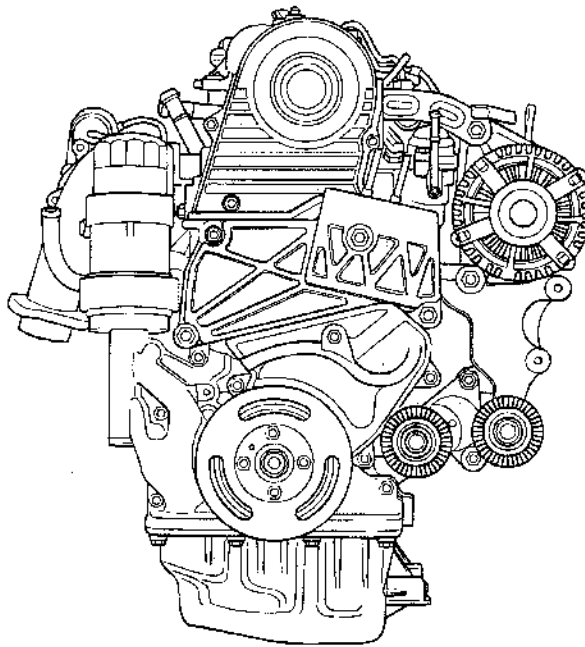
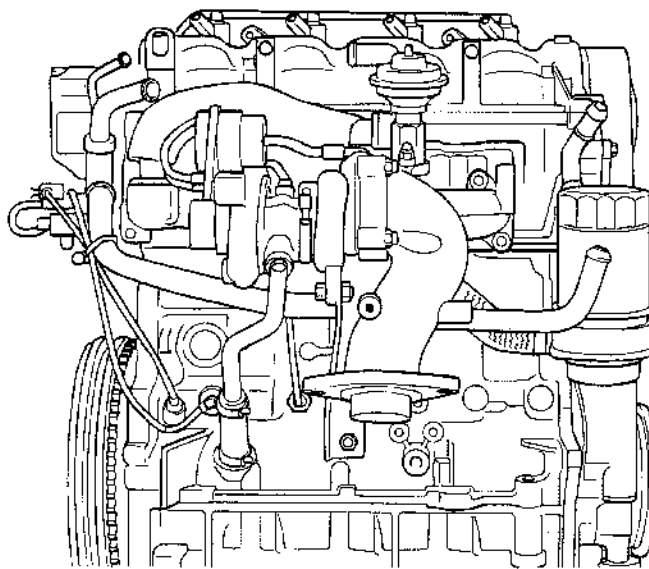


2.0TCI ENGINE



TORQUE : Nm (kg·cm, lb· ft)

KCHB001A



TORQUE : Nm (kg·cm, lb· ft)

KCHB001B

**TIGHTENING TORQUE** ECHB0300

Item	Nm	kg-cm	Lb-ft
Engine mount insulator bolt	90-110	900-1100	65-80
Engine mounting bracket nuts	60-80	600-800	43-58
Engine mounting bracket bolts	60-80	600-800	43-58
Engine Support bracket bolt and nut	43-55	430-550	32-40
Front roll stopper bracket to cross member bolts	40-55	400-550	29-40
Front roll stopper insulator bolt and nut	50-65	500-650	36-47
Rear roll stopper bracket to cross member bolts	50-65	500-650	36-47
Rear roll stopper insulator bolt and nut	50-65	500-650	36-47
Transaxle mounting bracket bolts	60-80	600-800	43-58
Transaxle mounting insulator bolt	90-110	900-1100	65-80
Front exhaust pipe to exhaust manifold	30-40	300-400	22-29
Rocker cover bolt	10-14	100-140	7-10
Camshaft sprocket bolt	120-150	1200-1500	88-110
Camshaft bearing cap bolt	27-30	270-300	20-22
Crankshaft position sensor	7-11	70-110	5-8
Air cleaner body installation bolt	8-10	80-100	6-7
Crankshaft sprocket bolt	185-195	1850-1950	136-144
Damper pulley to crankshaft sprocket	30-34	300-340	22-25
Cylinder head bolt (cold engine)	50+120°+90°	500+120°+90°	36+120°+90°
Timing belt auto tensioner bolt	50-55	500-550	36-40
Drive belt Auto tensioner bolt	26-31	260-310	19-23
Timing belt auto tensioner adjustable bolt	10-12	100-120	7-9
Drive belt idler bolt	46-51	460-510	34-38
Front exhaust pipe clamp bolt	20-30	200-300	14-22
Oil pan	10-12	100-120	7-9
Oil pan drain plug	35-45	350-450	25-33
Oil screen	10-12	100-120	7-9
Oil pressure switch	15-22	150-220	11-16
Oil screen bracket bolt	34-38	340-380	25-28
Oil pump cover bolt	20-27	200-270	15-20
Oil seal case bolt	10-12	100-120	7-9
Plug cap	20-27	200-270	14-20
Oil jet bolt	9-13	90-130	7-10
Oil pump rotor bolt	8-10	80-100	6-9
Timing belt upper cover	8-12	80-120	6-9
Timing belt lower cover	8-12	80-120	6-9
Relief plug	42-52	420-520	31-38

## TROUBLESHOOTING

ECHA0400

Symptom	Probable cause	Remedy
Low compression	Damaged cylinder head gasket Worn or damaged piston rings Worn piston or cylinder  Worn or damaged valve seat	Replace gasket Replace rings Repair or replace piston and/or cylinder block Repair or replace valve and/or seat ring
Oil pressure drop	Low engine oil level Faulty oil pressure switch Clogged oil filter Worn oil pump gears or cover Thin or diluted engine oil Oil relief valve stuck (open) Excessive bearing clearance	Check engine oil level Replace Replace Replace Change and find out cause Repair Replace
High oil pressure	Oil relief valve stuck (closed)	Repair
Excessive engine vibration	Loose engine roll stopper (front, rear) Loose transaxle mount bracket Loose engine mount bracket Loose center member Broken transaxle mount insulator Broken engine mount insulator Broken engine roll stopper insulator	Re-tighten Re-tighten Re-tighten Re-tighten Replace Replace Replace
Noisy valves	Thin or diluted engine oil (low oil pressure) Worn or damaged valve stem or valve guide	Change Replace
Connecting rod and/main bearing noise	Insufficient oil supply Thin or diluted engine oil Excessive bearing clearance	Check engine oil level Change and find out cause Replace
Timing belt noise	Incorrect belt tension (alternator tensioner, timing belt)	Adjust belt tension
Low coolant level	Leakage of coolant Damaged radiator core joint Corroded or cracked hoses (radiator hose, heater hose, etc) Faulty radiator cap valve or setting of spring Faulty thermostat Faulty engine coolant pump	Replace Replace  Replace Replace Replace
Clogged radiator	Foreign material in coolant	Replace
Abnormally high coolant temperature	Faulty thermostat Faulty radiator cap Restricted of flow in cooling system Loose or missing drive belt Faulty engine coolant pump Faulty temperature sensor wiring Faulty electric fan Faulty thermo-sensor on radiator Insufficient coolant	Replace Replace Replace Adjust or replace Replace Repair or replace Repair or replace Replace Refill coolant
Abnormally low coolant temperature	Faulty thermostat Faulty temperature sensor wiring	Replace Repair or replace

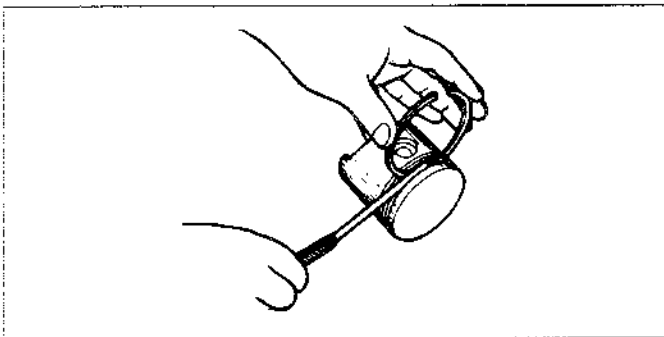
**INSPECTION** ECHR3630

**PISTON**

1. Check each piston for scuffing, scoring, wear and other defects. Replace any piston that is defective.
2. Check that the piston pin fits in the piston pin hole. Replace any piston and pin assembly that is defective. The piston pin must be smoothly pressed by hand into the pin hole (at room temperature)

**PISTON RING**

1. Check each piston ring for breakage, damage and abnormal wear. Replace the defective rings.
2. When the piston requires replacement, its ring should also be replaced.
3. Measure the clearance between piston ring and ring home.



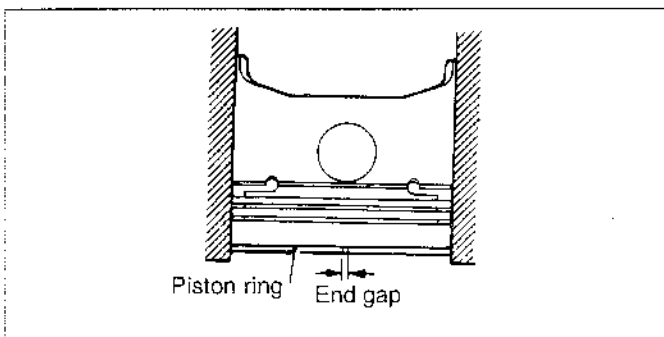
ECLA010B

Standard Value : Ring - to - ring groove clearance

No. 2 : 0.065 - 0.11 mm (0.00256 - 0.00433 in.)

Oil ring : 0.03 - 0.07 mm (0.00118 - 0.00275 in.)

4. Place a piston ring in the cylinder bore and set it square by pushing it down with piston.
5. Measure the end clearance using a thickness gauge.



ECLA010D

Standard Value : End gap

No. 1 : 0.2 - 0.3 mm (0.0079 - 0.0118 in.)

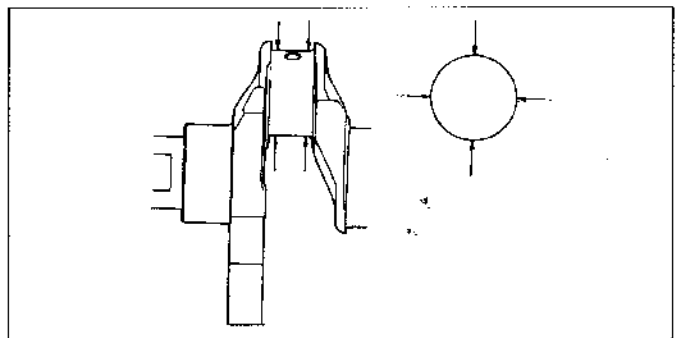
No. 2 : 0.30 - 0.45 mm (0.0118 - 0.0177 in.)

Oil ring : 0.2 - 0.45 mm (0.0079 - 0.0177 in.)

Limit : 0.8 mm (0.0315 in.)

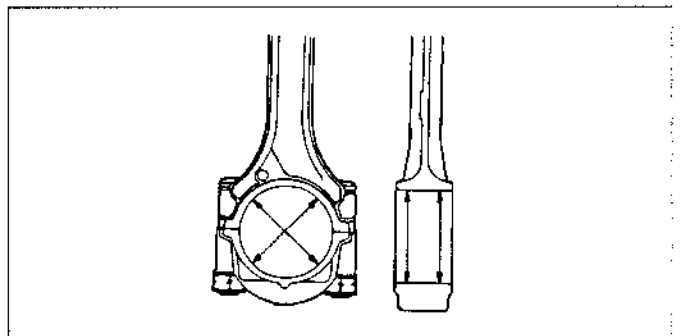
**CONNECTING ROD BEARING**

1. Check the bearing surfaces for uneven contact pattern, streaks, scratches, and seizure. If defects are evident, replace. If the surfaces are seriously nicked and seized, check also the crankshaft. If the crankshaft is also damaged, replace the crankshaft or grind to undersize for reuse.



ECLA010E

2. Measure the connecting rod bearing I.D. and crankshaft pin O.D. If the clearance (oil clearance) exceeds the limit, replace the bearing and, if necessary, the crankshaft. Or, grind the crankshaft to an undersize and, at the same time, replace the bearing with an undersize.



ECLA010F

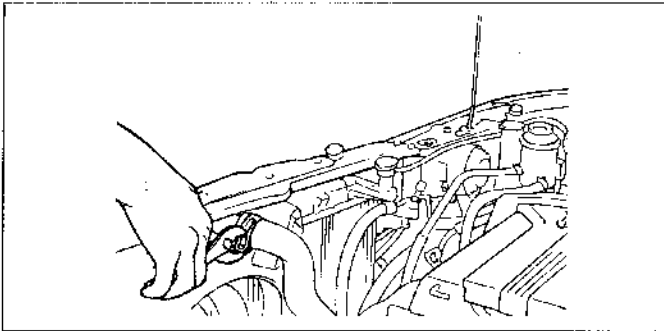
Standard value :

0.024 - 0.042 mm (0.0009 - 0.0016 in.)

Limit : 0.10 mm (0.0039 in.)

**REMOVAL** ECJA5600

1. Disconnect the ground cable from the battery terminal.
2. Disconnect the fan motor connector.
3. Loosen the radiator drain plug to drain the coolant.
4. Disconnect the upper and lower hoses and overflow tube after making marks on the radiator hose and the hose clamp, to ease reassembly.



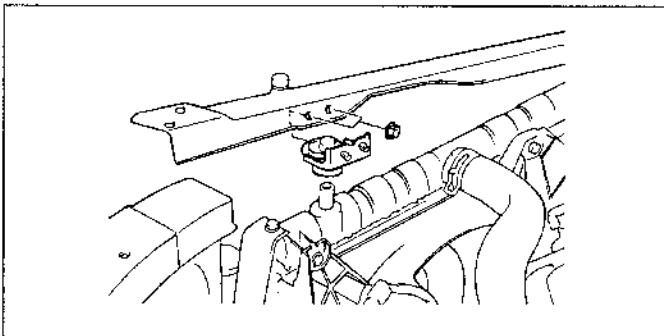
EDJA330A

5. For vehicles with automatic transaxles, disconnect the oil cooler hoses from the automatic transaxle.

**CAUTION**

*Cover or plug the hose and inlets of the radiator so that dust and other foreign materials can not enter after the hose is disconnected from the radiator.*

6. Remove the radiator upper mounting bolt.



EDHA001C

7. Remove the radiator together with the fan motor.
8. Remove the radiator fan motor and condenser fan motor from the radiator.

**INSPECTION** ECHA5700

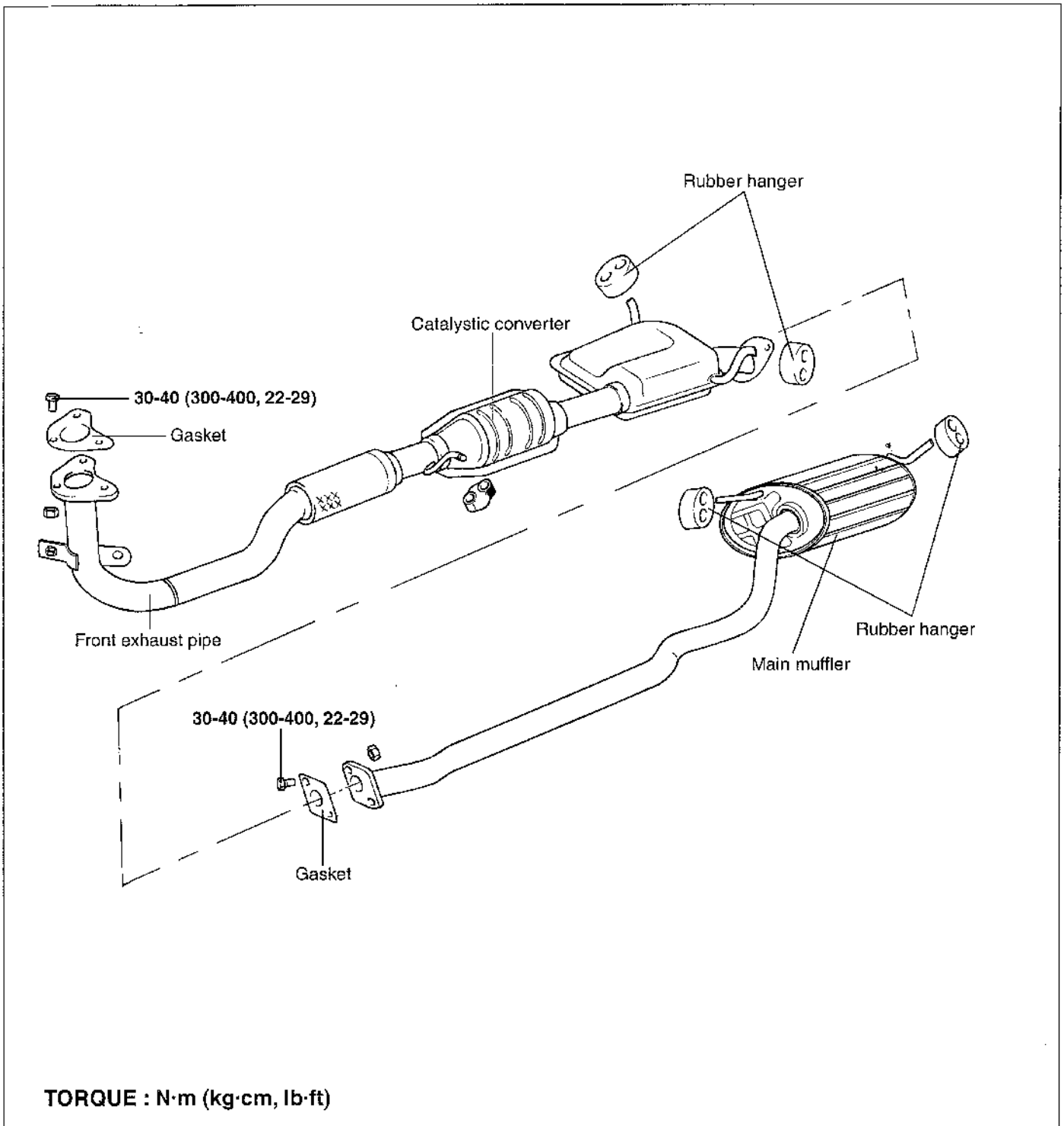
1. Check for foreign material between the radiator fins.
2. Check the radiator fins for damage and straighten if necessary.
3. Check the radiator for corrosion, damage, rust or scale.
4. Check the radiator hoses for cracks, damage or deterioration.
5. Check the reservoir tank for damage.
6. Check the automatic transaxle oil cooler hoses for cracking, damage or deterioration (only A/T).

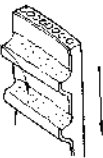

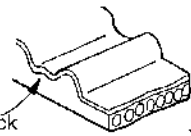

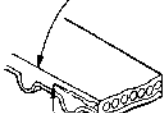
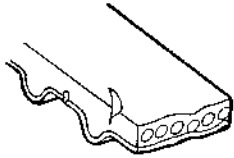
**INSTALLATION** ECHA5800

1. Fill the radiator and reservoir tank with clean coolant mixture.
2. Run the engine until the coolant has warmed up enough so that the thermostat valve is open. Then, stop the engine.
3. Remove the radiator cap and pour the coolant into the filler neck of the radiator. Fill the reservoir tank with the coolant to the upper level. Replace the radiator cap.
4. Check that there are no leaks from the radiator, hoses or connections.

# MUFFLER

## COMPONENTS ECH88700



Description	Flaw conditions
5. Badly worn out teeth (last stage)	<p data-bbox="1050 286 1182 338">Flank worn (On load side)</p>  <p data-bbox="1449 443 1532 465">ECA9200C</p> <p data-bbox="818 483 1374 544">Tooth flank worn and rubber exposed on load side (tooth width reduced)</p>
6. Cracked tooth bottom	<p data-bbox="1074 589 1158 640">Rubber exposed</p>  <p data-bbox="1449 745 1532 768">ECA9200D</p>
7. Missing tooth	<p data-bbox="1054 898 1114 927">Crack</p>  <p data-bbox="1449 969 1532 992">ECA9200E</p>
8. Badly worn side of belt	<p data-bbox="1070 1014 1278 1066">Tooth missing and canvas fiber exposed</p>  <p data-bbox="1449 1211 1532 1234">ECA9200F</p>
9. Cracked side of belt	<p data-bbox="1086 1301 1262 1330">Rounded belt side</p>  <p data-bbox="1007 1451 1342 1480">Abnormal wear (Fluffy canvas fiber)</p> <p data-bbox="1449 1496 1532 1518">ECA9200G</p>
9. Cracked side of belt	 <p data-bbox="1449 1720 1532 1742">ECA9200H</p>

## DESIGN AND FUNCTION OF THE COMPONENTS

### LOW-PRESSURE STAGE

The low-pressure stage (Fig. 1) provides enough fuel for the high-pressure section. The most important components are:

- Fuel tank,
- Pre-supply pump with prefilter,
- Low-pressure fuel lines for supply and return,
- Fuel filter and
- Low-pressure area of the high-pressure pump.

### Pre-supply pump

It is the pre-supply pump's job to maintain an adequate supply of fuel to the high-pressure pump. This applies

- In every operating state,
- At the necessary pressure, and
- Throughout the complete service life.

At present, there are two possible versions. An electric roller-cell fuel pump is the standard solution. An alternative is the mechanically driven gear-type fuel pump.

### Electric fuel pump

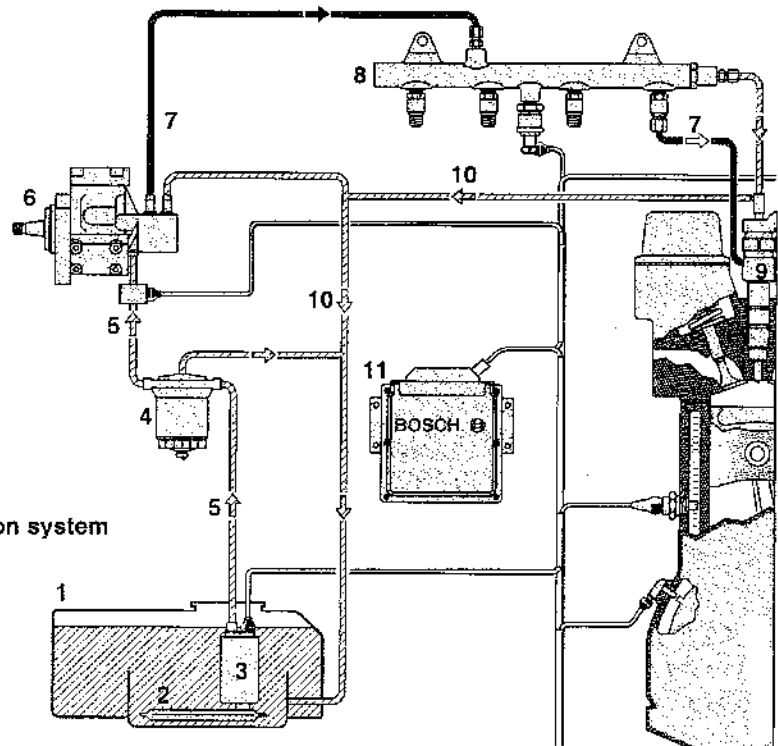
The electric fuel pump is only used in passenger cars and light commercial vehicles. It is not only responsible for delivering the fuel to the high-pressure pump, but within the framework of system monitoring it must also interrupt the flow of fuel in case of an emergency.

Beginning with the engine cranking process, the electric fuel pump runs continuously independent of engine speed. This means that the pump permanently delivers fuel from the fuel tank, and through the filter to the high-pressure pump. Excess fuel can flow back to the tank through an overflow valve.

A safety circuit is provided to prevent the delivery of fuel should the ignition be on with the engine stopped.

Electric fuel pumps are available as in-line or in-tank versions. In-line fuel pumps are installed outside the tank in the fuel line between the tank and the fuel filter. They are attached to the vehicle's floor assembly. In-tank fuel-pump versions on the other hand are installed in the fuel tank itself using a special mounting. Apart from the electrical and hydraulic connections to the outside, this mounting usually incorporates a fuel strainer, a fuel-level indicator, and a swirl pot which acts as a fuel reservoir.

[Fig. 1]



Fuel system for a Common Rail fuel-injection system

1. Fuel tank
2. Pre-filter
3. Presupply pump
4. Fuel filter
5. Low-pressure fuel lines
6. High-pressure pump
7. High-pressure fuel lines
8. Rail
9. Injector
10. Fuel-return line
11. ECU



## TROUBLESHOOTING

## FUEL INJECTION SYSTEM

Symptom	Probable cause	Remedy
Engine does not start	Cranking speed too low	Repair starting system or charge or replace battery so that engine cranks at a minimum of 150 rpm.
	No voltage at fuel cut-off solenoid on injection pump	Check for voltage with test light. If necessary, replace fuse or faulty wires.
	Fuel cut-off solenoid on injection pump loose or faulty	Tighten solenoid. Check that solenoid clicks when key is turned off and on. Replace faulty solenoid.
	No voltage at glow plug bus	If test light shows no voltage at bus with key at "ON" position, test relay and wiring.
	Glow plug faulty	Test and, if necessary, replace glow plug.
	Air in fuel system	Bleed fuel system.
	Injection pump not delivering fuel	If no fuel emerges from a loosens injection pipe during cranking, check timing belt and fuel supply from filter.
	Injection pipes misconnected	Connect pipes in correct location
	Injection timing incorrect	Adjust injection timing.
	Faulty injection	Check and, if necessary, replace injectors.
	Engine mechanical faults, as described earlier under this heading	Test compression and, if necessary, repair engine.
	Faulty injection pump	Try to start engine with new pump installed. If necessary, replace pump permanently. Check and, if necessary, adjust the idle speed.
Idle speed incorrect or idle rough or irregular	Idle speed incorrectly adjusted	Check that accelerator lever on pump is not loose, then adjust accelerator cable.
	Accelerator control binding	Replace hose of secure with clamps, bleed air from system.
	Loose fuel hose between filter and injection pump	Tighten, if necessary, and repair.
	Air in fuel system	Bleed fuel system.

## ADDITIONAL WATER HEATER

### 1. Possible DTC: P1635

- CC-CODE

#### 1) C018 (Line : Short circuit)

- Possible causes of trouble:

- A. Short circuit to Bat line, Open circuit in wiring
- B. Fuse defective
- C. Open circuit. Contact resistance
- D. Additional water heater relay defective

#### 2) C019 (Line : Open circuit)

- Possible causes of trouble:

- A. Short circuit to Bat line, Open circuit in wiring
- B. Fuse defective
- C. Contact resistance
- D. Additional water heater relay defective

### 2. Measure the voltage at relay pin 85 to GND.

---

Set value :

- 8 - 15V (OFF)
  - 0V(ON)
- 

### 3. Check the additional water heater relay wiring

### 4. Measure the supply voltage at relay pin. 87 to GND.

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Set value : 8 - 15V

---

### 5. Check the additional water heater relay wiring

### 6. Check wiring between ECU pin 23 and additional water heater relay.

### 7. If wiring and fuse is OK, replace the additional water heater relay.

**NOTE :**

**FO vehicle of which mounting combustive heater reveals the above trouble code normally. So please ignore the code.**

## GLOW RELAY AND GOLW LAMP

### 1. Possible DTC: P1325 (Glow relay) P1329 (Glow indicator lamp)

- CC-CODE

#### 1) C018 (Line : Short circuit)

- Possible causes of trouble:

- A. Short circuit to Bat line, open circuit
- B. Fuse defective
- C. Contact resistance
- D. Glow time control
- E. Glow plug indicator lamp

#### 3) C019 (Line : Open circuit)

- Possible causes of trouble:

- A. Short circuit to GND line
- B. Fuse defective
- C. Contact resistance
- D. Glow time control
- E. Glow plug indicator lamp

**NOTE**

**Glow plug indicator lamp lights briefly for self test when ignition switch is turned on.**

### 2. Activate the lamp by way of actuator diagnosis

If check lamp does not flash: Check the fuse  
Check glow lamp wiring

### 3. Activate the lamp by way of actuator diagnosis

If relay is not switched : Check the fuse  
Measure the supply voltage at relay pin. 2 to GND.

---

Set value : 8 - 15V

---

Check glow lamp wiring

Measure the supply voltage at relay pin. 3 to GND.

---

Set value : 8 - 15V

---

Check glow lamp wiring.

### 4. If wiring and fuse is OK, replace the glow relay.

### 5. After replace the glow relay, perform the test again.

## EFP : ELECTRIC FUEL PUMP

### 1. Possible DTC: P0230

- CC-CODE

#### 1) C004 (Plausibility error)

After run mode or fuel cut off mode, if rail pressure does not drop below the set value within set time, error is detected.

- Possible causes of trouble:

- A. Contact resistance
- B. EFP relay defective
- C. EFP defective

#### 2) C018 (Line : Short circuit)

- Possible causes of trouble:

- A. Short circuit to Bat line, open circuit in wiring
- B. EFP relay defective
- C. EFP defective

#### 3) C019 (Line : Open circuit)

When EFP runs for a second or longer and ignition switch is turned on :

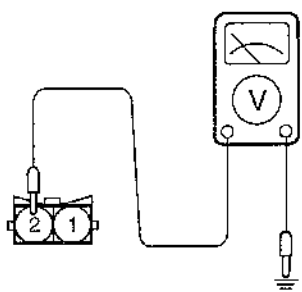
Line to EFP relay was short circuit to GND

Measure the sensor resistance of pin 1 (+) and pin 2 (-)

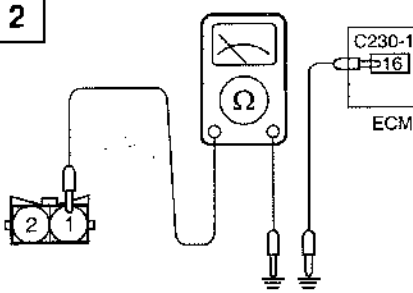
- Possible causes of trouble:

- A. Short circuit to Bat line, Open circuit in wiring
- B. Contact resistance

**HARNESS INSPECTION PROCEDURES**

<b>1</b>		<p>Measure the supply voltage</p> <ul style="list-style-type: none"> <li>○ Connector : Disconnected</li> <li>○ Ignition switch : ON</li> <li>○ Voltage(V) : Battery voltage</li> </ul>	<p><b>OK</b> → <b>2</b></p> <p><b>NG</b> → Repair the harness</p>
----------	---	--	--

EFHB136B

<b>2</b>		<p>Check for an open circuit, or a short circuit to the ground between ECM and EGR solenoid valve.</p> <ul style="list-style-type: none"> <li>○ Connector : Disconnected</li> </ul>	<p><b>OK</b> → <b>END !</b></p> <p><b>NG</b> → Repair the harness</p>
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EFHB137B

**EGR SOLENOID VALVE INSPECTION**

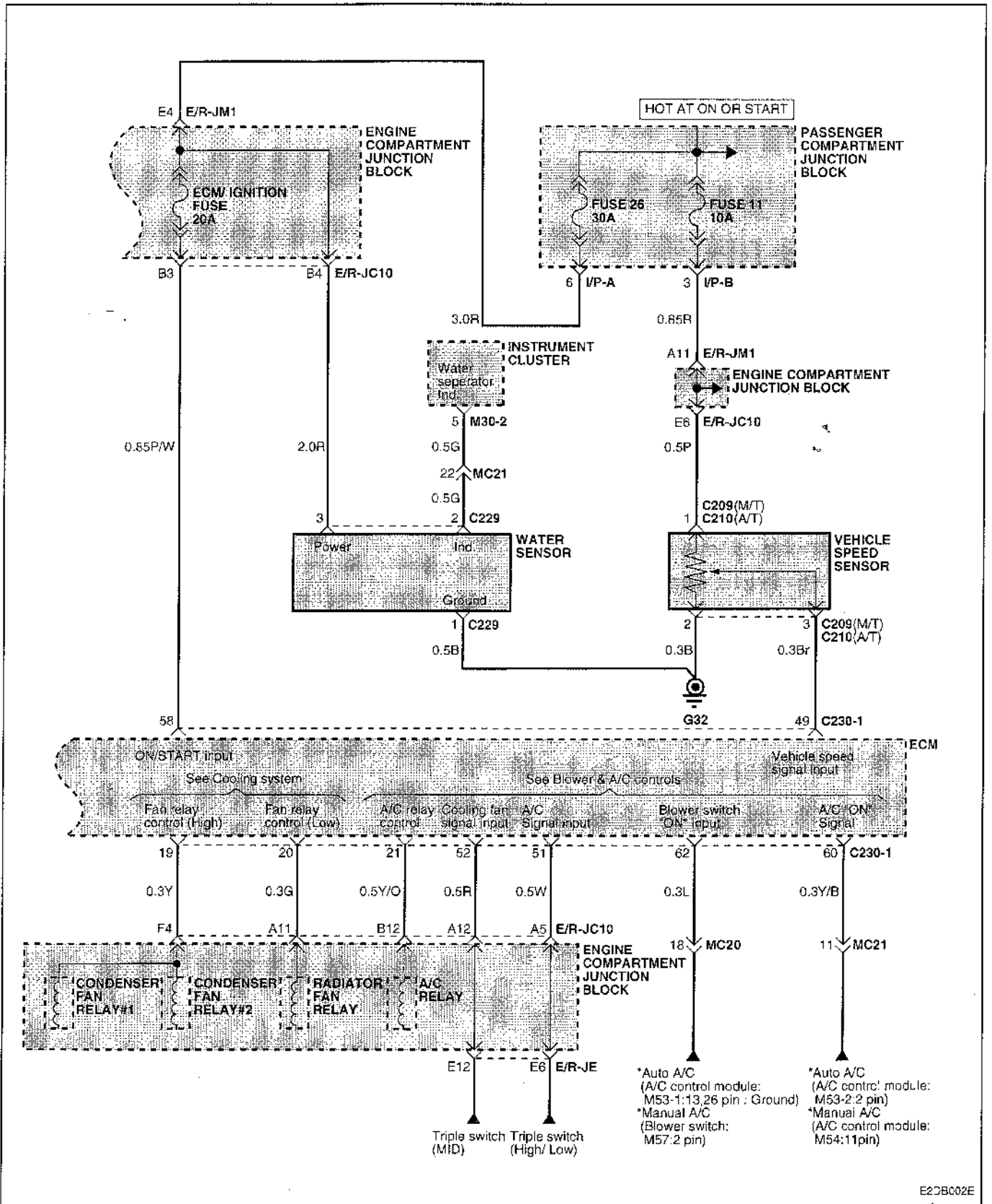
**USING HI-SCAN**

Check item	Check condition	Engine condition	Standard value
EGR solenoid valve	solenoid valve OFF → ON	Ignition switch : ON	Check the sound for proper operation

**USING VOLTMETER**

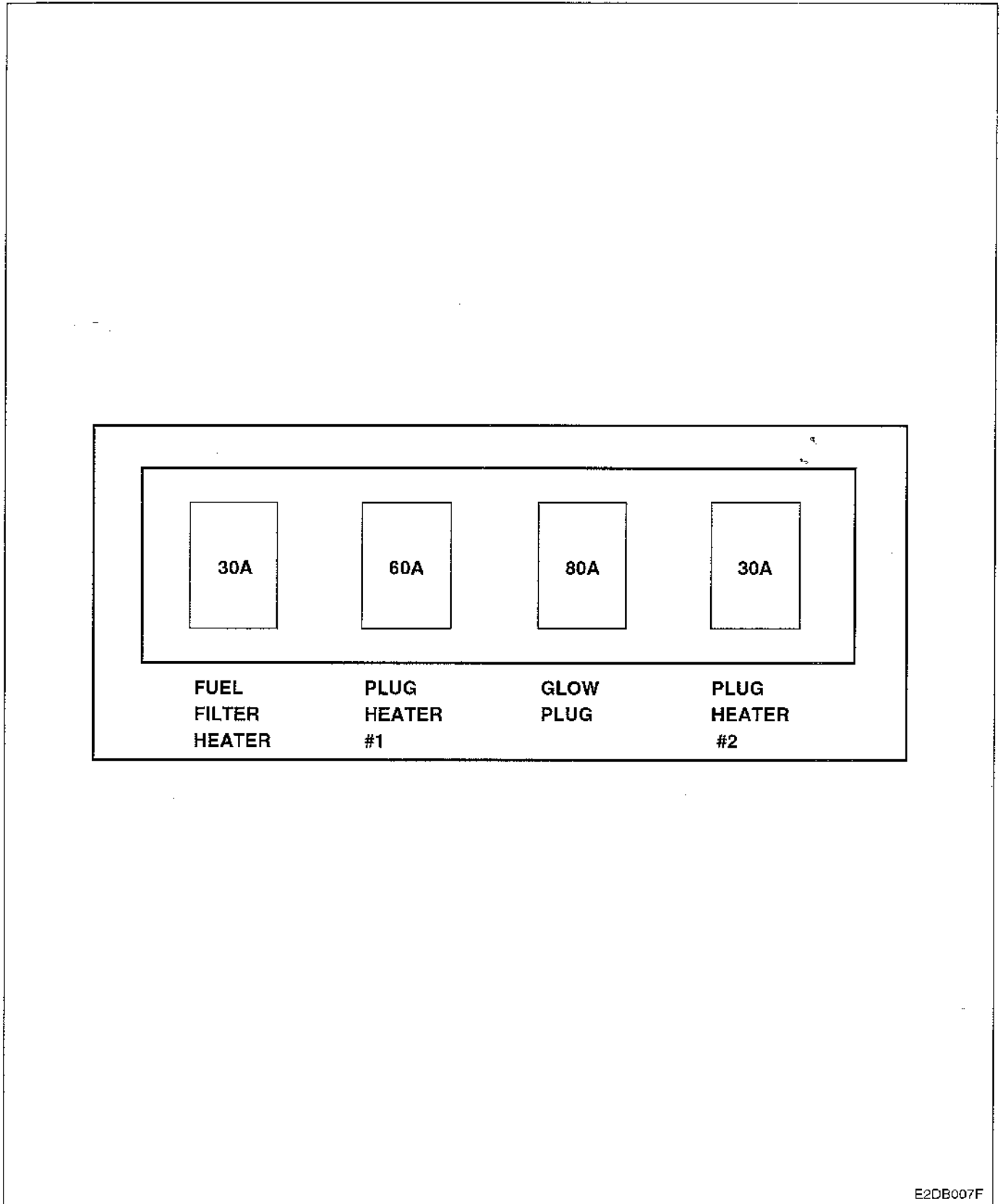
Check item	Specified value
EGR solenoid valve resistance	14 ~ 17Ω

ENGINE CONTROL SYSTEM (5)

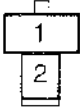
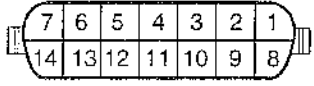
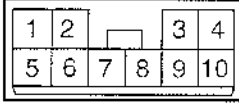
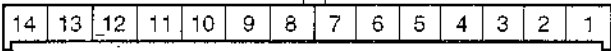
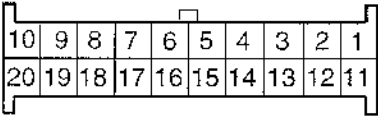
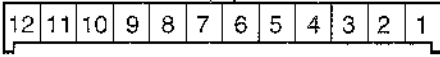
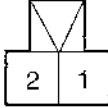
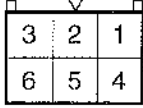


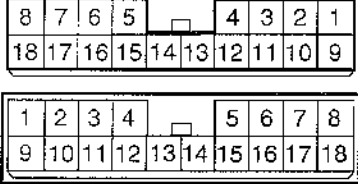
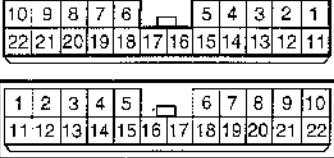
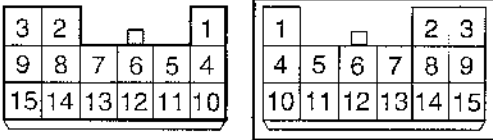


FUSIBLE LINK BOX

LAYOUT

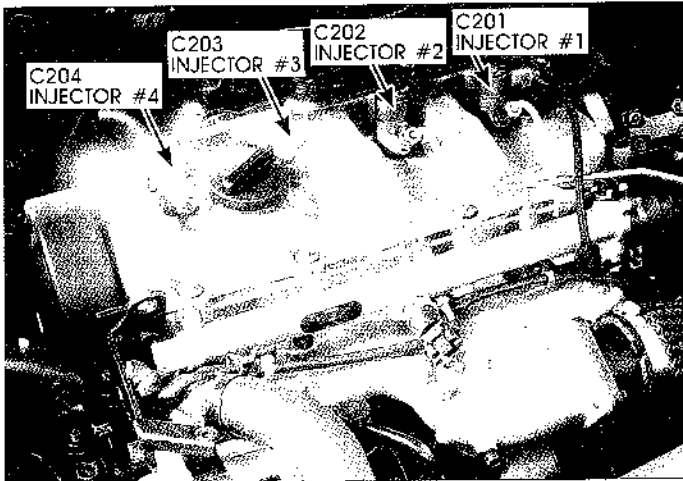


CONNECTOR CONFIGURATION (3)

<p><b>M04</b></p>  <p>CR02F051</p>	<p><b>M28</b></p>  <p>CR14F021</p>	<p><b>M29</b></p>  <p>CR10M003</p>	<p><b>BLANK</b></p>
<p><b>M30-1</b></p>  <p>CR14F007</p>		<p><b>M30-2</b></p>  <p>CR20F020</p>	
<p><b>M30-3</b></p>  <p>CR12F001</p>	<p><b>M37</b></p>  <p>CR02F011</p>	<p><b>M41</b></p>  <p>CR06F049</p>	
<p><b>M44</b></p>  <p>CR04F016</p>	<p><b>M57</b></p>  <p>CR06F002</p>	<p><b>MC20</b></p>  <p>CR18B005</p>	
<p><b>MC21</b></p>  <p>CR22B006</p>		<p><b>MC22</b></p>  <p>CR15B002</p>	

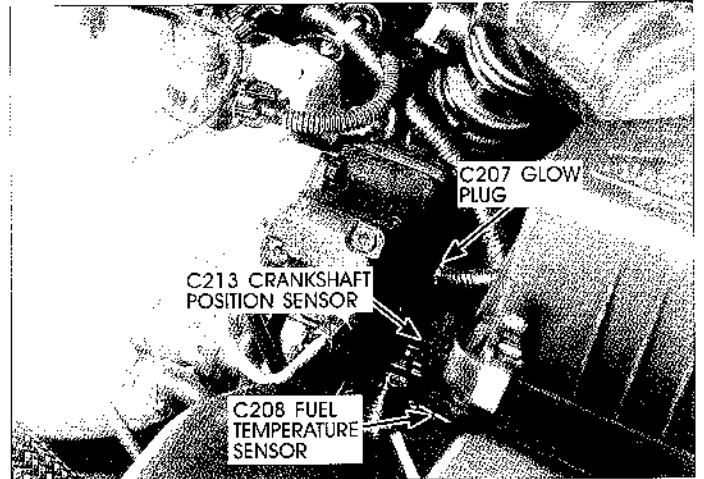
# COMPONENT LOCATION

## COMPONENT LOCATION(1)



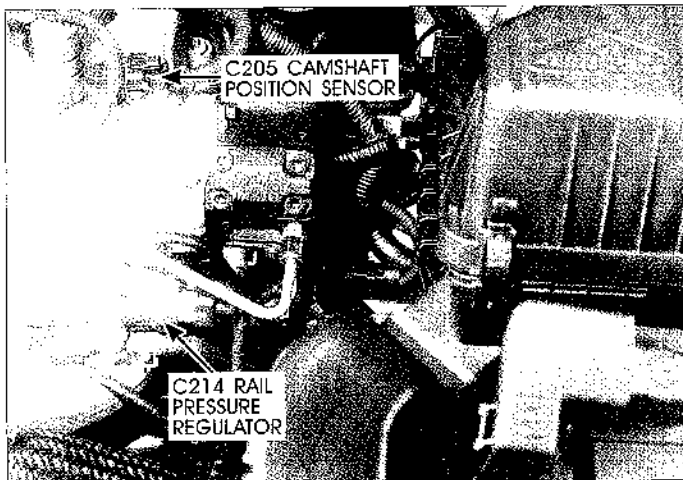
C201,C202,C203,C204

F3DA0C2M



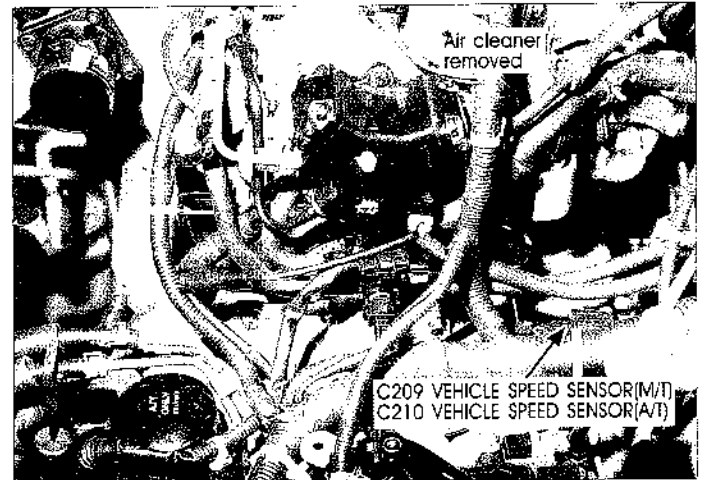
C207,C208,C213

E3DA0C2P



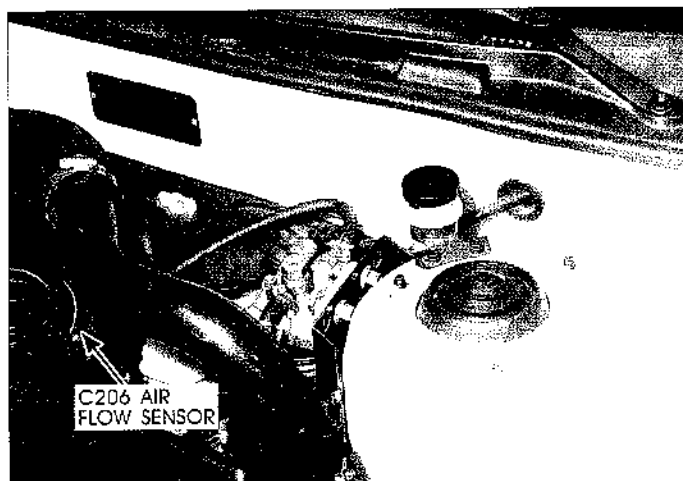
C205,C214

E3DA002N



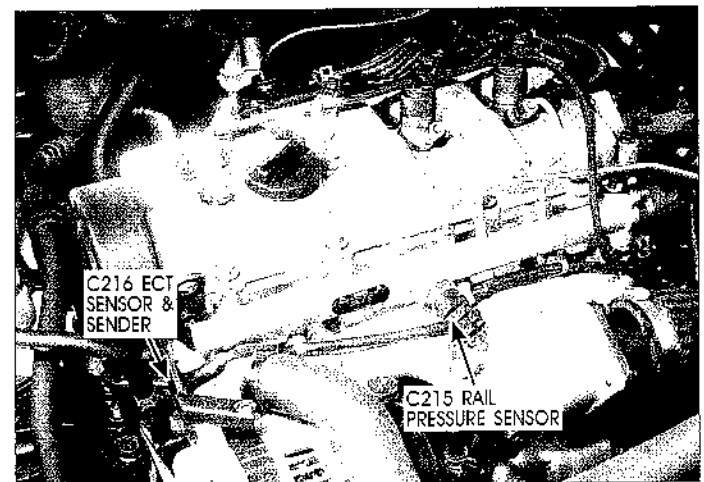
C209,C210

E3DA002Q



C206

E3DA002O



C215,C216

E3DA0C2R