Chrysler Training Center Manual

- Fuel Injection Explanation
- Good drawings/pictures
- Very good, best explanatory info we have
- Thanks to Jim Bartuska
- JGrady 2018

CHRYSLER CORPORATION

TRAINING CENTER

FUEL INJECTION

AUGUST - 1957

Prepared by
SERVICE DEVELOPMENT
&
TRAINING DEPARTMENT

FUEL INJECTION

CONTENTS

GLOSSARY OF FUEL INJECTION

FUEL SYSTEM

FUEL INJECTION

1. GENERAL DESCRIPTION

The fuel injection system, as shown in Figure 1, is used on the new Dodge, De Soto, Plymouth and Chrysler cars and electronically controls the injection of fuel into the intake manifold of the engine. The injectors are located in the intake manifold and are directed at the intake port of each cylinder.

Fuel for the injectors is supplied under constant pressure by an electric fuel pump in the fuel tank. (Refer to Figure 2). The fuel is forced through a pressure regulator filter and vapor separator combination to the fuel manifolds, (right and left hand) and then to each injector.

The triggering selector shown in Figure 3, is driven by a flexible shaft, connected to the ignition distributor, and is a combination timing and current distributing device. The triggering selector transmits an electrical signal to the electronic modulator, which actuates the modulator. The output is then returned to the selector portion of the triggering selector for distribution to the correct injector. The electrical impulse to the injector opens a solenoid controlled valve within the injector (see Figure 10) for a very minute period of time, and, at this instant, fuel is injected into the intake manifold. (The time period that the valve is open for injection, is measured in milliseconds.)

Five electrical devices in the system, and known as "sensors", make the system responsive to barometric pressure, temperature, intake manifold vacuum and

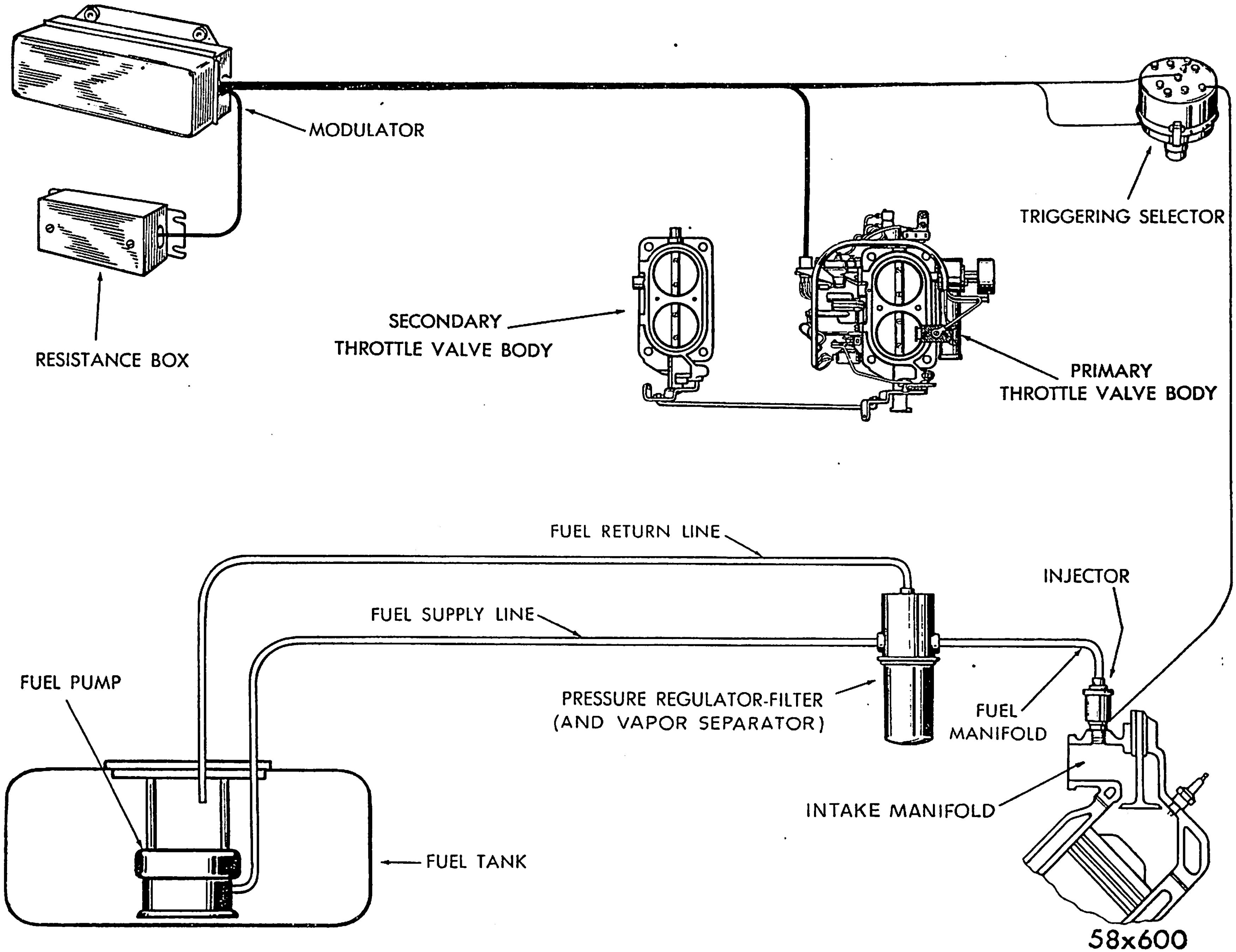


Fig. 1—Schematic of Fuel Injection

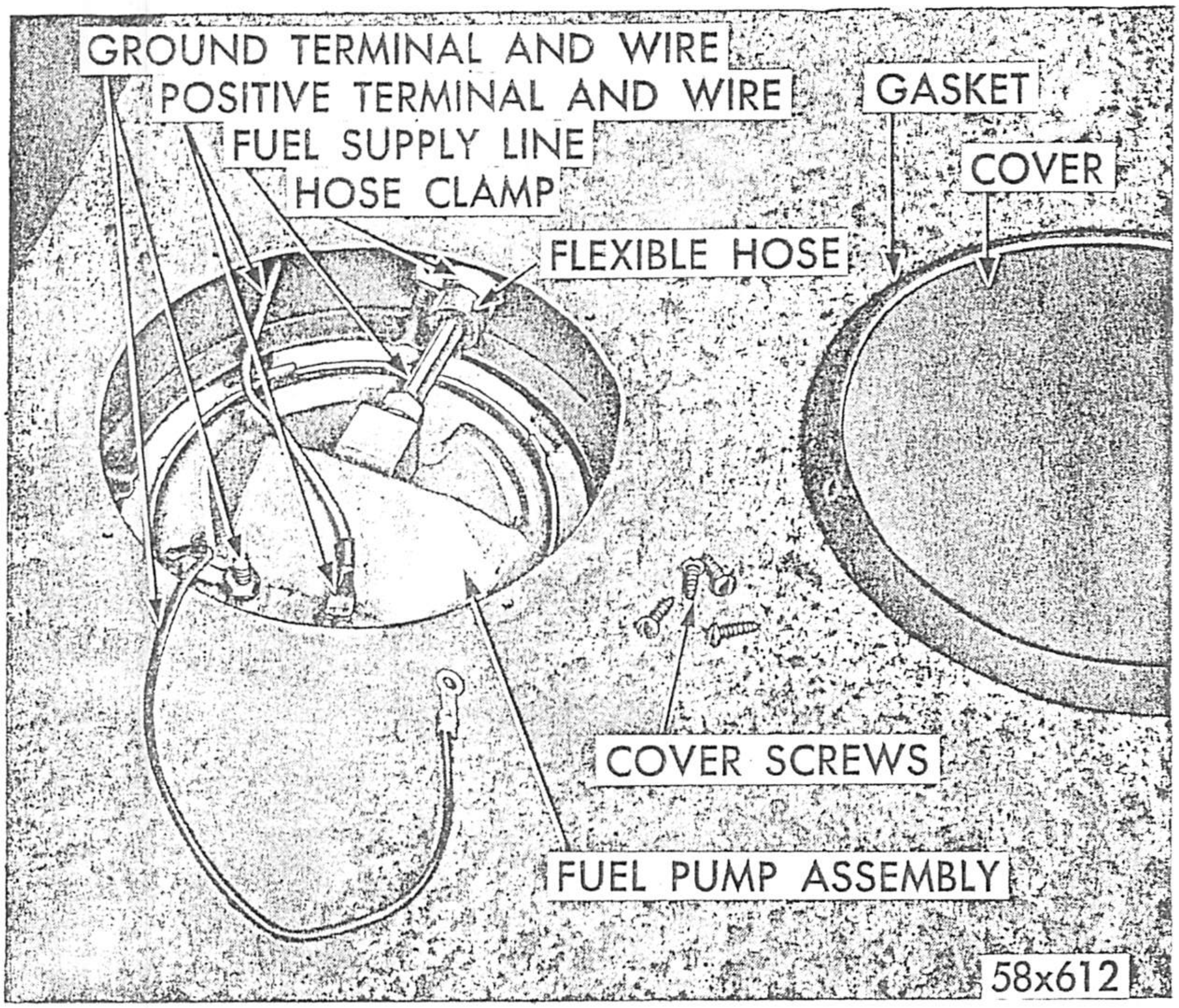
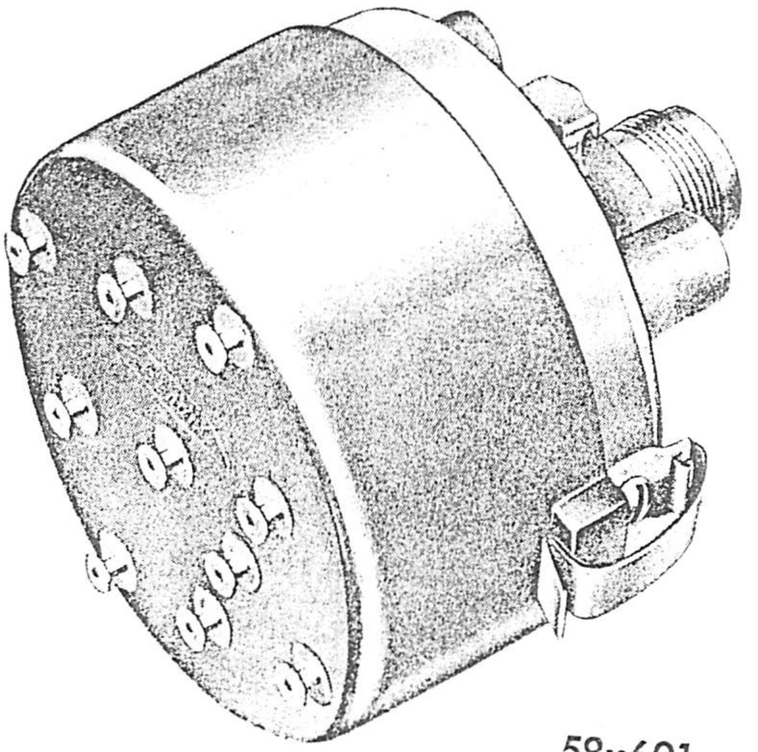


Fig. 2—Fuel Pump Mounting



58x601

Fig. 3—Triggering Selector Assembly

other factors which affect engine requirements. The sensors also affect the modulator, which provides the correct air/fuel mixture for all stages of engine performance, namely: starting, warm up, idling, acceleration, varying loads and speeds.

Air is inducted into the system through twin air cleaners. with replaceable filter elements, and are mounted on two throttle valve bodies, which in turn are mounted on the intake manifold. Each of the throttle valve bodies are equipped with dual barrels and throttle valves. (See Figure 1.)

The throttle valve body on which the sensors are mounted is called the Primary throttle valve body, (See Figure 4.) The throttle valves of the primary throttle valve body are directly connected to the accelerator pedal through the use of rods and linkage. The Secondary throttle valve body contains only throttle valves. The throttle valves of both units are inter connected by an adjustable rod. When the accelerator pedal is initially depressed from the closed position, only the valves of the primary unit are opened. As pressure is increased on the accelerator pedal, the secondary throttle valves (retarded by design) start to open. Both sets of throttle valves continue to open and reach the wide open throttle position simultaneously.

This completes the cycle of delivering the air and fuel into the combustion chamber of the engine.

2. FUEL INJECTION COMPONENTS

Fuel injection consists of the following three basic systems: The fuel supply system, the injector control system and the sensor system. Each of the basic

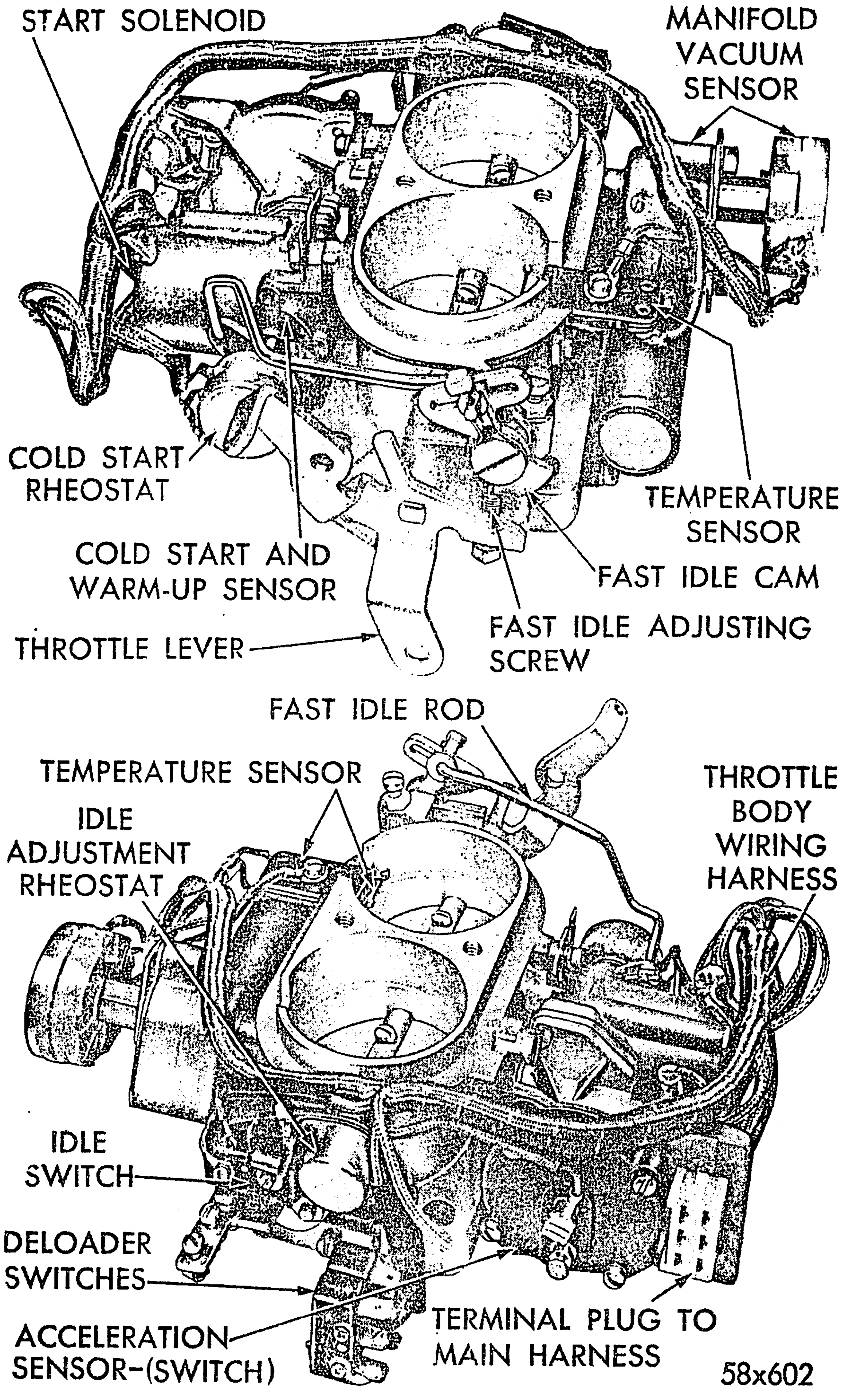


Fig. 4—Primary Throttle Body Assembly

component systems and their components, and functions, are described as follows:

3. THE FUEL SUPPLY SYSTEM

The fuel supply system consists of: The fuel tank, the fuel pump, the pressure regulator/filter (and vapor separator), fuel manifolds and injectors, as shown in Figure 5.

Fuel Pump -- (See Figure 6).

The electrically operated fuel pump is submerged in the fuel tank and furnishes fuel to the pressure regulator/filter at 29 + or - 4 psi. for all cars. The fuel pump is wired into two circuits, (refer to the wiring diagram Figure 21), the starting switch circuit and to a pressure switch located in the oiling system of the engine.

The fuel pump begins to operate the instant the starter switch is closed and, as the engine starts, the pressure in the oil line closes the pressure switch and takes over the flow of current to the fuel pump. This circuit combination prevents fuel from being pumped to the intake and combustion chamber in case of a leaky injector or when the engine is dead and the ignition key is left on.

Pressure Regulator/Filter and Vapor Separator

The combination pressure regulator/filter and vapor separator, as shown in Figure 7, is located at the high point of the system and reduces the pressure from the fuel pump and maintains a constant pressure in the fuel manifolds of 14 + or - 1/2 psi. on the Chrysler 300D and 12 1/2 + or - 1/2 psi. on Dodge, De Soto and Plymouth cars. The pressure regulator is equipped with a replace-

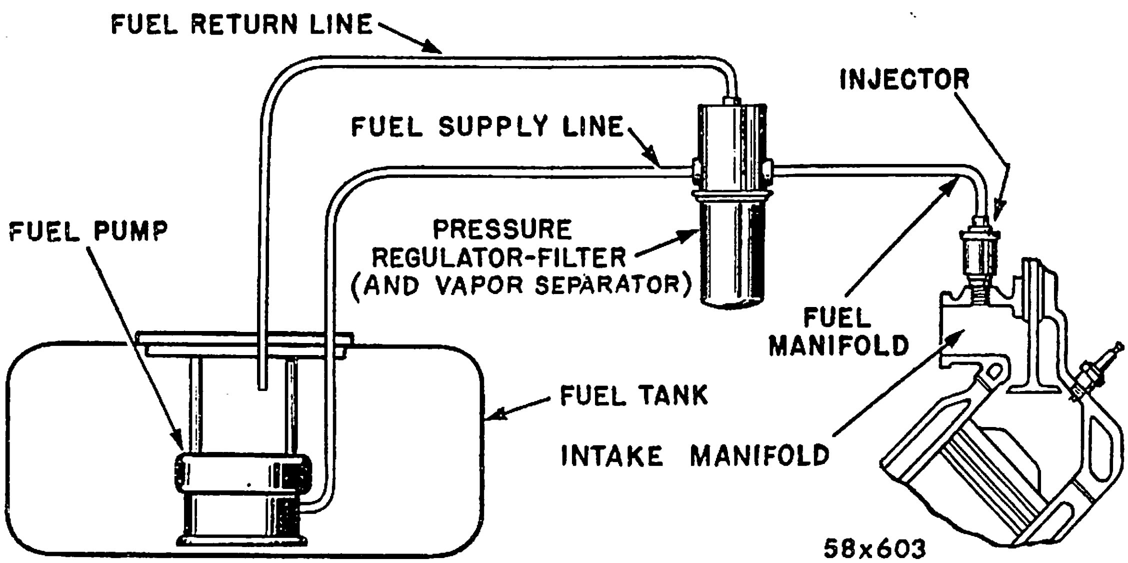


Fig. 5—Fuel Supply System

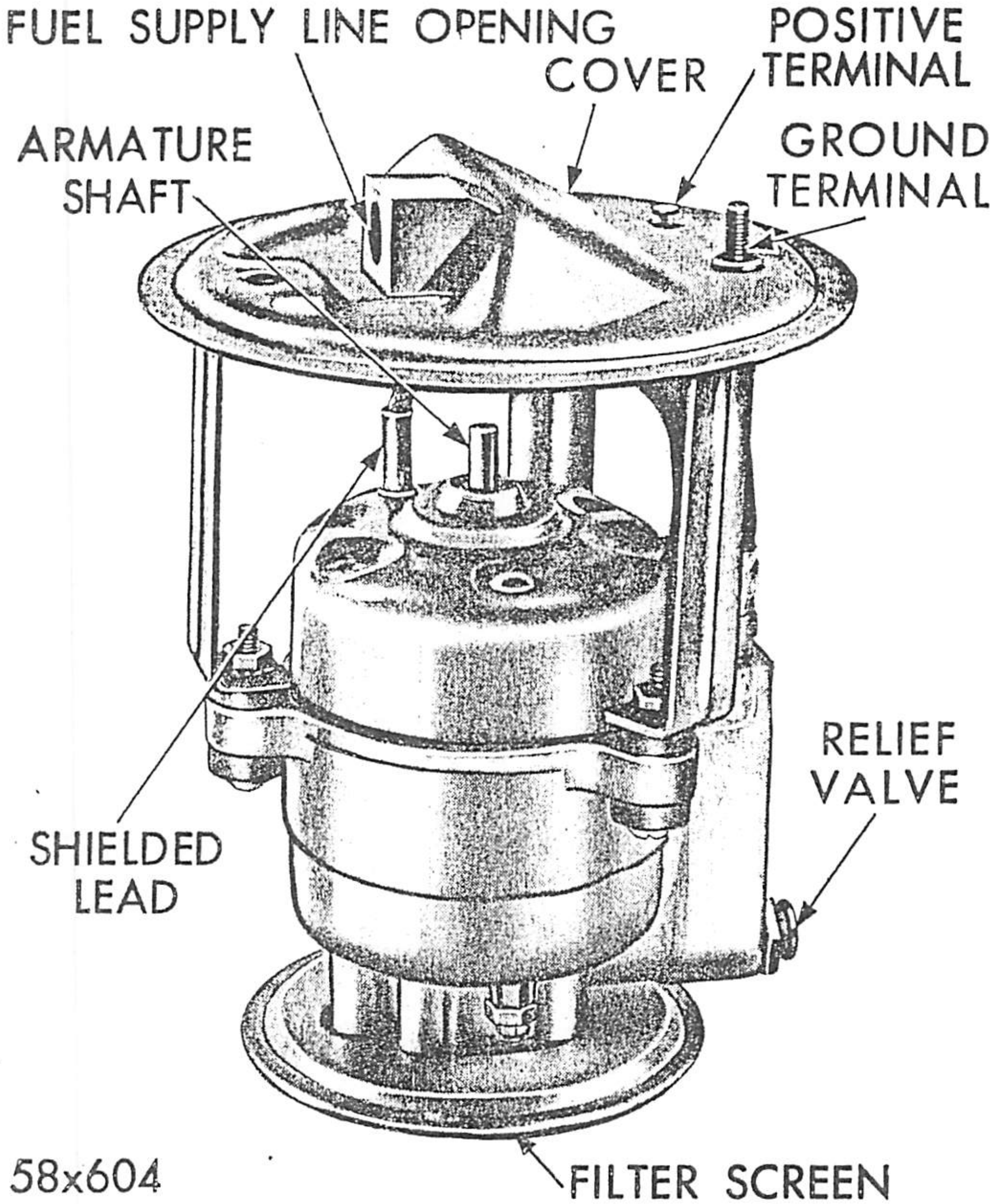


FIG.6-FUEL PUMP ASSEMBLY

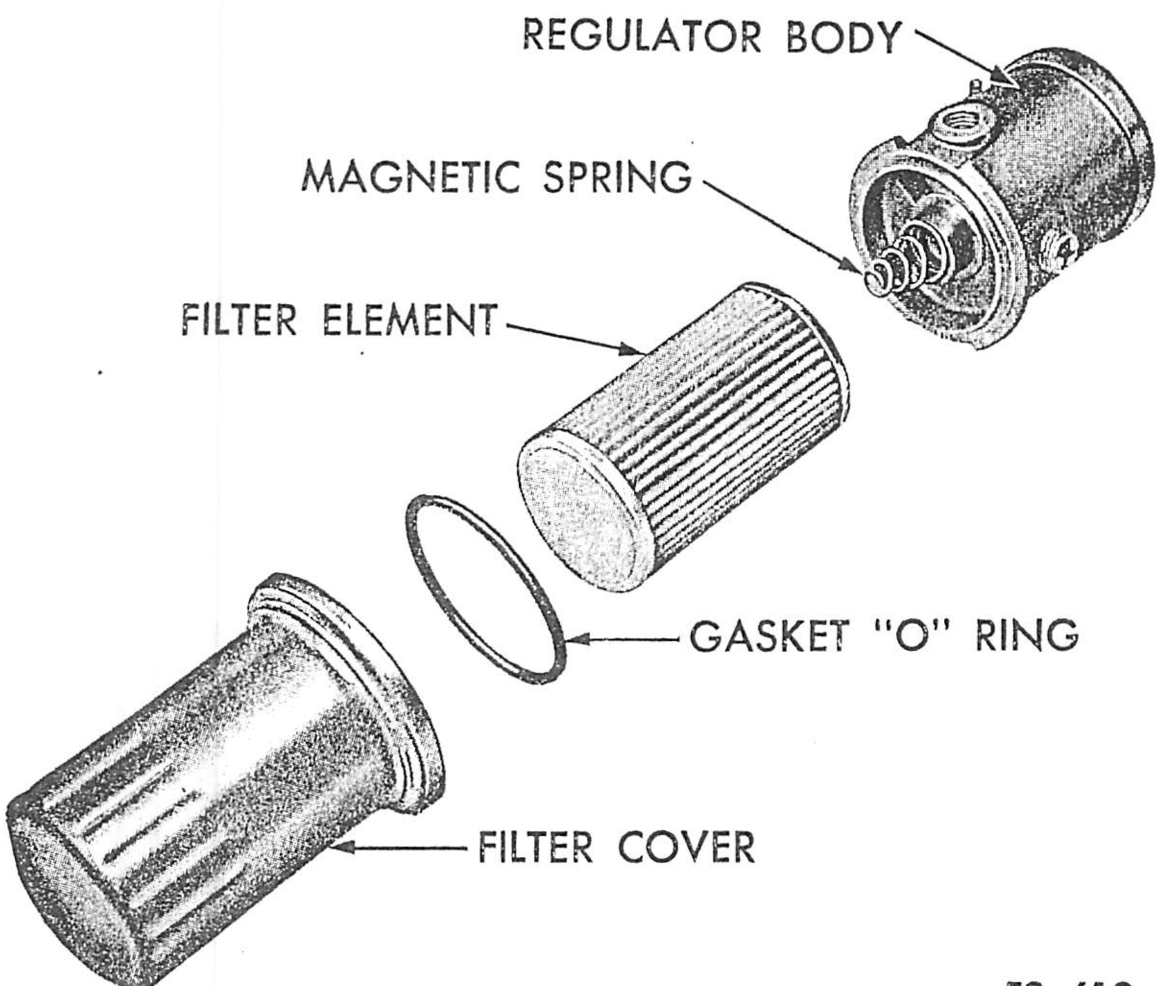


Fig. 7—Pressure Regulator Filter and Vapor Separator (Exploded View)

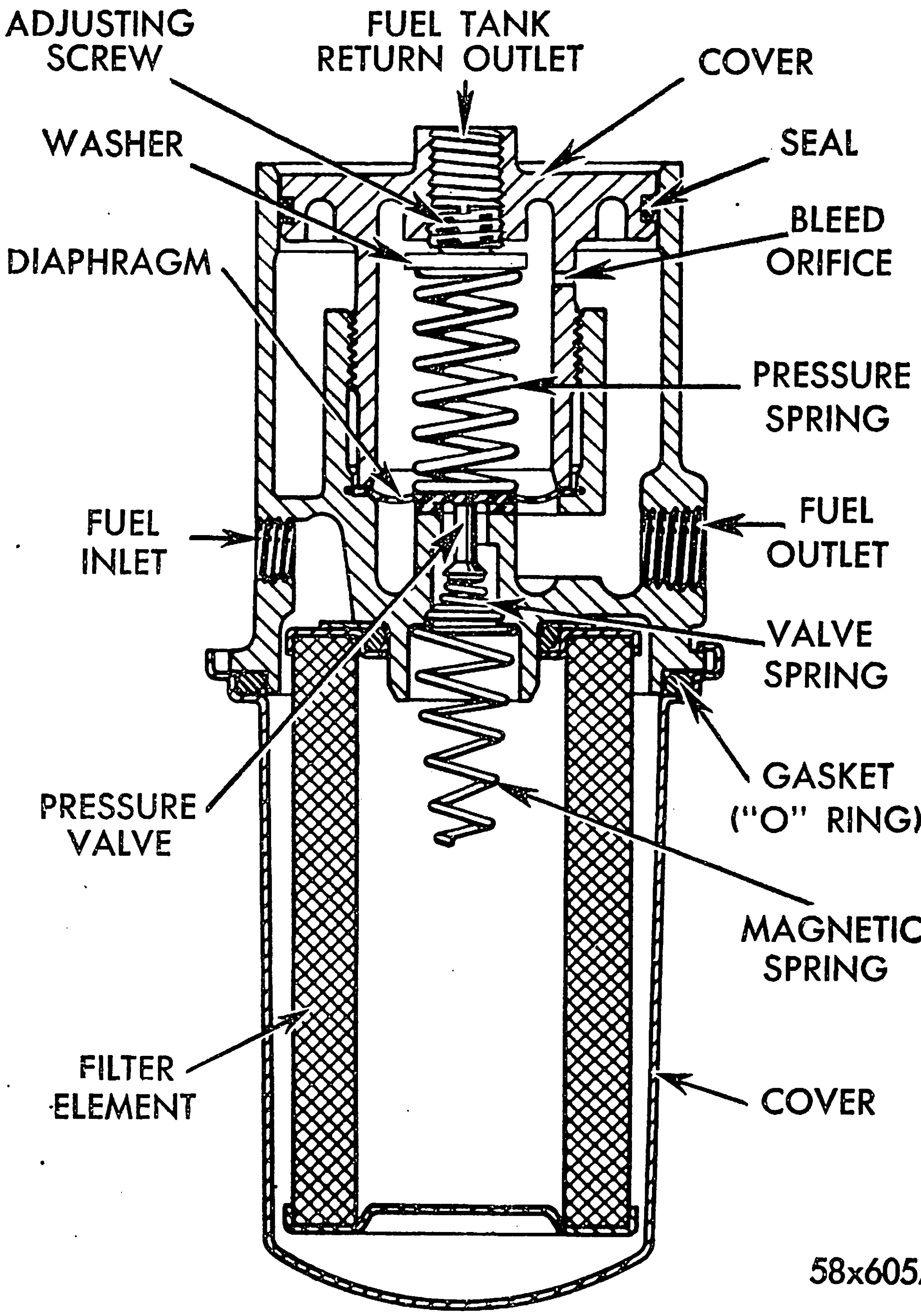
able filter element and a magnetic coil spring that attracts iron oxide. A metered bleed orifice in the pressure portion of the regulator, allows a portion of the fuel and any vapor bubbles, to be returned to the fuel tank through the return line (See Figure 8). This assures that only solid fuel is being maintained in the fuel manifolds and injectors. Any volume of fuel in excess of engine requirements (at all road loads or speeds) is by-passed through the fuel pump relief valve. (See Figure 6).

Fuel Manifolds

The fuel manifolds (right and left hand) carry the fuel from the pressure regulator (through flexible hoses) and connect to each injector by means of tube seal nuts, as shown in Figure 9.

Injectors

The injectors are located in ports on the intake manifold, and are inclined laterally so as to direct the fuel at the intake port of each cylinder. The injector consists of a solenoid, a flat disc valve, a return spring and a metered orifice plate, as shown in Figure 10. The disc valve is located between the solenoid and the orifice plate. A star-shaped flat spring holds the disc valve against the orifice plate when the injector is closed. Thus, the fuel is cut off to the metered orifices by the disc valve. When the solenoid is energized by current from the selector, the disc valve (made of a magnetic material) is attracted to the magnet of the solenoid against the force of the flat spring. This allows fuel to flow through the metered orifices (6) and discharges it into the intake port area of the intake valve



ADJUSTING SCREW
FUEL TANK RETURN OUTLET
COVER
WASHER
SEAL
BLEED ORIFICE
DIAPHRAGM
PRESSURE SPRING
FUEL INLET
FUEL OUTLET
VALVE SPRING
GASKET ("O" RING)
PRESSURE VALVE
MAGNETIC SPRING
FILTER ELEMENT
COVER

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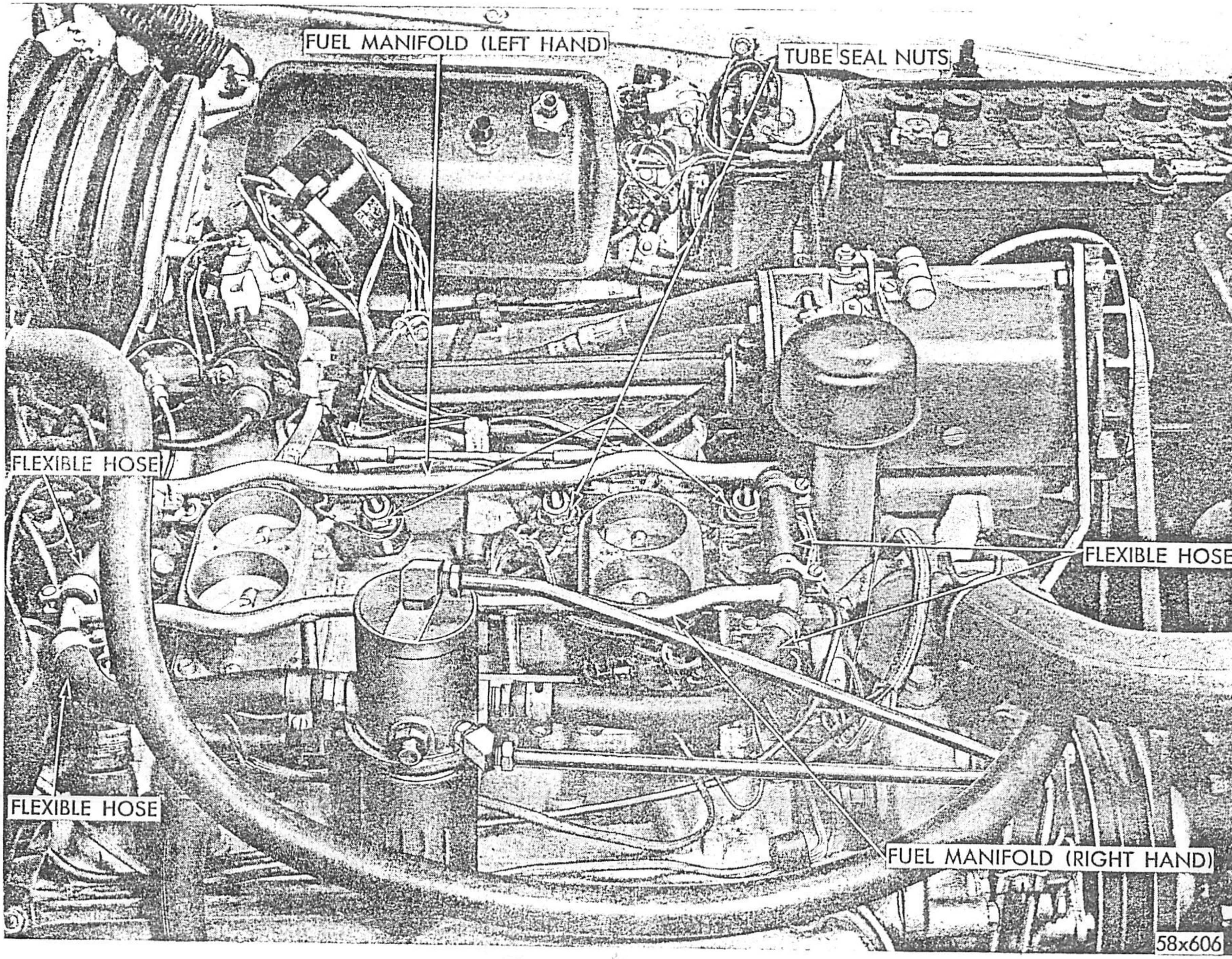

Fig. 9—Fuel Manifolds

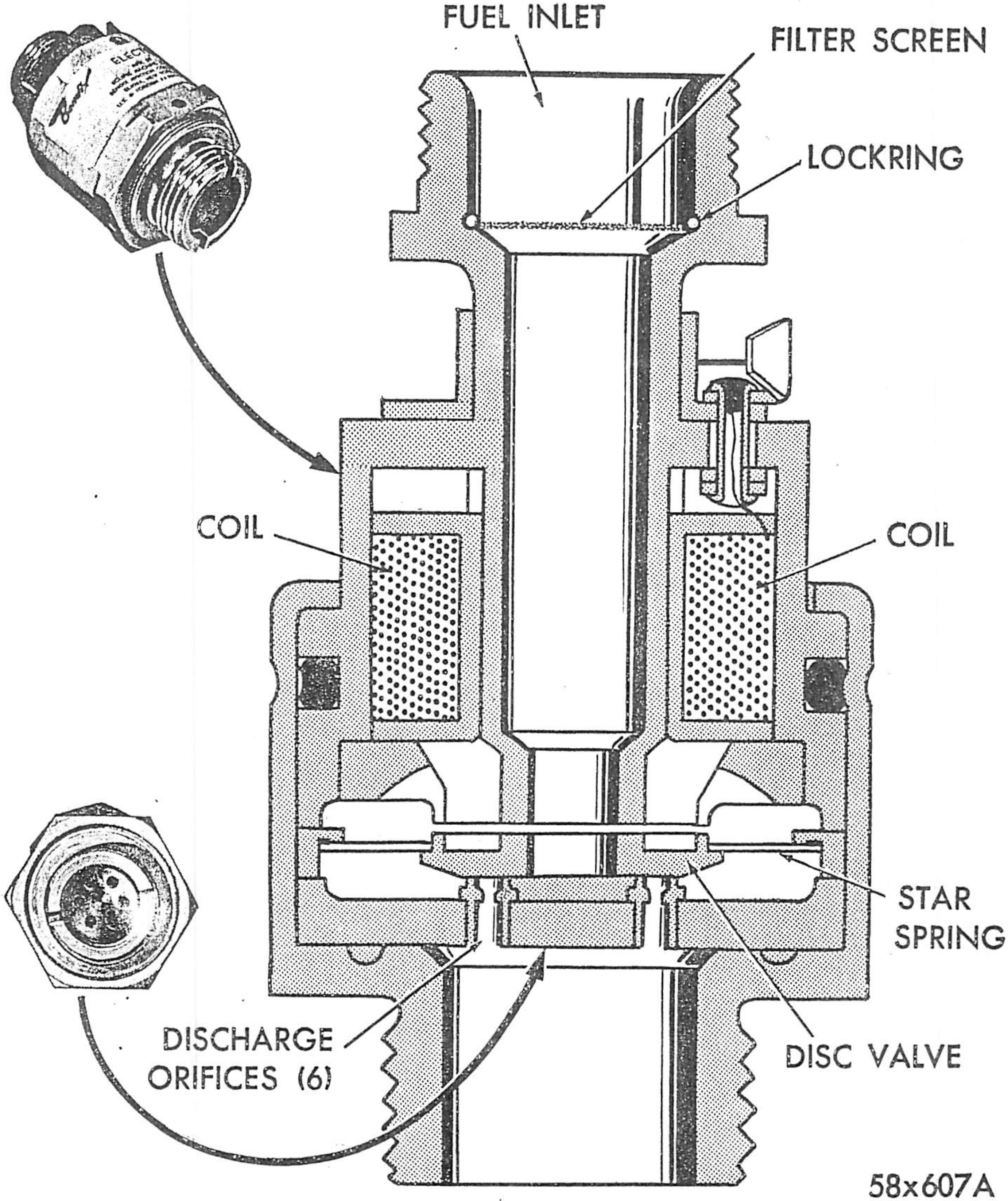

Fig. 10—Injector Assembly

and into the combustion chamber, at the instant the intake valve opens.

The period of time that the injector valve is open, is controlled by the sensors and varies in accordance with the requirements of the engine. The period of time is measured in milliseconds, which is 1/1000th of a second. At the completion of the time period, the current to the solenoid is cut off, de-energizing the magnetic core. This in turn releases the disc valve, which is forced against the orifice plate by the star spring thereby closing off the supply of fuel.

4. THE INJECTOR CONTROL SYSTEM

The injector control system consists of: The triggering selector unit, the electronic modulator, altitude compensator, resistance box, wiring harness, and the sensor system, as shown in Figure 11.

The Triggering Selector Unit

The function of the triggering selector unit is to "trigger" or create a voltage change in the modulator, thereby initiating a current flow from the modulator, through the sensor system and returned to the modulator and hence to the selector portion of the triggering device where it is distributed to the proper injector.

The triggering selector unit consists of a four lobe cam, with two sets of breaker points that ride on the cam, as shown in Figure 12. These contact points establish when the current flow to the modulator is to begin. The unit also consists of a current distributor (rotor and cap) which connects the output of the modulator to the proper injector. The triggering selector unit is driven at one-half engine speed by a flexible shaft connected to the

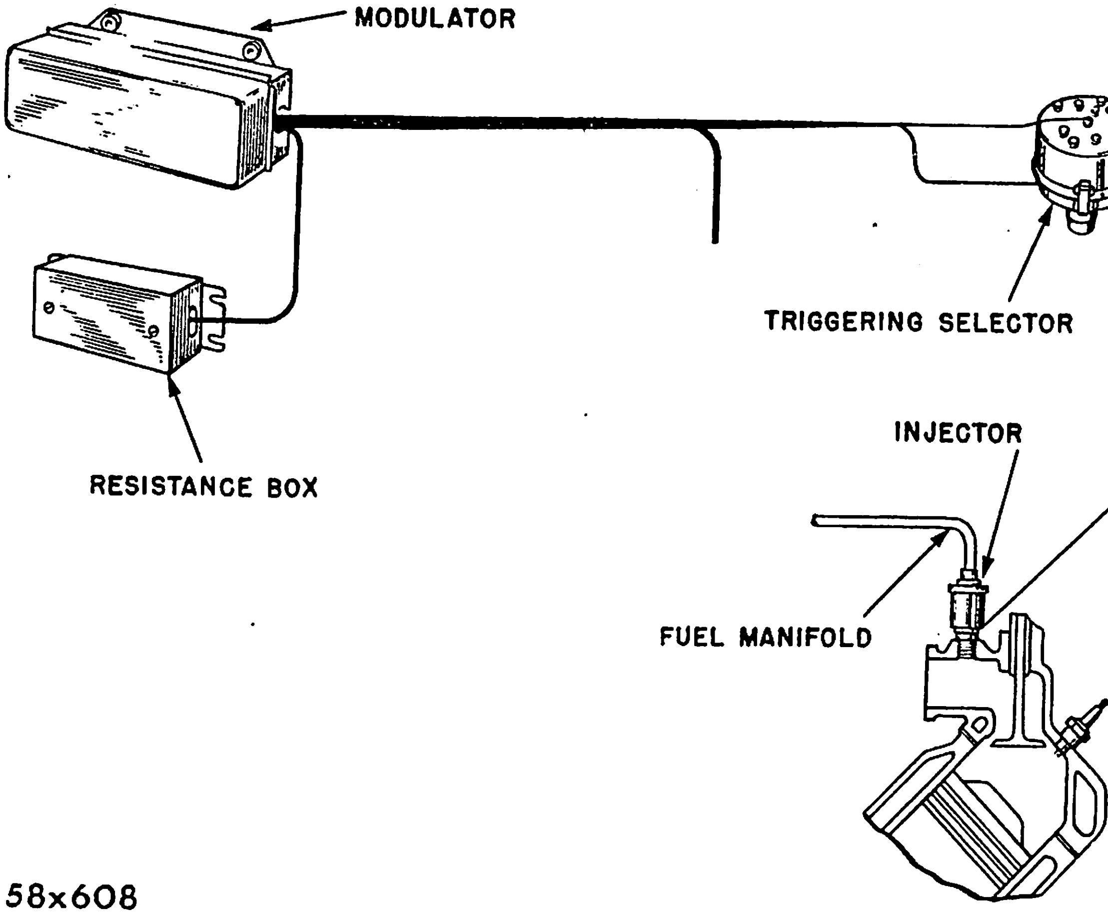

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Fig. 11—Injector Control System

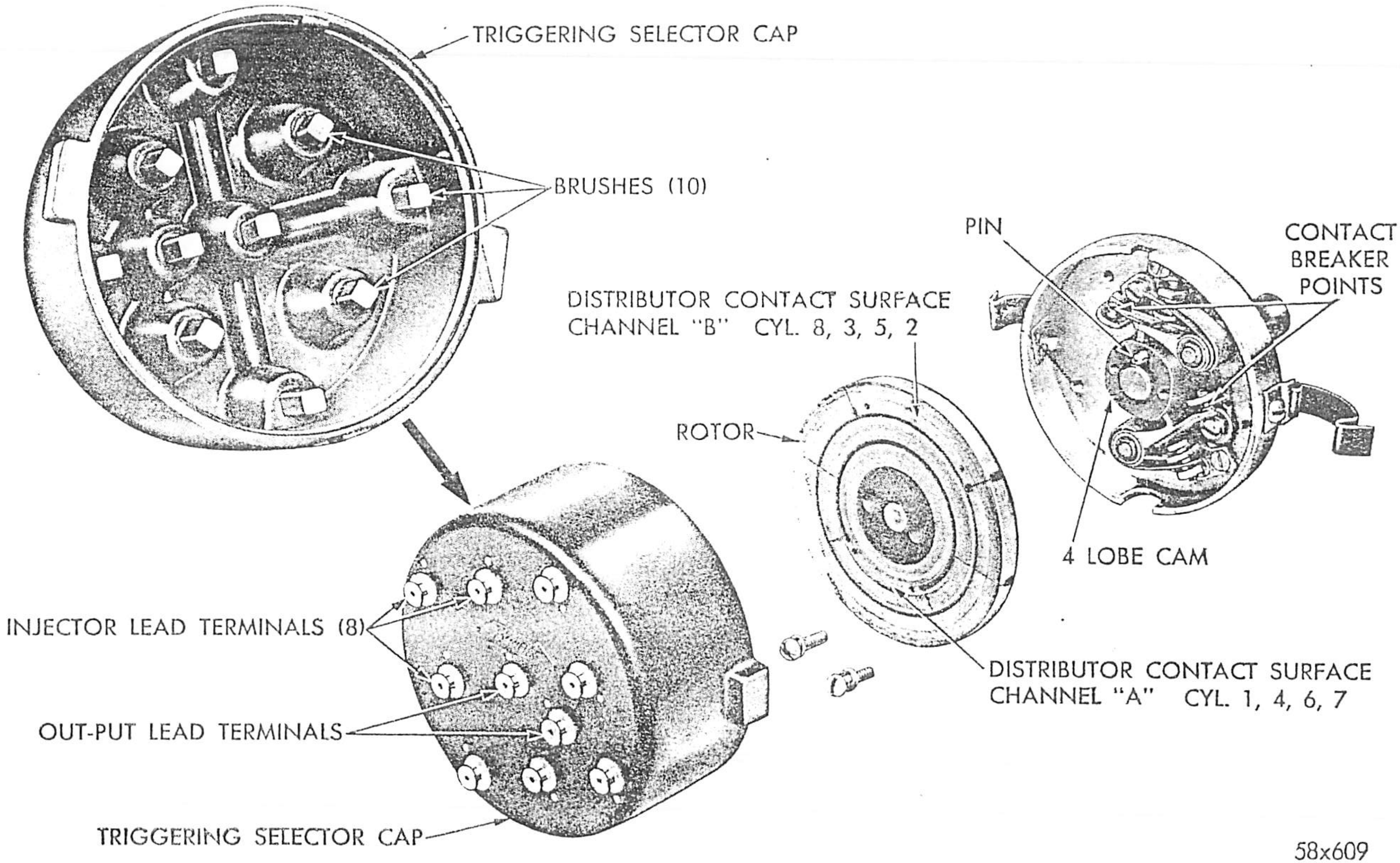

Fig. 12—Triggering Selector (Exploded View)

ignition distributor. The triggering selector unit is not in any way, connected with the ignition system of the car.

The two sets of breaker contact points are designated as input set to channel "A" and channel "B". The rotor of the unit has two separate distributing contact surfaces, as shown in Figure 12. Each distributing surface is shaped as an arc, and is associated with four (4) brush contacts located in the distributing cap. The outer arc distributes the electrical current from channel "A" circuit to the injectors for cylinders 1, 4, 6 and 7. The inner arc distributes the electrical current from channel "B" circuit for cylinders 8, 3, 5 and 2. (Refer to Figure 12.) The modulator also has two sets of electronic components designated as channels "A" and "B" circuits. The contact breaker set "A" of the triggering selector is connected to the input of channel "A" in the modulator, whereas the contact breaker set "B" of the triggering selector is connected to the input of channel "B" in the modulator.

The contact points operate in alternate succession. When a set of points "break", its respective channel circuit to the modulator which in turn sends the current through the sensor system. It is then returned back to the modulator. The modulator now routes this determined pulse width current to the selector unit where it is distributed to the appropriate injector.

The Modulator -- (See Figure 13)

The modulator consists of the two identical electronic systems which are identified as channel "A" and channel "B" circuits. Each channel is associated with one of the two sets of breaker contact points, located within the triggering selector unit. The modulator turns "on" and "off" the electrical current which operates the injector. Each time a set of breaker contact points open, a flow of current is turned "on" by the channel associated with that set of breaker points. Since the two sets of breaker contacts operate alternately, the two channels of the modulator also operate alternately.

With a constant fuel pressure, the amount of fuel which an injector liberates into the engine is proportionate to the length of time which the solenoid is energized. The triggering selector contact points "breaking" starts the period of injection, and the condition of all sensors, including the altitude compensator, modify the operation of the modulator so that the duration of the pulse to the injectors produces fuel flow which matches engine requirements.

Each time a set of breaker points open, and electric current is turned "on" by one of the two channels of the modulator. The duration of this current is extremely short. Since the electric current is of such short duration, it is called a "pulse" of current. The period of this pulse is termed "pulse duration". Thus, voltage which has a duration of 3/1000ths of a second, is referred to as a 3 millisecond pulse, or a pulse which is of 3 milliseconds duration.

Resistance Box -- (See Figure 14)

The resistance box is a part of the modulator circuit. One portion of the modulator circuit contains resistors which generate heat. Therefore, these resistors have been installed in a separate box with a perforated cover, and readily dissipates the heat generated by the system, when in operation. The resistance box and the modulator are connected by the wiring harness.

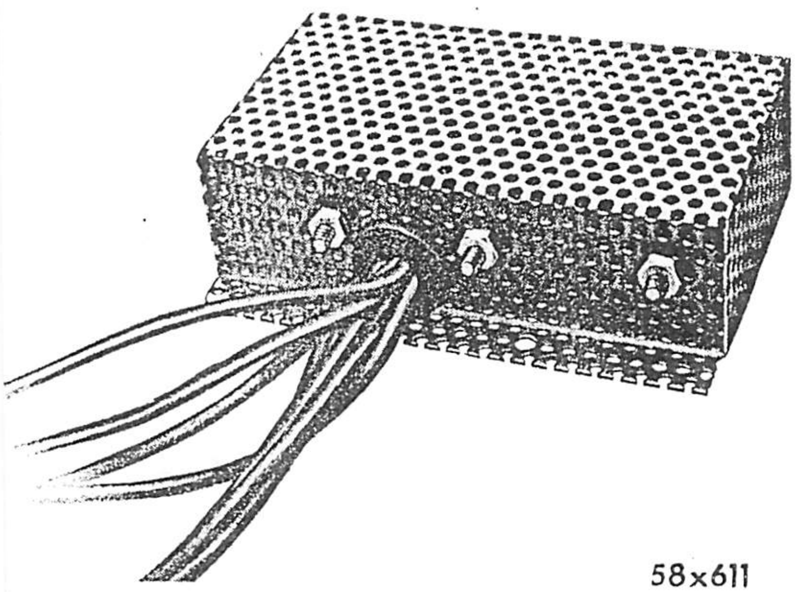

Fig. 14—Resistance Box Assembly

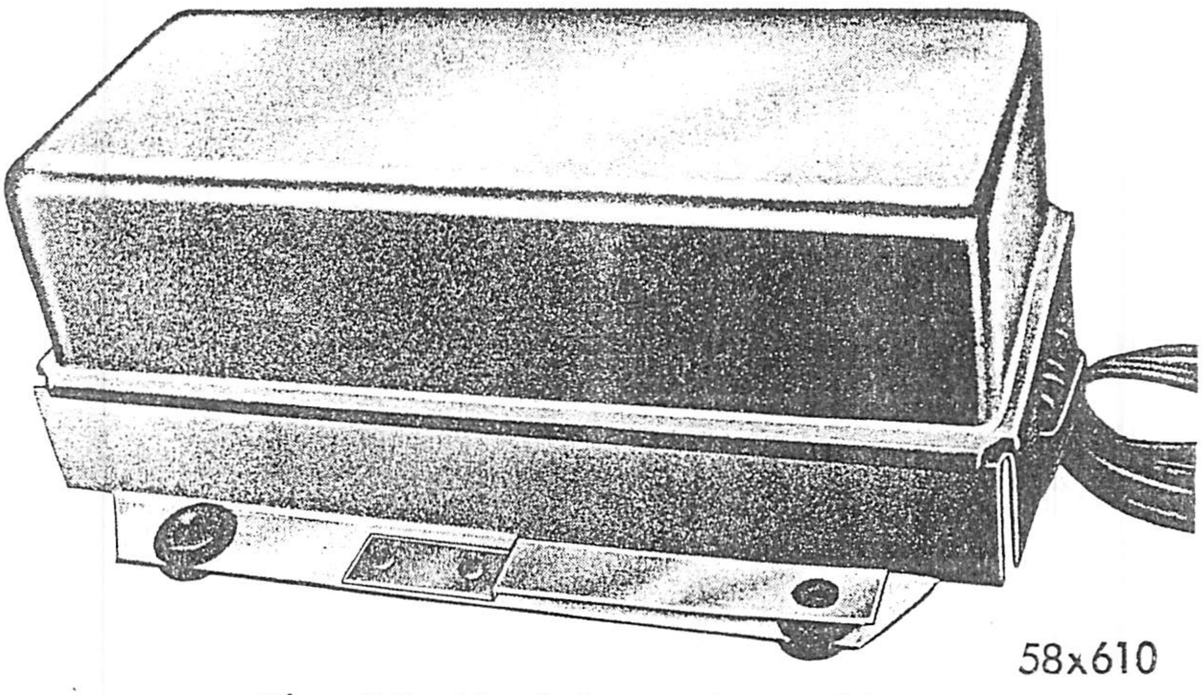

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Fig. 13—Modulator Assembly

Altitude Compensator

The altitude compensator is located within the modulator and is a device that automatically adjusts the pulse duration for altitude changes. The altitude compensator is pre-adjusted and sealed, and does not require servicing in the field.

5. THE SENSOR SYSTEM

The sensor system which is attached to the primary throttle valve body, consists of: The manifold vacuum sensor, the acceleration sensor, the cold-start and warm-up sensor, the idle adjustment sensor, the air temperature sensor, as shown in Figures 15 and 16. The sensor system is divided into two circuits, namely the main control circuit and the auxiliary control circuit. A description of these two circuits will follow:

The modulator uses these two sensor circuits which control the pulse duration, and consequently, the amount of fuel injected into the engine. One of these circuits is sensitive to resistance. The more resistance that is inserted into this circuit, the greater will be the pulse duration. The other sensor circuit is sensitive to voltage. The higher the voltage to the modulator inducted into this circuit, the shorter will be the pulse duration from the modulator.

The voltage sensitive sensor circuit is called the "main control circuit" and the resistance sensitive circuit is known as the "auxiliary control circuit".

Included in the main control circuit is the manifold vacuum and the acceleration sensors. The manifold vacuum and the acceleration sensors both vary the voltage which is fed into the modulator from the main control circuit. This in turn,

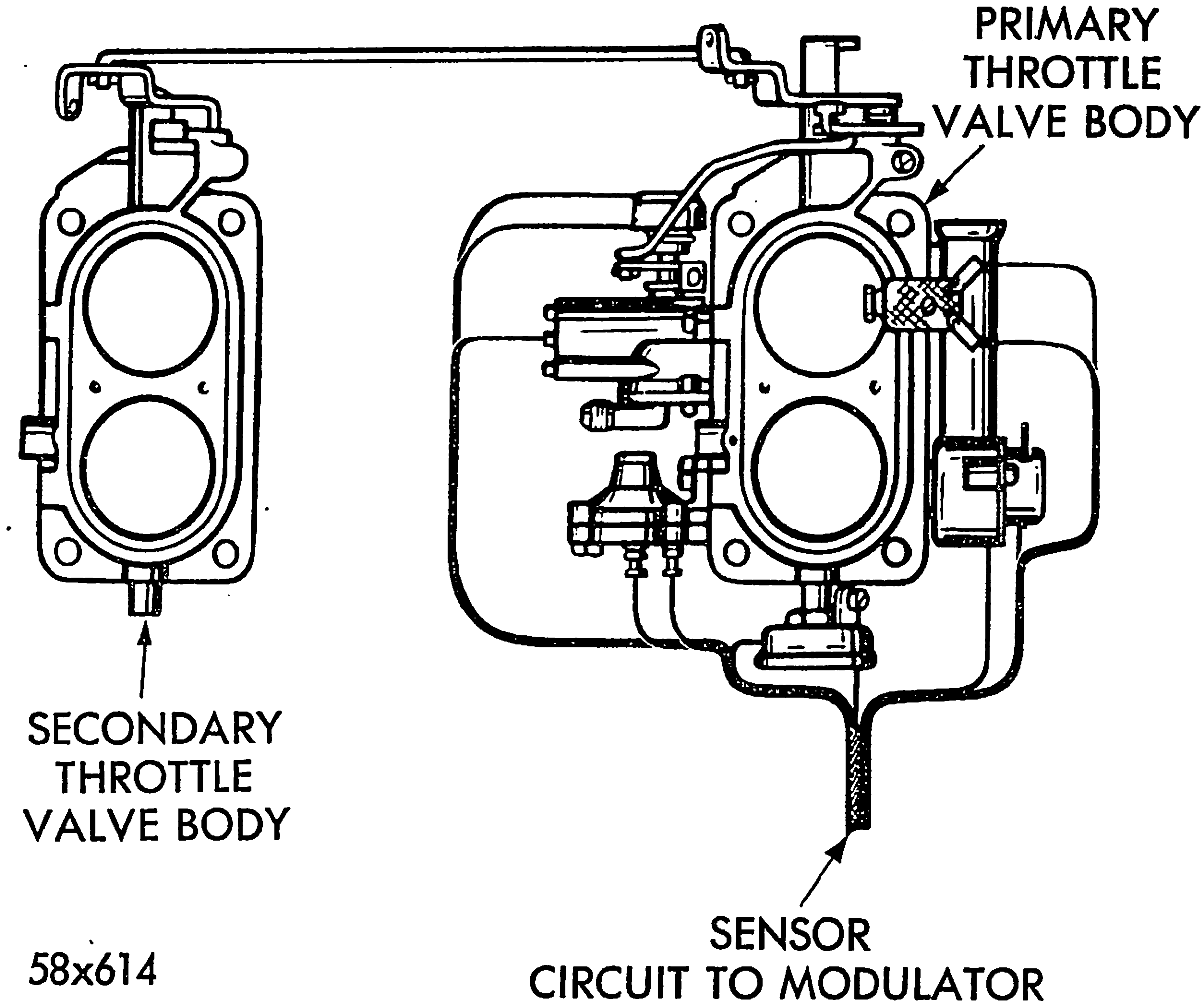

FIG. 15—FUEL INJECTOR SENSOR SYSTEM

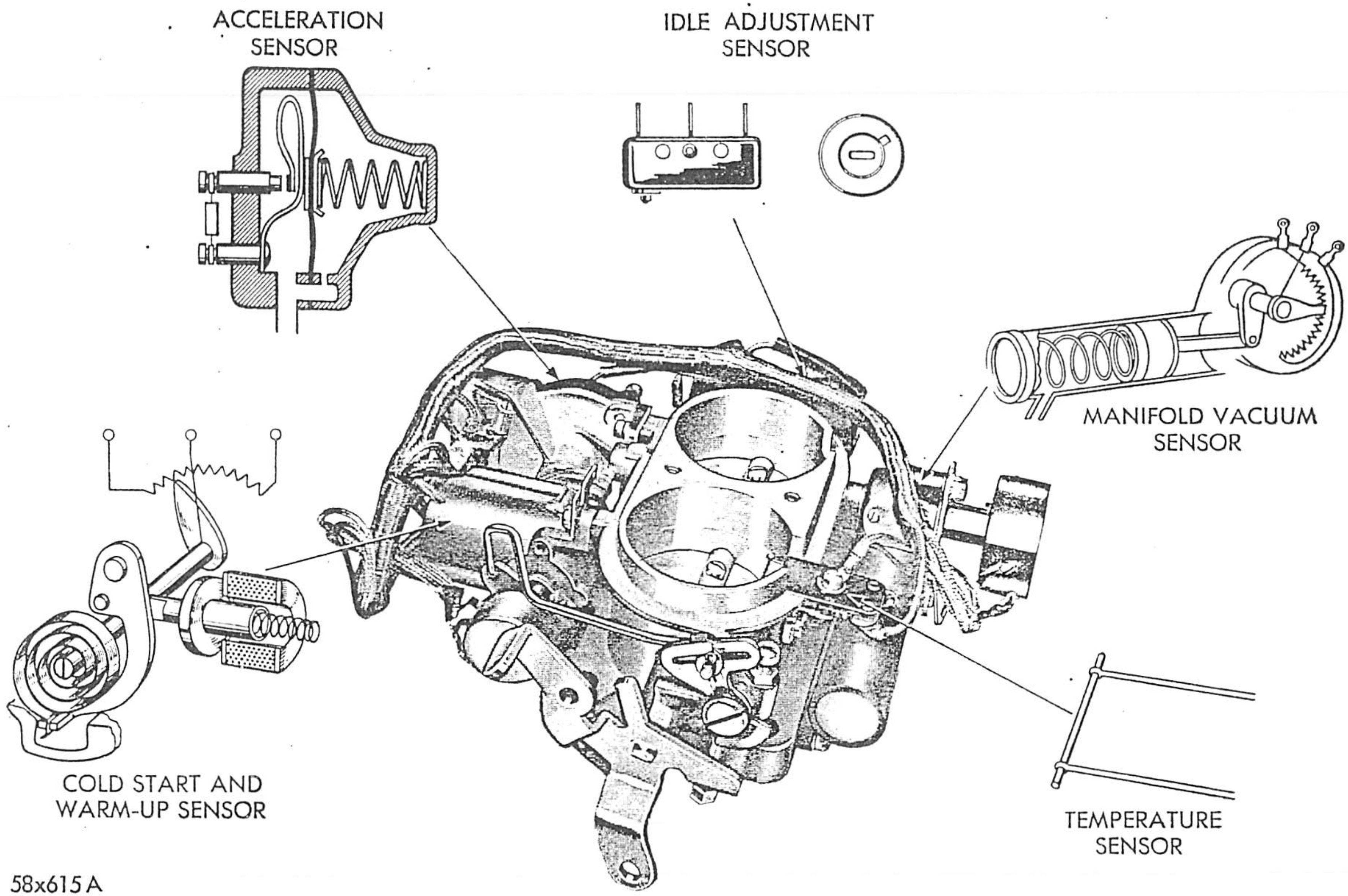

FIG. 16—PRIMARY THROTTLE BODY AND SENSORS

varies the amount of fuel injected into the engine, and, according to the needs of the engine.

The cold-start and warm-up sensor and the idle adjustment sensor are included in the auxiliary control circuit. This circuit provides the correct fuel-air ratio during engine starting, warm-up and engine idle. During normal engine operation, after the engine has warmed up (and at speeds greater than idle), the auxiliary control sensors have negligible effect upon the pulse duration, and consequently the air-fuel ratio.

6. THE MAIN CONTROL SENSOR CIRCUIT

As stated previously, the main control circuit consists of the manifold vacuum sensor and the acceleration sensor. Each of these sensors will be described relative to operational function as follows:

The Manifold Vacuum Sensor

The manifold vacuum sensor unit shown in Figure 17, is located on the primary throttle body, and consists of a potentiometer, the shaft of which, is connected to a spring loaded piston by means of a crank mechanism. The cylinder in which the piston travels, is connected to the lower portion of the throttle body by a channel which is open to the intake manifold vacuum. (See Figure 16). As the manifold vacuum increases, the vacuum piston moves against the calibrated spring. The sliding motion of the piston is converted into a rotary motion of the potentiometer's shaft by the crank linkage. The contact arm of the potentiometer picks up the control voltage to the modulator. The rotation of the contact arm is toward the increased voltage position and thereby reduces the pulse duration. When the throttle is opened, the manifold vacuum decreases, allowing

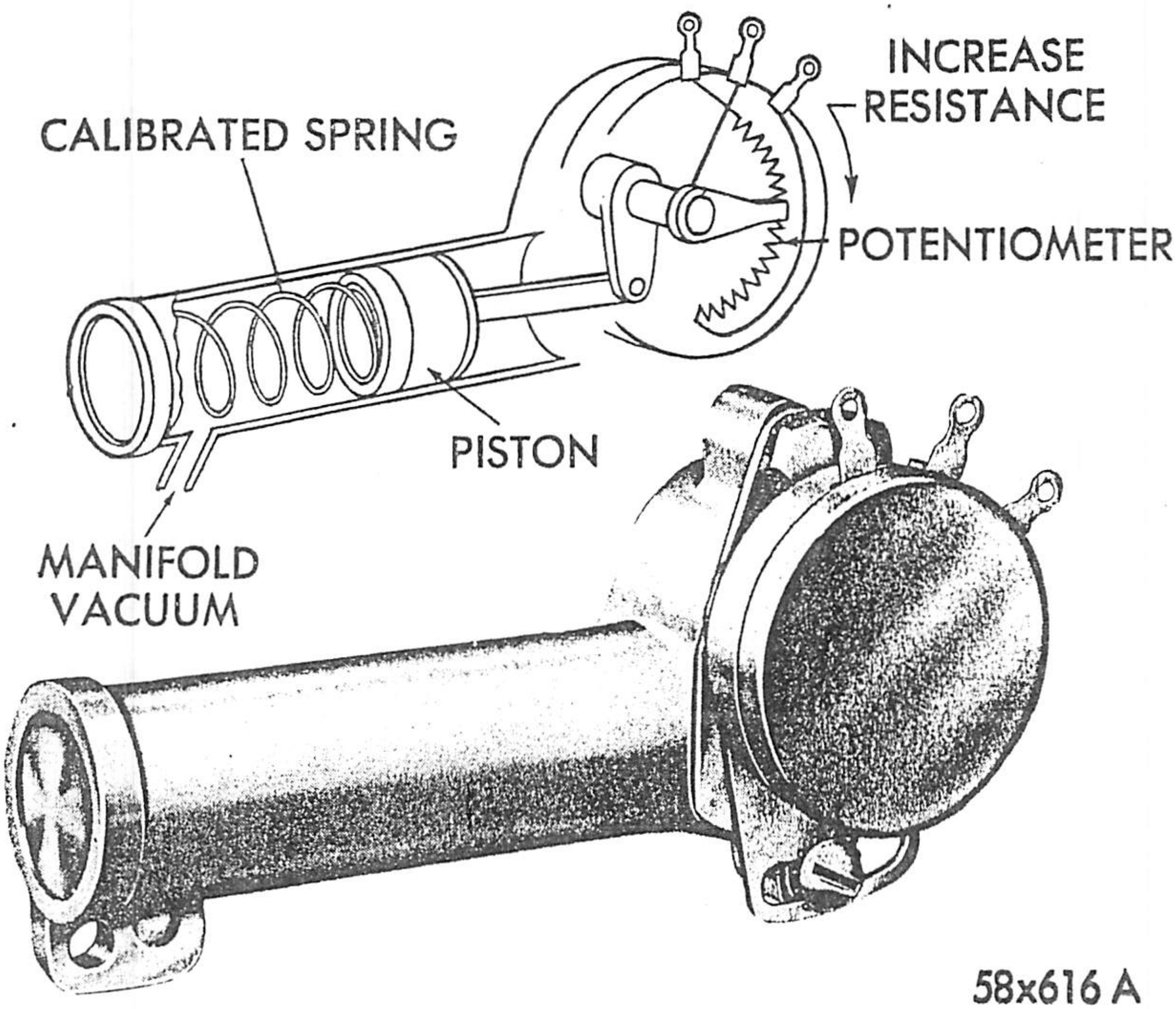

FIG. 17— MANIFOLD VACUUM SENSOR

the calibrated piston return spring to move the piston in the opposite direction. The potentiometer contact arm likewise rotates in the opposite direction and thereby decreases the voltage to the modulator. This action increases the pulse duration and thus, the engine vacuum affects the amount of fuel injection into the engine.

The Acceleration Sensor

To insure a smooth uninterrupted flow of power for acceleration, additional fuel must be metered into the engine. This is accomplished through the use of the acceleration sensor. The acceleration sensor consists of a vacuum diaphragm switch which is normally in the closed position. This switch is connected in series with the manifold vacuum sensor. Electrically, it is located between the positive 12 volt supply and the sensor potentiometer. When the switch is open, the potentiometer of the manifold vacuum sensor is connected directly to ground .... which causes the modulator to produce a greater pulse duration and consequently enrich the fuel-air mixture as required for acceleration.

As previously mentioned, this sensor consists of a diaphragm that separates the two halves of a chamber, as shown in Figure 18. One half of the chamber is connected to the engine manifold vacuum at the throttle body. (See Figure 16). The diaphragm contains a pair of contacts that comprise the switch. An air bleed equalizes the pressure on both sides of the diaphragm. The electrical contacts within the sensor are normally closed, thereby completing the circuit between the positive 12 volts and the manifold vacuum potentiometer. When the manifold vacuum suddenly drops, (as in the case of acceleration) the pressure on both sides of the diaphragm momentarily becomes unequal.... the air bleed hole in the diaphragm is small and restricts the flow of air that would

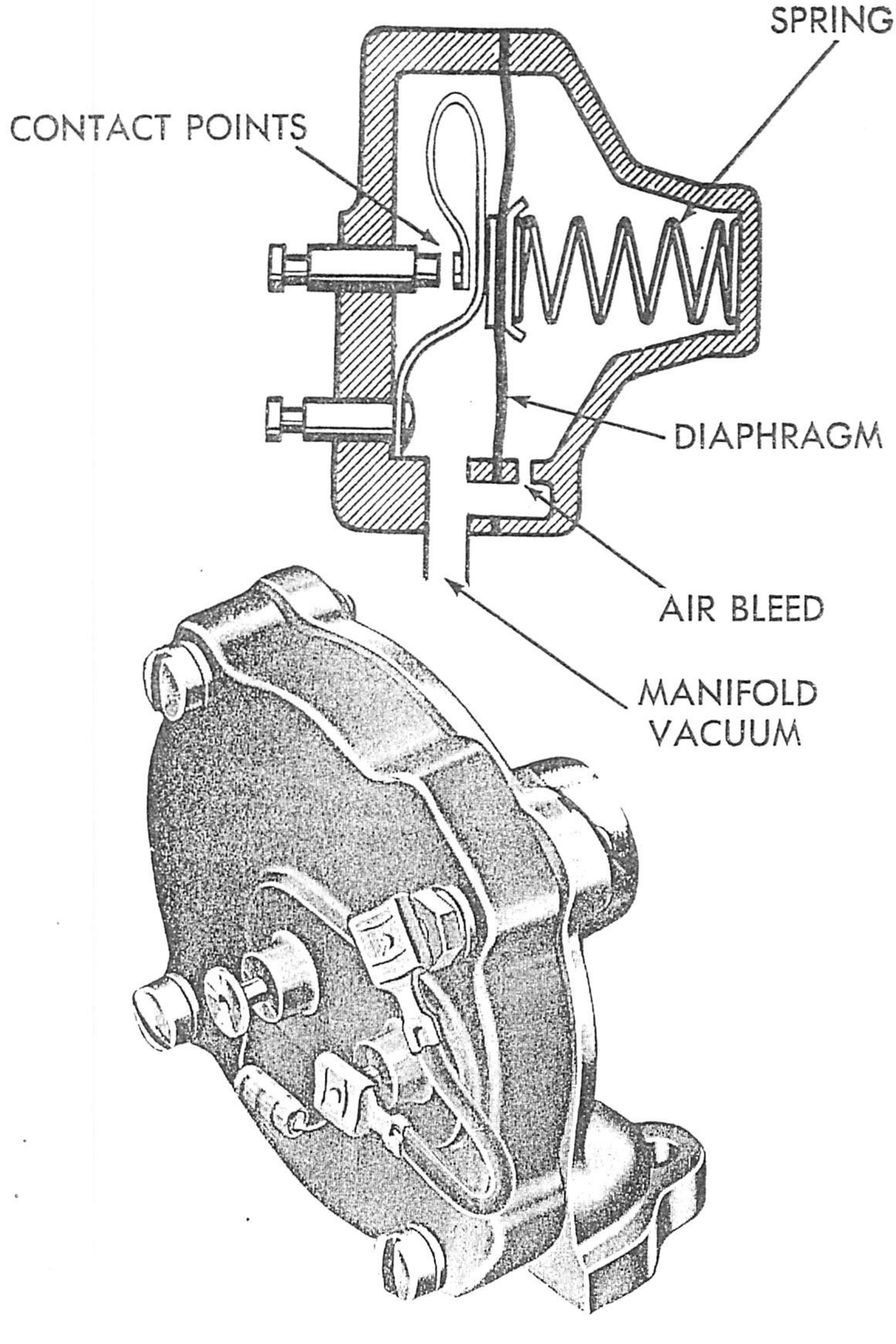

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FIG. 18—ACCELERATION SENSOR

equalize the two pressures. When the manifold vacuum pressure drops suddenly, the higher pressure is on the side of the diaphragm with the electrical contacts. The higher pressure forces the diaphragm toward the low pressure side of the chamber, thus opening the electrical contacts. The air bleed in the diaphragm quickly neutralizes the pressure differential on either side, and the diaphragm returns to its normal position, with the contacts of the switch closed.

7. AUXILIARY CONTROL SENSOR CIRCUIT

The auxiliary control sensor circuit consists of the cold-start and warm-up sensor, the unloader, the idle adjustment sensor and temperature sensor. Each of these sensors are described as follows:

Cold-Start and Warm-Up Sensor

The cold-start and warm-up sensor performs the same functions as the choke on a conventional carburetor .... namely, it adds fuel for starting the engine and while it is warming up to normal operating temperature. The warm-up enrichment is controlled by a thermostat coil spring, which is connected to the shaft of the rheostat (or variable resistor), as shown in Figure 19. The action of the thermostat coil spring is similar to that of its counter-part in a conventional carburetor. As temperature of the thermostat coil spring changes, the coil winds or unwinds and turns the shaft of the rheostat.

The rheostat windings are so arranged that, when the engine is cold, the resistance introduced into the auxiliary control circuit increases the pulse duration, and increases the amount of fuel injected into the engine. The cold-start sensor consists of a solenoid plunger, which is connected by a lever to

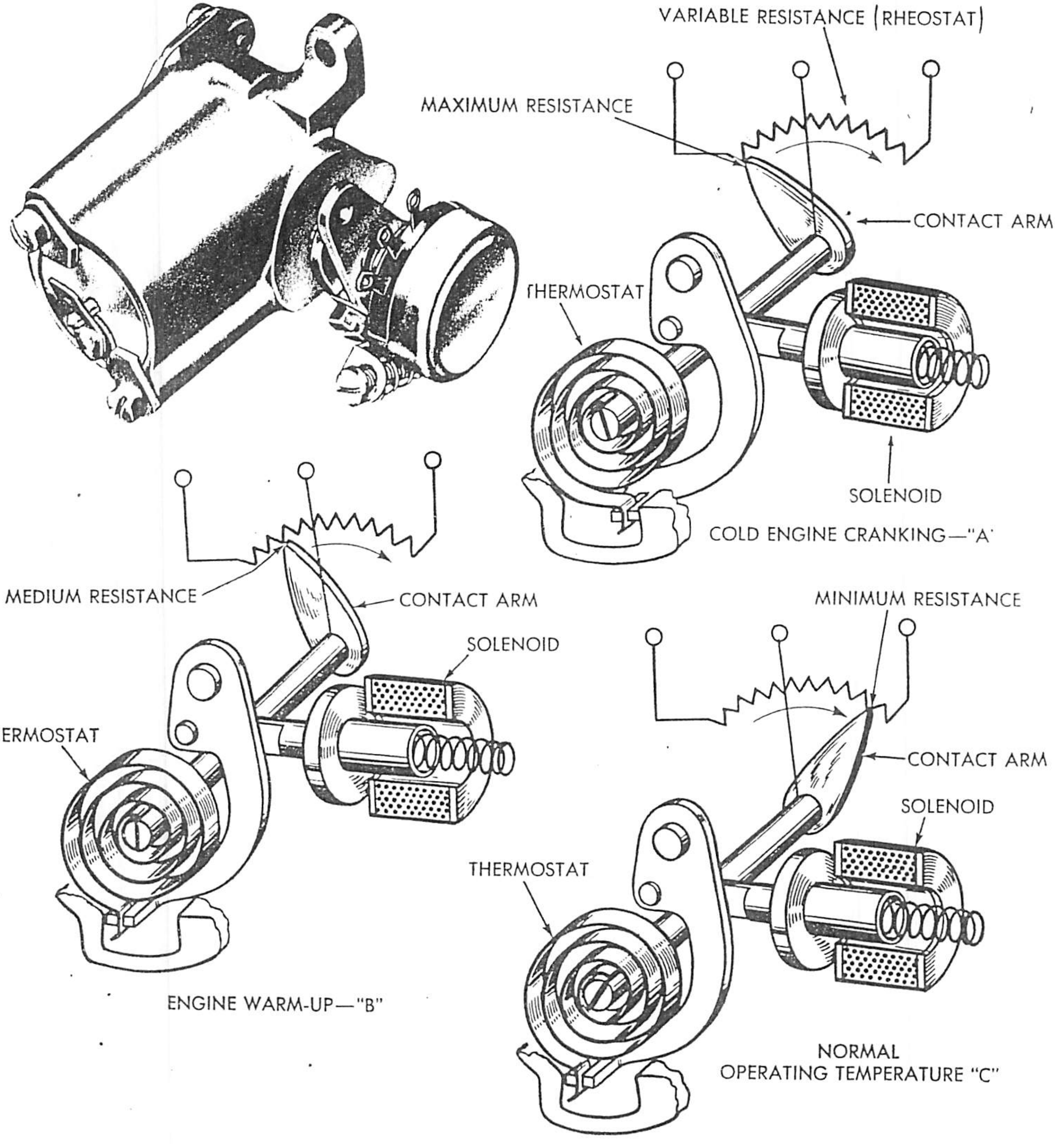

FIG. 19—COLD-START AND WARM-UP SENSOR

the outer end of the thermostat coil spring. (See Figure 19).

When the starter is engaged, the solenoid plunger actuates the lever which contacts the thermostat coil tang. This causes the thermostat coil spring to rotate an additional amount. The temperature of the thermostat coil spring determines the amount of rotation of the resistor shaft and thus, controls the additional pulse duration. (See "A" of Figure 19).

When the engine fires and the starting motor is disengaged, the solenoid plunger releases the thermostat coil spring, which rotates the resistor shaft and decreases the resistance, and the pulse duration. (See Figure 19 "B"). As the engine continues to run, the thermostat coil spring tension is then only affected by the warm air from the "stove" in the manifold. As spring tension continues to decrease, the resistance of the rheostat also decreases and a decreased pulse duration is the result as the engine warms up. (See "C" of Figure 19).

Linkage that is connected to the sensor and the fast idle cam, provides a fast idle position of the throttle valves, during a cold start and in the warm up period.

Cold Start Pulses

Normally, when the breaker contacts of the triggering selector open, an output pulse occurs. During the cranking period however, in addition to the increased pulse duration, (due to the resistance added by the cold start sensor) a circuit in the modulator also causes two additional pulses to occur and triples the flow of fuel during the cranking period.

The De-Loader (Wide open Kick)

The de-loader is a device that consists of two switches and related components, located near the end of the throttle shaft, as shown in Figure 4.

The de-loader provides an electrical means of de-energizing the modulator and thereby, interrupting fuel injection while the engine is being cranked at wide open throttle. (This procedure should be followed in the event the engine becomes flooded during the cranking period.)

A lever attached to the throttle shaft, contacts the two switches and closes them when the throttle is held in the wide open position. The switches of the de-loader are normally in the open position. When the throttle is held in the wide open position, one switch shorts out the cold-start and warm-up sensor rheostat. The other switch being connected to the temperature sensor, connects the starter relay to the temperature sensing circuit and introduces additional voltage. This reduces the pulse duration to an extremely low value while the engine is being cranked at wide open throttle.

The Idle Adjustment Sensor

The idle adjustment sensor is located on the throttle body and consists of the idle adjustment switch and the idle adjustment rheostat. (Refer to Figure 4). The idle adjustment rheostat is located near the end of the throttle shaft and is connected (in series) with the acceleration and manifold vacuum sensors, which are part of the main sensor circuit.

The idle switch is also located near the end of the throttle shaft and is actuated by a lever on the throttle shaft.

The function of the idle adjustment sensor is similar to that of the idle system of a conventional carburetor, in that it adjusts the fuel to air ratio at closed throttle. During curb idle, the idle switch is "open" and the idle adjustment rheostat (being in series with the manifold vacuum sensor), raises the voltage in the potentiometer circuit which decreases the pulse duration from the modulator. This permits the rheostat to provide either a "richer" or "leaner" mixture as required by the engine.

When the throttle is opened beyond curb idle, the idle switch is "closed" and the pulse duration is then modified by the manifold vacuum sensor, in accordance with the manifold vacuum of the engine.

The Temperature Sensor

The temperature sensor, as shown in Figure 20, is located on the primary throttle body and is exposed to the incoming air. The temperature sensor changes the flow of fuel to compensate for air temperature changes. A lowering of the temperature requires a greater quantity of fuel, whereas a rising temperature requires less fuel for the proper air/fuel ratio. When a change of temperature takes place, the temperature sensor changes the resistance to the modulator which will increase or decrease the pulse duration. This action controls the amount of fuel injected into the engine.

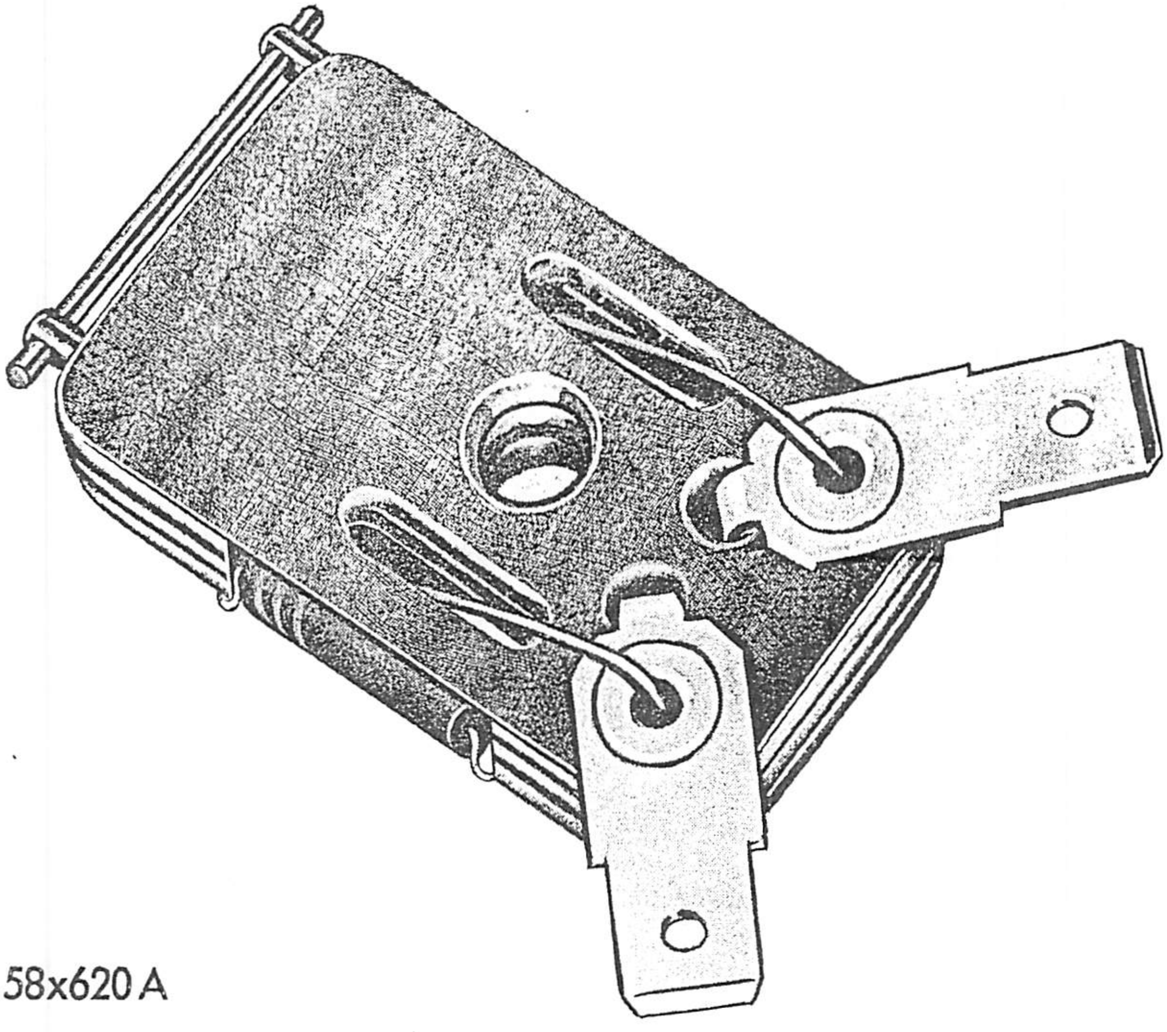

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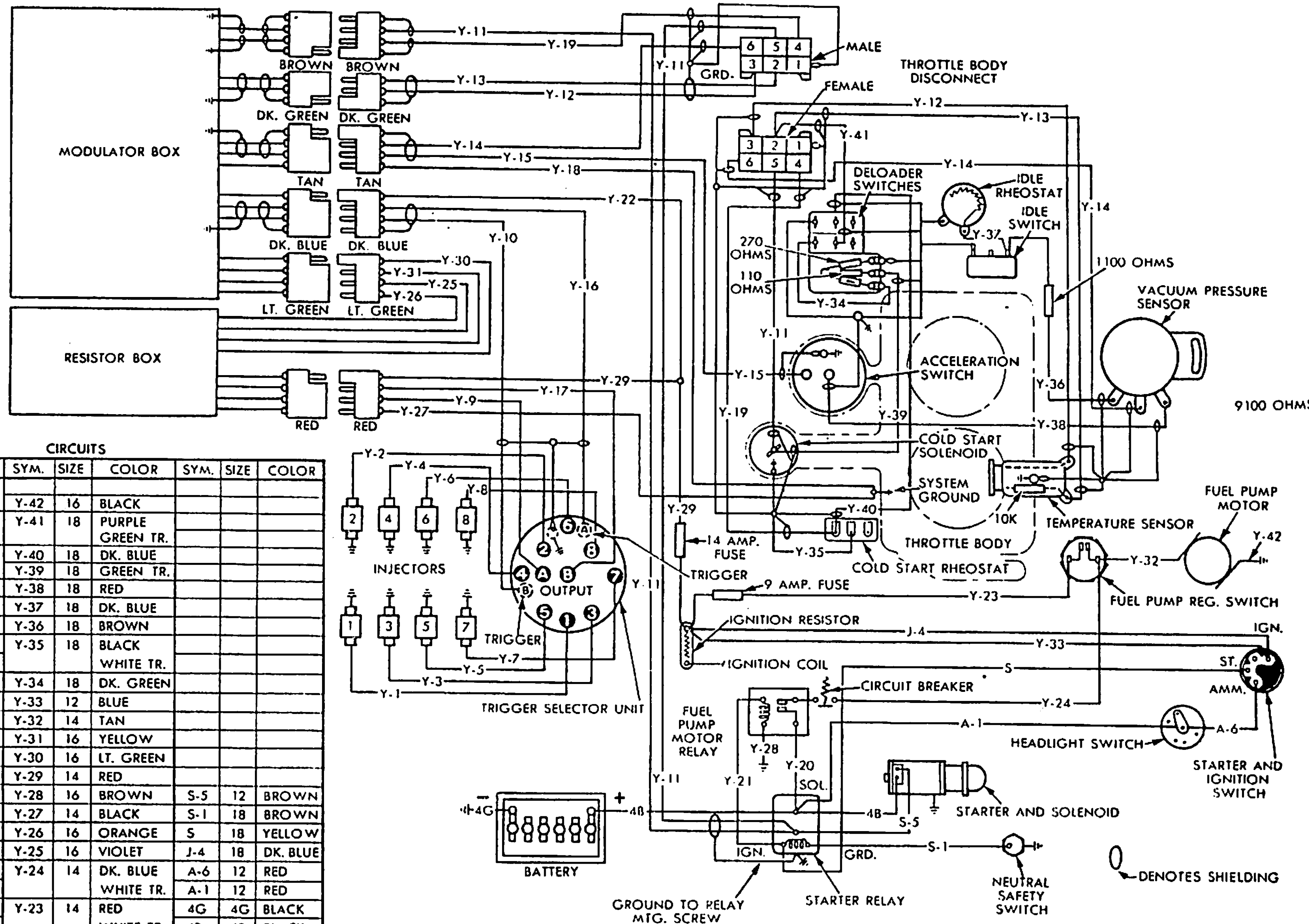
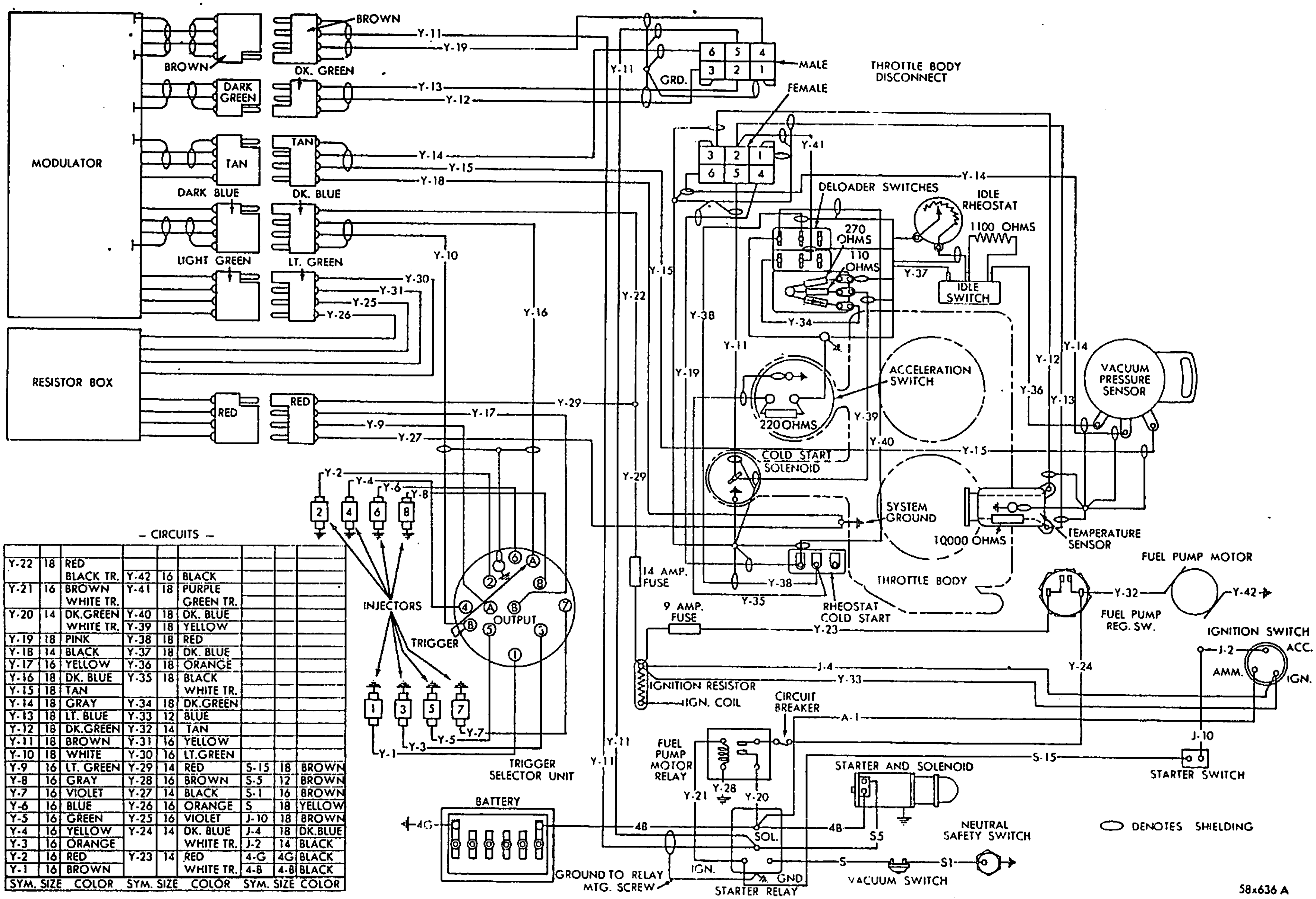
FIG. 20—TEMPERATURE SENSOR



CIRCUITS

SYM.	SIZE	COLOR	SYM.	SIZE	COLOR	SYM.	SIZE	COLOR
Y-22	18	RED BLACK TR.	Y-42	16	BLACK			
Y-21	16	BROWN WHITE TR.	Y-41	18	PURPLE GREEN TR.			
Y-20	14	DK. GREEN WHITE TR.	Y-40	18	DK. BLUE			
			Y-39	18	GREEN TR.			
Y-19	18	PINK	Y-38	18	RED			
Y-18	14	BLACK	Y-37	18	DK. BLUE			
Y-17	16	YELLOW	Y-36	18	BROWN			
Y-16	18	DK. BLUE	Y-35	18	BLACK WHITE TR.			
Y-15	18	TAN						
Y-14	18	GREY	Y-34	18	DK. GREEN			
Y-13	18	LT. BLUE	Y-33	12	BLUE			
Y-12	18	DK. GREEN	Y-32	14	TAN			
Y-11	18	ORANGE	Y-31	16	YELLOW			
Y-10	18	WHITE	Y-30	16	LT. GREEN			
Y-9	16	LT. GREEN	Y-29	14	RED			
Y-8	16	GREY	Y-28	16	BROWN	S-5	12	BROWN
Y-7	16	VIOLET	Y-27	14	BLACK	S-1	18	BROWN
Y-6	16	BLUE	Y-26	16	ORANGE	S	18	YELLOW
Y-5	16	GREEN	Y-25	16	VIOLET	J-4	18	DK. BLUE
Y-4	16	YELLOW	Y-24	14	DK. BLUE WHITE TR.	A-6	12	RED
Y-3	16	ORANGE				A-1	12	RED
Y-2	16	RED	Y-23	14	RED WHITE TR.	4G	4G	BLACK
Y-1	16	BROWN				4B	4B	BLACK

Fig. 21—Fuel Injection Wiring Diagram



– CIRCUITS –

SYM.	SIZE	COLOR	SYM.	SIZE	COLOR	SYM.	SIZE	COLOR
Y-22	18	RED BLACK TR.	Y-42	16	BLACK			
Y-21	16	BROWN WHITE TR.	Y-41	18	PURPLE GREEN TR.			
Y-20	14	DK.GREEN WHITE TR.	Y-40	18	DK. BLUE			
			Y-39	18	YELLOW			
Y-19	18	PINK	Y-38	18	RED			
Y-18	14	BLACK	Y-37	18	DK. BLUE			
Y-17	16	YELLOW	Y-36	18	ORANGE			
Y-16	18	DK. BLUE	Y-35	18	BLACK WHITE TR.			
Y-15	18	TAN						
Y-14	18	GRAY	Y-34	18	DK.GREEN			
Y-13	18	LT. BLUE	Y-33	12	BLUE			
Y-12	18	DK.GREEN	Y-32	14	TAN			
Y-11	18	BROWN	Y-31	16	YELLOW			
Y-10	18	WHITE	Y-30	16	LT.GREEN			
Y-9	16	LT. GREEN	Y-29	14	RED	S-15	18	BROWN
Y-8	16	GRAY	Y-28	16	BROWN	S-5	12	BROWN
Y-7	16	VIOLET	Y-27	14	BLACK	S-1	16	BROWN
Y-6	16	BLUE	Y-26	16	ORANGE	S	18	YELLOW
Y-5	16	GREEN	Y-25	16	VIOLET	J-10	18	BROWN
Y-4	16	YELLOW	Y-24	14	DK. BLUE WHITE TR.	J-4	18	DK.BLUE
Y-3	16	ORANGE				J-2	14	BLACK
Y-2	16	RED	Y-23	14	RED WHITE TR.	4-G	4G	BLACK
Y-1	16	BROWN				4-B	4-B	BLACK

8. THE FUEL SUPPLY SYSTEM

Fuel Manifolds -- Tubes that distribute fuel from the pressure/regulator/filter and vapor separator, to the injectors.

Fuel Pump -- Delivers fuel from the supply tank to the pressure regulator/filter at 29 + or - 4 psi.

Injectors -- Electrically operated valves which open and close to discharge fuel into the manifold through 6 metered orifices.

Pressure Regulator/Filter and Vapor Separator -- Maintains a constant pressure of 14 + or - ½ psi. (for the Chrysler 300D or 12½ + or - ½ psi. for the Dodge, De Soto and Plymouth Cars) in the fuel manifolds and injectors. This unit contains a filter element and a magnetic spring for removing impurities from the fuel.

9. THE INJECTOR CONTROL SYSTEM

Altitude Compensator -- Modifies the pulse duration in accordance with the requirements of altitude conditions, (located in the modulator.)

Base Pulse Duration -- The duration of the electrical pulse established by the modulator.

Breaker Contact Points --(Dual Set) Break the circuit delivering current to the modulator.

Cold-Start Pulse -- A double pulse which takes place during the cranking period of cold starts.

Increased Pulse Duration -- The additional pulse which is created by the modulator upon a signal from the sensors.

Millisecond -- One one-thousandth (1/1000) of a second. The period of injection is measured in milliseconds.

Modulator -- Receives a signal from the triggering selector and starts a current that is modulated by the sensors. It sends an output current to the triggering selector for delivery to the injectors.

Pulse Duration -- The unit of time which an injector solenoid is energized by the current from the modulator.

Resistance Box -- Contains the resistance units for the modulator (to dissipate heat).

Rotor -- A Disc in the triggering selector unit with two contact surfaces for transmitting the current to the injectors.

Timing -- The regulation of the current from the triggering selector to the modulator.

Triggering Selector -- Performs a two-fold function: (a) the triggering portion controls the time to "trigger" (or send) an input current to the modulator.

(b) The distributing portion receives the output current from the modulator and transmits it to the correct injector.

Triggering Selector Cap -- Completes the circuit between the triggering selector and the injectors. In conjunction with the rotor, it delivers the current to the proper injector.

10. SENSOR SYSTEM

Acceleration Sensor -- Momentarily increases the pulse duration for acceleration. This sensor is controlled by manifold vacuum.

Cold-Start and Warm-Up Sensor -- Increases the pulse duration for cold starts. This sensor is controlled by a solenoid and a thermostat coil spring. It also modifies the pulse duration, during the warm-up period and controls the fast idle cam.

De-Loader (Wide Open Kick) -- Provides a manual means to reposition the cold-start sensor to reduce pulse duration when the throttle is in the wide open position during the cranking period. This is used in case the engine becomes flooded while cranking.

Idle Adjustment Sensor -- Provides a manual adjustment of the pulse duration for correct air/fuel mixture at idle speed.

Manifold Vacuum Sensor -- Modifies the pulse duration in accordance with engine manifold vacuum.

Potentiometer -- A device for dividing the voltage.

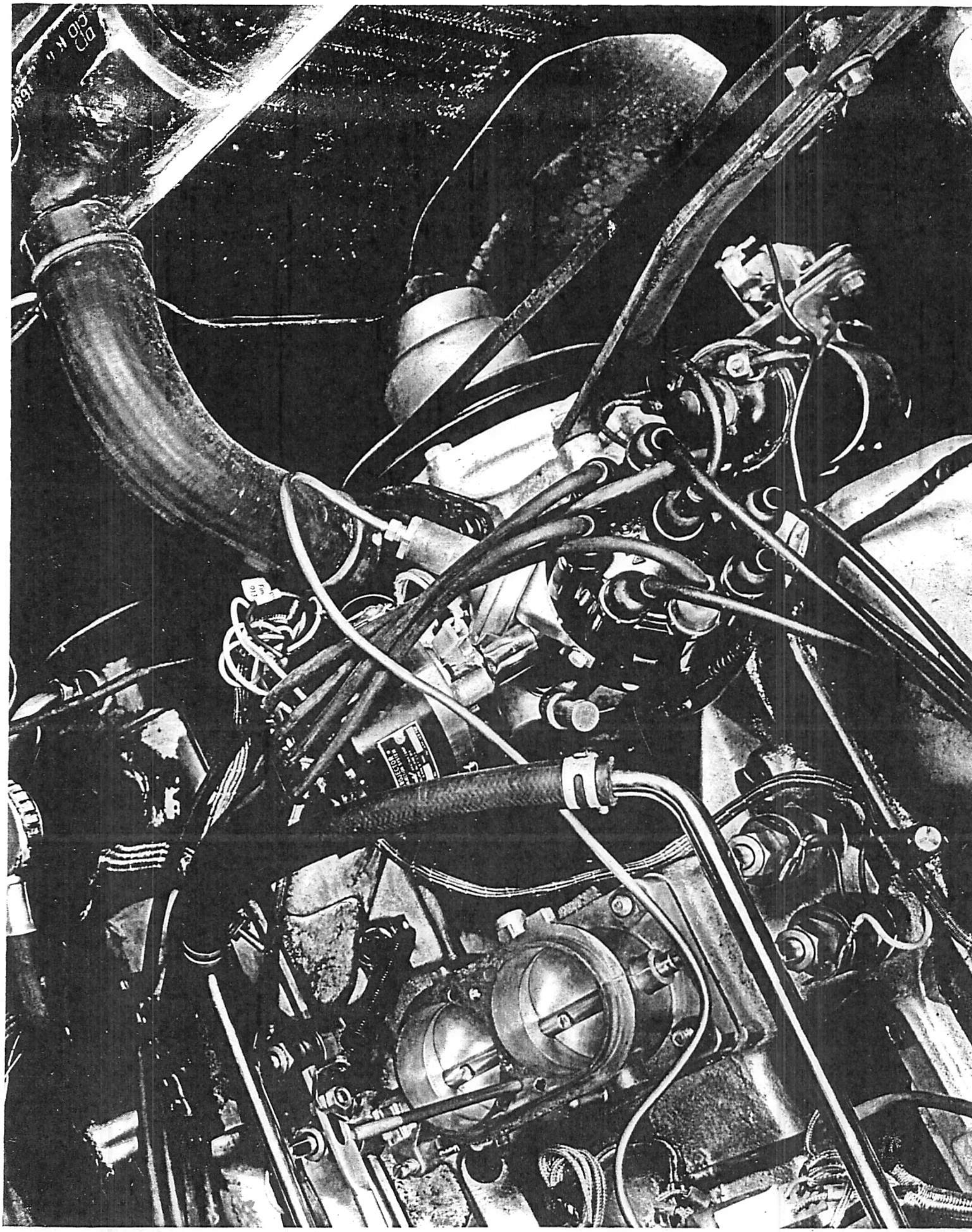
Primary Throttle Valve Body -- One unit in a compound installation having two (2) throttle valve bodies. It controls air flow to the intake manifold and carries the sensors.

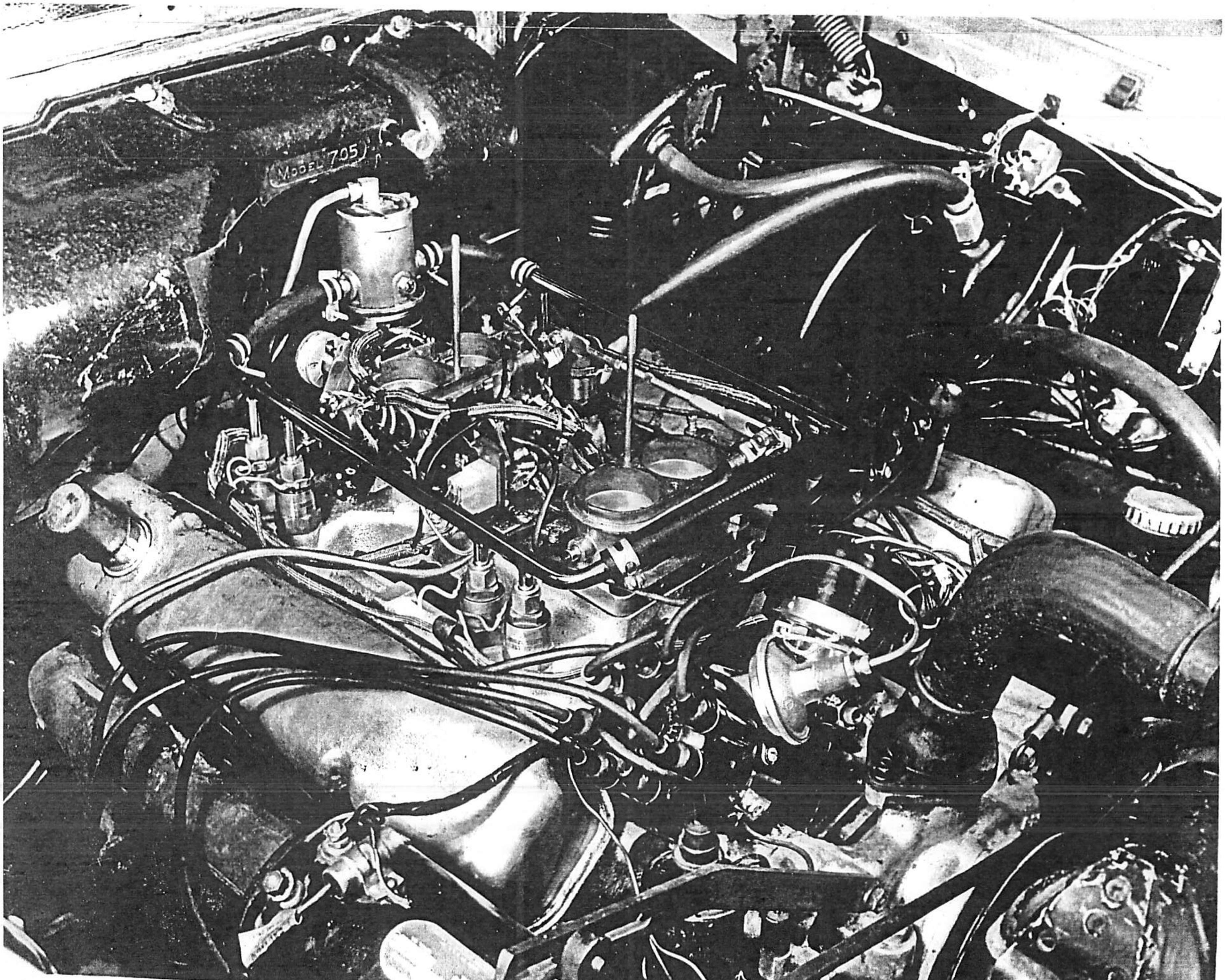
Rheostat -- A device for changing the resistance in a circuit.

Secondary Throttle Valve Body -- One unit in a compound installation having two (2) throttle valve bodies. It controls air flow but does not carry any sensors. It does carry the idle speed adjusting screw (curb idle).

Sensor Circuit -- A group of two or more sensors wired together. However, each sensor independently affects the pulse duration.

Temperature Sensor -- A resistor that is sensitive to temperature changes. It also modifies the pulse duration in accordance with temperature of the inlet air flow through the primary throttle valve body.

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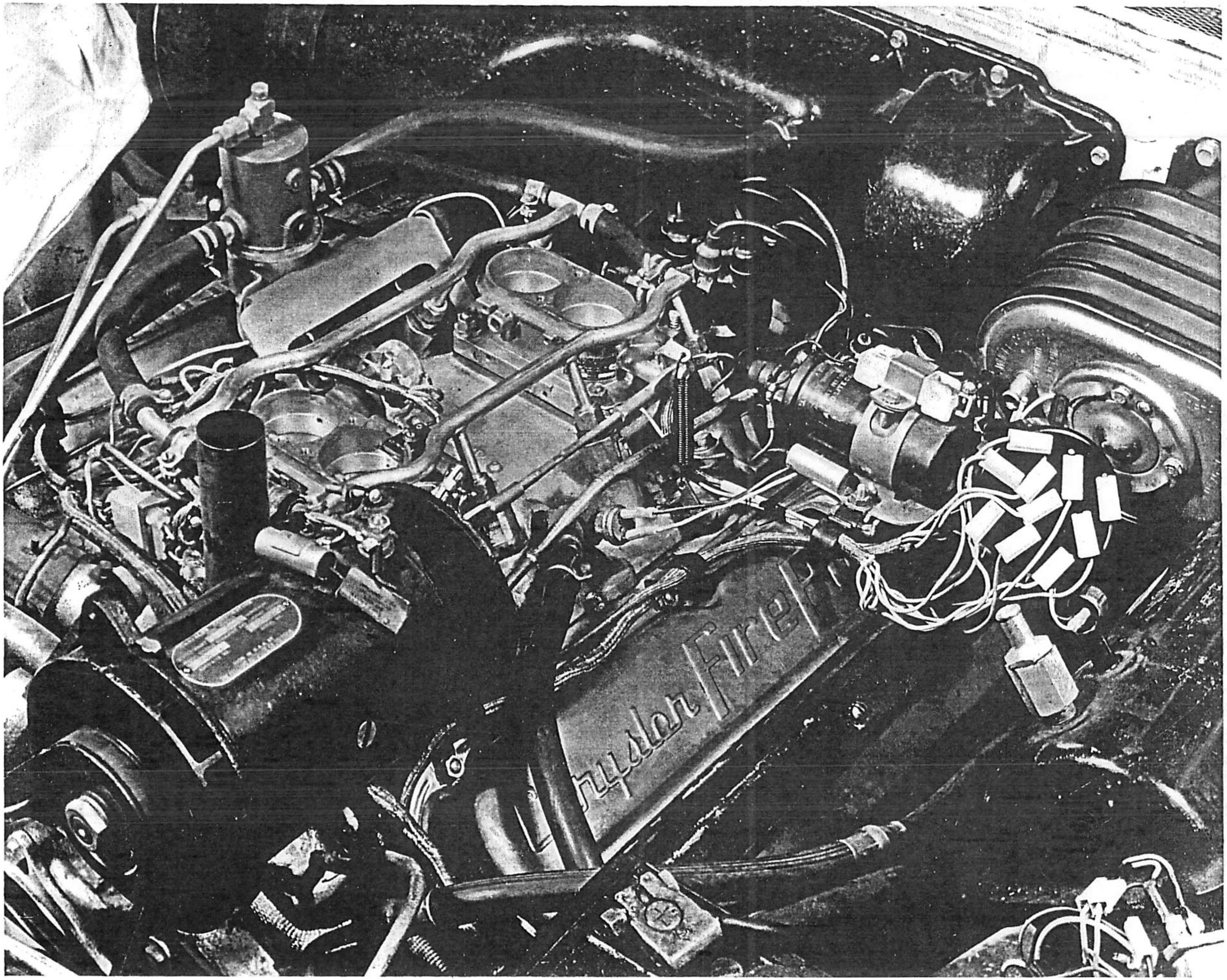
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