ENGINE FUEL AND EXHAUST

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ENGINE FUEL AND EXHAUST

GENERAL DESCRIPTION

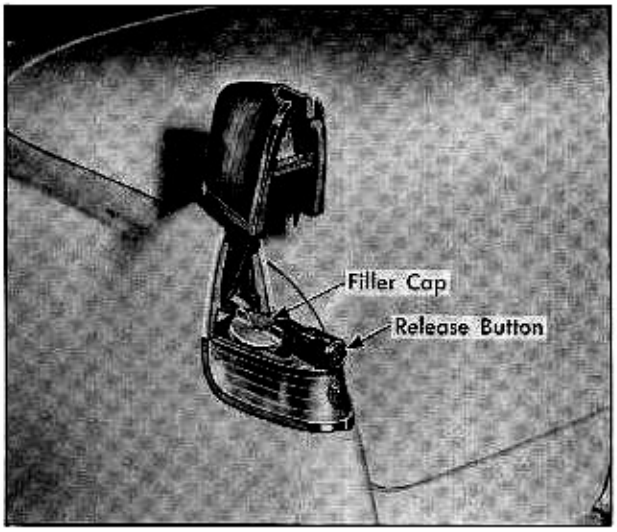

Fig. 12-1 Gasoline Filler Cap

The fuel tank on all 1954 Series Cadillac cars is mounted against the lower surface of the trunk compartment with two support straps and insulated from the underbody with anti-squeak. This provides for easy removal from below without disturbing any of the sheet metal parts.

The tank is constructed of two shallow pans, square in shape, placed flange to flange and welded around the entire flange. Ribs stamped into the pan provide a rigid construction.

Two tubes are attached to the tank and join at the upper end of the filler pipe. One allows air to escape from the tank when gasoline is added.

The gasoline filler cap is located below the hinged left rear tail lamp, as shown in Fig. 12-1.

The gasoline line is attached to the left front corner of the tank and extends along the left frame side bar to the fuel pump. This location permits maximum cooling of the lines by outside air currents and prevents vapor lock.

The fuel pump is mounted on the engine oil filler housing. The pump push rod is driven by an eccentric, machined as an integral part of the camshaft. Fuel is drawn into the fuel pump on the downward stroke of the diaphragm as the rocker arm is moved upward by the push rod.

Some engine operating conditions do not necessitate full travel of the diaphragm in the fuel pump. When this condition of fuel pump sufficiency is reached, a separate spring and link arrangement keeps the rocker arm and push rod in contact.

A fuel filter, connected between the fuel pump and the carburetor, receives fuel from the pump and filters out all dirt particles in excess of .001" in diameter. This removes a cause of flooding and possible clogging of small passages in the carburetor.

Either the four-barrel Rochester Model 4GC or Carter Model WCFB carburetor are used interchangeably on 1954 engines. While both carburetors differ in design, operating principles and characteristics are similar. The basic carburetion systems of each carburetor are briefly described in the following paragraphs.

Rochester Carburetor Circuits

The Rochester Model 4GC Carburetor consists basically of two dual carburetors. The two carburetors will be referred to as the Primary side and the Secondary side. The Primary side completely controls the metering to the engine throughout the idle and part throttle ranges. The Secondary Side supplements the fuel and air from the Primary Side throughout the idle and power or wide open throttle range.

Float System

To aid in maintaining the correct fuel level under all conditions of operation, two sets of dual floats are used.

Both sides of the carburetor incorporate individual float systems for maintaining the proper fuel level in each float bowl. All fuel enters the carburetor on the primary side.

As the fuel level drops, the dual floats also drop, thus allowing fuel pressure to move the inlet needles off their seats. Pressure from the fuel pump forces fuel through the filter screen into the inlet passage and the float bowl. As the fuel level rises, the floats rise and force the inlet needles into their seats, closing the fuel passage.

Both sides of the carburetor are individually and internally vented. These vents transmit the pressure from beneath the air cleaner to the fuel in the float bowls. The amount of the fuel metered by the carburetor is dependent upon the pressure in the float bowls causing fuel to flow.

To minimize difficult hot weather starting or rough idling, an external vent is incorporated which opens only when the throttle valves are in the closed position. This external idle vent consists of an actuating lever attached to the pump shaft and lever assembly, idle vent valve retainer, idle

vent valve spring, and idle vent valve. When the throttle valves are closed, the actuating lever contacts the spring loaded vent valve and holds it open. This permits vapors from the float bowl to be vented to the atmosphere. As the throttle valves are opened, the idle vent valve spring closes the vent valve thus eliminating the atmospheric vent and returning the carburetor to an internal balance.

A cored passage in the bowl casting links the primary and secondary float bowls together. In this way any abnormal rise in fuel level on one side will tend to be absorbed by the other, and should not seriously disrupt the operation of the engine. This passage also equalizes vapor pressures between the two bowls.

Idle Circuits

At small throttle openings, the vacuum created at the main discharge nozzles is not great enough to cause fuel to flow from the nozzles. Additional systems are provided to supply the proper mixture ratios required throughout the idling range. These circuits are shown in Fig. 12-2.

A fixed idle system is provided in the primary throttle bores which is supplied with fuel from the secondary side of the carburetor. The secondary idle fuel is drawn from the float bowl through the main metering jets into the fuel well in the bottom of the secondary float bowl. It then passes through the calibrated restriction in the end of each idle tube. The fuel is then drawn up through the idle tube, is bled at the idle air bleeds, passes through other calibrated restrictions, and is again bled by additional calibrated air bleeds. This mixture is drawn through the channel in the float bowl around the secondary throttle body bores, is further bled by the lower idle air bleeds, and is discharged from the throttle body idle orifices in the primary throttle bores. As the throttle is opened, the vacuum acting on the fixed idle discharge holes decreases very rapidly. These discharge holes, therefore, stop feeding fuel in the off-idle range.

In addition, an adjustable idle system is provided in the primary side of the carburetor. This system provides the balance of fuel required for normal curb idle as well as that required for operation in the off-idle range. The primary idle fuel is drawn from the float bowl through the main metering jets into the fuel well in the bottom of the primary float bowl. It then passes through the calibrated idle tube restrictions and idle tubes. Air joins this fuel at the calibrated air bleed and the mixture passes through a calibrated restriction and then through the float bowl idle channel, is further bled at the lower idle air bleeds and upper idle holes, and is discharged from the primary throttle body needle holes As the throttle valves are opened, the bleed

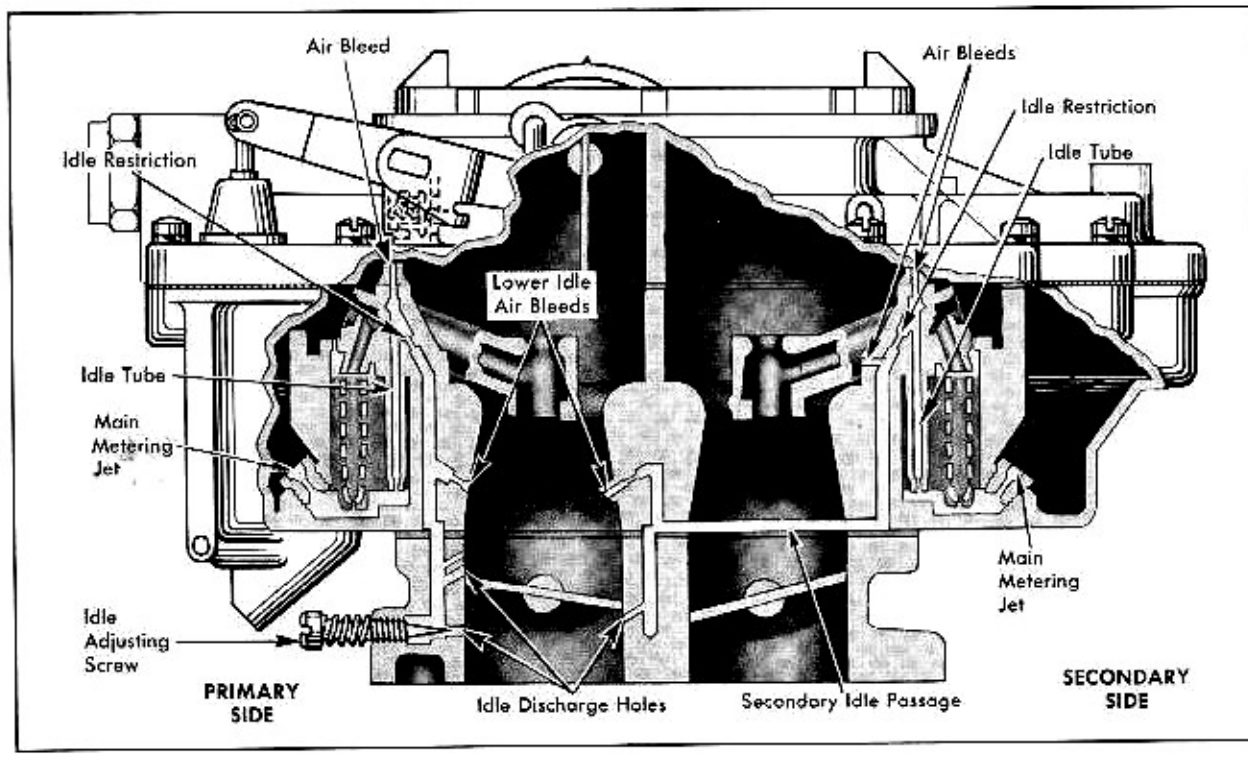

Fig. 12-2 Rochester Carburetor Idle Circuits

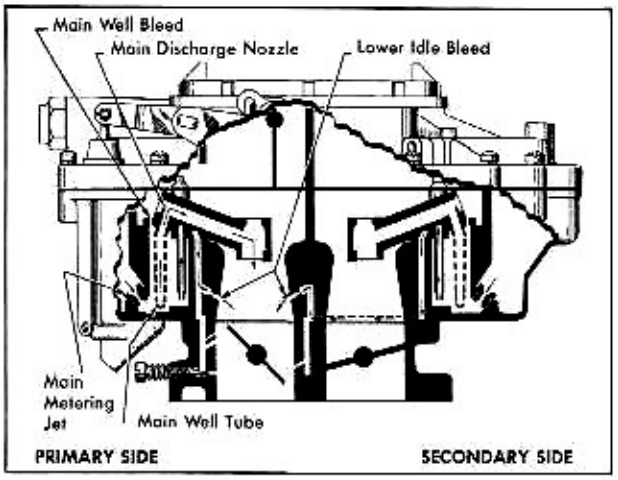

Fig. 12-3 Part Throttle Circuits

effect of the idle holes above the throttle valves gradually diminishes. When these holes become exposed to manifold vacuum they then become fuel discharge holes to meet the increased demand of the engine.

Part Throttle Circuit

As the throttle valves are opened to a greater degree and more air is drawn through the carburetor, it is necessary to provide a means other than the idle systems for supplying additional fuel to meet the engine requirements. Refer to Fig. 12-3.

The primary side of the carburetor meets this increased demand for fuel in the following manner: At a point of sufficient throttle opening, manifold vacuum, multiplied several times in the large and small venturi, is transmitted to the upper tips of the main well tubes, which act as main discharge nozzles. This partial vacuum draws fuel from the float bowl through the calibrated main metering jets and into the air bled main well tubes. While passing through the main well tubes, air joins the mixture through calibrated holes in the sides of the main well tubes. Air is admitted to the main well through the main well bleeds. The mixture then passes from the tip of the nozzle through the mixture passage to the small venturi and on into the intake manifold.

As the throttle opening is progressively increased and more fuel is drawn through the main well tubes, the fuel supply from the bowl is restricted to the main metering jets, and the fuel level in the main well drops. As this fuel level drops, other calibrated holes in the main well tubes are uncovered to the air. When this occurs they become additional air bleeds, thus mixing progressively more air with the fuel passing through the main well tubes. Thus, although the nozzle suction is increased by exposure to manifold vacuum as well as by air flow, as the throttle valves are opened, the fuel mixture to the

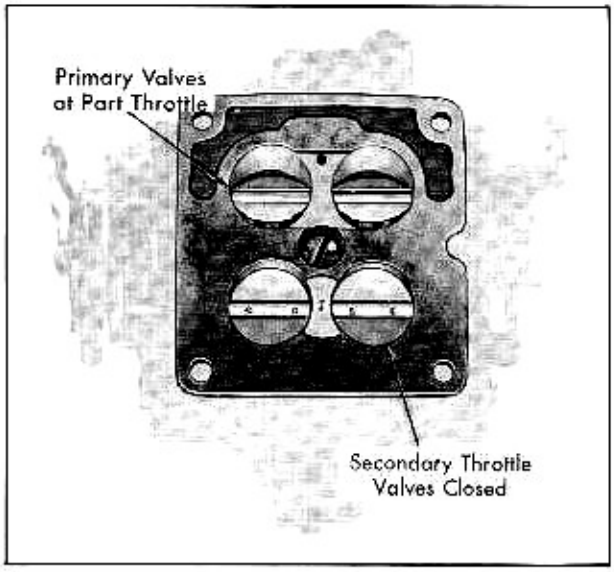

Fig. 12-4 Early Part Throttle

engine remains constant through the part throttle range.

An additional source of fuel to maintain a constant mixture ratio at wide primary throttle openings is furnished by the lower idle air bleeds which project into both sides of each primary throttle bore. These nozzles supplement the fuel discharged by the main system to fill the gap between late part throttle and early power system operation. Fuel is discharged from these nozzles at throttle openings which correspond to a steady speed of approximately 70 to 90 miles per hour. It will be noted that these nozzles acted as air bleeds during the operation of the idle system. When they are acting as discharge nozzles the idle discharge holes in the throttle body bleed air and mix it with the fuel passing through these part throttle nozzles.

The throttle valves on the secondary side of the carburetor are closed during idle and part throttle operation, as shown in Fig. 12-4. The secondary throttle valves are mounted off-center on the shaft so that manifold vacuum holds them closed until they are forced open against a return spring by linkage actuated by the primary throttle shaft. The primary throttle valves are approximately 3/4 open at the instant the secondary valves begin to open, Fig. 12-5. This amount of primary throttle opening is sufficient to drive the car approximately 90 miles per hour, although all four throttle valves can be opened fully at any car speed, depending upon accelerator pedal position.

During the remaining 1/4 of the primary throttle travel to fully open position, the secondary throttle valves open through their full travel, so that all four throttle valves reach the wide-open position together, as shown in Fig. 12-6.

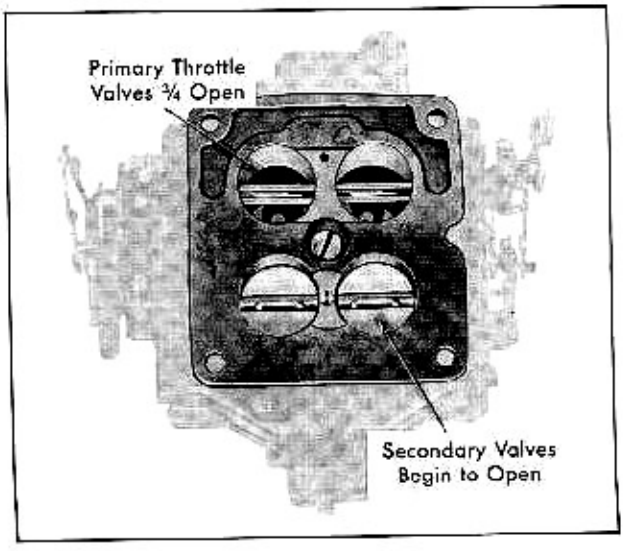

Fig. 12-5 Late Part Throttle

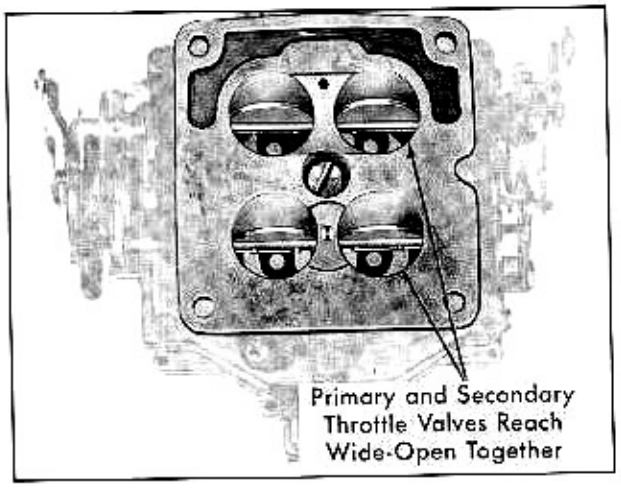

Fig. 12-6 Full Throttle

The secondary side of the carburetor supplies a constant fuel-air mixture when called for by high primary throttle openings. The secondary side, therefore, supplies fuel only during the idle and power ranges. Its calibration is fixed, requiring no adjustments other than the throttle valve position as determined by the linkage.

Power System

To achieve the proper mixtures required when more power is desirable or sustained high speed driving is to be maintained, the Model 4GC Carburetor employs the use of a vacuum operated power piston in the air horn and a power valve in the float bowl. This power system is located within and acts only upon the primary side of the carburetor.

The power piston vacuum channel is exposed to manifold vacuum beneath the throttle valves. The vacuum in this channel varies directly with the manifold vacuum. In the idle and part throttle ranges, the manifold vacuum is normally quite high. This vacuum is sufficient to hold the power piston in its extreme up position. However, as the throttle valves are progressively opened, the manifold vacuum drops. When the vacuum drops below approximately 9 inches of mercury, the calibrated spring above the power piston forces the piston down. This situation occurs at very high driving speeds or upon rapid acceleration. When the piston drops down, it unseats the spring loaded power valve permitting additional fuel to flow from the float bowl through the calibrated power restrictions and into the main well. This additional fuel supplements that already flowing through the main metering jets into the main well on the primary side, raising the fuel level in the main well and thus making the mixture being delivered to the manifold slightly richer than normal part throttle mixtures. This power mixture continues to be supplied as long as the manifold vacuum remains below approximately 9 inches of mercury. When the manifold vacuum again increases sufficiently, the force of the power piston spring is overcome and the piston is drawn up. This action allows the power valve to close, and returns the carburetor to the economical part throttle mixtures. Refer to Fig. 12-7.

It will be noted that the power piston cavity in the carburetor air horn is connected to the main air flow passage by a vacuum break hole. It is the purpose of this hole to prevent the transfer of vacuum acting on the piston from acting also on the surface of the fuel in the float bowl. Any leakage of air past the upper rings of the piston will be compensated for by this vacuum break hole and will not affect carburetor calibration.

It is also in the power range that the secondary side of the carburetor provides additional air and

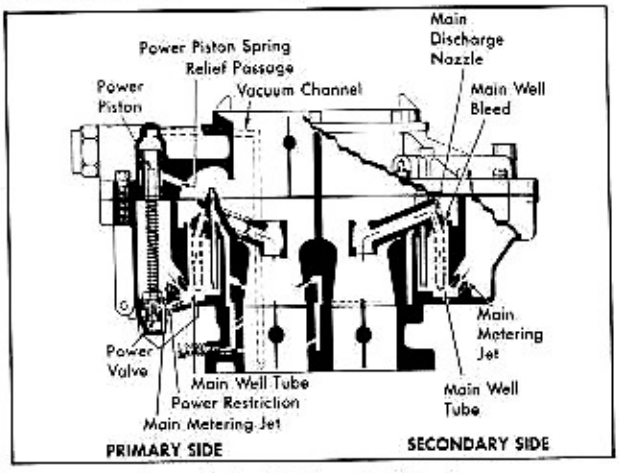

Fig. 12-7 Full Throttle Circuits

fuel to the engine for increased power. In this range manifold vacuum acting on the secondary side of the carburetor is multiplied at the large and small venturi and draws fuel from the float bowl through the calibrated main metering jets into the main wells. This fuel then passes through the main well tubes and is bled in a manner similar to that discussed previously in the operation of the primary main well air bleeds.

The mixture of fuel and air is then drawn to the nozzles at the upper tips of the main well tubes. It then passes through the mixture passage to the small venturi and is discharged into the intake manifold.

Accelerator Pump System

When the throttle is opened suddenly the air flow and manifold vacuum change almost instantaneously, while the heavier fuel tends to lag behind causing a momentary leanness. The accelerator pump, shown in Fig. 12-8, overcomes this condition by providing the additional fuel necessary for smooth operation on rapid acceleration.

Since the throttle valves on the secondary side of the carburetor remain fully closed throughout part throttle operation, it is only necessary to have one accelerator pump, that being located on the primary side of the carburetor.

A double spring pump plunger is used on the Model 4GC Carburetor. The rates of compression of the top spring versus the bottom springs are carefully calibrated to insure a smooth, sustained charge of fuel for aceleration.

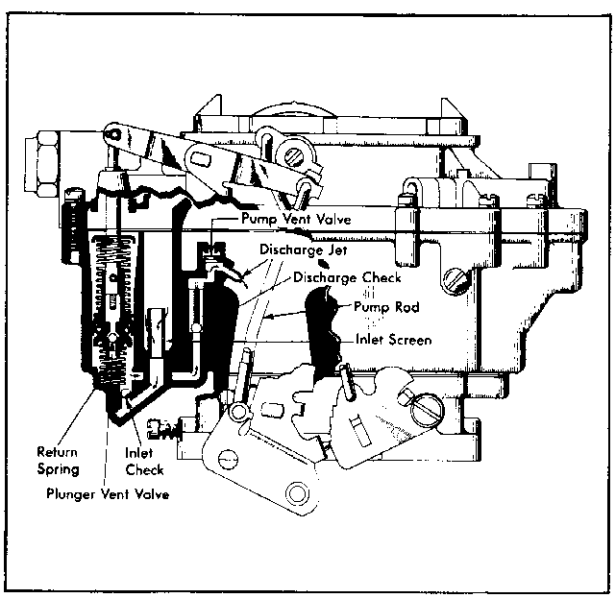

Fig. 12-8 Accelerator Pump System

On the pump intake or up stroke, fuel from the float bowl passes through the pump filter screen, unseats the aluminum inlet ball, and fills the pump well.

The accelerator pump, being connected through the inside pump lever, pump shaft and lever assembly, and pump rod to the throttle lever, moves at the slightest change in throttle opening. Upon acceleration or down stroke of the pump plunger, the force of fuel in the pump well seats the inlet ball. The fuel is then forced through the discharge channel, unseats the pump outlet ball, and discharges through the pump jets into the main air stream. No targeting of these pump jets in required.

The accelerator pump system is vented to acquire peak operating efficiency. The pump plunger head has been vented to minimize the effect of fuel percolation in the float bowl pump well. This has been accomplished by the design of a ball check and seat in the plunger head. In this manner any buildup of fuel vapors in the pump well will rise and by-pass the ball, thus venting themselves into the float bowl. There is, therefore, always a charge of solid fuel beneath the plunger head for rapid acceleration. Without this feature, any vapor pressure buildup would evacuate the charge of fuel in the pump system, thus causing poor initial acceleration.

The primary cluster is so designed that further venting of the pump system is unnecessary. This design prevents what is commonly known as "pump pull-over" or fuel enrichment at high speed due to fuel being drawn through the pump discharge jets.

Choke System

The Model 4 GC Carburetor uses a fully automatic choke to insure proper starting and driving during engine warm-up. Choking of the carburetor is necessary only on the primary side, due to the fact that the secondary throttle valves are locked in the closed position whenever the choke valve is even partially closed. This is accomplished by a secondary throttle shaft lockout lever and a slot in the fast idle cam. Whenever the choke valve is closed, this lockout arrangement prevents opening of the secondary throttle valves. However, when the choke valve is wide open, the fast idle cam drops down so that the lockout lever clears the cam, thus permitting the secondary throttle valves to open.

The choke system is composed of a thermostatic coil, vacuum piston offset choke valve, fast idle cam, modifier lever and rods. Its operation is controlled by a combination of intake manifold vacuum, air forces on the offset choke valve, atmospheric temperature, exhaust manifold heat, and primary throttle opening.

When the engine is cold the thermostatic coil is calibrated to hold the choke valve closed. As the engine is started, air velocity against the offset choke valve causes the valve to open slightly against the torque of the thermostatic coil. In addition, intake manifold vacuum is applied to the vacuum piston through a vacuum channel from the throttle body, which also tends to open the choke valve. Therefore, the choke valve assumes a position where the torque of the thermostatic coil is balanced against vacuum pull upon the choke piston and air velocity against the offset choke valve, thereby causing a regulated air flow into the carburetor which provides a richer mixture during the warmup period.

During warmup, the vacuum piston serves to modify the choking action to compensate for varying engine loads or acceleration. Any acceleration or increased road load decreases the vacuum exerted on the choke piston. This allows the thermostatic coil torque to momentarily close the choke valve to provide the engine with a sufficiently richer mixture for acceleration.

As the engine warms up, outside air is heated by passing through the hot air stove on the right exhaust manifold and is drawn into the thermostatic coil housing. This hot air raises the temperature of the coil, which in turn causes the coil to slowly relax its tension. Thus the choke valve is allowed to move gradually to the full open position.

To prevent stalling during the warm-up period, it is necessary to run the engine at a fast idle. This is accomplished by the fast idle screw which bears against the steps of the fast idle cam. The fast idle cam is in turn linked to the choke valve shaft by the choke rod, choke trip lever, and the choke lever and collar assembly. The fast idle cam holds the primary throttle valves open sufficiently during the warmup period to give an increased idle RPM, until such time as the choke valve moves to the full open position.

While the automatic choke is in operation, the driver may wish to advance the throttle to the full wide open position. Since this would decrease pull upon the vacuum piston thereby closing the choke valve, it is desirable to provide increased carburetor air flow by opening the choke valve mechanically. To accomplish this, a tang on the fast idle cam is contacted by the primary throttle lever at wide open position so as to sufficiently open the choke valve. This is called the choke unloader, and also serves to dechoke an over rich condition during cold operation. This choke unloader will also relieve a flooded condition on starting by allowing more air to enter the carburetor and mix with the excess gasoline in the manifold whenever the engine is cranked with the accelerator held fully depressed.

An additional fuel mixture control during warmup is the choke modifier, which progressively relaxes the tension on the thermostatic coil as the primary throttle opening is increased. This is accomplished by a rod which is connected to the secondary actuating lever on the primary throttle shaft to a longer lever protruding from the choke housing. Instead of the thermostatic coil being attached to the choke cover, the outer end is engaged by the shaft of this longer lever. The torque which tends to close the choke valve is thus lessened to compensate for the decrease of manifold vacuum pull upon the choke piston as the primary throttle is opened. The choke modifier feature therefore tends to maintain the correct air-fuel ratio for any throttle opening.

Carter Carburetor Circuits

The Carter Model WCFB carburetor is basically two dual carburetors contained in one assembly, with duplicate low and high speed circuits and float chambers. The section containing the metering rods, accelerator pump, and choke system is termed the Primary Side of the carburetor, while the other section is the Secondary Side. The secondary side supplies a fixed ratio of air and fuel at or near wide open throttle, to supplement that of the primary side.

Float System

The purpose of the float system is to maintain an adequate supply of fuel at the proper levels in the two carburetor bowls for use by the low speed, high speed, pump, and choke circuits.

Primary and secondary bowls are separated by a partition, and one assembly of dual floats with needle valve is used in each bowl. The fuel inlet connection is on the primary side. Fuel is supplied from this point to the primary needle and seat through a passage around the air horn in the bowl cover. Incoming fuel must pass through a brass strainer screen in order to reach either needle seat.

Each of the two bowls is vented into the air cleaner through passages in the air horn section of the bowl cover. Bowl vents are calibrated to provide the proper pressure above the surface

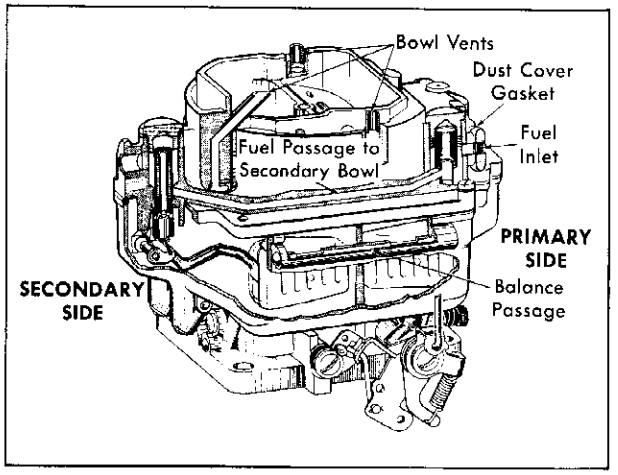

Fig. 12-9 Carter WCFB Float System

of the fuel in the bowls at all times. Since the same pressure which causes air to flow into the carburetor also causes fuel to flow, the restriction offered by the air cleaner does not influence the fuel air ratio metered by the carburetor. A connecting passage along the outside of the bowl casting tends to equalize the vapor pressure between the two bowls. Fig. 12-9.

The atmospheric idle vent allows vapors to escape from the carburetor bowls to the outside air, under conditions of idling or stopping the engine when hot. Refer to Fig. 12-10.

Idle Circuits

Fuel for idle and early part throttle operation is metered through the low speed circuits of the primary side of the carburetor, shown in Fig. 12-10. Discharge of fuel from the idle ports in the throttle body continues as the primary throttle is opened until the vacuum at the main discharge nozzles becomes great enough to draw fuel through the main system.

In idle and early part throttle operation, fuel enters the main wells from the primary bowl, through the metering rod jets on the primary side of the carburetor, and is drawn up through calibrated low speed jets at the bottoms of the idle tubes. These low speed jets measure the amount of fuel to be used.

The fuel is then drawn up and air is bled through the by-pass restriction. This mixture is drawn up and through the cross-over passage in the bowl cover. The mixture then passes through a calibrated economizer restriction which retards the flow to allow additional air to be mixed in at the air bleed passage in the bowl. The rate of fuel flow through the economizer determines the amount of air which enters the air bleeds.

After the fuel is broken up and mixed with air in this manner, it is conducted down through passages in the bowl to the fixed and adjustable idle ports in the two primary throttle bores.

The fixed idle ports are vertical slots which extend partly above and partly below the primary throttle valves at normal idle and very early part throttle conditions. The size of the idle port below the valve which feeds the fuel mixture thus in-

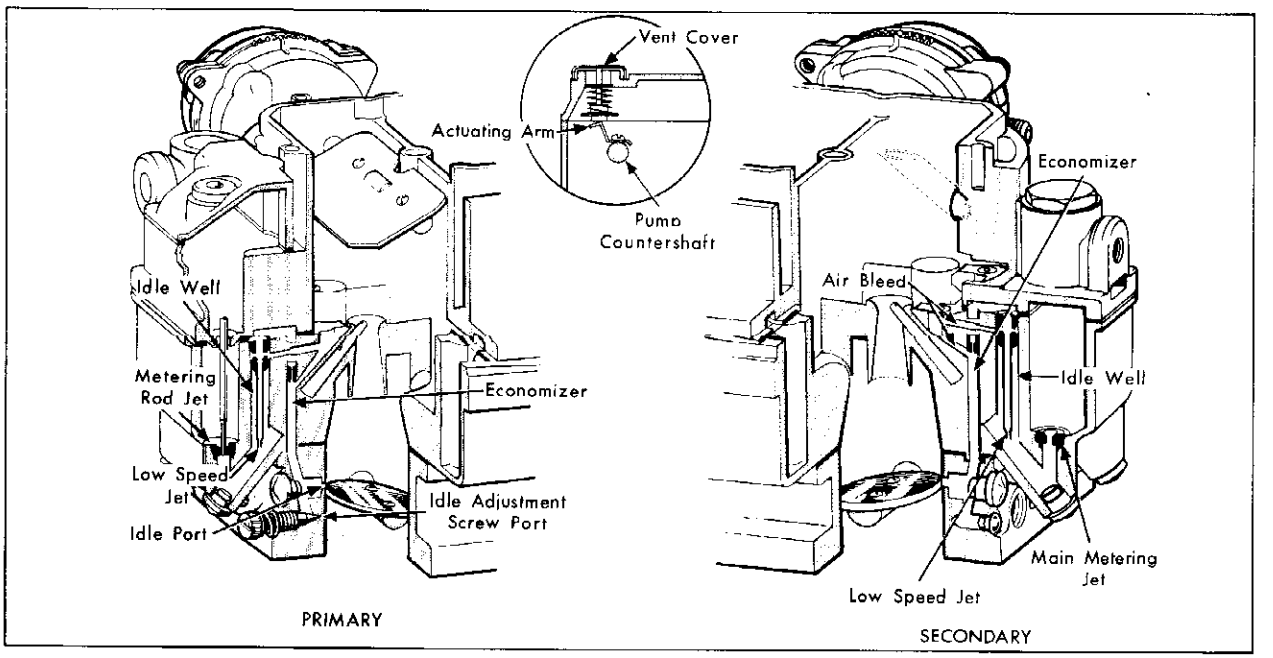

Fig. 12-10 Carter Carburetor Low Speed Circuits

creases as the throttle valve is opened. At the same time, the portion of the slot above the valve, which acts as an additional air bleed, becomes progressively smaller. Calibration of this arrangement is such as to provide the correct mixture for operation at small throttle openings, until the main nozzles come into action.

The amount of fuel mixture supplied by the adjustable ports is governed by the setting of the idle adjusting screw on the primary side.

The secondary side of the carburetor contains an equivalent low speed system which serves only to bring the secondary barrels into action smoothly, without disrupting the air-fuel mixture at small secondary throttle openings.

The secondary side does not supply any fuel at idle or part throttle operation. The secondary throttle valves remain seated until forced open by linkage connected to the primary throttle, since the secondary valves are offset and use manifold vacuum plus spring tension to seal themselves closed. When the secondary valves are closed, the fixed low speed slots in the secondary throttle bores are sealed off by the valves and do not feed any fuel mixture to the engine. The secondary throttle bores do not have adjustable idle ports.

Part Throttle Circuits

Fuel for part throttle and full throttle operation is supplied by the high speed circuits, through the main discharge nozzles.

The main discharge nozzles come into action as the throttle valves open sufficiently to allow manifold vacuum to reach the large and small venturi in each of the four barrels. Manifold vacuum is multiplied at the venturi, causing fuel to be drawn up through the main discharge passages to the nozzles.

Fuel enters the main wells through the metering rod jets on the primary side and through smaller jets without metering rods on the secondary side. Air bleeds are located within the small venturi on the upper sides of the nozzles.

The metering rods in the primary jets determine the proportion of fuel supplied to the primary discharge nozzles, for a given air flow through the venturi. In the part throttle range, the large, or economy step of each rod is positioned in the jet, giving a fixed fuel-air mixture.

The position of the metering rods is dual controlled, by manifold vacuum and by mechanical linkage with the primary throttle. The metering rods are lifted by this linkage to supply more fuel through the jets at wide primary throttle openings, to fill the gap between part throttle and power system operation.

Anti-percolator passages and bushings with calibrated holes are used to vent vapor pressure from the main well and low speed well passages, so that vapors formed by engine heat will not force extra fuel out of the discharge nozzles, Fig. 12-11.

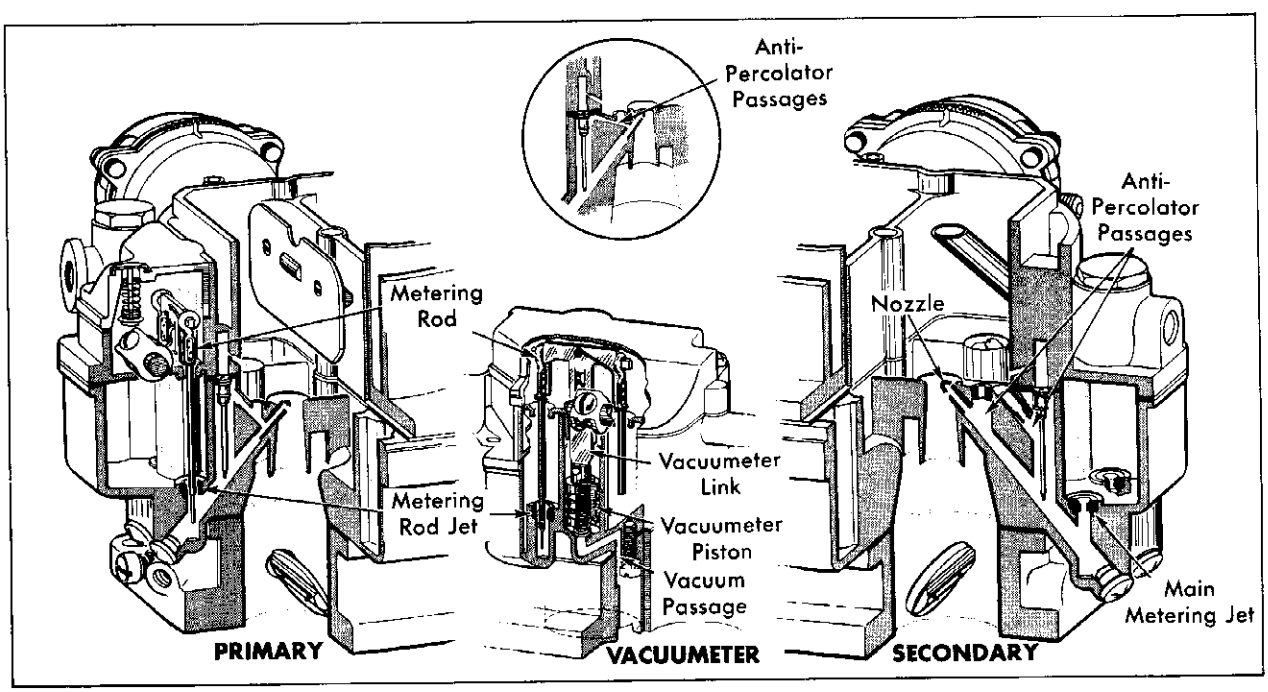

Fig. 12-11 High Speed Circuits

The secondary throttle valves remain closed and do not allow any fuel or air to be supplied by the secondary side of the carburetor until the primary throttle valves are approximately 3/4 open. At this point, a mechanical linkage engages the secondary throttle shaft and forces it open against a return spring. The secondary throttle opens at a faster rate than the primary throttle, so that all four throttle valves reach the wide open position together.

All four throttle valves can be opened at any car speed, since the amount of opening is dependent only upon the accelerator pedal position. The primary throttle opening at which the secondary throttle is just ready to open will drive the car up to approximately 90 miles per hour, but the reserve power of the two secondary barrels is also available for acceleration at any lower speed, except during the warm-up period when the choke is on.

The secondary side of the carburetor has a fixed calibration, and it requires no adjustments other than the throttle valve opening as determined by the linkage.

Power System

In order to supply the correct fuel mixtures required for high power output, such as in accelerating rapidly or maintaining very high cruising speeds, the metering rods which pass through the primary jets are lifted to place the smaller steps within the jets.

The metering rods are lifted mechanically as previously discussed, by linkage connected to the primary throttle. This linkage includes a lever on the accelerator pump countershaft which raises the yoke to which the metering rods are attached, as shown in Fig. 12-11.

In addition to mechanical actuation, the metering rods are held in the lean, or economy, position by manifold vacuum exerted on a vacuum piston operating in a cylinder in the bowl casting, and are lifted to the power position by a spring which raises the vacuum piston when manifold vacuum falls below a certain predetermined amount. Low manifold vacuum occurs during rapid acceleration or other heavy throttle conditions.

The vacuum passage to the metering rod vacuum piston connects the lower end of the cylinder in the bowl casting through the throttle body to the intake manifold. Possible leakage of air past the vacuum piston will not affect the pressure above the fuel in the float chambers, since the upper end of this cylinder is open to the air horn, and is sealed from the float chambers by the bowl cover gasket.

Since the secondary side of the carburetor has no metering rods, fuel enrichment for power operation is performed entirely by the primary side.

Accelerator Pump System

When the throttle is opened suddenly at speeds below approximately 30 miles per hour, the air flow through the carburetor increases almost instantaneously, while the fuel, being heavier, tends to lag behind. To provide smooth engine operation under these conditions, the accelerator pump shown in Fig. 12-12, injects a measured amount of fuel into the air stream as the throttle is opened.

Since no lag in acceleration occurs at greater throttle openings, it is necessary to have only one accelerator pump, which is located on the primary side of the carburetor and is linked to the primary throttle.

When the throttle is closed, the pump plunger is moved upward in its cylinder, and fuel is drawn into the pump bore through the intake check valve. The discharge check valves are seated at this time to prevent air being drawn into the pump cylinder.

As the throttle is opened, the pump plunger is moved downward, seating the intake check and forcing fuel out through the discharge passage. Fuel pressure from the plunger unseats the pump discharge valve, allowing the fuel to be forced out the twin discharge jets into the air stream in the two primary venturi. The pump jets are contained in a die cast assembly and no targeting adjustment is required.

Excessive pressure due to rapid movement of the pump plunger is prevented by the pump relief valve in the discharge passage. When the throttle is opened suddenly, the pump plunger shaft telescopes, compressing the plunger spring, which forces fuel out the pump jets in a smooth, sustained stream. The pump spring beneath the plunger is so calibrated with respect to the plunger spring that the duration and intensity of the pump discharge supplies the correct amount of fuel for smooth engine operation.

At car speeds above approximately 30 miles per hour, accelerator pump discharge is no longer necessary. Accordingly, the plunger is made to bottom in the pump cylinder at all throttle openings beyond that required for steady cruising at this speed.

During high speed operation, a partial vacuum exists at the pump jets, due to the velocity of the air stream. To prevent fuel from being drawn through the pump circuit, the passage to the outer

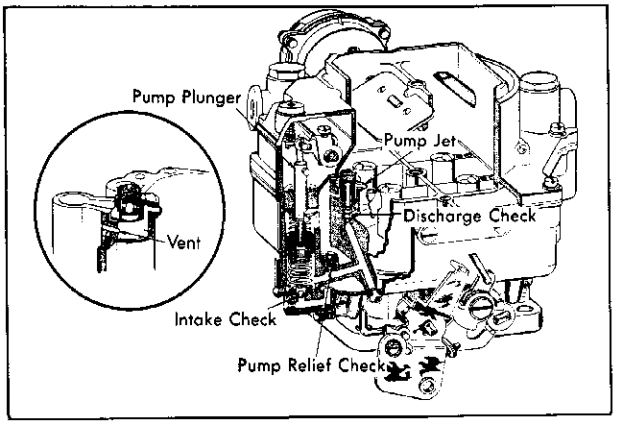

Fig. 12-12 Accelerator Pump System

pump jets is vented by a cross passage to the carburetor bowl above the fuel level. This allows air to be drawn off instead of fuel. Actually, the fuel discharge orifices are the inner pump jets, as shown in the inset of Fig. 12-12. The fuel stream never touches the walls of the outer jets which shield the fuel from the airstream and which are vented to the bowl.

Choke System

The climatic control, or automatic choke, provides a richer mixture as required for quick cold engine starting and smooth operation during the warm-up period, as illustrated in Fig. 12-13.

Choking is necessary only on the primary side of the carburetor, since the secondary throttle valves are locked in the closed position whenever the choke is partially on. In addition, an extra lockout pawl keeps the secondary lockout linkage engaged until the primary throttle is returned to idle position for the first time after the warm-up period is over.

When the engine is cold, tension of the thermostatic coil spring holds the choke valve closed. When the engine is started, air velocity against the off-set choke valve causes the valve to open slightly against the thermostatic spring tension. Intake manifold vacuum applied to the choke piston also tends to pull the choke valve open. The choke valve assumes a position where tension of the thermostatic spring is balanced by the pull of vacuum on the piston and force of air velocity on the offset valve.

When the engine starts, slots located in the sides of the choke piston cylinder are uncovered allowing intake manifold vacuum to draw warm air through the hot air tube, from the hot air stove located on the exhaust manifold, through the climatic control housing. The flow of warm air in turn heats the thermostatic spring and causes it to lose some of its tension. The thermostatic spring loses its tension gradually until the choke valve reaches full open position.

If the engine is accelerated during the warm-up period, the corresponding drop in manifold vacuum allows the thermostatic spring to momentarily close the choke, providing a richer mixture. The choke modifying linkage between the thermostatic spring and throttle shaft relieves thermostatic spring tension during cold engine acceleration.

During the warm-up period it is necessary to provide a fast idle speed to prevent engine stalling. This is accomplished by a fast idle cam which is rotated by a connector rod attached to the choke shaft. The fast idle cam prevents the primary throttle valves from returning to a normal, warm engine idle position while the climatic control is in operation.

If, during the starting period, the engine is flooded, it is necessary to hold the choke open sufficiently and remove the excessive fuel in the intake manifold. This may be accomplished by depressing the accelerator pedal to the floor mat and engaging the starter. The projection on the throttle lever (unloader) will rotate the fast idle cam and in turn partially open the choke valve.

Idle Speed-Up Control

Cars equipped with the Cadillac Air Conditioner have a vacuum powered, solenoid operated, Idle Speed-Up Control attached to the carburetor. This device is designed to increase the engine idle RPM from 400 to 900, when the selector is in the Neutral "N" position and the Air Conditioner switch is "On", to provide adequate cooling and guard against possible overheating of the engine during parking.

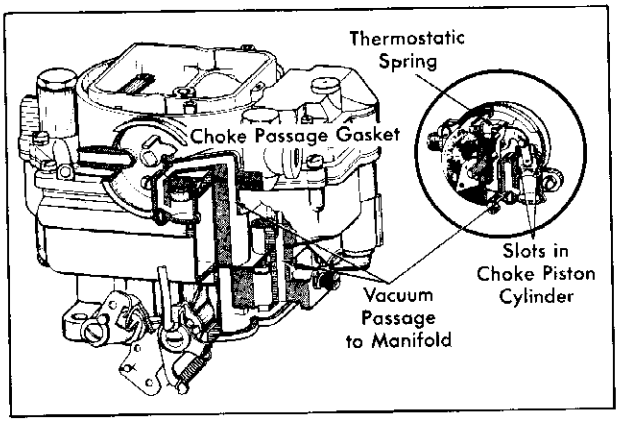

Fig. 12-13 Choke System

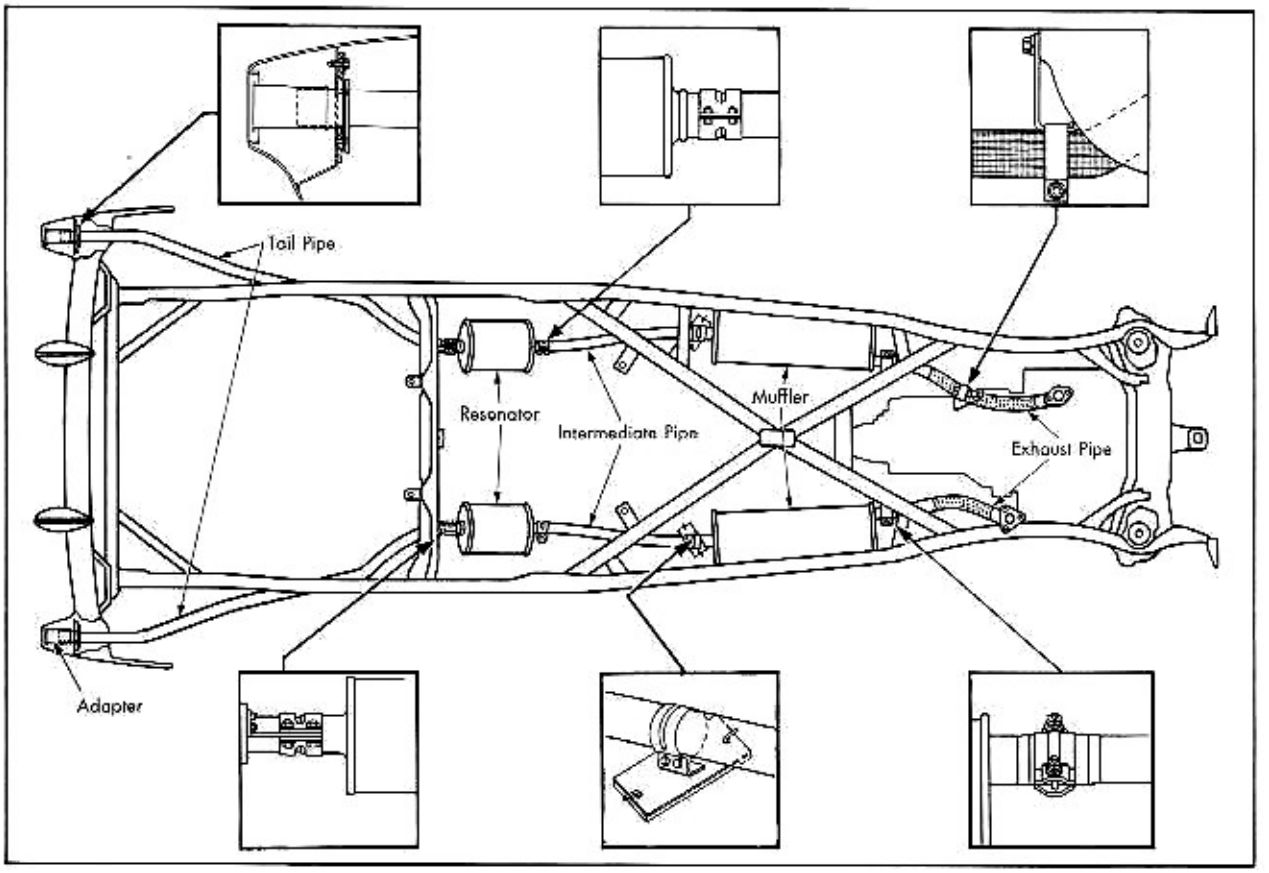

Fig. 12-14 General Arrangement of Exhaust System

Exhaust System

The dual exhaust system, designed to reduce back pressure, consists of two exhaust pipes, mufflers, intermediate pipes, resonators, tail pipes, and sleeves, as shown in Fig. 12-14.

These units are supported by brackets, insulated from the frame and bumper by rubber and fabric cushions. Provision for fore and aft expansion in the exhaust system, when it becomes warm, is made at the adapters on the rear bumper. The tail pipes are supported by three spring type clips which prevent rattles at this point and permit fore and aft movement.

A thermostatically controlled heat valve, at the junction of the left exhaust manifold and exhaust pipe, controls the flow of exhaust gases from the left cylinder head. During the engine warm-up period the valve is closed, forcing the hot exhaust gases through the ribbed heat passage under the intake manifold to heat the intake gases to provide optimum performance and economy when the engine is cold. A branch of this passage conducts exhaust gases up to the carburetor, as shown in Fig. 12-15. These hot gases warm the carburetor in the region of the primary throttle valves and idle ports, to prevent stalling due to ice formation during engine warm-up on cool, humid days. For the above reasons it will be noted that exhaust gases are emitted only through the right exhaust outlet in the rear bumper during the warm-up period.

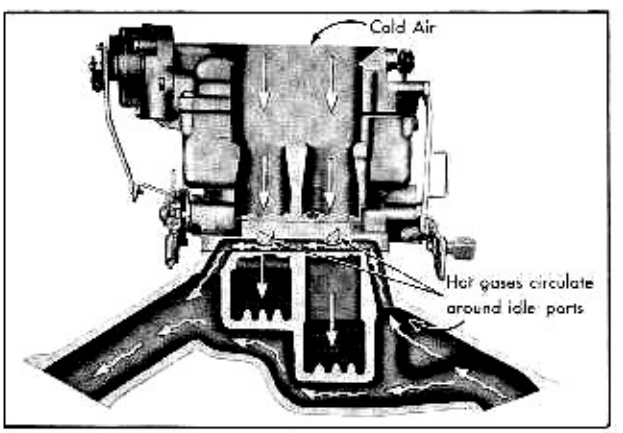

Fig. 12-15 Idle Port Heating Passages

SERVICE INFORMATION

(1) Fuel Requirements

All 1954 Series engines have a compression ratio of 8.25 to 1 and in order to prevent detonation a premium gasoline with an octane rating of 82 Motor Method and 91 Research Method should be used.

Detonation is caused by using a gas which is too low in octane rating for the engine in which it is used. The charge of gasoline in the combustion chamber burns so rapidly that it creates enough heat and pressure to ignite the unburned portion of the charge with an abrupt explosion or "knock". If nonknocking fuels are not locally available the spark setting may be retarded from the "A" toward the "C" position on the harmonic balancer to prevent detonation.

Detonation should not be confused with pre-ignition, which is caused by incandescent carbon in the combustion chamber igniting the gasoline charge ahead of the normal point of spark plugs firing.

Pre-ignition is commonly described as "wild ping" because of its uneven rhythm. Pre-ignition first appears in one or two cylinders and then gradually spreads to all cylinders in the engine, while detonation which is due to low octane gasoline affects all cylinders. The best remedy for pre-ignition is to remove the carbon from the combustion chambers.

(2) Rochester Carburetor Adjustments

NOTE: It is necessary that the following adjustments be performed in the exact sequence given. However, these adjustments can be classified into independent groups. Adjustment groups are: a-b, c-d, and e-f-g-h-i-j. When one adjustment of a group is made, the rest in the group must be performed.

a. Float Level Adjustment

Both floats may be adjusted as described below.

1. Remove bowl cover with gasket from carburetor bowl, as outlined in Note 10c.

2. With bowl cover inverted on a flat surface, bend float arms vertically until floats appear level in relation to each other.

NOTE: Rochester floats are adjusted with the bowl cover gasket on the cover, as shown in Fig. 12-16.

3. Place Float Gauge, Tool No. J-5683, in position as shown in Fig. 12-16, so that gauge is located against the curvature in the bore of the carburetor air horn.

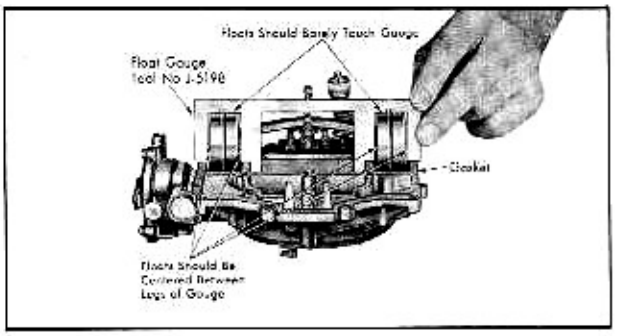

Fig. 12-16 Float Level Adjustment

4. Bend the float arms at the rear of the float assembly. They should be bent until the floats just clear the top portion of the gauge between the gauge legs (the scale dimension from the gasket to the bottom of each float should be 1-19/32 inches).

5. Bend arms horizontally until each float is centered between the gauge arms. Tilt the bowl cover assembly 90° to each side and check to see that the floats do not touch gauge legs, indicating the floats will not touch sides of bowl.

6. Recheck float setting after centering of floats.

b. Float Drop Adjustment

1. Hold bowl cover in an upright position and measure the distance from the bottom of the cover gasket to the bottom of the floats. This distance should be 2-1/4 inches, as shown in Fig. 12-17.

2. Bend the tang at the rear of the float against the needle seat to lessen the drop and away from the seat to increase the drop. Both float assemblies should be adjusted in the same manner.

3. Install bowl cover assembly, as outlined in Note 12f.

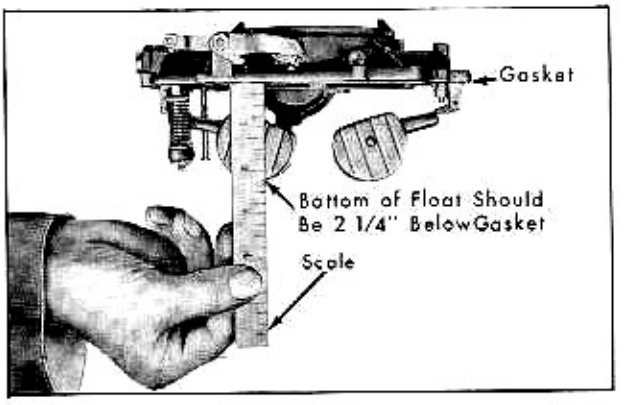

Fig. 12-17 Float Drop Adjustment

ENGINE FUEL AND EXHAUST

c. Accelerator Pump Adjustment

Back off idle stop and fast idle screws so that the throttle valves are fully closed. Hold the throttle in this position and carefully bend the pump rod until the dimension from the air horn surface to the bottom edge of the pump plunger rod is 61/64", as shown in Fig. 12-18.

NOTE: If this adjustment group is performed separately, the fast idle screw must be readjusted as in paragrpah "f" below.

d. Atmospheric Idle Vent Adjustment

NOTE: This adjustment is important because it insures proper vent opening at closed throttle, lessening the possibility of percolation.

1. Place .063" end of wire gauge, Tool No. J-5195, between the throttle valve and the primary bore of the throttle body on the side opposite the idle adjusting screws.

2. Close the throttle against the gauge and bend the atmospheric vent contact arm, using Tool No. J-5197, until it just contacts the atmospheric vent valve in the bowl cover, Fig. 12-19.

e. Choke Modifier Adjustment

1. Close primary throttle. Be certain throttle valves are seated in their bores.

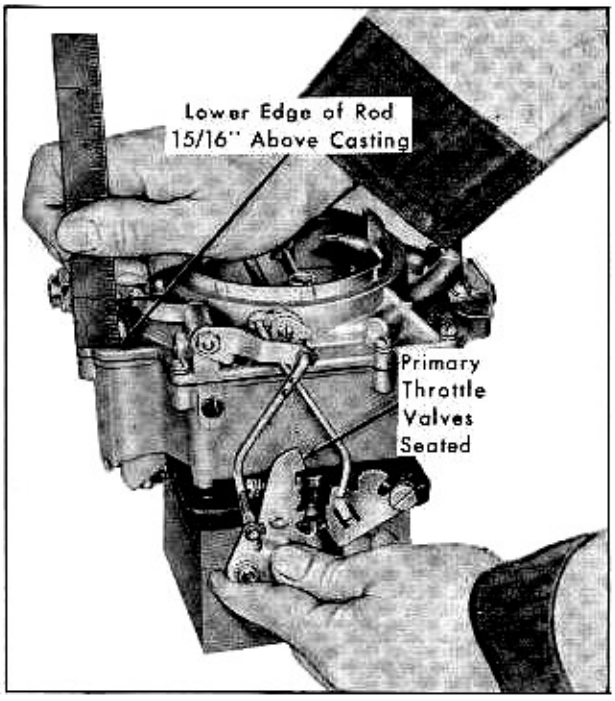

Fig. 12-18 Accelerator Pump Adjustment

2. Loosen thermostat lever retaining screw. Rotate metal pointer counterclockwise from free position until thermostat spring starts to close

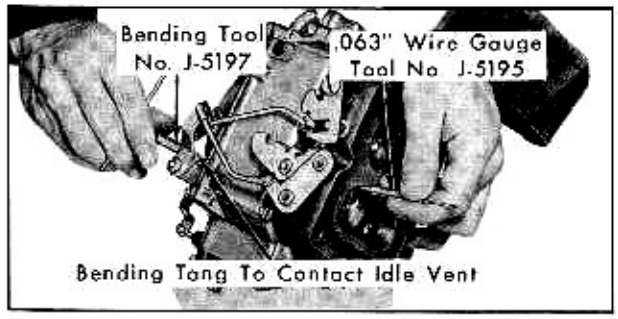

Fig. 12-19 Idle Vent Adjustment

choke valve. Continue counter-clockwise until metal pointer lines up with the index position on thermostat cover.

3. Tighten retaining screw.

f. Fast Idle Adjustment—Carburetor Off Engine

1. Move the fast idle cam so that choke is fully closed.

2. Hold the throttle lever in the closed position so that the fast idle screw rests on highest step of fast idle cam.

3. Adjust fast idle screw to obtain a clearance of .026" between the throttle valves and the primary bore of the throttle body on the side opposite the idle adjusting needles, Fig. 12-20. Measure the throttle opening with Tool No. KMO-658.

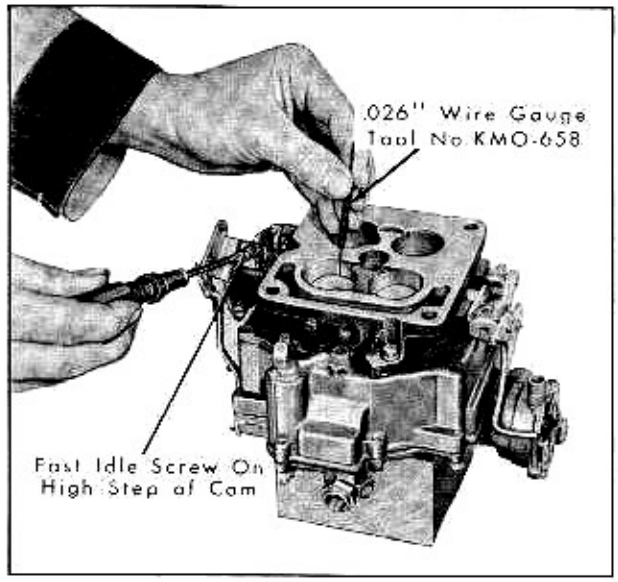

Fig. 12-20 Fast Idle Adjustment

ENGINE FUEL AND EXHAUST

g. Choke Rod Adjustment

1. Position fast idle cam and primary throttle so that fast idle screw contacts the second step of fast idle cam, and rests against the shoulder of the highest step, as shown in Fig. 12-21.

2. Hold the choke valve closed so that the choke trip lever is in contact with the choke counter-weight lever.

3. With the fast idle screw and cam in this position, carefully bend the choke rod to obtain a clearance of .040", as measured with Tool No. J-5196, between the top edge of the choke valve and the dividing wall in the air horn, Fig. 12-21. Using Bending Tool No. J-1137, as shown in Fig. 12-22.

h. Choke Unloader Adjustment

1. With the choke trip lever in contact with the choke counter-weight, move the throttle to the full open position.

2. Hold in this position and carefully bend tang of fast idle cam to obtain a clearance of .125", as measured with a 1/8" drill, between the top edge of the choke valve and the dividing wall in the air horn, Fig. 12-23. Use Bending Tool No. J-5197 as shown in Fig. 12-24.

i. Secondary Throttle Opening Adjustment

1. With carburetor inverted, move choke to fully opened position.

2. Rotate primary throttle to fully open position.

3. Check opening of secondary throttle valves.

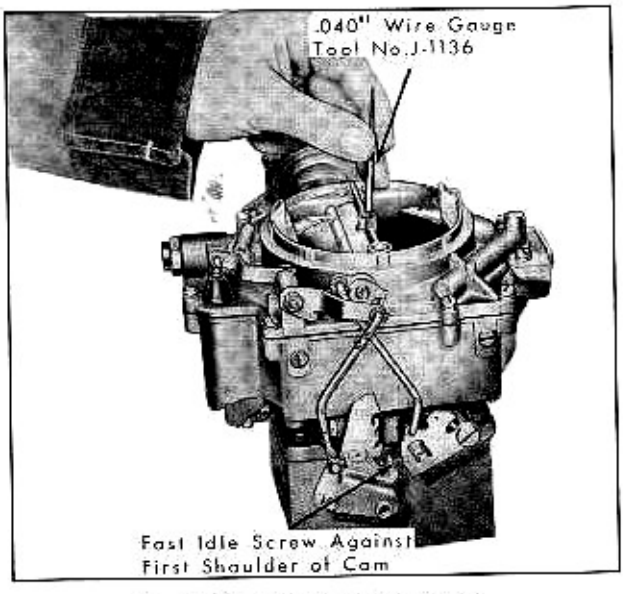

Fig. 12-21 Choke Rod Adjustment

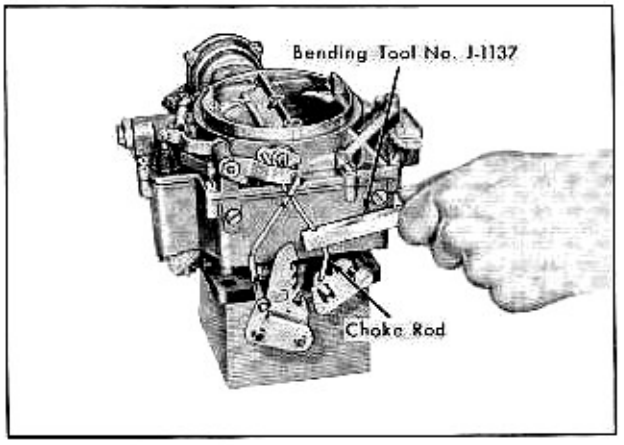

Fig. 12-22 Bending Choke Rod

They should reach wide open position at the same time.

4. If adjustment is required, disconnect both ends of the secondary throttle link.

5. Check wide-open stops on primary and secondary throttle shafts, and bend tangs as required to obtain wide open positions.

6. Connect secondary throttle actuating link.

7. Use heavy pliers to bend the throttle link as needed so that both throttle shafts reach their wide open stops together. When this adjustment is properly made, the secondary throttle opening position is automatically set correctly.

j. Secondary Throttle Lockout Adjustment

1. Position the fast idle cam and secondary

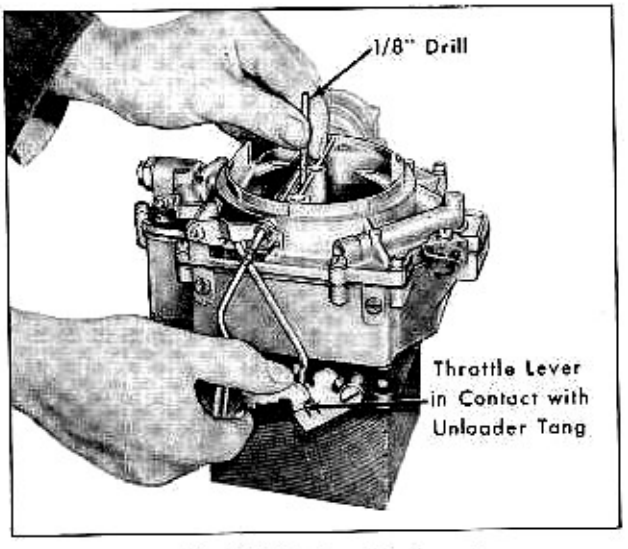

Fig. 12-23 Unloader Adjustment

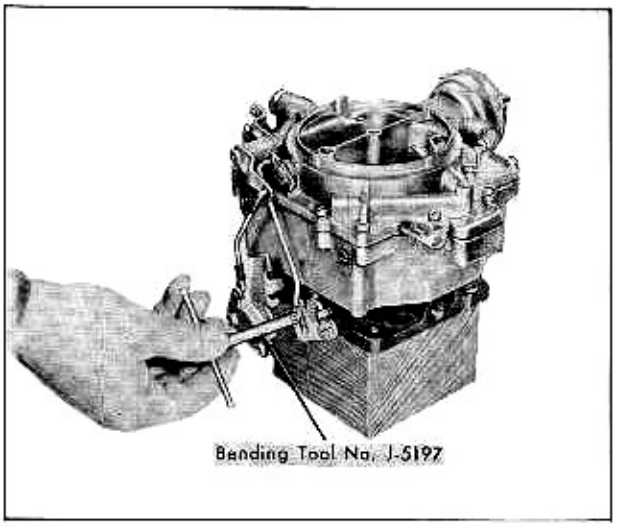

Fig. 12-24 Bending Unloader Tang

lockout lever, as shown in Fig. 12-25, with the choke valve partially closed.

2. Check the clearance between the lever and cam with .015" feeler gage as shown.

3. Use pliers to bend the lever to obtain the proper clearance (.015").

4. Open the choke valve and position the fast idle cam and lockout lever as shown in Fig. 12-26.

5. Measure the clearance between the lever cam in this position with .015" feeler gage and bend with Tool No. J-5197 to secure specified clearance.

(3) Carter Carburetor Adjustments

NOTE: It is necessary that the following adjustments be performed in the exact sequence given. However, these adjustments can be classified into independent groups. Adjustment groups are: a-b, c-d-e, and f-g-h-i-j-k. When one adjustment of a group is made, the rest in the group must be performed.

a. Float Level Adjustment

NOTE: The Carter carburetor float level adjustment is made with the bowl cover gasket removed.

Primary and secondary floats are set at different heights, using two separate gauges.

1. Remove bowl cover assembly from carburetor bowl, as outlined in Note 13c.

2. Remove float hinge pins, primary and secondary floats with needles and clips attached.

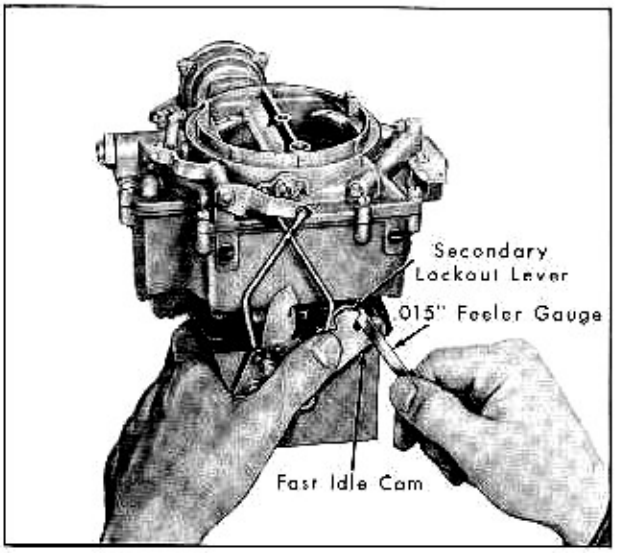

Fig. 12-25 Secondary Lockout-Choke On

3. Remove metering rods, and then remove vacuumeter piston by rotating 90° to either side.

4. Remove bowl cover gasket.

5. Replace needles, floats, and hinge pins, taking care that floats and needles are replaced on the same side from which they were removed.

6. With bowl cover inverted on a flat surface, bend float arms vertically until floats appear level in relation to each other.

7. Place Primary Float Level Gauge, Tool No. J-5457, in position as shown in Fig. 12-27.

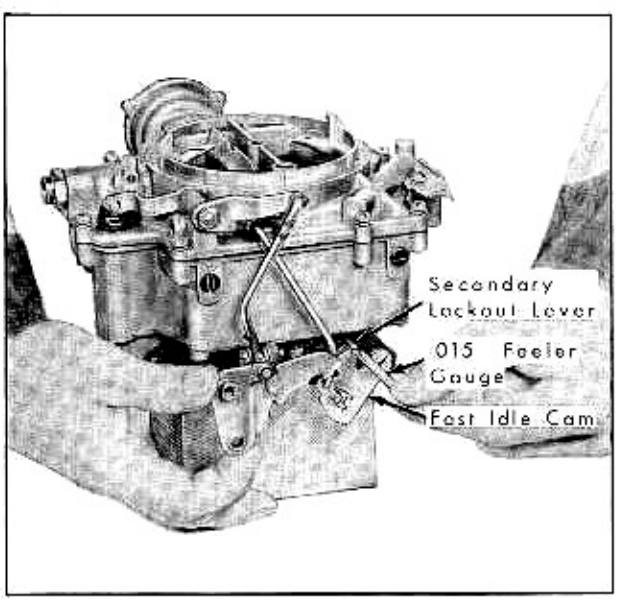

Fig. 12-26 Secondary Lockout-Choke Off

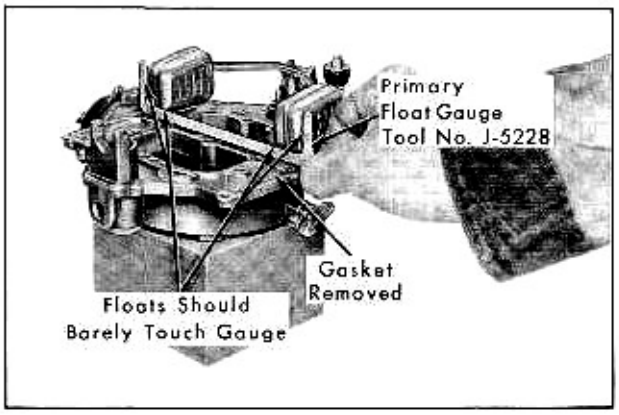

Fig. 12-27 Float Level Adjustment

8. Both floats should just clear the horizontal section of the gauge. Bend float arms as required.

9. With notched end of gauge fitted tightly against the side of the bowl cover casting, float arms should be bent for sideways adjustment until floats barely touch the vertical uprights of float gauge.

10. Repeat steps 7, 8, and 9 for secondary floats, using Secondary Float Level Gauge, Tool No. J-5458. It will be noted that the distance between center of float and casting machined surface is 1/8" for the primary floats, and 3/16" for the secondary floats.

b. Float Drop Adjustment

1. After performing the Float Level Adjustment, hold bowl cover assembly in upright position and note the distances which the floats drop, Fig. 12-28.

2. Measure from machined surface of bowl cover casting down to bottom and center of floats. Distances should be 1-15/16" for primary floats and 2" for secondary floats, as shown in Fig. 12-28.

3. Adjust as necessary by removing float and bending the small tang which contacts the float needle seat. Bend tang towards needle seat to lessen drop, or away from seat to increase drop.

4. Invert bowl cover assembly and remove floats.

5. Inspect bowl cover gasket carefully. If damage is noted, discard it and use a new gasket. Place gasket on bowl cover.

6. Install floats with needles and clips, being careful to distinguish between primary and secondary floats.

7. Install vacuumeter piston, and assemble bowl cover to carburetor as outlined in Note 15g, installing metering rods after assembly.

c. Accelerator Pump Adjustment

1. Remove dust cover and gasket.

2. Be sure that pump connector link is installed in outer hole (long stroke) of pump lever, with ends extending towards counter shaft arm.

3. Back off both idle stop screws until primary throttle valves are fully seated in their bores.

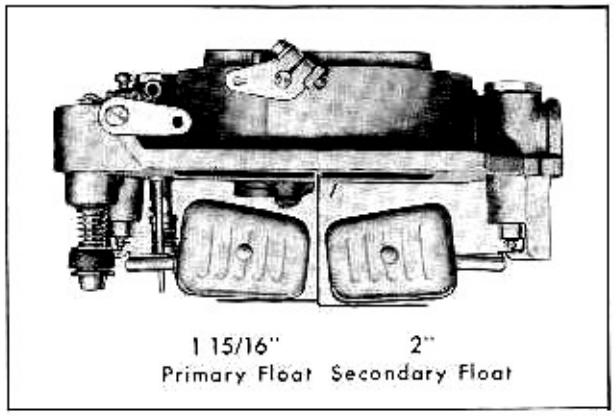

Fig. 12-28 Float Drop Adjustment

4. Use Bending Tool No. J-1137 as shown in Fig. 12-29 to lengthen or shorten pump rod as required until the top of the pump plunger shaft is 9/32" below the top of the dust cover boss, Fig. 12-30. Optional Adjustment: Hold a straightedge across top of dust cover boss as shown in Fig. 12-31. Adjust length of pump rod as in step 4 above, until the flat on top of the pump arm (under set screw) is

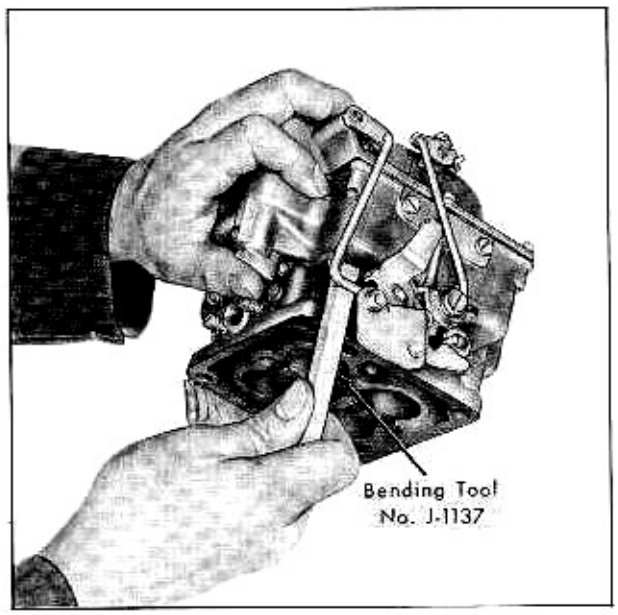

Fig. 12-29 Bending Pump Rod

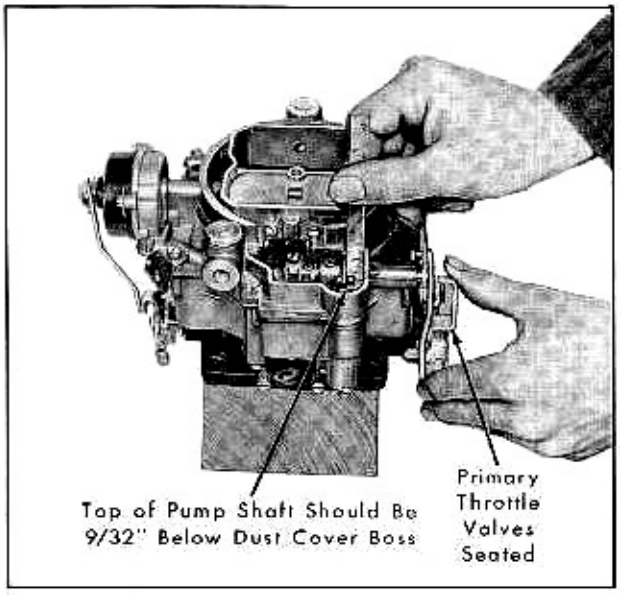

Fig. 12-30 Accelerator Pump Adjustment

parallel with upper edge of straightedge. Unloader Gauge J-818-3 may be used conveniently for this adjustment.

5. Make Metering Rod and Idle Vent Adjustments as outlined below.

d. Metering Rod Adjustment

1. Loosen set screw in metering rod lever to obtain a slight bind on the pump countershaft. Lift lever slightly.

2. With primary throttle valves seated in their bores, depress metering rod link until metering rods bottom against the bowl casting, as shown in Fig. 12-32.

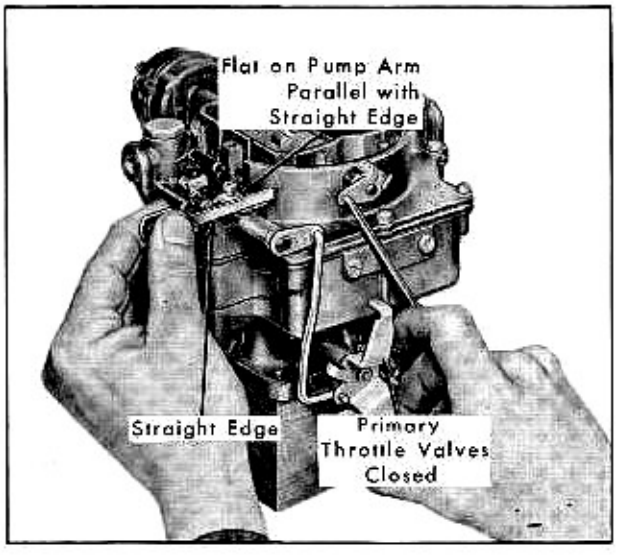

Fig. 12-31 Optional Pump Adjustment

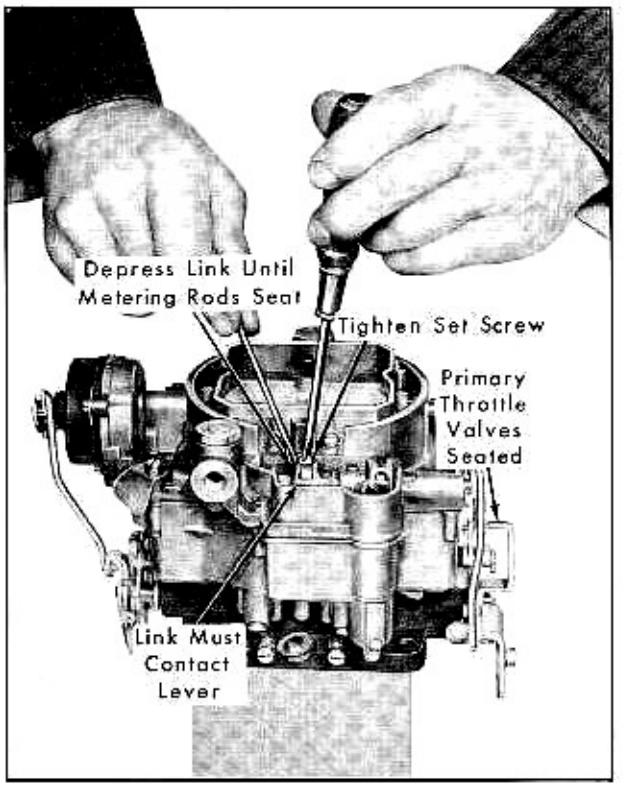

Fig. 12-32 Metering Rod Adjustment

3. Keeping the lever in contact with the metering rod link, tighten set screw.

e. Atmospheric Idle Vent Adjustment

NOTE: The idle vent may be adjusted with the carburetor on the engine and air cleaner removed. Be sure the accelerator pump and metering rods are properly adjusted, as the idle vent adjustment depends on the pump adjustment.

1. Check vent valve opening by measuring the difference in height (at the rivet head on valve) with the primary throttle valve in the open position and then in the closed (hot idle) position. Be sure choke is off. This should be 1/32 inch. Fig. 12-33.

2. If the vent valve opens more than 1/32 inch, it may be adjusted by simply pressing the valve down slightly, with the throttle closed, until the proper opening is obtained.

3. If the vent valve opening is less than 1/32 inch, it will be necessary to remove the dust cover with valve and bend the actuating arm, Fig. 12-34, up slightly and repeat above operations after installing dust cover.

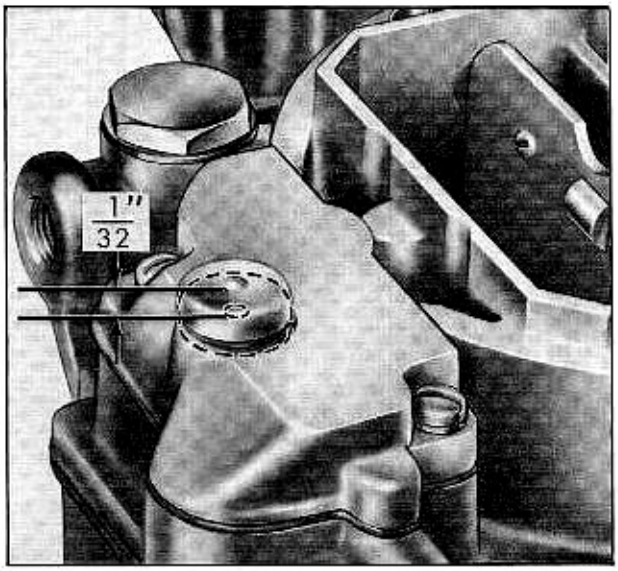

Fig. 12-33 Idle Vent Opening

CAUTION: Loss of low speed cruising fuel economy, due to a rich mixture, will result if valve opens too high, since it will not close soon enough as the throttle is opened. If vent valve does not open far enough, its advantages will be reduced.

4. Replace air cleaner and check idle smoothness when hot.

f. Choke Modifier Adjustment

1. Loosen choke cover retaining screws and rotate climatic control assembly to index setting (central mark on choke housing). Retighten retaining screws. Refer to Fig. 12-35.

2. Remove spring clip from lower end of choke modifier rod and remove rod.

3. Rotate metal pointer and lever counter-clockwise from free position until thermostatic spring starts to close choke valve. Continue counterclockwise until metal pointer lines up with plastic pointer on coil housing.

4. Holding metal pointer in this position, loosen clamp screw and rotate modifier lever until lever points forward (toward fuel inlet) and scribed line is vertical. Retighten clamp screw.

5. Hook upper end of choke modifier rod into modifier lever.

6. Use Bending Tool No. J-1137 at upper angle of rod to lengthen or shorten modifier rod as required until it freely enters hole in lever on primary throttle shaft, as shown in Fig. 12-35, when pointer is aligned as in Step 4 above, and primary throttle valves are seated.

7. Install spring clip on lower end of choke modifier rod.

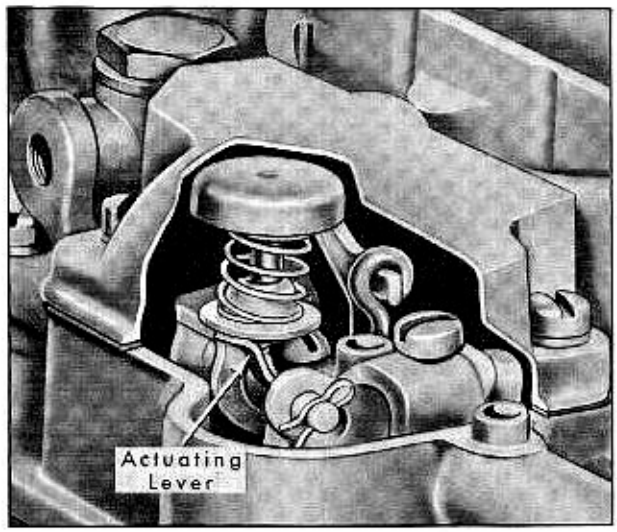

Fig. 12-34 Atmospheric Idle Vent Adjustment

g. Choke Rod Adjustment

1. Loosen choke lever clamp screw.

2. Insert .020" wire gauge, Tool No. J-1136, between tang on fast idle cam and boss on throttle body casting. Hold this gauge in place by pressure of screwdriver exerted on choke lever clamp screw, as shown in Fig. 12-36. This will automatically take up all slack in the linkage.

3. Hold choke valve tightly closed, and tighten clamp screw.

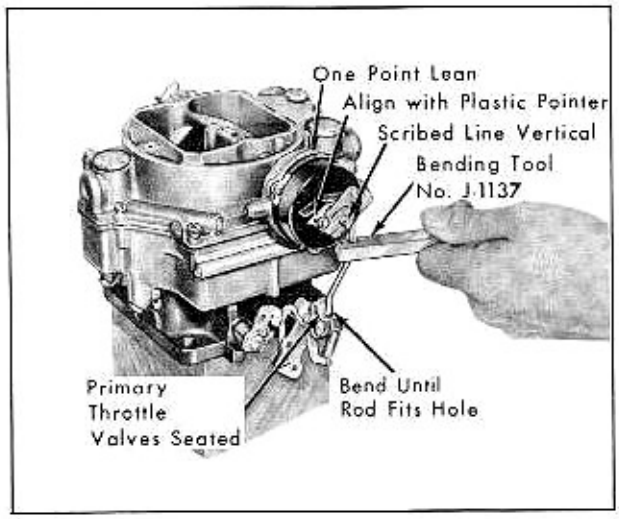

Fig. 12-35 Choke Modifier Adjustment

ENGINE FUEL AND EXHAUST

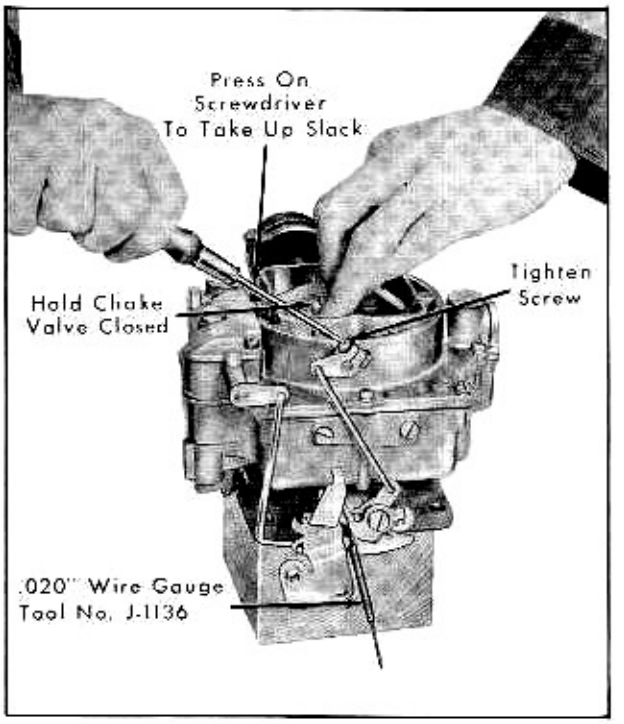

Fig. 12-36 Choke Rod Adjustment

4. Make Unloader, Secondary Lockout, and Fast Idle Adjustments as outlined below.

h. Choke Unloader Adjustment

1. Rotate primary throttle to full open position.

2. Insert 3/16" Unloader Gauge, Tool No. J-818-3, between upper edge of choke valve and inner dividing wall of air horn, as in Fig. 12-37. Under finger pressure, choke valve should give a slight drag on gauge.

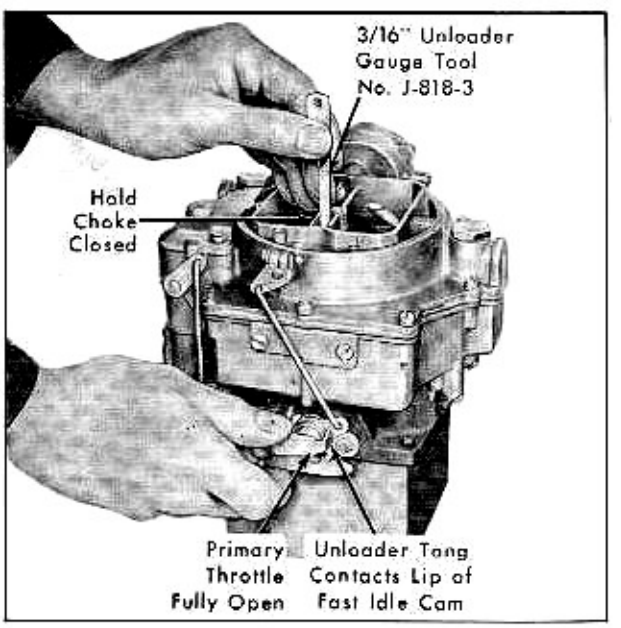

Fig. 12-37 Unloader Adjustment

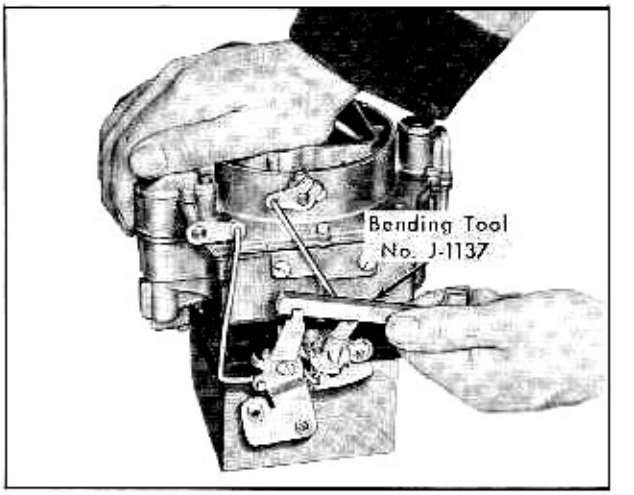

Fig. 12-38 Bending Unloader Tang

3. Using Bending Tool No. J-1137 as shown in Fig. 12-38, bend unloader tang on throttle lever as required.

i. Secondary Throttle Opening Adjustment

1. With carburetor inverted, move choke to fully open position.

2. Rotate primary throttle to fully open position.

3. Check opening of secondary throttle valves. They should be fully open at the same time.

4. If adjustment is required, remove the secondary throttle actuating link.

5. Check wide-open stops on primary and secondary throttle shafts, and bend tangs with heavy pliers as required to obtain wide open position.

6. Install secondary throttle actuating link. (Note that the link goes in the hole nearest the center of the secondary throttle shaft and the hole in corner of lever on the primary shaft.)

7. Use heavy pliers to bend throttle link as needed so that both throttle shafts reach their wide-open stops together. When this adjustment is correctly made, the secondary throttle opening postion is automatically set correctly.

j. Secondary Throttle Lockout Adjustment

1. Close primary throttle valves against .015"

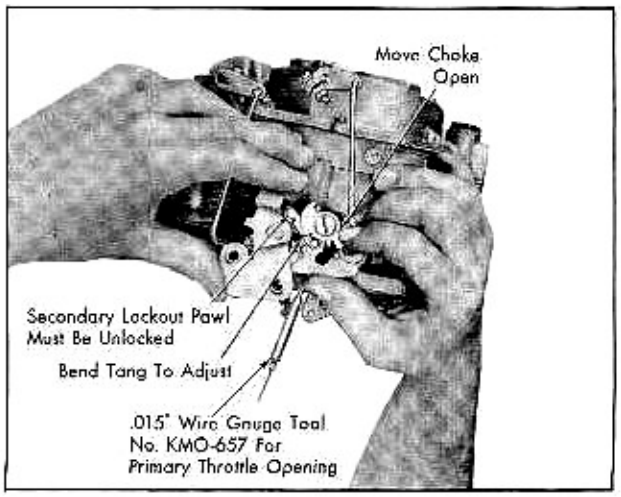

Fig. 12-39 Secondary Lockout Pawl Adjustment

wire gage, Tool No. KMO-657, and hold fast idle cam clear of adjusting screw. Wire gage should be on side of bore opposite idle ports. Refer to Fig. 12-39.

2. Observe whether secondary lockout pawl is moved to unlocked position. Adjust as required, using long-nosed pliers on the tang which contacts primary throttle lever just behind the fast idle screw, until lockout pawl just clears dowel in throttle body casting, as shown in Fig. 12-39.

3. Holding choke valve closed, adjust secondary throttle shaft tang sideways, using heavy pliers, as required to obtain a clearance between this tang and the secondary lockout cam of .015", measured with a feeler gage as shown in Fig. 12-40.

4. Open choke fully. Tang on cam trip lever should move secondary lockout cam to permit rotation of secondary throttle shaft when primary throttle is opened sufficiently, Fig. 12-41.

5. Adjust tang as required to obtain a minimum clearance of .015" between secondary throttle shaft tang and lockout cam, using Bending Tool No. J-5197, as shown in inset of Fig. 12-41.

6. Check to see that tang on cam trip lever returns secondary lockout cam to locked position when choke valve is fully closed. Adjust cam trip lever tang for minimum clearance if necessary.

k. Fast Idle Adjustment (Off Engine)

1. Invert carburetor as shown in Fig. 12-42.

2. Place .020" wire gauge, Tool No. J-1136, between primary throttle valve and side of bore opposite idle screws.

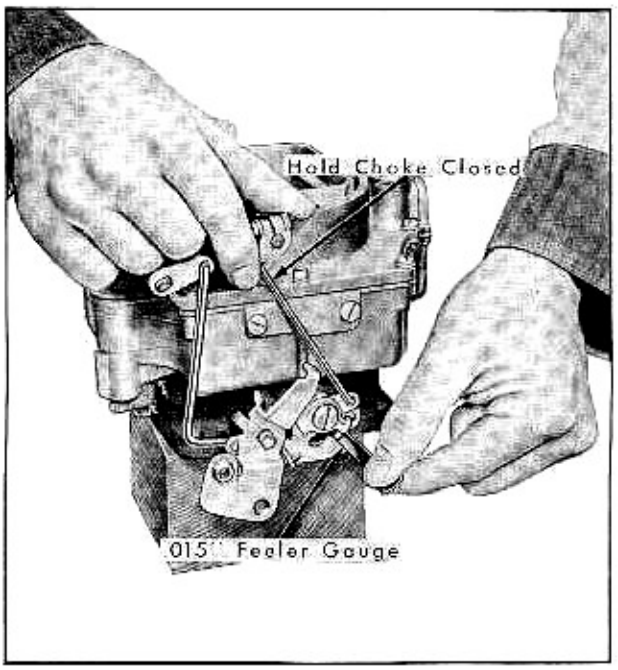

Fig. 12-40 Secondary Lockout-Choke On

3. Move choke valve to fully closed position, and adjust fast idle screw to give a slight drag on the wire gauge when screw is resting on the high step of the fast idle cam.

NOTE: Idle Speed and Mixture Adjustments and Fast Idle Adjustment on Engine must be performed after installation of carburetor, as described in Notes 4 and 6 below.

(4) Idle Speed and Mixture Adjustments

NOTE: The following procedure applies to

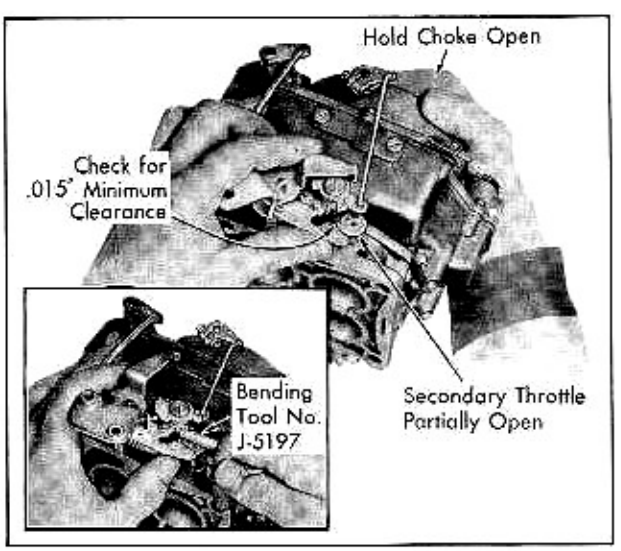

Fig. 12-41 Secondary Lockout-Choke Off

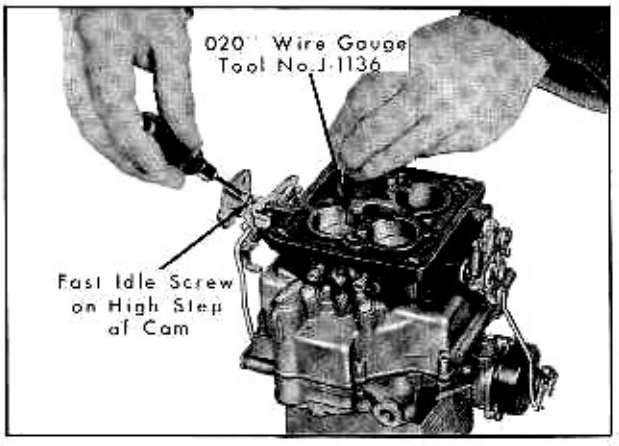

Fig. 12-42 Fast Idle Adjustment

both the Rochester 4 GC and the Carter WCFB carburetors.

1. Connect a tachometer to the engine and set the hand brake securely. Place transmission in neutral.

2. Start and warm engine to normal operating temperature. Be sure that choke is fully off and that carburetor is on slow idle.

3. Loosen front and rear T.V. rod jam nuts at carburetor throttle lever trunnion. Place selector in either "Dr" position.

4. Set idle speed to not more than 400 RPM.

5. Turn one idle mixture adjusting screw in or out until highest RPM is reached.

6. Repeat step 5 with the other idle mixture adjusting screw.

7. Reset idle RPM as noted in step 4.

8. Repeat steps 4-7 until turning the mixture screws will not cause an increase in engine idle RPM, and the smoothest engine idle is obtained.

9. Shut off engine.

10. Disconnect throttle rod from dash relay by removing spring clip.

11. Place 1/4 inch drill shank through gauging hole of relay lever and bracket.

12. Adjust relay rod trunnion position to allow free entry into hole in relay lever, with throttle in hot idle position.

13. Install spring clip in trunnion.

14. Push rearward on end of T.V. rod to position transmission throttle valve against its stop.

15. Bring rear jam nut up against trunnion, with throttle in hot idle position.

16. Back off rear jam nut 2-1/2 complete turns.

17. Tighten front jam nut, making certain that linkage does not bind in any position.

18. Remove drill shank from gauging hole.

NOTE: For complete Hydra-Matic linkage adjustment, refer to Section 14, Note 4.

19. Perform Fast Idle Adjustment on Engine, as outlined in Notes 5 and 6.

20. Drive car to check transmission shift smoothness. It may be necessary to readjust T.V. jam nut slightly to obtain smooth shifting.

(5) Fast Idle Adjustment on Engine-Rochester Carburetor

1. Start engine and allow engine and transmission to reach operating temperature. Tachometer should still be connected from previous adjustments. Transmission should be in neutral.

2. Make certain choke is fully open.

3. Hold throttle lever closed so that fast idle adjusting screw rests on highest step of fast idle cam. Choke valve will not be disturbed, if engine is warm.

4. Adjust fast idle screw to give a speed of 1700 RPM with transmission in neutral.

5. Return engine to normal idle.

6. Shut off engine and remove tachometer.

(6) Fast Idle Adjustment on Engine—Carter Carburetor

1. Start engine and allow engine and transmission to reach operating temperature. Tachometer should still be connected from previous adjustments. Transmission should be in neutral.

2. Make certain choke is fully open.

3. Hold choke rod down by pressing on end of cam trip lever.

4. Open primary throttle slightly and rotate fast idle cam to its stop against spring tension, so that fast idle screw rests on high step of cam.

5. Adjust fast idle screw to give a speed of 1700 RPM with transmission in neutral.

6. Return engine speed to normal idle.

7. Shut off engine and remove tachometer.

(7) Idle Speed-Up Control Adjustment

1. Start engine and allow it to warm up.

2. Turn the Air Conditioner "On".

3. With selector shift lever in the neutral position "N"; (On Carter Carburetors)

Adjust serrated nut on rod to maintain idle speed at 900 RPM.

Lock serrated nut with jam nut.

(On Rochester Carburetors)

Hold the stem with a wrench and adjust the hex-head screw to maintain an idle speed of 900 RPM.

(8) Removal of Carburetor from Engine

NOTE: The following procedure applies to both the Rochester 4 GC and the Carter WCFB carburetor.

1. Remove air cleaner and air cleaner mounting stud and gasket.

2. Disconnect fuel line from carburetor and loosen fuel line at fuel filter. (Note Carter requires a 5/16 straight tube fitting in carburetor to attach fuel line. Rochester has a combined strainer nut and 5/16 invert flare and, therefore, does not require another fitting. Just screw in fuel line nut.)

3. Disconnect manifold to choke housing heater pipe.

4. Remove front jam nut from carburetor to transmission T.V. rod, and rotate throttle lever to allow removal of rod from trunnion (leave trunnion attached to throttle lever, since the T.V. rod must be readjusted when carburetor is replaced).

5. Disconnect throttle relay rod from throttle lever by removing throttle return spring from rod.

6. Unscrew distributor vacuum line at carburetor throttle body fitting.

7. Remove four nuts holding carburetor to intake manifold studs.

8. Lift carburetor off manifold, and disengage distributor vacuum line.

9. Remove and discard carburetor to manifold gasket.

(9) Installation of Carburetor on Engine

NOTE: The following procedure applies to both the Rochester 4 GC and the Carter WCFB carburetor.

1. Scrape old gasket off intake manifold. Clean gasket from bottom of carburetor. Place a new carburetor to manifold gasket over studs of intake manifold, with opening for carburetor heating passage toward front of car.

2. Start distributor vacuum line into fitting on carburetor throttle body.

3. Lower carburetor onto intake manifold studs, with choke housing to right side of car.

4. Install and tighten 4 nuts on manifold studs. Be sure to tighten nuts evenly, using a short open-end wrench.

5. Tighten distributor vacuum line fitting.

6. Connect and tighten manifold to choke housing heater pipe.

7. Connect and tighten fuel line to carburetor. Tighten fuel line at fuel filter. (Note: Be sure strainer nut on RPD carburetor is tight.)

8. Insert throttle relay rod in lower throttle lever hole. Secure with hook end of throttle retracting spring, inserted from below.

9. Open throttle and insert T.V. rod into trunnion on throttle lever. Install front jam nut loosely.

10. Install air cleaner mounting stud in carburetor and gasket in position.

11. Install air cleaner.

12. Perform Idle Speed and Mixture Adjustments and Fast Idle Adjustment, as outlined in Notes 4 to 6 above.

(10) Rochester Carburetor Disassembly

a. Idle Speed—Up Control Removal (on cars equipped with Air Conditioning)

1. Remove vacuum pipe connection at idle speed-up control.

2. Remove cover screw which retains control wire clip.

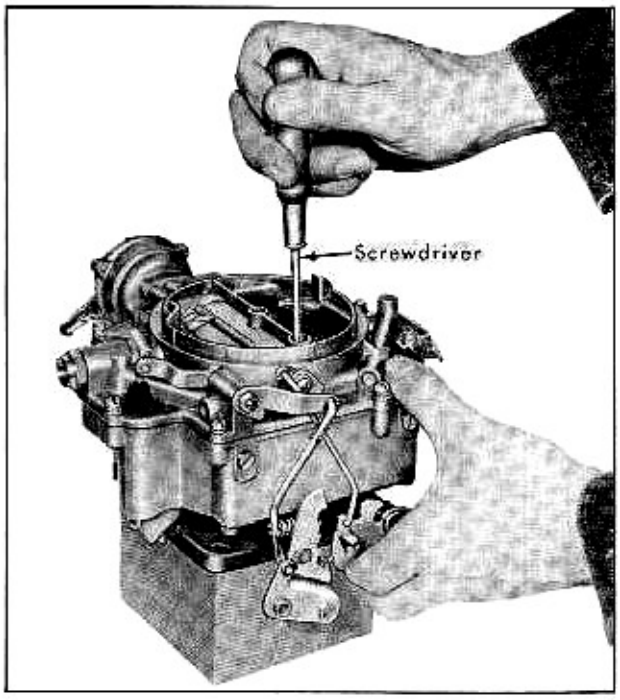

Fig. 12-43 Removing Bowl Cover Screws

3. Remove four mounting plate to bowl cover screws and lockwashers.

4. Lift idle speed-up control and mounting plate from bowl cover.

b. Idle Speed-Up Control Disassembly

1. Remove 2 screws and washers from bakelite cover.

2. Remove spring from coil.

3. Remove valve from inside idle support control.

4. Remove elbow from idle speed-up control.

c. Bowl Cover Removal

1. Remove modifier rod by removing horseshoe clip on bottom of rod and retainer clip on top.

NOTE: The upper type clip may be easily removed by pushing with a screwdriver against the projecting tang.

2. Remove pump rod by procedure in above step.

3. Remove choke lever and trip lever with retaining screw from choke shaft.

4. Remove fast idle cam pivot screw. Remove choke rod and fast idle cam attached.

5. Remove 3 inner and 10 outer bowl attaching screws with lockwashers. One of the inner bowl screws is located in a counterbore just inside the edge of the air horn as shown in Fig. 12-43. On cars equipped with the Idle Speed-Up Control, only 2 inner bowl and 7 outer bowl attaching screws remain to be removed. The other 4 have been removed previously.

6. Break bowl cover loose from bowl using finger pressure only. Do not attempt to pry cover loose.

7. Lift bowl cover assembly straight up out of the bowl by gripping air horn section as shown in Fig. 12-44. Be careful not to bend float assemblies.

d. Bowl Cover Disassembly

1. With bowl cover assembly inverted, remove float hinge pins and floats. Remove needles from their seats.

NOTE: Keep parts from primary side separate from those of the secondary side.

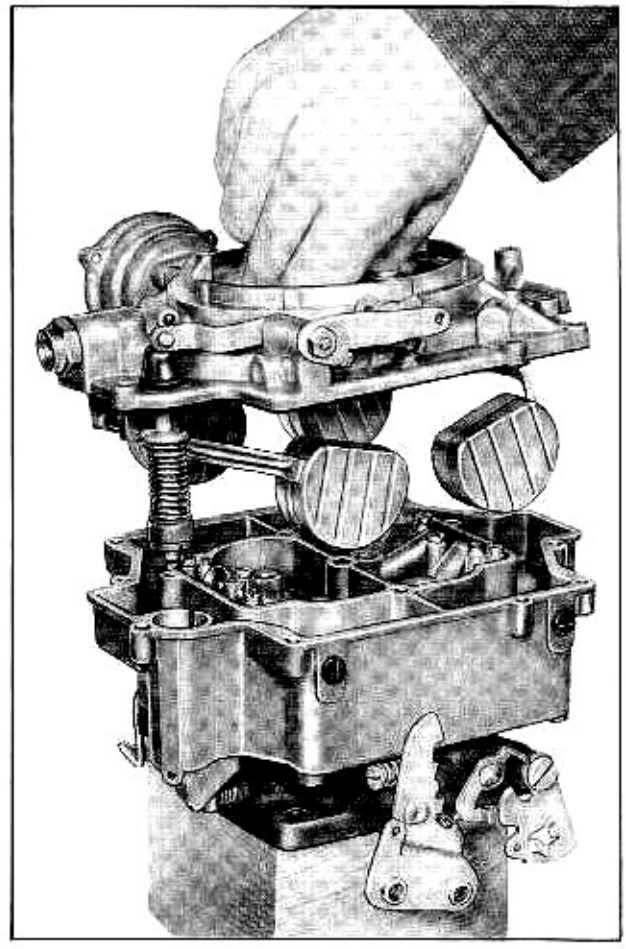

Fig. 12-44 Removing Bowl Cover

2. If necessary, remove vacuum power piston from bowl cover by pulling out with pliers.

3. Remove and discard bowl cover gasket.

4. Remove primary and secondary needle seats and gaskets using a screwdriver. Remove screen from secondary needle.

NOTE: If needle valves and seats are to be reused, it is particularly important to keep the needle valves mated with their corresponding seats.

5. Remove idle vent valve, spring, and retainer by inverting bowl cover and pressing on retainer with a screwdriver and then sliding the assembly up out of well in bowl cover.

CAUTION: Hold hand over valve assembly when removing so the parts will not be lost.

6. Turn bowl cover right side up. Remove horseshoe pin from accelerator pump plunger shaft, disengage plunger shaft from pump lever, and pull pump plunger with rubber boot downward and out of bowl cover. Rubber boot, retainer, washer, and spring may be removed from pump for cleaning if desired.

7. Remove nut and lockwasher from pump shaft and remove pump lever. Slide pump countershaft out of bowl cover boss.

8. Remove fuel inlet nut, gasket, and strainer.

e. Choke Disassembly

1. With bowl cover right side up on bench, remove retaining screw and thermostat lever.

2. Holding choke valve open, file staked ends of the 2 brass screws.

3. Holding choke valve closed, remove 2 choke valve screws. Discard used screws and slide choke valve out of slot in shaft.

4. Remove thermostat cover with 3 screws and retainers. Do not remove metal pointer or thermostat coil from shaft in cover.

5. Remove thermostat cover gasket and choke baffle plate.

6. Carefully rotate choke shaft counter-clockwise until choke piston clears vacuum cylinder.

7. Slide choke shaft out of housing and bowl cover.

8. Disconnect choke piston from link attached to shaft by tapping piston and then letting piston pin fall into cupped hand.

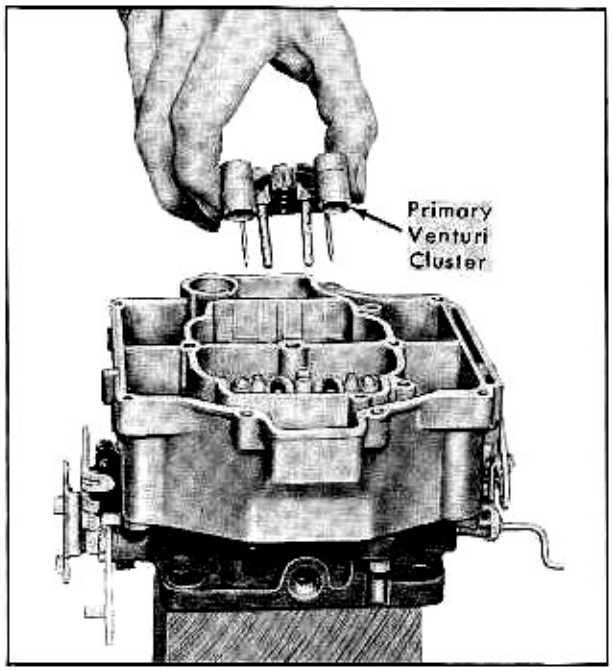

Fig. 12-45 Removing Venturi Cluster

9. Remove choke housing from bowl cover by removing 2 attaching screws and lockwashers. Remove and discard choke housing gasket.

f. Bowl Disassembly

1. Remove pump spring and pump inlet screen from bowl, using long-nosed pliers.

2. Remove aluminum pump inlet ball by inverting bowl.

NOTE: Never substitute a steel ball for the aluminum ball.

3. Remove power valve and gasket with a screwdriver.

4. Remove primary and secondary main metering jets using a screwdriver.

5. Remove primary and secondary venturi clusters, as shown in Fig. 12-45, by removing 3 attaching screws and lockwashers from each. Break cluster loose by finger pressure only, and remove and discard gaskets. Do not attempt further disassembly of either cluster.

6. Remove "T" slot from primary side with long-nosed pliers. Remove copper spring and then invert bowl and catch ball in cupped hand.

NOTE: Keep ball separated from ball removed in step e. 2.

7. Remove and discard fuel sight plugs if threads or screwdriver slots are damaged. Otherwise, plugs may be left installed.

g. Throttle Body Removal

1. Remove 3 linkage rods, as described in Note 10b, if this has not already been done.

2. Invert carburetor on workbench.

3. Remove large screw and lockwasher from counterbore in center of throttle body, using a screwdriver.

4. Remove 3 small attaching screws and lockwashers using a cross-head screwdriver.

NOTE: First remove idle speed-up control vacuum pipe from nipple, on Air Conditioner equipped cars.

5. Break throttle body loose from bowl with finger pressure only. Do not attempt to pry bowl loose.

6. Remove and discard throttle body to bowl gasket.

h. Throttle Body Disassembly

1. Remove 2 idle adjusting mixture screws with springs.

2. Remove nipple for distributor vacuum line. Remove elbow for idle speed-up control vacuum line if car is equipped with Air Conditioner.

3. Remove idle stop screw (hex-head) with spring from throttle body, and remove fast idle adjusting screw with spring from primary throttle lever.

NOTE: Keep each adjusting spring with its adjusting screw for easier identification.

4. Remove cotter pin, flat washer, spring washer and T.V. trunnion from throttle lever. Discard cotter pin.

5. Remove horseshoe clip from each end of secondary throttle actuating link. Remove washer from upper end of throttle link.

6. Unhook inner long end of primary throttle shaft override spring from lever, using long-nosed pliers.

7. Remove override spring retaining screw from primary throttle shaft.

8. Slide secondary throttle actuating lever and override spring off primary throttle shaft.

9. Remove throttle link from secondary throttle lever.

10. Remove secondary throttle lever retaining screw and spacer from secondary throttle shaft.

11. Slide secondary throttle lever and secondary throttle return spring off throttle shaft.

NOTE: Do not attempt further disassembly of the throttle body. The low speed ports in each throttle valve bore are bored at the factory after the valves are installed and adjusted, gaging from the closed throttle valve. If original adjustment of throttle valves is changed, the low speed metering calibrations will be changed.

(11) Inspection and Cleaning of Rochester Carburetor Parts

1. Thoroughly clean all metal parts of carburetor in carburetor cleaning solvent, with the exceptions noted below, and dry with compressed air.

CAUTION: Do not wash accelerator pump plunger assembly, thermostat coil and cover assembly or pump boot, in cleaning solvent. Wash these parts in clean gasoline only.

2. Clean and blow out all passages with compressed air. Remove any gum deposits which may have accumulated within carburetor parts. Clean carbon out of throttle body heat passage.

3. Make sure all calibrated restrictions, such as idle ports, air bleeds, or vents, are clean, but do not pass drills through these passages.

4. Check all shafts and their corresponding bearing bores for wear. Check each piston in its respective cylinder. Check for worn jets and worn holes in the ends of the various levers.

5. Inspect the accelerator pump plunger leather, replacing the plunger as an assembly if the leather is creased or cracked.

6. Examine float needles and seats. If a needle appears grooved, replace entire set with a factory matched needle, seat, and gasket.

7. Inspect idle mixture adjusting screws for burrs, ridges, or grooves. If wear is evident, replace screws.

8. Inspect floats for dents or leaks. Inspect

hinge pin bores for burrs or wear. Check hinge pins for straightness.

9. Clean strainer screens of dirt and lint. If distorted or plugged, these screens should be replaced.

10. Inspect fast idle cam for excessive wear on the steps, which would impair smooth engine operation during warmup. If wear is noted, replace cam.

11. Carefully inspect throttle body and valve assembly for wear at the throttle valves and bores, and between the shafts and their bores. This unit must be replaced as an assembly only, due to close manufacturing selective fit tolerances.

12. Always use new gaskets when reassembling carburetor.

(12) Rochester Carburetor Assembly

a. Throttle Body Assembly

1. Place secondary throttle return spring on secondary throttle shaft, with bent end of spring in hole in throttle body.

2. Wind up return spring 1 complete turn in the clockwise direction, and place secondary throttle lever on shaft over end of spring. Bent portion of lever should be placed above shaft as shown in Figs. 12-46 and 12-47.

3. Install spacer and retaining screw on end of secondary throttle shaft.

4. Place end of throttle link, which does not have washer attached, in hole in secondary throttle lever. Retain it with a horseshoe clip to secondary throttle lever.

5. Start secondary throttle actuating lever onto primary throttle shaft, with curved slot portion outward and rearward. With inner side of lever on shaft, place override spring on shaft, long end inward, and slide lever fully onto shaft with washer end of throttle link inserted through curved slot. Refer to Figs. 12-46 and 12-47 for assembly details.

6. Install override spring retaining screw through loop end of spring, and into primary throttle shaft from upper side.

7. Hook inner end of override spring over top edge of inner portion of lever, using a screwdriver to push the extended portion of the spring onto the inner portion of the lever.

8. Install a washer and a horseshoe spring on the upper end of the secondary throttle actuating link.

9. Install fast idle screw with long, heavy spring in primary throttle lever.

10. Install round-tipped, hex-head idle stop screw with short, heavy spring in primary shaft boss of throttle body.

11. Install T.V. trunnion, spring washer, flat washer, and retain with a new cotter pin.

12. Install nipple for distributor vacuum line. Install elbow for idle speed-up control on cars equipped with Air Conditioner.

13. Install 2 idle mixture adjusting screws with springs.

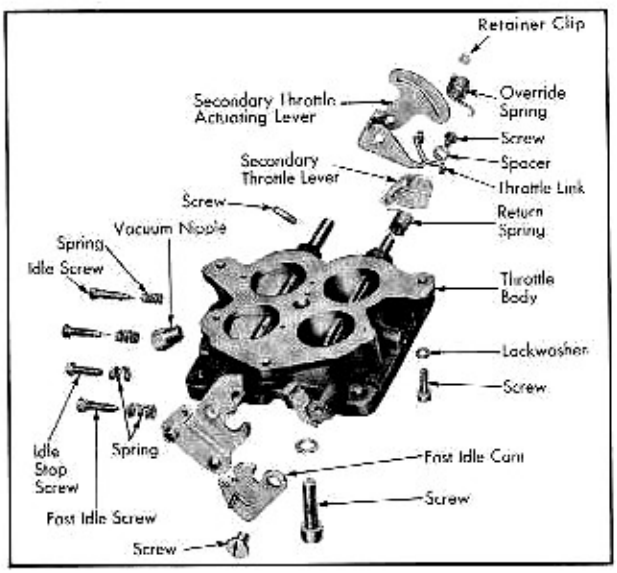

Fig. 12-46 Throttle Body Disassembled

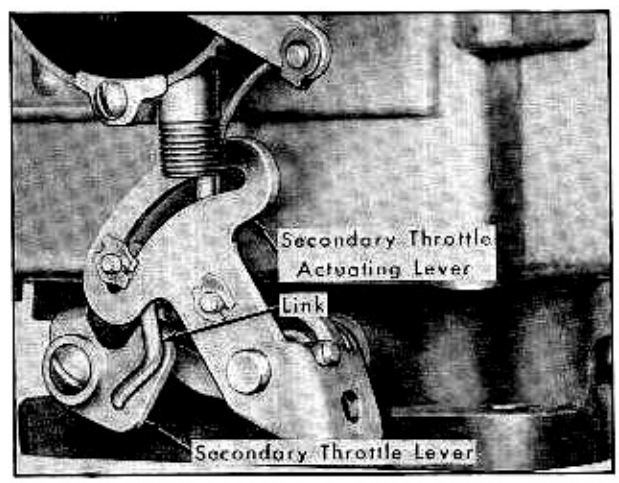

Fig. 12-47 Secondary Throttle Linkage

CAUTION: Tighten idle mixture adjusting screws carefully, so as not to groove needles or enlarge seats. Back out each screw 1 to 1-1/4 turns from the seated position for initial adjustment.

b. Throttle Body Installation

1. Place new throttle body to bowl gasket on bottom surface of bowl with bowl inverted on workbench.

NOTE: Gasket is not reversible. Large and small projecting tabs must be placed on primary side of bowl, surrounding the vacuum passage to the power valve piston.

2. Place throttle body assembly on bowl with primary throttle lever and fast idle cam on same side of bowl as fuel sight plugs, as shown in Fig. 12-48.

3. Start 3 outer Phillips attaching screws with lockwashers through gasket into bowl.

4. Install and tighten large center screw with lockwasher, using a screwdriver.

5. Tighten 3 outer screws uniformly, using a Phillips screwdriver.

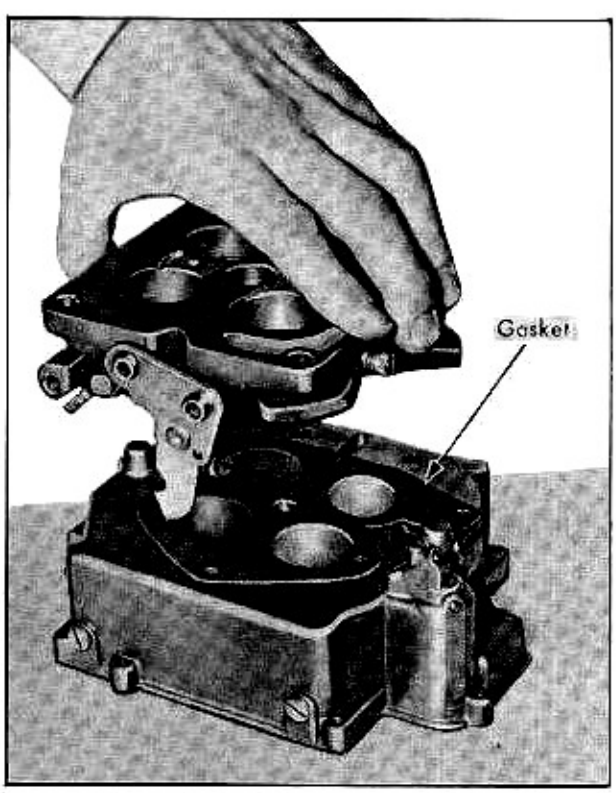

Fig. 12-48 Installing Throttle Body

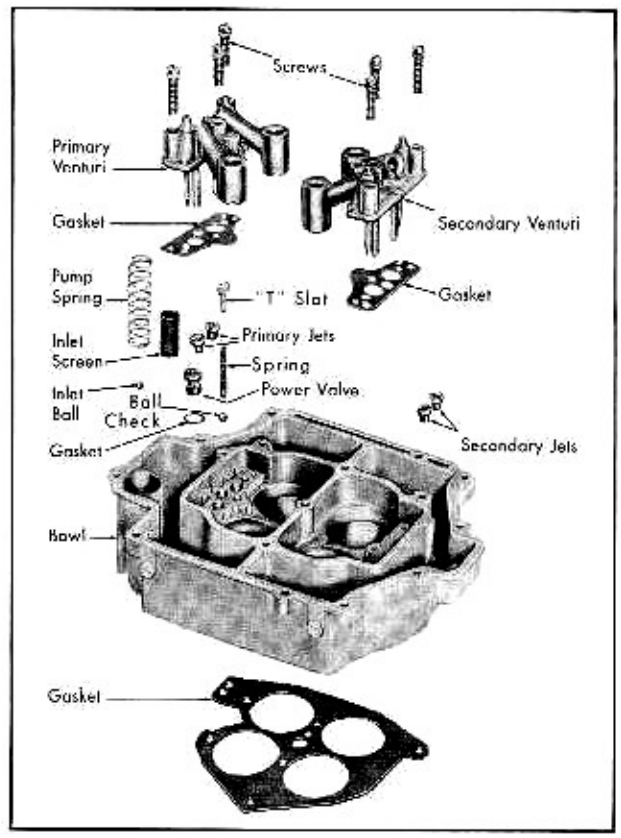

Fig. 12-49 Bowl Assembly Disassembled

6. If bowl cover was not removed, install 3 linkage rods as outlined in Note 12f. If any linkage parts were replaced, perform adjustments 2c through 2j.

c. Bowl Assembly

1. Install fuel sight plugs.

2. With bowl upright, drop ball and copper spring into bore under primary venturi cluster location. Refer to Fig. 12-49. Then put "T" slot into the fixed position of the bore causing the spring to become compressed.

3. Place new gaskets on primary and secondary venturi clusters and install in bowl, with 3 screws and lockwashers in each.

NOTE: The primary venturi cluster contains the accelerating pump jets. The secondary does not and therefore does not have added metal in front of the center screw. Also notice the projecting tang which aligns each cluster in the bowl. To the rear of the tang is found the cluster number 1 or 2.

4. Sort out primary and secondary main metering jets.

NOTE: The secondary jets have larger holes than the primary jets. The primary jets have 48 stamped on them while secondary jets are stamped with number 64.

5. Install primary and secondary jets using a small screwdriver to position it into the hole.

6. Install power valve and gasket using a screwdriver.

7. Drop aluminum pump inlet ball into pump bore. Tilt bowl to roll back into seat.

8. Place pump spring in pump bore and compress into position with finger pressure.

9. Install pump inlet screen, using long-nosed pliers.

d. Choke Assembly

1. With bowl cover right side up on bench, place new choke housing gasket on bowl cover boss. Refer to Fig. 12-50.

2. Install choke housing with 2 self-locking attaching screws.

3. Install choke piston on link attached to choke shaft with piston pin.

4. Slide choke shaft into housing and bowl cover. Rotate shaft so that piston enters vacuum cylinder.

5. Slide choke valve, with letters "RP" down through slot in choke shaft. Retain valve with 2 new brass screws. Press firmly on choke housing end of shaft, and hold valve tightly closed with the fingers while tightening screws to insure good alignment.

6. Carefully and lightly stake threaded ends of choke valve screws, being careful not to bend choke shaft.

7. Install choke baffle plate with curved slot

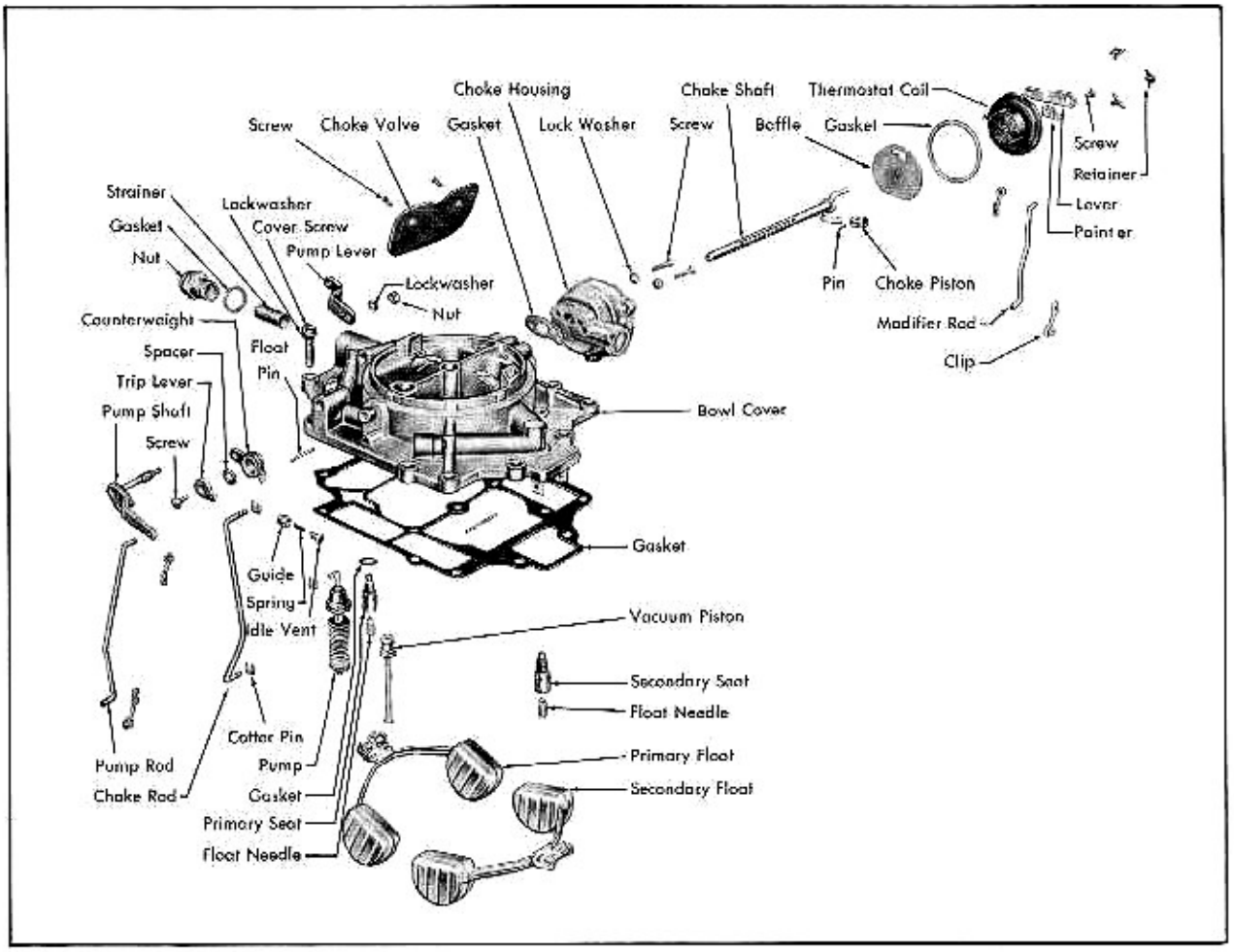

Fig. 12-50 Bowl Cover Assembly Disassembled

over tang on choke lever (baffle plate is symetrical side to side).

8. Install gasket and thermostat cover with projection on plastic cover at top of choke housing. Install 3 screws and retainers.

9. Install thermostat lever loosely with retaining screw. Lever should point forward and slightly down when metal pointer is at the scribed mark.

e. Bowl Cover Assembly

1. Place fuel strainer in inlet nut with gasket, and screw into place on primary side of bowl cover. Refer to Fig. 12-50.

2. Assemble pump plunger with spring washer, and retainer. Slide rubber boot onto plunger shaft, open end first.

3. Holding bowl cover upright, insert plunger assembly through hole in casting from below. Pull rubber boot through hole until one flange of boot is above casting with the other flange below.

4. Place a drop of heavy oil on pump countershaft and insert into boss of bowl cover with outer lever rearward.

5. Install pump lever on countershaft with lock washer and nut. Slip pump shaft into lever end, and retain with a horseshoe clip.

6. Invert bowl cover and install idle vent valve, spring, and retainer in underside of pump countershaft boss, with valve facing rearward. Compress spring and press assembly into position until retainer snaps into front side of boss.

7. Install primary and secondary needle seats and gaskets.

8. Place a new bowl cover gasket on bowl cover.

9. Install primary and secondary needles (tapered point down into needle seat), floats, and hinge pins.

NOTE: The flat side of the "D" float should be facing toward the bowl cover.

10. Perform Float Level and Float Drop Adjustments, as outlined in Notes 2a and 2b.

f. Bowl Cover Installation

1. Holding bowl cover assembly as shown in Fig. 12-44, carefully lower cover onto bowl, guiding pump plunger into its bore.

CAUTION: Be careful not to hold bowl cover in such a way as to press against floats.

2. Install the 3 inner and 10 outer bowl cover screws with lockwashers, tightening inner group first.

NOTE: If car is equipped with air conditioning, install the idle speed-up control to the bowl cover on the right side of the fuel inlet.

3. Install end of choke rod in choke lever, from side opposite collar, with horseshoe clips.

NOTE: A horseshoe clip is installed on each side of the choke lever and choke rod.

4. Install lower end of choke rod in fast idle cam, from side of projecting unloader tang, and retain horseshoe spring.

5. Place choke lever on choke shaft, with collar inward and lever pointing toward accelerator pump.

6. Install trip lever with "RP" stamping on outside and with straight edge of trip lever above the tang on the choke lever. Install retaining screw.

7. Attach fast idle cam to carburetor throttle body with pivot screw, using a screwdriver.

8. Install pump rod, with elbow end at the bottom, fastening the ends with 2 retaining clips. Place clips on end of lever, insert pump rod end through clip and lever, and then swing clip around to snap onto rod.

9. Rotate thermostat lever counter-clockwise from free position until coil picks up choke valve.

10. Install modifier rod in hole in the secondary throttle actuating lever and install horseshoe clip on the outside of the secondary throttle actuating lever.

11. Raise end of thermostat lever and install modifier rod, using the remaining retainer clip.

12. Check Choke Modifier Adjustment and choke settings, as outlined in Note 2e, and adjust as required. Check other adjustments as necessary.

NOTE: It is possible to remove the bowl cover assembly for float adjustment or other routine service without removing the carburetor from the engine. If linkage parts are replaced or bent, or new gaskets added, the full adjustment procedure on the bench and on the engine must be performed.

13. Connect vacuum line to elbows located at idle speed-up control and throttle body.

g. Idle Speed-Up Control Assembly

1. Install valve stem into hole.

2. Insert spring inside coil.

3. Install coil, spring, and bakelite cover on idle support housing with 2 screws and washers.

4. Install elbow into idle speed-up control housing.

h. Idle Speed-Up Control Installation

1. Install idle speed-up control in position on bowl cover.

2. Install four mounting plate to bowl cover screws.

3. Install control wire clip under cover screw.

4. Connect vacuum pipe to speed-up control.

(13). Carter Carburetor Disassembly

a. Idle Speed-Up Control Removal

1. Remove vacuum pipe from nipple on idle speed-up control.

2. Remove 3 screws and lockwashers from the mounting bracket attached to the bowl cover.

3. Lift idle speed-up control from bowl cover.

b. Idle Speed-Up Control Disassembly

1. Disconnect vacuum line from nipple on idle speed-up control housing.

2. Remove lock nut, round serrated nut, and spring from end of shaft.

3. Remove large hex-head nut, lockwasher, and separate bracket from casting.

4. Remove 6 screws and washers from circular housing.

5. Open assembly, exercizing care not to lose tapered coil spring and little brass rod in shaft hole on opposite side of diaphragm.

c. Bowl Cover Removal

1. Remove air cleaner, gasket, and mounting stud if carburetor is to be left on the engine.

2. Remove modifier rod by removing spring clip on lower end (with screwdriver pressing against the open end of the clip) and rotating rod to disengage upper end.

3. Remove choke rod by above procedure.

4. Remove pump rod by removing spring clip from lower end, and spring retainer, spring, and washer from the upper end. Remove spring retainer by rotating it 90° until the corresponding slot on the pump rod is located, then slide it off.

5. Remove dust cover and gasket with 2 screws and lockwashers.

6. Remove 16 bowl cover screws and lockwashers as shown in Fig. 12-51. (6 of these are found around the edge of the air horn, 9 around the flange of the bowl cover, and 1 within the dust bowl enclosure.) Extreme care must be taken not to damage the idle vent arm tang on the pump countershaft when removing the inner bowl cover screw and lockwasher within the dust bowl enclosure.

NOTE: Do not disturb levers on choke and pump shafts, unless disassembly or adjustment operations are contemplated.

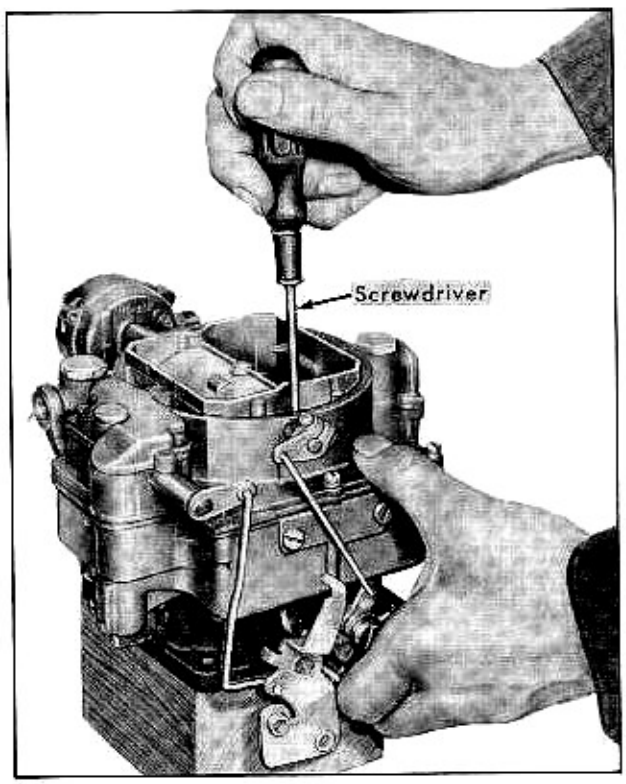

Fig. 12-51 Removing Bowl Cover Screws

7. Break bowl cover loose from bowl, using finger pressure only. Do not attempt to pry cover loose.

8. Lift bowl cover assembly straight up out of bowl by gripping air horn section as shown in Fig. 12-52, being careful not to bend float assemblies.

d. Bowl Cover Disassembly

1. Remove metering rods through upper side of bowl cover.

2. Remove spring clip from pump connector link.

3. Invert bowl cover assembly, and remove float hinge pins and floats with needles and clips attached.

NOTE: Keep parts from primary side separated from those of secondary side.

4. Remove accelerator pump plunger assembly.

5. Rotate vacuumeter piston 90° to either side and remove.

6. Remove and discard bowl cover gasket.

7. Remove primary and secondary needle seats with gaskets, using a screwdriver.

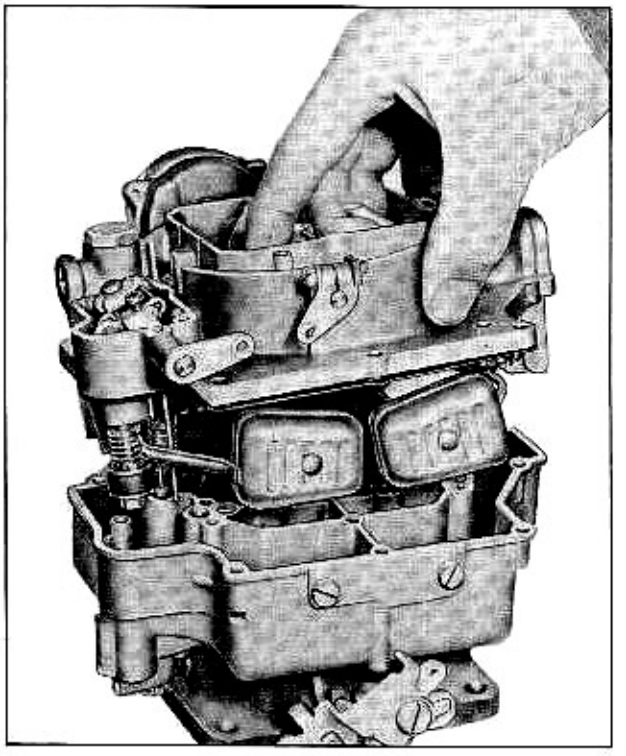

Fig. 12-52 Removing Bowl Cover

NOTE: If needle valves and seats are to be reused, it is important to keep the needle valves mated with their corresponding seats.

8. Remove front fuel strainer with plug and gasket.

9. Remove rear fuel plug and gasket.

10. Loosen clamp screws on pump shaft. Mark the relative position of clamps on shaft before loosening to insure proper assembly later on.

11. Remove idle vent arm screw and lockwasher.

12. Slide pump shaft out of bowl cover.

13. Remove clamps and metering rod carrier with spring.

e. Choke Disassembly

1. With bowl cover right side up on the bench, loosen the clamp screw on choke lever and remove lever.

2. Remove 2 choke valve screws, using a small screwdriver.

3. Remove 3 thermostat cover screws and retainers, Lever may be removed from pointer shaft by loosening clamp screw, but do not remove metal pointer or thermostat coil.

4. Remove choke housing gasket and baffle.

5. Carefully rotate choke shaft counter-clockwise until choke piston clears vacuum cylinder.

6. Remove choke shaft from housing and bowl cover, taking care not to enlarge holes in either casting with sharp edges of shaft.

7. Disconnect choke piston from link by pushing piston pin out with a piece of wire.

8. Remove choke housing from bowl cover by removing 3 attaching screws.

9. Remove gasket between choke housing and bowl cover and discard gasket.

f. Bowl Disassembly

1. Remove pump jet screw, pump jet, and gasket with a screwdriver. Remove pump valve by inverting bowl and tapping.

NOTE: Pump jet screw is hollow.

2. Remove relief valve and gasket with screwdriver.

3. Remove primary and secondary metering jets with a screwdriver. Secondary jets are numbered 120-185 and primary 120-166.

4. Remove pump spring and vacuum piston spring.

5. Remove pump inlet ball retainer with Tool No. J-1306. Remove inlet ball by inverting bowl.

6. Remove primary and secondary idle jets with a screwdriver.

7. If threads or screwdriver slots are damaged, remove and discard fuel sight plugs. Otherwise, plugs may be left installed.

g. Throttle Body Removal

1. Remove 3 linkage rods, as described in Note 13c, if this has not already been done.

2. Loosen 4 throttle body attaching screws with lockwashers.

3. Break throttle body loose from bowl by using finger pressure only. Do not attempt to pry throttle body loose. Remove screws and lockwashers from counterbores in throttle body.

4. Remove and discard throttle body to bowl gasket.

h. Throttle Body Disassembly

1. Remove 2 idle mixture adjusting screws with springs.

2. Remove nipple for distributor vacuum line, and elbow for idle speed-up control on Air Conditioner equipped cars.

3. Remove idle stop screw with spring, and remove fast idle adjusting screw from primary throttle lever.

4. Remove cotter pin, flat washer, spring washer, and T.V. trunnion from throttle lever.

5. Remove screw holding fast idle cam assembly to throttle body.

6. Remove throttle link with washer by removing spring retainer and washer from one end, and clip from the other end.

7. Remove retainer screw on end of primary throttle shaft, and slide off spacer, modifier lever with override lever and spring, secondary throttle actuating lever, and spring washer.

8. Remove secondary throttle lever by removing retainer screw and spacer, and sliding lever off shaft. The spring will come off when the secondary throttle lever is removed from the shaft.

NOTE: Do not attempt further disassembly of throttle body. The low speed ports in each throttle valve bore are bored at the factory after the valves are installed and adjusted, gaged from the closed throttle valve. If original adjustment of throttle valves is changed, the low speed metering calibrations will be changed.

(14) Inspection and Cleaning of Carter Carburetor Parts

1. Wash all parts thoroughly in carburetor cleaning solvent, with the exceptions noted below, and dry with compressed air.

CAUTION: Do not wash accelerator pump plunger assembly and plastic thermostat housing assembly in clean solvent. Wash these parts in clean gasoline only.

2. Clean and blow out all passages with compressed air. Remove any gum or carbon which may have accumulated within carburetor parts. Clean carbon out of throttle body heat passage.

3. Make sure all calibrated restrictions, such as idle ports, air bleeds or anti-percolator passages are clean, but do not use a drill for cleaning.

4. Check all shafts and their corresponding bearing bores for wear. Check each piston in its respective cylinder. Check for bent metering rods, worn jets, and leaking floats. Replace all worn or damaged parts.

5. Inspect the accelerator pump plunger leather, replacing the plunger as an assembly if the leather is creased or cracked.

6. Examine float needles and seats. If a needle appears grooved, replace entire set with a factory matched needle, seat, and gasket.

7. Inspect the idle mixture adjusting screws for burrs, ridges, or grooves. If wear is evident, replace screws.

8. Inspect floats for dents or leaks. Inspect hinge pin bores for burrs or wear. Check hinge pins for straightness.

9. Clean strainer screens of dirt or lint. If distorted or plugged, replace screens.

10. Inspect fast idle cam for excessive wear on the steps. If wear is noted, replace cam.

11. Carefully inspect throttle body and valve assembly for wear at the throttle valve and bores, and between the shafts and their bores. This unit must be replaced as an assembly only, due to close manufacturing selective fit tolerances.

12. Always use new gaskets when reassembling carburetor.

(15) Carter Carburetor Assembly

a. Throttle Body Assembly

1. Assemble spring washer, secondary throttle actuating lever, override lever with spring and modifier lever, spacer, and retaining screw onto choke housing end of primary throttle shaft. Refer to Figs. 12-53 and 12-54 for assembly details.

NOTE: It will be necessary to hook override spring between modifier lever and override lever before placing on throttle shaft, and to stretch spring slightly with pliers when installing over hooked portion of override lever.

2. Slide secondary throttle lever with spring onto secondary throttle shaft. Install spacer and retaining screw as shown in Fig. 12-54.

3. Install throttle link with washer on inside of secondary throttle lever, fasten with spring and retainer. Short leg of link goes into center hole of secondary throttle actuating lever and retain with spring clip. See Figs. 12-53 and 12-54.

4. Referring to Fig. 12-53, assemble fast idle cam and spring, cam trip lever, and lockout cam with pawl to throttle body with bearing screw.

NOTE: Long tang on trip lever faces outward and slips between fast idle cam and long end of spring. Short end of spring hooks over unloader tang on fast idle cam. Lockout pawl should be raised above dowel in throttle body when assembling. Tighten screw with Tool No. J-816-4.

5. Install idle stop screw with spring in throttle body.

6. Install fast idle adjusting screw in primary throttle lever.

7. Install nipple for distributor vacuum line. Install elbow for idle speed-up control on Air Conditioner carburetors.

8. Install T.V. trunnion, spring washer, flat washer, and retain with new cotter pin.

9. Install 2 idle mixture adjusting screws with springs.

CAUTION: Tighten idle mixture screws carefully, so as not to groove needle or enlarge seat. Back out 1-1/4 to 2 turns from seated position for initial adjustment.

b. Throttle Body Installation

1. Place new throttle body to bowl gasket on bottom surface of bowl with bowl inverted on workbench. Gasket will slip over 4 idle mixture passage bosses.

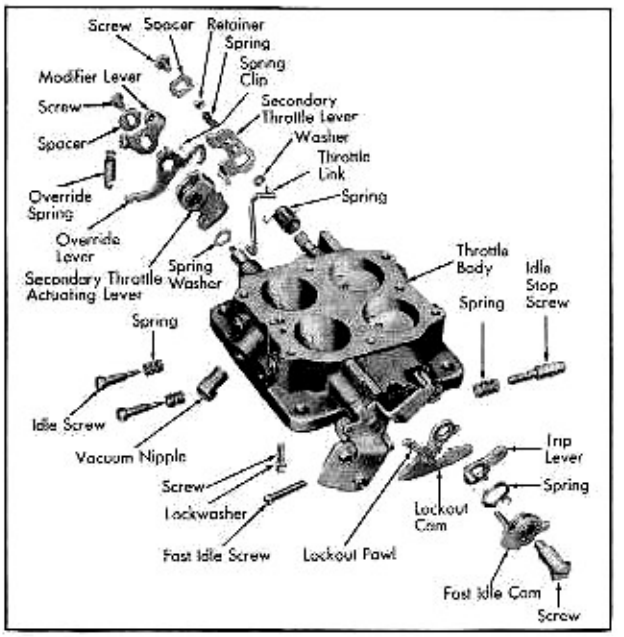

Fig. 12-53 Throttle Body Disassembled

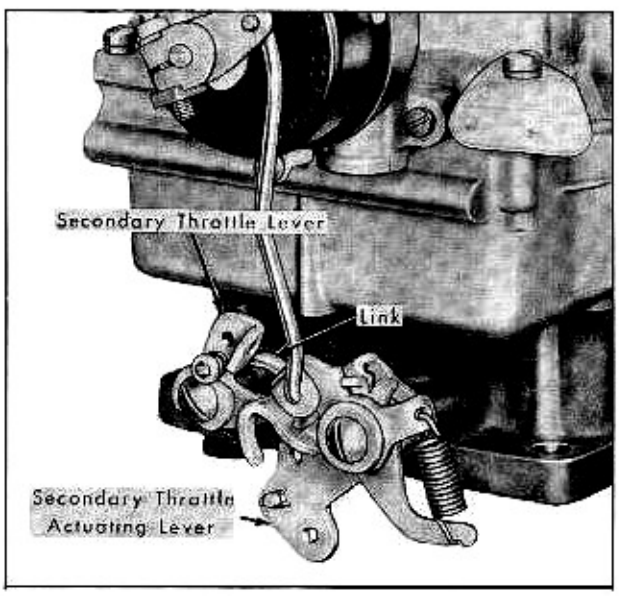

Fig. 12-54 Secondary Throttle Linkage

NOTE: Select correct position by alignment with venturi bores. Tapered slot in middle side of gasket must be on primary side.

2. Place throttle body assembly on bowl with primary throttle lever and fast idle cam on same side as bowl sight plugs, as shown in Fig. 12-55.

3. Install 4 attaching screws and lockwashers, tightening uniformly. Use 4 screws with largest diameter.

4. If bowl cover was not removed, install 3 linkage rods as outlined in Note 15g, and perform adjustments 3c through 3k.

c. Bowl Assembly

1. Install sight plugs, using screwdriver.

2. Drop pump inlet ball into its seat in center of pump cylinder.

NOTE: Ball will not center itself. If ball misses its seat, flip it in with a piece of wire.

3. Install ball check retainer with Tool No. J-2110 and a small hammer. Be sure that retainer falls in position with raised portion upward.

4. Drop pump check valve into its bore, pointed end down, and install gasket, pump jet, and screw. Refer to Fig. 12-56.

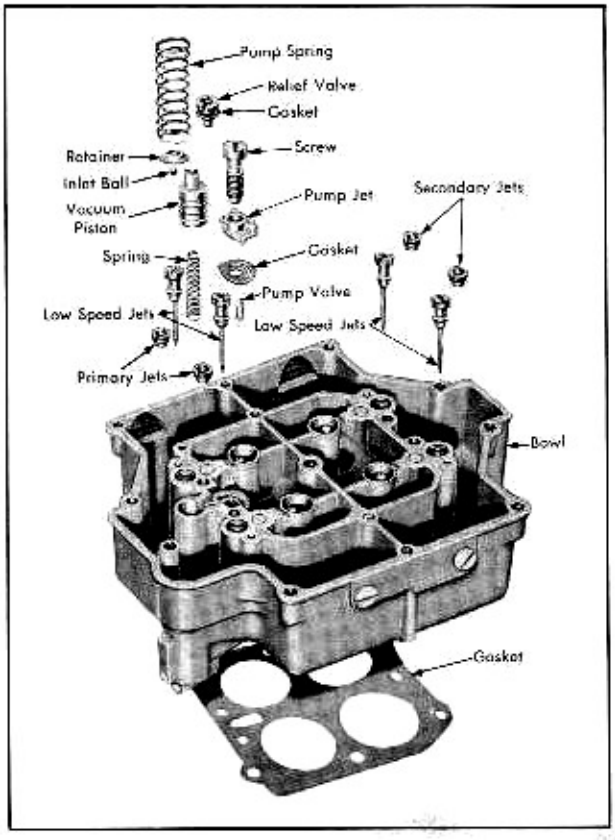

Fig. 12-56 Bowl Assembly Disassembled

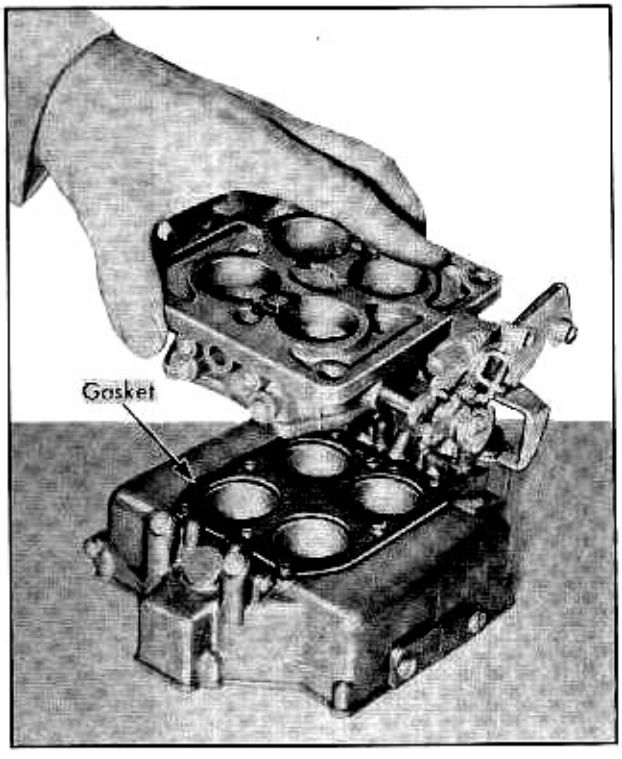

Fig. 12-55 Installing Throttle Body

5. Grip relief valve (with gasket) and place in seat. Tighten with screwdriver.

6. Lower primary jets into seat using a bent paper clip.

NOTE: This is the reverse of the Rochester Carburetor arrangement, and can be remembered by association with the metering rods used in the Carter carburetor. The metering rods can be used to select the Carter jets with the larger holes.

7. Drop each secondary jet into its seat and tighten with screwdriver.

8. Drop pump spring and vacuum piston spring into their respective bores.

9. Install primary and secondary idle jets with a screwdriver.

d. Choke Assembly

1. Install gasket on inner side of choke housing. Refer to Fig. 12-57.

ENGINE FUEL AND EXHAUST

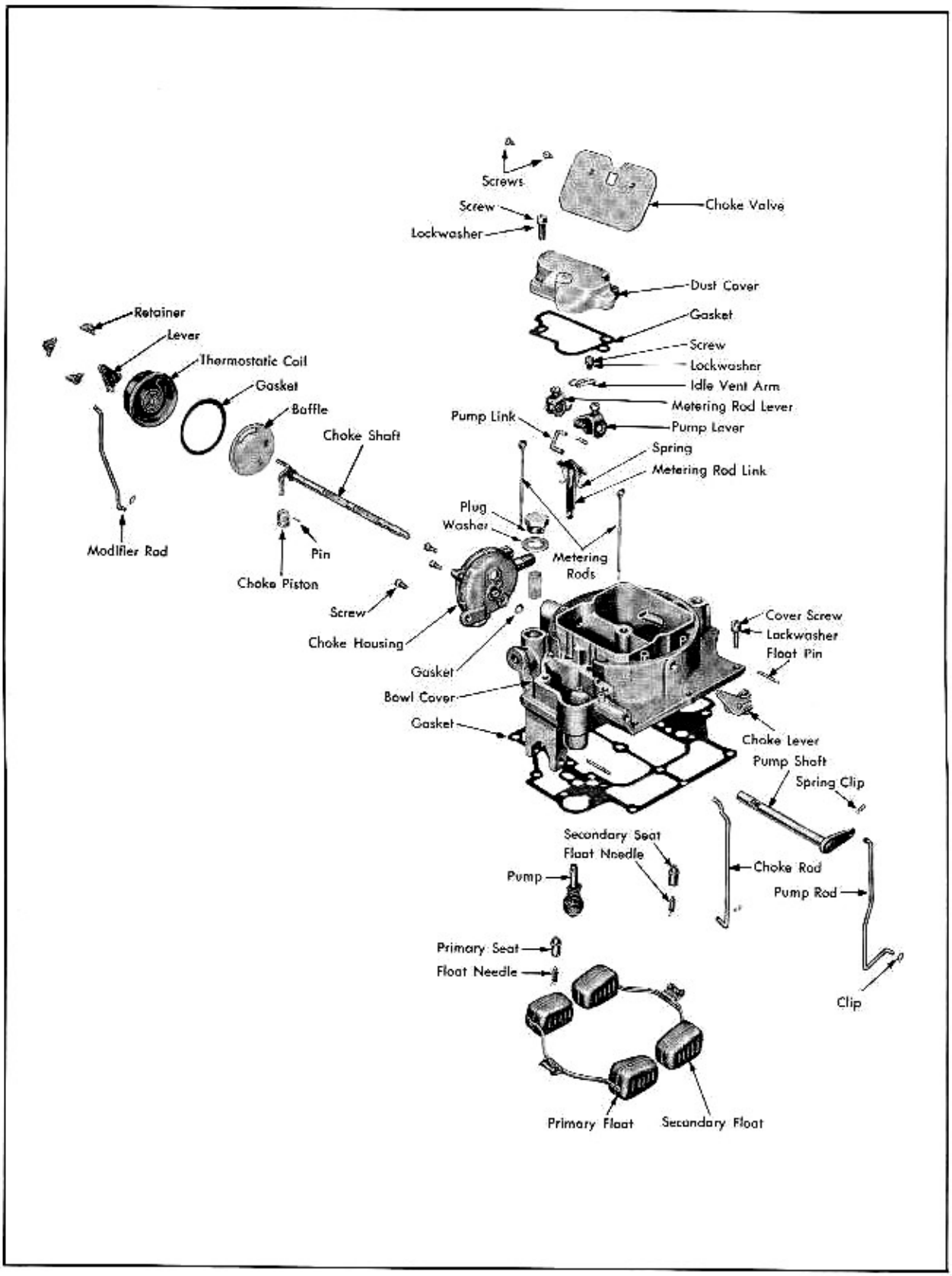

Fig. 12-57 Bowl Cover Assembly Disassembled

2. Attach choke housing to bowl cover with 3 notched screws. The two longest screws go on bottom of choke housing.

3. Assemble choke piston and pin onto link attached to choke shaft.

4. Insert choke shaft into choke housing and bowl cover being careful not to damage bore. Rotate shaft so that piston enters vacuum cylinder.

5. Install choke baffle plate with attached leaf spring facing out, and holes over exhaust passage and tang of choke piston lever.

6. Install plastic thermostat cover and gasket with 3 screws and retainers, so that scribed mark on edge of cover lines up with the index mark.

7. Install choke valve (with trademark up) on choke shaft with 2 new screws. Hold choke valve tightly closed with the fingers while tightening screws, to insure good alignment.

8. Carefully and lightly stake threaded ends of choke valve screws, being careful not to bend choke shaft.

9. Loosely install choke rod and choke lever, both pointing forward. Secure choke rod and modifier rod with spring clip at lower ends.

e. Bowl Cover Assembly

1. Assemble metering rod spring into upper hole of metering rod carrier, and insert into slot within dust cover boss. Refer to Fig. 12-57.

NOTE: Projecting tang on metering rod link must point rearward, or toward the air horn.

2. Start pump shaft into dust cover boss, then install pump lever (which fits onto the slotted portion of the pump shaft). Place metering rod lever on end shaft after passing through second bearing.

3. Tighten metering rod lever set screws. Install idle vent arm and tighten screw. Final adjustment will be performed later, as outlined in Note 3d.

4. Install fuel strainer with plug and gasket, on primary side. Install brass plug and gasket on secondary side.

5. Invert bowl cover, and install primary and secondary needle valve seats with gaskets, using a screwdriver.

6. Assemble primary and secondary needle valves with clips to the corresponding floats.

7. Install primary and secondary float assemblies with hinge pins.

8 Perform float adjustment as outlined in Notes 3a and 3b.

9. Remove float assemblies and install a new bowl cover gasket.

10. Reinstall primary and secondary float assemblies.

11. Install vacuum piston on metering rod link in horizontal position, then rotate to vertical.

12. Place pump assembly in bowl cover bore, and turn bowl cover upright while holding pump plunger.

13. Place bowl cover on bowl, with pump spring under plunger.

14. Using a pair of long-nosed pliers, install pump link through plunger shaft and pump arm with ends pointing away from choke housing side, and upper end in outer hole (long stroke) of pump arms. Retain link with spring clip on upper end.

f. Idle Speed-Up Control Assembly

1. Put small brass rod into vertical slot on diaphragm rod and slide diaphragm rod into other circular cover.

2. Drop ball in valve stem opening and place solenoid valve into the valve stem opening. Install gasket, solenoid switch, and spring on inside diameter of coil.

3. Install 2 screws and washers on solenoid housing with wire connections pointing away from the 6 hole circular cover.

4. Make sure that tab on diaphragm is lined up with mounting bracket side of circular cover. Insert tapered coil spring with large diameter end of spring against circular metal retainer on diaphragm.

5. Install 6 screws and washers fastening the circular covers together.

6. Install spring, round head nut, and hex-head nut to diaphragm rod. The large diameter of the round head nut should be against spring.

g. Bowl Cover Installation

1. Holding bowl cover assembly as shown in

Fig. 12-52, carefully lower cover onto bowl, guiding vacuum piston and pump plunger into their respective bores.

CAUTION: Be careful not to hold bowl cover in such a way as to press against floats.

2. Install the 6 inner bowl cover screws with lockwashers. The seven longest screws are installed in positions indicated in Fig. 12-56, and remaining screws in their respective places.

NOTE: Install idle speed-up control if car is equipped with Air Conditioning. Install vacuum pipe to idle speed-up control and throttle body.

3. Connect longest bent end of pump rod to primary lever with spring clip, and connect upper end of rod to pump arm with washer, spring, and spring retainer.

4. Install upper end of choke rod in slotted choke shaft lever, and retain lower end in cam trip lever with spring clip.

5. Rotate thermostat lever counter-clockwise from free position until coil picks up choke valve. Continue turning until metal pointer lines up with plastic pointer on choke housing.

6. Holding thermostat lever in this position, install upper end of modifier rod into lever from inner side. Slip lower end of rod into primary throttle shaft modifier lever and retain with spring clip.

7. Install metering rods through looped ends of metering rod spring and holes in bowl cover. Insert rods through metering jets and hook onto metering rod carrier at the ends of the "T"

8. Check to see that metering rod assembly is free to slide up and down against pressure of vacuum piston spring.

9. Check adjustments as required. If disassembly of bowl cover or throttle body has been performed, then adjustments outlined in Notes 3c through 3k will be necessary. If no disassembly has been performed, and if carburetor was adjusted correctly before removal of the bowl cover, then further adjustments may be omitted.

NOTE: It is therefore possible to remove the bowl cover assembly for float adjustment or other routine service without removing the carburetor from the engine. If levers on choke or pump shafts are loosened, however, the full adjustment procedure on the bench and on the engine must be performed.

10. Install dust cover and gasket with 2 screws and lockwashers.

11. Install air cleaner gasket, mounting stud and air cleaner, if carburetor has been left on engine. Otherwise, install and adjust carburetor as described in Notes 6 and 9.

(16) Fuel Pump Tests

1. To check the fuel pump capacity, disconnect gasoline line from filter to carburetor at fuel filter outlet, swing fuel line out of the way, and remove filter from pump.

2. Attach a one foot piece of 5/16" tubing to pump outlet. The pump should fill 1/2 pint bottle with fuel in 9 strokes (fuel spurts) at cranking speed. (26 cc per stroke minimum.) If 1/2 pint of fuel is delivered as specified, the pump is normal and gas line and tank are not obstructed. If no gas flows, or if only a little gas flows, check for the following:

a. Strainer nut on pump loose. Tighten nut.

b. Fuel line connections loose or cracked. Tighten or replace fuel line fitting.

c. Fuel line clogged. Blow out with compressed air.

d. Diaphragm flange screws loose. Tighten flange screws.

e. Flexible inlet line pinched, broken or porous. Replace flexible line.

f. Fuel pump push rod worn too short (7.1425 to 7.1475 inches long). If rod is worn excessively, check eccentric for wear by measuring rod stroke (.245 to .250 inch).

3. If pump does not operate properly after above corrections have been made, replace pump.

(17) Fuel Pump Removal

1. Disconnect flexible fuel line at end near front motor mount, and remove line from clips.

2. Disconnect flexible fuel line at fuel pump.

3. Remove fuel line between fuel filter and carburetor.

4. Remove two screws and flat washers holding fuel pump to oil filler housing, and remove pump with gasket and fuel filter.

5. Remove and discard pump mounting gasket.

6. Remove fuel filter from pump.

(18) Fuel Pump Disassembly

1. Wash outside of pump assembly in solvent and blow off with compressed air to remove loose dirt and grease.

2. Remove inlet valve chamber plug, gasket and screen.

3. Mark edges of top cover and body with a file to assure reassembly in correct relative position.

4. Remove cover flange screws and lock washers. Separate top cover from body by jarring cover with a screw driver handle.

5. If valve and cage assemblies, Fig. 12-58, are worn or damaged, remove by prying out with a narrow screw driver blade.

6. Clamp mounting flange of pump body in vise. File riveted end of rocker arm pin until flush with washer. Drive out rocker arm pin with drift punch.

7. Remove rocker arm, bushing, and link assembly with spring. Push bushing out to disassemble link and arm assembly.

8. Remove diaphragm from pump body.

9. File off staking burrs which retain diaphragm rod seal and remove seal.

10. Clean body and cover in solvent and blow out all passages with compressed air.

11. Inspect cover and body for cracks and breakage. Check for flange warpage on a smooth flat surface. Any warped castings must be replaced. Check strainer screen for damage or obstruction. Replace screen if deposits cannot be removed by swishing in solvent.

(19) Fuel Pump Assembly

1. Soak new diaphragm in clean kerosene while performing following steps.

2. Make an assembly of link and rocker arms with bushing, Fig. 12-58.

3. Place rocker arm and link in body with link hook pointing away from diaphragm flange. Position spring in pump and on rocker arm.

4. Align rocker arm bushing hole with hole in body and temporarily retain in position with small end of a tapered tool.

5. Press oil seal and retainer assembly into recess of body casting with lip of seal pointing down. Retain seal by staking body in four places.

6. Place diaphragm springs, with retainer on top, over oil seal retainer.

7. Insert diaphragm pull rod through retainer, spring, and oil seal. Tip diaphragm so pull rod will angle slightly away from hooked end of link. Hold body with diaphragm flange down so link will fall into engagement with slot in pull rod.

8. Install rocker arm pin through hole in body and through rocker arm assembly.

9. Install washer on small end of rocker arm pin and peen pin over washer.

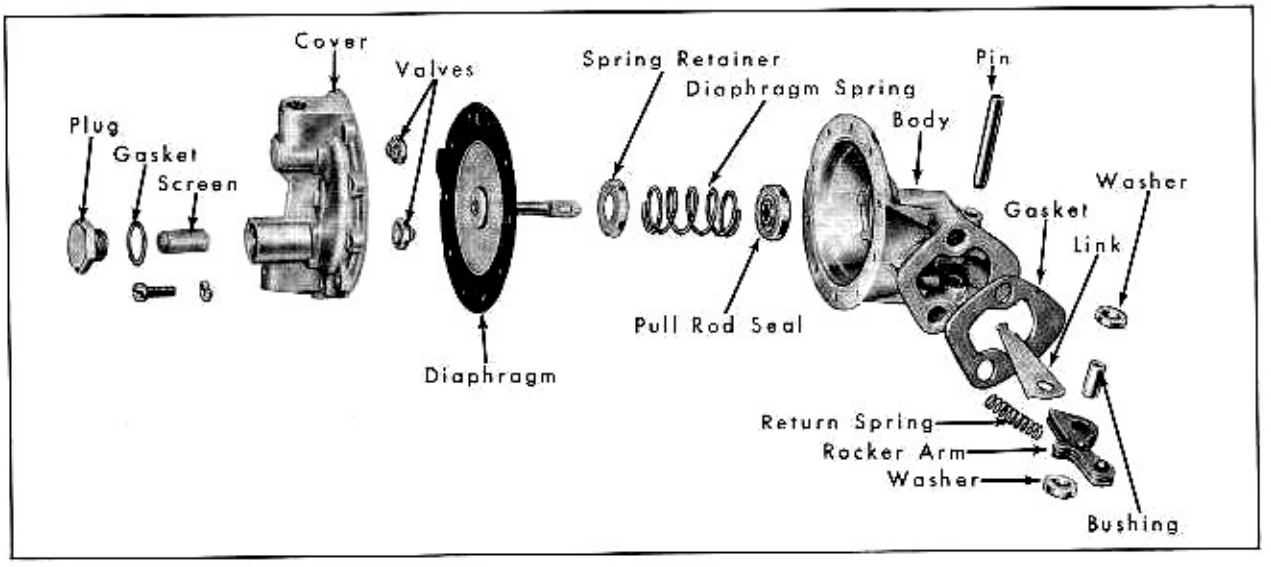

Fig. 12-58 Fuel Pump Disassembled

10. Place valve gaskets in position in cover and insert two valve and cage assemblies.

NOTE: Outlet valve spider should face into cover and inlet valve spider should face out of cover. Stake die casting to secure valve and cage assemblies in place.

11. Turn cover so that diaphragm flange rests on bench and install screen, gasket, and inlet valve chamber plug.

12. Install cover on body, making sure that file marks on cover and body are lined up. Push on rocker arm until diaphragm is flat across body flange. Install top cover screws and lockwashers loosely until screw heads just contact lock washers. Push rocker arm to full stroke and tighten cover screws securely.

(20) Fuel Pump Installation

1. Install fuel filter on fuel pump.

2. Install a new gasket on mounting flange of pump.

3. Crank engine until pump push rod in oil filler housing is at its lowest point.

4. Lubricate end of push rod with a drop of engine oil.

5. Position pump assembly on engine, fitting pump to oil filler housing with bearing surface of rocker arm on top of push rod.

6. Install two screws and flat washers holding pump assembly to oil filler housing.

7. Install fuel line between fuel filter and carburetor.

8. Connect flexible fuel line to fuel pump, and install line in clips.

9. Connect flexible fuel line to fuel line that leads from gas tank.

(21) Removal of Exhaust System Assembly

a. Removal of Exhaust Pipe

1. Raise front of car and disconnect steering connecting rod at pitman arm.

2. Disconnect exhaust pipe from manifold. On left side, remove heat control valve.

3. Loosen exhaust pipe to muffler coupling screws. On left side, remove slush deflector and loosen hanger clamp screw and slide clamp off hanger.

4. Remove exhaust pipe from muffler.

b. Removal of Muffler

1. Remove exhaust pipe as explained above.

2. Disconnect hanger, at rear of muffler, from frame.

3. Loosen muffler to intermediate pipe coupling screws.

4. Remove muffler from intermediate pipe.

c. Removal of Intermediate Pipe

1. Remove resonator as outlined in Note 21d.

2. Loosen muffler rear coupling screws.

3. Remove intermediate pipe from muffler.

d. Removal of Resonator

1. Raise rear of car.

2. Remove resonator to intermediate pipe coupling screws.

3. Remove hanger, at rear of resonator, from frame.

4. Drive resonator off intermediate pipe.

5. Loosen front screws of coupling at rear of resonator.

6. Reinstall hanger to frame crossbar screws.

7. Drive resonator forward off tail pipe.

e. Removal of Tail Pipe

1. Remove resonator as described in Note 21d.

2. Remove sleeve from end of tail pipe at opening in bumper.

3. Remove hanger from frame crossbar, slide tail pipe forward out of spring bracket, and remove from car.

(22) Installation of Exhaust System Assembly

a. Installation of Tail Pipe

1. Install tail pipe in position in car with rear of pipe in bumper brackets.

2. Install resonator on intermediate pipe.

3. Install forward end of tail pipe in resonator.

4. Install hanger on frame and install front and rear couplings at resonator to tail pipe and intermediate pipe joints.

5. Align pipes and resonator and tighten coupling screws.

6. Install sleeve through bumper opening, over end of tail pipe. Flange of sleeve should be 1/4" ahead of face of bumper.

b. Installation of Resonator

1. Install resonator on intermediate pipe.

2. Slide tail pipe forward into resonator.

3. Align pipes and resonator and install couplings. Tighten screws securely.

c. Installation of Intermediate Pipe

1. Install intermediate pipe in muffler.

2. Install resonator as described in Note 22b.

3. Align pipes and install couplings, tightening screws securely.

d. Installation of Muffler

1. Install muffler on intermediate pipe.

2. Install exhaust pipe as explained in Note 22e.

3. Install couplings at front and rear of muffler, align pipes and muffler, and tighten coupling screws.

e. Installation of Exhaust Pipe

1. Install exhaust pipe in muffler.

2. Install heat control valve, with gaskets, on left exhaust manifold flange.

3. Position exhaust pipe against manifold flange or heat control valve flange on left side and install screws.

4. On left side, install clamp over hanger and tighten clamp screw.

5. Tighten exhaust pipe to muffler clamp screws.

6. Install slush deflector on left side.

7. Install steering connecting rod on pitman arm.

8. Lower car.

(23) Removal and Installation of Heat Control Valve

a. Removal

1. Remove left exhaust pipe support to bell housing screw.

2. Remove screws which hold left exhaust pipe to manifold.

3. Holding exhaust pipe down slightly from manifold, slide heat control valve, with upper and lower gaskets, out and remove from car.

b. Installation

1. Install heat valve, with gaskets, between exhaust pipe and left exhaust manifold. Be sure face of valve, stamped "Top", is next to exhaust manifold.

2. Install exhaust pipe to manifold screws. Tighten to 30-35 ft. lbs. torque.

3. Install exhaust pipe support to bell housing screw.

(24) Installation of Exhaust Manifolds

Exhaust manifolds are subject to such extreme variations in temperature that the metal expands and contracts to a considerable degree. For this reason, care should be exercised not to tighten the manifolds bolts too tight. The manifold bolts should be tightened to 25-30 foot pounds, and retightened after the engine has been run at least 15 minutes.

(25) Cleaning Fuel Lines

In order to assure a continuous supply of clean fuel, the entire fuel system should be cleaned out twice a year, preferably in the spring and in the fall. This should include cleaning the fuel filter, draining the water trap at the bottom of the gasoline tank, disconnecting all fuel lines, and blowing them out with compressed air in reverse direction to fuel flow.

(26) Removal and Installation of Gasoline Tank

1. Drain gasoline from tank.

2. Raise rear end of car from floor.

3. Disconnect filler neck and vent pipe at lower clamps.

4. Disconnect gasoline line.

5. Disconnect gauge wire on float unit.

6. Remove tank support straps and lower tank from car. Installation is performed by reversing above operation.

(27) Care in Storage

Whenever a car is to be put in storage for any length of time, all gasoline should be drained from the entire fuel system, including the carburetor, fuel filter, fuel pump lines, and tank. This must be done to assure freedom from gum formation left by evaporating.

SPECIFICATIONS

Carburetor	Rochester 4-GC 7006221 7006220 -standard- Air Conditioner-	Carter WCFB 2109-S 2110-S
Throttle Bore		
Primary	1-5/16"	1-5/16"
Secondary	1-5/16"	1-5/16"
Main Venturi		
Primary	1"	1-1/16"
Secondary	1-1/16"	1-1/16"
Small Venturi		
Primary	1/4"	11/32"
Secondary	1/4"	11/32"
Low Speed Jets		
Idle Needle Orifice	.046"	.0595
Primary	.026"	.028"
Secondary	.026"	.028"
Main Metering Jets		
Primary	.048"	.0935"
Secondary	.064"	.067"
Power Valve Restriction	.038	
Metering Rods		
Economy Step		.073
Power Step		.054
Float Setting	(Gasket to Bottom of floats)	(Casting to top of floats)
Primary	1-19/32"	1/8"
Secondary	1-19/32"	3/16"
Choke Setting	index	index
Accelerator Pump		
Capacity - 10 strokes	15 cc. minimum	15 cc. minimum
Idle Screw Setting - Turns Open	1 to 1-1/4	1/2 to 1-1/2
Idle Speed	400 RPM in drive	400 RPM in drive

FUEL PUMP

NOTE: Testing to be done with entire car at room temperature

Fuel pressure at idle speed	3-1/2 to 5-1/4 p.s.i.
Fuel discharge per stroke at cranking speed	26 cc. minimum
Fuel discharge in 9 strokes at cranking speed	1/2 pint minimum
Push rod stroke	.245" to .250"
Push rod length	7.1425 to 7.1475"
Push rod diameter	.4355" to .4360"

ENGINE FUEL AND EXHAUST

TORQUE TIGHTNESS

Location	Size	Ft. Lbs. Min.	Ft. Lbs. Max.
Carburetor to intake manifold	5/16-24	15	20
Fuel tank strap nuts	5/16-24	2	3
Fuel tank drain plug	5/8-18	25	30
Fuel pump to oil filler housing	3/8-16	25	30
Muffler clamps - front	3/8-24	25	30
Muffler clamps - rear	3/8-24	25	30
Muffler support to frame - 75 and 86	5/16-18	4	8
Resonator clamps	3/8-24	25	30
Resonator support to frame	5/16-12	10	15
Exhaust pipe to manifold - right	5-16-24	15	20
Exhaust pipe to manifold-left	3/8-24	30	35

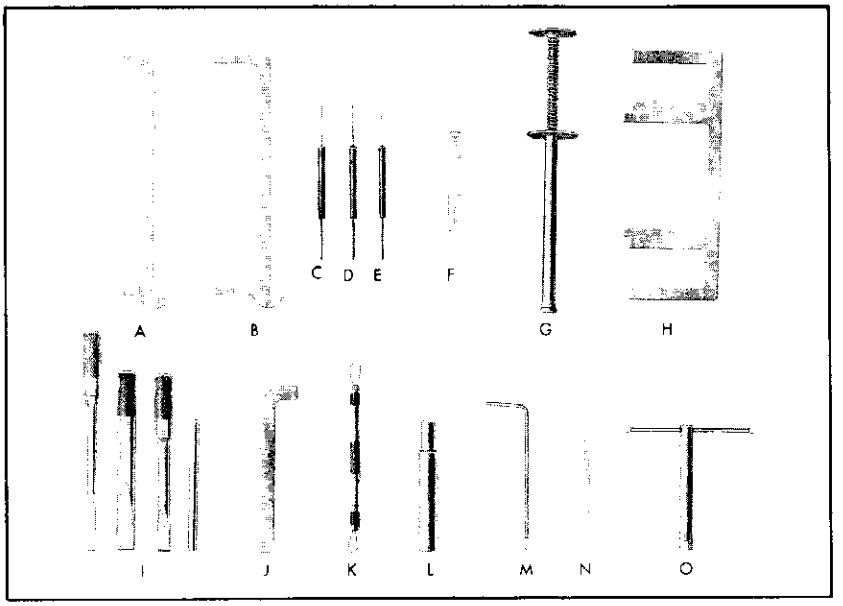

Fig. 12-59 Special Tools

Key	Tool No.	Name	Key	Tool No.	Name
A	J-5457	Primary Float Gage (1/8" Carter)	G	KMO-658	Screw Holder
B	J-5458	Secondary Float Gage (3/16" Carter)	H	J-5683	Float Level Gage (1-19/32") Rochester
C	J-5195	Idle Vent Gage (.063"), Rochester	I	J-816	Screw Driver Bit Set
D	KMO-658	Fast Idle Gage (.026"), Rochester	J	J-1137	Bending Tool
E	J-1136	Choke Rod Gage (.040"), Rochester	K	J-1136	Wire Gage (.020", .030" and .040" Carter)
F	KMO-657	Wire Gage (.015" and .018" Carter)	L	J-2110	Ball Retaining Ring Inserter
			M	J-1306	Ball Retaining Ring Removing Tool
			N	J-818-3	Unloader Gage (3/16" Carter)
			O	J-5197	Bending Tool

ENGINE FUEL AND EXHAUST

OTHER NOTES AND REFERENCES