EMISSION CONTROL SYSTEMS
ALL SERIES

CONTENTS

DESCRIPTION AND OPERATION

EMISSION CONTROL SYSTEM GENERAL DESCRIPTION

All 1973 cars must be capable of passing certain tests which measure the quantity of unburned impurities in the exhaust gases. Federal law places a limit on the amount of hydrocarbon, oxides of nitrogen and carbon monoxide released from the exhaust system.

All Buicks are equipped with various systems to control the emission of pollutants to the atmosphere through the exhaust system. All 1973 Buicks use the positive crankcase ventilation system, controlled combustion system, air injection reactor system and the exhaust gas recirculation system. The transmission controlled vacuum spark advance system will be used on all manual transmission applications, and on 455 Stage I engines with automatic transmissions. The evaporative emission control system, which prevents loss of fuel vapor from the fuel tank is explained in the fuel section.

CLOSED POSITIVE CRANKCASE VENTILATOR SYSTEM

All cars have a closed Positive Crankcase Ventilating System to help reduce air pollution and to provide more complete scavenging of crankcase impurities. Ventilation air is drawn through a filter assembly located in the air cleaner, through a hose, into the left rocker arm cover, down into the crankcase, across and up into the rear of the intake manifold, up through the ventilator valve, through a hose and into the intake manifold. Intake manifold vacuum draws any fumes from the crankcase to be burned in the engine.

When air flow through the carburetor is high, added air from the Positive Crankcase Ventilating System has no noticeable effect on engine operation; however, at idle speed, air flow through the carburetor is so low that any large amount added by the ventilating system would upset the air-fuel mixture, causing rough idle. For this reason, a flow control valve is used which restricts the ventilating system flow whenever intake manifold vacuum is high. See Figure 6F-1.

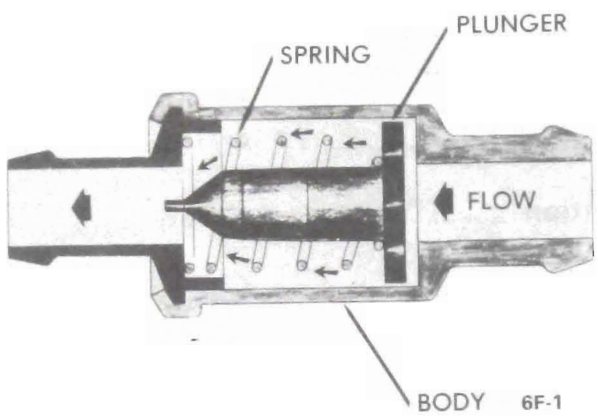

Figure 6F-1 Positive Crankcase Ventilator Valve

After a period of operation, the ventilator valve tends to become clogged, which reduces and finally stops all crankcase ventilation. An engine which is operated without any crankcase ventilation can be damaged seriously. Therefore, it is important to replace the ventilator valve periodically.

CAUTION: *If an engine is idling too slow or rough, this may be caused by a clogged ventilator valve or plugged hose; therefore, never adjust the carburetor idle without first checking the crankcase ventilator check valve and hose.*

After installing a new ventilator valve, always readjust engine idle.

All cars have a closed P.C.V. System. With this system, any blow-by in excess of the system capacity (from a badly-worn engine, sustained heavy load, etc.) is exhausted into the air cleaner and is drawn into the engine.

TRANSMISSION CONTROLLED VACUUM SPARK ADVANCE SYSTEM

Automatic Transmission (TCS)

The Transmission Controlled Vacuum Spark Advance (T.C.S.) System is used with engines designed for no spark advance at lower engine speeds, plus leaner carburetor and choke calibrations. With retarded idle timing, the throttle must be opened slightly more to maintain the same idle speed. This gives better mixture distribution and less exhaust dilution, resulting in much more complete combustion.

The transmission controlled vacuum advance system consists of a solenoid valve (inserted in the ported vacuum hose to the distributor), an oil pressure operated switch (installed in the transmission) and an electrical harness connecting these two units.

The solenoid valve is normally open but closes off vacuum when electricity flows through the solenoid. A vent bleeds off any vacuum in the hose to the distributor advance unit when the valve closes.

The oil pressure switch is located internally in the direct clutch circuit and is pressurized when the car has shifted into third or drive gear.

The oil pressure switch is normally closed but opens to stop electrical flow to ground when there is oil pressure to the switch. The switch is controlled by direct clutch apply pressure.

An electrical harness connects the ignition switch to one terminal of the solenoid valve, through the solenoid, out the other solenoid terminal and to ground thru the oil pressure switch (when closed).

Operation of the transmission controlled vacuum advance system is as follows:

1. When operating in P, N, L2, or L1 positions; there is no oil pressure in the direct clutch circuit to the transmission switch, so there can be no vacuum advance.

2. When operating in D, there is no oil pressure to the transmission switch until the transmission upshifts to third gear, at which time vacuum advance starts to operate normally.

3. When operating in R, there is always oil pressure in the direct clutch circuit to the transmission switch, so there is normal vacuum advance.

Because of the greater heat rejection to the coolant during idle with little vacuum spark advance, some engines are liable to overheat if allowed to idle for an extended period. For this reason, some engines have a thermo vacuum switch located in the coolant passage at the left front corner of the intake manifold. This vacuum switch has three nipples:

1. The nipple marked "MT" has a hose either directly to the intake manifold or to a tee which connects to the manifold.

2. The nipple marked "C" is connected to the carburetor for a "ported" vacuum source.

3. The nipple marked "D" is connected to the distributor vacuum advance unit.

When engine coolant is at normal temperatures, the thermo vacuum switch is positioned internally to supply "ported" vacuum to the distributor. However, if coolant temperature should ever rise above 220 degrees, the thermo vacuum switch will supply full intake manifold vacuum to the distributor, even at closed throttle. This will improve idle quality and will cause an idling engine to speed-up, resulting in improved fan and water pump action, besides reducing heat rejection to the coolant because of the 14 to 20 degrees spark advance.

Manual Transmission (TCS)

The transmission controlled vacuum spark advance system consists of a solenoid valve (inserted in the ported vacuum hose to the distributor), a mechanical operated switch through the shift linkage and an electrical harness connecting these two units.

The solenoid valve is normally opened, but closes off vacuum when electricity flows through the solenoid. A vent bleeds off and vacuum in the hose to the distributor advance unit when the valve closes.

The mechanical switch operated by the shift linkage is normally closed but opens to stop electrical flow to ground when the transmission is shifted to 3rd gear for 3 speeds and 4th gear for 4 speed transmissions.

3 Speed Manual Transmission

When operating in neutral, lst gear, 2nd gear and reverse there will be no vacuum advance, until transmission is shifted into 3rd gear.

4 Speed Manual Transmission

When operating in neutral, lst gear, 2nd gear, 3rd gear and reverse, there will be no vacuum advance, until transmission is shifted into 4th gear.

CONTROLLED COMBUSTION SYSTEM (C.C.S.)

The C.C.S. package includes leaner carburetor calibration at idle and part throttle plus leaner choke calibration. Since past model carburetion was as lean as possible consistent with good driveability with inlet air temperatures as low as minus 20 degrees, this still leaner C.C.S. carburetion is only possible because of the heated air system that is also a part of the C.C.S. package. With the heated air system operating, inlet air temperature is around 115 degrees after the first few minutes of operation; this makes use of leaner (hot weather) calibration possible, and the car still responds and drives well in cold weather.

The heated air part of the C.C.S. consists of a heat stove, a heated-air pipe, a nylon adapter elbow, where necessary, and an air cleaner containing a temperature controlled door operated by vacuum through a temperature sensor.

The heat stove is a sheet metal cover, shaped to and bolted on with the left exhaust manifold. Air drawn in along the lower edge of the stove passes across the manifold surface, picking-up heat. The heated air is drawn out from the upper center of the manifold, through the heated air pipe and plastic adapter elbow into the snorkel of the air cleaner.

The temperature control air cleaner is designed to mix this heated air with cold air from under the hood so that carburetor inlet air temperature averages about 115 degrees. This mixing is done by a damper door.

The damper door is moved by a diaphragm type vacuum motor. When there is no vacuum present in the motor, the diaphragm spring forces the damper door open, opening the snorkel passage. Whenever the engine is running, the amount of vacuum present in the vacuum motor depends on the temperature sensor in the air cleaner which is located in the vacuum line between the intake manifold and the vacuum motor. In the sensor, a bi-metal temperature sensing spring starts to open a valve to bleed more air into the vacuum line whenever the temperature in the air cleaner rises above about 115°. Whenever the temperature falls below about 115° the sensing spring starts to close the air bleed into the vacuum line, allowing more manifold vacuum to reach the vacuum motor. Whenever there is 9 inches or more of vacuum in the vacuum motor, the diaphragm spring is compressed, closing damper door which closes snorkel passage.

When the engine is not running, the diaphragm spring will always hold the damper door to wide open snorkel position. However, when the engine is running, the position of the damper door depends on the air temperature in the air cleaner.

When starting a cold engine (air cleaner temperature under 85°), the damper door will close off snorkel passage. As soon as the air cleaner starts receiving hot air from the heat stove, the sensor will cause the damper door to partially open snorkel passage, mixing cold air with hot air as necessary to regulate air cleaner temperature within 20° of the ideal 115° air inlet temperature.

If underhood air temperature rises to 135°, the air bleed valve in the sensor will be wide open so that vacuum to the vacuum motor approaches zero. The diaphragm spring in the vacuum motor will hold the damper door to wide open snorkel position. If underhood temperature rises above 135°, carburetor inlet air temperature will also rise above 135°.

While air cleaner temperature is being regulated, accelerating the engine hard will cause the vacuum level in the intake manifold and in the vacuum motor to drop. Whenever vacuum drops below 5 inches, the diaphragm spring will open the damper door (snorkel passage open) in order to get the maximum air flow required for maximum acceleration.

Since failure of the thermo air cleaner will generally result in damper door staying open (snorkel passage open) failure will probably go unnoticed in warm weather. In cold weather, however, owners will complain of leanness, hesitation, sag, surge or stalling. When any type of lean operation complaint is received, always test the thermo air cleaner for proper functioning before doing any work on the carburetor.

AIR INJECTION REACTOR SYSTEM (A.I.R.)

General

The A.I.R. System reduces the hydrocarbon and carbon monoxide content of the exhaust gases by injecting air into the exhaust port of each cylinder. The oxygen in the air reacts with the hot exhaust gas, causing further combustion in the exhaust manifold before the gas enters the exhaust pipe.

The A.I.R. System is used on all 1973 Buicks.

The system consists of a belt-driven air pump, diverter valve, check valve, special intake manifold and cylinder head assemblies and hoses connecting the various components. See Figures 6F-14 and 6F-15 for A.I.R. System installed.

Air Pump

The air injection pump is a positive displacement vane type which is permanently lubricated and requires no periodic maintenance.

The belt-driven air pump is located at the upper left front of the engine. The pump mounting bracket is attached to the front of the engine. Power take-off for the pump is at the water pump pulley. Pump speed is 1.25 times crankshaft speed. Intake air passes through a centrifugal fan at the front of the pump, where foreign materials are separated from the air by centrifugal force. Air is delivered to the intake manifold galleries by a formed flexible hose of 3/4" inside diameter fitted to a 3/4" exhaust tube on the diverter valve at the back of the pump.

The only serviceable component of the pump is the centrifugal filter fan. Do not assume pump is defective if it squeaks when turned by hand. Do not lubricate the pump in any way.

If engine or underhood compartment is to be cleaned with steam or high pressure detergent, the centrifugal filter fan should be masked off to prevent liquids from entering the pump.

Do not attempt to operate vehicle with the drive belt disconnected.

Diverter Valve and Silencer Assembly

The diverter valve is attached to the back of the pump. It senses manifold vacuum through a 3/16" fitting at the carburetor. During sudden deceleration, vacuum increases cause the valve to open, allowing air from the air-injection pump to pass through the valve and silencer to the atmosphere. Approximate duration of the valve opening is five seconds. This valve also controls pressure within the system by diverting excessive pump output to the atmosphere through an internal muffler.

Check Valve

An adapter on the left side of the intake manifold is fitted with a screw-on check valve. This valve has a one-way diaphragm which prevents hot exhaust gases from backing up into the hose and pump and causing damage. This will protect the system in the event of pump belt failure, abnormally high exhaust system pressure or air delivery hose ruptures.

Intake Manifold and Cylinder Heads Assemblies

The intake manifold on A.I.R. cars have special intake manifolds and cylinder heads to distribute air from the pump to the exhaust port of each cylinder. Figure 6F-3 shows an intake manifold for A.I.R. with the air intake on the left side of the manifold. Air is pumped in the left side and across to the right side by a cast passage crossover just in front and below the carburetor bores. Openings on each side of the manifold are drilled to match passages in the cylinder heads drilled directly into each exhaust port.

EXHAUST GAS RECIRCULATION SYSTEM (E.G.R.)

The Exhaust Gas Recirculation System is used on all 1973 Buicks.

The Exhaust Gas Recirculation System is used to reduce oxides of nitrogen emissions from the engine exhaust. During the combustion process, nitrogen which makes up 80 percent of the air will tend to mix with oxygen at temperatures above 2500° F. During the combustion process, temperatures in the engine's cylinders will go well above 2500° F. which forms nitrogen oxides.

To lower the formations of nitrogen oxides, it is necessary to reduce combustion temperatures. This is accomplished by introducing exhaust gases into the engine intake manifold, which will enter the engine cylinders with the air fuel mixture for combustion.

The exhaust gas recirculation (E.G.R.) valve, as shown in Figure 6F-2, is mounted on the right rear of the engine manifold.

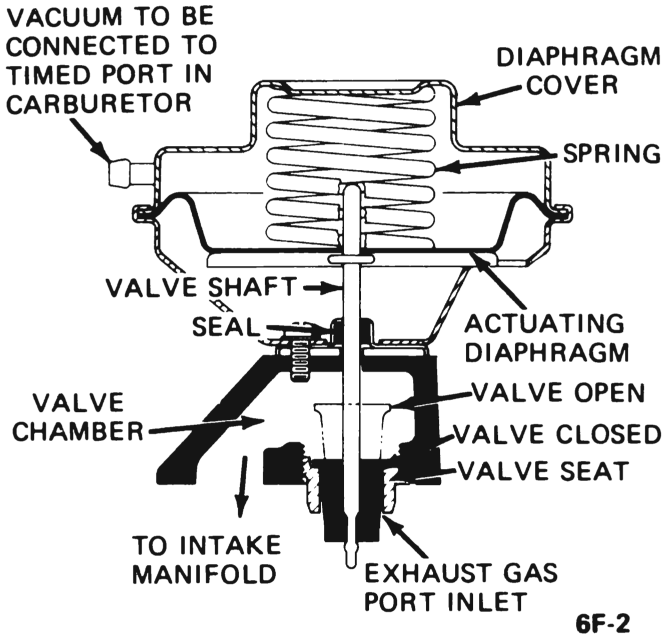

Figure 6F-2 E.G.R. Valve Cross-Sectional View

The exhaust gas intake port of the E.G.R. valve is connected to the intake manifold exhaust crossover channel, where it can pick up exhaust gases. See Figure 6F-3 for exhaust passages in intake manifold.

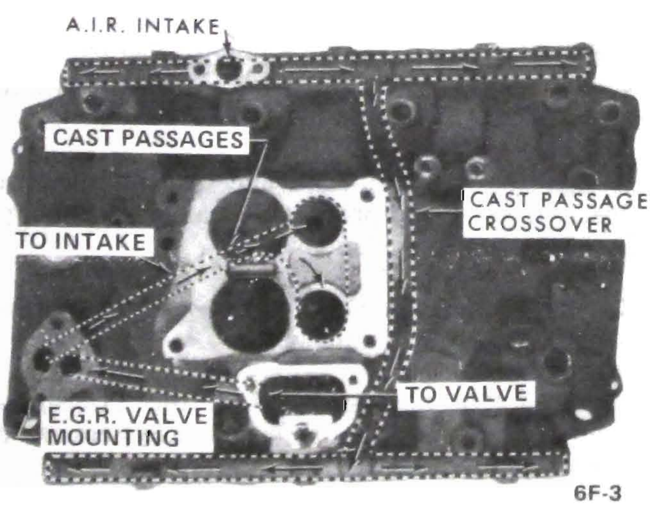

Figure 6F-3 Intake Manifold E.G.R. System (With A.I.R.)

The E.G.R. Valve is operated by vacuum and an inline temperature control valve. See Figure 6F-3A. The temperature control valve blocks the vacuum signal to the E.G.R. Valve any time under hood temperatures are below 55°F.

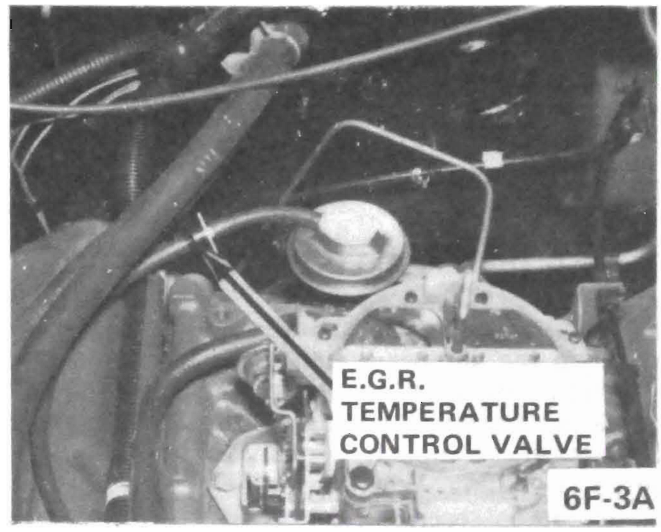

Figure 6F-3A E.G.R. Temperature Control Valve

The vacuum to the E.G.R. Valve is supplied by the carburetor.

Two punched ports, one just above the throttle valve and one mid-way between the throttle valve and upper surface of the throttle body are located in the primary bore.

As the primary throttle valve is opened beyond the idle position, the first vacuum port for the E.G.R. system is exposed to manifold vacuum to supply a vacuum signal to the E.G.R. valve. To control the vacuum signal at the lower port, the upper port bleeds air into the vacuum channel and modulates the amount of vacuum signal supplied by the lower E.G.R. port. In this manner, the E.G.R. valve can be timed for precise metering of exhaust gases to the intake manifold dependent upon location of the ports in the carburetor bore and by the degree of throttle valve opening.

As the primary throttle valve is opened further in the part throttle range at higher air flows the vacuum signal decreases at the lower port. At this time the upper port ceases to function as an air bleed and is gradually exposed to manifold vacuum to supplement the vacuum signal at the lower port and helps maintain correct E.G.R. valve position.

The upper and lower vacuum ports connect to a cavity in the throttle body which, in turn, through a passage supply the vacuum signal to an E.G.R. tube pressed into the front of the throttle body. The tube in the throttle body is connected by a hose to the E.G.R. valve located at the right rear section on top of the intake manifold.

The E.G.R. valve remains closed during periods of engine idle and deceleration to prevent rough idle from excessive exhaust gas contamination in the idle air/fuel mixtures.

The E.G.R. valve cannot be disassembled and no actual service is required, except that it should be checked for proper operation, as outlined under MAINTENANCE AND ADJUSTMENTS of this section.

DIAGNOSIS

TESTING THERMO AIR CLEANER OPERATION

Since failure of the thermo air cleaner will generally result in the damper door staying in the full open snorkel position, failure will probably go unnoticed in warm or hot weather. In cold weather, however, owners will complain of leaness, hesitation, sag, surge or stalling. When any type of lean operation complaint is received, always test the thermo air cleaner for proper functioning before doing any work on the carburetor.

Always perform checks in the same order as listed below.

Vacuum Motor Check

1. Check all hoses for proper hook-up. Check for kinked, plugged or damaged hoses.

2. With the engine "OFF", observe damper door position through snorkel opening. If position of snorkel makes observation difficult use the aid of a mirror. At this point damper door should be in such a position that the heat stove passage is covered (snorkel passage open). If not, check for binds in linkage.

3. Apply at least 9 in. Hg. of vacuum to diaphragm assembly through hose disconnected at sensor unit. Damper door should completely close snorkel passage when vacuum is applied. If not check to see if linkage is hooked up correctly and for a vacuum leak.

4. With vacuum applied, bend or clamp hose to trap vacuum in diaphragm assembly. Damper door should remain in position (closed snorkel passage). If it does not, there is a vacuum leak in diaphragm assembly. Replace diaphragm assembly.

Sensor Check

Quick Check of System:

1. Start test with engine cold, air cleaner at a temperature below 85 degrees. If the engine has been in recent use, allow it to cool.

2. Observe the damper door before starting the engine: it should be in the open snorkel position.

3. Start the engine and allow it to idle. Immediately after starting the engine, the damper door should be in the closed snorkel passage position.

4. As the engine warms up, the damper door should start to allow outside air and heated air to enter the carburetor inlet.

5. The system is operating normally as described above. If the air cleaner fails to operate as above or if correct operation of the air cleaner is still in doubt, proceed to the thermometer check.

Thermometer Check of Sensor:

1. Start test with air cleaner temperature below 85 degrees. If engine has been run recently, allow it to cool down. While engine is cooling, remove air cleaner cover and install a temperature gage such as J- 22973 as close as possible to sensor. Reinstall air cleaner cover. Do not install wing nut. Let car stand idle for 1/2 hour or more before proceeding to step 2.

2. Start and idle engine. Damper door should move to close the snorkel passage immediately if engine is cool enough. When damper door starts to open the snorkel passage (in a few minutes), remove air cleaner cover and read temperature gage. It must read 115 degrees plus or minus 20 degrees.

3. If the damper door does not start to open up the snorkel passage at temperature indicated, temperature sensor is defective and must be replaced.

TESTING TRANSMISSION CONTROLLED VACUUM ADVANCE

A failure in the transmission controlled vacuum advance spark system could result in either of two troubles:

1. Continuous vacuum advance in first and second gears which would prevent the car from passing the Federal emissions standards.

2. No vacuum advance in third gear which would result in lower gas mileage.

Check for proper operation of the Transmission Controlled Vacuum Spark Advance System as a part of each engine tune-up, as follows:

WARNING: Make sure parking brake is applied firmly and that a wheel is blocked in front and back.

1. Connect a vacuum gauge to the distributor vacuum advance line at the distributor. Position the gauge so it can be observed from the drivers seat. With transmission in neutral, increase engine speed to about 1000 RPM's.

2. At this point, note vacuum gauge reading, it should be zero.

3. Shift automatic transmission into reverse, 3 speed manual into 3rd gear or 4 speed manual into 4th gear.

4. Again note vacuum gauge reading, there should be vacuum present at this time. If no vacuum is present, proceed with the following.

5. Connect a jumper with a test light (1893 bulb or smaller) between the two connector terminals of the tes solenoid. Start engine and place automatic transmission in reverse, 3 speed manual in 3rd gear or 4 speed manual in 4th gear. The test light should be off.

6. If the test light is on, check for a grounded wire between solonoid connector and transmission, if wire is not grounded, replace transmission switch.

7. Shift transmission, (manual or automatic) to neutral. Test light should come on, if test light does not come on, check for an open circuit. If circuit is not open, replace transmission switch.

8. If Steps 6 and 7 above check out correctly and there is still no vacuum present as required in Step 4 above, replace T.C.S. solenoid.

A.I.R. PUMP DIAGNOSIS CHART

Condition	Possible Cause	Correction
Excessive Belt Noise	1. Loose belt.	1. Tighten belt.
	2. Seized pump.	2. Replace pump.
Excessive Pump Noise, Chirping, Rumbling Or Knocking	1. Leak in hose.	1. Locate source of leak and correct.
	2. Loose hose.	2. Reassemble and replace or tighten hose clamp.
	3. Hose touching other engine parts.	3. Adjust hose position.
	4. Diverter valve failure.	4. Replace valve.
	5. Check valve failure.	5. Replace valve.
	6. Pump mounting fasteners loose.	6. Retorque all mounting screws.
	7. Centrifugal filter fan damaged.	7. Replace centrifugal filter fan.
	8. Pump failure.	8. Replace pump.
	9. Max-Trac solenoid failure.	9. Pull connector off of solenoid. Diverter valve should stop diverting. If not replace solenoid.

AIR SYSTEM DIAGNOSIS

Condition	Possible Cause	Correction
No Air Supply	1. Loose belt.	1. Tighten belt.
	2. Leak in hose.	2. Locate source of leak and correct.
	3. Leak at hose fitting.	3. Reassemble and replace or tighten hose clamps.
	4. Diverter valve failure.	4. Replace valve.
	5. Check valve failure.	5. Replace valve.
	6. Pump failure.	6. Replace pump.

CHECKING E.G.R. VALVE OPERATION

The E.G.R. valve cannot be disassembled and no actual service is required, except that it should be checked for proper operation.

> **WARNING: If engine has been operated, caution should be used when checking movement of valve stem as valve will be hot.**

Checking E.G.R. Valve (Engine at Operating Temperature)

1. Start engine and position fast idle cam on second step.

2. Place hand under valve and check movement of valve stem by disconnecting and connecting vacuum line at diaphragm.

a. With vacuum line disconnected, valve stem should move downward.

b. With Vacuum line connected, valve stem should move upward.

3. If vacuum is present at valve and valve stem does not move, replace E.G.R. Valve.

Checking Temperature Control Valve

1. Start engine cold, (underhood temperatures below 55°F.) and raise engine speed to about 1500 RPM and feel for movement of the E.G.R. Valve stem.

> **NOTE:** *This test should be done immediately after engine is started as it does not take long for under hood temperatures to rise above 55°F.*

If E.G.R. valve stem moves, replace the temperature control valve. If the stem does not move, the temperature control valve is operating correctly.

An outside vacuum source can also be applied to the vacuum supply tube at the top of the vacuum diaphragm. The diaphragm should not leak down and move to the full-up position between 8-10" of vacuum.

P.C.V. VALVE TROUBLE DIAGNOSIS

Condition	Possible Cause	Correction
Slow, Unstable Idle, Frequent Stalling	Valve completely plugged or stuck.	Replace valve.

MAINTENANCE AND ADJUSTMENTS

P.C.V. FILTER

Inspect positive crankcase ventilator filter every four months or 6,000 miles and replace if necessary. Remove filter from inside air cleaner by removing breather hose clamp, breather hose and filter retainer clip.

MAJOR REPAIR

REMOVAL AND REPLACEMENT OF C.C.S. UNITS

The damper door is not serviceable. The air cleaner assembly must be replaced if the damper door is defective.

R and R Vacuum Motor

1. Drill center of two spot welds using a 1/16 inch drill. Do not center punch.

2. Enlarge two holes using a 5/32 inch drill.

Use extreme care not to damage the air cleaner snorkel.

3. Remove vacuum motor retainer strap. See Figure 6F- 4.

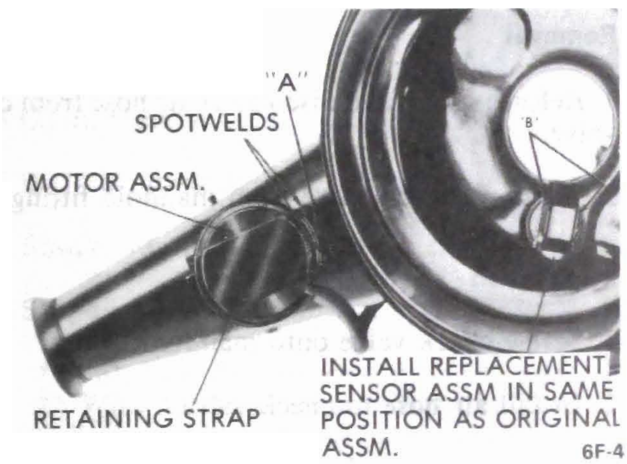

Figure 6F-4 - Replacing Vacuum Motor Assembly

4. Lift vacuum motor, cocking it to one side to unhook motor linkage at the control door.

5. Drill a 7/64" hole in snorkel tube at point "A" as shown in Figure 6F-4.

6. Use the motor strap retainer and the sheet metal screw provided in the motor service package to secure the retainer and motor to the snorkel tube.

7. Make sure the screw does not interfere with the operation of the damper assembly. Shorten screw if required.

R and R Air Cleaner Sensor

1. Remove two sensor retaining clips by prying. See Figure 6F-5.

2. Pull vacuum hoses from sensor.

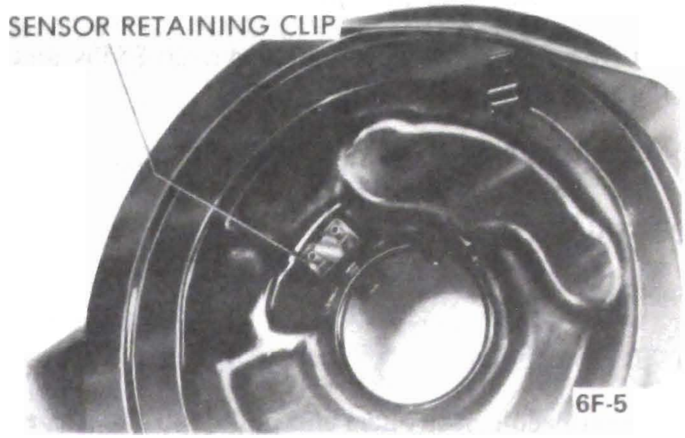

Figure 6F-5 - Replacing Sensor Assembly

3. Note carefully the installed position of the sensor so that you can install new sensor in same position. Then remove sensor.

4. Install sensor and gasket assembly in air cleaner in same position as noted in Step 3. This is to eliminate the possibility of interference with the air filter element.

See Figure 6F-5.

5. Install sensor retaining clip. Meanwhile supporting sensor at "B" around the outside rim to prevent damage to the temperature sensing spring. See Figure 6F-4.

6. Reinstall vacuum hoses.

AIR PUMP

Removal

1. Disconnect hoses from pump and valve.

2. Loosen bracket to pump mounting bolts.

3. Remove pump belt.

4. Remove pulley to hub bolts and remove pulley.

5. Remove pump.

6. Remove valve from pump if pump is to be replaced.

Installation

1. Replace valve on back of pump.

2. Position pump assembly on mounting bracket with holes lined up and install bolts loosely.

3. Place pulley on hub and tighten pulley to hub bolts to 72-108 lb.in.

4. Install pump belt over pulley.

5. Move pump until belt is tightened to 60-85 lbs. and tighten bracket bolts.

6. Connect all hoses to valve and pump.

CENTRIFUGAL FILTER FAN

Removal

1. Remove pump.

2. Insert needle nose pliers and pull fan from hub, as shown in Figure 6F-6. It is seldom possible to remove fan without damaging it. Care should be taken to prevent fragments from entering the air intake hole.

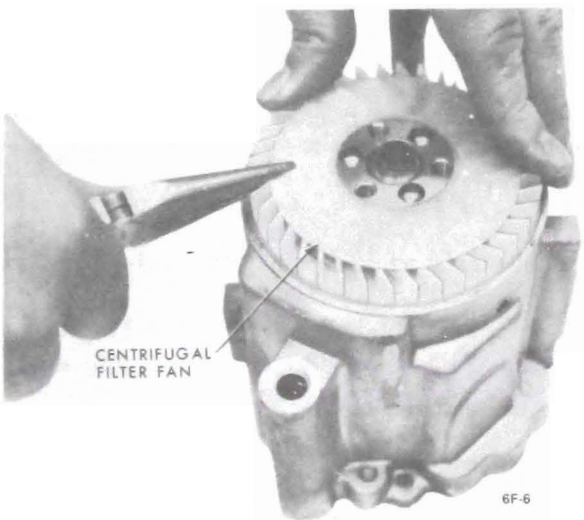

Figure 6F-6 Removing Centrifugal Fan From Hub

Installation

1. Install filter fan by drawing it into position, using pulley and bolts as tools. Draw the fan down evenly by alternately torquing the bolts, making certain that the outer edge of the fan slips into the housing.

2. Install pump.

A new fan may be noisy for about 20-30 miles of operation, until the outer diameter sealing lip has worn in.

DIVERTER VALVE AND SILENCER ASSEMBLY

Removal

1. Remove hoses on valve.

2. Remove two screws holding valve to pump and remove valve.

3. Remove gasket material from valve and pump.

Installation

1. Do not use a gasket when replacing the diverter valve.

2. Install valve and secure with two screws. Torque to 120-160 lb.in.

3. Connect hoses to valve assembly.

CHECK VALVE

Removal

1. Release clamp and disconnect air hose from check valve.

2. Unscrew check valve from manifold fitting.

Installation

1. Screw check valve onto manifold fitting.

2. Install air hose to check valve.

E.G.R. VALVE REMOVAL AND INSTALLATION

Removal

1. Disconnect vacuum line from valve.

2. Remove two bolts holding valve to manifold and remove valve.

Installation

1. Install gasket and valve in manifold and tighten bolts.

2. Connect vacuum hose to valve.

SPECIFICATIONS

EMISSION CONTROL SYSTEM SPECIFICATIONS

Positive Crankcase Ventilator Valve Type	CV-679C
PCV Valve Location	Intake Manifold
Carburetor Inlet Air Regulated Temperature	115° $\pm$ 20°
Idle Mixture Setting (Lean From Best Idle)	50 RPM
Thermo Vacuum Switch Operating Temperature	220°
Engine Thermostat Operating Temperature	190°
Air Injection Pump Belt Tension	65-80 Lbs.

Idle Speed and Ignition Timing Chart

Engine and Transmission	Timing* ($\pm$2°)	Idle Speed** Idle Stop Solenoid Con.	Idle Speed** Idle Stop Solenoid Discon.	Fast Idle Speed
350 Cu.In. Manual	4° BTDC	800	600	820
350 Cu.In. Automatic	4° BTDC	650	500	700
455 Cu.In. Manual	4° BTDC	900	600	920
455 Cu.In. Automatic	4° BTDC	650	500	700
455 Stage I Manual	10° BTDC	900	600	920
455 Stage I Automatic	10° BTDC	650	500	700

* With hose disconnected from vacuum advance and plugged.

** With automatic transmission in "Drive" (manual transmission in "Neutral"), first set idle with idle stop solenoid connected, then check idle speed with solenoid disconnected.

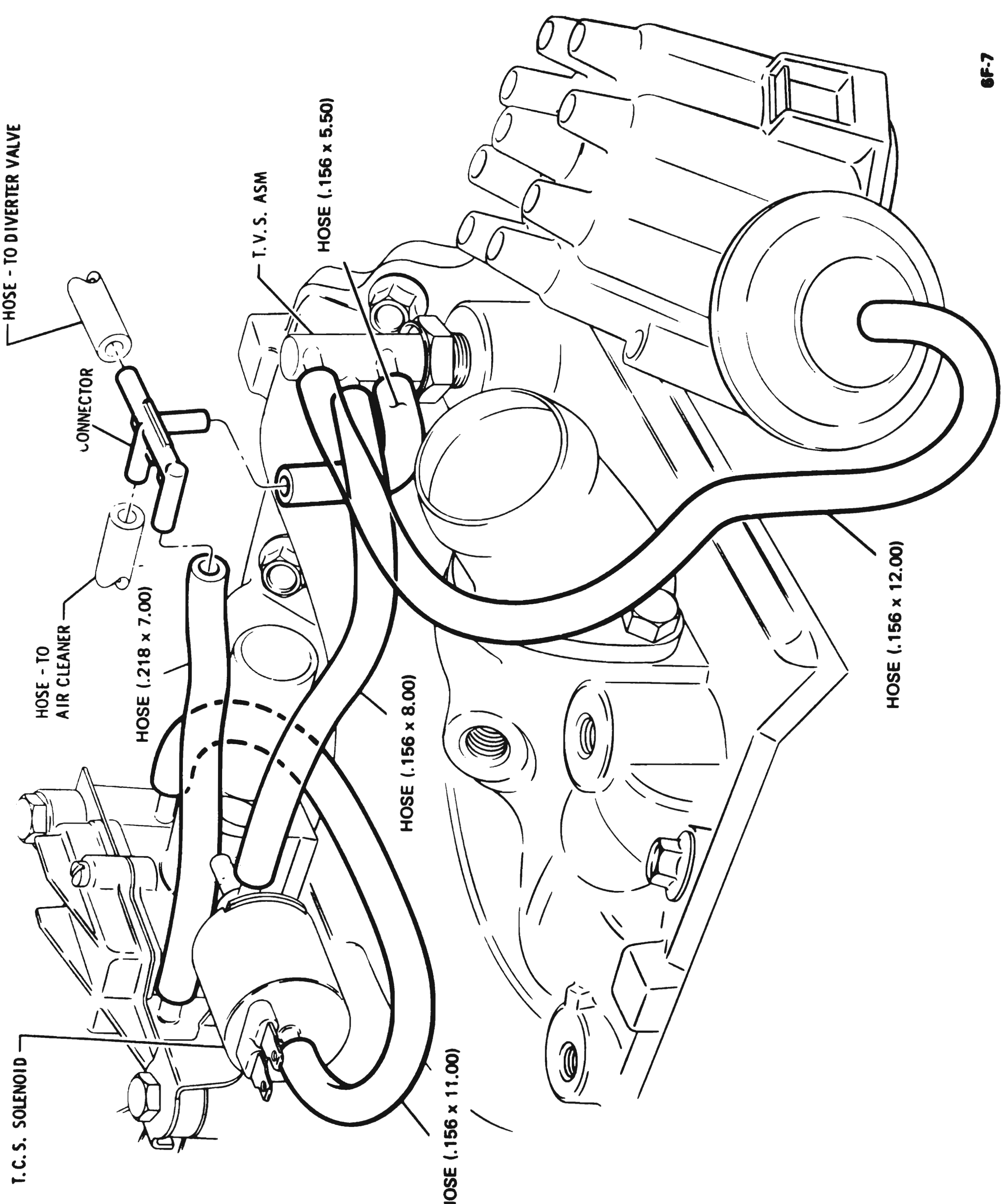

Figure 6F-7 Vacuum Tube Routing (455 Manual Transmission and State I with Automatic Transmission)

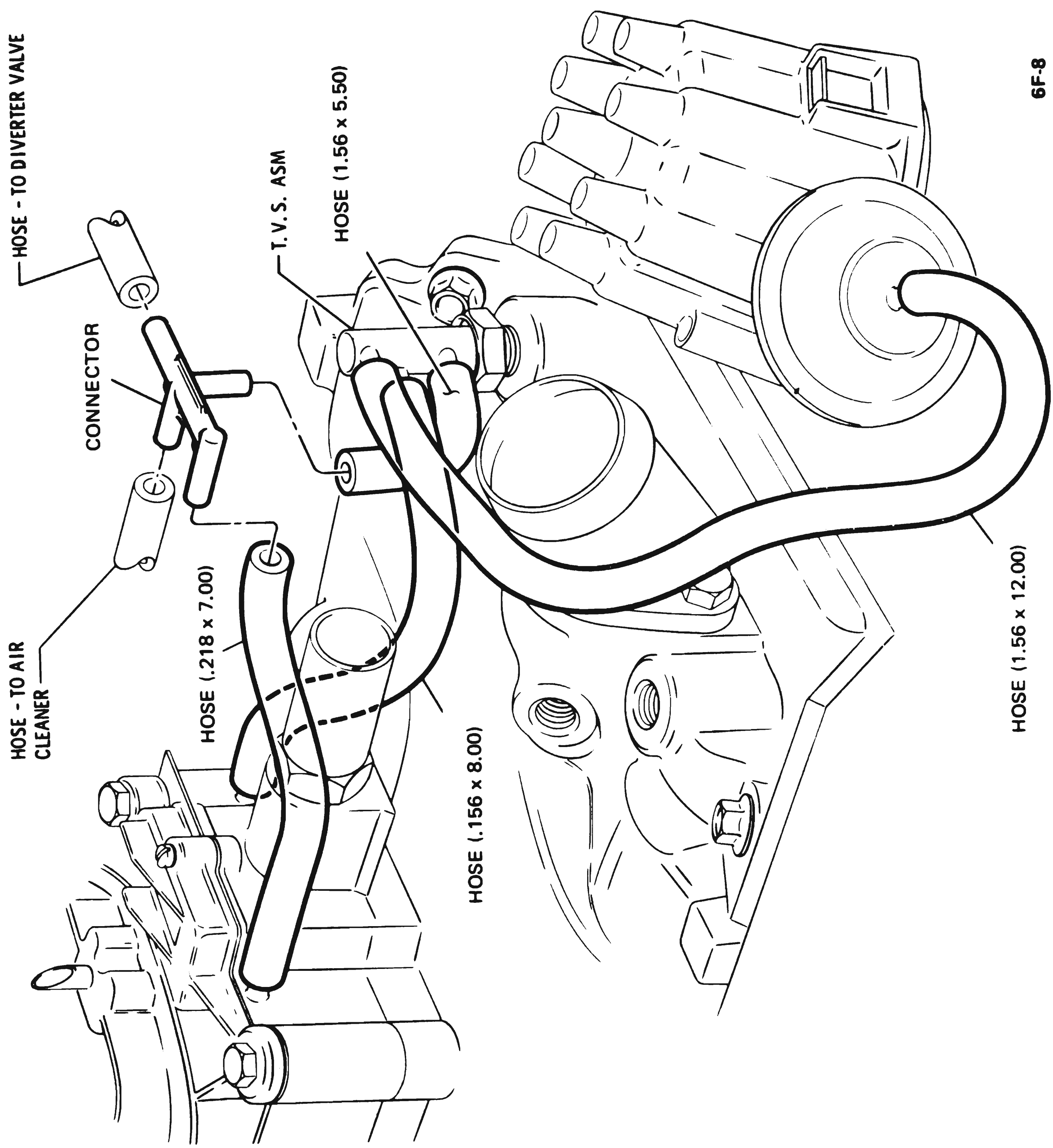

Figure 6F-8 Vacuum Tube Routing (350 4 BBL With A/C and H-D-C and Automatic Transmission, All 455 Engines Automatic Transmissions Except Stage I)

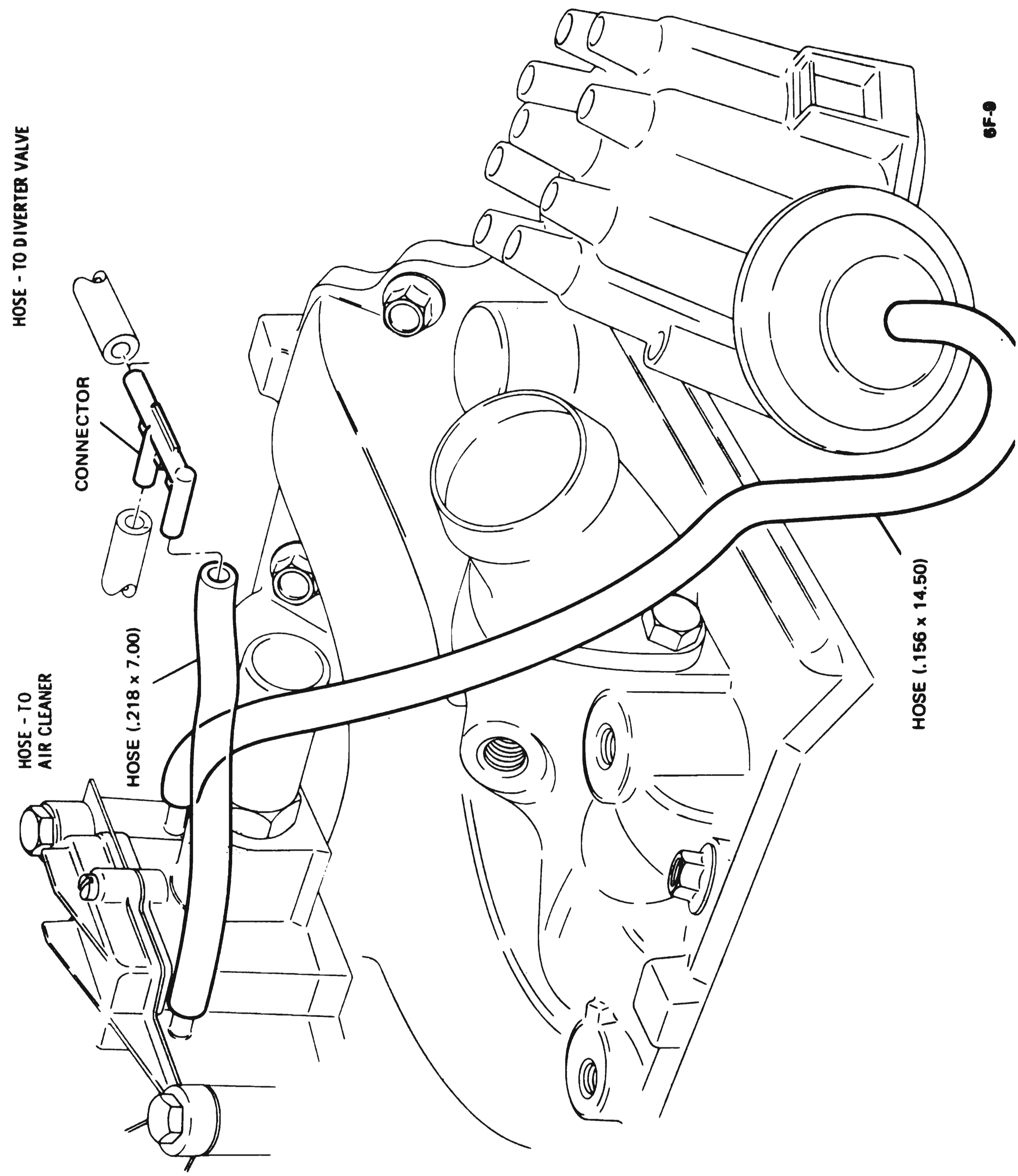

Figure 6F-9 (350 4 BBL Less A/C and H-D-C Automatic Transmission)

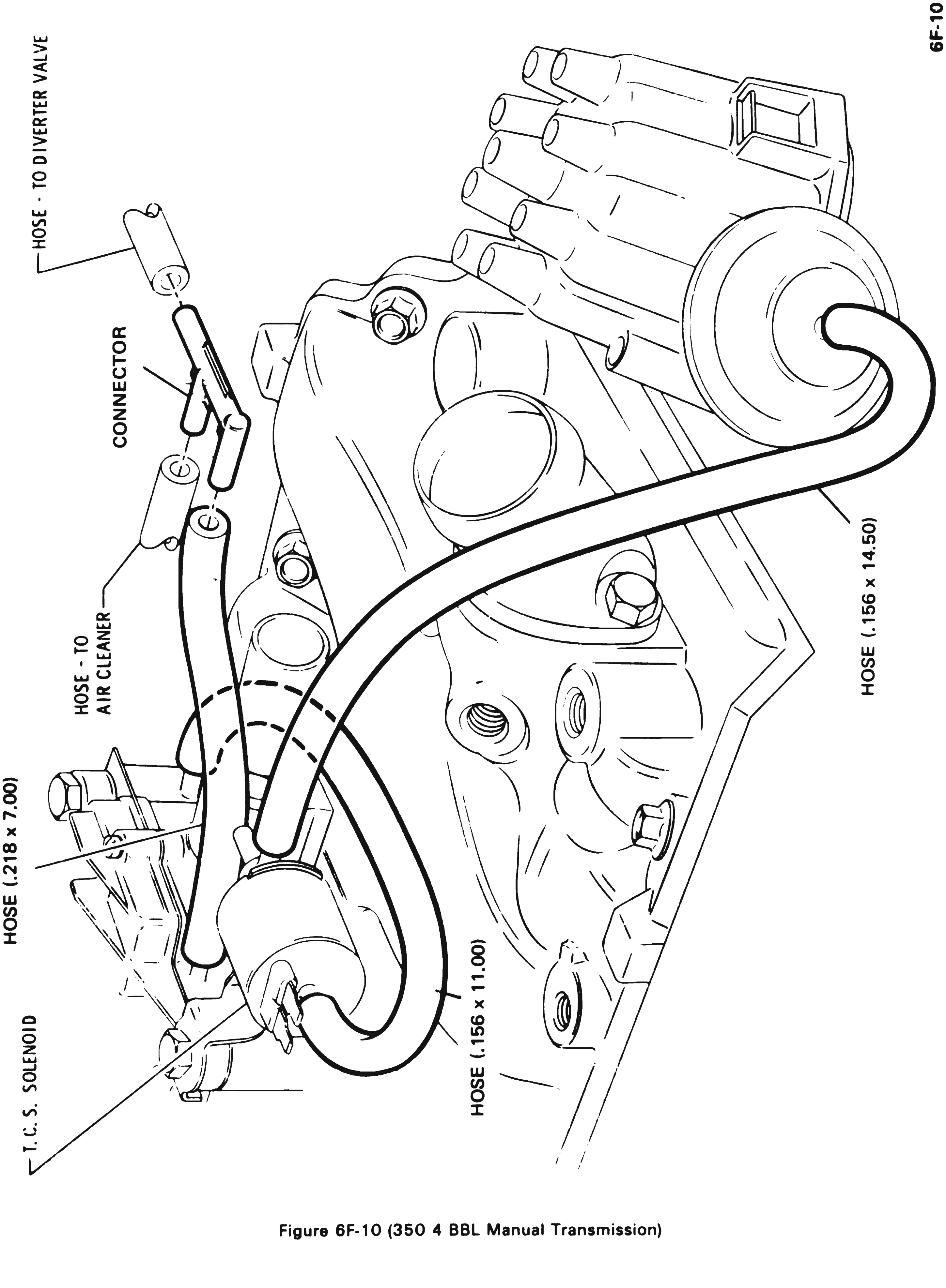

Figure 6F-10 (350 4 BBL Manual Transmission)

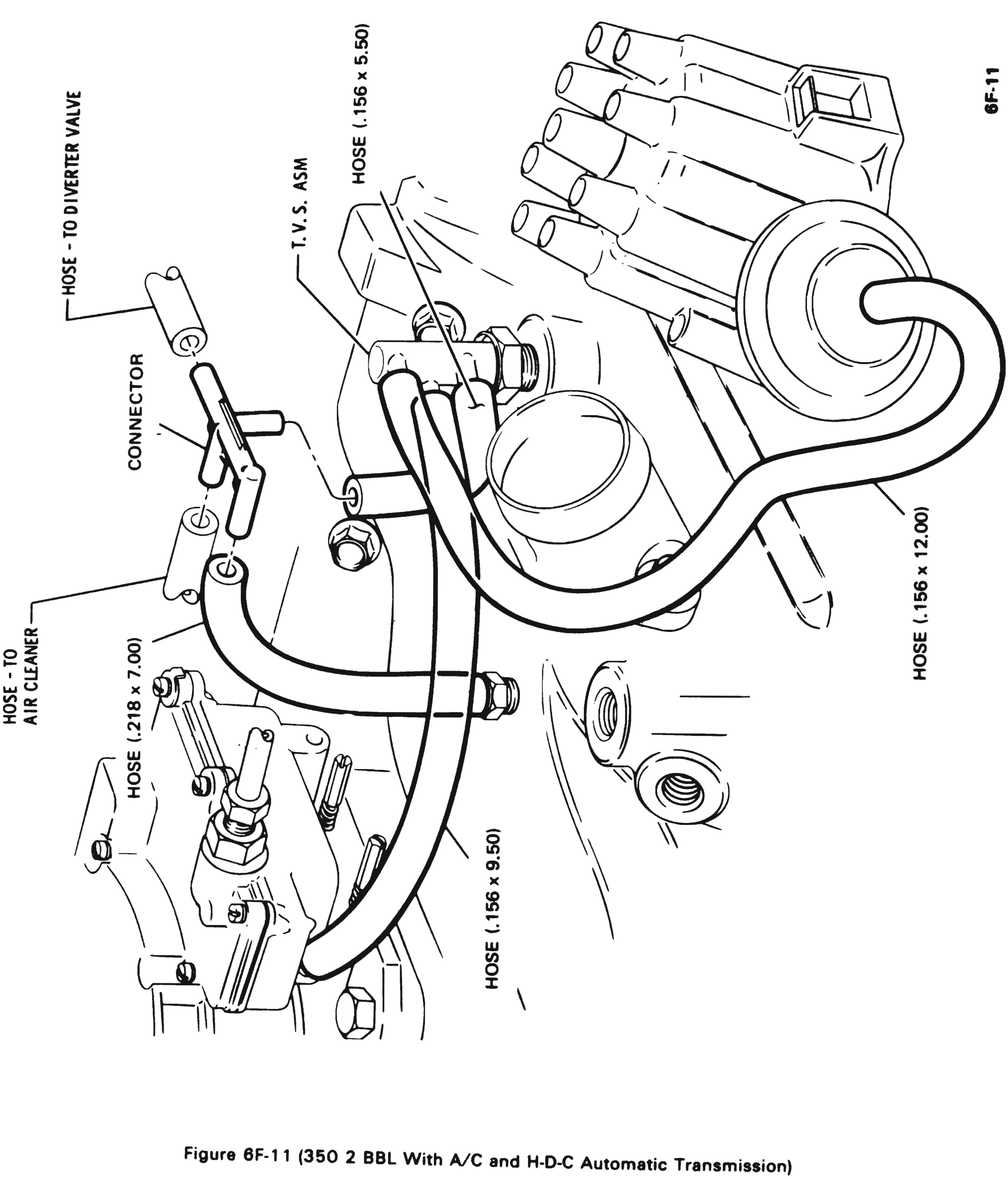

Figure 6F-11 (350 2 BBL With A/C and H-D-C Automatic Transmission)

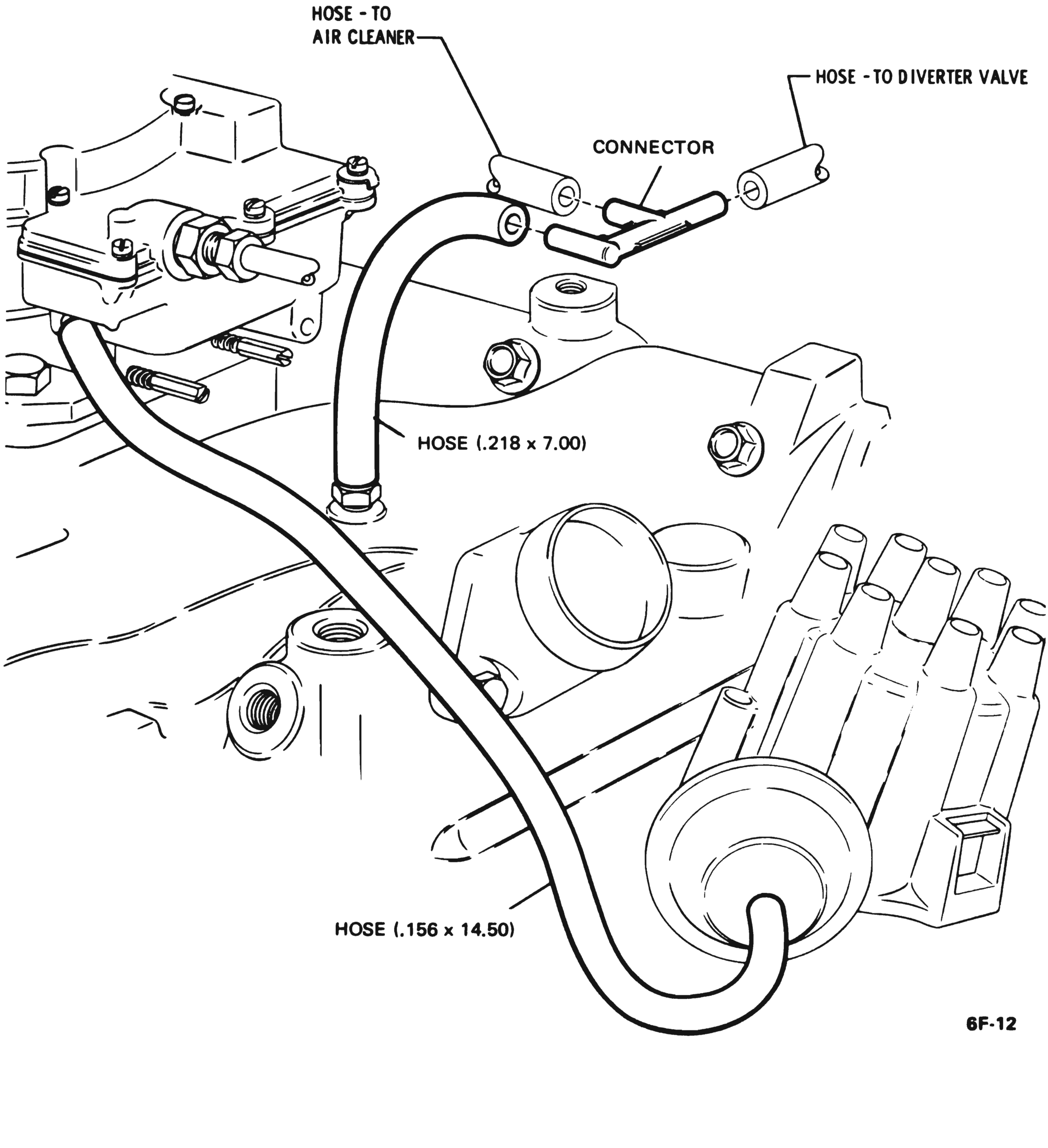

Figure 6F-12 (350 2 BBL Less A/C and H-D-C Automatic Transmission)

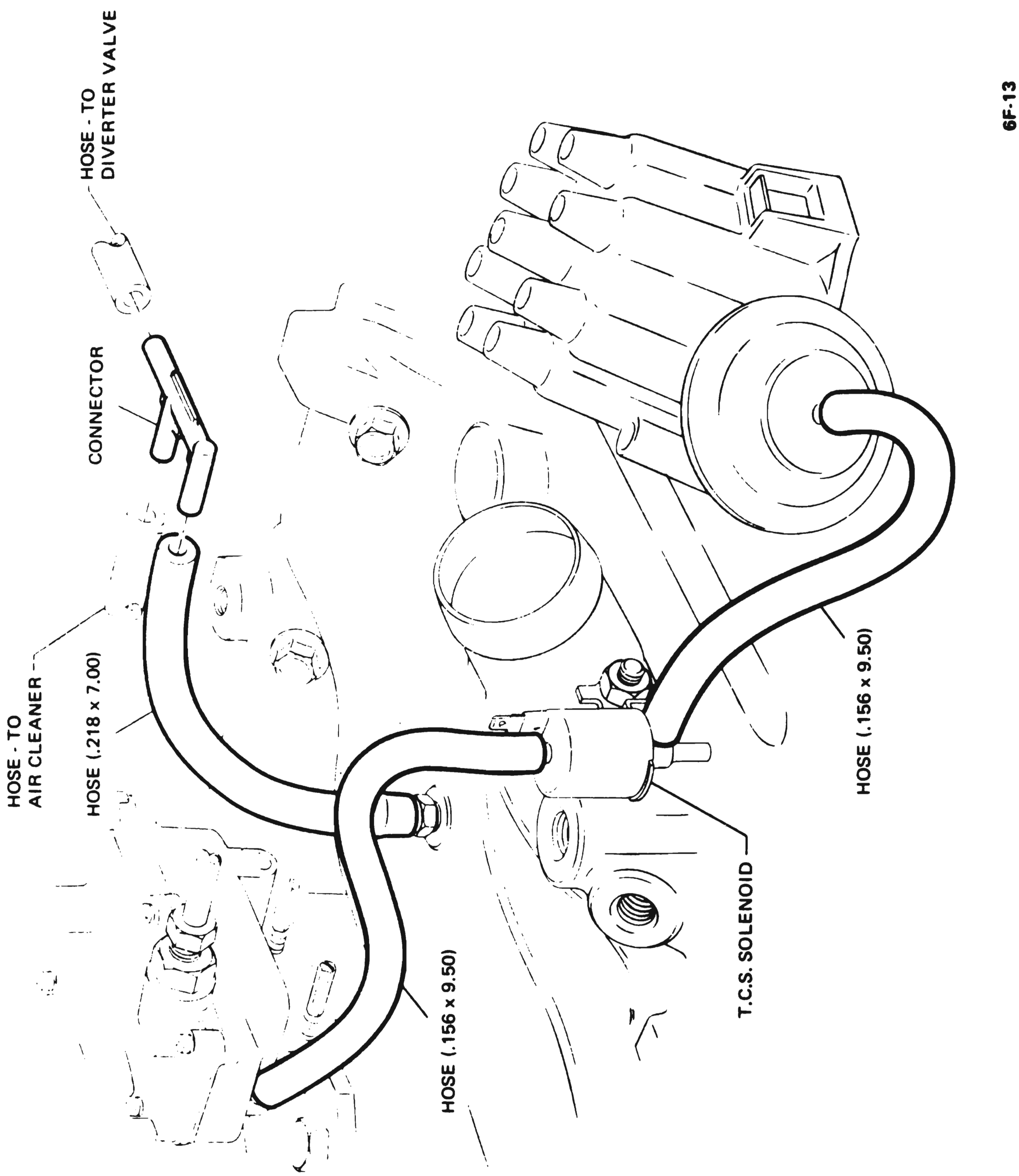

Figure 6F-13 (350 2 BBL Manual Transmission)

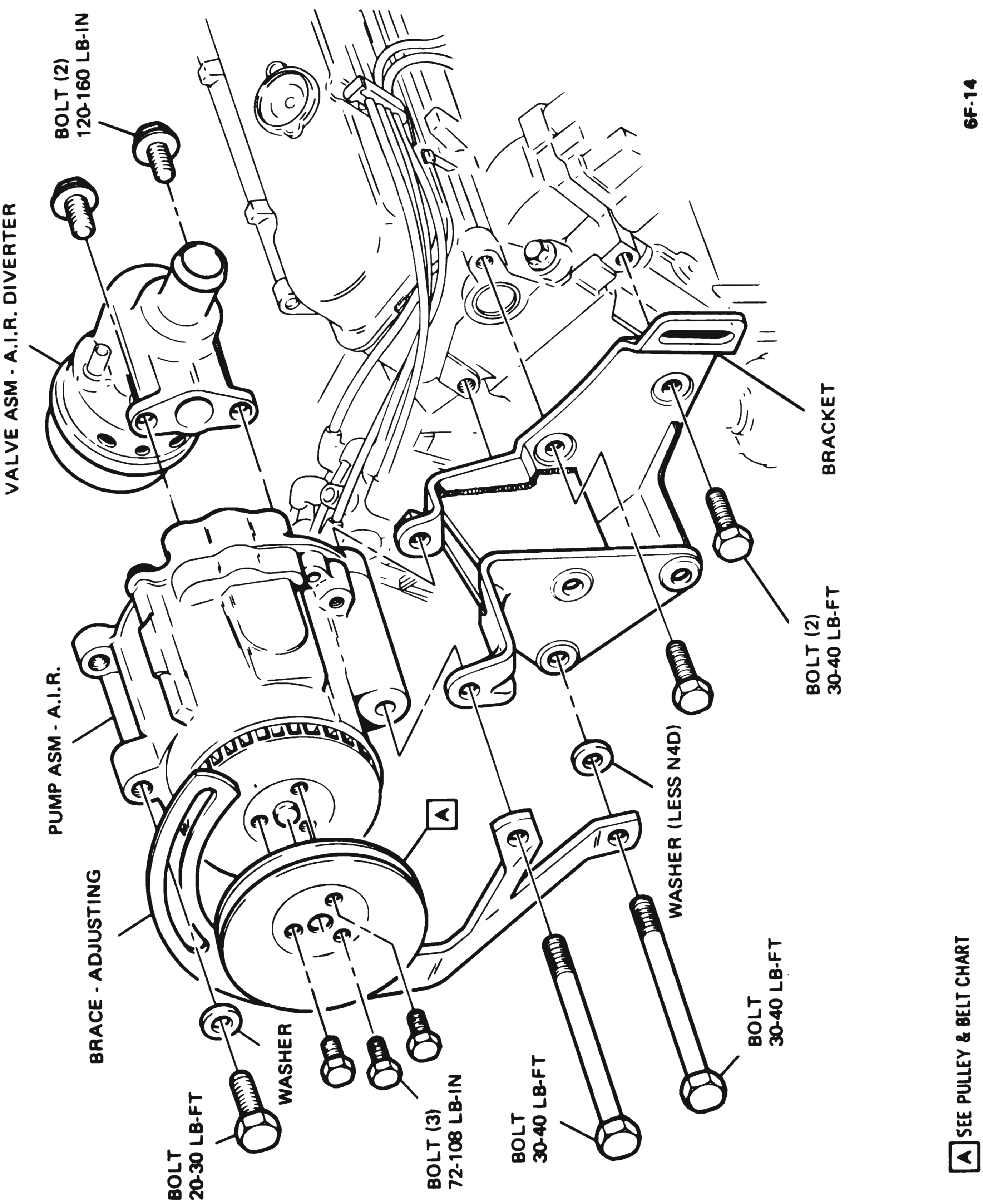

Figure 6F-14 A.I.R. Pump, Valve Assembly and Bracket

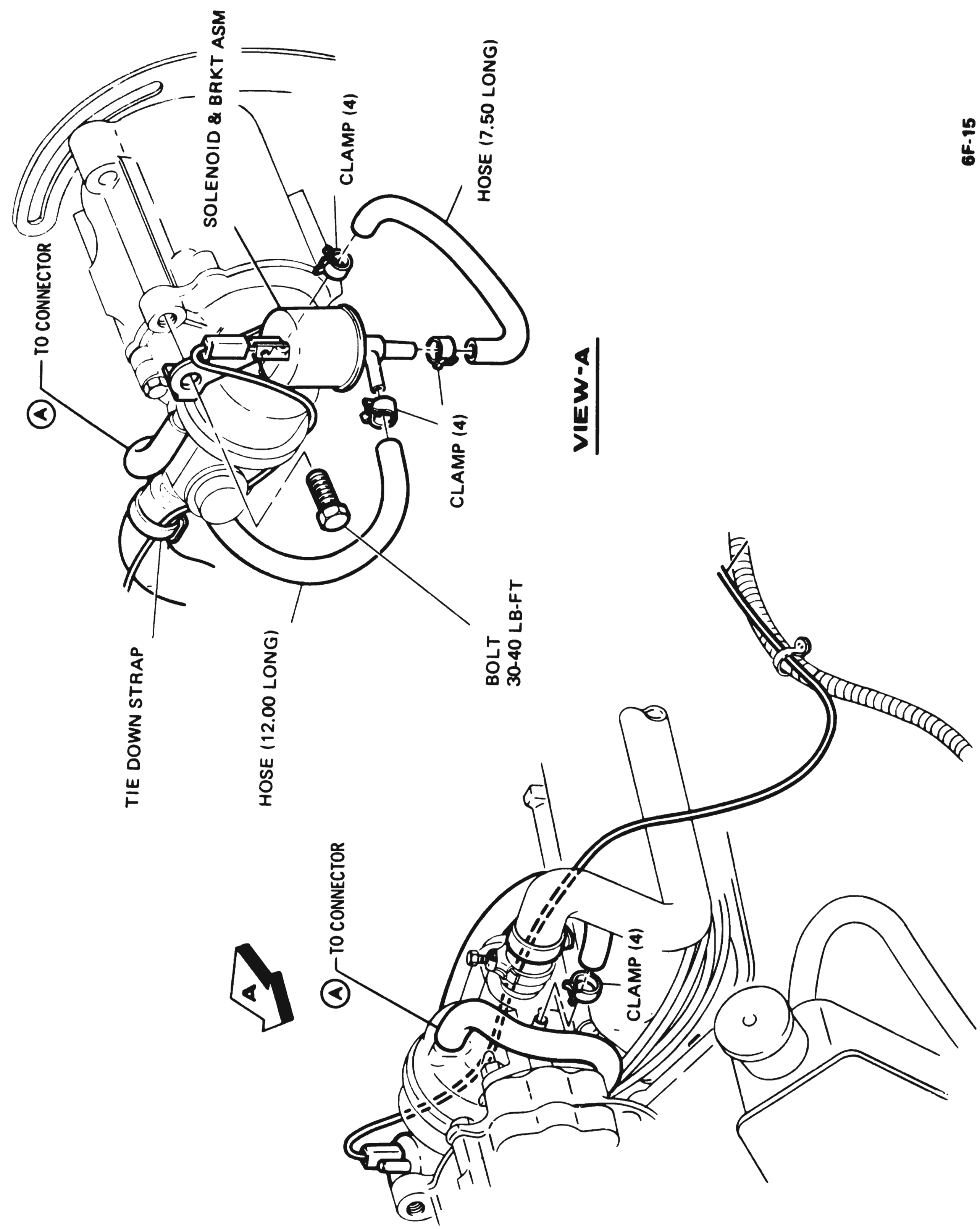

Figure 6F-15 A.I.R. Diverter Valve Solenoid

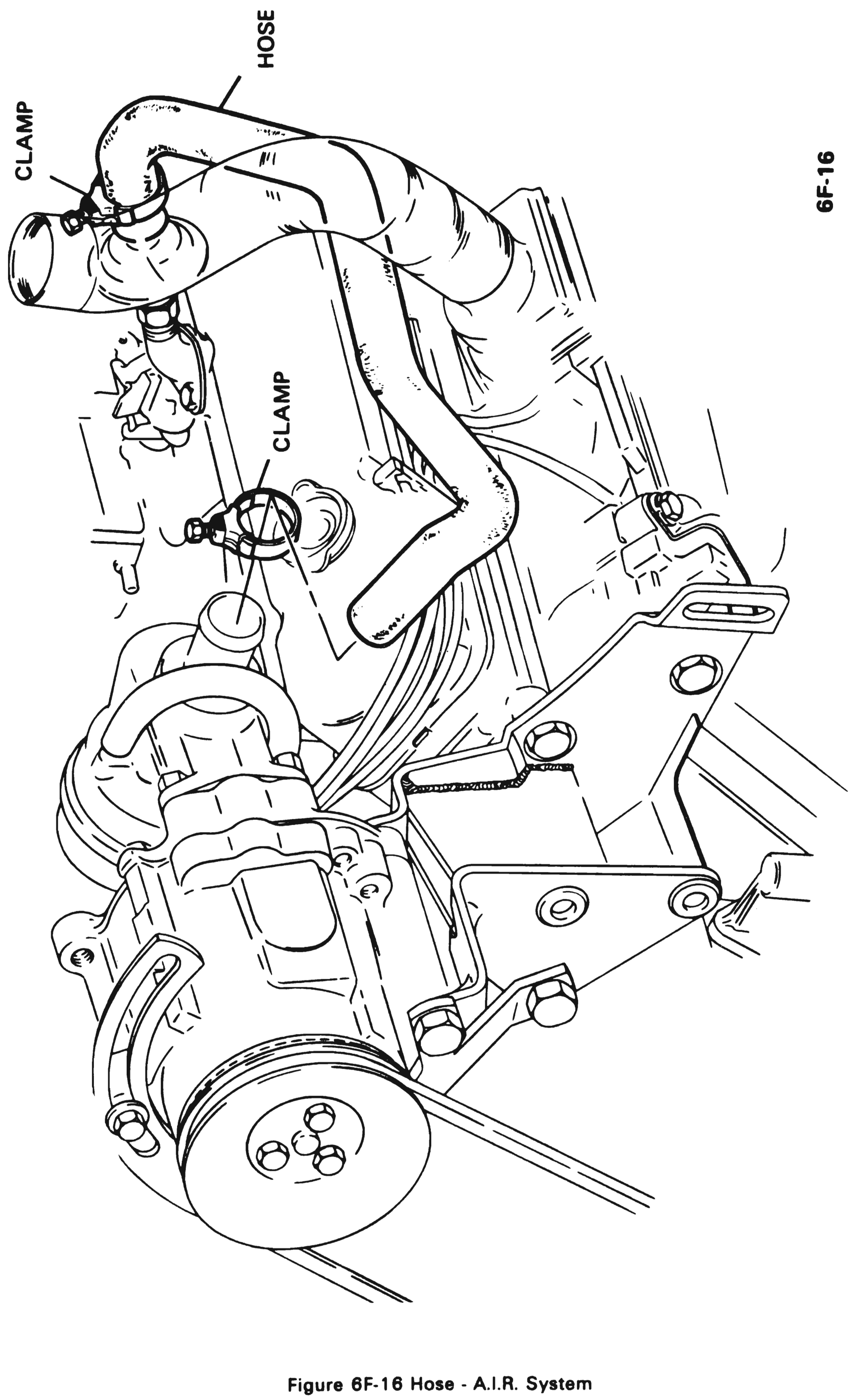

Figure 6F-16 Hose - A.I.R. System

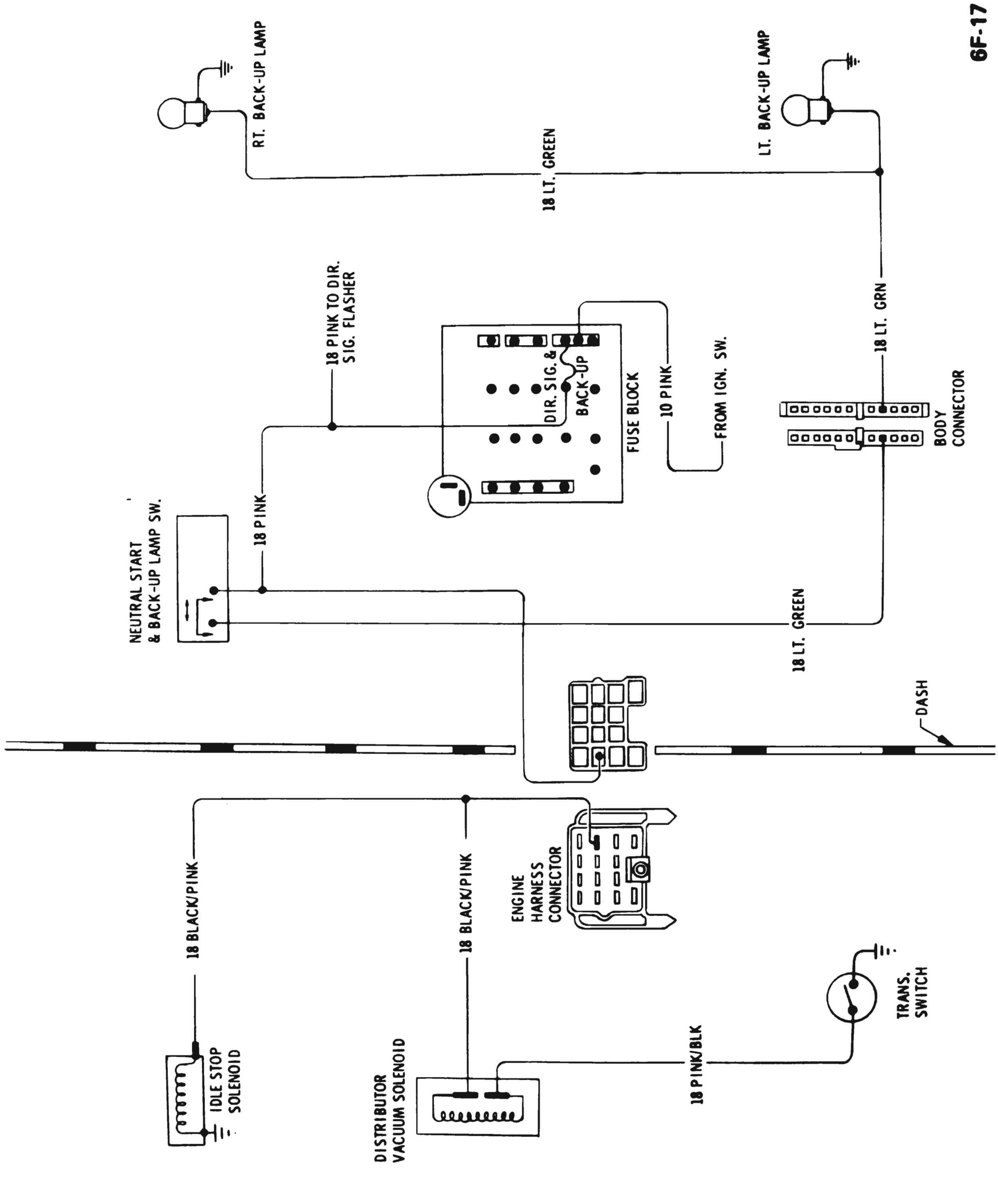

Figure 6F-17 Back-Up Lamp and T.C.S. Solenoid All Series

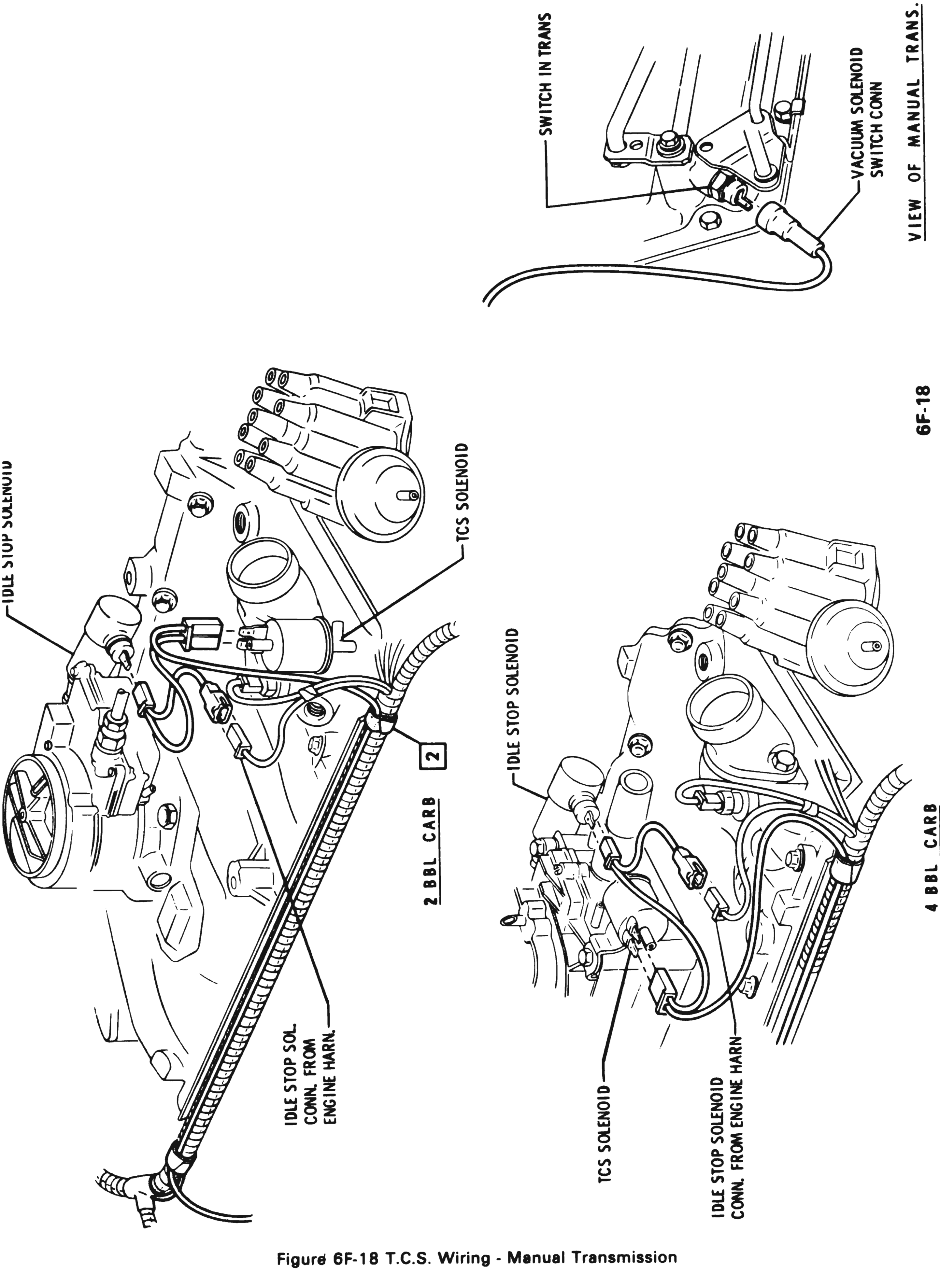

Figure 6F-18 T.C.S. Wiring - Manual Transmission

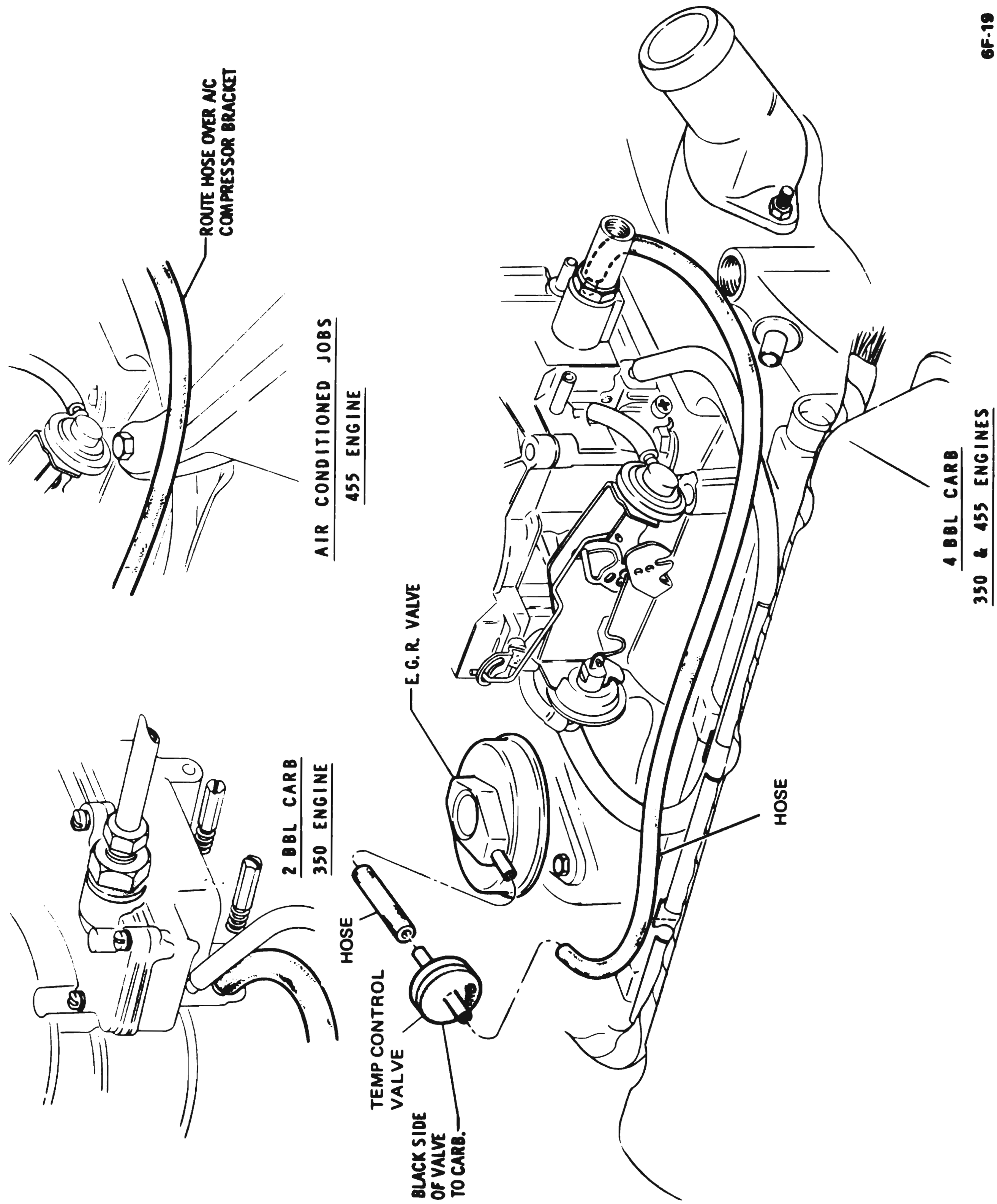

Figure 6F-19 E.G.R. Vacuum Tube Routing

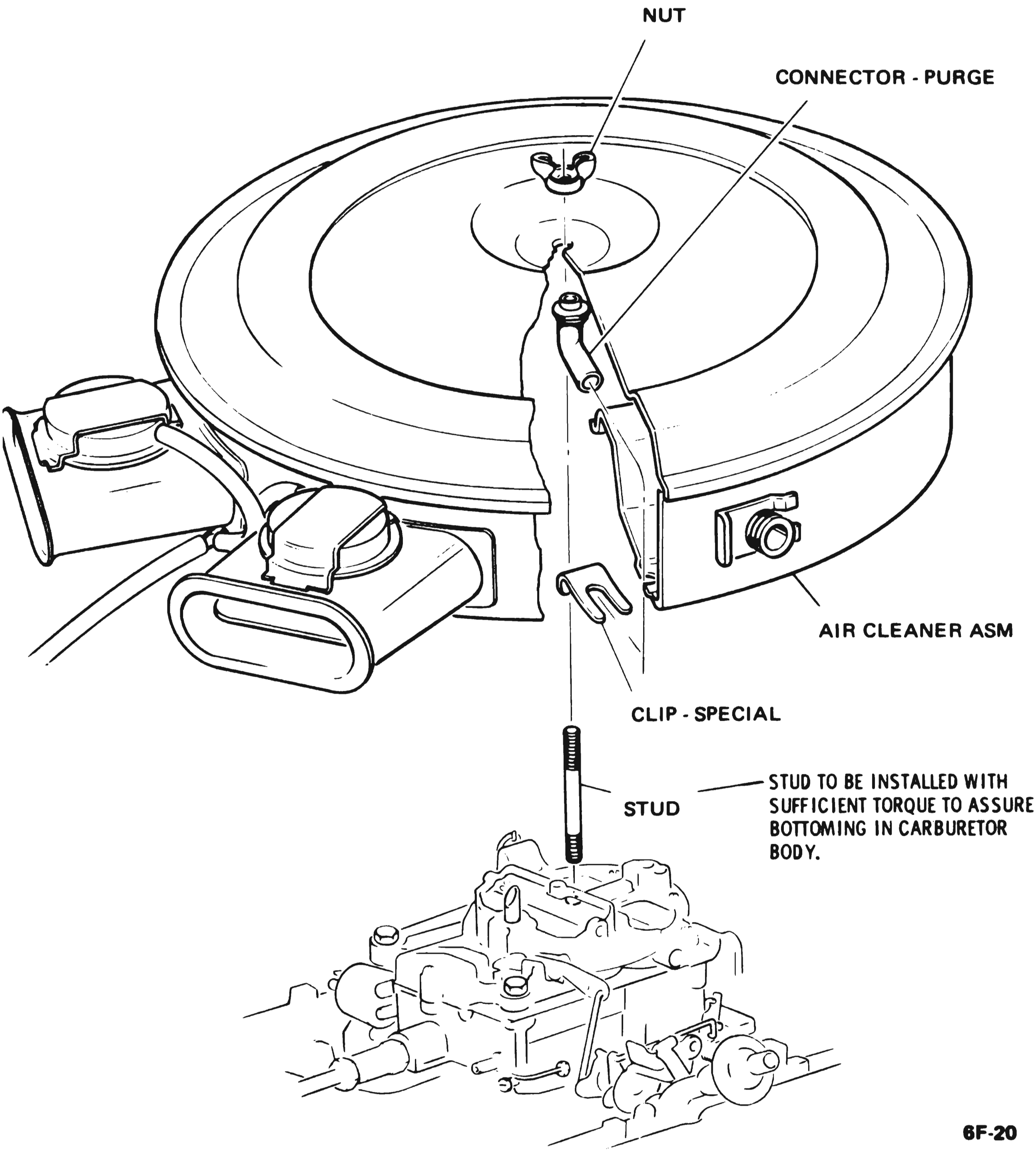

Figure 6F-20 Air Cleaner (Dual Snorkel)