MAZDA PISTON ENGINE EXHAUST GAS RECIRCULATION

GLC
626
B2000

DESCRIPTION

The Exhaust Gas Recirculation (EGR) system is designed to lower the burning temperatures of gases in combustion chambers, thereby reducing formation of oxides of nitrogen (NOx). Metered amounts of exhaust gas dilutes the air/fuel mixture to lower combustion temperatures. Three systems are used: The one EGR valve system (GLC, except Calif. Auto. Trans. and B2000 Models) consists of an EGR valve, water thermo valve and vacuum amplifier. The two EGR valve system (Calif. Auto. Trans. GLC Model), consists of 2 EGR valves, 2 three-way solenoids, a water thermo valve, accelerator switch, speed switch and vacuum amplifier. The modified two EGR valve system (626 Models), consists of 2 EGR valves, 2 water thermo valves, a vacuum amplifier and vacuum delay valve.

OPERATION

One EGR Valve Type – Exhaust gases flow out of exhaust manifold, through EGR tube and into EGR control valve. The EGR valve controls EGR flow in response to vacuum signals received from the vacuum amplifier. The vacuum amplifier monitors carburetor ported vacuum to control vacuum applied to the EGR valve. The water thermo valve restricts the flow of vacuum to the EGR valve until manifold coolant temperature reaches pre-determined value.

Two EGR Valve Type – Exhaust gases flow out of exhaust manifold, through EGR tubes and into EGR control valves. The EGR valves are controlled by a thermo valve and 2 three-way solenoid valves which control EGR flow dependent upon vehicle speed and engine operating temperatures. The EGR valves allow recirculation of exhaust gases under various engine operating conditions.

Modified Two EGR Valve System – In this system, the No. 1 EGR valve controls exhaust flow under light load driving conditions. The No. 2 EGR valve controls exhaust flow during heavy load driving conditions. Both valves are closed until thermal valves open at engine coolant temperatures above 122° F (50° C).

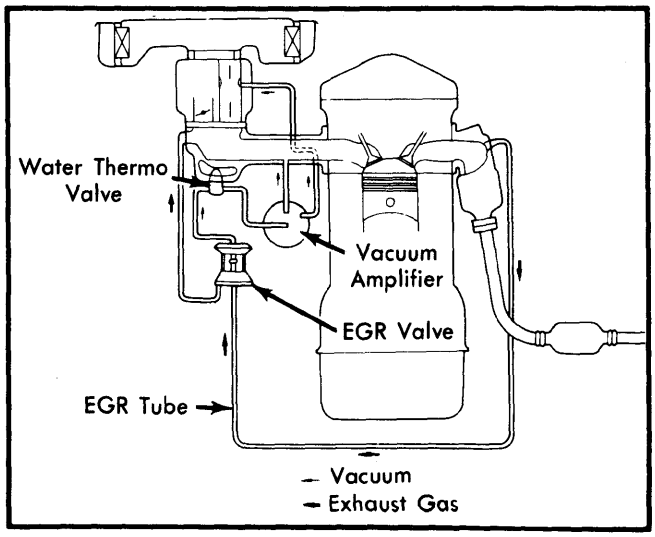

Fig. 1 Schematic of Mazda One EGR Valve System (GLC – Except Calif. Auto. Trans. and B2000 Models)

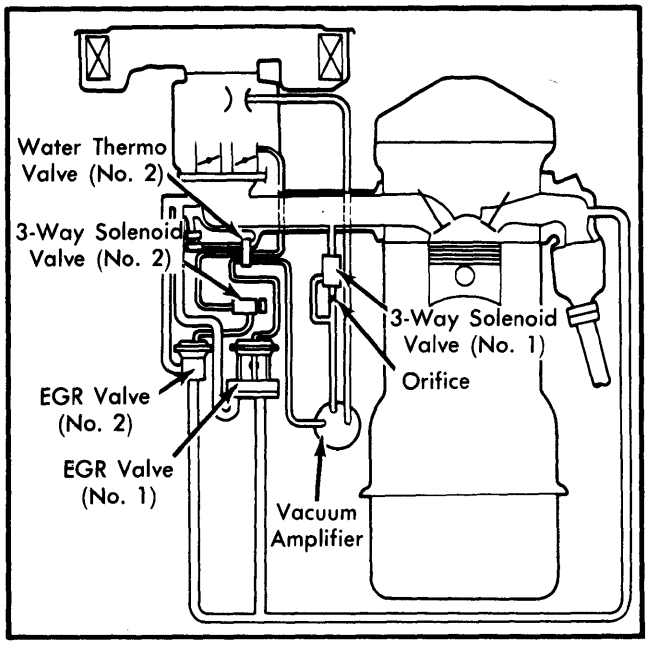

Fig. 2 Schematic of Mazda Two EGR Valve System (Calif. Auto. Trans. GLC Model Only)

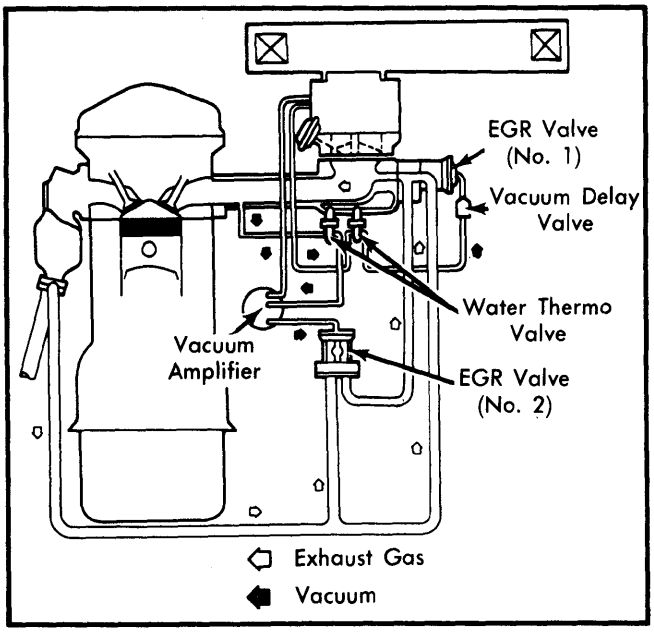

Fig. 3 Schematic of Mazda 626 Modified Two EGR Valve System

TESTING

EGR VALVES

1) Warm engine to normal operating temperature. Stop engine. Detach EGR vacuum sensing tube from EGR valve and apply intake manifold vacuum directly to EGR valve.

2) Pinch off intake manifold vacuum hose while engine is restarted. Release hose. If EGR valve is okay, engine will idle very rough or stall. If idle quality does not change, replace EGR valve.

MAZDA PISTON ENGINE EXHAUST GAS RECIRCULATION (Cont.)

VACUUM AMPLIFIER

1) Remove air cleaner and disconnect vacuum line from thermal valve at vacuum amplifier ("T" fitting on 626 models). Connect a vacuum gauge to vacuum line. Run engine at idle and disconnect vacuum line at carburetor. Gauge reading should be 1.8-2.2" (46-56 mm) Hg. Reconnect vacuum line to carburetor.

2) Slowly increase engine speed to 3500 RPM and gauge should read 3.6" (91 mm) Hg. If vacuum amplifier does not operate properly, replace amplifier.

WATER THERMO VALVES

1) Remove switch from vehicle and place in container of water with thermometer. Suspend parts in water so they do not touch side of container.

2) With vacuum hoses attached to fittings, blow into either hose. Air should NOT pass while water thermo valve is below 122° F (50° C) for B2000, 132° F (55° C) for GLC or 138° F (59° C) for 626. If it does, replace valve.

3) Heat water to above temperatures mentioned in step **2)**. Blow into hose. Air should now pass through valve. If not, replace valve.

3-WAY SOLENOID VALVES (CALIF. AUTO. TRANS. GLC ONLY)

No. 1 Solenoid Valve – **1)** Disconnect vacuum sensing tube (intake manifold-to-No. 1 solenoid valve) at intake manifold. Disconnect remaining hoses from solenoid valve.

2) Disconnect electrical connector (Black/White wire) from solenoid valve. Blow through hose which was disconnected at intake manifold. Air should escape at port "C". See *Fig. 4*.

3) Apply battery voltage to electrical terminal of solenoid valve and blow through hose again. Air should escape at port "B". If valve does not operate as described, replace No. 1 solenoid valve.

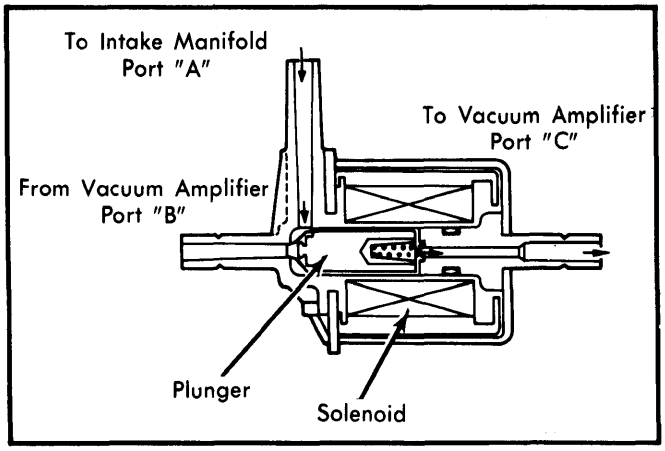

Fig. 4 Exploded View of Calif. Auto. Trans. GLC No. 1 Three-Way Solenoid Valve

No. 2 Solenoid Valve – **1)** Disconnect vacuum sensing tube (white) from No. 2 EGR valve. Disconnect vacuum hose (brown) from solenoid valve (Port "B"). See *Fig. 5*.

2) Disconnect electrical connector (Yellow/Black wire) from solenoid valve and ground green terminal in the coupler with a jumper wire.

3) Turn ignition switch "ON". Blow through the white hose (Port "A"). Air should escape through solenoid valve air filter.

4) Turn ignition switch "OFF" and blow through hose again. Air should escape at port "B". If valve does not operate as described, replace No. 2 solenoid valve.

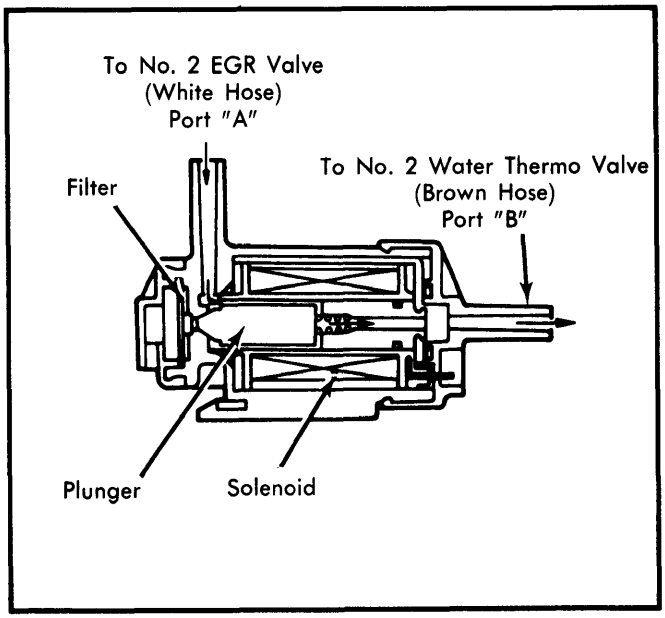

Fig. 5 Exploded View of Calif. Auto. Trans. GLC No. 2 Three-Way Solenoid Valve

VACUUM DELAY VALVE (626 ONLY)

1) Disconnect the inlet manifold-to-shutter valve hose at intake manifold. Disconnect vacuum delay valve-to-"T" fitting at the "T" and connect a vacuum gauge to hose.

2) Disconnect vacuum delay valve-to-air control valve vacuum hose at air control valve and connect the hose to intake manifold vacuum source.

3) Start engine and record the vacuum reading at idle. Disconnect vacuum hose at manifold vacuum source. Note the time required for the vacuum reading to decrease 11.8" (300 mm) Hg from that recorded at idle.

4) If time exceeds 6-9 seconds (manual transmission) or 12-18 seconds (automatic transmission), replace vacuum delay valve.

MAZDA PISTON ENGINE EXHAUST GAS RECIRCULATION (Cont.)

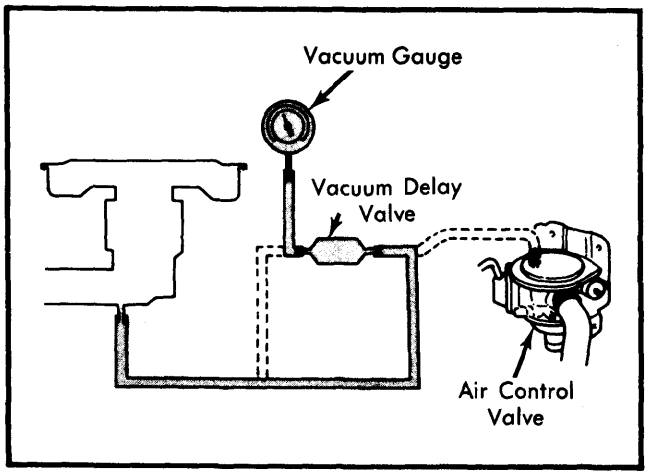

Fig. 6 Testing Mazda 626 Vacuum Delay Valve

ACCELERATOR SWITCH (CALIF. AUTO. TRANS. GLC ONLY)

Disconnect electrical connections at accelerator switch. Connect ohmmeter to switch terminals. Depress accelerator pedal slowly. Continuity should be measured when pedal is depressed more than 7/8 of pedal travel. If not, replace accelerator switch.

SPEED SWITCH (CALIF. AUTO. TRANS. GLC ONLY)

Remove instrument cluster from dash. Remove speedometer glass and connect test lamp. See *Fig. 7*. With speedometer needle pointing at speeds lower than 43-47 MPH, lamp should glow. Above the pre-determined speed, bulb should not glow. Replace speed switch if defective.

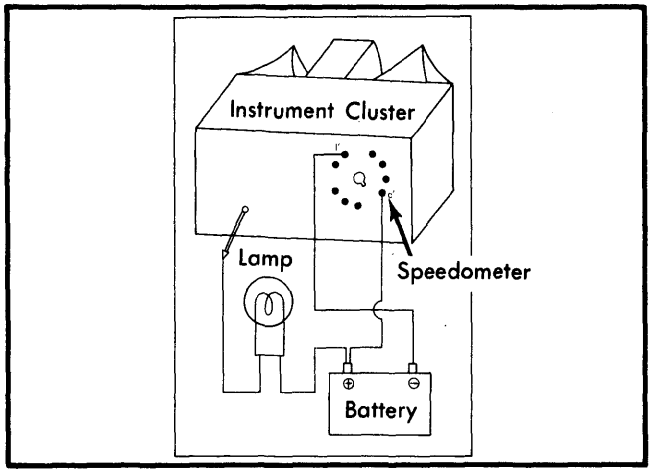

Fig. 7 Schematic for Testing Speed Switch (Calif. Auto. Trans. GLC Only)