QUADRAJET
MODELS 4MV, 4MC
CARBURETOR
MANUAL

Delco Rochester

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QUADRAJET - MODEL 4MV

GENERAL DESCRIPTION

The Quadrajet is a 4-barrel two stage carburetor of downdraft design. Its simplicity in construction makes it easy to service, yet its versatility and principles of operation make it adaptable from small to very large engines, without major casting changes.

There are three separate basic carburetor models. They are designated as 4M, 4MV, and 4MC. The 4M is the basic carburetor equipped for manual choke operation. The 4MV is an automatic choke model designed for use with a manifold mounted thermostatic choke coil. The 4MC model is an automatic choke carburetor which has the choke housing and coil mounted at the side of the float bowl. Except for choke systems, all models have basically the same principles of operation.

The Quadrajet carburetor has two stages in operation. The primary (fuel inlet) side has small 1-3/8" bores with a triple venturi setup equipped with plain tube nozzles. Operation is similar to most carburetors using the venturi principle. The triple venturi stack up, plus the small primary bores, result in more stable and finer fuel control during idle and part throttle operation. During off-idle and part throttle operation, fuel metering is accomplished with tapered metering rods operating in specially designed jets, positioned by a manifold vacuum responsive piston.

The secondary side of the Quadrajet has two large (2-1/4") bores. These, added to the primary, give enough air capacity to meet most engine requirements. The air valve is used in the secondary side for metering control and supplements the primary bores to meet air and fuel requirements of the engine.

The secondary air valve mechanically operates tapered metering rods which move in orifice plates, thereby, controlling fuel flow from the secondary nozzles in direct proportion to air flowing through the secondary bores.

The float bowl is centrally located to avoid problems of fuel spillage causing engine turn cut out and delayed fuel flow to the carburetor bores. The float bowl reservoir is smaller in design than most earlier 4-barrel carburetors to reduce fuel evaporation loss during engine "shut down" hot.

The float system has a single pontoon float and fuel valve for simplification and ease in servicing. An integral fuel filter located in the float bowl ahead of the float needle valve is easily removed for cleaning or replacement.

The throttle body is aluminum to reduce overall weight and improve heat conduction to prevent icing. A heat insulator gasket is used between the throttle body and bowl to prevent fuel percolation in the float bowl.

SERVICE FEATURES

The primary side of the carburetor has six operating systems. They are float, idle, main metering, power, pump and choke. The secondary side has one main metering system plus accelerating wells on some models. All metering systems receive fuel from the one float chamber.

The following text covers the operating systems for ease in trouble-shooting and also recommended service procedures. There are some design variations between different models which will be covered in that part of the text pertaining to the particular system or service procedure.
The Quadrajet carburetor is unique in that it has a centrally located fuel reservoir (fuel bowl). The fuel bowl is centered between the primary bores and is adjacent to the secondary bores. This type design assures an adequate fuel supply to all carburetor bores, which results in excellent performance with respect to car inclination or severity of turns.

The float pontoon is solid and is made of a light closed cell plastic material. This feature gives added buoyancy which allows the use of a single float to maintain constant fuel levels.

There are two types of float needle valves used in the Quadrajet carburetor. One type is diaphragm assisted and the other is the standard needle and brass seat.

The diaphragm assisted float needle is primarily used with a smaller float and on engines equipped with high pressure fuel pumps. The needle seat is a brass insert and is pressed in to the bowl fuel inlet channel below the diaphragm needle tip. The seat is not removable, as the needle valve tip is of a material which makes seat wear negligible. Care should be used during servicing so that the seat is not nicked, scored or moved. The float valve is factory staked and tested and should not be re-staked in the field.

On most models, a fuel inlet filter is an integral part of the float bowl and is located behind the fuel inlet nut. Should the filter become plugged due to excessive dirt or improper service, a pressure relief spring located behind the filter element allows fuel pump pressure to force the element off its seat. This allows fuel to by-pass the filter and enter the carburetor so the engine will run until the filter can be serviced.

It is very important that the filter be serviced periodically to prevent dirt from entering the carburetor metering orifices.

The float system (Figure 2) consists of a fuel chamber (fuel bowl), a single pontoon float, float hinge pin and retainer combination, float valve and seat and a float valve pull clip. A plastic filler block is located in the top of the float chamber over the float valve to prevent fuel slosh into this area.

The float system operates in the following manner: Fuel from the engine fuel pump enters the carburetor fuel inlet passage. It passes through the filter element, fuel inlet valve and on into the float bowl chamber. As the incoming fuel fills the float bowl to the prescribed level, the float pontoon rises and forces the fuel inlet valve closed, shutting off fuel flow. As fuel is used from the float bowl, the float drops allowing the float needle valve to open, allowing more fuel to again fill the bowl. This cycle continues, maintaining a constant fuel level in the float bowl.

A float needle pull clip, fastened to the float needle valve, hooks over the edge of the float arm at the center as shown in Figure 2. Its purpose is to assist in lifting the float valve off its seat whenever fuel level in the float bowl is low.
Fuel flow through the diaphragm assisted float needle valve varies from the standard float needle. With the standard type as shown in Figure 2 fuel flows from the inlet filter and inlet channel up through the needle seat orifice past the float needle valve and spills over into the float bowl. With the diaphragm type float needle valve (see inset) Figure 2 fuel from the inlet filter enters the channel above the float valve tip. When fuel level is low in the bowl the needle valve is off its seat and fuel flows down past the float valve tip into a fuel channel which leads upward through the bowl casting to a point above normal liquid level and spills over into the float bowl.

The diaphragm type needle valve has some advantages over the standard float needle in that a larger needle seat orifice can be used to provide greater fuel flow to the float chamber and yet allow the use of a small float. This is accomplished through a balance of forces acting on the float needle valve and diaphragm against fuel pump pressure. Fuel pressure entering the float needle valve chamber tends to force the needle valve closed. However, the same pressure is also acting on the float needle diaphragm. The diaphragm has a slightly larger area than the float needle valve head, therefore, the greater pressure acting on the diaphragm tends to push the needle valve off its seat. The force of the float arm acting on the needle stem, as the float bowl fills, overcomes this pressure difference and closes the needle valve. Therefore, the float's function is to overcome the pressure difference and does not have to force the needle valve closed against direct fuel pump pressure.

The carburetor float chamber is internally vented on all models through two vent tubes located in the air horn. The internal vent tubes lead from beneath the air cleaner to the float bowl chamber. Their purpose is to balance air pressure acting on the fuel in the bowl with air flow through the carburetor bores. In this way, balanced air/fuel mixture ratios can be maintained throughout all carburetor ranges of operation.

Some engine applications require an external vent into the float bowl during hot engine operation. The Quadrajet float bowl is externally vented through an idle vent valve. Its purpose is to vent fuel vapors which may form in the float bowl during periods of hot engine idle and "hot soak".

In operation the idle vent valve is closed except when the throttle valves are in the idle position. When the throttles are closed a wire lever on the pump lever pushes upward on the spring steel vent valve arm and opens the vent valve. Thus, fuel vapors are allowed to vent externally, thereby preventing them from entering the carburetor bores and being drawn into the engine. This prevents rough engine idle and excessively long hot engine starting.

When the throttle valves are opened to the off-idle and part throttle position, the idle vent valve closes, returning the carburetor to internally balanced venting.
A temperature controlled idle vent valve is used on some models (Figure 3). In place of the standard vent valve, a heat sensitive bi-metal strip is used as the valve holder. This is mounted beneath the idle vent valve arm.

The bi-metal strip holds the vent valve on its seat (closed) at temperatures below 75°. When underhood temperatures are above 75° to 85° the bi-metal strip bends upward moving the vent valve off its seat. This lets fuel vapors, caused during hot engine operation, escape from the float chamber. This results in improved hot engine idle and hot starting. At temperatures below 75°, the vent valve remains closed and retains fuel vapors internally to supply extra fuel for good cold engine starting.

During hot engine operation, when the thermostatic vent valve is open, it is necessary to close the valve except at idle to maintain an internally balanced carburetor. This is accomplished through the spring steel vent valve arm which operates off the wire lever on the end of the pump lever. As the throttle valves are opened from the idle position, the vent arm exerts pressure on the bi-metal strip and forces the valve closed.

The thermostatic vent valve is adjustable to make sure it closes at the proper time during throttle valve opening from the idle position.

The Quadrajet carburetor has an idle system on the primary side (fuel inlet side) of the carburetor to supply the correct air/fuel mixture ratios during idle and off-idle operation. The idle system is used during this period because air flow through the carburetor venturi is not great enough to obtain efficient metering from the main discharge nozzles.

The idle system is only used in the two primary bores of the carburetor. Each bore has a separate and independent idle system. They consist of idle tubes, idle passages, idle air bleeds, idle channel restrictions, idle mixture adjustment needles and idle discharge holes.

During curb idle the throttle valve is held slightly open by the idle speed adjusting screw. The small amount of air which passes between the primary throttle valve and bore is regulated by this screw to give the engine the desired idle speed. Since the engine requires very little air for idle and low speeds, fuel is added to the air to produce a combustible mixture by the direct application of vacuum (low pressure) from the engine manifold to the idle discharge hole below the throttle valve. With the idle discharge holes in a very low pressure area and the fuel in the float bowl vented to atmosphere (high pressure), the idle system operates as follows:

Fuel flows from the float bowl down through the main metering jets into the main fuel wells. It is picked up in the main wells by the two idle tubes (one for each primary bore) which extend into the wells. The fuel is metered at the lower tip of the idle tube and passes up through the tubes. On some models, where needed, the fuel is mixed with air at the top of each idle tube through an idle air bleed. The fuel mixture crosses over to the idle down channels where it is mixed with air at the side idle bleed located just above the idle channel restriction. The mixture continues down through the calibrated idle channel restrictions past the lower idle air bleeds and off-idle discharge ports where it is further mixed with air. The air/fuel mixture moves down to the adjustable idle mixture needle discharge holes where it enters the carburetor bores and blends with the air passing the slightly open throttle valves. The combustible air/fuel mixture then passes through the intake manifold to the engine cylinders.
The idle mixture needles are adjustable, to blend the correct amount of fuel mixture from the idle system with the air entering the engine at idle. Turning the idle mixture needle inward (clockwise) decreases the idle fuel discharge (gives a leaner mixture) and turning the mixture screws outward (counter-clockwise) enriches the engine idle mixture.

Some carburetor models have a fixed idle air bypass system. This consists of air channels which lead from the top of each carburetor bore in the air horn to a point below each primary throttle valve. At normal idle, extra air passes through these channels supplementing the air passing by the slightly opened throttle valves. The purpose of the idle air bypass system is to allow reduction in the amount of air going past the throttle valves so they can be nearly closed at idle. This reduces the amount of air flowing through the carburetor venturi to prevent the main fuel nozzles from feeding during idle operation. The venturi system is very sensitive to air flow and on some applications where larger amounts of idle air are needed to maintain idle speed, the fixed idle air by-pass system is used.

On emission control carburetor applications, the idle mixture needle discharge holes have been reduced in size. This was done to prevent a too rich idle adjustment in the field. The idle mixture needles should be turned out too far beyond normal idle mixture requirements.

Another feature added to emission carburetors is an adjustable off-idle air bleed system (Figure 3). A separate air channel is added in the air horn which leads from the top of the air horn to the idle mixture cross channel. An adjustment screw with a tapered head is mounted at the top of the channel and is used to control the amount of air bleeding into the idle system. The off-idle air bleed is adjusted at the factory to maintain very accurate off-idle air fuel mixture ratios. It is adjusted during carburetor flow test and no attempt should be made to readjust in the field. A triangular spring clamp forced over the vent tube covers the screw to protect the adjustment from being tampered with and should not be removed. All service air horns have this screw preset at the factory.

**Off Idle Operation**

As the primary throttle valves are opened from curb idle to increase engine speed, additional fuel is needed to combine with the extra air entering the engine. This is accomplished by the slotted off-idle discharge ports. As the primary throttle valves open, they pass by the off-idle ports, gradually exposing them to high engine vacuum below the throttle valves. The additional fuel added from the off-idle ports mixes with the increasing air flow past the opening throttle valves to meet increased engine air and fuel demands.

Further opening of the throttle valves increases the air velocity through the carburetor venturi sufficiently to cause low pressure at the lower idle air bleeds. As a result, fuel begins to discharge from the lower idle air bleed holes and continues to do so throughout operation of the part throttle to wide open throttle ranges, supplementing the main discharge nozzle delivery.

The idle needle holes and off-idle discharge ports continue to supply sufficient fuel for engine requirements until air velocity is high enough in the venturi area to obtain efficient fuel flow from the main metering system.

**Hot Idle Compensator**

The hot idle compensator is located in a chamber at the rear of the carburetor float bowl adjacent to the secondary bores. Its purpose is to offset enriching effects caused by excessive fuel vapors during hot engine operation.

The compensator consists of a thermostatically controlled valve, a bi-metal strip which is heat sensitive, a valve holder and bracket. The valve closes off an air channel which leads from a hole in the top of the air horn, just beneath the air cleaner, to a point below the secondary throttle valves.

Normally, the compensator valve is held closed by tension of the bi-metal strip. During extreme hot engine operation, excessive fuel vapors entering the engine manifold cause richer than normally required mixtures, resulting in rough engine idle and stalling. At a predetermined temperature, when extra air is needed to offset the enriching effects of fuel vapors, the bi-metal strip bends and unseats the compensator valve. This uncoveres the air channel leading from the valve chamber to the point below the throttle valves. This allows enough air to be drawn into the engine manifold to offset the richer mixtures and maintain a smooth engine idle.

When the engine cools and the extra air is not needed, the bi-metal strip closes the valve and operation returns to normal mixtures.

The compensator valve assembly is held in place by the dust cover over the valve chamber. A seal is used between the compensator valve and the float bowl casting.

In order to ensure proper idle adjustment when the engine is hot, the compensator valve must be closed. To check this, a finger may be held over the compensator air inlet channel located on top of the air horn. If no drop in engine RPM is noted on a tachometer, the valve is closed. If the valve is open, plug the hole or cool engine down to a point where the valve automatically closes for proper idle adjustment. Note: Plug the compensator hole with a pencil or something that will be seen, as the plug must be removed before the air cleaner is installed. Otherwise the compensator will not function if the plug is left in the hole.

**NOTE:** On some applications the air inlet to the hot idle compensator is located beneath the air valve in the secondary bores. The compensator valve can be checked for proper closing by pushing inward on a spring loaded plunger mounted in the idle compensator cover. The idle adjustment procedure is the same as recommended previously.

On some model 4MV carburetors, the Hot Idle Compensator is located on the primary side of the float bowl. It is mounted in the bowl with a pin protruding through the air horn casting to facilitate closing the valve when the idle adjustment is made.
The main metering system supplies fuel to the engine from off-idle to wide open throttle. The primary bores (two smaller bores) supply fuel and air during this range through plain tube nozzles and the venturi principle.

The multiple venturi in each primary bore produce excellent fuel metering control due to their sensitivity to air flow. The main metering system begins to operate as airflow increases through the venturi system and additional fuel is needed to supply the correct air/fuel mixture to the engine. Fuel from the idle system gradually diminishes as the lower pressures are now in the venturi system.

The main metering system consists of main metering jets, vacuum operated metering rods, main fuel wells, main well air bleeds, fuel discharge nozzles, and triple venturi. The system operates as follows.

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

Fuel from the float bowl flows through the main metering jets into the main fuel wells. It passes upward in the main well and is bled with air by an air bleed located at the top of well. The fuel is further bled air through calibrated air bleeds located near the top of the well in the carburetor bores. The fuel mixture then passes from the main well through the main discharge nozzles into the boost venturi. At the boost venturi, the fuel mixture then combines with the air entering the engine through the carburetor bores. It then passes as a combustible mixture through the intake manifold and on into the engine cylinders. The main metering system is calibrated by tapered and stepped metering rods operating in the main metering jet and also through the main well air bleeds.

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

Emission control carburetor models have an adjustable part throttle feature used in production to maintain a very close tolerance of fuel mixtures during part throttle operation (Figure 4). This includes a new type power piston and primary main metering rods. The new piston has a pin pressed into its base which protrudes through the float bowl and gasket and contacts an adjustable link in the throttle body. The metering rods are tapered at the upper metering
end so that fuel flow through the main metering jets are controlled by the depth of the taper in the main metering jet orifice. During production the adjustable part throttle screw is turned in or out to place the taper at the exact point in the jet orifice to obtain the desired air/fuel mixture ratio. Once set, the adjustment screw is capped and no attempt should be made to readjust it in the field.

The tapered metering rod used with the adjustable part throttle feature can be identified by the suffix "P" after the number stamped on the side of rod.

![Diagram of Power System]

**Figure 5—Power System**

**POWER SYSTEM**

The power system in the Quadrojet carburetor provides extra mixture enrichment to meet power requirements under heavy engine loads and high speed operation. The richer mixtures are supplied through the main metering systems in the primary and secondary sides of the carburetor.

The fuel mixture is enriched in the two primary bores through the power system. This consists of a vacuum operated power piston and a spring located in a cylinder contacted by a passage to intake manifold vacuum. The spring under the power piston pushes the piston upward against manifold vacuum.

During part throttle and cruising ranges, manifold vacuums are sufficient to hold the power piston down against spring tension so that the larger diameter of the metering rod tip is held in the main metering jet orifice. However, as engine load is increased to a point where extra mixture enrichment is required, the power piston spring overcomes the vacuum pull on the power piston and the tapered tip of the metering rods moves upward in the main metering jet orifice.

The smaller diameter of the metering rod tip allows more fuel to pass through the main metering jet and enrichen the fuel mixture to meet the added power requirements. As engine load decreases, the manifold vacuum rises and extra mixture enrichment is no longer needed. The higher vacuum pulls downward on the power piston against spring tension, which moves the larger diameter of the metering rod into the metering jet orifice returning the fuel mixture to normal economy ranges.

The primary side of the carburetor provides adequate air and fuel for low speed operation. However, at higher speed more air and fuel are needed to meet engine demands. The secondary side of the carburetor is used to provide extra air and fuel through the secondary throttle bores.

The secondary section of the Quadrojet has a separate and independent metering system. It consists of two large throttle valves connected by a shaft and linkage to the primary throttle shaft. Fuel metering is controlled by spring loaded air valves, metering orifice plates, secondary metering rods,
main fuel wells with bleed tubes, fuel discharge nozzles, accelerating wells and tubes. The secondary metering system supplements fuel flow from the primary side and operates as follows:

When the engine reaches a point where the primary bores cannot meet engine air and fuel demands, a lever on the primary throttle shaft through a connecting link to the secondary throttle shaft, begins to open the secondary throttle valves. As the secondary valves are opened, engine manifold vacuum (low pressure) is applied directly beneath the air valves. Atmospheric pressure on top of the air valves force the air valves open against spring tension and allows metered air to pass through the secondary bores of the carburetor.

On most models accelerating wells are used to supply fuel immediately to the secondary bores. This prevents a momentary leaness until fuel begins to feed from the secondary discharge nozzles.

When the air valves begin to open, the upper edge of each valve passes the accelerating well ports (one for each bore). As the edge of the air valves pass the ports, they are exposed to manifold vacuum and immediately feed fuel from the accelerating wells located on each side of the float bowl chamber. The accelerating ports will feed fuel until the fuel in the accelerating well is depleted. Each accelerating well has a calibrated orifice which meters the fuel supplied to the well from the float chamber. Some models have the accelerating well ports located beneath the front edge of the air valve instead of above. These begin to feed fuel to the secondary bores almost instantly after the secondary throttle valves open and before the air valves begin to open. This type porting is used on some models where added enrichment is needed during cold operation when the air valve is locked closed and also provides an earlier cut in of fuel from the ports than the models which have the port located above the valves. The use of either type of porting is dependent upon engine fuel demands.

The secondary main discharge nozzles (one for each bore) are located just below the center of the air valves, above the secondary throttle valves. The nozzles being located in a low pressure area feed fuel as follows:

As the secondary throttle valves are opened, atmospheric pressure opens the air valves. This rotates a plastic cam attached to the center of the air valve shaft. As the cam rotates it lifts the secondary metering rods out of the secondary orifice plates through the metering rod lever which follows rotation of the eccentric cam.

Fuel flows from the float chamber through the secondary metering orifice plates into the secondary main wells where it is mixed with air from the secondary main well tubes. The air emulsified fuel mixture travels from the main wells through the secondary discharge nozzles where it sprays into the secondary bores. Here the fuel is mixed with air traveling through the secondary bores to supplement the air/fuel mix-

ture delivered from the primary bores and goes on into the engine as a combustible mixture.

As the throttle valves are opened further and engine speeds increase, air flow through the secondary side increases and opens the air valve to a greater degree which in turn lifts the secondary metering rods further out of the orifice plates. The metering rods are tapered so that fuel flow through the secondary metering orifice plates is directly proportional to air flow through the secondary carburetor bores. In this manner, correct air/fuel mixtures through the secondary bores are controlled by the depth of the metering rods in the orifice plates.

The depth of the metering rods in the orifice plates in relation to air valve position are factory adjusted to meet air/fuel requirements for each specific engine model. A service setting is released should field adjustment become necessary due to parts replacement or malfunction in the field.

There are other features incorporated in the secondary metering system which are as follows:

1. The secondary main well air bleed tubes extend downward into the main fuel well below normal fuel level. These bleed air into the fuel in the secondary wells to quickly emulsify the fuel with air for good atomization and improved fuel flow from the secondary nozzles.

2. The secondary metering rods have a milled slot at the larger diameter of the metering tip. The purpose of the slots is to ensure an adequate supply of fuel in the secondary main wells when the air valves are in the closed position. At this point, the metering rods are nearly seated against the metering orifice plates. The slot in the rod is adjacent to the orifice plate and allows a small amount of fuel to pass between the metering rod and metering disc. During extreme hot engine idle or hot soak the fuel could boil out of the secondary fuel wells. The milled slot allows enough fuel to by-pass the orifice plate and keep the main fuel wells full of fuel. This insures adequate fuel supply in the main wells at all times to give immediate fuel delivery from the secondary discharge nozzles.

3. There are two baffle plates in each secondary bore located just below the air valves. They extend up and around the secondary discharge nozzles. Their purpose is to provide good fuel distribution at lower air flows by providing equal fuel distribution to all engine cylinders.

4. An air horn baffle is used on some models to prevent incoming air from the air cleaner reacting on the secondary main well bleed tubes.

The baffle is located adjacent to the secondary well bleed tubes and extends above the air horn between the primary and secondary bores. This prevents incoming air from forcing fuel level down in the secondary wells through the bleed tubes and prevents secondary nozzle lag on heavy acceleration.
There are two different type air valve dash pots used in the Quadrajet carburetor. Their primary purpose is to control the opening rate of the air valves and prevent secondary discharge nozzle lag. They also act as a dampener to prevent oscillation of the air valves due to engine pulsations.

The early type dash pot (Figure 6) consists of a piston which operates in a fuel well adjacent to the float bowl. The piston stem is connected to the air valve through a link and lever assembly. As the air valves open, the dash pot piston is pulled upward forcing fuel to flow between the side of the piston and fuel well which retards the air valve opening. A rubber washer attached to the piston stem acts as a check valve. During upward movement of the piston, the rubber washer seats and forces all fuel flow around the piston. When the air valve closes the check valve unseats and allows fuel to also pass through the center of the piston allowing the air valves to return closed rapidly.

The late type air valve dash pot (Figure 7) operates off of the choke vacuum break diaphragm unit. The secondary air valve is connected to the choke vacuum break unit by a rod, to control the opening rate of the air valve.

Whenever manifold vacuum is above approximately 5”-6” Hg, the vacuum break diaphragm is seated (plunger is fully inward) against spring tension. At this point, the vacuum break rod is in the forward end of the slot in the air valve lever and the air valves are closed.

During acceleration or heavy engine loads when the secondary throttle valves are opened, the manifold vacuum drops. The spring located in the vacuum break diaphragm overcomes the vacuum pull and forces the plunger and link outward which in turn, allows the air valves to open. The opening rate of the air valves is controlled by the calibrated restriction in the vacuum inlet in the diaphragm cover. This gives the dash pot action required to delay air valve opening enough for efficient fuel flow from the secondary discharge nozzles.
ACCELERATING PUMP SYSTEM

During quick acceleration, when the throttle is opened rapidly, the air flow and manifold vacuum change almost instantaneously. The fuel, which is heavier, tends to lag behind causing a momentary leanness. The accelerator pump is used to provide the extra fuel necessary for smooth operation during this time.

The accelerating pump system is located in the primary side of the carburetor. It consists of a spring loaded pump plunger and pump return spring, operating in a fuel well. The pump plunger is operated by a pump lever on the air horn which is connected directly to the throttle lever by a pump rod.

When the pump plunger moves upward in the pump well, as happens during throttle closing, fuel from the float bowl enters the pump well through a slot in the top of the pump well. It flows past the synthetic pump cup seal into the bottom of the pump well. The pump cup is a floating type. (The cup moves up and down on the pump plunger head). When the pump plunger is moved upward, the flat on the top of the cup unseats from the flat on the plunger head and allows free movement of fuel through the inside of the cup into the bottom of the pump well. This also vents any vapors which may be in the bottom of the pump well so that a solid charge of fuel can be maintained in the fuel well beneath the plunger head.

When the primary throttle valves are opened the connecting linkage forces the pump plunger downward. The pump cup seats instantly and fuel is forced through the pump discharge passage, where it unseats the pump discharge check ball and passes on through the passage to the pump jets located in the air horn where it sprays into the venturi area of each primary bore.

It should be noted the pump plunger is spring loaded. The upper duration spring is balanced with the bottom pump return spring so that a smooth sustained charge of fuel is delivered during acceleration.

The pump discharge check ball seats in the pump discharge passage during upward motion of the pump plunger so that air will not be drawn into the passage; otherwise, a momentary acceleration lag could result.

During high speed operation, a vacuum exists at the pump jets. A cavity just beyond the pump jets is vented to the top of the air horn, outside the carburetor bores. This acts as a suction breaker so that when the pump is not in operation fuel will not be pulled out of the pump jets into the venturi area. This insures a full pump stream when needed and prevents any fuel “pull over” from the pump discharge passage.
The Quadrajet choke valve is located in the primary side of the carburetor. It provides the correct air/fuel mixture enrichment to the engine for quick cold engine starting and during the warm-up period. The air valve is locked closed until the engine is thoroughly warm and choke valve is wide open.

The choke system consists of a choke valve located in the primary air horn bore, a vacuum diaphragm unit, fast idle cam, connecting linkage, air valve or secondary throttle valve lockout lever and a thermostatic coil. The thermostatic coil is located in the engine manifold and is connected by a rod to the intermediate choke shaft and lever assembly. Choke operation is controlled by the combination of intake manifold vacuum, the off-set choke valve, temperature, and throttle position.

The thermostatic coil located in the engine manifold is calibrated to hold the choke valve closed when the engine is cold.

NOTE: To close the choke valve, the primary throttle valves have to be opened to allow the fast idle cam follower to by-pass the steps on the fast idle cam and come to rest on the highest step of the fast idle cam.

When the choke valve is closed, the air valve lockout lever is weighted so that a tang on the lever catches the upper edge of the air valve and keeps the air valve closed.

During engine cranking, the choke valve is held closed by the tension of the thermostatic coil. This restricts air flow through the carburetor to provide a richer starting mixture.

Some late models use a cranking enrichment system. Two fuel feed holes located just beneath the choke valve supply added fuel for cold enrichment during the cranking period. The extra fuel is supplied through channels which lead to the secondary well bleed tubes and allow fuel to be drawn from the secondary main wells.

When the engine starts and is running, manifold vacuum applied to the vacuum diaphragm unit mounted on the float bowl opens the choke valve to a point where the engine will run without loading or stalling. Also at this point, the cold enrichment feed holes are no longer in a low pressure area so they cease to feed fuel. From this point on they will be used as secondary main well air bleed. At the same time, the fast idle cam follower lever on the end of the primary throttle shaft will drop from the highest step on the fast idle cam to a lower step when the throttle is opened. This gives the engine sufficient fast idle and correct fuel mixture for running until the engine begins to warm up and heat the thermostatic coil. As the thermostatic coil on the engine manifold becomes heated, it relaxes its tension and allows the choke valve to open further because of intake air pushing on the off-set choke valve. Choke valve opening continues until the thermostatic coil is completely relaxed at which point the choke valve is wide open.

When the engine is thoroughly warm, the choke coil pulls the intermediate choke lever completely down and allows the fast idle cam to rotate so that the cam follower drops off the
On some models, a secondary throttle valve lock-out is used in place of the air valve lock-out. The type design is used on applications where little or no air flow can be tolerated from the secondary throttle bores during engine warm up. On these applications, a lock-out lever located on the float bowl is weighted so that a tang on the lower end of the lever catches a lock pin on the secondary throttle shaft and holds the secondary throttle valves closed. As the engine warms up, the choke valve opens and the fast idle cam drops. When the engine is thoroughly warm, the choke valve is wide open and the fast idle cam drops down so the cam follower is completely off the stops of the cam. As the cam drops the last few degrees, it strikes the secondary lock-out lever and pushes it away from the secondary valve lock-out pin. This allows the secondary valves to open and operate as described under the power system.

Figure 10—Choke System—Model 4MC

**CHOKE SYSTEM — 4MC**

The Model 4MC choke system consists of a choke valve located in the primary air horn bore, a choke housing and vacuum diaphragm assembly, fast idle cam, connecting linkage, air valve lockout lever, and thermostatic coil. Choke operation is controlled by the combination of intake manifold vacuum, the offset choke valve, temperature, and throttle position.

The thermostatic coil is calibrated to hold the choke valve closed when the engine is cold.

NOTE: To close the choke valve, the primary throttle valves have to be partially opened to allow the fast idle cam follower to by-pass the stops on the fast idle cam and come to rest on the highest step of the fast idle cam.
the choke housing which, in turn, rotates the intermediate choke shaft and through connecting linkage opens the choke valve. At the same time, the fast idle cam follower lever on the end of the primary throttle shaft will drop from the highest step on the fast idle cam to the second step if the throttle is opened. This gives the engine sufficient fast idle and correct fuel mixture for running until the engine begins to warm up and heat the thermostatic coil. As the thermostatic coil becomes heated, it relaxes its tension and allows the choke valve to open further because of intake air pushing on the off-set choke valve. Choke valve opening continues until the thermostatic coil is completely relaxed and the choke valve is wide open.

During engine warm-up the choke coil rotates, forcing the intermediate choke shaft and lever clockwise. This allows the fast idle cam to rotate until the cam follower drops off the last step of the fast idle cam so the engine will run at normal idle speeds. When the choke moves toward the open position, the end of the choke rod strikes a tang on the air valve lock-out. As the choke rod moves to the end of its travel, it pushes the lock-out tang upward and unlocks the air valve.

The choke system is equipped with an unloader mechanism which is designed to partially open the choke valve, should the engine become loaded or flooded during the starting period. To unload the engine, the accelerator pedal should be depressed so that the throttle valves are held wide open. A tang on a lever on the choke side of the primary throttle shaft contacts the fast idle cam and through the intermediate choke shaft forces the choke valve slightly open. This allows extra air to enter the carburetor bores and pass on into the engine manifold and engine cylinders to lean out the fuel mixture so that the engine will start.

MAJOR SERVICE OPERATIONS
ALL MODELS

Disassembly, Cleaning, Inspection and Adjustments

The following disassembly and assembly procedures may vary somewhat between applications due to specific design features. However, they will basically pertain to all Quadrajet models.

Disassembly:

NOTE: Place carburetor on proper holding fixture.

Figure 11

AIR HORN REMOVAL – (Figure 11)

1. Remove idle vent valve attaching screw; then remove idle vent valve assembly. If thermostatic vent valve is used, remove dust cover then remove valve. Care should be used not to bend or distort the bi-metal strip.
2. Remove clip from upper end of choke rod, disconnect upper end of choke rod from upper choke shaft lever. Remove choke rod from lower choke lever in bowl by working choke rod “up and down” until lower end of rod is free from lever.
3. Remove clip from upper end of pump rod; then disconnect pump rod from pump lever. Wire vent valve lever can be removed from pump lever if replacement is necessary.
4. On 1967 and later models remove the vacuum break rod from vacuum diaphragm plunger by removing retaining clip. Remove other end of rod from air valve shaft lever.
5. Remove secondary metering rods by removing small screw at top of metering rod holder. Remove rod holder and rods by lifting straight upward out of air horn. Now remove secondary rods from rod holder by sliding end of each rod out of holder.
6. Remove (9) air horn to float bowl attaching screws. Two counter-sunk screws are located inside air horn bore next to the primary venturi. Note: Some Chevrolet models have a secondary baffle plate which is mounted under the two center air horn attaching screws next to the secondary bores. This can also be removed at this time. Others have a choke lock-out lever shield located over the lock-out lever. This is held in position by the air horn screw next to the lock-out lever. Check the parts bulletin for correct usage of these extra parts.
7. Remove air horn by lifting straight up. Air horn gasket should remain on bowl for removal later.

CAUTION: Place air horn inverted on clean bench. Care must be taken not to bend two small secondary main well air bleed tubes and accelerating well tubes (where used). These small tubes protrude from air horn casting and are permanently pressed in place. Do not remove.

![Figure 12](image)

AIR HORN DISASSEMBLY — (Figure 12)
1. (Early Models) Remove end of dash pot plunger rod from air valve lever. Some slide out of lever and others are held by a retaining clip. The dash pot piston has a synthetic seal inside the piston on the plunger shaft. This should not be immersed in carburetor cleaner as the seal will be destroyed. Clean in a stoddard solvent or kerosene.

Note: Further disassembly of the air horn is not required for cleaning purposes. If part replacement is required, proceed as follows.
2. Remove (2) choke valve attaching screws. Then remove choke valve and shaft.
3. Remove pump lever roll pin and remove pump lever.
4. If the air horn is equipped with the air valve lockout and it needs replacement, remove the lockout lever by driving out roll pin with small drift punch.
5. If the air valve spring or secondary metering rod cam needs replacement, a repair kit is available. To replace these parts proceed as follows:
   A. Remove air valve spring fulcrum pin lock screw.
   B. Remove air valve spring fulcrum pin from casting.
   C. Remove air valve spring.
   D. Remove (4) air valve attaching screws and remove valves from shaft.
   E. Remove air valve shaft by sliding out of air horn casting. Then plastic metering rod cam can be removed.

No further disassembly of the air horn is required.

![Figure 13](image)

FLOAT BOWL DISASSEMBLY — (Figure 13)
1. Remove pump plunger from pump well.
2. Remove air horn gasket from dowels on secondary side of bowl, then remove gasket from around power piston and primary metering rods.
3. Remove pump return spring from pump well.
4. Remove plastic filler block over float valve.
5. Remove power piston and primary metering rods as an assembly. There are four different type power piston retainers used. See Figure 14.

![Figure 14](image)

A. The first design has a "button head" pin extension pressed into the base of the power piston. This type power piston is held in place by the "button head" which protrudes through a hole in the throttle body gasket. The power piston can be removed by using needle nose pliers to pull straight up on metering rod hanger directly over power piston.

B. The second type power piston retainer is a flat brass spring clip which fits around the power piston, at the center. This type power piston assembly is removed in the same manner as above.
C. The third type power piston retainer is a spring clip which fits over and around the top of the power piston cavity. Two fingers at the top of clip hold the piston down in cavity. This type power piston can be removed by pushing upward on clip retainer to disengage from casting.

D. The fourth power piston retainer is a plastic retainer which is part of the power piston assembly. The plastic retainer fits in a recess at the top of the power piston cavity. The power piston with the plastic retainer can be removed by pushing downward against spring tension and allowing the piston to snap back against the retainer until it “pops” out of casting.

6. Remove primary metering rods from power piston by disconnecting tension spring loops from top of each rod. Then rotate each metering rod to remove from hanger. CAUTION: Use care when disassembling rods to prevent distortion of tension spring and/or metering rods.

7. Remove power piston spring from power piston cavity.

8. FLOAT ASSEMBLY REMOVAL:
   A. DIAPHRAGM TYPE – Figure 15
   1. Remove float assembly by pulling upward on hinge pin. Float needle and hinge pin can now be removed from float hanger by sliding toward pump well. After pin is removed, slide float assembly toward front of bowl to disengage needle pull clip from float arm. Do not distort float needle pull clip.
   2. Using needle nosed pliers, remove pull clip from float needle.
   3. Remove two screws from float needle diaphragm retainer; then remove retainer and float needle assembly from bowl. Figure 16. CAUTION: Needle seat is factory staked and tested. Do not attempt to remove or reseat. If damaged, replace float bowl assembly.

B. STANDARD TYPE NEEDLE AND SEAT – Figure 17
   1. Remove float assembly by pulling upward on hinge pin. Float needle and hinge pin can now be removed from float assembly.
   2. Remove float needle seat and gasket from float bowl using tool BT-3006. NOTE: Float needle and seat are factory matched and tested and should be replaced as a set.

9. Remove primary main metering jets. No attempt should be made to remove secondary metering discs. Normal cleaning is all that is necessary.

10. Remove pump discharge check ball retainer and steel check ball.

11. The baffle plate in secondary bores need not be removed for cleaning purposes. It can be removed for replacement by lifting straight upward, out of slots in side of bores.
CHOKE DISASSEMBLY

A. 4MV MODELS — Figure 18
1. Remove vacuum hose from vacuum break diaphragm unit and from tube connection on bowl.
2. Remove retaining screw from choke bracket assembly and remove assembly from float bowl.
3. Remove secondary lockout lever or idle speed-up lever from projection on bowl casting (where used).
4. Slide fast idle cam off from bushing on choke bracket.

NOTE: If further disassembly of the choke is necessary, the vacuum diaphragm unit can be removed as follows:
   a) (Early Models) Remove clip on connecting link at vacuum break lever. Then remove link from lever and vacuum diaphragm plunger.
   b) (All Models) Spread the retaining ears on bracket next to vacuum diaphragm. Then slide vacuum diaphragm assembly out of bracket.

B. 4MC MODELS — Figure 19
1. Remove (3) choke cover and coil retaining screws and clips. Then remove cover and coil assembly and inside baffle plate from choke housing.
2. Remove attaching screw from inside choke housing. Then remove choke housing assembly from float bowl. Remove vacuum passage gasket between choke housing and float bowl.
3. Remove fast idle cam from choke housing.
   CAUTION: Do not place vacuum break diaphragm assembly in carburetor cleaner.
4. Remove lower choke rod actuating lever from cavity at side of float bowl.
5. Remove hot idle compensator (where used) by removing two screws in compensator cover at rear of float bowl. Remove cover, hot idle compensator and "O" ring seal in bowl cavity recess beneath compensator.
6. Remove fuel inlet filter nut, gasket, filter, and spring. Some models use a filter screen with no pressure relief spring. Consult parts list for each particular model — for proper parts application.
7. Remove throttle body from float bowl by removing (3) attaching screws.
8. Remove throttle body to bowl insulator gasket.

THROTTLE BODY DISASSEMBLY — Figure 20
1. Remove pump rod from throttle lever by rotating rod out of primary throttle lever.
2. Remove (2) idle mixture screws and springs.
3. The fast idle lever and fast idle cam follower lever can be removed for replacement by removing attaching screw at end of primary throttle shaft.
   Note: Some models have a torsion spring which ties the two levers together. Make sure to check spring location for ease in reassembly.
Cleaning and Inspection

NOTE: The carburetor should be cleaned in a cold immersion type cleaner.
1. Thoroughly clean carburetor castings and metal parts in an approved carburetor cleaner such as Carbon X (X-55) or its equivalent.

CAUTION: Any rubber parts, plastic parts, diaphragms, pump plungers, should not be immersed in carburetor cleaner. However, the plastic cam on the air valve shaft will withstand normal cleaning in carburetor cleaner. It should be rinsed thoroughly after cleaning.
2. Blow out all passages in castings with compressed air. Do not pass drills or wire through jets or passages.
3. Inspect idle mixture needles for ridges, burrs, or being bent.
4. Examine float needle and seat and diaphragm (where used) for wear. Replace parts as needed with factory matched set.
5. Inspect float assembly for bent float arms, or damaged float.
6. Inspect gasket mating surfaces on castings for damage to sealing beads and nicks or burrs.
7. Inspect holes in levers for excessive wear or out-of-round conditions. If worn, levers should be replaced.
8. Examine fast idle cam for wear or damage.
9. Check air valve for bends and damage. If air valve is damaged, the air horn assembly must be replaced. A torsion spring kit is available for repairs to air valve closing spring. A new plastic secondary metering rod cam is included in kit.
10. Check throttle levers and valves for bends or other damage.
11. Check all diaphragms for possible ruptures or leaks.
12. Clean or replace fuel inlet filter or screen.
13. Inspect metering rods and jets for wear or damage.

Assembly and Adjustment Procedures

THROTTLE BODY ASSEMBLY – (Figure 20)
1. Install fast idle cam follower, fast idle lever on end of primary throttle shaft. Install torsion spring (where used), and retaining screw in end of shaft. Tighten securely.
2. Install (2) idle mixture needles and springs until lightly seated. Back out mixture needles 1-1/2 turn as initial adjustment.
3. Install pump rod into hole in throttle lever. End of rod points outward away from casting.

FLOAT BOWL ASSEMBLY – (Refer to Figures 15, 16, 17)
1. Install new throttle body to bowl insulator gasket making sure the gasket is properly positioned on two locating dowels on bottom of float bowl.
2. Install throttle body making certain throttle body is properly located over dowels on float bowl. Install three throttle body to bowl screws and tighten evenly and securely.
3. Place carburetor on proper holding fixture.
4. Install fuel inlet filter spring, filter, new gasket, and inlet nut. Tighten securely. The filter spring is not used on models which have a fuel inlet screen.
5. Install hot idle compensator O-ring seal in recess in bowl; then carefully install compensator over gasket. Install compensator cover and two retaining screws. Tighten securely. Some models do not use the hot idle compensator. Consult parts list for proper usage.

4MV CHOKE ASSEMBLY
6. Install vacuum break diaphragm (if removed from bracket) by sliding between two retaining ears on choke bracket. Vacuum nipple on unit points toward float bowl. Pinch two ends of retaining ears together to retain diaphragm unit.
(Early Models) Install vacuum break link (U-Bend end) in slot in diaphragm plunger. End of link should be on inside of slot towards choke bracket. Install other end of vacuum break link in hole on vacuum break lever and retain with clip.
7. Install fast idle cam on choke bracket. Be sure fast idle cam actuating pin on intermediate choke shaft is located in slot in fast idle cam.
Install secondary lock-out lever or idle speed up lever on projection on float bowl (where used), before installing choke bracket assembly.

Figure 21

ASSEMBLY OF CHOKE TO BOWL – 4MV – Figure 21
8. Install small inside choke lever to plain end of choke rod. Then holding choke rod and lever assembly with upper grooved end of rod pointing toward carburetor bores, lower lever into the float bowl cavity, aligning large hole in lever with hole in side of float bowl casting. While holding lever in this position, install choke assembly engaging shaft with hole in inside choke lever. Install choke bracket retaining screw and tighten securely. Remove choke rod from lever for installation later.
9. Install vacuum hose to tube connection on bowl and vacuum break diaphragm assembly.
ASSEMBLY OF CHOKe TO BOWL - MODEL 4MC
10. Install choke housing using steps (8). Make sure small
gasket is installed on vacuum passage between choke
housing and float bowl. Install retaining screw and
tighten securely.
11. Choke inside baffle, cover, and coil can be installed later
after inside choke adjustments are made.
12. Install deflector in secondary bores of float bowl.
Notches in deflector should be towards top. Make sure
deflector is seated and top is flush with casting surface.
13. Install pump discharge check ball and retainer in passage
next to pump well.

DIAPHRAGM TYPE NEEDLE INSTALLATION – (Refer to
Figures 15 and 16)
15. Install float needle and diaphragm assembly. Make sure
diaphragm is properly seated before installing retainer.
Install diaphragm retainer and two screws. Tighten
securely.
16. Install float needle pull clip on float needle stem using
needle nosed pliers. Pull clip is properly positioned with
open end towards front of bowl.
17. Install float by sliding float lever into loop in pull clip.
With lever in clip, hold float assembly at toe and install
float hinge pin from pump well side. Be careful not to
bend needle pull clip.

INSTALLATION OF STANDARD FLOAT NEEDLE AND
SEAT – (Refer to Figures 14 and 17)
18. Install float needle seat and gasket. Tighten securely.
19. Install float hinge pin in float arm; open end of hinge pin
points toward pump well.
20. Install float needle and pull clip on end of float arm.
Needle pull clip should be installed so that it hooks over
top of float arm. See Figure 2. Do not place pull clip
through small holes in top of float arm. Severe flooding
will result.
21. Lower float assembly into float bowl making sure needle
center float needle seat and float hinge pin seats in
grooves in bowl casting. Upper loop on float hinge pin
should be above bowl casting surface (minimum .015” at
highest point) for proper retention.
22. FLOAT LEVEL ADJUSTMENT – Figure 22
a) With adjustable “T” scale measure the distance from
top of float bowl surface (gasket removed) to top of
float at toe (locate gauging point 1/16” back from
toe on float surface). Do not gauge on top of part
number.
NOTE: When checking adjustment make sure float
hinge pin is firmly seated and the float arm is held
down against float needle so that it is seated.
b) Bend float pontoon up or down at point shown, to
adjust.

Figure 22

23. Install power piston spring in power piston well. If the
primary metering rods were removed from hanger, re-
install making sure the tension spring is hooked over the
top end of each metering rod. Install power piston
assembly in well with metering rods carefully positioned
in metering jets. Press down firmly on power piston to
insure engagement of retaining pin in throttle body
gasket.

NOTE:
a) Some later models use a spring clip over top of
power piston well. On these, make sure clip is in-
stalled and seated.
b) On those which have a split ring retainer around the
center of the power piston, carefully compress split
ring and push piston down in well until it seats. This
properly positions this type retainer.
c) On late models which use the plastic retainer on the
top of the power piston, install power piston in well
and force plastic retainer into cavity until the edge
is flush with top of casting.
24. Install plastic filler block over float needle; press down-
ward until seated.
25. Install pump return spring into pump well.
26. Install air horn gasket around primary metering rods and
piston. Position gaskets over two dowels on secondary
side of float bowl.
27. Install pump plunger in pump well.

AIR HORN ASSEMBLY – (Refer to Figure 12)
1. Install the following - if removed:
a) Pump lever - retain with roll pin.
b) Dash pot plunger rod through air horn and attach to
air valve lever. Make sure clip retainer is installed
(where used).
c) Air valve lockout lever (where used) - retain will roll
pin. Make sure lever is free from binds.
d) Choke shaft, choke valve, and two attaching screws -
tighten and stake choke valve screws.
e) If it was necessary to replace the air valve closing spring and the air valve shaft was removed, install air valve shaft, plastic cam, air valves, and (4) attaching screws. Center air valves, tighten screws and stake in place. Make sure air valve operates freely with no binds. Then install air valve closing spring in air horn cavity. Insert spring pin, adjust air valve closing spring as outlined under adjustment procedures.

**Figure 23**

AIR HORNS TO BOWL INSTALLATION — Figure 23

2. Carefully place air horn assembly on float bowl, aligning secondary well bleed tubes and accelerating well tubes with proper holes in air horn gasket. Position pump plunger stem with hole in air horn and dash pot (where used) in well in float bowl. Gently lower air horn assembly until seated on gasket.

3. Install (9) air horn to float bowl attaching screws. Two long screws go through secondary side of air horn at rear and two counter-sunk screws inside primary bores next to venturi. Tighten all screws evenly and securely — in sequence as shown in Figure 24.

**Figure 24**

FINAL ASSEMBLY — (Refer to Figure 11)

4. Install idle vent actuating wire into pump lever.

5. Install upper end of pump rod into specified hole in pump lever. Retain with spring clip.

6. Install choke rod into lower inside lever in float bowl cavity. Connect upper end to choke shaft lever and retain with clip.

7. Install idle vent valve on locating pins after engaging with actuating wire. Install attaching screw and tighten securely.

NOTE: Some later models use a thermostatically controlled idle vent valve. On these, install the thermostatic bi-metal strip first then the spring arm on top of the bi-metal strip. Then install attaching screw. Install dust cover under air horn screw.

8. (Late Models) Install end of combination vacuum break and air valve dash pot rod into lever on end of air valve shaft. End of rod goes inward towards air valves — connect other end of rod to choke diaphragm plunger. Retain with clip.

9. Install secondary metering rods into metering rod holder. End of rods point inward, towards each other.

10. Carefully lower secondary rods through holes in air horn into secondary main metering orifice plates. Holder will then seat on secondary metering rod actuating lever. Install retaining screw and tighten securely. Open and close air valve to check for any binds.

**Figure 25**

PUMP ROD ADJUSTMENT — Figure 25

To check this adjustment the primary throttle valves must be completely closed. Back out idle stop screw on bowl away from stop tang on throttle lever. Disconnect end of secondary throttle valve actuating rod from primary throttle lever. Some models do not have an attaching clip so it will be necessary to bend the secondary throttle closing tang away from primary lever. The closing tang must then be readjusted after pump adjustment.

With throttle valves completely closed and pump rod in specified hole in pump lever, measure the distance from top of choke valve wall, next to vent stack, to top of pump stem with adjustable T-scale. Dimension should be as specified. Bend the pump lever as shown to adjust.
Figure 26

**IDLE VENT VALVE ADJUSTMENT** — Figure 26

After pump rod adjustment has been made, open the primary throttle to a point where the vent valve just closes.

With the adjustable T-scale, measure the distance from the top of the choke valve wall, next to vent stack, to top of pump plunger stem. Bend the vent valve actuating wire until vent valve just closes at the dimension specified.

Figure 27

**IDLE VENT VALVE ADJUSTMENT (Thermostatic Type)** — Figure 27

Some later models have a thermostatically operated idle vent valve. When adjusting this type valve, use the following procedure.

After the pump rod adjustment has been made, hold the vent valve closed and open primary throttle to a point where the vent valve arm just contacts the bi-metal strip next to the rubber valve.

With adjustable T-scale, measure the distance from the top of the choke valve wall next to vent stack to top of pump plunger stem. Bend the vent valve actuating wire as shown to obtain specified setting dimension.

**AIR VALVE ADJUSTMENT** (Early models only) — Figure 28

To check adjustment, hold air valve wide open against stop tang. Measure the distance between upper inside edge of air valve and the back side of choke valve wall on torsion spring side, as shown. Dimension should be as specified. Bend the top tang on dash pot lever as shown, to adjust.

Figure 29

**FAST IDLE ADJUSTMENT** — Figure 29

(This is a preliminary setting only, reset fast idle to correct R.P.M. setting on car).

Place fast idle cam follower on highest step of fast idle cam. Back out fast idle screw until the primary throttle valves are completely closed and cam follower is away from highest step of cam. Then turn fast idle screw inward until the cam follower just contacts highest step of cam; from this point, turn screw two more complete turns. This preset the fast idle screw so that the following choke settings can be made accurately.

Figure 30
CHOKe ROD ADJUSTMENT (Models 4MV and 4MC) – Figure 30
With the fast idle adjustment made, place the fast idle cam follower on the second step of the fast idle cam and against the rise to the highest step. Rotate the choke valve towards closed choke by pushing counter-clockwise on the vacuum break lever (model 4MV) or thermostatic coil tang in choke housing (model 4MC).

Measure the dimension with plug gauge between the lower edge of choke valve, at choke lever end and inside air horn wall.

To adjust, bend the choke rod at the point shown.

VACUUM BREAK ADJUSTMENT – Figure 31 – Model 4MV (Early models without air valve dash pot combination).
Some early models use a torsion spring to delay choke opening. On these units make sure tail of spring is located in top notch on choke bracket before adjustment.
To adjust the vacuum break, proceed as follows:
1. Place fast idle cam follower on highest step of fast idle cam.
2. Using vacuum source, connect to vacuum break diaphragm and seat diaphragm.
3. Using light finger pressure, rotate vacuum break lever towards closed choke. (Do not stretch tension spring on Oldsmobile models as vacuum break link must stay in the end of slot away from diaphragm unit for proper adjustment). With the vacuum break lever held in this position, use specified plug gauge and insert between lower edge of choke valve and air horn wall (choke side).
4. To adjust to specified dimension, bend the vacuum break link at point shown. Use care to prevent distortion of vacuum break lever and fast idle cam pick-up pin. If small pick-up pin is bent, the choke bracket will have to be replaced.

VACUUM BREAK ADJUSTMENT – Figure 32 – Model 4MC (Choke Housing on Bowl).
With choke cover and coil assembly and inside baffle plate removed, make the vacuum break adjustment as follows:

Step – “A”
1. Place fast idle cam follower on highest step of fast idle cam.
2. Rotate choke coil lever inside choke housing until choke valve is completely closed.
3. Align choke coil pick-up tang on inside choke lever directly over index tab on inside of choke housing. If alignment is necessary, bend lever sideways at point shown.
4. After coil tang is aligned, adjust vacuum break tang to specified clearance between tang and vacuum break pin – choke valve held closed as in step 2. Bend vacuum break tang at point shown to obtain specified clearance.

Step – “B”
1. Hold vacuum break diaphragm adjustment screw down against diaphragm cover and vacuum break tang on inside choke lever against diaphragm plunger pin.
2. Measure the distance between lower edge of choke valve and inside air horn wall (choke lever side) with plug gauge.
3. Make sure choke rod is in bottom of slot in choke shaft lever.
4. Turn adjustment screw on plunger in or out to obtain specified clearance.

After adjustment, install inside baffle plate and choke cover and coil. Make sure end of choke coil is located in slot on inside coil lever. Install (3) retaining clips and screws loosely. Adjust choke cover to specified mark on choke housing. Choke valve should be lightly closed at 75°.
AIR VALVE – DASHPOT ADJUSTMENT – 1967 and later models – Figure 33
1. Seat vacuum break diaphragm using outside vacuum source.
2. With air valve completely closed and diaphragm seated, measure clearance between air valve dash pot rod and air valve lever, as shown.
3. Dimension should be as specified. If not, bend rod at air valve end as shown, to adjust.

VACUUM BREAK ADJUSTMENT – 1967 and later models – Figure 34
1. Seat vacuum break diaphragm using outside vacuum source.
2. Rotate vacuum break lever counter-clockwise toward closed choke until vacuum break tang contacts off-set in vacuum break dash pot rod.
3. With choke rod in bottom of slot in choke lever, measure distance between lower edge of choke valve and inside air horn wall (choke lever side). This can be done by attaching a rubber band or spring to the vacuum break lever and a stationary part of the carburetor.
4. Bend vacuum break tang at point shown, to adjust.

SPLIT CHOKE SPRING ADJUSTMENT – Figure 35 – 4MV (Early models)
1. Partially open primary throttle valves so that fast idle cam follower clears steps on fast idle cam.
2. Rotate vacuum break lever towards closed choke until tang on lever and spring stop tang on bracket just contact end of split choke spring.

UNLOADER ADJUSTMENT – Figure 36 – (All models)
Open the primary throttle valves so that the fast idle cam follower will clear steps on fast idle cam.
1. Hold the choke valve in the closed position. This can be done by attaching a rubber band or spring to the vacuum break lever and a stationary part of the carburetor.
2. Open primary throttle valves to the wide open position.
3. Insert specified plug gauge between lower edge of choke valve and inside air horn wall. If upper choke lever is slotted, choke rod should be in bottom of slot when checking setting.
4. To adjust, bend tang on fast idle lever, as shown.
NOTE: It is advisable to recheck the unloader setting after the carburetor is installed on the engine by depressing the accelerator pedal. Full throttle and correct unloader on the vehicle ensures that there is full accelerator pedal travel.
AIR VALVE LOCKOUT ADJUSTMENT — Figure 37
1. Rotate vacuum break lever clockwise until choke valve is wide open. If upper choke lever is slotted, the rod must be in upper end of slot.
2. Open air valve slightly so that edge of air valve is opposite tang on lockout lever, as shown.
3. Measure distance between tang on lockout lever and edge of air valve. Dimension should be as specified.
4. To adjust, bend the upper end of lockout lever, as shown.

Close choke valve after adjustment to make sure lower edge of lockout lever clears top edge of air valve for proper locking during choke operation. If the lockout lever does not swing over top edge of air valve make sure air valve is properly seated. If it is, file the top edge of valve for clearance.

SECONDARY THROTTLE VALVE LOCKOUT ADJUSTMENT — Figure 38
1. Opening Clearance
   Hold choke valve wide open by rotating vacuum break lever toward open choke (clockwise). With secondary throttle valve held partially open measure the clearance between lockout pin and toe of lockout lever, as shown. Bend lockout lever at point shown, to adjust.
2. Secondary Lockout-pin side clearance
   With choke valve and secondary throttle valve fully closed, bend lockout pin at point shown to maintain specified side clearance between side of lockout pin and lockout lever.

SECONDARY THROTTLE OPENING ADJUSTMENT — Figure 39
For correct opening of the secondary throttle valves, the following adjustments should be checked.

2 point pick-up
1. Open primary throttle valves until actuating link contacts top of tang on secondary lever. With the valves in this position, the bottom of the link should be in the center of the slot of the secondary lever.
3 point pick-up
3. 3 point pick-up should have .070 clearance, as indicated.

2. Bend tang on secondary lever, at point shown, to adjust.

SECONDARY THROTTLE CLOSING ADJUSTMENT — Figure 40
To ensure proper closing of the secondary throttle valves, the closing adjustment can be made as follows:
1. Set carb idle screw to recommended RPM, making sure cam follower is not resting on the fast idle cam.
2. There should be .020 clearance between actuating link and front of slot in secondary lever when tang of actuating lever on primary shaft is against pin.
3. Bend tang on primary actuating lever, if necessary, to adjust.
SECONDARY METERING ROD ADJUSTMENT — Figure 41

NOTE: Make sure air valves are completely closed.

To check the secondary metering rod adjustment, measure from the top of the metering rod to the top of the air horn casting next to air cleaner stud hole, dimension should be as specified.

To adjust, bend metering rod hanger at point shown. Make sure both rods are adjusted to the same dimension.

CHoke Coil Rod ADJUSTMENT — Figure 43

Disconnect choke coil rod from vacuum break lever. Open primary throttle valves so that fast idle cam follower will clear steps of fast idle cam. Then rotate vacuum break lever counter-clockwise until choke valve is completely closed.

(Upper end of choke rod must be in bottom of slot if upper choke lever has a slotted hole.)

To adjust choke coil rod, push or pull rod until it hits stop in choke coil housing. Then bend rod so that it just fits into specified notch in vacuum break lever. Then attach rod to hole in lever. Attach retaining clip (if used).

NOTE: On levers which do not have an adjustment notch for the choke coil rod, adjust as follows: Figure 44.

With choke valve completely closed and coil rod against the stop in choke coil housing, the upper end of rod should just enter hole in vacuum break lever. From this point bend the coil rod so that it goes one diameter beyond the hole to give the choke valve this extra closing pressure. On some models where the choke coil rod is attached to the opposite (left) side of shaft on the vacuum break lever, the coil rod should be shortened one hole diameter to give choke valve extra closing pressure.

AIR VALVE CLOSING SPRING ADJUSTMENT — Figure 42

To adjust the air valve spring wind-up, loosen locknut (Allen screw) and turn spring fulcrum pin counter-clockwise to remove all spring tension. With air valve closed, turn fulcrum pin clockwise the specified number of turns after loop on the torsion spring contacts pin on shaft. Hold adjusting screw in this position, tighten locknut.

COMPLETE MANUALS, CARBURETOR TOOLS AND GAUGES ARE AVAILABLE THROUGH UNITED DELCO DISTRIBUTORS
## 4 MV DIAGNOSIS CHART

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