MAZDA ROTARY ENGINE AIR INJECTION SYSTEM

RX-7

DESCRIPTION

This system controls HC and CO emissions by injecting secondary air into the exhaust system to cause further burning of exhaust gases. System consists of an air pump, check valve, air control valve (with 2 relief valves), a relief solenoid valve and thermal reactor.

OPERATION

Air is drawn from the clean side of the air cleaner by the air pump and directed to the air control valve under pressure. The No. 1 relief valve of the control valve directs cooling air to outer portion of thermal reactor to reduce high heat deterioration. The No. 2 relief valve (controlled by the relief valve solenoid) controls the amount of air injected into thermal reactor according to intake manifold vacuum. Under normal operating conditions, part of the secondary air supplied from the air pump is directed back to the air cleaner.

The preheated air is mixed with the hot exhaust gas at the exhaust port of rotor housing. From the exhaust port, the exhaust gases burn more completely in the thermal reactor before entering exhaust system. The check valve prevents exhaust gas from leaking back into the air pump.

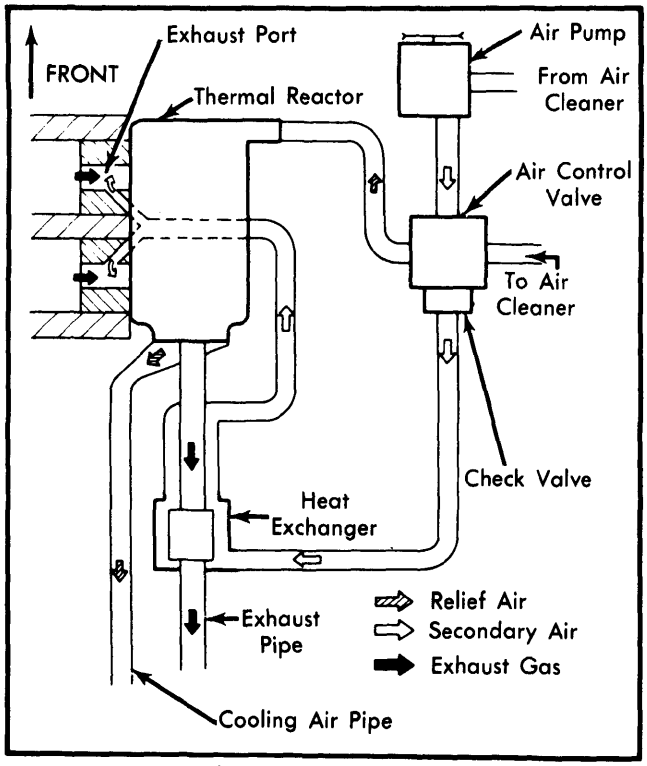

Fig. 1 Schematic of Air Injection System With Thermal Reactor

TESTING

AIR PUMP

1) With engine at normal operating temperature, inspect all hose connections for leaks. Check for pump noise and belt tension.

2) Disconnect air line to air control valve. Connect hose to a pressure gauge.

3) Start engine and run at idle speed. Gauge should register more than 1.64 psi (.115 kg/cm²) with engine at 800 RPM. If pump outlet is below specification, replace pump.

CHECK VALVE

With engine at normal operating temperature, connect tachometer. Detach air pump-to-air control valve hose at control valve. Start engine and increase speed to 1500 RPM. Watch for exhaust gas leak at air inlet fitting of control valve. If leak exists, replace check valve (it is not blocking reverse flow through system).

THERMAL REACTOR & HEAT EXCHANGER

Inspect for obvious damage, cracks, loose connections and signs of leaks. Repair or replace as required.

AIR CONTROL VALVE

1) After ensuring air pump and all hoses are correct, check carburetor and air control valve attaching nuts for tightness. Disconnect vacuum sensing tube from relief solenoid valve. Disconnect air control valve hose at air cleaner.

2) Start engine and run at idle. Place finger over open end of hose from air control valve. Connect detached end of vacuum sensing tube back onto relief solenoid valve.

3) Slowly increase engine speed and check that air starts to flow from air control valve hose when engine speed is about 1300 RPM. Stop engine and remove pipe from air control valve to thermal reactor.

4) Start engine and run at idle. Check that air does not flow from air control valve (where pipe has been disconnected). Increase engine speed. Air should flow from valve at about 4500 RPM. If valve does not function as described, replace it.

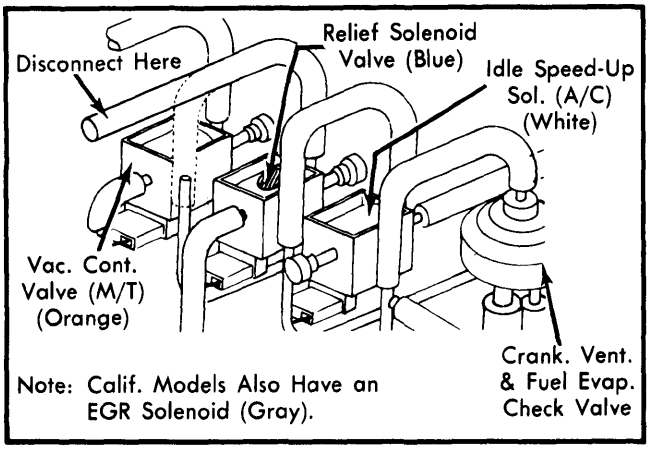

Fig. 2 Schematic Showing Hose Disconnection for Air Control Valve Test (Federal Models Shown)

RELIEF SOLENOID VALVE

1) Disconnect vacuum sensing tubes from relief solenoid valve and vacuum pipe. Blow through solenoid valve from vacuum sensing tube (top hose). Air should pass through valve and come out side fitting.

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2) Disconnect coupler from relief solenoid valve and connect battery power to terminals on valve. Blow through valve from vacuum sensing tube (top hose). Air should pass through solenoid valve and come out air filter of valve. If valve does not respond as described, replace it.

RELIEF SOLENOID VALVE SIGNAL CHECK

1) Warm engine to normal operating temperature. Connect tachometer to engine. With voltmeter connected to good ground, insert other probe into light green wire terminal of relief solenoid valve connector (do not detach connector). On all models with Auto. Trans. and Calif. models with Man. Trans., disconnect vacuum switch electrical coupler.

2) On all models, start engine and increase engine speed to 2000 RPM, using throttle. Slowly decrease engine speed and record speed at which current begins flowing to terminal. It should be 1050-1250 RPM. Stop engine.

3) Slowly increase engine speed from idle and check speed at which current stops flowing to solenoid. Difference between this speed and speed noted in previous step (1050-1250), should be 80-220 RPM.

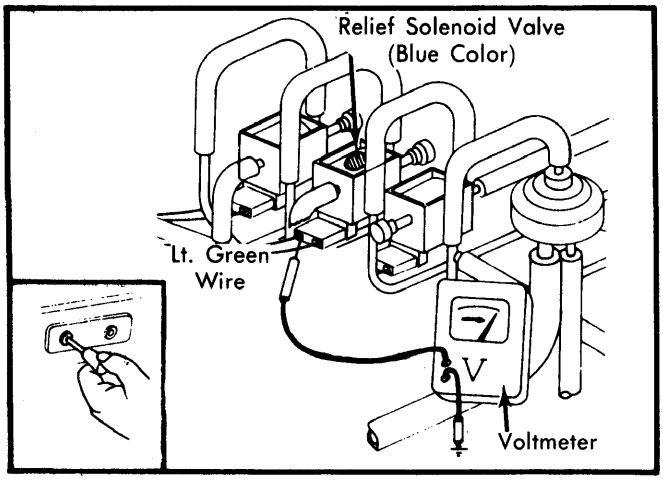

Fig. 3 Testing Signal to Relief Valve Solenoid (Federal Models with Man. Trans. Shown)

4) On all models with Auto. Trans. and Calif. models with Man. Trans., continue with following tests:

5) Start engine with choke knob pulled fully out. Note voltmeter to ensure current is reaching solenoid terminal. Push choke knob back into position. Place jumper wire on vacuum switch connector as shown. See *Fig. 4*.

6) Increase engine speed to 4600 RPM, using throttle. Note that current should stop flowing to terminal within 1¾-2½ minutes from pulling choke knob in step **5)**.

7) Next, return engine to idle and slowly increase engine speed, noting that current stops flowing to terminal when engine speed exceeds 2700-3300 RPM (3000-3600 RPM on Calif. Auto. Trans. models).

8) If relief solenoid valve does not perform as described, replace solenoid valve. On all models with Auto. Trans. and Calif. models with Man. Trans., check timer and components before replacing solenoid valve.

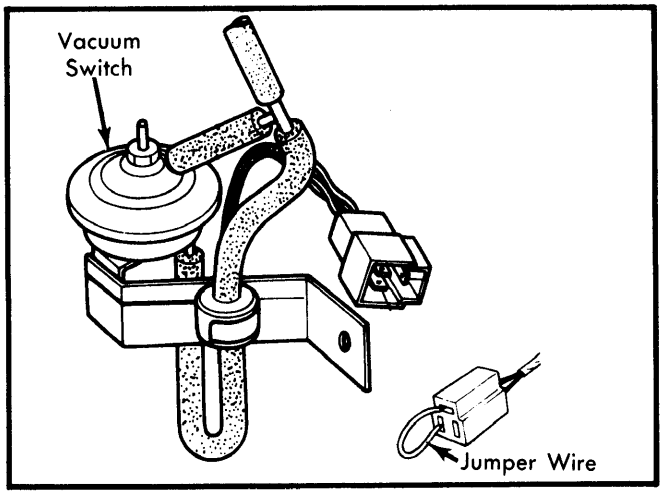

Fig. 4 Jumper Wire Connections for Testing Vacuum Switch Coupler (Exc. Federal Man. Trans. Models)