EVINRUDE SERVICE

MANUAL
1978

9.9/15 HP
models

10824, 10825, 10855, 10835
15804, 15805, 15854, 15855

⚠ SAFETY WARNING

Proper service and repair is important for the safe, reliable operation of all mechanical products. The service procedures we recommend and describe in this service manual are effective methods for performing service operations. Some of these service operations require the use of tools specially designed for the purpose. These special tools should be used when and as recommended.

It is important to note that some warnings against the use of specific service methods that can damage the engine or render it unsafe are stated in this service manual. However, please remember that these warnings are not all inclusive. Since Evinrude Motors could not possibly know, evaluate and advise the service trade of all possible ways in which service might be done or of the possible hazardous consequences of each way, we have not undertaken any such broad evaluation. Accordingly, anyone who uses a service procedure or tool which is not recommended by Evinrude Motors must first thoroughly satisfy himself that neither his nor the engine's safety will be jeopardized by the service methods selected.

Housings and covers around the power head are machinery guards. Operation of the motor with these guards removed exposes the operator to additional hazards.

When replacing components having safety warnings attached, the safety warnings must be attached to the replacement parts.

SAFETY
The purpose of the safety symbols is to attract your attention to possible dangers. The symbols, and the explanations with them, deserve your careful attention and understanding. Safety warnings do not by themselves eliminate any danger. The instructions or warnings they give are not substitutes for proper accident prevention measures.

⚠ **SAFETY WARNING**
Failure to obey a safety warning may result in injury to you or to others.

NOTE
Advises you of information specially useful in the servicing and overhaul of your motor.

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NOTE

All photographs and illustrations used in this manual may not necessarily depict actual models or equipment, but are intended for reference only.

Also, all photographs, illustrations and specifications contained in this manual are based on the latest product information available at the time of publication.

SECTION 1
INTRODUCTION

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INTRODUCTION

Evinrude outboard motors are designed and built for dependable high performance. To assure continued peak operation, it is important that every Evinrude owner be able to receive skilled and thorough service for his motor. Customer satisfaction and profitable service operation depend on service "know-how" and training.

Read this manual carefully so that you are familiar with the service procedures - then keep it readily available as a reference book in your service department.

Always remember, each service job is a chance for you to maintain motor performance that will keep your customer happy to be an Evinrude owner.

ARRANGEMENT OF MANUAL

This Service Manual includes the specific information you will need to service the motor. All general procedures are covered in abbreviated form, mostly by reference to procedural illustrations. The specific procedures which apply only, or primarily, to this motor are covered in fully-illustrated, detailed, step-by-step instructions.

The General Service Information section will help you diagnose a malfunctioning motor. It includes specifications, tune-up procedures, and a Trouble Check Chart. Clearances and torque values are also included for quick reference during servicing operations. Each of the following sections, Fuel System, Ignition System, Power Head, Lower Unit, and Manual Starter, gives detailed instructions for disassembly, inspection, reassembly, and operating adjustments of the components. These procedures will help you service a specific system, or completely overhaul the motor.

PARTS CATALOG

The Evinrude Parts Catalog contains exploded views illustrating the correct sequence of all parts as well as a complete listing of the parts for replacement. This catalog can be of considerable help as a reference during disassembly and reassembly.

SERVICE POLICY

Whether within or following the warranty period, Evinrude Motors has a constant interest in its products.

It is Evinrude's policy to assist dealers in building up their service knowledge and facilities so that they can give prompt, efficient service. The Evinrude Service School, OMC Training Centers, frequent Service Bulletins, and this Service Manual represent tangible efforts to give Evinrude owners the best and most prompt service possible. This Service Manual covers all phases of servicing the motor. However, new situations sometimes arise in servicing a motor. If a service question does not appear to be answered in this manual, you are invited to write to the Service Department for additional help. Always be sure to give complete information, including motor model number and serial number. Write to:

Evinrude Motors
4143 North 27th Street - P.O. Box 663
Milwaukee, Wisconsin 53216
Attention: Service Department

Be sure that you are familiar with the Evinrude Warranty. If you have any questions, write the Evinrude Service Department.

REPLACEMENT PARTS

⚠ SAFETY WARNING

When replacement parts are required, use genuine OMC parts or parts with equivalent characteristics including type, strength, and material. Failure to do so may result in product malfunction and possible injury to the operator and/or passengers.

Individual purchasers of Service Manuals - see your local AUTHORIZED SERVICE DEALER.

SPECIAL SERVICE TOOLS

Evinrude has specially-designed tools to simplify some of the disassembly and reassembly operations. These tools are illustrated in this Service Manual, in many cases in actual use. Refer to the Evinrude Special Service Tool Catalog for a description and ordering instructions for these tools. Individual purchasers of Service Manuals must order Special Tools through an authorized dealer.

OUTBOARD MOTOR NOMENCLATURE

Sometimes the words "right" and "left" are very confusing when referring to the sides of an outboard motor. Therefore, the sides are referred to as STARBOARD or PORT sides. STARBOARD means on the right hand while facing the bow (FRONT) of the boat; PORT means left hand. See Figures 1-1 and 1-2.

Service required for Evinrude motors is generally one of three kinds . . . .

1. NORMAL CARE AND MAINTENANCE, which includes putting a new motor into operation, storing motors, lubrication, and care under special operating conditions such as salt water and cold weather.
2. OPERATING MALFUNCTIONS due to improper motor mounting, propeller condition or size, boat condition, or the malfunction of some part of the motor. This includes motor tune-up procedures to keep the motor in prime operating condition.
3. COMPLETE DISASSEMBLY and overhaul, such as inspecting a motor that has been submerged, or rebuilding trade-in units.

It is important to you as the service man to determine before disassembly just what the trouble is, and how to correct it quickly and with minimum expense to the owner. Refer to the Trouble Check chart in Section 2 to help you diagnose motor malfunctions.

1. Low speed mixture adjusting knob
2. Choke knob
3. Starter handle
4. Shift lever
5. Start button (electric start)
6. Clamp screws
7. Tilt lever
8. Stern brackets
9. Thrust rod (tilt adjustment)
10. Shallow water drive bracket
11. Oil level plug
12. Water intake, port and starboard
13. Oil drain/fill plug
14. Water discharge, port and starboard
15. Exhaust relief
16. Fuel pump and filter
17. Flywheel
18. Armature plate assembly
19. Electric starter
20. Ignition coils
21. Latch, motor cover
22. Idle speed adjusting knob
23. Propeller and converging ring
24. Gearcase
25. Battery cable (electric start)
26. Swivel bracket
27. Model and serial number plate
28. Safety chain link
29. Steering handle and twist grip
30. Stop button
31. Air silencer
32. Re-wind starter
33. Positive battery cable boot
34. Water pump indicator

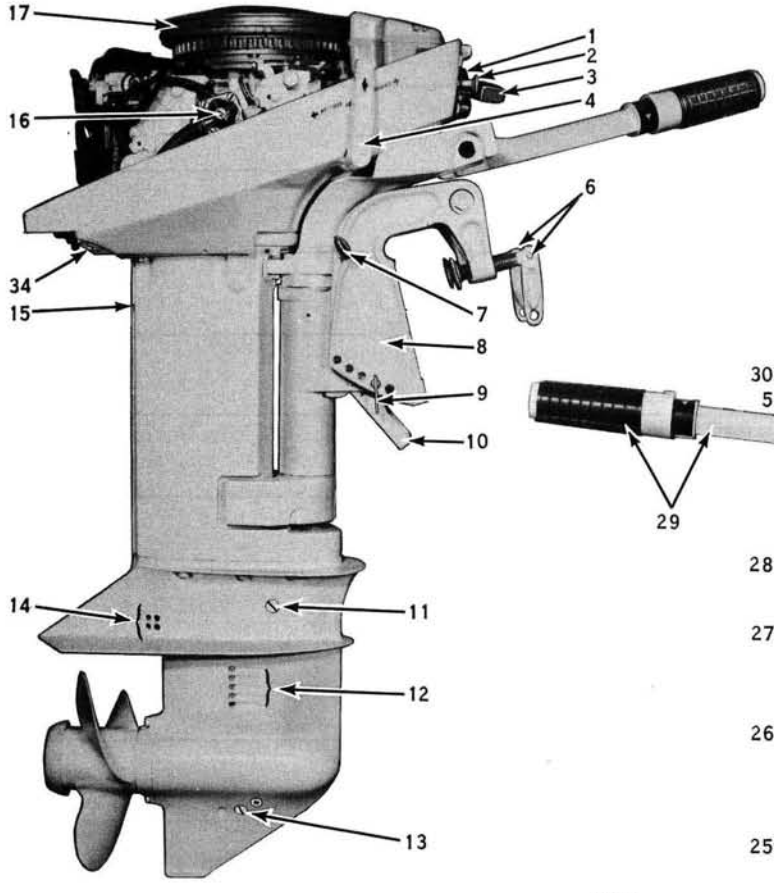

Figure 1-1. Starboard (Manual Start)

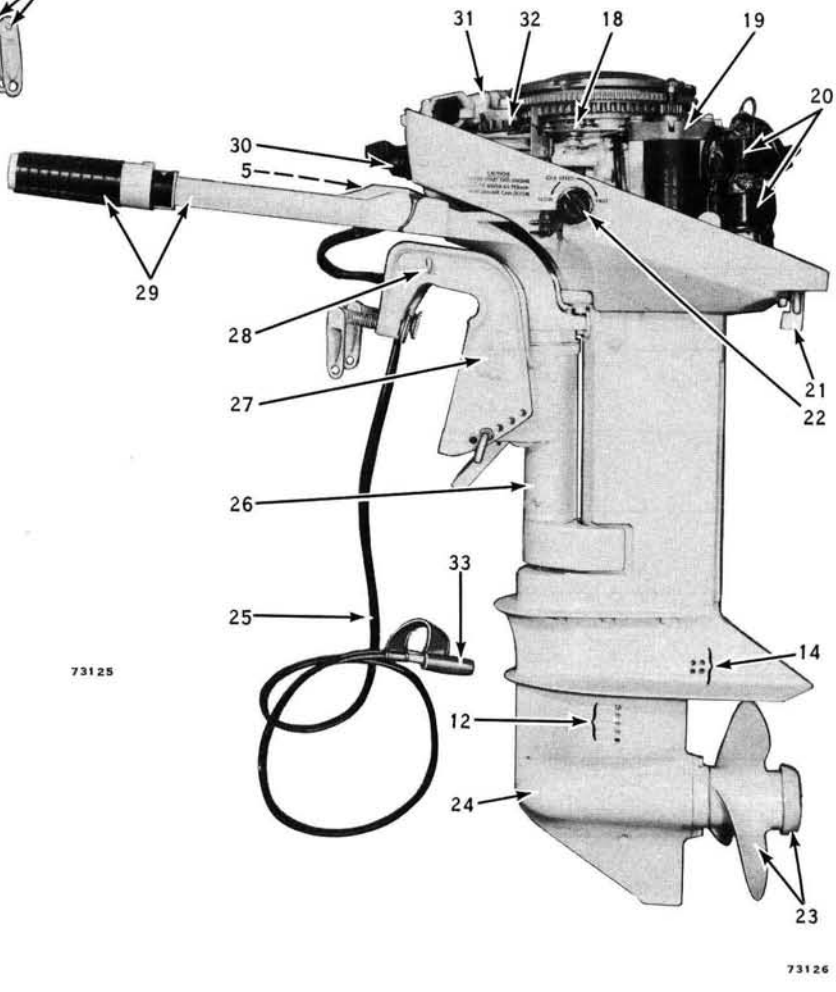

Figure 1-2. Port Side (Electric Start)

SECTION 2
GENERAL SERVICE INFORMATION

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⚠ SAFETY WARNINGS

- To prevent possible eye injury always wear SAFETY GLASSES while servicing motor.
- The motor cover is a machinery guard. When testing or adjusting a running motor, do not allow anything to contact the spinning flywheel.
- Do not operate motor out of water. Do not operate motor in a test tank without the proper test wheel. Either will result in damage to water pump, overheating, too high RPM, and possible explosion of motor parts.
- To avoid possible operator injury be sure SAFETY DEVICES are installed and properly adjusted while servicing motor.
- Refer to solvent manufacturer's caution label regarding proper use and storage of solvent.

NOTE

Do not run engine out of water as severe damage to the engine and pump may occur.

SPECIFICATIONS

Model Numbers	10824, 15804 - Standard length (15" transom) (381 mm) Manual start 10825, 15805 - Long shaft (20" transom) (508 mm) Manual start 15854 - Standard length (15" transom) (381 mm) Electric start 10855, 15855 - Long shaft (20" transom) (508 mm) Electric start 10835 - Long shaft, electric start with reverse thrust kit
9.9 Horsepower (B.I.A. certified) at 5000 rpm Full throttle operating range 4500 to 5500 rpm Test wheel Part Number 386537 Tank Test - 5400 rpm standard 4200 rpm with reverse thrust kit 15 Horsepower (B.I.A. certified) at 6000 rpm Full throttle operating range 5500 to 6500 rpm Test wheel Part Number 386537 Tank test - 6200 rpm standard 4800 rpm with reverse thrust kit	
Engine type 2 cyl., 2 cycle, alternate firing	
Bore and stroke 2.188" bore x 1.760" stroke (55.58 x 44.70 mm)	
Piston displacement 13.20 cubic inches (216 cm^3)	
Piston ring sets (2 per set)	
standard	Part Number 386279
0.030" oversize	Part Number 386280
Width of ring	Upper - 0.0700 - 0.0695 in. (1.778 - 1.765 mm) Lower - 0.0615 - 0.0625 in. (1.562 - 1.588 mm)
Piston less rings	
standard	Part Number 387660
.030" oversize	Part Number 387661
Crankshaft size	
Top journal	0.8762 - 0.8757 in. (22.255 - 22.243 mm)
Center journal	0.8125 - 0.8120 in. (20.638 - 20.625 mm)
Bottom journal	0.8125 - 0.8120 in. (20.638 - 20.625 mm)
Connecting rod crank pin	1.0635 - 1.0630 in. (27.013 - 27.000 mm)
Carburetion	Single barrel, float feed, fixed high speed adjustable low-speed, manual choke
High speed orifice plug (9.9 hp)	Part Number 322752 Identification Number 38
High speed orifice plug (15 hp)	Part Number 322293 Identification Number 54
Float level setting	Flush with rim of casting
Inlet needle seat	0.065 - 0.062" (1.65 - 1.57 mm) Use #52 drill as gage
Cooling system	Thermostatically controlled Combination positive displacement and centrifugal pump
Propeller gear ratio	12:29
Propeller supplied with motor	3 blade, 9-1/2" dia. x 10" pitch
Propeller supplied with sailboat model	3 blade, 9-1/4" dia. x 8" pitch
Propeller options	3 blade, 10" dia. x 5" pitch 2 blade weedless 9" dia. x 10" pitch

Speed control	On steering handle Remote control available
Gear shift control	Forward, neutral and reverse
Weight (without fuel tank)	Models 10824, 15804 - 72 lbs. (32.7 kg) Models 10825, 15805 - 76 lbs. (34.5 kg) Model 15854 - 77.5 lbs. (35.2 kg) Models 10855, 15855 - 81.5 lbs. (37.0 kg) Model 10835 - 81.5 lbs. (37.0 kg) Fuel tank weight 11 pounds (5.0 kg) net
Fuel capacity	6 gallons (22.7 litres)
Electrical system (Electric start models only)	5 amp flywheel alternator
Starter	Manual - Self-winding Electric - 12 volt, and rope
Starter amperage draw while cranking	55 Amps max.
Ignition	Breakerless C.D. magneto
Spark plug	Champion L78V
Alternate spark plug	Champion L77J4 or AC M40FFX gapped at 0.040" (1.0 mm)
Spark plug torque	17-1/2 - 20-1/2 foot-pounds (24 - 27 N·m)
Charge coil resistance	
Rope	575 ± 75 ohms
Electric	475 ± 75 ohms
Ignition coil	Part No. 581819

IGNITION COIL TEST SPECIFICATIONS

Stevens Model ST-75		
Reverse Polarity (Switch Setting CD)		1.6
Stevens Tester Model M.A.-75 or M.A.-80		
Switch **A	Index Adjustment 20	
Merc-O-Tronic with Capacitor Discharge Adapter Model 55-980		
Operating Amperage	Primary Resistance	*Secondary Continuity
1.7	0.1 Ohm or Less	5 (Approx.)

**Use Model CD-1 Adapter
Red test clip to orange/black
Black test clip to orange

Graham Tester Model 51
Maximum Secondary . . . . . 1,000 ohms
Maximum Primary . . . . . 0.6 ohm
Maximum Primary DC ohms (point test) . . . . . 1.0 ohms
Coil Index 60
Coil Test Minimum AMPLIFIED . . . . . 29 (With secondary circuit "open.") Hi tension lead disconnected
Gap Index . . . . . 60 (Coil must fire spark gap on tester at this setting.)

IGNITION COIL OHMMETER TEST

Primary Low Ohms	Secondary High Ohms
0.1 ± 0.05	275 ± 25

*Horsepower established at sea level. Allow 2% reduction per 1000' (300 m) above sea level.

E10/15

CLEARANCE CHART

POWER HEAD		LOWER UNIT	
Piston ring gap	0.015 Max. - 0.005 Min. (0.38 - 0.13 mm)	Propeller shaft in front gear bushing	0.0087 Max. - 0.0002 Min. (0.221 - 0.005 mm)
Piston ring groove clearance, lower	0.0035 Max. - 0.0025 Min. (0.089 - 0.064 mm)		
Piston pin to piston - loose end	0.0005 Max. - 0.0000 Min. (0.013 - 0.000 mm)		
Cylinder and piston	0.0053 Max. - 0.0025 Min. (0.135 - 0.064 mm)		
Crankshaft end play	Controlled by lower journal bearing		

TORQUE CHART

⚠ SAFETY WARNING

FAILURE TO COMPLY WITH RECOMMENDED TORQUE VALUES COULD RESULT IN OPERATOR INJURY OR MOTOR DAMAGE.

POWER HEAD		LOWER UNIT	
Flywheel nut	45 - 50 Foot-pounds (60 - 70 N·m)	Upper mounts	60 - 80 Inch-pounds (5 - 7 Foot-pounds) (7.0 - 9.0 N·m)
Connecting rod screw	48 - 60 Inch-pounds (4 - 5 Foot-pounds) (5.0 - 7.0 N·m)	Pilot shaft to steering bracket screws	95 - 130 Inch-pounds (8 - 10 Foot-pounds) (11.0 - 15.0 N·m)
Cylinder head screws	216 - 240 Inch-pounds (18 - 20 Foot-pounds) (24 - 27 N·m)	Slip Clutch Propeller	85 Foot-pounds Min. (115 N·m)
Crankcase to cylinder screws - 5/16" dia. screws only	145 - 170 Inch-pounds (12 - 14 Foot-pounds) (16.0 - 19.0 N·m)	*Pull at propeller shaft for tilt up	30 - 40 lbs. (13.6 - 18.1 kg)
Electric start through bolts	30 - 40 Inch-pounds (3.4 - 4.6 N·m)	*Pull at propeller shaft to overcome reverse lock	100 - 200 lbs. (45.4 - 90.7 kg)
Electric start pinion nut	150 - 170 Inch-pounds (17.0 - 19.0 N·m)		
Spark plug	17-1/2 - 20-1/2 Foot-pounds (24 - 27 N·m)		
Power pack mounting bolts	4 - 5 Foot-pounds (5.0 - 7.0 N·m)		
Manual starter assembly screw	24 - 30 Foot-pounds (32 - 40 N·m)		

NOTE

When tightening two or more screws on the same part, DO NOT tighten screws completely, one at a time. To avoid distortion of the part, first tighten all screws together to one-third of specified torque, then to two-thirds of specified torque, then torque down completely.

Re-check torque on cylinder head screws and spark plugs after motor has been run, has reached operating temperature, and motor has cooled comfortable to touch.

STANDARD SCREWS

	Inch-Pounds	Foot-Pounds	N·m
No. 6	7-10		0.8-1.2
No. 8	15-22		1.6-2.4
No. 10	25-35	2-3	2.8-4.0
No. 12	35-40	3-4	4.0-4.6
1/4"	60-80	5-7	7.0-9.0
5-16"	120-140	10-12	14.0-16.0
3/8"	220-240	18-20	24.0-27.0

*Standard length lower unit.

LUBRICATION CHART

LUBRICATION POINT	LUBRICANT	FREQUENCY (PERIOD OF OPERATION) FRESH WATER	#SALT WATER
1. Tilt Reverse Lock Lever Shaft, Clamp Screw Threads, and Throttle Shaft Gears - See Figure 2-1	OMC Anti-Corrosion Lube	60 days	30 days
2. Idle Speed Adjustment, Magneto Linkage, and Manual Starter Drag Spring - See Figure 2-2		60 days	30 days
3. Shift Lever Detent Cam, Carburetor Linkage and Choke - See Figure 2-3		60 days	30 days
4. Gearcase - See Figure 2-4	OMC HI-VIS Gearcase Lube Capacity 8.8 ozs. †(260 mL)	Change after first 20 hours of operation. Check every 50 hours of operation thereafter. Add lubricant if necessary. Drain and refill every 100 hours of operation or once each season, whichever occurs first.	Same as Fresh Water Same as Fresh Water
5. Electric Starter Pinion Shaft Helix - See Figure 2-5	Anderol 766 (OMC #317619)	60 days	30 days
6. Swivel Bracket and Motor Cover Latch Lever Shaft - See Figure 2-6	OMC Sea-Lube* Anti-Corrosion Lube	60 days	30 days

#Some areas may require more frequent lubrication.
†1 oz. - 29.57 millilitre

GEARCASE LUBRICATION

⚠ SAFETY WARNING

DISCONNECT ELECTRICAL CONNECTOR BETWEEN ARMATURE PLATE AND POWER PACK TO AVOID ACCIDENTALLY STARTING MOTOR. SEE SECTION 4.

Remove oil drain/fill and oil level plugs from side of gearcase. With motor in normal running position, allow oil to drain completely.

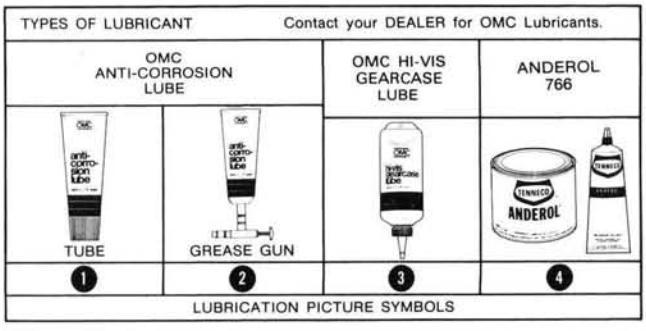
Refill with OMC HI-VIS Gearcase Lubricant through drain/fill hole. See Figure 2-4. If OMC HI-VIS Gearcase Lubricant is not available, OMC Premium Blend Gearcase Lube can be used as an alternate. With motor in normal running position, fill until lubricant appears at oil level hole.

Install oil level plug before removing lubricant tube or filter can nozzle from oil drain/fill hole. Drain/fill plug can then be securely installed without oil loss.

If the proper tube or filter type can is not available, install drain/fill plug. Slowly fill gearcase through oil level hole allowing trapped air to escape. Install plug.

NOTE

Recommended lubricants, which have been formulated to protect against damage to bearings and gears must be used. Extensive damage can result from improper lubrication.



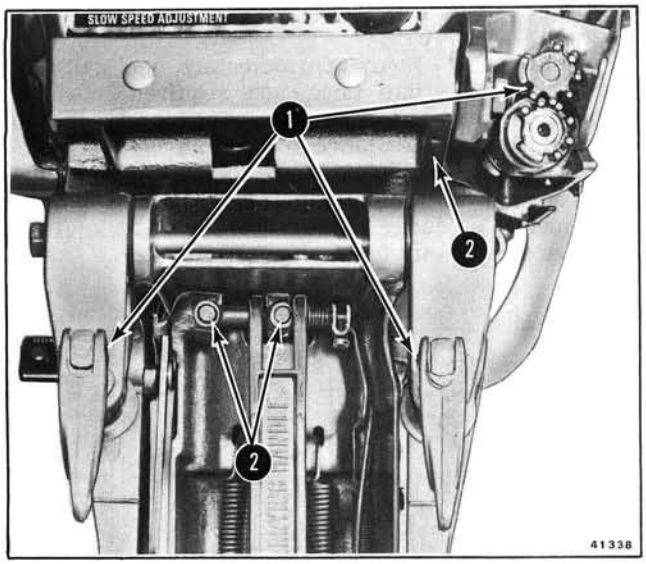


Figure 2-1

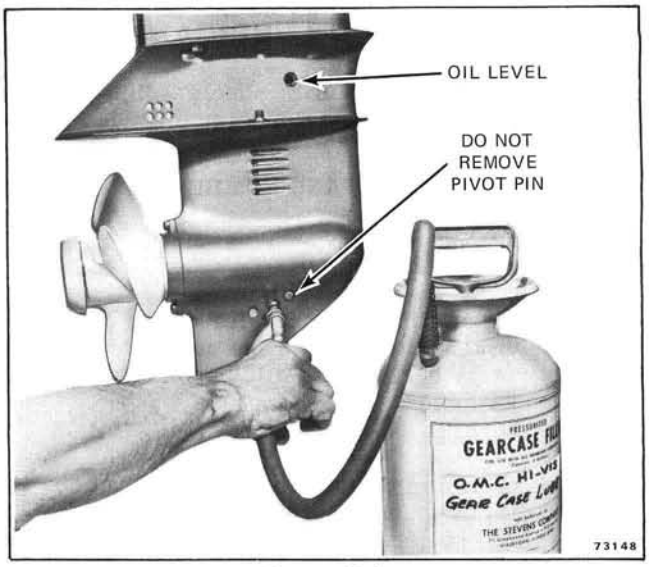


Figure 2-4

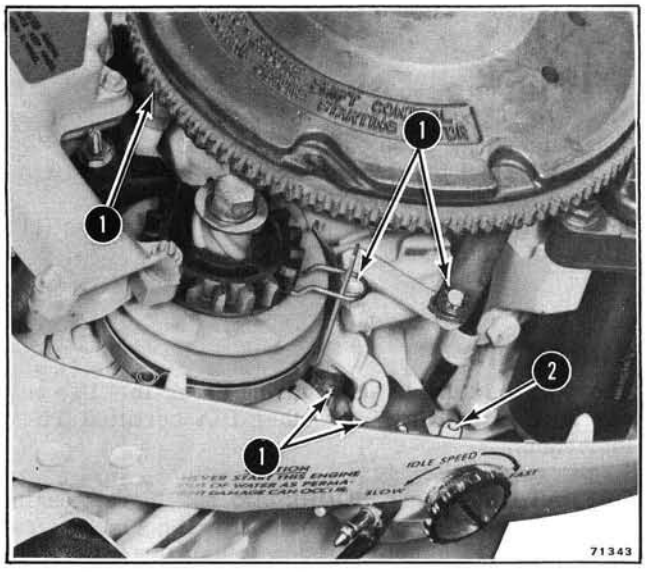


Figure 2-2

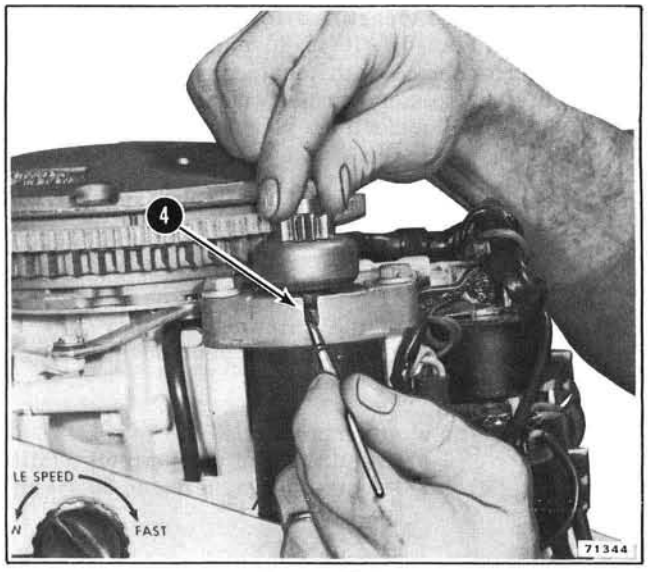


Figure 2-5

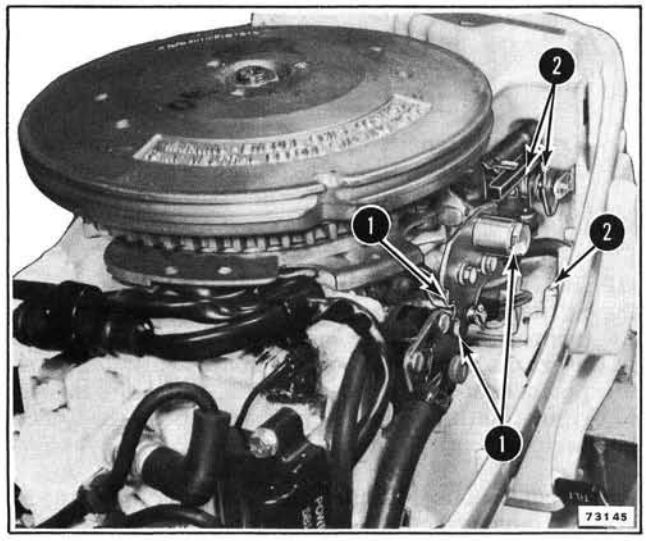


Figure 2-3

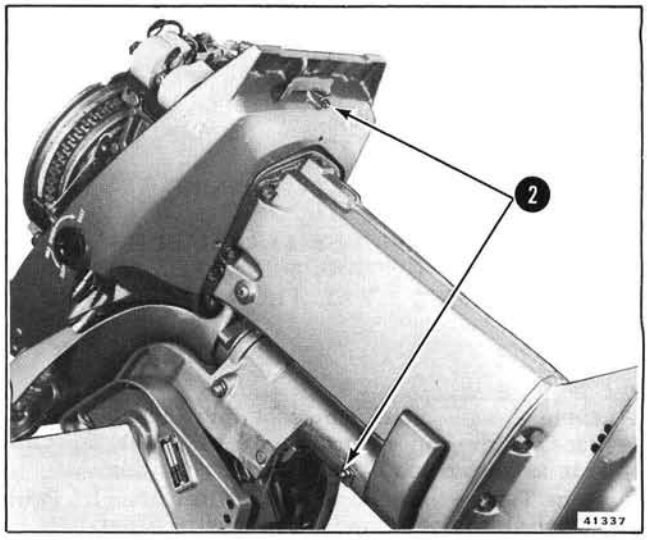


Figure 2-6

ENGINE FUEL AND LUBRICANT

RECOMMENDED GASOLINE: Use gasoline with the following minimum octane numbers.

PUMP POSTED OCTANE NUMBER	86
Research Octane Number Most Commonly Used in the Past	91

Automotive gasolines regular-leaded or lead-free meeting these minimum octane numbers may be used; however, best results will be obtained by using lead-free gasoline.

NOTE

When operating in any other country than the United States, Canada or Australia, any gasoline may be used which will satisfactorily operate an automotive engine.

LUBRICANT: Use Evinrude Outboard 50:1 lubricant which is BIA certified for service TC-W (two cycle-water cooled). It is formulated to give best engine performance with least combustion chamber deposits, least piston varnish, maximum spark plug life, and best lubrication. See inside back cover.

If Evinrude lubricant is not available, another BIA certified TC-W or TC-2 may be used.

NOTE

Avoid the use of the following, as they will contribute to deterioration of your engine and shorten spark plug life:

AVOID USE OF:
- Automotive oils
- Premix fuel of unknown oil quality
- Premix fuel richer than 50:1 ratio

NOTE

Some additives in 50:1 lubricant are subject to evaporation. Always cover partially used cans to prevent deterioration of lubricant.

FUEL MIXING INSTRUCTIONS

Always use fresh gasoline.

SAFETY WARNING

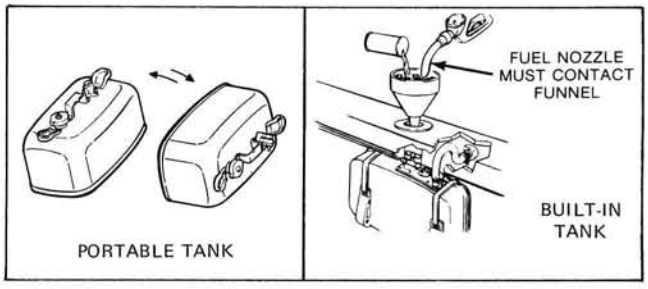
GASOLINE IS HIGHLY FLAMMABLE - ALWAYS MIX OUTDOORS IN WELL VENTILATED AREA AWAY FROM SPARKS AND HEAT.

Above 32° F (0° C)

Portable Tank - Pour lubricant into tank, add fuel. Replace filler cap securely. To mix fuel, tip tank on side as shown and back to upright position.
Built-in Tank - Use large metal filter funnel. Pour lubricant slowly with the fuel as tank is filled.

Below 32° F (0° C)

Portable Tank - Pour approximately one gallon (4 litres) gasoline into tank, add required lubricant. Replace filter cap securely. Thoroughly mix by shaking tank. Add balance of gasoline.
Built-in Tank - In separate container mix all lubricant needed with one gallon (4 litres) or more of gasoline. Use large metal filter funnel. Pour this mixture slowly with fuel as tank is filled.



FUEL MIXTURE

1 part lubricant to 50 parts gasoline OR:
(6 gal. tank) 1 pint lubricant to 6 gallons (22.7 litres) of gasoline.
(3 gal. tank) 1/2 pint lubricant to 3 gallons (11.4 litres) of gasoline.

BREAK-IN

The 50:1 mixture is used during break-in. Use only our 50:1 LUBRICANT or other BIA certified TC-W lubricants.

OPERATION (FIRST HOUR): Do not operate engine at continuous full power for the first hour of operation. After 15 minutes of slow to half throttle operation, we recommend a short burst of full throttle operation every 5 to 10 minutes. Run at full throttle for about 90 seconds, then return to half throttle or less.

NOTE

Frequently check operation of cooling system during break-in. A fine spray of water discharged from exhaust relief outlet indicates proper operation.

OPERATION (SECOND HOUR): Bring boat into planing attitude and reduce power to three-quarter throttle (approximate) while maintaining planing attitude. At intervals during the second hour, apply full power for periods of one to two minutes, returning throttle to original setting - three-quarter throttle for a cooling period.

Avoid continuous full throttle operation for extended periods during the next three hours.

TUNE-UP PROCEDURE

When an owner brings a motor to you for a tune-up, or for some minor operating malfunction, the following procedure should be used as a guide to determine the cause of the malfunction. Write down the owner's comments. Keep an accurate card file on your service shop operation. Each service operation should be on record as to the:

OWNER'S NAME
MODEL NO.
SERIAL NO.
NATURE OF COMPLAINT
NATURE OF WORK PERFORMED
COST TO THE OWNER
WAS WORK PERFORMED UNDER WARRANTY

After writing down the owner's comments, check the motor visually and begin a systematic tune-up procedure. Consult the Trouble Check Chart to find the causes of any malfunction which may be discovered when tuning up the motor.

⚠ SAFETY WARNING

ELECTRIC START MODELS - DISCONNECT BATTERY CABLES AND COVER RED POSITIVE LEAD WITH INSULATING BOOT, BEFORE MANUALLY CRANKING ENGINE OR ATTEMPTING ANY REPAIRS ON ENGINE EXCEPT WHERE OTHERWISE SPECIFIED. SPARKS COULD IGNITE GASOLINE FUMES.

1. Remove intake and exhaust by-pass covers, and cylinder head. Slowly rotate flywheel and visually inspect pistons, rings, and cylinders for wear, freeness, and carbon deposits.

NOTE

Piston ring and cylinder wall condition should be determined before continuing tune-up. Gum and varnish deposits on rings or pistons may be removed with an application of OMC Accessory Engine Cleaner. If scuffing is evident power head must be removed.

If pistons and rings are considered to be in satisfactory condition for continued service, remove carbon, surface and reinstall covers, using new gaskets.

2. Clean carbon from cylinder head and top of pistons. Do not alter piston deflector. Surface cylinder head and by-pass covers and reinstall, using new gaskets. Tighten cylinder head screws to specified torque.
3. Inspect spark plugs. Clean or replace as necessary.
4. Inspect and test power pack, coils, and ignition wires. Check for spark on each cylinder. See Section 4 for test procedures. Inspect upper main bearing seal for evidence of oil leakage. If necessary, replace. See Section 5.
5. Inspect carburetor and choke. See Section 3.
6. Inspect fuel pump and lines. Replace filter element and gasket. See Section 3.
7. Synchronize carburetor and magneto. See Section 3.
8. Check propeller for condition and correct pitch. See Section 6.
9. Drain and refill gearcase and thoroughly lubricate all components of the motor. See Pages 2-4 and 2-5.
10. Tighten all screws and nuts, etc., to specified torque. See Page 2-3.
11. Tank-test and adjust carburetor low-speed needle; check cooling system operation. Use a tachometer and test wheel for accurate rpm tests. Retighten cylinder screws to specified torque after motor has cooled comfortable to touch. See Page 2-3.
12. Fog motor for storage, using OMC Accessory Rust Preventative Oil and fuel containing OMC 2+4 Fuel Conditioner.
13. Use OMC Gasket Sealing Compound #317201 on all screws, nuts, bolts, and pressed in seals in gear housing.
14. If fuel tank is not drained for storage, add OMC 2+4 Fuel Conditioner to stabilize the gasoline.

NOTES

TROUBLE CHECK CHART

TROUBLE	POSSIBLE CAUSE
1. MOTOR WILL NOT START	A. FUEL SYSTEM - See Section 3 Fuel line improperly connected Engine not primed Speed control not advanced (throttle closed) Engine flooded Old fuel Clogged fuel filter Choke not closing completely Choke spring broken or disconnected Fuel system faulty B. IGNITION SYSTEM - See Section 4 Spark plug leads crossed or reversed Linkage improperly adjusted Sheared flywheel key Ignition system faulty Cable plugs disconnected or incorrectly connected C. STARTER - See Section 7 and 8 Starter circuit faulty Neutral start switch (faulty or adjustment) D. NEUTRAL START Gear shift not in neutral Manual start lockout adjustment
2. LOSS OF POWER - (Providing Ignition OK)	A. POWER HEAD - See Section 5 Carburetor and magneto not synchronized Throttle control lever bent (won't advance) Air leak at manifold gaskets - warped manifold (backfires) Broken leaf valves (backfires) Worn main bearing seals Excessive carbon on pistons and cylinder head Stuck piston rings, or scored cylinder or piston Recirculating system plugged (check valve See Section 3) B. CARBURETOR - See Section 3 Poor fuel mix - too much lubricant Carburetor adjustment - (too lean - backfires) (too rich - excessive fuel) Choke not opening Air leak at low speed needle Inlet needle and seat worn or sticky Incorrect carburetor float setting Dirt in high speed orifice Altitude horse power loss C. FUEL PUMP AND TANK - See Section 3 Faulty fuel hose - kinked Fuel tank or pump filter plugged Fuel filter restricted Fuel and vent valves not opening Valves not operating Diaphragm leaking or damaged Fuel system hoses plugged "O" ring damaged in fuel line connector D. EXHAUST GAS ENTERING CARBURETOR - See Section 6 Exhaust cover screws leaking Cover plate gasket damaged Damaged exhaust housing seal Cracked exhaust housing E. OVERHEATING POWER HEAD - See Section 5 Exhaust cover gasket leaking Inner exhaust cover leaking Power head gasket improperly installed or damaged Head gasket leaking (warped head) (water in cylinders) Pump housing "O" ring

TROUBLE CHECK CHART (CONT)

TROUBLE	POSSIBLE CAUSE
2. LOSS OF POWER (Cont)	Water intakes obstructed Pump housing air bleed restricted Water passages obstructed Pump plate not sealing (bottom) Pump impeller damaged Pump housing or plate worn Pump housing seal worn (driveshaft grooved) Water tube grommet damaged F. LOWER UNIT - See Section 6 Propeller hub slipping Bent or worn propeller - converging ring missing Bent gear housing or exhaust housing G. EXHAUST GASES ENTERING COOLING SYSTEM See Section 6 Pump impeller plate not sealing (bottom) Damaged water tube grommet or "O" rings Pump housing seal damaged (5" adapter seals) Exhaust tube to water tube grommet Seal between gearcase and exhaust housing
3. MOTOR MISFIRES (Providing Fuel System & Carburetor OK)	A. SPARK PLUGS - See Section 4 Cover or inner terminal damaged (spark plug terminal point out of H.T. lead) boot Faulty spark plug leads Loose - low torque Incorrect spark plug Defective (cracked insulator) B. IGNITION - See Section 4 Loose wiring Damaged ignition coil leads Faulty sensor coil Faulty charge coil Faulty power pack Sheared flywheel key Cable plugs loose Loose armature plate screws
4. POOR PERFORMANCE ON BOAT	A. MOTOR ADJUSTMENT Incorrect propeller Incorrect tilt angle B. VENTILATION Protruding hull attachments Keel too long Bent propeller (vibration) Transom too high C. BOAT Improper load distribution Marine growth on bottom Added weight (water absorption) Hook in bottom Catamaran (single engine) - venturi effect

TROUBLE CHECK CHART (CONT)

TROUBLE	POSSIBLE CAUSE
5. STARTER MOTOR WILL NOT OPERATE	A. STARTING CIRCUIT - See Section 7 Loose or corroded battery connections Neutral start switch inoperative (loose) Throttle advanced too far Poor or broken battery connections Weak or shorted battery Defective starter switch Jammed starter drive Damaged starter drive parts Worn brushes Broken brush spring Burned commutator Shorted or open windings - armature B. EXCESSIVE STARTER CURRENT DRAW - See Section 7 Worn or dry armature shaft bearings Excessive friction in engine Brushes not seating Dirty or corroded commutator Shorted armature Bearing heads buckled

SUBMERGED MOTORS

If a motor is lost overboard while running, it should always be disassembled before any attempt is made to start it. Often internal parts are sprung and running under these conditions can result in permanent damage.

A motor lost overboard in salt water should always be disassembled and cleaned before starting is attempted. Some materials used in modern engines are subject to very rapid corrosion in the presence of salt water and should be inspected to determine if replacements are required.

A motor lost overboard in fresh water can usually be safely started if recovered within twelve hours providing no sand or silt is present. Disconnect the power pack cable plugs and dry out. See Section 4. Remove the spark plugs, the carburetor orifice screw, and drain all fuel lines and tank. Crank the engine with starter rope until all water present has been expelled. Squirt outboard lubricant into spark plug holes. Reassemble and start.

If sand has entered the engine, no attempt at starting should be made. Disassemble and clean the power head.

If it is impossible to have the engine serviced immediately after it has been retrieved after extended submersion, it is advisable to submerge the power head in clean fresh water to prevent oxidation until it can be taken apart.

NOTES

SECTION 3
FUEL SYSTEM

TABLE OF CONTENTS

SAFETY WARNING

GASOLINE IS EXTREMELY FLAMMABLE AND HIGHLY EXPLOSIVE UNDER CERTAIN CONDITIONS. INSURE GOOD VENTILATION, DO NOT SMOKE, OR ALLOW OPEN FLAMES OR SPARKS NEAR FUEL SYSTEM WHILE SERVICING.

DESCRIPTION

FUEL FLOW

The fuel system consists of fuel tank, fuel pump, and carburetor. The fuel tank is suction operated. A diaphragm-displacement type fuel pump on the motor draws fuel from the tank and furnishes it to the carburetor through a fuel filter.

CARBURETOR

The carburetor is a single-barrel, float feed type. The high-speed jet is fixed and the low-speed jet is adjustable. The carburetor has a manual choke. Throttle linkage is synchronized with the magneto by a cam on the magneto armature plate. See Figure 3-1.

THEORY OF OPERATION

The carburetor is a metering device for mixing fuel and air. At idle speed, an engine requires a mixture of about 8 parts air to 1 part fuel. High speed mixture is about 12:1.

A small chamber holds the fuel. A float valve admits fuel from the fuel tank to replace fuel as it is consumed by the engine.

The upstroke of the piston in the cylinder creates a suction that draws air through the throat. A restriction in the throat, called a venturi, has the effect of reducing air pressure at this point by controlling air velocity.

The differential in throat and chamber air pressures causes the fuel to be pushed out of the metering jets and into the air stream. Here it mixes with the air to form a combustible mixture for exploding in the engine cylinders.

In order to mix the fuel and air in just the right proportions for all engine speeds, the low speed jet has an adjustable needle valve to compensate for changing atmospheric conditions. The high speed jet has a fixed orifice.

To regulate engine speeds, a throttle valve controls the volume of fuel-air mixture drawn into the engine. To compensate for the extra amount of fuel required to start a cold engine, a choke valve is placed ahead of the metering jets and venturi.

When the choke valve is closed, a very rich fuel mixture is drawn into the engine. As the engine starts and warms up, the choke is opened to restore the normal ratio required.

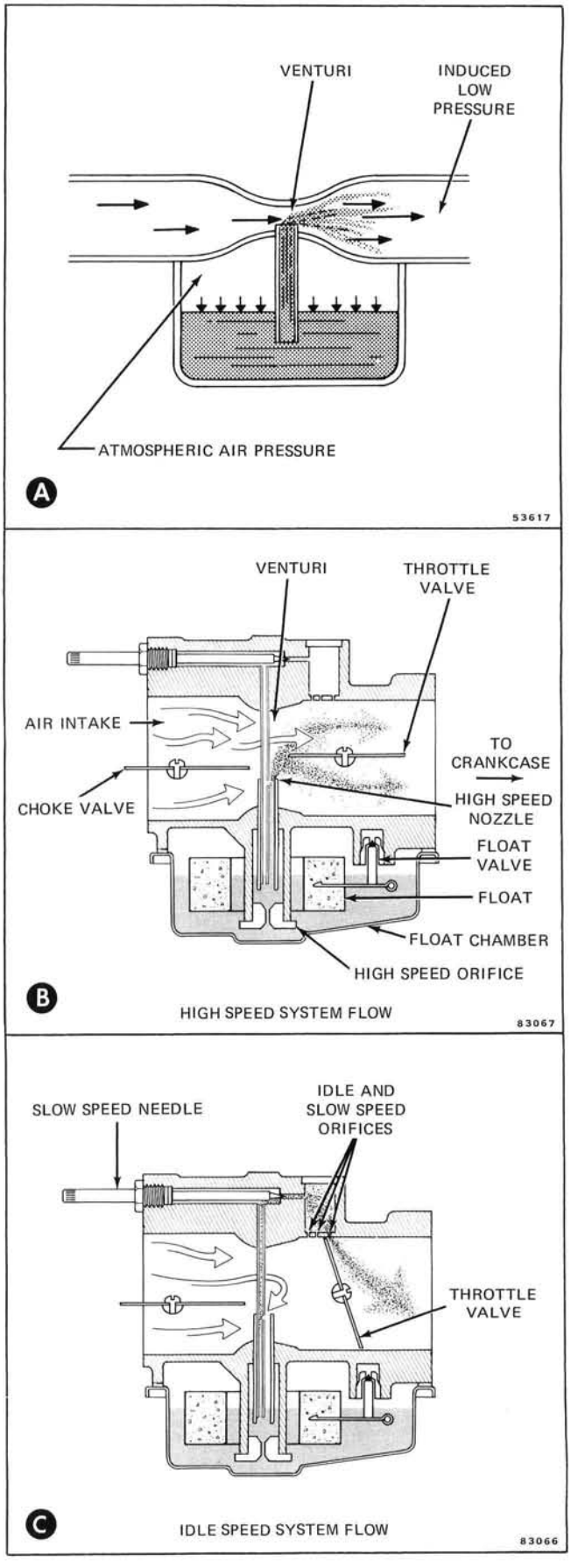


Figure 3-1. Carburetor Principle

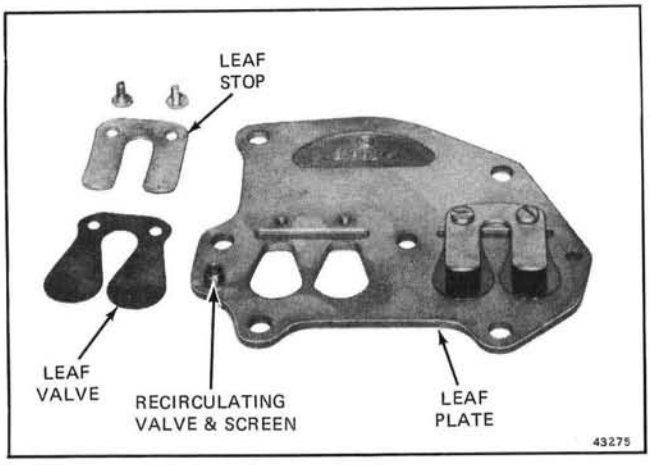


Figure 3-2. Leaf Valve Assembly

LEAF VALVES

The leaf valves time the injection of the fuel mixture into the crankcase by opening only when the pressure in the crankcase has dropped to a predetermined point on the compression stroke. See Figure 3-2.

CHOKE

The carburetor is fitted with a manual choke to reduce the ratio of air to fuel for cold starts. A choke valve in the air inlet is mounted to a choke shaft. When the choke knob is pushed in, the valve is held open, allowing air to pass freely through the inlet. When the choke knob is pulled out, the valve is closed, restricting the flow of air to the carburetor. See Figure 3-1.

FUEL PUMP

The fuel pump is of the diaphragm-displacement type, and is operated by changes in crankcase pressure. Alternate suction and pressure in the crankcase are transmitted to the pump diaphragm.

Fuel is drawn through a fine mesh filter before entering the pump, to remove impurities. See Figure 3-3.

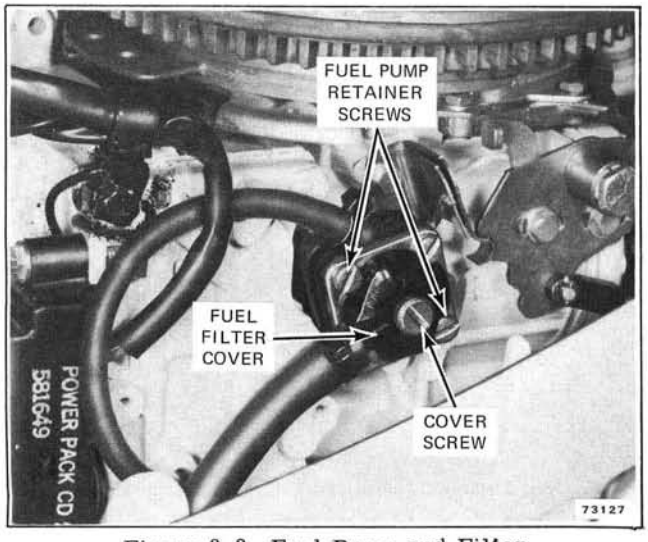


Figure 3-3. Fuel Pump and Filter

FUEL TANK

The fuel tank is suction operated. Fuel is lifted from the tank to the carburetor by the fuel pump. Priming is achieved by squeezing the primer bulb (part of the fuel line) several times or until pressure required to squeeze the bulb increases. The connector nearest the primer bulb must be connected to the fuel tank. See Figure 3-4.

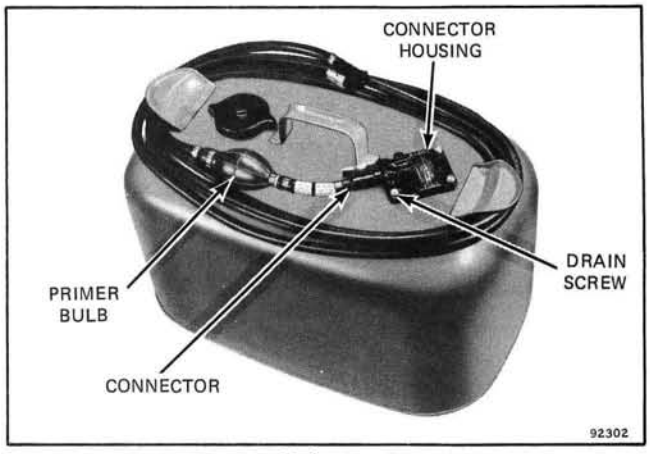


Figure 3-4. Fuel Tank

The tank air inlet and fuel outlet are seated until the supply line connector is plugged into the tank. When the fuel line is attached, two valve plungers are depressed, forcing the valves off their "O" ring seats. This vents the tank to the atmosphere and opens the fuel outlet. "O" ring seals in the fuel connectors shut off fuel flow when the line is disconnected from the tank or motor. To facilitate draining and cleaning, a drain screw has been provided in the fuel tank upper housing. See Figure 3-4.

CARBURETOR REMOVAL

a. Remove low speed knob.

b. Remove air silencer cover. See Figure 3-5. Remove air silencer base from carburetor (2 screws). See Figure 3-6.

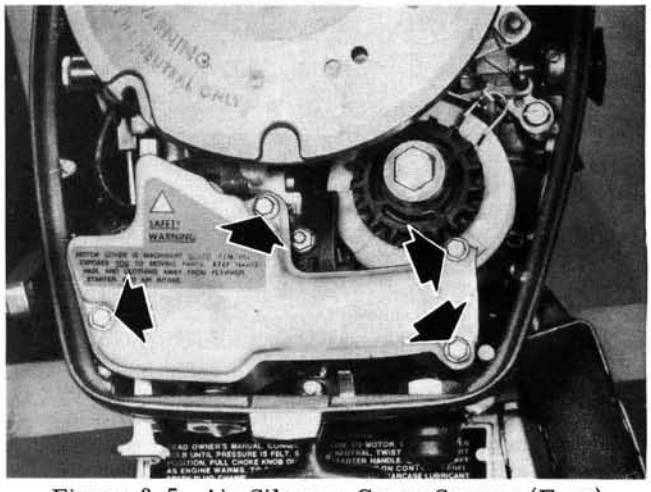


Figure 3-5. Air Silencer Cover Screws (Four)

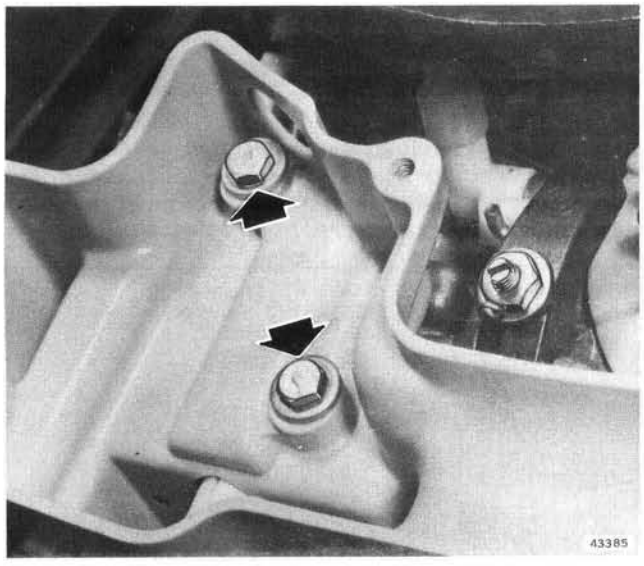


Figure 3-6. Air Silencer Screws (Two)

c. Remove choke knob detent. See Figure 3-7. Disengage choke shaft from choke lever, and remove choke knob and shaft from lower motor cover.

d. Remove manual starter as described in Section 8.

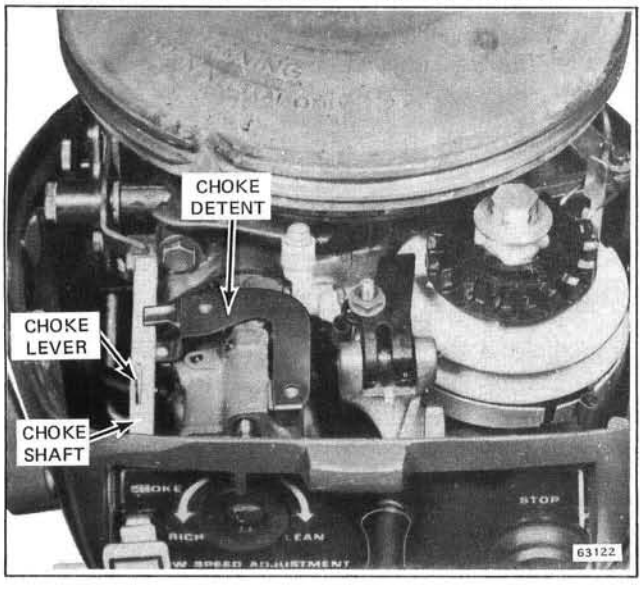


Figure 3-7. Choke Knob and Detent

e. Remove cam follower, shoulder screw and washer, and disengage lever from link and starter lock-out pawl spring. See Figure 3-8. Observe position of link in cam follower lever.

f. Remove two nuts, carburetor, gasket and link as an assembly, from intake manifold. See Figure 3-9. Observe position of link on lever. See Figure 3-10.

NOTE

Link must be installed in throttle lever before re-installing carburetor on manifold, as manual starter lock out bracket prevents installation after carburetor is mounted on manifold.

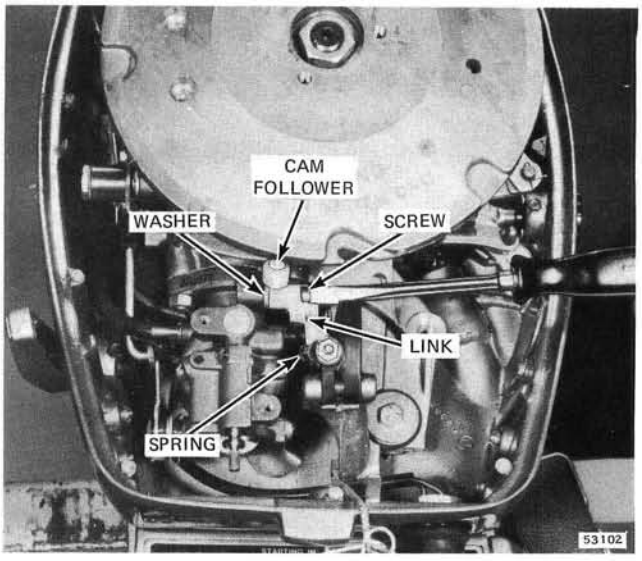


Figure 3-8. Removing Cam Follower

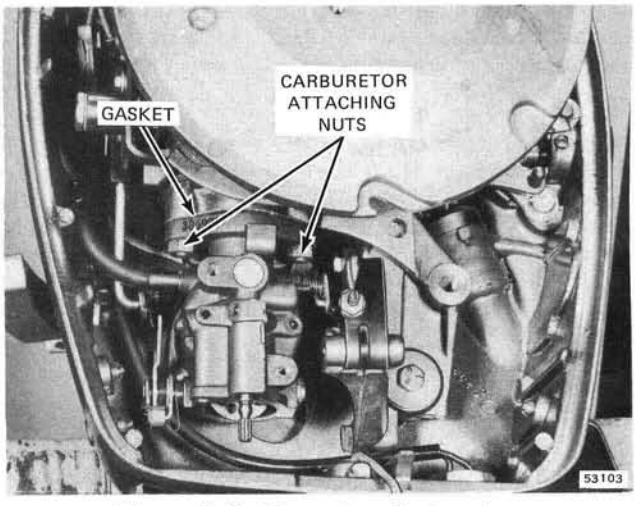


Figure 3-9. Removing Carburetor

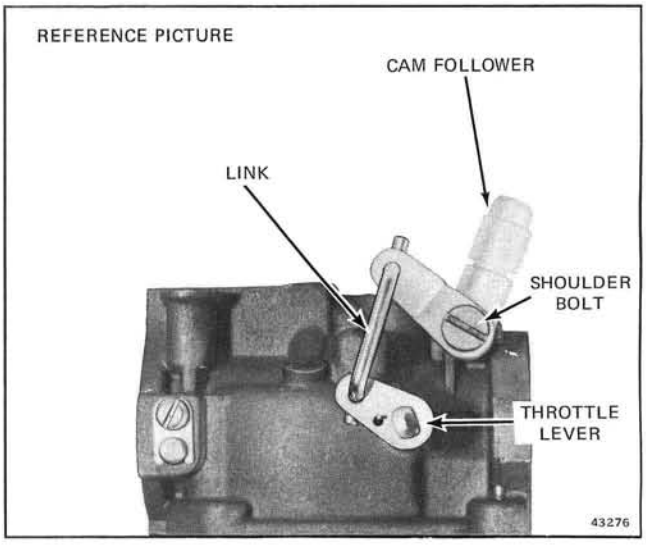


Figure 3-10. Link Position (Port Side View of Carburetor)

g. Remove fuel hose tie strap and disconnect fuel hose from carburetor.

LEAF PLATE REMOVAL

a. Remove six intake manifold screws and remove manifold. See Figure 3-11. Remove leaf plate and gasket from crankcase. See Figure 3-2.

CARBURETOR DISASSEMBLY

a. Using low speed knob, remove low speed needle in a counterclockwise direction. See Figure 3-12.

b. Remove float chamber and drain carburetor. Remove hinge pin, float and float valve assembly. See Figure 3-13.

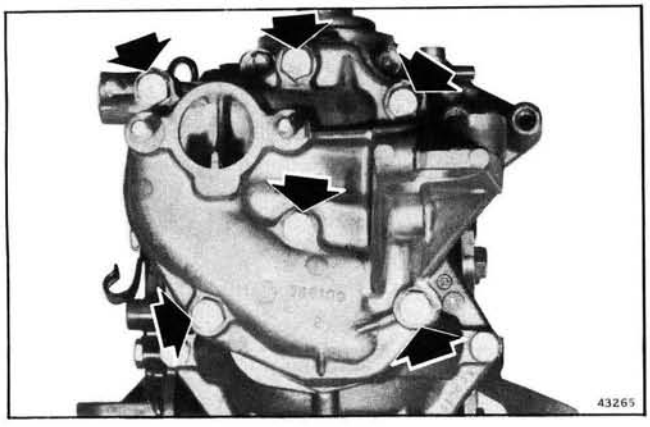


Figure 3-11. Intake Manifold Screws (Six)

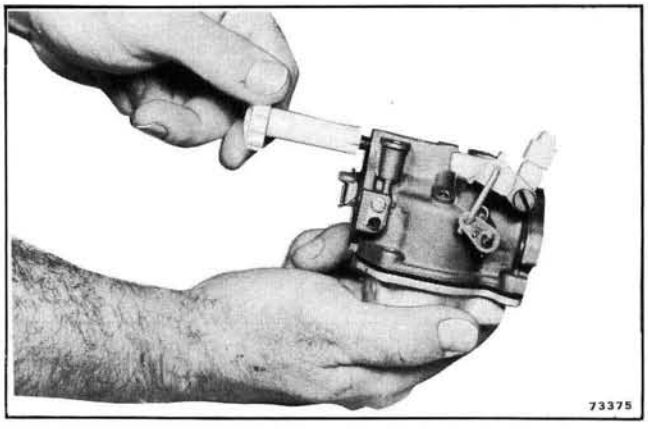


Figure 3-12. Removing Low Speed Needle

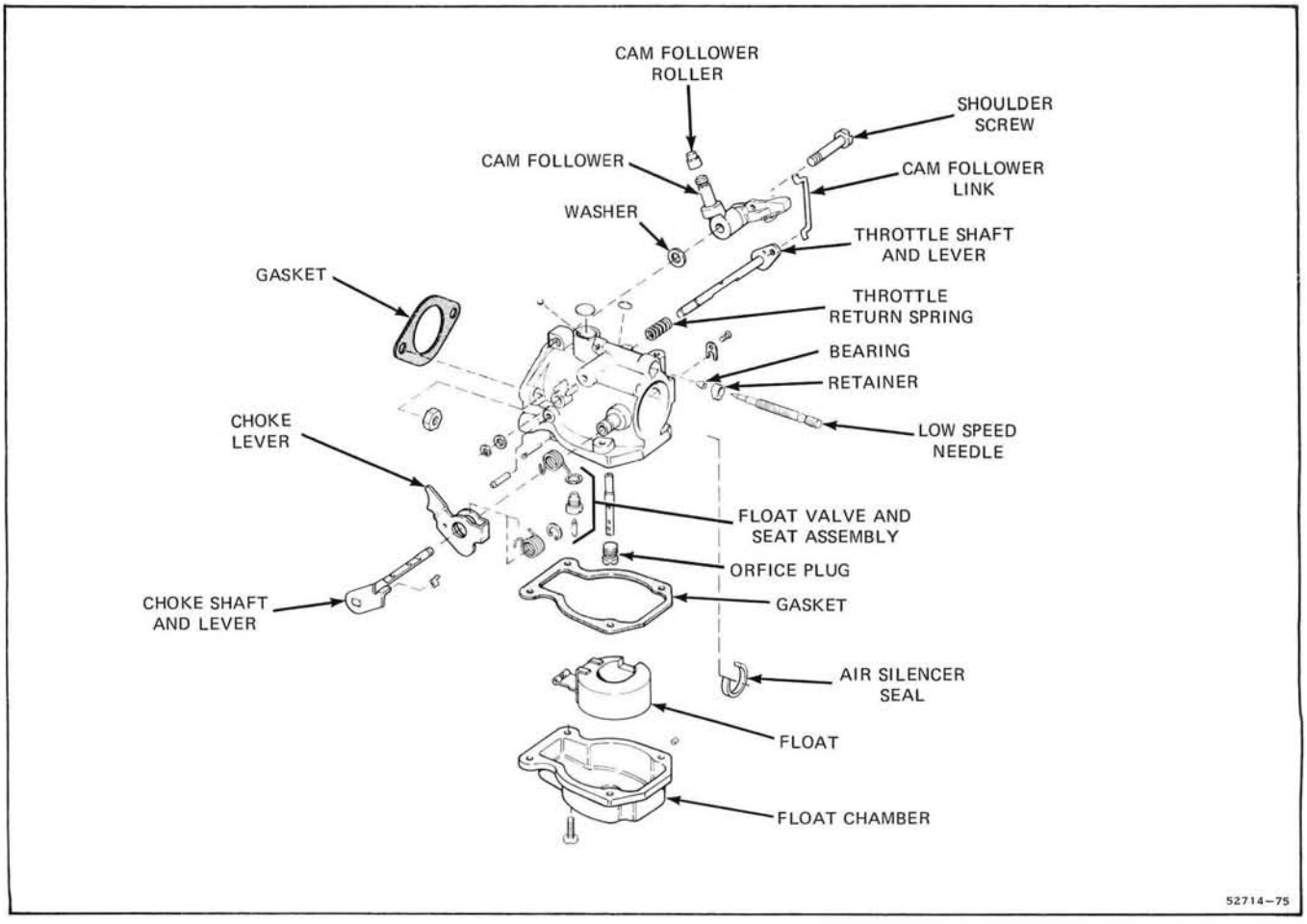


Figure 3-13. Carburetor Components

c. Remove orifice plug. See Figure 3-14. For orifice plug identification, see Specifications, Section 2.

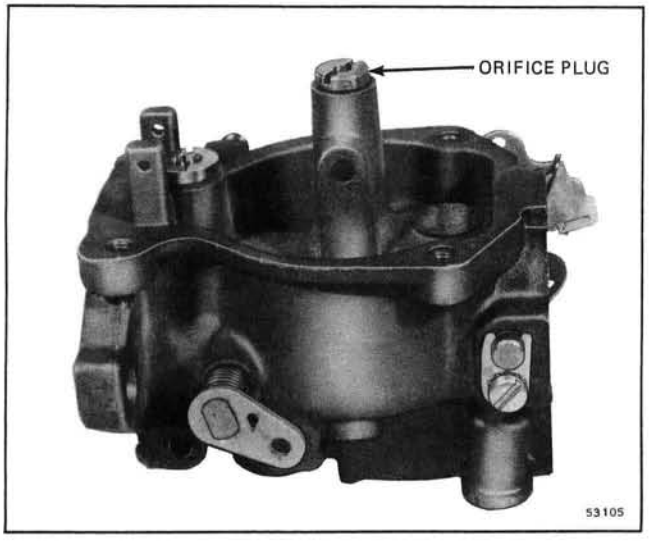


Figure 3-14. Carburetor Orifice Plug

CLEANING, INSPECTION, AND REPAIR

GENERAL INSTRUCTIONS

Clean all parts, except float, in solvent and blow dry. DO NOT dry parts with a cloth as lint may cause trouble in the reassembled carburetor. Be sure all particles of gaskets are removed from gasket surfaces. Flush all passages in the carburetor body with solvent and remove any gummy deposits with OMC Accessory Engine Cleaner. Certain solvents will not remove this gum which accumulates particularly in the float chamber and on needle valves.

FLOAT AND NEEDLE VALVE

a. Inspect float and arm for wear or damage. If the cork float has become oil-soaked, discard it and install a new one. Check float arm wear in the hinge pin and needle valve contact areas. Replace if necessary.

b. Inspect the inlet needle valve for grooves, nicks, or scratches. If any are found, replace float valve assembly. See Figure 3-15. Gum or varnish on the needle valve must be removed with OMC Accessory Engine Cleaner. DO NOT attempt to alter the shape of the needle valve.

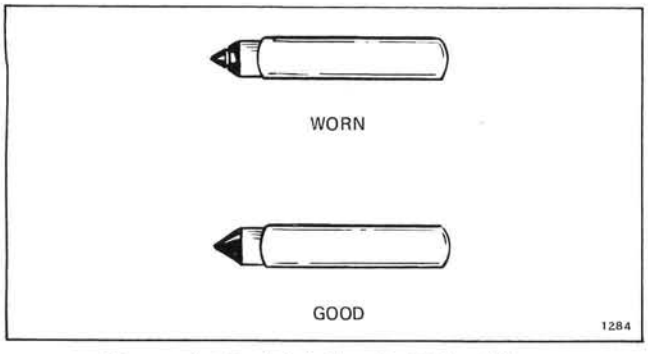


Figure 3-15. Inlet Needle Valve Wear

c. Check the needle valve seat with a magnifying glass; if seat is nicked, scratched, or worn out-of-round, it will not give satisfactory service. See Figure 3-16. The valve seat and needle are a matched set; if either is worn, both parts must be replaced. Use a new gasket when installing the needle seat.

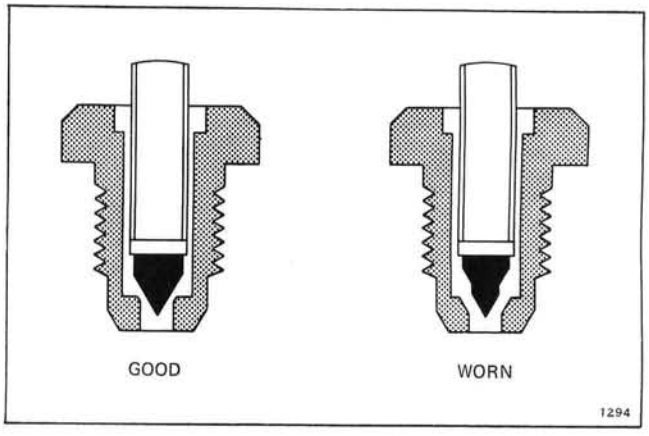


Figure 3-16. Inlet Needle Valve Seat Wear

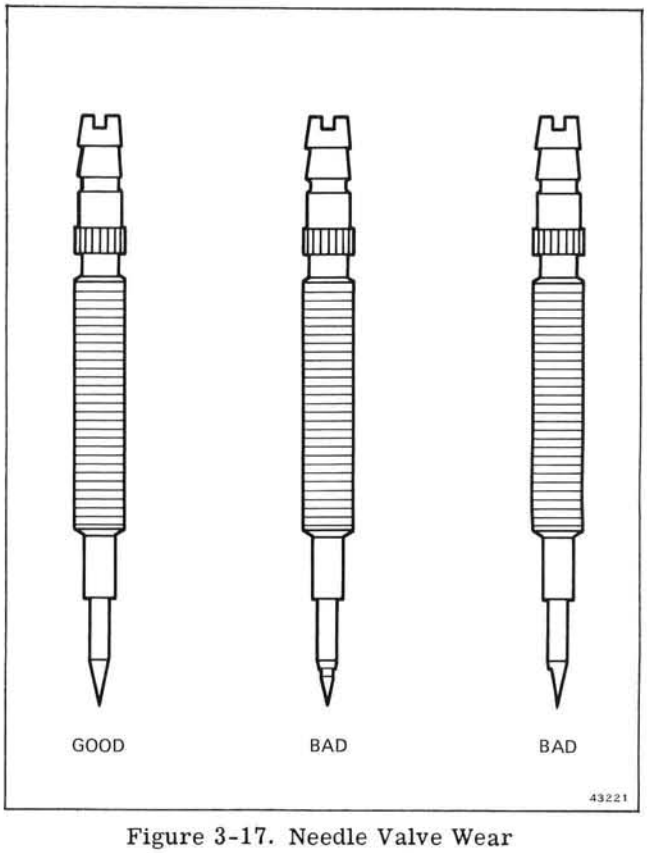


Figure 3-17. Needle Valve Wear

LOW SPEED NEEDLE VALVE

a. Inspect the tapered end of the needle valve for grooves, nicks, or scratches; replace if necessary. See Figure 3-17. Wear on one side of valve may indicate vibration from a damaged propeller.

b. DO NOT attempt to alter the shape of the low-speed needle valve.

CARBURETOR BODY

a. Clean out all the jets and passages, and the venturi, making sure no gum or varnish deposits remain. Dry after cleaning with compressed air. Keep clean for final reassembly.

b. Check all gasket surfaces for nicks, scratches, or distortion. Slight irregularities can be corrected with the use of a surface plate and emery cloth.

c. Check throttle and choke shafts for excessive play. Check operation of choke and throttle valves to be sure they correctly shut off air flow, yet move freely without binding. Replace carburetor if valves or shafts are excessively worn or damaged.

d. Check hinge pin anchor holes; replace carburetor body if worn.

⚠ SAFETY WARNING

STRIKING A STEEL TOOL WITH A STEEL HAMMER MAY PRODUCE CHIPS WHICH CAN CAUSE SERIOUS DAMAGE TO EYES. SAFETY GLASSES MUST BE WORN TO PREVENT INJURY.

CORE PLUGS

a. If necessary, remove core plug to clean out slow speed orifice holes.

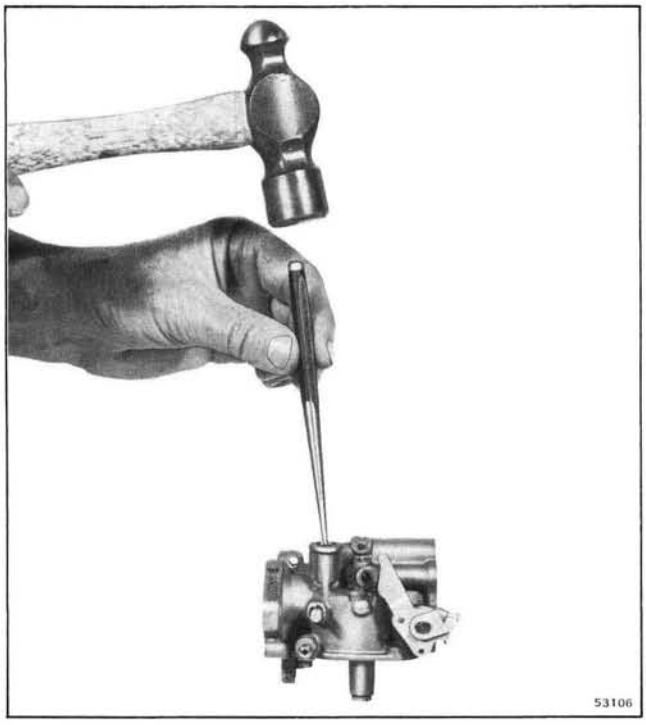


Figure 3-18. Seating Core Plug

b. If leakage occurs at a core plug area, a smart tap with a hammer and flat end punch in the center of the core plug will normally correct this condition. See Figure 3-18.

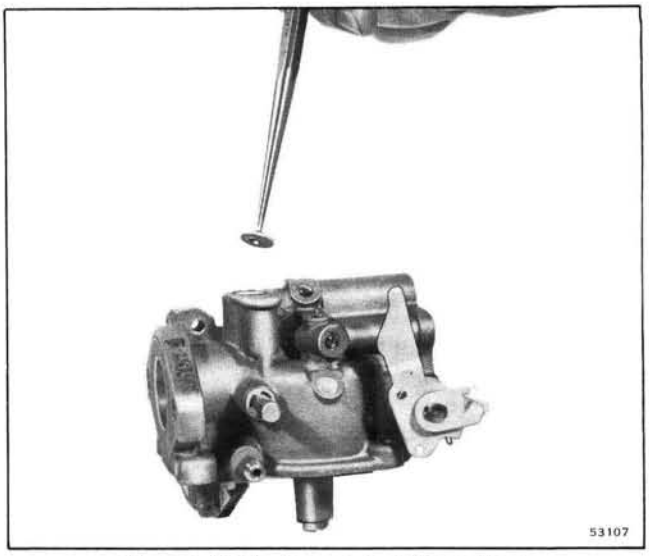


Figure 3-19. Removing Core Plug

c. If leakage persists, drill a 1/8 inch (3 mm) hole through the center of the core plug to a depth of not more than 1/16 inch (2 mm) below its surface. With a punch, carefully pry out the core plug. See Figure 3-19.

d. Inspect and clean casting contact area. If nicks, scratches, or an out-of-round condition exist, the casting will have to be replaced. If the casting opening is normal, apply a bead of OMC Adhesive "M" to the outer edge of a new core plug. Place the new core plug in the casting opening, convex side up. Flatten to a tight fit with a flat end punch and hammer. Check for leakage.

LEAD SHOTS

If leakage occurs at a lead shot area follow these corrective measures:

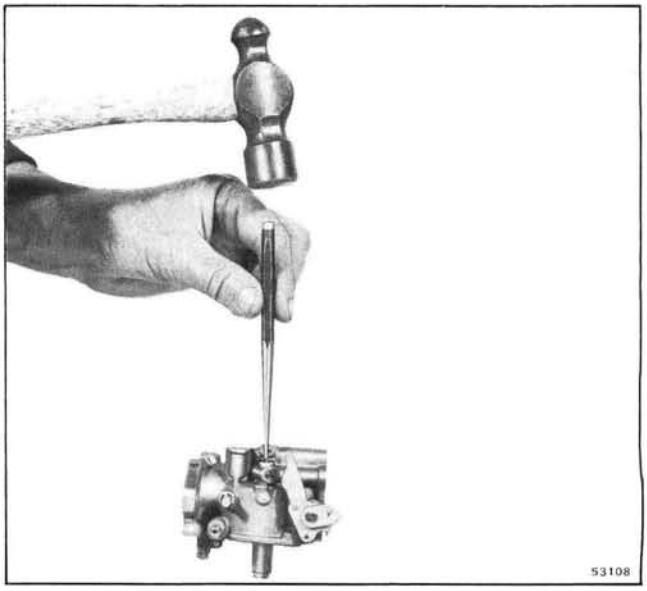


Figure 3-20. Seating Lead Shot

a. If leakage is slight, a smart tap with a hammer in the center of the lead shot will normally correct this condition. See Figure 3-20.

b. If leakage still exists, remove the lead shot with an appropriate sharp tool.

c. Clean and inspect casting opening. If the casting opening is normal, install new lead shot in casting opening and flatten out with light hammer taps. Check for leakage.

LEAF VALVES

a. Inspect the leaf plate assembly and disassemble if necessary. The leaf valves must be free from all varnish and gum, and the leaves must lay perfectly flat so they form a perfect seal with the leaf plate base. See Figure 3-21.

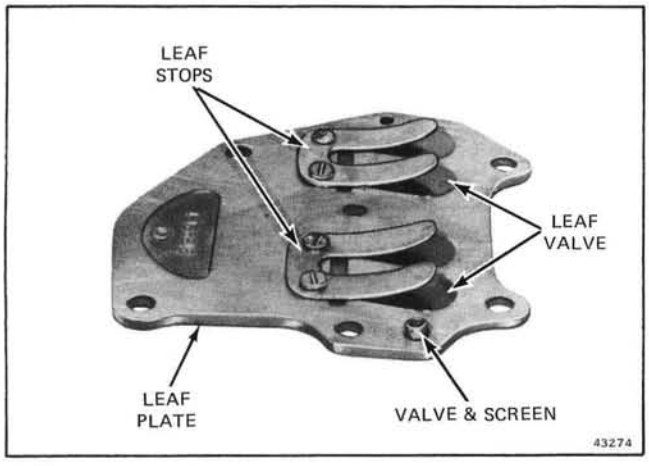


Figure 3-21. Leaf Plate, Valve and Screen Assembly

b. DO NOT attempt to bend or repair a damaged leaf; replace the complete assembly if damaged. DO NOT under any circumstances bend or flex the leaves by hand.

c. Replace the leaf stop if any leaves are broken. Check leaf plate for distortion or wear.

FUEL RECIRCULATING VALVE

a. The recirculating valve ordinarily requires little or no attention; however, when servicing the motor, clean the valve. See Figure 3-21.

b. If gum or varnish is found in the crankcase during servicing, clean the recirculating valve in OMC Accessory Engine Cleaner, as it is likely that gum and varnish have also been deposited there. Leaf plate valve and screen are serviced as an assembly.

CARBURETOR REASSEMBLY

GENERAL INSTRUCTIONS

Reassemble the carburetor, paying particular attention to the following procedure. Keep all dust, dirt, and lint out of the carburetor during reassembly. Be sure that parts are clean and free from gum, varnish, and corrosion when reassembling them. Replace all gaskets and sealing washers. DO NOT attempt to use original gaskets and washers, as leaks may develop after the engine is back in use.

CARBURETOR BODY

a. Install high-speed orifice plug in carburetor body. Replace float valve seat and gasket, float valve, float, and hinge pin.

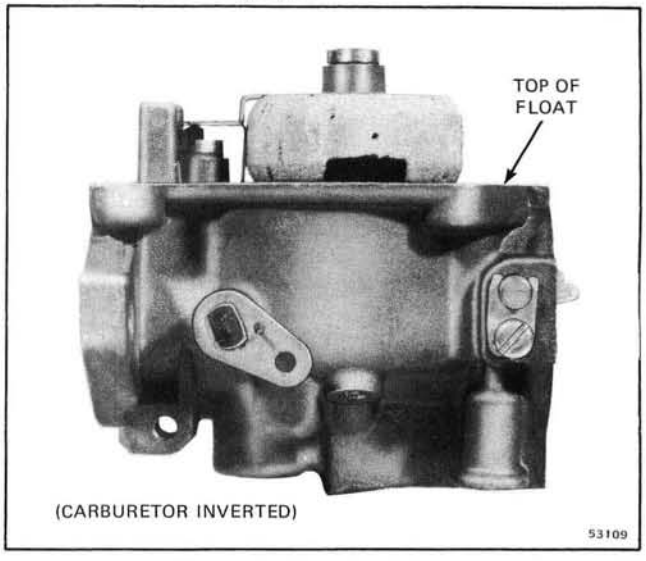


Figure 3-22. Float Level

b. Check for correct positioning of float. Turn carburetor body upside down so weight of float closes needle. Top of float should be even with rim of casting. See Figure 3-22.

c. Reassemble float chamber to carburetor body, using a new gasket.

LOW SPEED NEEDLE

a. Install the low-speed needle and Delrin retainer, turning in carefully with finger pressure (use the low-speed adjusting lever for this operation) until it comes lightly against the seat, then back off 1 turn (9.9 hp) 7/8 of a turn (15 hp). CAUTION should be taken to prevent jamming the needle against the seat.

LEAF VALVES

a. The importance of keeping the leaves in these valves free from distortion cannot be over-emphasized. Replace any leaf or leaf stop which shows any indication of distortion or damage.

b. The leaf is so designed that it maintains constant contact with the leaf plate until a predetermined pressure is exerted against it. Leaf travel away from the plate is limited by the leaf stop. When pressure is removed, the inherent spring action of the leaf segments returns and holds them against the plate. Attach the leaf segments and leaf stops to the leaf plates, then examine each leaf carefully. Each leaf must lie flat against the plate with no edges turned up or away from the plate.

NOTE

DO NOT lift or bend segments by hand. This may damage them so that the leaves would have to be replaced.

c. Check leaf plate for distortion or wear.

d. Attach the two leaf valves and stops to the leaf plate base. Center leaf valves over recesses in plate. See Figure 3-2. Tighten screws to torque specified in Section 2 to avoid distortion of the leaves or leaf plates.

CHOKE

a. Check the choke for free operation. Choke valve must move freely, without binding.

CARBURETOR INSTALLATION

a. Using new gaskets, install leaf valve assembly and intake manifold on crankcase.

b. Reconnect fuel line to carburetor using a new nylon hose strap.

c. Place a new carburetor gasket on intake manifold.

d. Insert cam follower link in throttle shaft and lever, and install carburetor. Connect cam follower to link.

e. Attach cam follower to carburetor with shoulder bolt and spacer washer. Connect starter lock-out pawl spring. See Figures 3-8 and 3-10.

f. Install choke knob and shaft and choke knob detent. See Figure 3-7.

g. Install manual starter as described in Section 8.

CARBURETOR ADJUSTMENTS

THROTTLE CAM ADJUSTMENT

a. Proper setting of the throttle pickup on the throttle cam is important for obtaining good overall running qualities together with the best possible fuel economy. Sometimes though, it is difficult to tell when the carburetor's throttle shaft first begins to move. You can make a simple tool to exaggerate this movement from an alligator clip and a piece of stiff wire. See Figure 3-23A.

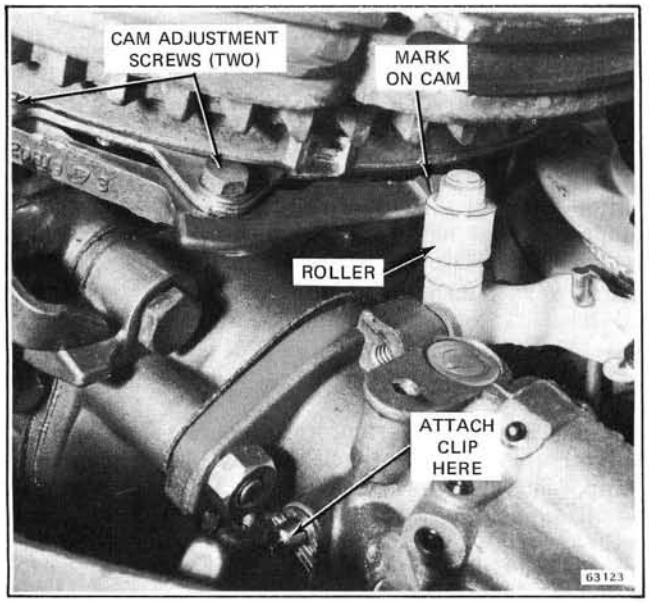


Figure 3-23. Synchronizing Marks on Cam

b. Attach clip to end of throttle shaft opposite the cam follower linkage. See Figure 3-23.

c. Advance throttle grip until center of cam follower roller is within the raised marked area on the throttle cam. See Figure 3-23. At this point throttle shaft should just begin to rotate. If not, adjust as follows: Loosen two cam screws (see Figure 3-23) and adjust cam in or out as necessary. Tighten screws and check operation. Throttle shaft should start to rotate as center of roller aligns within the wide mark on the throttle cam.

d. Install air silencer base and cover with washers and screws. See Figures 3-5 and 3-6.

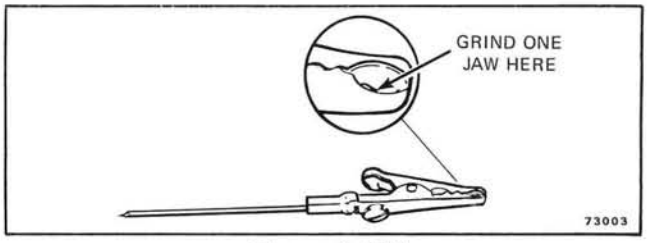


Figure 3-23A

LOW SPEED NEEDLE ADJUSTMENT

a. Start engine.

NOTE

Allow engine to run in a tank with test propeller at one-half throttle or slightly more until it reaches operating temperature before adjusting low speed needle.

b. With motor at operating temperature, run in gear at slow speed (700-750 rpm) with test propeller in tank or on boat. Adjust low-speed needle until highest rpm reading and smoothest performance are obtained. Allow 15 seconds for motor to respond to adjustment.

c. Position low speed knob with pointer down, and replace on needle valve shaft without disturbing position of needle.

d. Adjust idle adjustment knob to allow motor to run at 600 rpm in gear. For neutral speed adjustment, see Section 6, "Adjustments."

FUEL PUMP AND FILTER

Before servicing the fuel pump, remove and clean the fuel filter. If damaged, install a new filter screen. Also remove the fuel line from the fuel tank and blow through all passages and lines with compressed air to be sure they are open. This may be the cause of inadequate fuel delivery, and if so, would eliminate unnecessary replacing of the fuel pump. See Testing Fuel Pump. If this procedure does not correct the trouble, fuel pump is probably malfunctioning and should be replaced.

TESTING FUEL PUMP

Conduct this test on the motor in a test tank or on the boat.

a. Remove carburetor to fuel pump hose. Connect a fuel pressure gauge between the carburetor and fuel pump.

NOTE

Before testing, loosen fuel tank gas cap momentarily to release any pressure that may have built up. Fuel tank must not be more than 24 inches (610 mm) below fuel pump.

b. Start motor and observe gauge. Pump pressures should read as below.

RPM		
600	2500 to 3000	4500
1 PSI (7 kPa)	1.5 PSI (10 kPa)	2.5 PSI (17 kPa)

FUEL PUMP AND FILTER REMOVAL

a. Disconnect hoses from pump and filter assembly.

b. To remove fuel pump, remove two screws attaching pump and filter assembly to power head, and remove pump and filter assembly. See Figure 3-24.

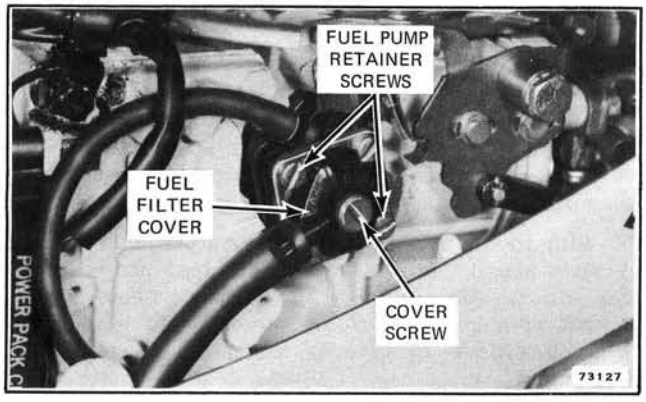


Figure 3-24. Fuel Pump and Filter

CLEANING, INSPECTION, AND REPAIR

a. The fuel pump operating components are not serviced separately. If a malfunction occurs, replace the complete pump.

b. Inspect the filter for accumulation of sediment by removing the filter cap screw and the filter cap. See Figures 3-24 and 3-25.

c. Clean all parts of the filter assembly and fuel connectors in solvent and blow dry. DO NOT dry parts with a cloth, as lint may stick to the parts and clog the passages or prevent the fuel pump valves from seating. Dissolve any gummy deposits with OMC Accessory Engine Cleaner (certain solvents will not dissolve these deposits).

NOTE

It is recommended that a new fuel filter gasket be installed when servicing the filter and pump assembly.

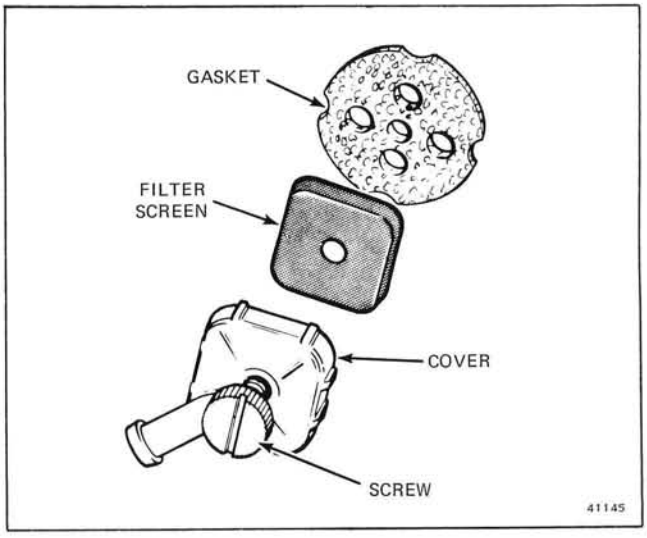


Figure 3-25. Fuel Filter

FUEL PUMP AND FILTER REASSEMBLY

a. Reassemble the fuel filter to the pump in the reverse order of disassembly, being sure lip of screen faces pump.

b. Attach fuel pump to motor using a new gasket. Tighten filter and pump screws securely. (Check for leaks by connecting fuel tank line to motor and squeezing primer bulb until definite pressure is felt in the bulb.)

FUEL TANK

FUEL MIXTURE

A motor in excellent mechanical and operating condition may give faulty performance because of an improper fuel mixture. Petroleum gum and varnish which precipitate from a stale mixture may clog the filter screen and any small orifices, interfering with starting and normal running. For proper fuel mixture see Section 2 "Engine Fuel and Lubricant."

To assure that the fuel tank contains the proper mixture, drain and flush the tank at least once a year, and at every tune-up or major repair. To facilitate complete draining of the tank, a drain screw is provided in the fuel tank upper housing. See Figure 3-26. Clean the tank by flushing with clear gasoline or solvent. See Owner's Manual for correct fuel mixture.

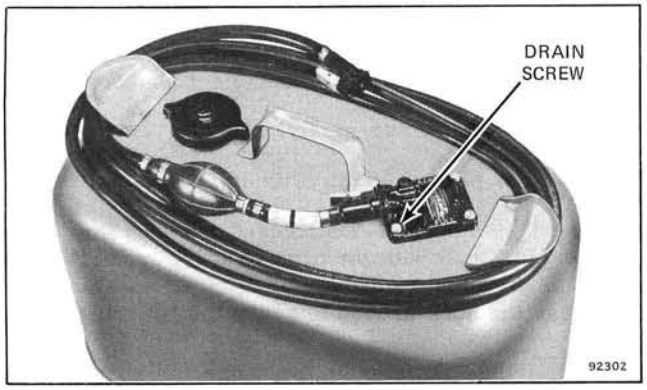


Figure 3-26. Fuel Tank Upper Housing

DESCRIPTION

The fuel tank is of simple but rugged construction, with a capacity of 6 gallons (22.7 litres) of fuel mixture. It includes the bulb primer (for priming the fuel pump), fuel level gage, fuel hose and connectors, a bracket arrangement to hold the fuel line when not in use, and a carrying grip. The fuel tank upper housing, which provides the connection to the fuel hose, contains two release valves and a disc valve which prevents any escape of gasoline or fumes, minimizing the danger of explosion or fire.

CLEANING, INSPECTION, AND REPAIR

The fuel level indicator is mounted to the upper housing and fuel line assembly. The entire assembly may be removed by removing the four attaching screws. Lift the assembly from the tank carefully to avoid damaging the indicator float or the screen at the end of the fuel line. See Figure 3-27.

Check for free movement of the indicator on the indicator pin. Remove the pin from the indicator support by compressing the free end and pulling it out. Inspect the indicator to make sure that the float arm is not bent and that the float is not damaged or oil-soaked.

Remove the two screws attaching the indicator support to the upper housing. Lift the indicator lens out of the upper housing, and clean it with solvent or lacquer thinner to remove any foreign matter which may be clouding the lens.

Inspect the lens seal for cracks or shrinkage which may allow leakage. The release valves must seat tightly to prevent gasoline or fumes from leaking out, but must open a clear passage for air to enter the tank and for fuel to be drawn out when the fuel hose is connected. Dirt may keep the release valves from seating properly. The release valves are best cleaned by removing the core plugs and disassembling. Replace valve seats ("O" rings) to assure a tight seal. See Figure 3-28.

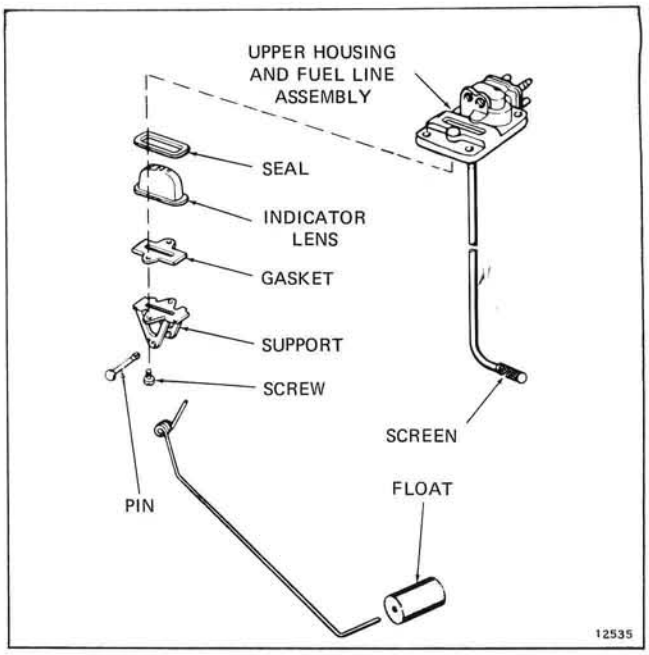


Figure 3-27. Fuel Tank Level Indicator

The air inlet disc valve must seat tightly to prevent fumes from escaping the tank when the fuel hose is connected, but must allow air to enter the tank. The disc valve spring retainer is staked to the upper housing and may be removed by filing off the burrs if replacement is necessary. Restake with a small punch.

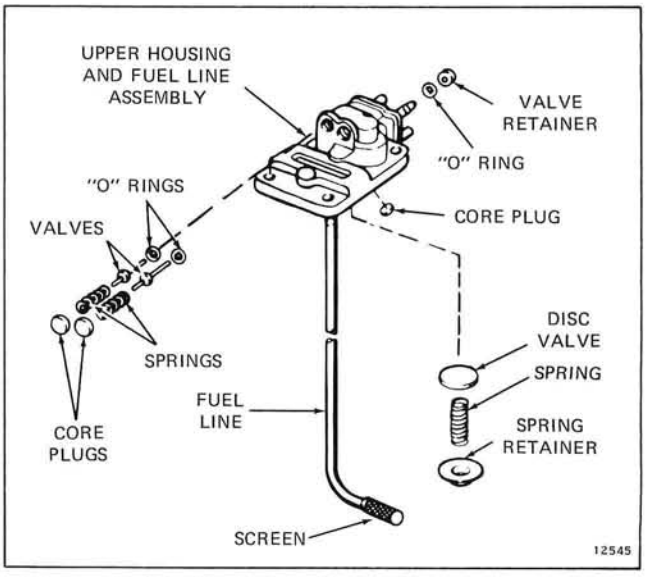


Figure 3-28. Fuel Tank Upper Housing and Valves

HOSE AND PRIMER BULB ASSEMBLY

CLAMPS

To disassemble hose clamps, grip clamp with pliers. Bend overlapping hook backward (in direction of arrow) to release clamp. See Figure 3-29.

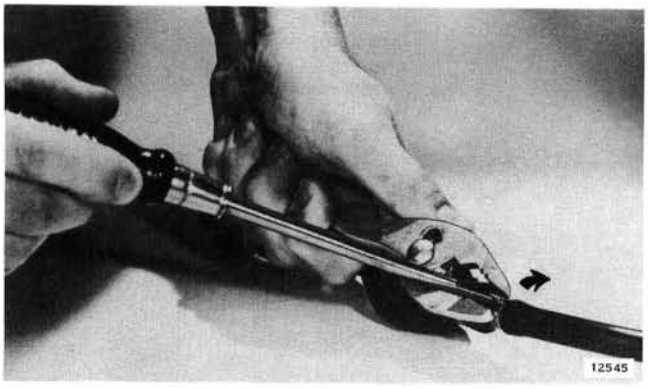


Figure 3-29. Removing Hose Clamp

To assemble hose clamps, grip clamp firmly with pliers. Apply slight pressure to hook on top side with screw driver. Squeeze clamp with pliers until hooks interlock. See Figure 3-30.

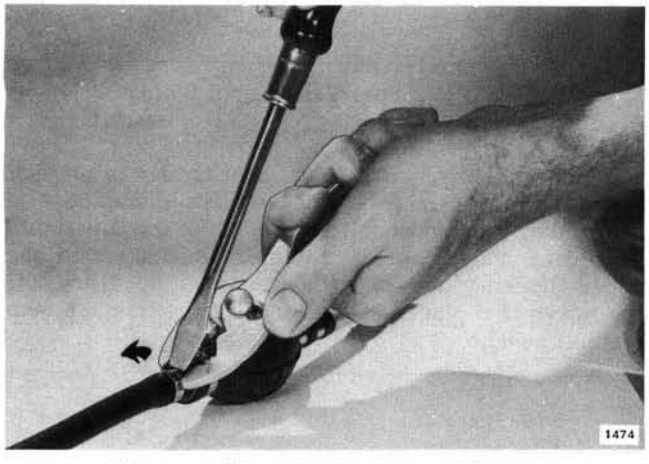


Figure 3-30. Attaching Hose Clamp

CONNECTOR HOUSING

Installation of the "O" ring in the fuel hose connector requires the use of two instruments, one to hold the plunger down and one to remove the "O" ring. Both instruments are illustrated and can be made easily of 16 gage (1/16" diameter) steel wire. A piece of discarded remote control wire may be used. Form a small hook on the bottom end of the longer tool of about 1/16" radius. After cutting the wires to length, be sure the ends are rounded off to prevent scratching or damaging the "O" ring seat on the plunger. See Figure 3-31.

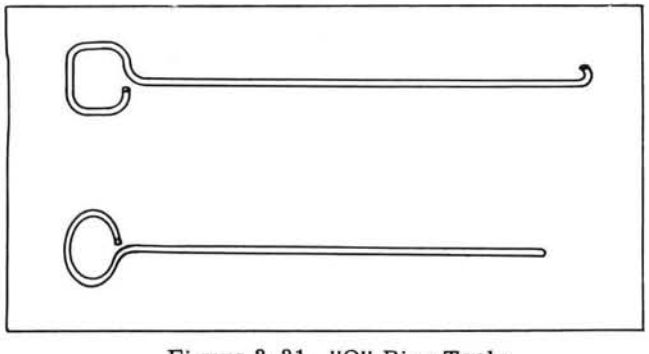


Figure 3-31. "O" Ring Tools

NOTE

If "O" ring is damaged, air will enter fuel line and carburetor. Motor will run out of fuel.

To remove the "O" ring from the connector, proceed as follows:

a. Grip the connector gently in a vise between two wood blocks.

b. Push the plunger down with the straight instrument.

c. Insert the hooked instrument between the "O" ring and its seat with the hook in a flat or horizontal position. See Figure 3-32.

d. Twist the hook around to grasp the "O" ring, then pull out.

To install the "O" ring in the connector, proceed as follows:

a. Place a drop or two of oil on the "O" ring.

b. Place the "O" ring on face of the connector.

c. Push the plunger down with the straight instrument.

d. Pinch the "O" ring together and gently push into position with fingers.

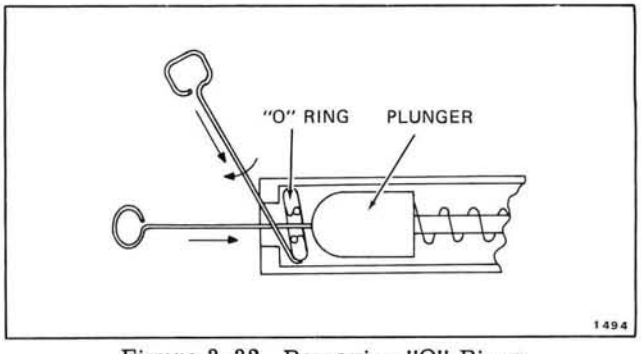


Figure 3-32. Removing "O" Rings

When reassembling the fuel hose, check for cracks in the primer bulb or in the hose. The primer bulb must be attached so that fuel flow is from the shorter to the longer hose length. Fuel flow through the primer bulb is indicated by an arrow. See Figure 3-33.

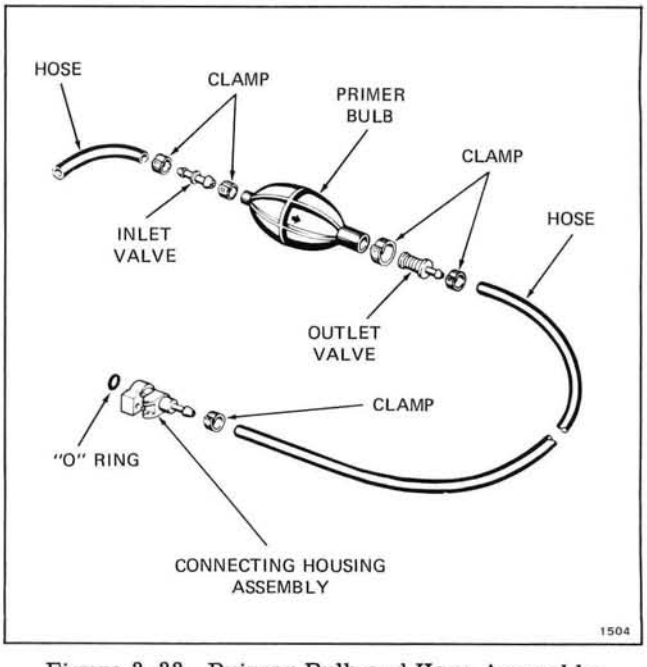


Figure 3-33. Primer Bulb and Hose Assembly