BUMPER

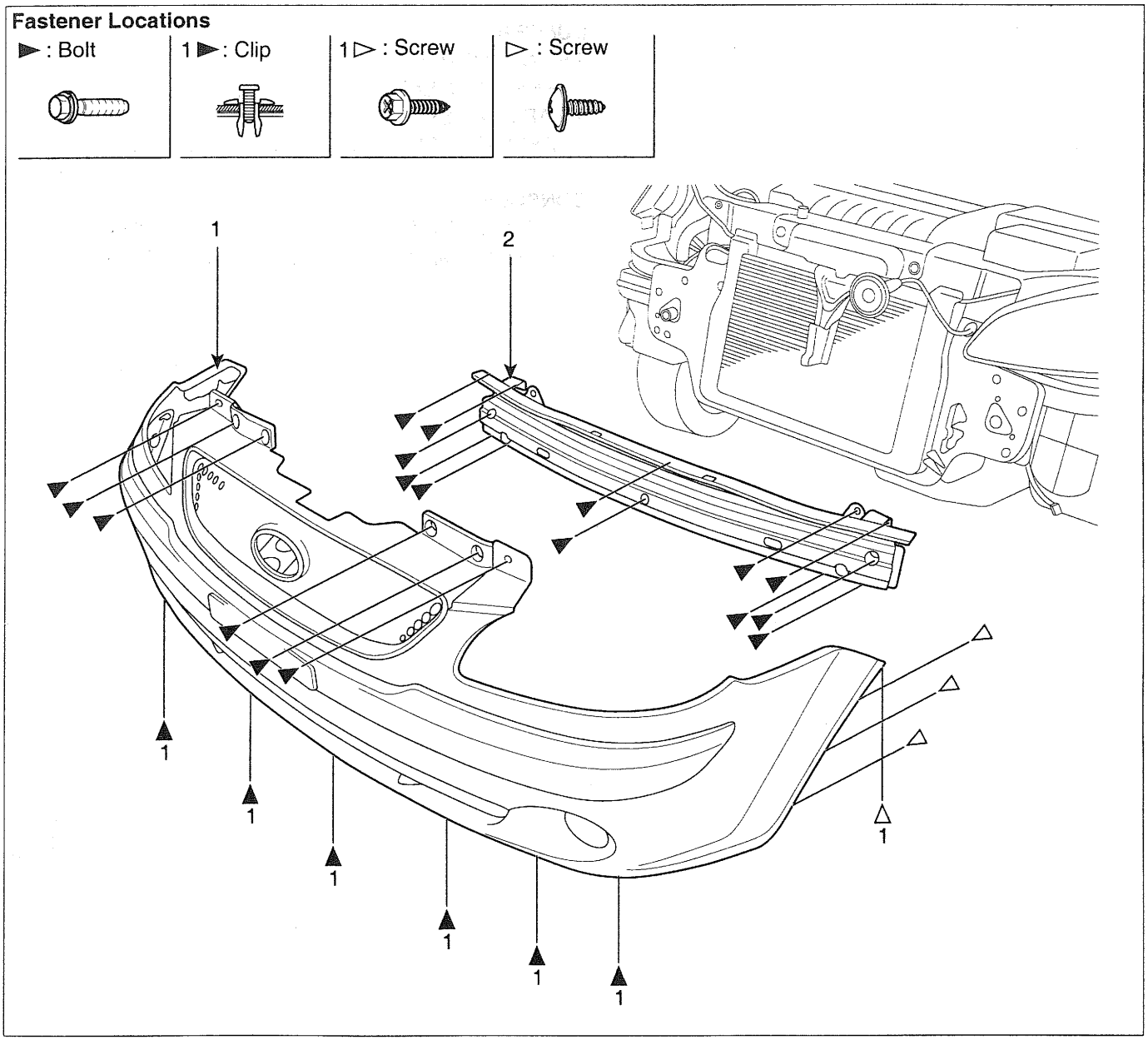
FRONT BUMPER

REPLACEMENT E0F7C583

NOTE

- *When prying with a flat-tip screwdriver, wrap it with protective tape around the related parts, to prevent damage.*
- *Put on gloves to protect your hands.*
- *Take care not to bend or scratch the cover and other parts.*
- *Replace any damage clips.*

1. After loosening the mounting clips and bolts, remove the front bumper.
2. Installation is the reverse of removal.

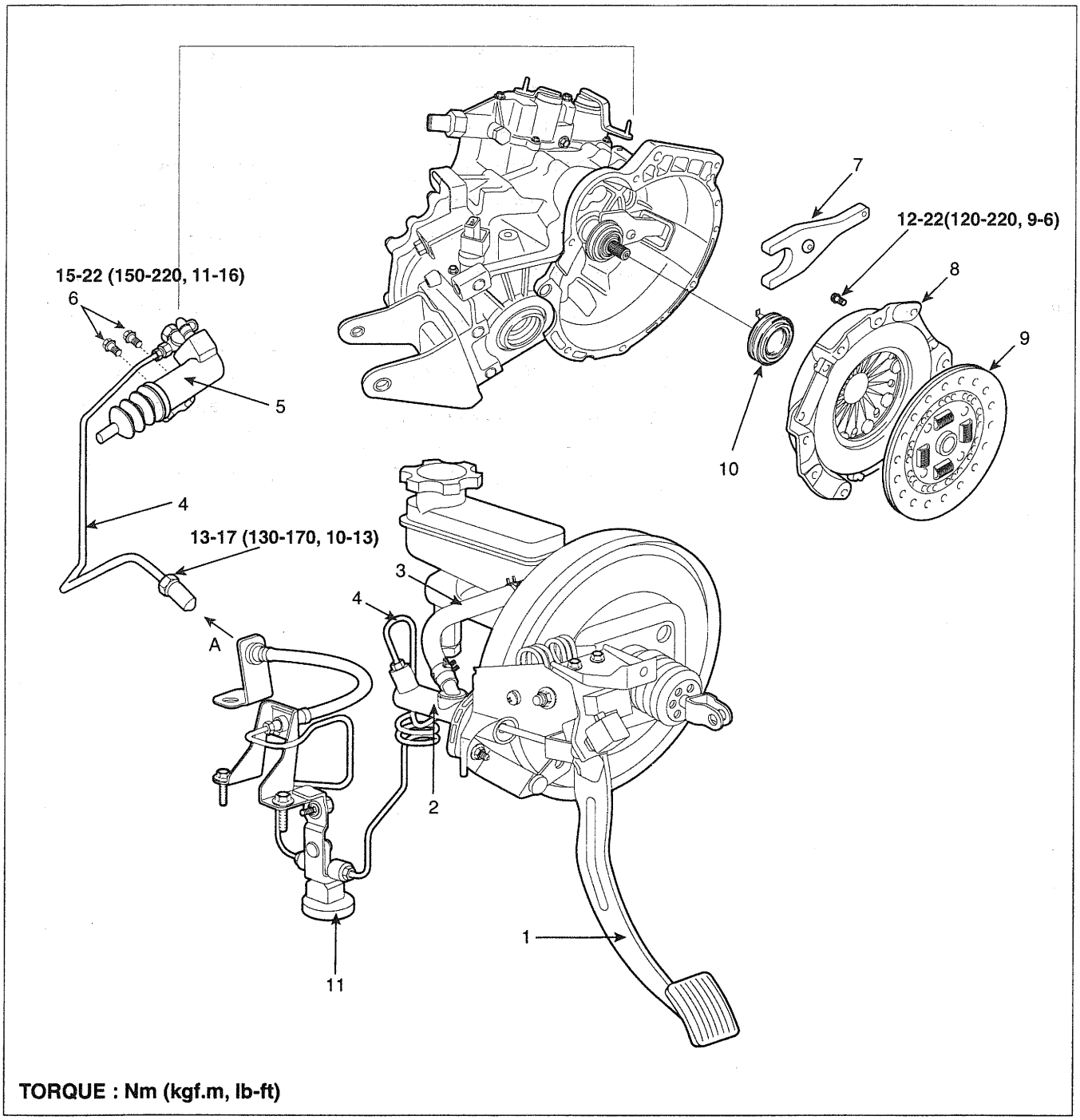


1. Front bumper cover
2. Front bumper rail

ESPG001A

CLUTCH SYSTEM

COMPONENTS E09C3452



1. Clutch pedal
2. Master cylinder
3. Reserve hose
4. Clutch tube
5. Clutch release cylinder
6. Bolt
7. Clutch release fork
8. Clutch cover
9. Clutch disc
10. Clutch release bearing
11. Damper

EOPG001A

GENERAL

GENERAL E12522AB

SPECIFICATION

IGNITION SYSTEM

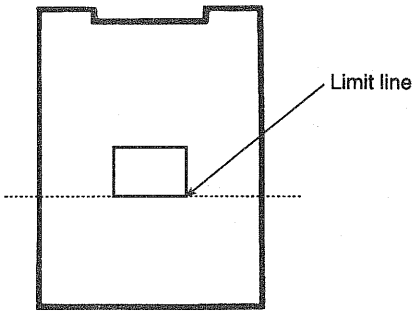
Items		Specification	
		1.6 DOHC	1.4 DOHC
Ignition coil	Primary resistance	0.87 ± 10 % (Ω)	
	Secondary resistance	13.0 ± 15 % (kΩ)	
Spark plugs (Unleaded)	NGK	BKR5ES-11	
	CHAMPION	RC10YC4	
	Gap	1.0 ~ 1.1 mm (0.0394 ~ 0.0433in.)	
Spark plugs (Leaded)	NGK	BKR5ES	
	CHAMPION	RC10YC	
	Gap	0.9 ~ 1.0 mm (0.0354 ~ 0.0394in.)	

STARTING SYSTEM

Items			Specification	
			1.6 DOHC	1.4 DOHC
Starter	Rated voltage		12 V, 0.9 kW	
	No. of pinion teeth		8	
	No-load characteristics	Voltage	11.5 V	
		Ampere	60A, MAX	
		Speed	5,500 rpm, MIN	
	Commutator diameter	Standard	33 mm (1.2992in.)	
	Under cut depth	Standard	0.5 mm (0.0197in.)	
		Limit	0.2 mm (0.0079in.)	

INSPECT STARTER BRUSH

Brushes that are worm out, or oil-soaked, should be replaced.



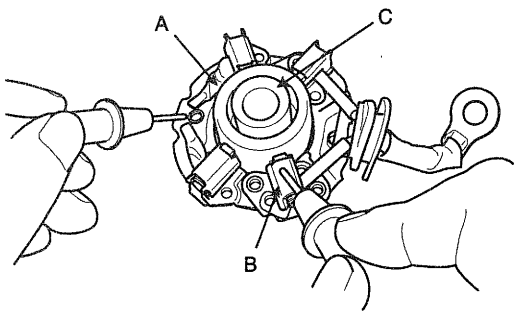
BBGE008A

NOTE

To seat new brushes, slip a strip of #500 or #600 sandpaper, with the grit side up, between the commutator and each brush, and smoothly rotate the armature. The contact surface of the brushes will be sanded to the same contour as the commutator.

STARTER BRUSH HOLDER TEST

1. Check that there is no continuity between the (+) brush holder (A) and (-) brush holder (B). If there is no continuity, replace the brush holder assembly.



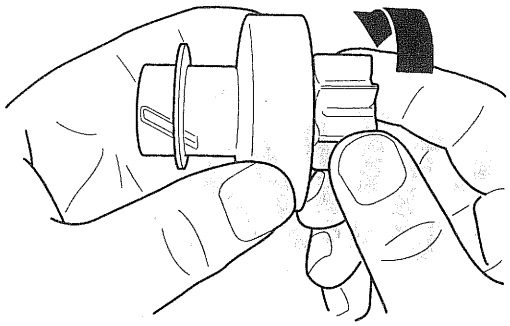
ABHE012A

NOTE

Use a pipe (C) of suitable size for the brushes not to get removed from the brush holder.

INSPECT OVERRUNNING CLUTCH

1. Slide the overrunning clutch along the shaft. Replace it if does not slide smoothly.
2. Rotate the overrunning clutch both ways. Does it lock in one direction and rotate smoothly in reverse? If it does not lock in either direction of it locks in both directions, replace it.



ABHE013A

3. If the starter drive gear is worn or damaged, replace the overrunning clutch assembly. (the gear is not available separately).
   Check the condition of the flywheel or torque converter ring gear if the starter drive gear teeth are damaged.

CLEANING

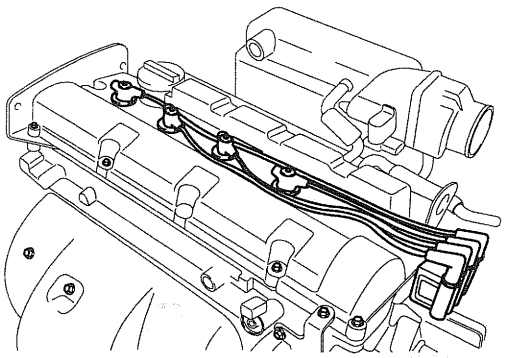
1. Do not immerse parts in cleaning solvent. Immersing the yoke assembly and/or armature will damage the insulation. Wipe these parts with a cloth only.
2. Do not immerse the drive unit in cleaning solvent. The overrun clutch is pre-lubricated at the factory and solvent will wash lubrication from the clutch.
3. The drive unit may be cleaned with a brush moistened with cleaning solvent and wiped dry with a cloth.

COMPESSION PRESSURE INSPECTION EEF8AA76

NOTE

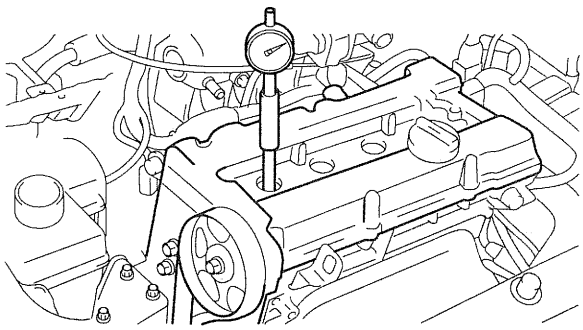
If the there is lack of power, excessive oil consumption or poor fuel economy, measure the compression pressure.

1. Warm up and stop engine.
   Allow the engine to warm up to normal operating temperature.
2. Disconnect the ignition coil connectors and the spark plug cables. (Refer to EE group - ignition system)



KCPF020A

3. Remove the spark plugs.
   Using a 16mm plug wrench, remove the 4 spark plugs.
4. Check the cylinder compression pressure.
   1) Insert a compression gauge into the spark plug hole.



KDPC001B

   2) Fully open the throttle.
   3) While cranking the engine, measure the compression pressure.

NOTE

Always use a fully charged battery to obtain engine speed of 250rpm or more.

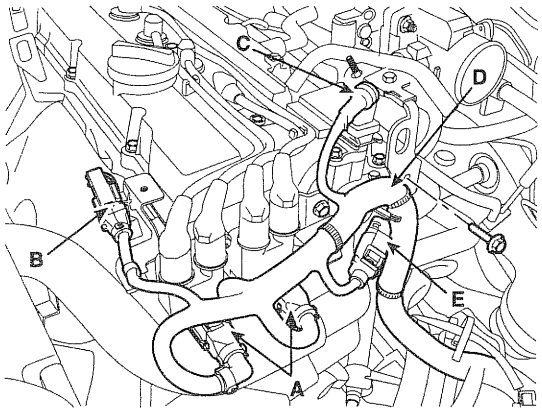
   4) Repeat step 1) through 3) for each cylinder.

NOTE

This measurement must be done in as short a time as possible.

Compression pressure Standard : 1,618kPa (16.5kg/cm², 235psi) (250~400 rpm) Minimum : 1,471kPa (15.0kg/cm², 213psi) Difference between each cylinder : 98kPa (1.0kg/cm², 14psi) or less

14) Disconnect the water temperature sensor connector (E).



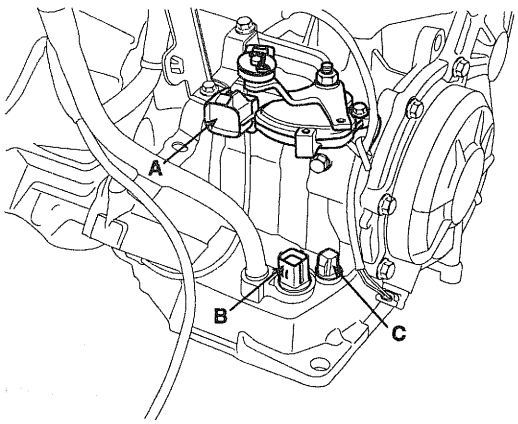
KCPF006A

16. Remove the transaxle wire harness connectors and control cable from transaxle (A/T).

1) Disconnect the transaxle range switch connector(A).

2) Disconnect the solenoid valve connector(B).

3) Disconnect the ATF oil temperature sensor connector (C).



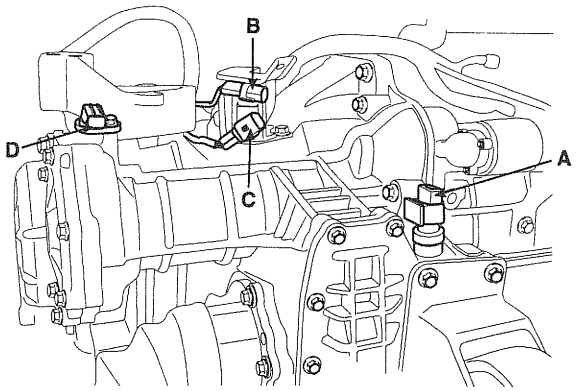
ACJF021A

4) Disconnect the vehicle speed sensor connector(A).

5) Disconnect the band server switch connector(B).

6) Disconnect the pulse generator(A) connector(C).

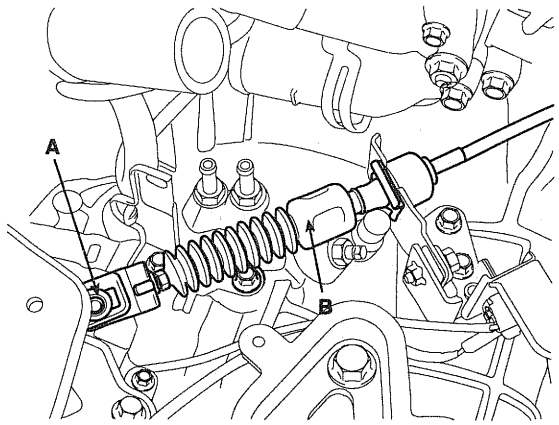
7) Disconnect the pulse generator(B) connector(D).



ACJF022A

8) Remove the control cable nut(A) from transaxle range switch.

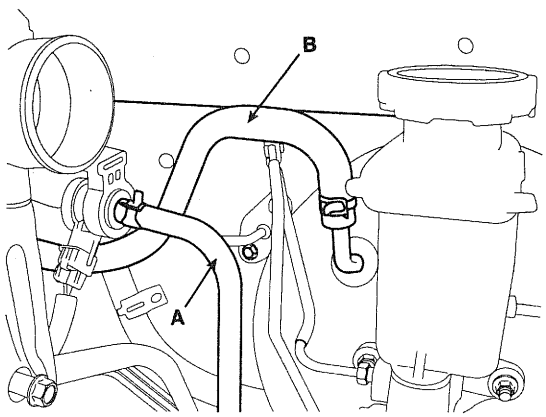
9) Remove the control cable(B).



ACJF023A

17. Disconnect the hose(A) of the PCSV (Purge Control Solenoid Valve) side.

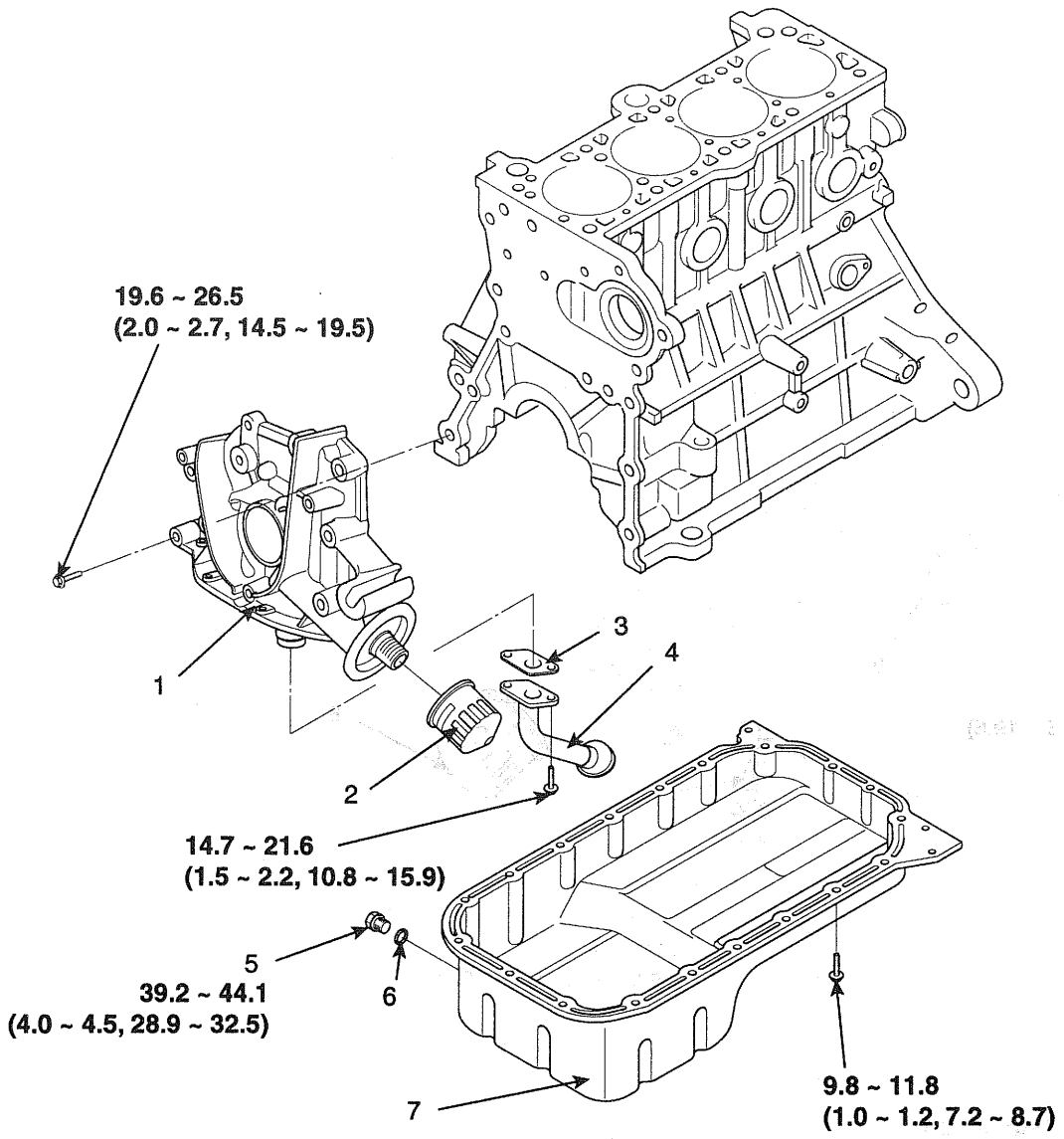
18. Remove the brake booster vacuum hose(B).



ACJF018A

LUBRICATION SYSTEM

COMPONENT E41742E9



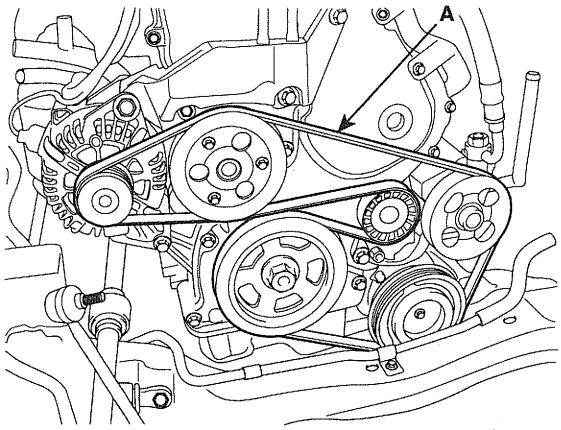
1. Front case
2. Filter
3. Gasket
4. Oil screen
5. Drain plug
6. Gasket
7. Oil pan

LCJF013A

REMOVAL E5A01FA9

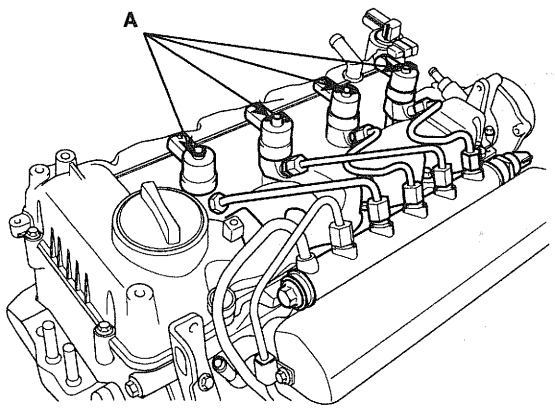
Engine removal is not required for this procedure.

1. Remove the drive belt(A).



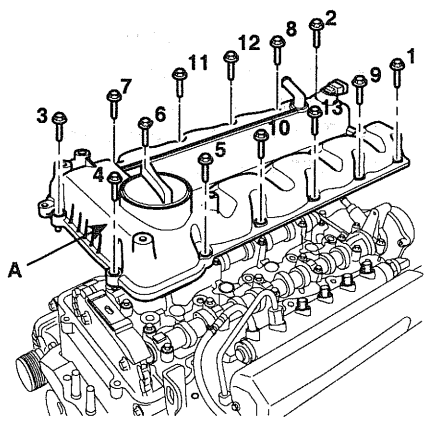
ACGF031A

2. Remove the injector(A). (Refer to FLB Gr.)



LCGF003A

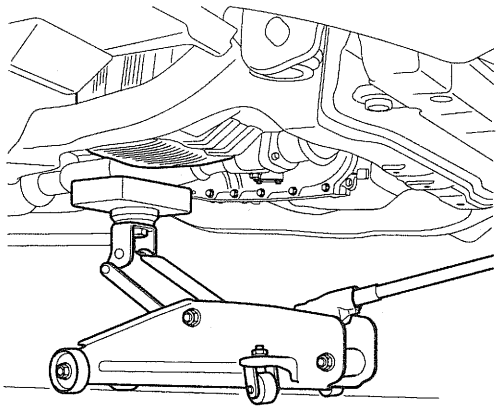
3. Remove the cylinder head cover(A).



LCGF004A

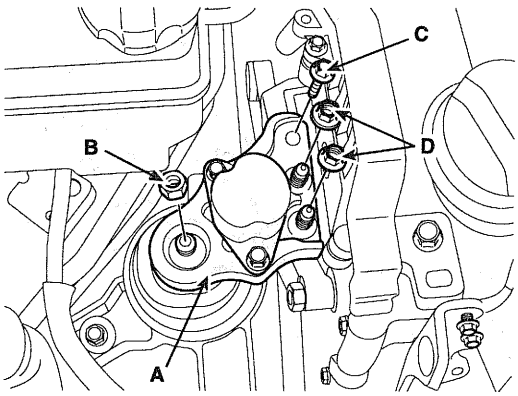
4. Remove the engine mounting support bracket.

1) Set the jack to the engine oil pan



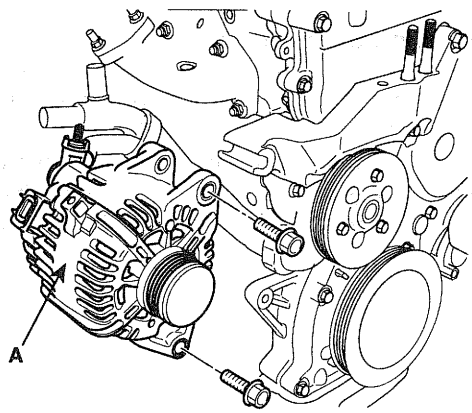
LDIF001A

2) Remove the engine mounting support bracket(A).



KDPF015A

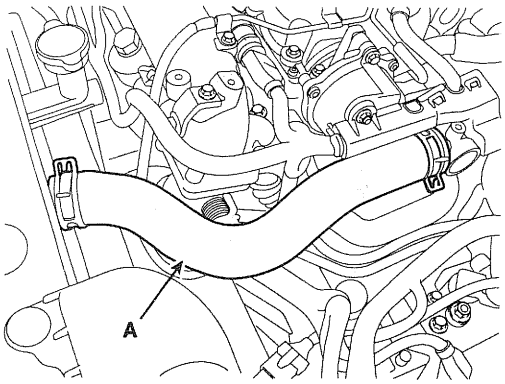
5. Remove the alternator(A).



LCGF005A

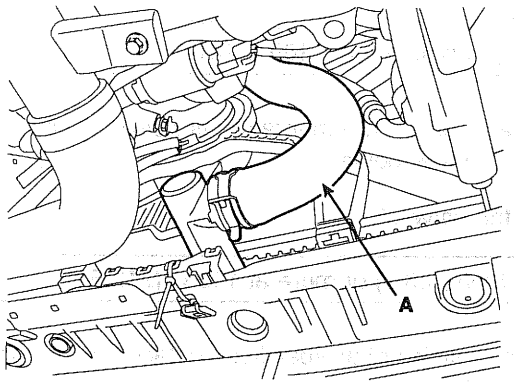
RADIATOR

1. Drain the engine coolant.
   Remove the radiator cap to speed draining.
2. Remove the upper radiator hose(A).



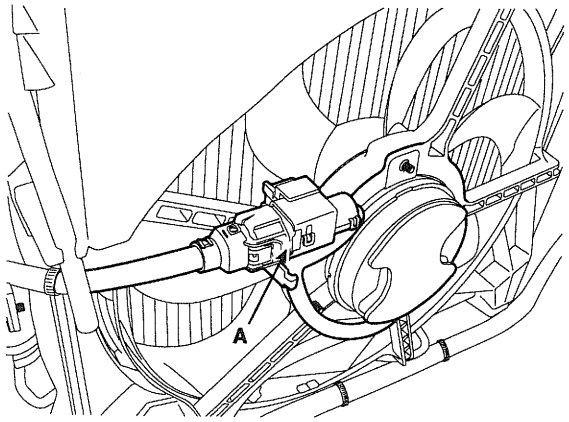
KDPF005A

3. Remove the lower radiator hose(A).



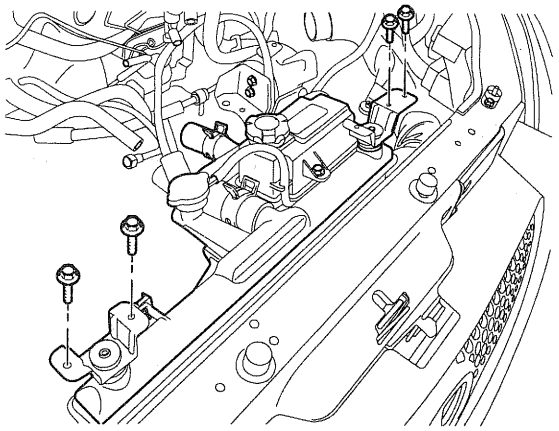
KDPF008A

4. Disconnect the fan motor connector(A).



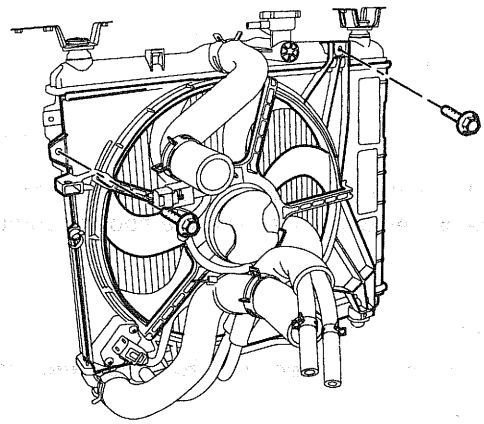
KCPF014A

5. Remove the radiator upper bracket, then pull up the radiator.



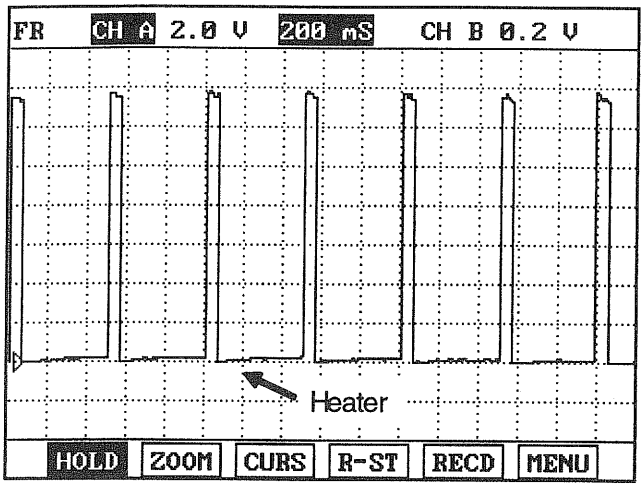
KCPF015A

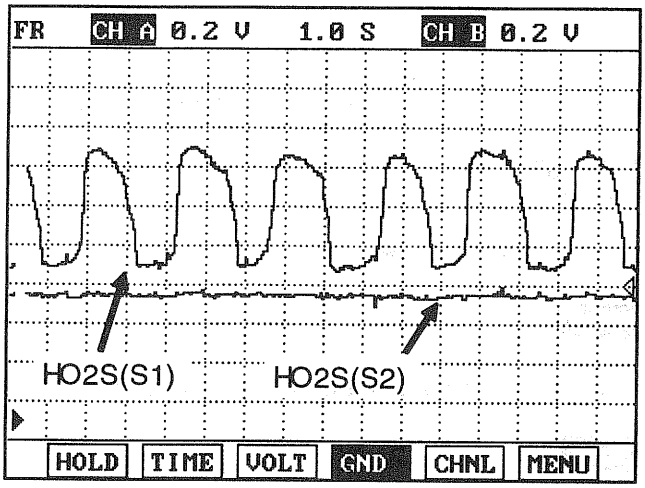
6. Remove the cooling fan assembly (A).



KCPF017A

SIGNAL WAVEFORM & DATA E36D0E92



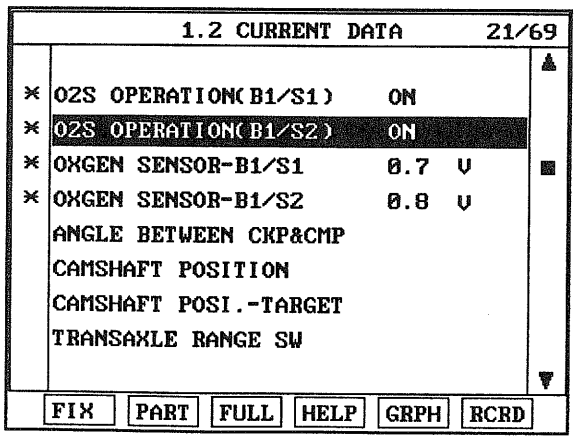


The HO2S requires a minimum temperature to provide a closed loop fuel control system. So the HO2S contains a heater element to reduce its warm-up time and ensure its performance during all driving conditions. The HO2S heater is controlled ON after engine start except for Cold condition and high speed accelleration. The ECM controls this heater element by duty cycle. The main relay supplies voltage to the heater and the ECM provides a ground circuit for activating the heater.

LFJF318A

MONITOR SCANTOOL DATA E635098A

1. Connect scantool to DLC (Data Link Cable).
2. Warm up the engine to normal operating temperature.
3. Monitor "HO2S(B1S2)" parameter on scantool.



EGPF500D

4. Is the "HO2S Heater(B1/S2)" data displayed correctly?

YES

▶ Fault is intermittent caused by poor contact in the sensor' s and/or ECM' s connector or was repaired and ECM memory was not cleared. Thoroughly check connectors for looseness, poor connection, ending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

NO

DTC P0124 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT INTERMITTANT

COMPONENT LOCATION E7185974

Refer to DTC P0121.

GENERAL DESCRIPTION E0A4A648

Refer to DTC P0121.

DTC DESCRIPTION EADC0CFE

If the difference between modeled relative load and measured relative load is over the threshold value according to throttle position under enable conditions, ECM sets DTC P0124.

DTC DETECTING CONDITION EBA6992E

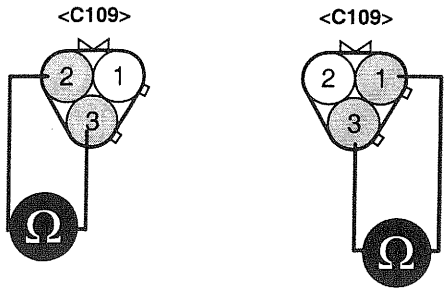
Item	Detecting Condition	Possible Cause
DTC Strategy	• Rationality check	• Poor connection • TPS • ECM
Enable Conditions	• Rate of change of throttle angle 〈 0.1221% • Engine speed 〉 600rpm • Coolant temperature 〉 75℃ • Rate of change of predicted eng. load 〈 15% • Altitude 〉 0m • Time in idling 〉 30s	
Threshold Value	• Difference between modeled relative load and measured relative load 〉 threshold f(throttle position)	
Diagnostic Time	• 2.5sec	
MIL ON Condition	• DTC only	

SPECIFICATION EA86BF80

Refer to DTC P0121.

SCHEMATIC DIAGRAM E0DFE9D7

Refer to DTC P0121.



1. Primary Coil Control(CYL2,3)
2. Primary Coil Control(CYL1,4)
3. Power

EFPG500Z

3) Is the measured resistance within specifications?

YES

▶ Go to "Timing mark check" procedure.

NO

▶ Substitute with a known - good ignition coil and check for proper operation.
▶ If the problem is corrected, replace ignition coil and go to "Verification of Vehicle Repair" procedure.

6. Timing mark check.

1) Key "OFF".

2) Check the timing mark.

3) Is the timing mark normal?

YES

▶ Go to "Air leakage check" procedure.

NO

▶ Repair and go to "Verification of Vehicle Repair" procedure.

7. Air leakage check.

1) Visually/physically inspect the air leakage in intake/exhaust system as following items,
- Vacuum hoses for splits, kinks and improper connections.
- Throttle body gasket
- Gasket between intake manifold and cylinder head
- Seals between intake manifold and fuel injectors
- Exhaust system between HO2S and Three way catalyst for air leakage.

2) Has a problem been found in any of the above areas?

YES

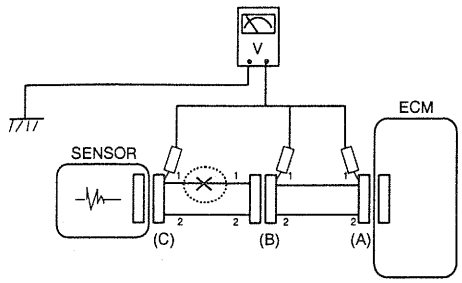
▶ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

NO

▶ Go to "PCV(Positive Crankcase Ventilation) valve check" procedure.

8. PCV(Positive Crankcase Ventilation) valve check.

FIG 4



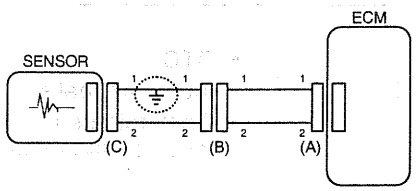
BFGE501D

● CHECK SHORT CIRCUIT

1. Test Method for Short to Ground Circuit
   - Continuity Check with Chassis Ground

   If short to ground circuit occurs as shown in [FIG. 5], the broken point can be found by performing below Step 2 (Continuity Check Method with Chassis Ground) as shown below.

FIG 5



BFGE501E

2. Continuity Check Method (with Chassis Ground)

   NOTE

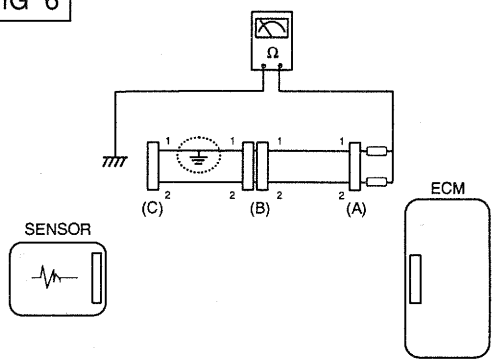
   Lightly shake the wire harness above and below, or from side to side when measuring the resistance.

Specification (Resistance)
1Ω or less → Short to Ground Circuit
1MΩ or Higher → Normal Circuit

a. Disconnect connectors (A), (C) and measure for resistance between connector (A) and Chassis Ground as shown in [FIG. 6].

   The measured resistance of line 1 and 2 in this example is below 1 Ω and higher than 1MΩ respectively. Specifically the short to ground circuit is line 1 (Line 2 is normal). To find exact broken point, check the sub line of line 1 as described in the following step.

FIG 6

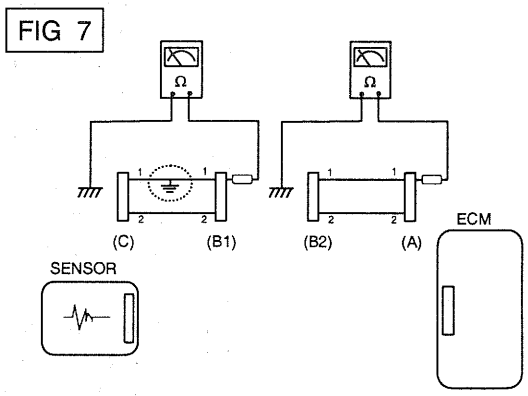


BFGE501F

b. Disconnect connector (B), and measure the resistance between connector (A) and chassis ground, and between (B1) and chassis ground as shown in [FIG. 7].

   The measured resistance between connector (B1) and chassis ground is 1Ω or less. The short to ground circuit is between terminal 1 of connector (C) and terminal 1 of connector (B1).

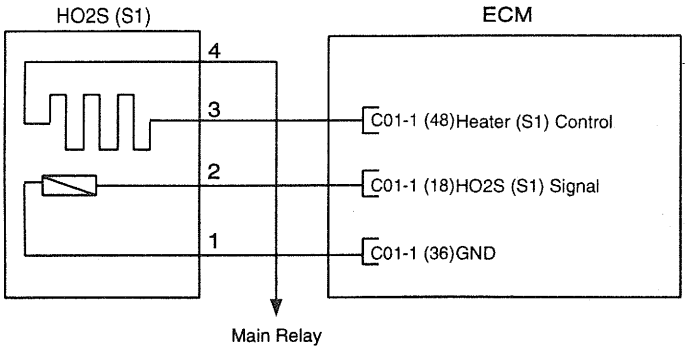
FIG 7



BFGE501G

SCHEMATIC DIAGRAM EC35B133

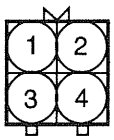
[CIRCUIT DIAGRAM]



[CONNECTION INFORMATION]

Terminal	Connected to	Function
1	ECM C01-1 (36)	Sensor Ground
2	ECM C01-1 (18)	HO2S (S1) Signal
3	ECM C01-1 (48)	Heater (S1) Control
4	Main Relay	Battery Voltage (B+)

[HARNESS CONNECTOR]



HO2S [S1] (C17)

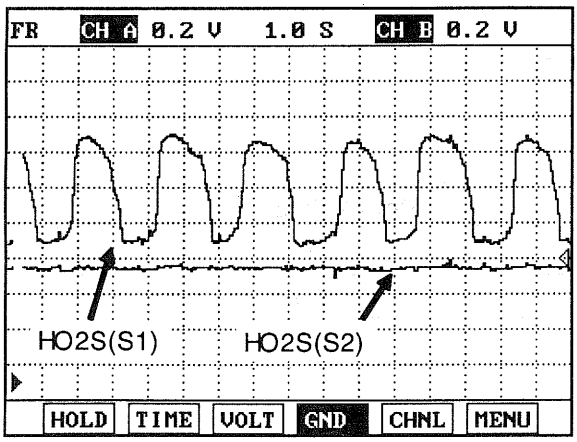
6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	5	4
25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	3	
44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62		
63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	2	1

C01-1

ECM

EFPF001A

SIGNAL WAVEFORM & DATA E50AF374



If you release the accelerator pedal suddenly after engine running about 4000 rpm, fuel supply will stop for short period and the O2 sensor service data in the Hi-Scan (Pro) will display values 200mV or lower.
When you suddenly press on the accelerator pedal down, the voltage will reach 0.6 ~ 1.0 V.
When you let the engine idle again, the voltage will fluctuate between 200 mV or lower and 0.6 ~ 1.0 V.
In this case, the O2sensor can be determined as good.

LFJF421A

MONITOR SCANTOOL DATA E5F261F7

1. Connect scantool to DLC (Data Link Cable).
2. Warm up the engine to normal operating temperature.

SIGNAL WAVEFORM AND DATA E3EB10C4

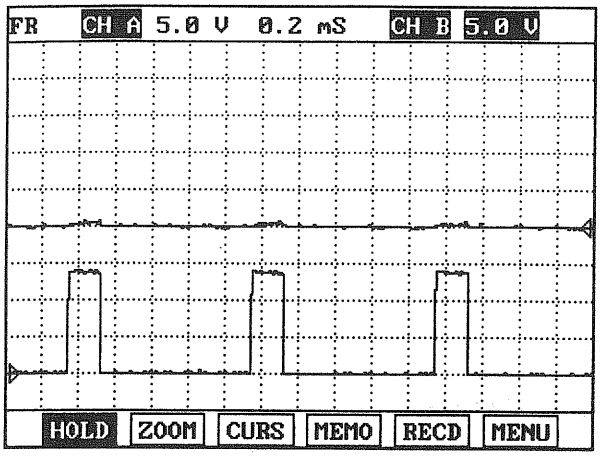


Fig.1

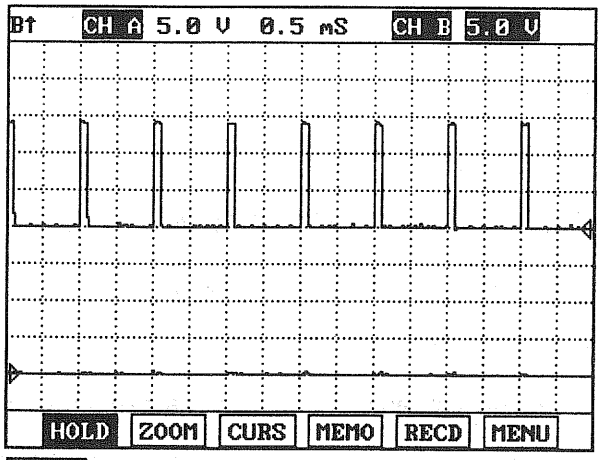


Fig.2

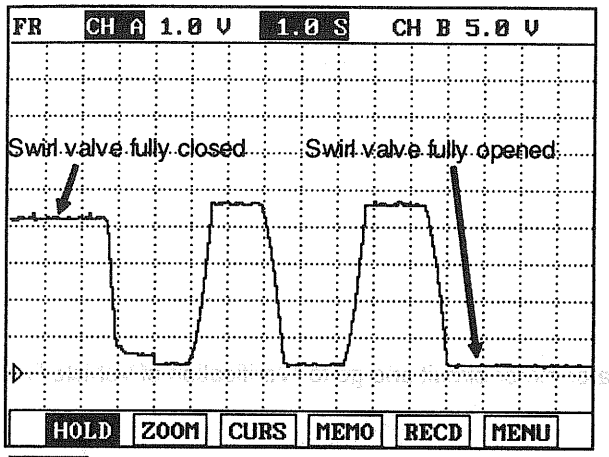


Fig.3

Fig. 1) Waveform when variable swirl valve closed at idle. Terminal 1 is (+) and 2 is (-).
Fig. 2) Waveform when variable swirl valve opened at above 3000RPM. Terminal 1 is (-) and 2 is (+).
Fig. 3) Waveform of variable swirl control actuator motor position sensor at the point of turning engine OFF.
4.3V at swirl valve closed and 0.3V at swirl valve opened. Swirl valve is opened and closed twice at engine "OFF".

LGJF011H

TERMINAL AND CONNECTOR INSPECTION E2F0DEDA

1. Electrical systems consist of a lot of harness and connectors, poor connection of terminals can cause various problems and damge of component.

2. Perform checking procedure as follows.

   1) Check damage of harness and terminals : Check terminals for contact resistance, corrosion and deformation.

   2) Check connecting condition of ECM and component connector : Check terminal seperation, damage of locking device and connecting condition between terminal and wiring.

   NOTE

   Disconnect the pin which requires checking at male connector and insert it to the terminal at female connector for checking connecting condition. (after checking, reconnect the pin at correct position.)

3. Is the problem found?