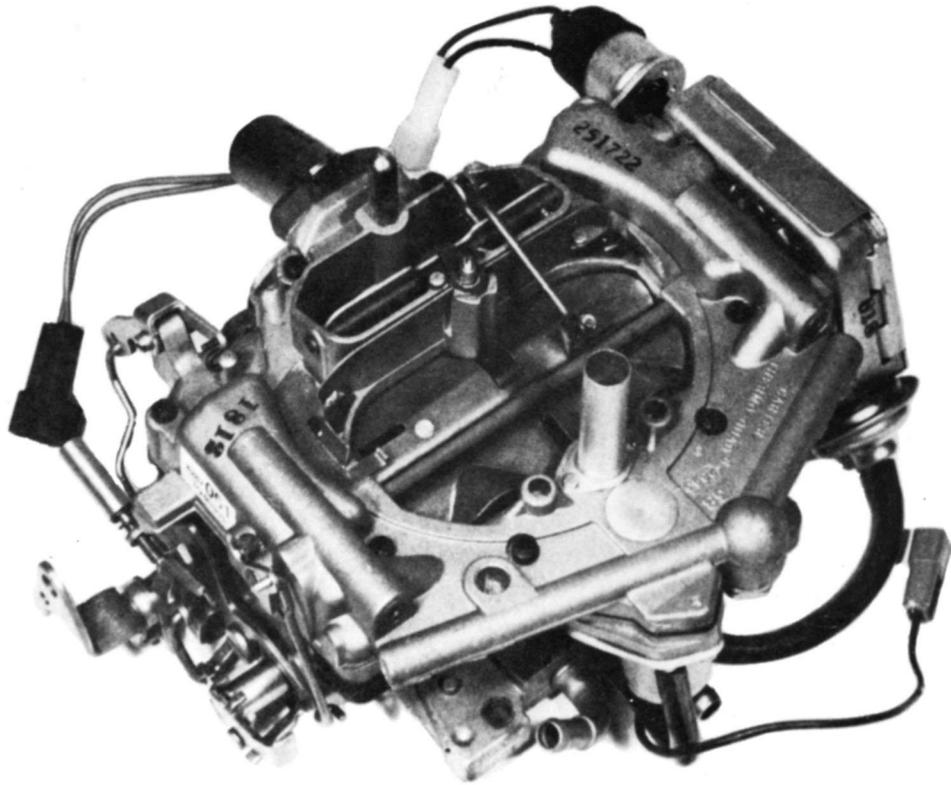


# THERMO-QUAD™ SERVICE MANUAL

CARTER CARBURETOR



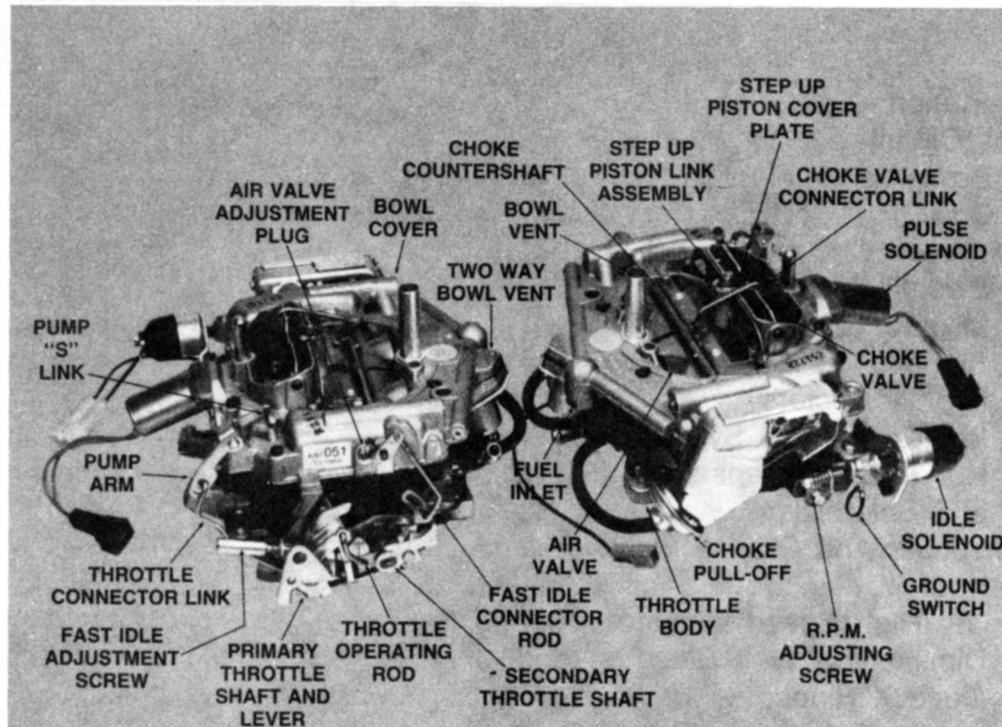
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**CARTER®**

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# SOLID FUEL THERMO-QUAD



## DESCRIPTION

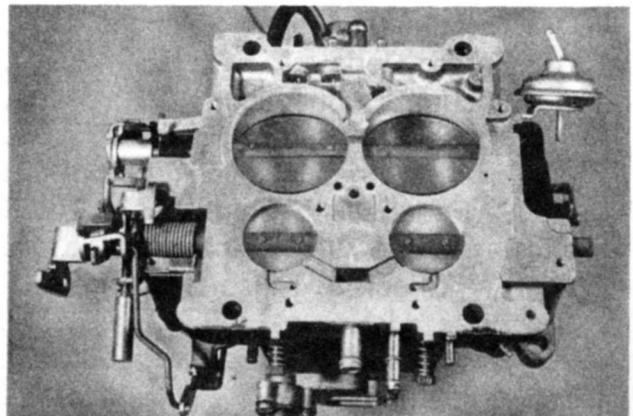
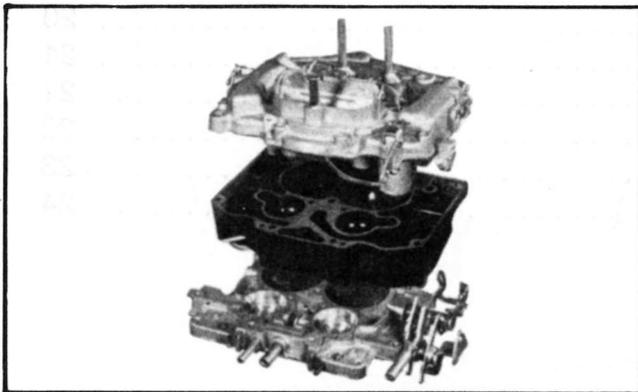
The Carter Thermo-Quad was one of the first new type carburetors designed to help reduce exhaust emissions without sacrificing the maximum performance that high-output engines were capable of delivering.

The design innovations incorporated in the Thermo-Quad provide a much higher degree of temperature control. The results were so effective that the Thermo-Quad runs as much as 20° cooler than all metal carburetors.

Performance oriented technicians understand immediately that a cooler carburetor keeps the fuel in the liquid state where it is supposed to be liquid — and vaporized when supposed to be vapor. He also knows that heat expands both liquid and vapor, and that a "cooler-fed" engine will produce more power. Expansion should occur inside an engine — not outside.

Three basic assemblies make up the Thermo-Quad: the throttle body, fuel bowl and bowl cover. The throttle body is a high-grade aluminum casting and contains the throttle valves, linkages, idle mixture screws, and various vacuum ports and external tubes. The bowl cover is also an aluminum casting and contains essentially all metering components.

Between the throttle body and bowl cover is a phenolic resin fuel bowl that possesses very high insulating characteristics. Consequently, heat from the engine which would normally envelop the entire carburetor is blocked by the fuel bowl, thus permitting the metering section (bowl cover) to remain much cooler than conventional all metal carburetors.



The Thermo-Quad carburetor is a "spread bore" unit, utilizing small primaries spaced or "spread" to line up with the oversize secondaries.

All Thermo-Quad secondary bores are 2¼", the primary bores are 1⅜" or 1½".

When a Thermo-Quad equipped vehicle is driven conservatively, the small primary bores maintain high intake air velocity consistent with maximum operating economy. High air velocity also aids fuel distribution, lowers emissions and gives excellent throttle response.

When extra power is needed and the larger diameter secondary throttle valves are opened, a virtually unrestricted supply of air-fuel mixture is admitted to the engine. There are no fixed venturis in the secondary bores, however, the venturi effect is provided by the spring-loaded air valve in the secondary section. This valve is comparable to a "variable venturi."

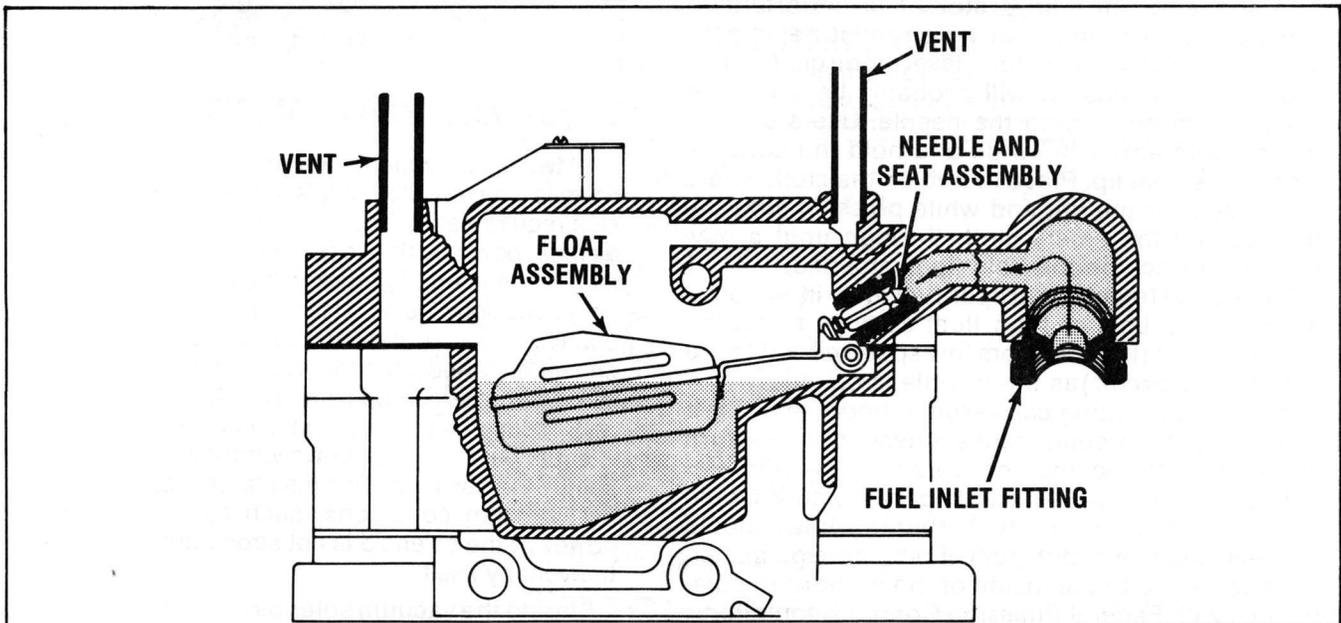
Five conventional circuits common to all Carter Carburetors are found in the Thermo-Quad:

1. Float circuit
2. Low speed circuit
3. High speed circuit
4. Pump circuit

## 5. Choke circuit

The Thermo-Quad air horn houses the choke valve, air valve for the secondaries and its controls and adjustments, the fuel inlet system (two floats and inlet needles and seats), the complete accelerating pump system, primary boost venturi, vacuum controlled step-up piston and rods, low and high speed fuel metering systems (secondary jets, fuel discharge nozzles and all air bleeds and restrictions). The Primary jets are in the fuel bowl.

The Thermo-Quad carburetor has many unique features which require extra caution during all adjustments. For example: The vacuum kick diaphragm provides two separate functions. It still provides for vacuum "kick," but it also controls the secondary air valve. Because of the separate nature of the two functions, two distinct but interrelated adjustments are necessary and these adjustments must be performed in the proper sequence.



# CIRCUITS

## FLOAT CIRCUIT

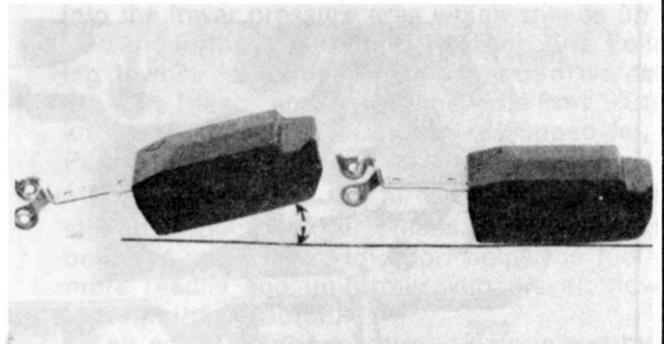
The purpose of the float circuit is to maintain an adequate supply of liquid fuel at the proper, pre-determined level in the bowl for use by the low speed, high speed and pump circuits.

Two separate float circuits are used, with a float, inlet needle and seat for each. The primary low speed circuit plus primary and secondary high speed circuits are supplied with fuel taken from the fuel cavities in the bowl.

All Thermo-Quads use nitrophyl floats. Setting the floats to specifications assures an adequate supply of fuel in the bowl cavities for all operating conditions. Special consideration should be given in service to make sure the floats do not bind in their hinge pin brackets or drag against the inner walls of the bowl cavities.

The old method of checking brass floats does not

apply to the nitrophyl design. The nitrophyl is checked by weight. The float used in all Thermo-Quad carburetors should weigh 7.4 to 8.0 grams.



## CHECKING THE NITROPHYL FLOAT

A general "rule of thumb" check can be made on the Thermo-Quad float as follows. A good float will remain in the position shown on the left. A heavy float will not retain this position, it will fall to the

position shown on the right. This is only a quick test and cannot be used as a positive means to determine borderline cases.

The intake needle and seats are installed at an angle to provide the best possible seating action commensurate with float movement.

Setting the float to specifications assures an adequate supply of fuel in the bowl for all operating conditions. Float adjustments must be made with the bowl cover held inverted and with the free weight of the float resting on the intake needle. An incorrect float setting will result if the bowl cover is not held level, or the float is depressed when gauging the float setting. The float is adjusted by bending the float arm.

In order to avoid unnecessary bending, both floats should be reinstalled in their original positions prior to adjusting for correct fuel level. Dry float specifications and adjustments are used rather than attempting to measure fuel height in the bowl:

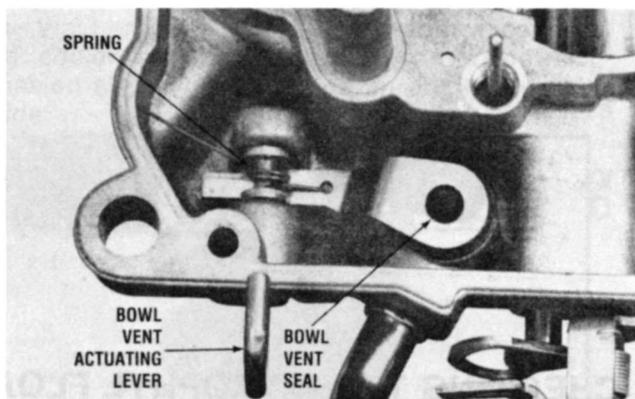
In servicing the carburetor, it is important to service the lip of the float which must be smooth for proper action and fuel level control. A small groove or indentation will probably be found on the lip from contacting the needle. Use a strip of emery cloth about 1/4" wide and hold the abrasive side to the float lip. Place thumb on the cloth where it passes over the lip, and while pressing with the thumb, pull the emery cloth through until a new contact surface on the float lip is attained.

Float adjustment for proper fuel level in the bowl is important. Low or high float settings affect the transfer point (transfer from low speed circuit to the high speed circuit) as the throttle is opened.

A high float setting can result in flooding, while a low float setting could cause a hesitation in a turn should the jet become uncovered.

The intake needle, seat and float assembly should be inspected for wear. The carburetor bowl should be clean and free of dirt, gum or other foreign matter.

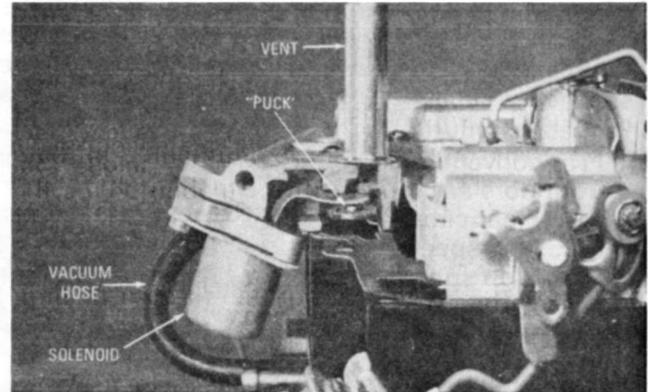
All vents are to the inside of the air horn in compliance with Federal Emission Control Regulations. A connecting vent passage effects a balance of the air pressure between the two bowl cavities. The bowl vents are calibrated to provide proper air pressure above the fuel at all times.



Some models use a mechanically operated bowl vent valve located at the top of one of the bowl cavities. With the engine at curb idle, the primary throttle linkage opens the valve to allow vapors to

exit to the vapor storage system. As soon as the throttle is opened, this valve is closed and remains closed until return to curb idle.

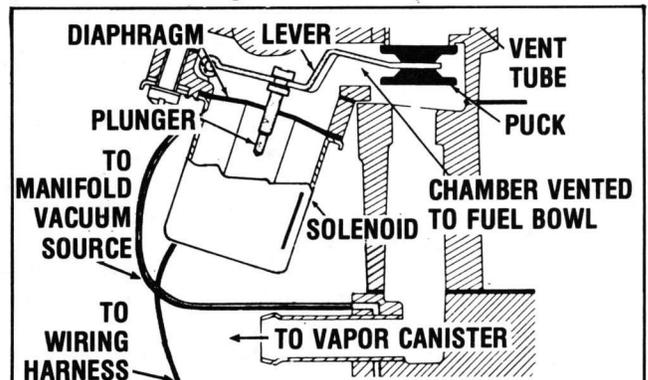
Bowl vapor vent adjustment must be to specifications. If valve doesn't open to specifications with throttle valves seated, bowl vapors cannot escape freely and this may cause "hard-hot-starting." If it opens too far, or hangs open, it will allow an external vent to the bowl, resulting in poor mileage.



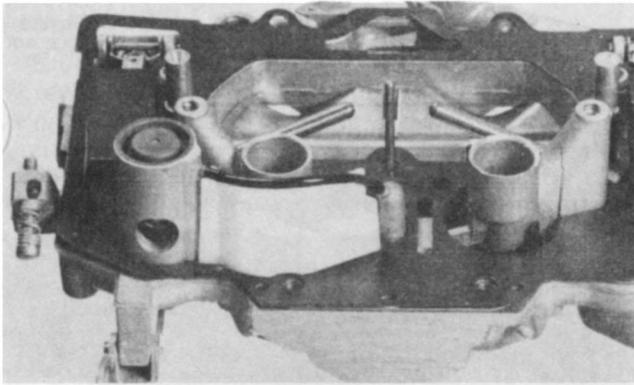
## TWO-WAY BOWL VENT

A two-way vacuum operated, solenoid held vent valve is used on late models to meet evaporative emission requirements. The vent passage extends thru the air horn, bowl and flange to the 3/8" canister fitting. When the engine is off, the puck valve is spring loaded in its upper position closing off the carburetor inside vent and opening the vent passage to the canister. When the engine is started, manifold vacuum pulls the puck to a downward position opening the carburetor inside vent and closing the passage to the canister. After manifold vacuum pulls the puck downward, it is held in this position by the solenoid. This maintains proper vent during low vacuum conditions, such as on acceleration, however, the solenoid is not strong enough to operate the vent by itself.

Should the vacuum solenoid valve fail, driveability is seriously affected. The puck valve would remain in its upper position, closing off the carburetor inside vent located in the air cleaner. Carburetor bowl venting would then be by way of the charcoal canister which would subject the fuel bowl to higher pressure, resulting in excessively rich mixtures.

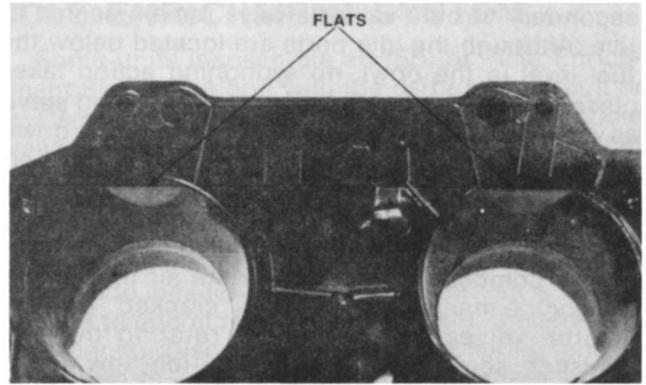


Troubleshooting the two-way vent valve should include checking the vacuum and electrical connections. It must have both for proper operation.



### FUEL BOWL INSERT

To lower evaporative emissions, late model fuel bowls reduce bowl volume from 125 cc to 95 cc. Many models use a special bowl insert which reduces bowl volume to 85 cc.



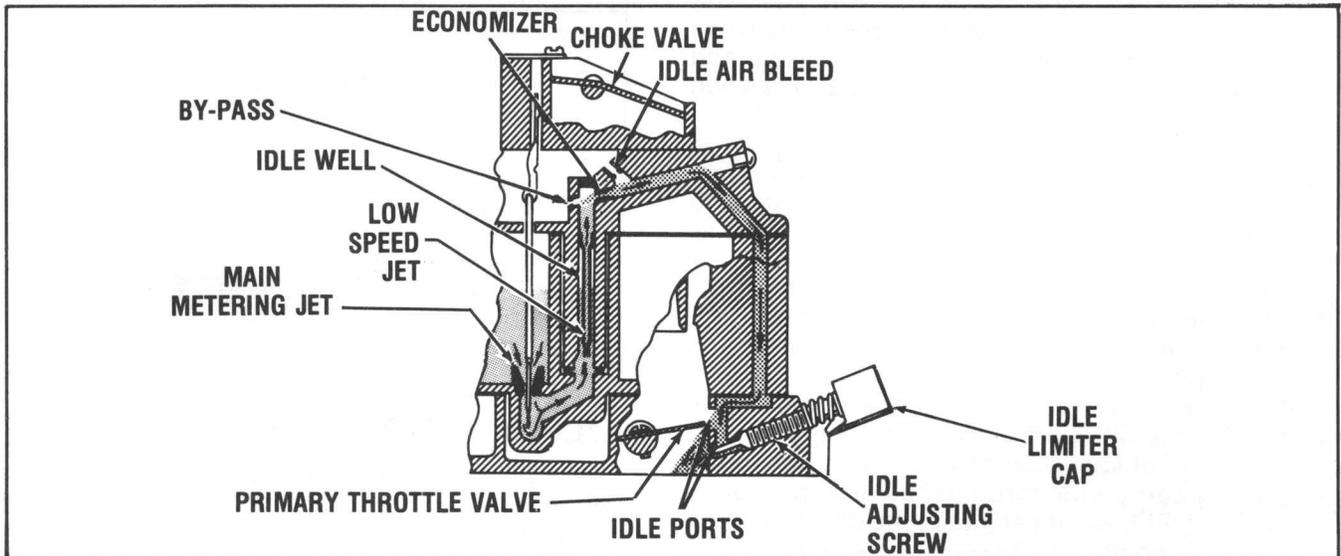
### THERMO-QUAD BOWL

The bowls are not inter-changeable from one unit to another. Some models have "flats" or "eyebrows" on the primary side of the main body for fuel distribution. These will vary in size depending on engine and manifolding.

## AN IMPORTANT REMINDER

To assure a positive seal, the bowl cover must be properly torqued with a new bowl cover gasket. A

leak at the bowl cover increases the pressure on the fuel resulting in a loss of economy.



### LOW SPEED CIRCUIT

When the throttle valves are at or near the closed position they serve as a restriction, increasing air velocity. The air velocity passing around the throttle valves and over the idle port creates a low pressure area. The higher pressure in the fuel bowl causes fuel to flow from the idle ports. The idle circuit is an inverted "U" from the idle port to the low speed jet.

Liquid gasoline enters the idle wells through the main metering jets.

Fuel for idle and early part throttle operation is metered through the two low speed circuits which are located on the primary side only. Fuel from the main metering jet enters the idle circuit through the low speed jet.

Following this circuit downstream, the first entrance of air is called the "By-Pass." This is followed by the "Economizer." The air and fuel mixture is

"squeezed" through this restriction and ejected into the lower pressure area which speeds up the flow and further mixes the air and gasoline. Following downstream is the second entrance of air, called the "Idle Bleed" and then to the "Idle Port". This is known as a Five Point Circuit; Low Speed Jet, By-Pass, Economizer, Idle Bleed and Idle Port.

Equally important, tiny air bubbles enter the fuel stream through the air bleeds. Aerating the fuel before it reaches the idle port helps the fuel mix more readily and uniformly with the air flowing through the carburetor.

The quality of the mixture is determined by the size of the idle jet, the by-pass and the idle bleed.

The idle ports, located directly above the idle adjusting screw ports, are slot shaped. As the throttle valves are opened, more of the idle ports are uncovered, allowing a greater quantity of the air-fuel mixture to enter the carburetor bores. The

secondary throttle valves always remain seated at idle. Although the idle ports are located below the fuel level in the bowl, no syphoning action takes place because the by-pass and the idle bleed serve as vents to prevent syphoning of fuel from the bowl.

Turning the idle adjustment screws toward their seats reduces the quantity of air-fuel mixture supplied by the idle circuit. This is an over-rich mixture that emerges from the ports, but is leaned to a proper combustible mixture by the air that enters the engine manifold around the "cracked" primary throttle valves. Consequently, rotating the idle adjusting screw inward leans the idle low speed mixture and rotating it outward enriches the idle mixture.

Dirt or foreign material in the economizer will cause a lean idle condition. Any restriction in the by-pass or idle bleed will result in a rich condition.

The low speed jet, by-pass, economizer and idle bleed bushings are pressed in place and must never be removed when servicing the carburetor.

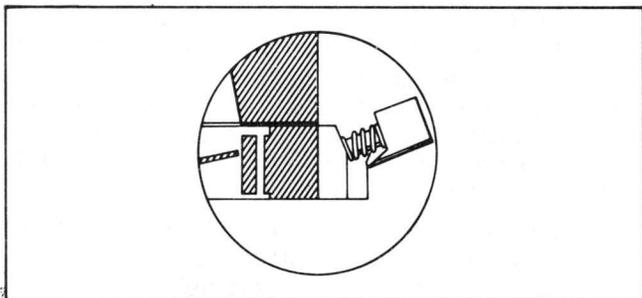
All by-passes, economizers, idle ports, idle adjustment screw ports, as well as the bore of the carburetor must be clean and free of carbon.

Air leakage at the gasketed surface surrounding the low speed (idle) mixture passages or between the flange and manifold may cause poor idle and low speed operation. Always use new gaskets when servicing the carburetor.

During opening of the throttle valve a point is reached when the low speed circuit fuel delivery diminishes and the high speed circuit begins to deliver fuel from the main nozzle. This is known as the transfer point.

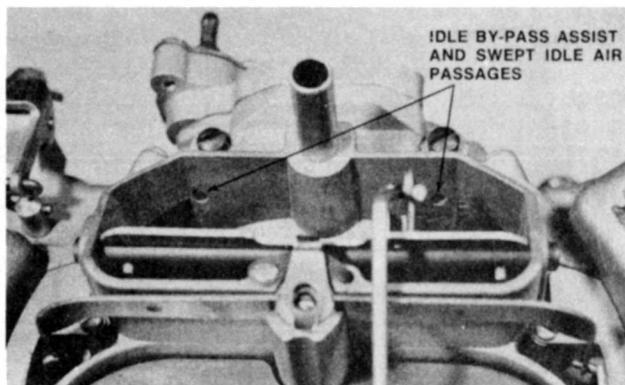
A low float setting can cause a problem at the transfer point, as the high speed nozzle will not begin fuel delivery at the correct time. Float setting plays its part in timing the nozzle.

Port relation is the position of the throttle valve relative to the idle port at curb idle. Port relation could be out of specifications due to carbon in the bore of the carburetor, throttle shaft or throttle body wear. In either case, it can upset the idle and affect the transfer point.



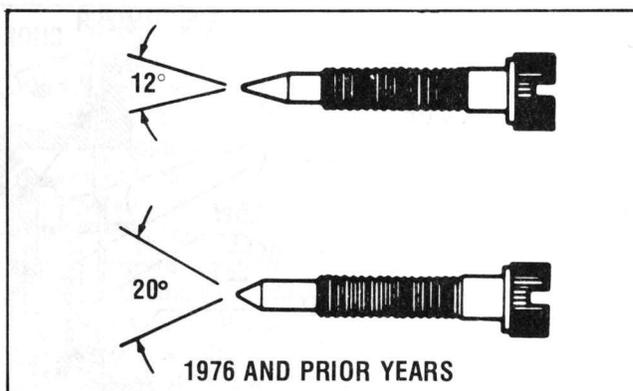
## SWEPT IDLE AIR

Some Thermo-Quad models use the swept idle air circuit which by-passes some air around the throttle valve. It assures that the fuel mixture comes down the center-line of the bore of the carburetor rather than down the wall of the carburetor. It also causes a turbulence below the throttle valves to aid air-fuel mixture and distribution.



## IDLE BY-PASS ASSIST

Several applications incorporate an idle by-pass assist circuit. This extra air is channeled down thru the air horn, bowl and throttle body, "by-passing" the venturi and nozzle and allows closing the throttle valves a little more for a given RPM. This lowers the CFM at the nozzle and prevents nozzle drip, particularly during fast idle. When the idle by-pass circuit is used, it also serves as the swept idle circuit.

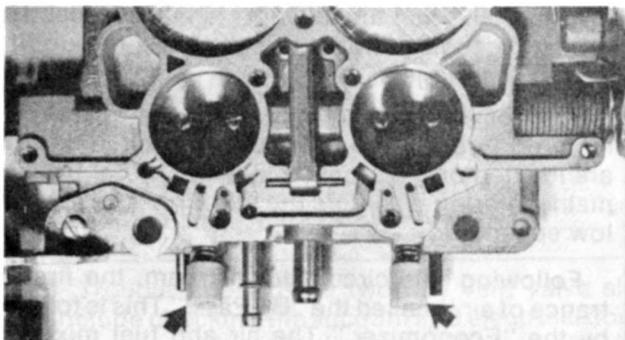


## IDLE MIXTURE SCREWS

Idle adjusting screws are used for trimming the idle mixture to individual engine requirements for satisfactory idle.

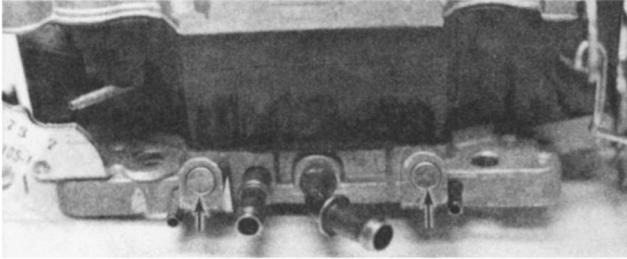
To reduce sensitivity, idle adjusting screws were changed in 1977 from a 20° taper to a 12° taper.

It is important to note that when balancing carburetor idle mixture screws, the screw must be seated very lightly so as not to damage the throttle body. It is not difficult to distort the idle system at the mixture port due to the increased mechanical advantage at the tip of the screw.



## IDLE LIMITER CAPS

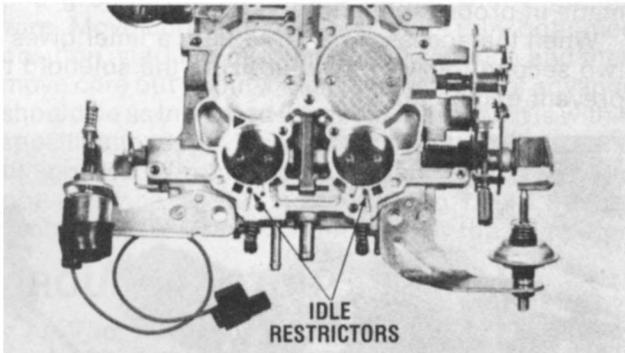
Emission Laws require use of idle adjusting screws with limited adjustability. This allows for proper idle adjustment while assuring the emission limits will not be exceeded. To meet these requirements, later model carburetors use idle limiter caps to prevent over-rich idle adjustments.



## TAMPERPROOF MIXTURE SCREWS

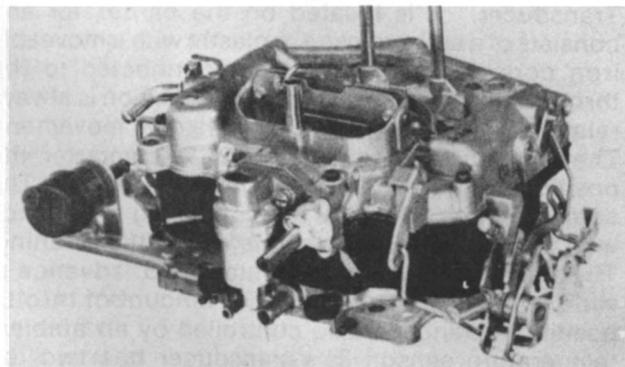
Some 1980 and later models use the hidden "Tamperproof Idle Mixture Screws."

The idle mixture screws are adjusted and sealed at the factory. Adjustment of the sealed idle mixture screws should be performed only when the carburetor will not meet specifications or when a major carburetor overhaul is necessary.



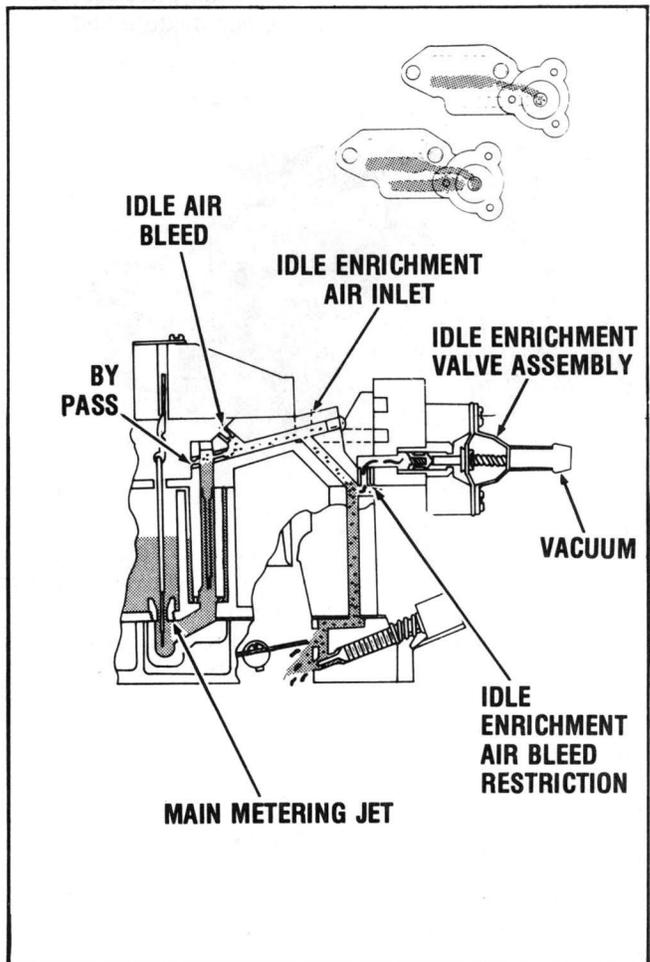
## IDLE RESTRICTORS

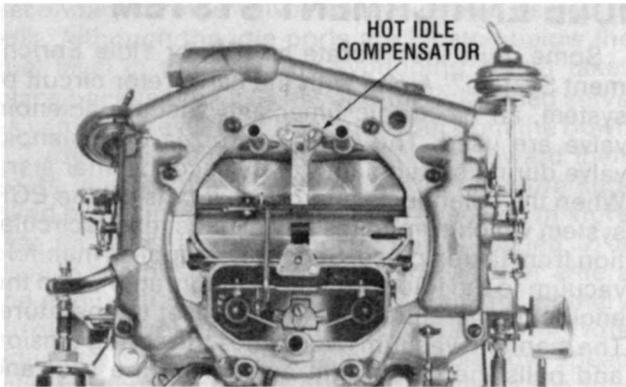
Some pre 1980 Thermo-Quads employ idle restrictors within the throttle body of the carburetor. The purpose is to restrict the maximum air-fuel enrichment available at curb idle. Once the carburetor idle mixture screw has been withdrawn sufficiently from its seat within the carburetor throttle body, the screw becomes ineffective in obtaining any more enrichment.



## IDLE ENRICHMENT SYSTEM

Some units incorporate an IES, or "Idle Enrichment System." Along with the carburetor circuit or system, an electronic timer and vacuum solenoid valve are used. The timer energizes the solenoid valve during starting and for 35 seconds after start. When the solenoid is energized, it cuts off the EGR system which eliminates any exhaust gas recirculation from taking place. Secondly, it applies manifold vacuum to the idle enrichment diaphragm when the engine temperature is below a preset temperature. The manifold vacuum overcomes the spring tension and pulls the diaphragm away from the seat and valve, thereby allowing the valve to seat, closing off the air passage. Cutting off the air supply enriches the mixture allowing more fuel to be delivered during starting and for 35 seconds after start. After the 35 second time period has elapsed, the electronic timer de-energizes the solenoid valve which allows the EGR system to function and cuts off the manifold vacuum to the idle enrichment diaphragm. The spring then pushes the diaphragm against the valve and seat assembly causing the valve to unseat. This opens the air bleed to the low speed circuit allowing the normal air-fuel ratio to be delivered to the engine. The purpose and results are improved hot engine starting by delaying the EGR for 35 seconds and improved cold engine performance after starting by initiating idle enrichment for 35 seconds.

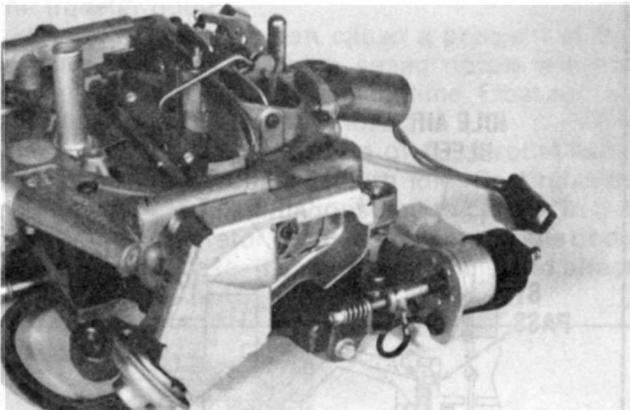




## HOT IDLE COMPENSATOR

Some models are equipped with a hot idle compensator located in the throttle body or on the air horn.

During long periods of idling, with an extremely hot engine, the fuel in the bowl can become hot enough to form vapors. These vapors can enter the carburetor bore by way of the inside bowl vent, thus causing a rich mixture, rough idle and a lowering of idle RPM. This same underhood temperature decreases the density of the air which causes a richer mixture and rough idle. The hot idle compensator is made of a cone attached to a bi-metal thermostatic strip, and is calibrated to open under these temperature conditions. When the valve is open, air is bled through a calibrated passage to the intake manifold. This off-sets the rich mixture and maintains a smooth idle.



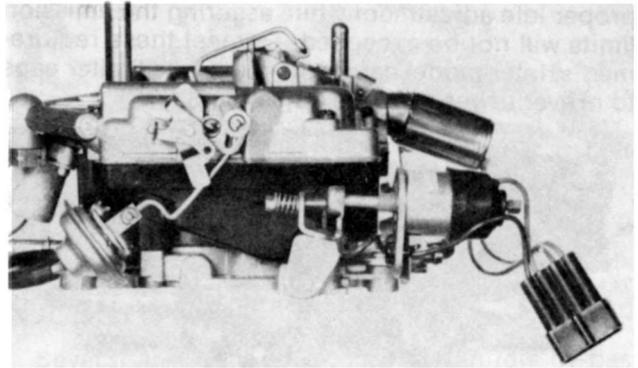
## IDLE SOLENOID

Many carburetor models use an idle solenoid to prevent "dieseling" or "after run."

Many things that have been done to lower emissions have enhanced the possibility of dieseling. Higher idle speeds, leaner air-fuel mixtures, retarded ignition timing, and higher operating temperatures all contribute to dieseling.

When the ignition is turned on, the solenoid is energized, moving the plunger outward. The idle RPM is adjusted at the solenoid. When the ignition is turned off, the solenoid is de-energized, the plunger moves inward allowing the throttle valves to close enough to virtually shut off the air supply causing the engine to stop running immediately.

Some units have a second adjustment to prevent the throttle valves from closing too tight, causing them to stick in the throttle bores.

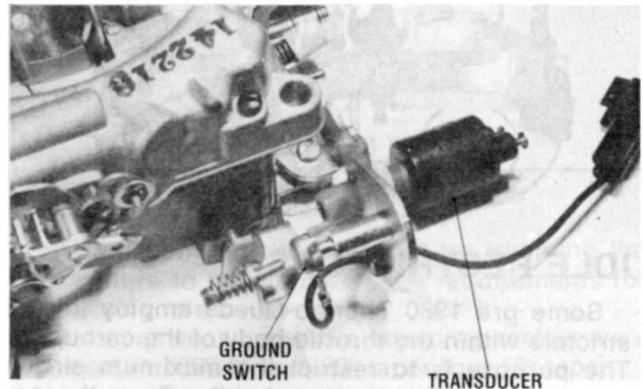


## SIS SOLENOID

Some later models use an S.I.S. (solenoid idle stop) solenoid. When the air conditioning, rear window defogger or any accessory with a heavy load is turned on, the S.I.S. solenoid is energized and the plunger moves outward to open the throttle valves slightly.

The adjustment of the S.I.S. solenoid is on its inward travel rather than the conventional outward travel. Two adjustments are required and must be made in proper sequence.

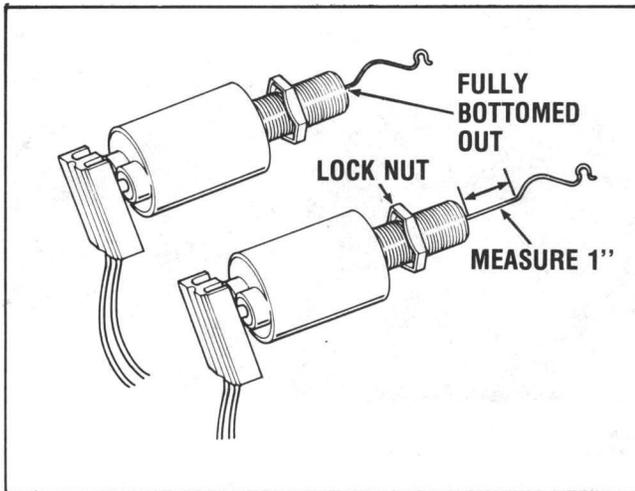
When the accessory is turned off, a timer gives a two second delay in de-energizing the solenoid to prevent engine die out.



## TRANSDUCER AND GROUND SWITCH

Thermo-Quads used on the E.S.A. (Electronic Spark Advance) engines use a "Throttle Position Transducer." It is located on the carburetor and consists of a coil enclosed in plastic with a moveable iron core. With the iron core connected to the throttle linkage, its movement and position is always relative to throttle position and throttle movement. The transducer signals the E.S.A. computer the position and the rate of change of the throttle. The computer then advances ignition timing to coincide with throttle position and rate of throttle opening. The transducer has a maximum of 15° advance at wide open throttle position. The amount of throttle position advance is also controlled by an ambient temperature sensor. The transducer has two ter-

minals for harness connection which have no polarity. Maladjustment of the transducer affects timing at all engine speeds.



The transducer coil can be checked with an ohmmeter and should have between 60 and 90 OHMS resistance.

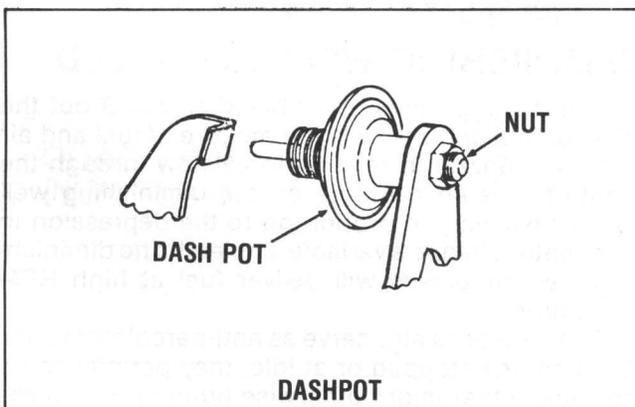
To check operation of the transducer, connect a timing light, unhook transducer connector from throttle, position throttle linkage on fast idle cam and ground the carburetor switch with a jumper wire. Move core of transducer to its fully bottomed position, start engine, wait for 90 seconds and then move core out about 1 inch. The amount of advance should be as indicated in specifications. If it is within specifications move core back into transducer and timing should return to basic setting. If timing did not advance or did not return to basic timing, problem is in wiring connections or the computer.

## GROUND SWITCH

All Thermo-Quads used with E.S.A. (Electronic Spark Advance) incorporate a grounding switch at the throttle stop.

The function of the ground switch is to signal the ESA computer when the throttle valves are closed. The ESA retards timing at closed throttle position.

If the throttle does not return completely to the idle position and send a ground signal to the ESA computer, timing will not be retarded. This should always be checked if detonation is a problem.

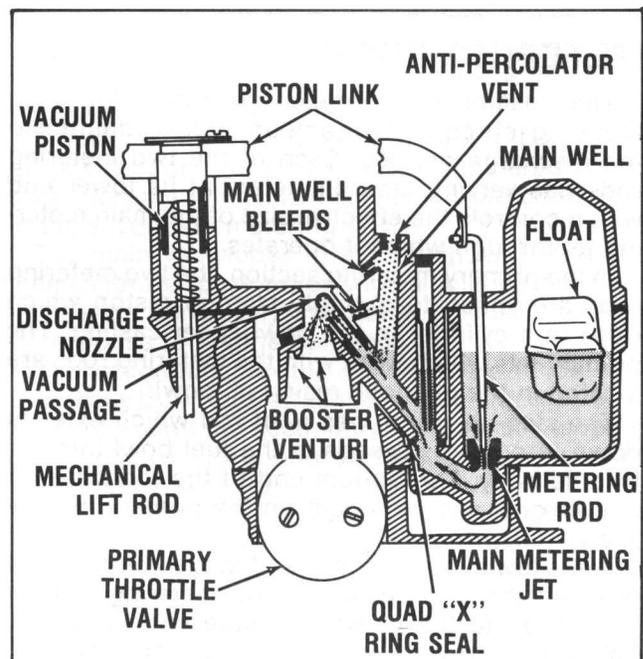


## DASHPOT

Some applications use a slow closing throttle device commonly called a dashpot. They are used to delay or slow the throttle closing the last few degrees to prevent engine stalling at the lower speeds and also to eliminate a sudden peak of hydrocarbon emissions on sudden deceleration.

At idle, the manifold pressure is very low, resulting in good vaporization of the air-fuel mixture in the intake manifold. When the throttle valve is opened, manifold pressure increases. The higher manifold pressure increases the boiling point of the liquid preventing complete vaporization of the air fuel mixture. During these periods of high manifold pressures there are some wet particles of fuel clinging to the inside of the intake manifold which is known as "wet manifold." During sudden deceleration, the manifold pressure goes back to a low pressure state, the wet particles clinging to the inside of the intake manifold go back to a vapor state and are taken into the engine as a rich mixture. This is known as "manifold flash," and can cause the engine to die out, especially at low speeds. Deceleration from higher speeds gives the engine time to clear itself of these rich mixtures, however, deceleration and sudden stops from lower speeds may cause the engine to stall. The dashpot delays or slows throttle closing, giving the engine time to clear itself of these rich mixtures to prevent engine stall.

Extra throttle return spring or maladjustment can upset the dashpot operation.

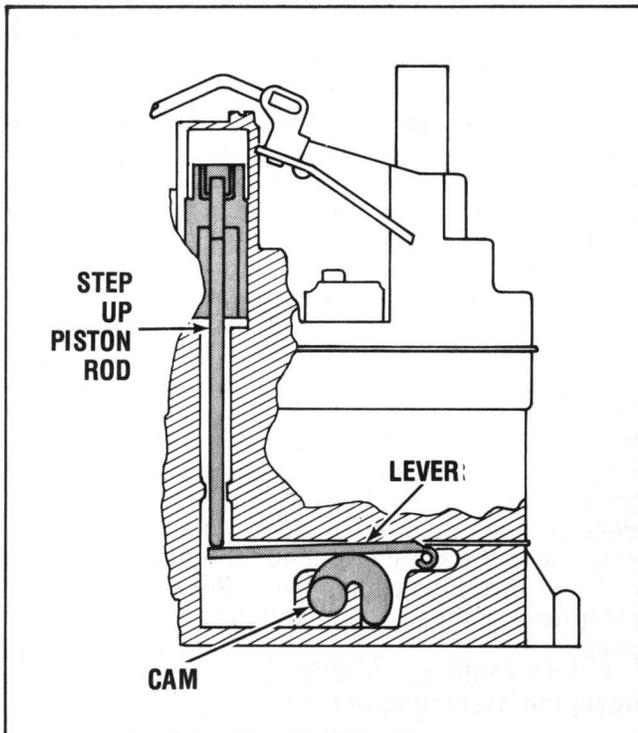


## HIGH-SPEED CIRCUIT

Fuel for part throttle and full throttle engine operation is supplied through the high speed circuit, which is divided into the primary high speed circuit and secondary high speed circuit. These two circuit functions are described separately, as follows:

## PRIMARY SIDE

The solid fuel nozzle design (uphill) provides more precise fuel metering and better nozzle control, which results in improved driveability and lower emission levels, while still maintaining maximum response and performance with no sacrifice in fuel economy.



## METERING RODS

The position of the metering rods in the main metering jets control the amount of fuel admitted to the discharge nozzles. Each of the two metering rods has varying step diameters at its lower end which controls the effective size of the main metering jet through which it operates.

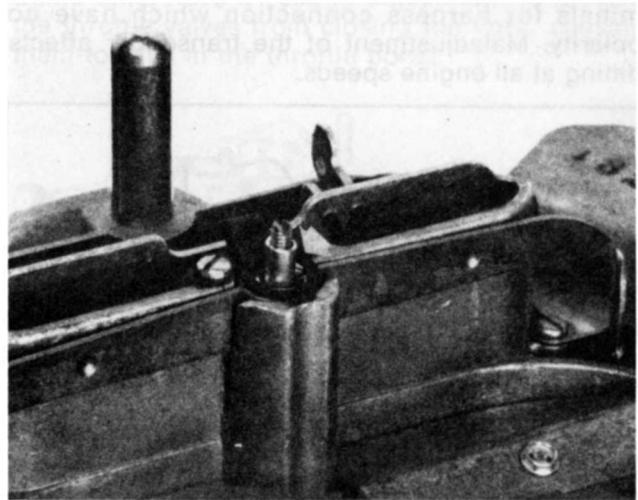
In the primary metering section, the two metering rods are yoked to a single step-up piston which rides in a cylinder in the bowl cover casting. The primary jets which work with the metering rods are located in the phenolic resin fuel bowl.

The step-up piston has a lift rod which extends down through a passage in the fuel bowl into the throttle body. The bottom end of the rod rides on a lever operated by a cam on the primary throttle shaft.

In the low and medium speed range, the cam and lever lift the step-up piston and metering rods in proportion to the primary throttle valve opening. This action provides positive mixture control.

Under high speed or engine load conditions, when the tension of the vacuum piston spring overcomes the pull of "vacuum" under the piston, the metering rod will step up so its smaller diameter (power step) is in the jet. This permits the necessary additional fuel to be metered through the jet.

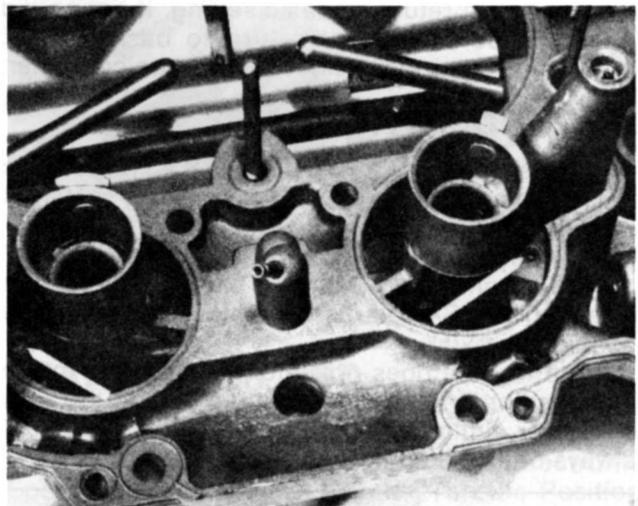
Adjustment of the metering rods *should not be attempted*, since an accurate adjustment cannot be made in the field.



## METERING ROD LOCK

Most original equipment Thermo-Quads starting with 1980 production employ a tamper resistant metering rod adjustment. After final adjustment during factory flow test the adjustment is locked by swedging a small collar on the screw.

In addition to the metering action of the metering rod in the main-metering jet, precise air-fuel measurements are constantly effected for every high-speed engine demand by three calibrated air bleeds to each of the main high-speed wells. The main well bleed is located at the top of the well and serves as an air bleed to the high-speed well and also to the angular nozzle bleed.



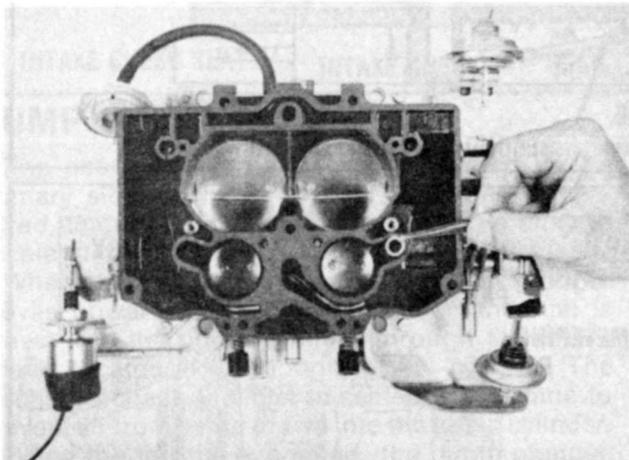
## DIMINISHING WELL AIR BLEED

The diminishing well air bleed smooths out the flow of fuel and controls the mixture of fuel and air from the nozzle in relation to air flow through the venturi. The air pressure on the diminishing well bleeds will vary in proportion to the depression in the venturi, hence a variable air bleed. The diminishing well air bleeds will deliver fuel at high RPM operation.

The air bleeds also serve as anti-percolator vents. With engine stopped or at idle, they permit vapors to escape that might otherwise build up and force raw fuel through the nozzle into the intake manifold.



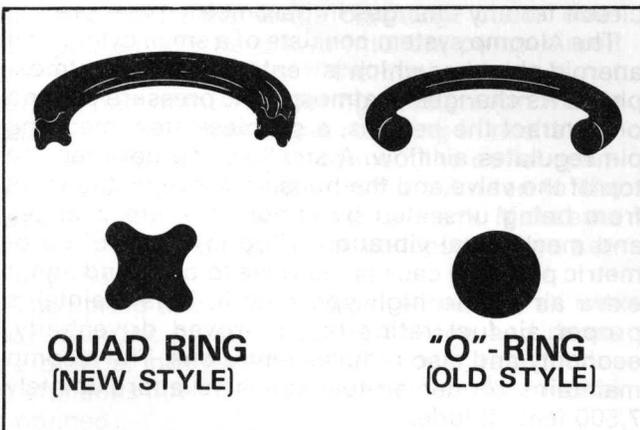
For proper fuel distribution to the intake manifold, some models use distribution tabs riveted to the "boost" venturis.



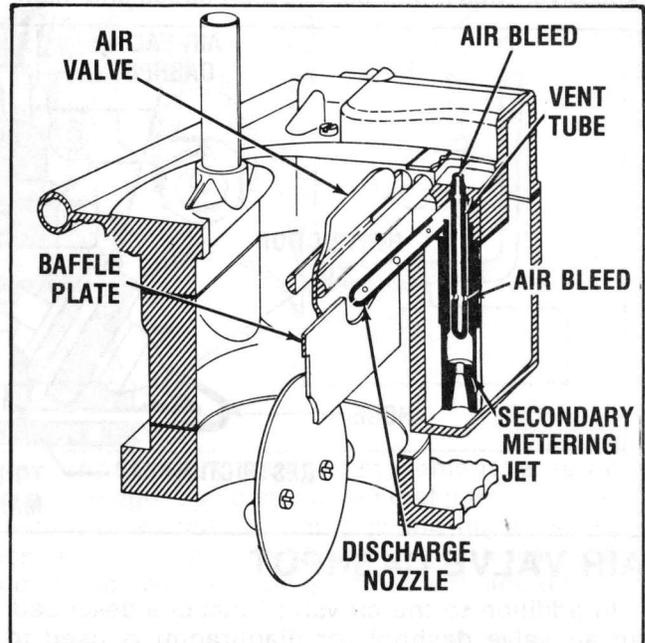
## QUAD-X RINGS

The Thermo-Quad carburetor requires a perfect seal at the primary wells located in the main body of the carburetor.

A leak at this point will cause a rough idle and off-idle condition, as unmeasured fuel is entering the intake manifold.



A Quad-X Ring, as pictured above is used to seal this passage. Problems of leakage are normally caused by attempting to use standard "O" rings, leaving them out completely, or placing two on one side and one on the other preventing a tight seal.



## SECONDARY SIDE

The Thermo-Quad incorporates an air valve controlled secondary which is air bled, using a "downhill" nozzle. A vent tube aerates the fuel as it leaves the high speed well.

For proper fuel distribution to the intake manifold, the two discharge nozzles may vary in the amount of bleed holes and size.

Liquid fuel for the high speed circuit in the secondary portion of the carburetor is metered at the secondary metering jets. There are no metering rods in the secondary metering jets.

The main vent tubes in the secondary side with their calibrated perforations and air bleeds, function to provide sensitively calibrated air-fuel mixtures in response to engine demands.

The secondary throttle valves are opened mechanically by linkage attached to the primary throttle lever. Although the secondary valves may be open, the secondary side cannot come into operation until air velocity opens the secondary air valve.

The spring loaded air valve located in the secondary side of the carburetor, is opened by air velocity through the secondary bores and closed by accurately adjusted spring tension. A unique feature of this air valve is its shape. The lower edge of the valve is contoured in such a manner that when air velocity through the carburetor is high, and the lower edge of the air valve approaches the secondary nozzles, the contours act as venturis to increase air velocity at the tips of the nozzles. The effect is comparable to a variable venturi, minus the air restrictions produced by the conventional venturi.

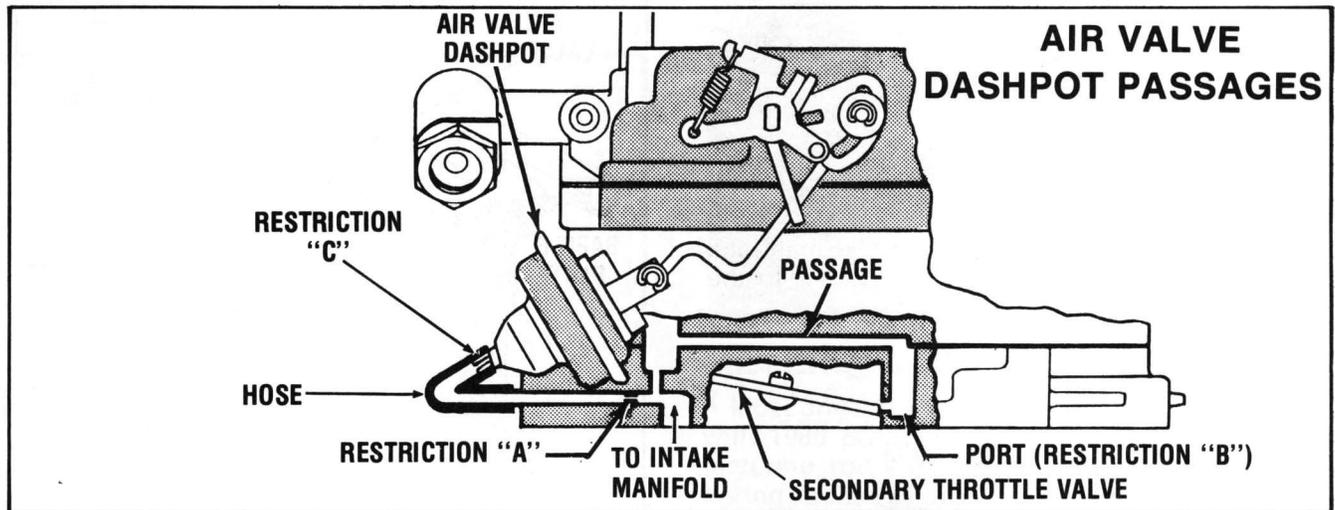
Proper adjustment of the air valve spring is most

important. If the air valve opens too soon, the air velocity is not great enough to take fuel from the main nozzle, resulting in a "bog." If the air valve opens too late, there is a loss of power and performance.

A clogged air bleed or main vent tube may cause excessively rich mixtures. The high speed and main

vent tubes are permanently installed and must not be removed.

The air bleeds at the top of the vent tubes in the secondary side of the carburetor also act as anti-percolators in the same manner as in the primary side.



## AIR VALVE DASHPOT

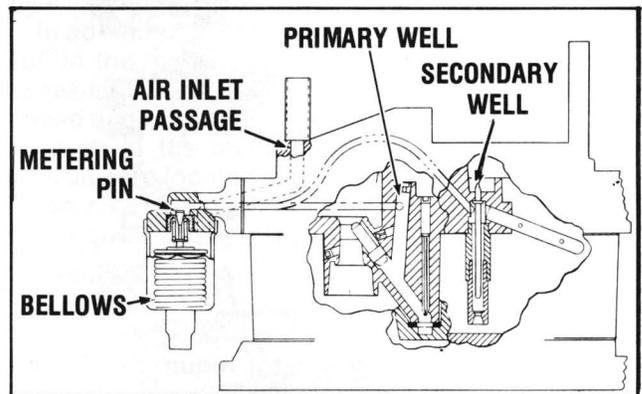
In addition to the air valve functions described, an air valve dashpot (or diaphragm) is used to further control the air valve. The operation of the dashpot plus the control restrictions and passages is as follows:

During primary throttle operating condition (secondary valves not open), manifold pressure (vacuum) is transmitted through the passages connecting the air valve diaphragm to the underside of the carburetor flange. If the secondary valves are opened from either a closed throttle or part throttle position of the primary valves, the restrictions "A", "B" and "C" bleed off manifold pressure to the diaphragm, thus allowing the air valve to open at a rate that will provide smooth secondary operation.

Restriction "A" and "C" are series restrictions for controlling rate of pressure bleed off to the diaphragm. Restriction "B" has an added function: During steady, extreme high speed operation (70 mph approx.) in high gear, or lesser speeds in a lower gear, it is possible that the secondary valves may be opened very slightly. If the diaphragm was directly connected to manifold vacuum at all times, the diaphragm might pull the air valve to a closed position causing an over-rich mixture. Restriction "B" bleeds off a part of the manifold vacuum to the diaphragm. The diaphragm can then properly position the air valve for satisfactory performance.

If bleed "B" should become plugged or restricted, a very rich condition and hesitation will occur. With too little, or no vacuum bleed off, the diaphragm will prevent proper positioning of the air valve. The high air velocity causes an improperly positioned air valve to serve as a choke, resulting in a very rich condition.

The air valve diaphragm also functions as the choke pull-off. This will be described under "choke circuit."



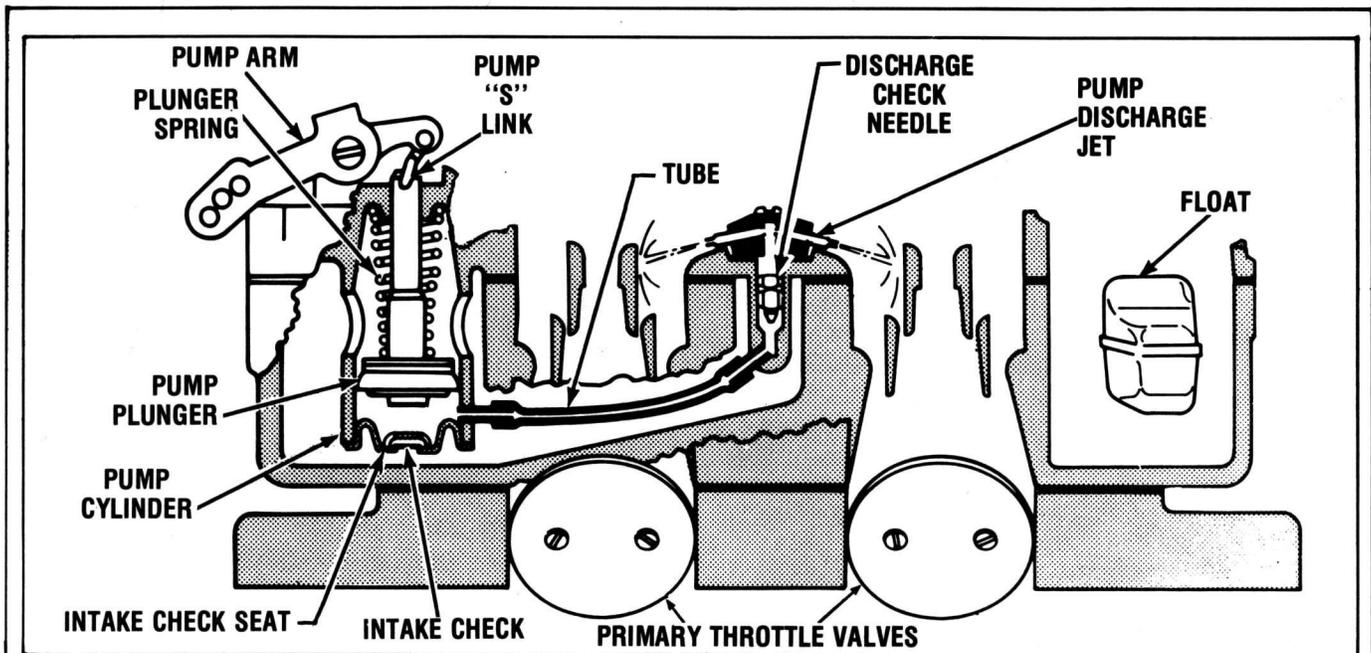
## ALCOMP SYSTEM

Many Thermo-Quad models use an altitude compensator, commonly referred to as the alcomp. It automatically adjusts the carburetor high-speed circuit for any changes in barometric pressure.

The Alcomp system consists of a small cylindrical aneroid chamber which is vented directly to atmosphere. As changes in atmospheric pressure expand or contract the bellows, a stainless steel metering pin regulates air flow. A small spring between the top of the valve and the housing prevents the valve from being unseated by minor pressure changes and mechanical vibrations. The lowering of barometric pressure causes the valve to open and admit extra air to the high speed well. This maintains proper air-fuel ratios for improved driveability, economy and also reduces emissions. The alcomp maintains proper air-fuel ratios to approximately 7,500 feet altitude.

Early models controlled both primary and secondary high speed circuits, while some later models control only the primary high speed circuit.

The unit requires no adjustment. It can be removed to service the carburetor, however, it is not serviceable in the field.



## PUMP CIRCUIT

The accelerating pump circuit, located in the primary side of the carburetor, provides a measured amount of fuel necessary to insure smooth acceleration.

When the throttle is closed, the pump plunger moves upward in the pump cylinder and fuel is drawn into the pump cylinder through the intake check, located at the bottom of the cylinder. The discharge check (needle) is seated at this time to prevent air from being drawn into the pump cylinder.

When the throttle is opened, the pump plunger moves downward closing the intake check and forcing fuel out through the discharge passage, past the discharge check needle and out through the pump jets.

A brass discharge check needle is used in all Thermo-Quads. The weight of the needle prevents pump pull-over when high air velocity creates a low pressure area at the pump jet.

It is a MUST that the intake and discharge check valves seat properly. If the discharge check does not seat, air will be drawn into the pump circuit resulting in a hesitation. If the intake check is not seating, part of the fuel during acceleration will be returned to fuel bowl, again resulting in hesitation.

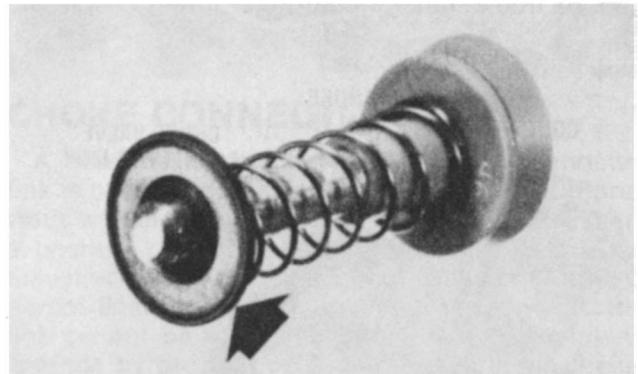
A plastic tube is used to connect the outlet opening at the bottom of the pump cylinder to the passage just below the discharge check. Make sure this tube is not damaged or collapsed when servicing the carburetor.

The spring above the plunger eliminates all free play from the pump actuating linkage and drives the plunger downward at the proper rate for instantaneous fuel delivery as soon as the throttle is opened.

A floating viton cup type accelerator pump is used. This allows a venting action for vapors to pass above the pump and allow only liquid fuel to be emitted when the pump is actuated.

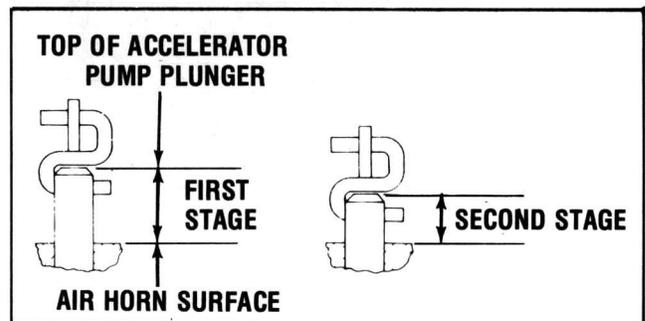
At higher speeds, pump discharge is no longer necessary to insure smooth acceleration. To pre-

vent unnecessary plunger movement, external pump linkage is so constructed that it travels "over center" when the throttle is in the higher speed positions, thus imparting just enough stroke to the plunger to keep all passages filled with liquid fuel.



## PUMP SEAL

Some 1980 and later model thermo-quads use an accelerator pump shaft seal to lower evaporative emissions.



## TWO-STAGE PUMP

Most late model Thermo-Quads incorporate a very unique accelerating pump design known as the "two-stage" system. This provides a measured amount of fuel necessary to ensure smooth acceleration at both low and high engine speeds. When

the throttle valves are opened, the plunger moves downward on stage one, forcing fuel out the discharge passage and pump jet.

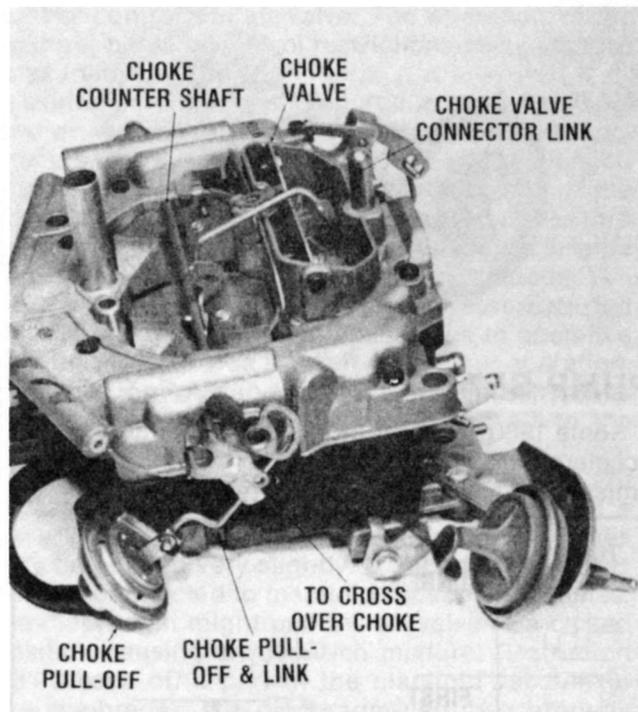
As the plunger moves to the end of stage one travel, the linkage is so designed to prevent any further travel until the secondary valves start to open. As the secondary valves start to open, linkage causes the pump plunger to begin stage two, giving additional plunger travel and fuel delivery.

All four barrel carburetors use a lock-out to prevent secondary throttle operation during the choke cycle warm-up period. During this lock-out phase, the linkage is so designed to allow the accelerating pump to combine stage one and stage two into one long stroke, increasing fuel delivery during the warm-up period.

On some models, the pump lever contains three holes for attaching the throttle connector rod. Be sure to check the vehicle specifications for the proper hook-up.

The linkage connecting the pump plunger to the throttle requires an adjustment to obtain the correct pump stroke for proper pump delivery. This adjustment must be made according to specifications listed by the manufacturer. Follow instructions and "specs" as outlined for the unit you are working on.

The intake and discharge checks and pump jet must be free of lint, gum, or other foreign material.



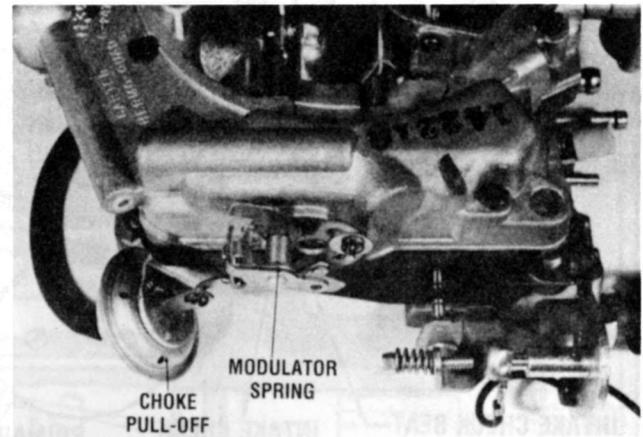
## CHOKE CIRCUIT

The automatic choke circuit provides the correct mixture necessary for quick cold engine starting and warm-up.

When the engine starts, manifold vacuum is applied to the choke pull-off, opening the choke a predetermined amount to prevent over-rich mixtures. During the warm-up period, the choke valve is always in a position relative to its three controlling factors: air velocity, choke coil heat and manifold

vacuum.

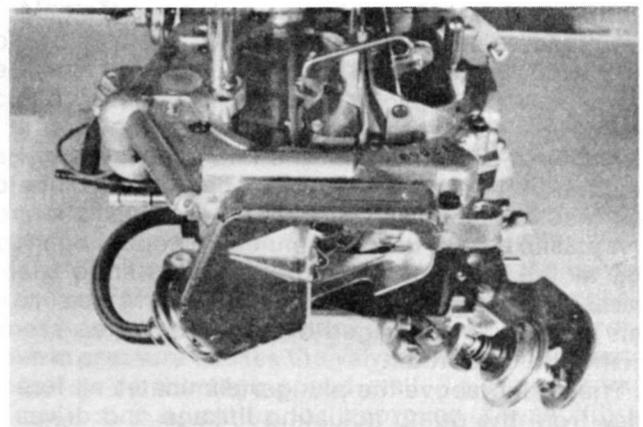
If the engine is accelerated during the warm-up period, the corresponding drop in manifold vacuum allows the thermostatic coil to close the choke slightly, providing a richer mixture.



## CHOKE PULL-OFF & MOD. SPRING

The Thermo-Quad choke pull-off diaphragm works in conjunction with a modulator spring attached to the inner and outer choke counter shaft levers. Early models use an extension spring and later models use a torsion spring. It provides better warm-up mixtures by allowing the amount of choke pull-off opening to vary with the torque of the choke coil spring.

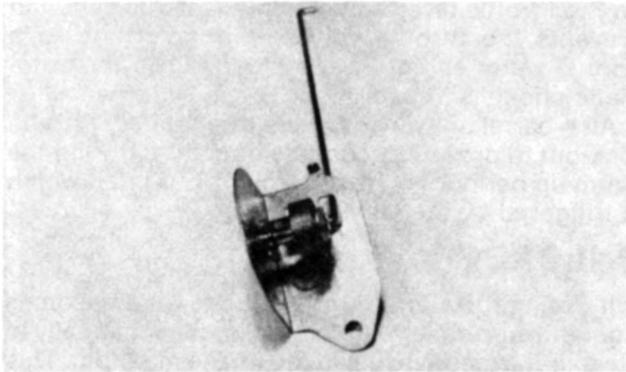
The Thermo-Quad carburetor has many unique features which require extra caution during all adjustments. For example: The choke pull-off diaphragm provides two separate functions. It still provides for choke break, but it also controls the secondary air valve. Because of the separate nature of the two functions, two distinct but interrelated adjustments are necessary and these adjustments must be performed in the proper sequence.



## TAMPER PROOF CHOKE PULL-OFF

For a period of time, regulations required tamper-proofing the choke pull-off linkage. On these units the choke pull-off is spot welded to a housing which serves as the mounting bracket and also a part of the tamperproof enclosure.

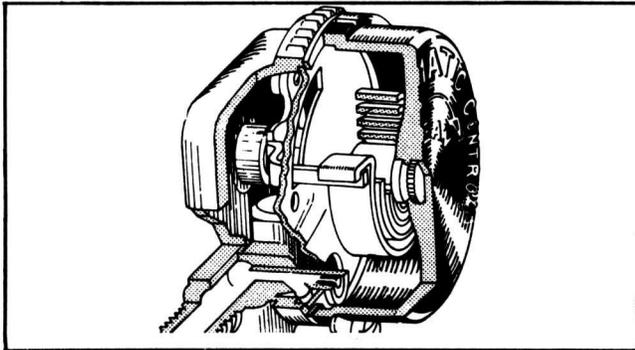
The outside cover plate is riveted on to enclose the choke pull-off link.



## CROSS-OVER CHOKE

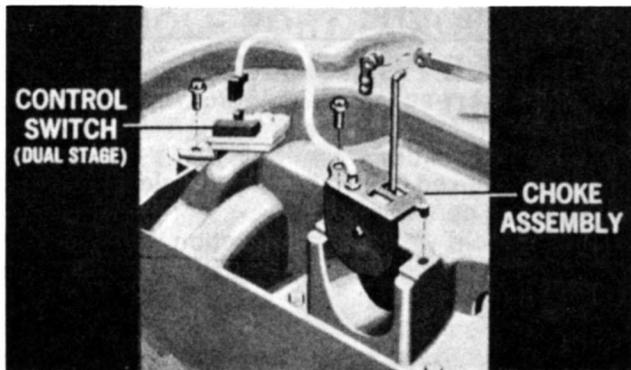
Most models use the cross-over (remote mounted) type choke mounted in a heat pocket of the exhaust manifold.

When the cross-over type choke is used, the carburetor mounting gasket is most important. If it's not to specified thickness it upsets choke calibration due to the length of the choke rod.



## INTEGRAL CHOKE

A few applications use the integral choke. Its operation is the same, however, the adjustments are different.



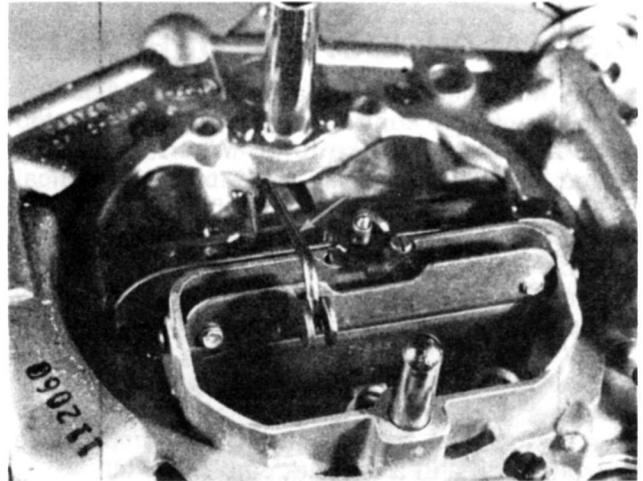
## ELECTRIC ASSIST CHOKE

Electric assist chokes are used in many applications to help reduce Hc and Co emissions during starting and warm-up. It gives a closer choke calibration during the warm-up period. This device consists of a heating element located next to the thermostatic spring as a part of the choke assembly. A wire from the heater element is connected to an electric control switch. It is designed to shorten choke duration above a predetermined temperature.

Below this predetermined temperature, it provides the choke heater with partial power or heat, allowing a longer choke duration.

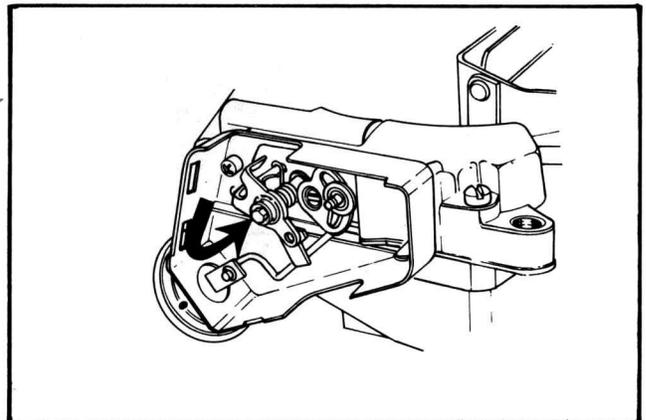
To check the electrical heating element an ohm-meter is used. Resistance of 4 to 12 ohms is normal, check specs for particular application.

The switch heat is controlled by engine temperature and a small internal electrical heater. The dual stage choke provides three levels of choke heat. 1) low heat during engine warm-up. 2) high heat after engine warm-up. 3) none well after the warm-up period.



## CHOKE CONNECTOR LINK

A newly designed, hardened choke connector link is being used on 1981 and later units. On previous models the outer choke control lever was in a positive position and the choke control lever adjustment was made by bending the choke connector link. Since the hardened choke connector link cannot be bent, the control lever adjustment is made by proper positioning of the outer choke lever.



## CHOKE LEVER

The new outer choke lever is coned to fit over a new choke countershaft which has a 3 degree taper. The countershaft is drilled and tapped for a 4-40 screw to hold the outer counter shaft lever in place. As the direction of torque is counter clockwise, **this screw has left handed threads.**



## VACUUM PULL-OFF CHOKE

Some units use a V-Poc, "Vacuum Pull-Off Choke," which is a vacuum controlled diaphragm connected by linkage to the choke lever. When vacuum is applied, it opens the choke valve to a near vertical position. This positive opening of the choke prevents any choke operation after the initial warm-up period.

In some applications the V-Poc is controlled by a temperature compensated timer.

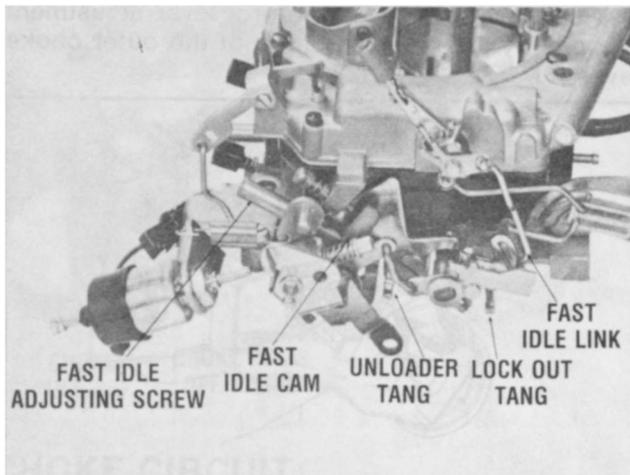
The "V-Poc off time" will vary with temperature, however the minimum time is 35 seconds.

In other applications, the V-Poc is controlled by three factors: a transmission switch, temperature control switch and a vacuum control switch.

The transmission switch allows operation of the V-Poc only when in high gear.

The temperature control switch is mounted on the cylinder head and prevents operation of the V-Poc until the temperature reaches approximately 40 degrees F.

The vacuum control switch prevents operation of the V-Poc when manifold vacuum is below 6" Hg.



## FAST IDLE AND UNLOADER LINKAGE

### FAST IDLE

During the warm-up period, it is necessary to provide a fast idle speed to prevent engine stalling. This is accomplished by a fast idle cam connected to the choke linkage. The fast idle adjusting screw

on the throttle lever contacts the fast idle cam and prevents the throttle valves from returning to a normal warm engine idle position, while the automatic choke is in operation.

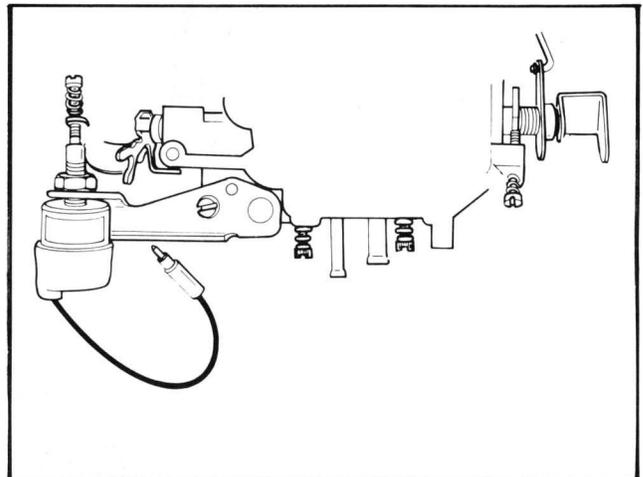
All 4-barrel units incorporate a secondary throttle lock-out to prevent secondary operation during the warm up period. This is controlled by a latch which is triggered by the fast idle system.

## UNLOADER

If during the starting period the engine becomes flooded, the choke valve may be opened manually to clean out excessive fuel in the intake manifold. This is accomplished by depressing the accelerator pedal to the floor mat and engaging the starter. The unloader projection on the throttle lever contacts the unloader lug on the fast idle arm and partially opens the choke valve.

## A WORD OF WARNING

External carburetor linkages are designed to operate dry and should not be lubricated. If oil is used, it will attract dirt, become gummy and interfere with correct linkage operation.



## THROTTLE POSITIONER SOLENOID

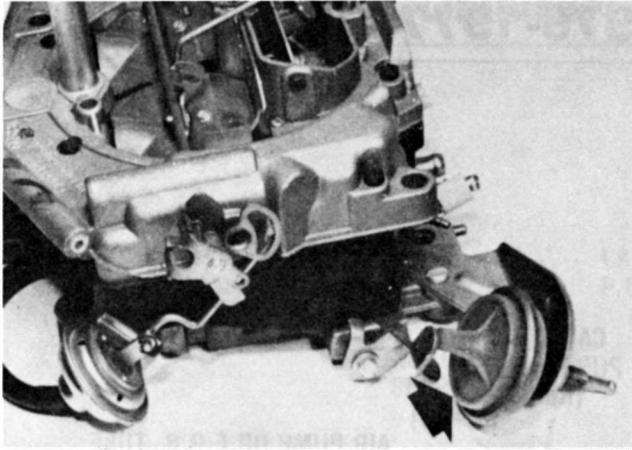
Some applications use a throttle positioner solenoid, referred to as a decel solenoid, to protect the catalytic converter.

The solenoid works in conjunction with an electronic speed switch and positions the throttle valves during rapid deceleration.

The electronic speed switch senses the pulses from the electronic ignition system to determine engine R.P.M.

When the engine speed is at, or above approximately 2000 R.P.M., the electronic speed switch energizes the solenoid which is adjusted to hold the throttle valves at approximately 1500 R.P.M. When engine speed drops to 2000 R.P.M., the electronic speed switch de-energizes the solenoid allowing the throttle valves to return to normal idle.

This permits a sufficient flow of air to properly balance air-fuel ratios, provide more complete combustion and protect the converter from overheating.



## VACUUM THROTTLE POSITIONER

Some applications use a vacuum throttle positioner which serves two functions.

It consists of an electronic speed switch, an electrically controlled vacuum solenoid valve and a vacuum operated throttle positioner.

Its decel and operating functions are the same as the solenoid positioner above.

When the vacuum throttle positioner is deactivated, the bleed-off on the control side of the diaphragm causes the positioner to function as a dashpot.

## PURGE PORTS

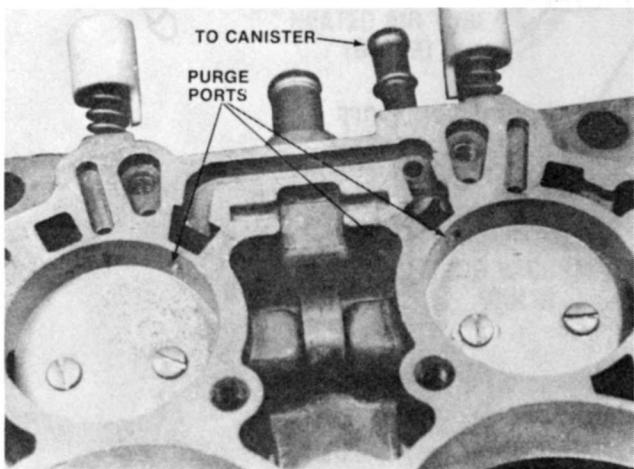
As a part of the evaporative emission control system, purge ports have been added to scavenge the fuel vapors which have been routed to the canister via the outside bowl vents.

Three types of purge systems are used:

- a.) 2 hole port purge
- b.) 3 hole port purge
- c.) Full flow purge

## TWO HOLE PORT PURGE

The purge ports are located on the atmospheric side of the throttle valves. As the throttle valves are opened, the ports are exposed to manifold vacuum to give a predetermined amount of air flow from the canister.

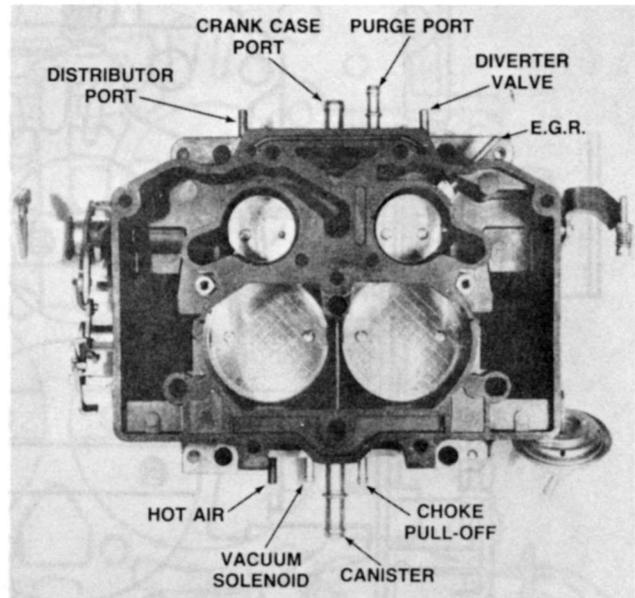


## THREE HOLE PURGE SYSTEM

The 3 hole purge system is used to increase air flow for improved canister purging. In addition to the purge ports in the primary bores, a purge hole has been located in the lifter cam cavity which is subjected to manifold vacuum at all times. The high manifold vacuum is partially bled off by the purge ports in the primary bores. As the throttle valves are opened, there is less bleed off from the purge ports in the primary bores which increases air flow from the canister. The passageway to the canister also acts as a restrictor to control maximum air flow.

## FULL FLOW PURGE

Starting in 1980, some models use full flow purge. Manifold vacuum from the cam cavity is supplied directly to the purge fitting. In this system, manifold vacuum is controlled by an external on/off control.



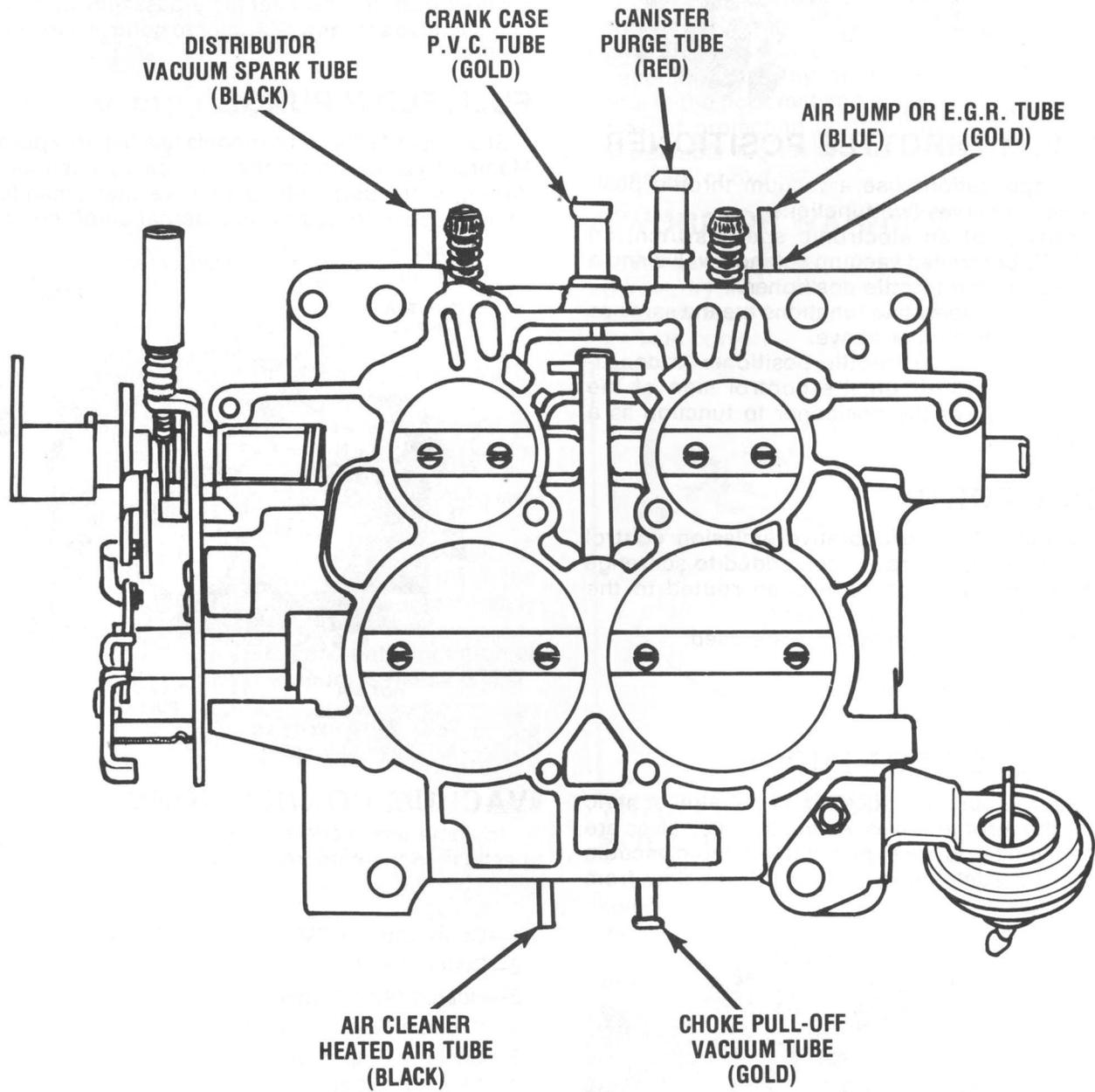
## VACUUM CONNECTIONS

In some late models there are nine vacuum connections to the carburetor, namely:

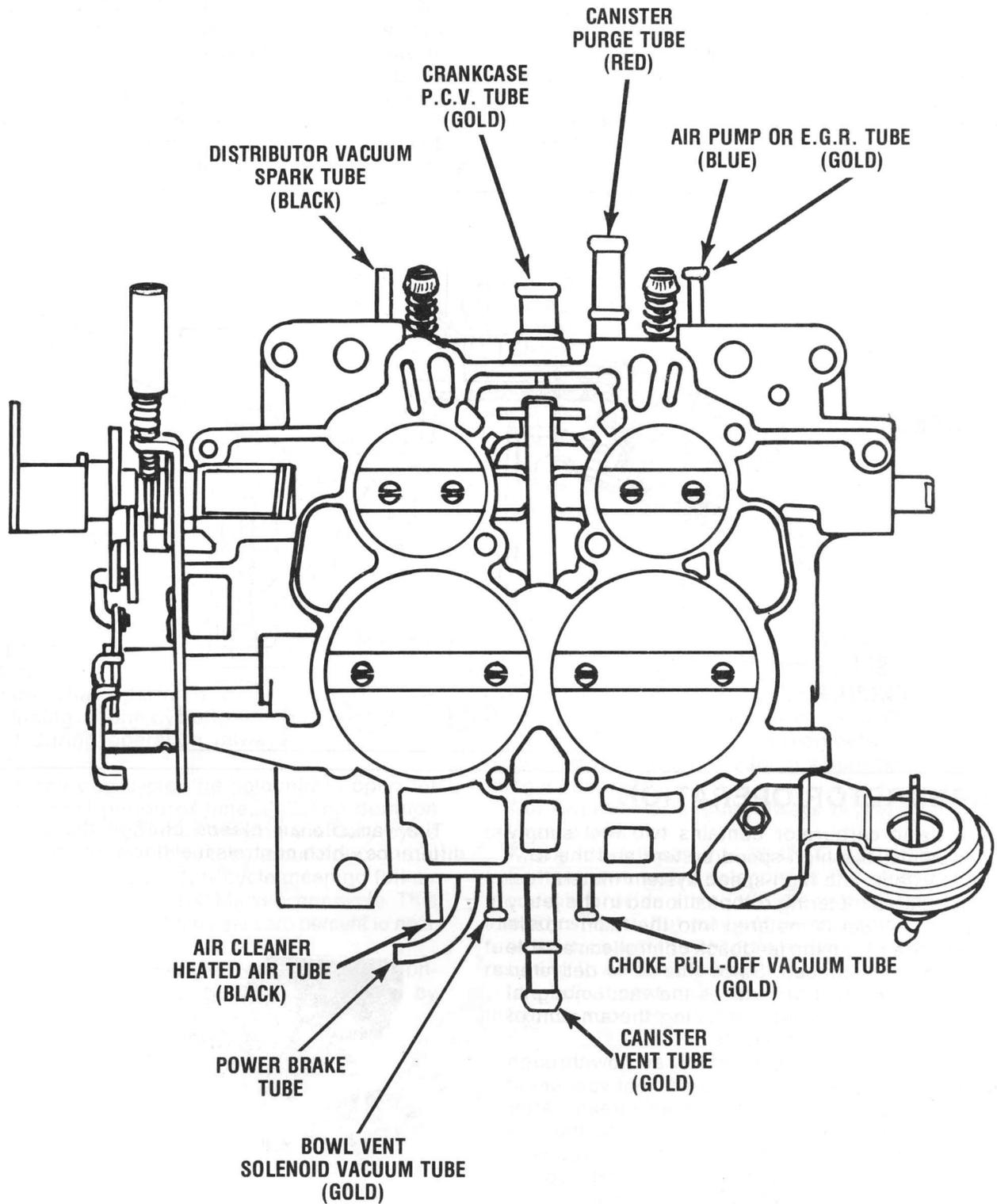
- 1—Crank Case (PCV)
- 2—Distributor Port
- 3—Heated (Air Cleaner)
- 4—Vacuum Solenoid (Bowl Vent)
- 5—Canister (Vapor Out)
- 6—Choke Pull-Off
- 7—EGR
- 8—Diverter Valve (Air Pump)
- 9—Purge Port (Vapor In)

Proper idle adjustment with correct positioning of the throttle valve is required to insure correct initial vacuum signal "Starting Point" for the various ported connections.

# HOSE CONNECTIONS 1976-1977 MODELS



# HOSE CONNECTIONS 1978 thru 1982



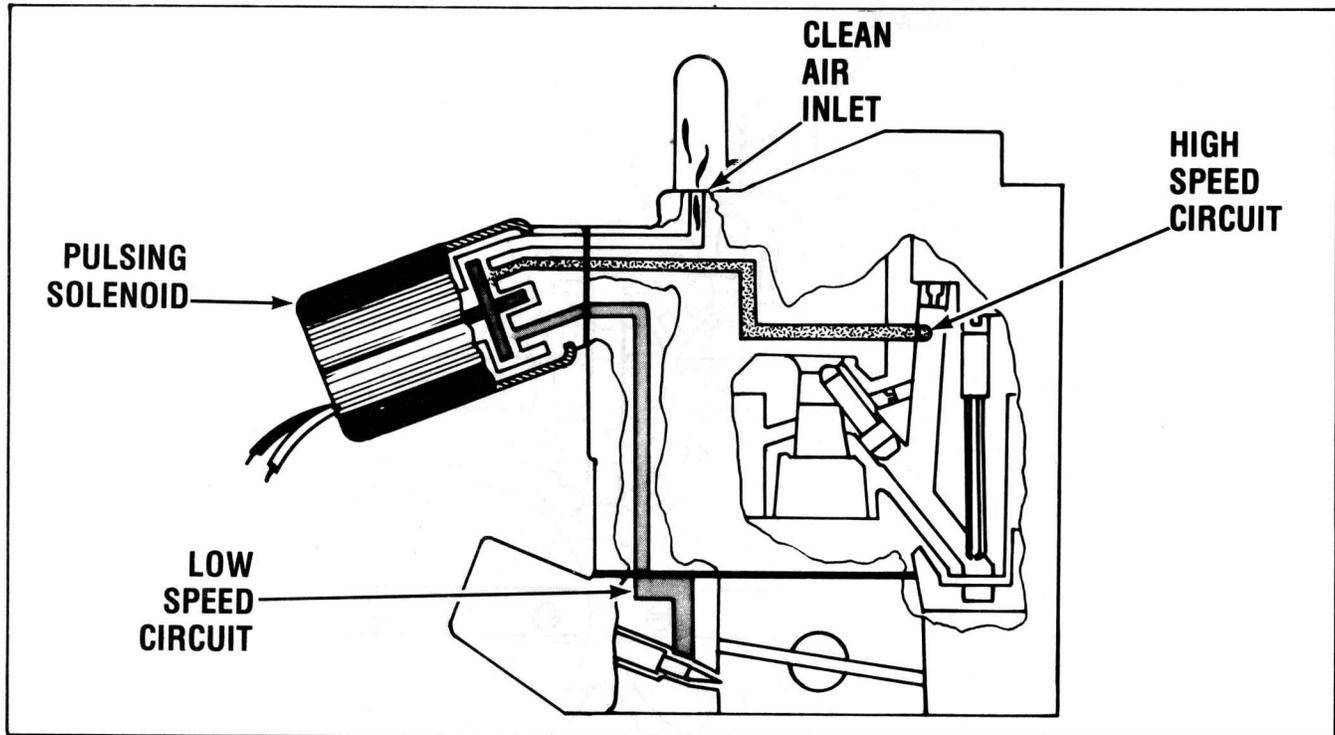
# THE FEEDBACK SYSTEM USING VARIABLE AIR BLEEDS

## THERMO-QUAD WITH O<sub>2</sub> FEEDBACK

The basic purpose of feedback control is to provide a narrow air-fuel ratio band so that the catalytic converter will operate at maximum efficiency.

A feedback controlled carburetion system is supplied by Carter that maintains a flow of exhaust

gases of uniform composition to catalytic converters. This is a requirement if three-way catalytic converters are to be used in meeting projected emission standards. Exhaust gas uniformity depends upon delivery of a constant air-fuel ratio by the carburetor. Instead of metering fuel directly, Carter Automotive finds that precise and responsive control of the air-fuel ratio is obtained by using variable air bleeds in the carburetor fuel circuits.

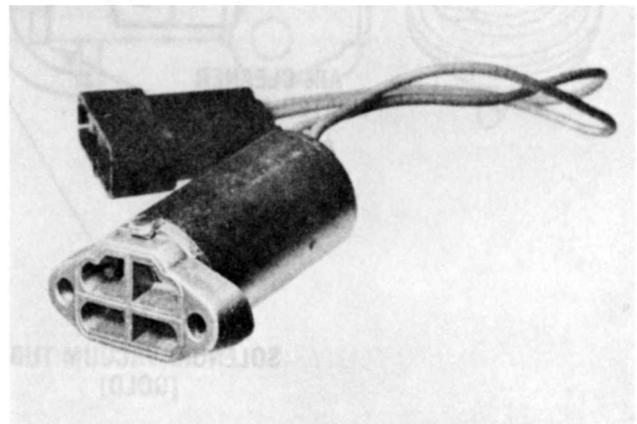


## CARBURETOR OPERATION

The basic carburetor contains two fuel supply sub-systems; the high-speed system and the low-speed system. The high-speed system meters fuel with a tapered metering rod positioned in the jet by the throttle. Fuel is metered into the main nozzle well where air from the feedback controlled variable air bleed is introduced. Since this air is delivered above the fuel level, it reduces the vacuum signal on the fuel consequently reducing the amount of fuel delivered from the nozzle.

The idle system is needed at low air flow through the venturi because there is insufficient vacuum at the nozzle to draw fuel into the air stream. After leaving the main jet, fuel is supplied to the idle system by the low-speed jet. It is then mixed with air from the idle by-pass, then accelerated through the economizer and mixed with additional air from the idle bleed before being discharged from the idle ports below the throttle. Air from the variable air bleed is introduced between the idle air bleed and idle port. This air reduces the vacuum signal on the low speed jet and consequently the amount of fuel delivered to the idle system.

The variable air bleeds change the pressure difference which controls fuel flow through the jets.

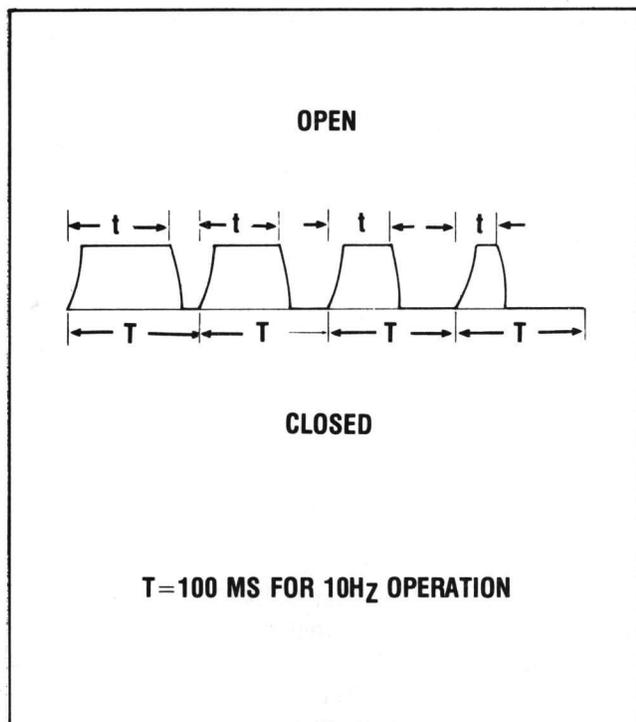


## PULSE SOLENOID

The Thermo-Quad uses a pulse solenoid to control the variable air bleeds.

The solenoid has only two positions of operation;

opened when energized to bleed air to both the high speed and low speed circuits, or closed when de-energized, cutting off the air bleeds.



## PULSE WIDTH MODULATION

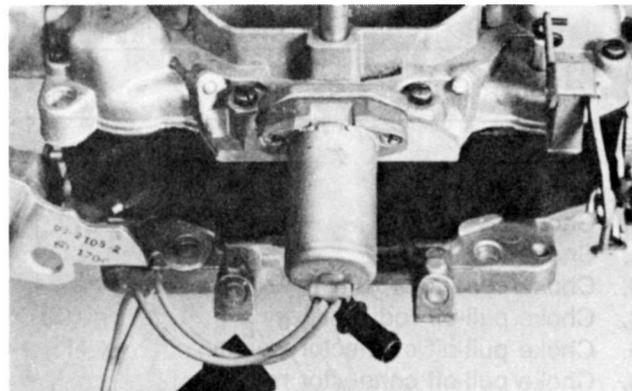
During normal operation the solenoid goes through one open and one closed period in each cycle. The pulse solenoid is a 10 Hz. frequency (10 cycles per second) which adds up to 100 Mil/sec. per cycle.

Each cycle has a particular time period, "T," from the beginning of one cycle to the next and is held constant during operation (always 10 cycles per second).

During any one cycle, the solenoid is open for some fractional period of time, "t." The duration of "t" can be varied, thus varying the duty cycle and amount of air bleed to the carburetor circuits.

One hundred percent duty cycle meaning full air bleed for approximately 100 Mil/sec. per cycle. This duty cycle may be varied from near zero percent to near one hundred percent.

Pulse width modulation of the air flow is controlled by the solenoid duty cycle as signaled by the computer.



## CHECKING PULSE SOLENOID

Checking the pulse solenoid is very quick and easy. With engine at operating temperature, merely place hand on solenoid. If not pulsing, shut-off engine and disconnect wiring harness from pulse solenoid.

Check for open or shorted coil winding by using an ohmmeter across the two blue wires. (The coil is not grounded to the case.) The reading should be 22 ohms resistance at room temperature.

If winding checks good, momentarily flash 12 volts to pulse solenoid to check armature movement.

A dwell meter can be used with the pulse solenoid to give an overall indication of operation. The dwell reading would be indicative of the ratio of "on" to "off" time which is referred to as pulse width modulation. With engine warmed up, place fast idle cam to obtain approximately 1200 RPM and check dwell reading. Closing the choke valve slightly to richen air fuel mixture should give an increase in dwell.

A command from the computer to "lean out" would give a dwell reading between 30 to 60 degrees dwell, a rich command would read between 0 to 30 degrees dwell. An ideal reading would be between 28 to 32 degrees.

The dwell meter should always be set on the 6 cylinder scale.

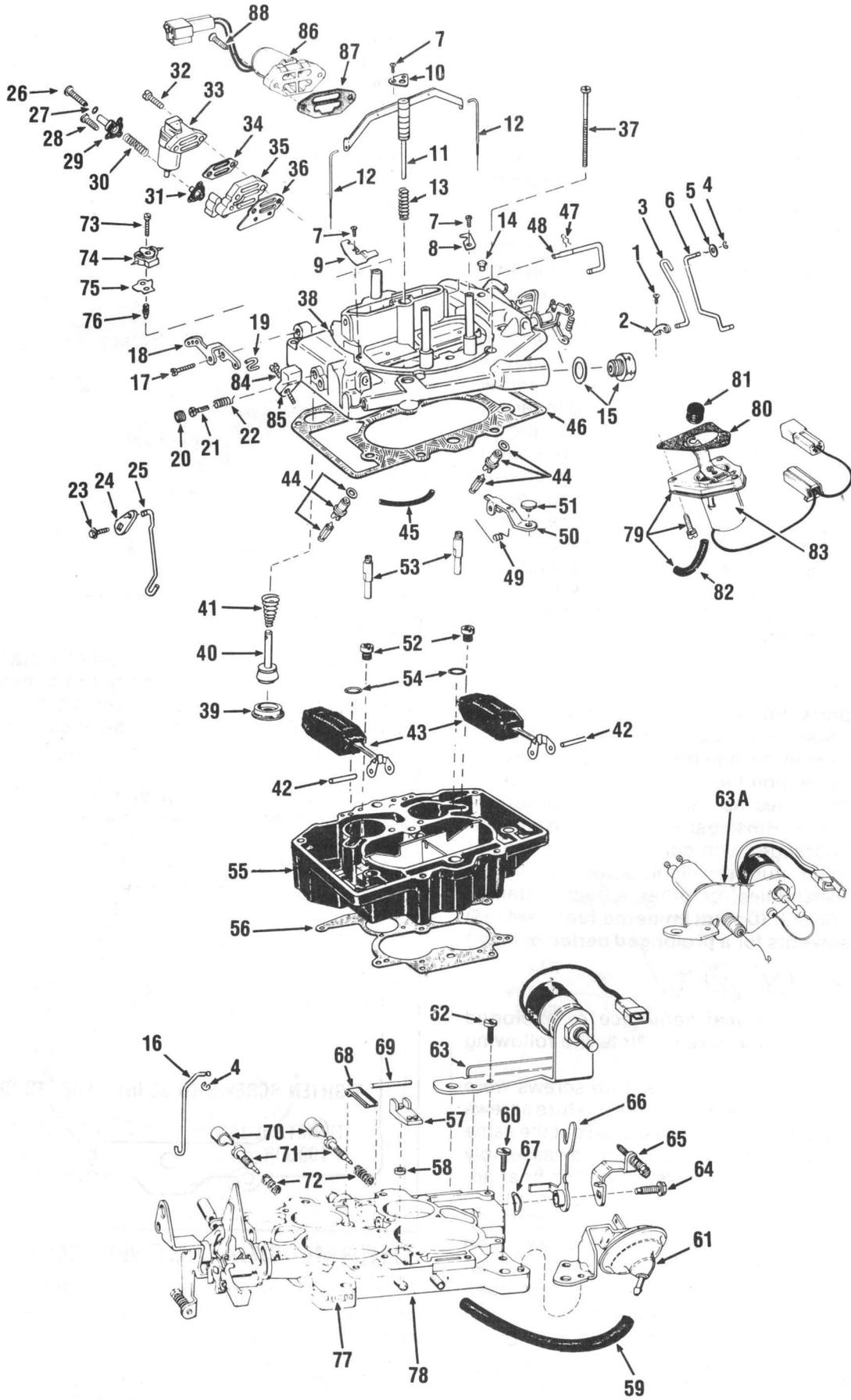
Proper idle adjustment with the O<sub>2</sub> system is most important. The pulse solenoid in the closed loop mode will provide a smooth idle with an improper idle adjustment, but may not be able to control air fuel mixture as the throttle valves are opened, resulting in an off idle bog.

Idle adjustment must be made as specified on the underhood decal.

# EXPLODED VIEW PARTS LISTS

- |                                                      |                                        |
|------------------------------------------------------|----------------------------------------|
| 1. Choke lever screw                                 | 45. Pump passage tube                  |
| 2. Choke lever                                       | 46. Bowl cover gasket                  |
| 3. Choke connector rod                               | 47. Bowl vent pin retainer             |
| 4. Choke pull-off rod retainer (2)                   | 48. Bowl vent lever (upper)            |
| 5. Choke pull-off connector washer                   | 49. Bowl vent lever spring             |
| 6. Choke pull-off connector rod                      | 50. Bowl vent arm                      |
| 7. Step-up piston and metering rod cover plate screw | 51. Bowl vent grommet                  |
| 8. Metering rod cover plate (choke side)             | 52. Primary metering jet (2)           |
| 9. Metering rod cover plate (pump side)              | 53. Secondary metering jet (2)         |
| 10. Step-up piston cover plate                       | 54. Quad "X" rings-1972 and later (2)  |
| 11. Step-up piston assembly                          | 55. Fuel bowl                          |
| 12. Metering rod (2)                                 | 56. Flange gasket                      |
| 13. Step-up piston spring                            | 57. Idle compensator valve             |
| 14. Bowl vent adjustment plug                        | 58. Idle compensator gasket            |
| 15. Fuel inlet fitting and gasket                    | 59. Choke pull-off hose                |
| 16. Throttle connector rod                           | 60. Choke pull-off bracket screw       |
| 17. Pump arm screw                                   | 61. Choke pull-off and bracket         |
| 18. Pump arm                                         | 62. Bracket screw (if used)            |
| 19. Pump connector "S" link                          | 63. Solenoid and bracket               |
| 20. Air valve lock plug                              | 63A. Transducer and bracket            |
| 21. Air valve adjustment plug                        | 64. Bowl vent lever operating screw    |
| 22. Air valve spring                                 | 65. Bowl vent lever (lower)            |
| 23. Countershaft screws                              | 66. Bowl vent fork lever               |
| 24. Countershaft lever                               | 67. Throttle shaft washer              |
| 25. Fast idle connector rod                          | 68. Step-up piston lifter              |
| 26. Idle enrichment screw                            | 69. Step-up piston lifter rod          |
| 27. Idle enrichment cover screw washer               | 70. Idle limiter cap (2)               |
| 28. Idle enrichment cover screw (2)                  | 71. Idle mixture screw (2)             |
| 29. Idle enrichment diaphragm cover                  | 72. Idle mixture screw spring (2)      |
| 30. Idle enrichment diaphragm spring                 | 73. Pump housing screw                 |
| 31. Idle enrichment diaphragm                        | 74. Pump jet housing                   |
| 32. Altitude compensator screw (2)                   | 75. Pump housing gasket                |
| 33. Altitude compensator                             | 76. Pump discharge check needle        |
| 34. Altitude compensator gasket                      | 77. Carburetor identification number   |
| 35. Idle enrichment casting                          | 78. Flange assembly                    |
| 36. Idle enrichment casting gasket                   | 79. Bowl vent valve screw (3)          |
| 37. Bowl cover screw (10)                            | 80. Bowl vent valve gasket             |
| 38. Bowl cover assembly                              | 81. Bowl vent valve grommet            |
| 39. Pump intake check assembly                       | 82. Bowl vent valve hose               |
| 40. Plunger assembly                                 | 83. Bowl vent solenoid                 |
| 41. Plunger spring                                   | 84. Low idle speed screw               |
| 42. Float pin (2)                                    | 85. Low idle speed screw spring        |
| 43. Float (2)                                        | 86. Pulse solenoid                     |
| 44. Needle, seat and gasket                          | 87. Pulse solenoid mounting gasket     |
|                                                      | 88. Pulse solenoid mounting screws (2) |

# EXPLODED VIEW



# ADJUSTMENTS

## DISASSEMBLY

The numerical sequence of the exploded view may be followed in most instances to disassemble the carburetor far enough to permit cleaning, inspection, and installation of kit contents. Variations in design, omission and addition of parts may occur between models in this group. **NOTE: To remove pump plunger (40) use a small rod placed on upper end of plunger shaft and tap lightly.**

On some models the countshaft lever (24) is not removable. It will be necessary to revolve the bowl cover to disengage the fast idle cam rod (25) from slot in cam to separate bowl cover from fuel bowl. **Do not** disturb transducer adjustment. To remove, take transducer and bracket assembly off carburetor as a unit. Two of the bowl cover screws (37) are located between choke valve and inner wall of bowl cover. The air valve parts (20, 21, and 22) should not be removed unless air valve or shaft is binding. If the idle limiter caps (70) must be removed to qualify the idle, position the limiter caps to the stop. Remove caps from idle air mixture screws carefully to avoid damaging screws. Before removal of idle adjustment screws, be sure and count the number of turns to seat the screws as the same number of turns from the seat should be maintained during the reassembly of carburetor.

## CLEANING

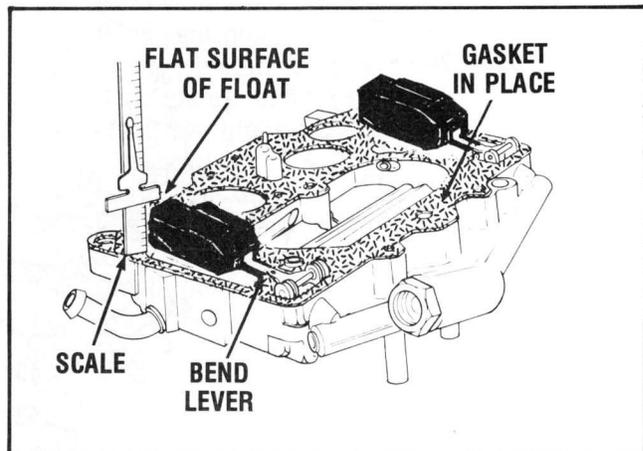
Clean all parts thoroughly in an approved cleaning solvent. Special attention should be given to carbon deposits in throttle bores and passages. Do not use wires or pointed tools to clean passages and calibrated holes as calibration of carburetor may be destroyed. Rinse parts in a suitable solvent. Blow out all passages with compressed air. Do not immerse leather, rubber, diaphragms, solenoids, transducer assemblies, or other similar materials in cleaning solvent. **(Do not immerse fuel bowl (55) in cleaning solvents for a prolonged period of time.)**

## REASSEMBLY

Reverse the numerical sequence of exploded view to reassemble carburetor. Note the following special instructions:

1. If the idle limiter caps and mixture screws were removed during disassembly, the mixture screws should be seated lightly then backed out the same number of turns established during disassembly for initial idle mixture adjustment. For final adjustment, see decal in engine compartment.
2. Lubricate the cup on plunger assembly (40). Install spring (41) small end downward on plunger stem. Install stem through hole in bowl cover, and install "S" link (19) with lower open end toward choke to hold in place.
3. Install step-up piston assembly (11) with guide dimples toward choke valve.
4. Be sure quad "X" rings (54) are seated properly in bowl well before installing bowl cover assembly.

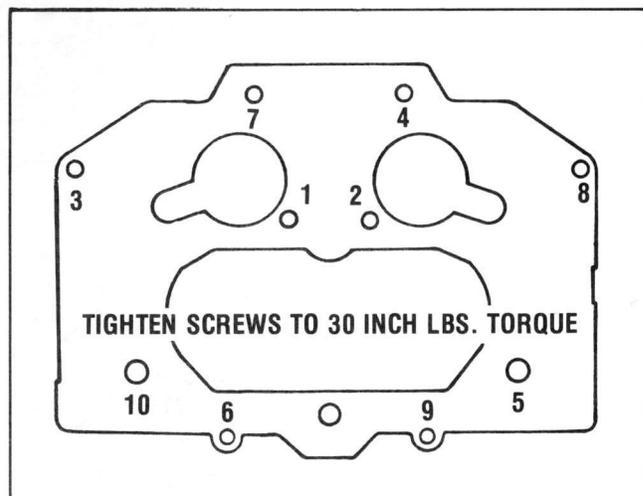
5. Be sure the upper vent lever (48) on bowl cover is positioned in the fork of bowl vent lever (66) on flange assembly when installing bowl cover.
6. **CAUTION:** Damage to the fuel bowl (55) will result if the ends of float pins (42) are allowed to extend between bowl cover (38) and fuel bowl when tightening bowl cover screws (37).
7. On completion of all adjustments, be sure throttle valves move freely from wide open to closed position.



## FLOAT LEVEL

With bowl cover inverted, gasket installed and floats resting on seated needle, the dimension of each float from bowl cover gasket to bottom side of float should be according to specifications for the particular carburetor involved. To adjust, bend the float lever.

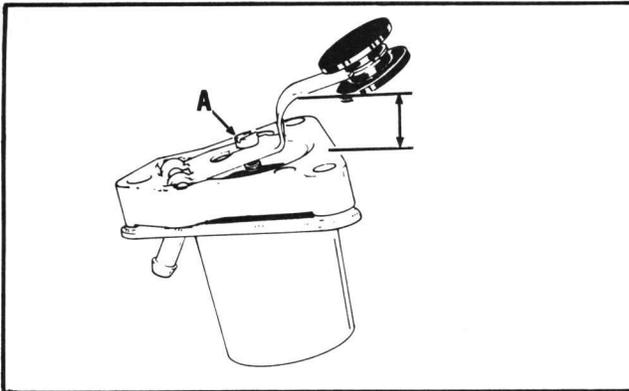
**CAUTION:** Never allow lip of float to be pressed against the needle when adjusting.



## THERMO-QUAD BOWL COVER

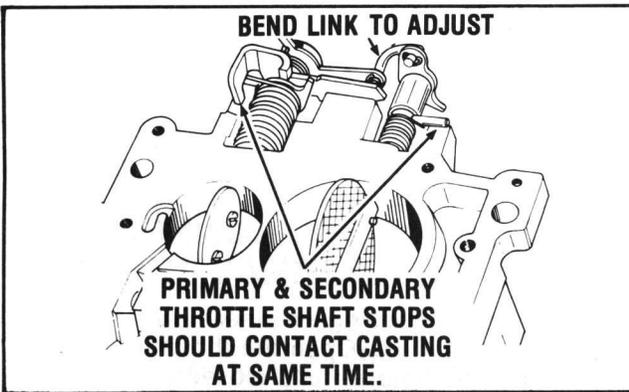
To assure the proper gasket sealing, the bowl cover screws should be tightened in the sequence shown in illustration.

1. Tighten center screws 1 & 2
2. Tighten outside screws in order
3. Retighten center screws 1 & 2



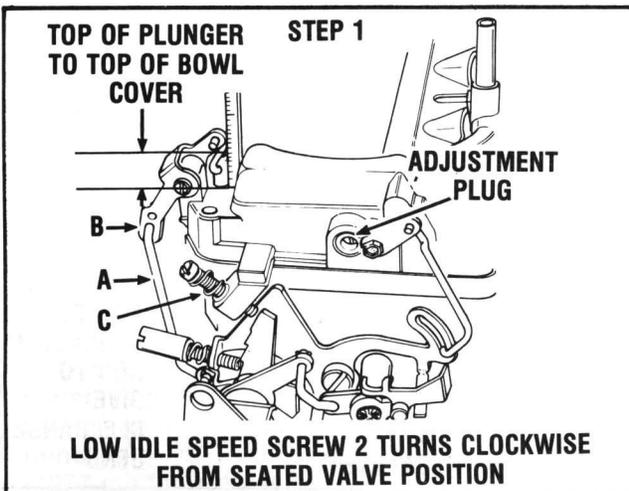
### SOLENOID OPERATED VENT VALVE, ELECTRIC WITH VACUUM ASSIST (IF EQUIPPED)

Adjustment must be made with the unit removed from the carburetor. To adjust, apply battery voltage and manually push the control arm downward where it will be held by the solenoid. The distance from the control arm to the housing should be .209 (#4 drill) and is achieved by adjusting the diaphragm screw "A".



### SECONDARY THROTTLE LINKAGE

Open throttle valves to the wide open position. The primary and secondary throttle shaft stops should contact casting at the same time. To adjust, bend link. Do not attempt to adjust secondary throttle valves to the wide open (vertical) position.

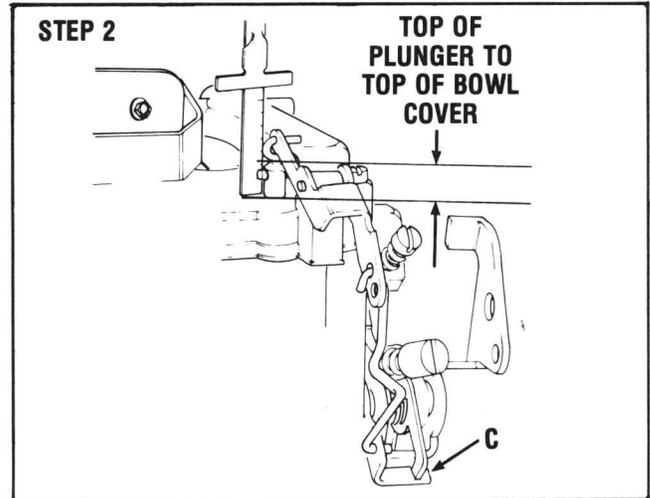


### PUMP

Both following steps must be made with the throttle connector rod (A) in proper hole of pump arm (B) as shown in specifications with choke in open position.

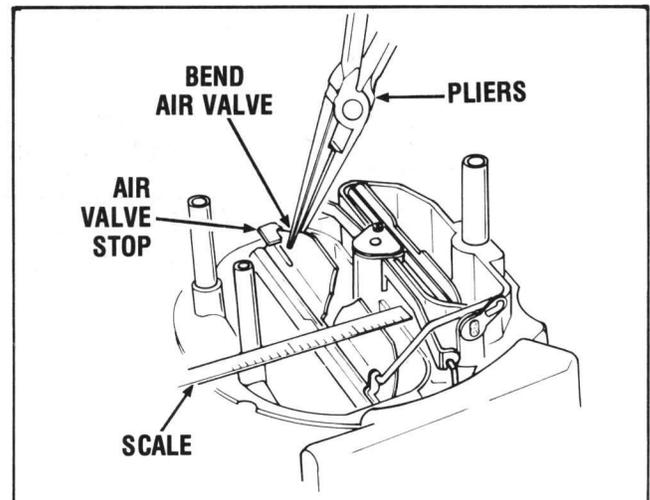
#### STEP 1

Turn low idle speed screw (c) clockwise until it just touches the stop and continue two (2) full turns. The dimension from the top of plunger stem to top of bowl cover should be as specified. To adjust, bend connector rod (A).



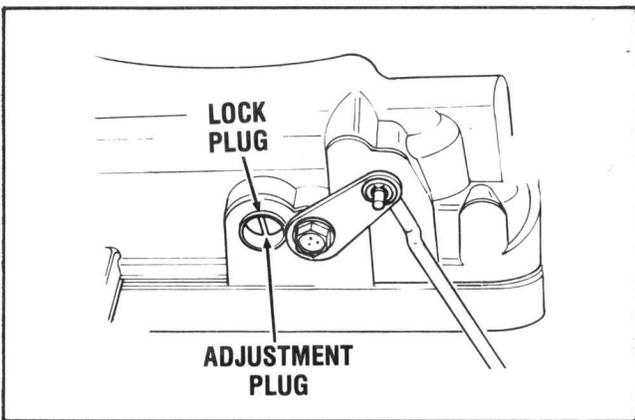
#### STEP 2 (IF REQUIRED)

Open throttle slowly until the secondary throttle shaft just begins to move. Hold in this position. Measure again from the top of plunger stem to top of bowl cover. The dimension should be as listed in specifications. To adjust, bend tang (C) on primary throttle shaft.



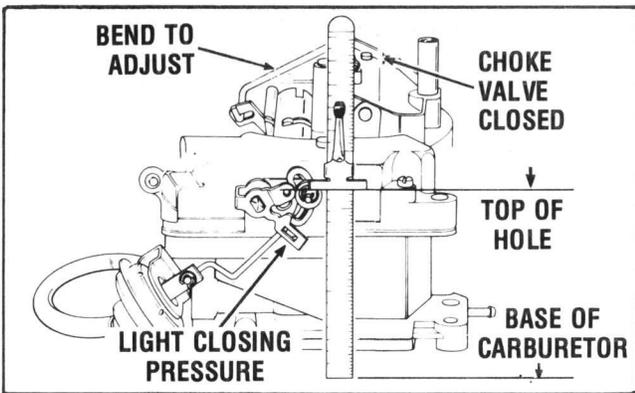
### AIR VALVE OPENING

With air valve in wide open position, the opening between the air valve at the short side and air horn should be according to specifications for the particular carburetor involved. The corner of the air valve is notched for adjustment. Bend the corner with a pair of pliers to provide the proper opening.



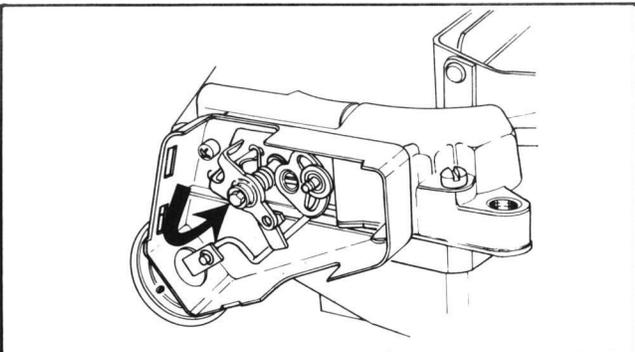
## AIR VALVE SPRING TENSION

1. Loosen the air valve lock plug and allow the air valve to position itself to wide open position.
2. With a long screwdriver that will pass through the center of Tool 109P-397 positioned on air valve adjustment plug, rotate the plug counterclockwise until the air valve contacts its stop lightly, testing with the finger, then rotate an additional number of turns as specified for the carburetor involved.
3. Hold the adjustment plug with screwdriver, and tighten the lock plug securely with Tool 109P-397. Make sure the adjustment does not move when tightening. Check the air valve for freedom of movement. There must be no binding at any valve position.



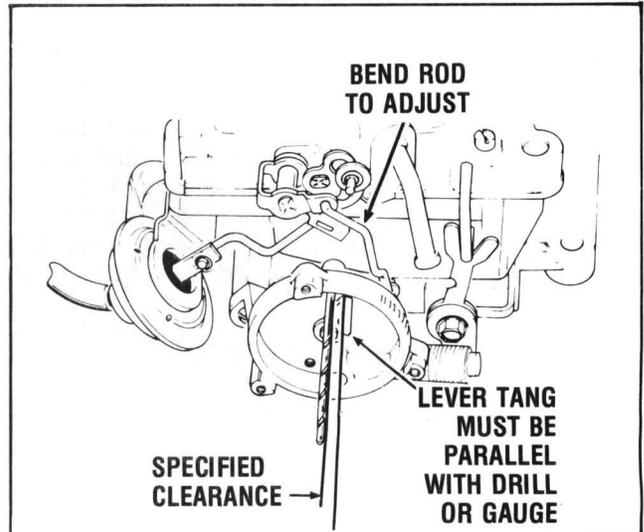
## CHOKE CONTROL LEVER

Close choke valve by pushing on choke lever, with throttle partially open. The vertical dimension from top of rod hole to base of carburetor should be  $3\frac{3}{8}$  inch. To adjust, bend rod.



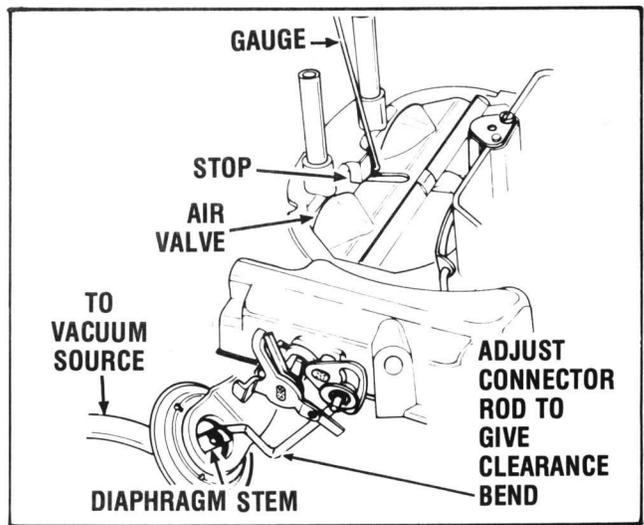
## CHOKE CONTROL LEVER — 1981 AND LATER

To adjust, remove counter shaft lever screw (this screw has left handed threads). With a small screwdriver placed between the outer and inner choke shaft lever, loosen outer choke shaft lever from the taper of the counter shaft enough to rotate outer choke lever to the proper specification. Holding the opposite end of the choke counter shaft, seat the outer lever onto the taper of shaft by tapping lightly with a very small hammer, then install screw and torque to 8-15 in lbs. (Do not use screw to force outer lever onto taper of shaft).



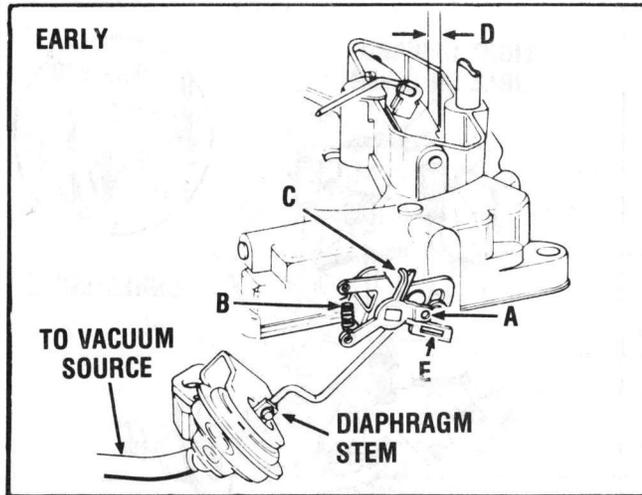
## CHOKE CONTROL CONNECTOR ROD (WITH INTEGRAL CHOKE)

Remove coil housing, retainer ring, screws, gasket and baffle plate. Open the throttle so that the choke can be held in fully closed position. Insert a .120 drill in the hole in the face of casting. Tang of lever should be parallel with drill (straighten tang if necessary). Adjust rod to give .062 inch or  $\frac{1}{16}$  inch clearance between drill and tang with slight clockwise pressure on tang. Install coil housing and parts.



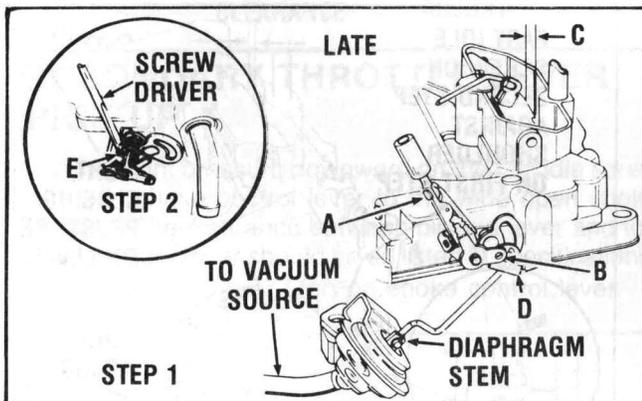
## DIAPHRAGM CONNECTOR ROD

Bottom the vacuum diaphragm by using an outside source of vacuum or by pressing downward on end of diaphragm stem, there should be .040 inch between air valve and stop. To adjust, bend diaphragm connector rod.



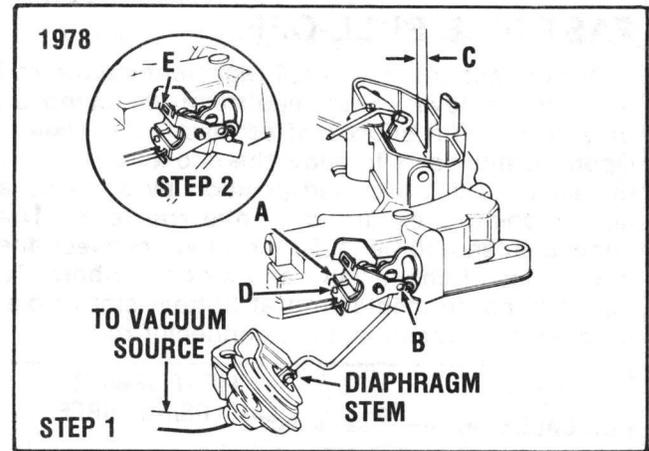
### VACUUM BREAK — LOW BREAK (EARLY)

Open throttle and place fast idle screw on highest step of fast idle cam. Seat diaphragm by using an outside vacuum source. Move choke towards the closed position by applying a firm closing pressure to choke rod lever (A) extending spring (B) until tab (C) contacts stop. The dimension (D) between lower edge of choke valve and inner wall of air horn should be as listed in specifications. To adjust, bend tang (E) with screwdriver.



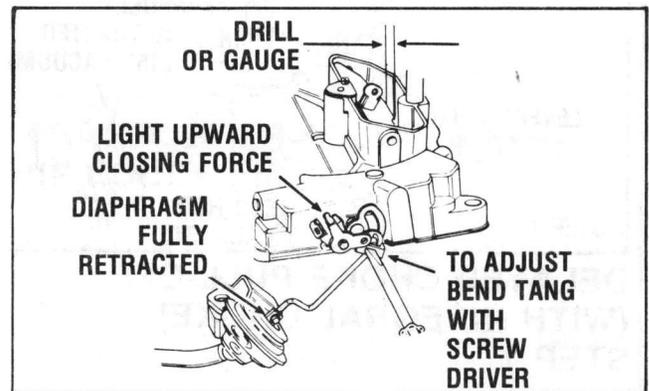
### VACUUM BREAK (LATE) & (1978) HIGH BREAK (STEP 1)

Open throttle and place fast idle screw on highest step of fast idle cam. Seat diaphragm by using an outside vacuum source. Hold levers together at (A) using a small clamp. Move choke valve toward the closed position by applying a light closing pressure to choke rod lever (B). The dimension (C) between lower edge of choke valve and inner wall of air horn should be as listed in specifications. To adjust, bend lever (D). (1978 models use allen wrench) (1977 model use pliers).



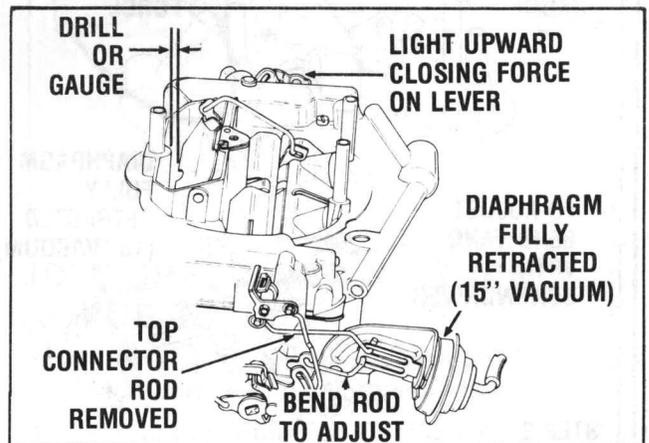
### LOW BREAK (STEP 2)

Remove small clamp from choke lever. Follow same procedure as Step 1. The dimension (C) should be as listed in specifications. To adjust, bend tang (E) on choke lever with screwdriver.



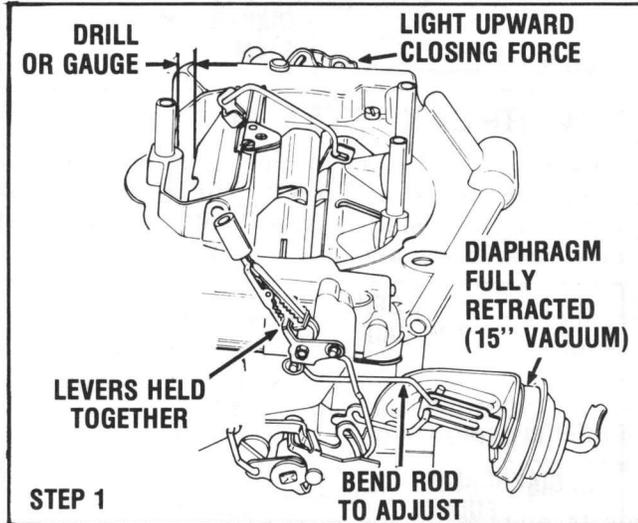
### INITIAL CHOKE PULL-OFF (WITH INTEGRAL CHOKE)

Seat diaphragm by using an outside vacuum source. Open throttle slightly to release the fast idle cam to allow the choke valve to be moved toward the closed position, by applying a light closing pressure to choke lever. The dimension between the lower edge of choke valve and wall of air horn should be as listed in specifications. To adjust, place screwdriver in slot of tang, and bend as required.



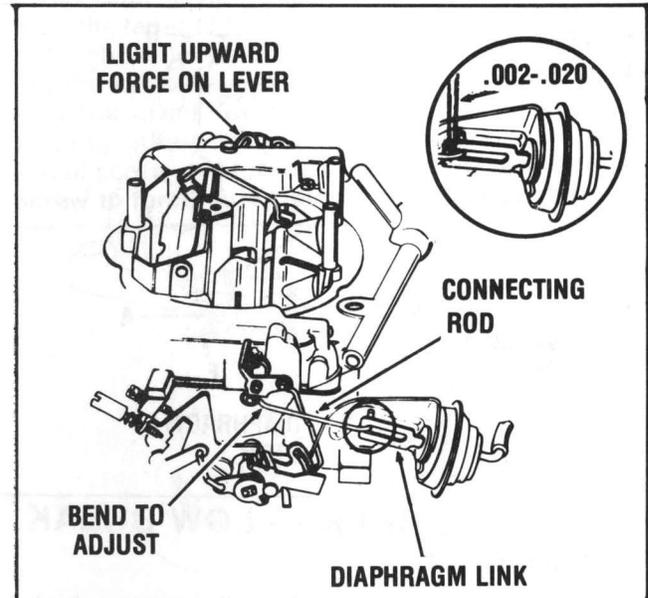
## FAST IDLE PULL-OFF

Disconnect the top diaphragm connector rod from choke lever. Seat diaphragm by using an outside vacuum source of at least 15" vacuum. Open throttle valve to allow the choke valve to be moved toward the closed position by applying a light closing pressure to choke rod lever. The dimension should be .125 inch or 1/8" between the lower edge of choke valve and wall of air horn. To adjust bend connector rod at bottom slot of diaphragm, then reconnect top connector rod.



## STEP 2

Remove the small clamp from levers and follow the same procedures as in Step 1. The dimension between lower edge of choke valve and air horn should be as listed in specifications. To adjust, place screwdriver in slot of tang, and bend as required.

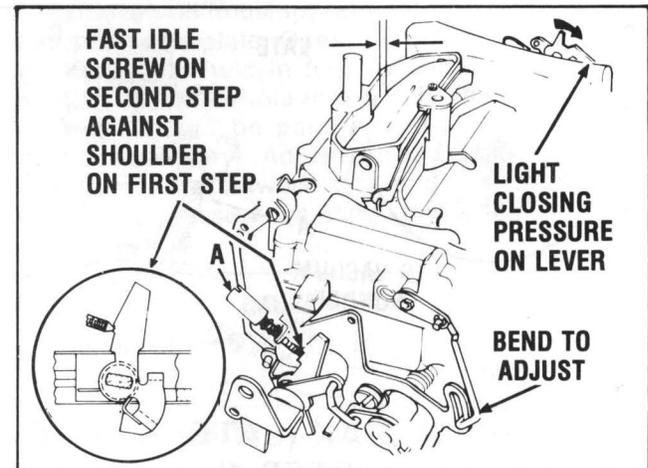
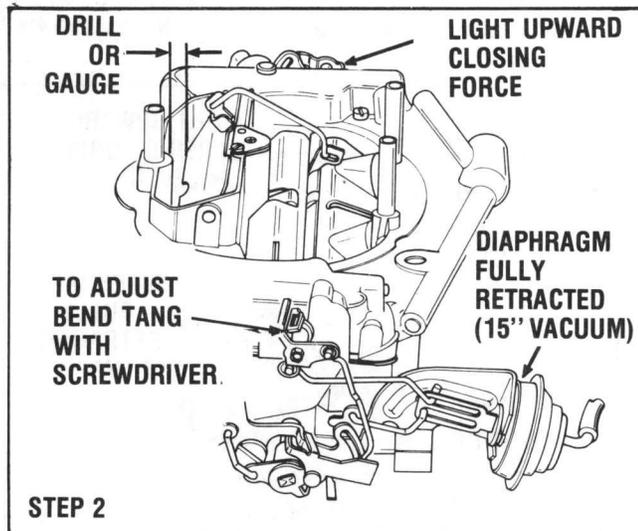


## V-POC VACUUM PULL-OFF CHOKE — IF EQUIPPED

Open throttle slightly to release the fast idle cam. Apply a light upward pressure on choke lever, to close valve. There should now be .002 to .020 clearance between slot of diaphragm link and connecting rod. To adjust, bend connecting rod.

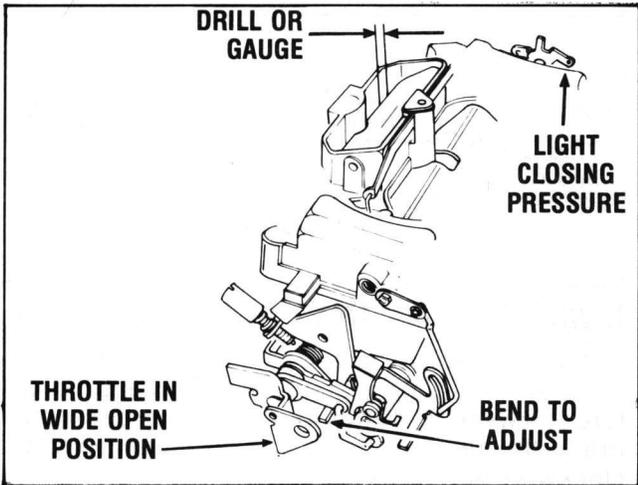
## DELAYED CHOKE PULL-OFF (WITH INTEGRAL CHOKE) STEP 1

Hold inner and outer choke levers together as shown with small clamp, seat diaphragm by using an outside vacuum source. Open throttle slightly to release the fast idle cam, to allow the choke valve to be moved toward the closed position by applying a light closing pressure to choke lever. The dimension between lower edge of choke valve and wall of air horn should be as listed in specifications. To adjust, bend connector rod in upper slot of diaphragm.



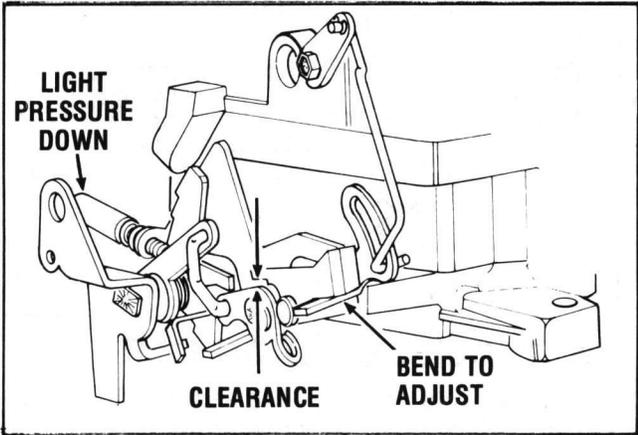
## FAST IDLE CAM AND LINKAGE

With throttle closed, turn fast idle screw (A) in until when pushed down it will drop off lowest step of fast idle cam and cannot be raised again until the throttle is opened. Place fast idle screw on second highest step of fast idle cam, close choke valve as far as possible. The dimension between the lower edge of choke valve and inner wall of air horn should be as listed in specifications. To adjust, bend connector rod.



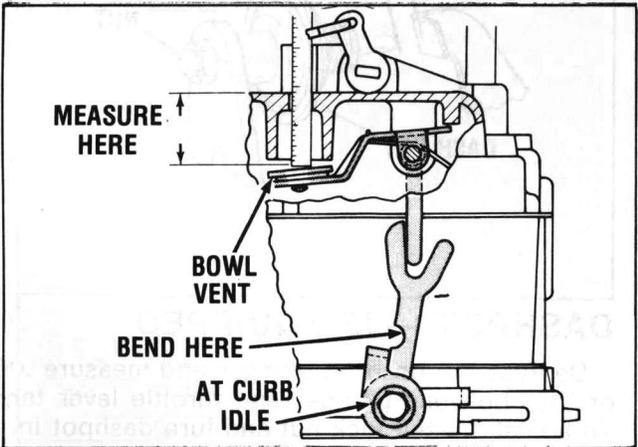
### UNLOADER

With throttle in wide open position, close valve as far as possible without forcing. The dimension between lower edge of choke valve and inner wall of air horn should be as listed in specifications. To adjust, bend front tang on fast idle control lever.



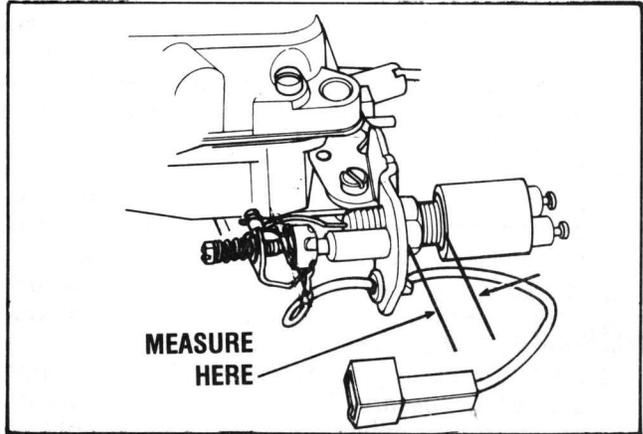
### SECONDARY THROTTLE LEVER PICK UP

Apply light pressure downward on the fast idle screw to move choke control lever to the wide open choke position. The clearance between pick up lever and top of secondary lever should be as listed in specifications. To adjust, bend rear tang on choke control lever.



### BOWL VAPOR VENT

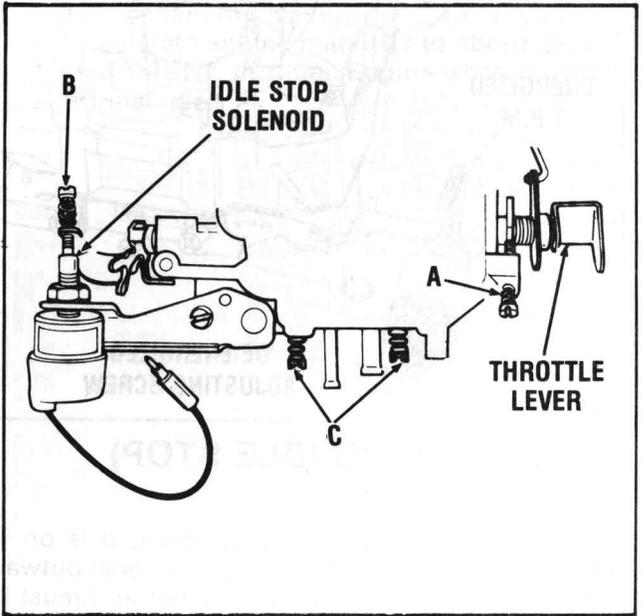
With throttle valves set at curb idle and idle stop solenoid energized, if equipped, remove plug from air horn and insert a narrow ruler in hole. Rest ruler lightly on top of valve. The dimension from top of valve to top of casting should be as listed in specifications. To adjust, bend operating lever. Before installing the new plug be sure and compare with the old plug that was removed, for the proper diameter size.



### TRANSDUCER ADJUSTMENT (IF EQUIPPED)

Adjustment is made by loosening transducer locknut and rotating transducer to obtain specified clearance between front of transducer and its mounting bracket.

Thermo-Quads use a black colored transducer which is adjusted to  $.540 \pm .005$ .



### IDLE SPEED AND MIXTURE (PRIOR TO 1977)

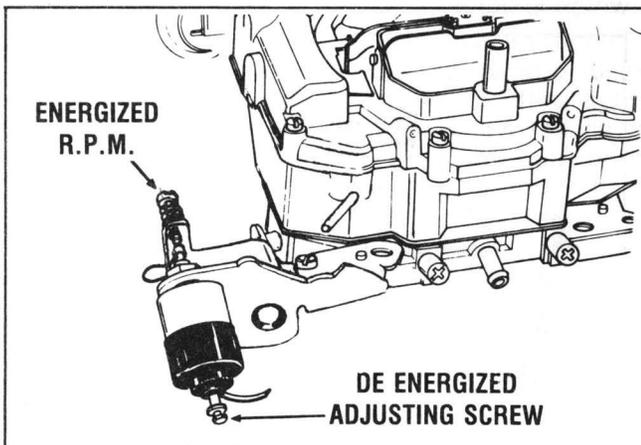
Use exhaust analyzer if available. If not available, make temporary adjustment as follows:

1. Refer to the "Emission Control Decal" in engine

- compartment for the proper engine RPM.
2. Engine at normal operating temperature, choke fully open, air cleaner installed, automatic transmission in "neutral," and air conditioner turned off.
  3. Connect a tachometer and turn idle speed screw (A) or if equipped with the idle stop solenoid, turn solenoid speed screw (B) to the specified engine RPM with the solenoid wire connected to energize the solenoid. **NOTE: 1975 models equipped with the Catalyst Protection System will include a throttle solenoid positioner and can be identified by a printed decal on the solenoid, which states DO NOT USE solenoid or screw to set idle speed. This adjustment described below.**
  4. Turn the mixture screws (C) counterclockwise (richer) until a loss of engine RPM is indicated on tachometer. Turn the mixture screws (C) clockwise (leaner) until the highest RPM is obtained, then continue turning clockwise until engine RPM starts to decrease. Turn the mixture screws counterclockwise (richer) until the lean best idle setting is obtained. Readjust speed screw if necessary. If equipped with the idle stop solenoid turn speed screw (A) inward until end of screw just touches stop, now back off one full turn to obtain low idle speed setting.

## 1977 AND LATER IDLE SPEED AND MIXTURE

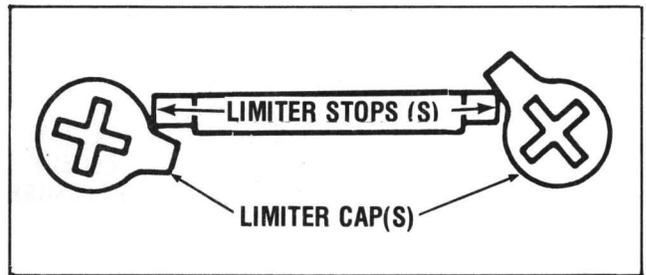
Refer to decal in engine compartment for proper procedures and specifications.



## SIS (SOLENOID IDLE STOP) (IF EQUIPPED)

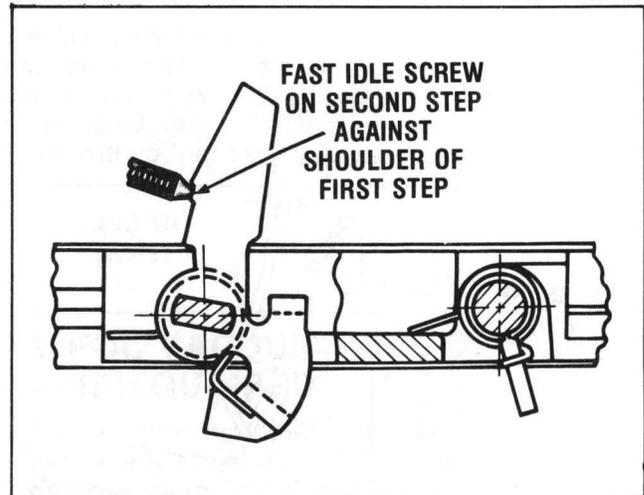
The adjustment of the S.I.S. solenoid is on its inward travel rather than the conventional outward travel. Two adjustments are required and must be made in proper sequence. First adjustment is idle R.P.M. with accessories on, solenoid energized. This adjustment is made with the R.P.M. screw on throttle lever.

The second idle adjustment is made with accessories off and solenoid de-energized. This is accomplished by adjusting the inward travel of the solenoid plunger.



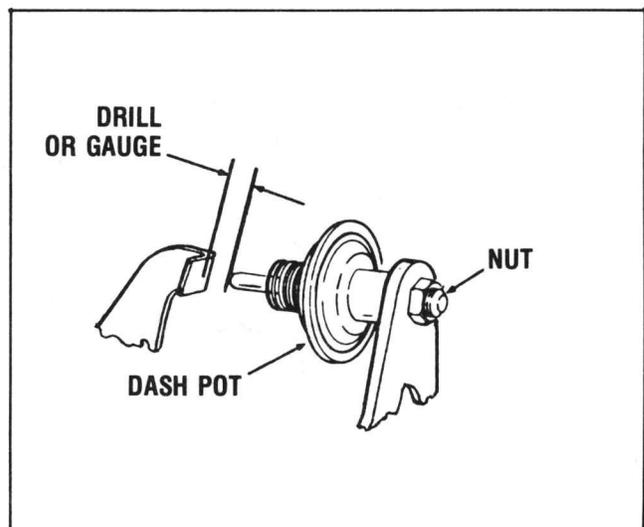
## LIMITER CAP INSTALLATION

Soak the limiter caps in boiling water for a few minutes, to aid installation. Position caps on mixture screws so that when they are seated by pressing firmly the tab will be in the maximum counterclockwise position against the limiter stops. (See illustration).



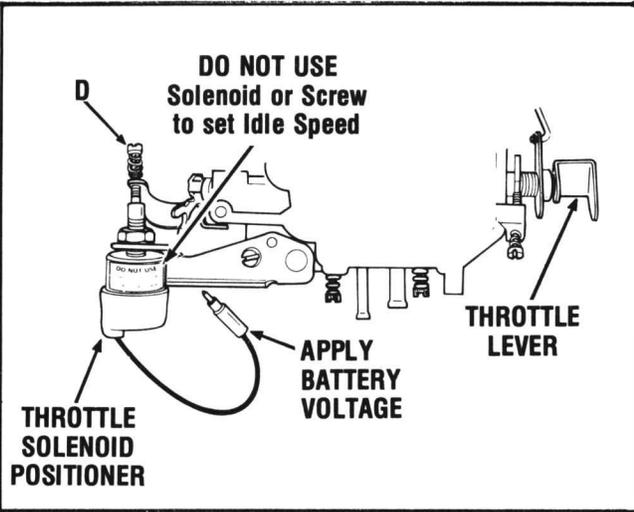
## FAST IDLE SPEED ON CAR

With fast idle screw on the second highest step of cam. Adjust fast idle screw to the engine R.P.M. listed in specifications.



## DASHPOT — IF EQUIPPED

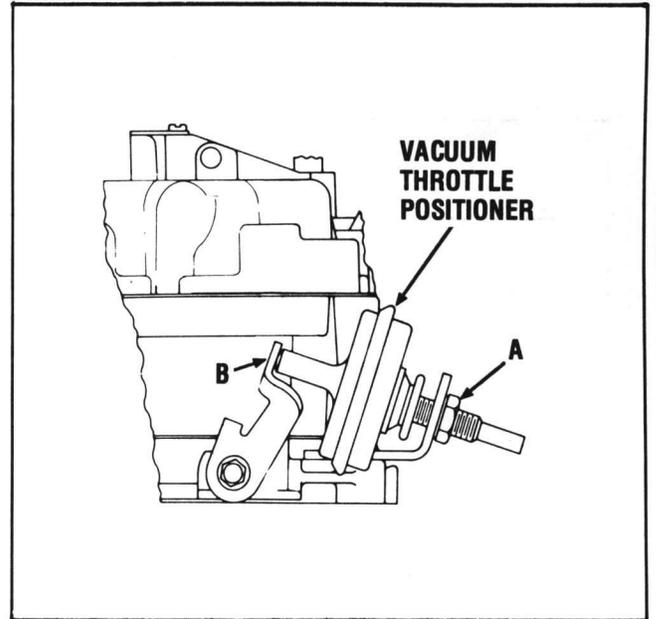
Depress the dashpot plunger and measure .062 or 1/16" between plunger and throttle lever tang. To adjust, loosen lock nut and turn dashpot in or out as required.



## THROTTLE POSITIONER SOLENOID — IF EQUIPPED

(Catalyst Protection System)

1. Disconnect the solenoid wire and hold throttle wide open. Apply battery voltage with a jumper lead to solenoid wire. The solenoid stem should extend positively and maintain its extended position. If it does not, replace unit. Remove the jumper lead from solenoid wire and release throttle.
2. Connect a tachometer, start engine, again apply battery voltage with jumper lead to solenoid wire. Raise engine speed to make sure solenoid is fully extended. Adjust speed screw (D) if needed to approximately 1500 RPM, allow time for OSAC valve to provide vacuum spark advance and engine speed to stabilize. Disconnect the jumper lead and reconnect the solenoid wire.
3. Accelerate engine manually to approximately 2500 RPM and release throttle. Engine should return to normal idle.



## VACUUM THROTTLE POSITIONER — IF EQUIPPED

(Catalyst Protection System)

1. Accelerate engine manually to speed of approximately 2000 RPM.
2. Loosen nut (A) and rotate vacuum throttle positioner until positioner stem just contacts throttle lever (B).
3. Release throttle, then slowly rotate the positioner to decrease engine speed until a sudden drop in speed occurs (about 1000 RPM). At this point, continue adjusting the vacuum positioner in the decreasing direction  $\frac{1}{4}$  additional turn and tighten jam nut (A).
4. Accelerate engine manually to about 2500 RPM and release throttle. Engine should return to normal idle.

# BUILT TO MEET OR EXCEED O.E. SPECS.



## ELECTRIC PUMP

- Weight - 2 lb., 6 oz.
- Rotary Vane design
- Pressure Regulated
- No inlet or outlet valves
- 72 gph Free-Flow
- Operates at 160° temperature
- 1/4" inlet and outlet fittings
- Lift - 8'
- P4070 - 12 volt, 5 psi
- P4259 - 6 volt, 5 psi
- P4389 - 12 volt marine, 5 psi
- P4594 - 12 volt, 7 psi



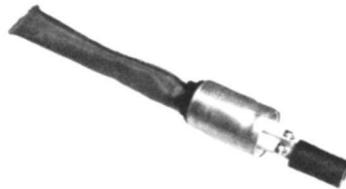
## MECHANICAL PUMP

- Aluminum castings to dissipate heat
- Light weight
- Channel steel levers
- Unitized diaphragm/shaft/spring/seal
- Resilient valves, self conforming to seat
- Rolling-Loop diaphragm
- Delivers 45 gph with 4 psi restriction



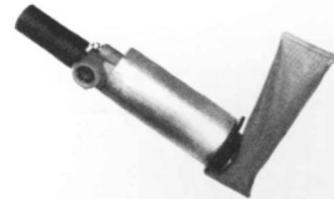
## 12 VOLT IMPORT APPLICATIONS

- Universal mounting bracket and hardware
- Bayonet fittings for either 5/16" or 1/4" hose
- Single screw for pressure adjustment
- Pressure adjustable from 1-3/4 psi to 6 psi



## IN-TANK ELECTRIC PUMP

- For carburetor equipped vehicles
- Current draw - 1.4 amps
- 20 gph at 4 psi



## IN-TANK ELECTRIC PUMP

- Used with Throttle Body Injection
- Current draw - 4 amps
- Continuous delivery - 20 gph at 12 psi
- Excess fuel returned to tank

### TECH. MANUAL

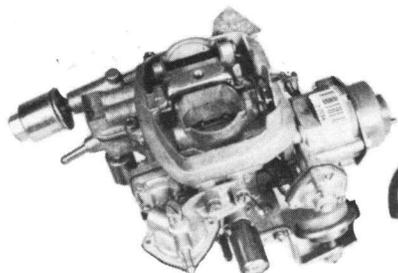
<b>TYF</b>	FORM #3560	.....
<b>740</b>	FORM #3624	.....
<b>BBS</b>	FORM #3620A	.....
<b>BBD-1 1/4"</b>	FORM #3576A	.....
<b>YF-YFA</b>	FORM #3608B	.....
<b>RBS</b>	FORM #3625	.....
<b>TQ</b>	FORM #3623A	.....
<b>AFB-AVS</b>	FORM #3703A	.....
<b>BASICS</b>	FORM #3630A	.....

### WITH COLOR SLIDES

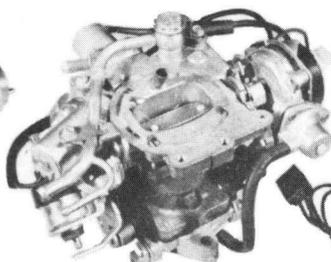
.....	CTP-21
.....	CTP-20
.....	CTP-5A
.....	CTP-6A
.....	CTP-22
.....	CTP-8A
.....	CTP-1A
.....	CTP-23
.....	CTP-2A

# THERMO-QUAD™ SERVICE MANUAL

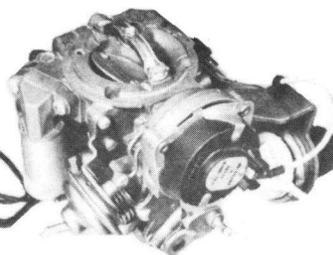
## CARTER CARBURETOR



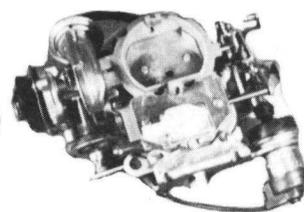
CARTER-WEBER 740



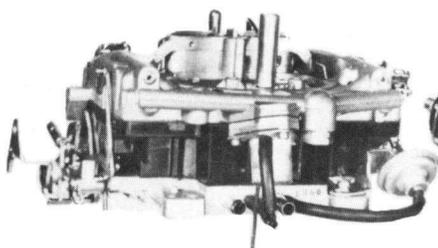
CARTER-WEBER TYF



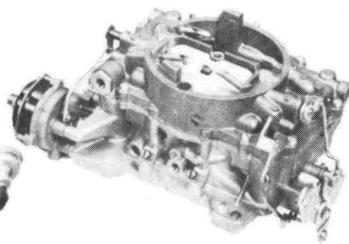
CARTER-WEBER YF-YFA



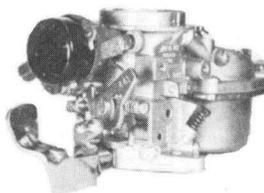
CARTER BBD 1-1/4"



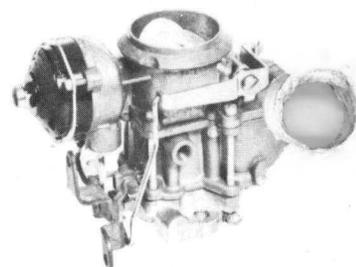
CARTER THERMO-QUAD™



CARTER AFB-AVS



CARTER RBS



CARTER BBS

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