1974-79 EXHAUST EMISSION SYSTEMS
Honda Air Injection System

1979 Civic 1200

NOTE: For 1974-78 models, see AIR INJECTION SYSTEMS article in this section.

DESCRIPTION

The air injection system reduces exhaust emissions by burning the hydrocarbon (HC) and carbon monoxide (CO) concentrations in the exhaust ports of the cylinder head. System consists of a belt-driven air pump, anti-afterburn valve, air by-pass valve assembly, air by-pass solenoid valve, check valve, vacuum switch, delay valve, choke switch, and various connecting tubes and hoses.

OPERATION

Air from the belt-driven air pump is injected into the exhaust ports near each exhaust valve. The oxygen in the air and the heat of the exhaust gas during the exhaust stroke induce combustion in each exhaust port, burning the excess hydrocarbon (HC) and carbon monoxide (CO) gases.

Normally, air flows from the pump through the check valve to the exhaust manifold, except when manifold vacuum is below the preset value of the vacuum switch (at heavy load) after a certain amount of delay time by the delay valve. The choke switch shuts off the by-pass solenoid valve during choke operation by interrupting the ground circuit. When either of the preceding conditions is present, air from the pump is routed back into the air cleaner assembly.

CHECK VALVE

The check valve is provided to prevent exhaust gas from flowing back into the air pump. When air pressure of the air pump is greater than that of the exhaust gas, it opens the valve and the air passes into the air injection manifold.

When the pressure of the exhaust gas exceeds the pump pressure for any reason (such as drive belt failure), the check valve will close immediately to prevent exhaust gas from entering the air pump, which could cause damage to the air supply hoses and/or air pump.

AIR BY-PASS VALVE ASSEMBLY, VACUUM SWITCH, DELAY VALVE, AIR BY-PASS SOLENOID & CHOKE SWITCH

When the engine is at normal operating temperature and manifold vacuum is high, both the choke switch and the vacuum switch are closed. Electricity from the ignition switch flows through the vacuum switch, energizing the by-pass solenoid valve, then goes to ground through the choke switch. Air from the pump goes to the air injection manifold. Some air will vent to the atmosphere through the relief valve in the by-pass valve to prevent excessive pump pressures.

When the by-pass solenoid valve is de-energized by either the choke or vacuum switch, air pressure passes from the pump through the air by-pass valve assembly through the solenoid to the air by-pass valve diaphragm. The air pressure pushes the diaphragm down, opening the by-pass valve. Air from the pump is now returned to the air cleaner.

ANTI-AFTERBURN VALVE

At the beginning of a sudden deceleration, a rich air/fuel mixture is present in the intake manifold and is supplied to the cylinders. This excessively rich mixture does not completely burn in the combustion chambers and may cause an afterburn (backfire).

To prevent such partial combustion, the anti-afterburn valve supplies fresh air to the intake manifold during periods of increased manifold vacuum to reduce the overly rich mixture. The valve is sensitive only to sudden increases in intake manifold vacuum and remains open in proportion to the amount of pressure change sensed by the diaphragm of the anti-afterburn valve.

A check valve and fixed orifice are built into the diaphragm. The check valve allows air to flow only from the sensing chamber to the air chamber. If the vacuum in the sensing chamber, which is connected to the intake manifold, decreases, the check valve opens to allow air into the air chamber until the pressures in both chambers equalize. In the event of a sudden increase in manifold vacuum, the entire diaphragm unit is pulled downward. This condition lasts for a few seconds until the pressure in both chambers in equalized by air entering through the metering orifice.

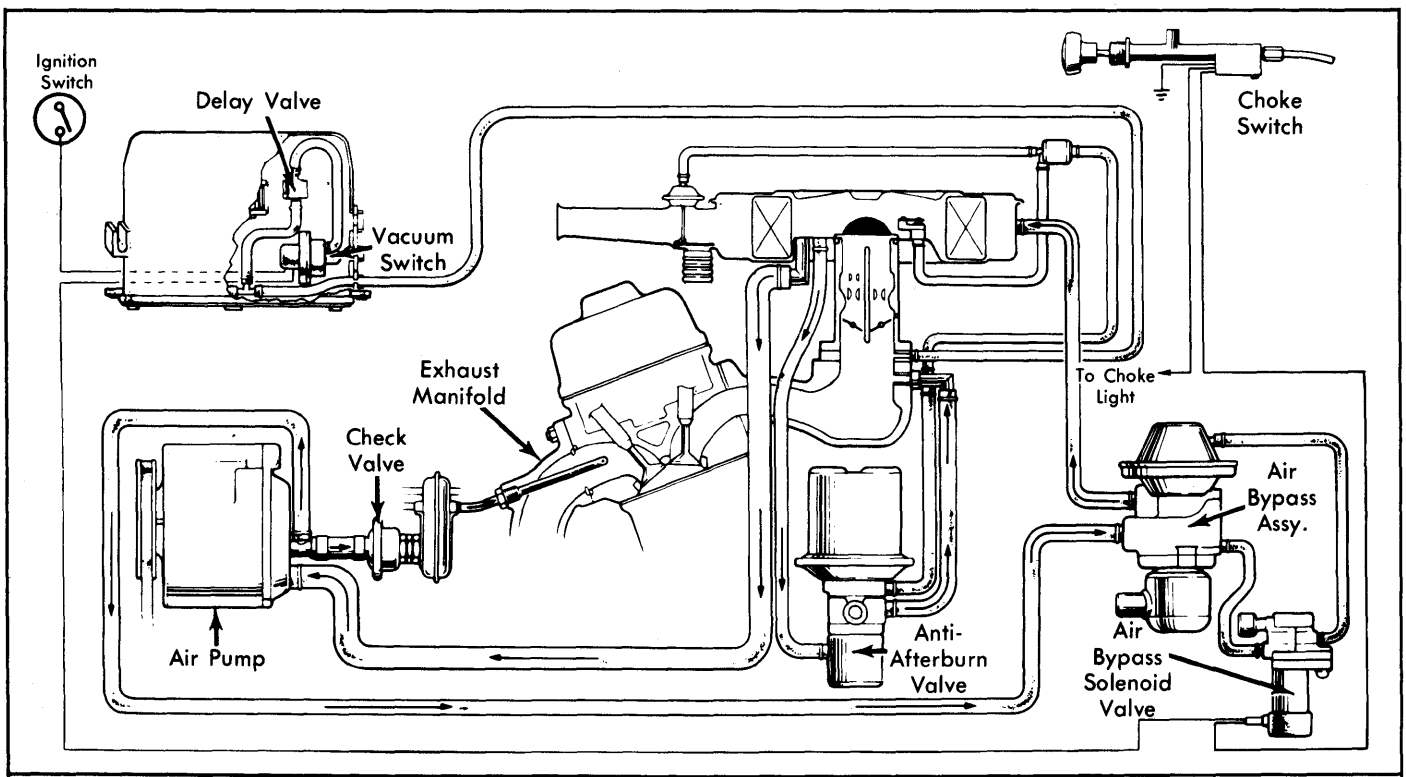

Fig. 1: Schematic Of Civic 1200 Air Injection System

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Honda Air Injection System (Cont.)

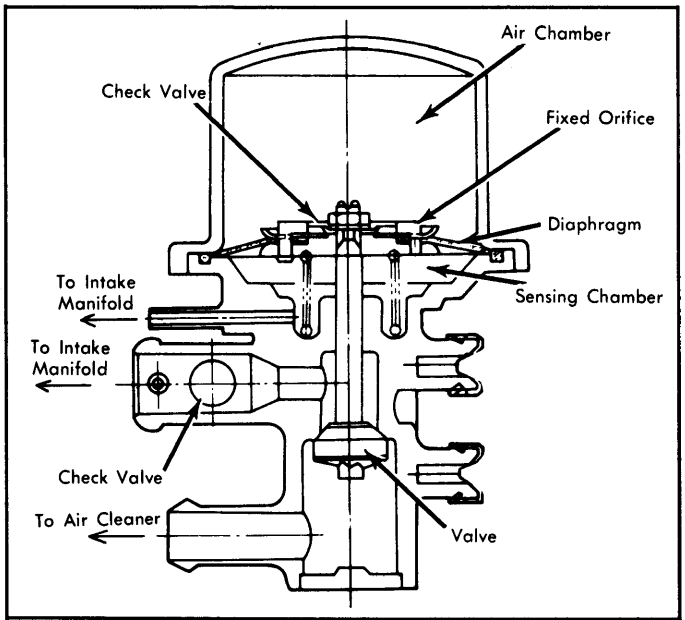

Fig. 2: Sectional View Of Anti-Afterburn Valve

TESTING

CHECK VALVE

Disconnect check valve hose at valve. Start and idle engine. Check that air is being drawn into the valve and that no exhaust gas is being forced out. If exhaust gas is forced out, replace check valve.

AIR PUMP & RELIEF VALVE

1) Disconnect air pump-to-check valve hose at valve and plug the hose. Disconnect return hose from air cleaner and install a pressure gauge in hose. *See Fig. 3.*
2) Start and idle engine and check pressure gauge. No pressure should be indicated on gauge. If pressure is indicated, see TROUBLE SHOOTING in this article.
3) Raise engine speed to 3500 RPM and disconnect vacuum tube leading from delay valve to the intake manifold at the manifold. Within 2-10 seconds (4-20 seconds on auto. trans. equipped models), more than 5.9 psi (0.4 kg/cm²) should be indicated on pressure gauge.
4) Allow engine to return to idle. If pressure or time is not as specified in preceding step, see TROUBLE SHOOTING in this article.
5) Gradually increase engine speed and make sure that air begins to exhaust from air by-pass relief valve at a pressure of 2.2-5.9 psi (0.15-0.4 kg/cm²).
6) If pressure is not within specifications when air begins to exhaust, replace the air by-pass valve assembly. Reconnect hose to intake manifold and continue with choke switch test.

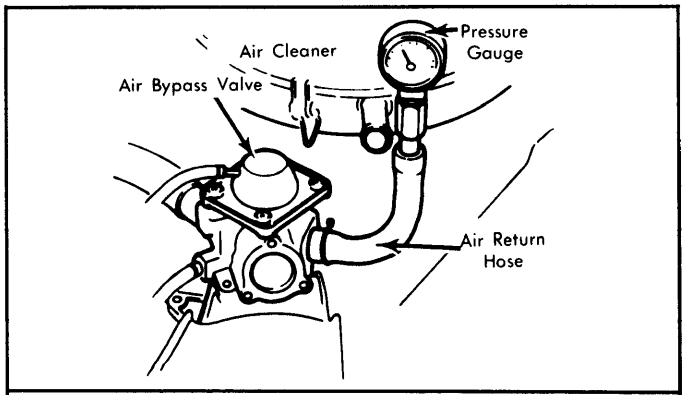

Fig. 3: Pressure Gauge Installation

CHOKE SWITCH

1) With engine at idle, pull choke knob out and check that pressure is available at air return hose. If pressure is not present, see TROUBLE SHOOTING in this article.
2) Check that pressure is not available when choke knob is pushed in. If pressure is still present with choke knob in, see TROUBLE SHOOTING in this article.
3) Remove plug from check valve hose and reconnect. Remove pressure gauge and reconnect return hose to air cleaner.

ANTI-AFTERBURN VALVE

1) Remove air cleaner assembly cover and start engine. With engine at idle, check for vacuum at valve inlet. Raise engine speed to 3500 RPM and close the throttle quickly. *See Fig. 4.*
2) Vacuum should be felt at valve inlet as throttle closes. If not, check and ensure that vacuum port is clear. Clean as necessary and repeat test. If vacuum is still not present when throttle is closed, replace anti-afterburn valve and retest.

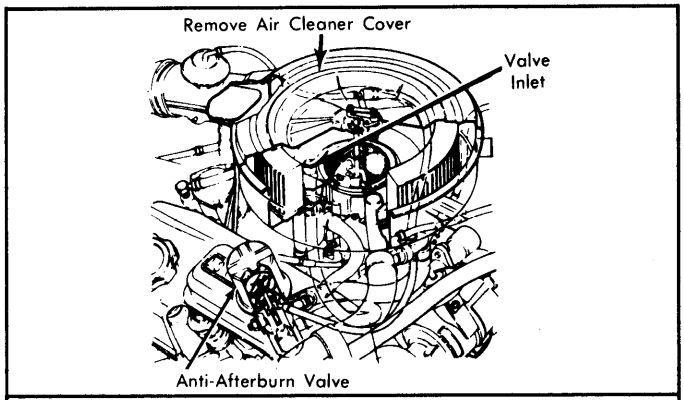

Fig. 4: Testing Anti-Afterburn Valve

TROUBLE SHOOTING

NO PRESSURE PRESENT

1) If no pressure is indicated, check for pressure at air by-pass valve hose. If pressure exists, replace air by-pass valve assembly. If not, check for pressure at by-pass valve assembly port leading to by-pass solenoid. If no pressure at valve port, check air pump pressure and repair as necessary.
2) If pressure exists at valve port, check for battery voltage at solenoid valve. If no voltage exists, replace vacuum switch. If voltage exists, remove vacuum tube from vacuum switch and check voltage again.
3) If voltage remains at solenoid valve, replace vacuum switch. If voltage drops, replace delay valve. If pressure indicated is less than 5.9 psi (0.4 kg/cm²), replace air pump assembly.

PRESSURE IS INDICATED AT IDLE WITH CHOKE KNOB IN

1) Disconnect hose from air by-pass valve upper diaphragm. If pressure is still present, replace air by-pass valve assembly.
2) If pressure drops, check for battery voltage at solenoid valve. If battery voltage is present, check solenoid ground through choke switch. If ground is okay, replace solenoid valve. If not, replace choke switch.
3) If no voltage is present at solenoid valve, check for continuity across vacuum switch. If continuity exists, check wiring and repair or replace vacuum switch as required. If no continuity exists, check for vacuum to vacuum switch.
4) If no vacuum exists, replace delay valve and/or hoses. If vacuum exists, check for battery voltage at vacuum switch Black/Yellow wire. If no voltage exists, repair or replace fuses or wiring. If voltage exists, replace vacuum switch and retest.

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Honda Air Injection System (Cont.)

PRESSURE NOT AVAILABLE AT AIR RETURN HOSE WITH CHOKE KNOB OUT

Disconnect Black and Blue/White wires at air by-pass solenoid valve. If pressure is now indicated, replace choke switch. If no pressure is indicated, replace air by-pass solenoid valve.

AIR RETURN TIME NOT WITHIN SPECIFICATIONS

1) Replace delay valve and repeat test. If return time is still not within specifications, check continuity of vacuum switch with ignition switch off. If continuity exists, replace vacuum switch and retest.

2) If no continuity exists, connect hand-held vacuum pump to vacuum switch and gradually apply vacuum. Check that continuity is available when vacuum reaches 7.5-8.3 in. Hg (6.3-7.1 in. Hg on auto. trans. equipped models).

3) If continuity still does not exist, replace vacuum switch and retest. If return time is still out of specifications on man. trans. equipped models, replace delay valve and recheck.