

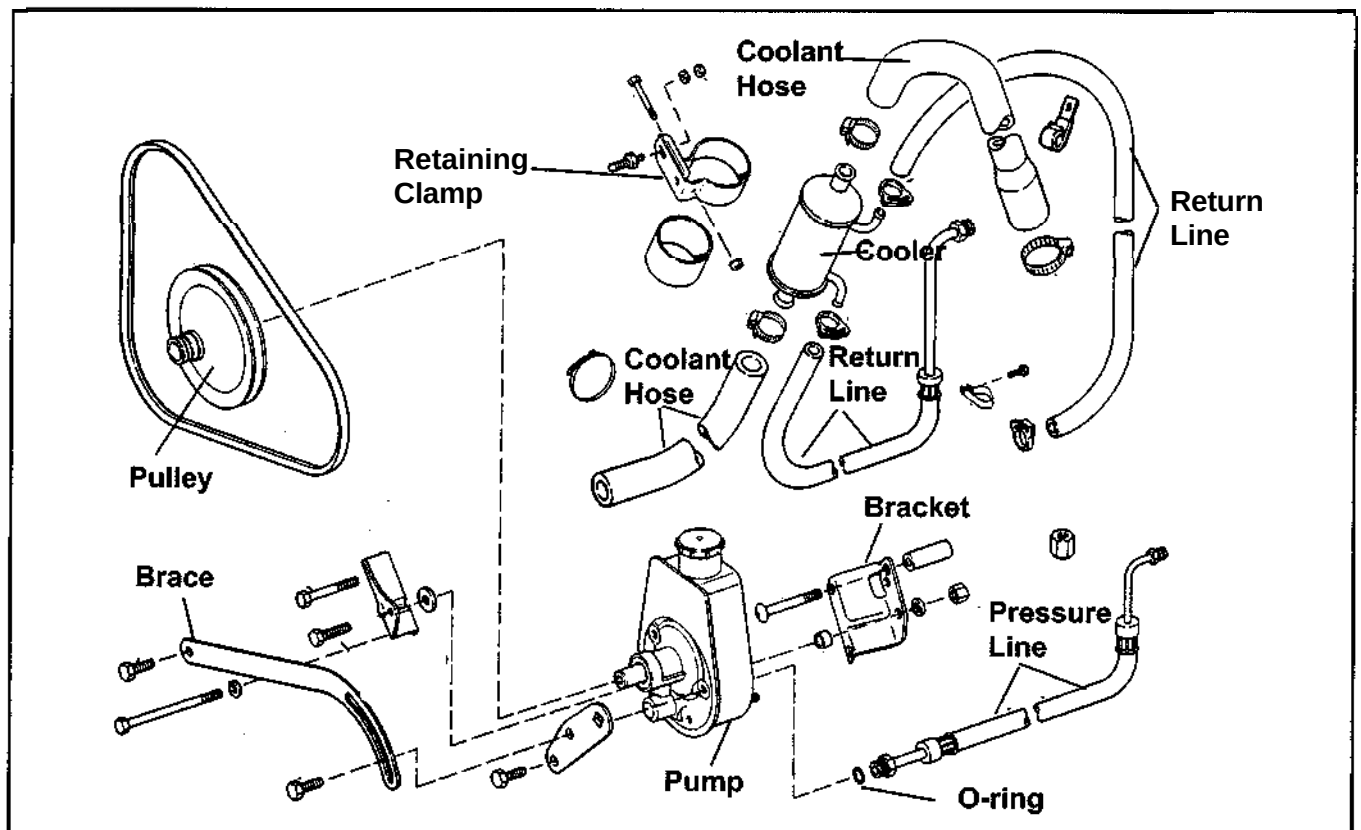


Fig. 16 Power steering pump and related components-carbureted Ford engines (typical)

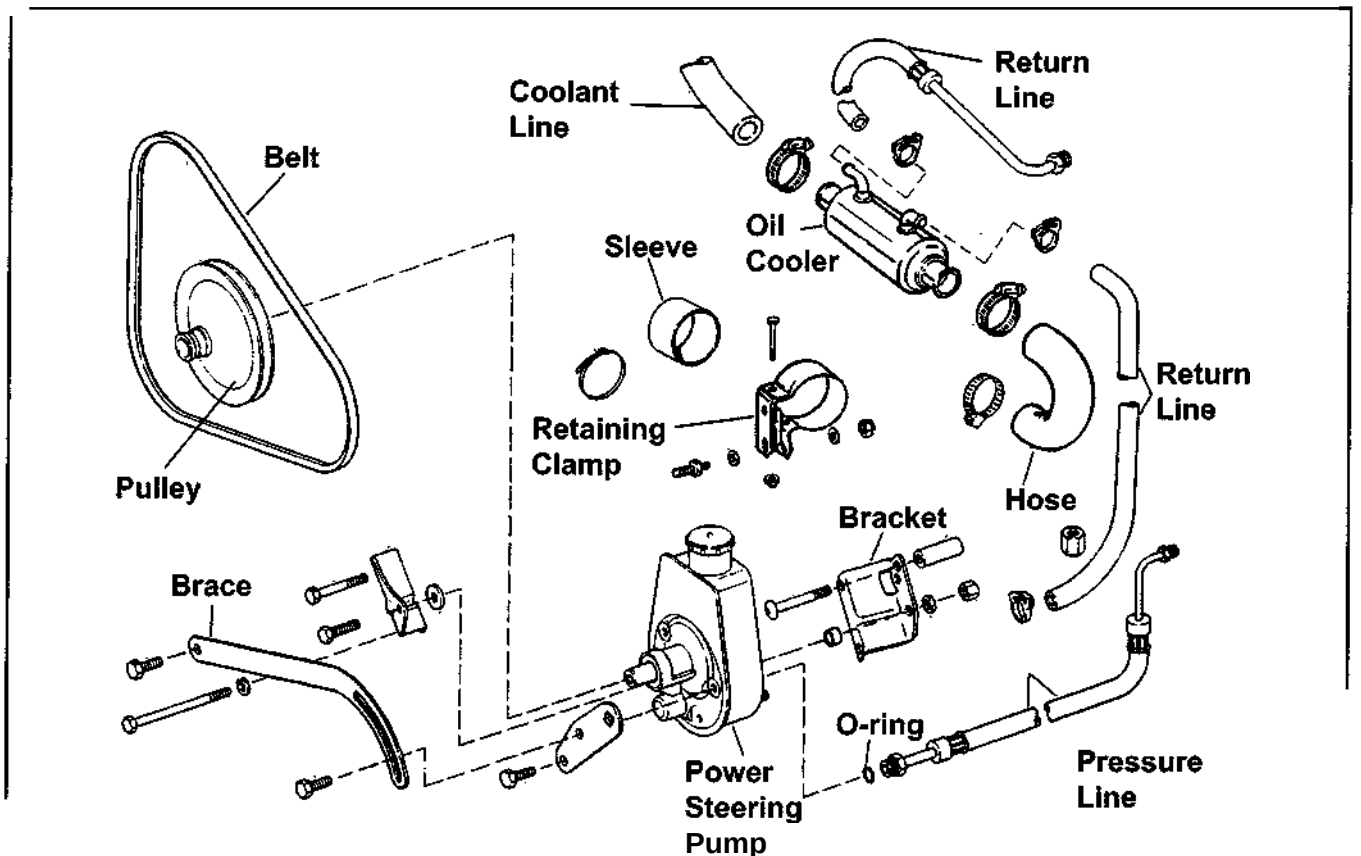


Fig. 17 Power steering pump and related components—EFI Ford engines (typical)

14-10 STEERING SYSTEMS

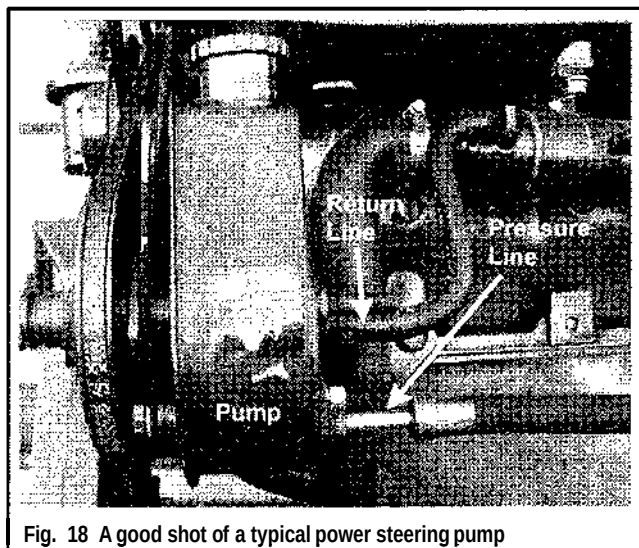
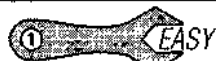


Fig. 18 A good shot of a typical power steering pump

MAINTENANCE



The steering cable should be lubricated with water repellent grease (OMC Triple Guard) every 60 days during the boating season, although depending on your particular local conditions it may be necessary to shorten the interval.

Steering Cylinder

The steering cylinder assembly consists of the steering power cylinder and the control valve (actuator valve on early models). A piston rod clevis at the end of the guide tube provides connection points for the steering cable ram and the drive unit steering arm. The steering cable casing is connected to the other side of the control valve, while the entire assembly is mounted in the transom plate.

☐ The steering cylinder is serviced as an assembly. With the exception of removing the cylinder rod clevis, no other overhaul procedures are possible.

REMOVAL & INSTALLATION



◆ See Figures 7, 12, 22 and 23

1. Disconnect and remove the steering cable as detailed previously.
2. Remove the cotter pin from the bottom of the remaining clevis pin (steering arm pin) and pull the pin out.

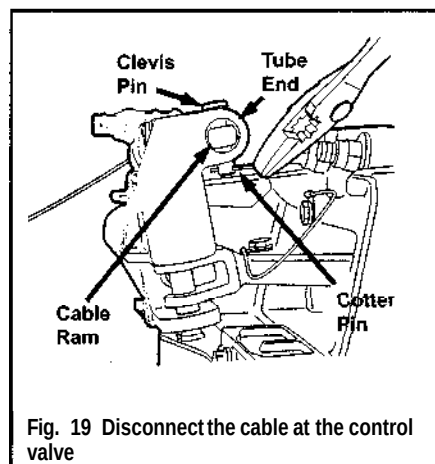


Fig. 19 Disconnect the cable at the control valve

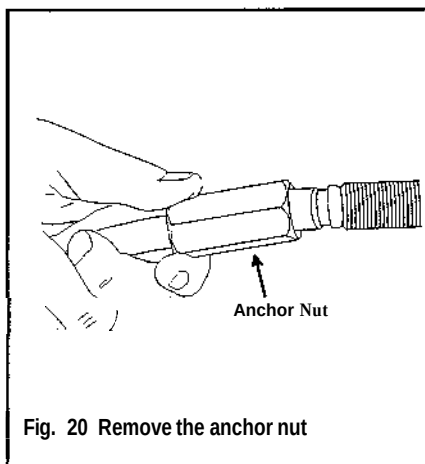


Fig. 20 Remove the anchor nut

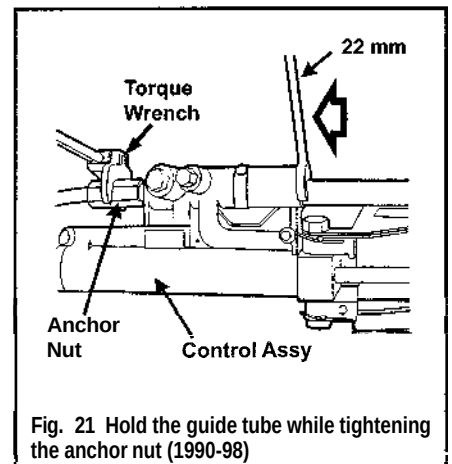


Fig. 21 Hold the guide tube while tightening the anchor nut (1990-98)

There are two clevis pins in the guide clevis—the larger one in the center cut-out is for the steering arm, while the smaller one on the port side end is for the cable ram.

3. Position a small pan under the hydraulic hose connections and then loosen the line nuts with a flare wrench; it's a good idea to cover the fitting with a rag while loosening it to protect against any fluid spill or spray. Plug the hoses and valve ports immediately. Move the hoses out of the way.

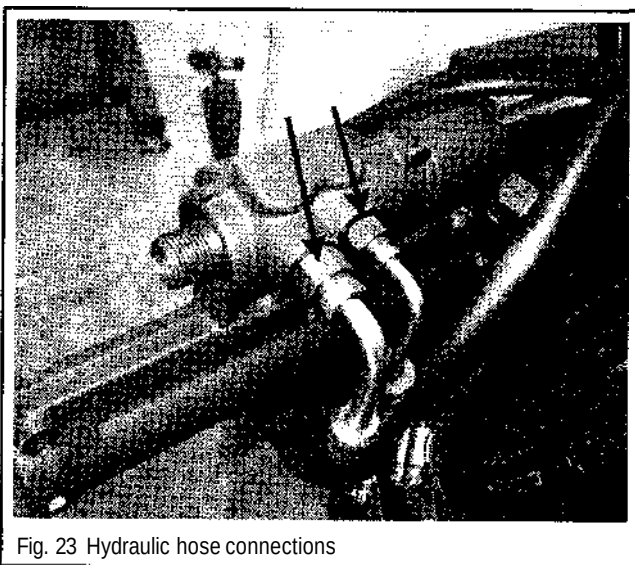
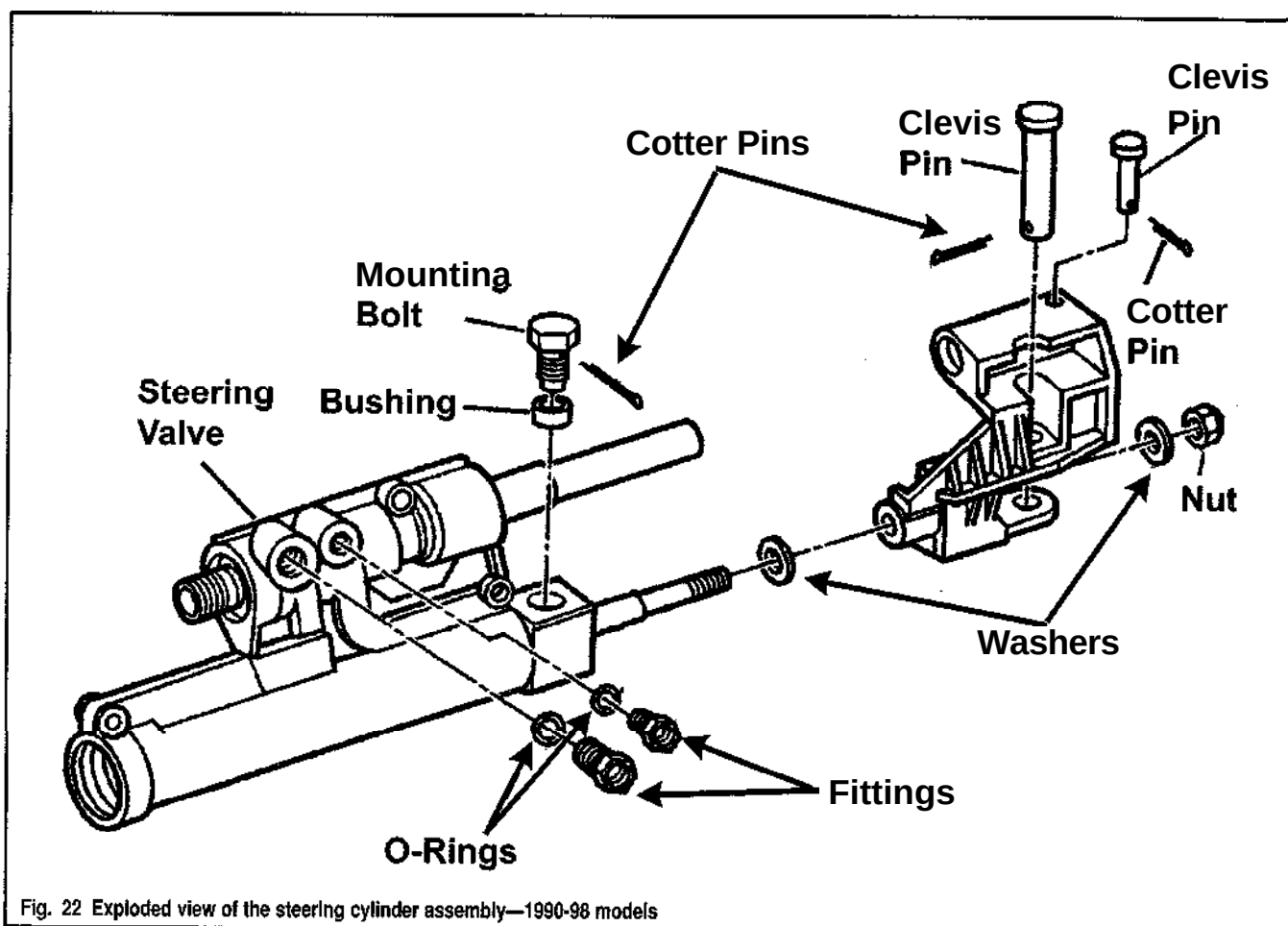
✖ ✖ CAUTION

Do not move the cylinder rod until you have drained it completely. Aside from the possible resulting fluid spray being potentially dangerous, you'll create quite a mess in the engine bay.

4. Pull out the cotter pins running through the mounting bracket bosses on the transom plate and then remove the 2 mounting bolts. Lift off the assembly.
5. If the steering arm bushings require replacement, or if you wish to replace them anyway since you've got the unit out, carefully drill two 11/16 in. (1.5mm) holes in each and pull them out with a small bent-tip awl.
6. If the clevis needs service on 1990-98 models, extend the rod fully and wrap it with heavy paper. Clamp the rod in a soft-jawed vise being very careful not to scratch or damage the rod's surface. OMC offers special clamping blocks for this (# 983213) if you are so inclined. Loosen the 19mm locknut in the end of the rod and remove the clevis.

To Install:

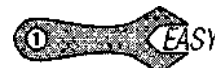
7. Clean all components thoroughly in solvent and dry with compressed air.
8. Clamp the guide tube rod carefully in a vise as discussed previously. Position the clevis on the end of the rod and tighten locknut to 23-38 ft. lbs. (31-38 Nm).
9. Coat new bushings very lightly with Triple Guard grease and then press them into their bores until they seat themselves; you may have to tap them lightly with a small mallet.
10. Thread the two mounting bolts back into the transom plate bracket until the ends are just flush with the inside surface of the bracket.
11. Squeeze a small dab of grease into each bushing and then position the steering cylinder into the transom bracket so the holes of each line up. Thread the mounting bolts in by hand until they sufficiently engage their respective bushings in the cylinder and then tighten them to 40-45 ft. lbs. (54-61 Nm). Continue turning the bolts until the cotter pin holes in the bolt and the boss are in alignment. Insert new cotter pins into each hole and bend over the ends.
12. Remove the plugs and connect the hydraulic hoses to the cylinder. Tighten the line nut on the pressure hose (inner) to 10-12 ft. lbs. (14-16 Nm). Tighten the return line nut (outer) to 15-17 ft. lbs. (20-23 Nm). On 1986-89 models, coat the threads with Teflon Pipe Sealant (do not use Teflon tape!) and tighten the fittings to 95-105 inch lbs. (11-12 Nm).
13. Move the steering arm into position in the lower portion of the clevis so the pin holes line up correctly and then install the pin from the top side. Insert a new cotter pin and bend over the ends.
14. Connect the steering cable. Check the fluid level in the pump reservoir and bleed the system.



Trim Tab

ADJUSTMENT

◆ See Figure 24



Models utilizing power steering should not have been equipped with a trim tab, but if your boat IS equipped with one, confirm that the tab has been set correctly at the factory as follows.

The trim tab should be pre-set at the factory and should normally require no adjustment. To confirm the setting, measure from the very end of the trim tab directly over to the port side of the anti-cavitation plate so that your measurement is taken at a point perpendicular to the centerline of the drive unit. Left-hand rotation units should measure 3 1/4 in. (83mm) (5 degrees to port of the centerline), while right-hand units should measure 2 1/4 in. (57mm) (30 degrees to port of the centerline).

If the measurement is not within specifications, loosen the trim tab bolt and re-position the tab to meet the correct dimension. Tighten the bolt to 28-32 ft. lbs. (38-43 Nm) on drives through 1994; for 1994-98 drives, tighten the bolt to 14-16 ft. lbs. (19-22 Nm).

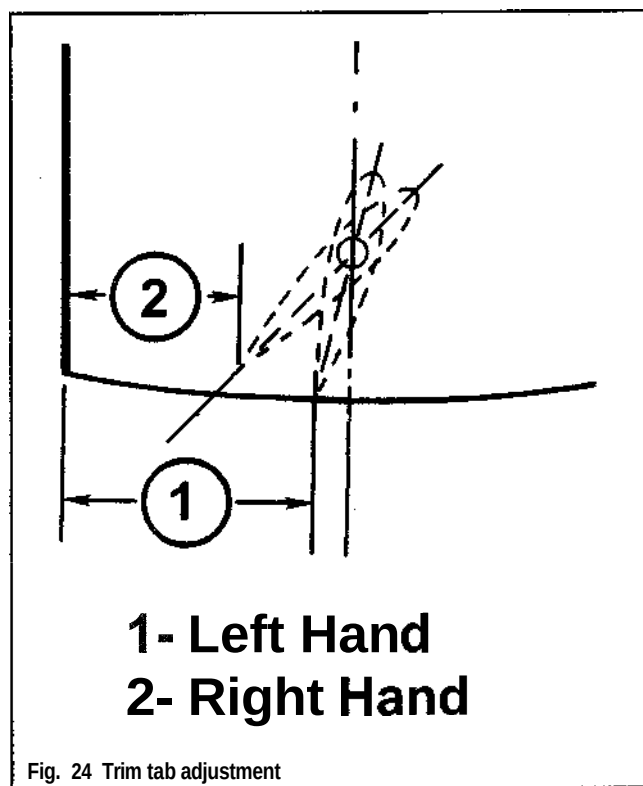


Fig. 24 Trim tab adjustment

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ENGINE FINDER

The following listing contains all engines covered in this manual

Model/L	Engine/Cylinder	Coverage Years
2.3L	140 CID, 4 cyl	1987-90
2.5L	153 CID, 4 cyl	1986
3.0L	181 CID, 4 cyl	1986-98
3.0 HO	181 CID, 4 cyl	1990-93
4.3L	262 CID, V6	1986-98
4.3 HO	262 CID, V6	1990-93
5.0L	302 CID, V8 (Ford)	1989-96
5.0 HO	302 CID, V8 (Ford)	1990-93
5.0L	305 CID, V8 (GM)	1986-88, 1998
5.7L	350 CID, V8 (GM)	1986-92, 1994 & 1996-98
5.7 LE	350 CID, V8 (GM)	1990-92
5.8L	351 CID, V8 (Ford)	1989-96
5.8 HO	351 CID, V8 (Ford)	1995
5.8 LE	351 CID, V8 (Ford)	1991-93
7.4L	454 CID, V8 (GM)	1988, 1990-98
7.5L	460 CID, V8 (Ford)	1987-90
8.2L	502 CID, V8 (GM)	1992-93, 1998
262	262 CID, V6	1989
350	350 CID, V8 (GM)	1989-91
351	351 CID, V8 (Ford)	1992-94
454	454 CID, V8 (GM)	1988, 1990-93
454 HO	454 CID, V8 (GM)	1991-93
460	460 CID, V8 (Ford)	1988-90
502	502 CID, V8 (GM)	1992-93

SERVICE FUNDAMENTALS

PERIODIC SERVICING

Many of the troubles related to outboard motors will be much easier to repair if noticed before they result in extensive damage and sometimes the lack of proper servicing is the primary cause of failure. The following service and inspection schedule can be used as a guide. If the motor is operated under severe conditions, the intervals should be shortened.

NOTE: This schedule of mid-season service, off-season storage and pre-season preparations is taken from the Marine Service Manual of Recommended Practices which is copyrighted by the Boating Industry Association.

MID-SEASON (OR EVERY 50 HOURS)

1. Drain and flush gearcase. Refill to correct level using manufacturer's recommended lubricant.
2. Remove and clean fuel filter bowl. Replace fuel bowl element. Always use new filter bowl gasket.
3. Clean and regap spark plugs to recommended gap. Replace worn or burnt spark plugs. (Use new gaskets and torque plugs to manufacturer's recommendations).
4. Check propeller for correct pitch. Replace if propeller is worn, chipped or badly bent.
5. Lubricate all grease fittings, using manufacturer's recommended lubricant.
6. Check remote control box, cables and wiring harness.
7. Check steering controls; lubricate mechanical steering.
8. Lubricate all carburetor and magneto linkages with manufacturer's recommended lubricant.
9. Adjust tension on magneto and/or generator drive belts.
10. Clean and coat battery terminals with grease.
11. Check water pump and thermostat operation.
12. Check breaker points' condition and timing.
13. Check carburetor and ignition synchronization.
14. Check carburetor adjustment.

OFF-SEASON STORAGE

Operate motor in test tank, or on boat, at part throttle with shift lever in neutral. Rapidly inject rust preventative

oil (with pump type oil can) into carburetor air intake, or intakes, until motor is smoking profusely. Stop motor immediately to prevent burning oil out of cylinders. This will lubricate and protect internal parts of powerhead while motor is in storage. If motor was last operated in salt water, run it in fresh water before preparing it for storage.

1. Place motor on a stand in normal upright position. Remove motor cover.
2. Retard throttle all the way and disconnect spark plug leads. Manually rotate motor flywheel several times to draining the water from water pump.
3. Drain carburetor float chamber. Remove fuel filter bowl—drain, clean and replace filter element and gasket.
4. Clean and lubricate electric starter drive mechanism.
5. Completely drain and clean fuel tank.
6. Remove propeller and check for condition and pitch. Clean and liberally lubricate propeller shaft. Replace propeller drive pin if bent or worn. Replace propeller using new cotter pin or tab lockwasher.
7. Drain and refill gearcase, using the manufacturers recommended lubricant.

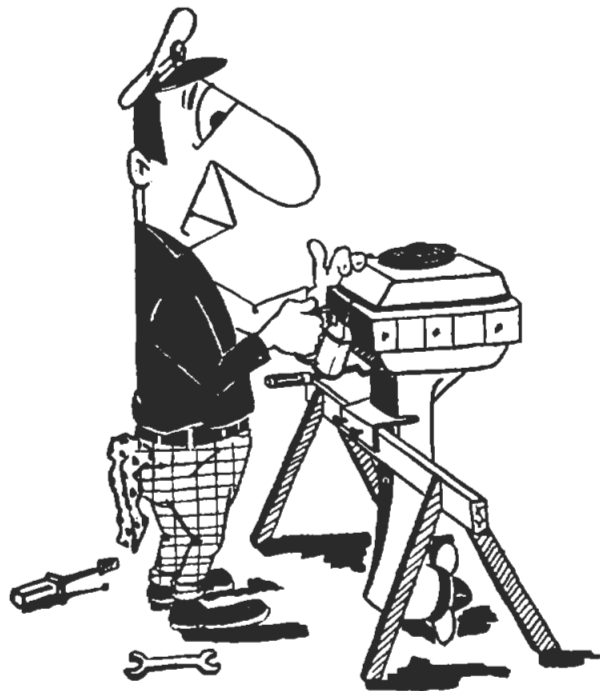
8. Wipe over entire external motor surface with a clean cloth soaked in light oil.

9. Store in an upright position in a dry, well-ventilated room. To prevent accidental starting, leave spark plug leads disconnected.

10. Remove battery from boat and keep it charged while in storage.

PRE-SEASON PREPARATION

1. Remove, clean, inspect and properly gap spark plugs. Replace defective plugs. (Use new gaskets and torque plugs to manufacturer's recommendations.)
2. Remove oil level plug from gearcase and check for proper oil level.
3. Thoroughly clean and refinish surfaces as required.
4. Check battery for full charge and clean terminals. Clean and inspect battery cable connections. Check polarity before installing battery cables. Cover cable connections with grease to prevent corrosion.
5. If possible, run motor in test tank prior to installing on boat. Check water pump and thermostat operation.

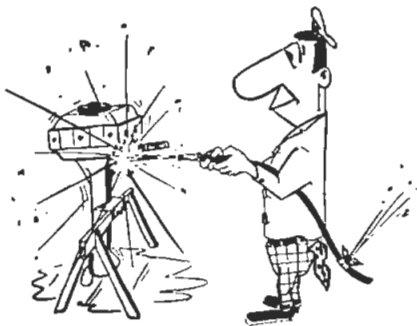


Proper maintenance is important.

Trouble-shooting

SALT WATER CARE

Motors that are operated in salt water require some special care to combat the possibility of corrosion resulting from such use. If possible, tilt motor out of water and flush cooling system and outside of lower unit with fresh water immediately after each use.



Special care is needed if motor is used in salt water.

The aluminum-silicon alloys used for outboard motor castings are relatively resistant to corrosion from oxidation but are very susceptible to galvanic action and the resultant corrosion if unprotected.

Oxidation is the destruction of a useful form of metal resulting from a chemical combination of the element with oxygen. Although oxidation can occur under water, the most favorable environment is the atmosphere under extreme conditions of warmth and humidity. Rust is an iron oxide and the best known example of oxidation. The oxidation of aluminum leaves a white, powdery coating on the surface of the metal which protects it from further oxidation, and aluminum can withstand years of exposure to the atmosphere without harmful effect.

Briefly described, galvanic action is an electrical process where atoms of one metal are carried in a solution and deposited on the surface of a dissimilar metal. Chrome or nickel plating are controlled forms of galvanic action. Each metallic element has a particular degree of susceptibility to galvanic corrosion, and pure aluminum is second only to magnesium in this scale. The aluminum alloys are somewhat less susceptible than pure metal, and galvanic action can be effectively stopped by painting or other surface protection. Aluminum parts are protected by a process known as anodizing, which deposits a hard, protective coating of aluminum oxide over the surface. The anodized surface is impervious to corrosion from any source, but is only effective if unbroken. Scratches or abrasion can expose the unprotected metal.

Galvanic action is more prevalent in salt water because of the presence of minerals in the water which makes it more effective as a conductor. The action can be hastened by the presence of stray electric currents, and batteries or other sources of electricity should be disconnected when not in use. Some protection is offered by attaching a small block of more susceptible metal in the water near the part to be protected. This small block then becomes the target of galvanic action and is consumed, but the valuable part is spared.

All motors, but especially those used in salt water, should have an adequate coverage of approved paint. Paint bonds well to an anodized aluminum surface, but is difficult to apply to uncoated aluminum. Use only an approved paint, applied according to instructions.

WARNING: Most manufacturers do not recommend the use of antifouling paint on any part of the motor. Antifouling paints contain mercury or copper which can cause galvanic corrosion in the presence of aluminum.

TROUBLE-SHOOTING

Intelligent service is normally divided into two basic functions; that of determining the cause of trouble, and correcting the trouble after cause has been determined. The cause may be obvious in many cases, where broken, worn or damaged parts are apparent. Repair in these cases becomes merely a matter of renewal and adjustment. Many of the performance problems, however, are not so apparent and the first task of the experienced service technician is that of determining the cause.

The experienced serviceman generally develops and follows a logical sequence in trouble-shooting which will most likely lead him quickly to the source of trouble.

Some of the points to check may not be applicable to certain outboard motors.

NOTE: This sequence (items 1 through 27) is taken from the Marine Service Manual or Recommended Practices which is copyrighted by the Boating Industry Association.

1. Manual starter rope pulls out, but pawls do not engage.
 - A. Friction spring bent or burred.
 - B. Excess grease on pawls or spring.
 - C. Pawls bent or burred.



Develop an orderly procedure when trouble-shooting.

SERVICE MANUAL**Trouble-shooting**

2. Starter rope does not return.
 - A. Recoil spring broken or binding.
 - B. Starter housing bent.
 - C. Loose or missing parts.
3. Clattering manual starter.
 - A. Friction spring bent or burred.
 - B. Starter housing bent.
 - C. Excess grease on pawls or spring.
 - D. Dry starter spindle.
4. Electric starter inoperative.
 - A. Loose or corroded connections or ground.
 - B. Starting circuit safety switch open, or out of adjustment.
 - C. Under capacity or weak battery or corroded battery terminals.
 - D. Faulty starter solenoid.
 - E. Moisture in electric starter motor.
 - F. Broken or worn brushes in starter motor.
 - G. Faulty fields.
 - H. Faulty armature.
 - I. Broken wire in harness or connector.
 - J. Faulty starter key or push button switch.
 - K. Worn or frayed insulation.
5. Electric starter does not engage but solenoid clicks.
 - A. Loose or corroded connections or ground.
 - B. Weak battery.
 - C. Faulty starter solenoid.
 - D. Broken wire in electric harness.
 - E. Loose or stripped post on starter motor.
 - F. See steps in number 4.
6. Hard to start or won't start.
 - A. Empty gas tank.
 - B. Gas tank air vent not open.
 - C. Fuel lines kinked or severely pinched.
 - D. Water or dirt in fuel system.
 - E. Clogged fuel filter or screens.
 - F. Motor not being choked to start.
 - G. Engine not primed—pump primer system.
 - H. Carburetor adjustments too lean (not allowing enough fuel to start engine).
 - I. Timing and synchronizing out of adjustment.
 - J. Manual choke linkage bent—auto choke out of adjustment.
 - K. Spark plugs improperly gapped, dirty or broken.
 - L. Fuel tank primer inoperative (pressurized system).
 - M. Ignition points improperly gapped, burned or dirty.
- N. Loose, broken wire or frayed insulation in electrical system.
- O. Reed valves not seating or stuck shut.
- P. Weak coil or condenser.
- Q. Faulty gaskets.
- R. Cracked distributor cap or rotor.
- S. Loose fuel connector.
- T. Electronic ignition component malfunction.
7. Low speed miss or motor won't idle smoothly and slowly enough.
 - A. Too much oil—too little oil.
 - B. Timing and synchronizing out of adjustment.
 - C. Carburetor idle adjustment (mixture lean or rich).
 - D. Ignition points improper (gap, worn or fouled).
 - E. Weak coil or condenser.
 - F. Loose or broken ignition wires.
 - G. Loose or worn magneto plate.
 - H. Spark plugs (improper gap or dirty).
 - I. Head gasket, reed plate gasket (blown or leaking).
 - J. Reed valve standing open or stuck shut.
 - K. Plugged crankcase bleeder, check valves, or lines.
 - L. Leaking crankcase halves.
 - M. Leaking crankcase seals (top or bottom.)
 - N. Exhaust gases returning through intake manifold.
 - O. Electronic ignition component malfunction.
8. High speed miss or intermittent spark.
 - A. Spark plugs improperly gapped or dirty.
 - B. Loose, leaking or broken ignition wires.
 - C. Breaker points (improper gap or dirty; worn cam or cam follower).
 - D. Weak coil or condenser.
 - E. Water in fuel.
 - F. Leaking head gasket or exhaust cover gasket.
 - G. Spark plug heat range incorrect.
 - H. Engine improperly timed.
 - I. Carbon or fouled combustion chambers.
 - J. Magneto or distributor poorly grounded.
 - K. Distributor oiler wick bad.
 - L. Electronic ignition component malfunction.
9. Coughs, spits, slows.
 - A. Idle or high speed needles set too lean.
 - B. Carburetor not synchronized.
- C. Leaking gaskets in induction system.
- D. Obstructed fuel passages.
- E. Float level set too low.
- F. Improperly seated or broken reeds.
- G. Fuel pump pressure line ruptured.
- H. Fuel pump (punctured diaphragm), check valves stuck open or closed, fuel lines leak.
- I. Poor fuel tank pressure (pressurized system).
- J. Worn or leaking fuel connector.
10. Vibrates excessively or runs rough and smokes.
 - A. Idle or high speed needles set too rich.
 - B. Too much oil mixed with gas.
 - C. Carburetor not synchronized with ignition properly.
 - D. Choke not opening properly.
 - E. Float level too high.
 - F. Air passage to carburetor obstructed.
 - G. Bleeder valves or passages plugged.
 - H. Transom bracket clamps loose on transom.
 - I. Prop out of balance.
 - J. Broken motor mount.
 - K. Exhaust gases getting inside motor cover.
 - L. Poor ignition—see number 8.
11. Runs well, idles well for a short period, then slows down and stops.
 - A. Weeds or other debris on lower unit or propeller.
 - B. Insufficient cooling water.
 - C. Carburetor, fuel pump, filter or screens dirty.
 - D. Bleeder valves or passages plugged.
 - E. Lower unit bind (lack of lubrication or bent.)
 - F. Gas tank air vent not open.
 - G. Not enough oil in gas.
 - H. Combustion chambers and spark plugs fouled, causing preignition.
 - I. Spark plug heat range too high or too low.
 - J. Wrong propeller (preignition).
 - K. Slow speed adjustment too rich or too lean.
12. Won't start, kicks back, backfires into lower unit.
 - A. Spark plug wires reversed.
 - B. Flywheel key sheared.
 - C. Distributor belt timing off (magneto or battery ignition.)
 - D. Timing and synchronizing out of adjustment.
 - E. Reed valves not seating or broken.

Trouble-shooting

13. No acceleration, low top Rpm.
 - A. Improper carburetor adjustments.
 - B. Improper timing and synchronization.
 - C. Spark plugs (improper gap or dirty).
 - D. Ignition system malfunction.
 - E. Faulty coil or condenser.
 - F. Loose, leaking or broken ignition wires.
 - G. Reed valves not properly seated or broken.
 - H. Blown head or exhaust cover gasket.
 - I. Weeds on lower unit or propeller.
 - J. Incorrect propeller.
 - K. Insufficient oil in gas.
 - L. Insufficient oil in lower unit.
 - M. Fuel restrictions.
 - N. Scored cylinder—stuck rings.
 - O. Marine growth, hooks, rockers or change in load of boat.
 - P. Sticky magneto plate.
 - Q. Carbon build-up on piston head at deflector.
14. No acceleration, idles well but when put to full power dies down.
 - A. High or low speed needle set too lean.
 - B. Dirt or packing behind needles and seats.
 - C. High speed nozzle obstructed.
 - D. Float level too low.
 - E. Choke partly closed.
 - F. Improper timing and synchronization.
 - G. Fuel lines or passages obstructed.
 - H. Fuel filter obstructed. Fuel pump not supplying enough fuel.
 - I. Not enough oil in gas.
 - J. Breaker points improperly gapped or dirty.
 - K. Bent gearcase or exhaust tube.
15. Engine runs at high speed only by using hand primer.
 - A. Carburetor adjustments.
 - B. Dirt or packing behind needles and seat.
 - C. Fuel lines or passages obstructed.
 - D. Fuel line leaks.
 - E. Fuel pump not supplying enough fuel.
 - F. Float level too low.
 - G. Fuel filter obstructed.
 - H. Fuel tank or connector at fault.
16. No power under heavy load.
 - A. Wrong propeller.
 - B. Weeds or other debris on lower unit or propeller.
 - C. Breaker points improperly gapped or dirty.
 - D. Stator plate loose.
17. Cranks over extremely easy on one or more cylinders.
 - A. Low compression.
 1. Worn or broken rings.
 2. Scored cylinder or pistons.
 3. Blown head gasket.
 4. Loose spark plugs.
 5. Loose head bolts.
 6. Crankcase halves improperly sealed.
 7. Burned piston.
18. Engine won't crank over.
 - A. Manual start lock improperly adjusted.
 - B. Pistons rusted to cylinder wall.
 - C. Lower unit gears, prop shaft rusted or broken.
 - D. Broken connecting rod, crankshaft or driveshaft.
 - E. Coil heels binding on flywheel.
 - F. Engine improperly assembled.
19. Motor overheats.
 - A. Motor not deep enough in water.
 - B. Not enough oil in gas or improperly mixed.
 - C. Bad thermostat.
 - D. Seals or gaskets (burned, cracked or broken).
 - E. Impeller key not in place or broken.
 - F. Plugged water inlet, outlet or cavity.
 - G. Obstruction in water passages.
 - H. Broken, pinched or leaking water lines.
 - I. Improper ignition timing.
 - J. Motor not assembled properly.
 - K. Shorted heat light wiring.
 - L. Bad water pump impeller, plate, housing or seal.
20. Motor stops suddenly, freezes up.
 - A. No oil in gas, or no gas.
 - B. Insufficient cooling water.
 - C. No lubricant in gearcase.
 - D. Rusted cylinder or crankshaft.
 - E. Bent or broken rod, crankshaft, driveshaft, prop shaft, stuck piston.
 - F. Bad water pump or plugged water passages.
21. Motor knocks excessively.
 - A. Too much or not enough oil in gas.
 - B. Worn or loose bearings, pistons, rods or wrists pins.
 - C. Over advanced ignition timing.
 - D. Carbon in combustion chambers and exhaust ports.
22. Generator will not charge.
 - A. Battery condition.
 - B. Connections loose or dirty.
 - C. Drive belt loose or broken.
 - D. Faulty regulator or cutout relay.
 - E. Field fuse or fusible wire in regulator blown.
 - F. Generator not polarized (dc generators).
 - G. Open generator windings.
 - H. Worn or sticking brushes and/or slip rings.
 - I. Faulty rectifier diodes (ac generators).
 - J. Faulty ammeter.
23. Low generator output and a low battery.
 - A. High resistance at battery terminals.
 - B. High resistance in charging circuit.
 - C. Faulty ammeter.
 - D. Low regulator setting.
 - E. Faulty rectifier diodes (ac generators).
 - F. Faulty generator.
24. Excessive battery charging.
 - A. Regulator set too high.
 - B. Regulator contacts stuck.
 - C. Regulator voltage winding open.
 - D. Regulator improperly grounded.
 - E. High resistance in field coil.
 - F. Regulator improperly mounted.
25. Excessive fuel consumption.
 - A. Hole in fuel pump diaphragm.
 - B. Deteriorated carburetor gaskets.
 - C. Altered or wrong fixed jets.
 - D. Jets improperly adjusted.
 - E. Carburetor casting porous.
 - F. Float level too high.
 - G. Loose distributor pulley.
26. Shifter dog jumps.
 - A. Worn shifter dog or worn gear dogs.
 - B. Worn linkage.
 - C. Remote control adjustment.
 - D. Gearcase loose or sprung.
 - E. Exhaust housing bent.
 - F. Linkage out of adjustment.
27. Electric shift inoperative or slips.
 - A. Improper remote control installation.
 - B. Faulty coils.
 - C. Faulty springs.
 - D. Faulty clutch and gear.
 - E. Faulty bearings.
 - F. Wrong lubricant.
 - G. Loose or sprung gearcase.
 - H. Shorted wiring.

OUTBOARD MOTOR

- E. Manual starter not centered.
- F. Flywheel nut loose.
- G. Flywheel hitting coil heels.
- H. Bent shift rod (vibrating against exhaust tube).
- I. Loose assemblies, bolts or screws.