

Fig.65 Carburetor - 63M and 263M Series

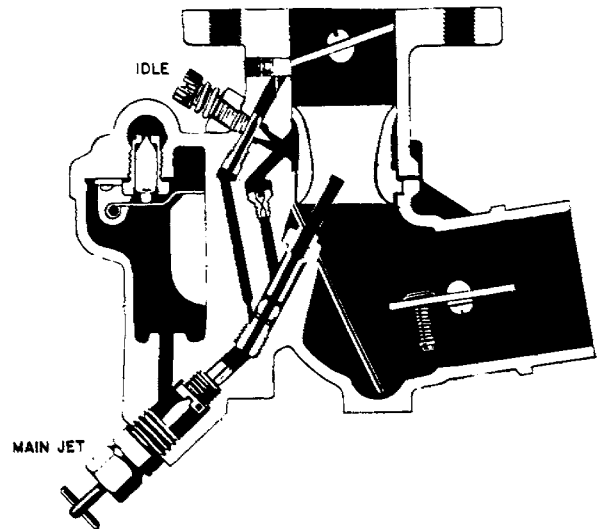


Fig.66 Carburetor - 61M Series

desired idling speed and repeat the adjustment of idling jet "A".

With the boat under way on smooth water, open the throttle approximately 75%. Turn the high speed jet "B" in until the engine loses power and RPM. Now open the jet slowly until the engine runs smoothly and at its highest RPM for this throttle setting.

The carburetor should now be correctly adjusted for smooth operation and maximum power at all speeds. A slightly rich fuel mixture is preferable to a lean mixture as a lean mixture has the apparent effect of reducing the octane rating of the fuel and can result in a tendency toward detonation (ping), burned valves and scored or worn cylinders. Therefore, do not lean out the fuel mixture in an attempt at fuel economy.

Knight engines with serial number 4979 to 6346 were equipped with a fixed main jet carburetor intended to discourage the general tendency to lean out the fuel mixture for economy but which is actually detrimental to the engine. Standard

jet size is No. 42 (2.1 mm.) This jet size should be correct for all applications. However, if the operator desires very fine tuning he may try jets varying from size 41 to 44, but not smaller than 41.

At the bottom of the carburetor float bowl will be found a hexagon head brass plug where a variable main jet is usually found on marine carburetors. The main jet is reached by removing this plug. The jet itself is a small, brass threaded cylinder with a shoulder and a screwdriver slot at one end. Remove and install the jet with a screwdriver using care not to damage the jet or the threads in the carburetor bowl casting. The size number is stamped on the end of the jet.

This carburetor, part number 6005 120, has a two-hole idle system that is rather sensitive in adjustment. It will require more care in adjusting the idle jet than with the former Knight carburetor.

The part number of each carburetor model will be found stamped on the

small, round brass disc riveted to the carburetor.

The Zenith carburetor supplied on the Model 250, 155 H.P. Knight may require adjustment of the throttle plate stop screw "A" at the full throttle position (See Fig. 69.) This carburetor is somewhat sensitive to the throttle plate positioning in that if it goes slightly past the vertical position, it will upset fuel distribution in the manifold and cause a marked decrease in engine power and speed at full throttle. The carburetor is correctly set on engines tested at the factory, but replacement carburetors will have to be adjusted in the field.

With the carburetor attached and the engine ready to run, loosen the stop screw "A" until it does not contact the stop pin "B" with the throttle lever "C" at the full throttle position as shown in Fig. 69. In this position the cast lug on the throttle lever should touch the stop pin. Now with the engine running at full throttle, close the throttle very slowly and care-

fully observe the reaction of the tachometer. If the tachometer shows a steady decrease as the throttle is retarded, the stop screw is not needed in adjusting the carburetor. However, if the tachometer first increases to a maximum and then falls off as the throttle is retarded, the stop screw must be used to correctly position the throttle plate as follows: Find the throttle position that will give maximum engine RPM and stop the engine without disturbing the throttle setting. Screw the stop screw in until it just touches the stop pin. Restart the engine and check to see that it will still attain its peak RPM as noted before the adjustment. It would be preferable if the adjustment or setting of the stop screw was made with the engine running, but this is not possible or advisable in many installations.

Always take every precaution against fire hazards when working around your fuel system. Be sure to disconnect batteries; do not turn on flashlights, operate electric switches or turn over the starter or generator.

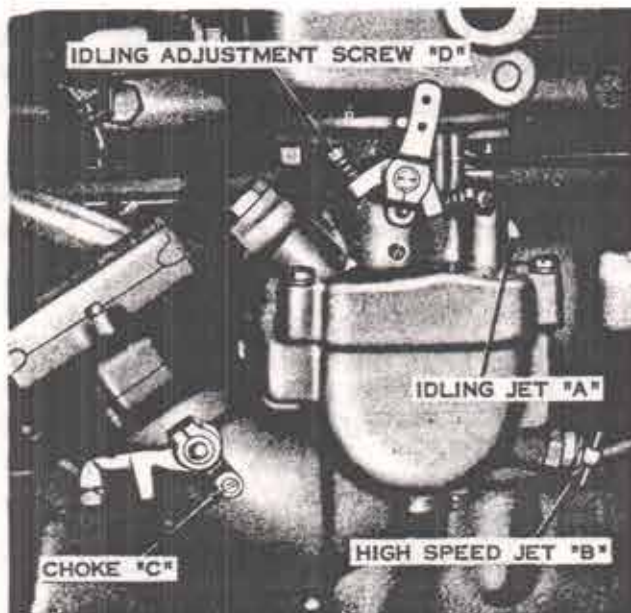


Fig. 68 Carburetor - Adjustments

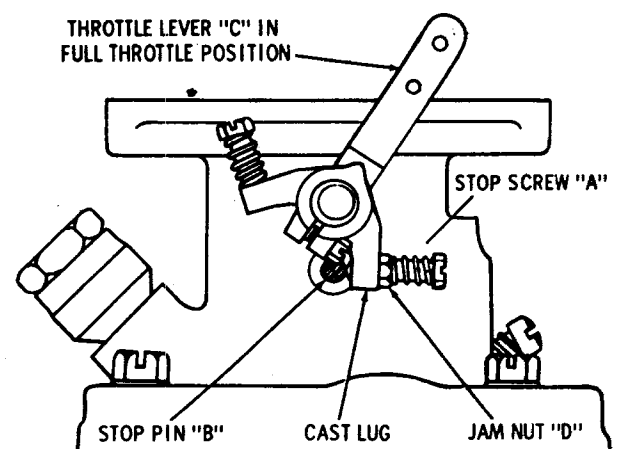


Fig. 69 Carburetor - Adjustments

## 7. VALVE TAPPET ADJUSTMENT

a. Valve tappet adjustments are to be made with the piston on top dead center of the compression stroke with both valves closed.

b. Two types of tappet adjusting screws are used: one is of the self-locking type and the other has a locking nut for holding the adjusting screw in place. Before making the adjustment, this locking nut must be loosened and the adjusting nut held in place when it is re-tightened after the adjustment is completed. See Fig. 70.

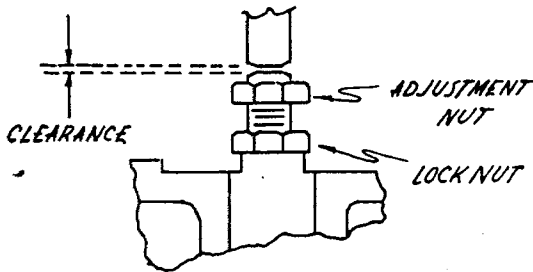


Fig.70 Valve Tappet - Adjustment

(1) Remove the valve cover plate on the carburetor side of the engine. Be careful not to damage the valve plate gasket.

(2) Crank the engine until the piston is in the top dead center position.

(3) Adjust the tappets to the clearance shown in Table 7.

(4) Replace the valve cover. If the gasket is damaged, replace with a new gasket using a good grade gasket cement.

## 8. REVERSING GEAR ADJUSTMENT, JOES MODEL

### a. Forward drive Adjustment

(1) Remove the reversing gear cover

plate.

(2) Loosen the screw (2) which holds the clip (3) in the notches cut in the gear case housing until the clip can be lifted out of the notch. See Fig. 71.

(3) Turn the gear case cover clockwise one notch.

#### CAUTION

Overtightening may cause reverse gear drum to break when shift lever is moved.

(4) Place the clip in the notch and tighten screw.

(5) Repeat the process until the clutch does not slip under full drive of the engine.

(6) Replace the reversing gear cover plate.

### b. Reverse Drive Adjustment

(1) Remove the reversing gear cover plate.

(2) Remove cotter pin and slack off adjusting nut (1). See Fig. 71.

(3) Pull operating lever toward reverse position until cam roll rests on cam at point (A), Fig. 72.

(4) Tighten adjusting nut until drum will not revolve with the lever in reverse position and the engine at full power.

#### CAUTION

Do not adjust so tightly that the cam roll cannot ride out of the notch at point (C), Fig. 72.

## 9. REVERSING GEAR ADJUSTMENT, PARAGON MANUAL MODEL

### a. Forward Drive Adjustment

(1) Remove the reversing gear cover plate.

(2) Back out lock screw (1) until the end is free of the notch cut in the adjusting collar. See Fig. 74 (A and B).

(3) Turn the adjusting collar clockwise until the lock screw is opposite the next notch in the collar.

(4) Tighten the lock screw being sure that the end of the screw enters the notch in the collar.

(5) Repeat the above process until the clutch does not slip with the engine at full power.

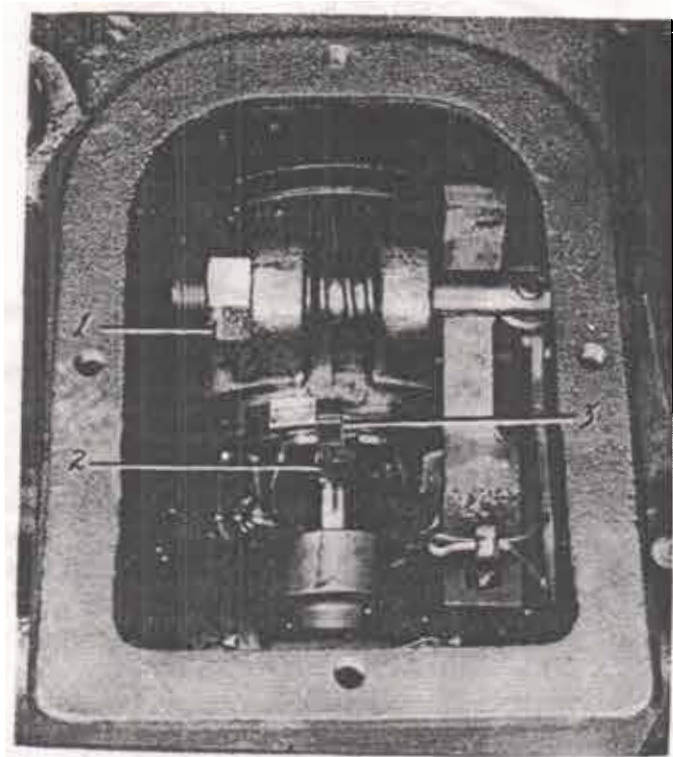


Fig.71 Reverse Gear - Adjustment - Joes Model

**b. Reverse Drive Adjustment**

(1) Remove the reversing gear cover plate.

(2) Remove the locking wire from the adjusting bolt.

(3) With the engine turning over slowly, move the operating lever

to the reverse position. See Fig. 74 (A and B).

(4) Tighten the adjusting bolt (2) until the brake band prevents the gear case from revolving. Turn the adjusting bolt approximately one-half turn past this point to compensate for wear on the brake band.

(5) Replace the locking wire on the adjusting bolt.

**10. REVERSING GEAR ADJUSTMENT, HYDRAULIC REVERSING GEAR**  
The hydraulic reversing gear is de-

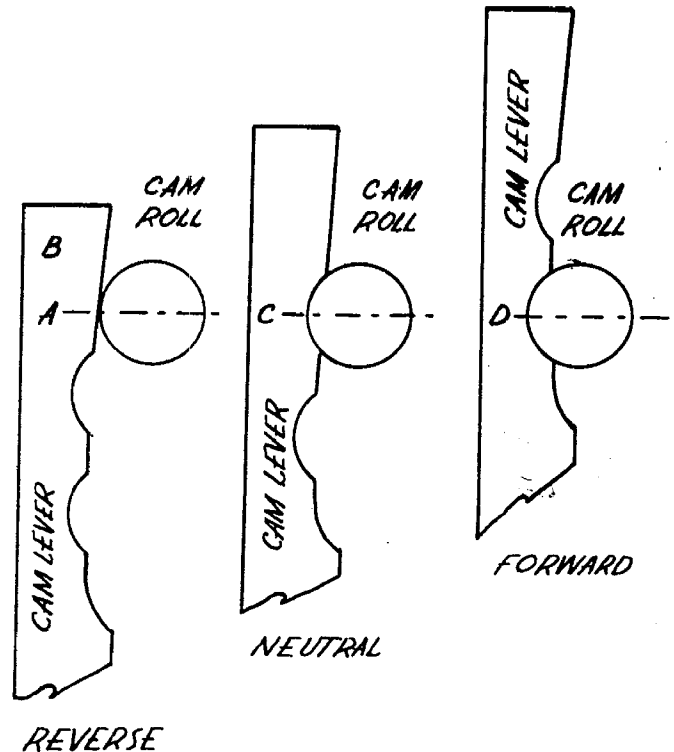


Fig.72 Reverse Gear - Cam Adjustment - Joes Model

signed so that in normal service no adjustments are necessary. As the clutch plates wear, the forward piston compensates for this wear by moving further forward. As the brake band lining wears, the reverse piston moves further down to compensate for this wear.

## 11. STA-NU-TRAL MANUAL TRANSMISSION

The adjustments that follow for the Sta-Nu-Tral manual transmission should be made periodically. They are especially important where remote control type of equipment is used for shifting and the operator cannot feel the tension on the clutch.

The transmission is of the planetary type, with which is incorporated a multiple-disc clutch running in engine oil. Tension of the reverse lever "B", Fig. 73, determines whether or not adjustment of the clutch is required.

Adjustment of the clutch in forward motion is as follows: Remove top cover of reverse gear housing. Place shifting fork in the reverse position and pull out spring-loaded pin "A" in after plate of reverse gear and clutch assembly. This plate is threaded into the reverse gear drum. Rotate the end plate in a clockwise direction until pin "A" seats itself in the next adjoining hole in the clutch plate. Try the shifting lever to see if desired result has been obtained. Repeat performance until clutch adjustment is satisfactory.

When adjusting clutch for reverse, set reverse lever "B" in reverse position. Slack off locknut "F" and adjust stop screw "G" until reverse lever remains in reverse position. When this result has been obtained, lock stop screw with locknut. NOTE: This adjustment is made at the factory and is rarely required in the field.

Next, while still holding reverse lever in the reverse position, slack off locknut "C" and screw down on adjusting screw "D" until there is a 1/16" gap under washer "E". When this adjustment has been made, tighten locknut "C".

Anchor bolt "H" is used to center

the reverse band evenly about the drum. With the reverse gear in the forward or neutral position the re-

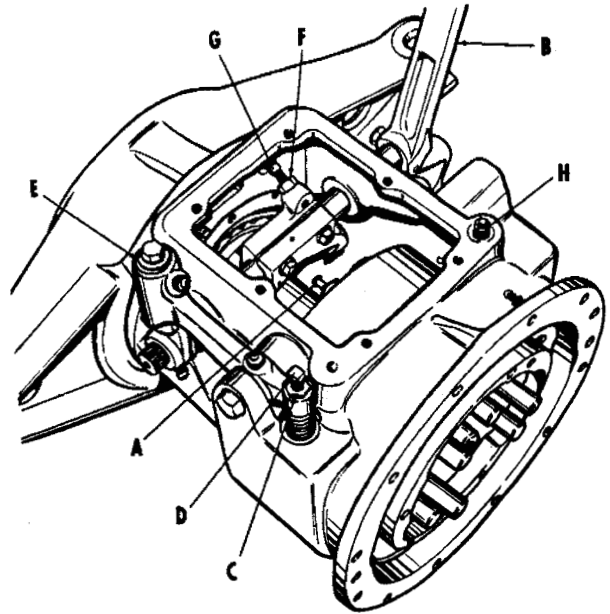


Fig.73 Sta-Nu-Tral - Reverse Gear

verse band should be free of pressure contact with the drum, i.e., you should be able to "wiggle" the band easily with the fingers. If the band is dragging against the drum, it can be raised or lowered slightly by adjusting the nuts on the anchor bolt "H".

## 12. OIL PRESSURE REGULATOR ADJUSTMENT

The oil pressure regulator is set at the factory for proper pressure and further adjustment should not be necessary. However, if adjustment should become necessary, proceed as follows:

(1) Run the engine until it has reached operating temperature.

(2) Loosen the pressure regulator locking nut. See Fig. 75. Located inside oil pan on six cylinder engines. See Fig. 76.

(3) Hold the locking nut and turn



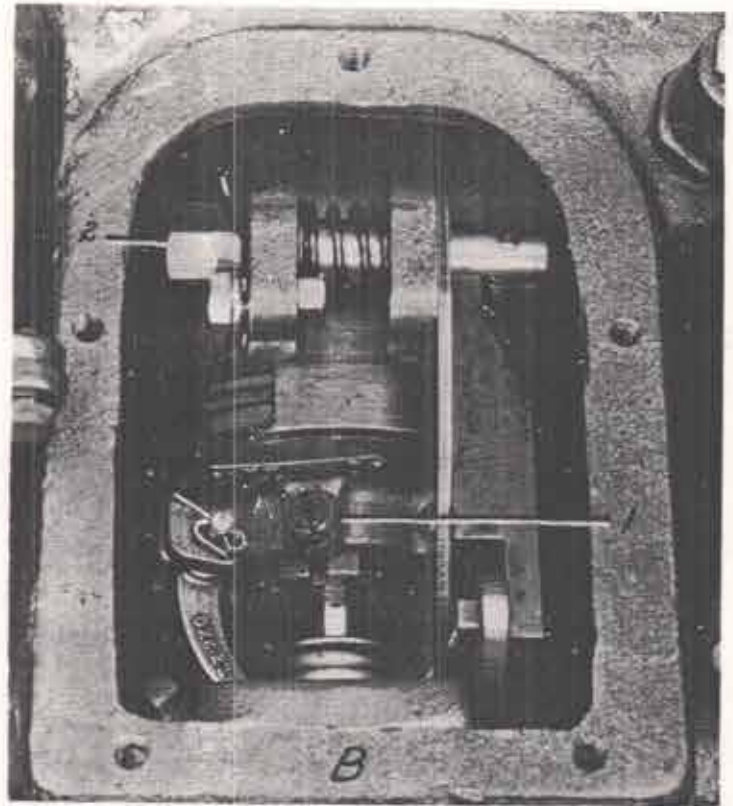
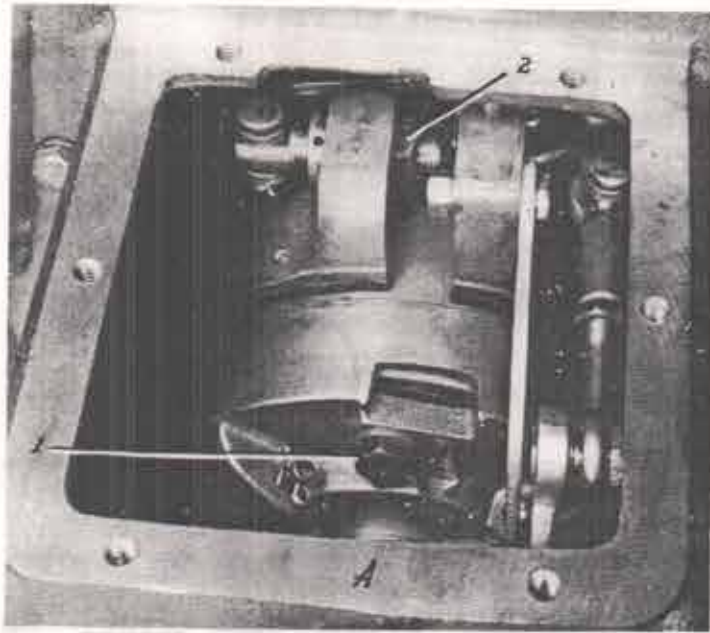


Fig. 74 Reverse Gear - Adjustment - Paragon

the pressure regulating screw in or out until the proper pressure shown in Table 4 is reached.

(4) Hold the regulating screw in place with a screwdriver and tighten the locking nut.

### 13. SPARK PLUG MAINTENANCE

Spark plugs should be inspected and cleaned from time to time and the gap between the electrodes set for proper clearance. Table 10 gives the proper size spark plug



Fig.75 Oil Pressure Regulator - Adjustment

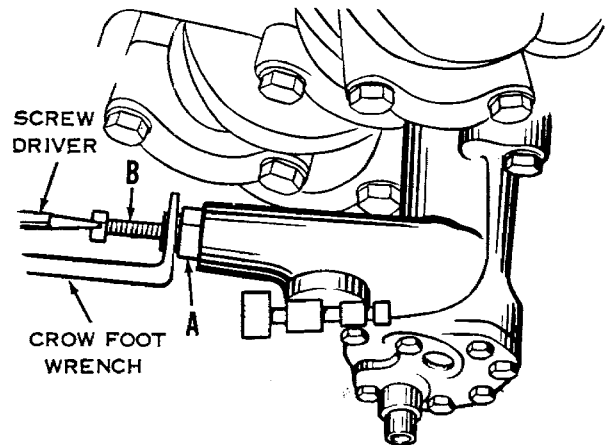


Fig.76 Oil Pressure Regulator - Adjustment

and gap setting for each engine covered by these instructions.

14. FUEL PUMP MAINTENANCE  
(See Fig.77)

a. Disassembly

(1) Disconnect fuel lines and remove pump from engine.

(2) Loosen nut holding bale to sediment bowl and remove bowl.

(3) Remove screen and gasket.

(4) Remove screws holding primer to bottom of pump.

(5) Remove springs and retaining caps.

(6) Remove spring clips from pin, holding cam lever to diaphragm plunger, and remove pin.

(7) Remove screws holding pump cover to pump body. Be careful not to damage diaphragm when separating cover from pump body.

b. Inspection

(1) Inspect screen for tears and holes.

(2) Inspect diaphragm for cracks, breaks and punctures.

(3) Check diaphragm return springs.

(4) Check cam roll and cam arm for worn parts.

c. Replacement of Parts

(1) Replace all parts which are damaged or show signs of wear.

(2) A special fuel pump repair kit is available from the Universal factory.

d. Assembly

(1) Put diaphragm assembly in place on pump body.

(2) Insert pin securing diaphragm plunger to cam lever.

(3) Replace retaining clips on pin.

(4) Replace primer pump cover. Be sure springs are in place and properly seated on retaining plugs in cover.

(5) Replace pump cover. Tighten all screws evenly and check to be sure diaphragm lies flat and smooth.

(6) Replace screen, gasket and sediment bowl.

(7) Replace fuel pump on engine and reconnect fuel lines.

Table 10  
SPARK PLUG DATA

ENGINE	NUMBER (Champion)	SIZE	GAP SETTING
Blue Jacket Twin	D-16M	18 mm.	.025
Atomic Four	J-8M	14 mm.	.025
Utility Four	D-16M	18 mm.	.025
Unimite Four	J-8M	14 mm.	.030
Super-Four	D-16M	18 mm.	.025
Arrow	J-7	14 mm.	.030
Bluefin	J-7	14 mm.	.030
Marlin	J-7	14 mm.	.030
Tarpon	J-7	14 mm.	.030
Knight	J-7	14 mm.	.030
Little King	UJ-6M	14 mm.	.028
Big King	F-11Y	14 mm.	.033 - .038

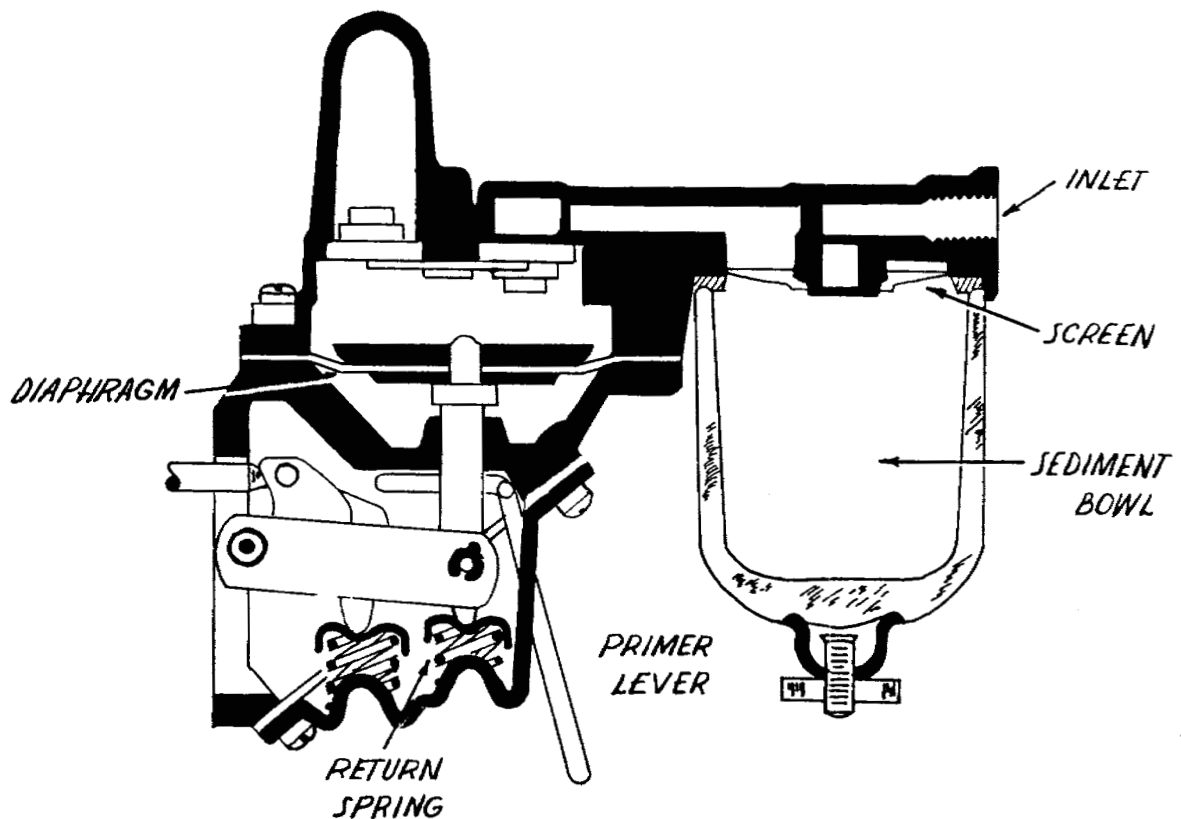


Fig.77 Fuel Pump

## 15. MAINTENANCE OF V-DRIVE UNITS

### a. General

(1) The Universal V-Drive unit is incorporated into the Atomic, Uni-mite, Bluefin and Knight models, and is designed as an integral part of the engine. The unit is directly coupled to the engine by a spline shaft and coupling.

(2) The V-Drive unit is a self-contained, non-adjustable, water-cooled unit. Water cooling is accomplished by direct connection to the main water supply of the engine.

(3) The unit requires no adjustment and very little maintenance with the exception of proper lubrication and the maintenance of proper water circulation.

### b. Lubrication

(1) The unit must be kept filled to the full mark on the bayonet stick. Use a good grade EP-90 universal gear lubricant.

#### CAUTION

New units shipped from the factory do not contain lubricant. Fill and check unit carefully before starting engine.

(2) After the first 50 hours of operation, drain unit and refill to full mark on the bayonet stick. Clean magnetic drain plug before refilling.

(3) Change lubricant every 500 hours of operation.



## 16. REPAIR PARTS KIT

A factory packaged repair parts kit is available for all models of engines covered by these instructions. Parts included in the kit have been selected by the Universal Motor Company Service Department based on years of experience in

engine maintenance. The kit contains parts most likely to require replacement through normal engine operation. Each part is carefully wrapped in a waterproof wrapping and packed in a convenient size metal box designed for lasting storage.

## SECTION VII TROUBLE SHOOTING

Any gasoline engine depends upon three main factors for proper operation: an unflinching fuel supply, uninterrupted ignition, and good compression. When any one of these is not present or present only intermittently, engine failure will result. The following "trouble shooting" information is designed

to help the operator locate and overcome some of the most probable causes of engine failure or improper operation. In Table 6 "Probable Causes" are listed in the most likely order of occurrence. Only one correction should be attempted at a time and that possibility eliminated before going on to the next.

Table 6

### TROUBLE SHOOTING PROCEDURES

Trouble	Probable Cause	Correction
Starter will not crank engine	Discharged battery	Charge or replace battery
	Corroded battery terminals	Clean terminals
	Loose connection in starting circuit	Check and tighten all connections
	Defective starting switch	Replace switch
	Starter motor brushes dirty or worn	Clean or replace brushes. See Par. 4, Sec. VI.
	Jammed Bendix gear	Loosen starter motor to free gear
Starter motor turns but does not crank engine	Defective starter motor	Replace motor
	Partially discharged battery	Charge or replace battery
	Defective wiring or wiring of too low capacity	Check wiring for worn or acid eaten spots. See Table 3, Sec. I for proper size wire.
Engine will not start (Defective fuel system)	Broken Bendix drive	Remove starter motor and repair drive. See Par. 4, Sec. VI.
	Empty fuel tank	Fill tank with proper fuel. See Table 5 for fuel oil models
	Flooded engine	Remove spark plugs and crank engine several times. Replace plugs.

Table 6  
TROUBLE SHOOTING PROCEDURES  
(Cont.)

Trouble	Probable Cause	Correction
<p>Engine will not start (Defective fuel system) (Cont.)</p>	<p>Water in fuel system</p> <p>Inoperative or sticking choke valve</p> <p>Improperly adjusted carburetor</p> <p>Clogged fuel lines or defective fuel pump</p> <p>NOTE: On fuel oil-kerosene models, be sure three-way valve is in proper position for starting on gasoline.</p>	<p>If water is found, clean tank, fuel lines and carburetor. Refill with proper fuel.</p> <p>Check valve, linkage, and choke rod or cable for proper operation.</p> <p>Adjust carburetor. See Par. 6, Sec. VI.</p> <p>Disconnect fuel line at carburetor. If fuel does not flow freely when engine is cranked, clean fuel lines and sediment bowl. If fuel still does not flow freely after cleaning, repair or replace pump. See Par. 14, Sec. VI.</p>
<p>Engine will not start (Defective ignition system)</p>	<p>Ignition switch "off", or defective</p> <p>Fouled or broken spark plugs</p> <p>Improperly set, worn or pitted distributor points. Defective condenser. Defective ignition coil.</p> <p>Wet, cracked, or broken distributor</p> <p>Improperly set, worn, or pitted magneto breaker points (Magneto models only)</p> <p>Improperly set, worn, or pitted timer points. Defective coil. (Battery in good condition) (Timer models only)</p> <p>Improper timing</p>	<p>Turn on switch or replace.</p> <p>Remove plugs and inspect for cracked porcelain, dirty points, or improper gap. See Par. 13, Sec. VI.</p> <p>Remove center wire from distributor cap and hold within 3/8 inch of motor block. Crank engine. Clean sharp spark should jump between wire and block when points open. Clean and adjust points. See Par. 1, Sec. VI. If spark is weak or yellow after adjustment of points, replace condenser. If spark still is weak or not present, replace ignition coil.</p> <p>Wipe inside surfaces of distributor dry with clean cloth. Inspect for cracked or broken parts. Replace parts where necessary.</p> <p>Remove spark plug wire and hold within 3/8 inch of engine block. Clean sharp spark should jump between wire and block when engine is cranked. If spark is weak or not present, clean and adjust breaker points. See Par. 1, Sec. VI.</p> <p>Remove spark plug wire and hold within 3/8 inch of engine block. A clean sharp spark should jump between wire and block when engine is cranked. Clean and set timer points. If spark still is not present when engine is cranked, replace coil.</p> <p>Check and set timing. See Par. 1, Sec. VI for electrical ignition models, Par. 5, Sec. VI for magneto models.</p>

Table 6  
TROUBLE SHOOTING PROCEDURES  
(Cont.)

Trouble	Probable Cause	Correction
Engine will not start (Poor compression and other causes)	Air leak around intake manifold  Loose spark plugs  Loosely seating valves  Damaged cylinder head gasket  Worn or broken piston rings or damaged cylinder walls	Check for leak by squirting oil around intake connections. If leak is found, tighten manifold and if necessary replace gaskets.  Check all plugs for proper seating, gasket and tightness. Replace all damaged plugs and gaskets.  Check for broken or weak valve springs, warped stems, carbon and gum deposits, and insufficient tappet clearance. See Par. 7, Sec. VI.  Check for leaks around gasket when engine is cranked. If a leak is found, replace gasket.  Replace broken and worn rings. Check cylinders for "out of round" and "taper"
Excessive engine temperature	No water circulation	Check for clogged water lines and restricted inlets and outlets. Check for broken or stuck thermostat. Look for worn or damaged water pump or water pump drive.
Engine temperature too low	Broken or stuck thermostat	Replace thermostat
No oil pressure	Defective gauge or tube  No oil in engine  Dirt in pressure relief valve  Defective oil pump, leak in oil lines or broken oil pump drive	Replace gauge or tube  Refill with proper grade oil. See Table 4.  Clean valve  Check oil pump and oil pump drive for worn or broken parts. Tighten all oil line connections.
Low oil pressure	Too light body oil  Oil leak in pressure line  Weak or broken pressure relief valve spring  Worn oil pump  Worn or loose bearings	Replace with proper weight oil. See Table 4.  Inspect all oil lines. Tighten all connections.  Replace spring.  Replace pump  Replace bearings
Oil pressure too high	Too heavy body oil  Stuck pressure relief valve  Dirt or obstruction in lines	Drain oil and replace with oil of proper weight. See Table 4.  Clean or replace valve  Drain and clean oil system. Check for bent or flattened oil lines and replace where necessary.

Table 6  
TROUBLE SHOOTING PROCEDURES  
(Cont.)

Trouble	Probable Cause	Correction
Sludge in oil	Infrequent oil changes Water in oil  Dirty oil filter	Drain and refill with proper weight oil Drain and refill. If trouble persists, check for cracked block, defective head gasket and cracked head  Replace filter
Loss of RPM (Engine)	Obstructed fuel line, air leak in fuel line, dirty filter or air cleaner, defective fuel pump or carburetor out of adjustment  Fouled or broken spark plugs, distributor points out of adjustment, or incorrect timing  Valve tappets out of adjustment, warped or burned valves, worn piston rings, too heavy lubricating oil or leaking cylinder head gasket	Correction of these difficulties is covered under "Engine will not start" portions of this table  Correction of these difficulties is covered under "Engine will not start" portions of this table  Correction of these difficulties is covered under "Engine will not start" portions of this table
Loss of RPM (Boat or associated equipment)	Damaged propeller Bent rudder Misalignment Too tight stuffing box packing gland Dirty boat bottom	
Vibration	Misfiring or pre-ignition  Loose foundation or foundation bolts Propeller shaft out of line or bent Propeller bent or pitch out of true	See correction under misfiring and pre-ignition
Pre-ignition	Defective spark plugs  Improper timing Engine carbon  Engine overheating	Check all spark plugs for broken porcelain, burned electrodes or electrodes out of adjustment. Replace all defective plugs or clean and reset. See Par. 1, 2 and 5, Sec. VI. Remove cylinder head and clean out carbon See correction under "Engine Overheating" portion of this table.
Misfiring	Defective spark plugs, improperly adjusted distributor points, or defective wiring	See correction under "Engine will not start" portions of this table
Backfiring	Insufficient fuel reaching engine due to dirty lines, strainer or blocked fuel tank vent. Water in fuel.  Poorly adjusted distributor	See correction under "Engine will not start" portions of this table.  See correction under "Engine will not start" portions of this table.