

1957 FUEL INJECTION

DESCRIPTION

The 7014800 Fuel Injection is specifically calibrated for use with the 1957 Chevrolet standard camshaft, hydraulic valve lifter, 9-1/2-to-1 compression ratio, 283 cubic-inch V-8 engine. This combination produces a power plant which delivers 250 gross horsepower @ 5000 rpm and 305 ft. lbs. torque @ 3800 rpm.

Improvements incorporated into the 7014800 Fuel Injection over previous models are the addition of a spark port to adapt this unit to a vacuum advance distributor and a revised cold enrichment assembly. A more stable idle, under all conditions, improved cold driveaway, improved hot starting, better part throttle "tip-in" performance, and improved fuel economy are the most apparent results of these changes.

Like the two preceding Chevrolet Fuel Injection models, the 7014800 unit is comprised of three basic assemblies: the intake manifold, air meter, and the fuel meter-injector nozzle assembly, Fig. 1.

Service procedures outlined in these pages completely supersede previous service instructions for all Chevrolet Fuel Injection units insofar as extent of disassembly permissible without disrupting the air-fuel ratio calibration established at the time of manufacture. Specifically, the recommendations are that under no circumstances should the main control diaphragm cover, fuel meter bowl cover, or ratio stops be removed or altered in field service as any tampering with any of these components will upset the factory set air-fuel calibration. If these parts are removed or their positions altered, the only solution at this time is to replace the fuel meter - injector nozzle assembly with a new or factory recalibrated assembly.

MAINTENANCE AND ADJUSTMENTS

Periodic maintenance requirements of the Chevrolet Fuel Injection are limited to re-

placement of fuel and air filter elements. Adjustments are limited to idle fuel and idle air (idle speed), cold enrichment rod length, and cold enrichment coil index setting.

Fuel cleanliness is a major factor in maintaining the Chevrolet Fuel Injection unit at peak operating efficiency. The best assurance of fuel cleanliness and a reduced tendency toward gasoline gum and varnish formulation is to use a reputable, premium fuel.

Servicing the Air Cleaner

Every 5000 miles or oftener in dusty areas, remove the air cleaner element and knock out loose dirt by "rapping" sharply against a solid object. The element should be replaced each 15,000 miles or oftener. To replace air cleaner element perform the following steps:

1. Remove air cleaner flexible duct.
2. Remove fuel bowl vent pipe at air cleaner.
3. Remove wing nut attaching cleaner to stud in air meter.

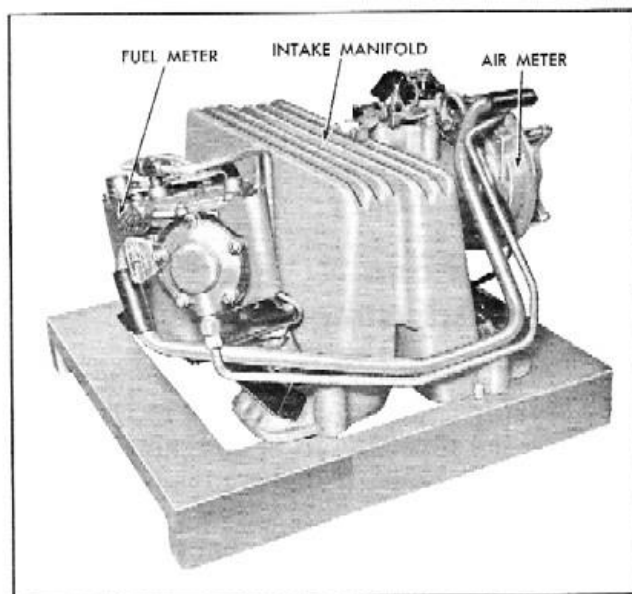


Fig. 1 7014800 Fuel Injection

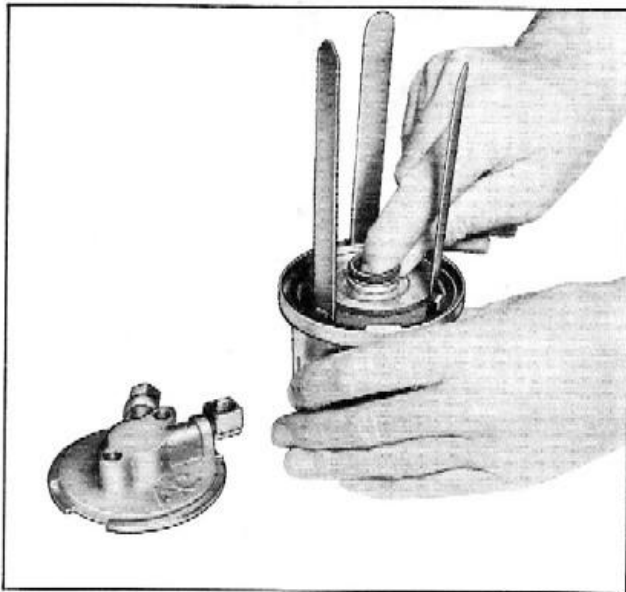


Fig. 2 Replacing Fuel Filter Element

4. Remove wing nut attaching air cleaner stud to bracket at front of engine, lift out air cleaner, then remove nut from opposite end of stud to allow removal of element.

5. Replace element and reinstall air cleaner by reversing the preceding steps.

Servicing the Fuel Filter

The fuel filter element should be replaced semi-annually - in the spring and fall.

To remove the element, remove the filter cover and insert three pieces of shim stock about .040" thick between the element and the clips inside the filter as shown in Fig. 2. Now the element can be removed by simply pulling upward. Install new element in the same manner.

Idle Speed and Mixture Adjustment

Before attempting to adjust the idle speed and mixture, allow the engine to warm-up so that the throttle tab is completely off of the fast idle cam. If these adjustments are being performed after servicing the Fuel Injection unit, fully close both the idle air and idle fuel adjusting screws, Fig. 3, and then back off each screw approximately two (2) turns as an initial setting for warm-

up. A tachometer and vacuum gage will aid in obtaining the best possible idle.

1. Once engine is warmed-up, adjust idle air screw as required to give a moderate idle speed.

2. Adjust the idle fuel screw as required to give the highest steady vacuum reading and highest engine rpm. If instruments are not available, adjust idle fuel needle as necessary to obtain the best engine feel.

3. Reduce idle speed by turning the idle air screw inward. Idle speed should be finally adjusted to 500 rpm in "Drive" range on Powerglide and Turboglide models and to 600 rpm in neutral on standard transmission jobs.

4. Repeat the above adjustments as required to obtain the highest vacuum, and smoothest idle possible at the specified speeds.

Cold Enrichment Adjustments

These adjustments will normally only be required at the time of rebuild but the adjustments may be checked as follows.

Thermostat Cold Enrichment Coil Setting

Scribe mark on the coil cover should be set 1-1/2 notches rich from the scribe

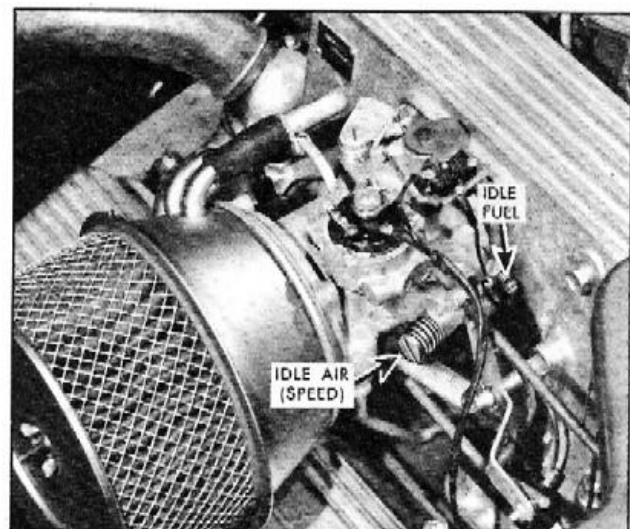


Fig. 3 Adjusting Idle Mixture and Speed

mark on the cold enrichment housing. (Notches are small radial marks on flange of coil cover).

Cold Enrichment Rod Adjustment

1. With the engine off and cool, disconnect the rubber sleeve from the cold enrichment housing signal boost tube and install a short length of rubber hose over the tube such as windshield wiper hose.

2. Crack the throttle valve as necessary to place the throttle tab just on the high step of the fast idle cam, then close the throttle.

3. Holding the trip lever against the counterweight tab as illustrated in Fig. 4, blow into the hose while listening at the air meter. If choke rod length is correct, slight air flow should be heard. Repeat check but with throttle tab on second step of fast idle cam. No air flow should be

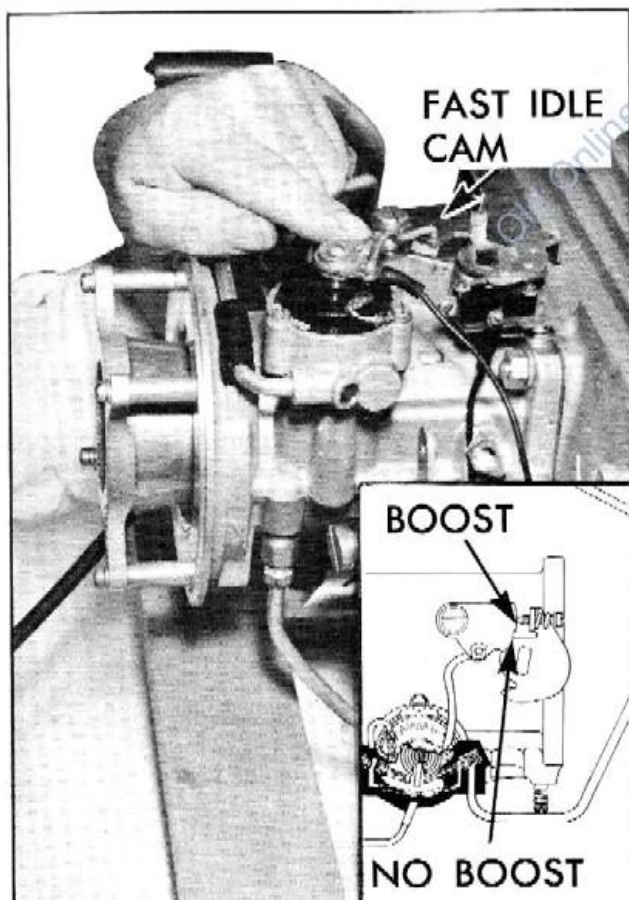


Fig. 4 Cold Enrichment Rod Length Adjustment

heard. If necessary, bend rod as required with bending tool J-6492 to shorten or lengthen rod in order to meet the above requirements.

Fast Idle Speed Setting

1. Normalize the engine at operating temperature.

2. With tachometer hooked up to measure rpm, start engine and place throttle tab on high step of fast idle cam.

3. Speed should be 1600-1700 rpm in neutral. If unit does not meet this specification, bend the throttle tab in or out as required.

TROUBLE SHOOTING

In general, the following procedures cover most of the malfunctions which may be encountered with the 7014800 Fuel Injection unit and basically apply to the two preceding Chevrolet Fuel Injection models also.

Probable causes of trouble are listed under each complaint heading by the order in which they should be checked.

Always make sure everything else is checked first, before blaming the fuel system.

DIRT & FOREIGN MATERIAL . . . always clean and inspect parts thoroughly.

WEAR . . . watch for wear on vital moving parts; if in doubt, replace it!

MISADJUSTMENT . . . check all adjustments carefully.

LEAKS . . . examine gaskets and connections carefully; check castings for damage to scaling surfaces. Check diaphragms for holes. Be sure all mountings bolts are tight.

DISTORTION . . . watch for parts that are damaged or bent out of shape.

DRIVING HABITS . . . do your best to

show your customers how they can get the most out of their car. Explain how fuel used for performance subtracts from economy.

In many instances in the following trouble possibilities, it is necessary to check for air leaks at the signal line connections and nozzle blocks, or to check for leaks in the enrichment or main control diaphragms. The following procedures should be used to make these checks:

Connection Leak Check

The quickest check for possible air leakage into vacuum signal lines, nozzle blocks, and rubber sleeve - type connections is to spray the connections, one by one, with water from a pump-type oil can while the engine is idling. If leaks are present, a sucking sound will be heard as the water is pulled in by the vacuum.

Diaphragm Leak Check

To check for leaks in the enrichment or main control diaphragm, disconnect the vacuum signal line at the end opposite the diaphragm connection end and attach a hose from a manometer with a vacuum source to the tube as shown in Fig. 5. Then with the vacuum release valve on the manometer unit shut, apply and hold a vacuum on the diaphragm and watch the manometer dial. If the diaphragm leaks, the manometer dial needle will slowly slip to lower readings. This will require replacement of the fuel meter. When testing the main control diaphragm, disconnect the vacuum signal line from the opposite end of the tee and install a plug.

Never apply a vacuum greater than 4" Hg (mercury) to the main control diaphragm as this may damage fuel meter. The enrichment diaphragm should be checked by applying 12-16" Hg. (mercury).

If a unit such as shown in Fig. 5 is not available, a substitute set-up may be arranged.

1. Connect a "Tee" fitting to the tube.

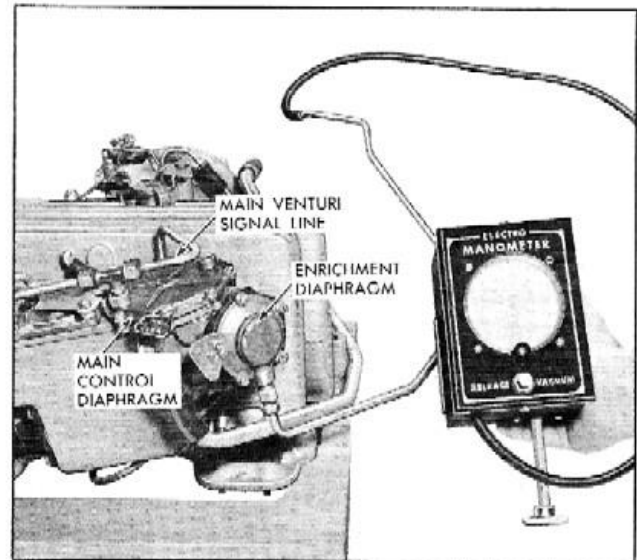


Fig. 5 Checking for Diaphragm Leaks

This tube is the one shown with the manometer attached in Fig. 5.

2. Connect a sensitive vacuum gage or manometer to one outlet of the tee.

3. Connect a vacuum pump to the other outlet of the tee. The vacuum pump that is a part of most Distributor Analyzers will work satisfactorily.

4. Turn on the vacuum pump and allow the vacuum to reach the levels specified above.

CAUTION: It is most important that the specified levels of vacuum not be exceeded even momentarily. Excessive vacuum on the main diaphragm may irreparably damage the fuel meter.

5. When the desired vacuum is obtained, tightly close or seal the line leading to the vacuum pump. The best means of closing the vacuum line is to double the hose.

6. Observe the vacuum gage connected to the tee. Any drop of vacuum indicates a ruptured or leaking diaphragm. Recheck the test equipment for leakage to be certain the diaphragm is at fault.

Won't Start

1. Check for correct cold starting procedure: The accelerator should be depressed once to index the fast idle cam,

then the accelerator should be released until the engine has started. If hot starting starting cut-off switch (micro-switch) is being actuated by the throttle cam at approximately 3/4 throttle. Bend the switch bracket as necessary. Also make certain that the driver understands that holding the throttle wide open during cranking will unload the system.

2. Observe the starting solenoid on the fuel meter to make certain it operates when the starter is engaged (closed throttle). If it does not, check out the starting cut-off switch and solenoid.

3. Check that fuel is flowing to the fuel distributor by loosening the distributor line at the fuel meter. Fuel should leak from the loosened fitting during cranking; otherwise the fuel valve is sticking and should be cleaned. Push the solenoid plunger to free fuel valve or remove valve and clean thoroughly.

4. To check that the fuel line to the fuel distributor is not clogged, remove one set of nozzles from a nozzle block and check for fuel flow while cranking the engine. If fuel flow is not observed, check the fuel distributor check valve for sticking or a clogged fuel meter-to-distributor fuel line.

5. If fuel flows from the nozzles and the car still won't start, check for large air leaks, such as loose or cracked nozzle blocks. If the system is tight and fuel is present, there is either a very unusual flooding condition or the trouble is not in the fuel system.

Starts and Dies

1. This problem is often the result of residual vapors in the engine and exhaust system. In all cases after initially starting the engine, accelerate the engine several times to purge the system. This procedure is especially important in hot weather.

2. If engine will not take throttle as in step 1 above, check for a broken or im-

properly connected fuel meter pump drive cable. Also, check that the enrichment lever rests on the power (rich) stop. In all cases, when the engine is stopped, the enrichment lever should rest on the power stop. After the engine is started, the enrichment lever should remain on the power stop as long as the throttle tab is on the fast idle cam; otherwise check for leakage past the enrichment check valve in the cold enrichment housing as described in "CLEANING AND INSPECTION". If leakage exists, attempt to remedy by cleaning; otherwise replace cold enrichment housing.

3. Be sure the solenoid releases after engine starts; otherwise check for binding or improper wiring.

4. Check for vacuum leaks, especially the vacuum lines to the main control diaphragm.

5. If trouble occurs on a cold start, check the cold enrichment coil cover for proper index (1-1/2 notches rich) and check fast idle cam rod adjustment. Also check that the cold enrichment linkage is free to move and that the throttle tab rests on a stop of the fast idle cam for the first few minutes of engine operation. If the engine seems to be "starving", disconnect the enrichment line at the cold enrichment housing and start the engine. This will provide full enrichment. If disconnecting the enrichment line eliminates the trouble, the enrichment valve in the cold enrichment housing is not seating properly; clean or replace the cold enrichment housing as required.

6. The spill plunger may be sticking. It can be moved manually by pushing on the solenoid plunger. If the condition persists, the spill plunger can be checked only by partial disassembly of the fuel meter.

7. Check for a leak in the main control diaphragm. Disconnect the main control diaphragm line and impose a vacuum of not over 4" Hg on the diaphragm and check for leakage by observing manometer. If leak is found, the fuel meter must be replaced as changing the main control diaphragm

requires recalibration of the Fuel Injection unit which is not possible currently in field service.

8. Check the engine fuel pump for capacity and pressure as described in the Chevrolet Passenger Car Shop Manual. The pressure specifications are 4-3/4 to 5-1/2 p.s.i.

Hesitation or Flat Spot

1. Check for vacuum leaks in the signal lines and fittings.

2. In the air meter, check the main control diaphragm venturi signal passage for cleanliness and see that the auxiliary signal passages are clean.

3. Check that the restriction in the main control diaphragm tee is clear.

4. Check the main control diaphragm for leaks with a manometer.

5. Check for sticking spill plunger.

6. Apply a vacuum of 12-16" Hg to the enrichment diaphragm to check for leakage.

7. Check that the enrichment control diaphragm rod length allows proper cut-in for power and economy as described in step 2 of "Assembly of Fuel Meter. Enrichment lever should leave the economy stop at 9" Hg or below and reach the power stop at 3" Hg or above.

8. Check to be sure the enrichment diaphragm is receiving vacuum from cold enrichment housing. If not, look for trouble in the cold enrichment housing such as broken heat element posts, burned out heat element, or a stuck ball in enrichment valve.

Surge

1. Check the engine fuel pump and the ignition system, especially the spark plugs, for proper operation and adjustment. If the engine is equipped with a vacuum advance distributor, the spark advance must be set with the vacuum disconnected to 12^o-14^o BTDC 500 rpm idle speed.

2. Check that the fuel filter in the fuel supply line to the Fuel Injection unit is not obstructed and causing spasmodic fuel flow.

3. Check for vacuum signal line leaks.

4. If surge seems to result from over-enrichment, check the enrichment control diaphragm for leaks; if surge is caused from too lean a mixture, check the main control diaphragm for leaks. If the main control diaphragm is leaking, it is necessary to replace the fuel meter assembly.

5. Check the spill plunger for free operation as described under "Starts and Dies".

Rough Idle

1. Check for correct idle speed and mixture adjustments and correct distributor spark advance setting.

2. If adjustment of the idle fuel adjusting screw has little or no effect on engine operation, check for a sticking spill plunger.

3. Check that there is no perceptable vacuum signal from the boost tube at the cold enrichment housing when the rubber sleeve is disconnected and a finger is placed over the tube. This check must be made when the throttle tab is completely off the fast idle cam.

4. Check for leaks in the signal and fuel lines as described previously.

5. Check for a plugged nozzle by shorting out one spark plug at a time. If a plugged nozzle is present, there would be no change in engine operation when the spark plug to that cylinder was shorted out. Remove the nozzle and clean as described in "Cleaning and Inspection". This is likely to be extremely rare and a check of the spark plugs and leads should be made first.

6. Check that the enrichment lever leaves the economy stop at 9" Hg vacuum or below and arrives at the power stop at 3" Hg or above with a manometer as described under Fuel Meter Assembly.

7. Check for vacuum leaks, especially around the nozzle blocks and vent tubes. If a vacuum leak was not found by the water method but the nozzle area is still suspected, it will be necessary to remove the nozzles in sets and check that the small nozzle gasket is properly seated on each nozzle as described in "Installation of Signal, Fuel and Vent Lines".

8. Check for obstructions in the nozzle block vent tubes.

Poor Fuel Economy

1. Be sure the enrichment lever rests on the economy stop during normal operation after a 5-8 minute warm-up period.

2. After the throttle tab is completely off the fast idle cam, check that there is no perceptible signal at the signal boost tube by disconnecting the rubber sleeve and placing a finger over the tube. If suction is felt, the signal boost valve in the cold enrichment housing is leaking and should be cleaned so that complete signal boost valve seating is obtained; otherwise replace the cold enrichment housing.

3. Check that accurate manifold vacuum signals are reaching the enrichment diaphragm by first taking an engine vacuum check and then by performing the same check at the enrichment signal line connection at the cold enrichment housing. Signal indications at the cold enrichment housing should be within 1" Hg of manifold vacuum reading; otherwise check for partially closed enrichment valve in the cold enrichment housing or a leaking gasket between the cold enrichment housing and air meter.

4. Check for an enrichment diaphragm leak by applying approximately 12-16" Hg to enrichment diaphragm signal tube with a manometer and vacuum source. Manometer indications should hold steady; otherwise a diaphragm leak is indicated.

5. Visually check that the ratio stop screw positions have not been altered. These stops are pre-set at the factory and

their positions should never be altered in the field. It will be noted that the lock nuts and screws are covered with a blue sealer which, if broken, will indicate that the adjustments have been disturbed. If these settings have been altered, the fuel meter assembly should be replaced as there is no method presently established for adjusting these settings in the field.

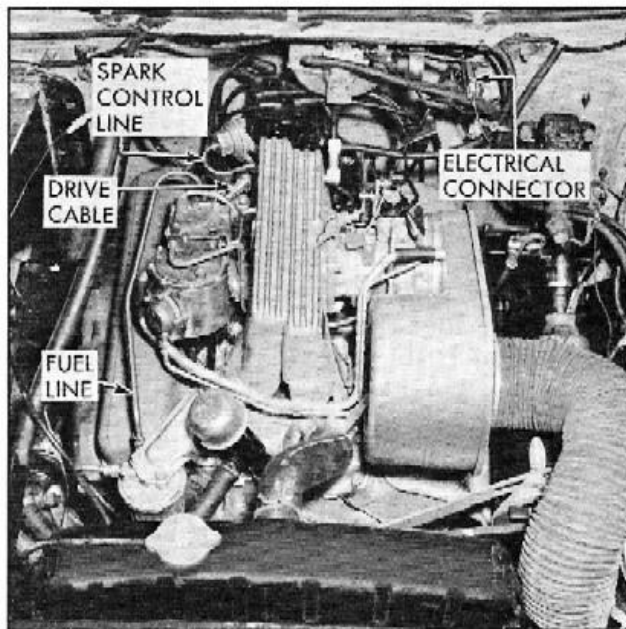


Fig. 6 Fuel Injection - Installed View

REMOVAL OF FUEL INJECTION FROM ENGINE

1. Disconnect and remove fuel injection pump drive cable by unscrewing nut attaching cable housing to distributor, pull housing and cable out of distributor, and then pull housing and cable free of fuel injection pump, Fig. 6.

2. Disconnect fuel line at the fuel meter.

3. Remove air cleaner as described under "MAINTENANCE AND ADJUSTMENTS."

4. Disconnect the accelerator control rod and transmission TV rod (if automatic transmission) from the bellcrank on the Fuel Injection manifold.

5. Disconnect electrical connector for the starting cut-off switch and cold enrichment coil.

6. Loosen the spark control pipe at the distributor, then disconnect pipe at air meter end. Pipe should be loosened to allow its movement during removal of the Fuel Injection unit.

7. Remove the eight nuts and lockwashers attaching Fuel Injection intake manifold to adapter plate on engine and lift off Injector. Ports in adaptor plate should be sealed off with masking tape immediately after removal of the Fuel Injection unit to prevent loose nuts etc, from falling into the combustion chambers.

FUEL INJECTION FLOW CHECK

When the Fuel Injection unit is removed from the engine, it may be worth while to perform a fuel flow check. This is accomplished by filling the fuel meter with fuel and spinning the fuel meter pump. If a drill is attached to the fuel meter pump drive cable, Fig. 7, use a pan to catch the fuel.

NOTE: It is recommended that a geared hand-drill or air-powered drill be used to minimize any fire hazard.

NOTE: If a hand drill is used it will be necessary to push up on the starting bypass solenoid plunger to permit full flow. Full fuel flow may also be obtained

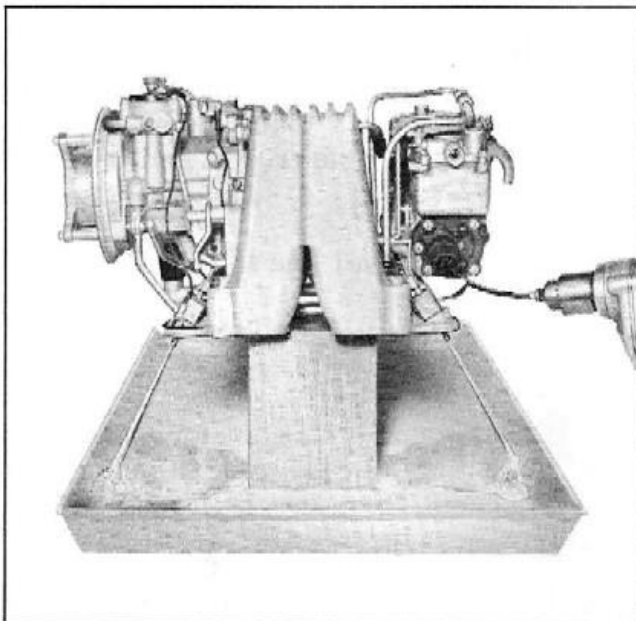


Fig. 7 Fuel Injection Fuel Flow Check

by disconnecting the main control diaphragm venturi signal line and applying a very light vacuum to the main control diaphragm. This may be done by applying oral vacuum to the main control diaphragm.

Properly operating, the streams of fuel from the nozzles should be practically perfectly aligned as viewed from the end of the unit and of equal volume.

This test should be performed after any rebuild of the unit and is sometimes helpful as a final diagnostic check of a complaint stemming from poor or erratic fuel flow.

The following are the most probable causes if all fuel streams are not in alignment:

- a. Kinked nozzle fuel lines
- b. Partial blockage of one or more fuel distributor outlets
- c. Partial blockage of the effected nozzles
- d. Unlike coded nozzle installed in error during replacement

Less probable possible causes are miscoded nozzles and odd size apertures in one or more fuel distributor outlets.

The above check will reveal only differences in fuel flow from the nozzles. It will not aid in uncovering problems arising from excessively lean mixtures, as all fuel flowing into the distributor, regardless of quantity, is distributed equally to all eight nozzles.

REMOVAL OF ASSEMBLIES

Removal of Throttle Control Linkage

1. Remove throttle return spring.
2. Remove nut and external toothed washer securing linkage to the throttle valve shaft lever beneath the air meter.

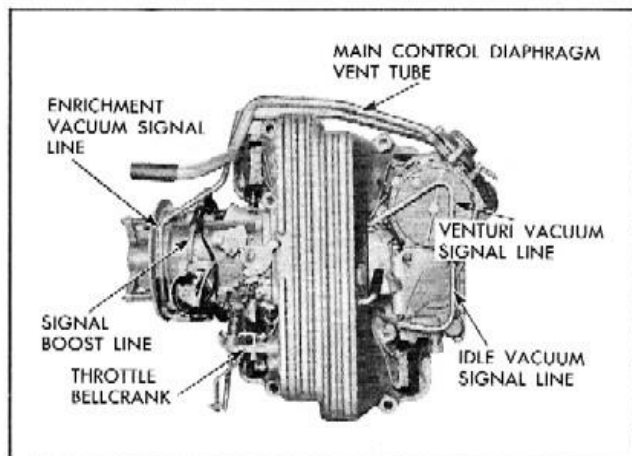


Fig. 8 Signal and Fuel Meter Vent Lines

3. Remove hairpin retainer attaching accelerator linkage levers to post and manifold casting and remove linkage. Do not further disassemble.

Removal of Signal, Fuel, and Vent Lines

1. Remove enrichment vacuum signal line by disconnecting at the rubber sleeve at the cold enrichment housing on the air meter and at the enrichment diaphragm on the fuel meter, Fig. 8.

2. Disconnect main diaphragm vent tube at the rubber sleeve at the fuel meter and remove tube. Do not remove short tube fixed in the fuel meter.

3. Remove the fuel meter-to-distributor fuel line, leaving the brass adaptor fitting installed in the fuel meter casing, Fig. 9. This fitting should not be removed from the fuel meter, unless replacement is required. Exercise caution in removing this line at fuel meter end. Tube extends through adaptor fitting into casting.

4. To remove the venturi signal vacuum line, pull line out of its rubber sleeve at the air meter end and unscrew the fitting on top of the main control diaphragm cover.

5. Remove idle signal vacuum line by unscrewing fittings at both the air meter and main control diaphragm cover ends. Do not remove adaptor from air meter casting unless replacement is required.

6. Remove the venturi-to-enrichment housing vacuum signal line.

CAUTION: Lower hose contains a calibrated restriction. If a replacement hose is required, press restriction out of old hose and install in new hose. On 7014800 units, this restriction should be .036" in diameter.

7. Remove nozzle block vent tubes from both the fuel meter and air meter sides.

8. Unscrew the cap screw securing the nozzle retainer, then lift the nozzles clear of the intake manifold and nozzle blocks. Remove nozzle blocks and gasket, then remove the other three sets of nozzles in the same manner.

9. Invert unit and carefully push fuel distributor to air meter side to free from its retaining bracket. Remove distributor, fuel lines, and nozzles as an assembly using care not to break or sharply kink lines. This completes the removal of the signal, fuel, and vent lines.

Removal of Air Meter

1. Disconnect lead from solenoid at starting cut-off switch, Fig. 10.

2. Remove four nuts and lock washers securing air meter to the intake manifold and remove the air meter assembly and gasket, Fig. 11.

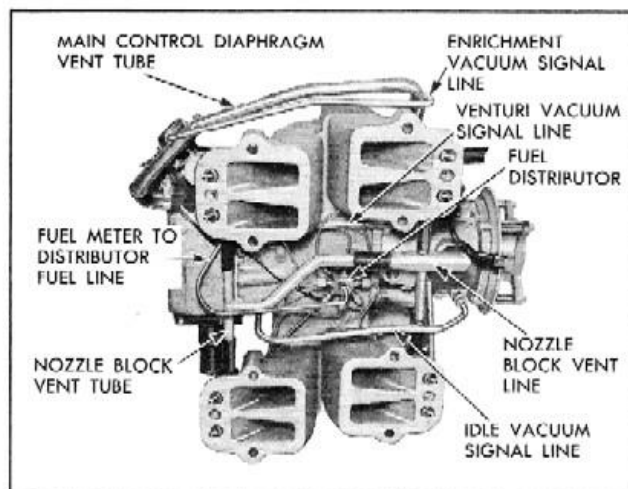


Fig. 9 Fuel and Nozzle Vent Lines

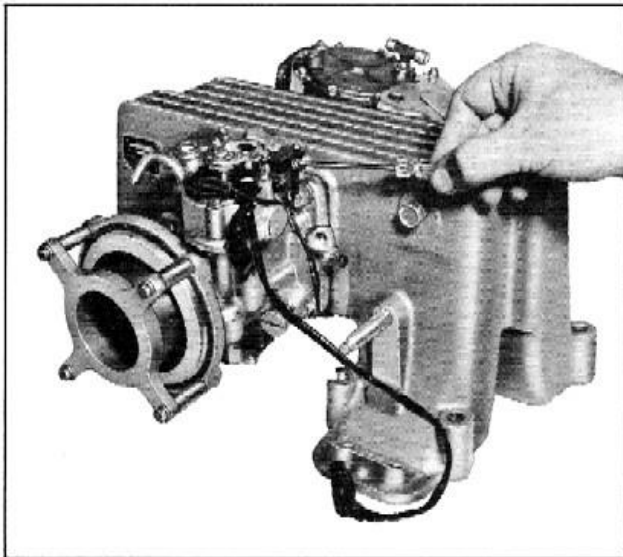


Fig. 10 Disconnecting Starting Cut-Off Switch

Removal of Fuel Meter

To detach fuel meter, place intake manifold on end and remove three cap screws and lockwasher fastening the fuel meter bracket to the manifold, Fig. 12. Complete removal by pulling fuel bowl vent tube free of rubber sleeve connecting it to the intake manifold.

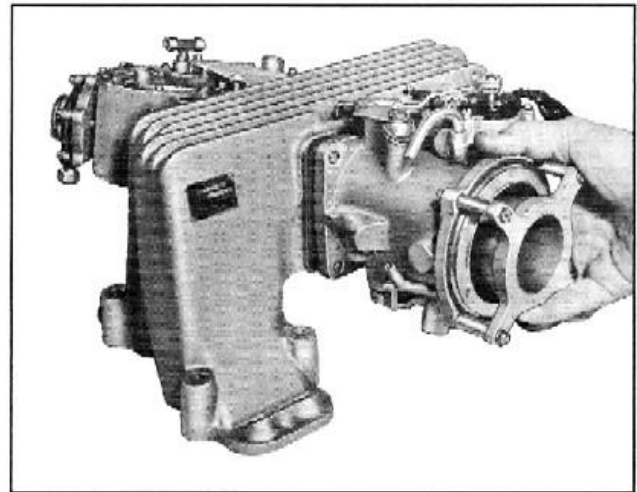


Fig. 11 Removing Air Meter

DISASSEMBLY

Disassembly of Air Meter

1. Remove the idle air and idle fuel adjusting screws and springs, Fig. 13.
2. Unscrew four diffuser cone attaching screws and remove diffuser cone, spacers, venturi ring, rubber gasket and attaching screws, Fig. 14.

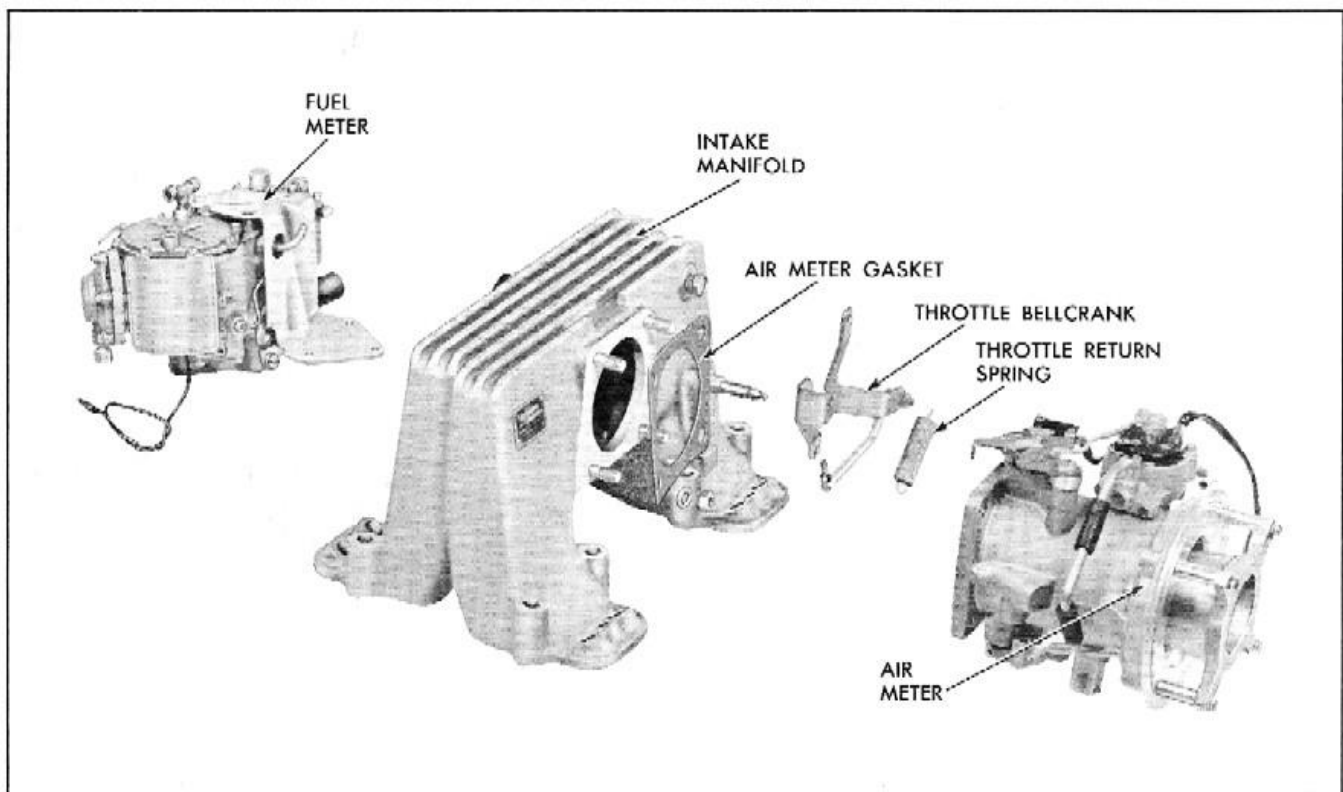


Fig. 12 Fuel Injection Basic Components

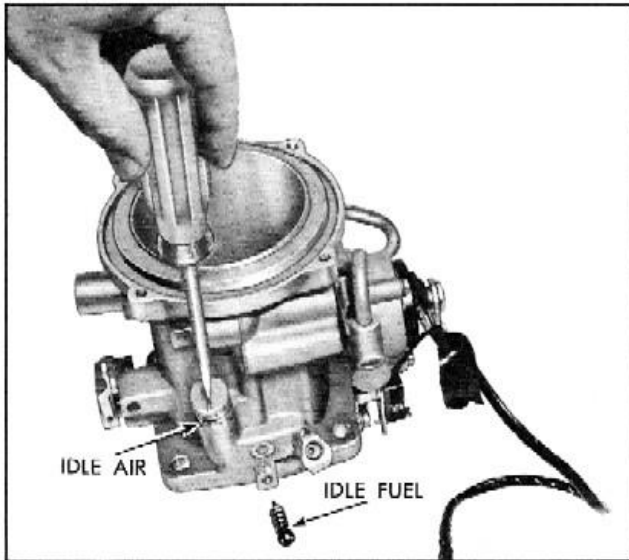


Fig. 13 Removing Idle Fuel and Idle Air Adjusting Screws

3. Remove the fast idle linkage and cold enrichment coil as an assembly by first removing the screw attaching the fast idle cam, Fig. 15. Then remove three screws and retainers securing thermostatic coil to the housing and lift out the cam, cam spring, linkage, and coil as an assembly. Further disassembly of these components is unnecessary unless replacement is required.

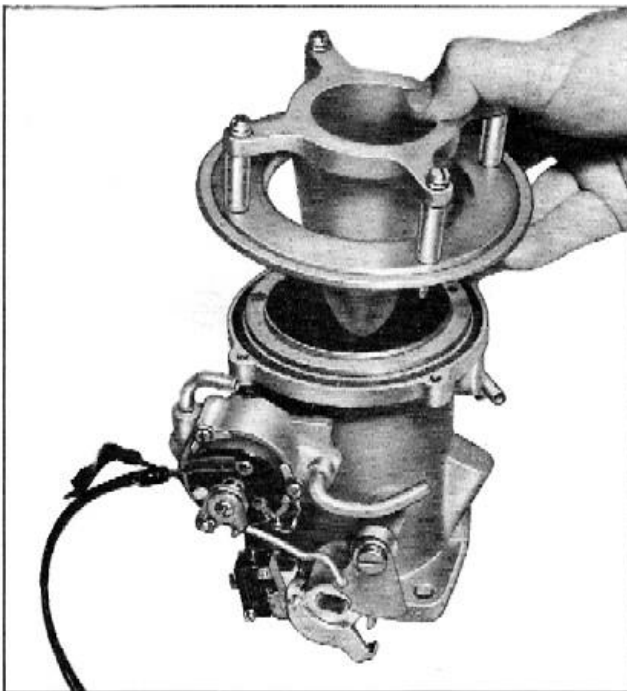


Fig. 14 Removing Diffuser Cone and Venturi Ring

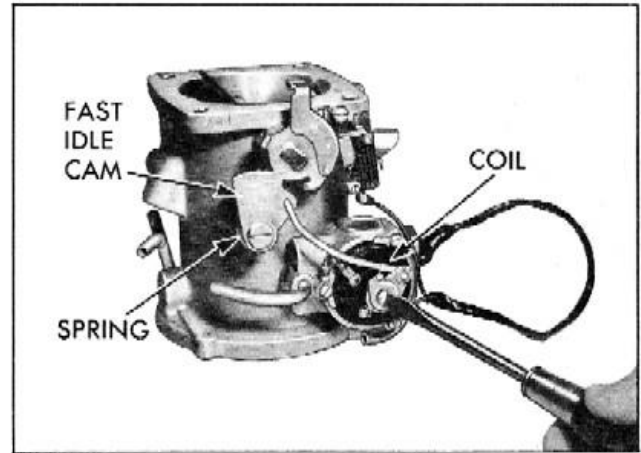


Fig. 15 Removing Cold Enrichment Coil

4. Remove both the starting cut-off switch and its bracket by removing the two screws and lockwashers securing the bracket to the boss on the air meter.

5. The above operations complete usual air meter disassembly. Under no circumstances should the throttle valve, throttle valve shaft lever, or lever stop screw be removed as these parts are not serviced separately and their position should not be altered. To prevent possible thread damage to the air meter casting, neither the 45-degree spark control pipe fitting nor the female fitting at the auxiliary idle signal location should be removed unless replacement is required.

Disassembly of Fuel Meter

CAUTION: Disassembly of the fuel meter is strictly limited to the operations outlined in this procedure. Under no circumstances should the main control diaphragm or ratio stop screws be loosened or removed as such action would ruin the calibration of the fuel meter and require its replacement.

1. Remove fuel meter mounting bracket by removing four attaching screws, Fig. 16. Be careful not to lose the spacers used at the bowl cover attachment.

2. Remove starting by-pass fuel line, Fig. 17.

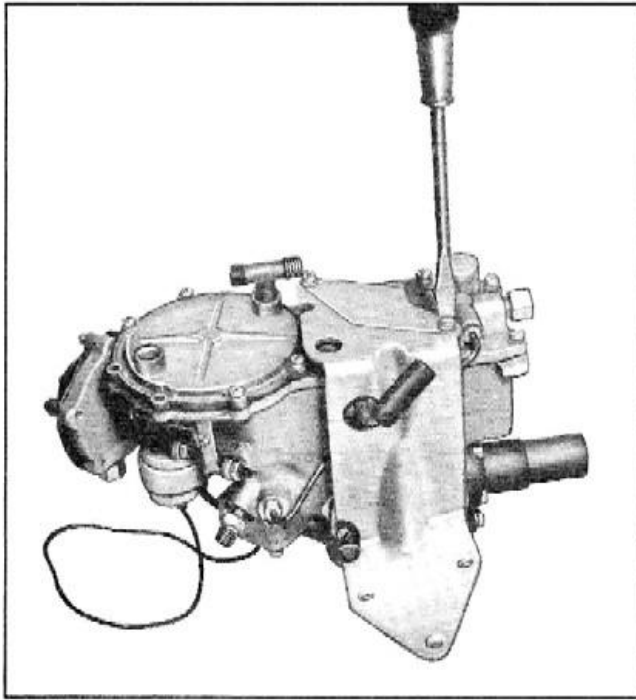


Fig. 16 Removing Fuel Meter Mounting Bracket

3. Remove high pressure fuel pump and gasket, Fig. 18, by removing five attaching screws. Do not further disassemble fuel pump!

4. Invert the fuel meter and remove the four screws and lockwashers securing the fuel valve cover. Remove the cover and "O" ring, then remove the filter, fuel valve and spring, and the spill plunger, Fig. 19. Be especially careful not to drop or lose the spill plunger as it is individually matched

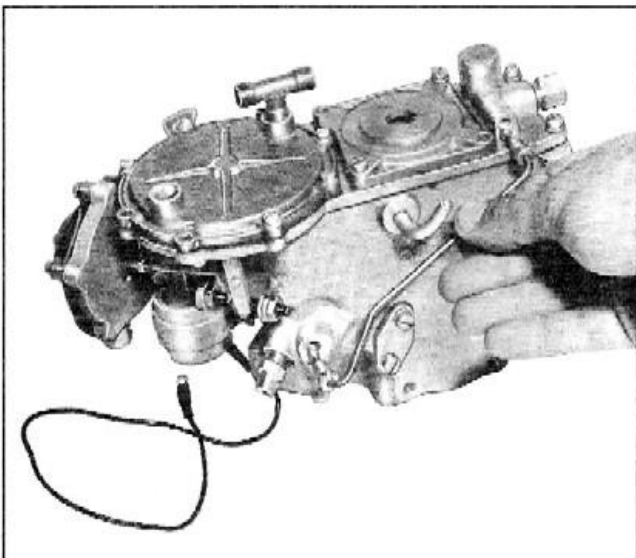


Fig. 17 Removing Starting By-Pass Fuel Line

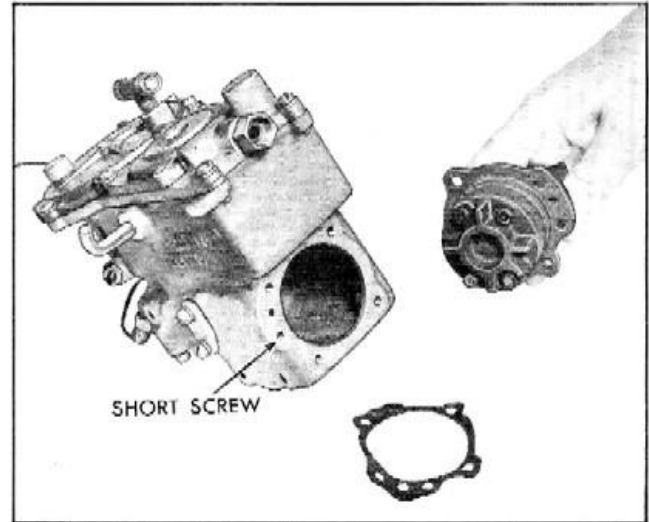


Fig. 18 Removing Fuel Meter Fuel Pump

to the fuel meter casting and is not serviced separately.

5. Detach the fuel passage cover plate by removing the two attaching screws and lockwashers, Fig. 19.

6. Remove the two remaining screws attaching the bowl vent cover and remove the cover and screen, Fig. 20. It is good practice to inspect and clean the screen and replace immediately to minimize the possibility of dirt entry to the fuel meter.

7. If checks performed during "Trouble Shooting" indicate that the enrichment diaphragm is leaking and requires replacement, remove the two screws securing the shield to the main control diaphragm cover and remove the shield.

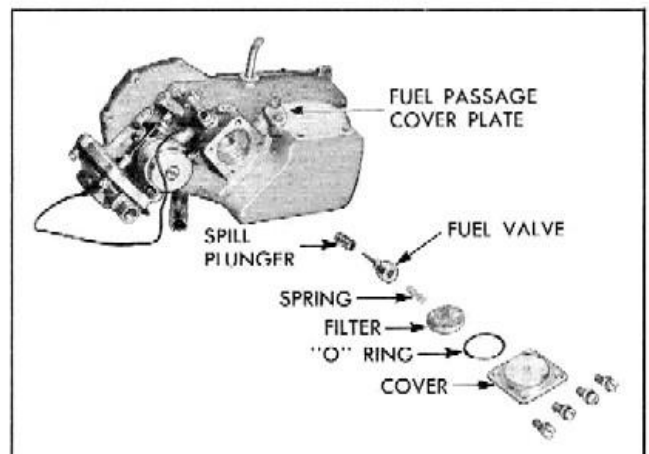


Fig. 19 Fuel Valve Components

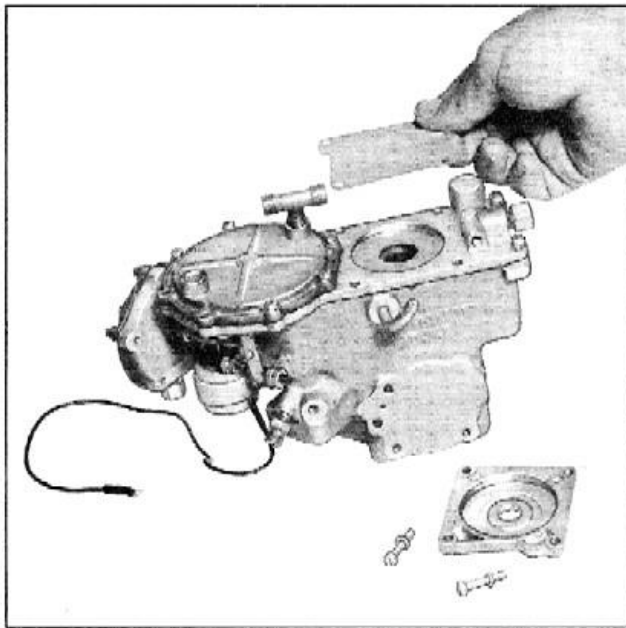


Fig. 20 Removing Fuel Bowl Vent Cover and Screen

8. To remove the enrichment diaphragm, first remove the hairpin retainer securing the diaphragm rod to the enrichment lever. Then remove the five screws securing the enrichment diaphragm cover while holding the cover in place to prevent losing the spring when the cover is released, Fig. 21. Once the cover is removed, turn the diaphragm slightly to free the rod from the enrichment lever. This completes fuel meter disassembly.

CLEANING AND INSPECTION

All metal parts should be thoroughly washed in clean solvent and blown dry. Under no circumstances should wires or drills be passed through any orifice as this would enlarge the openings and upset calibration. All gaskets should be discarded and replaced with new ones except the intake manifold-to-adaptor plate gasket.

The rubber hose sleeves used to attach various vent and signal tubes may be re-used after a careful check of condition. It is always best to replace any hose connection which shows the slightest sign of deterioration.

CAUTION: If it is necessary to replace the rubber hose connecting the

signal boost line to the venturi signal line, be sure to remove the restriction plug from the old hose and install it in the new one.

Vent, signal, and fuel lines should be checked for cracks and plugging. Blowing into the tubes is the simplest check for obstructions.

Check nozzle blocks closely for cracks. A very slight over-tightening of the nozzle block bolt can start fine cracks which will enlarge by vibration and cause an air leak, resulting finally in missing and rough idle.

The filter screen should be checked very closely for holes or plugging.

Free operation of the spill plunger is imperative as this regulates the amount of fuel delivered to the nozzles as signaled by the main control diaphragm. Because the fuel plunger is continually immersed in gasoline, sticking can result from gasoline gum and varnish formations. Thoroughly clean the fuel valve and the valve sleeve in the fuel meter with clean solvent and a small bristle brush. Dry with compressed air to protect against introduction of lint or dirt.

If a fuel flow or Trouble Shooting check reveals one or more faulty nozzles, remove faulty nozzle and adjacent nozzle and

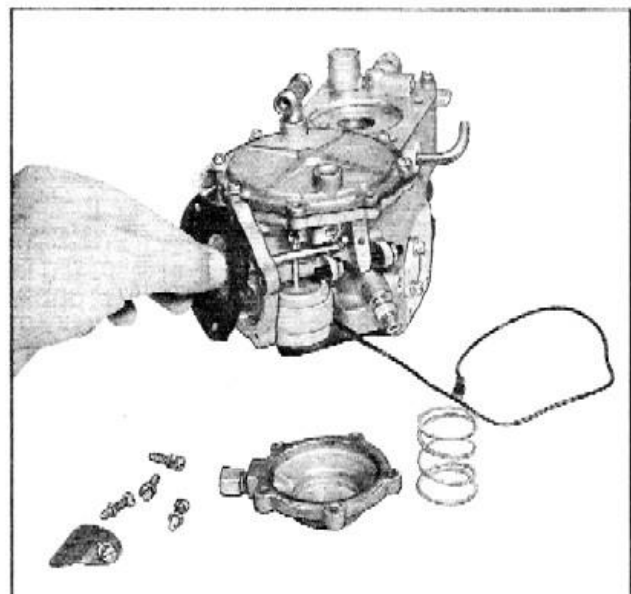


Fig. 21 Removing Enrichment Diaphragm

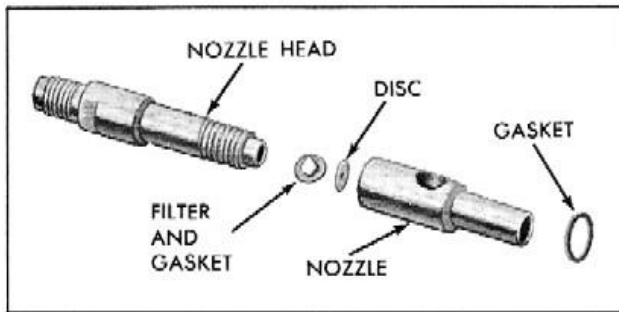


Fig. 22 Injection Nozzle - Exploded View

observe flow from nozzle lines. Also interchange nozzles and again observe fuel flow. If nozzle is definitely established as being faulty, disassemble as follows:

Hold the nozzle holder body with a 3/16" or slightly smaller drill or rod, and unscrew the upper half. Carefully remove the filter screen and the orifice disc. Inspect the disc for cleanliness. Do Not attempt to clean the orifice with drills or wires. Clean the filter screen and reassemble as shown in Fig. 22. The disc must be placed in the nozzle body with the bright surface down.

If it is necessary to replace a nozzle due to lost parts or from mutilation, check the nozzle code and replace with a like letter coded nozzle as shown in the following chart. Each nozzle carries a letter and number code at the upper end.

Production Nozzle Code	Use Replacement Nozzle	Part Number
Q-11 or Q-12	Q-12	7014856
R-12 or R-13	R-13	7014857
S-13 or S-14	S-14	7014858

After carefully washing the air meter casting, check that the small drillings near the throttle blade are not clogged. These too should be cleaned by using a small bristle brush and cleaning solvent.

Checks should also be made to be sure that the two valves in the cold enrichment housing fully open and close. The simplest check is to blow into the base of the housing while depressing the signal boost valve. Air

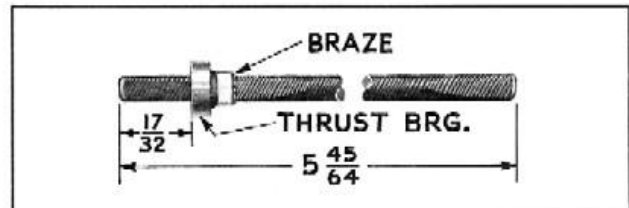


Fig. 23 Fuel Pump Drive Cable Dimensions

flow should be out of signal boost tube. Then repeat the check while depressing the enrichment vacuum valve. Air flow should be from the enrichment outlet. As a final check, blow into the housing without depressing either valve. No air should flow; otherwise reclean the housing until valves fully seat. Replace housing if necessary.

Check thrust member of fuel pump flexible drive cable. Thrust member should be firmly secured to the cable 17/32" from the end, Fig. 23. If loose, replace drive cable with a new one or if a new part is not available, carefully braze the thrust bearing in place.

ASSEMBLY

Assembly of Fuel Meter

1. Connect enrichment diaphragm rod by slightly twisting the enrichment diaphragm rod to hook into enrichment lever, then secure rod with hairpin retainer, Fig. 24.

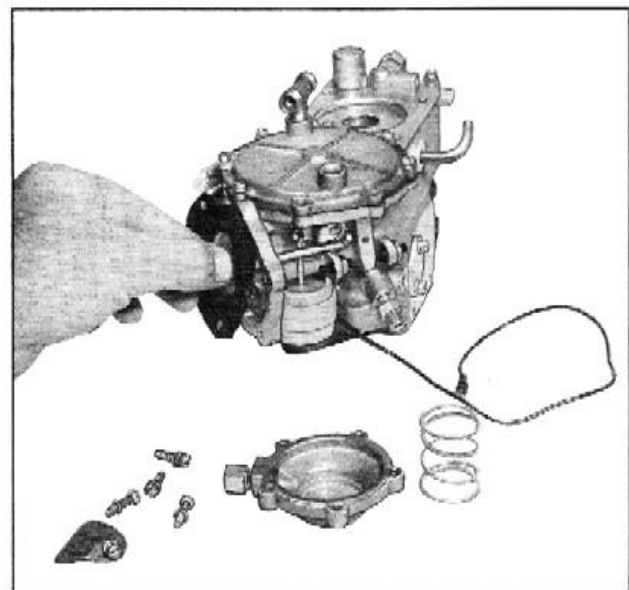


Fig. 24 Installing Enrichment Diaphragm

Complete installation by placing diaphragm return spring between enrichment cover on diaphragm and secure with five attaching screws. Use care to align diaphragm holes with holes in fuel meter to prevent a twisted diaphragm installation.

2. Check length adjustment of enrichment diaphragm rod by connecting a manometer with vacuum source to the enrichment vacuum line which should be temporarily installed for this adjustment. Apply and hold a vacuum of 12-15" Hg (mercury), then slowly release the vacuum noting the readings at which the enrichment lever leaves the economy stop (forward) and arrives at the power stop (rear) If rod length is correct, enrichment lever should leave the economy stop at 9" Hg or below and arrive at the power stop at 3" Hg or above. At 6" Hg, the lever must not be touching either stop. Adjust rod length by removing the enrichment diaphragm cover and lengthening or shortening the rod length as required to meet the above requirements.

3. Position shield on main control diaphragm cover and secure with two screws.

4. Using a new gasket, install fuel passage cover plate on side of fuel bowl with two screws and lockwashers.

5. If the bowl vent screen and cover were not cleaned and immediately installed during "Disassembly", they should be re-installed at this time.

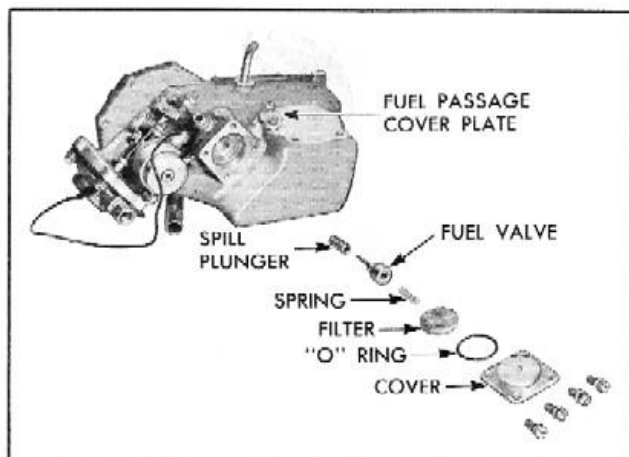


Fig. 25 Installation of Fuel Valve Components

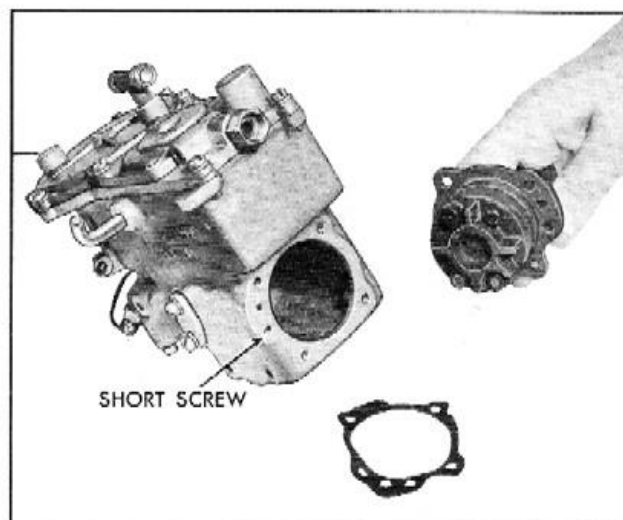


Fig. 26 Installing Fuel Meter Fuel Pump

6. With the fuel meter upside down, install the spill plunger, fuel valve, spring, and filter, Fig. 25. Install a new "O" ring on the spill plunger cover and lubricate with light engine oil--not grease. The addition of oil is important to prevent cutting the "O" ring during installation. Carefully push the cover into place until it is fully seated, then install the four screws and lockwashers and tighten uniformly in a criss-cross pattern.

7. Using a new gasket held in place with light engine oil, carefully position the high pressure fuel pump into the fuel meter and secure with five screws and lockwashers, Fig. 26.

NOTE: One screw is shorter and must be installed in proper hole, Fig. 26.

8. Reinstall starting by-pass fuel line, Fig. 27.

9. Position two spacers on bowl vent cover, position mounting bracket and cover plate on spacers, and secure with two screws and lockwashers. Attach bracket to side of fuel meter with two large screws and lockwashers to complete assembly of fuel meter.

Assembly of Air Meter

1. Position the starting cut-off switch

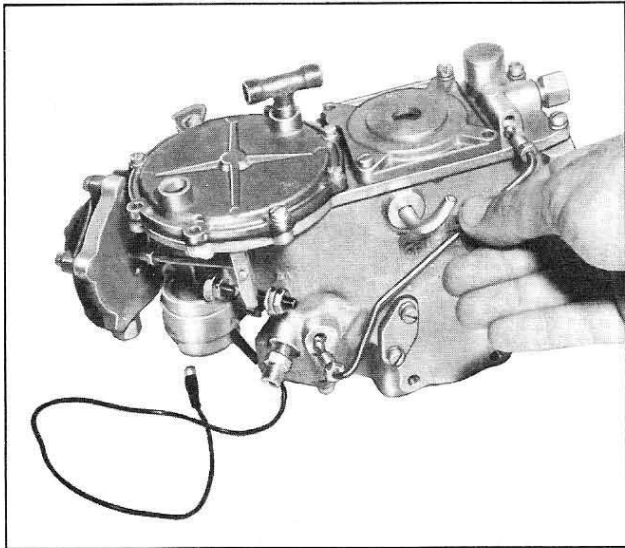


Fig. 27 Installing Starting By-Pass Fuel Line

on its boss on the air meter casting and secure with two screws and lockwashers.

2. Using a new gasket, position the cold enrichment housing on the air meter and secure with attaching screws.

3. Insert the cold enrichment coil into the cold enrichment housing so its operating lever is between the enrichment and signal boost valves. Loosely install three screws and retainers, position cover so scribed index is set 1-1/2 marks rich, and tighten three screws securely. Be sure coil ground wire is fastened by one of the screws.

4. Place fast idle cam return spring on air meter boss with the spring leg away from the cold enrichment housing, Fig. 28.

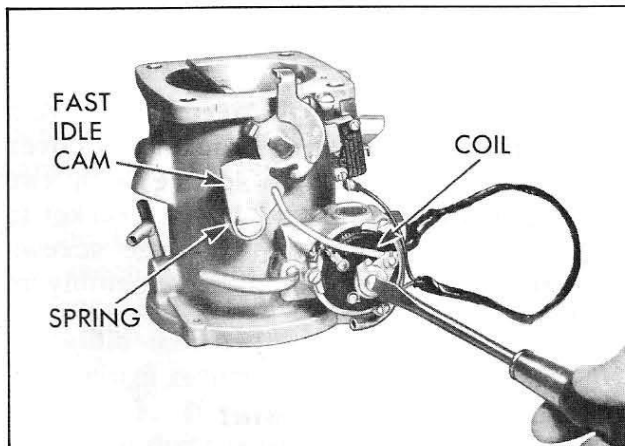


Fig. 28 Installing Cold Enrichment Coil

Hook spring tang against the cold enrichment side of the fast idle cam, center cam on boss, and secure with attaching screw. Properly installed, the spring tension should be forcing the fast idle cam away from the cold enrichment housing when the throttle is open.

5. Install new gasket on the venturi ring, then preassemble and install venturi ring and diffuser cone as follows:

a. Insert the four screws and lockwashers through the diffuser cone, then place a spacer on each of the four screws.

b. Place venturi ring on screws and spacers as shown in Fig. 29.

c. Holding the diffuser cone and venturi ring, position against air meter casting and tighten the four attaching screws.

6. Install idle air and idle fuel adjusting screws and springs, Fig. 30, and back-off two turns as an initial adjustment. This completes assembly of air meter.

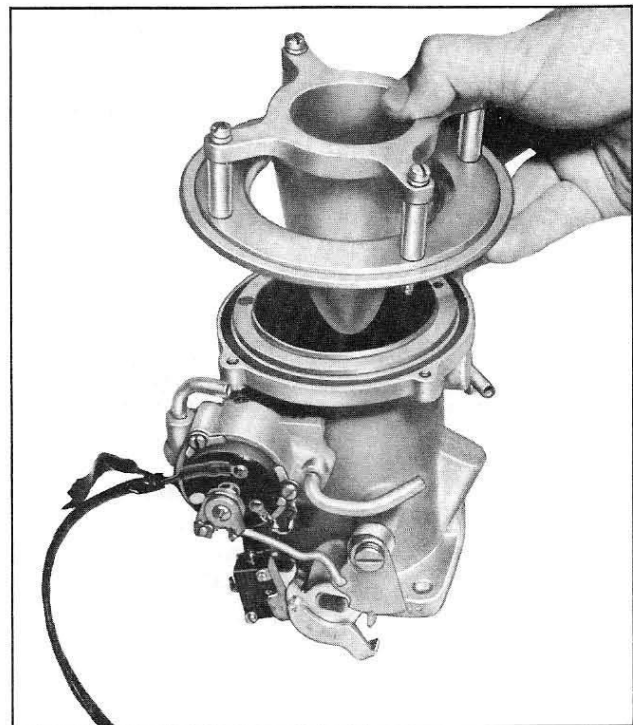


Fig. 29 Installing Diffuser Cone and Venturi Ring

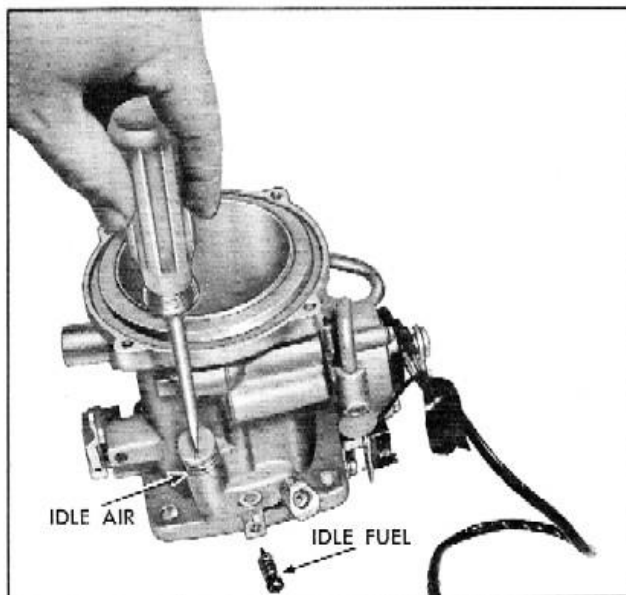


Fig. 30 Installing Idle Fuel and Idle Air Adjusting Screws

INSTALLATION OF ASSEMBLIES

Installation of Fuel Meter

To install fuel meter, place manifold casting on end, position mounting bracket over holes in underside of manifold, and install two capscrews and lockwashers. The third, or center bolt, should not be installed at this time as it is also used to secure the fuel distributor mounting bracket. Complete assembly by sliding fuel bowl vent rubber tube onto tube in intake manifold.

Installation of Air Meter

Using a new air meter-to-intake manifold gasket, position air meter on intake manifold studs and secure with four nuts and lockwashers. Wire from solenoid on fuel meter should be run beneath the intake manifold to the starting cut-off switch and attached with small screw and external tooth lockwasher, Fig. 31.

Installation of Signal, Fuel, and Vent Lines, Figs. 32, 33, & 34

1. Install venturi vacuum signal line to the front side of the restriction tee in the

main control diaphragm cover. Complete installation by connecting signal line to pipe pressed into air meter with rubber sleeve.

2. Attach fuel distributor mounting bracket to base of intake manifold and secure with capscrew and lockwasher. Push fuel distributor into mounting bracket being careful not to kink nozzle fuel lines. Adjust fuel lines to their approximate positions.

3. Install fuel meter-to-distributor fuel line. Line must extend through brass fitting.

4. Install nozzles and nozzle blocks as follows:

a. Install new nozzle gaskets and nozzles using light engine oil to hold in place.

b. Slip two nozzles into nozzle block retainer slots and install nozzles and retainer in nozzle block as an assembly. It is best to insert the nozzles while holding the nozzle block upside down to insure that the nozzle gaskets form a perfect seal.

c. Install assembled nozzles and nozzle block on intake manifold using a new nozzle block gasket. Insert bolt into nozzle block, then slip a .002" feeler gauge between the

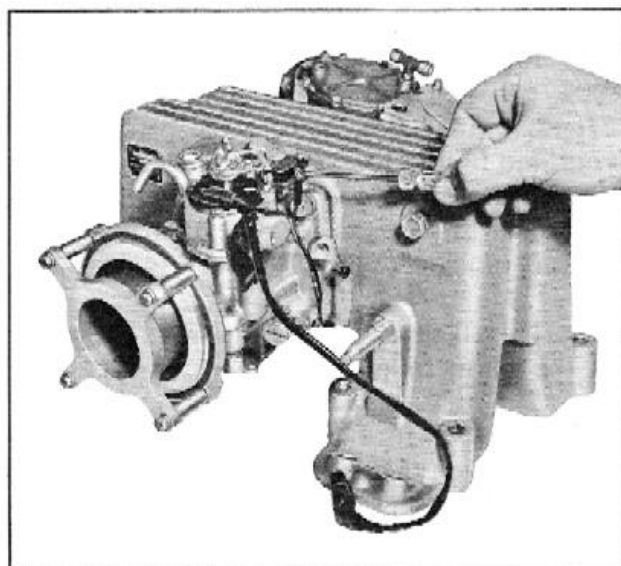


Fig. 31 Connecting Starting Cut-Off Switch

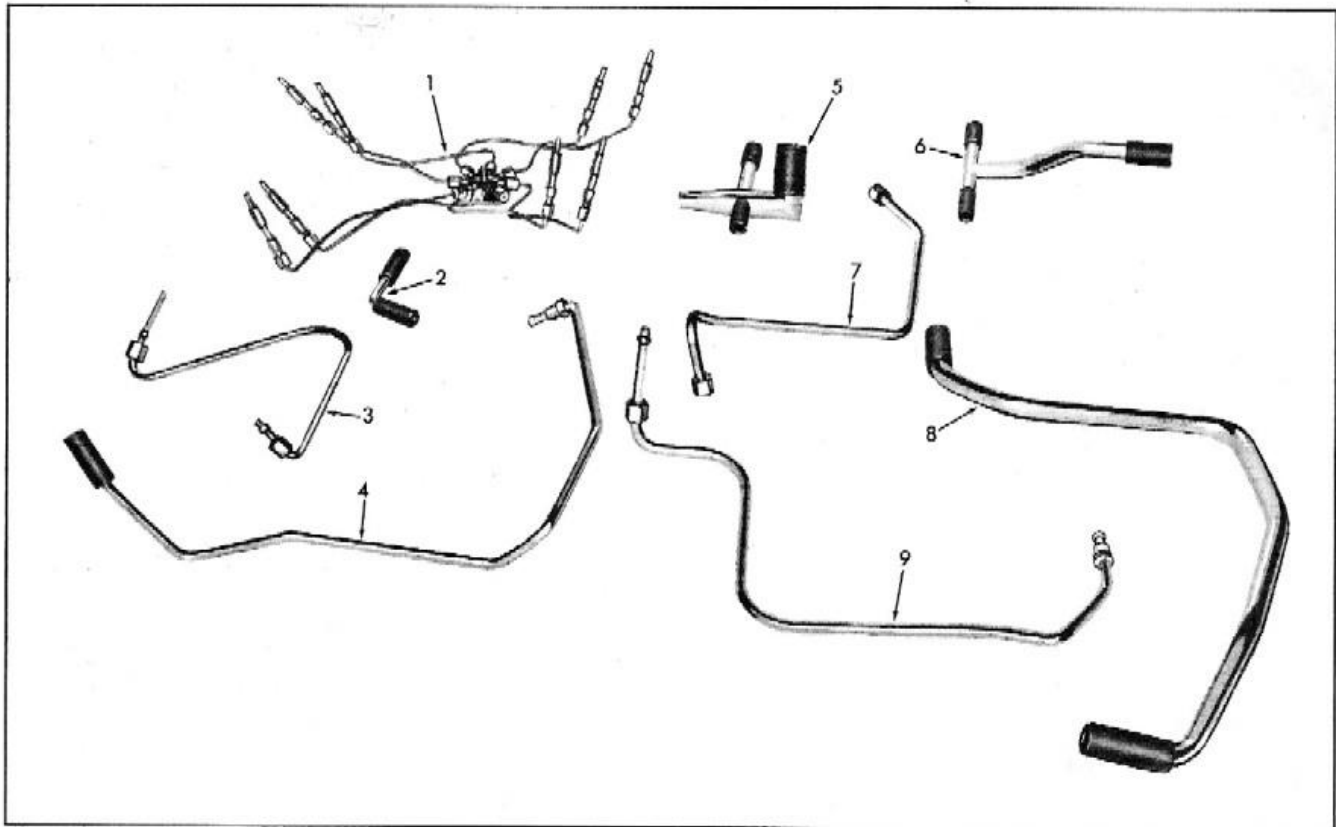


Fig. 32 Identification of Fuel, Signal, and Vent Lines

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Fuel Distributor With Lines and Nozzles 2. Signal Boost Line 3. Fuel Meter to Distributor Fuel Line 4. Enrichment Vacuum Signal Line (Enrichment Housing to Enrichment Diaphragm) 5. Nozzle Block Vent Tube (Air Meter Side) 6. Nozzle Block Vent Tube (Fuel Meter Side) | <ol style="list-style-type: none"> 7. Venturi Vacuum Signal Line (Venturi Cone Ring to Main Control Diaphragm) 8. Main Control Diaphragm Vent Tube (to Air Cleaner) 9. Idle Signal Vacuum Line (Air Meter to Main Control Diaphragm) |
|--|---|

nozzle block and retainer adjacent to the bolt location, Fig. 35. Tighten bolt until .002" feeler gauge can just be removed. Properly installed, the nozzle block will be retained by the tension against the nozzles; the retainer should not touch the nozzle block. Over-tightening will probably cause nozzle block cracking.

d. Install three remaining sets of nozzles in the same manner.

5. Connect fuel lines to nozzles. Do not over tighten. After line to nozzle connections are completed check that fuel lines do not contact intake manifold at any point. If necessary, pry lines away from manifold with a small screwdriver.

6. Install nozzle block vent tubes.

7. Connect idle signal vacuum line to the air meter and to the rear restriction side of the restriction tee on the fuel meter. With the fuel meter inverted, the line should pass over the nozzle block vent tube on the air meter side, then up along side of intake manifold casting on the fuel meter side of the restriction tee.

8. Thread enrichment vacuum line into fitting on the enrichment diaphragm housing, then connect opposite end of line to the enrichment tube on the cold enrichment housing using a rubber sleeve.

9. Connect main control diaphragm vent

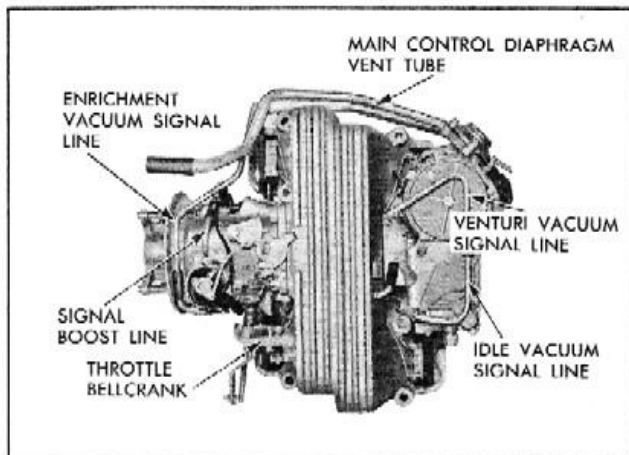


Fig. 33 Signal and Fuel Meter Vent Lines
Top View

tube to fuel meter using rubber sleeve. The other end of this tube attaches to the air cleaner when installed.

10. Connect signal boost line from venturi line to cold enrichment housing making certain restriction is in lower hose of boost line. This completes installation of the signal, fuel and vent lines.

Installation of Throttle Control Linkage

1. Position throttle bellcrank on intake manifold post and secure with hairpin retainer.

2. Insert bellcrank rod swivel into throttle valve shaft lever and secure with nut and external tooth lockwasher.

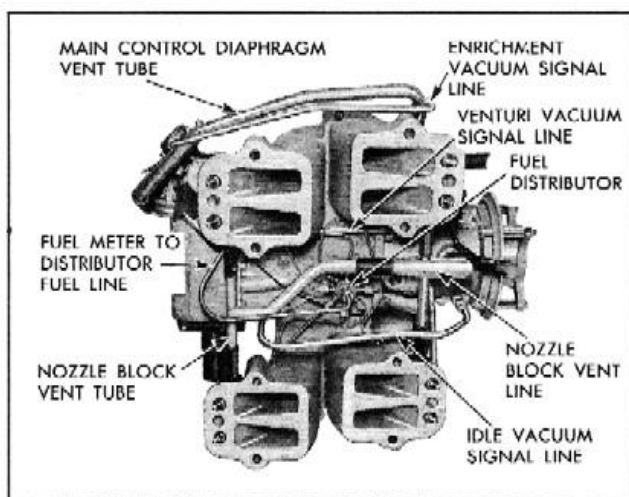


Fig. 34 Fuel, Signal, and Nozzle Vent Lines
Bottom View

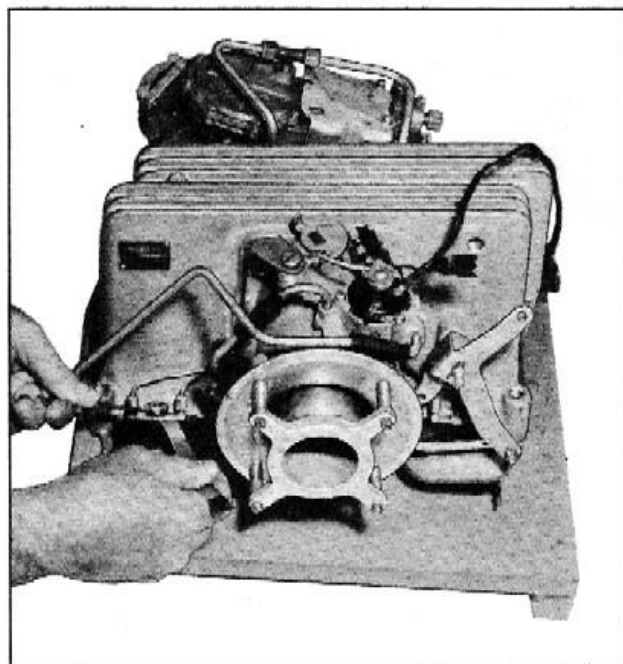


Fig. 35 Tightening Nozzle Retainer

3. Hook throttle return spring onto throttle valve shaft lever and throttle valve crank mounting post to complete assembly.

INSTALLATION OF FUEL INJECTION ON ENGINE

1. Remove masking tape sealing intake ports in adaptor plate, and secure with eight nuts and lockwashers. Tighten nuts evenly in a criss-cross pattern to 15 ft.-lbs.

2. Connect distributor spark control pipe, Fig. 36, into 45-degree fitting in air meter, then tighten fitting at distributor end of pipe.

3. Attach electrical connector for starting cut-off switch and cold enrichment coil into wiring harness connector on dash.

4. Install accelerator and transmission TV rod swivels into throttle bellcrank on intake manifold. If necessary, adjust swivel position to permit free entry into holes in bellcrank levers. Check for full throttle and TV travel by holding the accelerator in the "wide-open" position. Readjust rod swivel positions as required.

5. Install air cleaner as described under "MAINTENANCE AND ADJUSTMENTS."

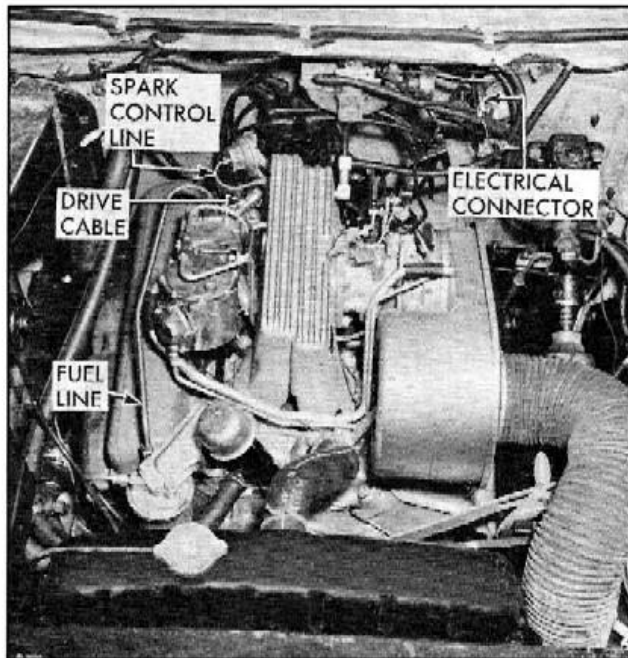


Fig. 36 Fuel Injection Installed on Engine

6. Install fuel line into fitting on fuel meter.

7. Install fuel injection pump drive cable as follows:

a. Carefully pull the fuel pump drive shaft from its housing being careful not to lose the small fiber washer located at the distributor end of the shaft between the

thrust bearing and the shaft housing. Examine the thrust bearing to insure that it is held securely on the shaft and the dimension from the end of the shaft to nearest face of the bearing is $17/32$ " as shown earlier in Fig. 23.

b. Prealign the fuel injection pump and distributor driveline members by inserting one end of the shaft into the fuel pump, then rotate the shaft to engage the other end in the distributor drive socket.

c. Carefully disengage shaft from both distributor and pump without rotating shaft. Reinstall fiber washer in distributor end of shaft housing and install shaft in housing.

d. Slide drive shaft assembly into position at fuel pump and carefully engage shaft in fuel pump driven member. Do not rotate shaft once it is engaged.

e. Engage shaft at distributor end and hold shaft housing firmly while tightening retaining nut to secure installation. This nut should be tightened to approximately 10 ft.-lbs.

8. Adjust idle speed and mixture as described previously in "MAINTENANCE AND ADJUSTMENTS." This completes the installation of fuel injection.

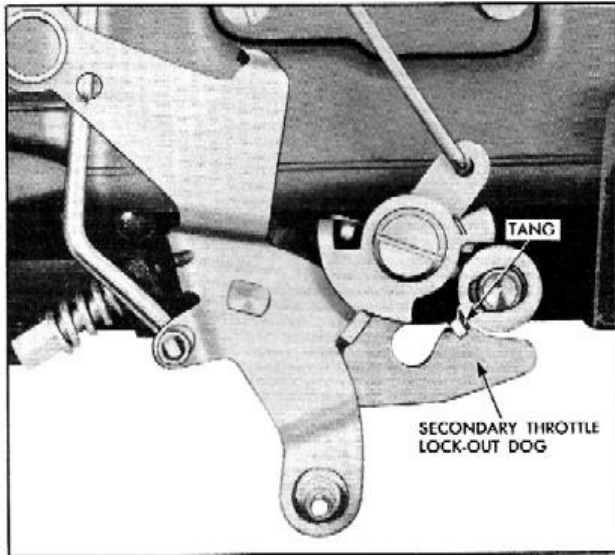


Fig. 26 Secondary Throttle Lockout Adjustment

g. Secondary Throttle Lockout Adjustment-Fully open choke valve, then open both primary and secondary throttle valves by fully depressing accelerator pedal to floor. Close choke valve and hold shut, then release accelerator pedal (closing throttle valves). Tang on secondary throttle shaft should freely engage notch in secondary lockout dog, Fig. 26. If necessary, bend tang to permit free engagement.

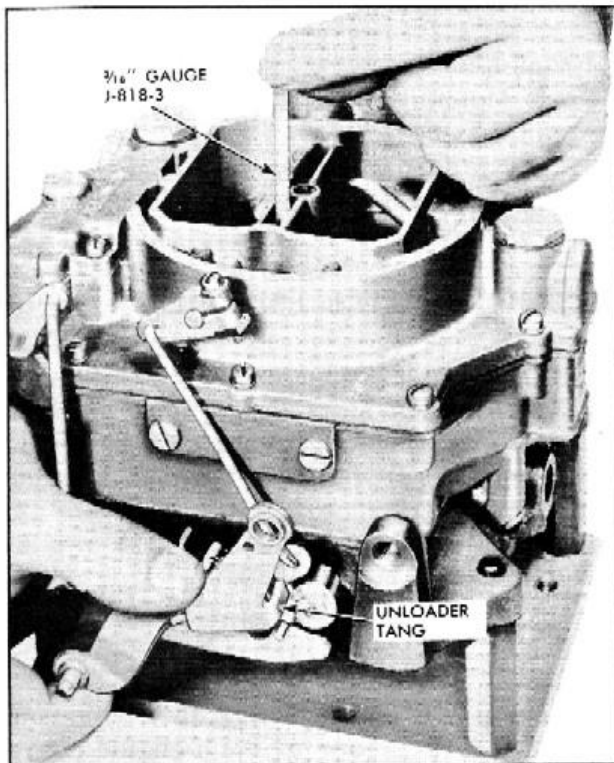


Fig. 27 Checking Unloader Adjustment

h. Unloader Adjustment-Fully depress accelerator pedal (primary throttle valves wide open.) Holding linkage in this position, insert 3/16" gauge J-818-3 between inboard edge of choke valve and center wall of bowl cover, Fig. 27. Gauge should just fit in this opening. If necessary, bend unloader tang with tool J-1137 as required to obtain proper adjustment.

Fuel Injection

a. Cold Enrichment Coil Setting - Check the scribe marks on the cold enrichment housing and cover. The scribe mark on the cover should be set 1-1/2 notches rich from the scribe mark on the cold enrichment housing. The notches are the radial marks cast on the flange of the cover.

b. Cold Enrichment Rod Adjustment - This adjustment should be required only at the time of a complete Fuel Injection

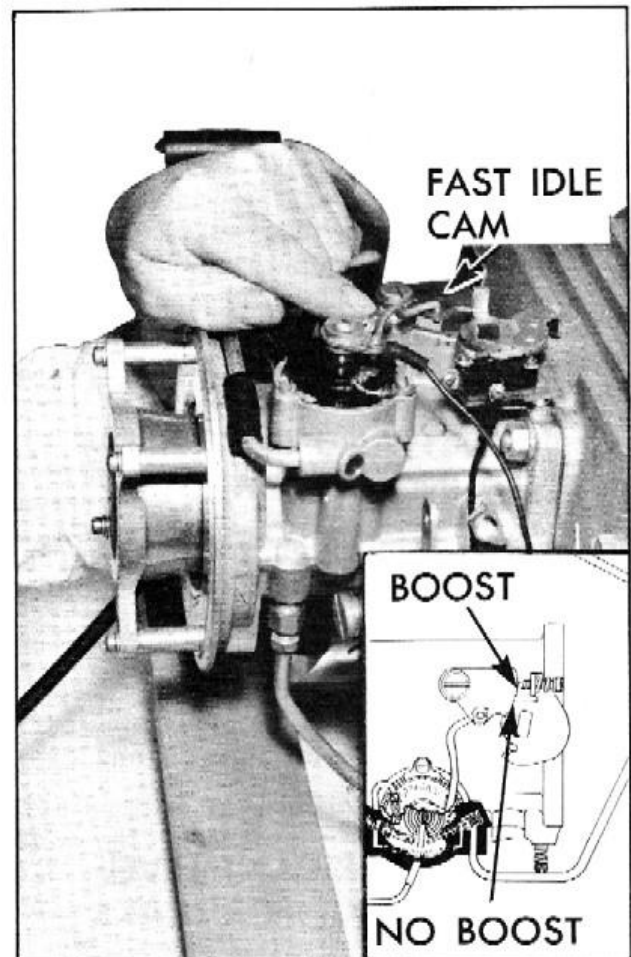


Fig. 28 Cold Enrichment Rod Adjustment

overhaul, but may be checked as part of the tune-up procedure.

1. With the engine off and cool, disconnect the rubber sleeve from the cold enrichment housing signal boost tube, and install a short length of rubber hose over the tube. (Windshield wiper hose or a brake bleeder hose is suggested.)

2. Crack open the throttle valve and place the throttle tab on the high step of the fast idle cam. Close the throttle to hold the cam in place.

3. Hold the cold enrichment trip lever against the counterweight tab as illustrated in Fig. 28. Blow into the hose and listen for slight air flow in the air meter. If the rod is the correct length, slight air flow will be heard.

4. Repeat Step 3 with the throttle tab on the second step of the fast idle cam. No air flow should be heard.

5. If either Step 3 or 4 shows the rod to be of the incorrect length, bend the rod as required with Bending Tool J-6492.

NOTE: For further service on the Fuel Injection System, refer to the portion of this manual under the R.P.O. equipment that covers the system in detail.

11. INSPECT AND SERVICE COOLING SYSTEM

Inspect cooling system for leaks, weak hoses, loose hose clamps and correct coolant level, and service as required.

NOTE: A cooling system pressure test may be performed to detect internal or external leaks within the cooling system.

12. CHECK LUBRICANT LEVEL AND INSPECT FOR LEAKS

Check level of lubricant in crankcase and transmission, inspect for oil leaks.

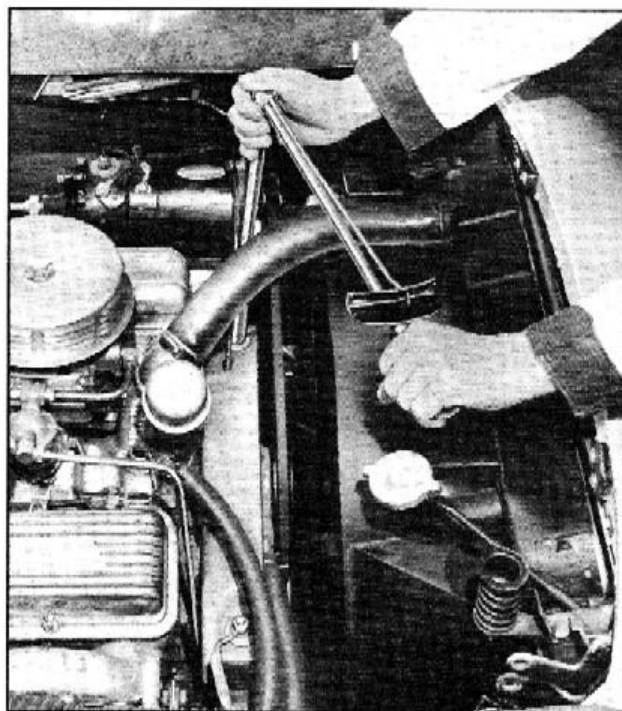


Fig. 29 Checking Front Engine Mounts

13. TIGHTEN ENGINE MOUNTING BOLTS

Engine mounting bolt torque should be checked periodically, Fig. 29. The proper torque wrench specifications are:

Front Mounts	25-35 Ft. Lbs.
Rear Mounts	50-55 Ft. Lbs.
Front Mounting Beam and Water Pump to Engine Bolts	19-24 Ft. Lbs.

14. NORMALIZE ENGINE

Set parking brake and place transmission in Neutral, then start engine and run until normal operating temperature is reached. This should be approximately 10-15 minutes with a cold engine.

NOTE: If disturbed, throttle stop screw will have to be reset.

Warmup will insure that proper lubricant viscosity is provided at each engine component and that each component will be at operating temperature and size.