

# Fuel System

## Fuel Pressure Relieving

### WARNING

- Do not smoke while working on the fuel system. Keep open flames or sparks from the work area.
- Be sure to relieve fuel pressure while the engine is off.

NOTE: Before disconnecting fuel pipes or hoses, release pressure from the system by loosening the 6 mm service bolt at top of the fuel filter.

1. Disconnect the battery negative cable from the battery negative terminal.
2. Use a box end wrench on the 6 mm service bolt at top of the fuel filter, while holding the special banjo bolt with another wrench.
3. Place a rag or shop towel over the 6 mm service bolt.
4. Slowly loosen the 6 mm service bolt one complete turn.

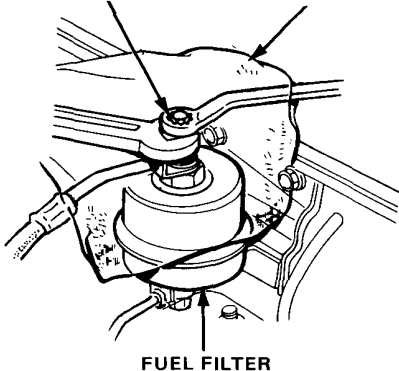
### NOTE:

- A fuel pressure gauge can be attached at the 6 mm service bolt hole.
- Always replace the washer between the service bolt and the Special Banjo Bolt, whenever the service bolt is loosened to relieve fuel pressure. Replace all washers whenever the bolts are removed to disassemble parts.

### SERVICE

12N-m (1.2 kg-m, 9 lb-ft)

SHOP TOWEL

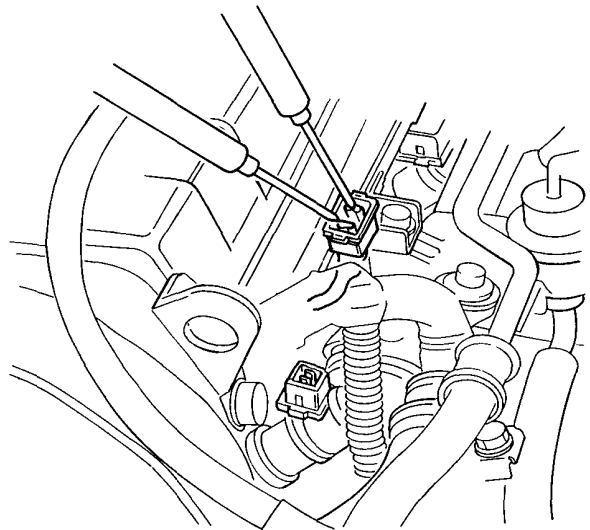


## Injector Testing

NOTE: Check the following items before testing idle speed, ignition timing, valve clearance and idle CO %.

### If the engine will run.

1. With the engine idling, disconnect injector couplers, and inspect the change in the idling speed.
- If the idle speed drop is almost the same for each cylinder, the injectors are normal.
  - If the idle speed or quality remains the same when you disconnect a particular injector, check for voltage at that coupler.



- If voltage fluctuates between 0 and 2 volts, replace the injector.
- If there is no voltage, check the following:
  - Whether there is any short-circuiting, wire breakage, or poor connection in the wiring between the resistor and the injector.
  - Whether the resistor is normal.
  - Whether there is any short-circuiting, wire breakage, or poor connection in the wire between the resistor and control unit.

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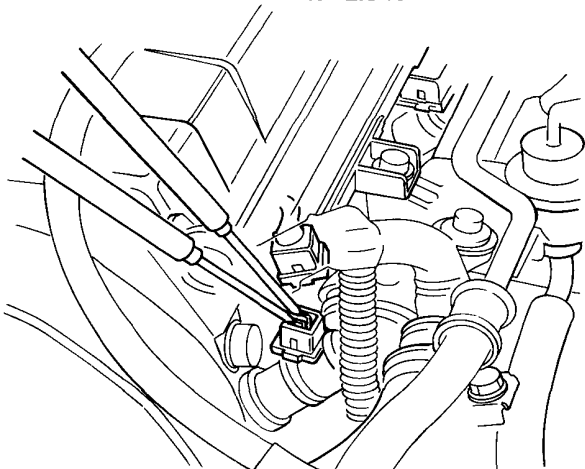
# Fuel System

## Injector Testing (cont'd)

If the engine cannot be started.

1. Remove the coupler of the injector, and measure the resistance between the terminals of the injector.

Resistance should be: 1.5–2.5  $\Omega$



- If resistance is not as specified, replace the injector.
- If the resistance is normal, check the following:
  - Whether there is any short-circuiting, wire breakage, or poor connection in the wiring between the resistor and the injector.
  - Whether the resistor is normal.
  - Whether there is any short-circuiting, wire breakage, or poor connection in the wire between the resistor and control unit.

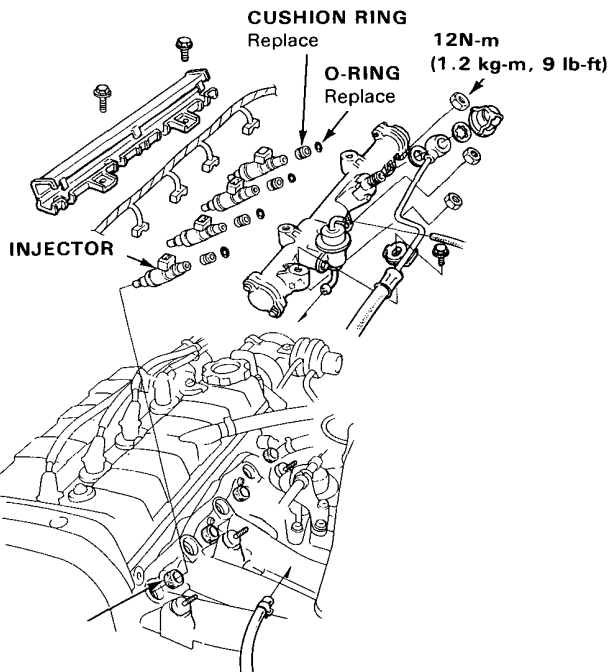
## Injector Replacement

**WARNING** Do not smoke during the work. Keep open flames away from your work area.

1. Disconnect the battery negative cable from the battery negative terminal.
2. Relieve fuel pressure (page 11-37).
3. Disconnect the coupler of the injector.
4. Disconnect the vacuum hose and fuel return hose from the pressure regulator.

**NOTE:** Place a rag or shop towel over the hose and tube before disconnecting them.

5. Loosen the retainer nuts on the fuel pipe.
6. Disconnect the fuel pipe.
7. Remove the injector from the intake manifold.



8. Slide new cushion rings onto the injector.
9. Coat new O-rings with clean engine oil and put them on the injectors.

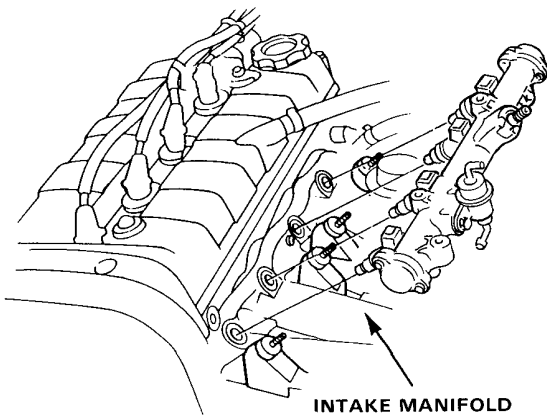


10. Insert the injectors into the fuel pipe first.

**CAUTION:** To prevent damage to the O-ring, insert the injector into the fuel pipe squarely and carefully.

11. Coat new seal rings with clean engine oil and press them into the intake manifold.
12. Install the injector and fuel pipe assembly in the manifold.

**CAUTION:** To prevent damage to the O-ring, install the injectors in the fuel pipe first, then install them in the intake manifold.

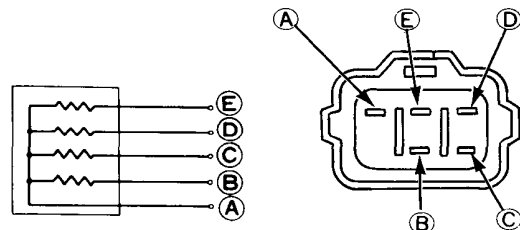
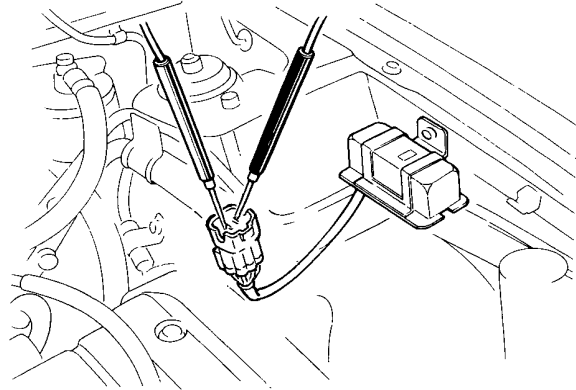


13. Tighten the retainer nuts.
14. Connect the vacuum hose and fuel return hose to the pressure regulator.
15. Install the couplers on the injectors.
16. Turn the ignition switch ON but do not operate the starter. After the fuel pump runs for approximately two seconds, the fuel pressure in the fuel line rises. Repeat this two or three times, then check whether there is any fuel leakage.

## Fuel System Resistor

1. Disconnect the resistor connector.
2. Check for resistance between each of the resistor terminals (E, D, C and B) and the power terminal (A).

Resistance should be: 5–7  $\Omega$



- Replace the resistor with a new one if any of the resistances are outside of the specification.

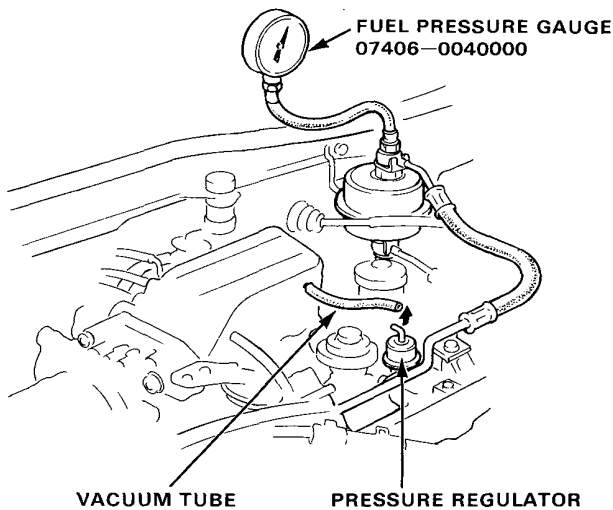
# Fuel System

## Fuel Pressure Testing

1. Relieve fuel pressure (page 11-37).
2. Remove the service bolt on the top of the fuel filter while holding the banjo bolt with another wrench and attach the fuel pressure gauge.
3. Start the engine. Measure the fuel pressure with the engine idling and the vacuum hose of the pressure regulator disconnected.

Pressure should be:

$255 \pm 20$  kPa ( $2.55 \pm 0.2$  kg/cm<sup>2</sup>,  $36 \pm 3$  psi)



- If the fuel pressure is not as specified, first check the fuel pump (page 11-42). If the pump is OK, check the following:
  - If the pressure is higher than specified, inspect for:
    - Pinched or clogged fuel return hose or piping.
    - Faulty pressure regulator.
  - If the pressure is lower than specified, inspect for:
    - Clogged fuel filter
    - Pinched or clogged fuel hose from the fuel tank to the fuel pump
    - Pressure regulator failure
    - Leakage, in the fuel line
    - Pinched, broken or disconnected regulator vacuum hose

## Pressure Regulator

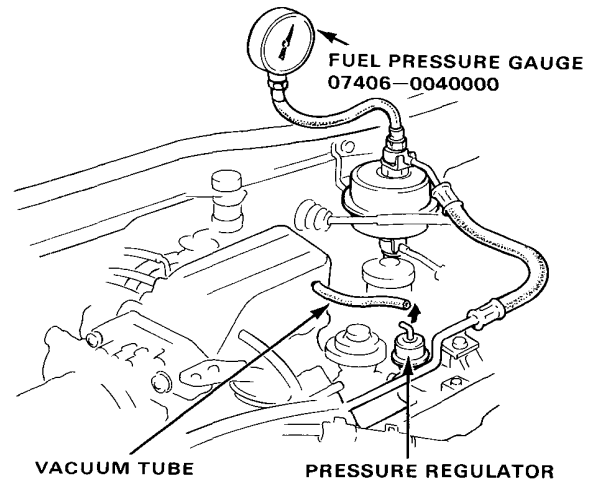
### Testing:

**WARNING** Do not smoke during the test. Keep open flames away from your work area.

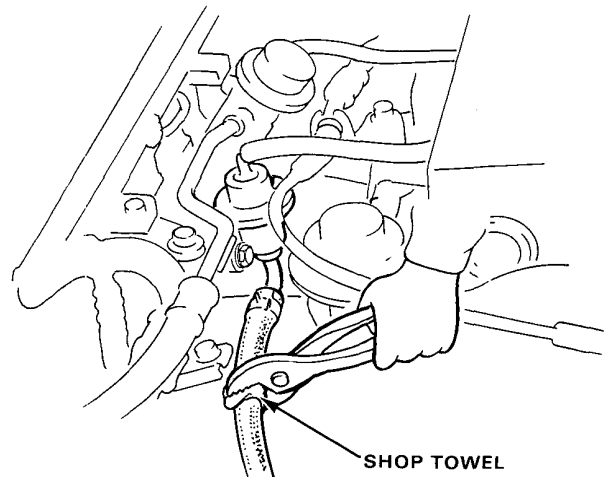
If the fuel pressure is not as specified, check the fuel pump first, then check the regulator.

1. Check for pinched or broken vacuum hoses.
2. Check that the fuel pressure rises by disconnecting the vacuum hose from the regulator.

Pressure should be:  $255 \pm 20$  kPa  
( $2.55 \pm 0.2$  kg/cm<sup>2</sup>,  $36 \pm 3$  psi)



- If the fuel pressure does not rise, pinch the return hose 2 or 3 times lightly.



- If the fuel pressure is not as specified, replace the pressure regulator.



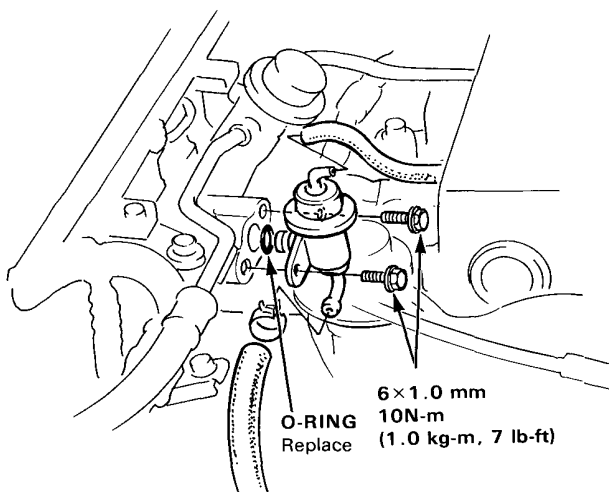
## Replacement:

**WARNING** Do not smoke while working on fuel system. Keep open flame away from work area.

1. Disconnect the negative terminal of the battery.
2. Place a shop towel under the pressure regulator, then relieve fuel pressure (page 11-37).
3. Disconnect the vacuum tube and fuel return hose.
4. Remove the two 6 mm retainer bolts.

### NOTE:

- Replace the O-rings.
- When assembling the regulator, apply clean engine oil to the O-ring and assemble it into its proper position, taking care not to damage the O-ring.

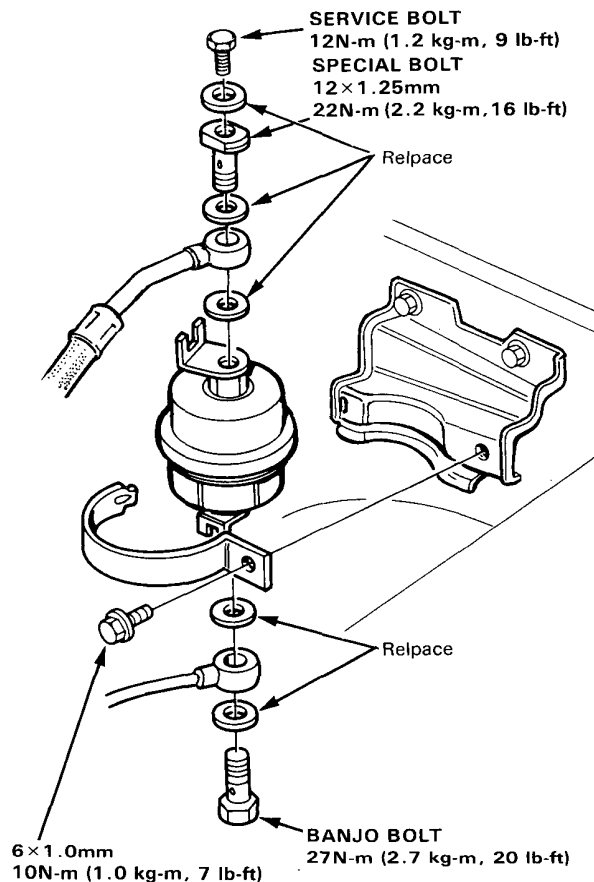


## Fuel Filter Replacement

**WARNING** Do not smoke while working on fuel system. Keep open flame away from work area.

The filter should be replaced: every 40,000 km (24,000 miles), or whenever the fuel pressure drops below the specified value ( $255 \pm 20$  kPa,  $2.55 \pm 0.2$  kg/cm<sup>2</sup>,  $36 \pm 3$  psi with the vacuum pressure hose disconnected) after making sure that the fuel pump and the pressure regulator are OK.

1. Disconnect the battery cable from the negative terminal.
2. Place a shop towel under and around the fuel filter.
3. Relieve fuel pressure (page 11-37).
4. Remove the two 12 mm sealing bolts from the filter.
5. Remove the fuel filter clamp and fuel filter.
6. When assembling, use new washers, as shown.

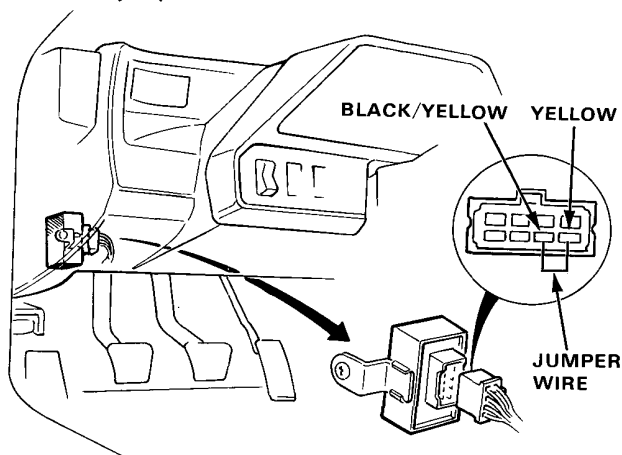


# Fuel System

## Fuel Pump Inspection

**WARNING** Do not smoke during the test. Keep open flame away from your work area.

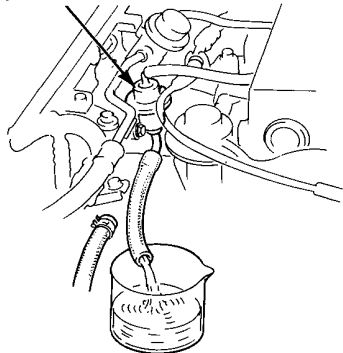
1. With the ignition switch OFF, disconnect the coupler from the main relay behind the fuse box.
2. Connect the Yellow wire and Black/Yellow wire with a jumper wire.



3. Relieve fuel pressure as described on page 11-37, then tighten the service bolt.
4. Disconnect the fuel return pipe from the regulator.
5. Turn the ignition switch ON, measure the amount of fuel flow for 10 seconds, then turn the ignition switch OFF.

**Amount should be:**  
230 cc (7.8 oz) min. in 10 seconds at 12 V

### PRESSURE REGULATOR



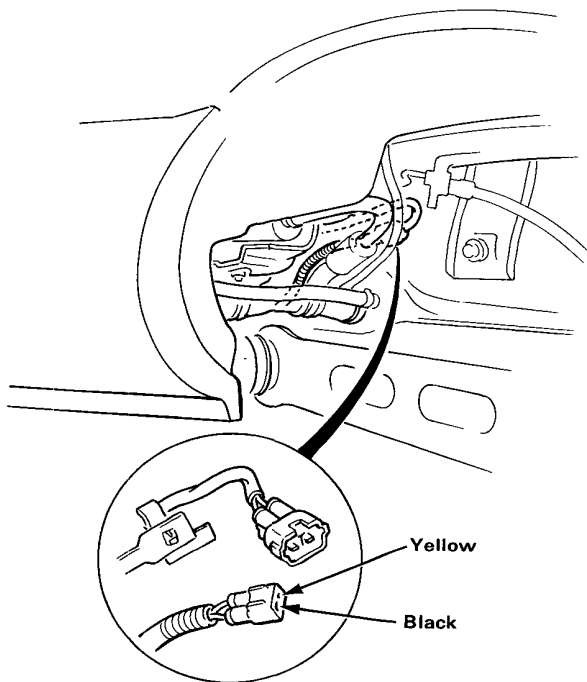
- If fuel flow is less than 230 cc (7.8 oz), or there is no fuel flow, check for:
  - Fuel pump failure
  - Clogged fuel filter
  - Clogged fuel line
  - Pressure regulator failure

If you suspect a problem with the fuel pump, check that the fuel pump actually runs; it should make noise when it is ON. If the pump does not make noise, check as follows.

1. Jack up car and place jack stands in proper locations.
2. Remove left rear wheel.
3. Remove the fuel pump cover and disconnect Yellow and Black wires.

**CAUTION:** Be sure to turn the ignition switch OFF before disconnecting the wires.

4. Check that battery voltage is available at the fuel pump wire couplers when the ignition switch is turned ON. (Positive probe to the Yellow wire, negative probe to the Black wire)



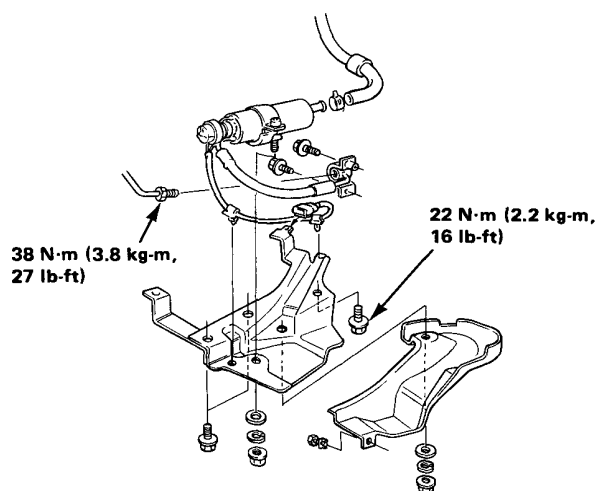
- If battery voltage is available, replace the fuel pump.
- If there is no voltage, check the main relay and wire harness.



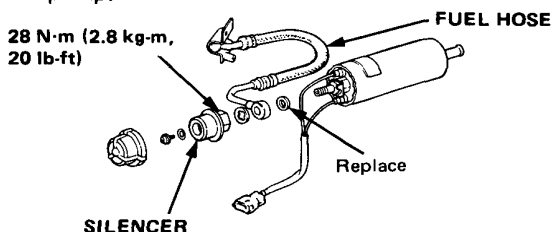
## Fuel Pump Replacement

**WARNING** Do not smoke while working on fuel system. Keep open flames away from your work area.

1. Jack up car and place jack stands in proper locations.
2. Remove left rear wheel.
3. Remove the fuel pump cover.
4. Remove the three bolts, then remove the fuel pump with its mount.
5. Disconnect the fuel lines and electrical wires at the connectors.



6. Remove the clamp and then remove the fuel pump.
7. Remove the fuel line and the silencer from the pump.

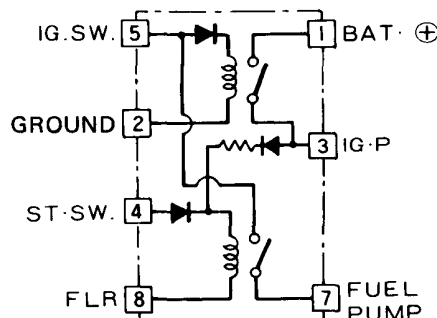
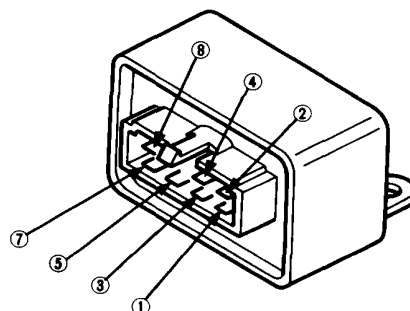


**CAUTION:** Do not disassemble the pump

8. Install the new fuel pump on its mount.
9. Carefully clean the sealing surface of the flared fuel line, then install it on the fuel pump and tighten the flare nut. Reinstall the fuel hose and silencer on the front of the fuel pump.
10. Reconnect the electrical wires and reinstall the fuel pump.
11. Have someone turn the ignition switch to ON while you watch the fuel pump connections for leaks. Repeat this check two or three times to be sure that there are no fuel leaks.

## Main Relay Testing

1. Remove the main relay, near the under-dash fuse box.
  2. Connect the battery positive terminal to the No. 4 terminal and the battery negative terminal to the No. 8 terminal of the main relay. Then check for continuity between the No. 5 terminal and No. 7 terminal of the main relay.
- If there is continuity, go on to step 3.
  - If there is no continuity, replace the relay.



3. Connect the battery positive terminal to the No. 5 terminal and the battery negative terminal to the No. 2 terminal of the main relay. Then check that there is continuity between the No. 1 terminal and No. 3 terminal of the main relay.
- If there is continuity, go on to step 4.
  - If there is no continuity, replace the relay.
4. Connect the battery positive terminal to the No. 3 terminal and battery negative terminal to the No. 8 terminal of the main relay. Then check that there is continuity between the No. 5 terminal and No. 7 terminal of the main relay.
- If there is continuity, the relay is OK. If the fuel pump still does not work, go to Harness Testing in the next column.
  - If there is no continuity, replace the relay.

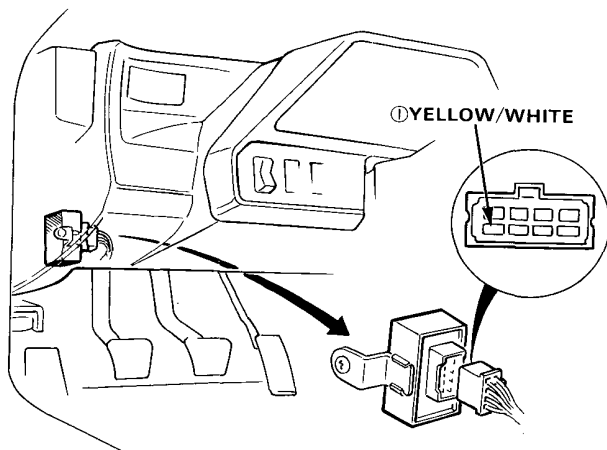
# Fuel System

## Harness Testing

1. Keep the ignition switch in the OFF position.
2. Disconnect the main relay coupler.
3. Connect the positive probe of the circuit tester to the Yellow/White wire ① in the coupler and ground the negative probe of the tester to body ground.

- Battery voltage should be available.

- If there is no voltage, check the wiring between the battery and the main relay as well as the ECU fuse in the engine compartment.

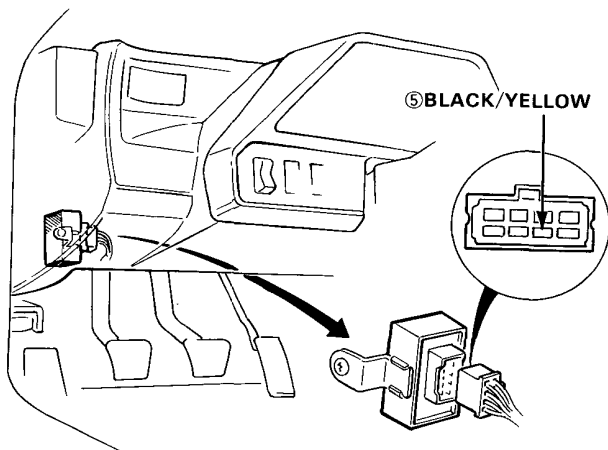


4. Connect the positive terminal of the tester to the Black/Yellow wire ⑤ of the coupler and ground the negative terminal of the tester to body ground.

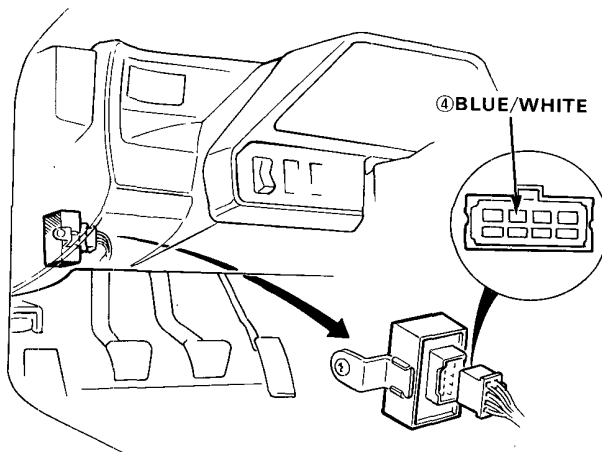
5. Turn the ignition switch ON.

- The tester should indicate battery voltage.

- If there is no voltage, check the wiring from the ignition switch and the main relay as well as fuse No. 4.



6. Connect the positive terminal of the tester to the Blue/White wire ④ in the coupler and ground the negative terminal to the body.



7. Turn the ignition switch to START position.

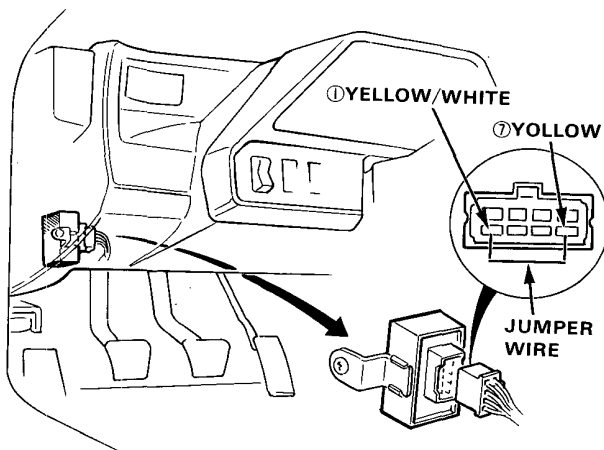
- The tester should indicate battery voltage.

- If there is no voltage, check the wiring between the ignition switch and main relay as well as the ECU fuse (10A)

8. Connect a jumper wire between the Yellow/White wire ① and Yellow wire ⑦ in the coupler.

- The fuel pump should work.

- If the fuel pump does not work, check the wiring between the battery and fuel pump and the wiring from the fuel pump to the ground (Black wire).

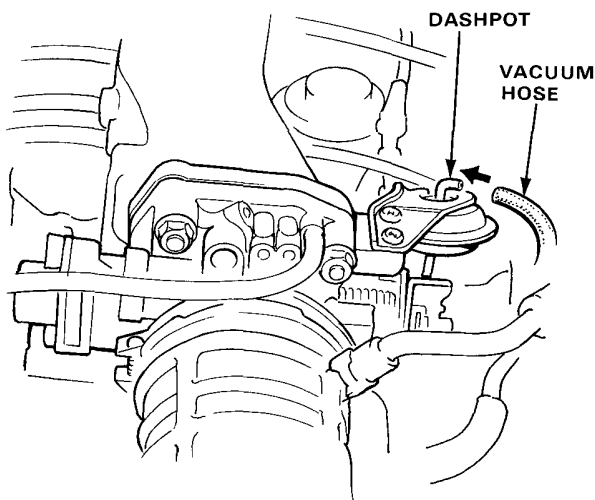




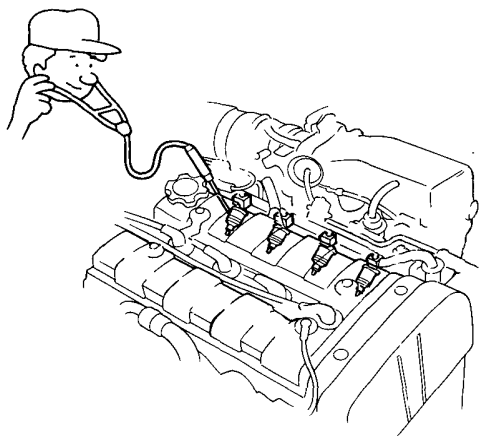


## Fuel Cut-Off System

1. Start the engine and warm it up to operating temperature. Check that the engine idles smoothly.
2. On cars equipped with manual transmission: disconnect the vacuum hose from the dashpot of the throttle body.



3. Use a stethoscope to confirm that the injectors are working; they should make a clicking sound.



4. While listening to an injector, raise the engine speed to 3,000 rpm then release the throttle; the clicking of the injectors should cease momentarily when releasing the throttle.
  - If the clicking does not cease, check the ECU, throttle angle sensor, or wiring between the injector and ECU. Consult the Troubleshooting Chart according to the pattern of the self-diagnosis lamps on the ECU (page 11-11).

# Fuel System

## Fuel Tank Replacement

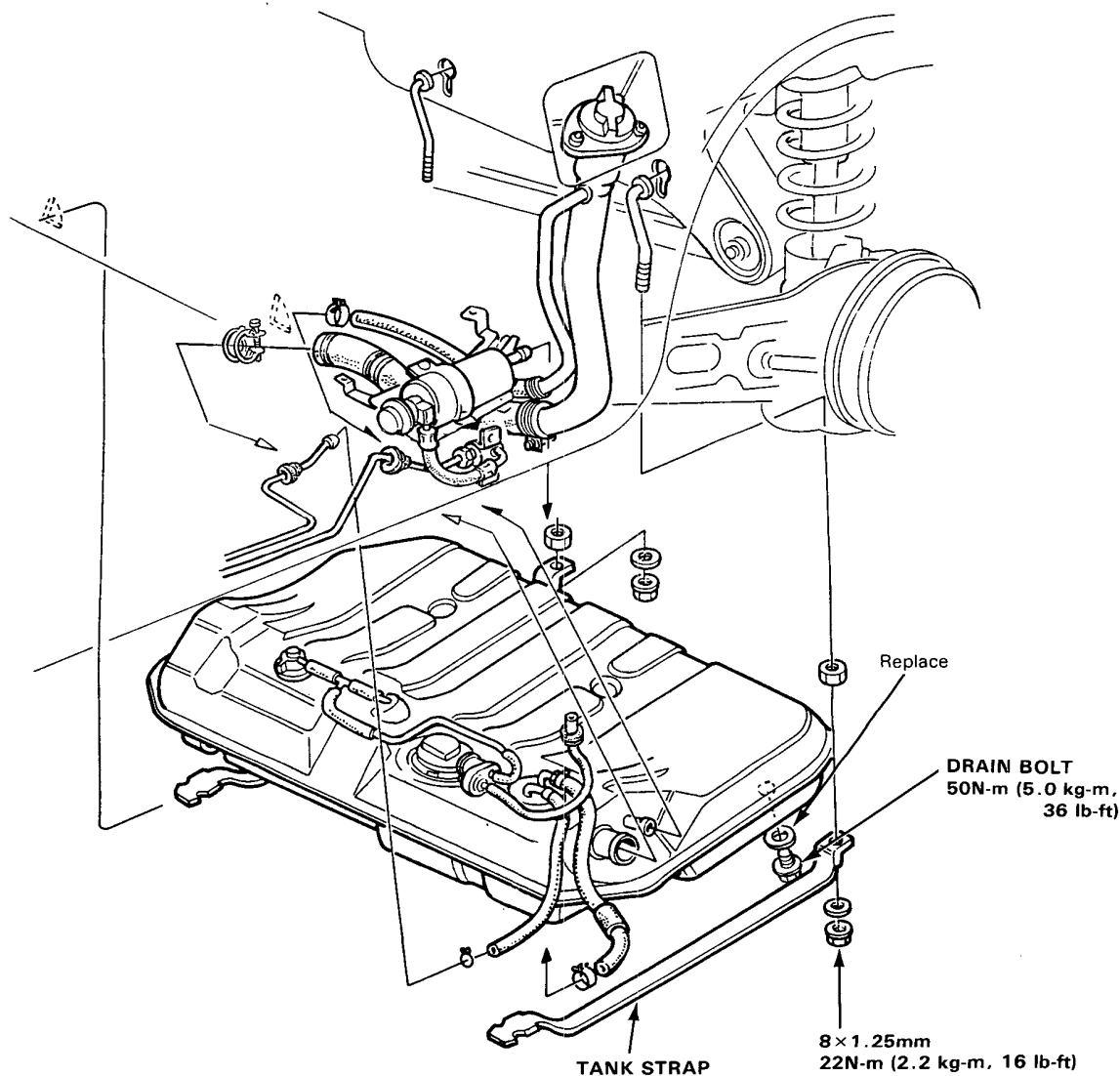
### WARNING

- Do not smoke while working on fuel system. Keep open flame away from work area.
- Block front wheels before jacking up rear of car.

1. Raise rear of the car and place jack stands in the proper locations.
2. Remove the drain bolt and drain the fuel into an approved container.
3. Disconnect the sending unit connectors.
4. Disconnect the hoses.

**CAUTION:** When disconnecting the hoses, slide back the clamps, then twist hoses as you pull, to avoid damaging them.

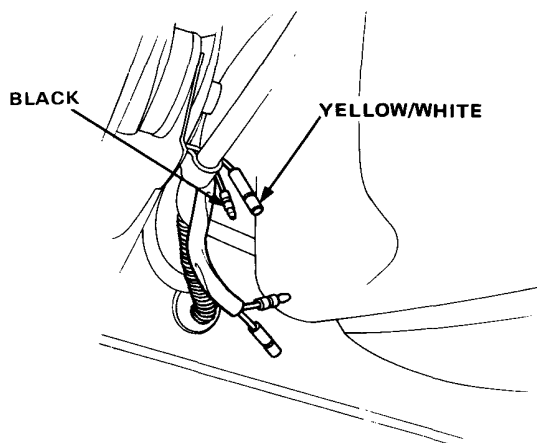
5. Place a jack, or other support, under the tank.
6. Remove the strap nuts and let the straps fall free.
7. Remove the fuel tank.
8. Install in the reverse order of removal.





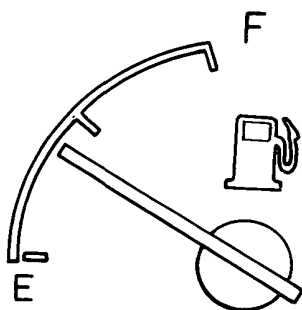
## Fuel Gauge Testing

1. Disconnect the fuel tank wire harness connectors. Connect the Yellow/White wire to the Black wire.



2. Turn the ignition switch ON. Check that the pointer of the fuel gauge starts moving toward F.

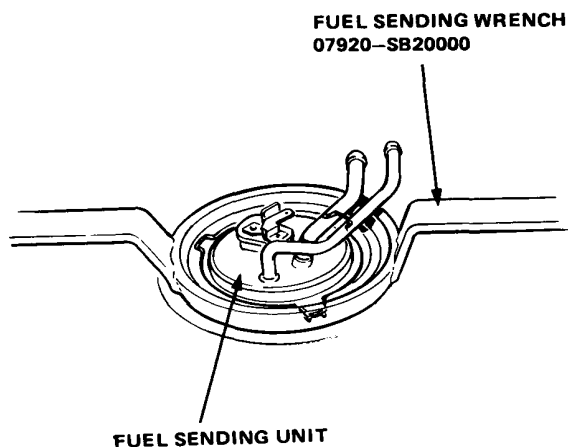
**CAUTION:** Turn the ignition switch OFF within 5 seconds, before the pointer reaches "F" mark on the gauge dial. Failure to turn the ignition switch OFF before the pointer reaches the "F" mark may cause damage to the fuel gauge.



- If the pointer of the fuel gauge does not swing at all, check the fuse, wire harness and coupler. Replace the fuel gauge if they are normal.
- Inspect the fuel gauge sending unit if the fuel gauge is OK.

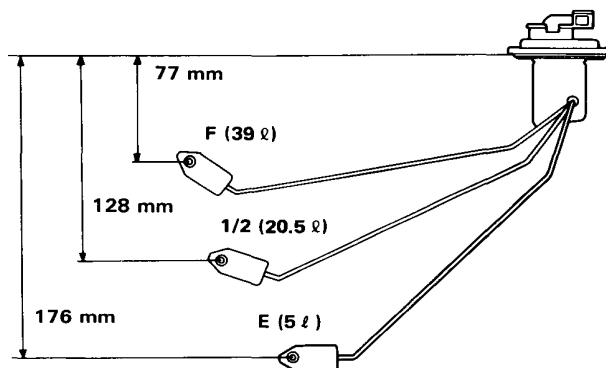
## Fuel Sending Unit Testing

1. Remove the fuel tank (page 11-46)
2. Remove the fuel gauge sending unit.



3. Measure the resistance between the terminals at E (EMPTY), 1/2 (HALF FULL) and F (FULL) by moving the float.

Float Position	E (5 l)	1/2 (20.5 l)	F (39 l)
Resistance (Ω)	105–110	25.5–39.5	2–5



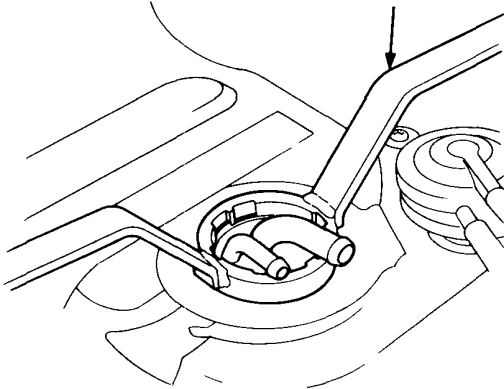
- If unable to obtain the above readings, replace the fuel unit with a new one.

# Fuel System

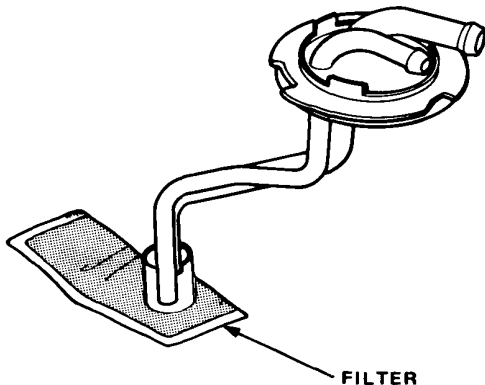
## Fuel Pipe Unit Replacement

1. Remove the fuel tank (page 11-46).
2. Remove the fuel pipe unit.

FUEL SENDING WRENCH  
07920-SB20000



3. Clean the filter at the end of the pipe unit.



## Fuel Cut-off Valve Replacement

### WARNING

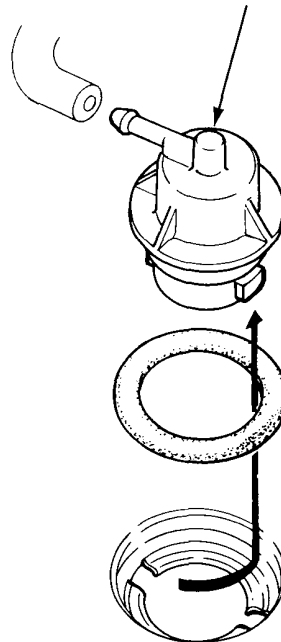
- Do not smoke while working on fuel system. Keep open flame away from work area.
- Block front wheels before jacking up rear of car.

1. Raise rear of car and place jackstands in the proper locations.
2. Place jack under fuel tank.

**CAUTION:** Place a flat piece of wood on the jack lifting pad to prevent damage to the fuel tank.

3. Remove the tank mounting nuts and bolts, then lower the tank just enough to gain access to the fuel cut-off valve.
4. Turn the valve  $\frac{1}{4}$  turn ( $90^\circ$ ), so its lugs are aligned with the slots in the mount, then lift it out.

FUEL CUT-OFF VALVE

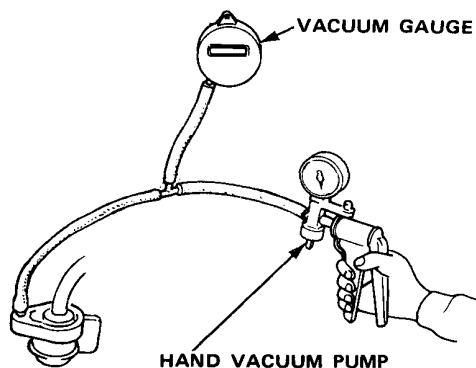




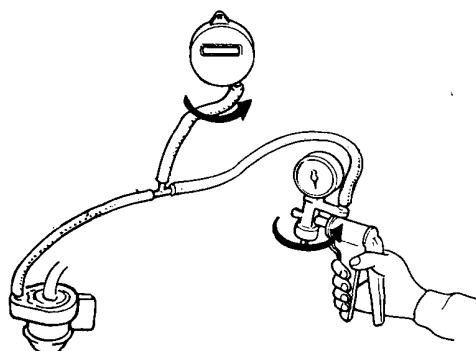
# Emission Controls

## Two-way Valve

1. Remove the fuel filler cap.
2. Remove the vapor line from the frame, and connect to a T-fitting from the vacuum gauge and the vacuum pump as shown.



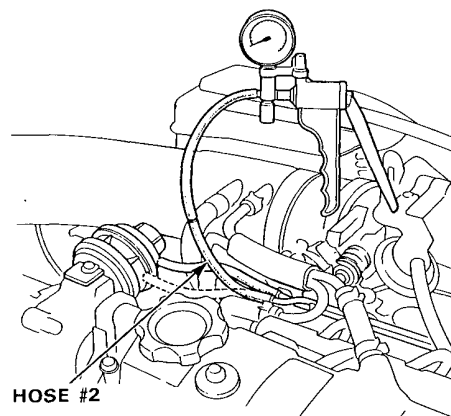
3. Slowly draw a vacuum while watching the gauge. Vacuum should stabilize at 15 to 30 mmHg (0.6 to 1.2 in. Hg).
  - If vacuum stabilizes momentarily (Two-way Valve opens) between 15 and 30 mmHg (0.6 and 1.2 in. Hg), go on step 4.
  - If vacuum stabilizes (valve opens) below 15 mmHg or above 30 mmHg (1.2 in. Hg), install new valve and retest.
4. Move hand pump hose from vacuum to pressure fitting, and move vacuum gauge hose from vacuum to pressure side as shown.



5. Slowly pressurize the vapor line while watching the gauge. Pressure should stabilize at 5 to 15 mmHg (0.2 to 0.6 in. Hg).
  - If pressure momentarily stabilizes (Valve opens) at 5 to 15 mmHg (0.2 to 0.6 in. Hg), the valve is OK.
  - If pressure stabilizes below 5 mmHg (0.2 in. Hg) or above 15 mmHg (0.6 in. Hg), install a new valve and re-test.

## Ignition Timing Control

1. Disconnect vacuum hose #2 from the vacuum advance diaphragm A on the distributor and connect a vacuum pump/gauge to the hose.



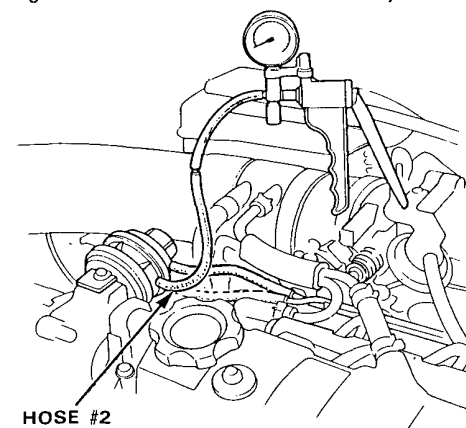
2. Start the engine, allow it to idle and check for vacuum.

There should be vacuum.

- If there is no vacuum, check the vacuum line for leaks, blockage or a disconnected hose and re-test.

3. Apply 500 mmHg (20 in.Hg) vacuum to the diaphragm A.

Timing should advance and remain steady.



- If timing does not advance, stop the engine and remove distributor cap. Turn breaker plate right and left to check for freedom of movement. If there is no evidence of binding, replace advance diaphragm and re-test.

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