1982 Fuel Injection

LUCAS-BOSCH "P" TYPE SYSTEM

Jaguar XJS

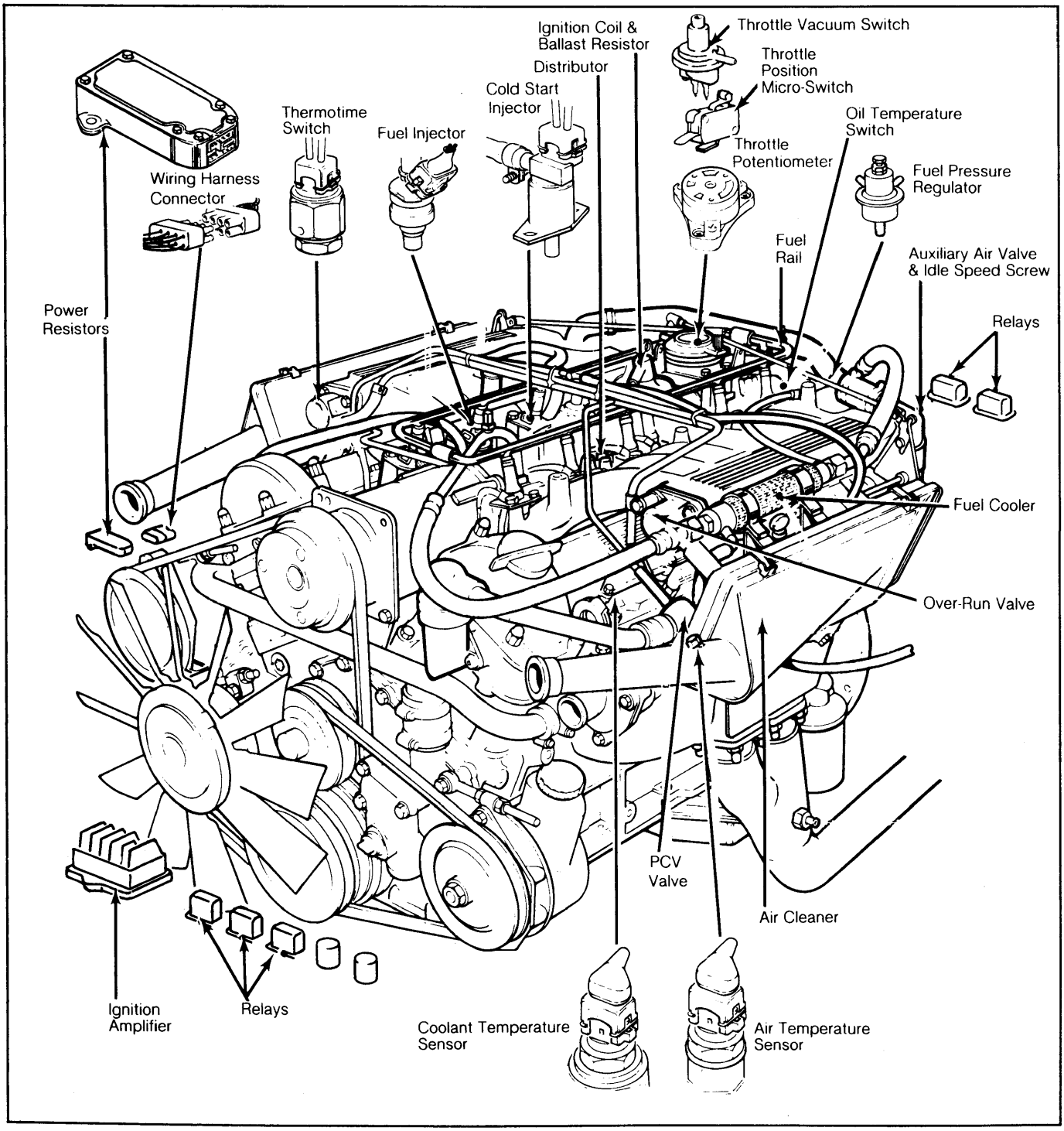
DESCRIPTION

The Lucas-Bosch "P" type fuel injection system is installed on all XJS 5.3 liter engines destined for North American markets. This system relies on pressure sensing devices for incoming air flow information.

The "P" type injection system consists of 2 sub-systems interconnected only at the injectors. These 2 systems are the fuel system and the electronic sensing and control system.

The fuel system supplies the injectors with a constant supply of fuel at a pressure of 36 psi. The electronic sensing and control system monitors engine operating conditions including load, speed, temperature,

Fig. 1: Location of Engine Sensors & Components of "P" Type Electronic Fuel Injection System



Always disconnect battery ground cable before disconnecting any components of injection system.

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and throttle movement. The control system uses the information provided by this network of sensors to produce the proper length pulse for the injector, insuring optimum combustion for any operating conditions.

As the fuel pressure is held constant, varying the duration of the injection pulse increases or decreases the amount of fuel being injected into each cylinder. Fuel mixture is enriched for cold starting, closed throttle operation, full throttle operation, and when the throttle is rapidly opened.

The induction system consists of tuned ram pipes, air cleaners, plenum chambers and induction ports. Air is drawn through paper element air cleaners to a butterfly valve for each bank of cylinders and then to individual ports for each cylinder leading off the plenum chamber. The injectors are installed at the cylinder head end of each port with the fuel spray being aimed at the back of each intake valve.

OPERATION

ELECTRONIC CONTROL UNIT

The control unit utilizes an integrated circuit containing the digital fuel injection control chip and an analog-to-digital converter to translate information from the sensors. The fuel injection program is stored in a Read-Only-Memory (ROM) chip.

For any given manifold pressure and engine speed combination, the memory provides a fuel injection duration for optimum combustion. The electronic control unit also monitors other sensors to modify the basic speed and pressure signals so that cold starting, mixture adjustment and other areas of engine operation can be controlled

FUEL PRESSURE REGULATOR

The fuel pressure regulator maintains a constant pressure in direct proportion to intake manifold vacuum. This is accomplished by attaching a vacuum diaphragm to the regulator. This produces an injection pressure that is always a certain set amount above manifold pressure.

ENGINE LOAD SENSING

As the air flow entering the engine varies the pressure in the plenum changes. This change in pressure is monitored by the manifold pressure sensor. The manifold pressure sensor sends a signal that indicates the degree of engine load to the electronic control unit.

The manifold pressure sensor is fitted with a separate diaphragm to compensate for changes in barometric pressure. The manifold pressure sensor is located in the electronic control unit and is connected by a hose to the intake manifold balance pipe.

AIR INTAKE SYSTEM

Air is drawn from the air cleaner through the throttle plates and into the engine. A potentiometer connected to the throttle pulley converts the throttle angular position into a voltage signal that is transmitted to the electronic control unit. A vacuum operated switch and a micro-switch also provide throttle position information to the electronic control unit.

TEMPERATURE SENSORS

The temperature of the intake air and the engine coolant are constantly monitored. This information is fed directly to the electronic control unit. The air temperature sensor has very little effect on injection duration. Because of this, the air temperature sensor should be considered more as a fine-tuning device instead of as a control device.

The air temperature signal modifies the manifold pressure signal to indicate the weight (density) of the air in the intake system. This helps the control unit maintain the most efficient air/fuel ratio.

The coolant temperature sensor has greater direct control on engine operation, although its' primary function is to aid in engine warm-up. This sensor combines with the cold start system and the auxiliary air valve to form the equivalent of the carburetors' automatic choke.

FLOODING PROTECTION SYSTEM

When the ignition is switched to "ON", but the engine is not cranking, the fuel pump will run for 2 seconds to raise the pressure in the fuel rail and then automatically shut off. Only after the engine has started cranking is the fuel pump turned on again.

All fuel pump switching is controlled by the electronic control unit. This system prevents flooding in case any of the injectors become faulty by remaining open when the ignition is left on.

AUXILIARY AIR VALVE

The auxiliary air valve is controlled by coolant temperature. To prevent stalling during cold start and cold idle conditions, the valve opens to allow air to by-pass the throttle plates. This increases engine speed. In addition to the main passage regulated by engine coolant, the air valve also contains a by-pass controlled by an adjusting screw.

COLD STARTING SYSTEM

During cold starting, additional fuel is injected into the intake manifolds by 2 cold start injectors. These injectors are controlled by the cold start relay and the thermotime switch.

The thermotime switch senses engine coolant temperature, and depending on temperature makes or breaks the ground circuit of the relay. When the starter circuit is activated, the cold start relay is energized with the ground circuit being completed by the thermotime switch.

The thermotime switch also limits the time that the relay is energized (12 seconds max.). The enrichment provided by the cold start system is in addition to the enrichment resulting from the coolant temperature sensors' signal to the electronic control unit.

If the temperature at the thermotime switch is above 95°F (35°C), the thermotime switch will not close and no cold start enrichment will take place.

CRANKING ENRICHMENT CIRCUIT

The electronic control unit increases the injection duration during cranking. This enrichment in addition to any enrichment that is a result of coolant temperature or cold start injection. This enrichment reduces partially after cranking stops and then falls to normal after a few

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seconds. This process helps keep the engine running during start-up.

OXYGEN SENSORS

The oxygen sensors measure the free oxygen concentration in the exhaust system. Too much free oxygen indicates a mixture that is too lean. Not enough free oxygen in the exhaust indicates a rich mixture. A signal is sent to the electronic control unit from the sensor to compensate for these variations in mixture. The air/fuel mixture is corrected by varying the injection duration pulse sent from the electronic control unit.

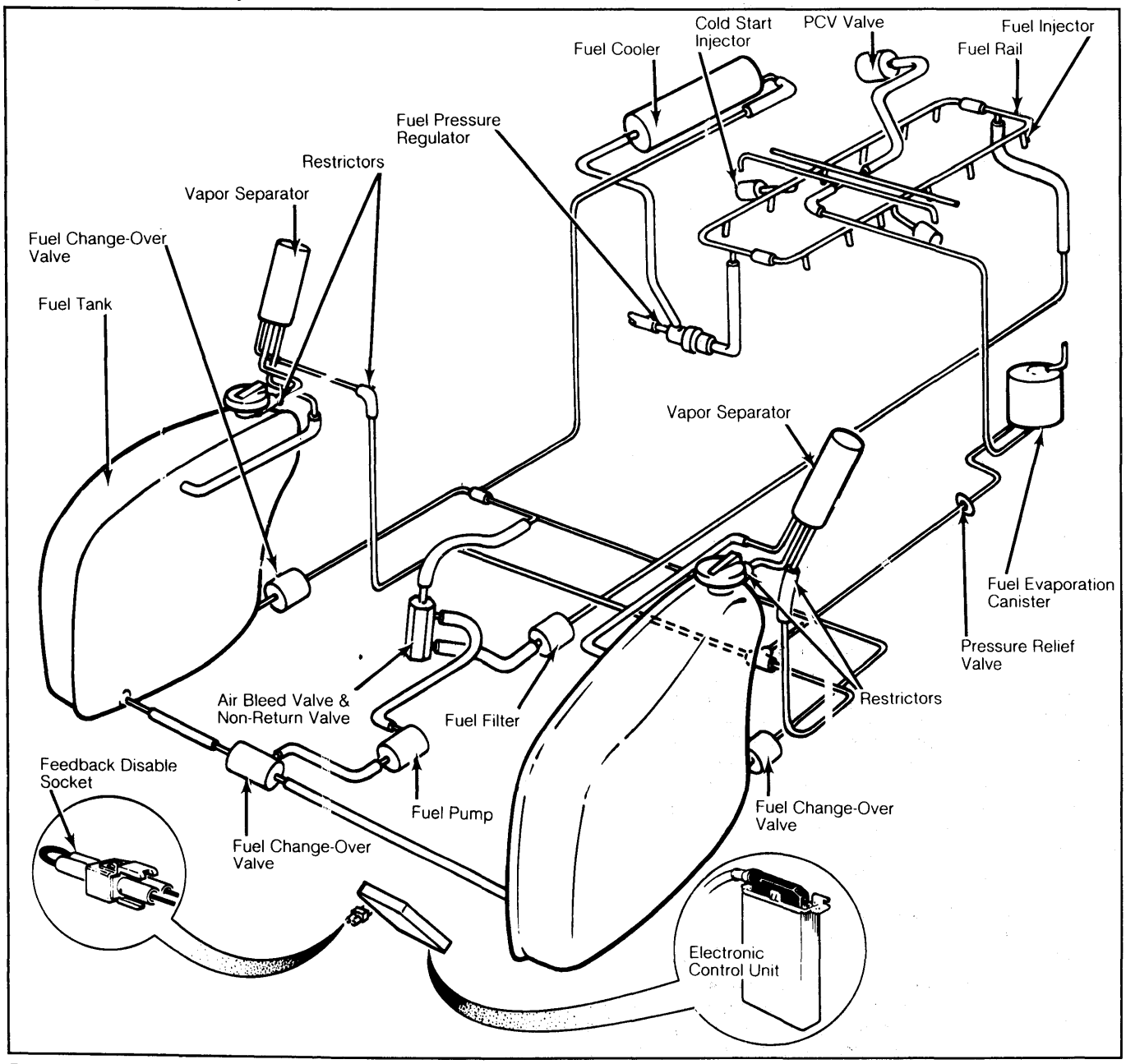
ENGINE SPEED SENSING

The engine speed signal is obtained from the distributor terminal of the coil. This signal triggers the electronic control unit to produce the time pulses to 2 groups of 6 injectors. The engine speed signal also modifies the injection duration which is already established by the manifold pressure switch signal.

FULL LOAD FUELING CIRCUIT

To obtain maximum engine power it is necessary to inhibit the closed loop control system and enrichen the fuel mixture. This is accomplished by using a vacuum operated electrical switch, sensing intake man-

Fig. 2: Jaguar XJS Fuel System



Fuel system is under constant pressure. Depressurize system before opening any connections in fuel system.

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ifold vacuum, and a micro switch, operated by the throttle pulley spindle. The 2 switches are wired in parallel so that either or both can signal the need for full load fueling.

The micro switch is mounted so that its' contacts are closed when the throttle is opened beyond a certain point. As the throttle is opened beyond this point, the switch signals the electronic control unit that full load fueling is necessary. The micro switch is necessary when the vehicle is traveling at high speeds under full load conditions when intake manifold vacuum is insufficient to close the vacuum operated full load switch.

The contacts of the vacuum operated switch are actuated by a spring loaded diaphragm that senses intake manifold vacuum. When the manifold vacuum falls to low levels due to part throttle full load operation, the diaphragm closes the switch contacts. This causes the fuel system to go into an open loop mode and enriches the fuel/air mixture about 12%.

TESTING

AUXILIARY AIR VALVE TEST

1) Remove the auxiliary air valve. Fully close the adjustment screw. Immerse the air valve bulb in boiling water and observe the valve head through the side port. Valve should move smoothly to the closed position.

2) Blow through the side port, no air should pass through the valve. Allow the valve bulb to cool. The valve head should move smoothly back to open the main air passage. If the valve does not operate correctly, replacement is required. Reset the adjusting screw before reinstalling valve.

COOLANT TEMPERATURE SENSOR TEST

1) Disconnect the battery ground cable. Remove the connector from the temperature sensor. Connect an ohmmeter between the terminals of the sensor. Resistance should be as noted in table.

2) Check the resistance between each of the sensor terminals and the sensor case. High or infinite resistance should be present. Reconnect the sensor connector and the negative battery cable.

TEMPERATURE SENSOR RESISTANCE

Temperature °F (°C)	Resistance Ohms
14 (-10)	9200
32 (0)	5900
50 (10)	3700
68 (20)	2500
86 (30)	1700
104 (40)	1180
122 (50)	840
140 (60)	600
158 (70)	435
176 (80)	325
194 (90)	250
212 (100)	190

FUEL SYSTEM PRESSURE TEST

1) Depressurize the fuel system. Loosen the hose clamp on the left-hand cold start injector supply hose to the fuel rail. Disconnect the cold start injector supply hose from the fuel rail. Connect a pressure gauge to open port on fuel rail.

2) Remove the distributor lead from the ignition coil. Ground terminal 85 of the pump relay. Turn ignition switch "ON" and note the pressure gauge reading. Fuel pressure should be 28-30 psi (2.0-2.2 kg/cm^2). Operate the fuel tank change-over switch and recheck reading.

3) If either or both readings are high, check for restricted or plugged return lines. If either or both readings are low, check for blockage in the supply line or a plugged filter.

4) If no blockage is present, the pressure regulator must be adjusted. If, after adjustment, the proper pressure cannot be obtained, the regulator or fuel pump may need to be replaced.

5) Turn ignition switch "OFF" and depressurize fuel system. Remove pressure gauge and reconnect fuel line to fuel rail. Turn ignition "ON" and check the fuel system for leaks. Remove the ground connection from terminal 85 of the pump relay and reconnect the distributor lead to the ignition coil.

INJECTOR WINDING TEST

1) Using an ohmmeter, check the resistance of each injector coil. Resistance should be 2.4 ohms at room temperature.

2) Connect one ohmmeter lead to injector housing and other lead to each of the injector terminals. Ohmmeter should read infinite resistance at both terminals. If any of the injector windings are shorted or open, the injector must be replaced.

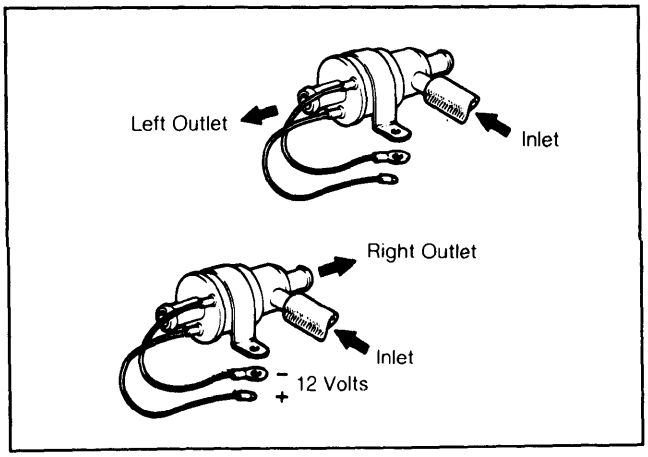
FUEL TANK CHANGE-OVER VALVE TEST

1) Disconnect the battery. Remove spare tire. Disconnect fuel lines and electrical connectors from change-over valves. Attach a short length of fuel line to inlet port of valve.

2) Blow into inlet port. Air should pass through to left side (as viewed from the inlet port) outlet port.

3) Apply 12 volts to wiring harness terminals of valve and blow into intake port again. Air should now pass through to opposite outlet port. *See Fig. 3.* If valve does not perform as specified, it must be replaced.

Fig. 3: Change-Over Valve Test



Air should pass to left without voltage applied and to right with voltage applied.

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FUEL PUMP RELAY TEST

1) Turn ignition switch "ON". The fuel pump should run for 1-2 seconds and then stop. If pump does not run, or does not stop, further diagnosis is necessary.

2) Check that inertia switch cut-out button is pressed in. Remove inertia switch cover and attaching screws and check to see that the wiring harness connection is secure. Remove wiring harness connector from switch and check for continuity across switch terminals.

3) Pull button on inertia switch out and check for an open circuit across switch terminals. Reconnect wiring harness connector and replace switch cover. Reset inertia switch button.

4) If inertia switch operates to specifications, ground terminal 85 of fuel pump relay and turn ignition switch "ON". Check for battery voltage at terminal 86 of main relay. If battery voltage is not present, check battery supply from ignition switch via inertia switch.

5) Check for battery voltage at terminal 87 of main relay. If no voltage is present, check for battery voltage across terminal 85 and ground connection of main relay. If voltage is now present, replace main relay.

6) Check for battery voltage at terminal 86 of pump relay. If no voltage is present, check for an open circuit between terminal 87 of main relay and terminal 86 of pump relay and correct as necessary.

7) Check for battery voltage at terminal 87 of pump relay. If no voltage is present, check for battery voltage across terminal 85 of pump relay and ground lead. If voltage is now present, replace pump relay.

8) Check for battery voltage at terminal 30 on both relays and at fuel pump positive terminal. If no voltage exists, check for an open circuit between terminal 87 of pump relay and positive terminal of pump and correct as necessary.

9) If pump still does not operate, check ground connections or replace pump.

AIR TEMPERATURE SENSOR TEST

1) Disconnect battery terminals and air temperature sensor connector. Connect an ohmmeter between the sensor terminals. The ohmmeter reading should vary with temperature and should be as specified in the table.

2) Check resistance between sensor body and each of the terminals. Resistance should be high or infinite. If sensor does not meet specifications, replacement is required.

AIR TEMPERATURE SENSOR RESISTANCE

Air Temperature °F (°C)	Resistance Ohms
14 (-10)	960
32 (0)	640
50 (10)	435
68 (20)	300
86 (30)	210
104 (40)	150
122 (50)	108
140 (60)	180

THERMOTIME SWITCH TEST

1) To test thermotime switch, it is necessary to determine temperature rating of switch. The switch is rated at 59°F (15°C) or 95°F (35°C). The rating is stamped on flat part of switch body.

2) After determining switch rating, coolant temperature must be measured. The test procedure to use depends on whether coolant temperature is above or below the rated value of switch.

Coolant Temperature Higher Than Switch Rating

1) Disconnect negative battery cable and thermotime switch connector. Connect an ohmmeter between terminal W of thermotime switch and ground.

2) Resistance should be high or infinite. Replace switch if low resistance or a short circuit reading is obtained.

Coolant Temperature Lower Than Switch Rating

1) Disconnect negative battery cable and thermotime switch connector. Connect an ohmmeter between terminal W of thermotime switch and ground.

2) A very low resistance (continuity) should be measured. Apply 12 volts to terminal G of thermotime switch.

3) Using a stop-watch, measure the time delay between applying voltage and the ohmmeter reading changing from low to high resistance. Time delay should be as specified in the table. Replace switch if it does not meet specifications.

THERMOTIME SWITCH DELAY

Coolant Temp. °F (°C)	Switch Rated 59°F (15°C)	Switch Rated 95°F (35°C)
-4 (-20)	8 Secs.	8 Secs.
14 (-10)	5.7 Secs.	6.5 Secs.
32 (0)	3.5 Secs.	5 Secs.
50 (10)	1.2 Secs.	3.5 Secs.
68 (20)		2.0 Secs.
86 (30)		0.5 Secs.
95 (35)		0 Secs.

COLD START SYSTEM TEST

CAUTION: This test results in fuel vapor being present in engine compartment. All necessary precautions against fire or explosion should be taken.

Remove 2 setscrews and washers retaining cold start injectors in intake manifold. Remove the start injectors and place them in a container to collect sprayed fuel. Disconnect distributor lead from the coil.

Engine Temperature Below 59°F (15°C)

1) Turn ignition switch "ON" and check the cold start injectors for any leakage. Crank the engine for a few revolutions. Injectors should spray while engine cranks. Do not operate the starter any longer than necessary to complete this test.

2) If injectors do not spray, crank engine and check for battery voltage at cold start injector supply (Pink/White) cable. If voltage is present, check ground connections and wiring harness connectors at cold start injectors. Repair as necessary. If no defects are found, injectors are faulty and must be replaced.

3) Crank engine and check for battery voltage at terminal 87 of cold start relay. If voltage is present,

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check wiring harness between relay and cold start injectors and repair as necessary.

4) Crank engine and check for battery voltage at terminal 30 of cold start relay. If no voltage is present, check supply wire from pump relay and repair as necessary. If voltage is present, relay is not being energized or contacts are faulty.

5) Crank engine and check for battery voltage at terminal 86 of cold start relay. If voltage is present, relay is not being energized or contacts are faulty. If no voltage is present, supply wire from starter circuit is faulty and must be repaired.

6) Crank engine and check for battery voltage at terminal 85 of cold start relay. If voltage is present and relay is not energizing, there is a problem with thermotime switch circuit. Disconnect wiring harness from terminal 85 and jump terminal 85 to ground. Relay should now energize. If not, relay is faulty and must be replaced.

7) If relay energizes, check for battery voltage at terminal 87 of cold start relay. If no voltage is present at terminal 87, the contacts of relay are faulty and the relay must be replaced.

8) Reinstall cold start injectors and all cables or connectors that were removed.

Engine Temperature Above 59°F (15°C)

1) Crank engine and check voltage at terminal 87 of cold start relay. Voltage should be 0 volts. If battery voltage is present, remove wiring harness connector from terminal 85 of the cold start relay.

2) If voltage is now 0 volts, the thermotime switch is at fault and must be replaced. If battery voltage is still present at terminal 87 after disconnecting terminal 85, the cold start relay is faulty and must be replaced.

3) If cold start injectors pass fuel when no voltage is present at terminal 87, the injectors must be replaced.

OVER-RUN VALVE TEST

1) Loosen hose clamps at air filter back plates. Remove inlet hoses from back plates. Block inlet ports and start engine. If idle speed is now correct, reconnect 1 of the valves. Start engine.

2) If idle speed is not correct, connected valve is faulty and requires replacement. If idle speed is correct, reconnect second valve. If idle speed is not correct now, the second valve is faulty and must be replaced.

REMOVAL & INSTALLATION

AUXILIARY AIR VALVE

CAUTION: This procedure must not be performed on a hot engine.

Removal

1) Disconnect battery ground cable. Remove radiator cap to relieve any residual pressure left in cooling system. Reinstall radiator cap. Loosen clamps securing air hoses to auxiliary air valve and remove hoses.

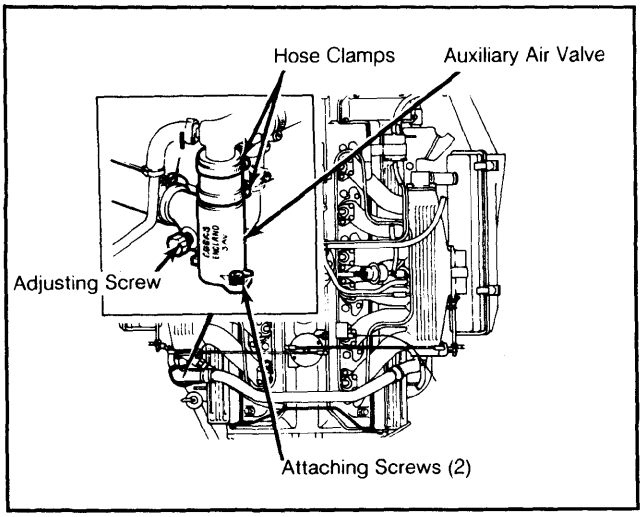
2) Remove 2 screws and washers securing auxiliary air valve to coolant pipe. Remove auxiliary air valve from coolant pipe and clean off all old gasket material. Note the number of turns required to turn adjusting screw all the way in. *See Fig. 4.*

Installation

To install, reverse removal procedure and note the following:

- Set adjusting screw on replacement valve to same number of turns noted in disassembly.
- Use non-hardening sealer on new gasket.
- Check coolant level and add coolant if necessary.
- Check and adjust idle speed if necessary.

Fig. 4: Auxiliary Air Valve Removal



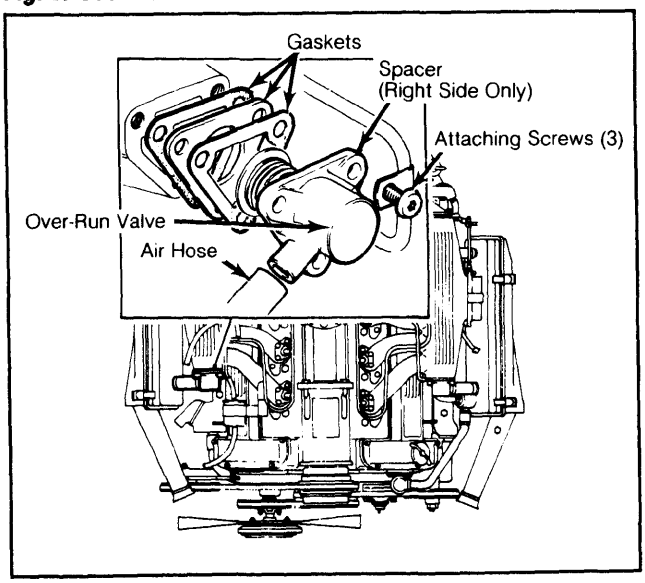
Do not remove this valve when engine is hot.

OVER-RUN VALVE

Removal & Installation

Loosen hose clamp securing air inlet hose to over-run valve. Remove 3 screws securing over-run valve to intake manifolds. Remove over-run valves from manifold making sure to keep spacer located on right-side valve. *See Fig. 5.* To install reverse removal procedure.

Fig. 5: Over-Run Valve Removal



Do not discard spacer located on right side valve.

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COOLANT TEMPERATURE SENSOR

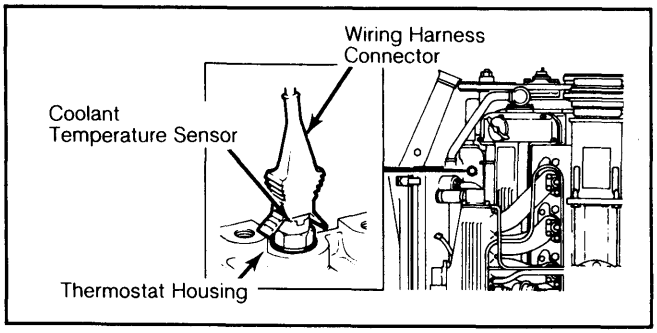
CAUTION: This procedure must not be performed on a hot engine.

Removal & Installation

1) Disconnect battery ground cable and coolant temperature sensor connector. Remove radiator cap to release any residual pressure left in cooling system. Reinstall radiator cap.

2) Apply sealing compound to threads of new temperature sensor and install new sealing washer. Remove temperature sensor from thermostat housing and immediately install new sensor to minimize coolant loss. *See Fig. 6.* To complete installation, reverse removal procedure and check coolant level.

Fig. 6: Coolant Temperature Sensor Removal



Do not remove this sensor when engine is hot.

THERMOTIME SWITCH

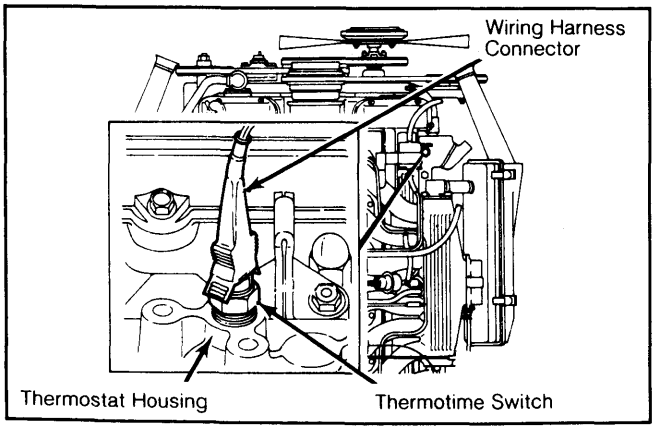
CAUTION: This procedure must not be performed on a hot engine.

Removal & Installation

1) Disconnect battery ground cable and thermotime switch connector. Remove radiator cap to release any residual pressure left in cooling system. Reinstall radiator cap.

2) Apply sealing compound to threads of new thermotime switch and install new sealing washer. Remove thermotime switch from thermostat housing and immediately install new switch to minimize coolant loss. *See Fig. 7.* To complete installation, reverse removal procedure and check coolant level.

Fig. 7: Thermotime Switch Removal



Do not remove this switch when engine is hot.

TRIGGER UNIT

Removal & Installation

1) Disconnect battery ground cable and the trigger unit wiring harness connector. Disconnect manifold pressure sensor pipe at tee and secure it out of way from the distributor. Remove distributor cap and rotor.

2) Remove 4 bolts securing trigger unit to distributor. Pull wire grommet out of distributor and remove trigger unit. To install, reverse removal procedure.

THROTTLE SWITCH

Removal & Installation

Disconnect battery ground cable and remove wiring harness connector from throttle switch. Remove throttle cross-rods from throttle pulley. Remove throttle pulley plate from throttle pedestal. Remove throttle switch attaching screws and lift switch clear of engine. To install, reverse removal procedure.

ELECTRONIC CONTROL UNIT

Removal & Installation

Disconnect battery ground cable. Remove control unit cover from the trunk. Remove 2 bolts securing control unit. Disconnect wiring harness plug and vacuum hose from control unit. Remove control unit from trunk. To install, reverse removal procedure.

FUEL TANK CHANGE-OVER VALVES

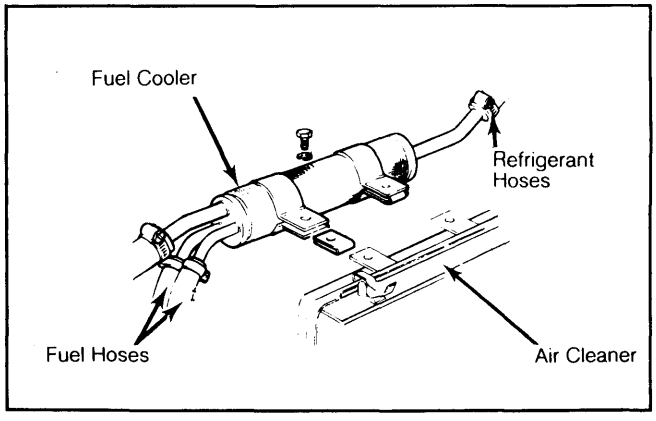
Removal & Installation

Disconnect battery ground cable. Remove spare tire. Clamp off all hoses attached to the valves. Loosen hose clamps and remove hoses. Disconnect wiring harness connections for the valves. Remove attaching screws and valves from the trunk floor. To install, reverse removal procedure.

FUEL COOLER

CAUTION: The fuel cooler/air conditioning system contains refrigerant gas under pressure. This gas can cause blindness if released improperly. It is mandatory that the air conditioning system be depressurized according to standard service procedures, prior to disconnecting the fuel cooler. All necessary precautions must be taken when depressurizing the system to prevent injury.

Fig. 8: Fuel Cooler Removal



Depressurize A/C system before removing cooler.

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Removal & Installation

Depressurize fuel system. Depressurize air conditioning system. Disconnect refrigerant inlet and outlet hoses from fuel cooler. *See Fig. 8.* Plug refrigerant hoses immediately to prevent entry of moisture into system. Clamp off both fuel lines connected to cooler. Disconnect fuel lines from cooler. Remove attaching screws and fuel cooler. To install, reverse removal procedure and recharge the air conditioning system with refrigerant.

FUEL PRESSURE REGULATOR

Removal & Installation

Depressurize fuel system. Remove the fuel cooler-to-pressure regulator hose from the regulator. Remove regulator securing nut. Disconnect regulator pipe from fuel rail. Move regulator upward and disconnect vacuum hose. Remove regulator-to-fuel rail hose and remove regulator. To install, reverse removal procedure.

FUEL PUMP

Removal & Installation

Disconnect battery and remove spare tire. Clamp off fuel lines connected to pump. Loosen hose clamps and remove fuel lines. Disconnect pump electrical connector. Loosen screws securing pump clamp and remove pump. To install, reverse removal procedure.

INJECTORS

Removal & Installation

Depressurize fuel system and disconnect negative battery cable. Remove the appropriate fuel rail(s). Disconnect injector wiring harness connector. Remove injector clamp nuts. Remove injector and clamp. Remove and discard injector seal. To install, reverse removal procedure and install a new injector seal.

FUEL RAIL

Removal & Installation

1) Depressurize fuel system and disconnect negative battery cable. Remove the appropriate throttle rod from throttle pedestal and swing it out of the way. Disconnect throttle cable and throttle kick-down switch from throttle pedestal.

2) Disconnect cross-pipe from intake manifold and fuel rail. Loosen regulator valve hose clamp. Disconnect cold start injector feed pipe from fuel rail. Remove Econocruise cable harness and Econocruise pipe from fuel rail.

3) Remove fuel feed and return pipes. Disconnect fuel rail halves. Loosen the fuel rail-to-injector clamps and remove fuel rail from injectors. To install, reverse removal procedure.

COLD START INJECTORS

Removal & Installation

1) Depressurize fuel system and disconnect negative battery cable. Clamp off fuel line leading to cold start injector. Remove wiring harness connector from cold start injector. Loosen hose clamp and disconnect fuel line from cold start injector.

2) Remove 2 setscrews attaching injector to manifold and remove injector. Inspect injector gasket and replace if necessary. To install, reverse removal procedure.

ADJUSTMENTS

NOTE: For all on-vehicle adjustments not covered in this article, see appropriate TUNE-UP SERVICE PROCEDURES article.

THROTTLE LINKAGE ADJUSTMENT

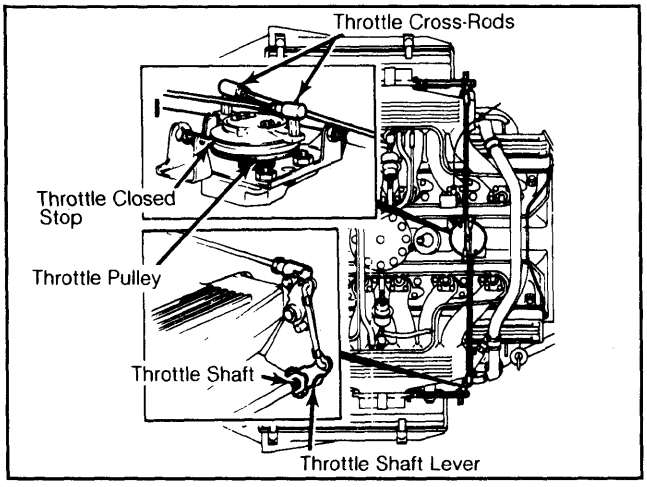
1) Adjust throttle closed stop if necessary. Release throttle cross-rods from throttle pulley. Loosen clamps securing levers to rear of throttle shafts.

2) With butterfly valve against closed stop, bell crank against stop, and play in coupling taken up in opening direction, tighten clamp to lock throttle lever to shaft. Repeat for other side of engine.

3) Install cross-rods onto ball connectors on throttle pulley. *See Fig. 9.* The rods must go into place without moving linkage or pulley. If adjustment is necessary, loosen lock nuts on cross-rods and adjust length of rods so that they will align with ball connectors when pulley is against closed stop.

4) Adjust fully open throttle stop so that it just touches pulley when throttle butterfly stop arms are against throttle housing. Check operation of throttle switch and kickdown switch.

Fig. 9: Throttle Linkage Adjustment Location



Check throttle and kickdown switch operation after adjustment.

THROTTLE BUTTERFLY VALVE

NOTE: Do not adjust only 1 valve. Whenever adjustments are made, always adjust both butterfly valves.

1) Remove both air cleaners. Loosen lock nut on butterfly valve stop screw. Turn stop screw all the way in. Make sure that butterfly valve closes fully.

2) Insert a 0.002" (0.05 mm) feeler gauge between top of butterfly valve and housing to hold valve open. *See Fig. 10.* Set stop screw so that it just touches stop arm. Tighten lock nut. Press stop arm against stop screw and withdraw feeler gauge.

3) Repeat procedure on other side of engine. Seal threads of adjusting screws with a drop of paint. Replace air cleaners. Check throttle linkage and kick-

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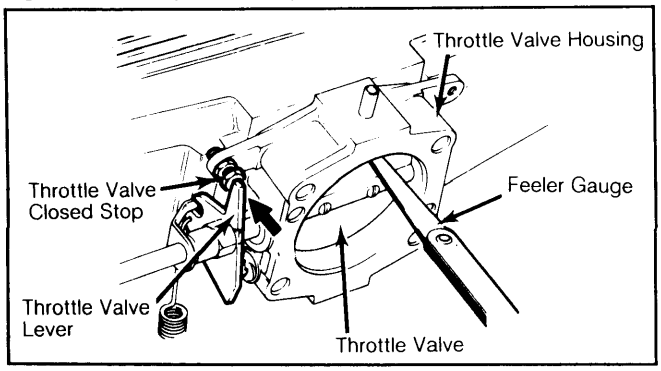
down switch adjustment. Check operation of throttle switch.

Fig. 10: Butterfly Valve Adjustment



Use a 0.002" (0.05 mm) feeler gauge to set throttle opening.

FUEL PRESSURE REGULATORS

NOTE: Fuel pressure should only be adjusted after the complete system has been checked.

1) Depressurize fuel system. Disconnect left-side cold start injector fuel supply hose from fuel rail. Connect a pressure gauge to fuel rail. Remove screws securing both pressure regulators to intake manifolds.

2) Clamp off fuel line leading to left-bank pressure regulator inlet. Start engine. Loosen lock nuts on both pressure regulators. Turn adjuster bolt on right-bank pressure regulator until gauge reads 29.6 psi (2.1 kg/cm²).

3) Remove clamp from left-bank pressure regulator inlet and transfer it to right-bank pressure regulator inlet. Turn adjuster bolt on left-bank pressure regulator until the gauge reads 29.6 psi (2.1 kg/cm²).

4) Release clamp and ensure gauge reads 28.5-30 psi (2.0-2.2 kg/cm²). Tighten lock nuts on both pressure regulators. Turn off ignition. Depressurize fuel system and remove pressure gauge. Reconnect cold start injector line and test system for leaks.

Fig. 11: Lucas-Bosch "P" Type Fuel Injection System Wiring Diagram