CHRYSLER CORP. EXHAUST GAS RECIRCULATION

DESCRIPTION

Exhaust gas recirculation allows a predetermined amount of hot exhaust gas to recirculate and dilute incoming air/fuel mixture. This diluting of the mixture reduces high heat peaks during combustion, thereby reducing NOx emissions.

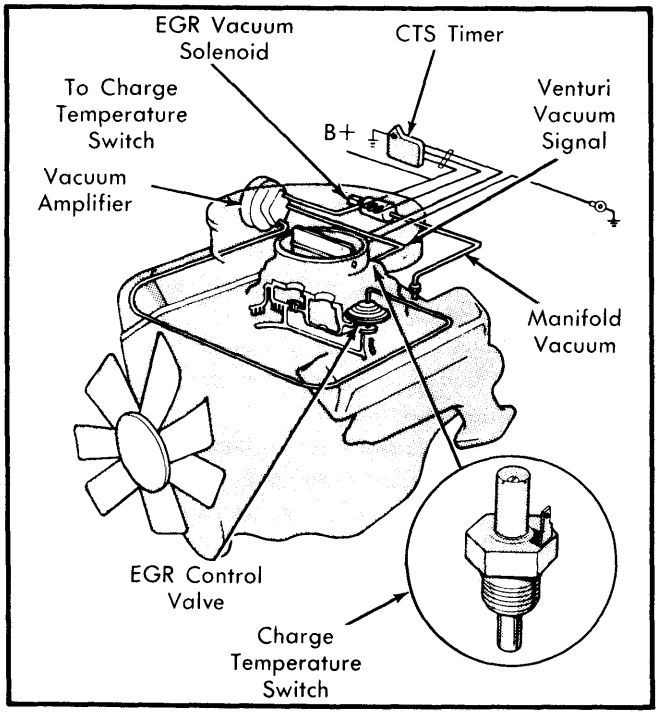

Fig. 1 Exhaust Gas Recirculation Venturi Vacuum Control and Charge Temperature Switch (CTS)

OPERATION

Venturi Vacuum Control provides signals for EGR operation on V8 and 6-cylinder models. Ported Vacuum Control is used on 1.7L and 2.2L 4-cylinder engines. 2.6L engines utilize a carburetor vacuum-controlled Dual EGR Control Valve in addition to a mechanically-linked Sub EGR Control Valve.

Venturi Vacuum Control System – Vacuum is tapped at the throat of the carburetor venturi or air flow sensor (EFI) to provide control vacuum to the vacuum amplifier. This low amplitude signal is increased in the amplifier to a level which will operate the EGR valve. A dump diaphragm compares venturi and manifold vacuum to prevent EGR operation at wide open throttle. EGR operation is determined primarily by venturi signal, but is also affected by intake vacuum and exhaust gas pressure.

Ported Vacuum Control System – As throttle blade opens, a slot type port in the carburetor throttle body is exposed to an increasing percentage of manifold vacuum. This port is connected through the Coolant Control EGR Valve to the EGR valve. Flow rate is dependent upon temperature, manifold vacuum, throttle position, and exhaust gas back pressure. Wide open throttle EGR operation is precluded by calibrating valve opening point above manifold vacuum available at full throttle.

2.6 Liter EGR System – The Dual EGR valve has primary and secondary valves which respond to different carburetor vacuums according to throttle opening. EGR operation is suspended at idle and wide open throttle. The primary valve controls EGR flow at relatively narrow throttle openings, while the secondary control valve admits exhaust gas into the intake mixture at wider throttle openings. Vacuum applied to the dual EGR control valve is controlled by a thermo valve. The sub EGR valve is part of the throttle body and is mechanically linked to the throttle. Two thermo valves sense coolant temperature at the intake manifold and prevent operation of the dual EGR valve below certain temperatures.

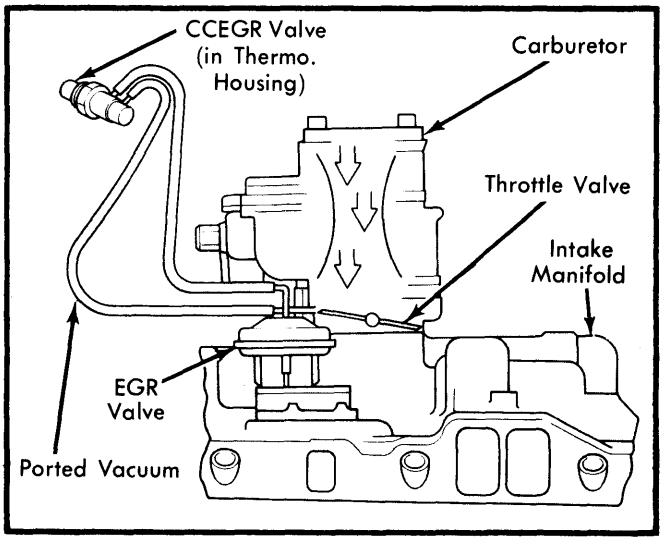

Fig. 2 Ported Vacuum Control EGR System 1.7L (105") and 2.2L (135") Engines

COOLANT CONTROL EGR VALVE (CCEGR)

NOTE – *Location of CCEGR valve is as follows: On 4 cylinder engines, valve is in thermostat housing. On 6 cylinder engines, valve is in cylinder head. On V8 engines, valve is in intake manifold.*

CCEGR Color Code & Temperature Chart

Color Code	Opening Temp. (°F)
Black	98
Yellow	125
Red	150

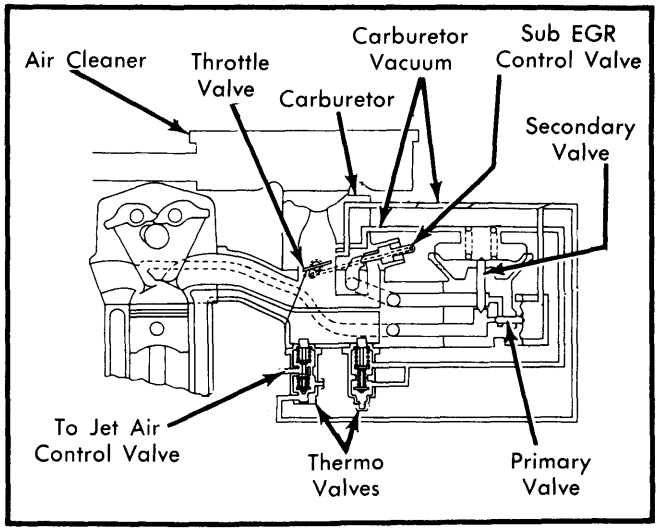

Fig. 3 EGR System for 2.6L (156") Engine

CHRYSLER CORP. EXHAUST GAS RECIRCULATION (Cont.)

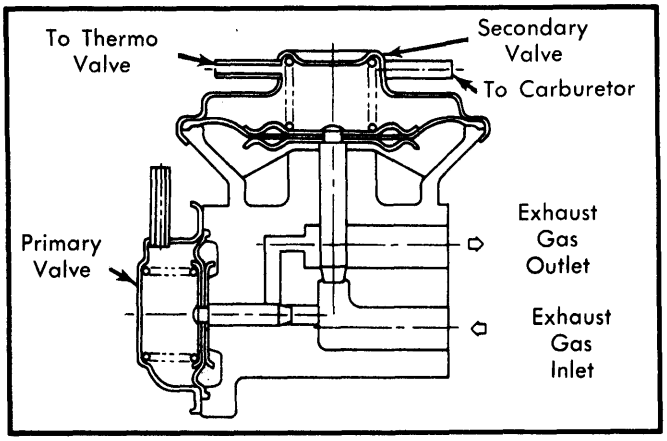

Fig. 4 Dual EGR Control Valve

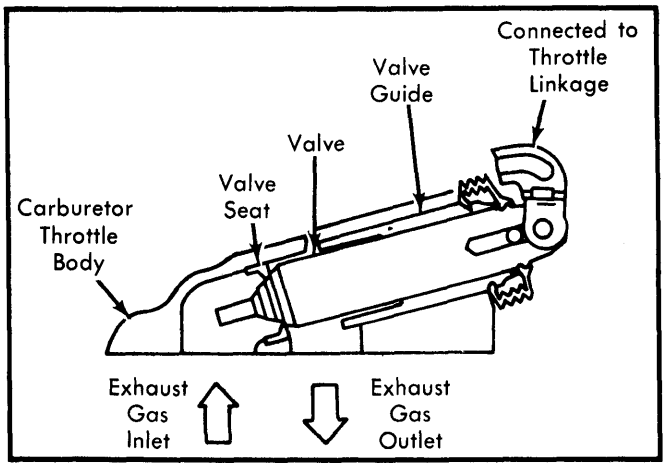

Fig. 5 Sub EGR Control Valve

EGR DELAY TIMER SYSTEM 6-CYLINDER AND V8 MODELS

Vehicles are equipped with EGR delay system which consists of an electrical timer which in turn is connected to an engine-mounted solenoid. The purpose of this delay device is to not allow EGR function for a preset amount of time following ignition turn on (this system is overridden by the CCEGR valve if cold engine start is made). Time delay is according to different applications, as shown in chart below.

EGR Time Delay Application (Solenoid Color Code)

Application	Delay (Seconds)
Black Color	35
Orange Color	60
Red Color	90

CHARGE TEMPERATURE SWITCH (CTS) 6-CYLINDER AND V8 MODELS

Switch is installed in No. 6 runner of intake manifold on 6-cylinder engines and in No. 8 runner of intake manifold on V8 engines. When air/fuel mixture temperature is below 60° F, switch closes, preventing EGR timer and EGR valve operation. Above 60° F, switch opens, allowing EGR timer and EGR valve operation.

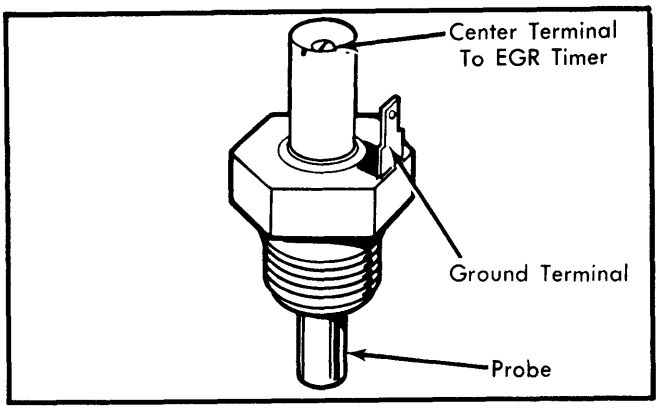

Fig. 6 Charge Temperature Switch (CTS) Used on 6-Cylinder and V8 Models

EGR CTS TIMER 6-CYLINDER AND V8 MODELS

Used with CTS, replaces previously used EGR Delay Timer. It is NOT interchangeable with earlier models. Due to wiring harness and function changes, 3 timers are used. They are color-coded black, orange or red to correspond with various applications.

TESTING

SYSTEM FUNCTIONAL CHECK

Exc. 2.6L Engine — 1) With engine fully warmed up and idling in "P" or Neutral, abruptly open throttle to approximately 2000-3000 RPM. Visible movement of EGR valve stem should be noted. Repeat several times if necessary.

2) Attach hand vacuum pump to EGR valve with engine at idle. Apply at least 5 in. Hg vacuum and engine should run rough or stall.

3) Attach vacuum gauge to EGR hose and open throttle quickly several times. A fluctuation of several in. Hg vacuum should be noted.

NOTE — *V8 and 6-cylinder models incorporate electronic EGR control within the spark control computer.*

2.6L Engine — 1) Check vacuum hose condition, routing and installation. Start cold engine and run at idle, then increase speed to 2500 RPM. Secondary EGR valve should NOT operate. If valve operates, replace thermo valve.

2) Warm up engine to at least 150°F. Accelerate engine to 2500 RPM and note that secondary EGR valve DOES operate. If not, check EGR valve or thermo valve and replace as necessary.

3) Disconnect green stripe hose from carburetor nipple and connect vacuum pump to hose. Pull sub EGR valve by hand and apply 6 in. Hg vacuum. If engine idling speed becomes unstable, valve is operating properly. If no change, check and replace EGR valve or thermo valve as required.

4) Reconnect green stripe hose to carburetor and disconnect yellow stripe hose. Apply 6 in. Hg vacuum with hand pump. Engine idle should become unstable if primary valve is operating properly. If no change, check and replace EGR valve or thermo valve.

CHRYSLER CORP. EXHAUST GAS RECIRCULATION (Cont.)

CCEGR VALVE (ALL MODELS)

1) Remove CCEGR valve from vehicle and place it in an ice bath to bring temperature of coolant sensing portion to below 40°F.

2) Attach a hand vacuum pump with gauge to the CCEGR nipple corresponding to the blue stripe hose on 6-cylinder and V8 models or to the yellow stripe hose on 1.7L (105") and 2.2L (135") 4-cylinder models.

3) Apply vacuum of 10 in. Hg. Note gauge for one minute. There should be NO MORE THAN a one inch drop in vacuum reading within this time. If so, replace valve.

EGR DELAY TIMER SYSTEM 6-CYLINDER AND V8 MODELS

1) First check all of system for proper hose and wiring connections.

2) With ignition switch off, remove wiring connector from the time delay solenoid valve. Connect an indicating light type circuit tester across wiring connector terminals just removed.

3) Start engine. Tester light should go on and remain on for amount of time as shown in color code application chart.

4) If light does not go on, remains on indefinitely, or does not react within time limit shown after engine start up, replace timer, then repeat test.

CAUTION — *To avoid overload of timer, tester current draw should not exceed 0.5 amps. A typical automotive 12V tester is satisfactory for this test, or a shop-made tester using instrument panel size bulbs is also suitable.*

EGR TIME DELAY SOLENOID 6-CYLINDER AND V8 MODELS

1) Make sure all vacuum hose connections are correct and not leaking.

2) Disconnect electrical plug from solenoid valve.

3) Connect either solenoid terminal to a ground and the other one to the battery positive terminal to activate the solenoid valve. This shuts off control vacuum to the EGR system.

NOTE — *You should hear a "click" from the solenoid as it is connected to the battery positive terminal.*

4) To test valve operation, let engine idle, then increase engine speed to about 2000 RPM. Watch EGR control valve stem, it should move. If not, replace the delay solenoid.

ELECTRONIC EGR SYSTEM 6-CYLINDER AND V8 MODELS

1) With engine stopped and cold, connect voltmeter to gray wire at EGR solenoid. With parking brake set, start engine. Voltmeter should read less than 1 volt until engine has reached normal operating temperature and electronic EGR schedule has timed out.

2) Solenoid will de-energize when EGR schedule has timed out and voltage should read charging system voltage. If not, replace solenoid and repeat procedure. If voltmeter indicates charging system voltage before EGR schedule is complete, replace computer or external mounted timer.

NOTE — *5.2L (318") 2-Bbl. Federal V8 has no coolant temperature thermal delay above 60° F ambient air temperature and will follow EGR time delay schedule only.*

3) If engine is restarted while still at normal operating temperature, EGR solenoid will only be energized for length of time delay schedule. It will then de-energize.

SERVICING

EGR VALVE

1) Inspect valve for deposits with particular attention to the poppet and seat area. If deposits exceed a thin film, valve should be cleaned.

2) Cleaning is aided by applying a liberal amount of manifold heat control solvent, or equivalent, to the poppet and seat area, allowing deposits to soften.

CAUTION — *Extreme care should be taken when using solvent cleaners to prevent spilling of solvent on valve diaphragm.*

3) Use an external vacuum source to open the poppet and then scrape deposits from this area.

4) If wear of stem or other moving components is noted, valve should be replaced.

NOTE — *Do not push valve stem manually, use an external vacuum source only.*

TROUBLE SHOOTING

NOTE — *All tests must be made with engine fully warm and running for at least two minutes.*

EGR VALVE STEM DOES NOT MOVE ON SYSTEM TEST

1) Check for correct hose connections and leak check to confirm all hoses are in good condition.

2) Check EGR valve for ruptured diaphragm or frozen valve stem by connecting external vacuum source (10 in. Hg or greater) to valve diaphragm. If no valve movement occurs, replace valve. If valve opens ⅛", pinch off supply hose to check for diaphragm leakage. Valve should remain open 30 seconds or longer. If leakage occurs, replace valve.

EGR VALVE STEM DOES NOT MOVE ON SYSTEM TEST, BUT OPERATES NORMALLY ON EXTERNAL VACUUM SOURCE

1) Disconnect CCEGR valve and bypass valve with short length of 3/16" tubing. If normal movement of EGR valve is restored, replace CCEGR valve (if system has two CCEGR valves, test both separately).

2) On Venturi Vacuum type systems, disconnect orange and blue (or unstriped) hoses at time delay solenoid valve and bypass valve with short piece of tubing.

3) If normal EGR stem movement is restored, reconnect hoses to valve and disconnect electrical plug from solenoid. If EGR valve stem does not move, solenoid should be replaced. If valve stem does move, timer should be further tested as previously described.

CHRYSLER CORP. EXHAUST GAS RECIRCULATION (Cont.)

4) If plugged passages are suspected with the Ported Vacuum type system, carburetor should be removed and slots inspected and cleaned as necessary. Recheck for normal EGR operation.

5) If plugged passages are suspected with the Venturi Vacuum system, carburetor cleaner should be used to clean deposits from venturi passage. Use light air pressure to verify that passage is open.

6) To check for defective vacuum control unit (Venturi Vacuum systems), remove venturi signal hose from carburetor. With engine at idle, apply approximately 2 in. Hg to the signal hose. Engine speed should drop at least 150 RPM and EGR valve stem should move 1/8" or more. If not, replace vacuum amplifier.

ENGINE WILL NOT IDLE, DIES ON RETURN TO IDLE OR ROUGH IDLE (EGR VALVE OPEN AT IDLE)

1) On Venturi Vacuum systems, disconnect and plug hose from EGR valve. If idle is unsatisfactory, replace EGR valve. If okay, reconnect hose to valve and disconnect from carburetor. If idle is okay, clean venturi tap. If idle not okay, replace vacuum control unit.

2) On Ported Vacuum systems, disconnect and plug hose from EGR valve. If idle is not okay, replace EGR valve. If idle is still rough, install vacuum gauge on ported signal tap. If more than 1" of vacuum, check idle setting. If vacuum is okay, check linkage and carburetor for binding.

ENGINE WILL NOT IDLE, DIES ON RETURN TO IDLE OR ROUGH IDLE (EGR VALVE CLOSED AT IDLE)

If removal of vacuum hose from EGR valve does not correct rough idle, remove EGR valve and inspect to insure that poppet is seated. Clean deposits on valve or replace valve.

NO EGR VALVE OPERATION WITH WARM ENGINE

Check hose routing and solenoid operation. Remove connector wire from CTS center terminal and wait 90 seconds. If EGR valve is now operating, replace CTS.

EGR VALVE OPERATING WITH COLD ENGINE

Check hose routing and EGR solenoid operation. Remove center wire from CTS. Using ohmmeter between center terminal and ground terminal of CTS, check for less than 10 ohms. If open circuit is shown, replace CTS. If CTS checks okay, look for open circuit between CTS and ground connection.

NOTE — *Maximum torque for CTS is 60 INCH lbs (6.8 N·m).*