

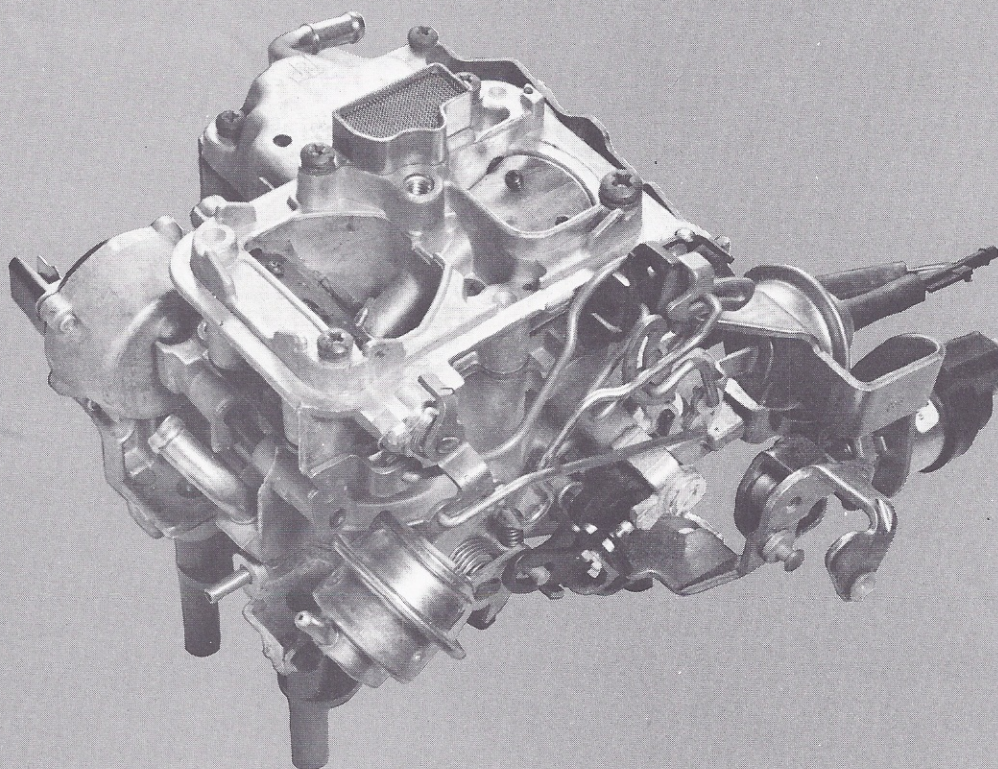
ROCHESTER PRODUCTS

9D-9-1

VARAJET II Carburetor

MODEL 2SE

Service Manual





The mixture is enriched in the primary bore through the power system. This system consists of a vacuum operated power piston and a spring located in a cylinder connected by a passage to manifold vacuum below the primary throttle valve. The spring under the power piston pushes the piston upward against manifold vacuum force tending to pull the piston downward.

During part throttle or cruising ranges, manifold vacuums are sufficient to hold the power piston down against spring force so that the larger metering diameter of the main metering rod is held in the main metering jet for leaner mixtures. However, as engine load is increased to a point where additional mixture enrichment is required, vacuum drops and the power piston spring force overcomes the vacuum pull on the power piston and the tapered tip of the primary metering rod moves upward in the primary metering jet. The smaller diameter of the metering rod tip allows more fuel to pass through the main metering jet and enrich the fuel mixture to meet the added power requirements.

As engine load decreases, the manifold vacuum increases and extra enrichment is no longer needed. The higher vacuum pulls downward on the power piston against spring force which moves the larger diameter of the primary metering rod into the metering jet, thereby returning the air/fuel mixture to normal economy ranges.

The primary stage of the Varajet II carburetor provides adequate air and fuel for low speed operation. However, at higher speeds, more air and fuel are needed to meet engine demands. The secondary stage of the carburetor provides the additional air and fuel through the secondary throttle bore for power and performance requirements.

The secondary stage has a separate and independent metering system. It consists of a large throttle valve connected by a shaft and linkage to the primary throttle shaft. Fuel metering is controlled by a spring loaded air valve, a secondary metering jet, a secondary metering rod, a secondary fuel well and fuel pick up tube (or drilling). These are used to modify fuel flow characteristics for exact air/fuel calibration.

The secondary metering system supplements fuel flow from the primary stage and operates as follows:

When the engine reaches a point where the primary bore cannot meet engine air and fuel demands, a lever in the primary throttle linkage, through contact with a pin on the secondary throttle lever, begins to open the secondary throttle valve. This occurs only if the electric choke has warmed the thermostatic coil sufficiently to release the secondary lockout lever. As the secondary throttle valve opens, engine manifold vacuum is applied directly beneath the air valve. Atmospheric pressure on top of the off-set air valve forces the air valve open against spring and secondary vacuum break forces. This allows air to pass through the secondary bore of the

carburetor.

As the air valve opens, the secondary metering rod is lifted out of the jet allowing increased fuel flow into the secondary bore. Fuel reaches the secondary metering jet from the float bowl through a secondary fuel pick up tube and channel in the air horn.

As the secondary throttle valve is opened further and engine speeds increase, air flow through the secondary stage increases and opens the air valve to a greater degree which, in turn, moves the secondary metering rod out of the secondary metering jet. The metering rod is tapered so that fuel flow through the secondary metering jet provides the proper air/fuel ratio during secondary operation.

The position of the metering rod in the jet, in relation to the air valve position, is factory adjusted to meet air/fuel requirements for each specific engine model. No change in this adjustment should be made in the field.

Baffles are added on the downstream side of the secondary air valve for improved air valve operation.

AIR VALVE DASHPOT

The secondary air valve uses an air valve dashpot feature to control opening rate of the air valve. This prevents an uncontrolled air valve opening rate which results in an instantaneous air rate change and a "lagging" fuel rate change as the secondary throttle valve is opened. The primary side vacuum diaphragm provides the air valve dashpot action. The dashpot, through linkage, controls opening of the air valve to provide a smooth transition to secondary system operation.

The air valve dashpot operates off the primary side vacuum diaphragm unit. The air valve is connected to the vacuum break unit by a bend adjustable link.

Whenever manifold vacuum is sufficiently high, the vacuum diaphragm is seated, plunger retracted, against spring load. At this point the vacuum diaphragm link is at the forward end of the vacuum diaphragm plunger stem slot and the air valve is closed.

During acceleration or heavy engine loads when the secondary throttle valve is opened, the manifold vacuum drops. The spring located in the vacuum diaphragm unit overcomes the vacuum force and moves the stem outward. This action allows the air valve to open. The opening rate of the air valve is controlled by the calibrated restriction in the vacuum inlet of the diaphragm cover and the valve closing spring. The dashpot action, due to this restricted vacuum flow and spring force, provides the required delay in air valve opening needed until sufficient fuel flows from the secondary discharge nozzle.

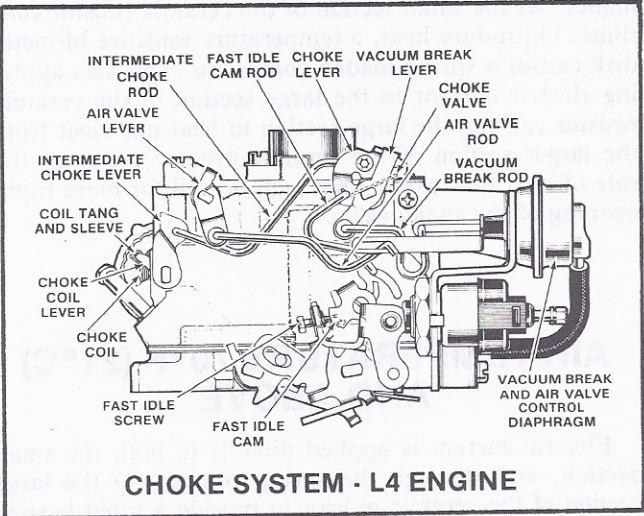


FIGURE 11

CHOKE SYSTEM (Fig. 11)

The choke system of the 2SE carburetor for the L 4 engine uses a single vacuum break unit that is mounted on the idle speed solenoid bracket located on the primary side of the carburetor. A dual vacuum break system is used on carburetor applications for the L-6 and V6 engines, with the secondary vacuum break unit mounted on a bracket located on the secondary side of the carburetor.

The choke system operates as follows:

When the engine is cold, prior to starting, depressing the accelerator pedal to the floor opens the throttle valve. This allows tension from the thermostatic coil to close the choke valve and also rotates the fast idle cam so the high step is in line with the fast idle cam screw on the throttle lever. As the throttle is released, the fast idle cam screw comes to rest on the high step of the fast idle cam, thus providing enough throttle valve opening to keep the engine running after cold start. During cranking, engine vacuum below the choke valve pulls fuel from the idle system and main discharge nozzle. This provides adequate enrichment for good cold starts.

When the engine starts and is running, manifold vacuum is applied to the primary vacuum break unit. This moves the diaphragm plunger in until it strikes the rear cover, thereby opening the choke valve to a point where the engine will run without loading or stalling. As the engine warms up, heat gradually relaxes tension of the thermostatic coil to allow the choke valve to continue opening. Through inlet air pressure pushing on the off-set choke valve and the weight of the linkage pulling the choke valve open, the choke valve continues to open further until it is fully open when the engine can run at

normal air/fuel mixtures.

On the V6 and L-6, the secondary vacuum break improves drivability during warm-up.

This carburetor is equipped with an electric choke. An electrically actuated ceramic resistor in the electric choke assembly heats the thermostatic coil which gradually relaxes its spring tension so that air velocity through the air horn can continue to open the choke valve. This continues until the engine is warm. At this point, the choke coil tension is completely relaxed and the choke valve is wide open.

The fast idle cam has graduated steps so that fast idle engine speed is lowered gradually during the engine warm-up period. The fast idle cam follows rotation of the choke valve. When the choke valve is completely open and the engine is warm, the fast idle cam screw on the throttle lever will be off the steps of the fast idle cam. At this point, the idle speed screw or solenoid controls normal engine idle speed.

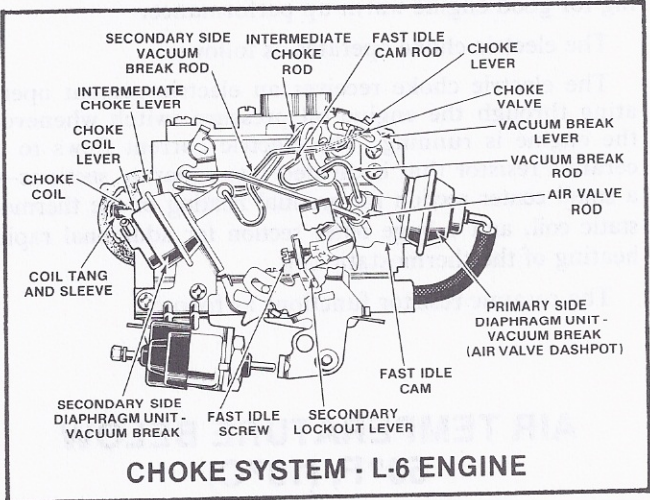


FIGURE 12

An unloader mechanism is provided should the engine become flooded during the starting period. The unloader partially opens the closed choke valve to allow increased air flow through the carburetor to lean out the overly rich mixtures. This is accomplished by depressing the accelerator pedal to the floor so that wide open throttle is obtained. When this is done, a tang on the throttle lever contacts an arm on the fast idle cam and forces the choke valve partially open. The extra air leans out the fuel mixture enough so that the engine will start.

ELECTRIC CHOKE ASSEMBLY (Fig. 13)

A ceramic resistor in the electric choke assembly is heated by an electric current and the resistor warms the

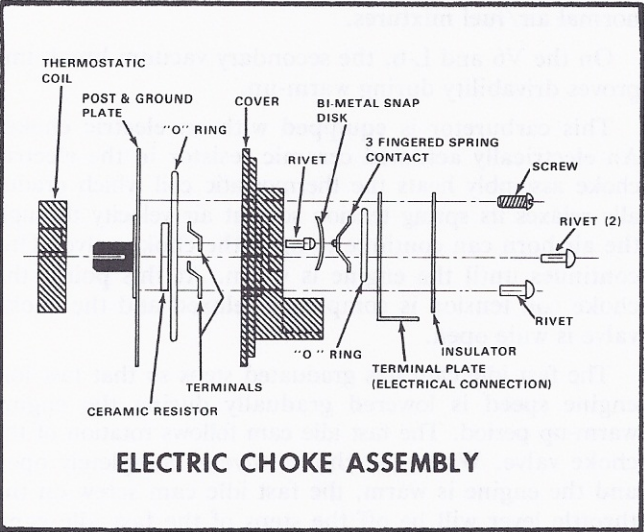


FIGURE 13

thermostatic coil for precise timing of choke valve opening for good engine warm-up performance.

The electric choke operates as follows:

The electric choke receives an electric current operating through the engine oil pressure switch whenever the engine is running. The electric current flows to a ceramic resistor that is divided into separate sections—a small center section for gradual heating of the thermostatic coil, and a large outer section for additional rapid heating of the thermostatic coil.

The ceramic resistor functions as follows:

**AIR TEMPERATURE BELOW
50°F, (10°C)**

Electric current, applied to the small section of the ceramic resistor causes the section to heat up and warm the thermostatic coil which allows gradual opening of the choke valve for good cold engine warm-up perfor-

mance. As the small section of the ceramic resistor continues to produce heat, a temperature-sensitive bi-metal disk causes a spring loaded contact to close also applying electric current to the large section of the ceramic resistor causing the large section to heat up. Heat from the larger section of the ceramic resistor increases the rate of heat flow to the thermostatic coil for more rapid opening of the choke valve.

**AIR TEMPERATURE 70°F (21°C)
AND ABOVE**

Electric current is applied directly to both the small section, and through the spring contact, to the large section of the ceramic resistor to provide a rapid heating of the thermostatic coil for greater choke valve opening when leaner air/fuel mixtures are desired at warmer ambient temperatures.

**AIR TEMPERATURE BETWEEN 50°F
(10°C) AND 70°F (21°C)**

Electric current applied to the small section or both the small and large sections of the ceramic resistor, depending upon the temperature, will produce the required heat to warm the thermostatic coil to control choke valve position for good engine performance in these temperature ranges.

NOTE: Ground contact for the electric choke is provided by a metal plate located at the rear of the choke assembly. **DO NOT INSTALL A CHOKE COVER GASKET BETWEEN THE ELECTRIC CHOKE ASSEMBLY AND THE CHOKE HOUSING.**

The electric choke and thermostatic coil are serviced as a complete assembly.



MAJOR SERVICE OPERATIONS

The procedures below apply to the complete overhaul with the carburetor removed from the engine.

However, in many cases service adjustments of individual systems may be completed without removing the carburetor from the engine.

A complete carburetor overhaul includes disassembly, thorough cleaning, inspection, and replacement of all gaskets, diaphragm, seals, worn or damaged parts, and service adjustment of individual systems.

NOTICE: Before performing any service on the carburetor, it is essential that the carburetor be placed on a holding fixture such as Tool J-9787-118. Without the use of the holding fixture, it is possible to damage throttle valves.

MODEL 2SE CARBURETOR SERVICE

IDLE SPEED SOLENOID

Remove

1. Bend back retaining tabs on lockwasher; then remove large solenoid retaining nut using suitable wrench.

NOTICE: Use care in removing nut with wrench to avoid bending or damaging choke linkage, solenoid bracket, or throttle lever.

2. Remove lockwasher and solenoid unit from bracket.

NOTICE: The solenoid should not be immersed in any type of carburetor cleaner and should always be removed before complete carburetor overhaul. Immersion in cleaner will damage solenoid.

AIR HORN

Remove

1. Remove pump lever retaining screw from air horn (Figure 14). Then rotate pump lever to remove from pump rod.
2. Remove hose from vacuum break assembly.
3. Remove idle speed solenoid-vacuum break bracket attaching screws from air horn and throttle body (Figure 15 and 16). Then, on L-4 models rotate bracket to remove vacuum break rod and air valve rod from vacuum

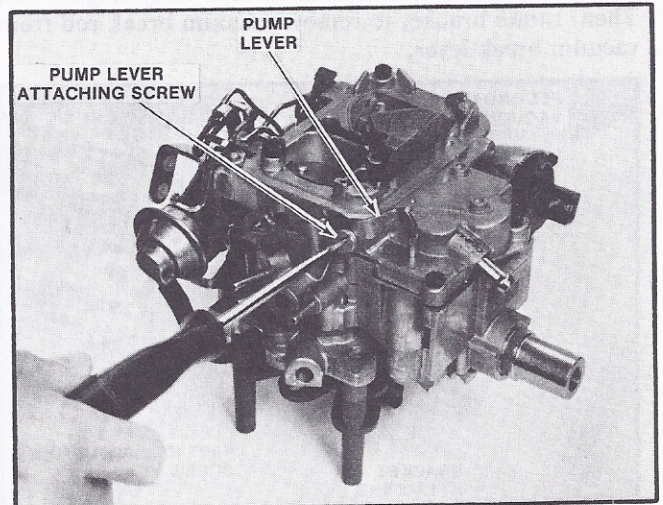


FIGURE 14 PUMP LEVER REMOVAL

break diaphragm plunger and remove bracket assembly from float bowl. On V6 and L-6 models, rotate vacuum break and bracket assembly to disengage rods from vacuum break and air valve levers. It is not necessary to remove the vacuum break or air valve rods from the vacuum break plunger on V6 models unless replacement of the rods or vacuum break unit is necessary (Figure 16). If not removed previously, idle speed solenoid may be removed from bracket following procedure described above.

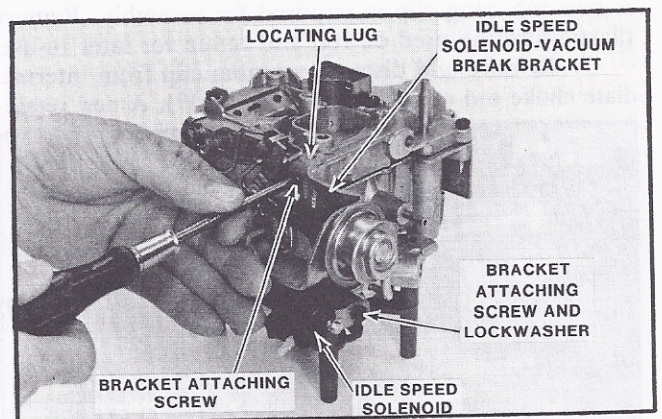


FIGURE 15 VACUUM BREAK REMOVAL - L4

NOTICE: Do not place vacuum break assembly and solenoid in carburetor cleaner. Immersion in cleaner will damage solenoid.

4. If necessary to replace the vacuum break, vacuum break rod or air valve rod on V6 models, remove and discard retaining clips from end of rods. New retaining



clips are required for reassembly. Remove plastic bushings used on rods and retain for later re-use.

5. Where used, remove secondary side vacuum break bracket attaching screws from throttle body (Figure 16). Then, rotate bracket to remove vacuum break rod from vacuum break lever.

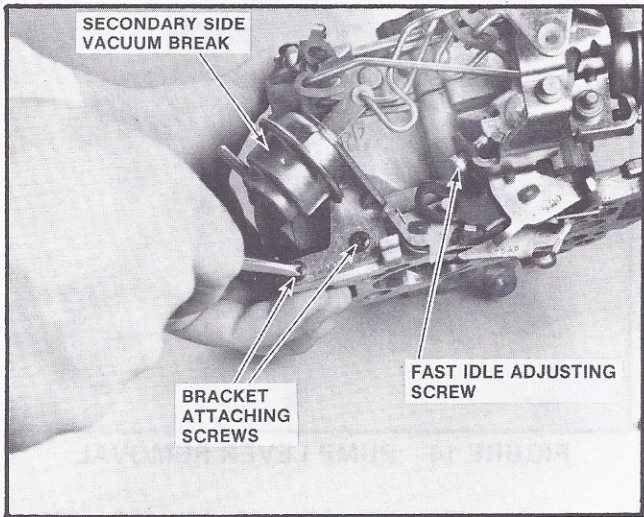


FIGURE 16 VACUUM BREAK REMOVAL - V6

NOTICE: Do not place vacuum break assembly in carburetor cleaner. Immersion in cleaner will damage vacuum break diaphragm.

6. It is not necessary to remove the secondary side vacuum break rod from the vacuum break plunger unless replacement of the vacuum break or rod is necessary. If necessary to replace the secondary side vacuum break rod, remove and discard retaining clip from end of rod. A new retaining clip is required for assembly. Remove plastic bushing used on rod and retain for later re-use.

7. Remove and discard retaining clip from intermediate choke rod at choke lever (Figure 17). A new retain-

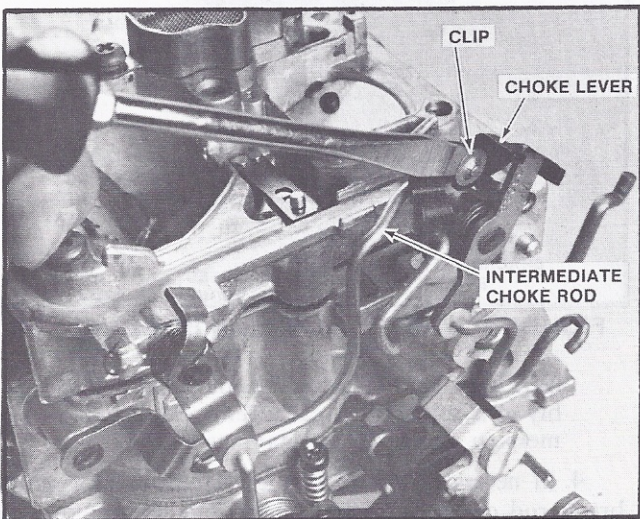


FIGURE 17 CHOKE ROD REMOVAL (L4 SHOWN)

ing clip is required for reassembly. Remove choke rod and plastic bushing from choke lever and save the bushing for later re-use.

8. If equipped, remove two (2) small screws that retain the hot idle compensator valve (Figure 18). Remove valve and seal from air horn. Discard seal.

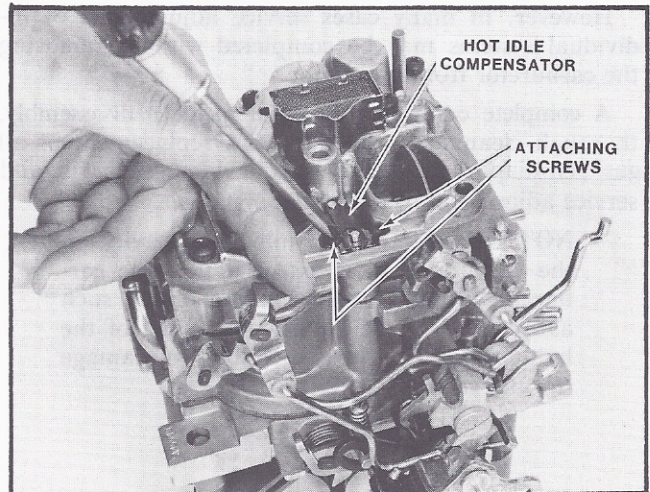


FIGURE 18 IDLE COMPENSATOR REMOVAL

Hot idle compensator valve must be removed to gain access to short air horn to bowl attaching screw.

9. Remove the six (L 4) or seven (V6) air horn to bowl attaching screws and lockwashers (Figure 19). Remove vent and screen assembly.

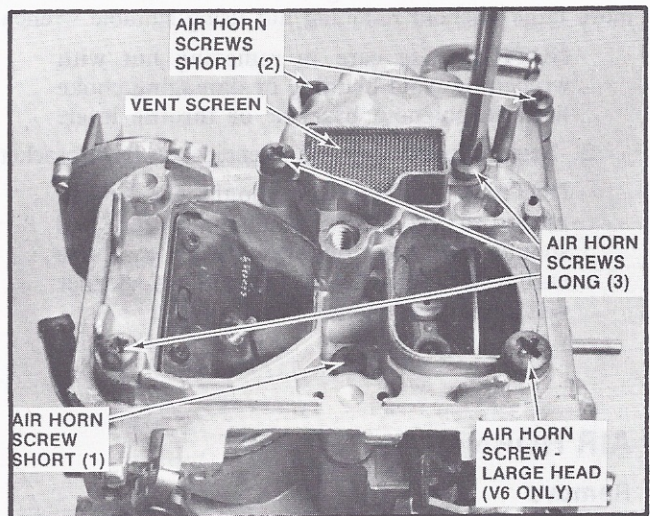


FIGURE 19 AIR HORN ATTACHING SCREWS & VENT SCREEN - V6 SHOWN

10. Rotate fast idle cam to the full UP position and remove air horn assembly by tilting to disengage fast idle cam rod from slot in fast idle cam (Figure 20). The air horn gasket should remain on the float bowl for later removal.

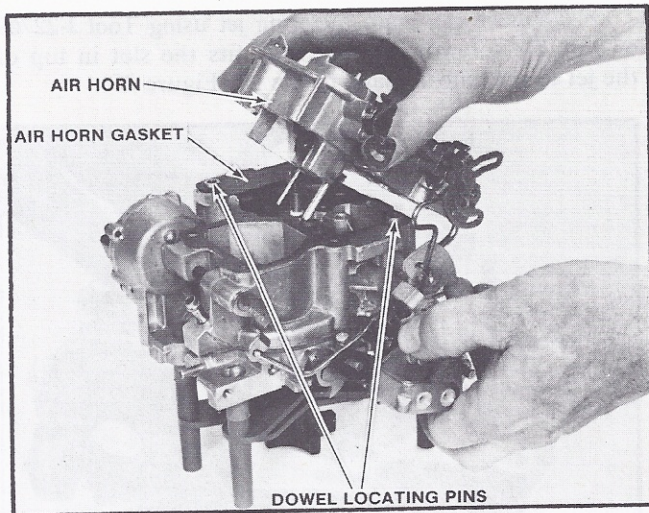


FIGURE 20 AIR HORN REMOVAL

NOTICE: DO NOT remove fast idle cam and screw from float bowl. These parts are not serviced separately and are to remain permanently in place as installed by the factory. The new service replacement float bowl will include the secondary lock-out lever, fast idle cam and screw installed as required.

11. Remove fast idle cam rod from choke lever by rotating rod to align squirt on rod with small slot in lever.

Air Horn Disassembly

1. Further disassembly of the air horn is not required for cleaning purposes. If part replacement is required, remove staking on two (2) choke valve attaching screws. Remove screws, choke valve, and shaft from air horn.

NOTICE: The air valve screws are permanently staked in place and should not be removed. Do not attempt to remove the secondary metering rod from the air valve assembly. The secondary metering rod adjustment screw is pre-set at the factory and no attempt should be made to change this adjustment in the field. If air horn replacement is required during carburetor service, the new service air horn assembly will include the secondary metering rod-air valve assembly pre-set as required. It is not necessary to remove the vacuum break rod, fast idle cam rod or air valve rod from the levers in the air horn unless replacement of the rods is necessary. The plastic bushings in the levers will withstand normal cleaning in carburetor cleaner.

2. On L4 models, it is not necessary to remove the vacuum break rod or air valve rod from the levers in the

air horn unless replacement of the rods is necessary. The plastic bushings in the levers will withstand normal cleaning in carburetor cleaner. If necessary to replace the vacuum break rod or air valve rod on L4 models, remove and discard retaining clips from end of rods. New retaining clips are required for reassembly. Remove plastic bushings used on rods and retain for later re-use.

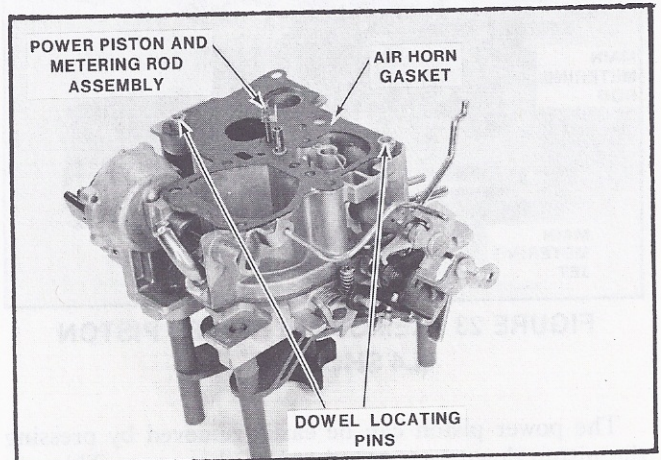


FIGURE 21 FLOAT BOWL DISASSEMBLY

FLOAT BOWL Disassembly (Figure 21)

1. Remove air horn gasket. Gasket is pre-cut for easy removal around metering rod and hanger assembly.
2. Remove pump plunger from pump well.
3. Remove pump return spring from pump well.
4. Remove plastic filler block over float valve.
5. Remove float assembly and float needle by pulling up on retaining pin. Remove float needle seat and gasket, using seat remover J-22769 (Figure 22).

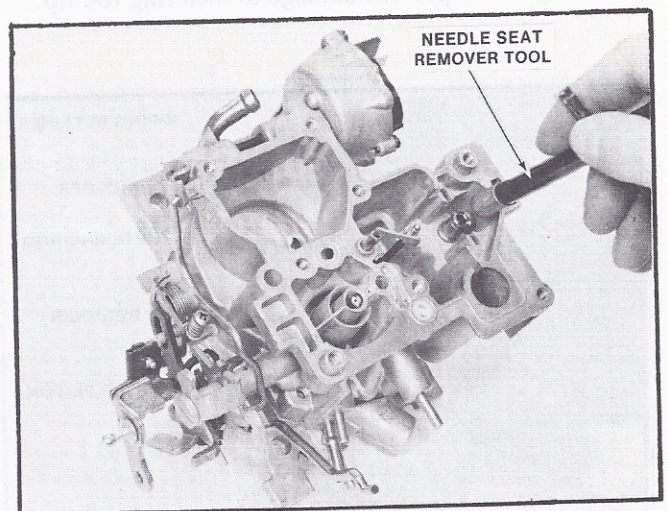


FIGURE 22 REMOVING INLET NEEDLE SEAT

6. Remove power piston and metering rod assembly by depressing piston stem and allowing it to snap free (Figure 23).

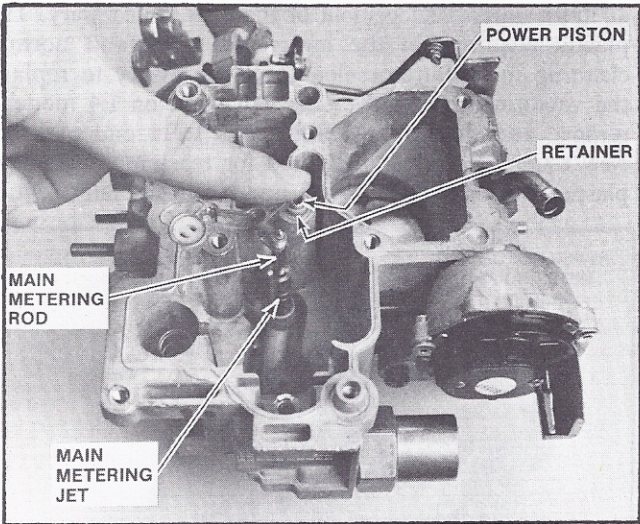


FIGURE 23 REMOVING POWER PISTON (L4 SHOWN)

The power piston can be easily removed by pressing the piston down and releasing it with a snap. This will cause the power piston spring to snap the piston up against the plastic retainer. This procedure may have to be repeated several times.

NOTICE: Do not remove power piston by using pliers on metering rod holder.

7. Remove the power piston spring from the piston bore. If necessary, metering rod may be removed from power piston hanger by compressing spring on top of metering rod and aligning groove on rod with slot in holder (Figure 24). Use extreme care in handling the metering rod to prevent damage to metering rod tip.

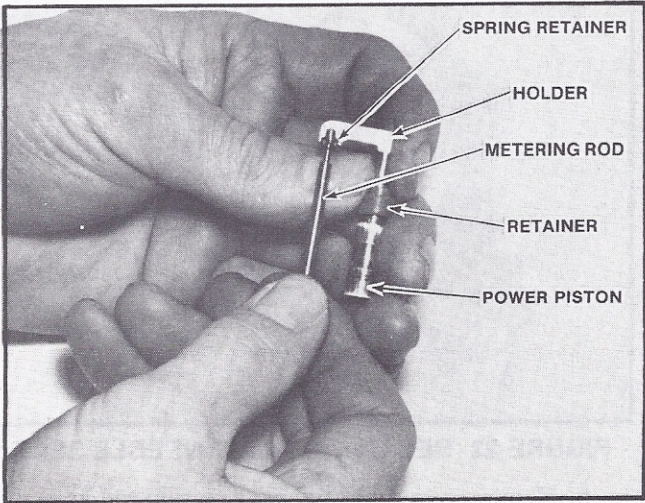


FIGURE 24 REMOVING METERING ROD FROM PISTON HOLDER

8. Remove the main metering jet using Tool J-22769 or suitable screwdriver that fully fits the slot in top of the jet to prevent damage to the jet (Figure 25).

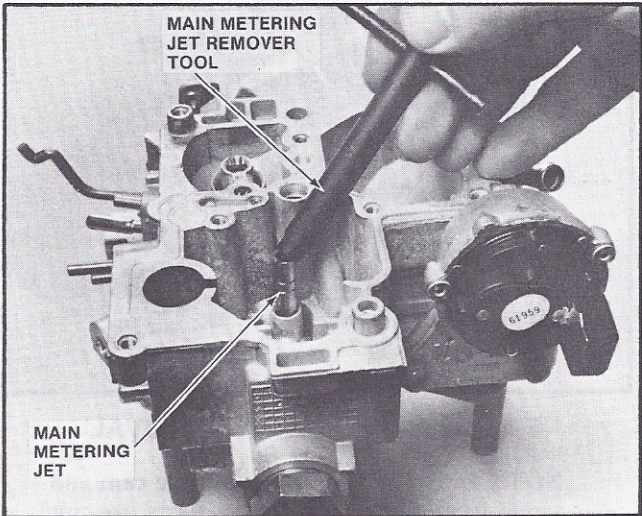


FIGURE 25 REMOVING MAIN METERING JET

9. Using a small slide hammer or equivalent, remove plastic retainer holding pump discharge spring and check ball in place (Figure 26). Discard plastic retainer (a new retainer is required for reassembly).

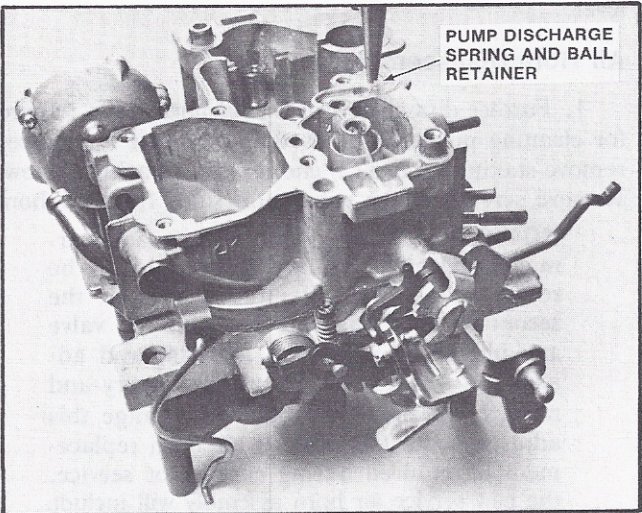


FIGURE 26 REMOVING PUMP DISCHARGE RETAINER

Turn bowl upside down catching pump discharge spring and check ball in palm of hand.

NOTICE: Do not attempt to remove plastic retainer by prying out with a tool such as a punch or screwdriver - this will damage the sealing beads on the bowl casting surface and require complete float bowl replacement.

Choke Disassembly

Remove three attaching screws and retainers from choke cover and coil assembly. Then pull straight outward and remove cover and coil assembly from choke housing.--OR

NOTICE: The tamper-resistant choke cover design is used to discourage readjustment of the choke thermostatic cover and coil assembly in the field. However, if necessary to remove the cover and coil assembly during normal carburetor disassembly for cleaning and overhaul using procedures described below.

1. Support float bowl and throttle body as an assembly on a suitable holding fixture such as Tool J-9789-118.

Carefully align a #21 drill (.159") on pop-rivet head and drill only enough to remove rivet head (Figure 27). Drill the two remaining rivet heads and then use a drift and small hammer to drive the remainder of the rivets out of the choke housing. Use care in drilling to prevent damage to choke cover or housing.

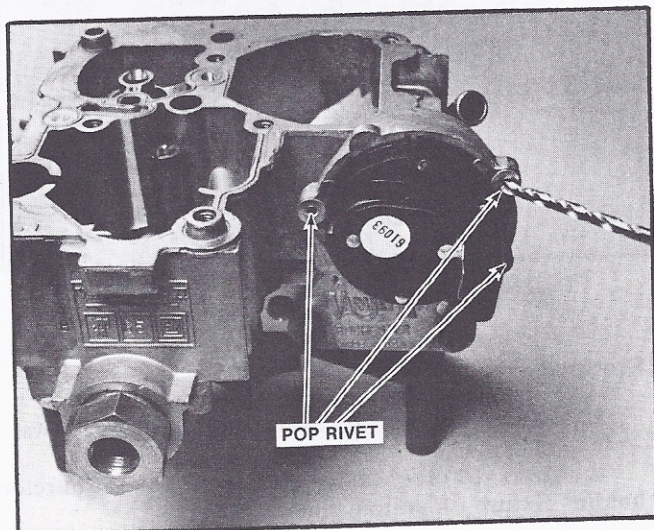


FIGURE 27 RIVETED CHOKE COVER REMOVAL

2. Remove the three retainers and choke cover assembly from choke housing.

3. Remove screw from end of intermediate choke shaft inside choke housing (Figure 28). Remove choke coil lever from shaft.

4. Remove intermediate choke shaft and lever assembly from float bowl by sliding rearward out throttle lever side (Figure 29).

5. Remove choke housing by removing two (2) attaching screws in throttle body (Figure 30).

Disassemble remaining float bowl parts.

1. Remove fuel inlet nut, gasket, check filter/valve assembly, and spring.

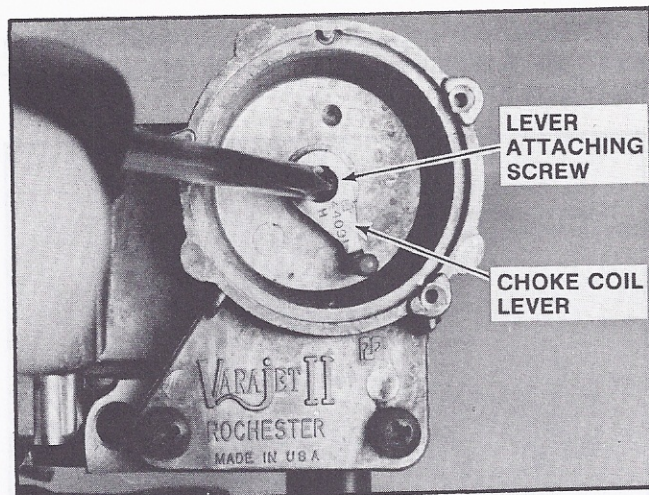


FIGURE 28 CHOKE COIL LEVER SCREW

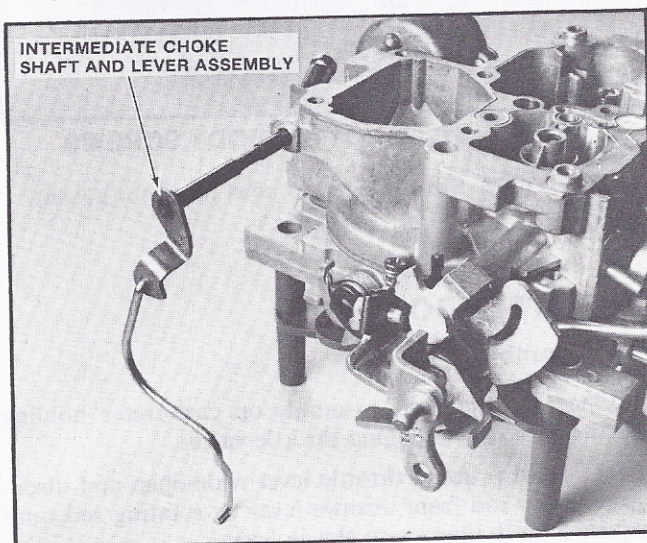


FIGURE 29 REMOVING INTERMEDIATE CHOKE SHAFT

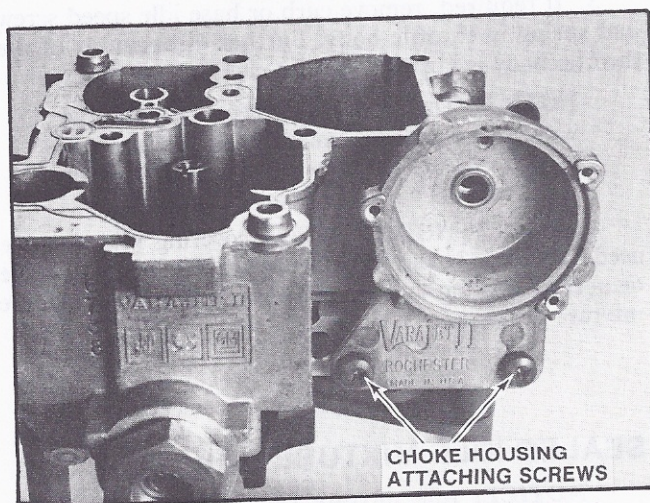


FIGURE 30 CHOKE HOUSING SCREWS



2. Remove four (4) throttle body to bowl attaching screws and lockwashers and remove throttle body assembly (Figure 31).

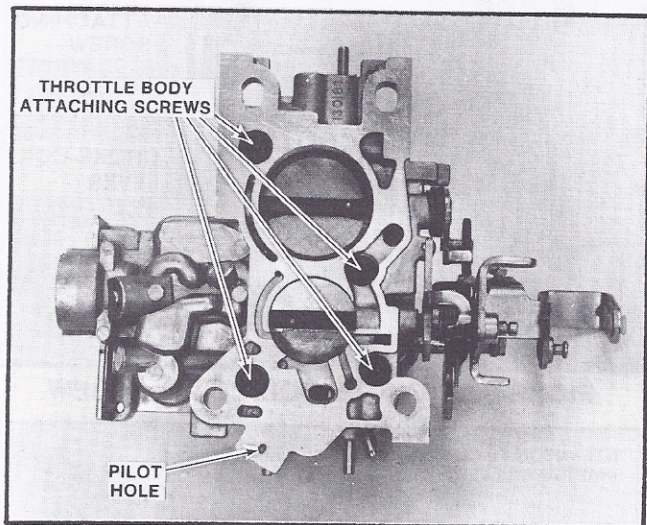


FIGURE 31 THROTTLE BODY SCREWS

3. Remove throttle body to bowl insulator gasket.

THROTTLE BODY

Disassemble

Place throttle body assembly on carburetor holding fixture to avoid damaging throttle valves.

1. Hold primary throttle lever wide-open and disengage pump rod from throttle lever by rotating rod until squirt on rod aligns with slot in lever.

2. If replacement is necessary, remove fast idle screw and clip in primary throttle lever.

3. If required, remove curb or base idle speed screw and spring in throttle body. Further disassembly of the throttle body is not required for cleaning purposes.

NOTICE: The primary and secondary throttle valve screws are permanently staked in place and should not be removed. The throttle body is serviced as a complete assembly.

4. **DO NOT REMOVE** plug covering idle mixture needle unless it is necessary to replace the mixture needle or normal soaking and air pressure fails to clean the idle mixture passages.

SEALED IDLE MIXTURE NEEDLE

NOTICE: Idle mixture should be adjusted only if required at time of major carburetor

overhaul, throttle body replacement or high exhaust emissions as determined by official inspections.

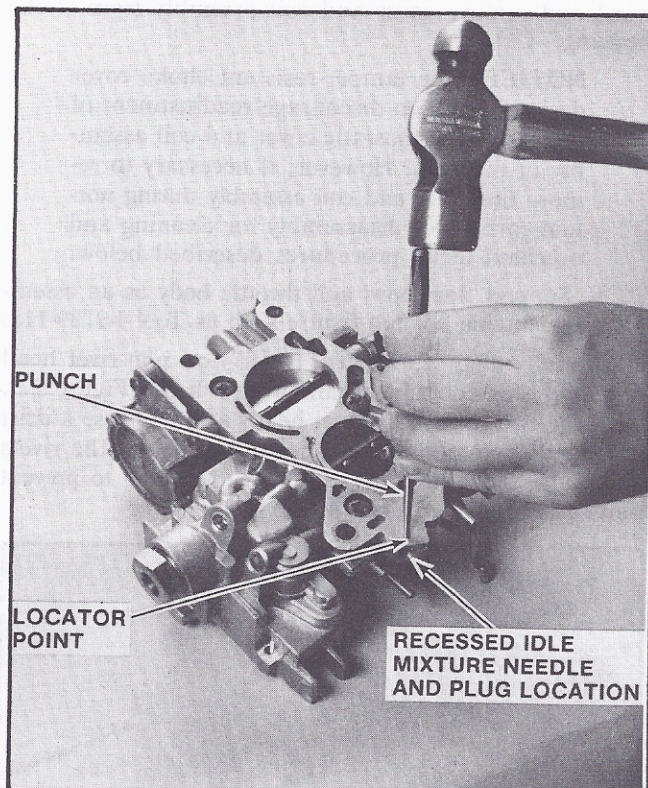


FIGURE 32 REMOVING IDLE MIXTURE SEAL PLUGS

Remove

1. Remove idle mixture needle and plug as follows:

a. Invert throttle body and place on carburetor holding fixture - manifold side up.

b. Place a punch in the locator point in the throttle body beneath the idle mixture needle plug (manifold side). See Figure 32 for locating point. Then, holding the punch vertical, drive punch through the locator until hardened steel plug breaks. Then, holding punch at a 45° angle, breakout throttle body casting to gain access to the mixture needle plug.

Hardened plug will break rather than remaining intact. It is not necessary to remove the plug completely; instead, remove loose pieces to allow use of idle mixture adjusting tool. Two styles of idle mixture screws are used 1. Hex head, 3/16", use tool J-28706, (OR) 2. Double-D Head, tool J-29030.

c. Using proper tool, remove idle needle, washer (if used), and spring from throttle body (Figure 33).

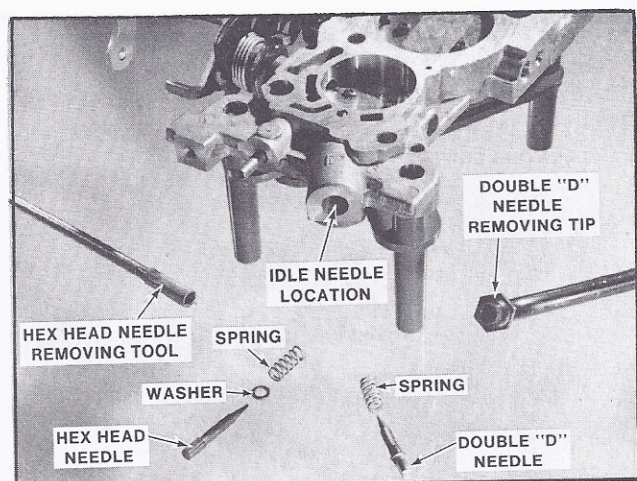


FIGURE 33 REMOVING IDLE MIXTURE SCREWS

CLEANING AND INSPECTION

The carburetor parts should be cleaned in a cold immersion-type cleaner such as Carbon X (X-55) or its equivalent.

NOTICE: The solenoid, electrical choke, rubber parts, plastic parts, diaphragms, pump plunger, plastic filler block should NOT be immersed in carburetor cleaner as they will swell, harden or distort. The plastic bushings in the end of the vacuum break rod, rod and air valve rod on L4 models will withstand normal cleaning in carburetor cleaner.

1. Thoroughly clean all metal parts and blow dry with compressed air. Make sure all fuel passages and metering parts are free of burrs and dirt. Do not pass drills or wires through jets and passages.
2. Inspect upper and lower surface of carburetor castings for damage.
3. Inspect holes in levers for excessive wear or out of round conditions. If worn, levers should be replaced. Inspect plastic bushings for damage and excessive wear. Replace as required.
4. Check, repair, or replace parts if the following problems are encountered:

A. Flooding

1. Inspect float needle and seat for dirt, deep wear grooves, scores, and proper seating.
2. Inspect float needle pull clip for proper installation (Figure 4). Be careful not to bend needle pull clip.
3. Inspect float, float arms and hinge pin for distortion, binding, and burrs. Check density of material in the float; if heavier than normal, replace float.
4. Clean or replace fuel inlet filter and check valve.

B. Hesitation

1. Inspect pump plunger for cracks, scores, or cup excessive wear. A used pump cup will shrink when dry. If dried out, soak in fuel for 8 hours before testing.
2. Inspect pump duration and return springs for being weak or distorted.
3. Check all pump passages and jet for dirt, improper seating of discharge check ball and scores in pump well. Check condition of pump discharge check ball spring.
4. Check pump linkage for excessive wear; repair or replace as necessary.

C. Hard Starting - Poor Cold Operation

1. Check choke valve and linkage for excessive wear, binds or distortion.
2. Inspect choke vacuum diaphragm(s) for leaks.
3. Clean or replace carburetor fuel filter.
4. Inspect needle for sticking, dirt, etc.
5. Also check items under "Flooding".

D. Poor Performance - Poor Gas Mileage

1. Clean all fuel and vacuum passages in castings.
2. Check choke valve for freedom of movement.
3. Check power piston, metering rod, and jet for dirt, sticking, binding, damaged parts or excessive wear.
4. Check air valve and secondary metering rod for binding conditions. If air valve or metering rod is damaged, the air horn assembly must be replaced.

E. Rough Idle

1. Inspect gasket and gasket mating surfaces on castings for damage to sealing beads, nicks, burrs and other damage.
2. Clean all idle fuel passages.
3. If removed, inspect idle mixture needle tip for ridges, burrs, or being bent.
4. Check throttle lever and valves for binding, nicks and other damage.
5. Check all diaphragms for possible ruptures or leaks.
6. Clean plastic parts only in Stoddard solvent - never in gasoline.

CARBURETOR ASSEMBLY THROTTLE BODY

Assemble

1. Install curb or base idle speed screw and spring, if removed, in throttle body (Figure 34).
2. If removed, install fast idle adjustment screw and clip in primary throttle lever.



3. Holding primary throttle lever wide open, install lower end of pump rod in throttle lever by aligning squirt on rod with slot in lever. End of rod should point outward toward throttle lever.

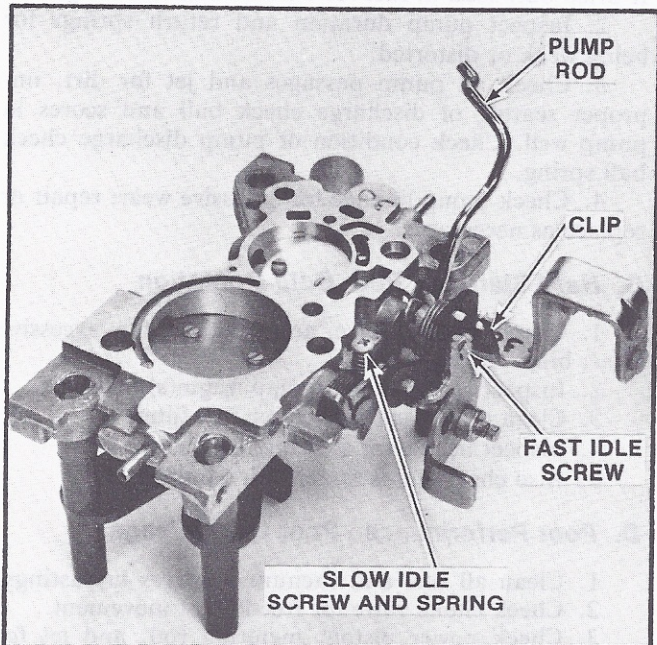


FIGURE 34 THROTTLE BODY

4. If removed, install idle mixture needle, washer (if used), and spring using tool J-28706 or J-28030 (Figure 33). Lightly seat needle and then back out three turns as a preliminary idle mixture adjustment. Final idle mixture adjustment must be made on-car using the procedures described under Idle Mixture Adjustment.

FLOAT BOWL

Assemble

NOTICE: If a new float bowl assembly is used, stamp or engrave the model number on the new float bowl (see Figure 3, page 4).

1. Install new throttle body to bowl insulator gasket over two locating dowels on bowl (Figure 35).

2. Holding fast idle cam so that cam steps face fast idle screw on throttle lever when properly installed, install throttle body making certain throttle body is properly located over dowels on float bowl; then install four (4) throttle body to bowl screws and lockwashers and tighten securely (Figure 31).

NOTICE: Inspect linkage to insure lockout tang is located properly to engage slot in secondary lockout lever and that linkage

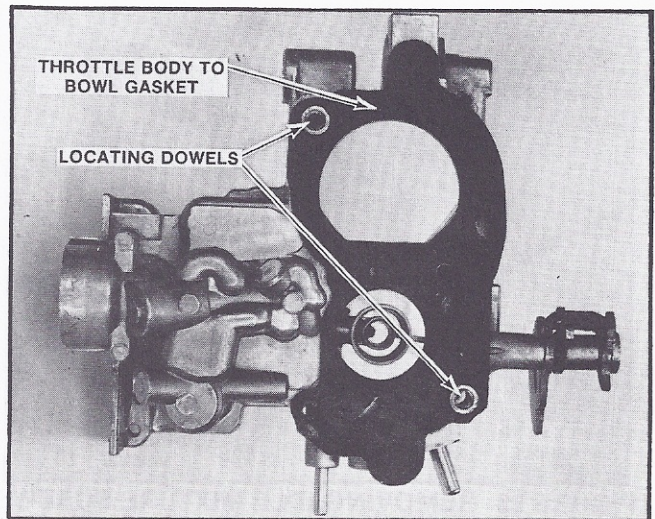


FIGURE 35 THROTTLE BODY TO BOWL INSULATOR GASKET

moves freely and does not bind.

3. Place carburetor on proper holding fixture such as J-9789-118.

4. Install fuel inlet filter spring, check valve-filter assembly, new gasket and inlet nut (Figure 36) and tighten nut to 24 N m (18 ft. lbs.).

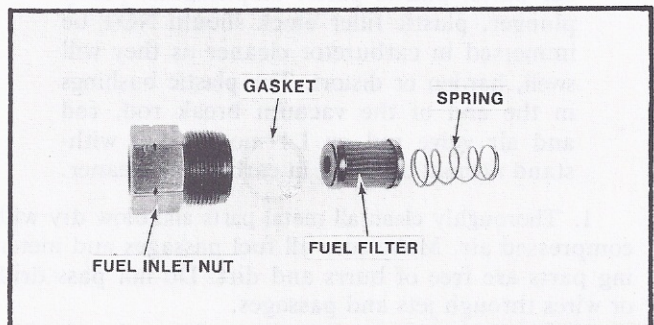


FIGURE 36

When installing a service replacement filter make sure the filter is the type that includes the check valve to meet U.S. Motor Vehicle Safety Standards (M.V.S.S.).

When properly installed, hole in filter faces toward inlet nut. Ribs on closed end of filter element prevent filter from being installed incorrectly unless forced. Tightening beyond specified torque can damage nylon gasket to cause fuel leak.

5. Install choke housing on throttle body, making sure raised boss and locating lug on rear of housing fit into recesses in float bowl casting (Figure 30). Install two (2) choke housing attaching screws and lockwashers in throttle body and tighten screws evenly and securely.

6. Install intermediate choke shaft and lever assembly in float bowl by pushing through from throttle lever

side (Figure 29).

7. With intermediate choke lever in the UP (12 o'clock) position, install thermostatic coil lever inside choke housing onto flats on intermediate choke shaft. Coil is properly aligned when the coil pick-up tang is at the top (12 o'clock) position (Figure 37). Install inside lever retaining screw into end of intermediate choke shaft and tighten securely.

Do not install thermostatic choke cover and coil assembly in housing until inside coil lever is adjusted (see Adjustments).

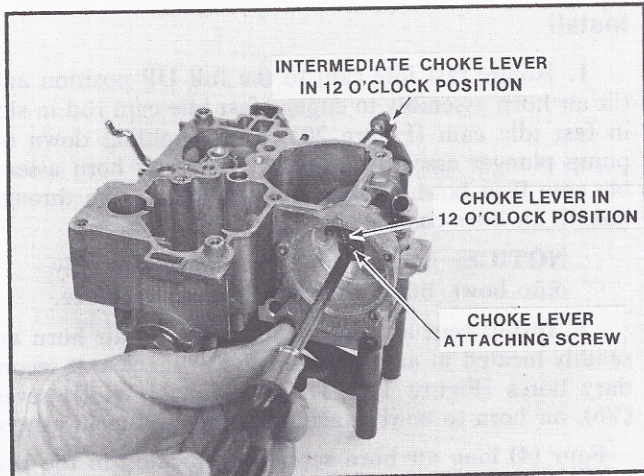


FIGURE 37 CHOKE COIL LEVER POSITION INSTALLED

8. Install pump discharge steel check ball and spring in passage next to float chamber (Figure 38). Insert end of new plastic retainer into end of spring and install retainer in float bowl, tapping lightly in place until top of retainer is flush with bowl casting surface.

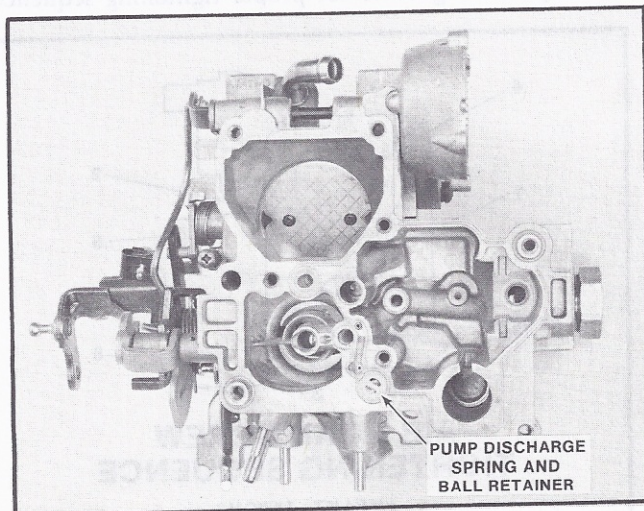


FIGURE 38 PUMP DISCHARGE RETAINER INSTALLED

9. Using screwdriver that fully fits the slot in the top, install main metering jet into bottom of float chamber. Tighten jet securely.

10. Install needle seat assembly, with gasket, using seat installer J-22769 (Figure 22).

11. To make adjustments easier, carefully bend float arm upward at notch in arm before assembly.

12. Install float needle onto float arm by sliding float lever under needle pull clip. Correct installation of the needle pull clip is to hook the clip over the edge of the float on the float arm facing the float pontoon (Figure 39).

13. Install float retaining pin into float arm with end of loop of pin facing pump well. Then, install float assembly by aligning needle in the seat and float retaining pin into locating channels in float bowl.

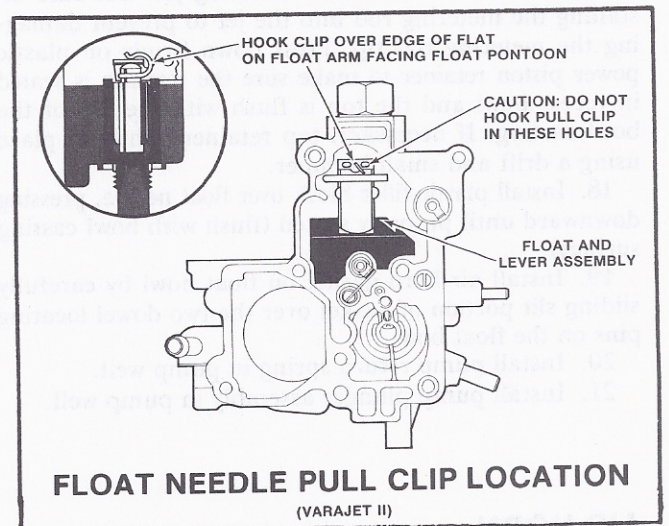


FIGURE 39

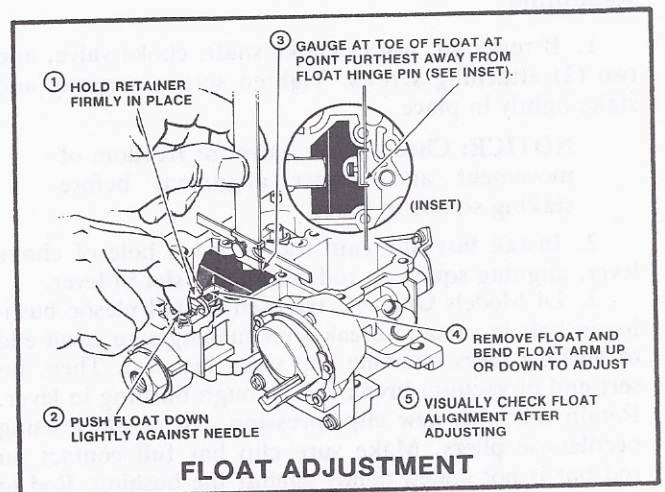


FIGURE 40

14. Float Level Adjustment (Figure 40).

a. Hold float retaining pin firmly in place and push



down lightly on float arm at outer end against top of float valve.

b. Using adjustable "T" scale, measure from top of float bowl casting surface (air horn gasket removed) to top of float at toe, gauging point 3/16" back from end of float at toe. (See inset, Float Adjustment Figure 40.)

c. Bend float arm as necessary for proper adjustment by pushing on pontoon (see Adjustment Chart for specifications).

d. Visually check float alignment after adjustment.

15. Install power piston spring into piston bore.

16. If removed, assemble metering rod to holder on power piston. Spring must be on top of arm when assembled correctly (Figure 24).

17. Install power piston and metering rod assembly into the float bowl and main metering jet. Use care installing the metering rod into the jet to prevent damaging the metering rod tip. Press down firmly on plastic power piston retainer to make sure the retainer is seated in recess bowl and the top is flush with the top of the bowl casting. If necessary, tap retainer lightly in place using a drift and small hammer.

18. Install plastic filler block over float needle, pressing downward until properly seated (flush with bowl casting surface).

19. Install air horn gasket on float bowl by carefully sliding slit portion of gasket over the two dowel locating pins on the float bowl.

20. Install pump return spring in pump well.

21. Install pump plunger assembly in pump well.

AIR HORN

Assemble

1. If removed, install choke shaft, choke valve, and two (2) attaching screws. Tighten screws securely and stake lightly in place.

NOTICE: Check choke valve for freedom of movement and proper alignment before staking screws in place.

2. Install fast idle cam rod in lower hole of choke lever, aligning squirt on rod with small slot in lever.

3. L4 Models Only - If removed, install plastic bushing in hole in vacuum break lever making sure small end of bushing faces retaining clip when installed. Then, insert end of vacuum break rod through bushing in lever. Retain rod with new clip, pressing clip in place using needle-nose pliers. Make sure clip has full contact on rod but is not seated tightly against the bushing. Rod to bushing clearance should be .8mm (.030").

Retaining clip is "dished". Install clip on rod with outward bend of self-locking lugs facing end of rod. Check that clip fully engages rod and is not distorted.

4. L4 Models Only - If removed, install plastic bushing in hole in air valve lever, making sure small end of bushing faces retaining clip when installed. Then, insert end of air valve rod through bushing in lever. Retain with new clip, pressing clip in place using needle-nose pliers. Make sure clip has full contact on rod but is not seated tightly against the bushing. Rod to bushing clearance should be .8mm (.030").

Retaining clip is "dished". Install clip on rod with outward bend of self-locking lugs facing end of rod. Check that clip fully engages rod and is not distorted.

Install

1. Rotate fast idle cam to the full UP position and tilt air horn assembly to engage fast idle cam rod in slot in fast idle cam (Figure 20). Then, holding down on pump plunger assembly, carefully lower air horn assembly onto float bowl, guiding pump plunger stem through hole in air horn casting.

NOTICE: Do not force air horn assembly onto bowl, but rather lightly lower in place.

2. Install vent and screen assembly on air horn assembly located in area between the primary and secondary bores (Figure 19). Then, install six (L4), seven (V6), air horn to bowl attaching screws and lockwashers.

Four (4) long air horn screws are located in the primary and secondary venturi area of which two (2) longer screws hold the vent and screen assembly in place, and one larger head screw goes next to the choke valve on the primary side on V6 models. In addition, two (2) short screws are located on the fuel inlet side and one (1) short screw is located in the area beneath the hot idle compensator valve.

All air horn screws must be tightened evenly and securely. See Figure 41 for proper tightening sequence.

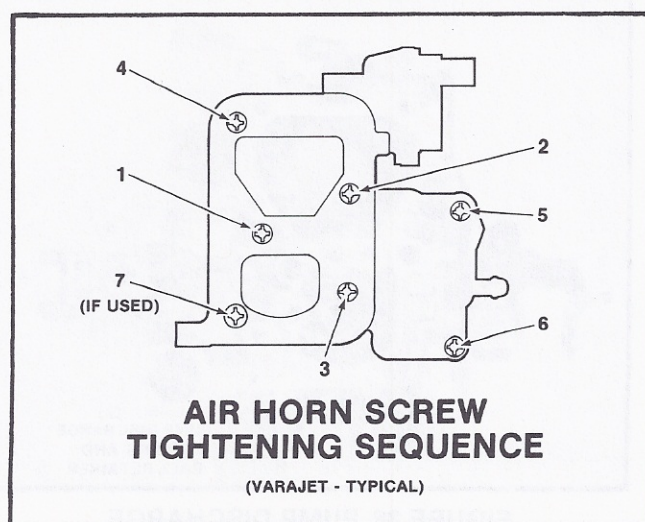


FIGURE 41



3. If equipped, install new seal in recess of float bowl; then install hot idle compensator valve and retain with two (2) small attaching screws. Tighten screws securely.

4. Install plastic bushing in hole in choke lever, making sure small end of bushing faces retaining clip when installed. With inner choke coil lever at 12 o'clock position, install intermediate choke rod in bushing. Retain rod with new clip using Tool J-28697 or needle-nosed pliers. Make sure clip has full contact on rod but is not seated tightly against bushing. Rod to bushing clearance should be .8mm (.030").

Retaining clip is "dished". Install clip on rod with outward bend of self-locking lugs facing end of rod. Check that clip fully engages rod and that clip is not distorted.

5. V6 Models - If removed, install plastic bushing in hole in secondary side vacuum break plunger, making sure small end of bushing faces retaining clip when installed. Then, install secondary side vacuum break rod and secure new clip to rod using Tool J-28697 or needle-nosed pliers. Make sure clip has full contact on rod but is not seated tightly against bushing. Rod to bushing clearance should be .8mm (.030").

NOTICE: Retaining clip is "dished". Install clip on rod with outward bend of selflocking clip facing end of rod. Check that clip fully engages rod and that clip is not distorted.

6. V6 Models - Rotate bracket and insert end of secondary side vacuum break rod into upper slot of vacuum break lever. Install bracket on throttle body and install countersunk screws. Tighten screws securely (Figure 16).

7. All Models - If removed, install solenoid in hole on bracket, large lockwasher and retaining nut. Tighten nut securely. Then, bend back two (2) retaining tabs on lockwasher to fit in slots in bracket.

NOTICE: Use care in tightening with wrench to avoid damaging vacuum break diaphragm plunger.

8. L4 Models - Rotate solenoid bracket and insert end of vacuum break rod into inner slot and end of air valve rod into outer slot of vacuum break diaphragm plunger. Install bracket over locating lugs on air horn and install countersunk screw in air horn and screw with lockwasher in throttle body. Tighten screws securely (Figure 15).

Do not attach vacuum break hose until vacuum brake adjustment is complete (see adjustments).

9. V6 Models - If removed, install plastic bushings in holes in primary side vacuum break plunger, making sure small end of bushings face retaining clips when installed. Then, install vacuum break rod in upper hole of plunger and air valve rod in lower hole of plunger and

secure new clips to rod using Tool J-28697 or needle-nosed pliers. Make sure clips have full contact on rods but are not seated tightly against bushings. Rod to bushing clearance should be .8mm (.030").

Rotate primary side vacuum break bracket to engage vacuum break and air valve rods in vacuum break and in air valve lever, positioning bracket over locating lug on air horn. Install two (2) countersunk screws and tighten securely (Figure 15).

NOTICE: Retaining clips are "dished". Install clip on rod with outward bend of self-locking clip facing end of rod. Check that clips fully engage rods and that clip is not distorted.

10. Insert pump rod in hole in pump lever by rotating lever. Install retaining screw in pump lever, then washer. Holding down on pump plunger stem, install pump lever on air horn. Make sure shoulder on screw seats in hole in lever and washer goes between lever and air horn casting. Tighten screw securely (Figure 14).

The vacuum break and choke rod (fast idle cam) adjustments must be performed, and the thermostatic coil lever inside the choke housing has to be indexed properly before installing the choke thermostatic coil and cover assembly. Refer to the Adjustment Procedures.

11. After the vacuum break, choke rod (fast idle cam) and inside choke coil lever are adjusted, the thermostatic coil and cover assembly should be installed, making sure coil pick-up tang engages the inside choke coil lever.

12. Install the choke cover and coil assembly in choke housing as follows:

NOTICE: Self-tapping cover retaining screws are supplied with service kits.

a. Start the three (3) self-tapping screws in the choke housing, checking to be sure screws start easily and are aligned properly (Figure 42). Then, remove screws.

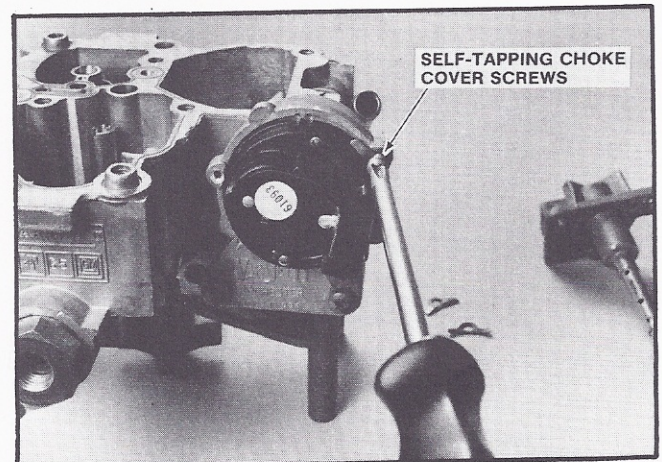


FIGURE 42 SELF-TAPPING CHOKE COVER SCREWS



b. Place fast idle screw on highest step of fast idle cam.

c. Install the thermostatic cover and coil assembly in the choke housing, aligning notch in cover with raised casting projection on housing cover flange. Make sure coil pick-up tang engages the inside choke coil lever.

NOTICE: On 2SE models for the V6 engine, the tang on the thermostatic coil is the "trapped stat" design. (See Figure 43.) This means that the coil tang is formed so that it will completely encircle the coil pick-up lever. Make sure the choke coil lever is located inside the coil tang when installing the choke cover and coil assembly.

d. Install three (3) cover retainers and self-tapping screws and tighten screws securely.

NOTICE: Ground contact for the electric choke is provided by a metal plate located at the rear of the choke assembly. Do not install a choke cover gasket between the electric choke assembly and the choke housing. Choke will not operate unless properly grounded.

ADJUSTMENT PROCEDURES
AND SPECIFICATIONS

Refer to the Delco Carburetor 9X manual "C" section for replacement parts and "D" section for troubleshooting, adjustment procedures and specifications, for each carburetor model. The adjustments should be performed in proper sequence listed for each carburetor model.

The 9X Manual, carburetor tools and gauges, are available through AC-Delco suppliers.

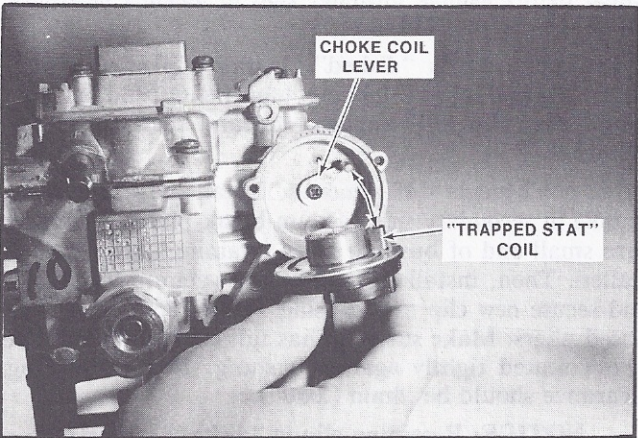


FIGURE 43 "TRAPPED" STAT CHOKE
COVER INSTALLATION



FIGURE 44 SELF-TAPPING CHOKE
COVER SCREWS

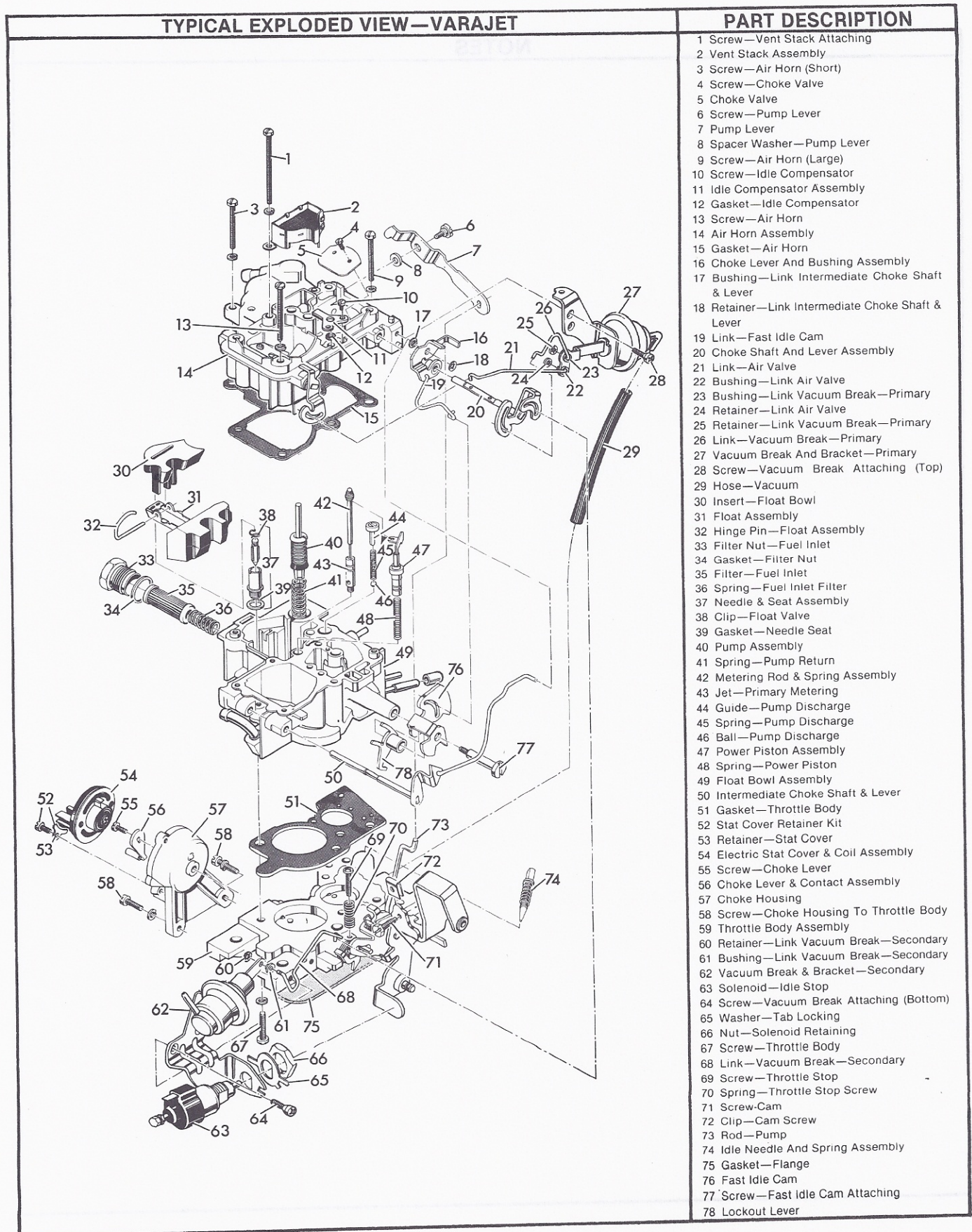


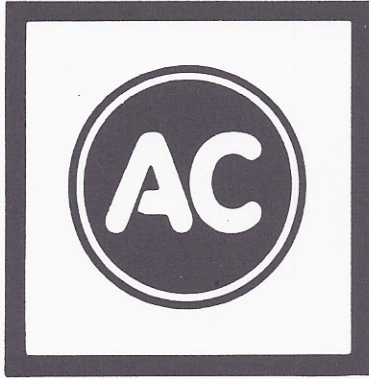
FIGURE 44

ROCHESTER PRODUCTS

VARAJET II Carburetor

MODEL 2SE

Service Manual





MODEL 2SE CARBURETOR

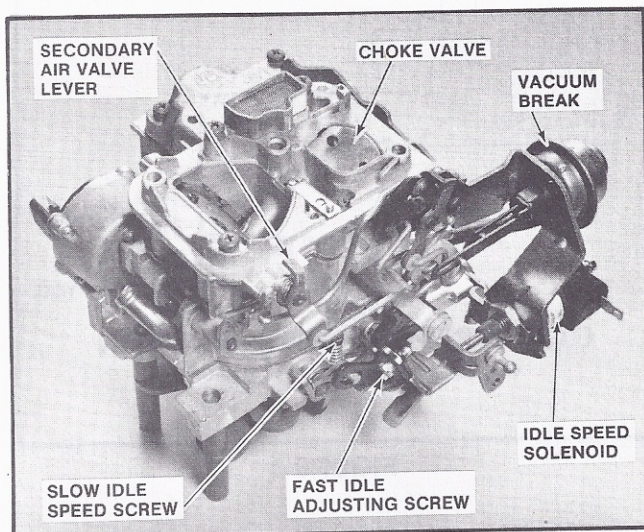


FIGURE 1—2SE L4

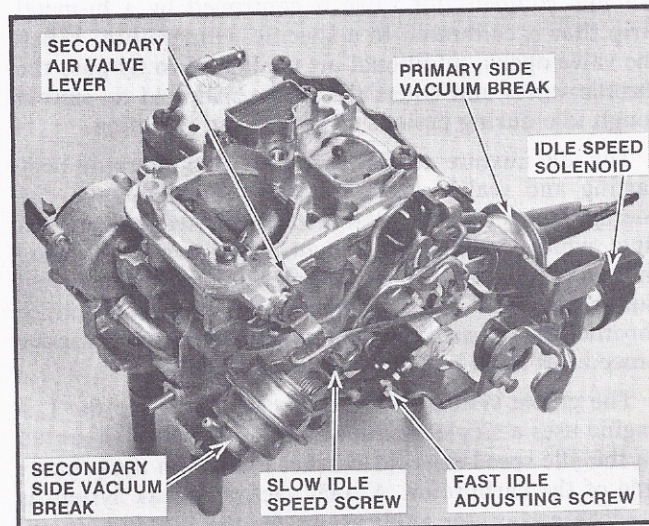


FIGURE 2—2SE V6

GENERAL DESCRIPTION

MODEL 2SE CARBURETOR

The Model 2SE carburetor is a two barrel, two stage carburetor of down draft design (Figure 1 and 2). To reduce carburetor weight, aluminum die castings are used for the air horn, float bowl, throttle body, and choke housing on all models except that a zinc die-cast choke housing is used on some 2SE models for the L4 engine to reduce heat transfer for good engine warm-up operation. All models use a heat insulator gasket between the throttle body and float bowl to reduce heat transfer to the fuel in the float bowl.

The primary stage has a triple venturi, with a small 35mm bore that results in good fuel metering control during idle and part throttle operation.

The secondary stage has a large 46mm bore that provides sufficient air capacity for engine power requirements. An air valve is used in the secondary stage with a single tapered metering rod.

2SE models for L4 applications use an integral 1" pleated paper fuel filter, with check valve, mounted in the float bowl behind the fuel inlet nut to give good filtration of incoming fuel. On 2SE models for V6 and L-6 applications an integral 2" pleated paper filter, with check valve, is used. The check valve is used to shut off fuel flow to the carburetor and prevent fuel leaks if a vehicle roll-over should occur.

The float chamber is located next to the primary and secondary bores (Figure 4). This feature assures ade-

quate fuel supply to both carburetor bores during all normal vehicle maneuvers.

A single pontoon float, brass needle seat, and a rubber tipped float needle with pull clip are used to control fuel level in the float chamber. The float chamber is internally vented through a vertical vent cavity in the air horn. Above this vent cavity is a removable vent stack assembly that has a small meshed screen at its top portion. This vent stack provides the correct height for the internal vent.

The float chamber also is externally vented through a tube (Figure 5 Location F) in the air horn. A hose connects this tube directly to a vacuum operated vapor vent valve located in the vapor canister. When the engine is not running, the canister vapor vent valve is open, allowing fuel vapors from the float chamber to pass into the canister where they are stored until normally purged. The venting of fuel vapors from the carburetor float bowl to the canister meets evaporative emission requirements and improves hot engine starting.

An adjustable part throttle screw is used in the float bowl to aid in refinement of fuel mixtures for good emission control. This screw is pre-set at the factory and a plug is installed to prevent tampering and to seal against any fuel leaks. The plug should not be removed nor the screw adjusted in service. If it becomes necessary to replace the float bowl, the new service float bowl will include an adjustable part throttle (A.P.T.) screw which has been pre-set at the factory and plugged as required.



A hot idle compensator assembly (when used) is located in the air horn casting. The opening and closing of the hot idle compensator valve is controlled by a bi-metal strip that is calibrated to a specific temperature. When the valve opens, additional air is allowed to by-pass the throttle valves and enters the intake manifold to prevent rough idle during periods of hot engine operation.

The idle mixture needle is recessed in the throttle body casting and sealed with a hardened steel plug to discourage tampering with the factory adjusted mixture setting, which could upset exhaust emissions. The plug must not be removed and idle mixture screw readjusted unless required due to major carburetor overhaul or throttle body replacement in which case special service procedures must be followed carefully.

The choke system of the 2SE carburetor for the L 4 engine uses a single vacuum break unit that is mounted on the idle speed solenoid bracket located on the primary side of the carburetor. A dual vacuum break system is used on carburetor applications for the L-6 and V6 engine, with the secondary vacuum break unit mounted on a bracket located on the secondary side of the carburetor. On all models, an electrically heated thermostatic choke coil is mounted in the choke housing located on the secondary side of the carburetor. Special rivets, and conventional retainers, are installed to retain the factory setting of the thermostatic choke coil in the housing to provide a tamper-resistant design to discourage readjustment in the field. In addition, a special cut-out is notched in the choke cover which must be indexed with a raised boss cast in the cover mounting flange on the choke housing. A new procedure for removal of the choke cover is required when performing major carburetor overhaul, replacement of the cover and coil assembly or choke housing.

NOTICE: The choke thermostatic cover and coil assembly must not be removed unless required during major carburetor overhaul, or replacement of the cover and coil assembly or choke housing.

The 2SE carburetor has a separate screw located in the primary throttle lever for fast idle speed adjustment. A separate screw, located in the throttle body, is used to make the curb or base (depending on usage) idle speed setting (solenoid de-energized).

For ease of service, alphabetical code letters are included on the air horn, float bowl, and throttle body castings at external tube locations to identify air and vacuum hose connections.

The carburetor model identification is stamped vertically on the float bowl in a flat area adjacent to the vacuum tube (Figure 3). If replacing the float bowl, follow the manufacturer's instructions contained in the service package so that the identification number can be transferred to the new float bowl.

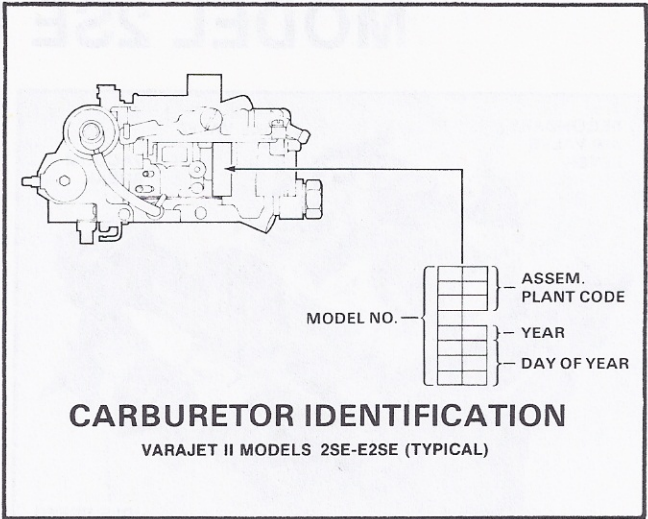


FIGURE 3

Refer to the part number on the bowl when servicing the carburetor.

An exhaust gas recirculation system (E.G.R.) is used on all vehicles to control oxides of nitrogen. The vacuum supply port or ports necessary to operate the recirculation valve are located in the throttle body and connect through a channel to a tube in the float bowl. This tube is connected by a hose to the E.G.R. valve. See Idle System (Figure 6) for port location and operation.

A fixed idle air by-pass system (where used) is used to reduce the amount of air flowing through the carburetor primary venturi to prevent the main nozzle from feeding fuel at idle.

The primary and secondary throttle shafts, the secondary actuating lever and lockout lever, are coated with a special coating to reduce friction and wear in these operating parts. Also, the secondary throttle bore and valve on 2SE models for the V6 engine is coated with a special graphite compound for minimum air leakage past the valve for good idle air control. Care should be taken during service to not disturb these coatings.

A throttle body mounted idle speed solenoid is used to position the primary throttle valve to obtain idle speed requirements of the engine.

SYSTEMS

The model 2SE carburetor has six basic systems. They are float, idle, main metering, power, pump and choke.

OPERATING SYSTEMS

FLOAT SYSTEM (FIGURE 5)

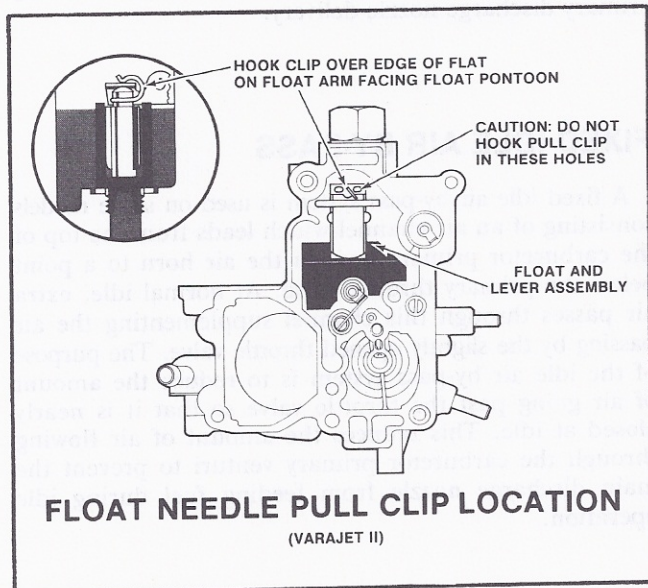


FIGURE 4

The float system operates in the following manner:

Fuel flow from the fuel pump enters the carburetor fuel inlet nut. It opens the check valve in the filter against spring tension and flows through the filter element, passes through the "windows" in the float valve seat and flows past the float valve on into the float chamber. As the incoming fuel fills the float chamber to the prescribed level, the float pontoon rises and forces the float valve closed, shutting off fuel flow. As fuel is used from the float chamber, the float pontoon drops to open the float valve allowing fuel to again fill the chamber. This cycle continues, maintaining a near constant fuel level in the float chamber for all ranges of engine operation.

A pull clip, fastened to the float valve, hooks over the edge of the float lever at the center. (Figure 4). Its purpose is to assist in lifting the float valve off its seat whenever fuel level in the float chamber is low.

The float valve seat is brass and uses a double angle staked seat with a viton tipped float valve. This reduces valve seat wear and aids in preventing the float valve from possibly sticking in the seat due to fuel gum formation.

The carburetor float chamber is internally vented to filtered air in the air cleaner. The internal vent balances air pressure acting on the fuel in the float chamber with air pressure in the air cleaner. In this way, balanced air/fuel mixture ratios can be maintained throughout the full range of carburetor operation.

All models use an additional "vent stack", with a small meshed screen, installed over the cast vertical vent

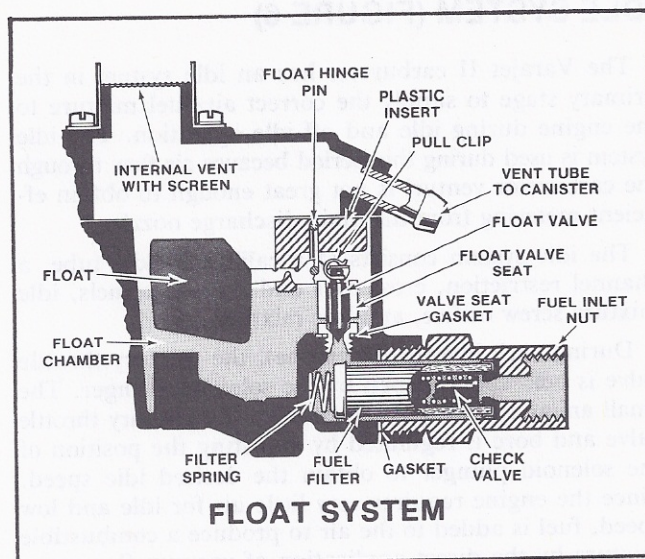


FIGURE 5

cavity in the air horn to prevent a vacuum depression above the fuel in the float chamber. This depression is created by the air flow patterns of the air cleaner.

The Varajet II float chamber also is externally vented through a tube in the air horn. Gasoline vapors are carried from the float chamber by this tube in the dome of the chamber through a hose to the canister vapor vent valve. The canister vapor vent valve is a spring loaded normally open valve which is closed by manifold vacuum during engine operation and opened by spring pressure when the engine is off thus allowing the carburetor float chamber vapors to be collected in the canister.

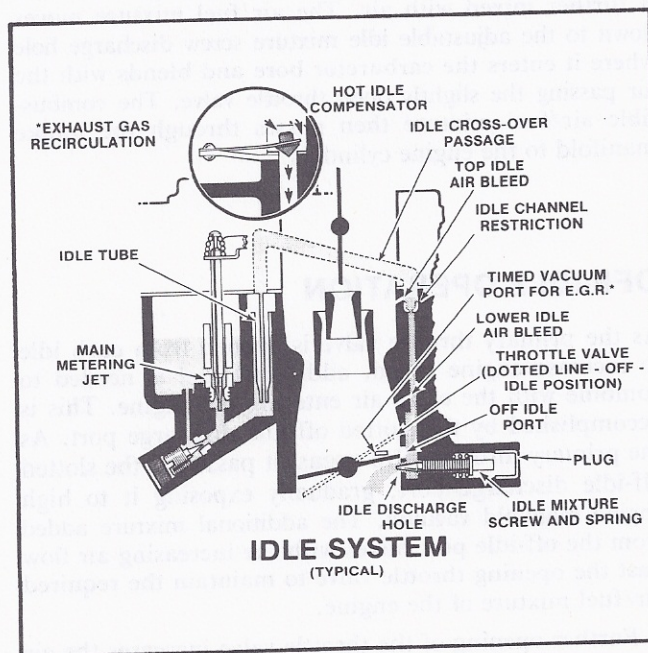


FIGURE 6



IDLE SYSTEM (FIGURE 6)

The Varajet II carburetor has an idle system in the primary stage to supply the correct air/fuel mixture to the engine during idle and off-idle operation. The idle system is used during this period because air flow through the carburetor venturi is not great enough to obtain efficient metering from the main discharge nozzle.

The idle system consists of a calibrated idle tube, a channel restriction, cross-over and down channels, idle mixture screw orifice, and idle mixture screw.

During curb idle (warm engine), the primary throttle valve is held slightly open by the solenoid plunger. The small amount of air passing between the primary throttle valve and bore is regulated by adjusting the position of the solenoid plunger to obtain the desired idle speed. Since the engine requires very little air for idle and low speed, fuel is added to the air to produce a combustible mixture by the direct application of vacuum (low pressure) from the intake manifold to the idle discharge hole below the throttle valve. With the idle discharge hole in a very low pressure area and the fuel in the float chamber vented to atmosphere (high pressure through the air cleaner), the idle system operates as follows:

Fuel flows from the float chamber down through the primary metering jet into the main fuel well. It is picked up in the main well by the idle tube. The fuel is metered at the lower tip of the submerged idle tube and passes up through the tube. Then the fuel crosses over to the idle down channel where it is bled with air through the top idle air bleed. The fuel mixture continues down through the calibrated idle channel restriction past the lower idle air bleed and off-idle discharge port where it is further mixed with air. The air/fuel mixture moves down to the adjustable idle mixture screw discharge hole where it enters the carburetor bore and blends with the air passing the slightly open throttle valve. The combustible air/fuel mixture then passes through the intake manifold to the engine cylinders.

OFF-IDLE OPERATION

As the primary throttle valve is opened from curb idle to increase engine speed, additional fuel is needed to combine with the extra air entering the engine. This is accomplished by the slotted off-idle discharge port. As the primary throttle valve opens, it passes by the slotted off-idle discharge port, gradually exposing it to high engine manifold vacuum. The additional mixture added from the off-idle port mixes with the increasing air flow past the opening throttle valve to maintain the required air/fuel mixture of the engine.

Further opening of the throttle valve increases the air velocity through the carburetor venturi sufficiently to

cause low pressure at the lower idle air bleed. As a result, fuel begins to discharge from the lower idle air bleed hole and continues throughout operation of the part throttle to wide-open ranges, thereby supplementing primary discharge nozzle delivery.

FIXED IDLE AIR BY-PASS

A fixed idle air by-pass system is used on some models consisting of an air channel which leads from the top of the carburetor primary bore in the air horn to a point below the primary throttle valve. At normal idle, extra air passes through this channel supplementing the air passing by the slightly opened throttle valve. The purpose of the idle air by-pass system is to reduce the amount of air going past the throttle valve so that it is nearly closed at idle. This reduces the amount of air flowing through the carburetor primary venturi to prevent the main discharge nozzle from feeding fuel during idle operation.

FUEL VAPOR STORAGE CANISTER PURGE

The fuel tank is not vented to atmosphere and fuel vapors are collected in a storage canister. In order to remove the condensed fuel vapors from the canister a purge system is provided in the canister and carburetor so that the vapors will not be drawn into the engine during idle, but still allow purging of the canister at higher engine speeds.

A timed vacuum port in the carburetor throttle body signals a purge valve in the vapor canister.

During engine idle vacuum is not applied to the timed vacuum port because it is located slightly above the throttle valve. As the throttle valve is opened to increase engine speed, the valve moves about the port and exposes it to high engine vacuum. This vacuum is transmitted through a tube connected to the vapor canister purge valve. This opens the purge valve in the vapor canister, and fuel vapors are drawn from the canister through another tube which leads directly to intake manifold vacuum through the secondary side of the carburetor. This allows purging of the vapor canister at higher engine speeds and still maintains good engine idle.

EXHAUST GAS RECIRCULATION (E.G.R.)

An exhaust gas recirculation (E.G.R.) system is used to meet exhaust emission requirements. A vacuum sig-



nal to operate an exhaust gas recirculation valve is supplied by a port in the carburetor primary bore located above the throttle valve. The port, through a channel and hose tube connection in the float bowl, supply a timed vacuum signal for E.G.R. valve operation in the off-idle and part throttle ranges of engine operation.

The E.G.R. system functions as follows:

During engine idle and deceleration, the E.G.R. vacuum signal port in the throttle body, located above the nearly closed throttle valve, is not exposed to manifold vacuum and the E.G.R. valve remains closed preventing exhaust gas contamination in the intake air/fuel mixture to cause rough idle.

As the primary throttle valve is opened beyond the idle position, the vacuum port for the E.G.R. system is exposed to manifold vacuum to supply a vacuum signal to the E.G.R. valve to recirculate exhaust gas to the intake manifold.

HOT IDLE COMPENSATOR (SOME MODELS)

The hot idle compensator is located in a cavity between the primary and secondary air inlets on the air horn. Its purpose is to offset the enrichening effects caused by excessive fuel vapors during hot engine operation.

The compensator consists of a thermostatically controlled valve, a heat sensitive bi-metal strip, a valve holder and bracket, and two screws that hold the assembly in place. A seal is used between the compensator valve and the air horn casting. The valve closes off an air channel leading from the top of the air horn to a passage below the primary throttle valve.

During low and moderate ambient temperature operation, the compensator valve is held closed by tension of the bi-metal strip. During extremely high ambient temperature operation, excessive fuel vapors enter the intake manifold, causing richer than normally required air/fuel mixtures resulting in rough engine idle and stalling. At a pre-determined temperature when additional air is needed to offset these enrichening effects of fuel vapors, the bi-metal strip bends and unseats the compensator valve. This uncovers the air channel leading to the passage below the primary throttle valve to allow enough air to be drawn into the intake manifold to offset the richer mixtures and maintain a smooth engine idle. When the engine cools and the additional air is not required, the bi-metal strip relaxes tension, closes the valve, and engine operation returns to normal mixtures.

IDLE STOP SOLENOID

An electrically operated idle stop solenoid is used on most models. The solenoid is mounted integral with the vacuum break bracket on the throttle lever side. Electrical power is supplied to the solenoid whenever the ignition switch is on the "on" position. Depressing the accelerator pedal slightly with the electrical power on will allow the solenoid to move to its extended position. This extended position is the normal position during all operating modes of the engine. When the ignition switch is turned off, the solenoid de-energizes and retracts allowing the throttle blade to close tighter, reducing the air flow and preventing the engine from running on (dieseling).

MAIN (PRIMARY) METERING SYSTEM (FIGURE 7)

The main metering system supplies fuel to the engine from off-idle to wide-open throttle. The primary bore supplies fuel and air during this range through a plain tube nozzle and the venturi principle.

The multiple venturi in the primary stage produces excellent fuel metering control due to its sensitivity to air flow.

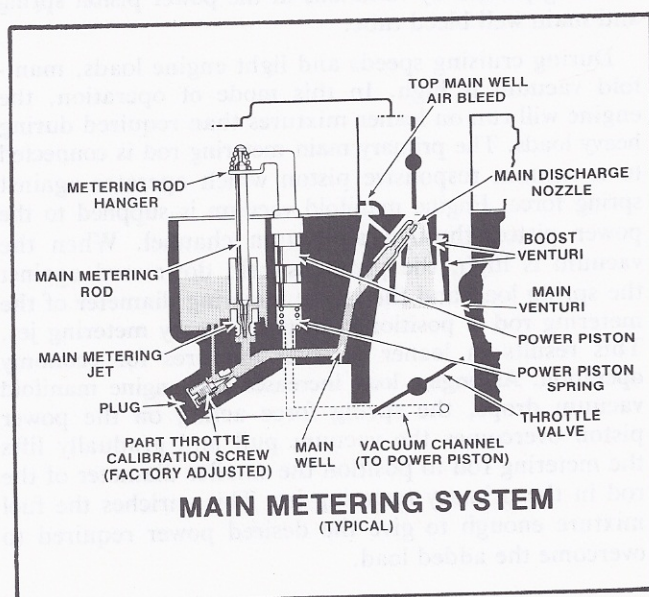


FIGURE 7

The main metering system begins to operate as air flow increases through the venturi system. It supplies additional fuel from the primary bore to maintain the required air/fuel mixture of the engine. Fuel from the idle system gradually diminishes as the lower pressures are now in the venturi system.



The main metering system consists of a primary metering jet, vacuum operated piston and primary metering rod, main fuel well, air bleed tube, main discharge nozzle, triple venturi, fuel pull-over enrichment, and adjustable part throttle (A.P.T.) mixture control. The main metering system operates as follows:

As the primary throttle valve is opened beyond the off-idle range allowing more air to enter the engine intake manifold, air velocity increases in the carburetor venturi. This creates a drop in pressure in the large venturi which increases many times in the boost venturi. Since the low pressure (vacuum) is now in the smallest boost venturi and the higher pressure is on the fuel in the float chamber, fuel flows from the main discharge nozzle as follows:

Fuel from the float chamber flows through the primary metering jet into the main fuel well. It passes upward in the main well where air is introduced from the stepped tube near the top of the well in the carburetor primary bore. The air/fuel mixture then passes from the main well through the main discharge nozzle into the boost venturi. At the boost venturi, the air/fuel mixture then combines with the air entering the engine through the carburetor bore creating a combustible mixture that passes through the intake manifold and on into the engine cylinders. The main metering system is calibrated by a tapered metering rod operating in the primary metering jet and by variations in the power piston spring and main well bleed tube.

During cruising speeds and light engine loads, manifold vacuum is high. In this mode of operation, the engine will run on leaner mixtures than required during heavy loads. The primary main metering rod is connected to a vacuum responsive piston which operates against spring force. Engine manifold vacuum is supplied to the power piston through a vacuum channel. When the vacuum is high, the piston is held downward against the spring load and the larger metering diameter of the metering rod is positioned in the primary metering jet. This results in leaner air/fuel mixtures for economy operation. As engine load increases and engine manifold vacuum drops, the spring force acting on the power piston overcomes the vacuum pull and gradually lifts the metering rod to position the smaller diameter of the rod in the primary metering jet. This enriches the fuel mixture enough to give the desired power required to overcome the added load.

ADJUSTABLE PART THROTTLE (A.P.T.)

The adjustable part throttle (A.P.T.) consists of a tapered metering screw located in a channel at the bottom of the float bowl. This channel supplements and controls fuel to the main metering system to maintain a

very close tolerance of fuel mixtures during part throttle operation. The A.P.T. screw is set at the factory and sealed. No attempt should be made to adjust the metering screw in the field. If it becomes necessary to replace the float bowl, the new service float bowl will include an adjustable part throttle (A.P.T.) screw which has been pre-set at the factory.

PULL-OVER ENRICHMENT (P.O.E.) (FIGURE 8)

A supplemental source of fuel to the main metering system is used on some models of the Varajet II carburetor to provide added enrichment and improved fuel control during higher engine speeds and carburetor air flows.

A calibrated tube in the primary bore is located just above the choke valve and feeds fuel from a tube that extends into the float chamber. During high carburetor air flows, low pressure created in the air horn bore pulls fuel from the pull-over enrichment fuel feed tube supplementing fuel flow from the main (primary) metering system. The pull-over enrichment system feeds fuel at higher engine speeds to provide the additional fuel needed for good engine performance. An air bleed restriction located at the top of the air horn, connects to the pull-over enrichment channel to add a small amount of air for calibration of the pull-over enrichment system.

The air-velocity sensitive pull-over enrichment system allows the use of slightly leaner mixtures during part throttle operation and still provides enough fuel during high speed operation. This feature gives added refinement to the fuel mixtures for exhaust emission control.

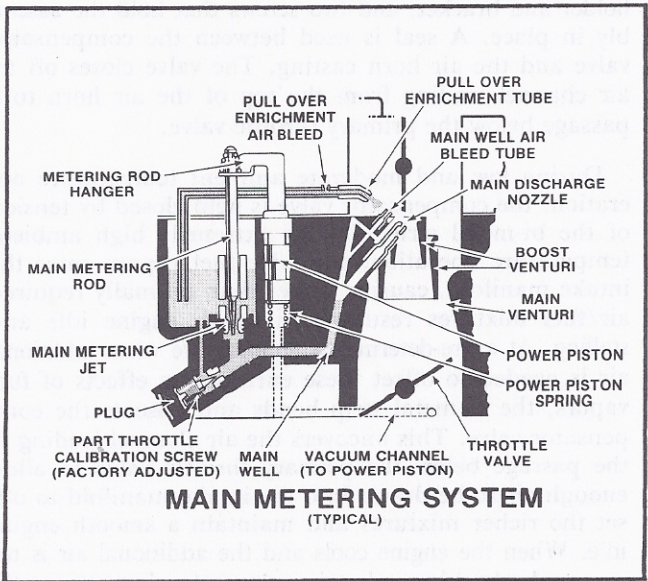


FIGURE 8

PUMP SYSTEM (FIGURE 9)

During quick accelerations when the throttle is opened rapidly, air flow through the carburetor bores and intake manifold vacuum change almost instantaneously. However, the fuel, which is heavier, tends to lag behind causing a momentary leanness. To prevent this, the accelerator pump system is used to provide the extra fuel necessary for a smooth transition in engine operation during this period.

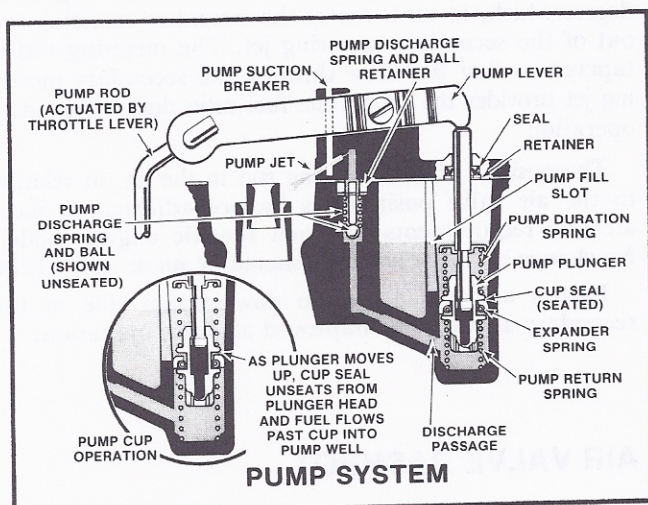


FIGURE 9

The accelerating pump system is located in the primary stage of the carburetor. It consists of a spring-loaded pump plunger and pump return spring (operating in a fuel well), fuel passage, discharge check ball, spring, retainer, and pump jet.

An expander (garter) spring is used in the pump cup for constant pump cup to pump wall contact. The pump cup is of the "floating" design; i.e., the up and down movement of the cup on the plunger head either "seats" to provide a solid charge of fuel on the down-stroke, or "unseats" on the filling of the pump well. The cup remains unseated when there is no pump plunger movement which allows vapor to vent from the pump well.

The pump system operates as follows:

The pump plunger is operated by a pump lever on the air horn which is connected directly to the throttle lever by a pump rod.

When the pump plunger moves upward in the pump well as happens during throttle closing, fuel from the float chamber enters the pump well through a vertical slot located near the top of the pump well. It flows past the "unseated" pump cup to fill the bottom of the pump well and pump discharge passage.

When the primary throttle valve is opened, the pump rod and lever forces the pump plunger downward. The pump cup seats instantly and fuel is forced through the

pump discharge passage where it unseats the pump discharge check ball and passes on through the passage to the pump jet where it sprays into the venturi area of the primary bore.

It should be noted the pump plunger is spring loaded. The upper duration spring is balanced with the bottom pump return spring so that a smooth, sustained charge of fuel is delivered during acceleration. The duration spring is used to control the differences in rate of movement between the pump linkage and the plunger head for correct pump fuel delivery.

The pump discharge check ball seats in the pump discharge passage during upward motion of the pump plunger so that air will not be drawn into the passage and prevent proper pump fill.

During higher air flows through the primary bore, a vacuum exists at the pump jet. A passage, located just behind the pump jet, leads to the top of the air horn to vent the pump fuel circuit outside the carburetor bore. This acts as a suction breaker so that when the pump is not in operation, fuel will not be pulled out of the pump jet into the venturi area. This insures a full pump stream when needed and prevents any fuel "pull-over" from the pump discharge passage.

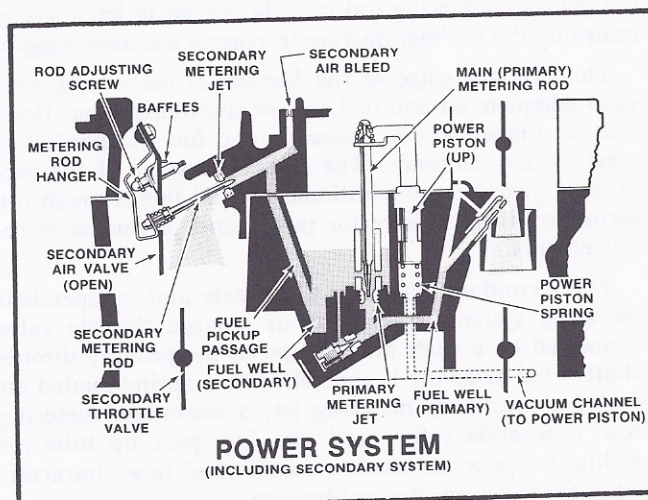


FIGURE 10

POWER SYSTEM (INCLUDING SECONDARY OPERATION) (FIGURE 10)

The power system in the Varajet II carburetor provides air/fuel mixture enrichment to meet power requirements under heavy engine loads and high speed operation. The richer mixtures are supplied through the main metering systems in the primary and secondary stages of the carburetor.