Starboard engine cover
5 Engine cover front seal
6 Engine cover rear lower seal
7 Engine cover rear upper seal
8 Anchor block seal
9 Bumper
10 Latch handle
11 Port engine cover
12 Fuel and electric retainer
13 Electric wires seal
14 Latch handle spring washer
15 Mount washer
16 Control cables grommet
17 Drain hose
18 Grommet retainer
19 Fuel and electric cover
20 Fuel and electric grommet
21 Starboard seal
22 Port seal

Fig. 35 Exploded view of the lower engine covers and related components-carbureted 75-175 Hp (1726/2589cc) V4/V6 Motors (1995 and later shown, earlier models similar)

■ **The cover bolts are usually of different lengths, keep the bolts sorted as they are removed in order to prevent difficulty during installation. Also, you'll want smaller, thin walled sockets for access to most of the bolts. The 2 bolts found inside the cover can be turned using a wrench or a U-joint and wobble adapter on a normal 3/8 or 1/4 in. drive ratchet.**

6. Locate and remove the bolts from the perimeter of the starboard lower cover and the 2 bolts located inside of the cover flange, one at either top cover latch assembly.

■ **There are usually 6 bolts securing the lower cover halves (4 threaded from the perimeter of the port side cover to the starboard side, and 2 threaded inside the covers, at the latch assemblies), but, check the covers carefully before attempting to separate them. If the covers seem unwilling to separate, make sure that there are no additional fasteners either around the perimeter or inside the cover.**

7. Carefully pull the port and starboard covers free of the outboard. Even with the bolts removed, the covers will remain in position by the interference fit of 2 rubber mounts. Slowly pull the covers straight outward to the sides of the motor (while using a hand or foot to keep the motor from turning) in order to free the covers from these mounts.

■ **The lower covers contain various flange seals. Make sure all seals are in good condition or replace them before reinstallation. Also, the starboard cover must be removed slowly, tilting the aft portion of the cover further away from the motor, in order to snake the cutout around the fuel/oil hoses. Work slowly and carefully, never forcing anything.**

8. Installation is essentially the reverse of the removal. During installation, be sure to reconnect all wiring, fuel and oil connectors. Make sure all hoses and wiring are positioned as noted during removal to prevent any pinching or damage by the covers themselves or by other moving parts once the motor is returned to service. Always tighten the retaining bolts securely, but be careful not to overtighten and crack the delicate covers.

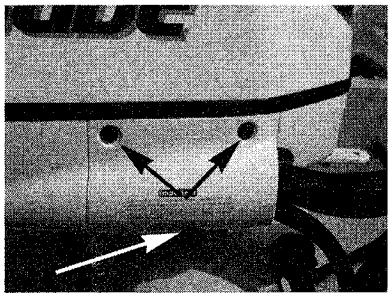


Fig. 36 There are 3 screws holding the cable entry cover to the motor...

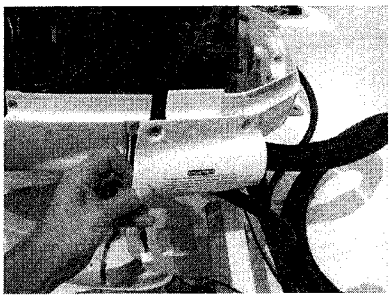


Fig. 36a ... loosen the screws and remove it to free the oil/fuel hoses

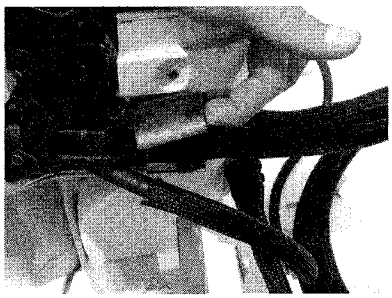


Fig. 36b Note the position of the hoses in the grommet

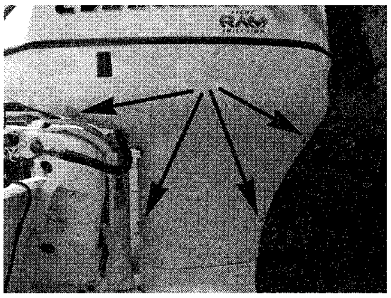


Fig. 37 Once the trim/tilt wiring is disconnected, remove the cover bolts...

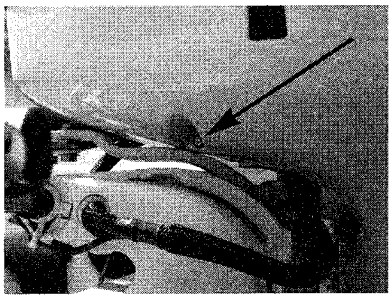


Fig. 38 Don't forget the one tucked under the front of the motor...

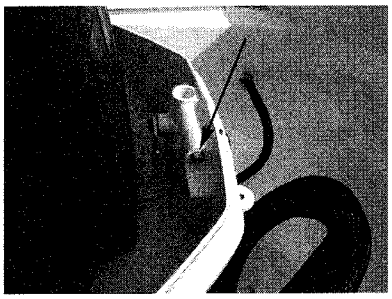


Fig. 39 ...or the bolt found at the front and aft cover latches

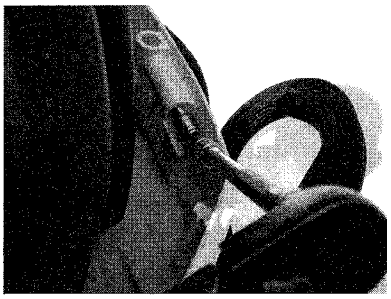


Fig. 39a The inner bolts can be loosened with a U-joint and wobble

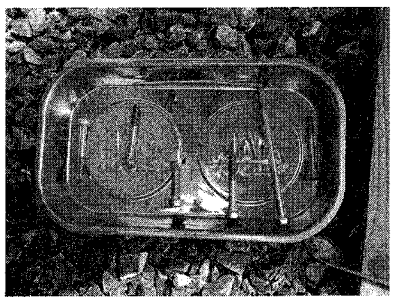


Fig. 39b The cover bolts are different lengths, keep them sorted by position

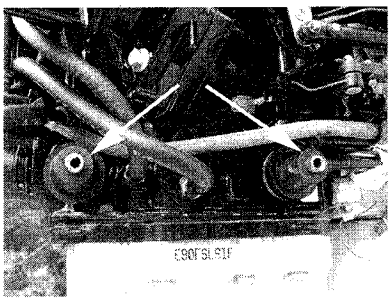
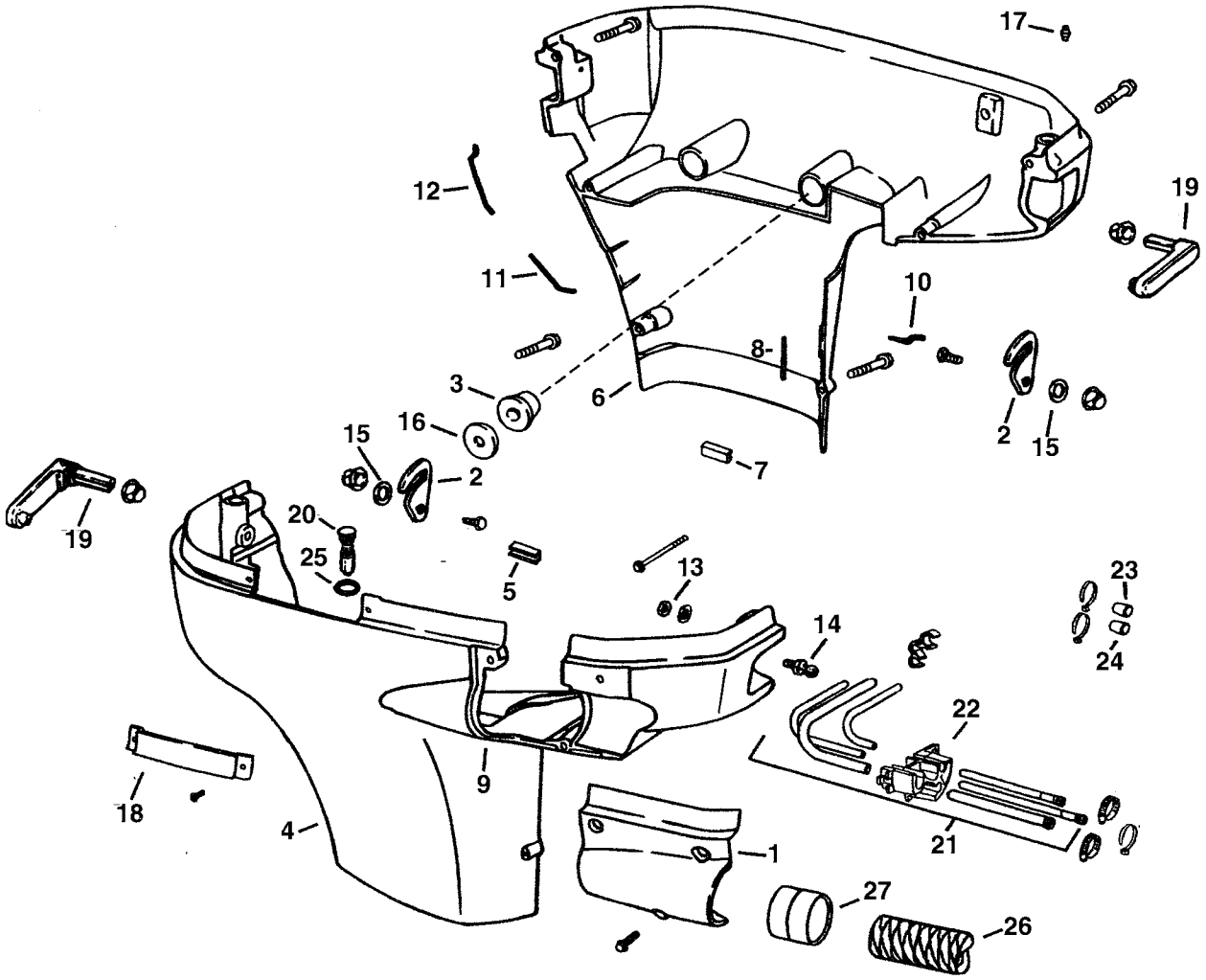


Fig. 39c The covers are mounted over rubber grommets



1 Cable entry cover
2 Front and rear hook
3 Lower cover mount
4 Starboard engine cover
5 Starboard seal
6 Port engine cover
7 Port seal
8 Engine cover front lower seal
9 Engine cover cable entry seal
10 Engine cover front upper seal
11 Engine cover rear lower seal
12 Engine cover rear upper seal
13 Ball joint screw nut
14 Ball joint screw
15 Latch handle spring washer
16 Mount washer
17 Lubrication fitting
18 Access panel
19 Latch handle
20 Drain check valve assembly
21 Fuel and oil tube assembly
22 Retainer
23 Oil supply and return hoses cap
24 Fuel hose cap
25 O-ring
26 Fuel and electrical sleeve
27 Cable entry grommet

Fig. 40 Exploded view of the lower engine covers and related components-FICHT 75-175 Hp (1726/2589cc) V4/V6 Motors

120-300 Hp (2000/3000/3300/4000cc) V4/V6/V8 Motors

◆ **See Figures 41, 42, 43 and 44**

1. Disconnect the negative battery cable for safety.
2. Release the top cover latches, then carefully lift the cover from the outboard. Make sure the top cover seal remains in the groove on the top cover.

■ **Whenever the top cover is removed, be sure to perform a quick visual check of the seal and replace the seal if it is damaged or worn beyond use.**

3. On 1992-98 carbureted modepower steering hoses at the front, starboard side of the lower cover. You'll need to loosen the screw that is threaded downward through the lower cover while holding the locknut from underneath. Remove the screw, flat washer and locknut.
4. On carbureted models, be sure that a spring clip is installed on the port and starboard lower pan supports.
5. If necessary, remove the cooling indicator hose and grommet.
6. Locate and remove the bolts from the perimeter of the lower cover. On V6 models, the bolts are normally threaded from the starboard side of the motor, on V4 and V6 motors however, the opposite is normally true. The number of bolts used varies slightly by model, so work slowly and make sure you've got them all out before trying to separate the covers.

■ **There are USUALLY at least 4 bolts securing the lower cover halves on V4 and V8 models and at least 6 bolts securing the cover halves on V6 models, but, check the covers carefully before attempting to separate them. If the covers seem unwilling to separate, make sure that there are no additional fasteners either around the perimeter or inside the cover.**

Fig. 41 The lower cover screws are normally found on the starboard side of V6 engines, or the port side of V4 and V8 motors

7. Remove one spring clip and one lower engine cover at a time.

■ **The lower covers contain various flange seals. Make sure all seals are in good condition or replace them before reinstallation.**

8. Installation is essentially the reverse of the removal. During installation, make sure all hoses and wiring are positioned as noted during removal to prevent any pinching or damage by the covers themselves or by other moving parts once the motor is returned to service. Always tighten the retaining bolts securely, but be careful not to overtighten and crack the delicate covers.

Cooling System

OEM

FLUSHING THE COOLING SYSTEM

EASY

◆ **See Figures 45, 46, 47, 48, 49, 50, 51 and 52**

The most important service that you can perform on your motor's cooling system is to flush it periodically using fresh, clean water. This should be done immediately following any use in salt, brackish or polluted waters in order to prevent mineral deposits or corrosion from clogging cooling passages. Even if you do not always boat in salt or polluted waters, get used to the flushing procedure and perform it often (ideally, immediately following every outing) to ensure no silt or debris clogs your cooling system over time.

■ **Flush the cooling system after any use in which the motor was operated through suspended/churned-up silt, debris or sand.**

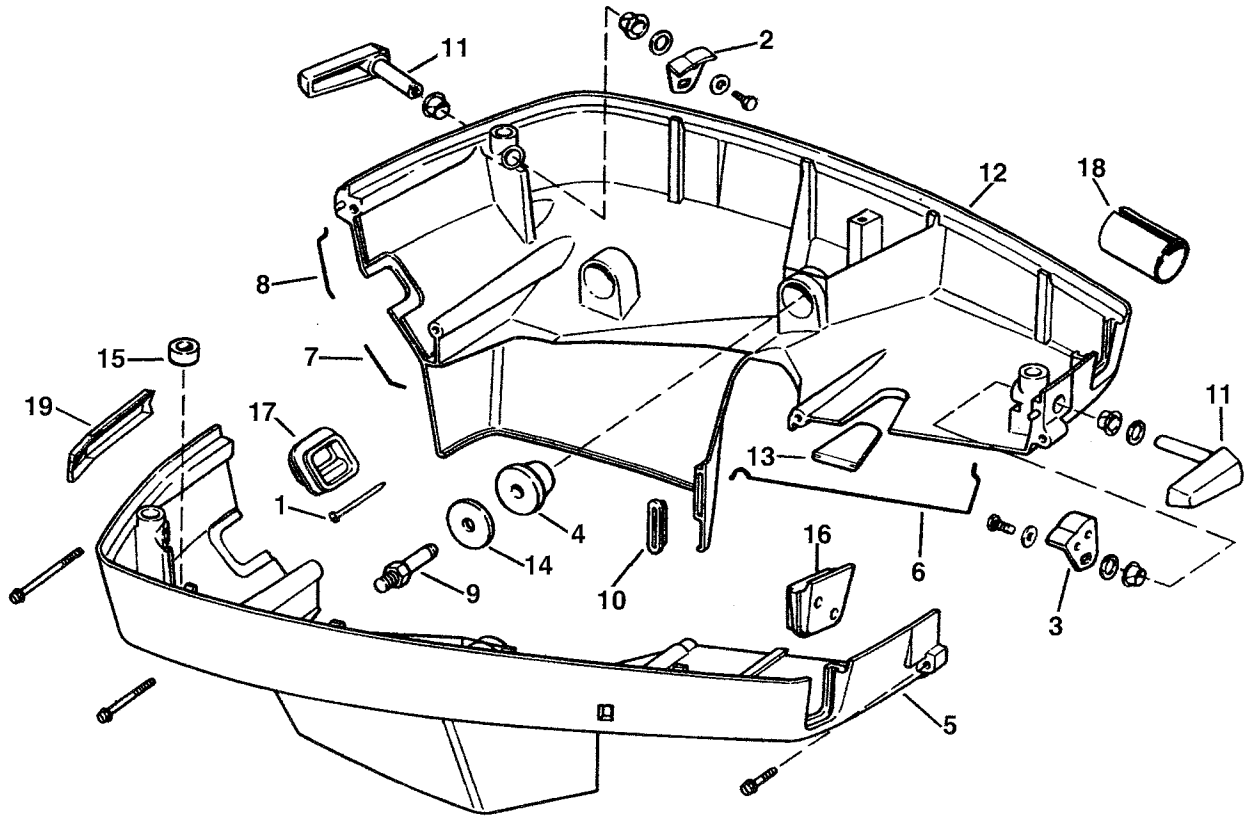
Although the flushing procedure should take place right away (dockside or on the trailer), be sure to protect the motor from damage due to possible thermal shock. If the engine has just been run under high load or at continued high speeds, allow time for it to cool to the point where the powerhead can be touched. Do not pump very cold water through a very hot engine, or you are just asking for trouble. If you trailer your boat short distances, the flushing procedure can probably wait until you arrive home or wherever the boat is stored, but ideally it should occur within an hour of use in salt water. Remember that the corrosion process begins as soon as the motor is removed from the water and exposed to air.

The flushing procedure is not used only for cooling system maintenance, but it is also a tool with which a technician can provide a source of cooling water to protect the engine (and water pump impeller) from damage anytime the motor needs to be run out of the water. **Never** start or run the engine out of the water, even for a few seconds, for any reason. Water pump impeller damage can occur instantly and damage to the engine from overheating can follow shortly thereafter. If the engine must be run out of the water for tuning or testing, always connect an appropriate flushing device **before** the engine is started and leave it turned on until **after** the engine is shut off.

✳✳ WARNING

ANYTIME the engine is run, the first thing you should do is check the cooling stream or water indicator. All models covered by this manual are equipped with some form of a cooling stream indicator towards the aft portion of the lower engine cover. Anytime the engine is operating, a steady stream of water should come from the indicator, showing that the pump is supplying water to the engine for cooling. If the stream is ever absent, stop the motor and determine the cause before restarting.

As we stated earlier, flushing the cooling system consists of supplying fresh, clean water to the system in order to clean deposits from the internal passages. If the engine is running, the water does not normally have to be pressurized, as it is delivered through the normal water intake passages and the water pump (the system can self flush if supplied with clean water). If your engine can be placed in a test tank that is filled with fresh, clean water, then in theory, simply running it will self-flush the motor.



1 Tie strap
2 Port rear hook
3 Front and rear starboard hook
4 Lower cover mount
5 Starboard engine cover and seal assy.
6 Starboard front engine cover seal
7 Engine cover rear lower seal
8 Rear upper seal
9 Lower cover stud
10 Lower cover bumper
11 Latch handle
12 Port engine cover
13 Grommet
14 Mount washer
15 Drain indicator grommet
16 Control cables grommet
17 Adapter to cover grommet
18 Battery cable sleeve
19 Applique

Fig. 42 Exploded view of the lower engine covers and related components-120-140 Hp (2000cc) V4 motors