SECTION 3

Emission Related Components

Contents

(Continued)

SECTION 3

Emission Related Components

Contents

(Continued)

SECTION 3

Emission Related Components

Contents

TITLE	BASIC PART NO.	SYMBOL
Air Bypass Valves	**9F715**	

DESCRIPTION

The air bypass solenoid is used to control engine idle speed and is operated by the Electronic Engine Control EEC module.

The valve allows air to pass around the throttle plates to control:

- Cold engine fast idle.
- No touch start.
- Dashpot.
- Over temperature idle boost.
- Engine idle load correction.

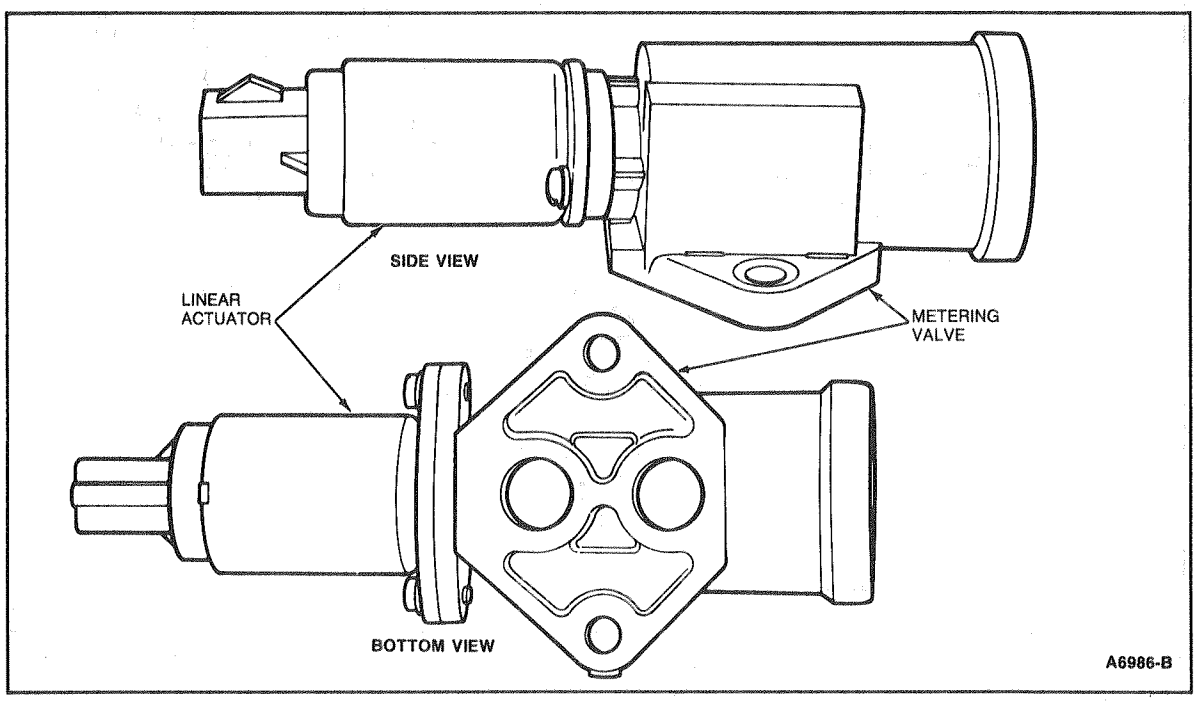
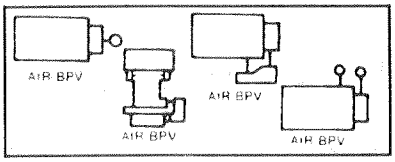


Figure 1 Air Bypass Valve Assembly

DIAGNOSIS

Refer to the EEC-IV Quick Test, Section 16.

TITLE	BASIC PART NO.	SYMBOL
Air Bypass Valves	**9B289**	

DESCRIPTION

There are two general groups of Air Bypass Valves, normally closed and normally open. Each group is available in remote (in-line) versions or pump-mounted (mounted directly on the air pump) versions (Figures 1, 2 and 3). The bypass valves are part of the Thermactor System, Section 10. Normally closed valves supply air to the exhaust system with medium and high applied vacuum signals during normal (engine at normal operating temperature) modes, short idles and some accelerations. With low or no vacuum applied the pump air is dumped through the silencer ports of the valve, or through the pump port.

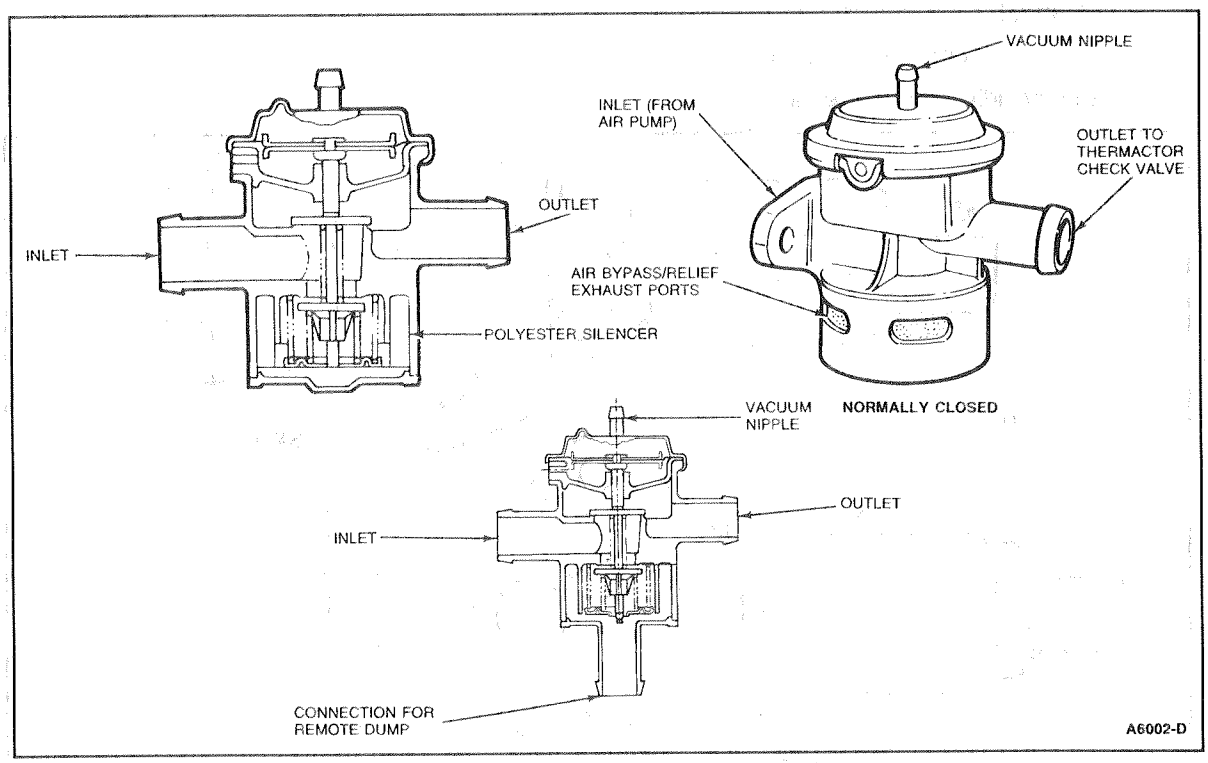
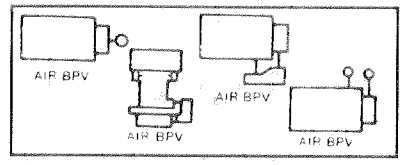


Figure 1 Normally Closed Air Bypass Valves

Normally Closed Bypass Valves (9B289)

Functional Check

1. Disconnect the air supply hose at the valve outlet.
2. Remove vacuum line to check to see that a vacuum signal is present at the vacuum nipple. Remove or bypass any restrictors or delay valves in the vacuum line. There must be a vacuum present at the nipple before proceeding.
3. With the engine at 1500 rpm and the vacuum line connected to the vacuum nipple, air pump supply air should be heard and felt at the air bypass valve outlet (Figure 1).
4. With the engine at 1500 rpm, disconnect the vacuum line. Air at the outlet should be significantly decreased or shut off. Air pump supply air should be heard or felt at the silencer ports, or at the pump port.
5. If the normally closed air bypass valve does not successfully complete the above tests, check the air pump. If the air pump is operating satisfactorily, replace the air bypass valve.

TITLE	BASIC PART NO.	SYMBOL
Air Bypass Valves	**9B289**	

Normally Open Air Bypass Valves (9B289)

Normally open air bypass valves are available with or without vacuum vents. Test procedures differ for each.

Normally open valves with a vacuum vent provide a timed air dump during decelerations and also dump when a vacuum pressure difference is maintained between the signal port and the vent port. The signal port must have 10 kPa (3 in-Hg) more vacuum than the vent port to hold the dump. This mode is used to protect the catalyst from overheating.

Normally Open Air Bypass Valves with Vacuum Vents

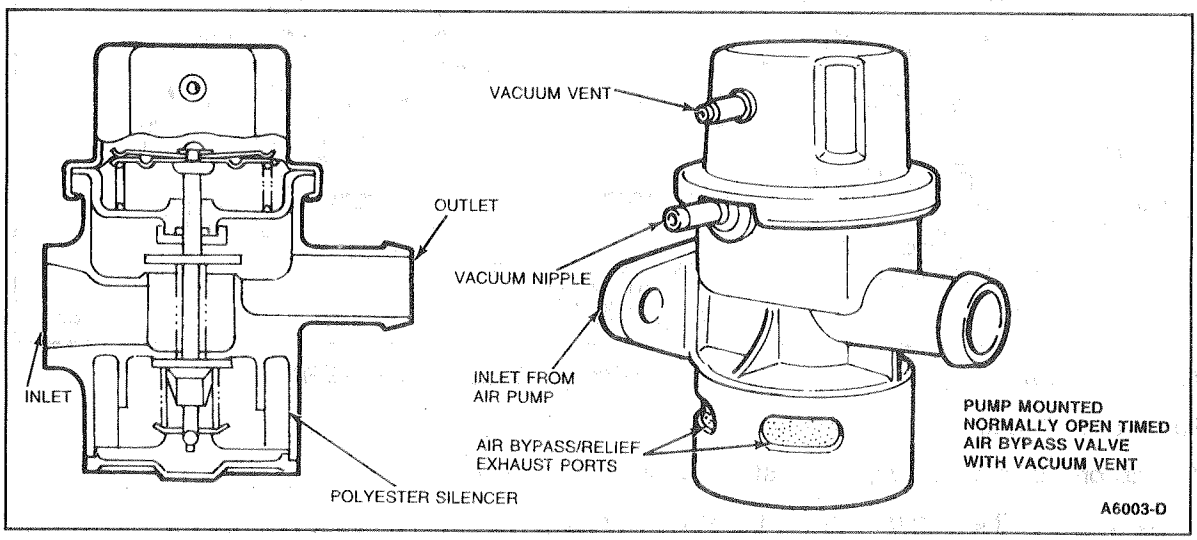
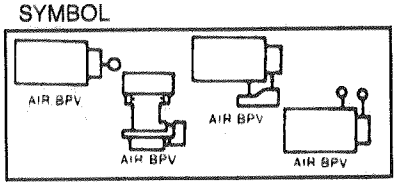


Figure 2 Normally Open Air Bypass Valves with Vacuum Vents

Functional Check

1. Disconnect the air pump supply line at the outlet.
2. Disconnect all vacuum lines from the vacuum nipple and the vacuum vent (Figure 2).
3. With the engine at 1500 rpm, air pump supply air should be heard and felt at the outlet (Figure 2).
4. Using a length of vacuum hose with no restrictors or devices, connect the vacuum nipple to one of the manifold vacuum fittings on the intake manifold. With the vacuum vent open to atmosphere and the engine at 1500 rpm, virtually no air should be felt at the valve outlet and virtually all air should be bypassed through the silencer ports.
5. Using the same direct vacuum line to an intake manifold vacuum source, cap the vacuum vent. Accelerate the engine to 2000 rpm, and suddenly release the throttle. A momentary interruption of air pump supply air should be felt at the valve outlet (Figure 2).
6. Reconnect all vacuum and thermactor lines. If any of the above tests are not satisfactorily completed, check the air pump. If the air pump is operating satisfactorily, replace the air bypass valve.

TITLE	BASIC PART NO.	SYMBOL
Air Bypass Valves	**9B289**	

Normally Open Air Bypass Valves without Vacuum Vent

Normally open valves without a vacuum vent provide a timed dump of air for 1.1 or 2.8 seconds when a sudden high vacuum of about 68 kPa (20 in-Hg) is applied to the signal port. This prevents backfire during deceleration.

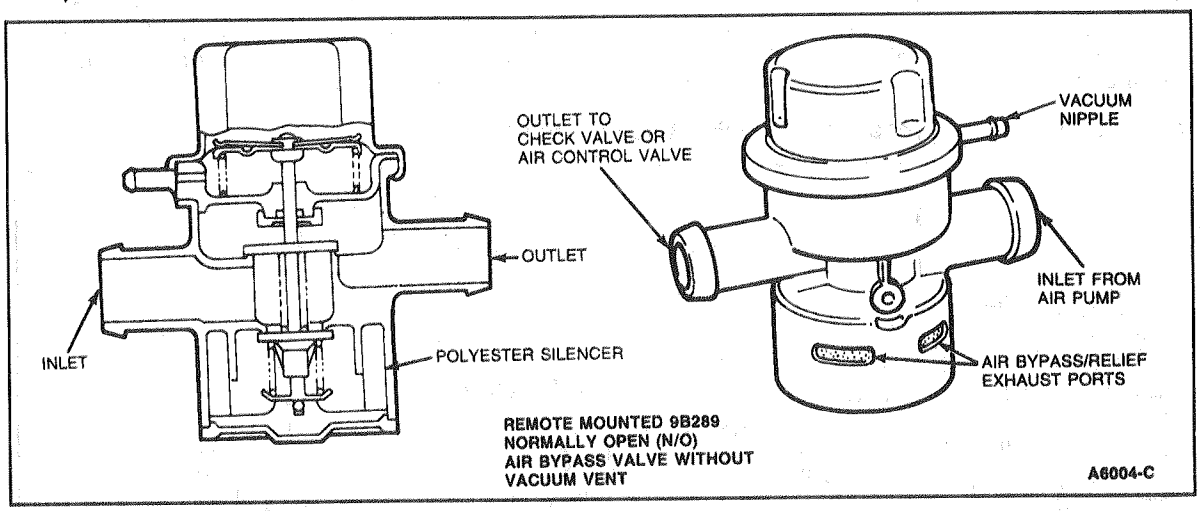
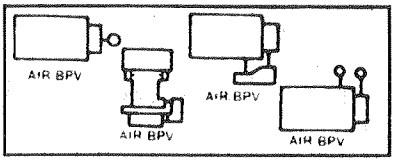


Figure 3 Normally Open Air Bypass Valves Without Vacuum Vent (9B289)

Functional Check

1. Disconnect the air supply line at the valve outlet (Figure 3).
2. Disconnect the vacuum line at the vacuum nipple.
3. With the engine at 1500 rpm, air should be heard and felt at the valve outlet.
4. Connect a direct vacuum line that is free from restrictions from any manifold vacuum source to the vacuum nipple on the air bypass valve. Air at the outlet should be momentarily decreased or shut off.
5. Air pump supply air should be heard or felt at silencer ports (Figure 3) during the momentary dump. Restore all original connections. If any of the above tests are not satisfactorily completed, check the air pump. If the air pump is operating satisfactorily, replace the air bypass valve.

TITLE	BASIC PART NO.	SYMBOL
Air Bypass Valves	**9B289**	

Normally Open Air Bypass Valves without Vacuum Vent

Heavy Truck Applications

Normally open valves without a vacuum vent provide a timed dump of air for 2 seconds nominal when a sudden high vacuum of about 68 kPa (20 in-Hg) is applied to the signal port. This prevents backfire during deceleration.

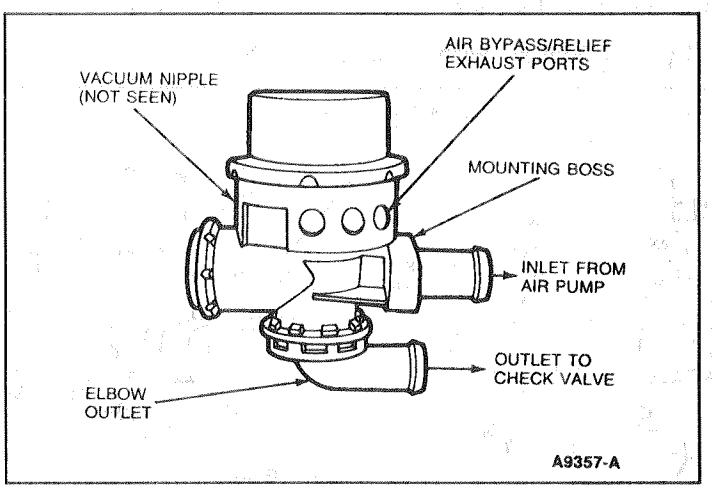
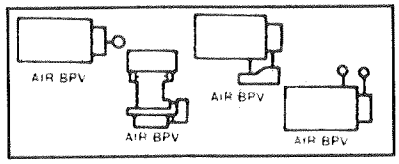


Figure 4 Normally Open Without Vacuum Vent

Functional Check

1. Disconnect the air supply line at the valve outlet (Figure 4).
2. Disconnect the vacuum line at the vacuum nipple.
3. With the engine at 1500 rpm, air should be heard and felt at the valve outlet.
4. Connect a direct vacuum line that is free from restrictions from any manifold vacuum source to the vacuum nipple on the air bypass valve. Air at the outlet should be momentarily decreased or shut off.
5. Air pump supply air should be heard or felt at silencer ports (Figure 4) during the momentary dump. Restore all original connections. If any of the above tests are not satisfactorily completed, check the air pump. If the air pump is operating satisfactorily, replace the air bypass valve.

TITLE	BASIC PART NO.	SYMBOL
Air Bypass Valves	**9B289**	

Normally Open Air Bypass Valves (9B289)

Heavy Truck Applications

Normally open valves with a vacuum vent provide a timed air dump deceleration and also dump when a vacuum pressure difference is maintained between the signal port and the vent port. The signal port must have 10 kPa (3 in-Hg) more vacuum than the vent port to hold the dump. This mode is used to protect the catalyst from overheating.

Normally Open Air Bypass Valves with Vacuum Vents

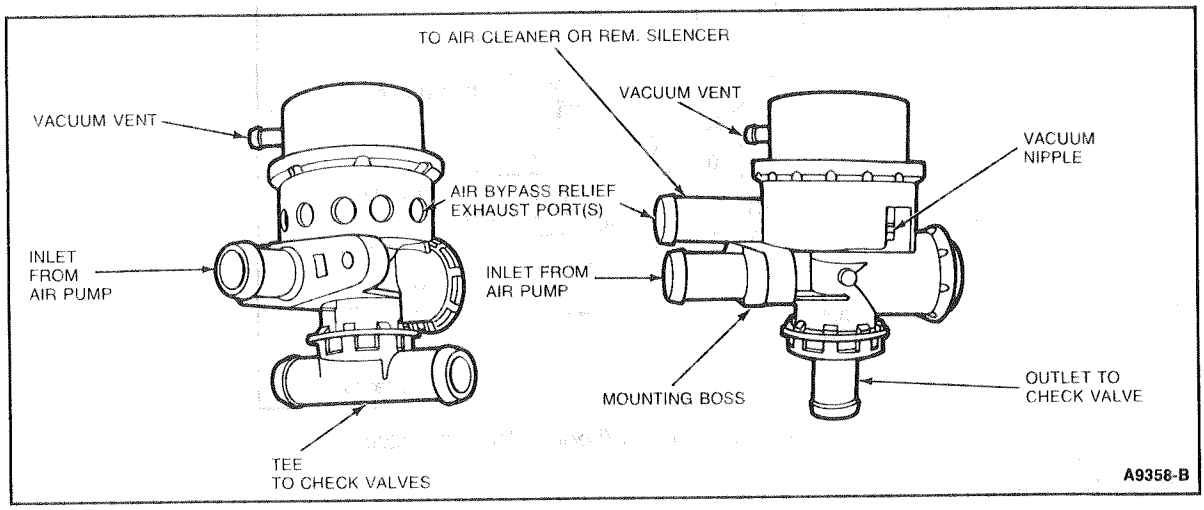


Figure 5 Normally Open Air Bypass Valves

Functional Check

1. Disconnect the air supply line at the valve outlet (Figure 5) and relief port if applicable.
2. Disconnect the vacuum line at the vacuum nipple.
3. With the engine at 1500 rpm, air should be heard and felt at the valve outlet.
4. Connect a direct vacuum line that is free from restrictions from any manifold vacuum source to the vacuum nipple on the air bypass valve. Air at the outlet should be momentarily decreased or shut off.
5. Air pump supply air should be heard or felt at silencer ports (Figure 5) during the momentary dump. Restore all original connections. If any of the above tests are not satisfactorily completed, check the air pump. If the air pump is operating satisfactorily, replace the air bypass valve.

TITLE	BASIC PART NO.	SYMBOL
Air Charge Temperature Sensor	**12A697**	

DESCRIPTION

The sensor provides the Electronic Fuel Injection System with mixture (fuel and air) temperature information. The ACT is used both as a density corrector to airflow calculation and to proportion the cold enrichment fuel flow. This sensor is similar in construction to the Engine Coolant Temperature (ECT) sensor, except it is packaged to improve sensor response time.

The sensor is threaded into a cylinder runner of the intake manifold and provides the fuel strategy with mixture temperature information. The sensor input is used as a density corrector for airflow calculations and to proportion the cold enrichment fuel flow.

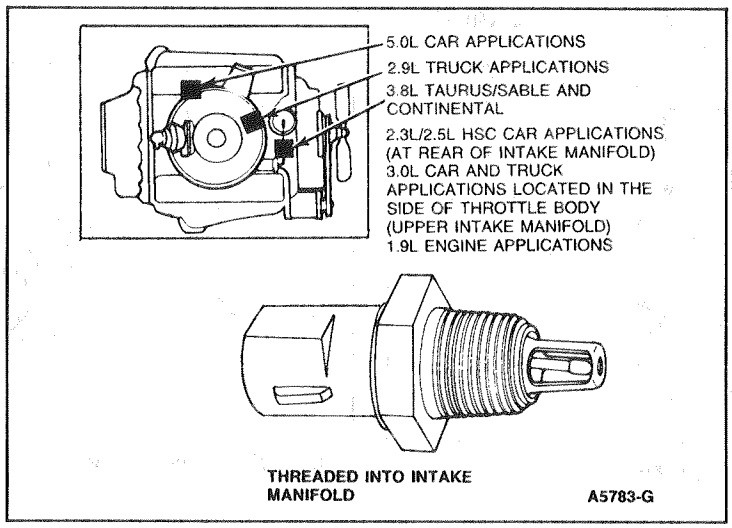


Figure 1 ACT (Air Charge Temperature) Sensor

DIAGNOSIS

Refer to the EEC-IV Quick Test, Section 16.

TITLE	BASIC PART NO.	SYMBOL
Air Check Valve/ Pulse Air Valve	**9A487**	

DESCRIPTION

The Air Check Valve (Figure 1) is a one-way valve that allows thermactor air to pass into the exhaust system while preventing exhaust gases from passing in the opposite direction.

The Pulse Air Valve (Figure 2) replaces the air pump application in some thermactor systems. It permits air to be drawn into the exhaust system on vacuum exhaust pulses and blocks the backflow of high-pressure exhaust pulses. The fresh air completes the oxidation of exhaust gas components.

NOTE: Although the two valves share the same basic part number and have the same appearance, they are NOT INTERCHANGEABLE.

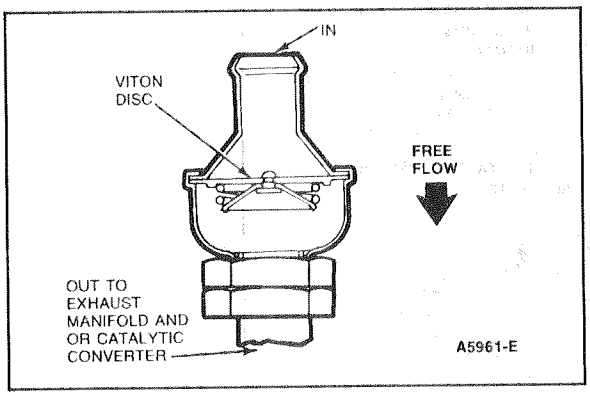


Figure 1 Air Check Valve

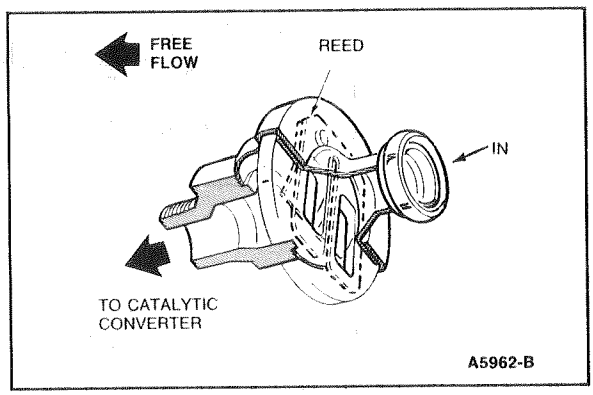


Figure 2 Pulse Air Valve (Thermactor II)

Functional Check

- Visually inspect the thermactor system hoses, tubes, control valve(s) and check valve(s) for leaks that may be due to backflow of exhaust gas. If holes are found and/or traces of exhaust gas products are evident, the check valve may be suspect.
- As shown in the above illustrations, the valves should allow freeflow of air in the direction of the arrow only. The valve(s) should check (or block) the freeflow of exhaust gas in the opposite direction.
- Replace the valve if air does not flow as indicated or if exhaust gas backflows opposite of the direction of the arrow.

NOTE: Refer to Section 10 for a description of the Thermactor System.

TITLE	BASIC PART NO.	SYMBOL
Air Cleaner Cold Weather Modulator	**9E862**	A/CL CWM

DESCRIPTION

A cold weather modulator is sometimes used in addition to the air cleaner temperature control (bimetal) sensor to control the inlet air temperature.

The cold weather modulator traps vacuum in the system, so the door will not switch to cold air when the vacuum drops during acceleration. The cold weather modulator only works when the outside air is cold, (refer to the chart below).

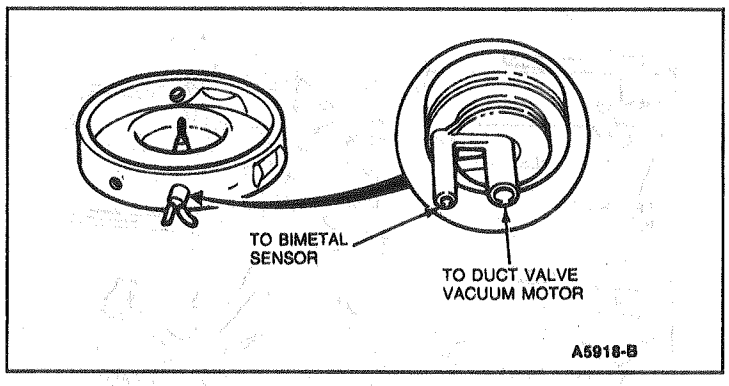


Figure 1 Cold Weather Modulator

DIAGNOSIS

A 54 kPa (16 in-Hg) vacuum applied to motor side of the modulator holds or leaks as follows:

COLOR	TYPE	HOLDS	LEAKS
Black	N/O	Below -6.7°C (20°F)	Above 1.7°C (35°F)
Blue	N/O	Below 4.4°C (40°F)	Above 12.8°C (55°F)
Green	N/O	Below 10°C (50°F)	Above 24.4°C (76°F)
Yellow	N/C	Above 18.3°C (65°F)	Below 10°C (50°F)

TITLE	BASIC PART NO.	SYMBOL
Air Cleaner Temperature Sensor	**9E607**	O A/CL BIMET

DESCRIPTION

The sensor is installed in the cleaner tray and is subjected to temperature changes within the air cleaner. At a given increase in temperature, the sensor bleeds off vacuum, permitting the vacuum motor to open the duct door to allow fresh air in while shutting off full heat.

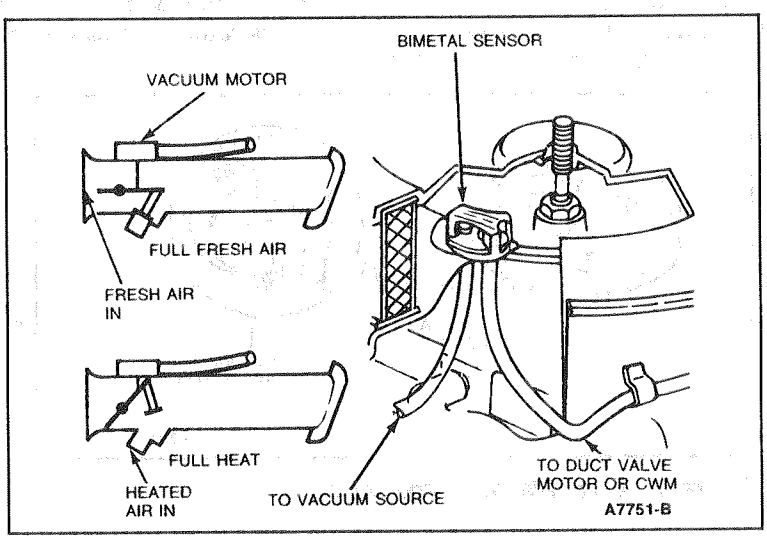


Figure 1 Air Cleaner Temperature Sensor

DIAGNOSIS

At an ambient temperature of less than 24°C (75°F), the sensor will allow vacuum to close the duct door to fresh air. The sensor will bleed off vacuum to allow the duct door to open and let in fresh air at or above the following temperatures:

Brown	24°C (75°F)
Pink, black, or clear	32.2°C (90°F)
Blue, yellow or green	40.6°C (105°F)

TITLE	BASIC PART NO.	SYMBOL
Air Cleaner Vacuum Motor	**9D604**	

DESCRIPTION

The air cleaner vacuum motor operates the door within the duct, which allows either warm or cold air to enter the engine, depending upon the temperature within the air cleaner.

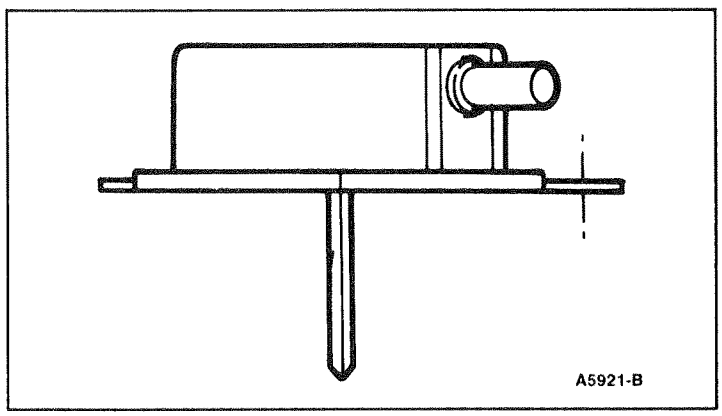
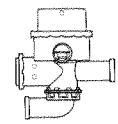


Figure 1 Air Cleaner Vacuum Motor

DIAGNOSIS

When a vacuum of 27 kPa (8 in-Hg) or greater is applied to the vacuum motor, the door stem should pull up and stay as long as vacuum is applied to the vacuum motor.

TITLE	BASIC PART NO.	SYMBOL
Air Control Valve (Switch-Relief)	**9F491**	

DESCRIPTION

The Air Supply Control Valve is used in the Thermactor (secondary air) System.

The air control valve directs air pump output to the exhaust manifold or downstream to the catalyst system depending upon the engine control strategy. The air control valve may be used as a Thermactor bypass valve (Figure 2), directing air to the catalyst/exhaust system or to a remote air dump location depending on engine control strategy. A pressure relief valve also provides air pump protection in the event of excessive exhaust back pressure or system blockage.

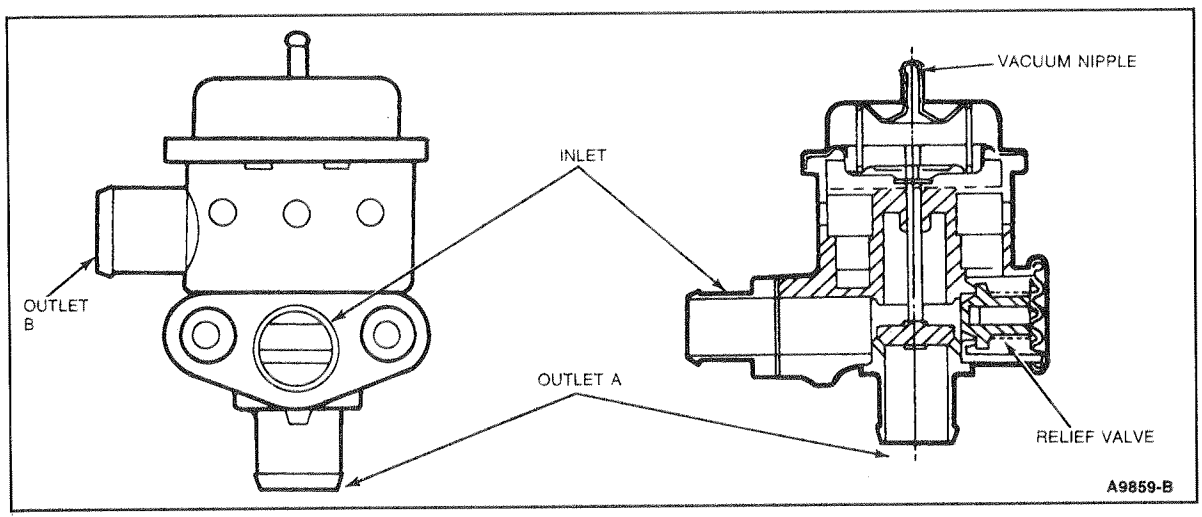


Figure 1 Air Control Valve (Switch-Relief)

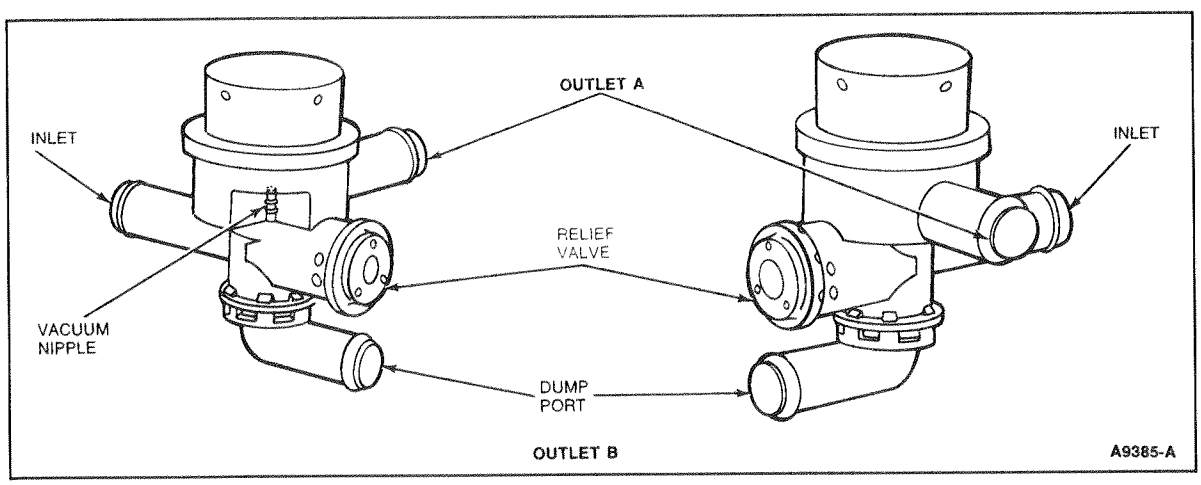
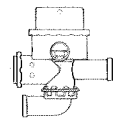


Figure 2 Air Control Valve (Thermactor Bypass Type)

TITLE	BASIC PART NO.	SYMBOL
Air Control Valve (Switch-Relief)	**9F491**	

Functional Check

1. Verify that airflow is being supplied to the valve inlet by disconnecting the air supply hose at the inlet and verifying the presence of airflow with the engine at 1500 rpm. Reconnect the air supply hose to the valve inlet.
2. Disconnect the air supply hoses at outlets A and B (Figure 1 or Figure 2).
3. Remove the vacuum line at the vacuum nipple.
4. Accelerate the engine to 1500 rpm. Airflow should be heard and felt at outlet B with little or no airflow at outlet A (Figure 1 or Figure 2).
5. With the engine at 1500 rpm, connect a direct vacuum line from any manifold vacuum fitting to the air control valve vacuum nipple. Airflow should be heard and felt at outlet A with little or no airflow at Outlet B.
6. Restore all connections. If conditions above are not met, replace the air control valve.

TITLE	BASIC PART NO.	SYMBOL
Air Silencer	**9G427** **9H467**	SILN

DESCRIPTION

The Air Silencer is a combination silencer and filter for air supply pumps that are not equipped with an impeller-type centrifugal air filter fan or for pulse air (Thermactor II) systems. The air silencer is mounted in a convenient position in the engine compartment and is connected to the air supply pump or pulse air valve inlet by means of a flexible hose.

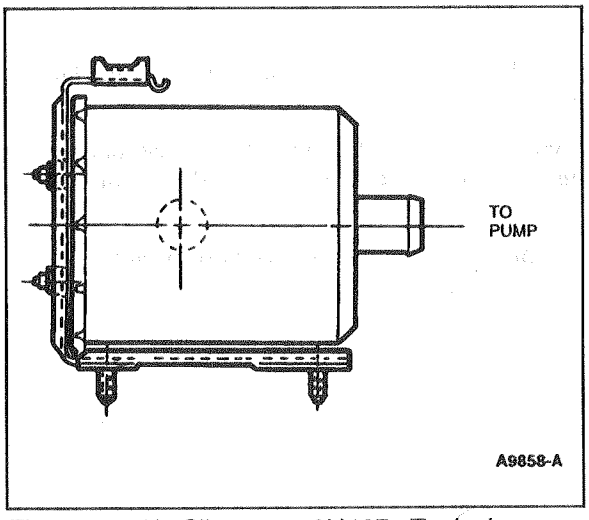


Figure 1 Air Silencer - 9H467, Typical

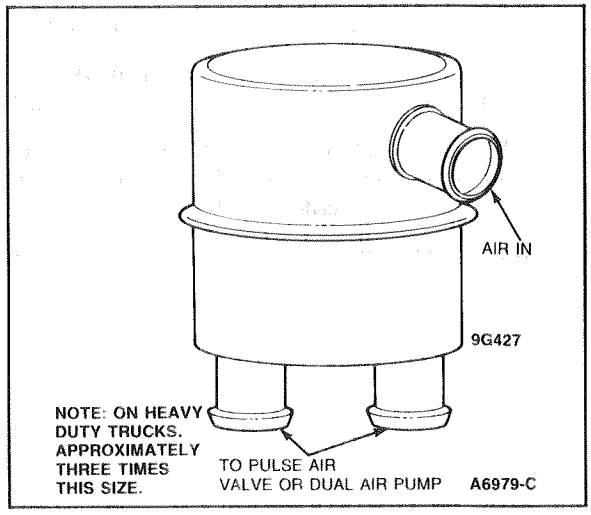
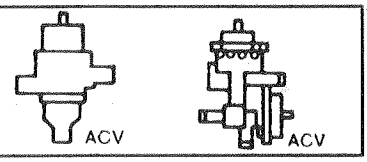


Figure 2 Air Silencer - 9G427, Typical

Functional Check

1. Inspect hoses and air silencer for leaks.
2. Disconnect hose from air silencer outlet, remove silencer and visually inspect for plugging.
3. The air silencer is operating satisfactorily if no plugging or leaks are encountered.

TITLE	BASIC PART NO.	SYMBOL
Air Supply Control Valve	**9F491**	

DESCRIPTION

The Air Supply Control Valve is used in the Thermactor (secondary air) System.

The air control valve directs air pump output to the exhaust manifold or downstream to the catalyst system depending upon the engine control strategy.

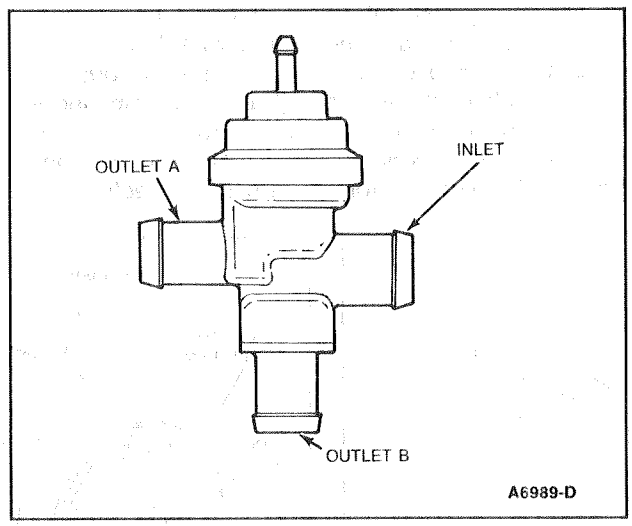


Figure 1 Standard Air Control Valve

Functional Check

1. Verify that airflow is being supplied to the valve inlet by disconnecting the air supply hose at the inlet and verifying the presence of airflow with the engine at 1500 rpm. Reconnect the air supply hose to the valve inlet.
2. Disconnect the air supply hose at outlets A and B (Figure 1).
3. Remove the vacuum line at the vacuum nipple.
4. Accelerate the engine to 1500 rpm. Airflow should be heard and felt at outlet B with little or no airflow at outlet A (Figure 1).
5. With the engine at 1500 rpm, connect a direct vacuum line from any manifold vacuum fitting to the air control valve vacuum nipple. Airflow should be heard and felt at outlet A with little or no airflow at outlet B.
6. If the valve is the bleed type, less air will flow from outlet A or B, and the main discharge will change when vacuum is applied to the vacuum nipple.
7. Restore all connections. If conditions above are not met, replace the air control valve.

TITLE	BASIC PART NO.	SYMBOL
Air Supply Pump	**9A486**	

DESCRIPTION

Passenger Cars and Light Trucks

The Air Supply Pump is a belt-driven, positive displacement, vane-type pump that provides air for the Thermactor system. It is available in 11-cubic inch and 19-cubic inch sizes, either of which may be driven with different pulley ratios for different applications. The 11-cubic inch pump (Figure 1) receives its air through a remote filter attached to the air inlet nipple, through a hose connected to the clean air side of the air cleaner or through an impeller-type centrifugal air filter fan. The 19-cubic inch pump (Figure 2) uses an impeller-type centrifugal air filter fan which separates dirt, dust, and other contaminants from the intake air by centrifugal force. The air supply pump does not have a pressure relief valve, a function performed by the bypass valve. A description of the Thermactor System is in Section 10.

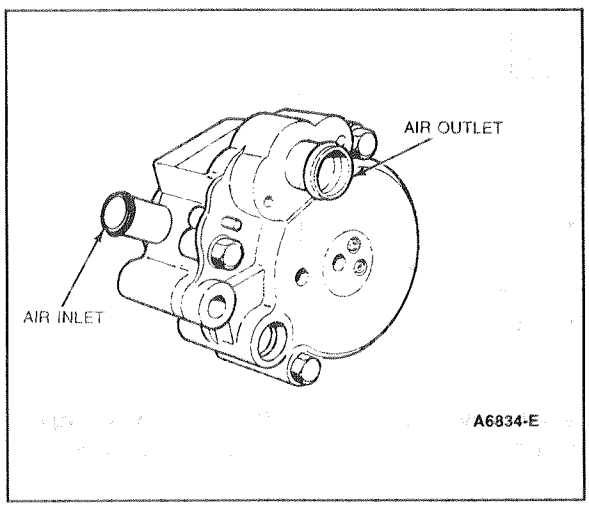


Figure 1 11-Cubic Inch Thermactor Air Supply Pump

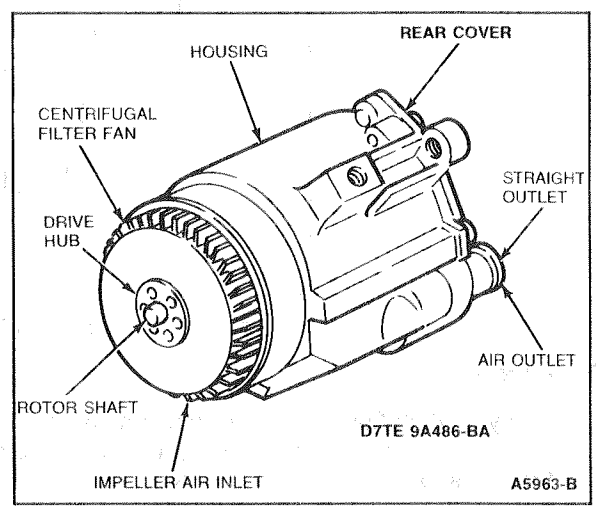


Figure 2 19-Cubic Inch Thermactor Air Supply Pump

Functional Check

1. Check belt tension and adjust to specification.
2. Disconnect air supply hose from bypass control valve.
3. The pump is operating satisfactorily if airflow is felt at the pump outlet and the flow increases as the engine speed is increased.

Do not pry on the pump to adjust belt. The aluminum housing is likely to collapse.

TITLE	BASIC PART NO.	SYMBOL
Air Supply Pump	**9A486**	

DESCRIPTION

Heavy Duty Trucks

The Air Supply Pump is a belt-driven, positive displacement, vane-type pump that provides air for the Thermactor system. It is available in 19, 22 and 23 cubic inch sizes, either of which may be driven with different pulley ratios for different applications. Both pumps (Figure 3), receive air from a remote silencer filter attached to the pumps' air inlet nipple. The pressure relief function is performed by the bypass valve. A description of the Thermactor System is in Section 10.

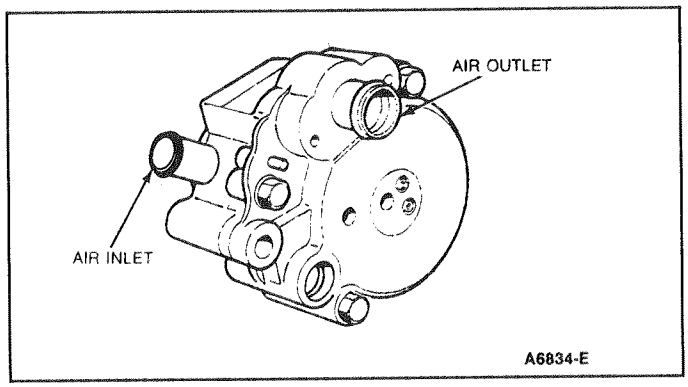


Figure 3 19, 22 and 23 Cubic Inch Thermactor Air Supply Pump

Functional Check

1. Check belt tension and adjust to specification.
2. Disconnect air supply hose from bypass control valve.
3. The pump is operating satisfactorily if airflow is felt at the pump outlet and the flow increases as the engine speed is increased.

Do not pry on the pump to adjust belt. The aluminum housing is likely to collapse.

TITLE	BASIC PART NO.	SYMBOL
Air Throttle Body Assembly	**9E926**	

DESCRIPTION

The Throttle Body Assembly (Figure 1) controls airflow to the engine through a single or dual butterfly valve. The throttle position is controlled by conventional linkage. The body is a single-piece, die casting of aluminum. It has a single bore with an air bypass channel around the throttle plate.

Other features of the air throttle body assembly include:

1. An adjustment screw to set the throttle plate at a minimum idle airflow position.
2. A pre-set stop to locate the wide-open throttle (WOT) position.
3. A throttle body mounted throttle position sensor.
4. A PCV fresh air source upstream of the throttle plate (some applications).
5. Individual vacuum taps (some applications) for PCV and EGR control signals.
6. Idle air bypass valve.

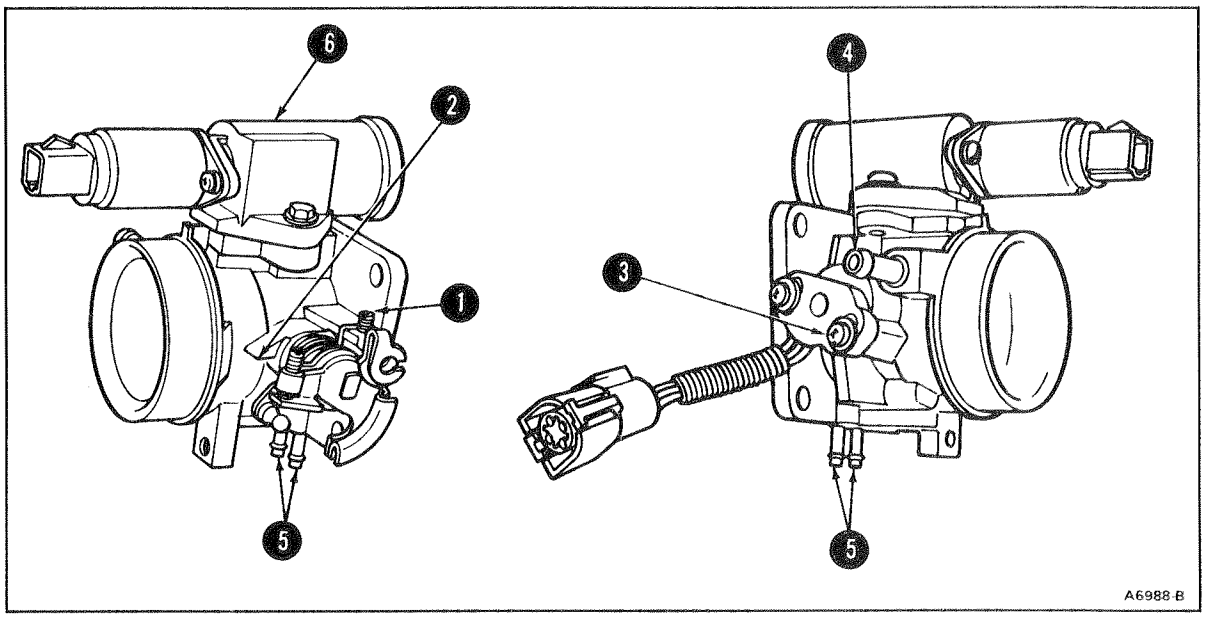


Figure 1 Air Throttle Body Assembly

TITLE	BASIC PART NO.	SYMBOL
Barometric Absolute Pressure Sensor	**9F479**	

DESCRIPTION

The BAP sensor measures barometric pressure using a frequency. This gives the ECA information on engine load.

It is used as a barometric sensor for altitude compensation, updating the ECA during Key On Engine Off and every wide-open throttle.

The ECA uses BAP for:

- Spark advance
- EGR flow
- Air/fuel ratio

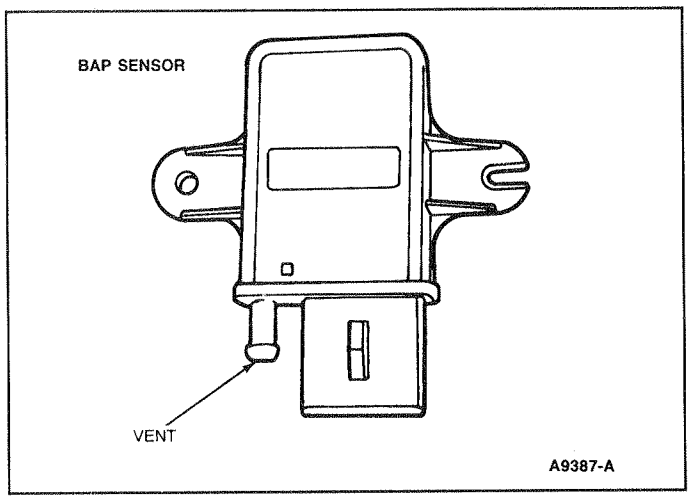


Figure 1 Barometric Absolute Pressure Sensor

DIAGNOSIS

Refer to the EEC-IV Quick Test, Section 16.

TITLE	BASIC PART NO.	SYMBOL
Canister Purge Regulator Valve	**9C915**	CPRV

DESCRIPTION

The canister purge solenoid is part of the Evaporative Emission Control System, Section 7 and is used with the Electronic Engine Control (EEC).

This valve controls the flow of vapors from the carbon canister to the intake manifold during various engine operating modes. This valve controls carbon canister purging.

This is a normally closed valve that is opened by a signal from the electronic control assembly (ECA).

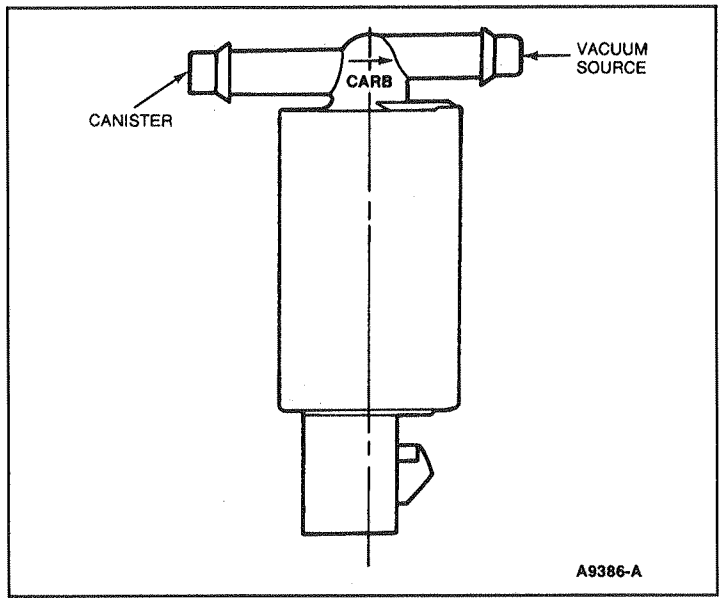


Figure 1 Canister Purge Regulator Valve

DIAGNOSIS

With valve de-energized, apply 5 in-Hg to "vacuum source" port, valve should not pass air; if it does, replace valve.

While applying 9-14 volts DC to valve, the valve will open and pass air. If it does not, replace valve.

NOTE: The Evaporative Emission System is outlined in Section 7.

TITLE	BASIC PART NO.	SYMBOL
Canister Purge Valve	**9B963**	PURGE CV

DESCRIPTION

The Canister Purge Valve is part of the Evaporative Emission Control System, Section 7.

The valve (Figure 1) is in-line with the carbon canister and controls the flow of vapors from the canister to the engine.

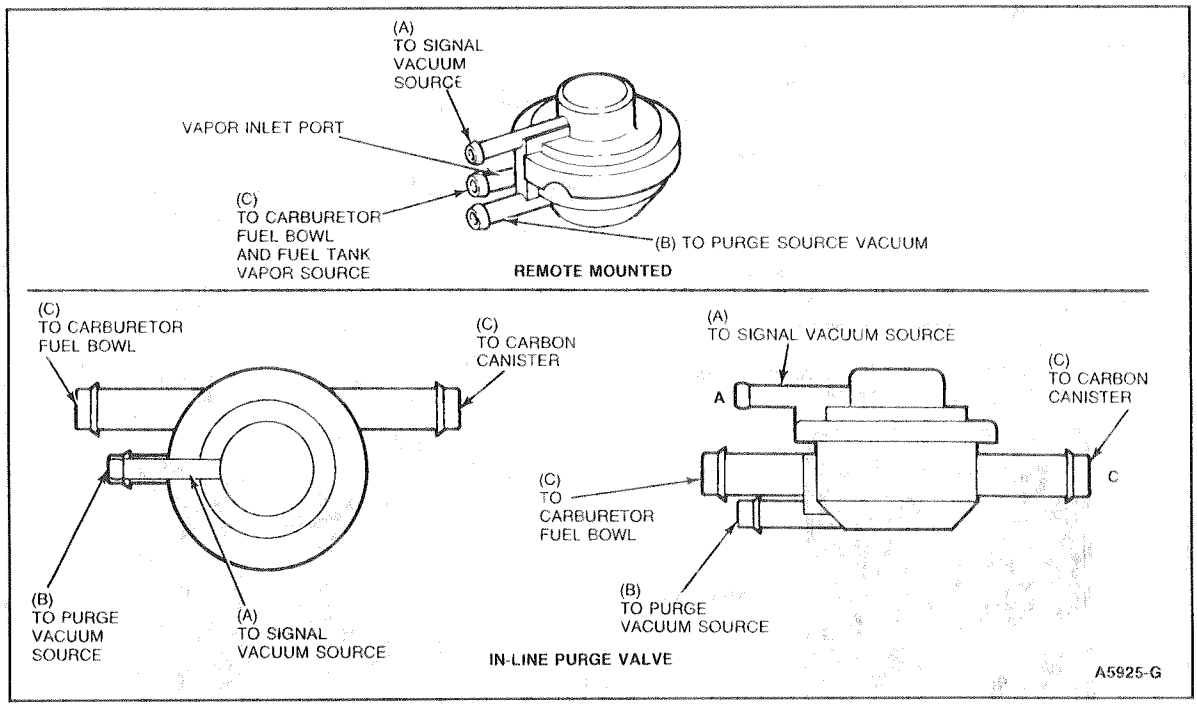


Figure 1 Purge Control Valve

DIAGNOSIS

Application of vacuum to Port A (only) should indicate no flow. If flow occurs, replace valve.

Application of vacuum to Port B (only) should indicate no flow, valve should be closed (all valves except E5VE-AA, E4VE-AA, E77E-AA, which should indicate slight flow). If valve flows (except E5VE-AA, E4VE-AA, E77E-AA), replace valve.

After applying and maintaining 54 kPa (16 in-Hg) vacuum to Port A, apply vacuum to Port B. Air should pass. (Note: Valves E5VE-AA, E4VE-AA, E77E-AA should indicate higher flow than that indicated in above test.)

Important: Never apply vacuum to Port(s) C. Doing so may dislodge internal diaphragm and valve will be permanently damaged.

NOTE: The Evaporative Emission System is outlined in Section 7.

TITLE	BASIC PART NO.	SYMBOL
Carbon Canister	**9D653**	

DESCRIPTION

The fuel vapors from the fuel tank and carburetor fuel bowl are stored in the carbon canister until the vehicle is operated, at which time, the vapors will purge from the canister into the engine for consumption. There are two canister sizes, 925 ml and 1400 ml carbon. Canisters are sometimes used in pairs when the vehicle has a large fuel tank, or dual fuel tanks or dual carburetor bowls.

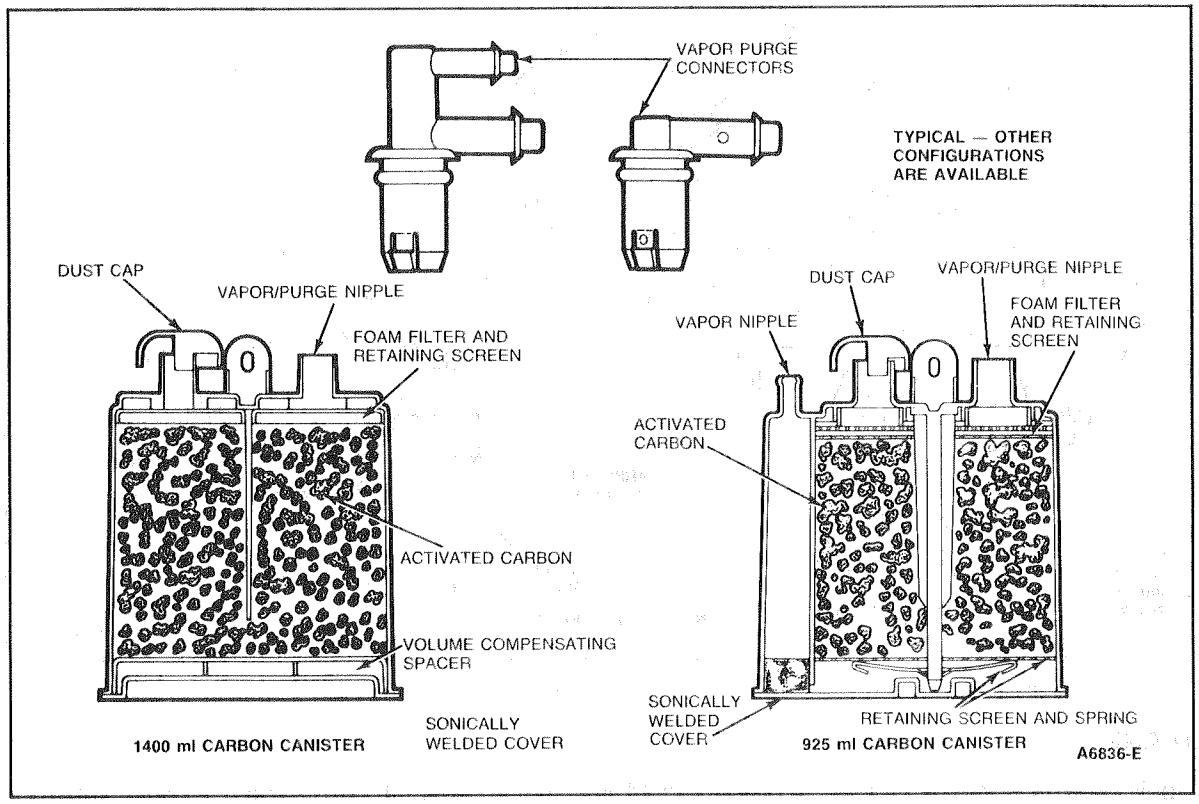


Figure 1 Carbon Canisters

DIAGNOSIS

There are no moving parts and nothing to wear in the canister.

Check for loose, missing, cracked, or broken connections and parts.

There should be no liquid in the canister.

NOTE: The Evaporative Emission System is outlined in Section 7.

TITLE	BASIC PART NO.	SYMBOL
Carburetor Fuel Bowl Solenoid Vent Valve	**9B982**	SV-CBV

DESCRIPTION

The Fuel Bowl Vent Solenoid Valve (Figure 1) is part of the Evaporative Emission Control System, Section 7 and is a normally open valve located in the fuel bowl vent line. The vent solenoid valve closes off the fuel bowl vent line when the engine is running, and it returns to the normally open condition when the ignition switch is turned off.

NOTE: If lean fuel mixture is suspected as the cause of a problem, inspect the bowl vent solenoid valve for proper closing during engine operation. If the valve leaks or does not close, the carburetor will give an incorrect air/fuel mixture.

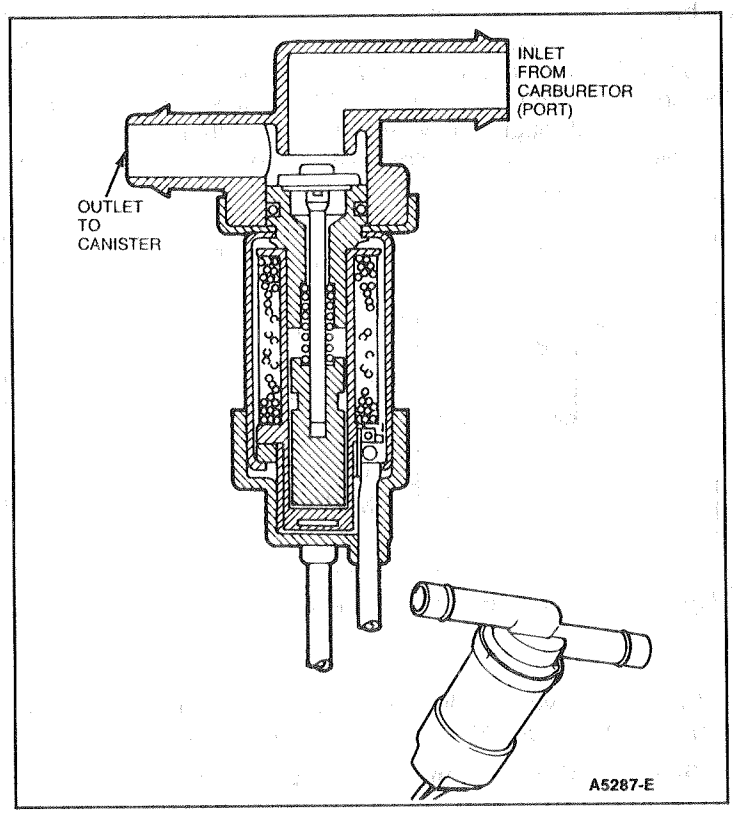


Figure 1 Fuel Bowl Vent Solenoid Valve

DIAGNOSIS

Apply 9-14 volts DC to valve, the valve should close, not allowing air to pass. If valve does not close or leaks when voltage and 1 in-Hg vacuum is applied to carburetor port, replace the valve.

NOTE: The Evaporative Emission System is outlined in Section 7.

TITLE	BASIC PART NO.	SYMBOL
Carburetor Fuel Bowl Thermal Vent Valve	**9E589**	TVV

DESCRIPTION

The Thermal Vent Valve (Figure 1) is a temperature actuated closed-to-flow/open-to-flow valve. It is inserted in the carburetor-to-canister vent line and is closed when the engine compartment is cold. This prevents fuel tank vapors (generated when the fuel tank heats up before the engine compartment does) from being vented through the carburetor fuel bowl — forcing them instead into the carbon canister.

This effect can occur, for instance, when sunlight strikes a vehicle which has been sitting out all night, and begins to warm the fuel tank. With the thermal vent valve closed, the vapors cannot enter the carburetor fuel bowl vent valve (now closed) but must be routed to the carbon canister. As the engine compartment warms up, during normal engine operation, the thermal vent valve opens. When the engine is again turned off, the thermal vent valve (now open because underhood temperature is above 120°F) allows fuel vapors generated from the carburetor float bowl to pass through the valve and store themselves in the carbon canister. As the thermal vent valve cools, it again closes and the cycle begins again.

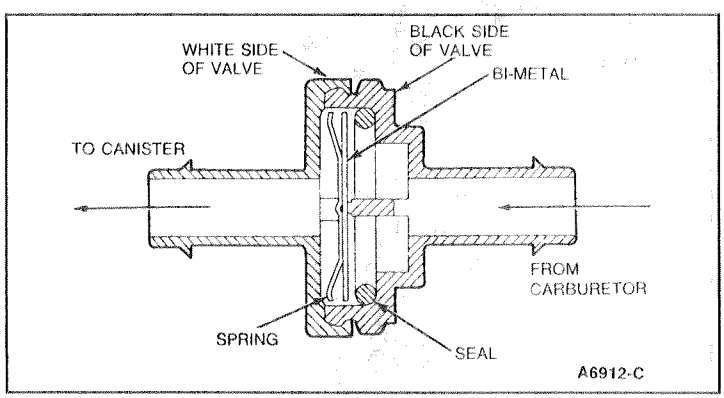


Figure 1 Fuel Bowl Thermal Vent Valve

DIAGNOSIS

At 90°F and below, the vent valve is fully closed and at 120°F and above, the vent valve is fully open. At temperatures between 90°F and 120°F, the valve may be either open or closed.

NOTE: The Evaporative Emission System is outlined in Section 7.

TITLE	BASIC PART NO.	SYMBOL
Combination Air Bypass/Air Control Valve	**9F491**	ACV

DESCRIPTION

The Combination Air Bypass/Air Control Valve (9F491) combines the functions of the air bypass valve (9B289) and the air control valve (9F491) into a single unit. There are two normally closed valves; the non-bleed type (Figure 1) and the bleed type (Figure 2) all of which look alike. One distinguishing feature will be that the bleed type will have a the percent of bleed molded into the plastic case.

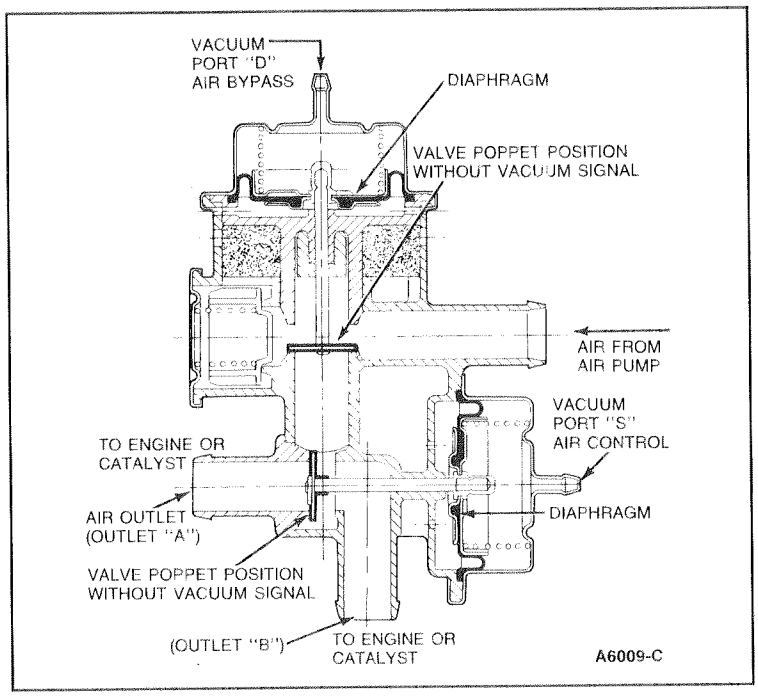


Figure 1 Valve Assembly — Exhaust Air Supply Control (Normally Closed) Without Bleed

Functional Check

Normally Closed, Figures 1 and 2.

1. Disconnect hoses from outlets A and B.
2. Disconnect and plug vacuum line to port D.
3. With engine operating at 1500 rpm, airflow should be noted coming out of the bypass vents.
4. Reconnect vacuum line to port D, and disconnect and plug vacuum line to port S. Ensure vacuum is present in the line to vacuum port D.
5. With engine operating at 1500 rpm airflow should be noted coming out of outlet B (no airflow should be detected at outlet A).

TITLE	BASIC PART NO.	SYMBOL
Combination Air Bypass/Air Control Valve	**9F491**	ACV

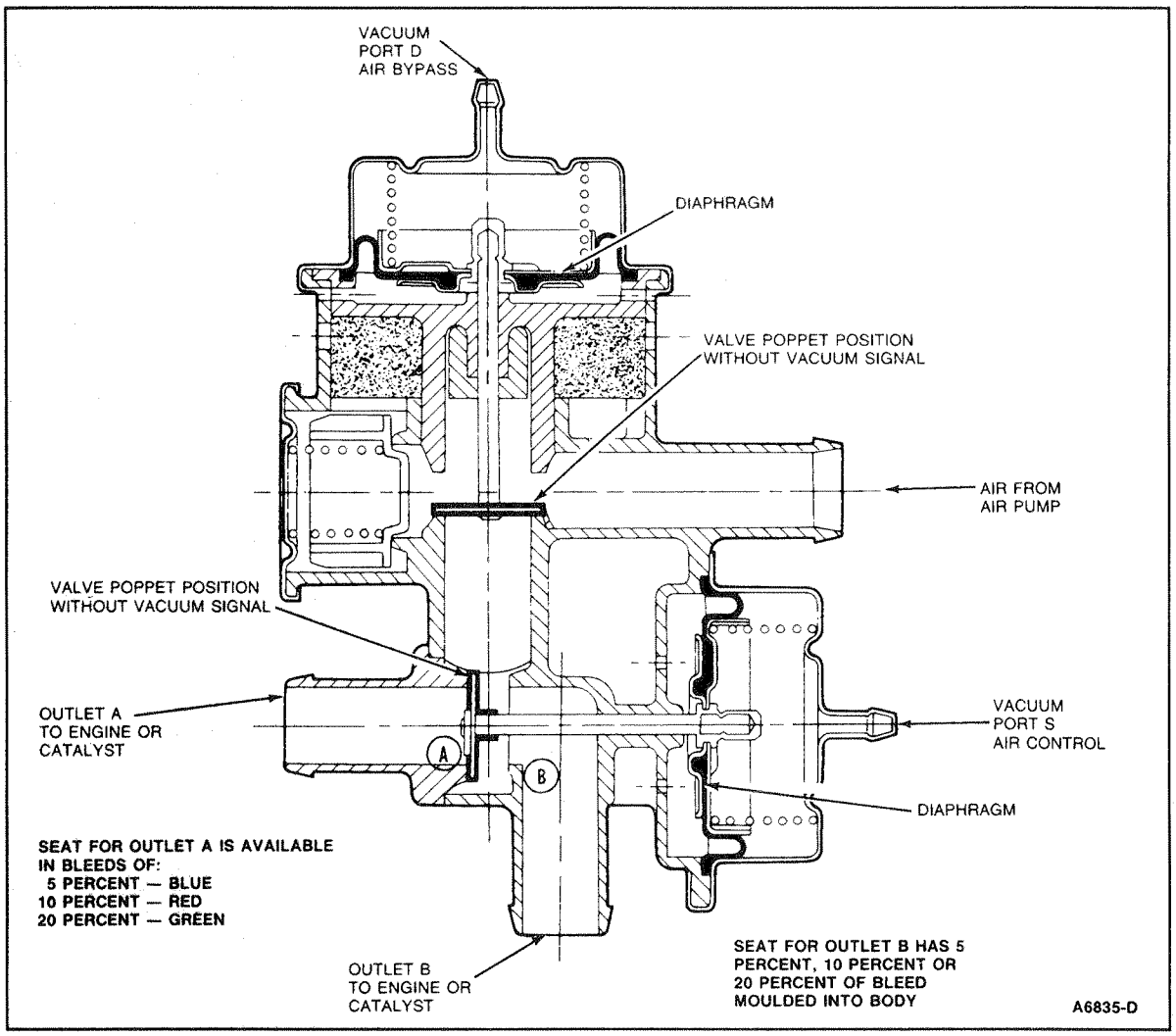


Figure 2 Valve Assembly Exhaust Air Supply Control (Normally Closed) With Bleed

6. Apply 27-34 kPa (8-10 in-Hg) vacuum to port S. With engine operating at 1500 rpm, airflow should be noted coming out of outlet A.

7. If the valve is the bleed type, some lesser amount of air will flow from outlet A or B, and the main discharge will change when vacuum is applied to port S.

NOTE: If there is a small air tap attached to the inlet tube from the air pump, airflow should be present during engine operation.

TITLE	BASIC PART NO.	SYMBOL
DC Motor-Idle Speed Control Actuator	**9N825**	

DESCRIPTION

The DC-Motor Idle Speed Control Actuator (DC-ISCA) (Figure 1) is mounted to the fuel charging assembly and controls the idle speed including such functions as: high cam rpm, anti-diesel shutoff, dashpot and pre-positioning for next vehicle start. The DC-ISCA is driven by the EEC-IV system and includes an integral Idle Tracking Switch (ITS).

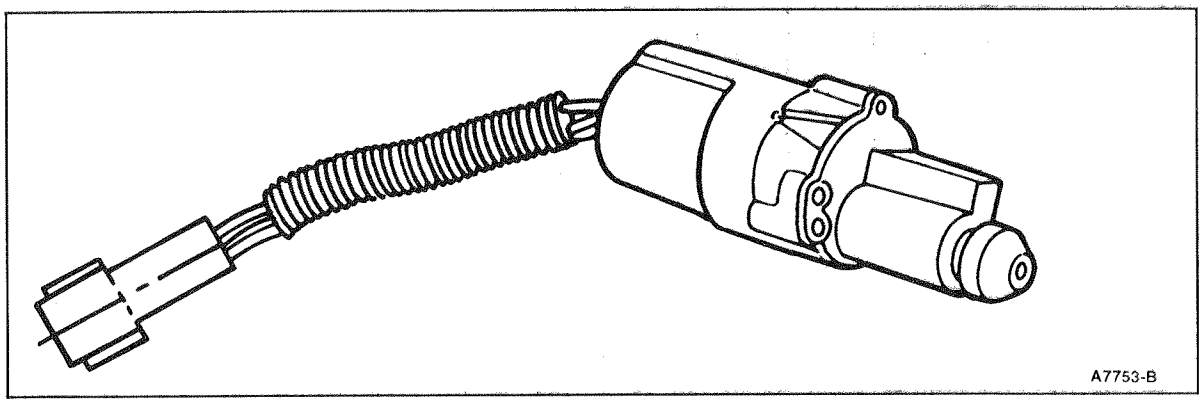


Figure 1 DC Motor-Idle Speed Control Actuator

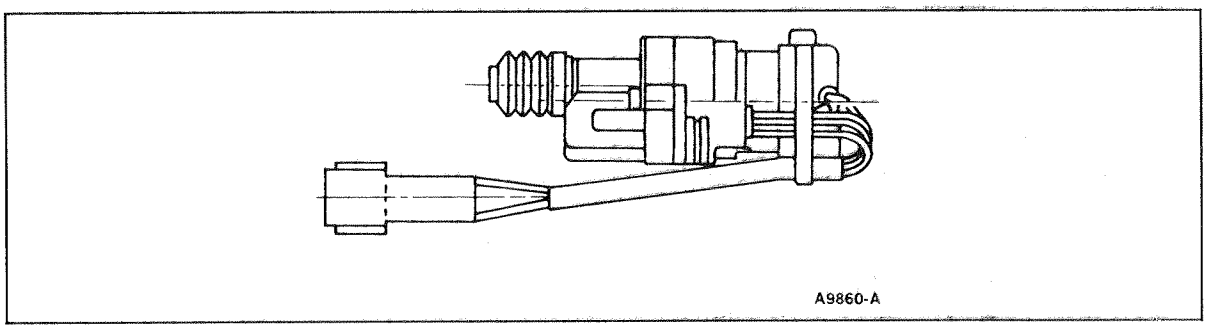


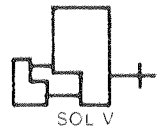
Figure 2 DC Motor-Idle Speed Control Actuator 2.0L Ranger Only

DIAGNOSIS

Refer to the EEC-IV Quick Test, Section 16.

APPLICATIONS

PART NUMBER	ENGINE	VEHICLE
E6DF-9N825-AA	1.9L CFI	Passenger Car
E7DF-9N825-AA	2.5L HSC	Passenger Car
E77F-9N825-AA	2.0L	Light Truck
E8DF-9N825-AA (1988½)	1.9L CFI	Passenger Car

TITLE	BASIC PART NO.	SYMBOL
Dual Thermactor Air Control Solenoid Valve	**9H465**	

DESCRIPTION

The dual thermactor air control solenoid valve assembly consists of two normally closed solenoid vacuum valves (TAB & TAD), one controlling the thermactor air bypass valve and the other the thermactor diverter valve. Both are vented when de-energized, sourced by the intake manifold vacuum reservoir and controlled by an EEC system (they are also discussed in the EEC and MCU Systems diagnostic procedures). Also used on 2 wheel drive/4 wheel drive vehicles and single solenoids for EGR shutoff.

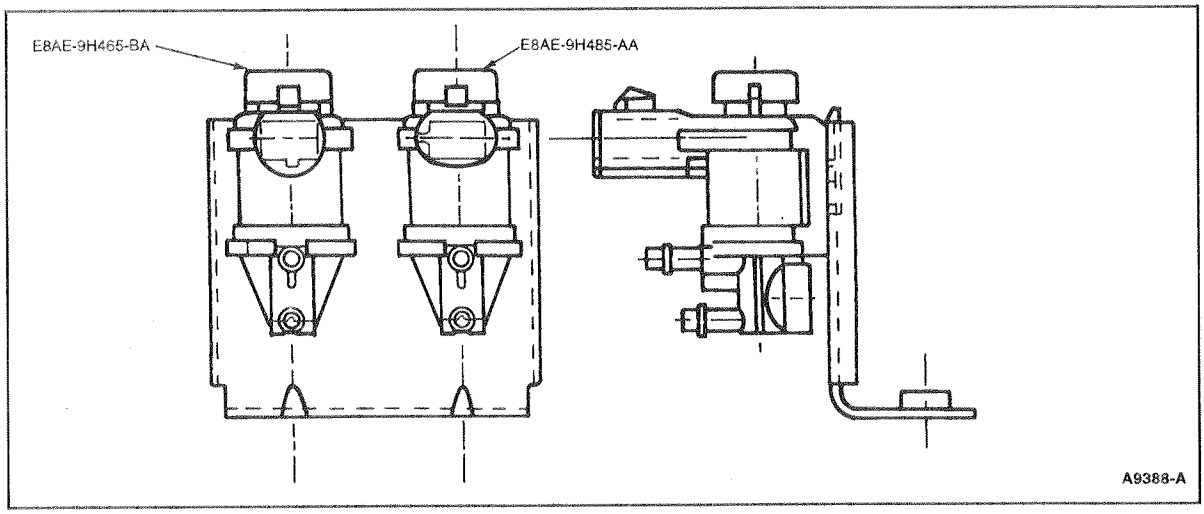


Figure 1 Dual Thermactor Air Control Solenoid Valve

DIAGNOSIS

For diagnostics, refer to the EEC-IV Quick Test, Section 16.

The function of each valve can be determined by externally energizing with vacuum sourced and output gauged. (Refer to solenoid vacuum valve, NC).

The resistance of each solenoid should be between 51 and 108 ohms when checked at the coil terminals. If the resistance is not within these values, the solenoid should be replaced.

NOTE: The valves can be expected to have a very small leakage rate when energized or de-energized. This leakage is not measurable in the field and is not detrimental to valve function.

TITLE	BASIC PART NO.	SYMBOL
EGR Back Pressure Variable Transducer	**9J431**	

DESCRIPTION

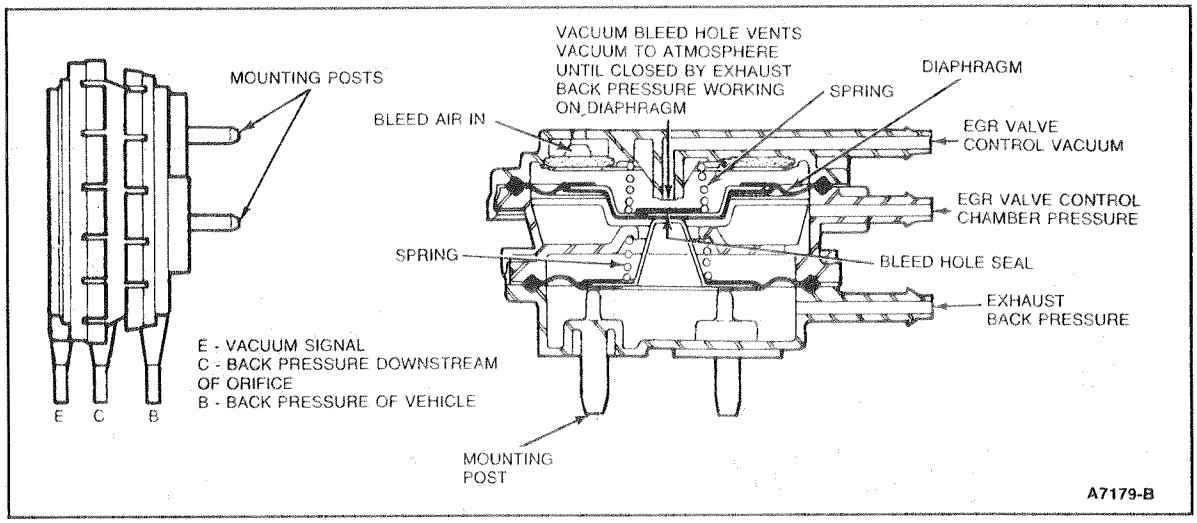
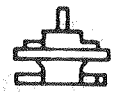


Figure 1 EGR Back Pressure Variable Transducer

DIAGNOSIS

Refer to Section 6, Exhaust Gas Recirculation (EGR) System.

TITLE	BASIC PART NO.	SYMBOL
EGR Load Control (WOT) Valve	**9F424**	 LCV

DESCRIPTION

This valve dumps EGR vacuum at or near WOT.

The normal path between Ports A and B is vented to atmosphere when sufficient vacuum is applied to Port C.

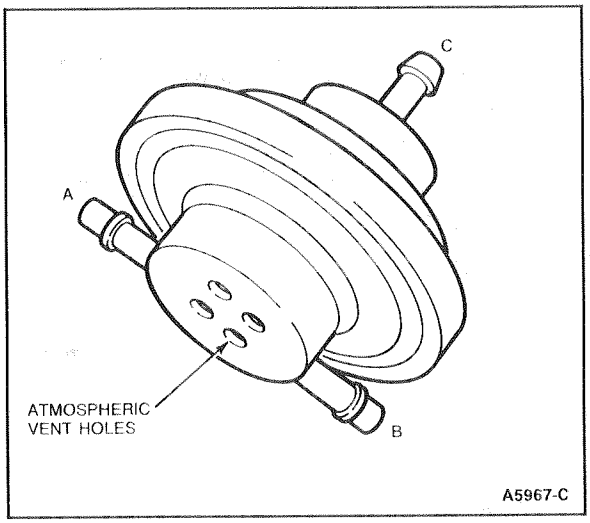


Figure 1 EGR Vacuum Load Control (WOT) Valve

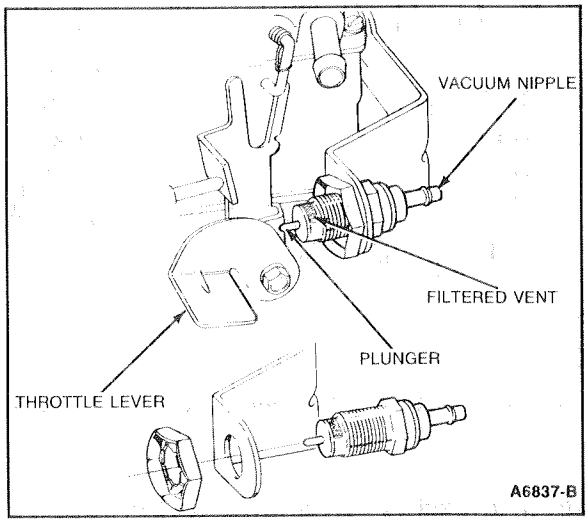


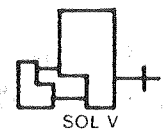
Figure 2 WOT Valve for Carter Carburetor

Functional Check

- With the engine running at normal operating temperature, set throttle on kickdown step (high cam for 2.3L).
- Connect Rotunda Vacuum Gauge 059-00008 or equivalent to the EGR side of the WOT valve, and note the reading.
- Using Rotunda Vacuum Tester 021-00014 or equivalent, apply a vacuum of at least 20.26 kPa (6 in-Hg) to the WOT venturi port (Port C).
- Gauge should drop to zero. If not, replace the valve.
- Remove test equipment and restore connections.

Functional Check (Adjustment)

Adjust so that hand pump vacuum at the vacuum nipple will drop when WOT is approached without limiting throttle travel.

TITLE	BASIC PART NO.	SYMBOL
EGR Solenoid Vacuum Valve Assembly	**9D474**	

DESCRIPTION

Dithering Type

The dual EGR solenoid valve assembly consists of two dithering solenoid valves. One is a vacuum valve which supplies vacuum to the sonic EGR valve when energized. The second valve is a vent valve which vents the EGR valve to the atmosphere when de-energized. Both solenoid valves receive variable duty cycle signals from ECU (EEC-IV) according to EGR requirements. A restrictor is added in vacuum valve inlet port to reduce its flow compared to vent valve. In case vacuum valve sticks open, the vent valve will be capable of venting the vacuum flow immediately without affecting the devices being controlled.

It is used with the EGR valve in EEC-IV systems.

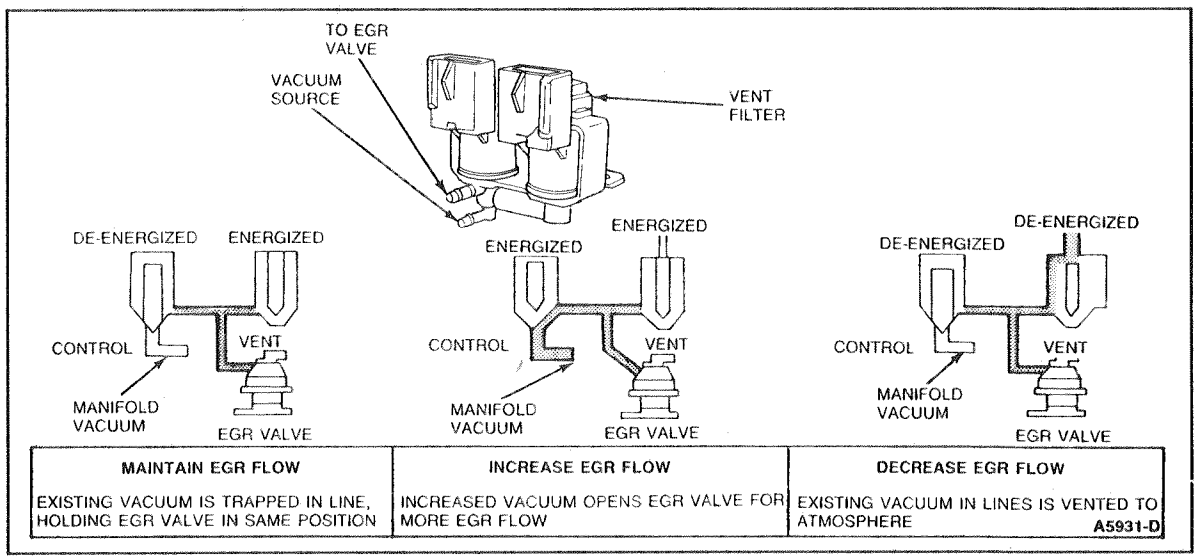


Figure 1 EGR Solenoid Valve Assembly — Dithering Type

DIAGNOSIS

The resistance of each solenoid should be between 32 and 64 ohms. If the solenoid is not within these values, the solenoid should be replaced.

The vent valve should flow when the solenoid is de-energized.

The control valve should flow air when solenoid is energized.

Refer to the EEC-IV Quick Test, Section 16.

NOTE: The valves can be expected to have a very small leakage rate when energized or de-energized. This leakage is not measurable in the field and is not detrimental to valve function.

TITLE	BASIC PART NO.	SYMBOL
EGR Vacuum Control Valve Filter	**9E491**	FLTR

DESCRIPTION

The EGR vacuum control valve filter (Figure 1) is used to vent various emission control components to atmosphere. If the filter is blocked, replace it.

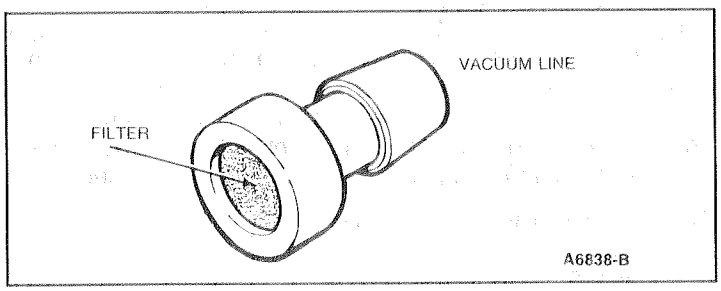


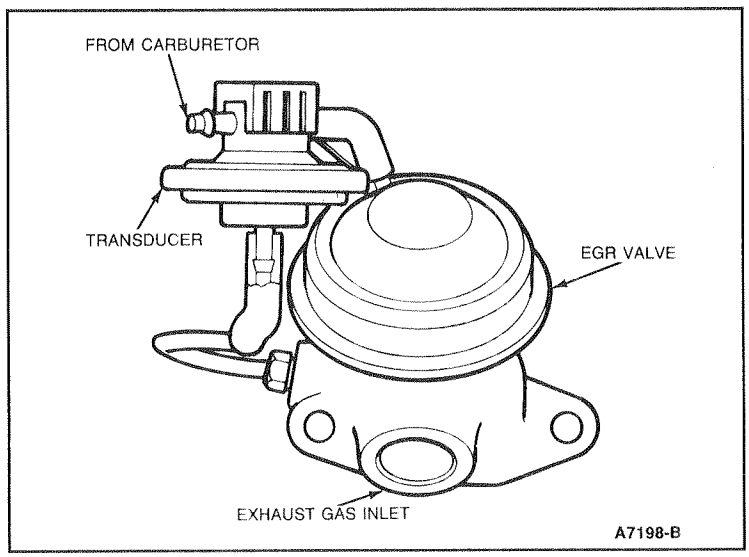
Figure 1 EGR Vacuum Control Valve Filter

TITLE	BASIC PART NO.	SYMBOL
EGR Valve and Transducer Assembly	**9H495**	

DESCRIPTION

The Valve and Transducer Assembly (9H495) which consists of a modified ported EGR valve and a remote transducer, is used on selected 2.0/2.3L engines (Figure 1). This assembly operates the same as the Integral Back Pressure Transducer EGR Valve (9D448) and is diagnosed and serviced as an assembly only. Valve function checks are the same as those for the Integral Back Pressure Transducer EGR Valve.

When servicing the assembly or any related vacuum harness, it is important to ensure proper orientation of the transducer. The nipple of the transducer attached to the metal tube from the EGR valve base must point straight down after installation. This allows drainage of exhaust gas condensation that may accumulate.



DIAGNOSIS

Refer to Section 6, Exhaust Gas Recirculation (EGR) System.

TITLE	BASIC PART NO.	SYMBOL
EGR Valve-Electronic	**9F483**	

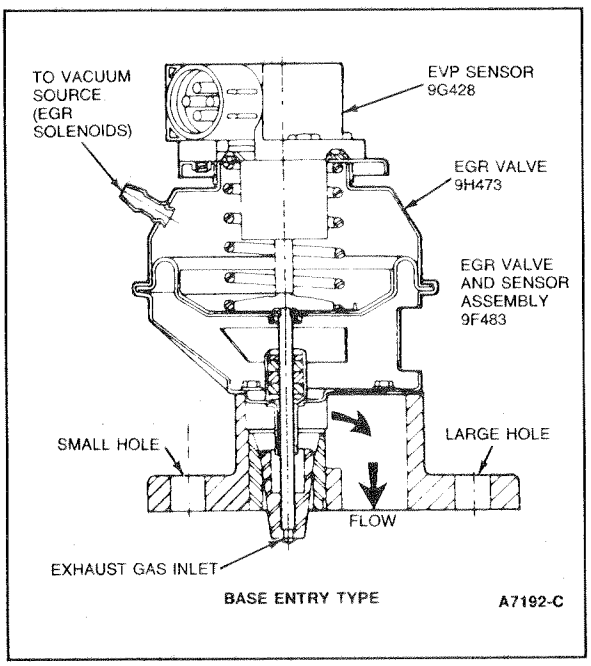
DESCRIPTION

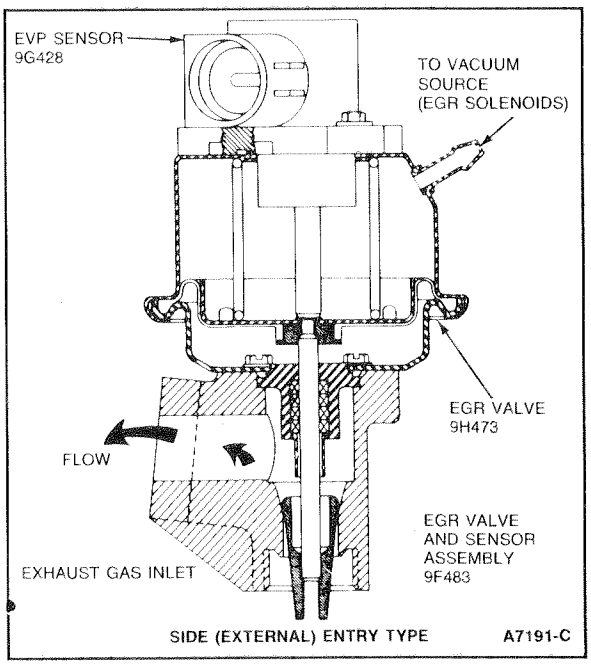
The Electronic EGR Valve (Figure 1) is required in EEC systems where EGR flow is controlled according to computer demands by means of an EGR valve position (EVP) sensor attached to the valve.

The valve is operated by a vacuum signal from the dual EGR Solenoid Valves (9D474) or the electronic vacuum regulator (9J459) which actuates the valve diaphragm.

As supply vacuum overcomes the spring load, the diaphragm is actuated which lifts the pintle off its seat allowing exhaust gas to recirculate (flow). The amount of flow is proportional to the pintle position. The EVP sensor mounted on the valve sends an electrical signal of its position to the Electronic Control Assembly (12A650).

The Electronic EGR Valve Assembly (9F483) is not serviceable. The EVP sensor (9G428) and EGR valve (9H473) must be serviced separately.





DIAGNOSIS

Verify vacuum routing per the vehicle decal before proceeding to EEC-IV Quick Test, Section 16.

TITLE	BASIC PART NO.	SYMBOL
EGR Valve-Integral Back Pressure Transducer	**9D448**	

DESCRIPTION

The integral back pressure transducer EGR valve combines inputs of back pressure and EGR port vacuum into one unit. The valve requires BOTH inputs to operate. The valve will not operate on vacuum alone. The back pressure valve has two types; poppet and tapered pintle, Figure 1.

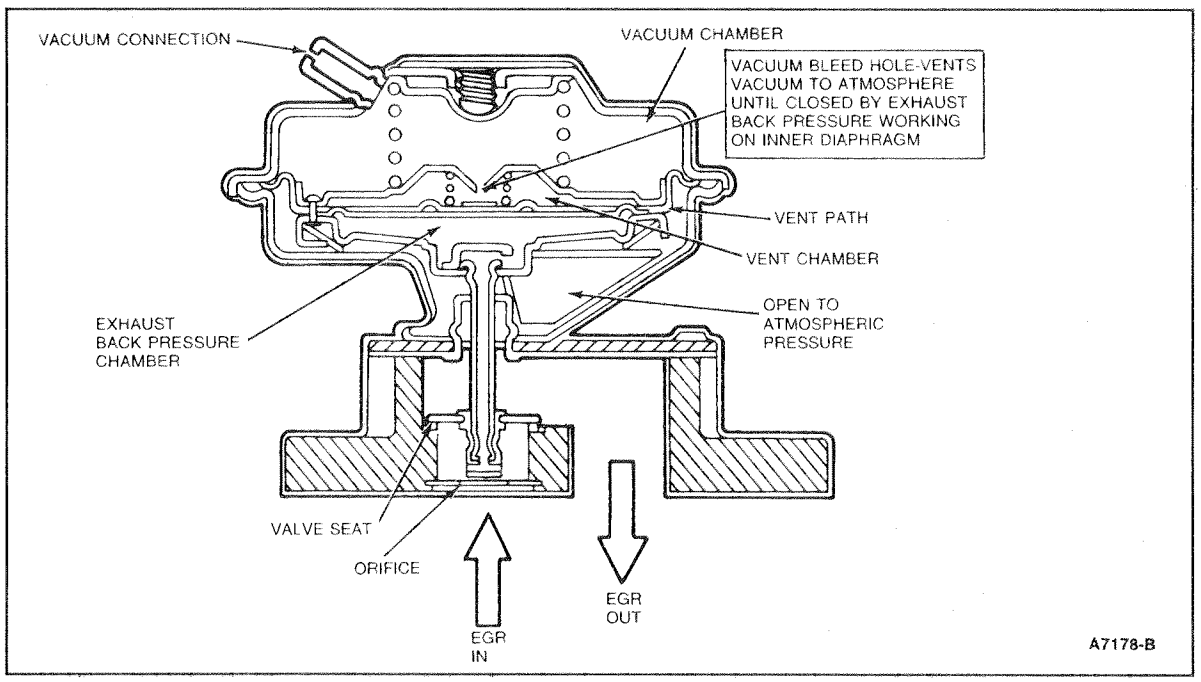


Figure 1 Integral Back Pressure Transducer EGR Valve (9D448)

DIAGNOSIS

Refer to Section 6, Exhaust Gas Recirculation (EGR) System.

TITLE	BASIC PART NO.	SYMBOL
EGR Valve-Ported	**9D475**	

DESCRIPTION

The ported EGR Valve is operated by a vacuum signal (only) from the carburetor EGR port signal which actuates the valve diaphragm. As the vacuum increases sufficiently to overcome the power spring, the valve is opened allowing EGR flow. The amount of flow is dependent on the tapered pintle or the poppet position which is a direct result of vacuum signal (Figure 1).

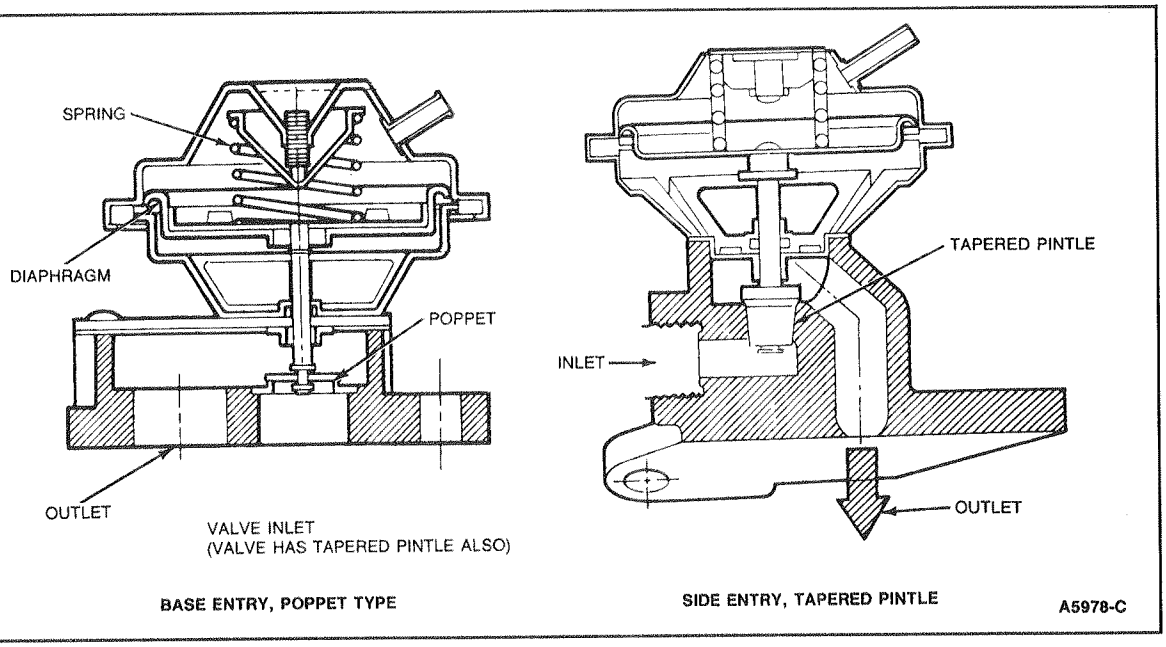


Figure 1 Ported EGR Valve (9D475)

DIAGNOSIS

Refer to Section 6, Exhaust Gas Recirculation (EGR) System.

TITLE	BASIC PART NO.	SYMBOL
EGR Valve Position Sensor	**9G428**	

DESCRIPTION

The EVP Sensor provides EEC System with a signal indicating position of the EGR valve.

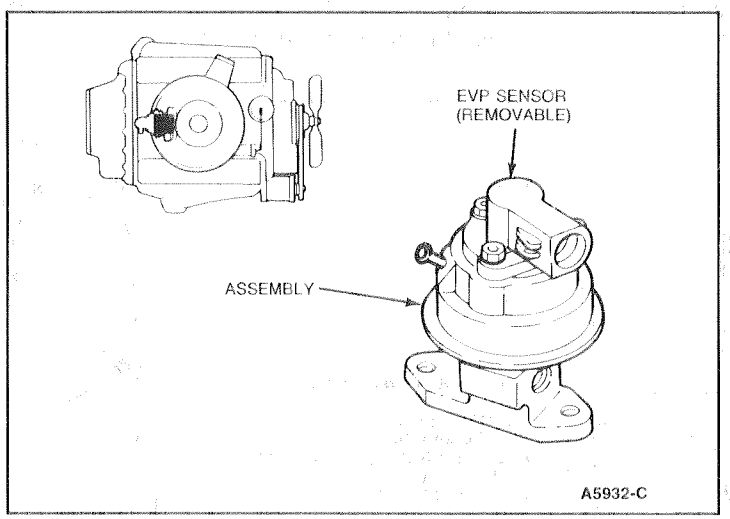
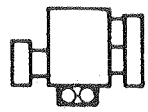


Figure 1 EGR Valve Position (EVP) Sensor

DIAGNOSIS

Refer to the EEC-IV Quick Test, Section 16.

TITLE	BASIC PART NO.	SYMBOL
EGR Venturi Vacuum Amplifier	**9E451**	 VVA

DESCRIPTION

The EGR Venturi Vacuum Amplifier (Figures 1 and 2) uses a relatively weak venturi vacuum to control a manifold vacuum signal to operate the EGR valve. It contains a check valve and a relief valve that opens whenever the venturi vacuum signal is equal to or greater than manifold vacuum.

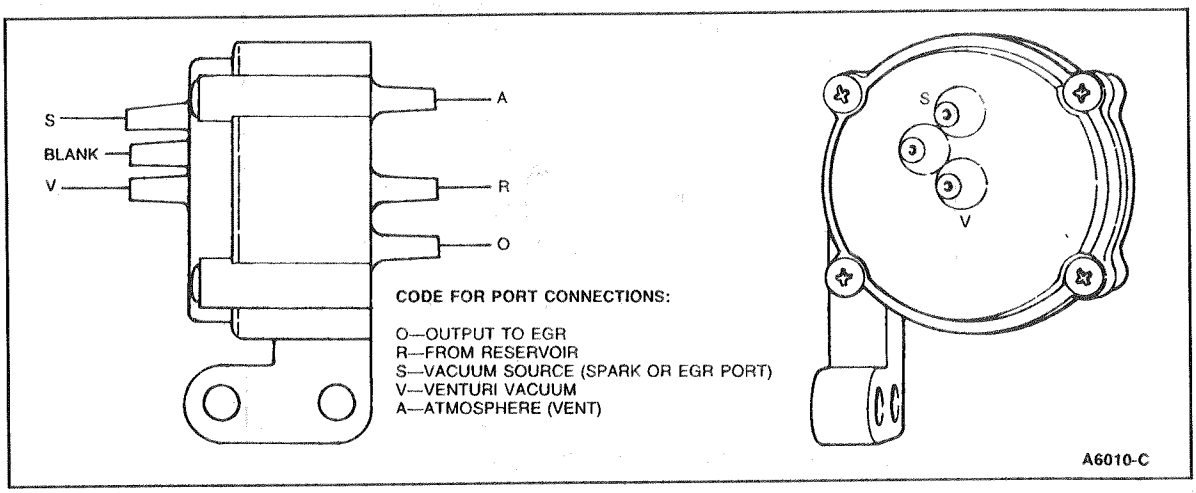


Figure 1 EGR Venturi Vacuum Amplifier

TITLE	BASIC PART NO.	SYMBOL
EGR Venturi Vacuum Amplifier	**9E451**	VVA

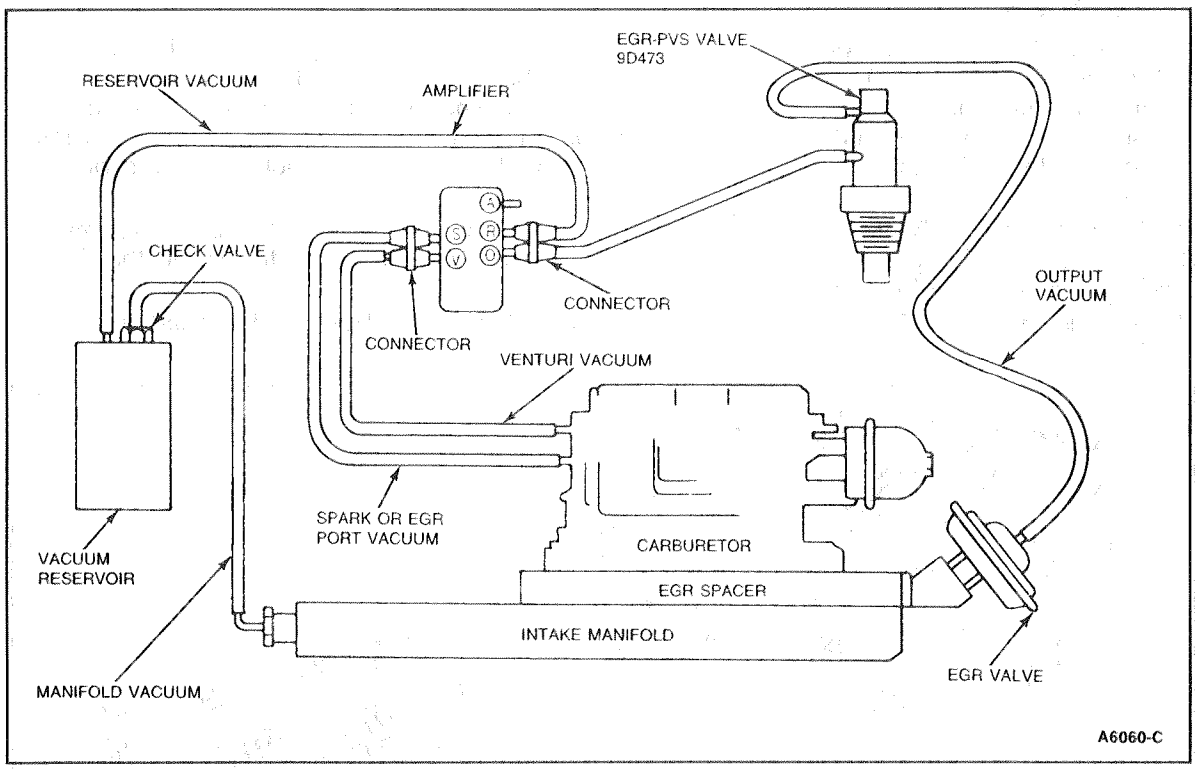


Figure 2 Typical EGR System with Venturi Vacuum Amplifier

Functional Check

Conditions

- Normally warm engine.
- Proper Curb Idle.
- Adequate Manifold Vacuum.

Test

- Connect Rotunda Vacuum Gauge 059-00008 or equivalent to the hose at the EGR Port O. The gauge may read as much as 6.8 kPa (2 in-Hg) at idle.
- Disconnect the venturi hose at the carburetor, and increase engine speed to 2000 rpm. Vacuum should not change.
- Maintain high engine speed, and connect venturi hose. Gauge should register at least 13.5 kPa (4 in-Hg).
- Return to idle. Gauge should return to initial reading.
- If the above conditions are not met, replace the VVA.

TITLE	BASIC PART NO.	SYMBOL
Electronic Control Assembly (EFI/CFI/FBC)	**12A650**	

DESCRIPTION

The center of the EEC-IV system is a microprocessor called the Electronic Control Assembly (ECA). The ECA (Figure 1) receives data from a number of sensors and other electronic components (switches, relays, etc.). The ECA contains a specific calibration for optimizing emissions, fuel economy, and driveability. Based on information received and programmed into its memory, the ECA generates output signals to control various relays, solenoids, and other actuators.

The ECA in the EEC-IV system is a microprocessor like the one in the other EEC systems. One significant difference is that this ECA has the calibration module located inside the ECA assembly, unlike the EEC-III system.

The ECA is found in different locations, depending on the model. Refer to the chart for locations.

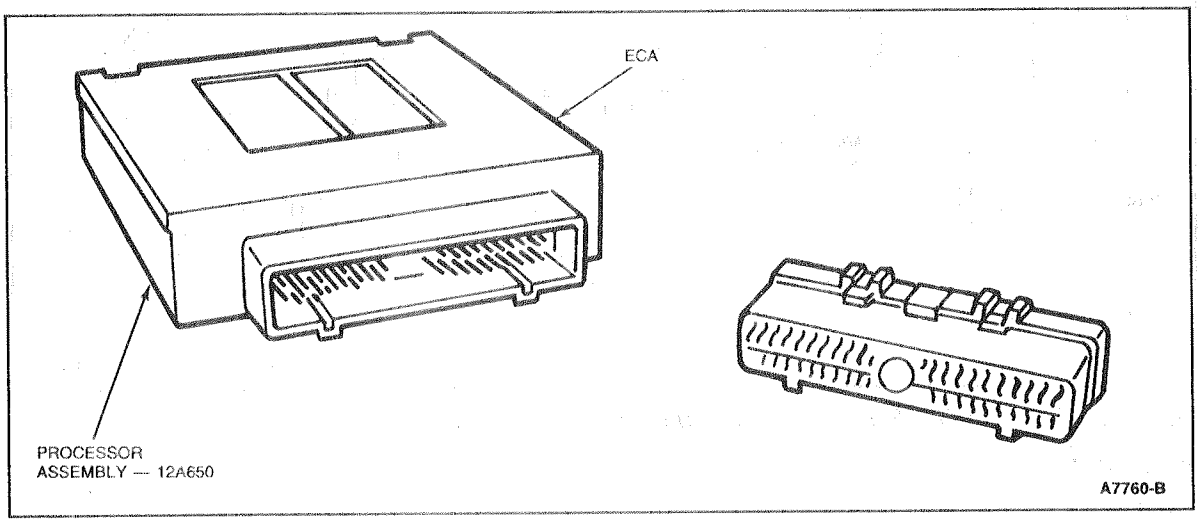


Figure 1 Electronic Control Assembly (ECA)

Vehicle	Location
Mark VII/Continental, Thunderbird/Cougar, Mustang, XR4Ti, Ranger/Bronco II	RH dash panel behind kick panel
Tempo/Topaz, Escort	Under instrument panel left of steering column
Taurus/Sable	Ahead of glove compartment
Lincoln Town Car, Ford Crown Victoria/Mercury Grand Marquis, Aerostar	LH side dash panel in passenger compartment
F-Series/Bronco	LH dash panel behind kick panel
Econoline	RH dash panel under heater blower motor

DIAGNOSIS

Refer to the EEC-IV Quick Test, Section 16.

TITLE	BASIC PART NO.	SYMBOL
Electronic Vacuum Regulator	**9J459**	

DESCRIPTION

The Electronic Vacuum Regulator (EVR) is an electromagnetic device which controls vacuum output to the EGR valve. The EVR replaces the EGR Solenoid Vacuum Vent Valve Assembly (9D474). An electric current in the coil induces a magnetic field in the armature. The magnetic field pulls the disk closed, closing the vent and increasing the vacuum level. The vacuum source is either manifold or vacuum. As the duty cycle is increased, an increased vacuum signal goes to the EGR valve.

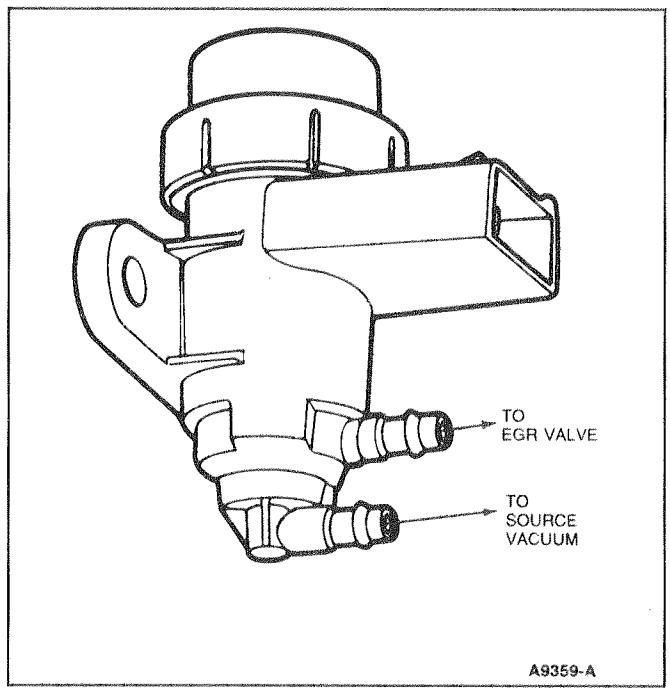


Figure 1 Electronic Vacuum Regulator

DIAGNOSIS

Refer to the EEC-IV Quick Test, Section 16.

TITLE	BASIC PART NO.	SYMBOL
Engine Coolant Temperature Sensor	**12A648**	

DESCRIPTION

The Engine Coolant Temperature (ECT) Sensor (Figure 1) detects the temperature of engine coolant and supplies the information to Electronic Control Assembly (ECA).

The ECT sensor is threaded into the heater outlet fitting or cooling passage on the engine. For engine control applications, the ECT signal is used to modify ignition timing, EGR flow, and air to fuel ratio as a function of engine coolant temperature. On electronic instrument cluster applications, the ECT output is used to control a coolant temperature indicator.

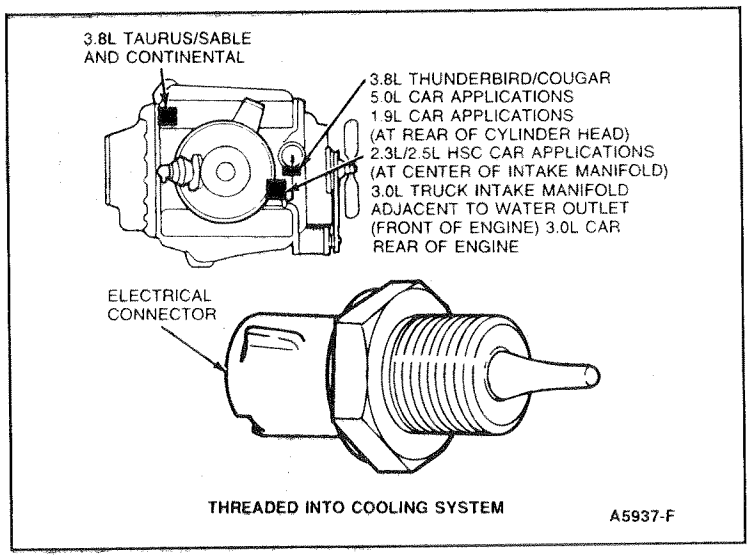


Figure 1 Engine Coolant Temperature (ECT) Sensor

DIAGNOSIS

Refer to the EEC-IV Quick Test, Section 16.

TITLE	BASIC PART NO.	SYMBOL
Exhaust Heat Control Valve	**9A427**	

DESCRIPTION

The purpose of the exhaust heat control valve (Figure 1) is to divert hot gases from the exhaust manifold to the intake manifold riser pad. Heat is transferred from the exhaust gas to the riser pad, which in turn heats the incoming fuel/air charge. There are two types currently available; the bimetal spring type and the vacuum actuated type.

Bimetal Type

Refer to Section 5 for a complete description.

Vacuum Operated

The vacuum operated heat valve functions as follows:

- When the engine is started, the valve is closed by intake manifold vacuum acting on the vacuum motor.
- The valve will stay closed until one of two conditions occurs:
  1. When the engine coolant temperature reaches a predetermined value, the vacuum supply to the heat valve is shut off by a temperature sensing vacuum switch and the heat valve opens.
  2. When the engine speed/load condition causes a drop in intake manifold vacuum below a specific value, the heat valve opens.

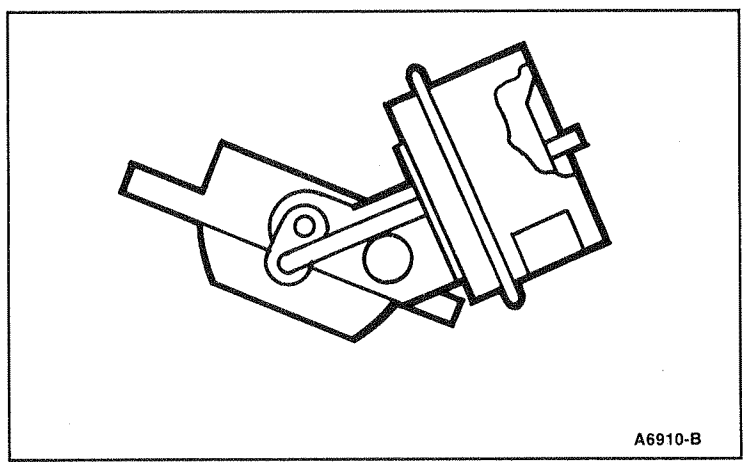


Figure 1 Exhaust Heat Control Valve

Functional Check

Apply 33.77-67.54 kPa (10-15 in-Hg) vacuum to the vacuum motor using a hand vacuum pump, Rotunda 021-00014 or equivalent, and trap for 60 seconds. The valve must close and not leak more than 6.75 kPa (2 in-Hg) and open when the vacuum is released. If it does not operate in this manner, replace the valve.

TITLE	BASIC PART NO.	SYMBOL
Feedback Carburetor Actuator Motor	**9C908**	

DESCRIPTION

The Actuator (Figure 1) is part of the Carburetor Feedback Control System, used on 7200 model carburetors. The actuator is threaded into the carburetor body, and its actuator shaft moves a fuel metering pintle valve to produce a richer or leaner air/fuel mixture at the carburetor. In response to an electronic signal coming from the Exhaust Gas Oxygen (EGO) sensor and conditioned by the EEC (or MCU) System, the actuator shaft moves in and out.

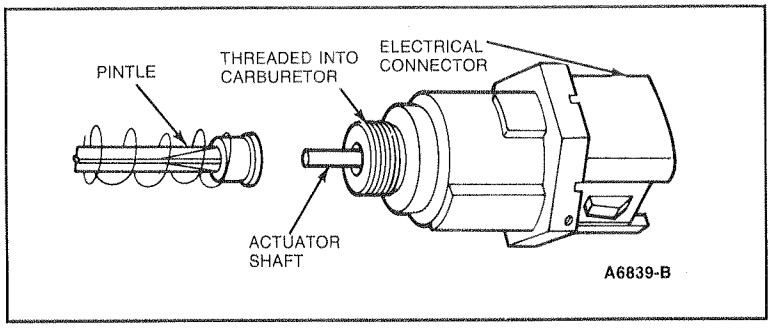
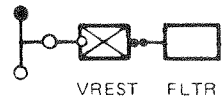


Figure 1 Feedback Carburetor Actuator Motor

DIAGNOSIS

1. Remove the FBCA motor from carburetor. Connect wiring harness to FBCA motor; turn ignition switch to Run to extend shaft. Turn ignition switch to Off. If FBCA shaft does not extend, replace FBCA motor and retest.
2. Push FBCA motor shaft back in by hand. If shaft will not push in, replace FBCA motor and retest.
3. Remove and clean pintle valve, spring and carburetor passage with choke cleaner and a small brush.
4. Reinstall pintle, spring a FBCA motor. Tighten FBCA motor to 8-10 lb-ft.
5. Retest according to appropriate quick test.
6. Check/reset curb idle, if necessary.

NOTE: FBCA motor is partly diagnosed as a part of the 5.8L MCU electronic system. Refer to the 5.8L FBC Police and Canadian Trailer Tow MCU Diagnosis Manual.

TITLE	BASIC PART NO.	SYMBOL
Filter Assembly — Vacuum Vent	**9F474**	

DESCRIPTION

The Vacuum Vent Filter (Figure 1) is used to filter air being drawn into the vacuum system when a vacuum bleed is required. It is a nylon tee with a restrictor and an open cell foam on one leg.

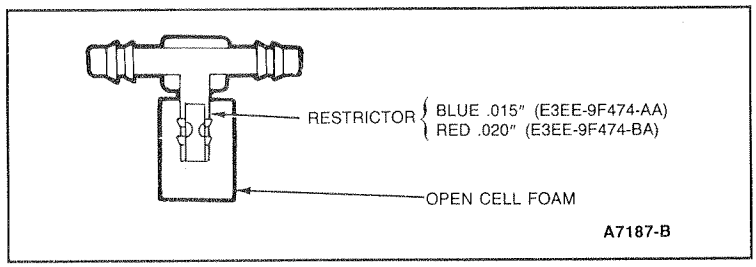


Figure 1 Vacuum Vent Filter Assembly

DIAGNOSIS

If the filter appears to be dirty, wash it in an appropriate solvent.

TITLE	BASIC PART NO.	SYMBOL
Fuel Injector	**9F593**	

DESCRIPTION

The Fuel Injector (Figure 1) is a solenoid operated valve that meters fuel flow to the engine. The injector is opened and closed a constant number of times per crank revolution. The amount of fuel is controlled by the length of time it is held open.

The injector is normally closed and is operated by a signal from the Electronic Engine Control (EEC) module.

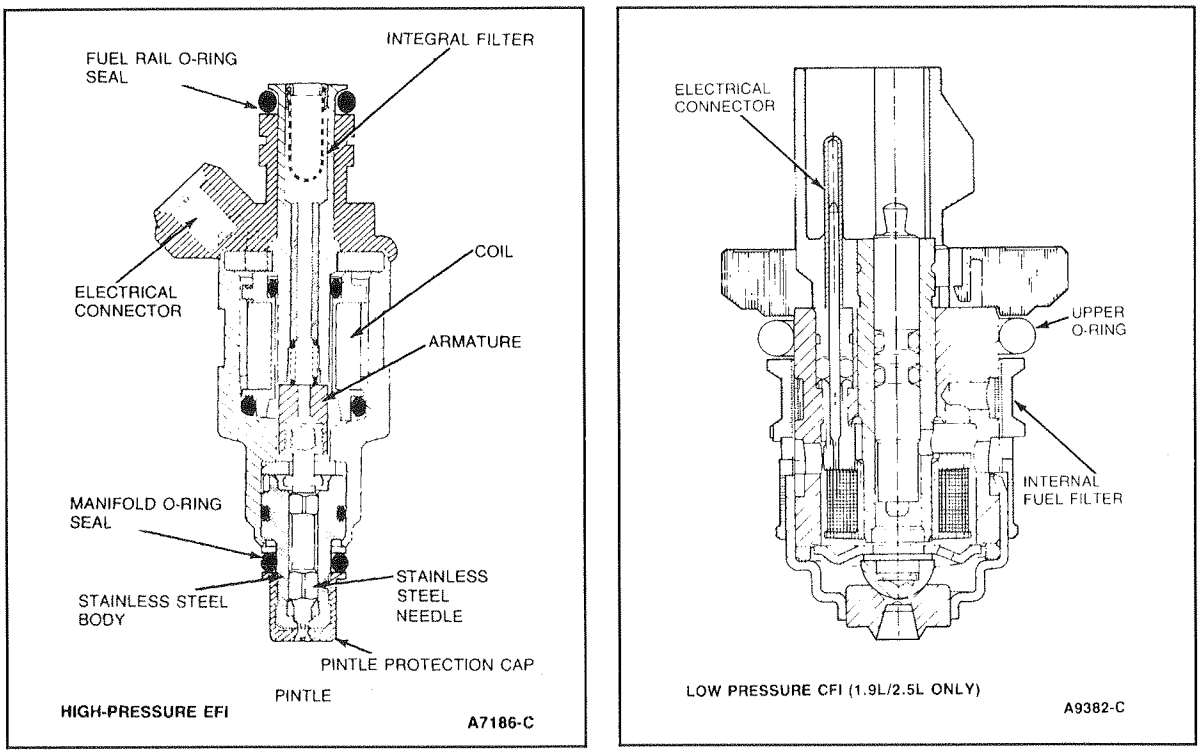


Figure 1 Fuel Injectors

DIAGNOSIS

NOTE: Low-pressure injectors have low coil resistance. High-pressure injectors can have either high or low coil resistance. Function can be adversely affected by using the wrong injectors.

NOTE: Do not apply battery voltage directly to the injector electrical connector terminals. The solenoid may be damaged internally in a matter of seconds.

For EFI injectors, refer to Section 4, Fuel Injector Testing/Cleaning.

Refer to the EEC-IV Quick Test, Section 16.

TITLE	BASIC PART NO.	SYMBOL
Fuel Pressure Regulator — EFI	**9C968**	

DESCRIPTION

The EFI Fuel Pressure Regulator (Figure 1), is attached to the fuel supply manifold assembly upstream of the fuel injectors. It regulates fuel pressure supplied to the injectors.

- The regulator is a diaphragm-operated relief valve in which one side of the diaphragm is exposed to fuel pressure and the other side is subjected to intake manifold pressure for multi-point fuel injection (EFI) and atmospheric pressure for single point injection (CFI).
- The nominal fuel pressure is controlled by a spring preload applied to the diaphragm. By exposing the top side of the diaphragm to manifold pressure, a constant pressure drop is maintained across the injectors, for all modes of operation, of a multi-point fuel injection system (EFI).
- Fuel in excess of that used by the engine is bypassed through the regulator and back to the fuel tank.

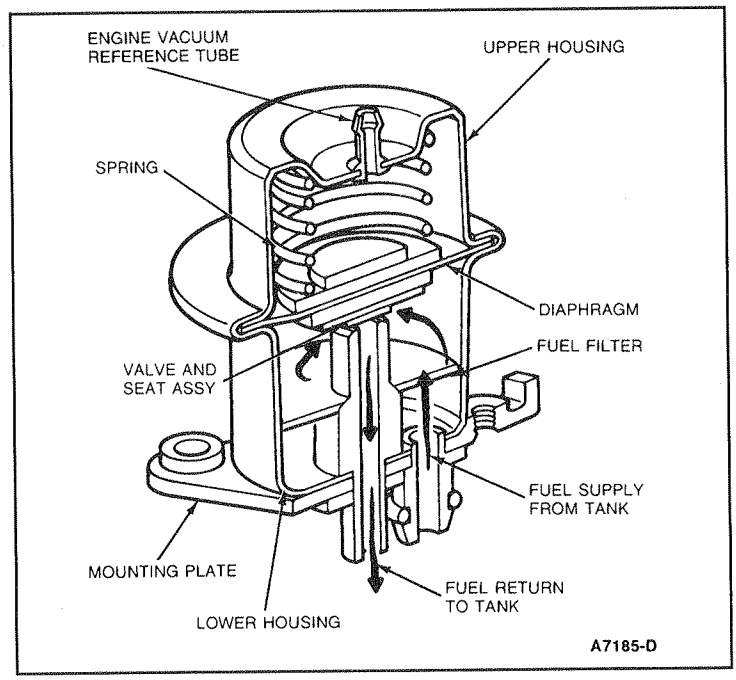


Figure 1 Fuel Pressure Regulator (EFI)

DIAGNOSIS

Refer to Section 11, Fuel Delivery Systems.

TITLE	BASIC PART NO.	SYMBOL
Fuel-Vapor Separator	**9C369**	 SA-FA

DESCRIPTION

The Fuel-Vapor Separator (Figure 1) is used in vacuum systems to prevent fuel migration to a vacuum operated device.

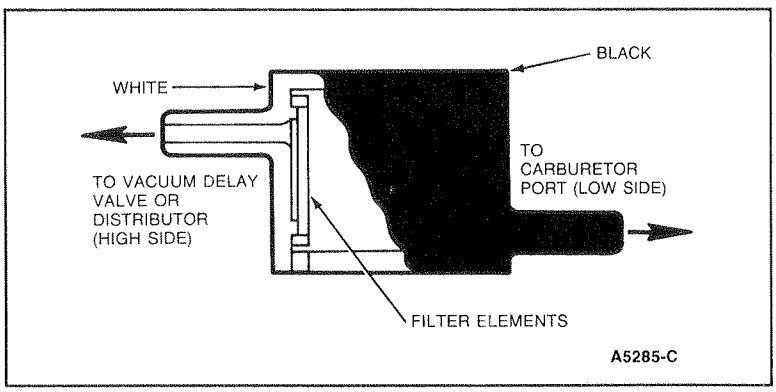


Figure 1 Fuel-Vapor Separator

DIAGNOSIS

NOTE: Separator requires positive orientation to ensure that any fuel collected will drain back to the carburetor.

If separator becomes cracked or clogged, replace the separator.

TITLE	BASIC PART NO.	SYMBOL
Heated Exhaust Gas Oxygen Sensor	**9F472**	

DESCRIPTION

The Heated Exhaust Gas Oxygen Sensor (HEGO) (Figure 1) supplies the ECA with a signal which indicates a rich or lean condition during engine operation.

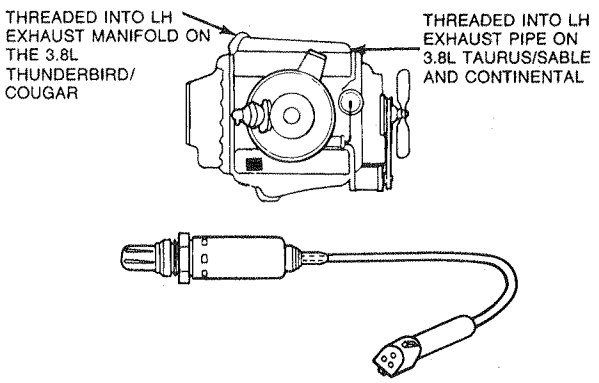


Figure 1 Heated Exhaust Gas Oxygen Sensor (HEGO)

DIAGNOSIS

Refer to the EEC-IV Quick Test, Section 16.

TITLE	BASIC PART NO.	SYMBOL
Heated Exhaust Gas Oxygen Sensor	**9F472**	

DESCRIPTION

The HEGO Sensor supplies ECA with a signal which indicates either a rich or lean condition during engine operation.

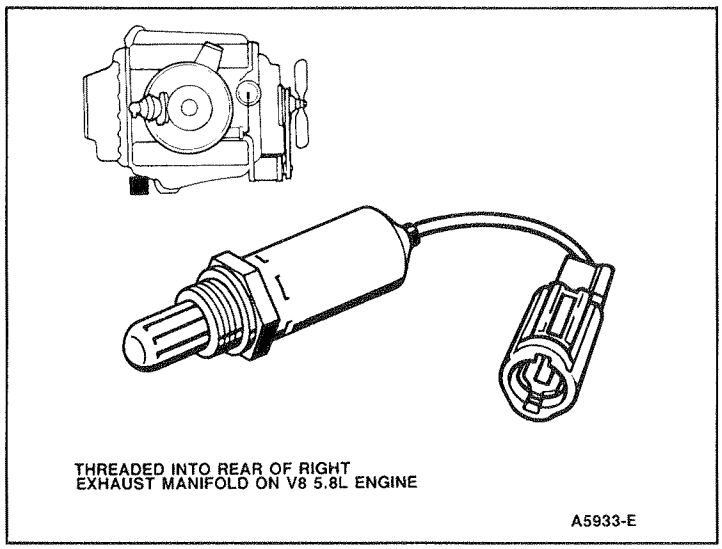


Figure 1 Heated Exhaust Gas Oxygen (EGO) Sensor

DIAGNOSIS

Refer to the EEC-IV Quick Test, Section 16.

TITLE	BASIC PART NO.	SYMBOL
Hot Idle Compensator	**9B532** **9E890**	HOT IDLE  COMP VLV

DESCRIPTION

The hot idle compensator is used to cool the engine during extreme hot engine idle operation.

When open, the compensator bleeds air into the manifold, which leans out the fuel-air ratio at idle. The increased air intake causes an increase in engine idle speed, which results in cooling of the engine.

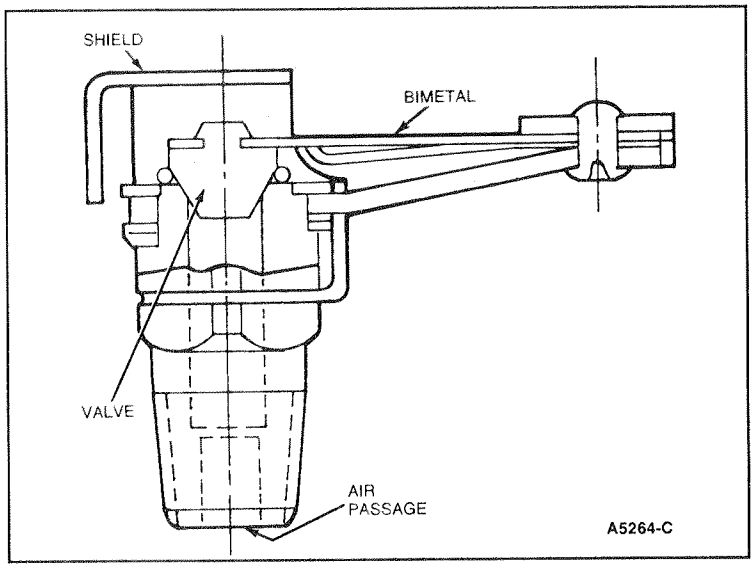


Figure 1 Hot Idle Compensator — Typical 9B532

DIAGNOSIS

The compensator may be internal or external to the carburetor.

Temperature on the bimetal lifts the normally closed valve and opens the air passage.

Valves open at a higher temperature and close at a lower temperature. This opening and closing range is from −12 to −7°C (10-20°F). Nominal closing temperatures vary from 26-60°C (79-140°F).

A compensator with a valve that is not fully closing can cause high idle speed and a high emission CO.

TITLE	BASIC PART NO.	SYMBOL
Ignition Barometric Pressure Switch	**12A243**	

DESCRIPTION

The Ignition Barometric Pressure Switch (Figure 1) is used to control spark timing and/or other electrical devices in response to changes in barometric pressure (i.e., altitude). When controlling spark timing, the ignition module (12A244) is made to vary the spark timing by an amount determined by calibration resistors in the switch assembly. In normal operation, spark timing is increased for vehicle operation above the switching point (increasing altitude) and retarded for vehicle operation below the switching point (decreasing altitude). When controlling other electrical devices, only On/Off control is provided; with On (switch closed) above the switching point and Off (switch open) below the switching point. Some switch assemblies control both spark timing and another device (dual switch assembly) and other switch assemblies control only one or the other (single switch assembly).

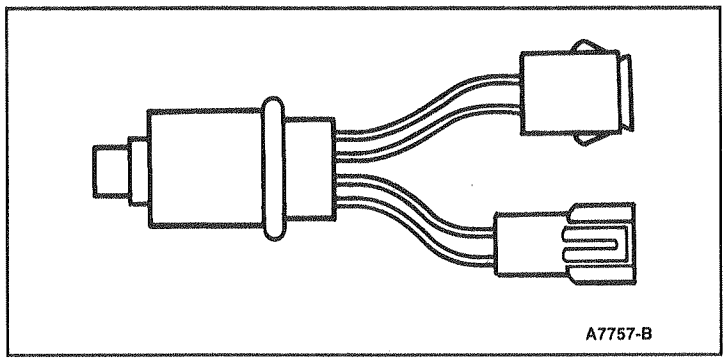


Figure 1 Ignition Barometric Pressure Switch

DIAGNOSIS

- Dual switch assembly shown.
- Attaching brackets vary according to installation requirements.
- Connectors may vary.

Part Number	Resistance (Ohms) Below 3,000 Feet	Resistance (Ohms) Above 4,600 Feet
E2AE-12A243-AA	Greater than 200,000	Less than 1
E43E-12A243-AA	2,820-2,920	1,750-1,850
E4DE-12A243-AB	2,560-2,660	1,960-2,060
E4EE-12A243-AA	Greater than 200,000	Less than 1

Either resistance value is correct if altitude is between 3,000 and 4,600 feet.

TITLE	BASIC PART NO.	SYMBOL
Inertia Switch	**9341**	

DESCRIPTION

The Inertia Switch (Figure 1) is used in conjunction with an electric fuel pump. The purpose of the inertia switch is to shut off the fuel pump in the event of an accident. It consists of a steel ball held in place by a magnet. When a sharp impact occurs, the ball breaks loose from the magnet, rolls up a conical ramp and strikes a target plate which opens the electrical contacts of the switch and thereby shuts off the electric fuel pump. Once the switch is open, it must be manually reset before re-starting the vehicle. The location of the switch is discussed in the Owner Guide.

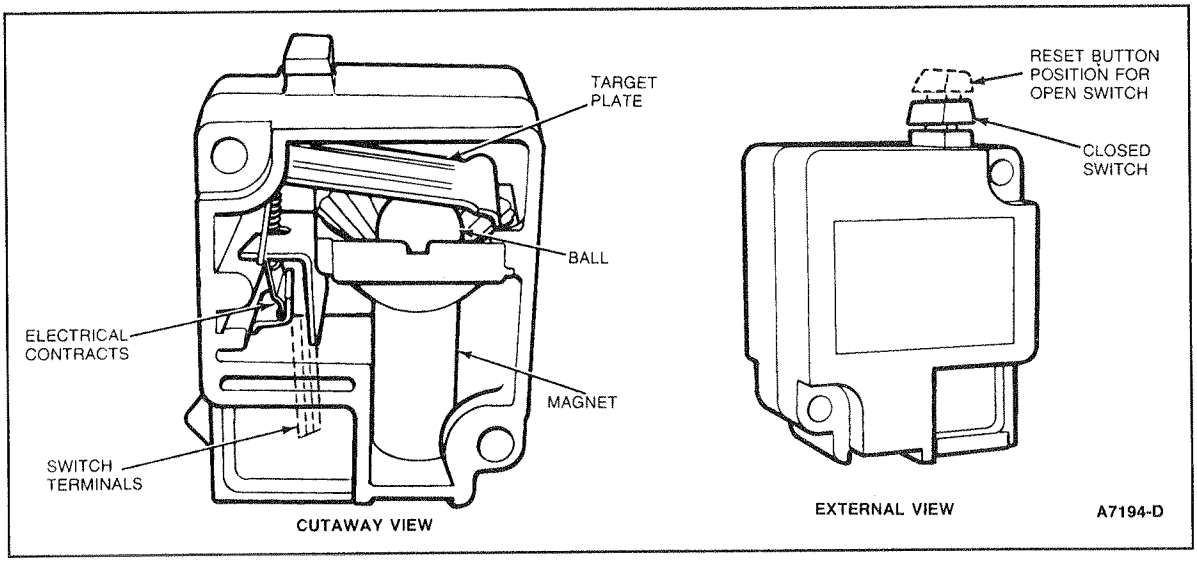


Figure 1 Inertia Switch

DIAGNOSIS

Reset Instructions

1. Turn ignition to Off.
2. Check for leaking fuel in the engine compartment, fuel lines and tank(s).
3. If no fuel leak is apparent, reset the switch by pushing the reset button on the top of the switch.
4. Turn ignition switch to Start for a few seconds, then to Off.
5. Again, check for leaking fuel.

WARNING: If you see or smell gasoline at any time other than during fueling, do not reset the switch.

Functional Check

Push down on the reset button to make sure the switch is closed.

Use DVOM, Rotunda 007-00001 or equivalent, with LOS button On and measure voltage across both terminals of the inertia switch. If DVOM reading is greater than 0.3V, replace the inertia switch.

NOTE: In the closed position, the button can be depressed an additional 1/16-inch against a spring. This is a normal condition and does not adversely effect the switch operation.

TITLE	BASIC PART NO.	SYMBOL
Integral Relay Control Module	**12B577**	

DESCRIPTION

The Integral Relay Control Module (IRCM) interfaces with the EEC-IV to provide control of the cooling fan, A/C clutch and the fuel pump. The module also incorporates the EEC power relay to provide power to the EEC-IV system.

The module is designed specifically for underhood application. The limits of operation are as follows:

Operating Temperature ..... -30°C to 100°C
Storage Temperature ..... -40°C to 125°C
Operating Voltage ..... 7 to 17 volts

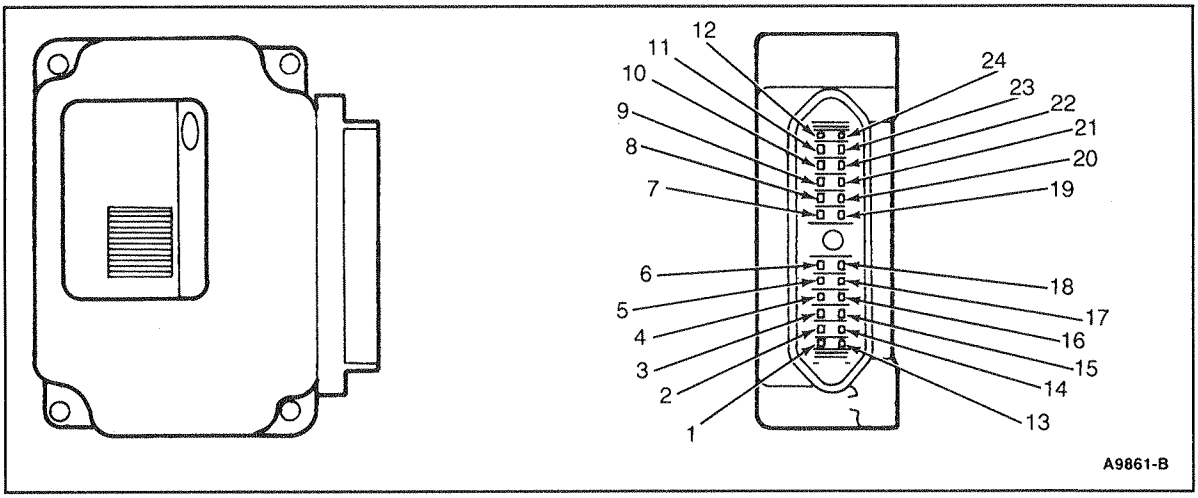


Figure 1 Integral Relay Control Module

DIAGNOSIS

Refer to EEC-IV Quick Test, Section 16.

Powertrain Model Application	Controller -12B577-	Bracket and Control Assembly — 12B581-	Vehicle Location
2.3L TC M/T and A/T Thunderbird	E7DF-CB	E7SF-AA	RH Fender Apron at Shock Tower
2.5L HSC M/T Taurus	E7DF-BB	E7DF-BA	Radiator Support
2.5L HSC A/T Taurus/Sable	E7DF-AB	E7DF-AA	Radiator Support
3.0L A/T Taurus/Sable	E7DF-CB	E7DF-CA	Radiator Support
3.8L A/T Taurus/Sable	E8DE-AA	E8DE-AA	Radiator Support

TITLE	BASIC PART NO.	SYMBOL
Knock Sensor	**12A699**	

DESCRIPTION

The Knock Sensor (Figure 1) is a piezoelectric accelerometer with the sensor designed to resonate at approximately the same frequency as the engine knock frequency. The sensor uses the resonant frequency to mechanically amplify the vibrations. This method allows relatively large signals to be achieved without electrical amplification and with small package size.

The sensor has a thin circular piezoelectric ceramic disk which is bonded to a metal diaphragm. Electrical connections are made through a two pin integral connector.

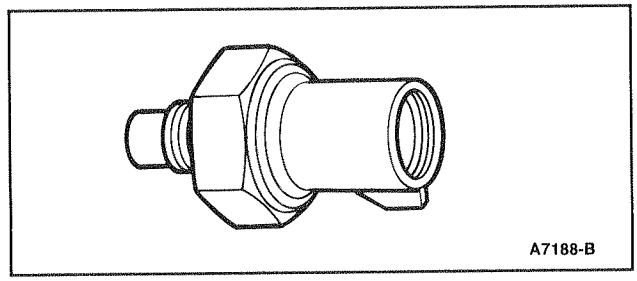


Figure 1 Knock Sensor

DIAGNOSIS

Refer to the EEC-IV Quick Test, Section 16.

Part Number	Resonant Frequency	Color	Planned Usage	Thread
E3AF-AA	5.4K	Black	5.8L Ford/Mercury	1/2-13 UNC
E3ZSF-AA	5.7K	Gray	2.3L (Turbo) Thunderbird	M12 × 1.5mm-6g
E6TF-AA	6.45K	Black	2.9L Ranger/Bronco II	M10 × 1.5mm-6g
E5TF-AA	6.0K	Black	3.0L Taurus/Sable, Aerostar	M10 × 1.5mm-6g
E7TF-AA	9.5K	White	4.9L Econoline/Bronco	M12 × 1.5mm-6g

TITLE	BASIC PART NO.	SYMBOL
Manifold Pressure Warning Indicator Switch Assembly	**10D883**	

DESCRIPTION

Turbocharged Vehicles Only

The switch assembly has a pressure switch to trigger the over-boost lamp (red) and a buzzer on the instrument panel (Figure 1).

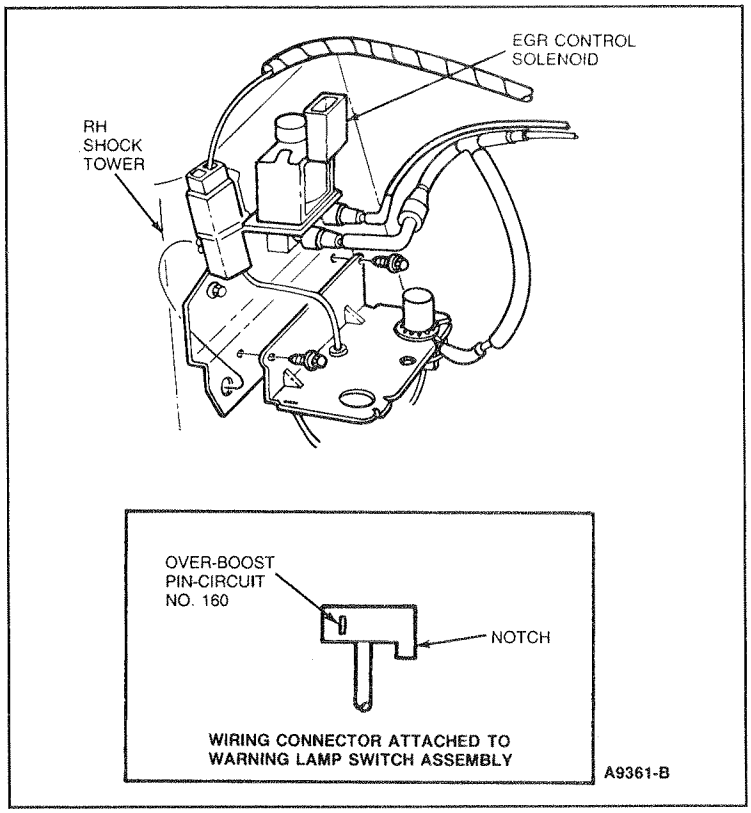


Figure 1 Manifold Pressure Warning Indicator Switch Assembly

DIAGNOSIS

Disconnect the wiring harness connector from the warning lamp switch assembly. Using a test lamp or equivalent device, determine if the pin is connected to ground when pressure is applied as follows:

1. Over-boost lamp switch check: The other pin on the connector, joining to Circuit 160, should be connected to ground when a pressure of 17.5 psi or greater is applied.

TITLE	BASIC PART NO.	SYMBOL
Manifold Absolute Pressure	**9F479**	

DESCRIPTION

The MAP sensor measures manifold vacuum using a frequency. This gives the ECA information on engine load.

It is used as a barometric sensor for altitude compensation, updating the ECA during Key On Engine Off and every wide-open throttle.

The ECA uses MAP for:

- Spark advance
- EGR flow
- Air/fuel ratio

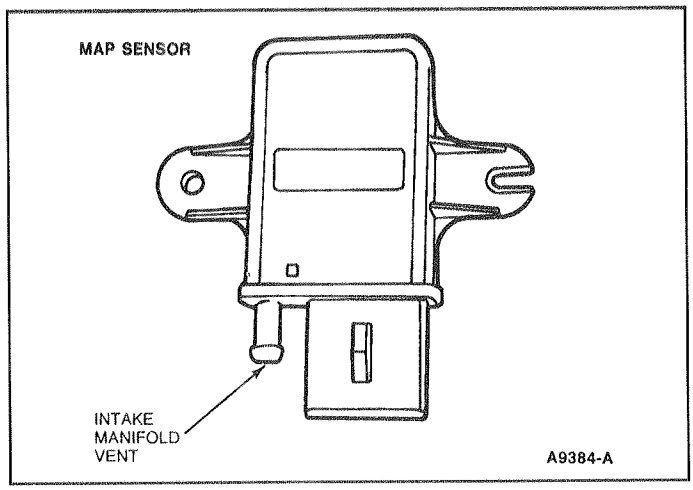


Figure 1 Manifold Absolute Pressure Sensor

DIAGNOSIS

Refer to the EEC-IV Quick Test, Section 16.

TITLE	BASIC PART NO.	SYMBOL
Mass Airflow Sensor	**12B579**	

DESCRIPTION

The sensor directly measures the mass of the air flowing into the engine. The sensor output is used by the ECA to calculate the injector pulse width for stoichiometry. The sensing element is a thin platinum wire wound on a ceramic bobbin and coated with glass. This "hot wire" is maintained at 200°C above ambient temperature as measured by a constant "cold wire".

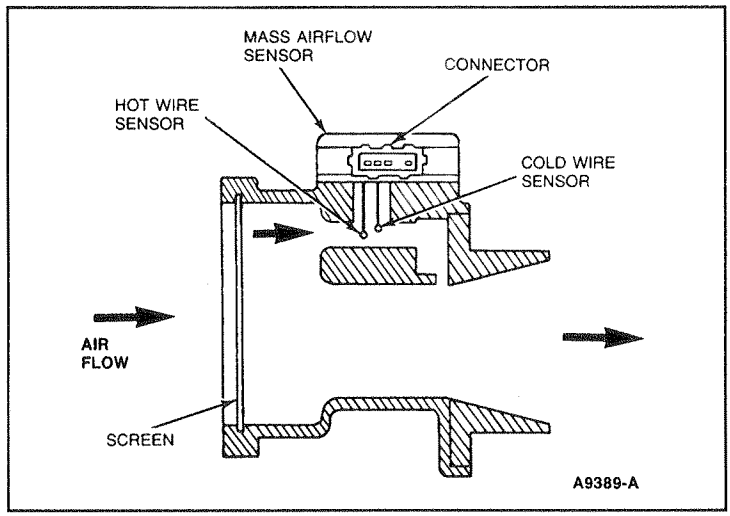


Figure 1 Mass Airflow Sensor Assembly

DIAGNOSIS

Refer to the EEC-IV Quick Test, Section 16.

TITLE	BASIC PART NO.	SYMBOL
Pressure Feedback Electronic EGR Valve	**9D460**	

DESCRIPTION

The Pressure Feedback Electronic (PFE) EGR valve is a conventional ported EGR valve with a back pressure sensing tube attached to it. The valve is used in conjunction with a pressure transducer (9J460) which supplies pressure feedback to the EEC-IV processor. The EGR flow rate is proportional to the pressure drop across a remotely mounted sharp edged orifice.

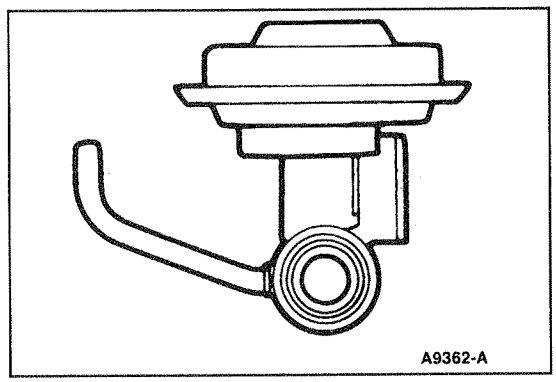


Figure 1 Pressure Feedback Electronic EGR Valve

DIAGNOSIS

Refer to Section 6, Exhaust Gas Recirculation (EGR) System.

TITLE	BASIC PART NO.	SYMBOL
Pressure Feedback Electronic EGR Transducer	**9J460**	

DESCRIPTION

The Pressure Feedback Electronic (PFE) EGR transducer converts a varying exhaust pressure signal into a proportional analog voltage which is digitized by the EEC-IV processor. The EEC-IV processor uses the signal received from the PFE transducer to complete the optimum EGR flow.

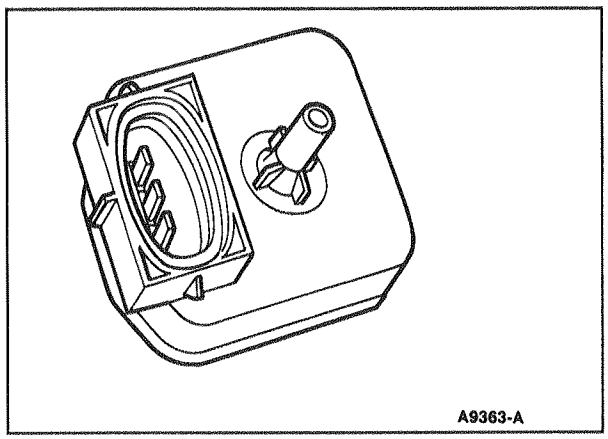


Figure 1 Pressure Feedback Electronic EGR Transducer

DIAGNOSIS

Refer to the EEC-IV Quick Test, Section 16.

TITLE	BASIC PART NO.	SYMBOL
Relay Assembly EEC (Power) EEC (Power) Time Delay	**12A646**	

DESCRIPTION

There are two types of relays: the power relay and the time delay power relay. The time delay relay has a delay of 5 to 10 seconds and is used with an actuator assembly throttle control. Both relay types consist of a movable contact in the normally open position. All power relays (except time delay) have the same design with a different bracket attachment.

Function

EEC power relays are in parallel with the ignition switch and provide power to the EEC module. Power relays also provide reverse battery protection and increased load handling to improve ignition switch reliability.

Specifications	Time Delay Power Relay	Power Relay
Pull-in Voltage	9V DC max	8.5V DC max
Millivolt Drop	15 mv/amp	10 mv/amp
Coil Current	220 ma @ 14.4V DC	220 ma@12.8V DC
Drop-out Voltage	4.5V DC	1-4V DC

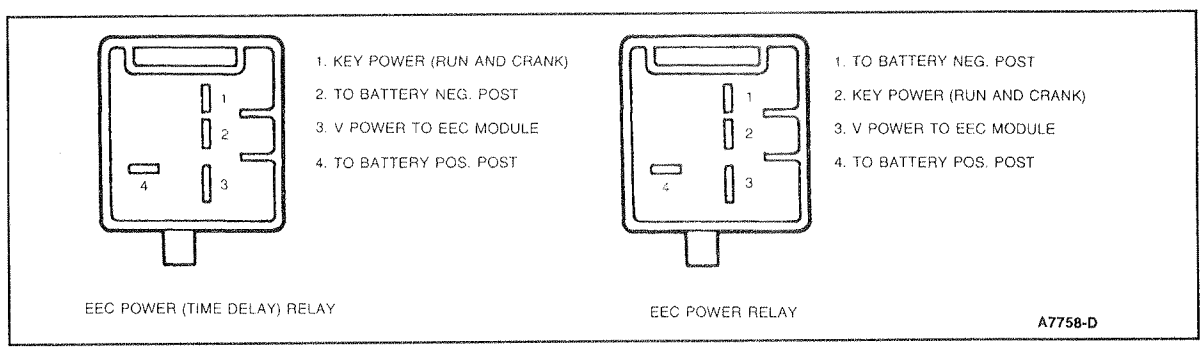
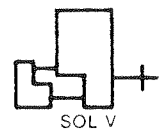


Figure 1 Relay Assembly

TITLE	BASIC PART NO.	SYMBOL
Relay Assembly EEC (Power) EEC (Power) Time Delay	**12A646**	

EEC POWER RELAY LOCATION AND APPLICATIONS

PART NUMBER AND RELAY TYPE (Power or Time Delay)	SYSTEM APPLICATION(S)	LOCATION(S)
• E6EF-12A646-B1A/B2A Power Relay	Escort 1.9L EFI	Passenger compartment under dash on module bracket.
• E3UF-12A646-B1A/B2A Power Relay	Econoline 4.9L/5.0L EFI	— Under dash on module bracket. — Under dash on right cowl.
• E3VF-12A646-B1A/B2A Power Relay	Ranger/Bronco II 2.3L EFI Bronco II/Ranger 2.9L EFI	Engine compartment.
• E35F-12A646-B1A/B2A Power Relay	Thunderbird/Cougar 3.8L EFI Thunderbird/Cougar/Mustang 5.0L SFI Mustang 2.3L OHC EFI	Passenger compartment under dash on right cowl assembly.
• E3AF-12A646-B1A/B2A Power Relay	Ford/Mercury 5.0L SFI Lincoln Town Car 5.0L SFI Continental/Mark VII 5.0L SFI Aerostar 2.3L/3.0L EFI F-Series/Bronco 4.9L/5.0L	Engine compartment doghouse.
• E3AF-12A646-B1A/B2A Power Relay	Heavy Truck 7.5L	Engine compartment doghouse.
• E7EF-12A646-A1A Time Delay	Escort 1.9L CFI	Passenger compartment under dash on right cowl assembly.
• E53F-12A646-A1A Time Delay	Tempo/Topaz 2.3L HSC CFI	Passenger compartment under dash behind glove compartment.

TITLE	BASIC PART NO.	SYMBOL
Solenoid Vacuum Valve Assembly	**9D474**	

DESCRIPTION

Normally Closed

The normally closed solenoid valve assembly (Figure 1) consists of two vacuum ports with an atmospheric vent. The valve assembly can be with or without control bleed. The outlet port of the valve is opened to atmospheric vent and closed to the inlet port when de-energized. When energized, the outlet port is opened to the inlet port and closed to atmospheric vent. The control bleed is provided to prevent contamination entering the solenoid valve assembly from intake manifold. This solenoid valve assembly is used on Throttle Kicker and EGR Shut-off.

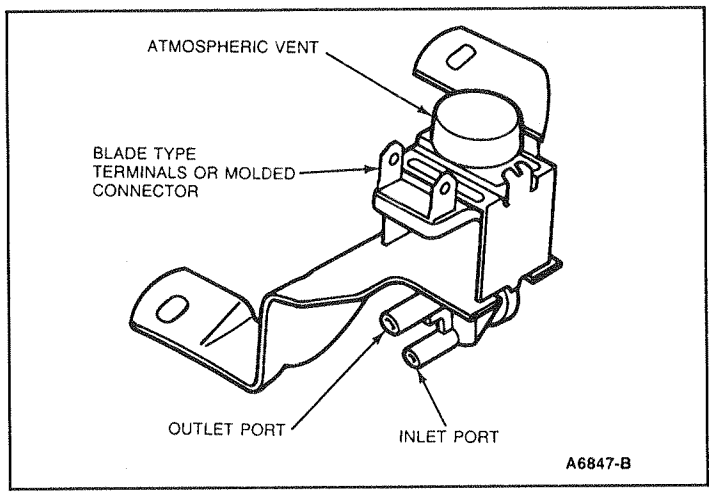


Figure 1 Typical Solenoid Valve Assembly — Normally Closed

DIAGNOSIS

The ports should flow air when the solenoid is energized.

The solenoid resistance when checked at the terminals should be between 51 and 108 ohms. If the solenoid resistance is not within these values, the solenoid should be replaced.

Refer to the EEC-IV Quick Test, Section 16.

NOTE: The valve can be expected to have a very small leakage rate when energized or de-energized. This leakage is not measurable in the field and is not detrimental to valve function.

TITLE	BASIC PART NO.	SYMBOL
Temperature Vacuum Switch	**9A995**	TVS

DESCRIPTION

The bimetal disc in the switch orients itself in one of two positions, depending on its temperature. One position allows free airflow in the vacuum line; the other position blocks airflow by sealing itself against the O-ring.

This device is mounted remotely to or directly on the air cleaner. It responds to the temperature of the inlet air heated by the exhaust manifold.

The switching temperature is below the range of normal, stabilized engine operating temperatures.

The TVS may be used to control the vacuum signal to the Thermactor dump valve, reducing emissions.

The normally open TVS may block the purge vacuum signal to provide satisfactory cold drive ability and reduce cold emissions. Also, the EGR may be held off to provide satisfactory cold driveability.

The normally closed TVS may allow cold spark advance to provide satisfactory driveaway.

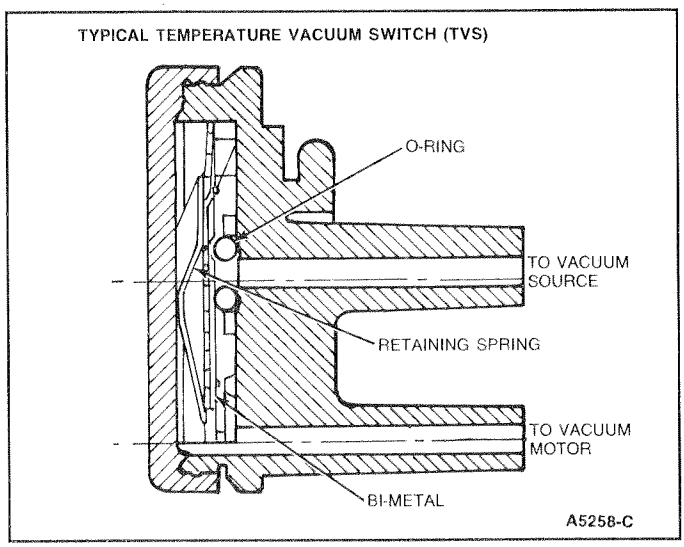
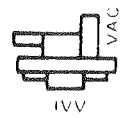


Figure 1 Temperature Vacuum Switch (TVS)

DIAGNOSIS

1. Apply 54 kPa (16 in-Hg) vacuum, using Rotunda Vacuum Tester 021-00014 or equivalent, to motor side and trap.
   a. With the white TVS cooled to 10°C (50°F), the normally open TVS must hold 16.9 kPa (5 in-Hg) for 30 seconds. The white TVS should not hold vacuum above 24.4°C (76°F).
   b. With the brown colored TVS cooled to −9.4°C (15°F), the normally open TVS must hold 16.9 kPa (5 in-Hg) for 30 seconds. The brown TVS should not hold vacuum above −1.1°C (30°F).
   c. The normally closed, red TVS should not hold vacuum at or below 10°C (50°F), however, it must hold 16.9 kPa (in-Hg) vacuum for 30 seconds above 18.3°C (60°F).
   d. With the purple TVC cooler to 4.4°C (40°F), the normally open TVS must hold 16.9 kPa (5 in-Hg) for 30 seconds, the purple TVS should not hold vacuum above 12.8°C (55°F).

TITLE	BASIC PART NO.	SYMBOL
Thermactor Idle Vacuum Valve	**9G328**	

DESCRIPTION

The TIV valve vents the vacuum signal to the atmosphere when the preset manifold vacuum or pressure is exceeded. It is used to divert Thermactor airflow during extended idle conditions to limit exhaust temperature and to cut EGR in a heavy boost mode for turbocharged applications.

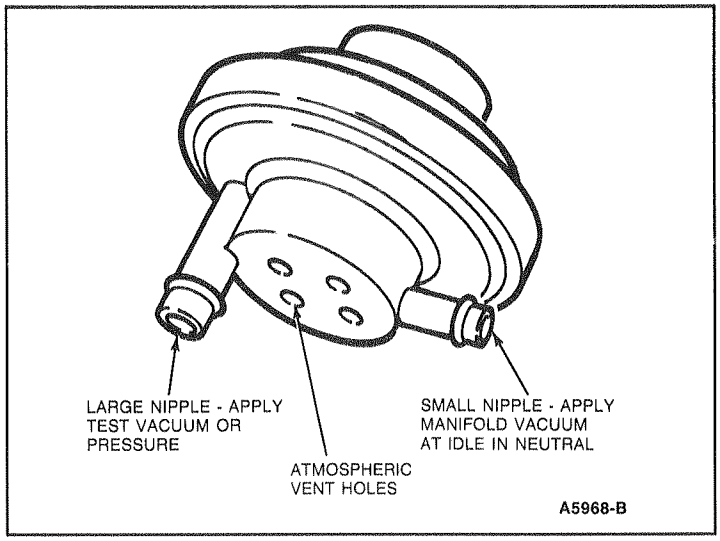
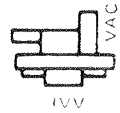


Figure 1 Thermactor Idle Vacuum Valve

Functional Checks

Conditions

1. Disconnect both nipples of the Thermactor Idle Vacuum (TIV) valve.
2. Install a vacuum hose from the manifold vacuum source to the small nipple of the TIV valve.

TITLE	BASIC PART NO.	SYMBOL
Thermactor Idle Vacuum Valve	**9G328**	

Checks

TIV valves with code words ASH or RED on decal:

1. With the engine at idle, in NEUTRAL, place fingers over the TIV valve atmospheric vent holes (Figure 1). If no vacuum is sensed, the TIV is damaged and must be replaced.
2. While the engine is still idling in NEUTRAL, apply vacuum, shown below, to the TIV valve large nipple from a test source. If vacuum is still sensed when placing fingers over vent holes, the TIV is damaged and must be replaced.
3. Disconnect the TIV small nipple from manifold vacuum and the TIV large nipple from the test vacuum. Reconnect the TIV valve to original hoses or connectors.

TIV valves with code word TUR on decal:

TIV Decal Code Mode	Vacuum kPa (in. Hg.)
Ash	5.1 (1.5) — 10 (3.0)
Red	11.8 (3.5) — 15.2 (4.5)

TIV Decal Code Mode	Pressure: kPa (in. Hg.)
TUR	5.1 (1.5) — 8.5 (2.5)

1. With the engine at idle, vacuum source to small nipple, transmission in NEUTRAL, place fingers over TIV valve atmospheric vent holes (Figure 1). If vacuum is sensed, the TIV is damaged and must be replaced.
2. While the engine is still idling in NEUTRAL, apply pressure, shown above, to the TIV valve's large nipple from a test source. If vacuum is not sensed when placing a finger over the vent holes, the TIV is damaged and must be replaced.
3. Disconnect the TIV valve's small nipple from manifold vacuum and the large nipple from the test pressure. Reconnect the TIV to its original hoses or connectors.

TITLE	BASIC PART NO.	SYMBOL
Throttle Position Sensor (Rotary)	**9B989**	

DESCRIPTION

The Throttle Position (TP) Sensor (Rotary) (Figure 1) supplies the ECA with a signal proportional to opening angle of throttle body throttle plates.

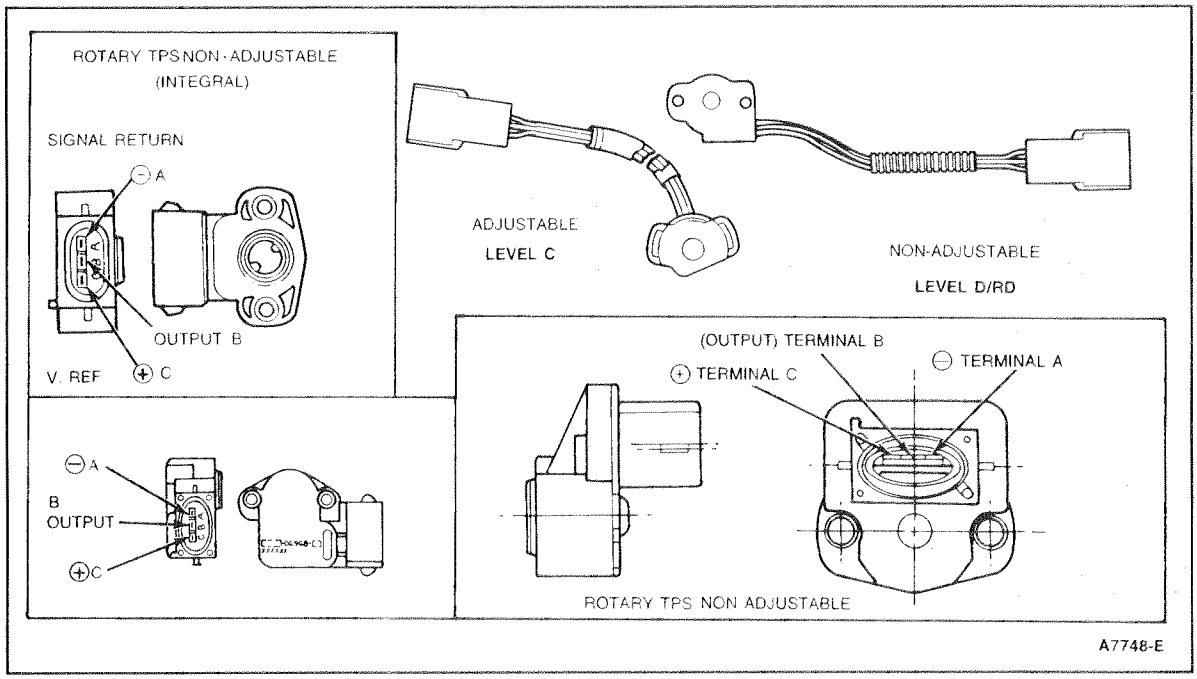


Figure 1 Throttle Position (TP) Sensor (Rotary)

ADJUSTMENT

This procedure can be used to check and/or adjust level C sensors only:

1. Install an EEC-IV Breakout Box, Rotunda T83L-50-EEC-IV, or equivalent.
2. Attach a DVOM, Rotunda 014-00407 or equivalent, on 20 volt scale. Connect the positive lead (+) to test Pin 47 and the negative lead (–) to test Pin 46.
3. Turn ignition key to RUN position, (do not start engine).
4. Adjust TP Sensor (rotate) until the DVOM reads 1.0 volt (0.9-1.1).
5. Tighten TP Sensor screws to 1.2-1.8 N.m (11-16 lb-in).
6. While watching the DVOM, move the throttle to wide-open and back to idle position. For proper operation, the DVOM should move from 1.0 to at least 4.0 and back to 1.0 volt.
7. Perform EEC-IV Quick Test, Section 16.

DIAGNOSIS

Refer to the EEC-IV Quick Test, Section 16.

TITLE	BASIC PART NO.	SYMBOL
Throttle Solenoid Positioner With Dashpot		

DESCRIPTION

The Throttle Solenoid Positioner (TSP) with or without Dashpot combines the features of the throttle solenoid positioner (TSP) and the dashpot by attaching a dashpot to the end of the TSP plunger.

The TSP acts as a variable carburetor throttle stop by extending its plunger when power is supplied to the solenoid and by retracting the plunger when power is turned off. When the TSP is energized, it will hold the throttle at an idle position, but, as soon as it is de-energized at the ignition switch, the TSP will function like an anti-dieseling device by automatically retracting its plunger into an anti-dieseling position, fully closing the throttle.

A TSP may also be used to increase the throttle opening when the air conditioning is turned on.

The dashpot is used on certain applications when a gradual, controlled throttle closing is desired, either for emission purposes or vehicle driveability.

Two kinds of TSPs with a dashpot are used: the fixed plunger rod length type and the adjustable plunger rod length type.

The TSP with a dashpot is not strong enough to open the throttle but will hold it open after it has been mechanically opened.

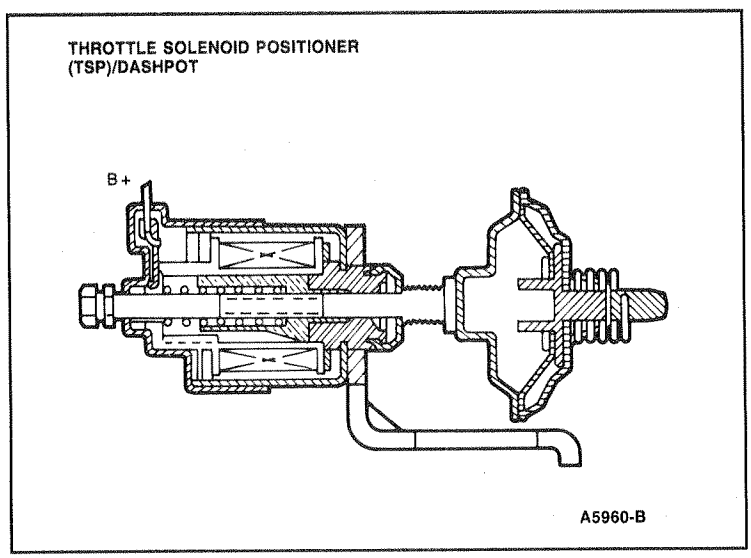


Figure 1 Throttle Solenoid Positioner with Dashpot

DIAGNOSIS

With the throttle open and the solenoid electrically energized, the plunger should extend.

Push the dashpot plunger into the collapsed position, and if no resistance is felt or if excessive force is required to bottom the plunger, the dashpot is damaged.

If either component fails, replace the assembly.

TITLE	BASIC PART NO.	SYMBOL
Vacuum Bowl Vent Valve & Vacuum/Thermostatic Bowl Vent Valve	**9G332**	V-CBV

DESCRIPTION

The Vacuum Bowl Vent Valve and the Vacuum/Thermostatic Bowl Vent Valve are vacuum and vacuum/temperature actuated On/Off valves.

The Vacuum Bowl Vent Valve (E3TE-9G332-AA) (Figure 2) and the Vacuum Thermostatic Bowl Vent Valve (E3EE-9G332-AA) (Figure 1) are similar in appearance. The valves are used in the Evaporative Emission System to control vapor flow from the carburetor bowl to the carbon canister. With either valve, the flow path from the bowl to the canister is closed by manifold vacuum when the engine is running. The thermostatic valve also closes the bowl-to-canister flow path when the temperature of the valve is 90°F or less (even without manifold vacuum). When the temperature of the valve is 120°F or more, the valve is open (unless closed by manifold vacuum).

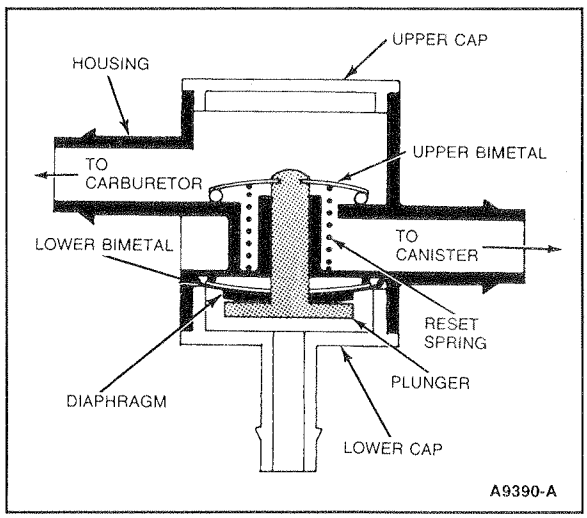


Figure 1 Vacuum/Thermostatic Bowl Vent Valve

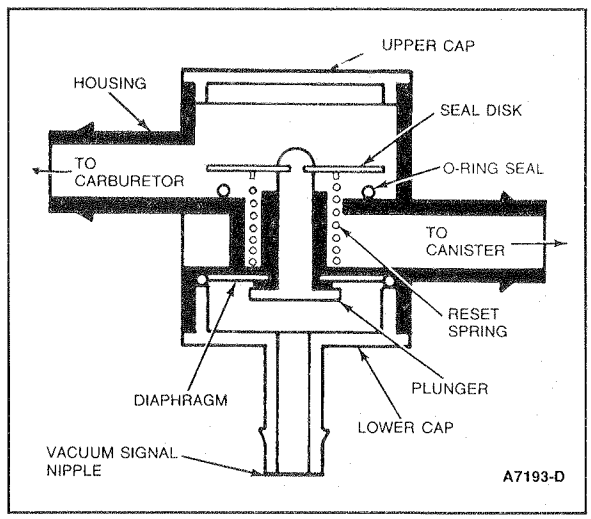


Figure 2 Vacuum Bowl Vent Valve

TESTING

The Vacuum Vent Valve (E3TE-9G332-AA), (Figure 2) should flow air between carburetor port and canister port when no vacuum is applied to vacuum signal nipple and should not flow air with a vacuum applied at the vacuum signal nipple.

The above test also applies to the Vacuum/Thermostatic Vent Valve (E3EE-9G332-AA), (Figure 1) when it is at a temperature of 120°F or more. At a temperature of 90°F or less the valve should not flow air, or be very restrictive to airflow.

The Evaporative Emission System is outlined in Section 7.

TITLE	BASIC PART NO.	SYMBOL
Vacuum Check Valve	**12A197**	 VCK-V

DESCRIPTION

A vacuum check valve (Figure 1) blocks airflow in one direction. It allows free airflow in the other direction. The check side of this valve will hold the highest vacuum seen on the vacuum side. If not, replace it.

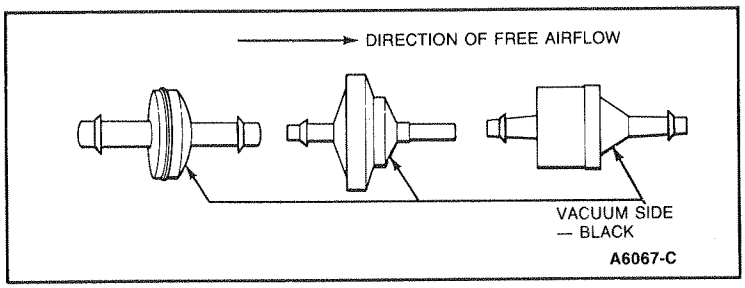
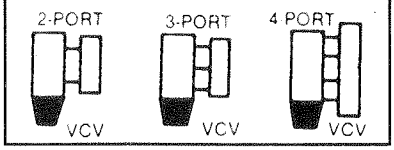


Figure 1 Vacuum Check Valve

DIAGNOSIS

Apply 54 kPa (16 in-Hg) vacuum to "check" side of valve and trap. If vacuum remains above 50.6 kPa (15 in-Hg) for 10 seconds, the valve is acceptable.

TITLE	BASIC PART NO.	SYMBOL
Vacuum Control Valve	**8A564 9D473 9F454 12A091**	

DESCRIPTION

The VCV controls vacuum to other emission devices during engine warm-up: the 2-port types simply open when engine coolant reaches their pre-determined calibration temperatures; the 4-port types open likewise, since they are nothing more than two 2-port types in one housing; and the 3-port types switch the vacuum source to the center port from the top or the bottom ports. Electrical switches can be either open or closed until the VCV is fully cycled. Most VCV's respond to a sensing bulb immersed in engine coolant by utilizing a wax pellet principle. The only exception is the 9F454 which operates on a bimetal principle. Vacuum is usually sourced as illustrated in Figure 1.

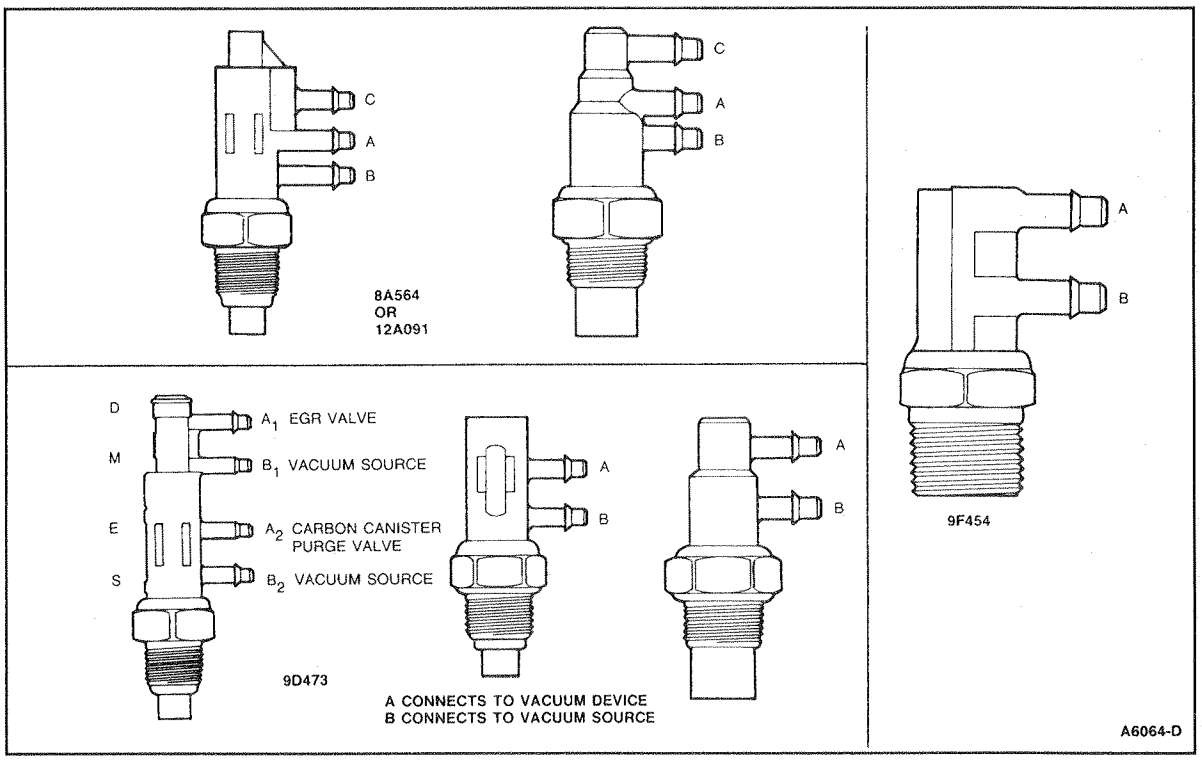
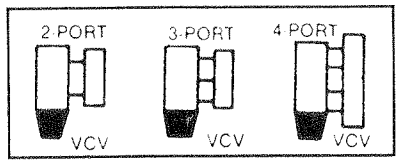


Figure 1 2-, 3-, and 4-Port Vacuum Valves

TITLE	BASIC PART NO.	SYMBOL
Vacuum Control Valve	**8A564 9D473 9F454 12A091**	

Functional Vacuum Check

1. With a cold engine, passage A to B should be closed and passage A to C should be open.
2. With engine at normal operating temperature, the VCV should be open between A and B and closed between A and C.

   For the 4-port valve, check A_1 to B_1 and A_2 to B_2 separately.
3. If these conditions are not met, replace the VCV Valve.

Electrical Vacuum Switch

The electrical vacuum switch (Figure 2) could be either opened or closed at room temperature. It will be reversed (opened to closed or closed to opened) with the engine at full operating temperature.

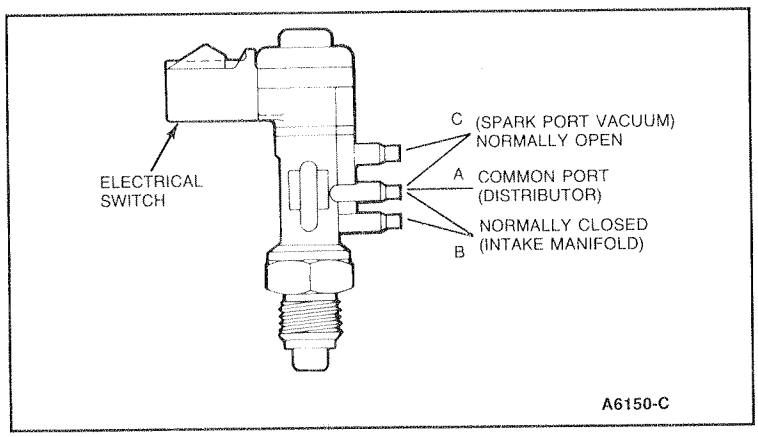


Figure 2 Electrical Vacuum Switch — 8A564

Functional Electrical Check

1. While the engine is cold, measure the continuity across the switch. Compare with specifications.
2. Warm the engine to normal operating temperature.
3. Measure the continuity across the switch. Compare with specifications.
4. The vacuum function is checked as previously described.

TITLE	BASIC PART NO.	SYMBOL
Vacuum Delay Valves	**9E897 12A189 12A208 12A245**	VDV, DV-TW, VRDV

DESCRIPTION

Vacuum Delay Valves (VDV) are used for a gradual application or release of vacuum to a vacuum-operated device to help control emissions. The four valves currently in use are illustrated below with an arrow to show the direction in which airflow is restricted (Figure 1). Note that, although each valve is named for a given system application, it may be used elsewhere.

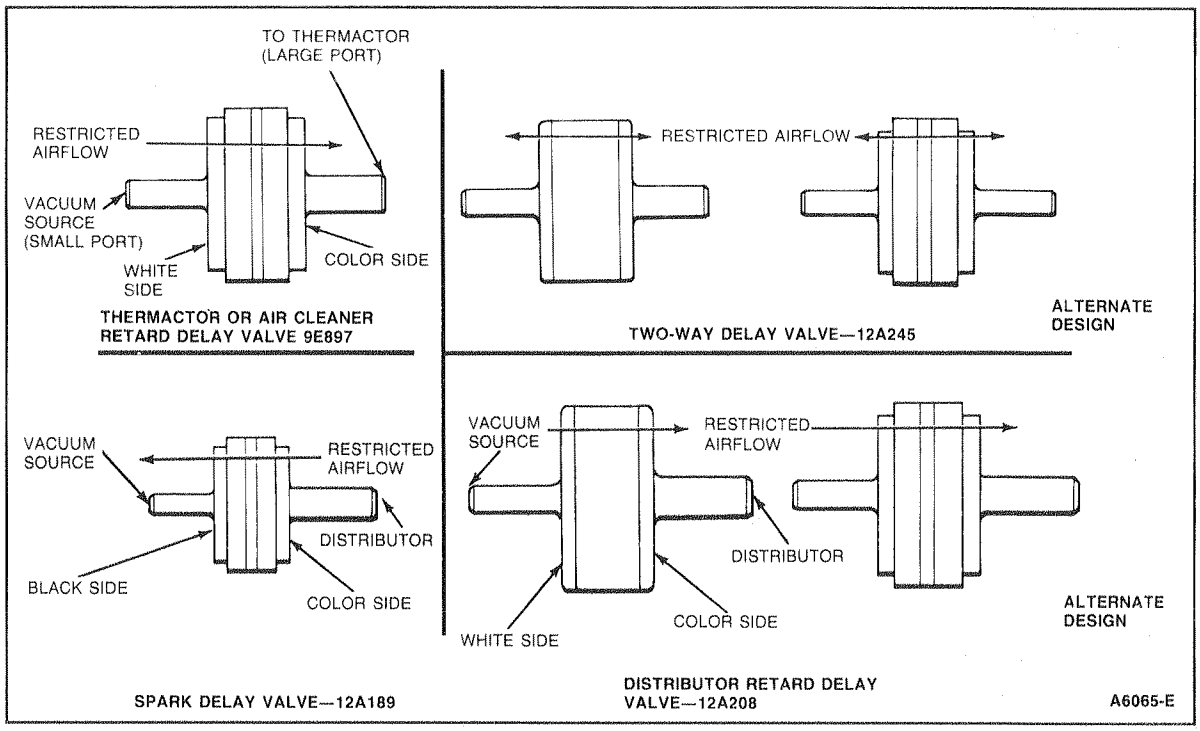
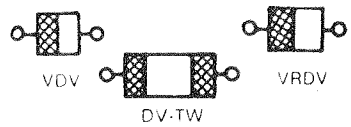


Figure 1 Four Types Of Vacuum Delay Valves

TITLE	BASIC PART NO.	SYMBOL
Vacuum Delay Valves	9E897 12A189 12A208 12A245	

Functional Check

Connect a hand vacuum pump, Rotunda 021-00014 or equivalent, to the VDV as shown in Figure 2 and pump.

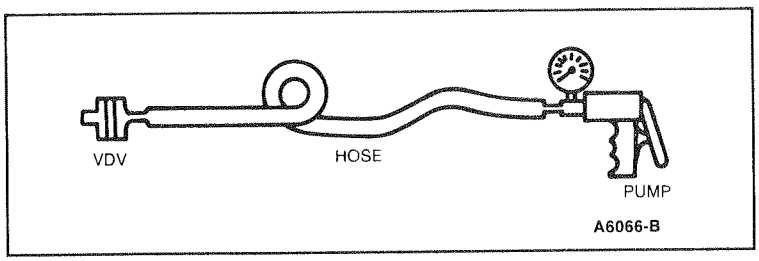


Figure 2 Hand Vacuum Pump Connection

1. Valves with one side black or white and the other side colored are good if vacuum can be built-up in one direction, but not the other direction and if that built-up vacuum can be seen to slowly decrease.
2. Valves with both sides the same color are good if vacuum can be built-up in both directions before visibly decreasing.

   NOTE: Exercise care in order to prevent oil or dirt from getting into the valve.

TITLE	BASIC PART NO.	SYMBOL
Vacuum Harness Assembly — Nylon	**9E498**	

DESCRIPTION

Engine vacuum systems currently use a preassembled harness which features colored nylon vacuum lines. The color is a visual aid both in production and in service. The emission decal on the engine provides a colored schematic of the vacuum hook-up which corresponds with the preassembled harness.

Vacuum hose harnesses consist of nylon hoses; 0.150-inch outer diameter and 0.090-inch inner diameter bonded to nylon or rubber connectors. Occasionally, a rubber hose may be connected to the harness. The nylon connectors have rubber inserts to provide a seal between the nylon connector and the component connection (nipple).

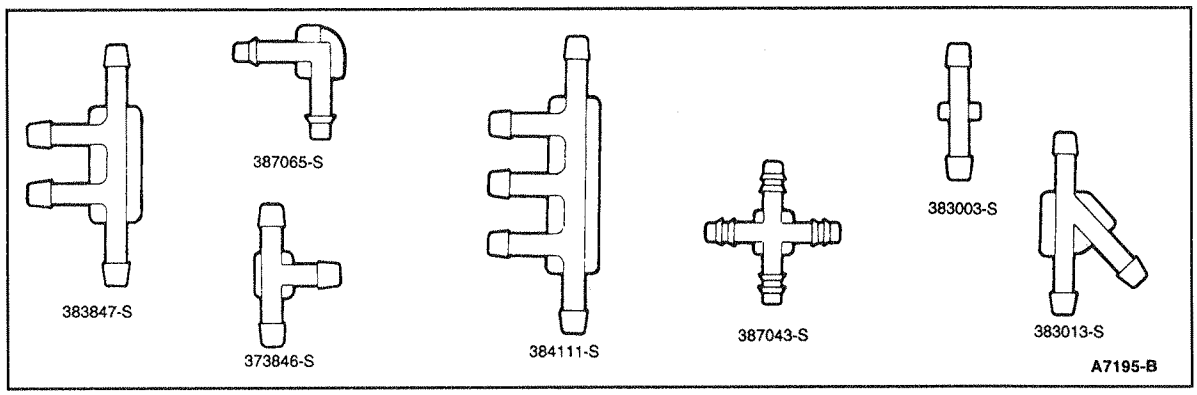


Figure 1 Vacuum Connectors Used With 5/32 Inch Rubber Hose for Service

TITLE	BASIC PART NO.	SYMBOL
Vacuum Harness Assembly — Nylon	**9E498**	

SERVICE PROCEDURES

If a nylon tube is broken or kinked, and the damaged area is 1/2-inch or more from a connector; the tube can be repaired by cutting out the damaged section, but not more than 1/2-inch, and then installing a rubber union (Figure 2).

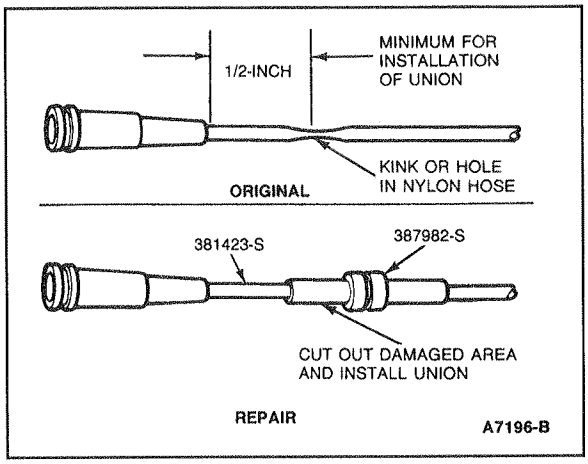


Figure 2 Broken or Kinked Hose Repair

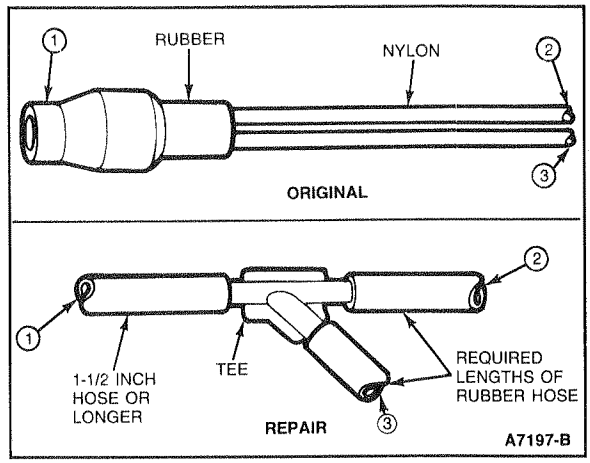
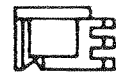


Figure 3 Hose Replacement

If the remaining hose is too short or the damaged portion is more than 1/2-inch: replace the entire hose and connectors with rubber vacuum hoses and a tee. Use existing service stock of 5/32-inch hose, 7/32-inch hose and tees.

NOTE: Circled numbers shown in Figure 3, identify same connection points on both original and repaired harnesses.

CAUTION: Care must be exercised to keep all vacuum parts away from hot components such as EGR tubes and exhaust manifolds. In addition, holes may be worn into the nylon hoses if allowed to rub against rough surfaces.

TITLE	BASIC PART NO.	SYMBOL
Vacuum Regulator (2-Port)	**9F490**	 VRV

DESCRIPTION

The two port vacuum regulator (Figure 1) provides a constant output signal when the input signal is greater than a preset level. At a lower input vacuum, the output equals the input.

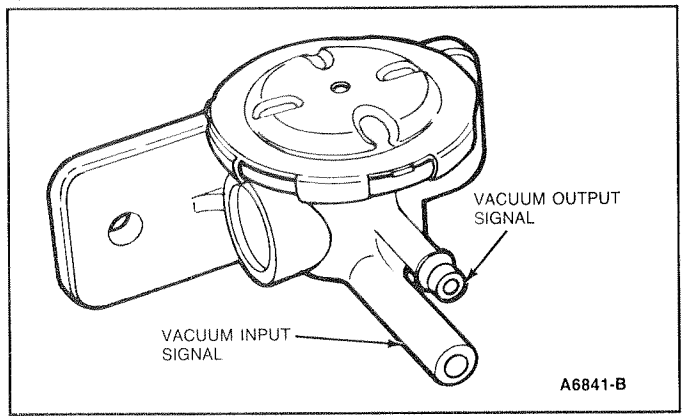


Figure 1 2-Port Vacuum Regulator

Functional Check

1. Remove vacuum line from the barbed output port (Figure 1), and install Rotunda Vacuum Gauge 059-00008 or equivalent.
2. With manifold vacuum at the input port and the engine at idle, the vacuum gauge should read between 35.7-45.9 kPa (10.5-13.5 in-Hg).
3. If the vacuum gauge reading is not within the specification, replace the regulator as required.

NOTE: The two port vacuum regulator is commonly attached to a 90-cubic inch vacuum reservoir.

TITLE	BASIC PART NO.	SYMBOL
Vacuum Regulator (3 & 4 Port)	**9F490**	VRV

DESCRIPTION

The three-port and four-port regulators are used to control the vacuum advance to the distributor. During engine idle conditions, the manifold vacuum signal is reduced to a constant output signal. Off idle, the output signal equals the spark port.

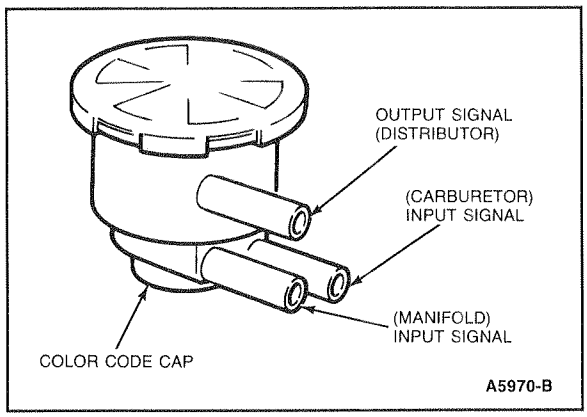


Figure 1 3-Port Vacuum Regulator

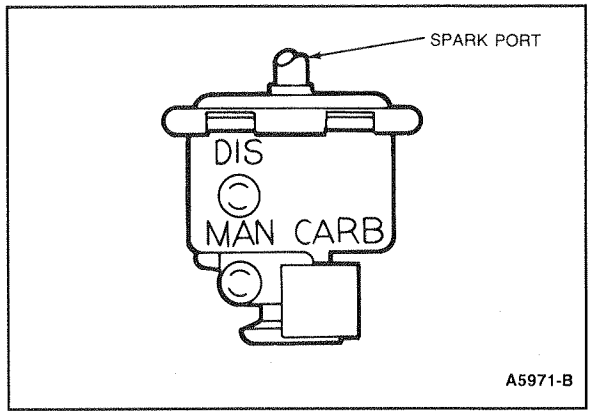


Figure 2 4-Port Vacuum Regulator

Functional Check

1. Remove the vacuum line from distributor port, and install a vacuum gauge (Figures 1 and 2).
2. With the engine at idle, the vacuum gauge reading should be within 3.4 kPa (1 in-Hg) vacuum of calibration point.
3. With the color codes different, vacuum readings are identified:
   - Black is 20 kPa (6 in-Hg)
   - Green is 23.6 kPa (7 in-Hg)
   - Red is 27 kPa (8 in-Hg)

   If the color code does not meet the respective vacuum reading, replace as required.

   NOTE: This procedure is applicable to both types of vacuum regulators.

TITLE	BASIC PART NO.	SYMBOL
Vacuum Reservoir	**9E453**	VRESER VRESER

DESCRIPTION

The Vacuum Reservoir (Figure 1) stores vacuum and provides "muscle" vacuum. It prevents rapid fluctuations or sudden drops in a vacuum signal such as those seen during an acceleration period.

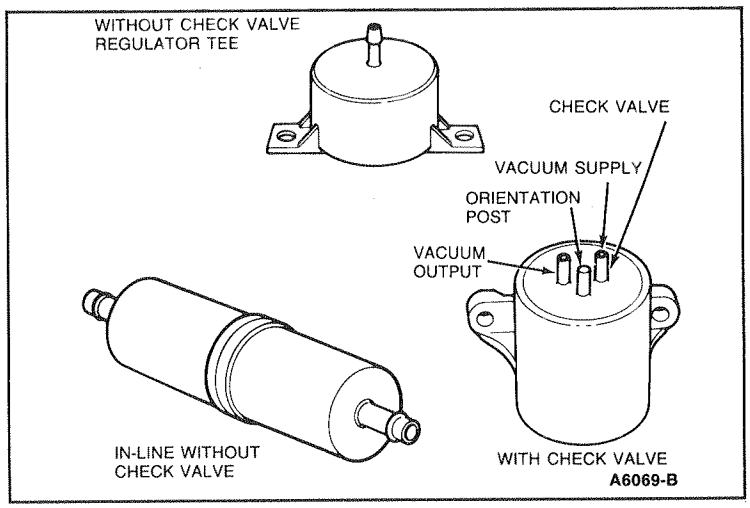


Figure 1 Vacuum Reservoirs

DIAGNOSIS

When charged initially with 15 to 20 in-Hg vacuum, vacuum loss shall not exceed .5 in-Hg in 60 seconds. If it does, replace the reservoir.

TITLE	BASIC PART NO.	SYMBOL
Vacuum Restrictor	**12A225**	V REST / T REST

DESCRIPTION

This orifice-type flow restrictor (Figure 1) is used in several emission calibrations to control the flow rate and/or timing inactions to the following emission component systems:

a. EGR valve timing — opening and closing.
b. Part throttle spark advance
c. Purge system
d. Thermactor system

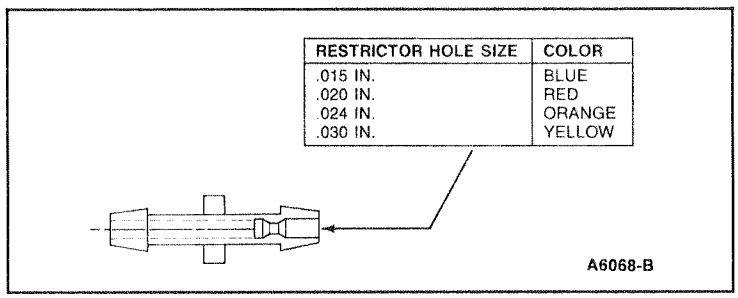


Figure 1 Distributor Vacuum Restrictor

DIAGNOSIS

The flow rate through the restrictor is the same in both directions. If it is blocked, replace it.

TITLE	BASIC PART NO.	SYMBOL
Vacuum Vent Valve	**12A226**	VACVV-D

DESCRIPTION

The Vacuum Vent Valve (Figure 1) controls the induction of fresh air into a vacuum system to prevent chemical decay of the vacuum diaphragm that can occur on contact with fuel. The 12A226 (natural cap) is a combined vent and delay valve. Although this valve was intended for use in a specific system with an air cleaner mounting, it may be used in any other vacuum system and mounted elsewhere. The valve should be mounted, as shown, with ports pointing downward for fuel drainback. The vacuum source must be connected to the cap port and the system or device operated, to the body port, as shown.

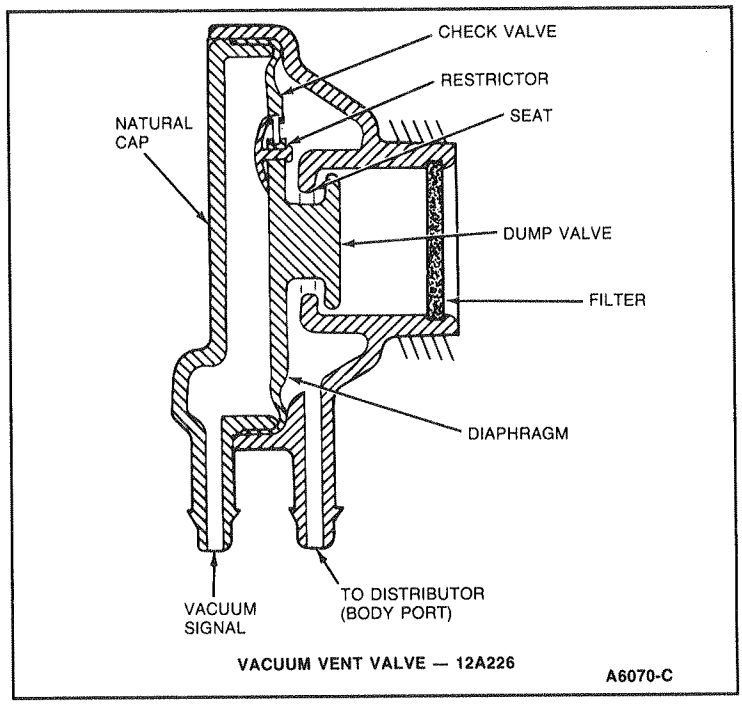


Figure 1 Vacuum Vent Valves — 12A226

DIAGNOSIS

1. With no vacuum applied to the signal port, the distributor (body port) should be open to atmosphere.
2. With an applied vacuum, the distributor should be closed to atmosphere.
3. A vacuum applied to the signal port and trapped should bleed off when the distributor port is open.

TITLE	BASIC PART NO.	SYMBOL
Vane Airflow Meter	**12B529**	

DESCRIPTION

The Vane Airflow Meter (Figure 1) measures air flowing into the engine and is mounted between the air cleaner and the air throttle body assembly. The meter contains a movable vane directly connected to an electrical device known as potentiometer. Air, rushing through the van airflow meter, changes the position of the vane and the potentiometer. The potentiometer relays vane position information to the EEC-IV module. The EEC-IV module can then translate vane position information into the volume of air flowing into the engine.

Inside the vane airflow meter is an air temperature sensor. This sensor constantly monitors the temperature of the air flowing into the engine. This information is also transmitted to the EEC-IV module.

The EEC-IV module computes volumetric airflow and air temperature, then adjusts the fuel flow to obtain the optimum air/fuel mixture.

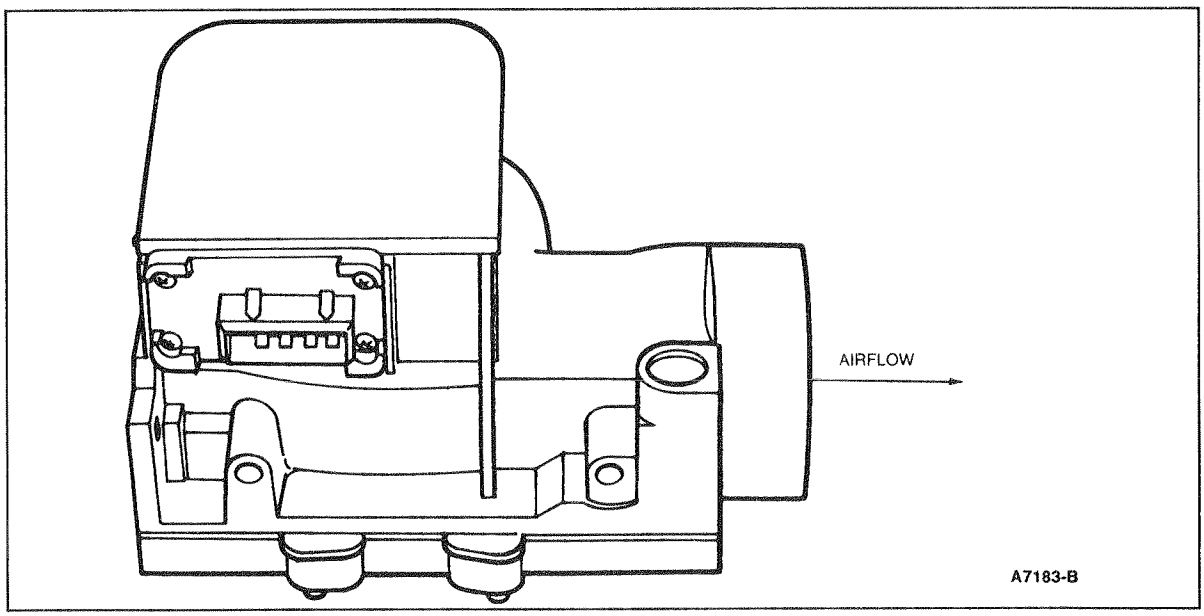


Figure 1 Vane Airflow Meter

DIAGNOSIS

Refer to the EEC-IV Quick Test, Section 16.