IMPORTANT SAFETY NOTICE

Proper service and repair is important to the safe, reliable operation of all motor vehicles. The procedures recommended by Rochester Products Division of General Motors and described in this service manual are effective methods of performing service operations. Some of these service operations require the use of tools specially designed for the purpose. The special tools should be used when and as recommended.

It is important to note that this manual contains various CAUTIONS and NOTICES which should be carefully read in order to minimize the risk of personal injury to service personnel or the possibility that improper service methods will be followed which may damage the vehicle or render it unsafe. It is also important to understand that these Cautions and Notices are not exhaustive. Rochester Products could not possibly know, evaluate and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way. Consequently, Rochester Products has not undertaken any such broad evaluation. Accordingly, anyone who uses a service procedure or tool which is not recommended by Rochester Products must first satisfy himself thoroughly that neither his safety nor vehicle safety will be jeopardized by the service method he selects.

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NOTE: USE THIS MANUAL PLUS SECTIONS 9D-5A & 9D-5S FOR COMPLETE SERVICE INSTRUCTIONS.

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MODEL E4ME-E4MC CARBURETORS

The E4M series Quadrajet carburetors, used with the Computer Command Control (CCC)* system, are electronically controlled, four barrel, two stage units of downdraft design. The first letter "E" in the model designation means the carburetor is "electronically controlled", and the last letter means the carburetor uses an electric choke (Figure 1) or hot air choke (Figure 2).

The Quadrajet carburetor has two stages in operation. Each stage operates to provide a blend of exhaust emission control and responsive engine performance. The primary side of the carburetor (fuel inlet) has two small bores. Each bore contains a triple venturi arrangement equipped with a plain tube nozzle. The triple venturi, plus the small bores, provides excellent fuel atomization and delivery in the off-idle and part throttle ranges of engine operation.

The E4M series carburetors differ from the conventional M4M carburetors (See Bulletin 9D-5 for description) in that the primary side of the carburetor includes special design features for optimum air/fuel mixture control during all ranges of engine operation. An electrically operated mixture control (M/C) solenoid, mounted in the float bowl, is used to control air and fuel metered to the idle and main metering systems of the carburetor.

Fuel metering is controlled by (2) special stepped metering rods, operating in the primary jets, positioned by a spring-loaded plunger located in the mixture control solenoid.

The plunger in the solenoid is controlled (or "pulsed") by an electrical signal received from the Electronic

*Formerly termed Computer Controlled Catalytic Converter (C-4)

CONTROL MODULE (ECM) — a small "on-board" computer (Figure 3).

The purpose of the Computer Command Control system is to provide, as near as possible, the most ideal air/fuel mixture ratios for best efficiency of the catalytic converter for exhaust emission control and good vehicle driveability under all engine operating conditions.

An oxygen sensor (O₂ sensor) in the exhaust provides "feed-back" information in the form of electrical signals to the ECM as to the oxygen content in the exhaust. As oxygen content increases (indicating a lean mixture), voltage falls and the ECM de-energizes the mixture control solenoid at which point the spring-loaded plunger
and metering rods move to the up (rich) position. As oxygen content in the exhaust decreases (indicating a rich mixture), voltage rises and the ECM energizes the mixture control solenoid to pull the plunger and metering rods down against spring tension to the lean position. At the same time, air metering to the idle system is controlled by an idle air bleed valve, located in the air horn. The valve follows movement of the mixture control solenoid plunger to control the amount of air bled into the idle system to lean or enrich the idle and off-idle fuel mixtures.

The movement (or “cycling”) of the solenoid plunger, down (lean) and up (rich), occurs ten times per second to blend rich and lean pulses for precise control of air and fuel mixtures. When burned during combustion, these mixtures reach the oxygen sensor in the exhaust where the cycle of measuring the amount of oxygen in the exhaust gases starts all over again. This is often referred to as “Closed Loop” operation.

The term “Open Loop” operation is also used to indicate that even though “feed-back” information is continually furnished by the oxygen sensor to the ECM (once the sensor has warmed sufficiently), other inputs (such as coolant temperature sensor, throttle position sensor, etc.) are used to modify the ECM control signal (at ten times per second) to the M/C solenoid plunger in the carburetor for good idle and driveability under all operating conditions.

A Throttle Position Sensor (TPS), mounted in the float bowl, is used to electrically signal the Electronic Control Module (ECM) various throttle position changes as they occur (See Main Metering System, page 7, for description of operation).

The secondary side of the Quadrajet has two large secondary bores. This increased area, when combined with that of the primary side of the carburetor, provides an air delivery capacity that can satisfy a broad range of engine operating conditions.

An air valve, positioned above the secondary bores, controls the fuel delivery for high demand conditions. This secondary air valve is connected mechanically to a pair of secondary metering rods that are tapered and suspended within a pair of fuel metering orifices in the bowl. The fuel, passing through these secondary orifices, is directed to the secondary discharge nozzles located at the top of the secondary bores and below the air valves.

The fuel flow through the nozzles is thereby controlled in direct proportion to air flowing through the secondary bores. The degree of air valve opening is determined by engine requirements and is set at the factory.

The carburetor has internally balanced venting through two (2) “D” shaped vent holes cast in the air horn (next to the idle air bleed valve), and a vent slot in the air horn, which are located directly over the float chamber (See Float System for description of fuel chamber venting).

Other features include an aluminum throttle body for decreased weight and improved heat distribution, plus a thick throttle body to bowl insulator gasket to reduce heat transfer to the float bowl.

Depending on application, an Idle Speed Control (ISC) is mounted on the float bowl (Figure 1) to control normal curb idle speed and to act as a throttle closing “dashpot”. THE NORMAL CURB IDLE SPEED IS PROGRAMMED INTO THE ECM AND NO ADJUSTMENTS SHOULD BE MADE. Curb idle speed is controlled by the ISC plunger which changes the carburetor throttle angle by acting as a moveable throttle stop. The ECM monitors idle speed and moves the throttle stop (ISC plunger) to maintain the desired idle speed required for the particular operating condition. For example, signal inputs to the ECM for transmission gear, air conditioning compressor clutch (engaged or not engaged), and throttle open or close are used to either increase or decrease throttle angle in response to these particular engine loadings. An integral part of the ISC is the throttle switch. Position of the switch determines whether or not the ISC should control idle speed. When the throttle lever is resting against the ISC plunger, the switch contacts are closed at which time the ECM moves the ISC plunger to the programmed idle speed. When the throttle lever is not contacting the ISC plunger, the switch contacts are open and the ECM stops sending idle speed commands and the driver controls engine speed.

On some E4MC models, an Idle Load Compensator (ILC) is used instead of an Idle Speed Control (ISC) (Figure 2). The ILC uses manifold vacuum to sense changes in engine load (for example, A/C compressor engaged) and compensates by adjusting throttle angle for curb idle speed. The ILC uses a spring-loaded vacuum-sensitive diaphragm whose plunger either extends (vacuum decrease) or retracts (vacuum increase) to adjust throttle angle for curb idle speeds.

**NOTICE: THE IDLE SPEED CONTROL (ISC) AND IDLE LOAD COMPENSATOR (ILC) ARE ADJUSTED AT THE FACTORY. A SPECIAL PLUNGER HEAD Requires USE OF A SPECIAL TOOL TO TURN TO DISCOURAGE READJUSTMENT IN THE FIELD. NO ATTEMPT SHOULD BE MADE TO ADJUST THE ISC OR ILC UNLESS, IN DIAGNOSIS. IDLE SPEEDS ARE NOT TO SPECIFICATION. If adjustment is necessary, refer to ON-CAR SERVICE in the vehicle manufacturer’s service manual or AC-Delco Tune-up Specifications Manual SD-100.**

In some instances, an idle speed solenoid (ISS) is used to control curb idle speed. The solenoid normally is used in one of the following ways:

1. To control curb idle speed (and thereby prevent “dieseling” when the engine is shut down), OR
2. To maintain curb idle speed on air conditioned equipped vehicles whenever the air conditioning is in operation (solenoid energized by the A/C switch).

Fast idle speeds on all models is controlled in the conventional way by a separate screw located on the fast idle lever.

All models use a bowl mounted choke housing with a non-adjustable thermostatic choke control assembly. Blind rivets are installed to retain the setting of the thermostatic coil (both electric and hot air type) in the housing.

An Exhaust Gas Recirculation system (E.G.R.) is used on all applications to control oxides of nitrogen (NOx) — a pollutant in the exhaust gas. The vacuum port(s) necessary to operate the recirculation valve is located in the throttle body and connects through a channel to a tube in the throttle body. This tube is connected by a hose to the manifold-mounted E.G.R. valve. (See Idle System for port location and operation).

On E4ME-E4MC carburetors, many of the mechanical operating parts — throttle shafts, choke shaft, intermediate choke lever, etc. — receive a special coating to reduce friction and wear. Care should be taken during carburetor service to avoid disturbing or damaging this coating.

![Carburetor Identification Diagram](image)

**Figure 4 Carburetor Identification**

The carburetor model identification is stamped vertically on the float bowl near the secondary throttle lever (Figure 4). If replacing the float bowl, follow the manufacturer’s instructions contained in the service package. In this way, the identification number can be transferred to the new float bowl. Refer to the part number when servicing the carburetor.

**OPERATING SYSTEMS**

The E4ME-E4MC carburetors have six basic systems. They are the float, idle, main metering (part throttle), power, pump and choke systems.

**FLOAT SYSTEM - Figure 5**

The float system consists of a centrally located fuel chamber, a check valve type fuel filter, a single closed-cell plastic float pontoon with integral float lever, a float hinge pin, float needle valve and pull-clip, float valve seat, internal vents, and an external vent connector tube on some applications.

The float hanger is designed to allow use of an electrical mixture control (M/C) solenoid in the float bowl. A plastic filter block is located in the top of the fuel chamber over the float needle valve to prevent fuel slosh in this area. A cavity insert, located beneath the M/C solenoid connector, is used in the fuel chamber on some models to reduce fuel slosh on turns.

An integral pleated paper fuel filter is mounted in the front of the float bowl behind the fuel inlet nut to filter dirt from the incoming fuel. A check valve is pressed into the neck of the fuel filter. The check valve consists of a plastic disc contained in a plastic retainer. It is held in the normally closed position by a small spring which exerts pressure on the check valve. When the engine starts and fuel flow pressure from the fuel pump enters the inlet nut, it pushes the small check valve off its seat. Fuel flow passes the valve into the inside of the filter and continues on through the filter to the float needle valve and seat. With the engine off, the check valve closes and shuts off fuel flow to the carburetor to prevent leaks if a vehicle roll-over should occur.

The check valve retainer also has a flanged neck which seals between the filter and fuel inlet nut.

The fuel filter is held in position by the force of a spring located between the filter assembly and the fuel inlet nut cavity. The spring is of the non-relief type.

The float system operates in the following manner:

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

A pull clip, fastened to the float needle valve and hooked over the edge of the float lever, is used to assist in lifting the float valve off its seat whenever fuel level in the fuel chamber is low.

The float valve seat is brass and uses a double angle staked seat with a rubber tipped float valve. This combination reduces valve seat wear and aids in preventing the float valve from possible sticking in the seat due to fuel gum formation. Milled slots (also called “windows”) are included in the float valve seat on some applications for improved fuel delivery to the fuel chamber.

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

The fuel chamber is externally vented through a tube (Location T) in the air horn. Gasoline vapors that form in the fuel chamber flow through this tube, and connecting hose, to a vacuum operated vapor vent valve that connects to, or is located in, a vapor canister mounted in the engine compartment. The canister vapor vent valve is a spring-loaded normally open valve which is closed by manifold vacuum during engine operation and opened by spring pressure when the engine is off, thus allowing the carburetor fuel vapors to be collected in the canister until normally purged. The venting of the carburetor bowl to the vapor canister meets evaporative emission requirements and improves hot engine starting.

**IDLE SYSTEM - Figure 6**

Each bore of the carburetor has a separate and independent idle system to provide the correct air/fuel mixture to the engine during idle and off-idle operation. Since air flow through the carburetor venturi is not sufficient to obtain efficient metering from the main discharge nozzles, the idle system is required.

The idle system operates as follows:

During curb idle, the primary throttle valves are held slightly open by either the Idle Speed Control (ISC), the Idle Load Compensator (ILC), or the Idle Speed Solenoid (ISS), depending on carburetor model and application. The small amount of air passing between the throttle valves and primary bores is controlled by the adjustment of the idle speed device used. Fuel is added to the air stream to produce a combustible mixture. This is done by locating small idle discharge holes below the throttle valves.

These are acted upon by engine vacuum. With the idle discharge holes in a very low pressure area (vacuum) and fuel in the fuel chamber vented to atmospheric pressure, fuel is forced from the fuel chamber down through the main metering jets and into the main fuel wells where it is picked up by idle tubes extending into the wells.

The fuel is metered at the lower tip of the idle tubes and is drawn upward through the tubes by the vacuum signal being applied to the system. The fuel is then mixed with air at the top of each tube through the solenoid controlled idle air bleed valve. The air bleed valve, located in the air horn, follows movement of the mixture control solenoid plunger to control the amount of air bled into the idle system to lean or richen the mixtures.

The fuel mixture crosses over to the idle down channel where it is further bled with air at the side idle bleed and then passes through a calibrated idle channel restriction. It then continues downward in the idle channel where it is mixed with air at the lower idle bleeds and off-idle discharge ports and then passes through the idle mixture discharge holes where it enters the carburetor bores and blends with the main air stream passing the slightly open throttle valves and continues on into the intake manifold of the engine.

The amount of fuel that is actually delivered through the idle system is determined by the size of the idle tubes, bleeds, discharge holes and position of the adjustable idle mixture needles. These components and adjustments are selected and set at the factory for optimum engine performance and exhaust emission control. The idle mixture needles are sealed with hardened steel.
plugs to discourage tampering in the field. The idle bleed valve is also covered to protect its factory setting. If adjustment of these items becomes necessary due to a driver performance complaint, emissions failure, major carburetor overhaul, or throttle body replacement, special factory service procedures, listed in the Carburetor Calibration Procedure Section (page 15), must be followed exactly.

OFF-IDLE OPERATION

As the primary throttle valves are opened to increase engine speed, they pass by the slotted off-idle discharge ports, one in each bore, gradually exposing the ports to high manifold vacuum. The mixture added from the off-idle discharge ports mixes with the increasing air flow past the throttle valves to provide the required air/fuel mixtures for the engine. Further opening of the throttle valves increases 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 throughout operation of the part throttle to wide open ranges, thereby supplementing main discharge nozzle delivery.

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

The idle system functions in a similar manner in each carburetor bore.

FIXED IDLE AIR BY-PASS - Figure 6

Some applications use a fixed idle air by-pass system consisting of air channels that lead from the top of each primary bore in the air horn to a point below each throttle valve. At normal idle, extra air passes through these channels supplementing the air passing by the slightly open throttle valves. The idle air by-pass system reduces the amount of air flowing past the throttle valves so that they are more nearly closed at idle. This reduces air flow through the carburetor venturi to prevent the main discharge nozzles from feeding fuel during idle operation. The triple venturi system is very sensitive to air flow and the idle air by-pass system is used where larger amounts of air are required to maintain idle speed.

VAPOR CANISTER PURGE

To meet evaporative emission standards, fuel vapors from the fuel tank and carburetor float bowl are collected in a vapor canister and are not vented to atmosphere. On most applications, purging of the vapors from the canister is accomplished by vacuum ports located in the throttle body. The purge ports may consist of a constant canister purge and a separate timed canister purge, or a timed canister purge only.

The constant canister purge port is located below the throttle valves thereby providing a full vacuum source for canister purge whenever the engine is running. The timed canister purge ports are located above the throttle valves in each bore next to the off-idle discharge ports. Timed canister purge ports provide vacuum for purge whenever the throttle valves are opened during the off-idle and part throttle ranges of engine operation. The timed purge ports supplement the constant canister purge (where used) to provide a larger purge capacity for the vapor canister and to prevent over-rich mixtures from being added to the carburetor metering at any time.

EXHAUST GAS RECIRCULATION (E.G.R.)

An Exhaust Gas Recirculation (E.G.R.) system is used on all models to meet exhaust emission requirements. The E.G.R. valve is operated by a vacuum signal taken from either one or two (Figure 6) punched ports located in the carburetor bore just above the throttle valve. E.G.R. valve operation is "timed" for metering exhaust gases to the intake manifold dependent upon location of the ports in the carburetor bore and by the degree of throttle valve opening.

In all cases, the E.G.R. vacuum signal port(s) is not exposed to manifold vacuum during engine idle and deceleration to keep the E.G.R. valve closed. This prevents rough idle which can be caused by excessive exhaust gas contamination in the air/fuel mixture.

TRANSMISSION CONVERTER CLUTCH

Some applications have a port located above the throttle valve (not shown) that is used to supply a timed vacuum source for the automatic transmission converter clutch (See Car Division service manual for description of this transmission feature).

MAIN METERING SYSTEM - Figure 7

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

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

The main metering system begins to operate as air flow increases through the venturi system. It supplies fuel from each bore to maintain the required air/fuel mixture to the engine during part throttle to wide open throttle operation. Fuel from the idle system gradually diminishes as the lower pressure is now in the venturi system.

The main metering system is on the primary side of the carburetor and consists of main metering jets, an
electrically operated solenoid plunger, main metering rods and springs, main well air bleeds, main discharge nozzles, triple venturi, and fuel pull-over enrichment (some applications).

Fuel metering is controlled by (2) special stepped metering rods, operating in the main metering jets, positioned by a plunger in the mixture control solenoid. The solenoid plunger is controlled (or "pulsed") by an electrical output signal received from the Electronic Control Module (ECM). The ECM, responding to an electrical signal from the oxygen sensor in the exhaust and other sensors, alternately energizes the solenoid to move the plunger (and rods) down against spring tension to the lean position, and de-energizes the solenoid to release the spring-return plunger and rods to the "rich" position, to control fuel delivery to the main metering system. Movement up and down of the solenoid plunger and rods in the jets occurs ten times per second.

Changes in engine load and corresponding throttle positions require different air/fuel mixtures in the cylinders to deliver proper engine performance and maintain low emissions. To supply the ECM with the necessary input signal to determine the correct air/fuel mixture for various throttle positions, a throttle position sensor (TPS) is incorporated in the E4ME-E4MC carburetors.

The throttle position sensor (TPS), mounted in the float bowl, is actuated by the pump lever through a TPS plunger. The TPS is used to electrically signal the ECM various throttle positions - idle, part throttle, wide-open throttle- as they occur. The ECM memory stores an average of operating conditions with the ideal air/fuel ratio for those operating conditions.

When the ECM receives a signal that indicates a throttle position change, it immediately shifts to the last "remembered" set of operating conditions that resulted in the ideal air/fuel ratio and programs the mixture control (M/C) solenoid for the air/fuel mixture desired. In addition, during wide-open throttle operation, the pump lever moves the TPS plunger to change the electrical output signal to the ECM. At this point, the ECM refers to memory and cycles (or "pulses") the solenoid plunger in a pre-programmed rich operating mode to obtain the richer mixtures needed for power requirements.

The air horn assembly also includes a lever, and an adjustment screw, used to position the throttle position sensor in the float bowl when the air horn is installed. The TPS adjustment screw is pre-set at the factory and plumbed. The plug is used to provide a tamper-resistant design and to retain the setting during vehicle operation.

The lean mixture control solenoid screw in the float bowl, rich mixture stop screw-idle air bleed valve-and TPS adjustment screw in the air horn, are adjusted and plumbed to retain the settings during vehicle operation and to provide a tamper-resistant design. If, in diagnosis, the "System Performance Check" indicates the carburetor is not adjusted correctly or it is necessary to replace the air horn assembly, float bowl, TPS sensor, or TPS adjustment screw, then the plugs may be removed and special factory service procedures, listed in the Carburetor Calibration Procedure Section (Page 15), must be followed exactly.

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

A supplemental source of fuel to the main metering system is used on some carburetor models to provide added enrichment and improved fuel control during high engine speed at high carburetor air flows.

A calibrated hole in each bore is located just above the choke valve and feeds fuel from a tube that extends into the fuel chamber. During high carburetor air flows, low pressure created in the air horn bores pulls fuel from the pull-over enrichment fuel feed hole, supplementing fuel flow from the main metering system. The pull-over enrichment system feeds fuel at high engine speeds to provide additional fuel needed for good engine performance.

POWER SYSTEM - Figure 8

The power system in the E4ME-E4MC Quadrajet carburetors 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 (Figure 8).

In the primary side, the main metering system operates as explained above. However, when the throttle lever is opened sufficiently for power requirements, the pump lever mechanically moves the throttle position sensor (TPS) plunger further down to change the electrical output signal from the ECM to the carburetor mixture control solenoid plunger. At this point, the plunger is "cycled" (or "pulsed") by the ECM in a pre-
programmed rich operating mode to obtain the richer mixtures needed from the primary side for power requirements.

SECONDARY SYSTEM - ALL MODELS (TYPICAL)

While the primary stage of the Quadrajet carburetor provides adequate air and fuel for low speed operation, the secondary stage of the carburetor provides the additional air and fuel through the secondary throttle bores for power and performance requirements.

The secondary stage 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, secondary fuel wells with bleed tubes, fuel discharge nozzles, accelerating wells and tubes. These are used to modify fuel flow characteristics for exact air/fuel calibration.

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

When the engine reaches a point where the primary bores cannot meet engine air and fuel demands, a lever on the primary throttle shaft, through a connecting link to the pick-up lever on the secondary throttle shaft, begins to open the secondary throttle valves. This occurs only after the choke has warmed the thermostatic coil sufficiently to release the secondary throttle valve lock-out lever.

As the secondary throttle valves open, engine manifold vacuum (low pressure) is applied directly beneath the air valves. Atmospheric pressure on the top of the air valves opens against spring tension and air valve dashpot forces. This allows 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 leanness 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 fuel chamber. Each accelerating well has a calibrated orifice which meters the fuel supplied to the well from the fuel chamber.

The secondary discharge nozzles (one for each bore) are located just below the center of the air valves and 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 eccentric 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 hanger which follows rotation of the eccentric cam.

Fuel then flows from the fuel chamber through the secondary metering orifice plates into the secondary main wells where it is mixed with air from the secondary main well air bleed 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 mixture delivered from the primary bores and goes on into the engine as a combustible mixture.

As the secondary throttle valves are opened further and engine speeds increase, air flow through the secondary side increases and opens the air valves 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 the air valve position are factory adjusted to meet air/fuel requirements for each specific engine model — no change in this adjustment should be made in the field. Also, many models include a tang on the air valve lever which contacts a stop on the air horn casting to control carburetor air flow capacity.

METERING RODS - PRIMARY - Figure 9

Special two-step main metering rods (with return springs) are used on the primary side of the E4ME-E4MC Quadrajet carburetors. These rods have a two-digit number stamped on the upper end of the rod. The
programmed rich operating mode to obtain the richer mixtures needed from the primary side for power requirements.

SECONDARY SYSTEM - ALL MODELS (TYPICAL)

While the primary stage of the Quadrajet carburetor provides adequate air and fuel for low speed operation, the secondary stage of the carburetor provides the additional air and fuel through the secondary throttle bores for power and performance requirements.

The secondary stage 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, secondary fuel wells with bleed tubes, fuel discharge nozzles, accelerating wells and tubes. These are used to modify fuel flow characteristics for exact air/fuel calibration.

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

When the engine reaches a point where the primary bores cannot meet engine air and fuel demands, a lever on the primary throttle shaft, through a connecting link to the pick-up lever on the secondary throttle shaft, begins to open the secondary throttle valves. This occurs only after the choke has warmed the thermostatic coil sufficiently to release the secondary throttle valve lock-out lever.

As the secondary throttle valves open, engine manifold vacuum (low pressure) is applied directly beneath the air valves. Atmospheric pressure on the top of the air valves open against spring tension and air valve dashpot forces. This allows 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 leanness 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 fuel chamber. Each accelerating well has a calibrated orifice which meters the fuel supplied to the well from the fuel chamber.

The secondary discharge nozzles (one for each bore) are located just below the center of the air valves and 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 eccentric 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 hanger which follows rotation of the eccentric cam.

Fuel then flows from the fuel chamber through the secondary metering orifice plates into the secondary main wells where it is mixed with air from the secondary main well air bleed 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 mixture delivered from the primary bores and goes on into the engine as a combustible mixture.

As the secondary throttle valves are opened further and engine speeds increase, air flow through the secondary side increases and opens the air valves 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 the air valve position are factory adjusted to meet air/fuel requirements for each specific engine model — no change in this adjustment should be made in the field. Also, many models include a tang on the air valve lever which contacts a stop on the air horn casting to control carburetor air flow capacity.

METERING RODS - PRIMARY - Figure 9

Special two-step main metering rods (with return springs) are used on the primary side of the E4ME-E4MC Quadrajet carburetors. These rods have a two-digit number stamped on the upper end of the rod. The
number is for internal factory identification only and 
DOES NOT indicate rod size or part number. Service 
replacement rods and main metering jets are included 
in a Metering Jet and Rod Package and MUST be in 
stalled in matched sets.

**METERING RODS - SECONDARY - Figure 10**

The secondary metering rods are coded with a two-
letter system. The two-letters correspond directly to 
the part number and should be used when ordering ser-
vice replacement rods.

(See AC-Delco Bulletin 9A-100 for a complete de-
scription and listing of metering rods).

There are other features incorporated in the secondary 
metering system 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 
well to quickly emulsify the fuel with air for good 
atomization and improved fuel flow from the secondary 
nozzles.

2. The secondary metering rods may have a milled 
slot at the larger diameter of the metering tip. The 
purpose of the slot 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.

3. A baffle plate, extending into each secondary 
bore, is located just below the air valves on all models. 
The baffle extends up and around the secondary dis-
charge nozzles to provide equal fuel distribution, as 
near as possible, to all engine cylinders at lower air 
flows.

4. On some models, an integral baffle is added to the 
bottom side of the secondary air valve. The baffle im-
proves mixture distribution from the secondary side at 
higher air flows.

5. An air horn baffle is used on some models to pre-
vent incoming air from the air cleaner reacting on the 
secondary main well bleed tubes. The baffle is located 
next to the secondary well bleed tubes and extends 
above the air horn between the primary and secondary 
bores. This prevents incoming air from forcing the fuel 
level down in the secondary wells through the bleed

(Four Barrel Carburetors)
tubes and prevents secondary nozzle lag on heavy acceleration.

6. Some models use notched secondary air valves to reduce the vacuum signal at the nozzles for leaner air/fuel mixture ratios during initial air valve opening. The leaner mixtures assist in meeting emission requirements and also improve throttle response when operating at high altitudes and in hot weather.

**AIR VALVE DASHPOT OPERATION - FIGURE 11**

![Air Valve Dashpot Diagram](image)

**Figure 11 Air Valve Dashpot**

The secondary air valves use an air valve dashpot feature to control the opening rate of the air valves to provide a smooth transition to secondary system operation.

The air valve dashpot operates as follows:

The secondary air valves are connected to a dashpot (the front vacuum break unit) by a rod to control the opening rate of the air valves. Whenever manifold vacuum is above approximately 5”-6” Hg, the vacuum break diaphragm is seated, plunger retracted against spring load. 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.

When the secondary throttle valves are opened and manifold vacuum drops below the 5”-6” Hg point, a calibrated restriction in the vacuum inlet tube in the cover will restrict air movement to the back side of the diaphragm. At this point, the spring in the vacuum diaphragm unit will force the diaphragm and plunger slowly outward to provide the required delay in air valve opening until sufficient fuel flows from the secondary discharge nozzles.

**ACCELERATING PUMP SYSTEM - Figure 12**

![Pump System Diagram](image)

**Figure 12 Pump System**

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

The accelerating pump system consists of a spring-loaded pump plunger and pump return spring (operating in a fuel well), fuel passage, discharge check ball, retainer, and pump jets (one in each bore).

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

The pump system operates as follows:

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

During throttle closing, the pump plunger is forced upward in the pump well and fuel flows through a vertical slot located in the side of the pump well. It flows past the “unseated” pump cup to fill the bottom of the pump well and pump discharge passage.

When the throttle valves are opened, the pump rod and lever forces the pump plunger downward. The pump cup seats against the pump plunger head forcing fuel through the pump jets where it sprays into the venturi area of the carburetor bores.
The pump plunger duration spring is balanced against the pump well return spring so that a smooth, sustained charge of fuel is delivered during acceleration. The duration spring is selected by the factory to control the differences in rate of movement between the pump linkage and the plunger head for correct pump fuel delivery.

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

Movement of the pump lever also controls the position of the throttle position sensor plunger in the air horn (See description TPS under Main Metering System).

During higher air flow through the carburetor bores, a vacuum exists at the pump jets. A passage which is located just behind the pump jets leads to the top of the air horn to vent the pump fuel circuit 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.

A pump plunger stem seal and TPS plunger seal are included in the air horn assembly to reduce the possibility of fuel vapor losses to meet evaporative emission requirements. The retainers and seals must be removed from the air horn assembly whenever the air horn is to be submerged in carburetor cleaner. New seals and retainers are included in Delco carburetor repair kits.

**CHOKE SYSTEM - GENERAL**

The off-set choke valve is mounted in the air horn above the primary carburetor venturi. The closed choke valve provides the correct air/fuel mixture enrichment for cold engine starting and, partially open, running during the warm-up period. The secondary throttle valves are locked closed until the engine is thoroughly warm and the choke valve is wide open.

The choke system used on the E4ME-E4MC models consists of a choke valve, integral choke housing mounted on the side of the float bowl, thermostatic coil, one (1) or two (2) vacuum break diaphragm assemblies, fast idle cam, and connecting linkage. The thermostatic choke coil operates the choke valve through connecting linkage to provide the correct air/fuel mixtures for cold engine starting and warm-up.

Because choke valve position is so vitally important as to pass or fail during certification of the vehicle for compliance with government regulations for exhaust emissions, the following items may be included (depending on application) to retain the factory choke settings and to provide a tamper-resistant design:

1. Notch in the choke cover which must be aligned either with an extended tab on one of the cover retainers located in the 2 o'clock position, or with a raised casting projection on the choke housing cover flange. Then, special blind rivets are installed to retain the cover to the housing;

2. Special steel cover, welded-in-place, over the front vacuum break adjustment screw;

3. Special steel cap, snapped in place, over the adjustment screw located in the cover of the rear vacuum break;

4. Non-adjustable rear vacuum break link.

Special service procedures must be followed in removing these items, where applicable, when choke and choke related adjustments are necessary.

**CHOKE SYSTEM - OPERATION**

(Figures 13 & 14)

The choke system operates as follows:

When the engine is cold, prior to starting, depressing the accelerator pedal to the floor opens the throttle valves. This allows the fast idle cam follower lever to clear the steps on the fast idle cam. At this point, torque from the thermostatic coil closes the choke valve and rotates the fast idle cam so that the cam follower comes to rest on the highest step of the fast idle cam. (This opening of the throttle valves also pumps a priming mist of fuel through the pump jets into the throttle bores to aid starting). During cranking, engine vacuum below the choke valve pulls fuel from the idle system and main discharge nozzles. Also, during cranking and until the engine reaches 200 rpm, the mixture control solenoid in the float bowl is not controlled by the ECM and spring force moves the M/C plunger and metering rods to the “up” position for the rich mixtures needed for engine starting. The closed choke valve and raised metering rods provide adequate enrichment for good cold starts.

When the engine is started cold, vacuum is applied to the positive acting vacuum break assembly, front or rear, opening the choke valve against tension of the thermostatic choke coil to a point where the engine will run without loading or stalling. Vacuum break diaphragm opening may be delayed through various means to delay the choke valve from opening too fast and prevent stalling. Features of vacuum units are explained later in this section.

Once the engine is above 200 rpm, the ECM cycles the M/C solenoid plunger in a pre-programmed rich operating mode (“Open Loop”) and as the engine continues to warm up, the thermostatic choke coil being heated by electrical resistance or hot air begins to relax, allowing the choke valve to open and the engine to run at normal air/fuel mixtures.

The fast idle cam has graduated steps so that the fast idle speed is lowered gradually during the engine warm-up period. The fast idle cam movement (and step position)
is a function of choke valve position. When the engine is warm and the choke valve is completely open, the fast idle cam follower will be off the steps of the fast idle cam. At this point, the idle speed device (idle speed control, idle load compensator, etc.) or carburetor idle speed screw controls normal (warm) engine idle speeds.

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

**VACUUM BREAK DIAPHRAGM ASSEMBLY FEATURES:**

The vacuum break assemblies used on the E4ME-E4MC models are either positive acting or time delayed vacuum diaphragm mechanisms used to control choke valve opening during engine start and warm-up. Positive acting vacuum break units respond immediately to applied vacuum. These units provide the correct choke valve opening during engine cranking and initial start-up to prevent stalling or engine loading. Time delayed vacuum break units respond more slowly to applied vacuum and usually open the choke valve further after a few seconds of engine operation. Timing of vacuum break units is accomplished by an integral delay valve or by restricting vacuum to the diaphragm chamber or to the unit itself.

The internal delay valve vacuum break uses an internal bleed check valve mounted inside the diaphragm chamber. Engine vacuum acting on the internal check valve bleeds air through a small hole in the valve which allows the vacuum diaphragm plunger to move slowly inward.

The vacuum restriction type vacuum break uses a small restrictor orifice in the integral vacuum tube. The restriction acts to delay engine vacuum from building up too quickly inside the diaphragm chamber. This acts to delay the inward movement of the diaphragm plunger.

Some choke systems rely on a temperature sensitive vacuum switch to control applied vacuum to the vacuum break unit itself. The Thermal Vacuum Switch (T.V.S.) is mounted in the air cleaner housing. With this arrangement, manifold vacuum to the T.V.S. is prevented from reaching the front or rear vacuum break unit, where applicable, until the carburetor inlet air temperature (at the air cleaner) reaches the correct temperature.

In addition to the delayed vacuum break unit which retards choke valve opening, an internal plunger bucking spring is used on the vacuum break plunger on certain E4ME-E4MC models. Some E4ME models use an external leaf-type bucking spring mounted on the plunger.

The purpose of the plunger bucking spring is to offset tension of the thermostatic coil. With the addition of the bucking spring in the vacuum break diaphragm plunger, the choke valve can be modulated through the thermostatic coil so that leaner mixtures are maintained during warmer temperatures and richer mixtures for colder temperature operation. This is accomplished in the following manner:

During extreme cold operation, the thermostatic coil has considerable more tension than during warmer temperatures; consequently, the thermostatic coil operating against the bucking spring on the vacuum diaphragm plunger compresses the plunger spring further and, thus, the choke valve does not open as far, allowing richer mixtures for the colder temperature.

The opposite is true when, during warmer temperatures, the thermostatic coil has less tension during the starting period so that the plunger “buckling” spring is not compressed as much and, as a result, the vacuum break diaphragm plunger opens the choke valve further supplying a leaner mixture for the warm-up period. In this manner, choke valve opening through the vacuum break diaphragm can be varied to give the correct fuel mixtures, dependent upon outside temperature.

Another feature on certain vacuum break units is a clean air purge. During engine operation, vacuum acting upon the diaphragm pulls a small amount of filtered air through a bleed hole to purge the system of any fuel vapors and dirt which may possibly enter the delay valve to disrupt choke operation. The purge also allows the vacuum diaphragm to release quickly under low/no vacuum conditions.

The clean air purge consists of a purge filter and bleed hole located in the back (tube side) of the metal housing or, on some assemblies, beneath a rubber cover around the tube outside the metal housing. During adjustment of the vacuum break assemblies with this feature, it will be necessary to cover the bleed hole with a piece of tape. The assemblies that use the rubber cover over the filter and bleed hole require that the cover be removed to expose the hole to be taped. On some models with a delay vacuum break, it is necessary to plug the end cover using an accelerator pump plunger cup — 2G type or equivalent — when seating the vacuum diaphragm for rear vacuum break adjustment.

Some internal delay type vacuum break units may have an inlet check ball located in the vacuum tube. The purpose of the inlet check ball is to prevent excess dirt and vapors from plugging the small delay valve in the diaphragm unit in case of engine “backfire” or “diesel” conditions.

**CHOKE SYSTEM - MODEL E4ME - Figure 13**

The E4ME model carburetors feature an electric choke coil mounted in the choke housing. This system
uses electric current supplied to the choke coil which, combined with the offset choke valve and throttle position, control choke operation. Electric current to the thermostatic choke coil is supplied through the oil pressure switch so that the electric choke is activated only when the engine is running. The electric choke is heated by current supplied to a ceramic resistor in the electric choke coil assembly. This warms the thermostatic coil for precise timing of choke valve opening for good warm-up performance. Initial choke opening against choke coil tension is controlled by one or two vacuum break units depending on application. Operation and features of the vacuum break units are explained previously under Choke System-Operation.

The electric choke operates as follows:

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

CHOOSE SYSTEM - MODEL E4MC - Figure 14

The E4MC model carburetors feature a thermostatic choke coil, mounted in the choke housing, that is heated by exhaust heated air. The system uses exhaust heated air combined with intake manifold vacuum, the offset choke valve, and throttle position, to control choke operation.

Hot air is supplied to the choke housing and thermostatic choke coil through connecting tubing from an exhaust heated well located in the intake manifold. Fresh air for the system is channeled from a source in the carburetor through connecting tubing to the manifold well where it is heated. The choke housing in this system has an integral vacuum passage that connects to the float bowl and an external connection for the "clean air tube".

Initial choke valve opening against choke coil tension is controlled by one or two vacuum break units. Operation and features of the vacuum break units are previously explained under Choke System-Operation.

The hot air choke operates as follows:

When the engine is started cold, manifold vacuum is applied through the connecting passage in the carburetor to the choke housing. The applied vacuum draws air from the clean air source through the exhaust heated manifold well into the choke housing. As the engine warms up, the air being drawn into the choke housing becomes heated in the manifold well and acts to relax choke coil tension. The air flow acting on the offset choke valve and relaxing tension of the thermostatic coil allow the choke valve to move gradually to the full open position.
CARBURETOR CALIBRATION PROCEDURE (ON CAR)

GENERAL DESCRIPTION

The Computer Command Control (CCC)* System is designed to provide precise control of carburetor air/fuel mixtures during all ranges of engine operation. The E4ME-E4MC model carburetors, used with the Computer Command Control System, are calibrated at the factory and normally should not need adjustment in the field. However, if necessary due to results of system diagnosis, contamination, tampering, replacement of parts, etc., it can be adjusted using the following procedures:

NOTICE: Before any attempt is made to adjust the carburetor, the following checks should have been made:

1. Normal engine tune-up items: ignition system including distributor, timing, spark plugs and wires. Check air cleaner, Evaporative Emission Systems, EFE System, PCV System, EGR Valve and engine compression. Also inspect intake manifold, vacuum hoses and hose connections for leaks, and carburetor mounting bolt torque.

2. The “Diagnostic Circuit Check” of the Computer Command Control system. Refer to vehicle manufacturer’s service manual or AC-Delco Tune-Up Specifications Manual (SD-100) for Diagnostic Circuit Check.

3. The “System Performance Check”, which should be performed Before and After any repairs or adjustments are made on the carburetor or any other Computer Command Control System component. Refer to vehicle manufacturer’s service manual or AC-Delco Tune-up Specifications Manual (SD-100) for System Performance Check.

MIXTURE CONTROL SOLENOID PLUNGER ADJUSTMENTS

1. Remove air horn following normal service procedures outlined in the Unit Repair Section.

2. Using Tool BT-7928 or equivalent, turn lean mixture screw in float bowl clockwise until bottomed lightly, of the gage to allow it to enter the vent hole freely. Gage will be used to determine total mixture control solenoid plunger travel.

With engine off, air cleaner and gasket removed, measure mixture control solenoid plunger travel as follows:

a. Insert modified float gage down “D” shaped vent hole. Press down on gage and release, observing that gage moves freely and does not bind. With gage released (plunger up position), reading at eye level record mark on gage (in inches) that lines up with top of air horn casting (upper edge).

b. Then, lightly press down on gage until bottomed (plunger down position). Record in inches mark on gage that lines up with top of air horn casting.

c. Subtract gage up dimension (item “a”) from gage down dimension (item “b”) and record difference (in inches). The difference in dimensions is total solenoid plunger travel.

d. If difference in plunger travel (item “c”) is within 2/32” – 4/32”, proceed to Idle Air Bleed Valve Adjustment. If plunger travel (item “c”) is less than 2/32” or greater than 4/32”, make Mixture Control Solenoid Plunger Adjustments, noted below.

CARBURETOR CALIBRATION CHECKING MIXTURE CONTROL SOLENOID PLUNGER TRAVEL

Mixture control solenoid plunger travel should be checked before proceeding with any carburetor adjustments or disassembly.

Using Float Gage BT-7720 or equivalent (used to externally check float level setting), insert gage in the vertical vent “D” shaped hole in the air horn casting (next to the Idle Air Bleed Valve Cover), Figure 15. It may be necessary to file or grind material off the edge

*Formerly termed Computer Controlled Catalytic Converter (C-4)
COUNTING NUMBER OF TURNS. If within specified turns, lean mixture screw adjustment is correct - back screw out to previous position and proceed to Step 4. If not within specified turns, solenoid plunger travel is incorrect. Adjust to specified number of turns from bottom (Figure 16). Refer to vehicle manufacturer’s service manual or “D” section of Delco Carburetor Manual (9X) for specifications.

NOTICE: Do not bottom lean mixture screw by forcing — to do so may result in breakage of the screw head. Do not use pliers which could damage or break screw.

3. With air horn inverted, drive lean mixture screw plug out of the air horn from bottom side using suitable punch (Figure 17). DISCARD PLUG.

4. Reinstall air horn and new gasket on float bowl, temporarily retaining with two screws and recheck solenoid plunger travel. If travel is correct, complete assembly of air horn to bowl and proceed to Step 8.

5. If solenoid plunger travel is incorrect, remove and invert air horn assembly and remove rich mixture stop screw from bottom side of air horn using Tool BT-7967A or equivalent (Figure 18). With rich mixture stop screw removed, drive screw plug out of air horn from bottom side using a suitable punch. DISCARD PLUG. Reinstall stop screw in air horn until screw is bottomed lightly.

6. Reinstall air horn and gasket on float bowl.

7. Insert gauge in vent hole and with Tool BT-7928 or equivalent, turn stop screw clockwise until total solenoid plunger travel is 3/32" (see Checking Mixture Control Solenoid Plunger Travel).

8. With solenoid plunger travel correctly set, install plugs (supplied in service kits) in air horn as follows:

a. Install plug (hollow end down) in hole over lean mixture screw in air horn casting (Figure 19) and, using a suitable punch, drive plug in air horn until upper surface of plug is even with lower edge of hole chamfer (Figure 20).

NOTICE: Plug must be installed to retain the setting of the lean mixture screw (in float bowl) and to prevent escape of fuel vapors which will upset emissions.

b. If removed, install plug (hollow end down) in air horn over rich mixture stop screw located next to the Idle Air Bleed Valve Cover (Figure 19) and, using a suitable punch, drive plug in place until it is approximately 1/16" (.062") below the surface of the air horn casting (Figure 20).

NOTICE: Plug must be installed to retain the setting of the rich mixture stop screw (in air horn).

9. If necessary, proceed to Idle Air Bleed Valve Adjustment.
IDLE MIXTURE AND SPEED ADJUSTMENT

A cover is riveted in place over the Idle Air Bleed Valve and the access passages to the idle mixture needles are sealed with hardened plugs to seal the factory settings during production. These items are NOT to be removed unless required for cleaning or part replacement, or the “System Performance Check”, performed earlier, indicates the carburetor is the cause of trouble. See procedure below.

IDLE MIXTURE ADJUSTMENT

1. Before proceeding:
   a. Set parking brake and block drive wheels.
   b. Disconnect and plug hoses as directed on the Emission Control Information Label under the hood.
   c. Check ignition timing as shown on the Emission Control Information Label.
   d. Connect dwell meter and tachometer as noted in the “System Performance Check”. Refer to vehicle manufacturer’s service manual or AC-Delco Tune-Up Specifications Manual (SD-100) for Systems Performance Check.

2. Start engine and with transmission in Park or Neutral, run engine at idle until fully warm and a varying dwell is noted on the dwell meter. It is absolutely essential that the engine is operated for a sufficient length of time to ensure the engine coolant sensor, and the oxygen sensor in the exhaust, are at full operational temperature.

3. Check engine idle speed and compare to specifications on underhood label. If necessary-adjust curb idle speed.

NOTICE: On models with Idle Speed Control (ISC) or Idle Load Compensator (ILC), no adjustment is required. If speed is out of specification, refer to vehicle manufacturer’s service manual or AC-Delco Tune-up Specifications Manual (SD-100).

4. With engine idling in drive (neutral for manual transmission), observe dwell reading on the 6-cylinder scale. If varying somewhere within the 10°-50° range, adjustment is correct. If not, perform the following:

5. Idle Air Bleed Valve Cover Removal

To gain access to the idle air bleed valve for adjustment or servicing, it will be necessary to remove the idle air bleed valve cover.

   a. With engine off, cover internal bowl vents and air inlets to bleed valve with masking tape or equivalent. Cover carburetor air intakes with masking tape or equivalent to prevent metal chips from entering carburetor and engine.

   b. Carefully align a #35 (.110”) drill bit on the steel rivet head holding the idle air bleed valve cover in place and drill only enough to remove rivet head (Figure 21). Drill the remaining rivet head and then use a drift and small hammer to drive the remainder of the rivets out of the idle air bleed valve tower in the air horn casting.

   NOTICE: Use care in drilling to prevent damage to the air horn casting.

   c. Lift out cover over idle air bleed valve and remove remainder of rivets from inside tower in air horn casting. Using shop air, carefully blow out any remaining chips inside the tower. Remove tape from air horn. DISCARD COVER AFTER REMOVAL. A missing cover indicates the idle air bleed valve setting has been changed from its original factory setting.

6. Idle Air Bleed Valve Adjustment

   a. Start engine and allow it to reach normal operating temperature.
Figure 21 Idle Air Bleed Valve Cover Removal

b. While idling in drive, (neutral-Manual Transmission), using a screwdriver, slowly turn idle air bleed valve up or down until dwell reading varies within the specified range (Figure 22). Perform this step carefully. The idle air bleed valve is very sensitive and should be turned only in 1/8 turn increments. Refer to vehicle manufacturer's service manual or AC-Delco Tune-Up Specifications Manual (SD-100).

c. If after performing step (b), above, the dwell reading does not vary and is not within the specified range, it will be necessary to readjust the idle mixture needles (See procedure below).

7. Idle Mixture Needle Plug Removal

a. Remove carburetor from engine, following normal service procedures, to gain access to the plugs covering the idle mixture needles.

b. Invert carburetor and drain fuel in container.

c. Place carburetor on a suitable holding fixture — manifold side up.

Figure 22 Idle Air Bleed Valve Adjustment

NOTICE: Use care to avoid damaging linkage, tubes, and parts protruding from air horn.

d. Make two parallel cuts in the throttle body on either side of the locator points beneath the idle mixture needle plug (manifold side) with a hacksaw (Figure 23). The cuts should reach down to the steel plug but should not extend more than 1/8” beyond the locator points. The distance between the saw marks depends on the size of the punch to be used.

e. Place a flat punch at a point near the ends of the saw marks in the throttle body. Holding the punch at a 45° angle, drive it into the throttle body until the casting breaks away, exposing the steel plug.

f. Holding a center punch vertical, drive it into the steel plug. Then holding the punch at 45° angle, drive the plug out of the casting.

NOTICE: Hardened plug will break rather than remaining intact. It is not necessary to remove the plug completely; instead, remove loose pieces.

g. Repeat procedure for the remaining mixture needle.

8. Idle Mixture Needle Adjustment

a. Using Tool BT-7610B or equivalent, turn each idle mixture needle inward until lightly seated. Then back out each mixture needle specified number of turns. Refer to vehicle manufacturer’s service manual or “D” section of Delco Carburetor Manual (9X) for specifications.

b. Reinstall carburetor, except do not install air cleaner and gasket.

c. Start engine, run until fully warm, and repeat Idle Air Bleed Valve Adjustment. If unable to set to specified dwell, and dwell is below specification, turn both mixture needles OUT an additional turn. If dwell is
above specification, turn both needles IN an additional turn. Then, readjust Idle Air Bleed Valve to obtain dwell limits.

NOTICE: After adjustments are complete, seal the idle mixture needle setting using silicone sealant RTV rubber or equivalent. The sealer is required to prevent tampering with the setting and to prevent the possibility of loss of fuel vapors.

9. If necessary, reset curb Idle speed to specifications on underhood label.

NOTICE: DO NOT adjust curb idle speed on models with Idle Speed Control (ISC) or Idle Load Compensator (ILC). If speed is out of specification, refer to vehicle manufacturer's service manual or AC-Delco Tune-up Specifications Manual (SD-100).

10. Check and, if necessary, adjust fast idle speed as described on Emission Control Information Label.

11. Disconnect dwell meter and tachometer.

12. Unplug and reconnect vacuum hoses.

13. Reinstall air cleaner, and gasket.

THROTTLE POSITION SENSOR (TPS) ADJUSTMENT (ON CAR)

NOTICE: The plug covering the TPS adjustment screw (Fig. 24) is used to provide a tamper-resistant design and retain the factory setting during vehicle operation. DO NOT REMOVE the plug unless, in diagnosis, the "System Performance Check" indicates the TPS Sensor is not adjusted correctly or it is necessary to replace the air horn assembly, float bowl, TPS sensor, or TPS adjustment screw. This is a critical adjustment that must be performed accurately and carefully to ensure proper vehicle performance and control of exhaust emissions.

If necessary to adjust the TPS sensor:

a. Using a No. 48 (.076") drill bit, drill hole in aluminum plug covering TPS adjustment screw (Figure 25), drilling only enough to start self-tapping screw (approximate drilling depth 1/6" to 1/8").

NOTICE: Use care in drilling to prevent damage to adjustment screw head.

b. Start a No. 8 x 1/2" long self-tapping screw in drilled hole in plug, turning screw in only enough to ensure good thread engagement in hole.

c. Placing a wide-blade section of screwdriver between screw head and air horn casting, pry against screw head to remove plug. DISCARD PLUG.

d. Using Tool BT-7967A or equivalent, remove screw (Figure 26).

e. Connect digital voltmeter (such as BT-2815) from TPS connector center terminal (B) to bottom terminal (C). (Jumpers for access can be made using terminals 12014836 and 12014837. Make jumpers up with #6, #18, or #20 wire approximately 6" long).
f. With ignition on, engine stopped, reinstall TPS adjustment screw and with Tool BT-7967A or equivalent, turn screw to obtain specified voltage at specified throttle position with A/C off. Refer to vehicle manufacturer's service manual or AC-Delco Tune-up Specifications Manual (SD-100) for specifications.

g. After adjustment, install new plug (supplied in service kits) in air horn, driving plug in place until flush with raised pump lever boss on casting.

**NOTICE:** Plug must be installed to retain TPS adjustment screw setting. If plug is not available, remove screw and apply Delco Threadlock Adhesive X-10 or equivalent to screw threads — then, repeat step f. above, quickly adjusting screw to obtain specified TPS voltage.

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**UNIT REPAIR**

**GENERAL DESCRIPTION**

The following procedures apply to the complete carburetor overhaul with the carburetor removed from the engine. However, in many cases, service adjustments of individual systems may be completed without removing the carburetor from the engine. (Refer to Carburetor Calibration Procedure "On-Car", page 15).

A complete carburetor overhaul includes disassembly, thorough cleaning, inspection and replacement of all gaskets, diaphragms, seals, worn or damaged parts and service adjustment of individual systems, plus restoring tamper-resistant features where applicable.

**CARBURETOR DISASSEMBLY**

**NOTICE:** Before performing any service on the carburetor, it is essential that the carburetor be placed on a holding fixture such as Tool BT-30-15 or equivalent. Without the use of the holding fixture, it is possible to bend or nick throttle valves.

**IDLE SPEED CONTROL (ISC) — IDLE LOAD COMPENSATOR (ILC) — IDLE SPEED SOLENOID (ISS)**

**Removal**

1. Remove attaching screws (2) and remove idle speed control, idle load compensator, or idle speed solenoid from float bowl.

**NOTICE:** THE IDLE SPEED CONTROL, IDLE LOAD COMPENSATOR, OR IDLE SPEED SOLENOID SHOULD NOT BE IMMERSED IN CARBURETOR CLEANER AND SHOULD ALWAYS BE REMOVED BEFORE COMPLETE CARBURETOR OVERHAUL. CARBURETOR CLEANER WILL DAMAGE INTERNAL PARTS.

**AIR HORN**

**Removal**

1. Remove upper choke lever from the end of choke shaft by removing retaining screw (Figure 27). Then, rotate lever to remove from choke rod.

2. Remove choke rod from lower choke lever (inside float bowl casting) by holding lower lever outward with small screwdriver and twisting rod counterclockwise.
3. Remove secondary metering rod hanger by removing the small screw in the top (Figure 28). Lift upward on metering rod hanger until the secondary metering rods are completely out of the air horn. Metering rods may be disassembled from the hanger by rotating ends out of the holes in the hanger.

4. Using a drift punch, drive roll pin (pump lever pivot pin) inward just until pump lever can be removed from air horn. Then, remove pump lever from pump link (Figure 29).

**NOTICE:** Use care in removing small roll pin to prevent damage to pump lever casting bosses on air horn.

5. Remove front vacuum break hose noting tube locations for reassembly.

6. Remove eleven air horn to bowl screws and lock-washers; then remove two countersunk attaching screws (Nos. 1 & 2) located next to the venturi (Figure 30). If used, remove secondary air baffle deflector from beneath the two center air horn screws (#3 and #4).

7. Remove air horn from float bowl by lifting straight up. The air horn gasket should remain on the float bowl for removal later (Figure 31).

**NOTICE:** When removing air horn from float bowl, use care to prevent damaging the solenoid connector, TPS adjustment lever, and the pull-over enrichment tubes (if used). These tubes are permanently pressed into the air horn casting. **DO NOT REMOVE.**

**AIR HORN Disassembly**

1. Remove front vacuum break attaching screws (2).

The vacuum break assembly may now be removed from the air valve rod and the rod from the air valve lever (Figure 32).

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**Figure 28** Removing Secondary Metering Rod Hanger

**Figure 29** Removing Pump Lever Roll Pin

**Figure 30** Air Horn Screws

**Figure 31** Removing Air Horn Assembly
NOTICE: DO NOT place vacuum break assembly in carburetor cleaner as it will damage internal parts.

2. Remove Throttle Position Sensor plunger by pushing plunger up through seal in air horn (Figure 33).

NOTICE: Use fingers only to remove plunger to avoid damaging sealing surface.

3. When air horn is removed, it is necessary to remove the lean mixture screw plug from the air horn (Figure 34). With air horn inverted, drive plug out of air horn from bottom side using suitable punch. DISCARD PLUG.

NOTICE: Do not turn rich mixture stop screw in air horn unless necessary to replace screw or the solenoid plunger travel check, performed prior to disassembly, shows adjustment is incorrect.

If necessary to replace screw, or readjust mixture control solenoid travel during reassembly, the rich mixture stop screw can be removed using tool BT-7967A or equivalent (Fig. 35). With stop screw removed, drive plug out of air horn to gain access to the stop screw (when installed). DISCARD PLUG.

4. Remove throttle position sensor seal by inverting air horn and use a small screwdriver to remove staking holding the seal retainer in place (Figure 35). Remove and discard retainer and seal.

5. Remove pump plunger stem seal by inverting air horn and use a small screwdriver to remove staking holding the seal retainer in place (Figure 35). Remove and discard retainer and seal.

NOTICE: Use care in removing the T.P.S seal retainer and pump plunger stem seal retainer to prevent damage to air horn casting. New seals and retainers are required for reassembly. Further disassembly of the air horn is not required for cleaning purposes.

The air horn assembly includes an Idle Air Bleed Valve which is preset at the factory and sealed. (2) special “O” rings are used to seal the valve in the air horn. The valve should not be removed from the air horn in service.
horn unless required (See Idle Air Bleed Valve Adjustment).

**NOTICE:** The air horn assembly with Idle Air Bleed Valve in place should be cleaned using only a low volatile cleaning solvent. **DO NOT PLACE AIR HORN ASSEMBLY IN CARBURETOR CLEANER.** To do so may damage the “0” rings sealing the Idle Air Bleed Valve.

The Computer Command Control system is sensitive to carburetor air/fuel mixture adjustments. The rich mixture stop screw, T.P.S. adjustment screw, and Idle Air Bleed Valve in the air horn are pre-set at the factory during carburetor flow test. Then, plugs and covers are installed in the air horn to provide a tamper-resistant design.

**DO NOT REMOVE** these plugs during normal carburetor cleaning and servicing unless the Computer Command Control system diagnosis procedures indicate the carburetor as a source of trouble for engine performance, fuel economy, and exhaust emission complaints, in which case special factory service procedures listed in the Carburetor Calibration Procedure Section, must be followed carefully. Refer to vehicle manufacturer's service manual or AC-Delco Tune-Up Specifications Manual (SD-100) for Diagnostic Procedures.

1. If necessary to replace the idle air bleed valve or disassemble the air horn for immersion in carburetor cleaner, proceed as follows (See Notice, above):

   a. Support air horn to prevent damage to protruding parts and carefully align a #35 drill bit (.110") on the steel rivet head holding the idle air bleed valve cover in place. Drill only enough to remove rivet head (Figure 36). Drill the remaining rivet head and then use a drift and small hammer to drive the remainder of the rivets out of the idle air bleed valve tower in the air horn casting.

   **NOTICE:** Use care in drilling to prevent damage to the air horn casting.

   b. Lift out cover over idle air bleed valve and remove remainder of rivets from inside tower in air horn casting. **DISCARD COVER AFTER REMOVAL.** A missing cover indicates the idle air bleed valve setting has been changed from its original factory setting and will require readjustment on the vehicle.

   c. Using a screwdriver, turn bleed valve counterclockwise to remove from air horn. Remove and discard “0” ring seals from around valve. (New “0” ring seals are required for reassembly). The idle air bleed valve is serviced only as a complete assembly.

2. If necessary, invert air horn assembly and, using Tool BT-7967A or equivalent, from bottom side remove rich mixture stop screw from air horn (Figure 35). With stop screw removed, drive plug out of air horn to gain access to the stop screw (when installed). **DISCARD PLUG.**

![Figure 36 Idle Air Bleed Valve Cover Removal (Typical)](image)

The air horn assembly also includes a lever, and an adjustment screw, used to position the Throttle Position Sensor in the float bowl when the air horn is installed. The T.P.S. adjustment screw is pre-set at the factory and plugged (Figure 24).

**NOTICE:** The plug covering the T.P.S. adjustment screw is used to provide a tamper-resistant design and retain the factory setting during vehicle operation. **DO NOT REMOVE** the plug unless, in diagnosis, the “System Performance Check” indicated the T.P.S. sensor is not adjusted correctly or it is necessary to replace the air horn assembly, float bowl, T.P.S. sensor or T.P.S. adjustment screw. This is a critical adjustment that must be performed accurately and carefully to ensure proper vehicle performance and control of exhaust emissions. If adjustment is required, refer to Carburetor Calibration Procedure, page 19.

The air valves and air valve shaft should not be removed. However, if it is necessary to replace the air valve closing spring or center plastic eccentric cam, a repair kit is available. Instructions for assembly are included in the repair kit.

**FLOAT BOWL-DISASSEMBLY**

1. Holding down on pump plunger stem, raise corner of air horn gasket and remove pump plunger from pump well.

2. Remove solenoid-metering rod plunger by lifting straight up (Figure 37).

3. Remove rubber seal from around mixture control solenoid connector.

4. Remove air horn gasket by lifting out of dowel locating pins on float bowl. **DISCARD GASKET.**
Use care in removing sensor and connector assembly to prevent damage to this critical electrical part.

Remove spring from bottom of T.P.S. well in float bowl (Figure 39).

7. Remove plastic filler block over float chamber.
8. Carefully lift each primary metering rod out of the guided metering jet, checking to be sure the return spring is removed with each metering rod. Then remove return spring by sliding off end of rod (Figure 40).

**NOTICE:** Use extreme care when handling these critical parts to avoid damage to metering rod and spring.

9. Remove the mixture control solenoid from the float bowl using the following procedure:
   a. Remove screw attaching solenoid connector to float bowl (Figure 41). Do not remove solenoid connector from float bowl until called for (See below).
   b. Using Tool BT-7928 or equivalent on upper end of lean mixture screw (in float bowl), observe number of turns while turning screw clockwise until bottomed lightly (Figure 42). **RECORD NUMBER OF TURNS COUNTED FOR LATER REASSEMBLY.** Then, turn screw counterclockwise and remove screw from float bowl. Carefully lift the mixture control solenoid and connector assembly from the float bowl. Do not remove plunger return spring or connector and wires from the solenoid body. The mixture control solenoid (with plunger) and connector are serviced only as a complete assembly.
   c. If used, remove plastic insert from cavity in float bowl beneath solenoid connector (Figure 43).
   d. Remove lean mixture screw tension spring (next to float hanger pin) (Figure 43).
10. Remove float assembly and float needle by pulling up on retaining pin. Remove needle and seat gasket using seat remover BT-3006M or equivalent (Figure 44).
Figure 40 Primary Metering Rods and Return Springs

Figure 41 Removing Solenoid Connector (Typical)

Figure 42 Lean Mixture Screw

Figure 43 Removing Cavity Insert

Figure 44 Removing Needle Seat
11. Remove large mixture control solenoid tension spring from boss on bottom of float bowl located between guided metering jets (Figure 45).

![Figure 45 Removing M/C Solenoid Tension Spring](image)

12. If necessary, remove the primary metering jets using special Tool BT-7928 or equivalent (Figure 46).

**NOTICE:** Use care installing tool on jet to prevent damage to the metering rod guide (upper area) and locating tool over vertical flat sections on lower area of jet. Also, no attempt should be made to remove the secondary metering jets (metering orifice plates). These jets are fixed and, if damaged, bowl replacement is required.

![Figure 46 Removing Primary Metering Jets](image)

13. Remove pump discharge check ball retainer (Figure 47) and turn bowl upside down, catching discharge ball in palm of hand.

![Figure 47 Removing Pump Discharge Check Ball Retainer](image)

14. Remove secondary air baffle, if replacement is required.

15. Remove pump well fill slot baffle only if necessary.

16. Remove hose from rear vacuum break assembly, where used. Then, remove (2) screws from bracket and rotate the assembly to remove vacuum break rod or link from slot in plunger head (Figure 48).

**NOTICE:** Do not place vacuum break assembly in carburetor cleaner. Carburetor cleaner will damage internal parts.

![Figure 48 Removing Rear Vacuum Break (Typical)](image)

**CHOKE DISASSEMBLY**

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

**Removal of Choke Cover**

1. Support float bowl and throttle body as an assembly on a suitable holding fixture such as Tool BT-30-15 or equivalent.

2. Carefully align a #21 (.159") drill bit on rivet head and drill only enough to remove rivet head (Figure 49). Drill the two (2) remaining rivet heads and then use a drift and hammer to drive the remainder of the rivets out of the choke housing.

**NOTICE:** Use care in drilling to prevent damage to choke cover or housing.

![Figure 49 Removing Choke Cover](image)

3. Remove the three retainers, choke cover gasket (if used), and choke cover assembly from choke housing. Do not remove baffle plate from beneath the thermostatic coil on the choke cover (hot air choke models).

4. Remove choke housing assembly from float bowl by removing retaining screw and washer inside the choke housing (Figure 50). The complete choke assembly can be removed from the float bowl by sliding outward.

![Figure 50 Removing Choke Housing](image)

5. Remove plastic tube seal (hot air models only) from vacuum inlet boss on choke housing (Figure 51).

**NOTICE:** Plastic tube seal should not be immersed in carburetor cleaner.

![Figure 51 Choke Assembly (Typical)](image)

6. If used, remove rear vacuum break rod or link from intermediate choke lever.

7. Remove secondary throttle valve lockout lever from float bowl (Figure 51).

8. Remove choke coil lever retaining screw at end of intermediate choke shaft and remove lever (Figure 51). Then, remove cup seal inside the choke housing shaft hole (hot air choke models) if the housing is to be immersed in carburetor cleaner.

9. Remove intermediate choke shaft from the choke housing by sliding outward. The fast idle cam can now be removed from the intermediate choke shaft (Figure 51).

10. Remove the cup seal (for the intermediate choke shaft) from the float bowl insert for bowl cleaning purposes (Figure 51). **DO NOT ATTEMPT TO REMOVE INSERT.**

11. Remove lower choke rod lever (inside bowl) from float bowl.
REMAINING FLOAT BOWL PARTS
Disassembly
1. Remove fuel inlet nut, gasket, check valve filter assembly and spring.
2. Remove three throttle body to bowl attaching screws and lock-washers and remove throttle body assembly (Figure 52).
3. Remove throttle body to bowl insulator gasket.

Figure 52 Removing Throttle Body to Bowl Screws

THROTTLE BODY
Disassembly

**NOTICE:** Place throttle body assembly on carburetor holding fixture to avoid damage to throttle valves.

1. Remove pump link from throttle lever by rotating link until tang on link aligns with slot in lever.
2. **DO NOT REMOVE** plugs covering the idle mixture needles during normal carburetor cleaning and servicing. Remove plugs only if diagnosis indicates the carburetor is the cause of a driver complaint or emissions failure, or the idle mixture needles or throttle body must be replaced, in which case the plugs may be removed and the idle mixture adjusted on the vehicle carefully following factory recommended procedures. (Refer to Carburetor Calibration Procedure page 15).

Further disassembly of the throttle body is not required for cleaning purposes. The throttle valve screws are permanently staked in place AND **SHOULD NOT BE REMOVED. THE THROTTLE BODY IS SERVICED AS A COMPLETE ASSEMBLY.**

CLEANING AND INSPECTION

Except for the air horn assembly with idle air bleed valve installed, the carburetor parts should be cleaned in a cold immersion type cleaner such as Carbon X (X-55) or its equivalent. The air horn assembly, with idle air bleed valve in place, should be cleaned using only a low volatile cleaning solvent.

**NOTICE:** The air horn (with bleed valve), electric choke, idle speed control, idle load compensator, idle speed solenoid, mixture control solenoid, throttle position sensor, plastic parts, diaphragms, pump plunger, pump stem and TPS plunger seals, and plastic filler block should not be immersed in carburetor cleaner as they will harden, swell, or distort. Also, provide special protection for the metering rods, metering jets, and idle air bleed valve (if removed) when cleaning to prevent damage to these critical parts.

The plastic cam on the air valve shaft and bushing insert in bowl will withstand normal cleaning. Rinse thoroughly after cleaning.

1. Thoroughly clean all metal parts and blow dry with shop air. Make sure all fuel passages and metering parts are free of burrs and dirt. Do not pass drills or wire through jets.
2. Inspect upper and lower surfaces of carburetor castings for damage.
3. Inspect holes in levers for excessive wear or out of round conditions. If worn, levers should be replaced.
4. Inspect plastic parts for cracks, damage, etc. Replace as necessary.
5. Check, repair or replace parts if the following problems are encountered:
   a. Flooding
      1. Inspect float needle and seat for dirt, deep wear grooves, scores and proper seating.
      2. Inspect float needle pull clip for proper installation (Figure 53). Be careful not to bend needle pull clip.
      3. Inspect float, float arms and hinge pin for distortion, binds, and burrs. Check density of material in the float; if heavier than normal — replace float.
      4. Replace fuel inlet filter and check valve.
   5. Check metering rods for dirt, sticking, binding, missing springs, damaged parts or excessive wear.
      **NOTICE:** Numbers stamped on primary metering rods (Figure 54) are for internal factory identification and **DO NOT** indicate rod size. Service replacement rods are included in a Metering Jet and Rod Package and **MUST** be installed in matched sets.
   6. Check mixture control solenoid plunger for sticking, binding, damaged part, or excessive wear. Correct or replace as necessary.
      **NOTICE:** The service replacement mixture control solenoid and plunger are included in
the Mixture Control Solenoid Package and MUST be installed as a matched set.

b. Hesitation
1. Inspect pump plunger for cracks, scores or cup excessive wear and replace plunger if necessary.
2. Inspect pump duration and return springs for being weak or distorted.
3. Check all pump passages and jets for dirt, improper seating of discharge check ball and scores in pump well. Check condition of pump discharge check ball.
4. Check pump linkage for excessive wear; repair or replace as necessary.

c. Hard Starting — Poor Cold Operation
1. Check choke valve and linkage for excessive wear, binds or distortion.
2. Inspect choke vacuum diaphragms for leaks.
3. Replace carburetor fuel filter.
4. Inspect float needle for sticking, dirt, etc.
5. Examine fast idle cam for wear or damage.
6. Also check items under “Flooding”.

d. Poor Performance — Poor Gas Mileage
1. Clean all fuel and vacuum passages in castings.
2. Check choke valve for freedom of movement.
3. Check metering rods for dirt, sticking, binding, missing springs, damaged parts or excessive wear.
4. Inspect primary metering jets for being dirty, loose, worn or damaged.

NOTICE: Numbers stamped on primary metering rods and jets (Figure 54) are for internal factory identification and DO NOT indicate rod or jet size. Service replacement rods and jets are included in a Metering Jet and Rod Package and MUST be installed in matched sets.

5. Check mixture control solenoid plunger for sticking, binding, damaged part or wear. Correct or replace as necessary.

NOTICE: The service replacement mixture control solenoid and plunger are included in the Mixture Control Solenoid package and MUST be installed as a matched set.

6. Check idle air bleed valve for sticking, binding, dirt, damaged or missing “O” rings.
7. Check air valve for binds 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 the kit.
8. Check TPS sensor plunger for sticking, binding, or improper adjustment. Plunger must move freely in seal in air horn.

e. Rough Idle
1. Inspect gasket and gasket mating surfaces on castings for damage to sealing beads, nicks, burrs and other damage.

NOTICE: Numbers stamped on primary metering rods and jets (Figure 54) are for internal factory identification and DO NOT indicate rod or jet size. Service replacement rods and jets are included in a Metering Jet and Rod Package and MUST be installed in matched sets.

5. Check mixture control solenoid plunger for sticking, binding, damaged part or wear. Correct or replace as necessary.

NOTICE: The service replacement mixture control solenoid and plunger are included in the Mixture Control Solenoid package and MUST be installed as a matched set.

6. Check idle air bleed valve for sticking, binding, dirt, damaged or missing “O” rings.
7. Check air valve for binds 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 the kit.
8. Check TPS sensor plunger for sticking, binding, or improper adjustment. Plunger must move freely in seal in air horn.

e. Rough Idle
1. Inspect gasket and gasket mating surfaces on castings for damage to sealing beads, nicks, burrs and other damage.
2. Clean all idle fuel passages.

3. If removed, inspect idle mixture needles for ridges, burrs, or being bent.

4. Check idle air bleed valve for sticking, binding, dirt or missing "O" rings.

5. Check throttle lever and valves for binds, nicks and other damage.

6. Check all diaphragms for possible ruptures or leaks.

7. Clean plastic parts only in cleaning solvent — never in gasoline.

CARBURETOR ASSEMBLY
THROTTLE BODY

Assembly
1. Install lower end of pump link in throttle lever by aligning tang on link with slot in lever. End of link should point outward toward throttle lever.

2. If removed-install idle mixture needles and springs using Tool BT-7610B or equivalent.

Lightly seat each needle and then back out specified number of turns. Refer to vehicle manufacturer's service manual or "D" section of Delco Carburetor Manual (9X) for specifications. Final idle mixture adjustment (including Idle Air Bleed Valve, if required) must be made "ON-CAR" using the procedures described under Carburetor Calibration Procedure (Page 15).

FLOAT BOWL

Assembly

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

1. Install new throttle body to bowl insulator gasket over two locating dowels on bowl (Figure 55).

2. Install throttle body making certain throttle body is properly located over dowels on float bowl; then install (3) throttle body to bowl screws and lockwashers and tighten evenly and securely (Figure 52).

3. Place carburetor on proper holding fixture such as BT-30-15 or equivalent.

4. Install fuel inlet filter spring, check valve filter assembly, new gasket and inlet nut (Figure 56) and tighten nut to 24 N.m. (18 ft. lbs.).

NOTICE: When installing a service replacement filter, make sure the filter is the type that includes the check valve to meet safety standards for vehicle roll-over.

When properly installed, hole in filter faces toward inlet nut. Ribs on closed end of filter element prevent filter from being installed incorrectly unless forced.

Tightening beyond specified torque can damage inlet nut gasket to cause fuel leak.

CHOKE HOUSING TO FLOAT BOWL

Assembly

1. Install new cup seal into insert on side of float bowl for intermediate choke shaft. Lip on cup seal faces outward (Figure 51).

2. Install secondary throttle valve lockout lever on boss on float bowl with recess in hole in lever facing inward (Figure 51).

3. Install new cup seal into choke shaft hole (hot air choke models). Lip on seal faces inward, toward float bowl.

4. If removed, install fast idle cam onto the intermediate choke shaft (steps on cam face downward). Then, carefully install fast idle cam and intermediate choke shaft assembly in choke housing, pushing shaft through seal in housing.

5. Install choke coil lever on flats on intermediate choke shaft, install retaining screw, and tighten securely (Figure 51). Lever is properly aligned when both inside and outside levers face toward fuel inlet.
6. If used, install rear vacuum break link in hole in intermediate choke lever. End of link faces toward choke housing when installed properly.

7. On hot air choke models, insert plastic tube seal (to float bowl) in vacuum inlet hole on choke housing (Figure 51).

8. Install the lower (inner) choke lever in cavity in float bowl. Install choke housing to bowl sliding intermediate choke shaft through bowl seal and into slot in lower (inner) choke lever (Figure 57). Tool BT-6911 or equivalent can be used to hold the lower choke lever in correct position while installing the choke housing.

4. Install pump discharge check ball and retainer screw in passage next to pump well (Figure 47). Tighten retainer screw securely.

5. If removed, carefully install primary metering jets in bottom of float bowl using Tool BT-7928 or equivalent (Figure 46). Jets should be seated securely in bowl — do not overtighten.

NOTICE: Use care installing jets to prevent damage to metering rod guide.

6. Install large mixture control solenoid tension spring over boss on bottom of the float bowl (Figure 45).

7. Install needle seat assembly, with gasket, using seat installer BT-3006M or equivalent (Figure 44).

8. To make adjustment easier, carefully bend float arm upward at notch in arm before assembly.

9. Install float needle onto float arm by sliding float lever under needle pull clip. Correct installation of the needle pull clip is to hook the clip over the edge of the float on the float arm facing the float pontoon (Figure 53).

10. Install float hinge pin into float arm with end of loop of pin facing pump well. Then, install float assembly by aligning needle in the seat and float hinge pin into locating channels in float bowl. DO NOT install float needle pull clip into holes in float arm or flooding may result.

11. Carefully adjust float level following procedures and specifications listed in vehicle manufacturer's service manual or "D" section of the Delco Carburetor Manual (9X).

12. If used, install plastic insert (that goes beneath the mixture control solenoid connector) in float bowl cavity with recess in side of insert facing needle seat (Figure 43). Tang on upper lip of insert goes in deep slot in bowl closest to the fuel inlet nut so that notch in insert aligns with slot in bowl (for connector wires). Make sure insert is seated in cavity.

13. Install mixture control solenoid screw tension spring between raised bosses next to float hanger pin (Figure 43).

14. Install mixture control solenoid and connector assembly as follows:
   a. Carefully install solenoid in the fuel chamber, aligning pin on bottom of solenoid with hole in raised boss at bottom of bowl. Align solenoid connector wires to fit in slot in bowl, or plastic insert (if used).
   b. Install lean mixture control solenoid screw through hole in solenoid bracket and tension spring in bowl. Start screw in bowl making sure of proper thread engagement.
   c. Using Tool BT-7928 or equivalent, turn lean mixture screw clockwise until solenoid screw is bottomed.
lightly in bowl, making sure arms on solenoid bracket clear the raised bosses in float bowl (Figure 42).

**NOTICE:** Do not bottom solenoid screw in bowl by forcing — to do so may break screw head.

d. From bottomed position, turn lean mixture screw counter-clockwise until the screw is backed out of the bowl EXACTLY THE NUMBER OF TURNS COUNTED AT TIME OF DISASSEMBLY. If solenoid plunger travel was incorrect when checked before disassembly or if tampering is suspected, the lean mixture screw must be reset. Refer to vehicle manufacturer's service manual or "D" section of Delco Carburetor Manual (9X) for specifications.

15. Align solenoid wires with notch in plastic insert (if used) and connector lugs with recesses in bowl; then, install connector attaching screw (Figure 41). Tighten screw securely.

**NOTICE:** Do not overtighten screw which could damage connector.

16. Install Throttle Position Sensor return spring in bottom of well in float bowl (Figure 39).

17. Install Throttle Position Sensor and connector assembly in float bowl by aligning groove in electrical connector with slot in float bowl casting. Push down on connector and sensor assembly so that connector and wires are located below bowl casting surface (Figure 38).

18. Install plastic filler block over float valve, pressing downward until properly seated.

19. Slide metering rod return spring over metering rod tip until small end of spring stops against shoulder on rod (Figure 40). Carefully install metering rod and spring assemblies through hole in plastic filler block and gently lower the metering rod into the guided metering jet.

**NOTICE:** DO NOT FORCE METERING ROD DOWN IN JET. USE EXTREME CARE WHEN HANDLING THESE CRITICAL PARTS TO AVOID DAMAGE TO ROD AND SPRING. IF SERVICE REPLACEMENT METERING ROD, SPRINGS, AND JETS ARE INSTALLED, THEY MUST BE INSTALLED IN MATCHED SETS.

20. Install pump return spring in pump well.

21. Install pump plunger assembly in pump well.

22. Holding down on pump plunger assembly against return spring tension, install air horn gasket by aligning pump plunger stem with hole in gasket, and aligning holes in gasket over T.P.S. plunger, solenoid plunger return spring, metering rods, solenoid attaching screw and electrical connector. Position gasket over two dowel locating pins on the float bowl.

23. Install large rubber seal over the mixture control solenoid connector (Figure 37).

24. Holding down on air horn gasket and pump plunger assembly, install the solenoid-metering rod plunger in the solenoid, aligning slot in end of plunger with solenoid attaching screw (Figure 37). Check to be sure plunger arms engage top of each metering rod.

**NOTICE:** If a service replacement Mixture Control Solenoid Package is installed, the solenoid and plunger MUST be installed as a matched set.

### AIR HORN Assembly

1. If removed, install T.P.S. adjustment screw in air horn using Tool BT-7967A or equivalent. Final adjustment of the Throttle Position Sensor is made "ON-CAR" (See Carburetor Calibration Procedure page 19).

2. Apply a liberal quantity of a lithium base grease to the air valve shaft pin (Figure 58), making sure to lubricate pin surface contacted by the closing spring.

![AIR VALVE WIND-UP SPRING - QUADRAJET](image)

**Figure 58** Lubrication of Air Valve Shaft Pin

3. Install new pump plunger stem seal and retainer in air horn casting (Figure 35). Lip on seal faces outward (away from air horn mounting surface). Lightly stake seal retainer in three places, choosing locations different from the original stakings.

4. Install new Throttle Position Sensor plunger seal and retainer in air horn casting (Figure 35). Lip on seal faces outward (away from air horn mounting surface). Lightly stake seal retainer in three places, choosing locations different from the original stakings.

5. If removed, install rich mixture stop screw from bottom side of air horn until screw is bottomed lightly using Tool BT-7928 or equivalent (Figure 35).

**NOTICE:** The solenoid stop screw must be readjusted following procedures for Carburetor Calibration (Page 15).
6. If removed, install idle air bleed valve in air horn using the following procedures:

   a. Install new "O" ring seals (2) on air bleed valve body, checking to be sure "O" rings seat in grooves (Figure 59).

   b. Install idle air bleed valve in air horn and, using a screwdriver, turn the bleed valve clockwise until valve is lightly seated in air horn.

   c. From bottomed position, turn bleed valve counterclockwise until the valve is backed out of the air horn 2 turns.

   **NOTICE:** Final adjustment of the idle air bleed valve must be made on the vehicle. Refer to Carburetor Calibration Procedure (Page 15).

**AIR HORN TO BOWL**

**Installation**

1. Holding down on air horn gasket at pump plunger location, carefully lower air horn assembly onto float bowl while positioning the T.P.S. Adjustment Lever over the T.P.S. sensor, guiding pump plunger stem through seal in air horn casting. To ease installation, insert a thin screwdriver between air horn gasket and float bowl to raise the T.P.S. Adjustment Lever (Figure 60) to position it over the T.P.S. Sensor. Make sure that the bleed tubes are positioned properly through the holes in the air horn gasket. Do not force the air horn assembly onto the bowl but rather lightly lower in place.

2. Install eleven air horn attaching screws and lockwashers; and two countersunk screws (Nos. 1 & 2) located next to the carburetor venturi area. If used, install secondary air baffle deflector under air horn screws #3 and #4. Tighten all screws evenly and securely following air horn screw tightening sequence. (Figure 61).

**AIR HORN SCREW TIGHTENING SEQUENCE - M4M-E4M MODELS**

Figure 61 Air Horn Screw Tightening Sequence
3. Install air valve rod into slot in lever on the end of the air valve shaft. Then install the other end of rod in hole in front vacuum break diaphragm plunger. Install vacuum break and bracket assembly on air horn using two attaching screws. Tighten screws securely. Do not attach hose on vacuum break assembly until adjustment is completed.

4. Install T.P.S. actuator plunger in air horn by carefully pushing plunger through seal in air horn until seated against T.P.S. plunger. Check that plunger moves freely.

5. Recheck mixture control solenoid plunger travel (see page 15 for procedure). Then, install new lean mixture screw plug, and rich mixture stop screw plug (if removed), following mixture control solenoid plunger adjustment. Refer to Carburetor Calibration Procedure (page 15).

**NOTICE:** The lean mixture screw plug MUST be installed in air horn to provide proper retention of the lean mixture screw in the float bowl, and to prevent the escape of fuel vapors which will upset emissions.

6. Connect upper end of pump link to pump lever. Place lever between raised bosses on air horn casting, making sure lever engages T.P.S. actuator plunger and the pump plunger stem. Align hole in pump lever with holes in air horn casting bosses (using a small drift or rod the diameter of the pump lever roll pin will aid alignment). Using diagonal (sidecutter) pliers, pry the roll pin only enough to insert a thin bladed screwdriver between the end of the roll pin and the air cleaner locating boss on air horn casting. Then with screwdriver push pump lever roll pin back through the casting until end of pin is flush with casting bosses on air horn (Figure 62).

**Figure 62 Installing Pump Lever and Pin**

**NOTICE:** Use care installing the roll pin to prevent damaging pump lever bearing surface and casting bosses.

7. Install two secondary metering rods in secondary metering rod hanger (upper end of rods point toward each other). Install secondary metering rod hanger, with rods, on air valve cam follower. Install retaining screw and tighten securely. Work air valve up and down several times to make sure they are free in all positions.

8. Connect rod into lower choke lever inside bowl cavity.

9. Install choke rod in upper choke lever and position lever on end of choke shaft. Install retaining screw and tighten securely (Figure 27). When properly installed, the lever will point to the rear of the carburetor and the number on lever will face outward.
COMPLETION OF CHoke ASSEMBLY

NOTICE: The choke coil pick-up lever (inside the choke housing) must be indexed properly and the fast idle cam (choke rod) and front and rear vacuum break adjustments checked before installing the choke cover and coil assembly. Refer to the adjustment procedures and specifications in vehicle manufacturer’s service manual or “D” section of Delco Carburetor Manual (9X).

10. Install the thermostatic choke cover, and gasket (if used), on the choke housing, making sure coil tang engages choke coil lever.

NOTICE: On E4ME models, ground contact for the electric choke is provided by a metal plate located at the rear of the choke cover assembly. DO NOT install a choke cover gasket between the electric choke assembly and the choke housing.

11. A choke cover retainer kit is required to attach the choke cover to the choke housing. Follow instructions contained in kit and install proper retainers and rivets using suitable blind rivet installing tool. It may be necessary to use an adapter (tube) if installing tool interferes with electrical connector tower on choke cover (Figure 63).

12. Install vacuum break hoses on front, and rear (if used), vacuum control units.

ADJUSTMENT PROCEDURES AND SPECIFICATIONS

Refer to the Delco Carburetor 9X Manual “C” Section for Replacement Parts and “D” Section for Adjustment Procedures and Specifications, for each carburetor model. The adjustments should be performed in sequence listed as applicable to each carburetor model. The 9X Manual, Carburetor Tools and Gages, are available through AC-Delco Suppliers.
## Explored View Part Description

### Part Description

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