

Fuel System

GENERAL

GASOLINE ENGINE CONTROL SYSTEM

POWERTRAIN CONTROL MODULE (PCM)
MANIFOLD ABSOLUTE PRESSURE SENSOR (MAPS)
INTAKE AIR TEMPERATURE SENSOR (IATS)
ENGINE COOLANT TEMPERATURE SENSOR (ECTS)
THROTTLE POSITION SENSOR (TPS)
CAMSHAFT POSITION SENSOR (CMPS)
CRANKSHAFT POSITION SENSOR (CKPS)
HEATED OXYGEN SENSOR (HO2S)

KNOCK SENSOR (KS)
INJECTOR
IDLE SPEED CONTROL ACTUATOR (ISCA)
CVVT OIL CONTROL VALVE (OCV)
PURGE CONTROL SOLENOID VALVE (PCSV)

DTC TROUBLESHOOTING PROCEDURES

FUEL DELIVERY SYSTEM

FUEL PUMP
FUEL TANK
FILLER-NECK ASSEMBLY

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



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SPECIFICATIONS E1A40AA3

FUEL DELIVERY SYSTEM

Items	Specification	
Fuel Tank	Capacity	55lit. (14.5 U.S.gal., 12.1 Imp.gal.)
Fuel Filter (built in Fuel Pump Assembly)	Type	High pressure type
Fuel Pressure Regulator (built in Fuel Pump assembly)	Regulated Fuel Pressure	338 ~ 348kpa (3.45 ~ 3.55kgf/cm ² , 49.0 ~ 50.5psi)
Fuel Pump	Type	Electrical, in-tank type
	Driven by	Electric motor
Fuel Retrun System	Type	Returnless

SENSORS

MANIFOLD ABSOLUTE PRESSURE SENSOR (MAPS)

Type: Piezo-resistive pressure sensor type
Specification

Pressure (kPa)	Output Voltage (V)
20.0	0.79
46.7	1.84
101.32	4.0

INTAKE AIR TEMPERATURE SENSOR (IATS)

Type: Thermistor type
Specification

Temperature [()]	Resistance (kΩ)
-40(-40)	40.93 ~ 48.35
-30(-22)	23.43 ~ 27.34
-20(-4)	13.89 ~ 16.03
-10(14)	8.50 ~ 9.71
0(32)	5.38 ~ 6.09
10(50)	3.48 ~ 3.90
20(68)	2.31 ~ 2.57
25(77)	1.90 ~ 2.10
30(86)	1.56 ~ 1.74
40(104)	1.08 ~ 1.21

Temperature [()]	Resistance (kΩ)
60(140)	0.54 ~ 0.62
80(176)	0.29 ~ 0.34

ENGINE COOLANT TEMPERATURE SENSOR (ECTS)

Type: Thermistor type
Specification

[FOR ECM (2 PIN)]

Temperature [()]	Resistance (kΩ)
-40(-40)	48.14
-20(-4)	14.13 ~ 16.83
0(32)	5.79
20(68)	2.31 ~ 2.59
40(104)	1.15
60(140)	0.59
80(176)	0.32

[FOR GAUGE (1 PIN)]

Temperature [()]	Resistance ()
60(140)	125
85(185)	42.6 ~ 54.2
110(230)	22.1 ~ 26.2
125(257)	15.2

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THROTTLE POSITION SENSOR (TPS)

Type: Variable resistor type
Specification

Throttle Angle	Output Voltage (V)
C.T	0.25 ~ 0.9
W.O.T	Min. 4.0V

Items	Specification
Sensor Resistance (kΩ)	1.6 ~ 2.4

HEATED OXYGEN SENSOR (HO2S)

Type: Zirconia (ZrO2) type
Specification

A/F Ratio	Output Voltage (V)
Rich	0.6 ~ 1.0
Lean	0 ~ 0.4

Item	Resistance ()
Heater Resistance ()	Approx. 9.0 (20)

CAMSHAFT POSITION SENSOR (CMPS)

Type: Hall effect type

CRANKSHAFT POSITION SENSOR (CKPS)

Type: Magnetic field sensitive Type

KNOCK SENSOR (KS)

Type: Piezo-electricity type
Specification

Item	Specification
Capacitance (pF)	950 ~ 1,350
Resistance(MΩ)	4.87

ACTUATORS

INJECTOR

Number: 4
Specification

Item	Specification
Coil Resistance ()	13.8 ~ 15.2 [20 (68)]

IDLE SPEED CONTROL ACTUATOR (ISCA)

Type: Double coil type
Specification

Item	Specification
Closing Coil Resistance ()	14.6 ~ 16.2 [20 (68)]
Opening Coil Resistance ()	11.1 ~ 12.7 [20 (68)]

Duty (%)	Air Flow Rate (m³/h)
15	0.5 ~ 1.5
35	5.5 ~ 9.3
70	28.5 ~ 36.5
96	39.0 ~ 48.0

PURGE CONTROL SOLENOID VALVE (PCSV)

Specification

Item	Specification
Coil Resistance ()	16.0 [20 (68)]

CVVT OIL CONTROL VALVE (OCV)

Specification

Item	Specification
Coil Resistance ()	6.9 ~ 7.9 [20 (68)]

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IGNITION COIL

Type: Stick type
Specification

Item	Specification
Primary Coil Resistance (Ω)	$0.75\Omega \pm 15\%$ [20 (68)]
Secondary Coil Resistance ($k\Omega$)	Measurement is impossible because a diode is inserted

دیجیتال خودرو

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FUEL SYSTEM

SERVICE STANDARD EA8DBCAS

Ignition Timing	BTDC $5^{\circ} \pm 10^{\circ}$		
Idle Speed	A/CON OFF	Neutral,N,P-range	660 \pm 100 rpm
		D-range	
	A/CON ON	Neutral,N,P-range	
		D-range	

TIGHTENING TORQUES ECFAE6DC

ENGINE CONTROL SYSTEM

Item	Kgf-m	N-m	lbf-ft
PCM/ECM installation nuts	0.4 ~ 0.6	3.9 ~ 5.9	2.9 ~ 4.3
Manifold absolute pressure sensor installation bolt	0.8 ~ 1.2	7.8 ~ 11.8	5.8 ~ 8.7
Engine coolant temperature sensor installation	3.0 ~ 4.0	29.4 ~ 39.2	21.7 ~ 28.9
Throttle position sensor installation screws	0.15 ~ 0.25	1.5 ~ 2.5	1.1 ~ 1.8
Crankshaft position sensor installation bolt	0.8 ~ 1.2	7.8 ~ 11.8	5.8 ~ 8.7
Camshaft position sensor installation bolt	0.8 ~ 1.2	7.8 ~ 11.8	5.8 ~ 8.7
Knock sensor installation bolt	1.9 ~ 2.5	18.6 ~ 24.5	13.7 ~ 18.1
Heated oxygen sensor (Bank 1 / Sensor 1) installation	4.0 ~ 5.0	39.2 ~ 49.1	28.9 ~ 36.2
Heated oxygen sensor (Bank 1 / Sensor 2) installation	4.0 ~ 5.0	39.2 ~ 49.1	28.9 ~ 36.2
Idle speed control actuator installation screws	0.6 ~ 0.8	5.9 ~ 7.8	4.3 ~ 5.8
CVVT Oil control valve installation bolt	1.0 ~ 1.2	9.8 ~ 11.8	7.2 ~ 8.7
Ignition coil installation bolt	1.0 ~ 1.2	9.8 ~ 11.8	7.2 ~ 8.7

FUEL DELIVERY SYSTEM

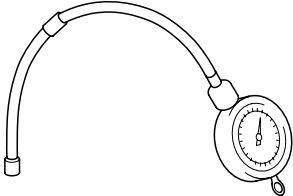
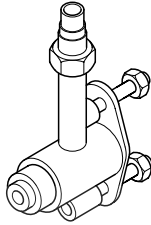
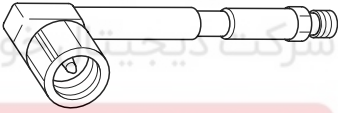
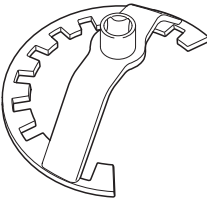
Item	Kgf-m	N-m	lbf-ft
Fuel tank band mounting nuts	4.0 ~ 5.5	39.2 ~ 54.0	28.9 ~ 39.8
Fuel pump plate cover tightening	6.1 ~ 7.1	60.0 ~ 70.0	44.3 ~ 51.6
Delivery pipe installation bolts	2.0 ~ 2.5	19.6 ~ 24.5	14.5 ~ 18.1

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SPECIAL SERVICE TOOLS



E0FBCA35

Tool (Number and name)	Illustration	Application
09353-24100 Fuel Pressure Gauge	 <p style="text-align: right;">EFDA003A</p>	Measuring the fuel line pressure
09353-38000 Fuel Pressure Gauge Adapter	 <p style="text-align: right;">BF1A025D</p>	Connection between the delivery pipe and fuel feed line
09353-24000 Fuel Pressure Gauge Connector	 <p style="text-align: right;">EFDA003C</p>	Connection between Fuel Pressure Gauge (09353-24100) and Fuel Pressure Gauge Adapter (09353-38000)
09310-2B100 Fuel Pump Plate Cover Wrench	 <p style="text-align: right;">SCMFL6666D</p>	Removeing and installation fuel low pressure fuel pump & sub fuel sender plate cover

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FUEL SYSTEM

BASIC TROUBLESHOOTING E4AA4129**BASIC TROUBLESHOOTING GUIDE**

1	Bring Vehicle to Workshop
2	Analyze Customer's Problem Ask the customer about the conditions and environment relative to the issue (Use CUSTOMER PROBLEM ANALYSIS SHEET).
3	Verify Symptom, and then Check DTC and Freeze Frame Data Connect Hi-Scan (Pro) to Diagnostic Link Connector (DLC). Record the DTC and freeze frame data.  NOTE <i>To erase DTC and freeze frame data, refer to Step 5.</i>
4	Confirm the Inspection Procedure for the System or Part Using the SYMPTOM TROUBLESHOOTING GUIDE CHART, choose the correct inspection procedure for the system or part to be checked.
5	Erase the DTC and Freeze Frame Data  WARNING NEVER erase DTC and freeze frame data before completing Step 2 MIL/DTC in "CUSTOMER PROBLEM ANALYSIS SHEET". <i>شرکت دیجیتال خودرو (مسئولیت محدود)</i> <i>اولین سامانه دیجیتال خودرو</i>
6	Inspect Vehicle Visually Go to Step 11, if you recognize the problem.
7	Recreate (Simulate) Symptoms of the DTC Try to recreate or simulate the symptoms and conditions of the malfunction as described by customer. If DTC(s) is/are displayed, simulate the condition according to troubleshooting procedure for the DTC.
8	Confirm Symptoms of Problem If DTC(s) is/are not displayed, go to Step 9. If DTC(s) is/are displayed, go to Step 11.
9	Recreate (Simulate) Symptom Try to recreate or simulate the condition of the malfunction as described by the customer.
10	Check the DTC If DTC(s) does(do) not occur, refer to INTERMITTENT PROBLEM PROCEDURE in BASIC INSPECTION PROCEDURE. If DTC(s) occur(s), go to Step 11.
11	Perform troubleshooting procedure for DTC
12	Adjust or repair the vehicle
13	Confirmation test
14	END

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CUSTOMER PROBLEM ANALYSIS SHEET

1. VEHICLE INFORMATION

VIN No.		Transmission	<input type="checkbox"/> M/T <input type="checkbox"/> A/T <input type="checkbox"/> CVT <input type="checkbox"/> etc.
Production date		Driving type	<input type="checkbox"/> 2WD (FF) <input type="checkbox"/> 2WD (FR) <input type="checkbox"/> 4WD
Odometer Reading	_____ km/mile		

2. SYMPTOMS

<input type="checkbox"/> Unable to start	<input type="checkbox"/> Engine does not turn over <input type="checkbox"/> Incomplete combustion <input type="checkbox"/> Initial combustion does not occur
<input type="checkbox"/> Difficult to start	<input type="checkbox"/> Engine turns over slowly <input type="checkbox"/> Other _____
<input type="checkbox"/> Poor idling	<input type="checkbox"/> Rough idling <input type="checkbox"/> Incorrect idling <input type="checkbox"/> Unstable idling (High: _____ rpm, Low: _____ rpm) <input type="checkbox"/> Other _____
<input type="checkbox"/> Engine stall	<input type="checkbox"/> Soon after starting <input type="checkbox"/> After accelerator pedal depressed <input type="checkbox"/> After accelerator pedal released <input type="checkbox"/> During A/C ON <input type="checkbox"/> Shifting from N to D-range <input type="checkbox"/> Other _____
<input type="checkbox"/> Others	<input type="checkbox"/> Poor driving (Surge) <input type="checkbox"/> Knocking <input type="checkbox"/> Poor fuel economy <input type="checkbox"/> Back fire <input type="checkbox"/> After fire <input type="checkbox"/> Other _____

3. ENVIRONMENT

Problem frequency	<input type="checkbox"/> Constant <input type="checkbox"/> Sometimes (_____) <input type="checkbox"/> Once only <input type="checkbox"/> Other _____
Weather	<input type="checkbox"/> Fine <input type="checkbox"/> Cloudy <input type="checkbox"/> Rainy <input type="checkbox"/> Snowy <input type="checkbox"/> Other _____
Outdoor temperature	Approx. _____ °C/°F
Place	<input type="checkbox"/> Highway <input type="checkbox"/> Suburbs <input type="checkbox"/> Inner City <input type="checkbox"/> Uphill <input type="checkbox"/> Downhill <input type="checkbox"/> Rough road <input type="checkbox"/> Other _____
Engine temperature	<input type="checkbox"/> Cold <input type="checkbox"/> Warming up <input type="checkbox"/> After warming up <input type="checkbox"/> Any temperature
Engine operation	<input type="checkbox"/> Starting <input type="checkbox"/> Just after starting (_____ min) <input type="checkbox"/> Idling <input type="checkbox"/> Racing <input type="checkbox"/> Driving <input type="checkbox"/> Constant speed <input type="checkbox"/> Acceleration <input type="checkbox"/> Deceleration <input type="checkbox"/> A/C switch ON/OFF <input type="checkbox"/> Other _____

4. MIL/DTC

MIL (Malfunction Indicator Lamp)	<input type="checkbox"/> Remains ON <input type="checkbox"/> Sometimes lights up <input type="checkbox"/> Does not light	
DTC	Normal check (Pre-check)	<input type="checkbox"/> Normal <input type="checkbox"/> DTC (_____) <input type="checkbox"/> Freeze Frame Data
	Check mode	<input type="checkbox"/> Normal <input type="checkbox"/> DTC (_____) <input type="checkbox"/> Freeze Frame Data

5. ECM/PCM INFORMATION

ECM/PCM Part No.	
ROM ID	

SCMFL6150L

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FUEL SYSTEM

BASIC INSPECTION PROCEDURE

MEASURING CONDITION OF ELECTRONIC PARTS' RESISTANCE

The measured resistance at high temperature after vehicle running may be high or low. So all resistance must be measured at ambient temperature (20 , 68), unless stated otherwise.

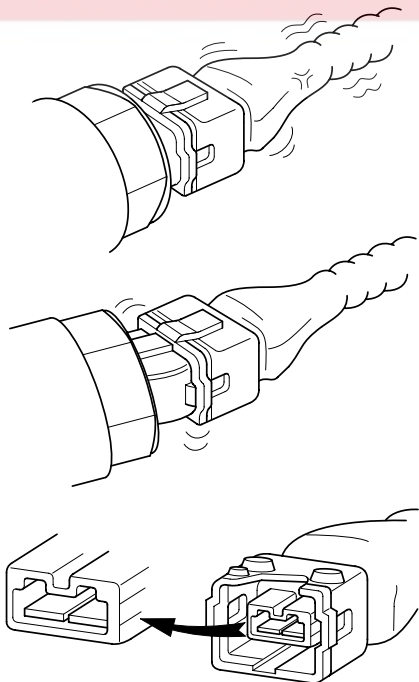


The measured resistance in except for ambient temperature (20 , 68) is reference value.

INTERMITTENT PROBLEM INSPECTION PROCEDURE

Sometimes the most difficult case in troubleshooting is when a problem symptom occurs but does not occur again during testing. An example would be if a problem appears only when the vehicle is cold but has not appeared when warm. In this case, the technician should thoroughly make out a "CUSTOMER PROBLEM ANALYSIS SHEET" and recreate (simulate) the environment and condition which occurred when the vehicle was having the issue.

1. Clear Diagnostic Trouble Code (DTC).
2. Inspect connector connection, and check terminal for poor connections, loose wires, bent, broken or corroded pins, and then verify that the connectors are always securely fastened.



BFG321A

3. Slightly shake the connector and wiring harness vertically and horizontally.
4. Repair or replace the component that has a problem.
5. Verify that the problem has disappeared with the road test.

SIMULATING VIBRATION

- a. Sensors and Actuators : Slightly vibrate sensors, actuators or relays with finger.



Strong vibration may break sensors, actuators or relays

- b. Connectors and Harness : Lightly shake the connector and wiring harness vertically and then horizontally.

SIMULATING HEAT

- a. Heat components suspected of causing the malfunction with a hair dryer or other heat source.



- **DO NOT heat components to the point where they may be damaged.**
- **DO NOT heat the ECM directly.**

SIMULATING WATER SPRINKLING

- a. Sprinkle water onto vehicle to simulate a rainy day or a high humidity condition.



DO NOT sprinkle water directly into the engine compartment or electronic components.

SIMULATING ELECTRICAL LOAD

- a. Turn on all electrical systems to simulate excessive electrical loads (Radios, fans, lights, rear window defogger, etc.).

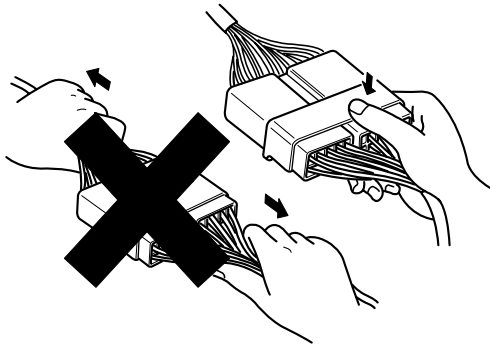
GENERAL

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CONNECTOR INSPECTION PROCEDURE

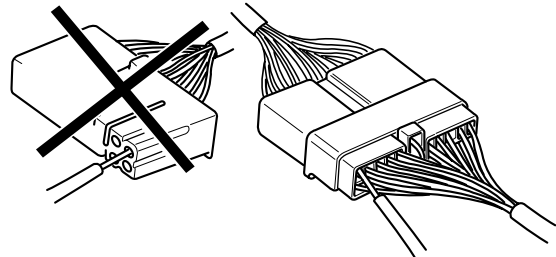
1. Handling of Connector

- a. Never pull on the wiring harness when disconnecting connectors.



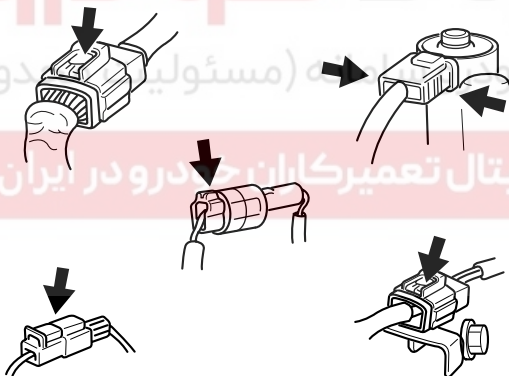
BFG015F

- d. When a tester is used to check for continuity, or to measure voltage, always insert tester probe from wire harness side.



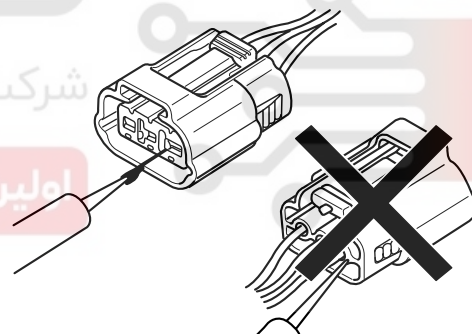
BFG015I

- b. When removing the connector with a lock, press or pull locking lever.



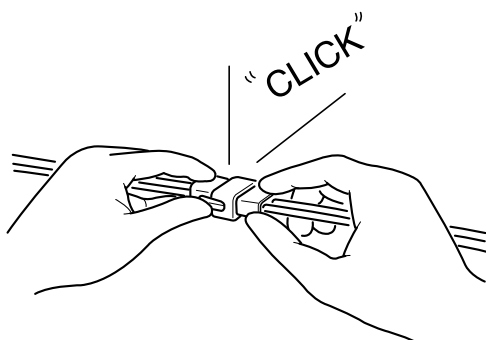
BFG015G

- e. Check waterproof connector terminals from the connector side. Waterproof connectors cannot be accessed from harness side.



BFG015J

- c. Listen for a click when locking connectors. This sound indicates that they are securely locked.



BFG015H

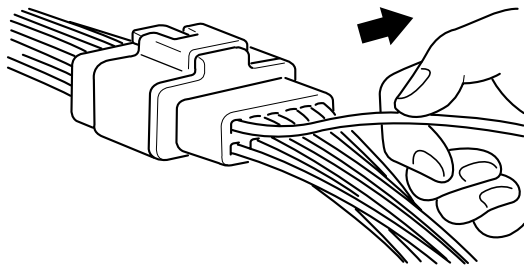


- Use a fine wire to prevent damage to the terminal.
- Do not damage the terminal when inserting the tester lead.

2. Checking Point for Connector

- a. While the connector is connected: Hold the connector, check connecting condition and locking efficiency.
- b. When the connector is disconnected: Check missed terminal, crimped terminal or broken core wire by slightly pulling the wire harness. Visually check for rust, contamination, deformation and bend.
- c. Check terminal tightening condition: Insert a spare male terminal into a female terminal, and then check terminal tightening conditions.

- d. Pull lightly on individual wires to ensure that each wire is secured in the terminal.



BFGEO15K

- 3. Repair Method of Connector Terminal
 - a. Clean the contact points using air gun and/or shop rag.



Never use sand paper when polishing the contact points, otherwise the contact point may be damaged.

- b. In case of abnormal contact pressure, replace the female terminal.

WIRE HARNESS INSPECTION PROCEDURE

- 1. Before removing the wire harness, check the wire harness position and crimping in order to restore it correctly.
- 2. Check whether the wire harness is twisted, pulled or loosened.
- 3. Check whether the temperature of the wire harness is abnormally high.
- 4. Check whether the wire harness is rotating, moving or vibrating against the sharp edge of a part.
- 5. Check the connection between the wire harness and any installed part.
- 6. If the covering of wire harness is damaged; secure, repair or replace the harness.

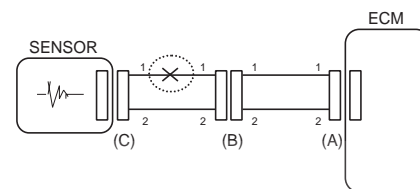
ELECTRICAL CIRCUIT INSPECTION PROCEDURE

CHECK OPEN CIRCUIT

- 1. Procedures for Open Circuit
 - Continuity Check
 - Voltage Check

If an open circuit occurs (as seen in [FIG. 1]), it can be found by performing Step 2 (Continuity Check Method) or Step 3 (Voltage Check Method) as shown below.

FIG 1



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- 2. Continuity Check Method



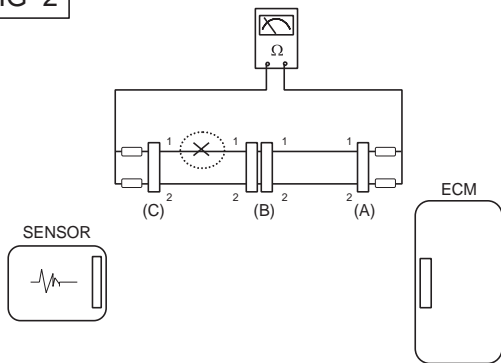
When measuring for resistance, lightly shake the wire harness above and below or from side to side.

Specification (Resistance)	
1 or less	Normal Circuit
1MΩ or Higher	Open Circuit

- a. Disconnect connectors (A), (C) and measure resistance between connector (A) and (C) as shown in [FIG. 2].

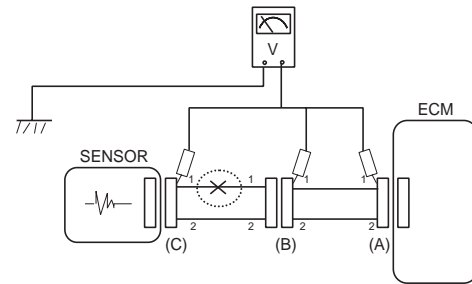
In [FIG.2.] the measured resistance of line 1 and 2 is higher than 1MΩ and below 1 respectively. Specifically the open circuit is line 1 (Line 2 is normal). To find exact break point, check sub line of line 1 as described in next step.

FIG 2



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FIG 4

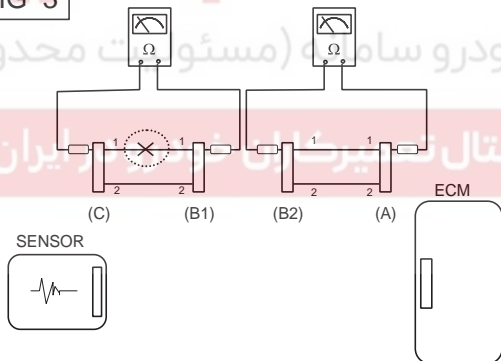


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- b. Disconnect connector (B), and measure for resistance between connector (C) and (B1) and between (B2) and (A) as shown in [FIG. 3].

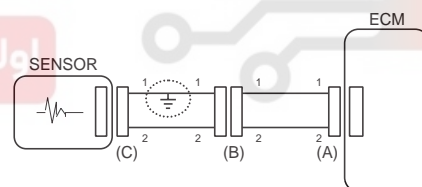
In this case the measured resistance between connector (C) and (B1) is higher than $1M\Omega$ and the open circuit is between terminal 1 of connector (C) and terminal 1 of connector (B1).

FIG 3



BFGE501C

FIG 5



BFGE501E

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 Step 2 (Continuity Check Method with Chassis Ground) as shown below.

- 3. Voltage Check Method
 - a. With each connector still connected, measure the voltage between the chassis ground and terminal 1 of each connectors (A), (B) and (C) as shown in [FIG. 4].

The measured voltage of each connector is 5V, 5V and 0V respectively. So the open circuit is between connector (C) and (B).

- 2. Continuity Check Method (with Chassis Ground)



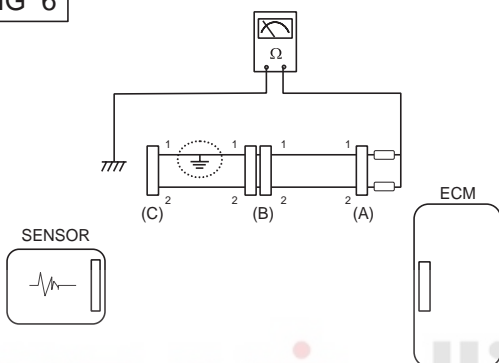
Lightly shake the wire harness above and below, or from side to side when measuring the resistance.

Specification (Resistance)	
1 or less	Short to Ground Circuit
1M 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 and higher than 1M 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

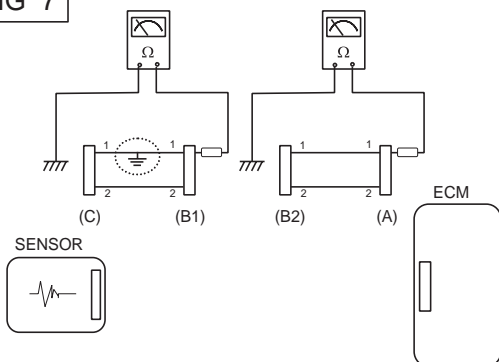


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- b. Disconnect connector (B), and measure the resistance between connector (A) and chassis ground, and between (B1) and chassis ground as shown in [FIG. 7].

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

FIG 7



BFGE501G



GENERAL

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SYMPTOM TROUBLESHOOTING GUIDE CHART

MAIN SYMPTOM	DIAGNOSTIC PROCEDURE	ALSO CHECK FOR
Unable to start (Engine does not turn over)	<ol style="list-style-type: none"> 1. Test the battery 2. Test the starter 3. Inhibitor switch (A/T) or clutch start switch (M/T) 	
Unable to start (Incomplete combustion)	<ol style="list-style-type: none"> 1. Test the battery 2. Check the fuel pressure 3. Check the ignition circuit 4. Troubleshooting the immobilizer system (In case of immobilizer lamp flashing) 	<ul style="list-style-type: none"> • DTC • Low compression • Intake air leaks • Slipped or broken timing belt • Contaminated fuel
Difficult to start	<ol style="list-style-type: none"> 1. Test the battery 2. Check the fuel pressure 3. Check the ECT sensor and circuit (Check DTC) 4. Check the ignition circuit 	<ul style="list-style-type: none"> • DTC • Low compression • Intake air leaks • Contaminated fuel • Weak ignition spark
Poor idling (Rough, unstable or incorrect Idle)	<ol style="list-style-type: none"> 1. Check the fuel pressure 2. Check the Injector 3. Check the long term fuel trim and short term fuel trim (Refer to CUSTOMER DATASTREAM) 4. Check the idle speed control circuit (Check DTC) 5. Inspect and test the Throttle Body 6. Check the ECT sensor and circuit (Check DTC) 	<ul style="list-style-type: none"> • DTC • Low compression • Intake air leaks • Contaminated fuel • Weak ignition spark
Engine stall	<ol style="list-style-type: none"> 1. Test the Battery 2. Check the fuel pressure 3. Check the idle speed control circuit (Check DTC) 4. Check the ignition circuit 5. Check the CKPS Circuit (Check DTC) 	<ul style="list-style-type: none"> • DTC • Intake air leaks • Contaminated fuel • Weak ignition spark
Poor driving (Surge)	<ol style="list-style-type: none"> 1. Check the fuel pressure 2. Inspect and test Throttle Body 3. Check the ignition circuit 4. Check the ECT Sensor and Circuit (Check DTC) 5. Test the exhaust system for a possible restriction 6. Check the long term fuel trim and short term fuel trim (Refer to CUSTOMER DATASTREAM) 	<ul style="list-style-type: none"> • DTC • Low compression • Intake air leaks • Contaminated fuel • Weak ignition spark
Knocking	<ol style="list-style-type: none"> 1. Check the fuel pressure 2. Inspect the engine coolant 3. Inspect the radiator and the electric cooling fan 4. Check the spark plugs 	<ul style="list-style-type: none"> • DTC • Contaminated fuel

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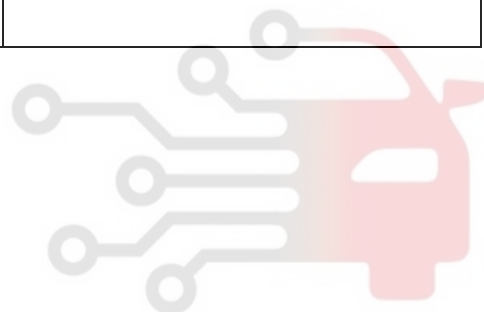
FUEL SYSTEM

MAIN SYMPTOM	DIAGNOSTIC PROCEDURE	ALSO CHECK FOR
Poor fuel economy	<ol style="list-style-type: none"> 1. Check customer's driving habits <ul style="list-style-type: none"> • Is A/C on full time or the defroster mode on? • Are tires at correct pressure? • Is excessively heavy load being carried? • Is acceleration too much, too often? 2. Check the fuel pressure 3. Check the injector 4. Test the exhaust system for a possible restriction 5. Check the ECT sensor and circuit 	<ul style="list-style-type: none"> • DTC • Low compression • Intake air leaks • Contaminated fuel • Weak ignition spark
Hard to refuel (Overflow during refueling)	<ol style="list-style-type: none"> 1. Test the canister close valve 2. Inspect the fuel filler hose/pipe <ul style="list-style-type: none"> • Pinched, kinked or blocked? • Filler hose is torn 3. Inspect the fuel tank vapor vent hose between the EVAP. canister and air filter 4. Check the EVAP. canister 	<ul style="list-style-type: none"> • Malfunctioning gas station filling nozzle (If this problem occurs at a specific gas station during refueling)

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



GASOLINE ENGINE CONTROL SYSTEM

FL -17

GASOLINE ENGINE CONTROL SYSTEM

DESCRIPTION E3BFCCF4

If the Gasoline Engine Control system components (sensors, ECM, injector, etc.) fail, interruption to the fuel supply or failure to supply the proper amount of fuel for various engine operating conditions will result. The following situations may be encountered.

1. Engine is hard to start or does not start at all.
2. Unstable idle.
3. Poor driveability

If any of the above conditions are noted, first perform a routine diagnosis that includes basic engine checks (ignition system malfunction, incorrect engine adjustment, etc.). Then, inspect the Gasoline Engine Control system components with the HI-SCAN (Pro).



- Before removing or installing any part, read the diagnostic trouble codes and then disconnect the battery negative (-) terminal.
- Before disconnecting the cable from battery terminal, turn the ignition switch to OFF. Removal or connection of the battery cable during engine operation or while the ignition switch is ON could cause damage to the ECM.
- The control harnesses between the ECM and heated oxygen sensor are shielded with the shielded ground wires to the body in order to prevent the influence of ignition noises and radio interference. When the shielded wire is faulty, the control harness must be replaced.
- When checking the generator for the charging state, do not disconnect the battery '+' terminal to prevent the ECM from damage due to the voltage.
- When charging the battery with the external charger, disconnect the vehicle side battery terminals to prevent damage to the ECM.

MALFUNCTION INDICATOR LAMP (MIL)

[EOBD]

A malfunction indicator lamp illuminates to notify the driver that there is a problem with the vehicle. However, the MIL will go off automatically after 3 subsequent sequential driving cycles without the same malfunction. Immediately after the ignition switch is turned on (ON position - do not start), the MIL will illuminate continuously to indicate that the MIL operates normally.

Faults with the following items will illuminate the MIL.

- Catalyst
- Fuel system
- Mass Air Flow Sensor (MAFS)
- Intake Air Temperature Sensor (IATS)
- Engine Coolant Temperature Sensor (ECTS)
- Throttle Position Sensor (TPS)
- Upstream Oxygen Sensor
- Upstream Oxygen Sensor Heater
- Downstream Oxygen Sensor
- Downstream Oxygen Sensor Heater
- Injector
- Misfire
- Crankshaft Position Sensor (CKPS)
- Camshaft Position Sensor (CMPS)
- Evaporative Emission Control System
- Vehicle Speed Sensor (VSS)
- Idle Speed Control Actuator (ISCA)
- Power Supply
- ECM/ PCM
- MT/AT Encoding
- Acceleration Sensor
- MIL-on Request Signal
- Power Stage



Refer to "INSPECTION CHART FOR DIAGNOSTIC TROUBLE CODES (DTC)" for more information.

[NON-EOBD]

A malfunction indicator lamp illuminates to notify the driver that there is a problem with the vehicle. However, the MIL will go off automatically after 3 subsequent sequential driving cycles without the same malfunction. Immediately after the ignition switch is turned on (ON position - do not start), the MIL will illuminate continuously to indicate that the MIL operates normally.

Faults with the following items will illuminate the MIL

- Heated oxygen sensor (HO2S)
- Mass Air Flow sensor (MAFS)
- Throttle position sensor (TPS)
- Engine coolant temperature sensor (ECTS)
- Idle speed control actuator (ISCA)
- Injectors
- ECM



Refer to "INSPECTION CHART FOR DIAGNOSTIC TROUBLE CODES (DTC)" for more information.

[INSPECTION]

1. After turning ON the ignition key, ensure that the light illuminates for about 5 seconds and then goes out.

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FUEL SYSTEM

- If the light does not illuminate, check for an open circuit in the harness, a blown fuse or a blown bulb.

erased when the battery terminal or ECM connector is disconnected, or by the HI-SCAN (Pro).

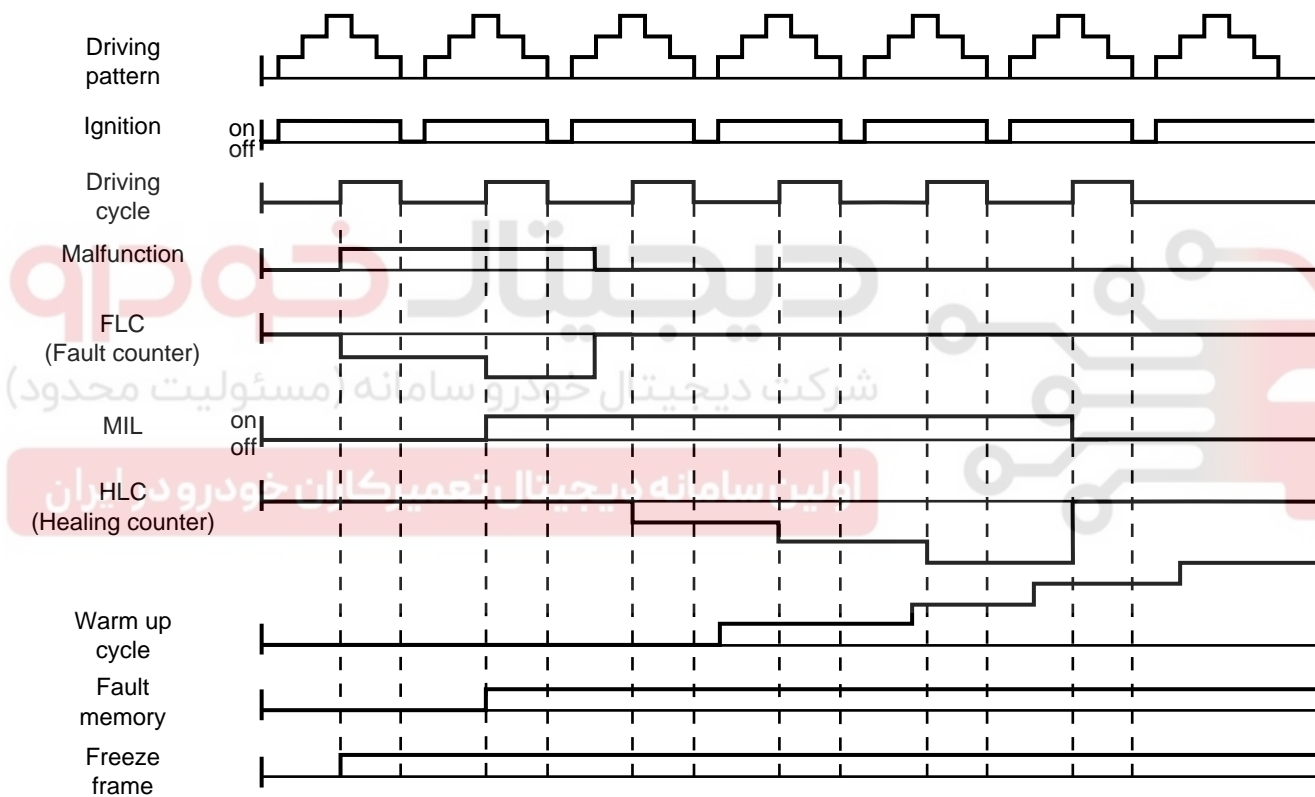
SELF-DIAGNOSIS

The ECM monitors the input/output signals (some signals at all times and the others under specified conditions). When the ECM detects an irregularity, it records the diagnostic trouble code, and outputs the signal to the Data Link connector. The diagnosis results can be read with the MIL or HI-SCAN (Pro). Diagnostic Trouble Codes (DTC) will remain in the ECM as long as battery power is maintained. The diagnostic trouble codes will, however, be



If a sensor connector is disconnected with the ignition switch turned on, the diagnostic trouble code (DTC) is recorded. In this case, disconnect the battery negative terminal (-) for 15 seconds or more, and the diagnosis memory will be erased.

THE RELATION BETWEEN DTC AND DRIVING PATTERN IN EOBD SYSTEM



LGIF601Q

- When the same malfunction is detected and maintained during two sequential driving cycles, the MIL will automatically illuminate.
- The MIL will go off automatically if no fault is detected after 3 sequential driving cycles.
- A Diagnostic Trouble Code(DTC) is recorded in ECM memory when a malfunction is detected after two sequential driving cycles. The MIL will illuminate when the malfunction is detected on the second driving cycle.
If a misfire is detected, a DTC will be recorded, and the MIL will illuminate, immediately after a fault is first detected.

- A Diagnostic Trouble Code(DTC) will automatically erase from ECM memory if the same malfunction is not detected for 40 driving cycles.

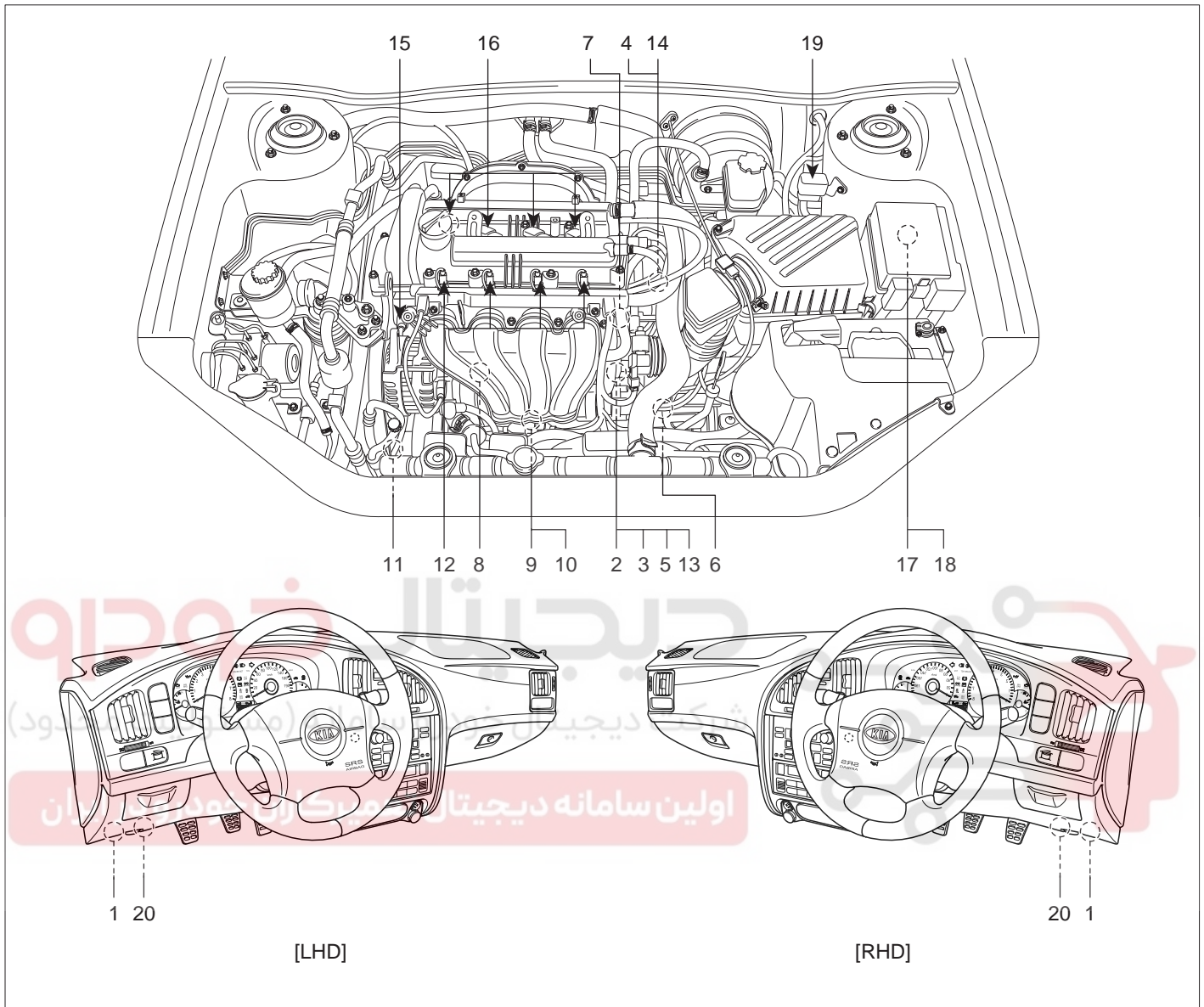


- A "warm-up cycle" means sufficient vehicle operation such that the coolant temperature has risen by at least 40 degrees Fahrenheit from engine starting and reaches a minimum temperature of 160 degrees Fahrenheit.
- A "driving cycle" consists of engine startup, vehicle operation beyond the beginning of closed loop operation.

GASOLINE ENGINE CONTROL SYSTEM

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COMPONENTS LOCATION EFEEE6DF



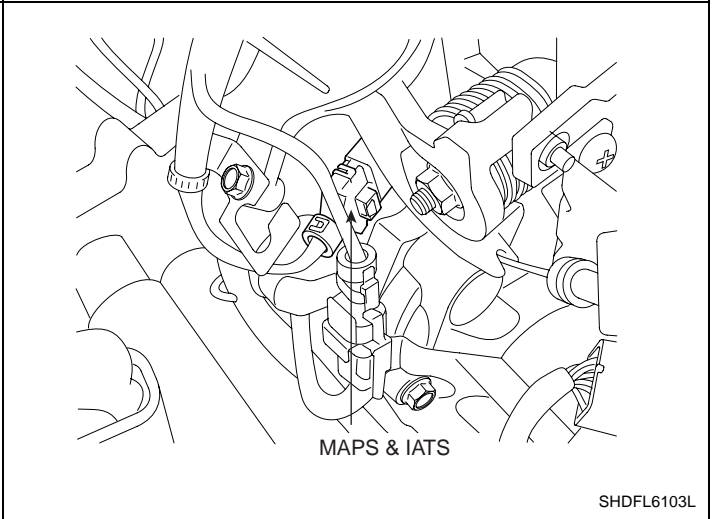
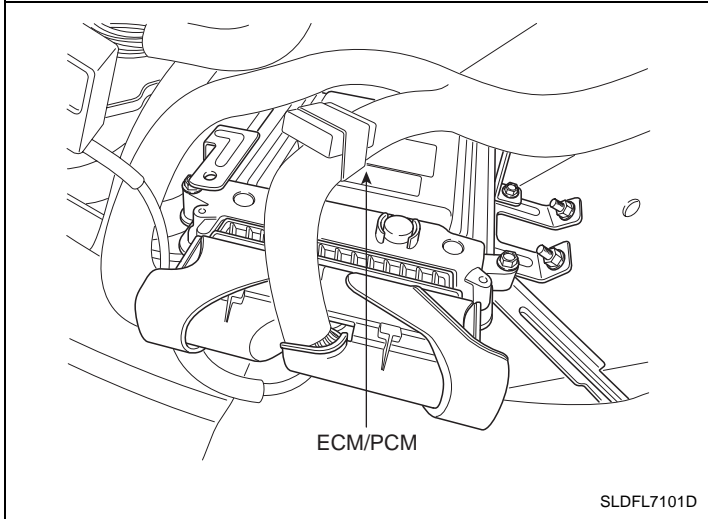
- 1. ECM (Engine Control Module) [M/T]
PCM (Powertrain Control Module) [A/T]
- 2. Manifold Absolute Pressure Sensor (MAPS)
- 3. Intake Air Temperature Sensor (IATS)
- 4. Engine Coolant Temperature Sensor (ECTS)
- 5. Throttle Position Sensor (TPS)
- 6. Crankshaft Position Sensor (CKPS)
- 7. Camshaft Position Sensor (CMPS)
- 8. Knock Sensor (KS)
- 9. Heated Oxygen Sensor (HO2S) [Bank 1/Sensor 1]
- 10. Heated Oxygen Sensor (HO2S) [Bank 1/Sensor 2]

- 11. A/C Pressure Transducer (APT)
- 12. Injector
- 13. Idle Speed Control Actuator (ISCA)
- 14. Purge Control Solenoid Valve (PCSV)
- 15. CVVT Oil Control Valve (OCV)
- 16. Ignition Coil
- 17. Main Relay
- 18. Fuel Pump Relay
- 19. Data Link Connector (DLC)
- 20. Multi-Purpose Check Connector

SLDFL7101L

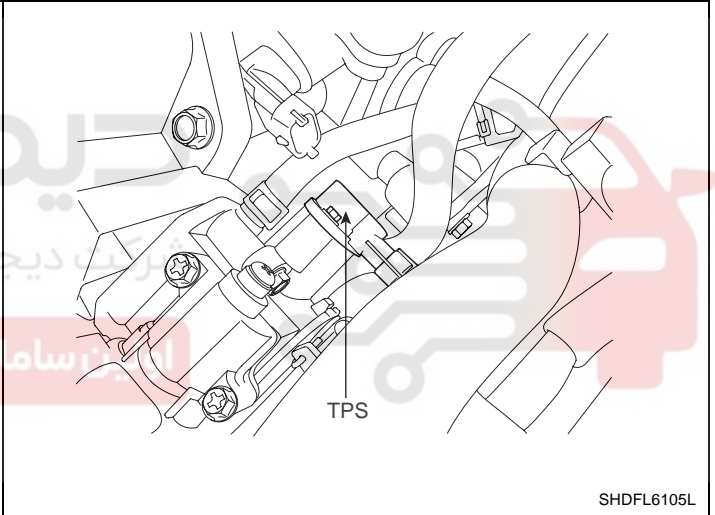
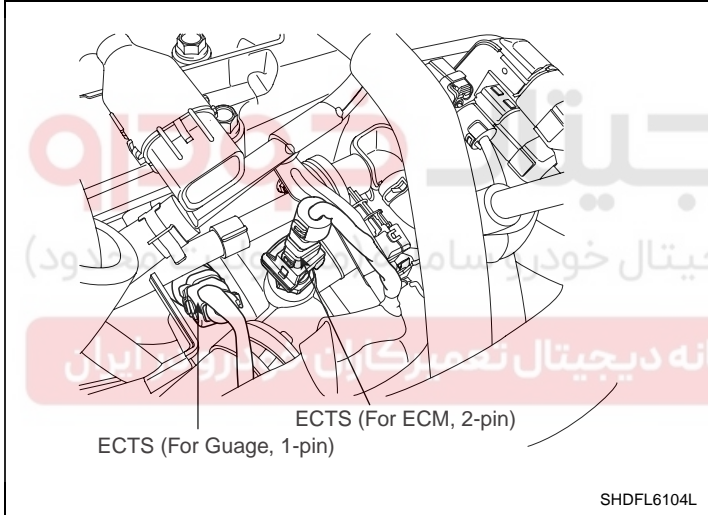
- 1. ECM (Engine Control Module) [M/T]
PCM (Powertrain Control Module) [A/T]

- 2. Manifold Absolute Pressure Sensor (MAPS)
- 3. Intake Air Temperature Sensor (IATS)



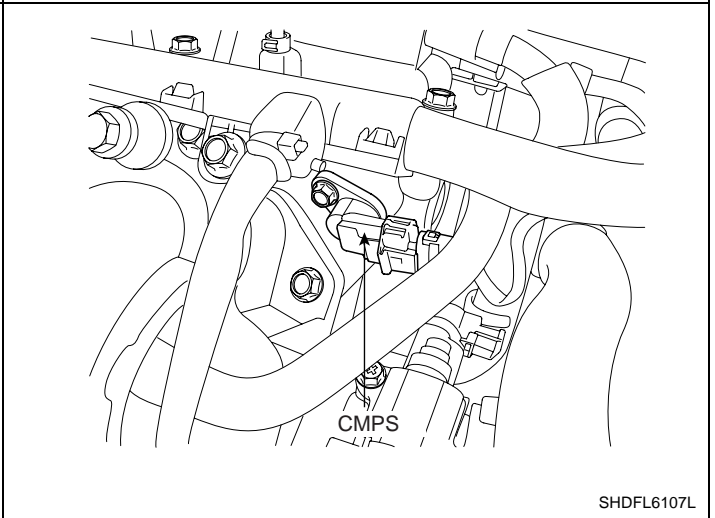
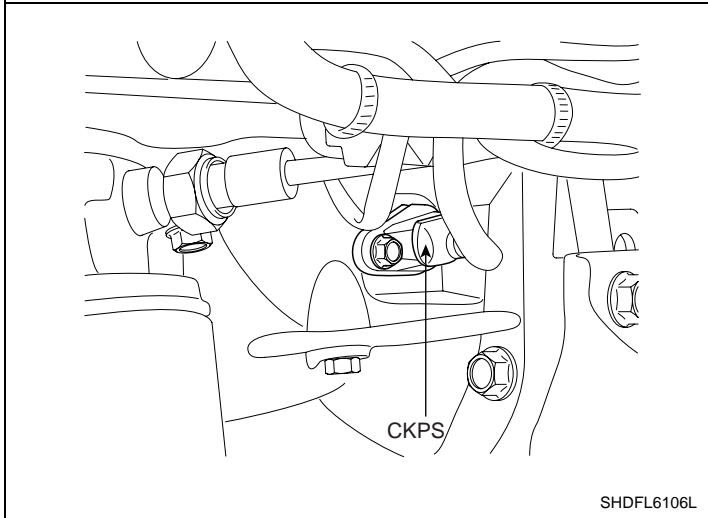
- 4. Engine Coolant Temperature Sensor (ECTS)

- 5. Throttle Position Sensor (TPS)



- 6. Crankshaft Position Sensor (CKPS)

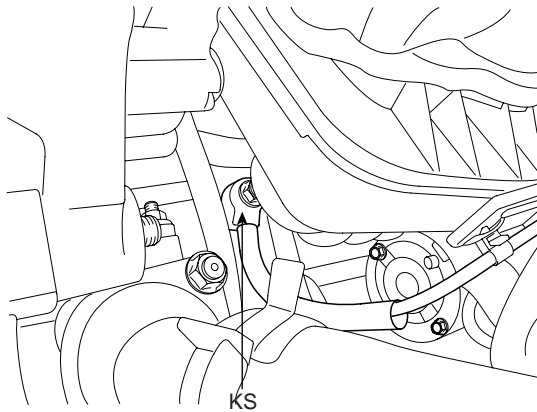
- 7. Camshaft Position Sensor (CMPS)



GASOLINE ENGINE CONTROL SYSTEM

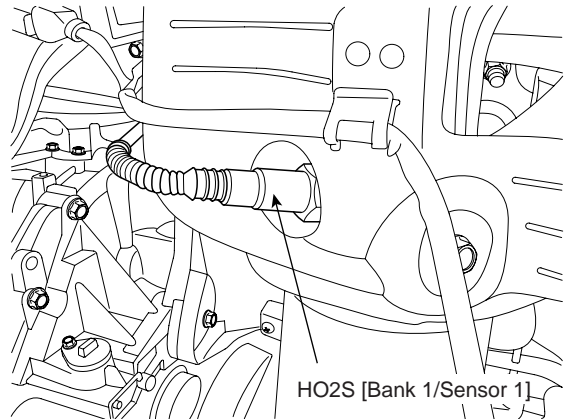
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8. Knock Sensor (KS)



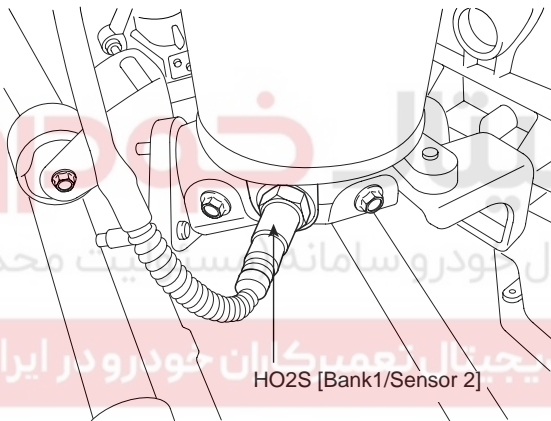
SHDFL6108L

9. Heated Oxygen Sensor (HO2S) [Bank 1/Sensor 1]



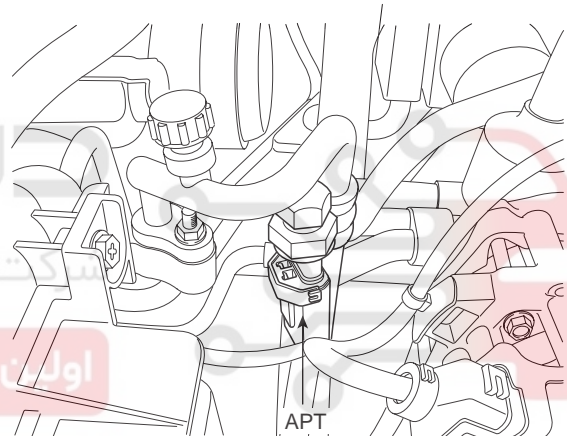
SHDFL6109L

10. Heated Oxygen Sensor (HO2S) [Bank 1/Sensor 2]



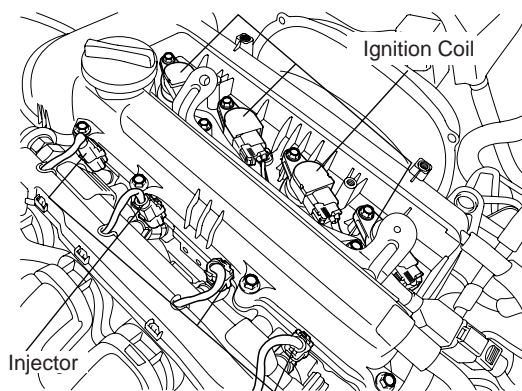
SHDFL6110L

11. A/C Pressure Transducer (APT)



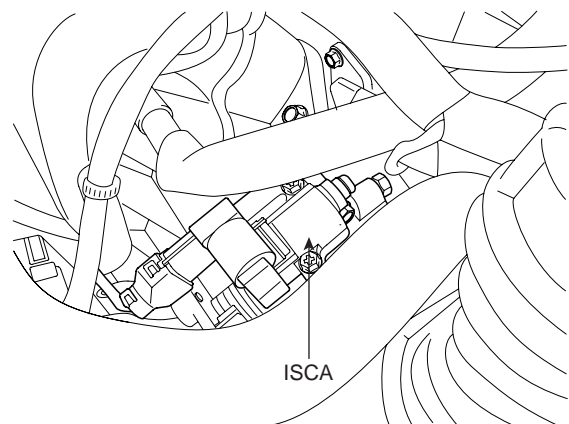
SLDFL7102D

12. Injector
16. Ignition Coil



SHDFL6112L

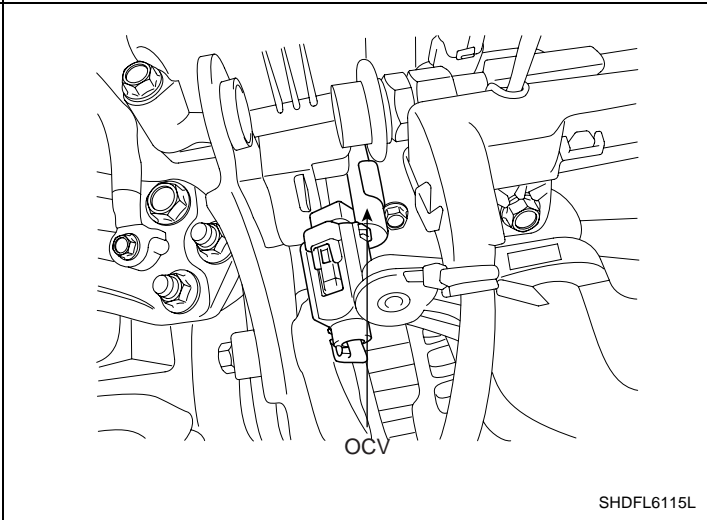
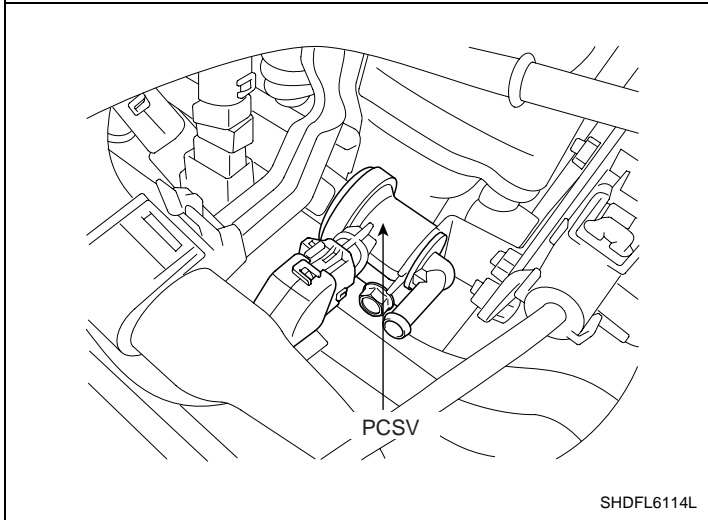
13. Idle Speed Control Actuator (ISCA)



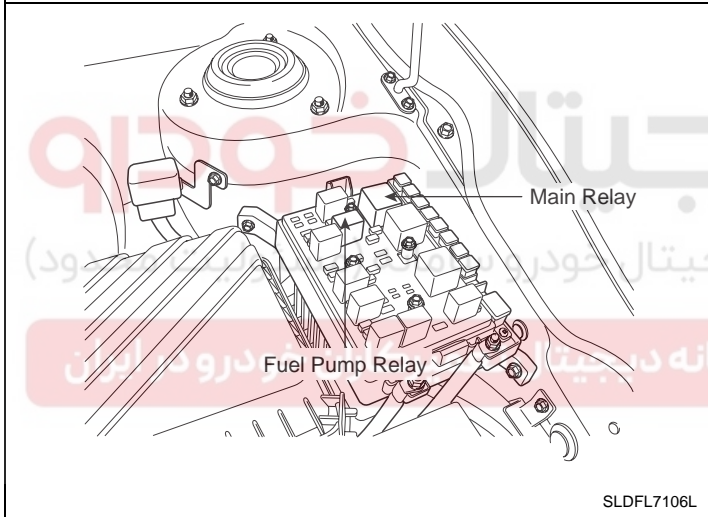
SHDFL6113L

14. Purge Control Solenoid Valve (PCSV)

15. CVVT Oil Control Valve (OCV)



17. Main Relay
18. Fuel Pump Relay

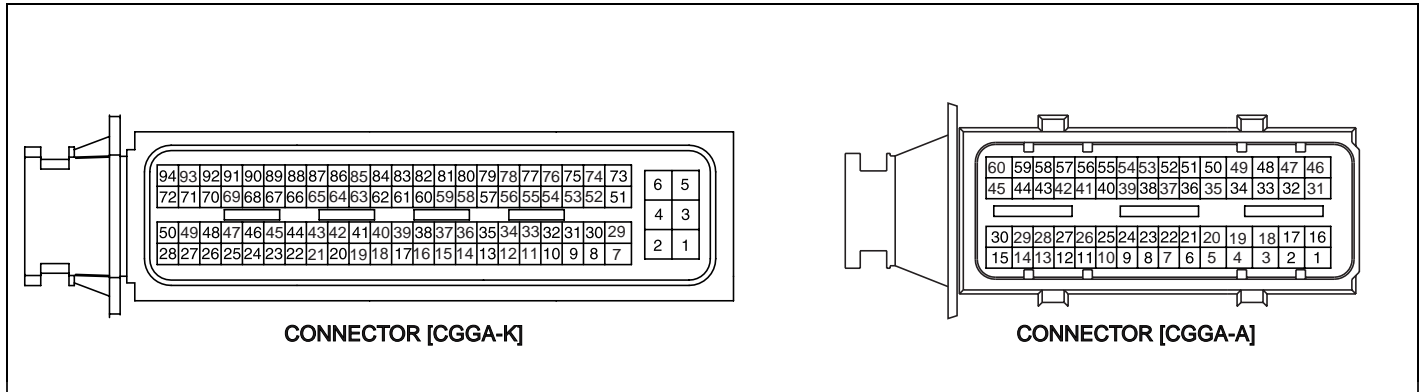


GASOLINE ENGINE CONTROL SYSTEM

POWERTRAIN CONTROL MODULE (PCM)

POWERTRAIN CONTROL MODULE (PCM) E0D80CFB

1. HARNESS CONNECTOR (A/T)



SHDFL6117L

2. TERMINAL FUNCTION (A/T)

CONNECTOR [CGGA-K]

Pin No.	Description	Connected to
1	Power Ground	Chassis Ground
2	Power Ground	Chassis Ground
3	Power Ground	Chassis Ground
4	For Autotransaxle Control	
5	For Autotransaxle Control	
6	Battery voltage supply after main relay	Main Relay
7	-	
8	Sensor ground	Manifold Absolute Pressure Sensor (MAPS)
9	Sensor ground	Heated Oxygen Sensor (Sensor 2) [Euro- /]
10	Manifold Absolute Pressure Sensor signal input	Manifold Absolute Pressure Sensor (MAPS)
11	-	
12	-	
13	Heated Oxygen Sensor (Sensor 2) signal input	Heated Oxygen Sensor (Sensor 2) [Euro- /]
14	-	
15	-	
16	-	
17	Alternator load signal input	Alternator
18	-	
19	-	

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FUEL SYSTEM

Pin No.	Description	Connected to
20	Vehicle speed signal input	ABS/ESP Control Module [With ABS/TCS (Euro- /)]
		PCM terminal CGGA-K (49) [Except Euro- /]
21	-	
22	Electric Load signal input (Defrost)	
23	A/C switch "ON" signal input	A/C Switch
24	For Autotransaxle Control	
25	For Autotransaxle Control	
26	For Autotransaxle Control	
27	For Autotransaxle Control	
28	For Autotransaxle Control	
29	-	
30	Sensor ground	A/C Pressure Transducer (APT)
31	Sensor ground	Heated Oxygen Sensor (Sensor 1) [Except LEADED]
32	Intake Air Temperature Sensor signal input	Intake Air Temperature Sensor (IATS)
33	-	
34	-	
35	Heated Oxygen Sensor (Sensor 1) signal input	Heated Oxygen Sensor (Sensor 1) [Except LEADED]
36	-	
37	-	
38	Sensor ground	Camshaft Position Sensor (CMPS)
39	-	
40	-	
41	Camshaft Position Sensor signal input	Camshaft Position Sensor (CMPS)
42	-	
43	-	
44	Power Steering Switch signal input	Power Steering Switch
45	-	
46	A/C thermal switch signal input	A/C Thermal Switch
47	For Autotransaxle Control	
48	For Autotransaxle Control	
49	For Autotransaxle Control	
50	For Autotransaxle Control	
51	Sensor ground	Throttle Position Sensor (TPS)
52	-	
53	-	
54	-	
55	-	

GASOLINE ENGINE CONTROL SYSTEM

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Pin No.	Description	Connected to
56	-	
57	For Autotransaxle Control	
58	-	
59	-	
60	For Autotransaxle Control	
61	For Autotransaxle Control	
62	For Autotransaxle Control	
63	-	
64	For Autotransaxle Control	
65	For Autotransaxle Control	
66	For Autotransaxle Control	
67	For Autotransaxle Control	
68	For Autotransaxle Control	
69	-	
70	For Autotransaxle Control	
71	For Autotransaxle Control	
72	For Autotransaxle Control	
73	Sensor ground	Engine Coolant Temperature Sensor (ECTS)
74	-	
75	Throttle Position Sensor signal input	Throttle Position Sensor (TPS)
76	-	
77	Engine Coolant Temperature Sensor signal input	Engine Coolant Temperature Sensor (ECTS)
78	-	
79	A/C Pressure Transducer signal input	A/C Pressure Transducer (APT)
80	For Autotransaxle Control	
81	For Autotransaxle Control	
82	For Autotransaxle Control	
83	For Autotransaxle Control	
84	For Autotransaxle Control	
85	-	
86	For Autotransaxle Control	
87	For Autotransaxle Control	
88	For Autotransaxle Control	
89	For Autotransaxle Control	
90	For Autotransaxle Control	
91	For Autotransaxle Control	
92	For Autotransaxle Control	

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FUEL SYSTEM

Pin No.	Description	Connected to
93	For Autotransaxle Control	
94	For Autotransaxle Control	

CONNECTOR [CGGA-A]

Pin No.	Description	Connected to
1	Ignition Coil (Cylinder #2) control output	Ignition Coil (Cylinder #2)
2	Ignition Coil (Cylinder #4) control output	Ignition Coil (Cylinder #4)
3	-	
4	-	
5	-	
6	Idle Speed Control Actuator [OPEN] control output	Idle Speed Control Actuator (ISCA)
7	-	
8	Purge Control Solenoid Valve control output	Purge Control Solenoid Valve (PCSV)
9	Main Relay control output	Main Relay
10	-	
11	Battery voltage supply after ignition switch	Ignition Switch
12	CAN [HIGH]	Other control module
13	-	
14	-	
15	Knock Sensor signal input	Knock Sensor (KS)
16	Ignition Coil (Cylinder #3) control output	Ignition Coil (Cylinder #3)
17	Ignition Coil (Cylinder #1) control output	Ignition Coil (Cylinder #1)
18	-	
19	-	
20	-	
21	Cooling Fan Relay [Low] control output	Cooling Fan Relay [Low]
22	Idle Speed Control Actuator [CLOSE] control output	Idle Speed Control Actuator (ISCA)
23	Cooling Fan Relay [High] control output	Cooling Fan Relay [High]
24	Fuel consumption signal output	Trip Computer
25	Engine speed signal output	Cluster (Tachometer)
26	-	
27	CAN [LOW]	Other control module
28	-	
29	-	
30	Sensor ground	Knock Sensor (KS)
31	-	
32	Immobilizer lamp control output	Immobilizer Lamp

GASOLINE ENGINE CONTROL SYSTEM

FL -27

Pin No.	Description	Connected to
33	Heated Oxygen Sensor (Sensor 2) Heater control output	Heated Oxygen Sensor (Sensor 2) [Euro- /]
34	Heated Oxygen Sensor (Sensor 1) Heater control output	Heated Oxygen Sensor (Sensor 1) [Except LEADED]
35	-	
36	Injector (Cylinder #3) control output	Injector (Cylinder #3)
37	Fuel Pump Relay control output	Fuel Pump Relay
38	A/C Compressor Relay control output	A/C Compressor Relay
39	-	
40	Crankshaft Position Sensor [A] signal input	Crankshaft Position Sensor (CKPS)
41	-	
42	-	
43	Sensor power (+5V)	Manifold Absolute Pressure Sensor (MAPS)
44	Immobilizer communication line	Immobilizer Control Module
45	Wheel Speed Sensor [A] signal input	Wheel Speed Sensor (WSS)[Without ABS/ESP (Euro- /)]
46	-	
47	-	
48	Injector (Cylinder #4) control output	Injector (Cylinder #4)
49	CVVT Oil Control Valve control output	CVVT Oil Control Valve (OCV)
50	Injector (Cylinder #1) control output	Injector (Cylinder #1)
51	Malfunction Indicator Lamp (MIL) control output	Cluster (Malfunction Indicator Lamp)
52	Injector (Cylinder #2) control output	Injector (Cylinder #2)
53	-	
54	-	
55	Crankshaft Position Sensor [B] signal input	Crankshaft Position Sensor (CKPS)
56	Battery Power	Battery
57	Sensor power (+5V)	A/C Pressure Transducer (APT)
58	Sensor power (+5V)	Throttle Position Sensor (TPS)
59	-	
60	Wheel Speed Sensor [B] signal input	Wheel Speed Sensor (WSS)[Without ABS/ESP (Euro- /)]

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FUEL SYSTEM

3. TERMINAL INPUT/OUTPUT SIGNAL (A/T)

CONNECTOR [CGGA-K]

Pin No.	Description	Condition	Type	Level	Test Result
1	Power Ground	Idle	DC	Max. 50mV	0mV
2	Power Ground	Idle	DC	Max. 50mV	3.6mV
3	Power Ground	Idle	DC	Max. 50mV	3.6mV
4	For Autotransaxle Control				
5	For Autotransaxle Control				
6	Battery voltage supply after main relay	IG OFF	DC	Max. 1.0V	200mV
		IG ON		Battery Voltage	12.9V
7	-				
8	Sensor ground	Idle	DC	Max. 50mV	16mV
9	Sensor ground	Idle	DC	Max. 50mV	6.2mV
10	Manifold Absolute Pressure Sensor signal input	IG ON	DC	3.9 ~ 4.1V	4.09V
		Idle		0.8 ~ 1.6V	1.44V
11	-				
12	-				
13	Heated Oxygen Sensor (Sensor 2) signal input	Racing	Analog	Rich: 0.6 1.0V	860mV
				Lean: Max. 0.4V	10mV
14	-				
15	-				
17	Alternator load signal input	Idle	Pulse	Hi: Battery Voltage	13.2V
				Lo: Max. 1.5V	1.34V
18	-				
19	-				
20	Vehicle speed signal input	Idle	Pulse	Hi: Min. 4.5V	12.2V
				Lo: Max. 1.0V	0V
				Freq.: 72.2Hz	
		Vehicle Run (30km/h)		Hi: Min. 4.5V	12.2V
Lo: Max. 1.0V	0V				
			Freq.: 212Hz		
21	-				
22	Electric Load signal input (Defrost)				
23	A/C switch "ON" signal input	A/C S/W OFF	DC	Max. 1.0V	20mV
		A/C S/W ON		Battery Voltage	12.48V

GASOLINE ENGINE CONTROL SYSTEM

FL -29

Pin No.	Description	Condition	Type	Level	Test Result
24	For Autotransaxle Control				
25	For Autotransaxle Control				
26	For Autotransaxle Control				
27	For Autotransaxle Control				
28	For Autotransaxle Control				
29	-				
30	Sensor ground	Idle	DC	Max. 50mV	6.2mV
31	Sensor ground	Idle	DC	Max. 50mV	6.8mV
32	Intake Air Temperature Sensor signal input	Idle	DC	0.2 ~ 4.8V	1.89V
33	-				
34	-				
35	Heated Oxygen Sensor (Sensor 1) signal input	Racing	Analog	Rich: 0.6 1.0V Lean: Max. 0.4V	884mV 8mV
36	-				
37	-				
38	Sensor ground	Idle	DC	Max. 50mV	12mV
39	-				
40	-				
41	Camshaft Position Sensor signal input	Idle	Pulse	Hi: Battery Voltage Lo: Max. 0.5V	13.72V 200mV
42	-				
43	-				
44	Power Steering Switch signal input				
45	-				
46	A/C thermal switch signal input	A/C S/W OFF A/C S/W ON	DC	Max.0.5V Battery Voltage	200mV 12.6V
47	For Autotransaxle Control				
48	For Autotransaxle Control				
49	For Autotransaxle Control				
50	For Autotransaxle Control				
51	Sensor ground	Idle	DC	Max. 50mV	11.2mV
52	-				
53	-				
54	-				
55	-				

FL -30

FUEL SYSTEM

Pin No.	Description	Condition	Type	Level	Test Result
56	-				
57	For Autotransaxle Control				
58	-				
59	-				
60	For Autotransaxle Control				
61	For Autotransaxle Control				
62	For Autotransaxle Control				
63	-				
64	For Autotransaxle Control				
65	For Autotransaxle Control				
66	For Autotransaxle Control				
67	For Autotransaxle Control				
68	For Autotransaxle Control				
69	-				
70	For Autotransaxle Control				
71	For Autotransaxle Control				
72	For Autotransaxle Control				
73	Sensor ground	Idle	DC	Max. 50mV	16.8mV
74	-				
75	Throttle Position Sensor signal input	C.T	Analog	0.25 ~ 0.9V	0.34V
		W.O.T		Min. 4.0V	4.43V
76	-				
77	Engine Coolant Temperature Sensor signal input	Idle	Analog	0.5 ~ 4.5V	1.43V
78	-				
79	A/C Pressure Transducer signal input	A/C ON	Analog	Max. 4.8V	1.88V
80	For Autotransaxle Control				
81	For Autotransaxle Control				
82	For Autotransaxle Control				
83	For Autotransaxle Control				
84	For Autotransaxle Control				
85	-				
86	For Autotransaxle Control				
87	For Autotransaxle Control				
88	For Autotransaxle Control				
89	For Autotransaxle Control				
90	For Autotransaxle Control				
91	For Autotransaxle Control				

GASOLINE ENGINE CONTROL SYSTEM

FL -31

Pin No.	Description	Condition	Type	Level	Test Result
92	For Autotransaxle Control				
93	For Autotransaxle Control				
94	For Autotransaxle Control				

CONNECTOR [CGGA-A]

Pin No.	Description	Condition	Type	Level	Test Result
1	Ignition Coil (Cylinder #2) control output	Idle	Pulse	1st Voltage: 300 ~ 400V	372V
				ON Voltage: Max. 2.0V	1.1V
2	Ignition Coil (Cylinder #4) control output	Idle	Pulse	1st Voltage: 300 ~ 400V	372V
				ON Voltage: Max. 2.0V	1.1V
3	-				
4	-				
5	-				
6	Idle Speed Control Actuator [OPEN] control output	Idle	Pulse	Hi: Battery Voltage	13.8V
				Lo: Max. 1.0V	20mV
7	-				
8	Purge Control Solenoid Valve control output	Active Inactive	Pulse	Hi: Battery Voltage	14.2V
				Lo: Max. 1.0V	120mV
9	Main Relay control output	Relay OFF	DC	Battery Voltage	12.78V
		Relay ON		Max. 1.0V	860mV
10	-				
11	Battery voltage supply after ignition switch	IG OFF	DC	Max. 1.0V	3.2mV
		IG ON		Battery Voltage	12.68V
12	CAN [HIGH]	RECES-SIVE	Pulse	2.0 ~ 3.0V	2.5V
		DOMI-NANT		2.75 ~ 4.5V	3.58V
13	-				
14	-				
15	Knock Sensor signal input	Knocking	Variable Fre-quency		
		Normal			
16	Ignition Coil (Cylinder #3) control output	Idle	Pulse	1st Voltage: 300 ~ 400V	366V
				ON Voltage: Max. 2.0V	1.1V
17	Ignition Coil (Cylinder #1) control output	Idle	Pulse	1st Voltage: 300 ~ 400V	352V
				ON Voltage: Max. 2.0V	1.1V
18	-				
19	-				
20	-				

FL -32

FUEL SYSTEM

Pin No.	Description	Condition	Type	Level	Test Result
21	Cooling Fan Relay [Low] control output	Relay OFF	DC	Battery Voltage	14.12V
		Relay ON		Max. 1.0V	61.6mV
22	Idle Speed Control Actuator [CLOSE] control output	Idle	Pulse	Hi: Battery Voltage	13.8V
				Lo: Max. 1.0V	200mV
23	Cooling Fan Relay [High] control output	Relay OFF	DC	Battery Voltage	14.01V
		Relay ON		Max. 1.0V	52.6mV
24	Fuel consumption signal output	Idle	Pulse	Hi: Battery Voltage	13.8V
				Lo: Max. 0.5V	20mV
25	Engine speed signal output	Idle	Pulse	Hi: Battery Voltage	14.0V
				Lo: Max. 0.5V	20mV
				Freq.: 20 ~ 26Hz	22Hz
26	-				
27	CAN [LOW]	RECESSIVE	Pulse	2.0 ~ 3.0V	2.5V
		DOMINANT		0.5 ~ 2.25V	1.5V
28	-				
29	-				
30	Sensor ground	Idle	DC	Max. 50mV	
31	-				
32	Immobilizer lamp control output	Lamp OFF	DC	Battery Voltage	12.6V
		Lamp ON		Max. 1.0V	20mV
33	Heated Oxygen Sensor (Sensor 2) Heater control output	Engine Run	Pulse	Hi: Battery Voltage	14.2V
				Lo: Max. 1.0V	220mV
34	Heated Oxygen Sensor (Sensor 1) Heater control output	Engine Run	Pulse	Hi: Battery Voltage	14.2V
				Lo: Max. 1.0V	200mV
35	-				
36	Injector (Cylinder #3) control output	Idle	Pulse	Hi: Battery Voltage	14.2V
				Lo: Max. 1.0V	40mV
				Vpeak: Max. 80V	73.6V
37	Fuel Pump Relay control output	Relay OFF	DC	Battery Voltage	12.8V
		Relay ON		Max. 1.0V	400mV
38	A/C Compressor Relay control output	Relay OFF	DC	Battery Voltage	14.1V
		Relay ON		Max. 1.0V	400mV
39	-				
40	Crankshaft Position Sensor [A] signal input	Idle		Vp_p: Min. 1.0V	6.48V
41	-				

GASOLINE ENGINE CONTROL SYSTEM

FL -33

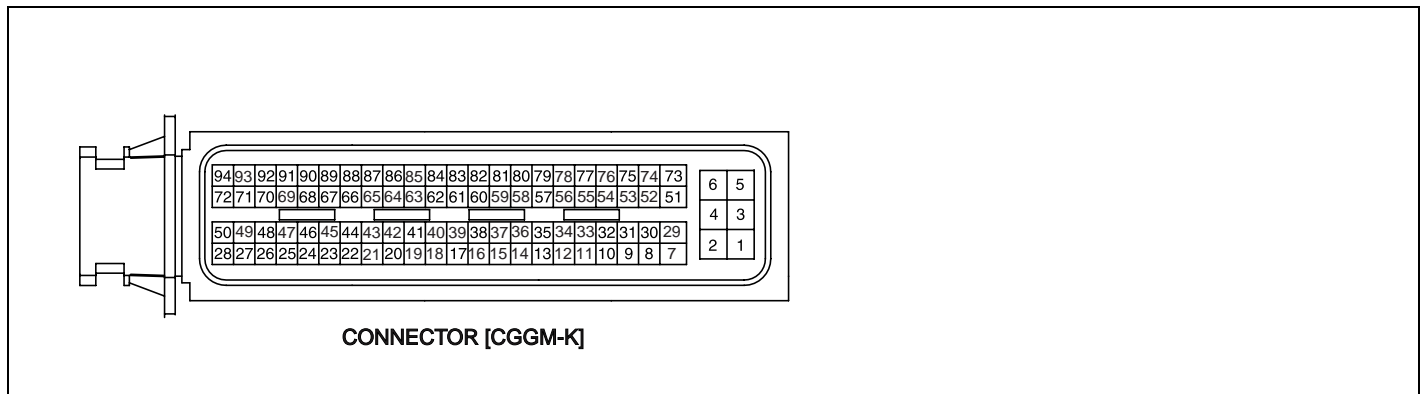
Pin No.	Description	Condition	Type	Level	Test Result
42	-				
43	Sensor power (+5V)	IG OFF	DC	Max. 0.5V	3.6mV
		IG ON		4.8 ~ 5.2V	5.02V
44	Immobilizer communication line	When communicating after IG ON	Pulse	Hi: Min. 8.5V	12.51V
				Lo: Max. 3.5V	1.17V
45	Wheel Speed Sensor [A] signal input	Vehicle Run	SINE Wave	Vp_p: Min. 0.2V	
46	-				
47	-				
48	Injector (Cylinder #4) control output	Idle	Pulse	Hi: Battery Voltage	13.6V
				Lo: Max. 1.0V	336mV
				Vpeak: Max. 80V	69.7V
49	CVVT Oil Control Valve control output	Idle	Pulse	Hi: Battery Voltage	14.9V
				Lo: Max. 1.0V	36.2mV
50	Injector (Cylinder #1) control output	Idle	Pulse	Hi: Battery Voltage	13.6V
				Lo: Max. 1.0V	336mV
				Vpeak: Max. 80V	69.7V
51	Malfunction Indicator Lamp (MIL) control output	Lamp OFF	DC	Battery Voltage	11.51V
		Lamp ON		Max. 1.0V	663mV
52	Injector (Cylinder #2) control output	Idle	Pulse	Hi: Battery Voltage	13.6V
				Lo: Max. 1.0V	336mV
				Vpeak: Max. 80V	69.7V
53	-				
54	-				
55	Crankshaft Position Sensor [B] signal input	Idle	SINE Wave	Vp_p: Min. 1.0V	6.48V
56	Battery Power	Always	DC	Battery Voltage	12.23V
57	Sensor power (+5V)	IG OFF	DC	Max. 0.5V	3.6mV
		IG ON		4.9 ~ 5.1V	5.02V
58	Sensor power (+5V)	IG OFF	DC	Max. 0.5V	3.6mV
		IG ON		4.9 ~ 5.1V	5.02V
59	-				
60	Wheel Speed Sensor [B] signal input	Vehicle Run	SINE Wave	Vp_p: Min. 0.2V	

FL -34

FUEL SYSTEM

ENGINE CONTROL MODULE (ECM)

1. HARNESS CONNECTOR (M/T)



SHDFL6118L

2. TERMINAL FUNCTION (M/T)

CONNECTOR [CGGM-K]

Pin No.	Description	Connected to
1	Ignition Coil (Cylinder #1) control output	Ignition Coil (Cylinder #1)
2	Power Ground	Chassis Ground
3	Ignition Coil (Cylinder #3) control output	Ignition Coil (Cylinder #3)
4	-	
5	-	
6	Battery voltage supply after main relay	Main Relay
7	Ignition Coil (Cylinder #4) control output	Ignition Coil (Cylinder #4)
8	A/C thermal switch signal input	A/C Thermal Switch
9	-	
10	Power Steering Switch signal input	Power Steering Switch
11	Knock Sensor signal input	Knock Sensor (KS)
12	Sensor ground	Throttle Position Sensor (TPS)
13	-	
14	-	
15	Sensor ground	Manifold Absolute Pressure Sensor (MAPS)
16	Sensor ground	Heated Oxygen Sensor (Sensor 2) [Euro- /]
17	Sensor ground	Camshaft Position Sensor (CMPS)
18	Immobilizer communication line	Immobilizer Control Module
19	Manifold Absolute Pressure Sensor signal input	Manifold Absolute Pressure Sensor (MAPS)
20	-	
21	-	
22	Main Relay control output	Main Relay
23	Cooling Fan Relay [High] control output	Cooling Fan Relay [High]

GASOLINE ENGINE CONTROL SYSTEM

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Pin No.	Description	Connected to
24	Injector (Cylinder #3) control output	Injector (Cylinder #3)
25	Idle Speed Control Actuator [CLOSE] control output	Idle Speed Control Actuator (ISCA)
26	-	
27	-	
28	Cooling Fan Relay [Low] control output	Cooling Fan Relay [Low]
29	Ignition Coil (Cylinder #2) control output	Ignition Coil (Cylinder #2)
30	A/C switch "ON" signal input	A/C Switch
31	Electric Load signal input (Defrost)	
32	Sensor ground	Knock Sensor (KS)
33	Sensor ground	A/C Pressure Transducer (APT)
34	-	
35	Sensor ground	Engine Coolant Temperature Sensor (ECTS)
36	Heated Oxygen Sensor (Sensor 2) signal input	Heated Oxygen Sensor (Sensor 2) [Euro- /]
37	-	
38	Sensor ground	Heated Oxygen Sensor (Sensor 1) [Except LEADED]
39	Throttle Position Sensor signal input	Throttle Position Sensor (TPS)
40	A/C Pressure Transducer signal input	A/C Pressure Transducer (APT)
41	-	
42	-	
43	Intake Air Temperature Sensor signal input	Intake Air Temperature Sensor (IATS)
44	-	
45	A/C Compressor Relay control output	A/C Compressor Relay
46	Fuel Pump Relay control output	Fuel Pump Relay
47	Injector (Cylinder #2) control output	Injector (Cylinder #2)
48	Immobilizer lamp control output	Immobilizer Lamp
49	-	
50	-	
51	Power Ground	Chassis Ground
52	-	
53	-	
54	Heated Oxygen Sensor (Sensor 1) signal input	Heated Oxygen Sensor (Sensor 1) [Except LEADED]
55	-	
56	-	
57	-	
58	Wheel Speed Sensor [A] signal input	Wheel Speed Sensor (WSS)[Without ABS/ESP (Euro- /)]
59	Sensor power (+5V)	A/C Pressure Transducer (APT)
60	Sensor power (+5V)	Throttle Position Sensor (TPS)

FL -36

FUEL SYSTEM

Pin No.	Description	Connected to
61	-	
62	CAN [LOW]	Other control module
63	Camshaft Position Sensor signal input	Camshaft Position Sensor (CMPS)
64	Vehicle speed signal input	ABS/ESP Control Module [With ABS/ESP (Euro- /)]
		Vehicle Speed Sensor (VSS) [Except Euro- /]
65	-	
66	Alternator load signal input	Alternator
67	Engine speed signal output	Cluster (Tachometer)
68	Injector (Cylinder #4) control output	Injector (Cylinder #4)
69	Purge Control Solenoid Valve control output	Purge Control Solenoid Valve (PCSV)
70	Malfunction Indicator Lamp (MIL) control output	Cluster (Malfunction Indicator Lamp)
71	Heated Oxygen Sensor (Sensor 2) Heater control output	Heated Oxygen Sensor (Sensor 2) [Euro- /]
72	Heated Oxygen Sensor (Sensor 1) Heater control output	Heated Oxygen Sensor (Sensor 1) [Except LEADED]
73	Power Ground	Chassis Ground
74	-	
75	-	
76	-	
77	Engine Coolant Temperature Sensor signal input	Engine Coolant Temperature Sensor (ECTS)
78	-	
79	Wheel Speed Sensor [B] signal input	Wheel Speed Sensor (WSS)[Without ABS/ESP (Euro- /)]
80	-	
81	Sensor power (+5V)	Manifold Absolute Pressure Sensor (MAPS)
82	Battery Power	Battery
83	Battery voltage supply after ignition switch	Ignition Switch
84	CAN [HIGH]	Other control module
85	-	
86	Crankshaft Position Sensor [B] signal input	Crankshaft Position Sensor (CKPS)
87	Crankshaft Position Sensor [A] signal input	Crankshaft Position Sensor (CKPS)
88	Fuel consumption signal output	Trip Computer
89	-	
90	Idle Speed Control Actuator [OPEN] control output	Idle Speed Control Actuator (ISCA)
91	Injector (Cylinder #1) control output	Injector (Cylinder #1)
92	CVVT Oil Control Valve control output	CVVT Oil Control Valve (OCV)
93	-	
94	-	

GASOLINE ENGINE CONTROL SYSTEM

FL -37

3. TERMINAL INPUT/OUTPUT SIGNAL (M/T)

CONNECTOR [CGGM-K]

Pin No.	Description	Condition	Type	Level	Test Result
1	Ignition Coil (Cylinder #1) control output	Idle	Pulse	1st Voltage: 300 ~ 400V	352V
				ON Voltage: Max. 2.0V	1.1V
2	Power Ground	Idle	DC	Max. 50mV	0mV
3	Ignition Coil (Cylinder #3) control output	Idle	Pulse	1st Voltage: 300 ~ 400V	366V
				ON Voltage: Max. 2.0V	1.1V
4	-				
5	-				
6	Battery voltage supply after main relay	IG OFF	DC	Max. 1.0V	200mV
		IG ON		Battery Voltage	12.9V
7	Ignition Coil (Cylinder #4) control output	Idle	Pulse	1st Voltage: 300 ~ 400V	372V
				ON Voltage: Max. 2.0V	1.1V
8	A/C thermal switch signal input	A/C S/W OFF	DC	Max.0.5V	200mV
		A/C S/W ON		Battery Voltage	12.6V
9	-				
10	Power Steering Switch signal input				
11	Knock Sensor signal input	Knocking	Variable Frequency		
		Normal			
12	Sensor ground	Idle	DC	Max. 50mV	11.2mV
13	-				
14	-				
15	Sensor ground	Idle	DC	Max. 50mV	16mV
16	Sensor ground	Idle	DC	Max. 50mV	6.2mV
17	Sensor ground	Idle	DC	Max. 50mV	12mV
18	Immobilizer communication line	When communicating after IG ON	Pulse	Hi: Min. 8.5V	12.51V
				Lo: Max. 3.5V	1.17V
19	Manifold Absolute Pressure Sensor signal input	IG ON	DC	3.9 ~ 4.1V	4.09V
		Idle		0.8 ~ 1.6V	1.44V
20	-				
21	-				
22	Main Relay control output	Relay OFF	DC	Battery Voltage	12.78V
		Relay ON		Max. 1.0V	860mV

FL -38

FUEL SYSTEM

Pin No.	Description	Condition	Type	Level	Test Result
23	Cooling Fan Relay [High] control output	Relay OFF	DC	Battery Voltage	14.01V
		Relay ON		Max. 1.0V	52.6mV
24	Injector (Cylinder #3) control output	Idle	Pulse	Hi: Battery Voltage	14.2V
				Lo: Max. 1.0V	40mV
				Vpeak: Max. 80V	73.6V
25	Idle Speed Control Actuator [CLOSE] control output	Idle	Pulse	Hi: Battery Voltage	13.8V
				Lo: Max. 1.0V	200mV
26	-				
27	-				
28	Cooling Fan Relay [Low] control output	Relay OFF	DC	Battery Voltage	14.12V
		Relay ON		Max. 1.0V	61.6mV
29	Ignition Coil (Cylinder #2) control output	Idle	Pulse	1st Voltage: 300 ~ 400V	372V
				ON Voltage: Max. 2.0V	1.1V
30	A/C switch "ON" signal input	A/C S/W OFF	DC	Max. 1.0V	20mV
		A/C S/W ON		Battery Voltage	12.48V
31	Electric Load signal input (Defrost)				
32	Sensor ground	Idle	DC	Max. 50mV	
33	Sensor ground	Idle	DC	Max. 50mV	6.2mV
34	-				
35	Sensor ground	Idle	DC	Max. 50mV	16.8mV
36	Heated Oxygen Sensor (Sensor 2) signal input	Racing	Analog	Rich: 0.6 1.0V	860mV
				Lean: Max. 0.4V	10mV
37	-				
38	Sensor ground	Idle	DC	Max. 50mV	6.8mV
39	Throttle Position Sensor signal input	C.T	Analog	0.25 ~ 0.9V	0.34V
		W.O.T		Min. 4.0V	4.43V
40	A/C Pressure Transducer signal input	A/C ON	Analog	Max. 4.8V	1.88V
41	-				
42	-				
43	Intake Air Temperature Sensor signal input	Idle	DC	0.2 ~ 4.8V	1.89V
44	-				
45	A/C Compressor Relay control output	Relay OFF	DC	Battery Voltage	14.1V
		Relay ON		Max. 1.0V	400mV
46	Fuel Pump Relay control output	Relay OFF	DC	Battery Voltage	12.8V
		Relay ON		Max. 1.0V	400mV

GASOLINE ENGINE CONTROL SYSTEM

FL -39

Pin No.	Description	Condition	Type	Level	Test Result
47	Injector (Cylinder #2) control output	Idle	Pulse	Hi: Battery Voltage	13.6V
				Lo: Max. 1.0V	336mV
				Vpeak: Max. 80V	69.7V
48	Immobilizer lamp control output	Lamp OFF	DC	Battery Voltage	12.6V
		Lamp ON		Max. 1.0V	20mV
49	-				
50	-				
51	Power Ground	Idle	DC	Max. 50mV	3.6mV
52	-				
53	-				
54	Heated Oxygen Sensor (Sensor 1) signal input	Racing	Analog	Rich: 0.6 1.0V	884mV
				Lean: Max. 0.4V	8mV
55	-				
56	-				
57	-				
58	Wheel Speed Sensor [A] signal input	Vehicle Run	SINE Wave	Vp_p: Min. 0.2V	
59	Sensor power (+5V)	IG OFF	DC	Max. 0.5V	3.6mV
		IG ON		4.9 ~ 5.1V	5.02V
60	Sensor power (+5V)	IG OFF	DC	Max. 0.5V	3.6mV
		IG ON		4.9 ~ 5.1V	5.02V
61	-				
62	CAN [LOW]	RECESSIVE	Pulse	2.0 ~ 3.0V	2.5V
		DOMINANT		0.5 ~ 2.25V	1.5V
63	Camshaft Position Sensor signal input	Idle	Pulse	Hi: Battery Voltage	13.72V
				Lo: Max. 0.5V	200mV
64	Vehicle speed signal input	Idle	Pulse	Hi: Min. 4.5V	12.2V
				Lo: Max. 1.0V	0V
					Freq.: 72.2Hz
		Vehicle Run (30km)		Hi: Min. 4.5V	12.2V
				Lo: Max. 1.0V	0V
					Freq.: 212Hz
65	-				
66	Alternator load signal input	Idle	Pulse	Hi: Battery Voltage	13.2V
				Lo: Max. 1.5V	1.34V

FL -40

FUEL SYSTEM

Pin No.	Description	Condition	Type	Level	Test Result
67	Engine speed signal output	Idle	Pulse	Hi: Battery Voltage	14.0V
				Lo: Max. 0.5V	20mV
				Freq.: 20 ~ 26Hz	22Hz
68	Injector (Cylinder #4) control output	Idle	Pulse	Hi: Battery Voltage	13.6V
				Lo: Max. 1.0V	336mV
				Vpeak: Max. 80V	69.7V
69	Purge Control Solenoid Valve control output	Active Inactive	Pulse	Hi: Battery Voltage	14.2V
				Lo: Max. 1.0V	120mV
70	Malfunction Indicator Lamp (MIL) control output	Lamp OFF	DC	Battery Voltage	11.51V
		Lamp ON		Max. 1.0V	663mV
71	Heated Oxygen Sensor (Sensor 2) Heater control output	Engine Run	Pulse	Hi: Battery Voltage	14.2V
				Lo: Max. 1.0V	220mV
72	Heated Oxygen Sensor (Sensor 1) Heater control output	Engine Run	Pulse	Hi: Battery Voltage	14.2V
				Lo: Max. 1.0V	200mV
73	Power Ground	Idle	DC	Max. 50mV	3.6mV
74	-				
75	-				
76	-				
77	Engine Coolant Temperature Sensor signal input	Idle	Analog	0.5 ~ 4.5V	1.43V
78	-				
79	Wheel Speed Sensor [B] signal input	Vehicle Run	SINEWave	Vp_p: Min. 0.2V	
80	-				
81	Sensor power (+5V)	IG OFF	DC	Max. 0.5V	3.6mV
		IG ON		4.8 ~ 5.2V	5.02V
82	Battery Power	Always	DC	Battery Voltage	12.23V
83	Battery voltage supply after ignition switch	IG OFF	DC	Max. 1.0V	3.2mV
		IG ON		Battery Voltage	12.68V
84	CAN [HIGH]	RECES-SIVE	Pulse	2.0 ~ 3.0V	2.5V
		DOMI-NANT		2.75 ~ 4.5V	3.58V
85	-				
86	Crankshaft Position Sensor [B] signal input	Idle	SINE Wave	Vp_p: Min. 1.0V	6.48V
87	Crankshaft Position Sensor [A] signal input	Idle	SINE Wave	Vp_p: Min. 1.0V	6.48V
88	Fuel consumption signal output	Idle	Pulse	Hi: Battery Voltage	13.8V
				Lo: Max. 0.5V	20mV

GASOLINE ENGINE CONTROL SYSTEM

FL -41

Pin No.	Description	Condition	Type	Level	Test Result
89	-				
90	Idle Speed Control Actuator [OPEN] control output	Idle	Pulse	Hi: Battery Voltage	13.8V
				Lo: Max. 1.0V	20mV
91	Injector (Cylinder #1) control output	Idle	Pulse	Hi: Battery Voltage	13.6V
				Lo: Max. 1.0V	336mV
				Vpeak: Max. 80V	69.7V
92	CVVT Oil Control Valve control output	Idle	Pulse	Hi: Battery Voltage	14.9V
				Lo: Max. 1.0V	36.2mV
93	-				
94	-				

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

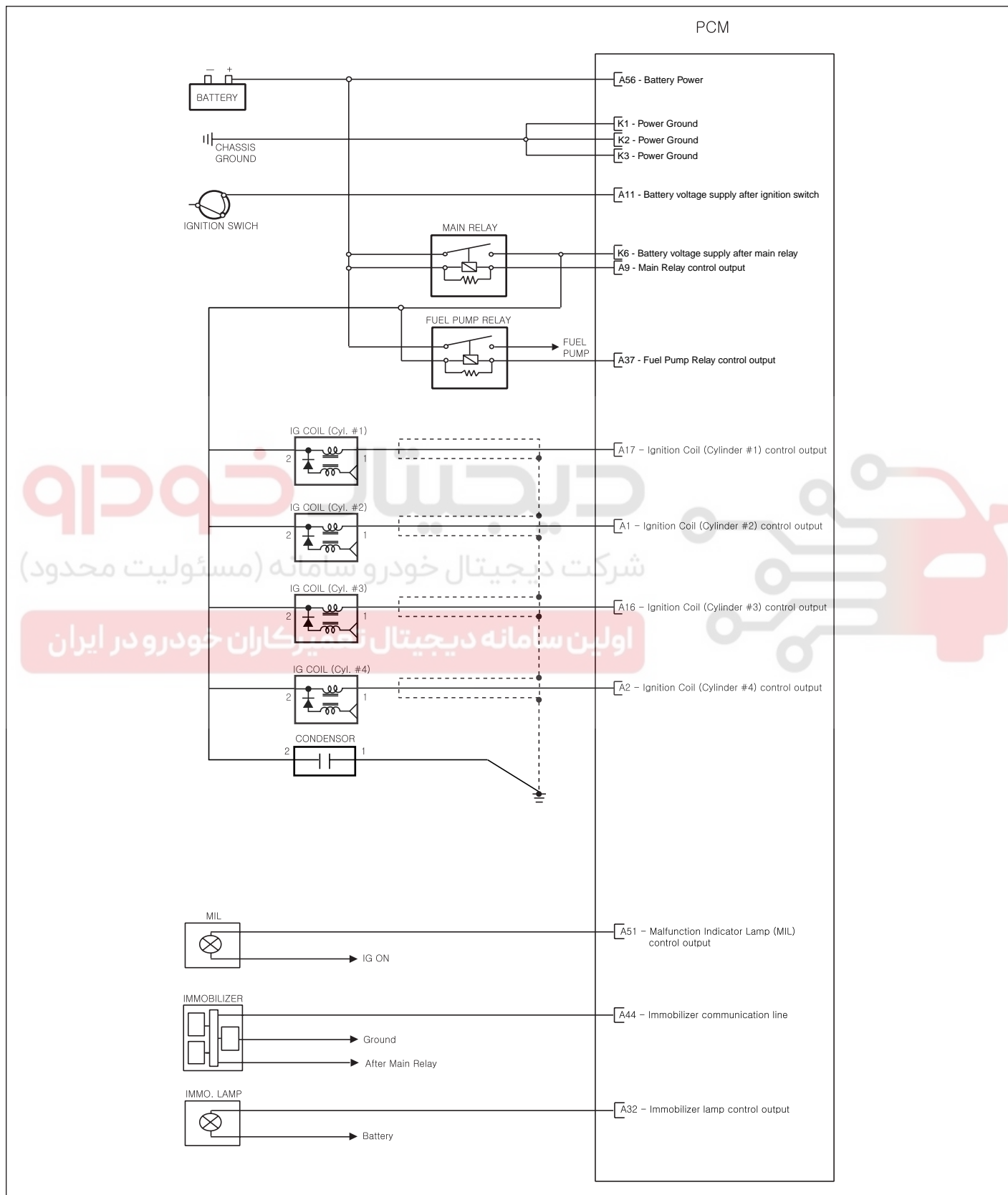


FL -42

FUEL SYSTEM

CIRCUIT DIAGRAM EFB10DF5

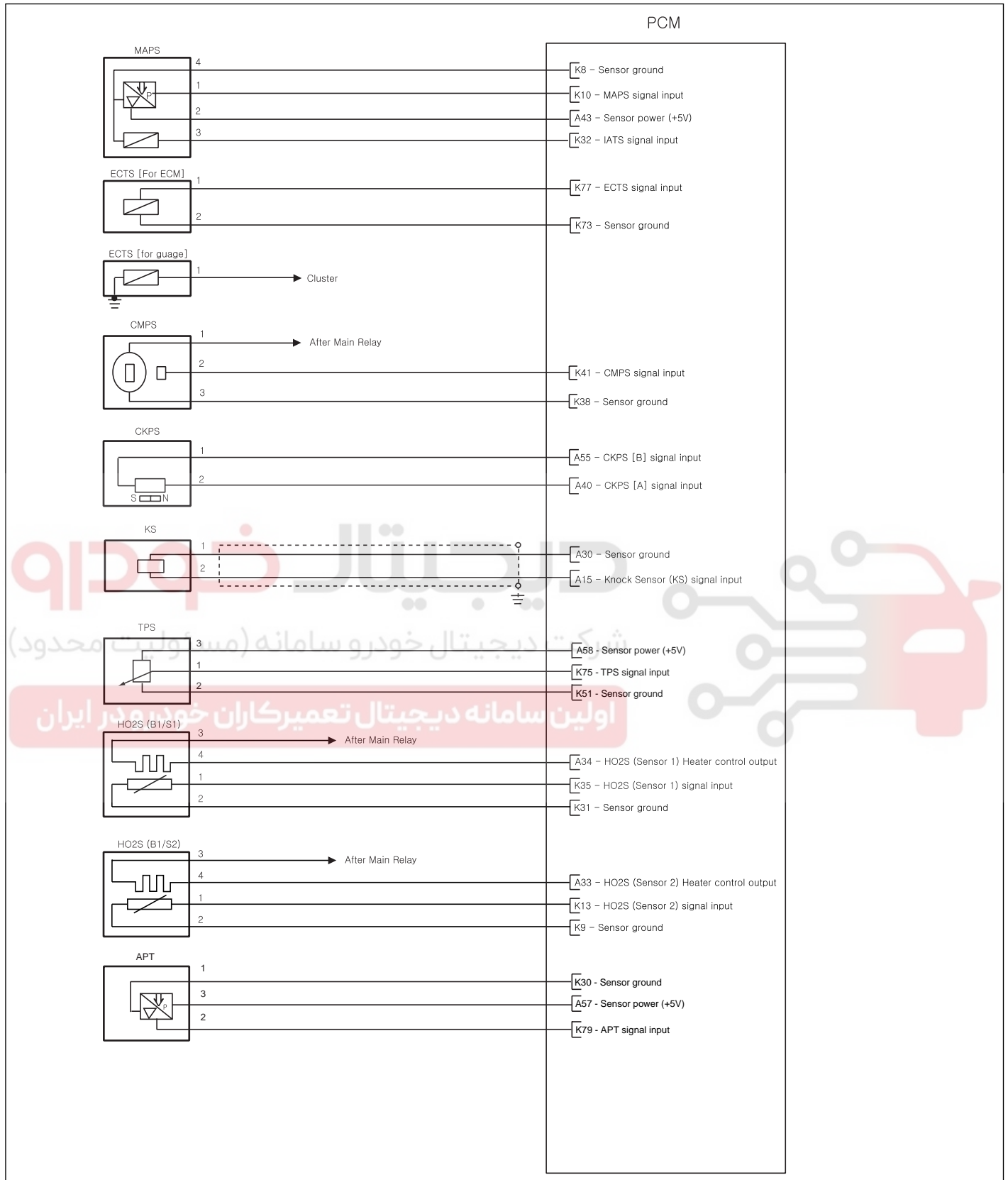
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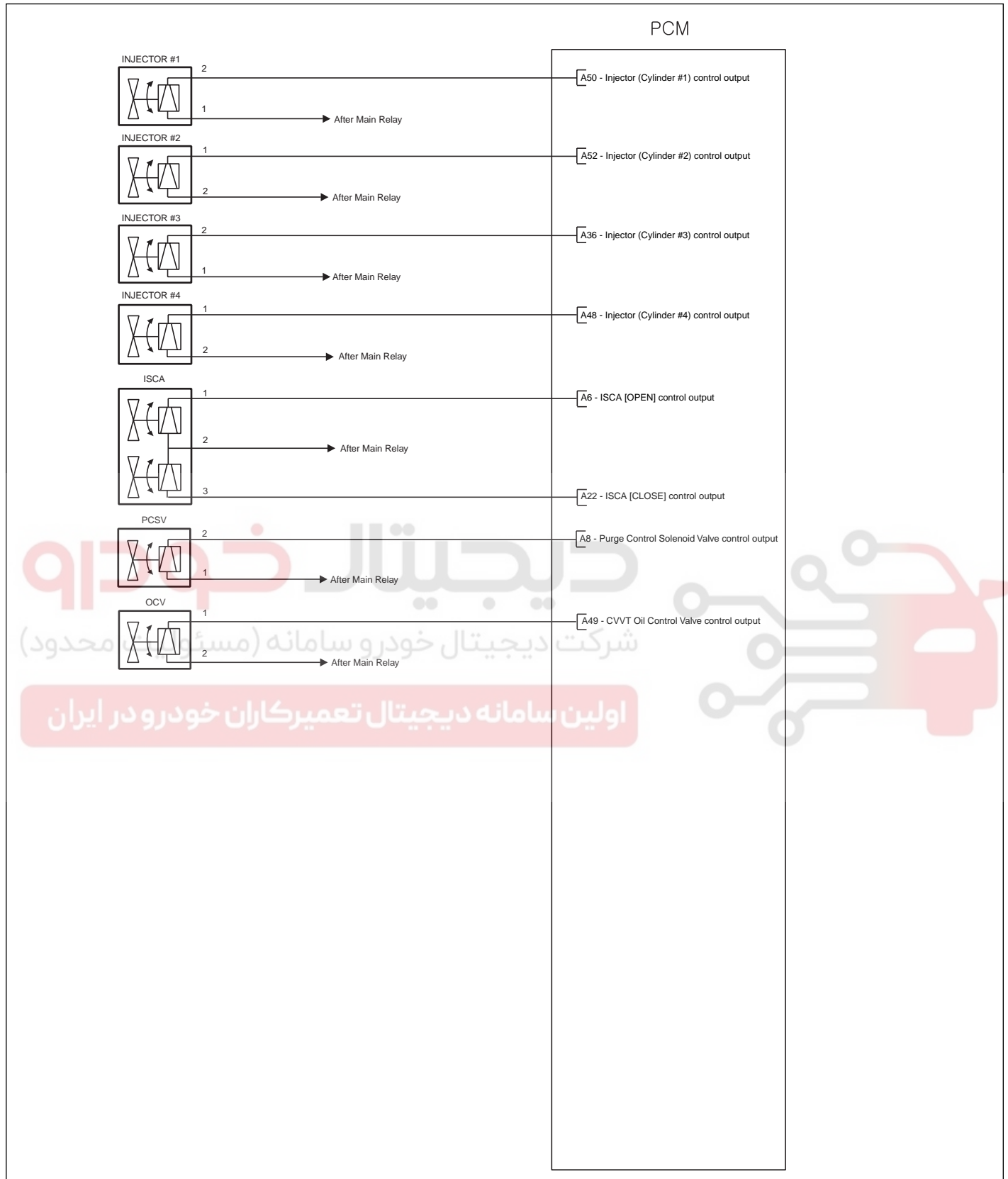
SHDFL6119L

GASOLINE ENGINE CONTROL SYSTEM

FL -43



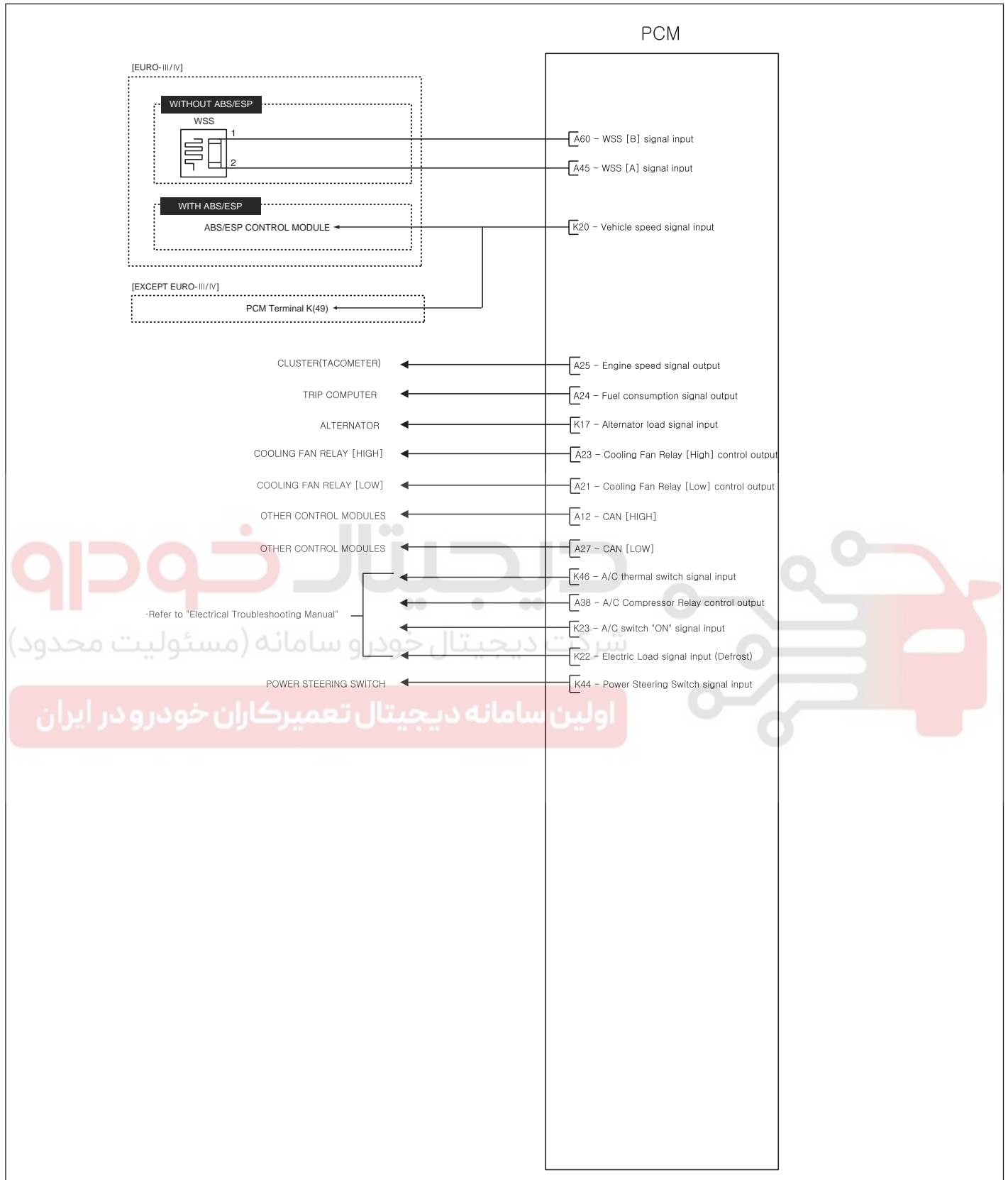
SHDFL6120L



دیجیتال خودرو
شرکت دیجیتال خودرو سامانه (مسئله محدود)
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

GASOLINE ENGINE CONTROL SYSTEM

FL -45

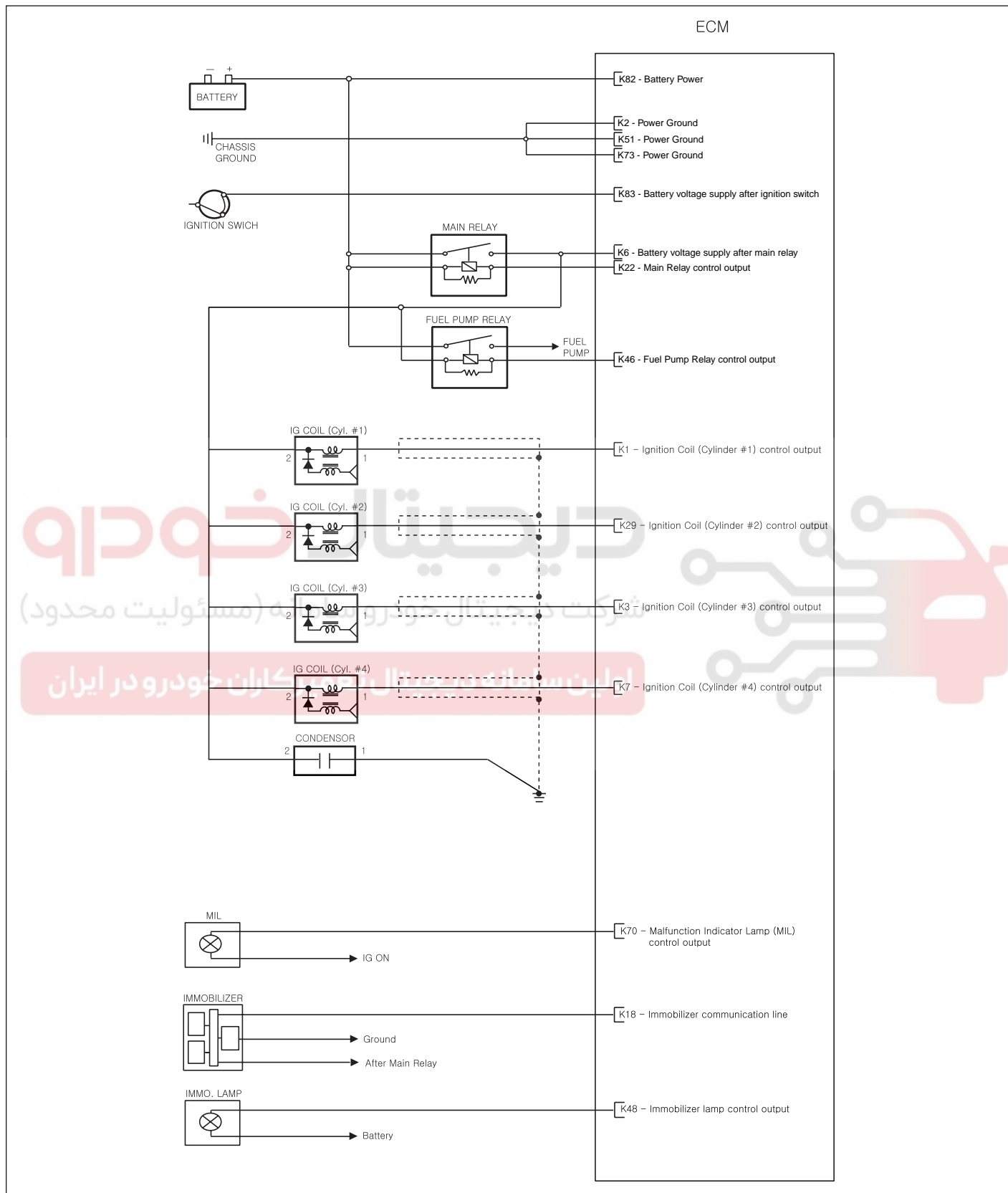


SLDFL7127L

FL -46

FUEL SYSTEM

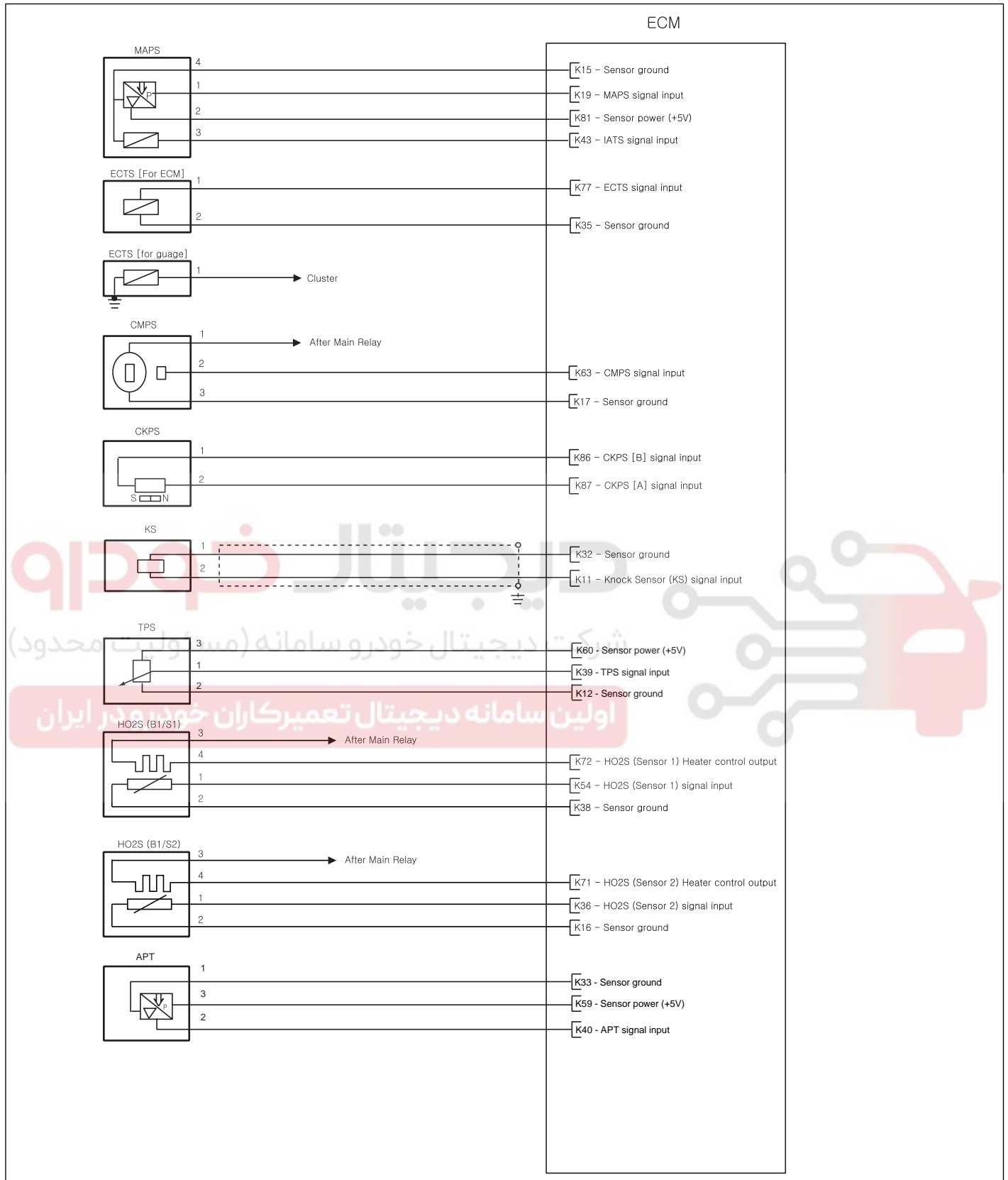
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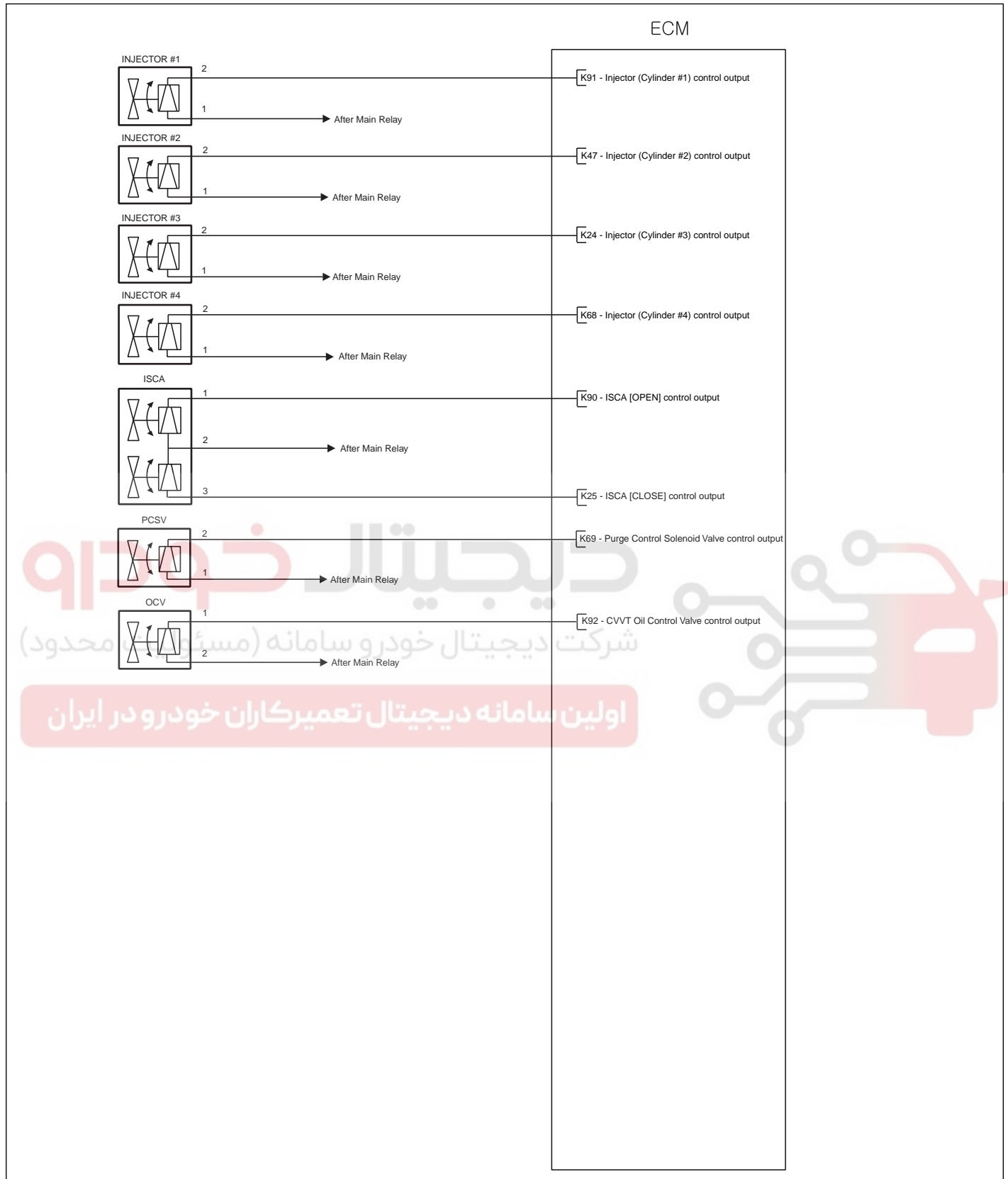
SHDFL6123L

GASOLINE ENGINE CONTROL SYSTEM

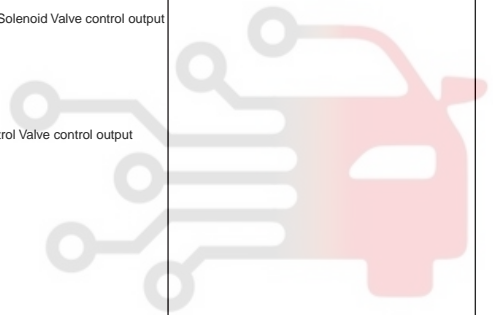
FL -47



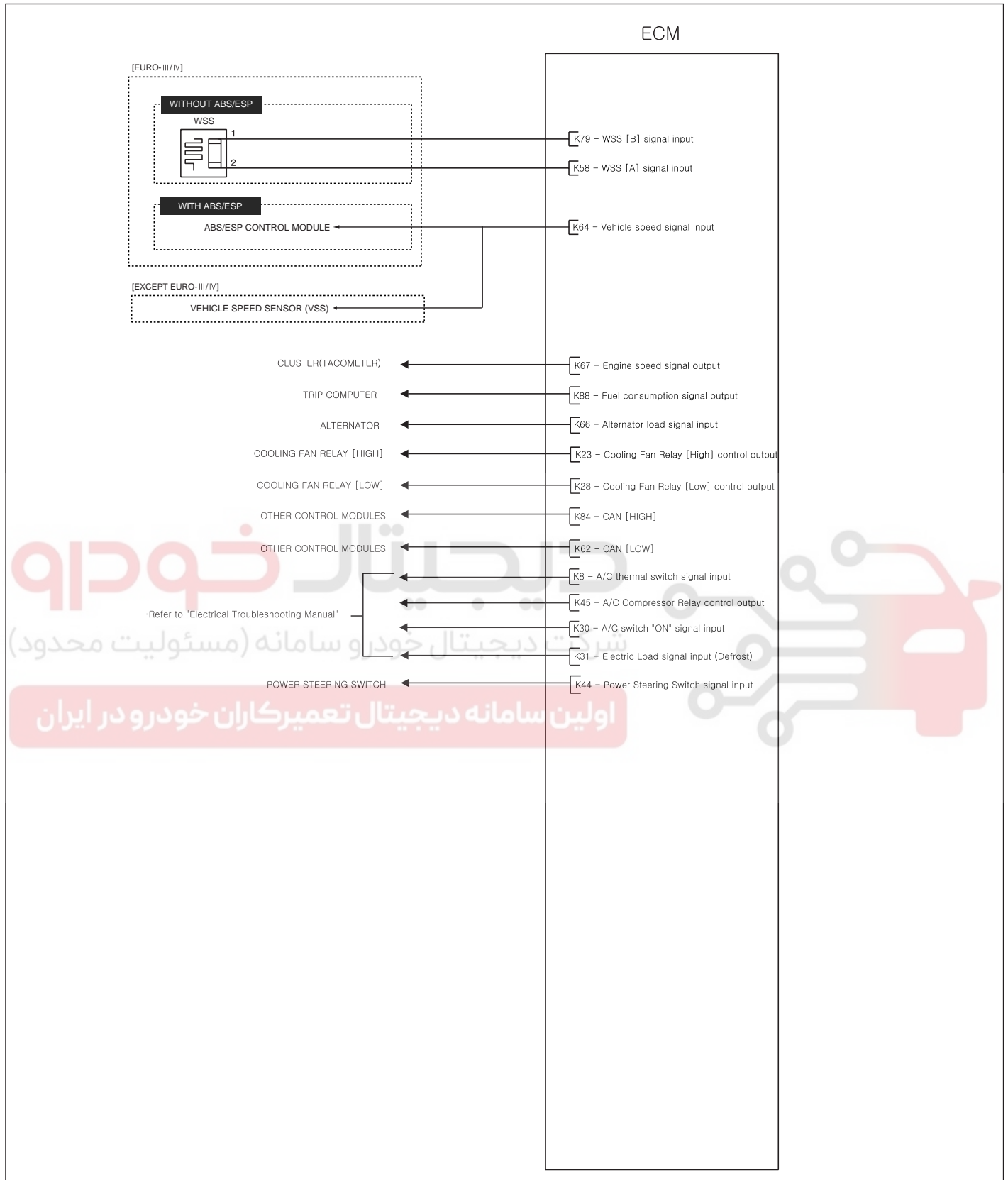
SHDFL6124L



دیجیتال خودرو
شرکت دیجیتال خودرو سامانه (مسئله محدود)
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



GASOLINE ENGINE CONTROL SYSTEM



SLDFL7128L

FL -50

FUEL SYSTEM

PCM PROBLEM INSPECTION**PROCEDURE** EE59E33E

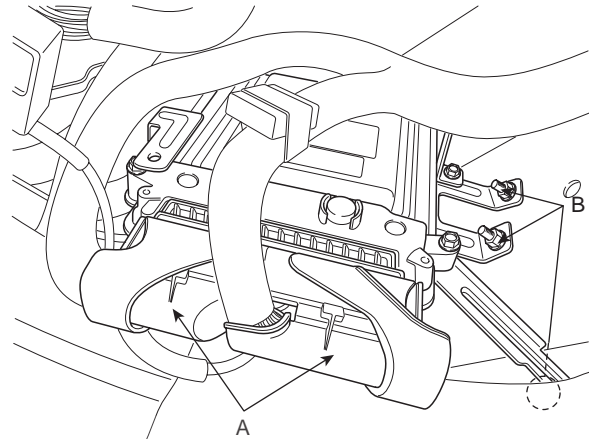
1. TEST PCM GROUND CIRCUIT: Measure resistance between PCM and chassis ground using the backside of PCM harness connector as PCM side check point. If the problem is found, repair it.

Specification (Resistance): 1 or less

2. TEST PCM CONNECTOR: Disconnect the PCM connector and visually check the ground terminals on PCM side and harness side for bent pins or poor contact pressure. If the problem is found, repair it.
3. If problem is not found in Step 1 and 2, the PCM could be faulty. If so, replace the PCM with a new one, and then check the vehicle again. If the vehicle operates normally then the problem was likely with the PCM.
4. RE-TEST THE ORIGINAL PCM : Install the original PCM (may be broken) into a known-good vehicle and check the vehicle. If the problem occurs again, replace the original PCM with a new one. If problem does not occur, this is intermittent problem (Refer to INTERMITTENT PROBLEM PROCEDURE in BASIC INSPECTION PROCEDURE).

REPLACEMENT E314328F

1. Turn ignition switch off.
2. Disconnect the battery (-) cable from the battery.
3. Disconnect the PCM connectors (A).



SLDFL7109D

4. Unscrew the PCM bracket mounting nuts (B) and remove the PCM from the air cleaner assembly.
5. Install a new PCM.

PCM mounting bolts: 3.9~ 5.9 N·m (0.4 ~ 0.6 kgf·m, 2.9 ~ 4.3 lbf·ft)

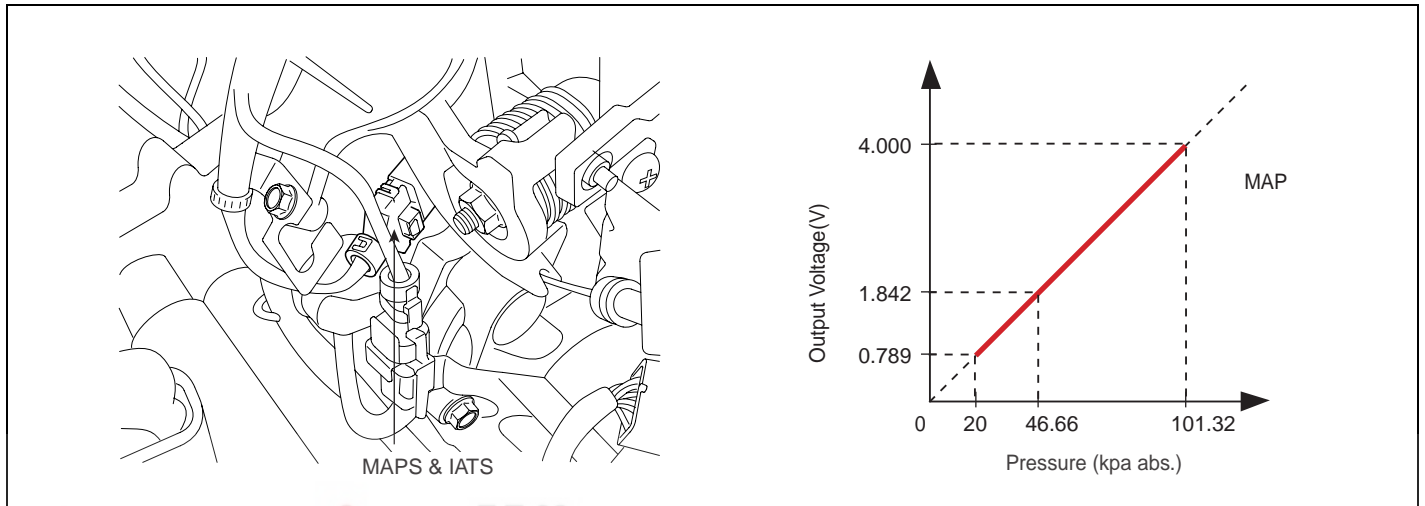
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

GASOLINE ENGINE CONTROL SYSTEM

MANIFOLD ABSOLUTE PRESSURE SENSOR (MAPS)

INSPECTION E49EEE6D

FUNCTION AND OPERATION PRICIPLE



SHDFL6127L

Manifold Absolute Pressure Sensor (MAPS) is speed-density type sensor and is installed on the surge tank. This MAPS senses absolute pressure in surge tank and transfers this analog signal proportional to the pressure to the PCM. The PCM calculates the intake air quantity and engine speed based on this signal. This MAPS consists of piezo-electric element and hybrid IC that amplifies the element output signal. The element is silicon diaphragm type and adapts pressure sensitive variable resistor effect of semi-conductor. 100% vacuum and the manifold pressure applies to both sides of it respectively. That is, this sensor outputs the silicon variation proportional to pressure change by voltage.

SPECIFICATION

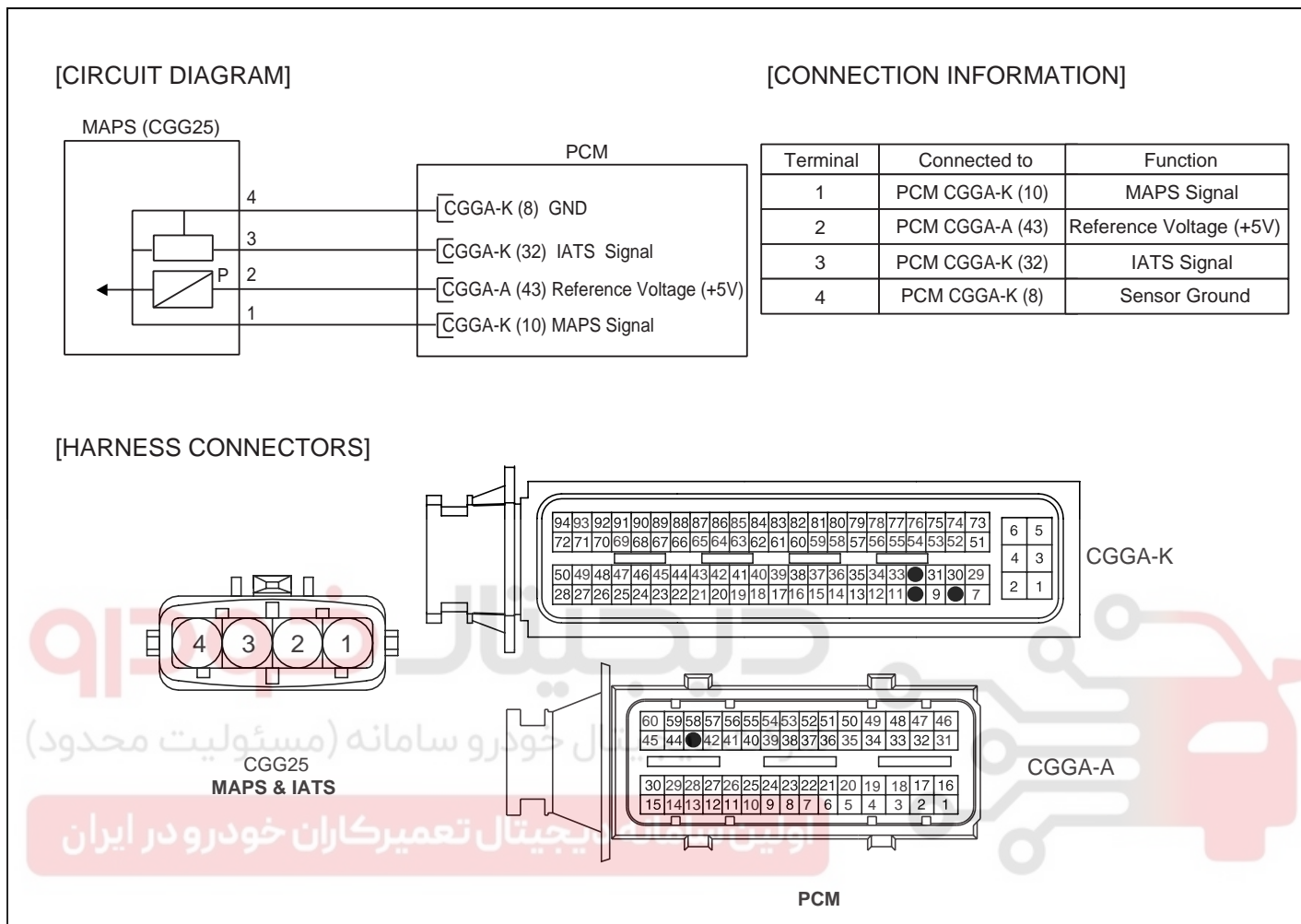
Pressure(kPa)	Output Voltage (V)
20.0	0.79
46.66	1.84
101.32	4.0

FL -52

FUEL SYSTEM

CIRCUIT DIAGRAM

(A/T)

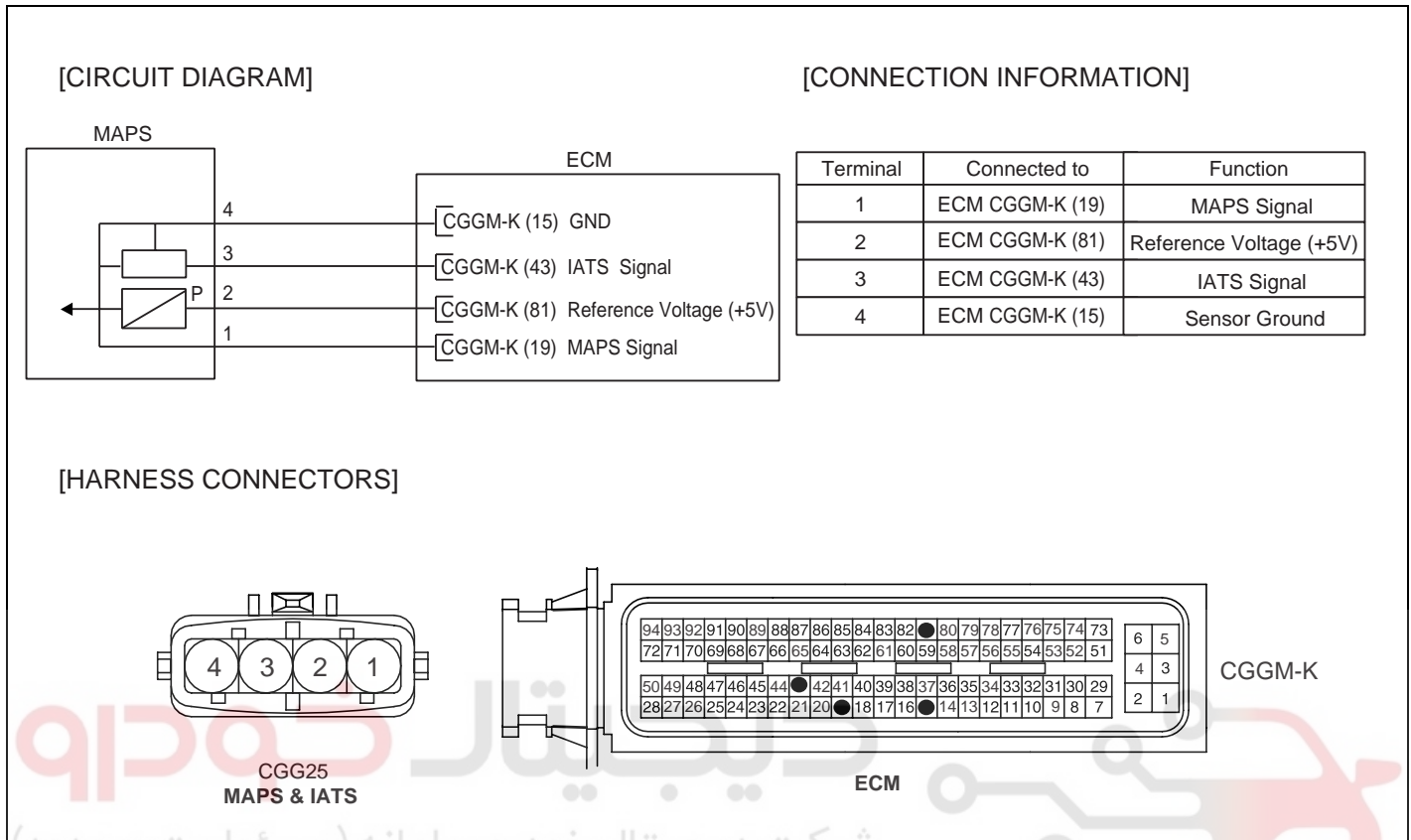


SHDFL6581L

GASOLINE ENGINE CONTROL SYSTEM

FL -53

(M/T)



SHDFL6582L

COMPONENT INSPECTION

1. Connect a scantool on Diagnosis Link Connector (DLC).
2. Check MAPS output voltage at idle and IG ON.

Condition	Output Voltage (V)
Idle	0.8V ~ 1.6V
IG ON	3.9V ~ 4.1V

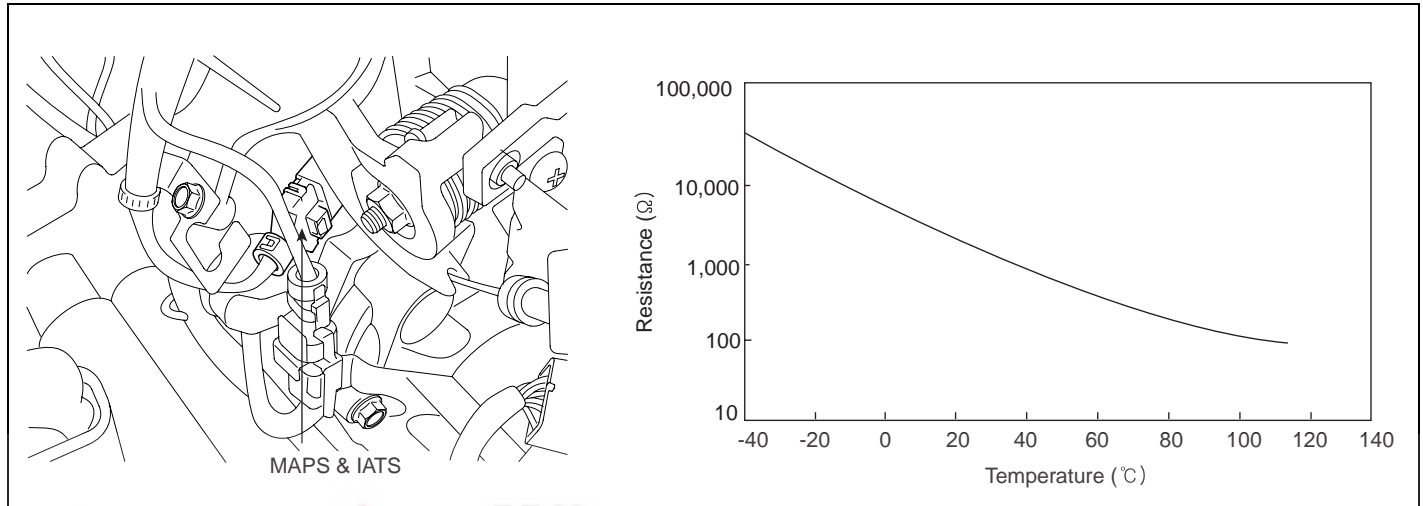
FL -54

FUEL SYSTEM

INTAKE AIR TEMPERATURE SENSOR (IATS)

INSPECTION E5BABC5

FUNCTION AND OPERATION PRICIPLE



SHDFL6128L

Intake Air Temperature Sensor (IATS) is installed inside the Manifold Absolute Pressure Sensor (MAPS) and detects the intake air temperature. To calculate precise air quantity, correction of the air temperature is needed because air density varies according to the temperature. So the PCM uses not only MAPS signal but also IATS signal. This sensor has a Negative Temperature Coefficient (NTC) and its resistance is in inverse proportion to the temperature.

SPECIFICATION

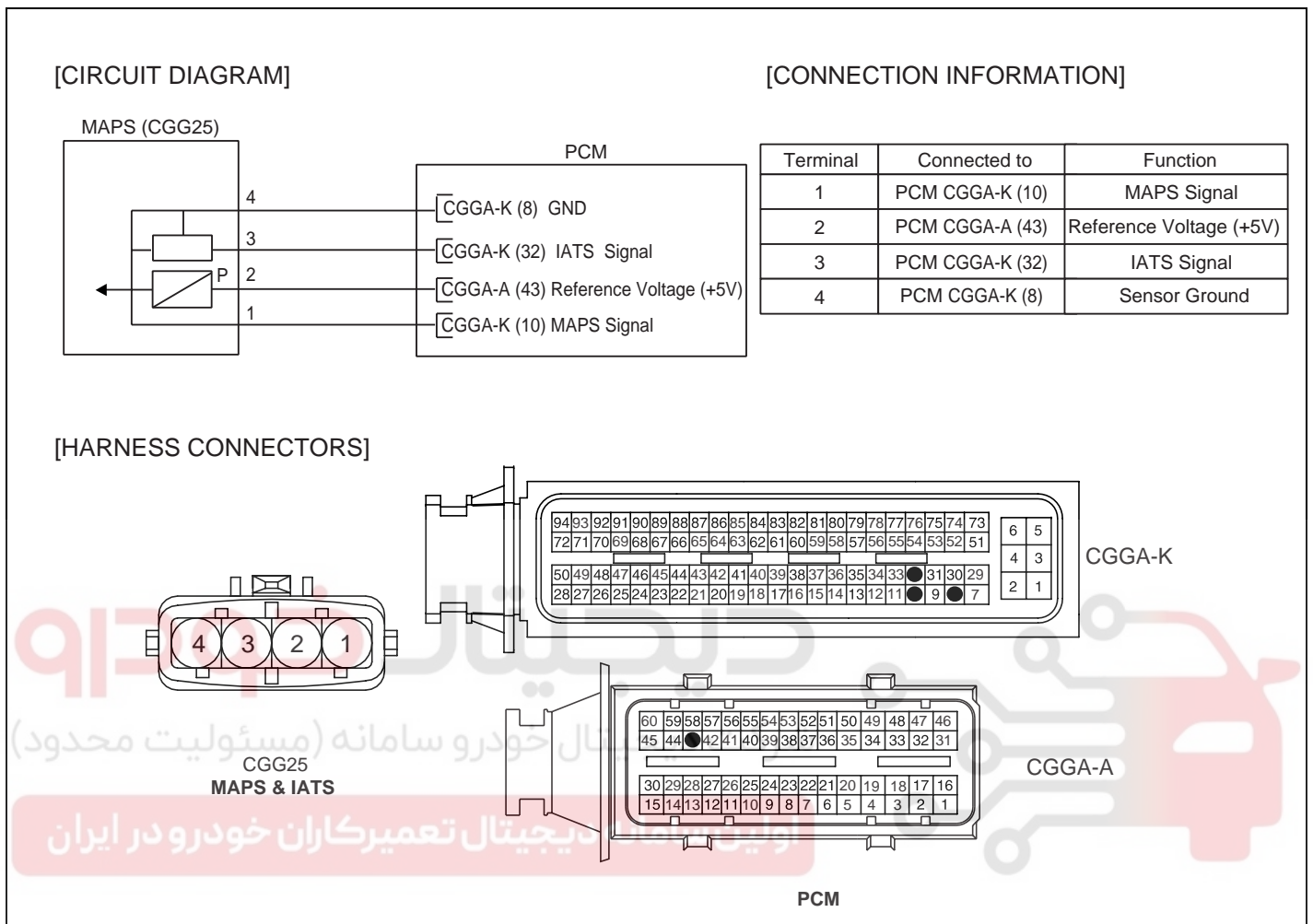
Temperature [()]	Resistance (k)
-40 (-40)	40.93 ~ 48.35
-30 (-22)	23.43 ~ 27.34
-20 (-4)	13.89 ~ 16.03
-10 (14)	8.50 ~ 9.71
0 (32)	5.38 ~ 6.09
10 (50)	3.48 ~ 3.90
20 (68)	2.31 ~ 2.57
25 (77)	1.90 ~ 2.10
30 (86)	1.56 ~ 1.74
40 (104)	1.08 ~ 1.21
60 (140)	0.54 ~ 0.62
80 (176)	0.29 ~ 0.34

GASOLINE ENGINE CONTROL SYSTEM

FL -55

CIRCUIT DIAGRAM

(A/T)

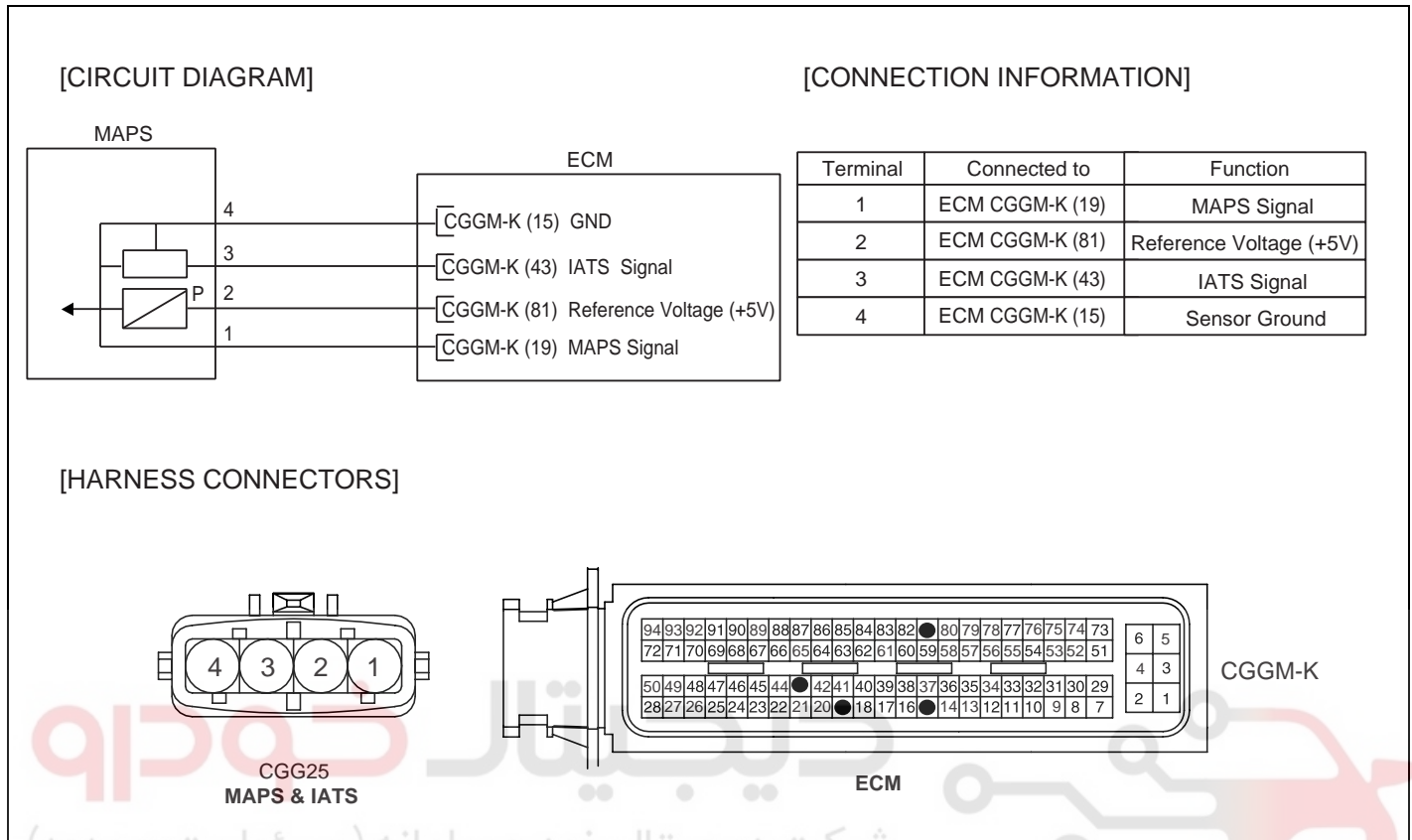


SHDFL6581L

FL -56

FUEL SYSTEM

(M/T)



SHDFL6582L

COMPONENT INSPECTION

1. Turn ignition switch OFF.
2. Disconnect IATS connector.
3. Measure resistance between IATS terminals 3 and 4.
4. Check that the resistance is within the specification.

Specification: Refer to SPECIFICATION.

GASOLINE ENGINE CONTROL SYSTEM

FL -57

ENGINE COOLANT TEMPERATURE SENSOR (ECTS)

INSPECTION E8067E2F

FUNCTION AND OPERATION PRICIPLE

Engine Coolant Temperature Sensor (ECTS) is located in the engine coolant passage of the cylinder head for detecting the engine coolant temperature. The ECTS uses a thermistor whose resistance changes with the temperature. The electrical resistance of the ECTS decreases as the temperature increases, and increases as the temperature decreases. The reference 5 V in the PCM is supplied to the ECTS via a resistor in the PCM. That is, the resistor in the PCM and the thermistor in the ECTS are connected in series. When the resistance value of the thermistor in the ECTS changes according to the engine coolant temperature, the output voltage also changes. During cold engine operation the PCM increases the fuel injection duration and controls the ignition timing using the information of engine coolant temperature to avoid engine stalling and improve drivability.

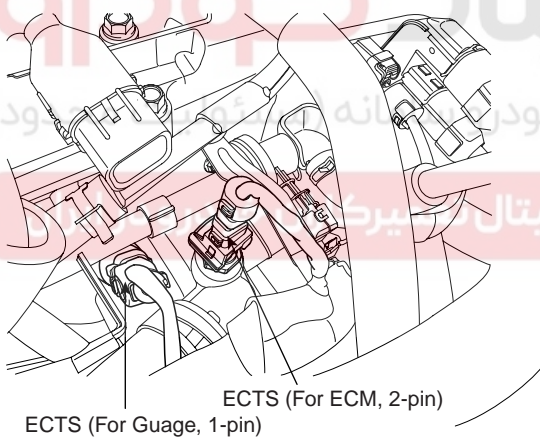
SPECIFICATION

[FOR ECM (2 PIN)]

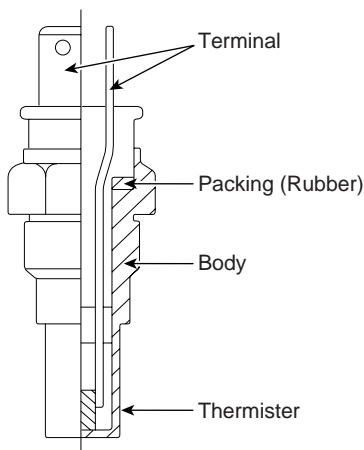
Temperature [()]	Resistance (kΩ)
-40(-40)	48.14
-20(-4)	14.13 ~ 16.83
0(32)	5.79
20(68)	2.31 ~ 2.59
40(104)	1.15
60(140)	0.59
80(176)	0.32

[FOR GAUGE (1 PIN)]

Temperature [()]	Resistance ()
60(140)	125
85(185)	42.6 ~ 54.2
110(230)	22.1 ~ 26.2
125(257)	15.2



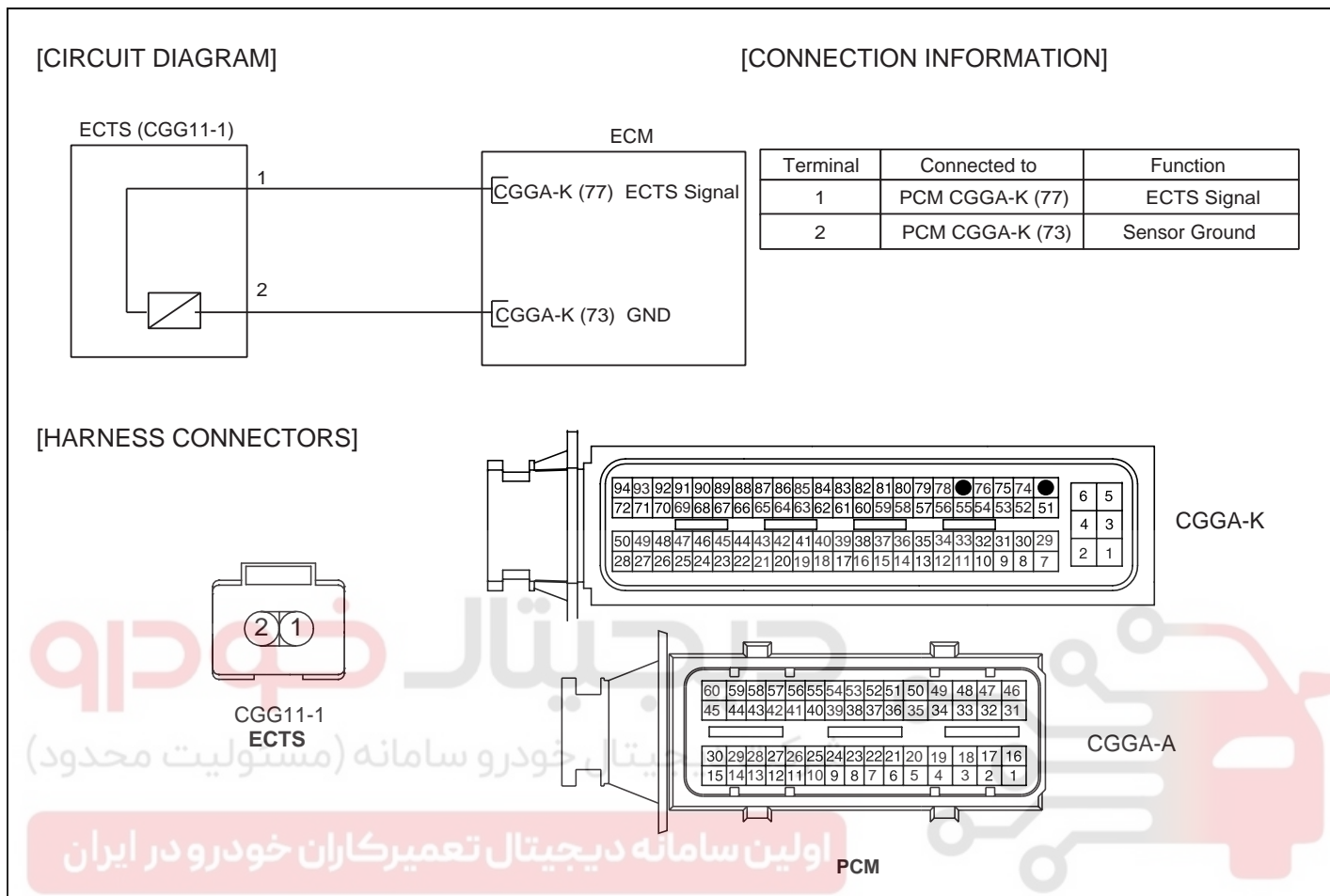
SHDFL6104L



EGRF241A

CIRCUIT DIAGRAM

(A/T)

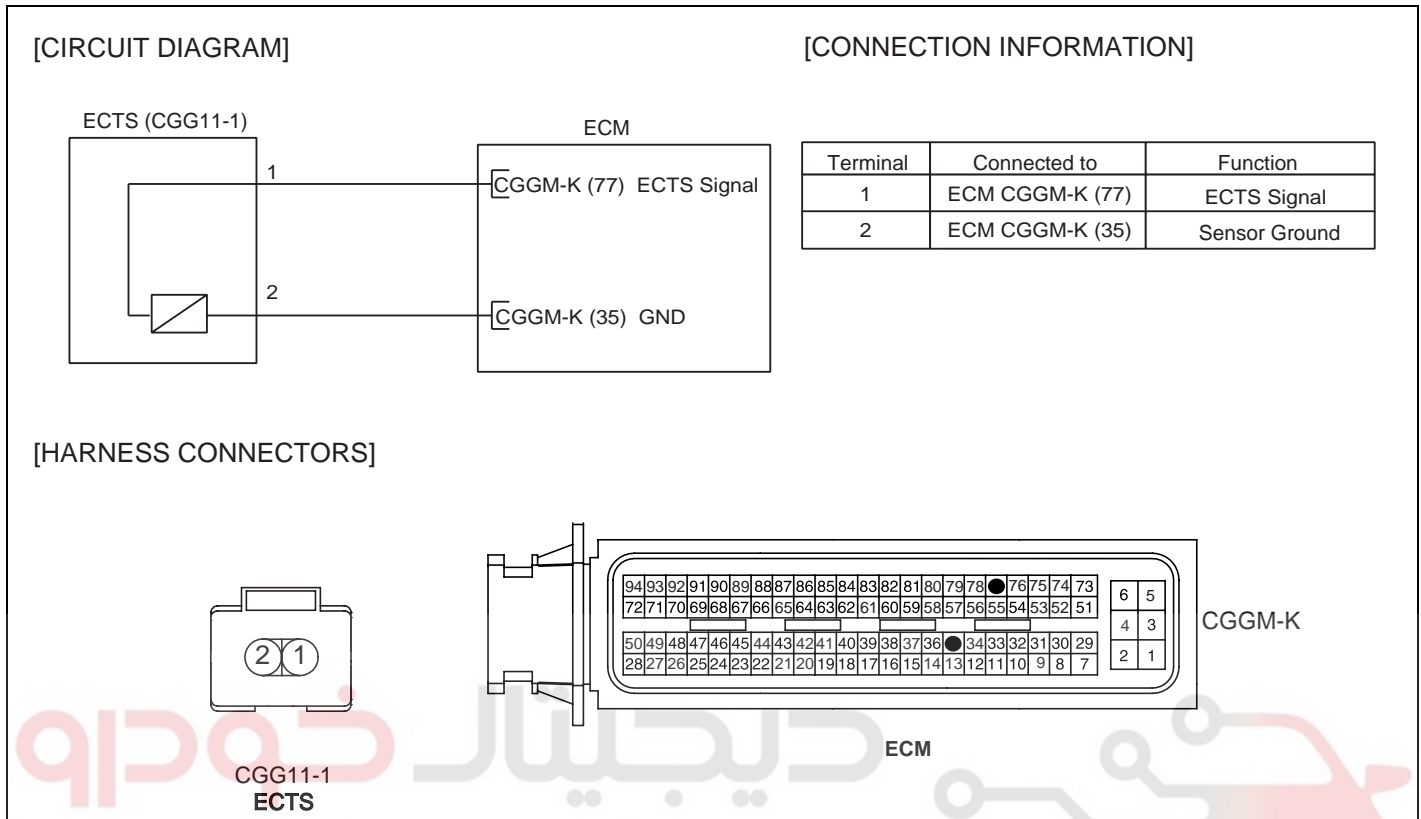


SHDFL6584L

GASOLINE ENGINE CONTROL SYSTEM

FL -59

(M/T)



شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

SHDFL6585L

COMPONENT INSPECTION

1. Turn ignition switch OFF.
2. Disconnect ECTS connector.
3. Remove the ECTS.
4. After immersing the thermistor of the sensor into engine coolant, measure resistance between ECTS terminals 1 and 2.
5. Check that the resistance is within the specification.

Specification: Refer to SPECIFICATION.

FL -60

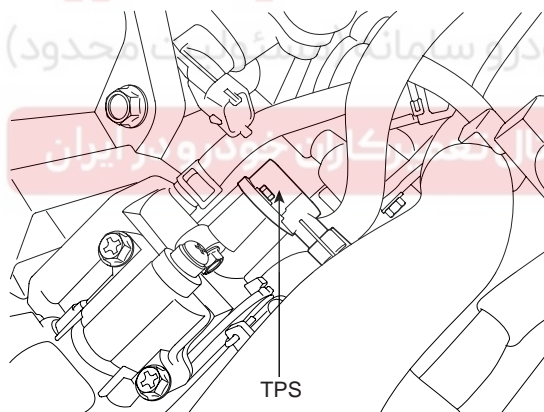
FUEL SYSTEM

THROTTLE POSITION SENSOR (TPS)

INSPECTION EEF179F9

FUNCTION AND OPERATION PRINCIPLE

The Throttle Position Sensor (TPS) is mounted on the throttle body and detects the opening angle of the throttle plate. The TPS has a variable resistor (potentiometer) whose characteristic is the resistance changing according to the throttle angle. During acceleration, the TPS resistance between the reference 5V and the signal terminal decreases and output voltage increases; during deceleration, the TPS resistance increases and TPS output voltage decreases. The PCM supplies a reference 5V to the TPS and the output voltage increases directly with the opening of the throttle valve. The TPS output voltage will vary from 0.25~0.9V at closed throttle to minimum 4.0V at wide-open throttle. The PCM determines operating conditions such as idle (closed throttle), part load, acceleration/deceleration, and wide-open throttle from the TPS. Also The PCM uses the Manifold Absolute Pressure Sensor (MAPS) signal along with the TPS signal to adjust fuel injection duration and ignition timing.



SHDFL6105L

SPECIFICATION

Throttle Angle	Output Voltage (V)
C.T	0.25 ~ 0.9
W.O.T	Min. 4.0V

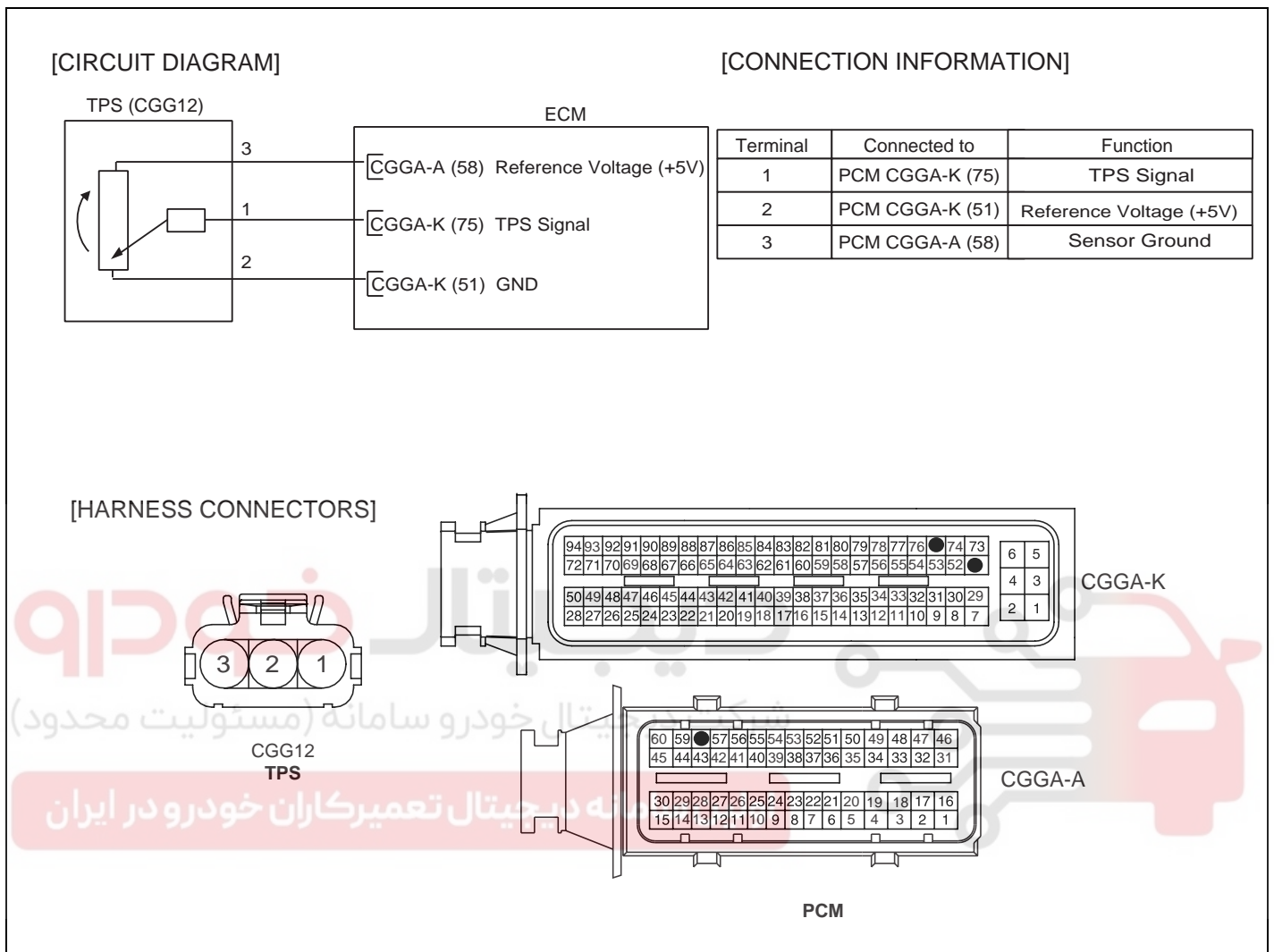
Items	Specification
Sensor Resistance (kΩ)	1.6 ~ 2.4

GASOLINE ENGINE CONTROL SYSTEM

FL -61

CIRCUIT DIAGRAM

(A/T)

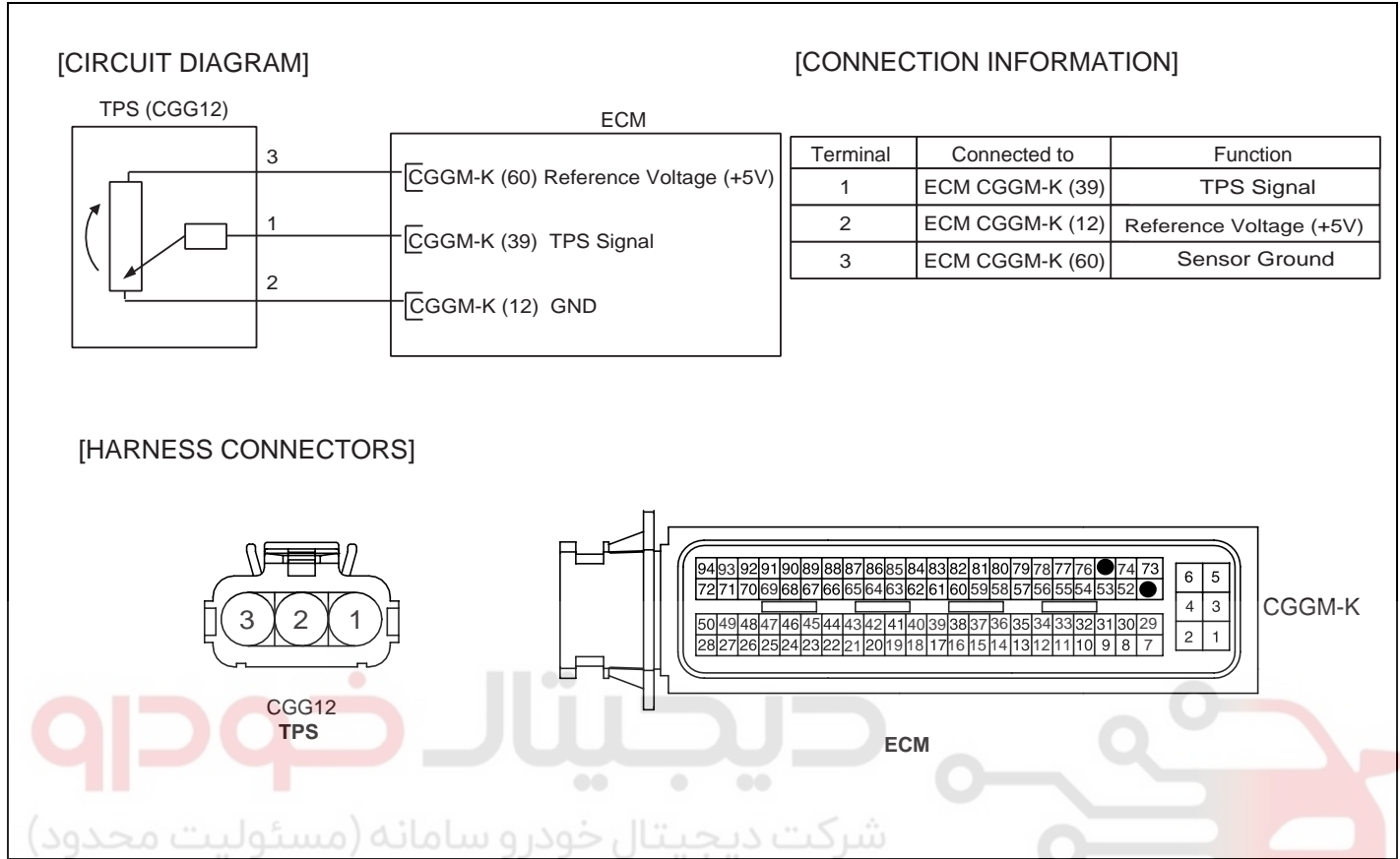


SHDFL6579L

FL -62

FUEL SYSTEM

(M/T)



SHDFL6580L

COMPONENT INSPECTION

1. Connect a scantool on the Data Link Connector (DLC).
2. Start engine and check output voltages of TPS at C.T and W.O.T.

Specification: Refer to SPECIFICATION.

3. Turn ignition switch OFF and disconnect the scantool from the DLC.
4. Disconnect TPS connector and measure resistance between TPS terminals 2 and 3

Specification: Refer to SPECIFICATION.

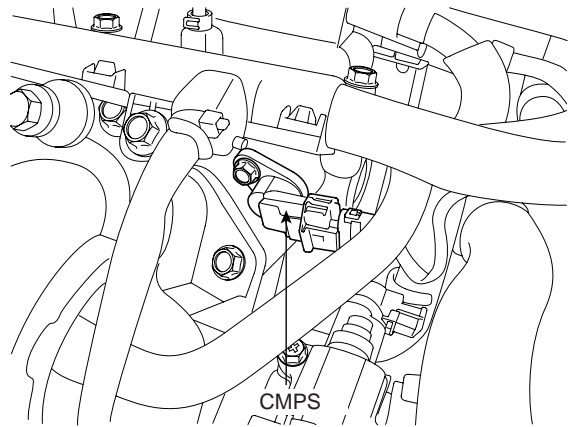
GASOLINE ENGINE CONTROL SYSTEM

CAMSHAFT POSITION SENSOR (CMPS)

INSPECTION EACF874A

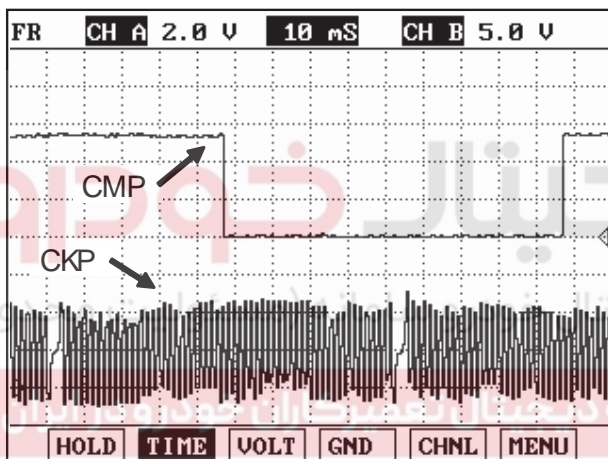
FUNCTION AND OPERATION PRICIPLE

Camshaft Position Sensor (CMPS) is a hall sensor and detects the camshaft position by using a hall element. It is related with Crankshaft Position Sensor (CKPS) and detects the piston position of each cylinder which the CKPS can't detect. The CMPS are installed on engine head cover and uses a target wheel installed on the camshaft. This sensor has a hall-effect IC which output voltage changes when magnetic field is made on the IC with current flow.

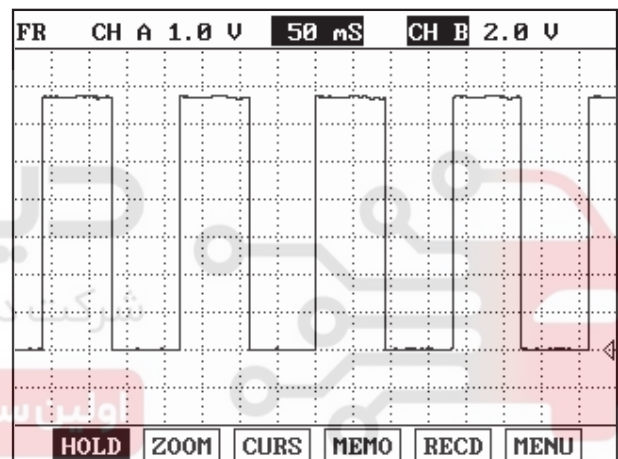


SHDFL6107L

WAVEFORM



CKP-CMP



CMP

This example shows a typical Crankshaft Position Sensor (CKPS) and Camshaft Position Sensor (CMPS) waveform at idle. The PCM controls the injection and ignition timing by using these signals. Generally CKPS signal is used to detect the piston's position and CMPS signal is used to detect the Top Dead Center of each cylinder.

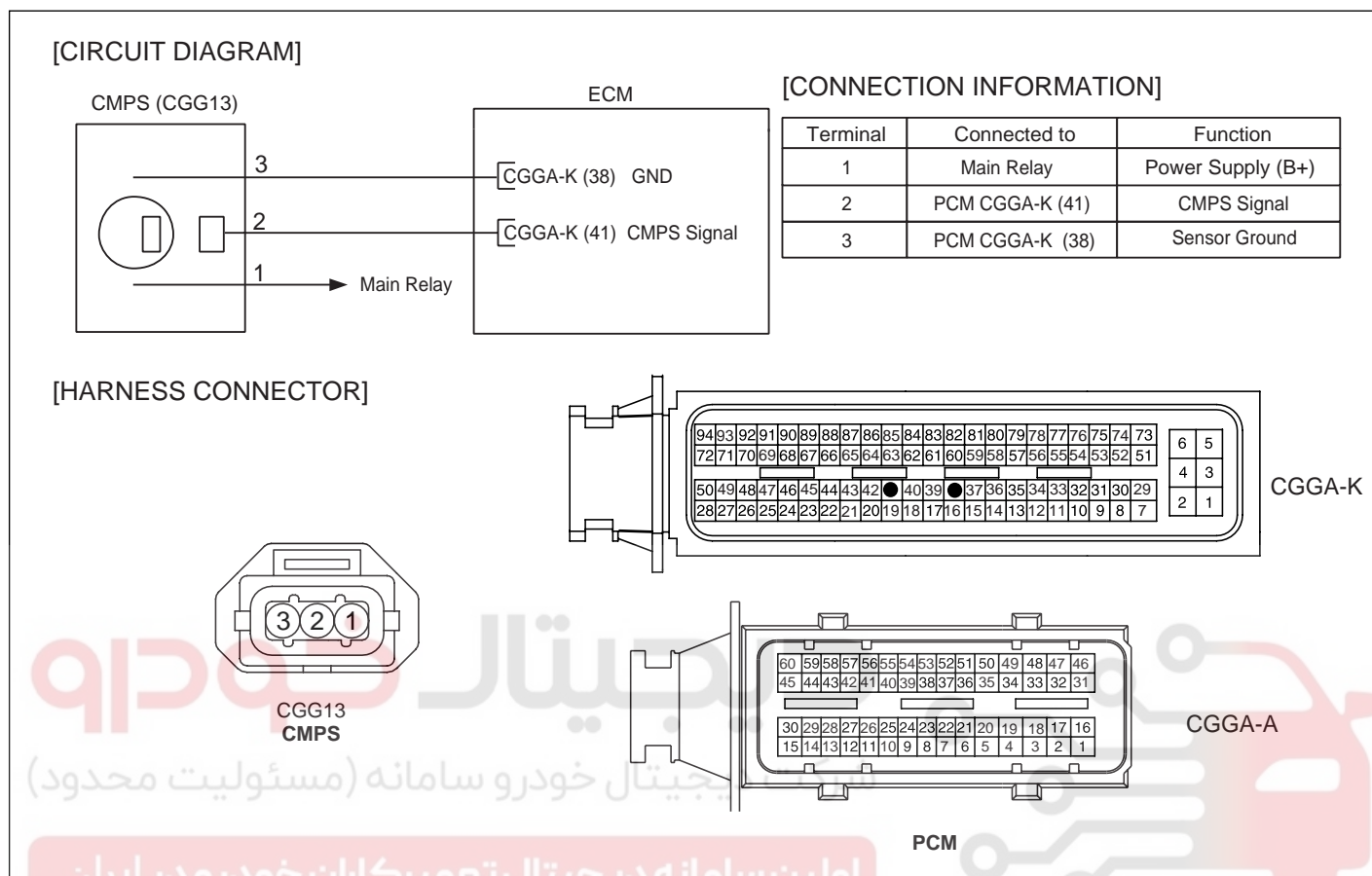
SHDFL6810L

FL -64

FUEL SYSTEM

CIRCUIT DIAGRAM

(A/T)

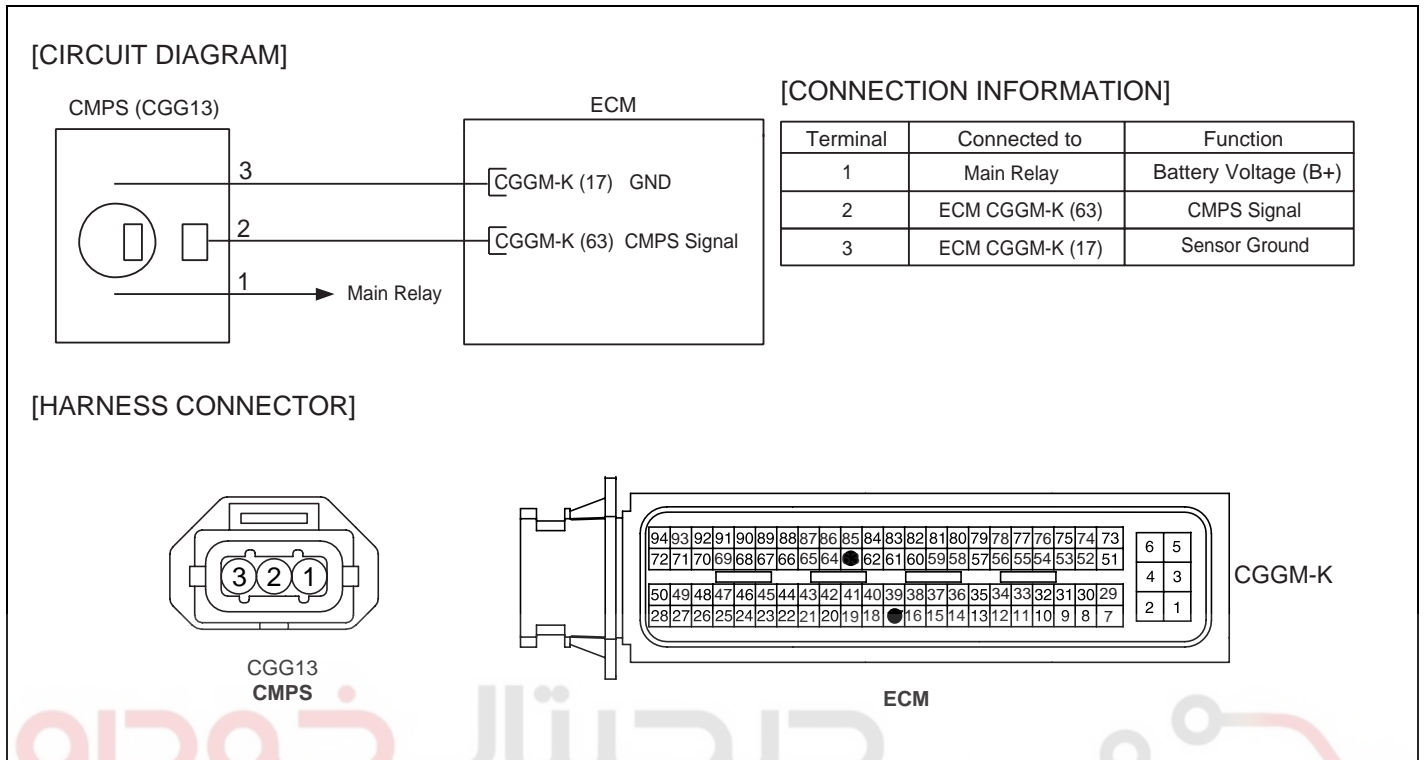


SHDFL6900L

GASOLINE ENGINE CONTROL SYSTEM

FL -65

(M/T)



SHDFL6901L

COMPONENT INSPECTION

1. Check signal waveform of CMPS and CKPS using a scantool.

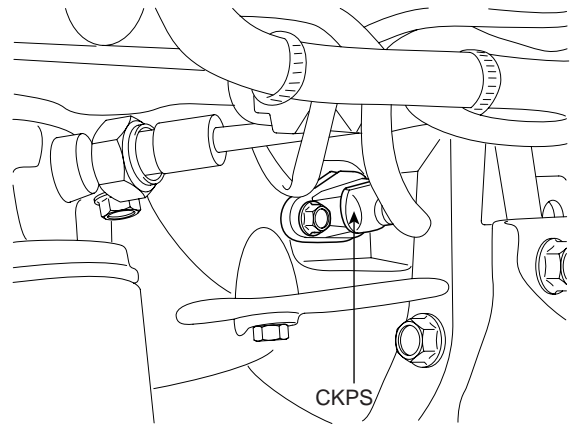
Specification : Refer to "WAVE FORM"

CRANKSHAFT POSITION SENSOR (CKPS)

INSPECTION EC5BAD78

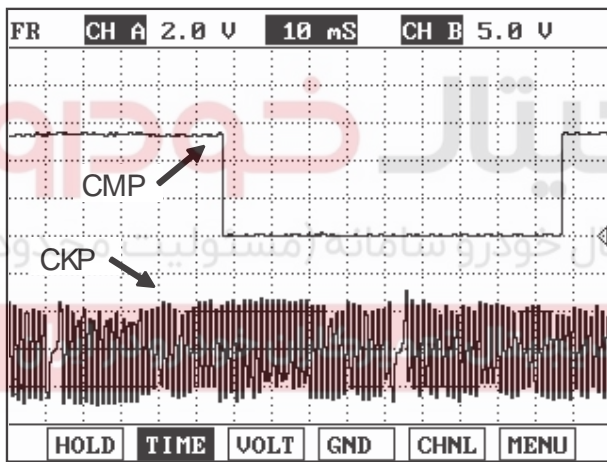
FUNCTION AND OPERATION PRICIPLE

Crankshaft Position Sensor (CKPS) detects the crankshaft position and is one of the most important sensors of the engine control system. If there is no CKPS signal input, fuel is not supplied and the main relay does not operate. That is, vehicle can't run without CKPS signal. This sensor is installed on transaxle housing and generates alternating current by magnetic flux field which is made by the sensor and the target wheel when engine runs. The target wheel consists of 58 slots and 2 missing slots on 360 CA (Crank Angle).

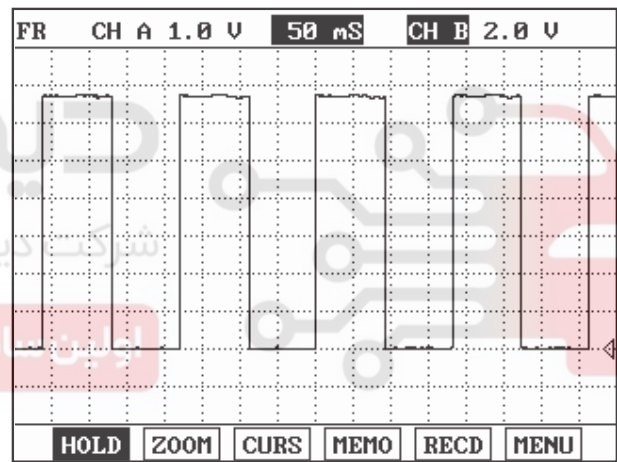


SHDFL6106L

WAVEFORM



CKP-CMP



CMP

This example shows a typical Crankshaft Position Sensor(CkPS) and Camshaft Position Sensor(CMPS) waveform at idle. The PCM controls the injection and ignition timing by using these signals. Generally CkPS signal is used to detect the piston's position and CMPS signal is used to detect the Top Dead Center of each cylinder.

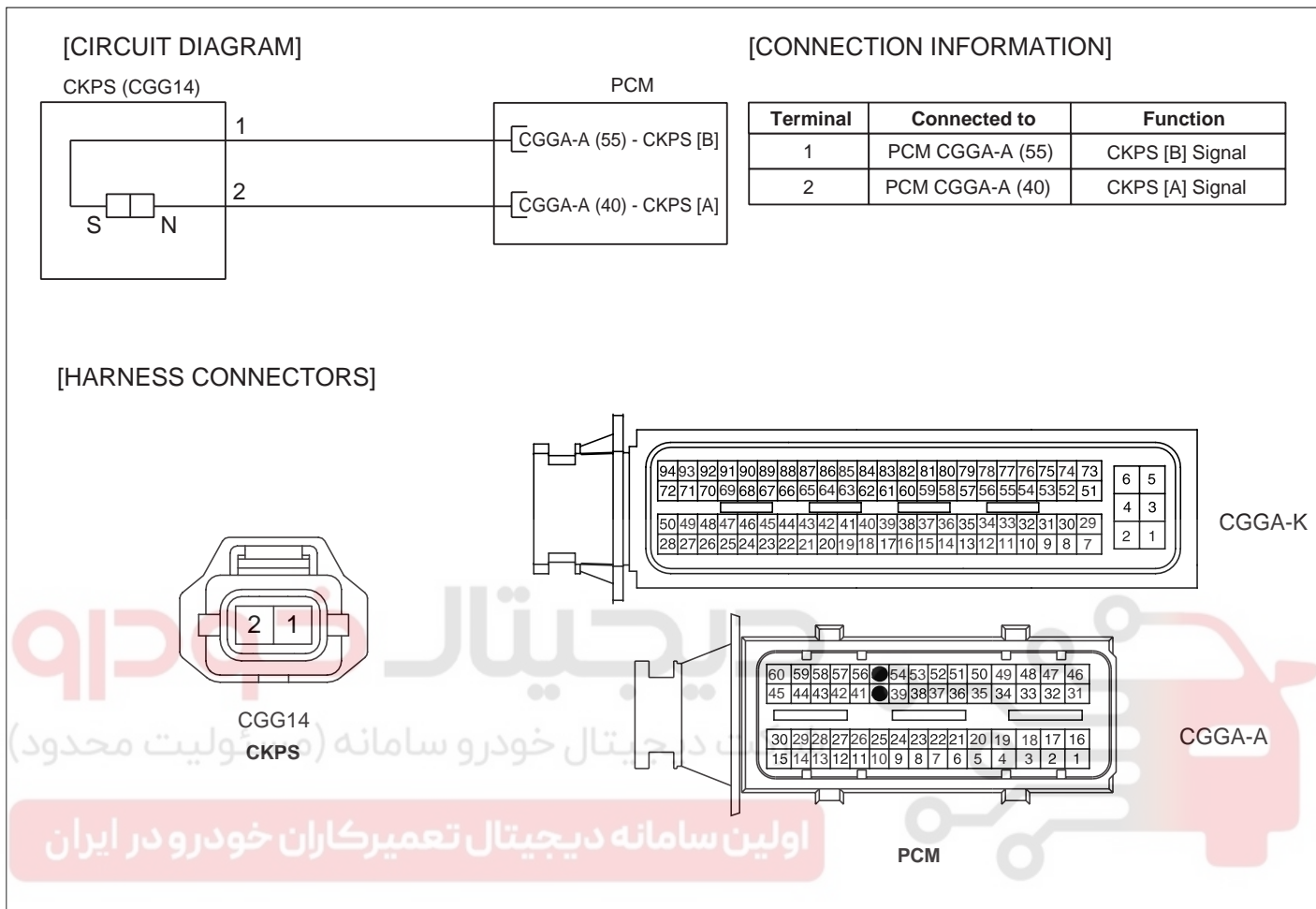
SHDFL6810L

GASOLINE ENGINE CONTROL SYSTEM

FL -67

CIRCUIT DIAGRAM

(A/T)

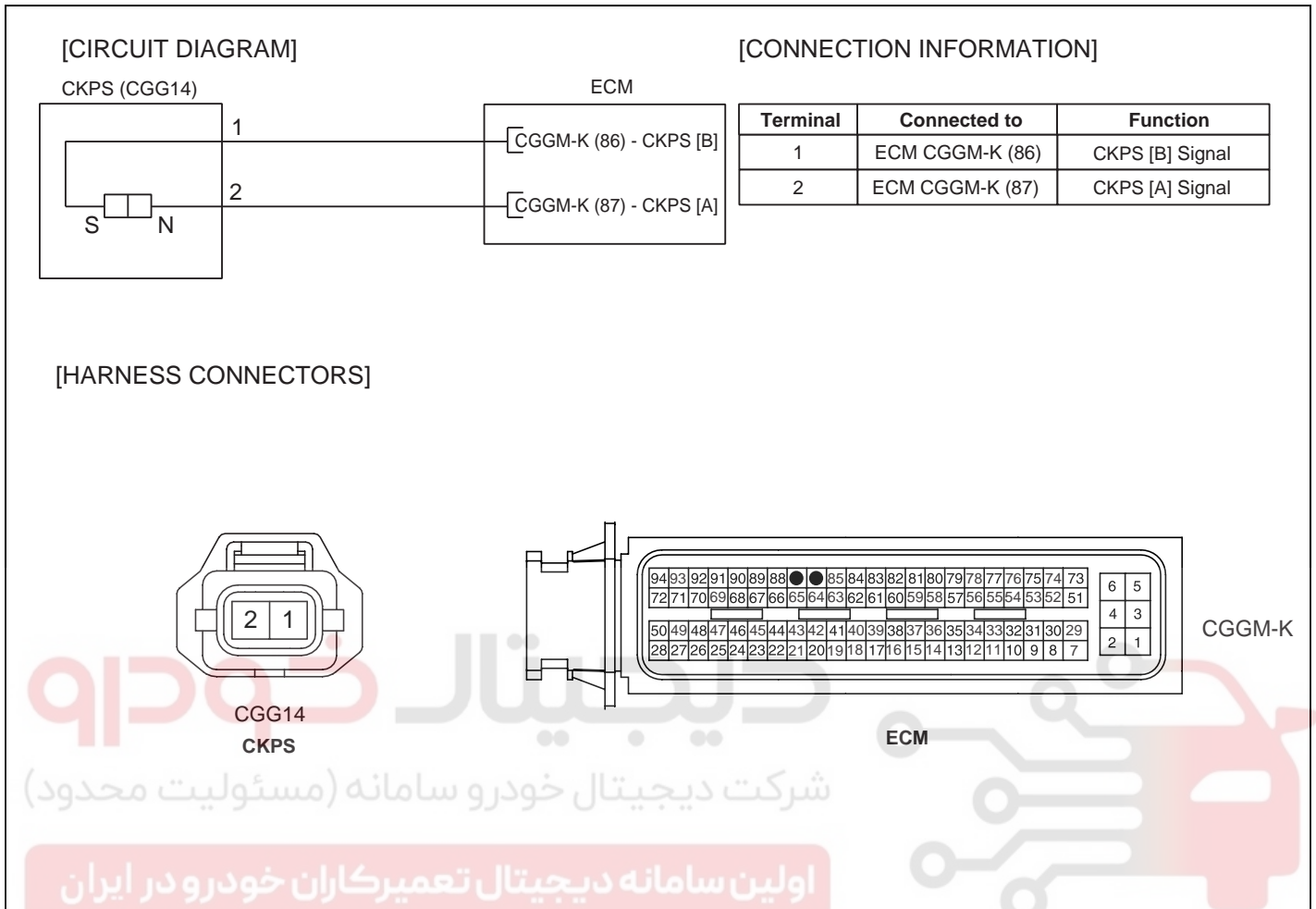


SHDFL6130L

FL -68

FUEL SYSTEM

(M/T)



SHDFL6133L

COMPONENT INSPECTION

1. Check signal waveform of CKPS and CMPS using a scantool.

Specification : Refer to "WAVE FORM"

GASOLINE ENGINE CONTROL SYSTEM

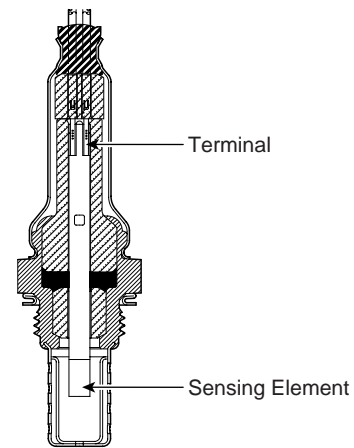
FL -69

HEATED OXYGEN SENSOR (HO2S)

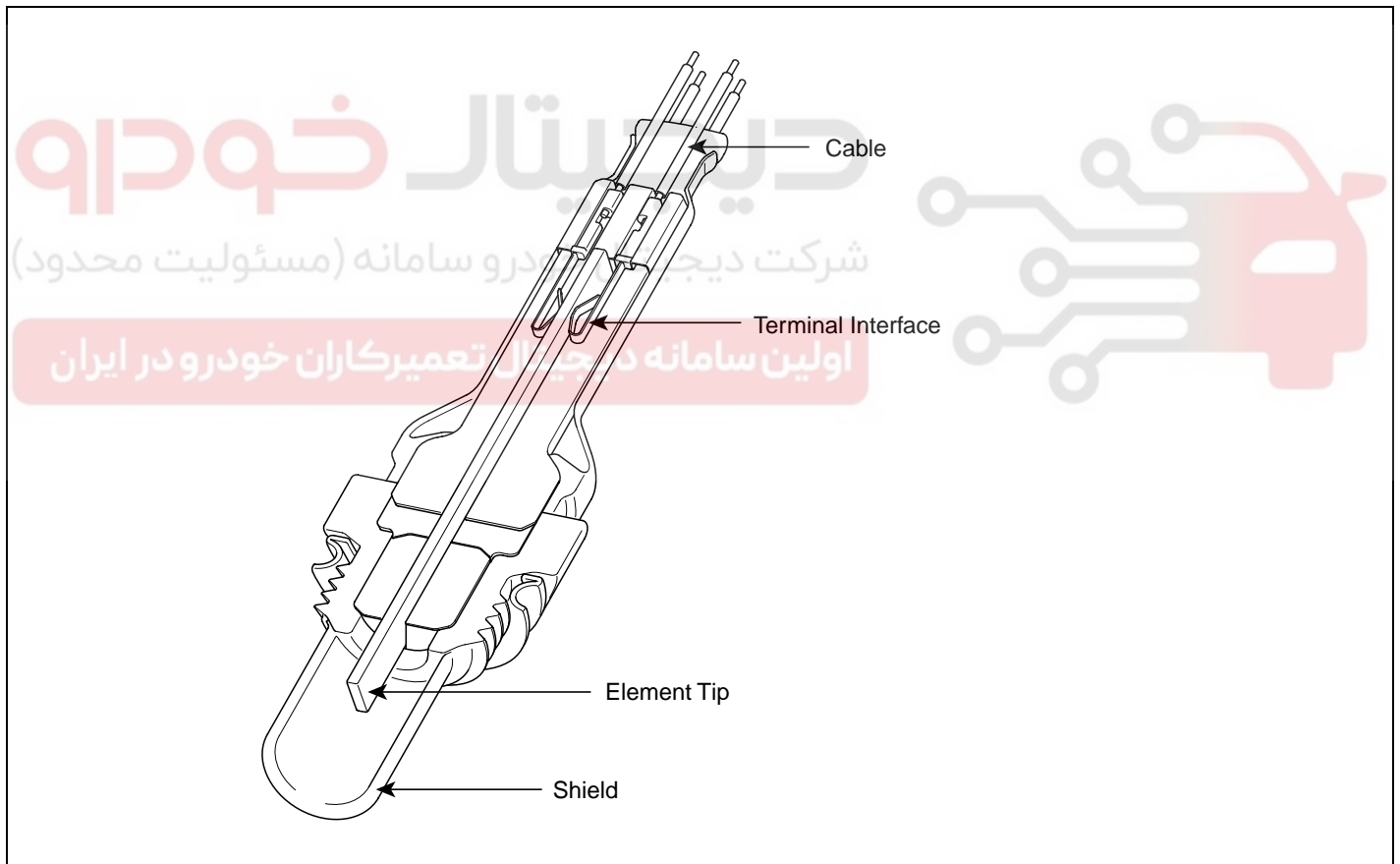
INSPECTION E92513F0

FUNCTION AND OPERATION PRICIPLE

Heated Oxygen Sensor (HO2S) consists of zirconium and alumina and is installed on upstream and downstream of the Manifold Catalyst Converter (MCC). After it compares oxygen consistency of the atmosphere with the exhaust gas, it transfers the oxygen consistency of the exhaust gas to the PCM. When A/F ratio is rich or lean, it generates approximately 1V or 0V respectively. In order that this sensor normally operates, the temperature of the sensor tip is higher than 370 (698). So it has a heater which is controlled by the PCM duty signal. When the exhaust gas temperature is lower than the specified value, the heater warms the sensor tip.



EGRF247A



EGRF248A

FL -70

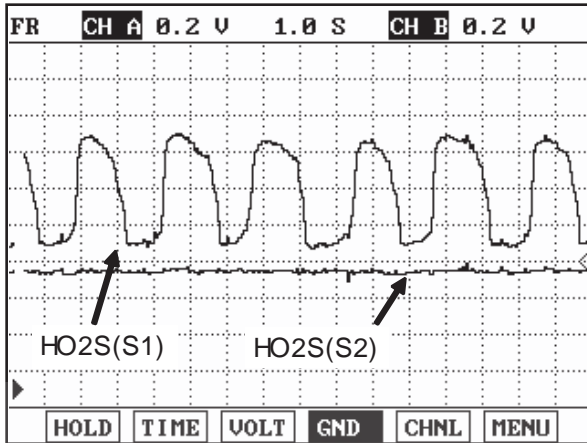
FUEL SYSTEM

SPECIFICATION

A/F Ratio	Output Voltage (V)
RICH	0.6 ~ 1.0
LEAN	0 ~ 0.4

Item	Specification
Heater Resistance ()	Approx. 9.0 at 20 (68)

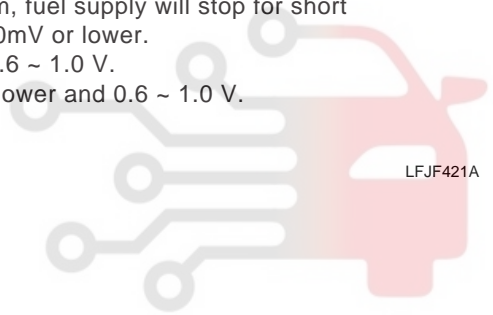
WAVEFORM



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.

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



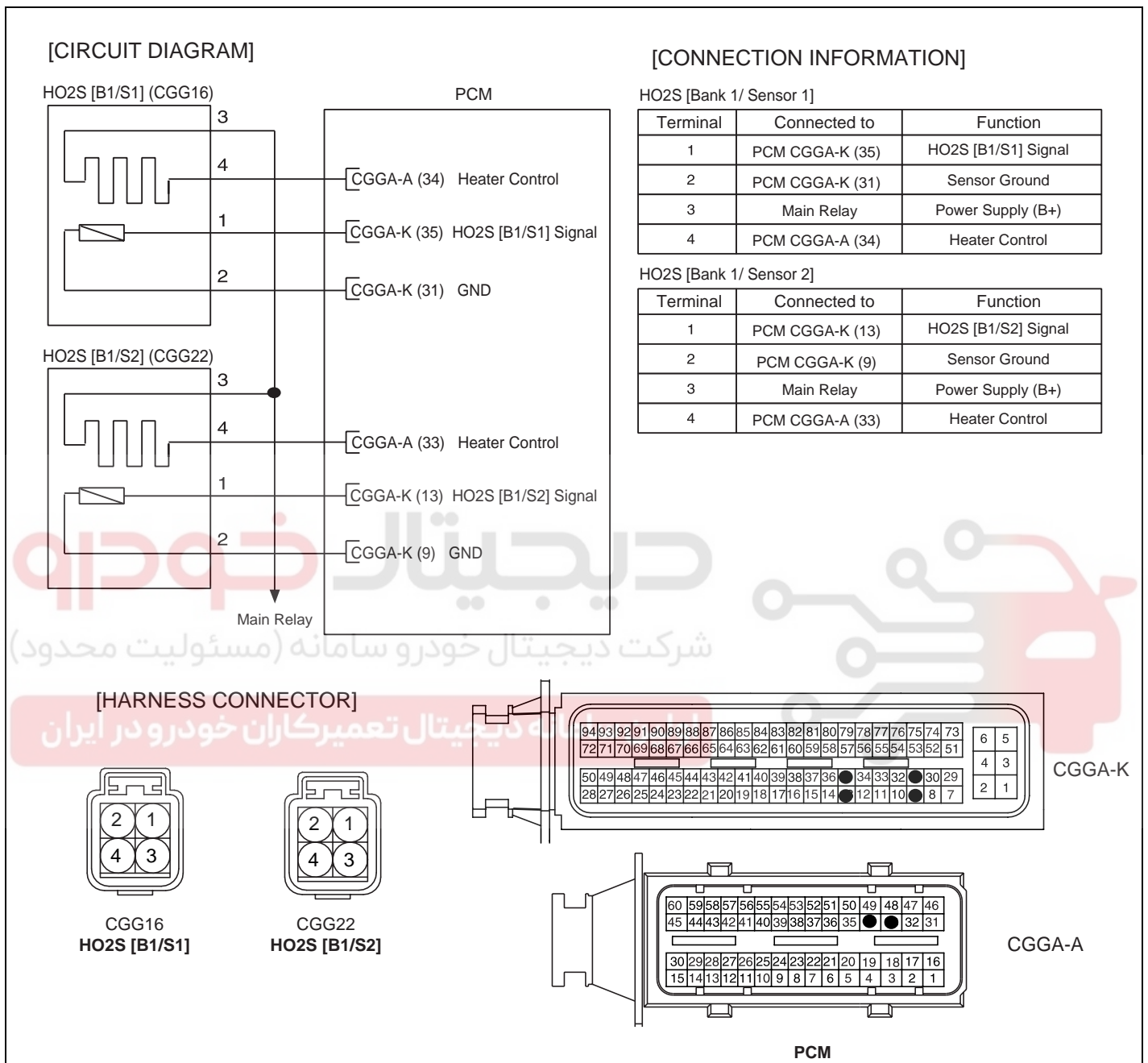
LFJF421A

GASOLINE ENGINE CONTROL SYSTEM

FL -71

CIRCUIT DIAGRAM

(A/T)

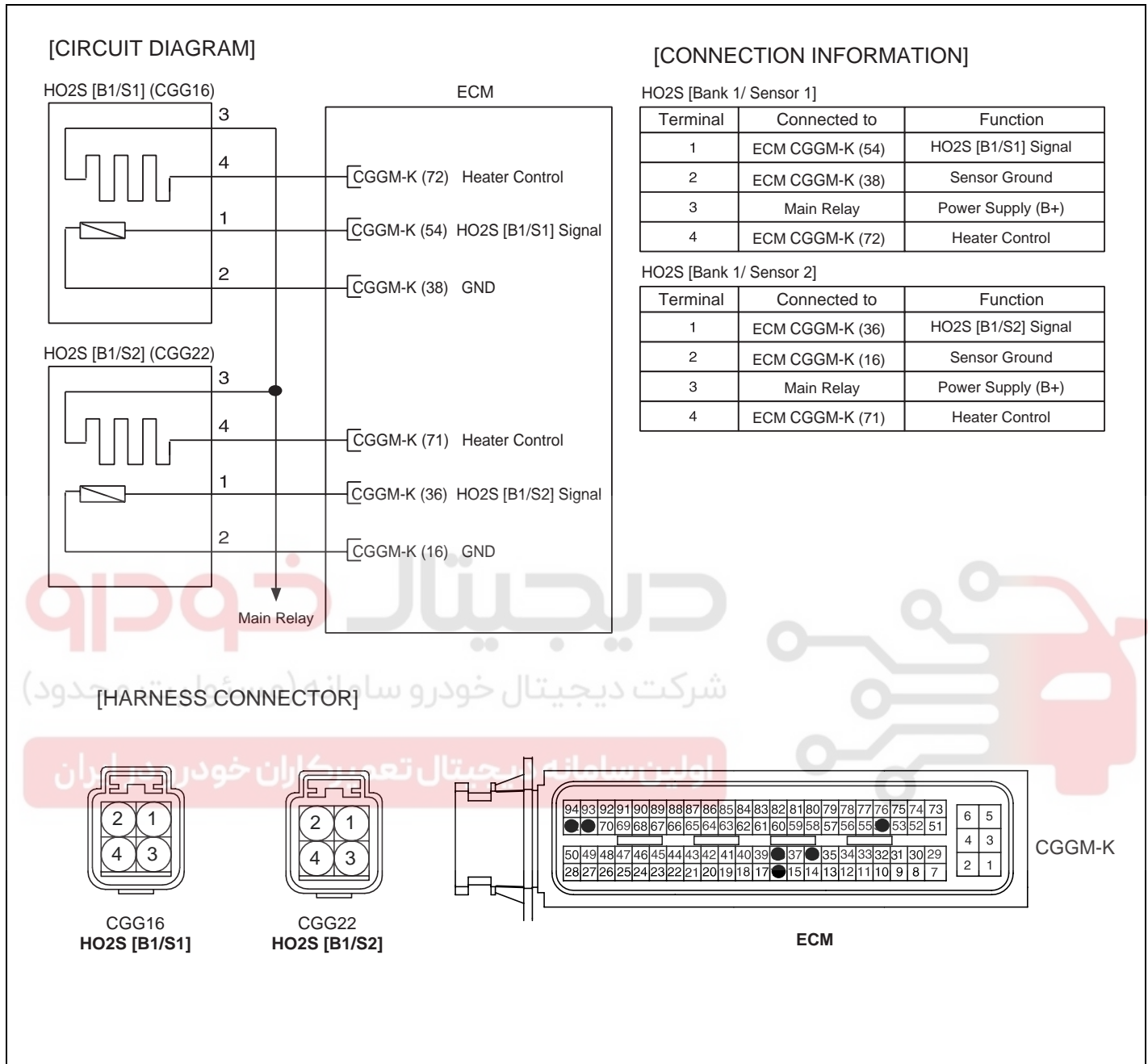


SHDFL6575L

FL -72

FUEL SYSTEM

(M/T)



SHDFL6576L

COMPONENT INSPECTION

1. Check signal waveform of HO2S using a scantool.

Specification: Refer to "waveform".

2. Disconnet the HO2S connector.
3. Measure resistance between HO2S heater terminals 3 and 4.
4. Check that the resistance is within the specification.

Specification: Refer to SPECIFICATION.

GASOLINE ENGINE CONTROL SYSTEM

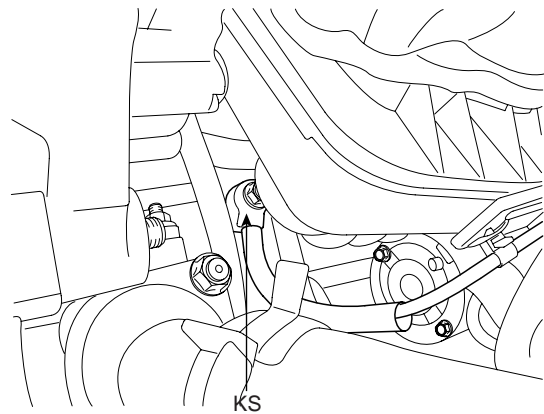
FL -73

KNOCK SENSOR (KS)

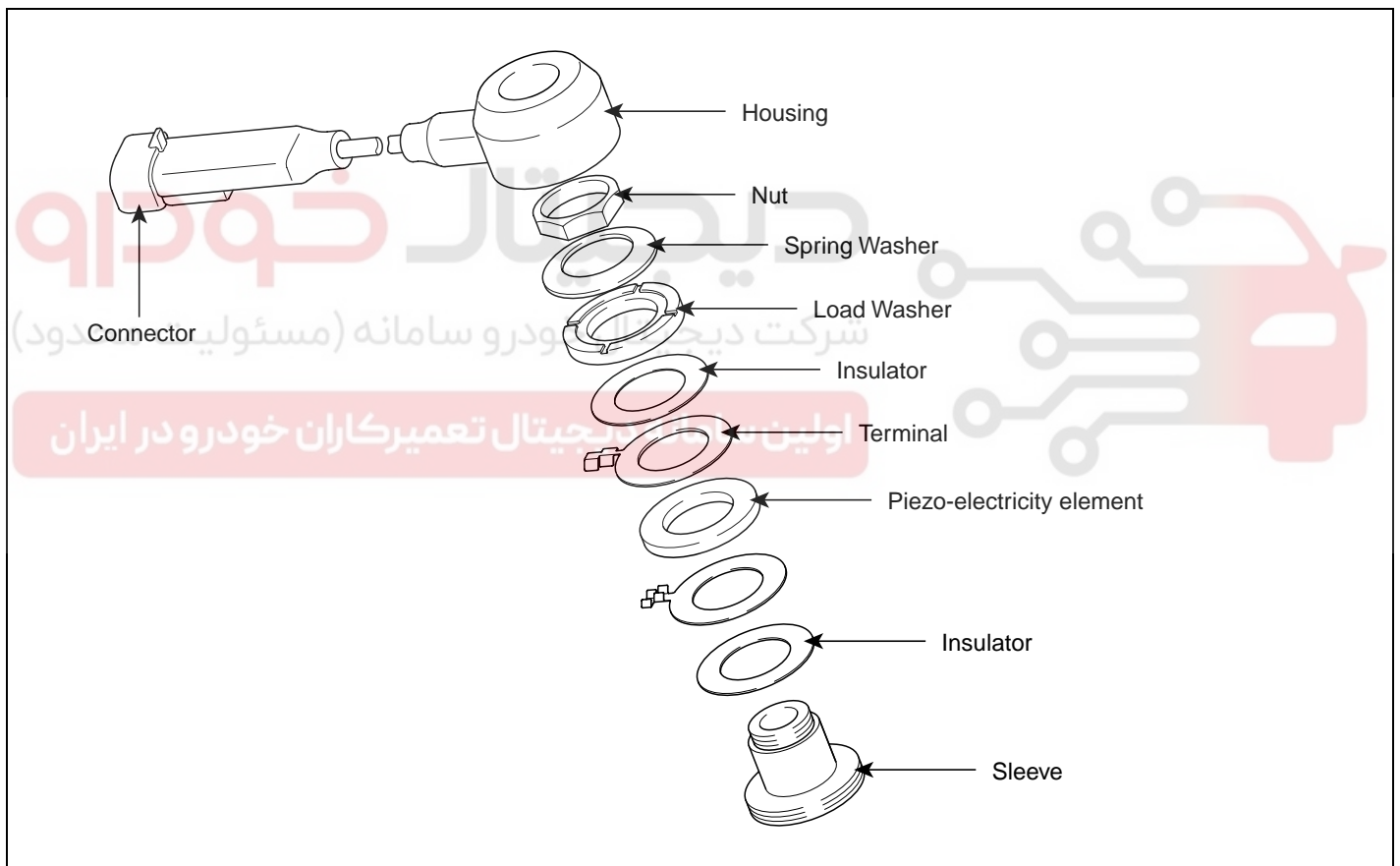
INSPECTION EC8E7B98

FUNCTION AND OPERATION PRICIPLE

Knocking is a phenomenon characterized by undesirable vibration and noise and can cause engine damage. Knock Sensor (KS) senses engine knocking and is installed on the cylinder block. When knocking occurs, the vibration from the cylinder block is applied as pressure to the piezo-electric element. At this time, this sensor transfers the voltage signal higher than the specified value to the PCM and the PCM retards the ignition timing. If the knocking disappears after retarding the ignition timing, the PCM will advance the ignition timing. This sequential control can improve engine power, torque and fuel economy.



SHDFL6108L



EGRF252A

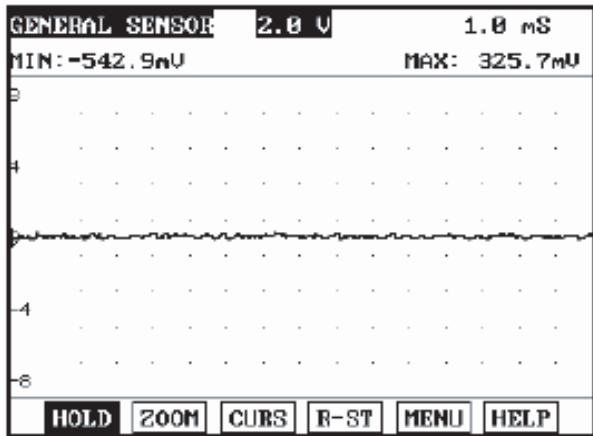
SPECIFICATION

Item	Specification
Capacitance (pF)	950 ~ 1,350
Resistance (M)	4.87

FL -74

FUEL SYSTEM

WAVEFORM

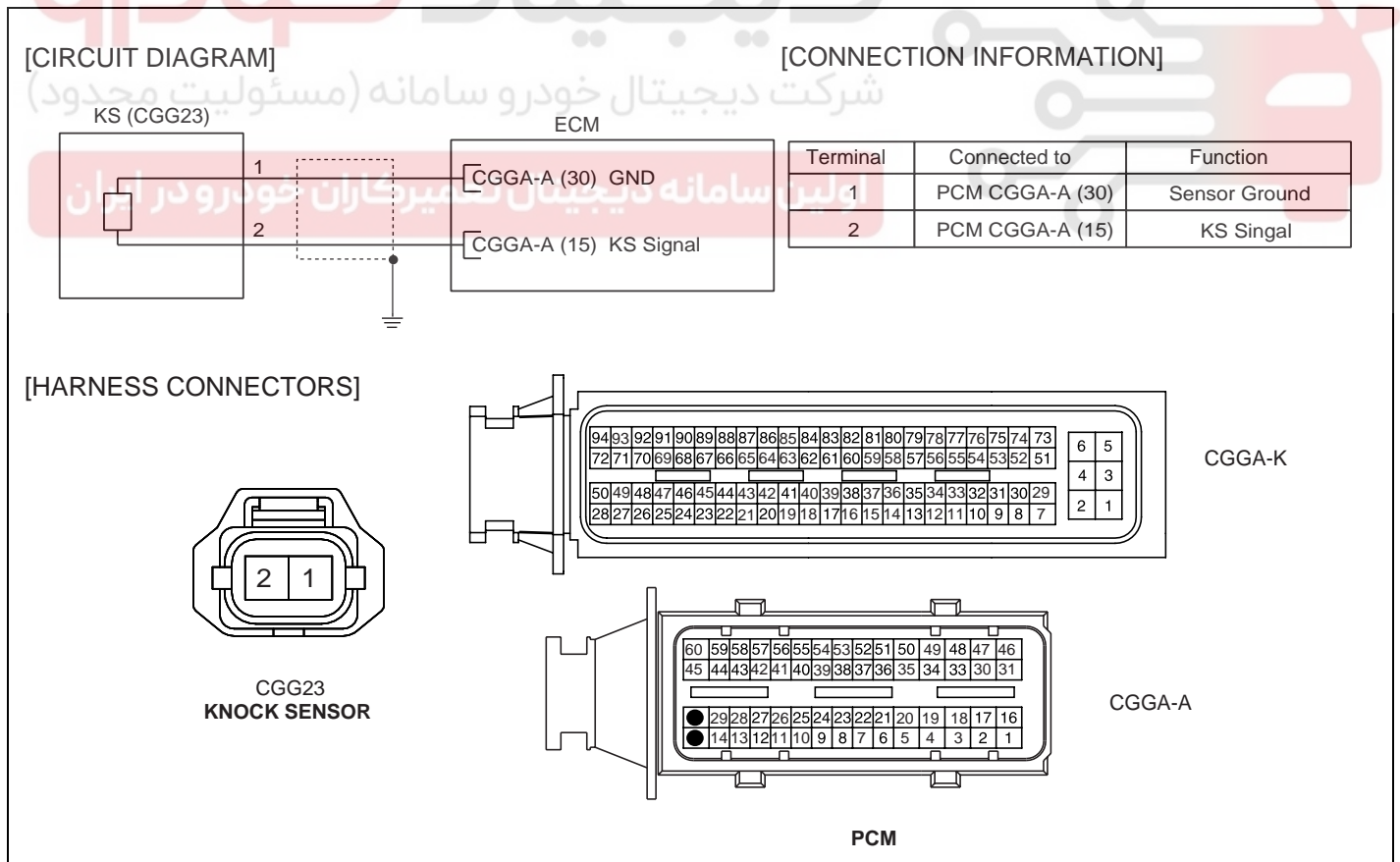


The knock sensor is installed at cycliner block to detect the vibration effectively during engine running. The above waveform shows the signal waveform of knock sensor when knock dosen't happen. Generally, knock signal has more noise than other sensor.

EGRF610B

CIRCUIT DIAGRAM

(A/T)

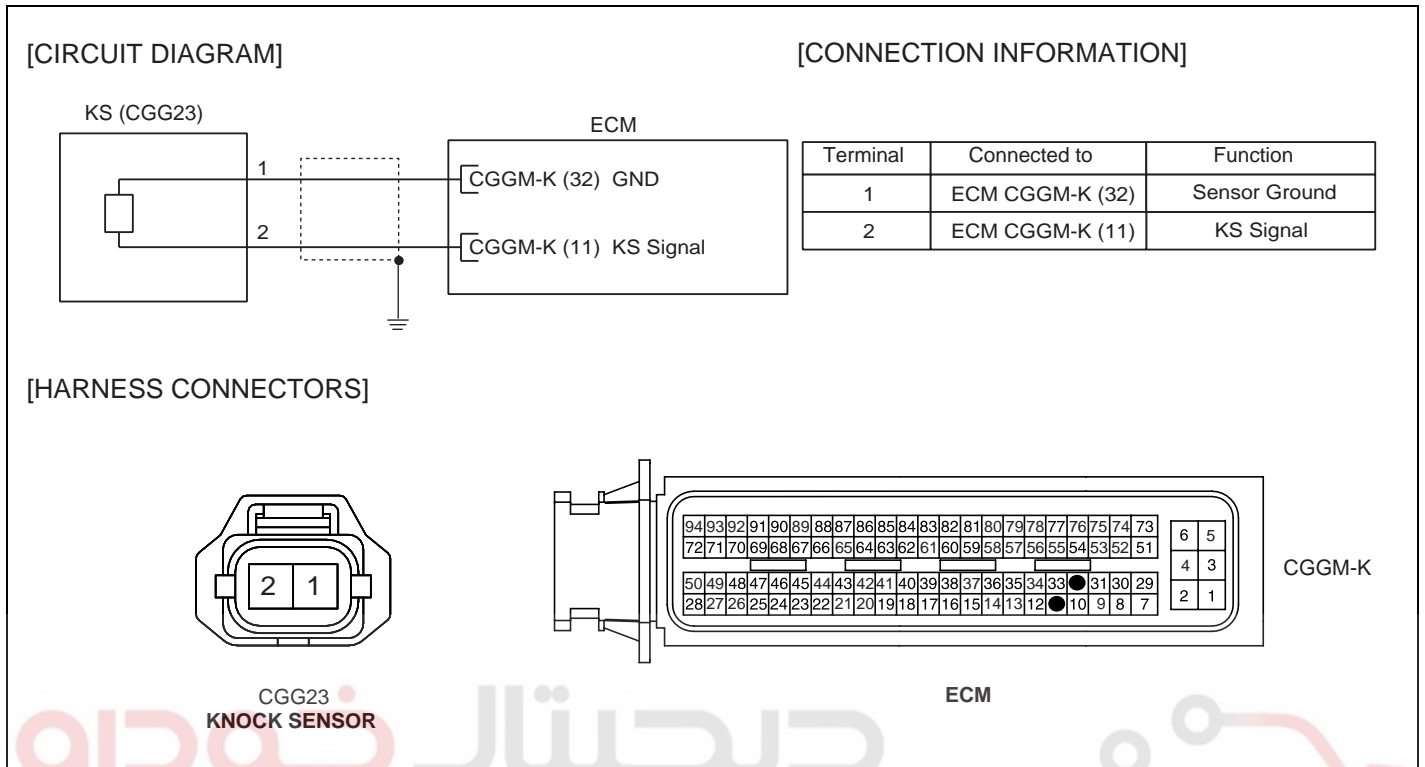


SHDFL6590L

GASOLINE ENGINE CONTROL SYSTEM

FL -75

(M/T)



SHDFL6591L

شرکت دیجیتال خودرو (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

FL -76

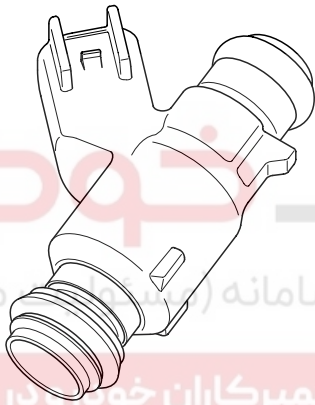
FUEL SYSTEM

INJECTOR

INSPECTION EC4AA758

FUNCTION AND OPERATION PRICIPLE

Based on information from various sensors, the PCM measures the fuel injection amount. The fuel injector is a solenoid-operated valve and the fuel injection amount is controlled by length of time that the fuel injector is held open. The PCM controls each injector by grounding the control circuit. When the PCM energizes the injector by grounding the control circuit, the circuit voltage should be low (theoretically 0V) and the fuel is injected. When the PCM de-energizes the injector by opening control circuit, the fuel injector is closed and circuit voltage should momentarily peak.



KFCF1026

SPECIFICATION

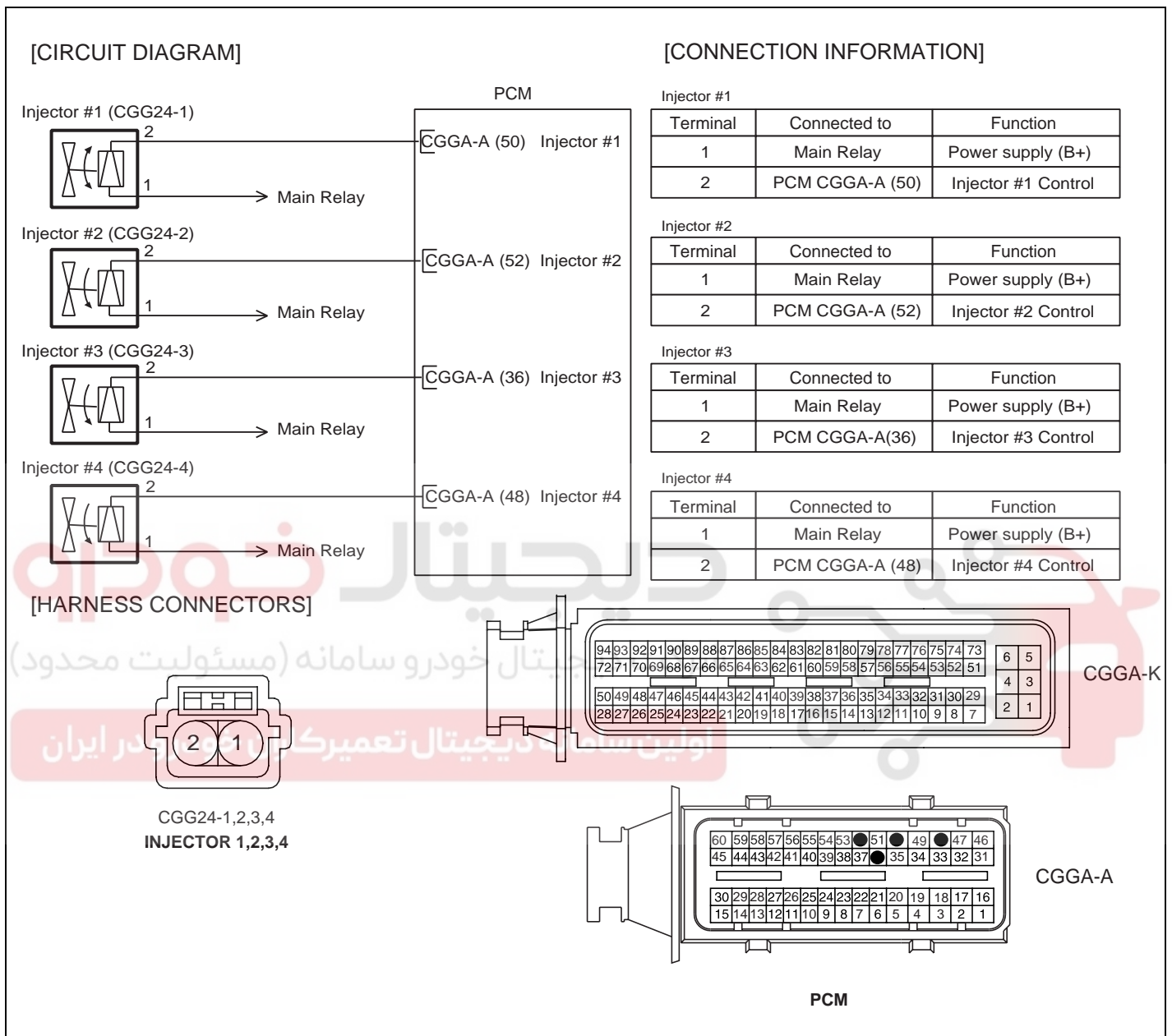
Item	Specification
Coil Resistance ()	13.8 ~ 15.2 at 20 (68)

GASOLINE ENGINE CONTROL SYSTEM

FL -77

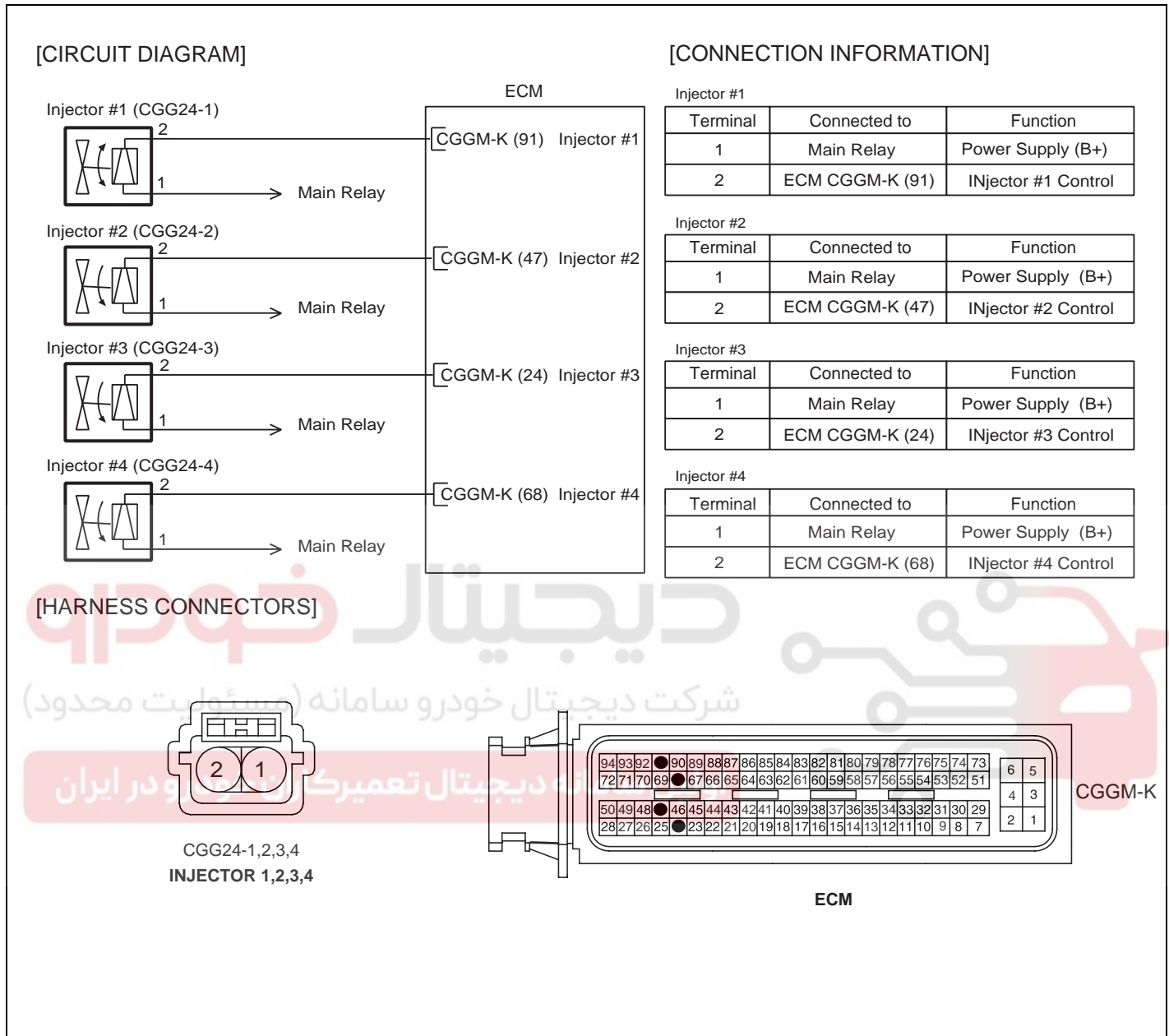
CIRCUIT DIAGRAM

(A/T)



SHDFL6586L

(M/T)



SHDFL6587L

COMPONENT INSPECTION

1. Turn ignition switch OFF.
2. Disconnect injector connector.
3. Measure resistance between injector terminals 1 and 2.
4. Check that the resistance is within the specification.

Specification: Refer to SPECIFICATION.

GASOLINE ENGINE CONTROL SYSTEM

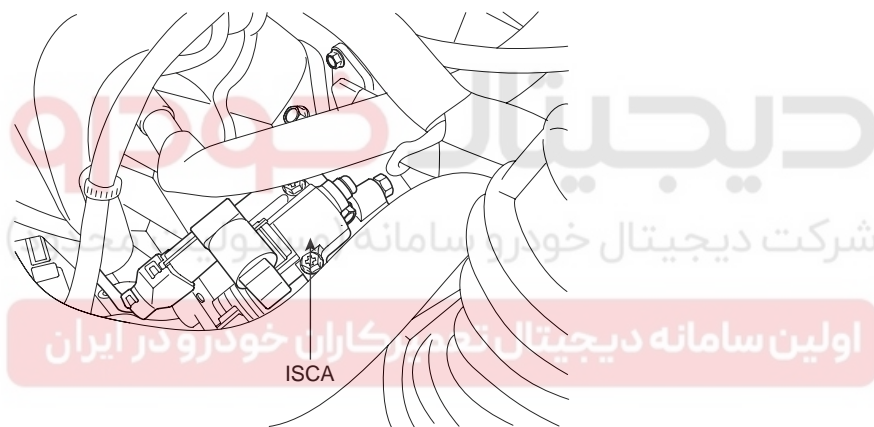
FL -79

IDLE SPEED CONTROL ACTUATOR (ISCA)

INSPECTION E4ABB3AF

FUNCTION AND OPERATION PRINCIPLE

The Idle Speed Control Actuator (ISCA) is installed on the throttle body and controls the intake airflow that is bypassed around the throttle plate to keep constant engine speed when the throttle valve is closed. The function of the ISCA is to maintain idle speed according to various engine loads and conditions, and also to provide additional air during starting. The ISCA consists of an opening coil, a closing coil, and a permanent magnet. Based on information from various sensors, the PCM controls both coils by grounding their control circuits. According to the control signals from the PCM, the valve rotor rotates to control the by pass airflow into the engine.



SHDFL6113L

SPECIFICATION

Items	Specification
Closing Coil Resistance ()	14.6 ~ 16.2 [20 (68)]
Opening Coil Resistance ()	11.1 ~ 12.7 [20 (68)]

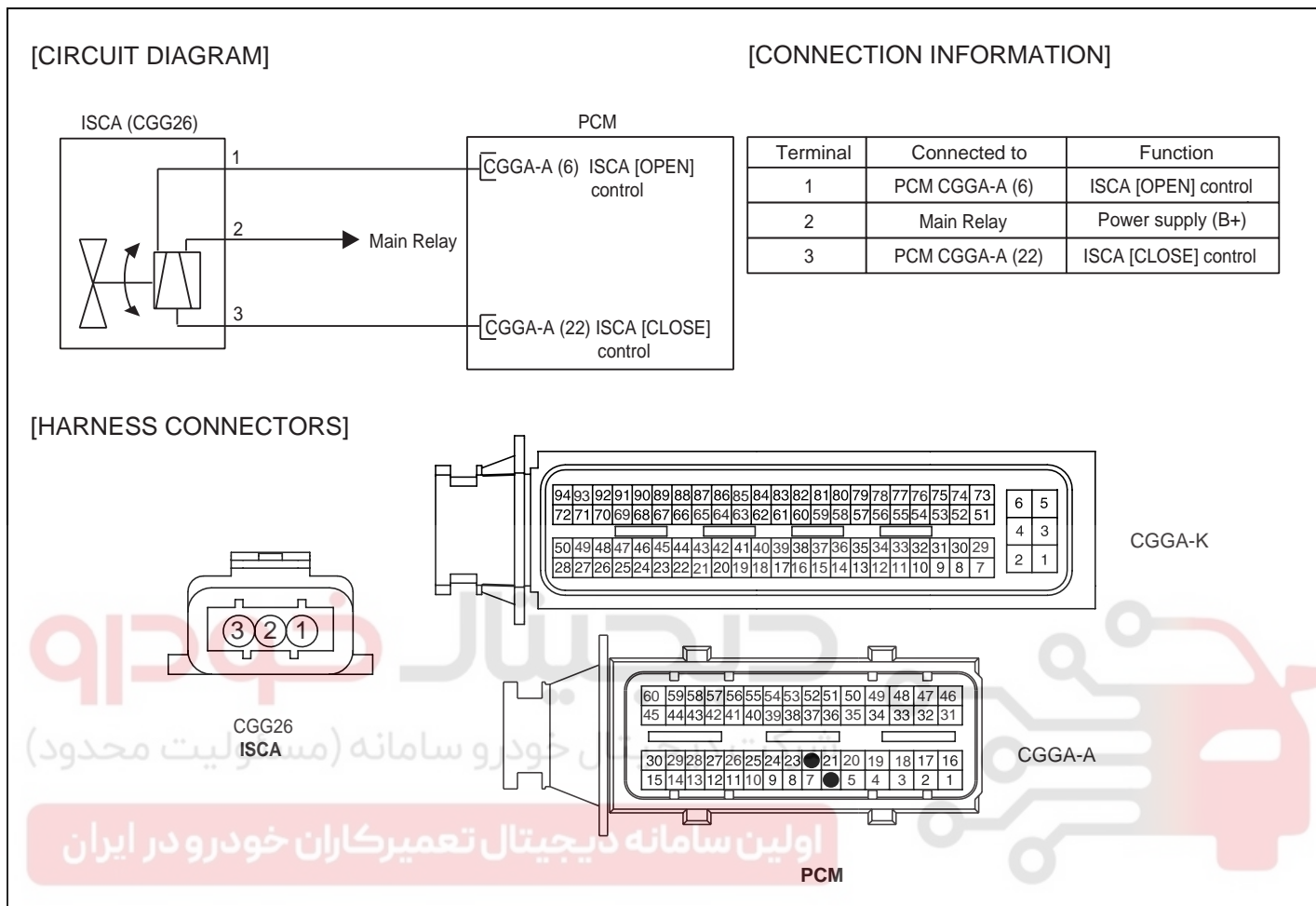
Duty (%)	Air Flow Rate (m ³ /h)
15	0.5 ~ 1.5
35	5.5 ~ 9.3
70	28.5 ~ 36.5
96	39.0 ~ 48.0

FL -80

FUEL SYSTEM

CIRCUIT DIAGRAM

(A/T)

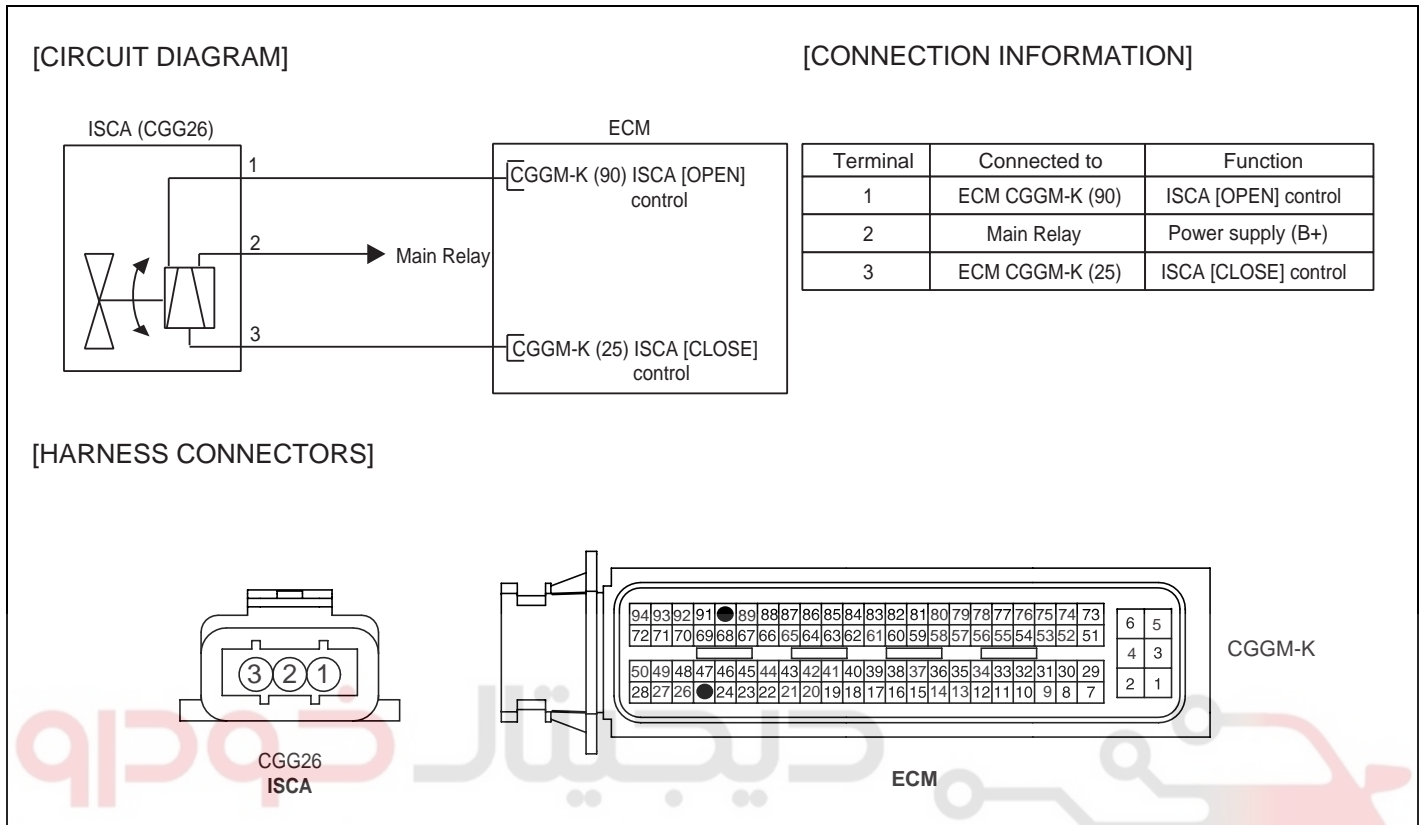


SHDFL6596L

GASOLINE ENGINE CONTROL SYSTEM

FL -81

(M/T)



SHDFL6597L

COMPONENT INSPECTION

1. Turn ignition switch OFF.
2. Disconnect ISCA connector.
3. Measure resistance between ISCA terminals 2 and 1 [Opening Coil].
4. Measure resistance between ISCA terminals 2 and 3 [Closing Coil].
5. Check that the resistance is within the specification.

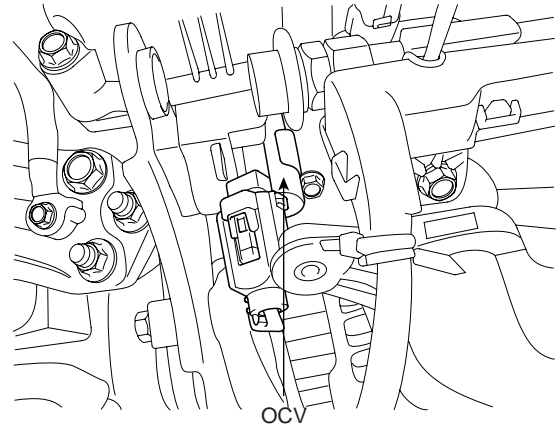
Check that the resistance is within the specification.

CVVT OIL CONTROL VALVE (OCV)

INSPECTION E29F3B83

FUNCTION AND OPERATION PRICIPLE

The Continuously Variable Valve Timing (CVVT) system controls the amount of valve overlap by varying the amount of oil flow into an assembly mounted on the intake camshaft through PCM control of an oil control valve. As oil is directed into the chambers of the CVVT assembly, the cam phase is changed to suit various performance and emissions requirements..



SHDFL6115L

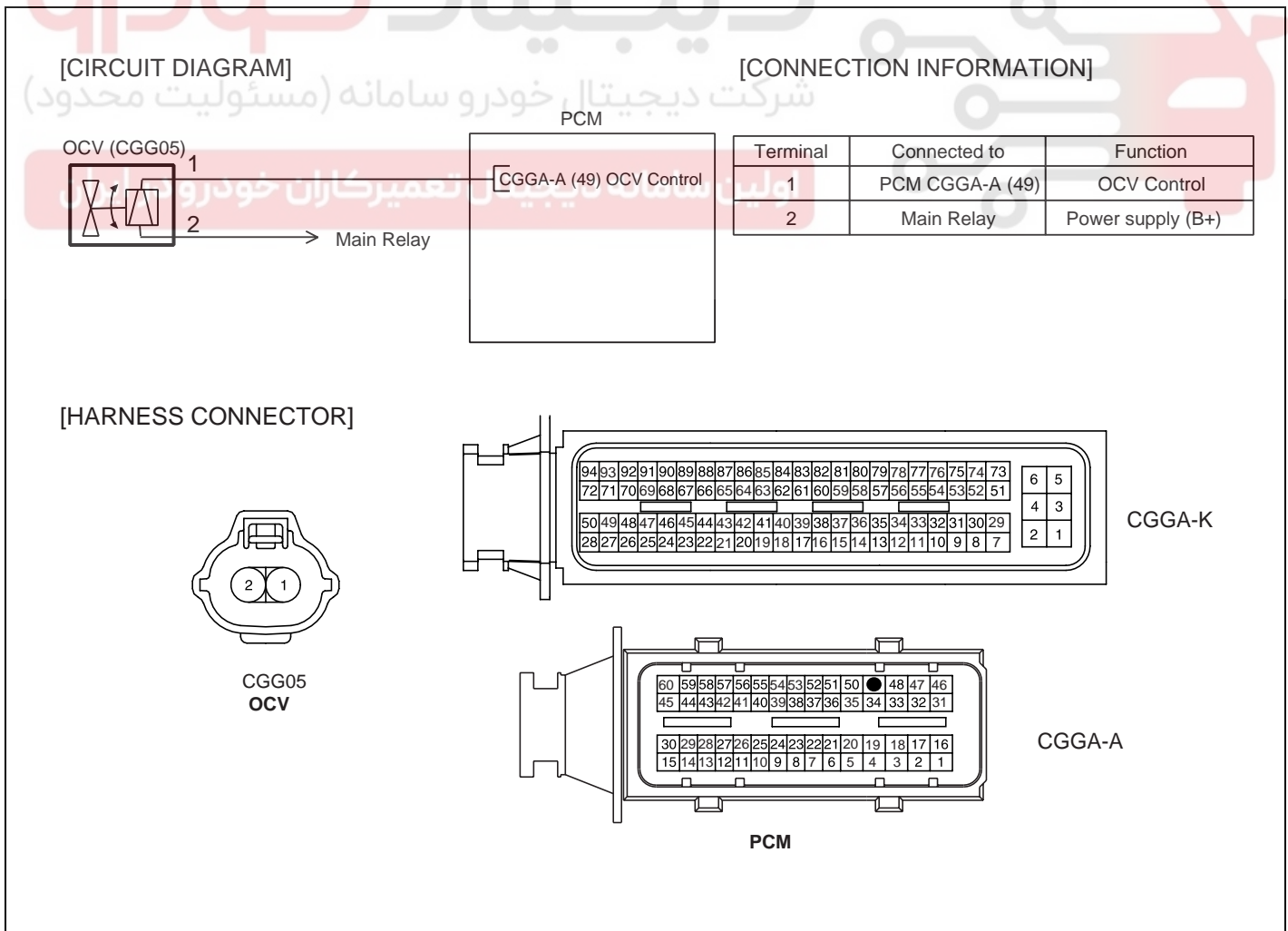
1. When camshaft rotates engine rotation-wise: Intake-Advance / Exhaust-Retard
2. When camshaft rotates counter engine rotation-wise: Intake- Retard / Exhaust- Advance

SPECIFICATION

Item	Specification
Coil Resistance ()	6.9 ~ 7.9 at 20 (68)

CIRCUIT DIAGRAM

(A/T)

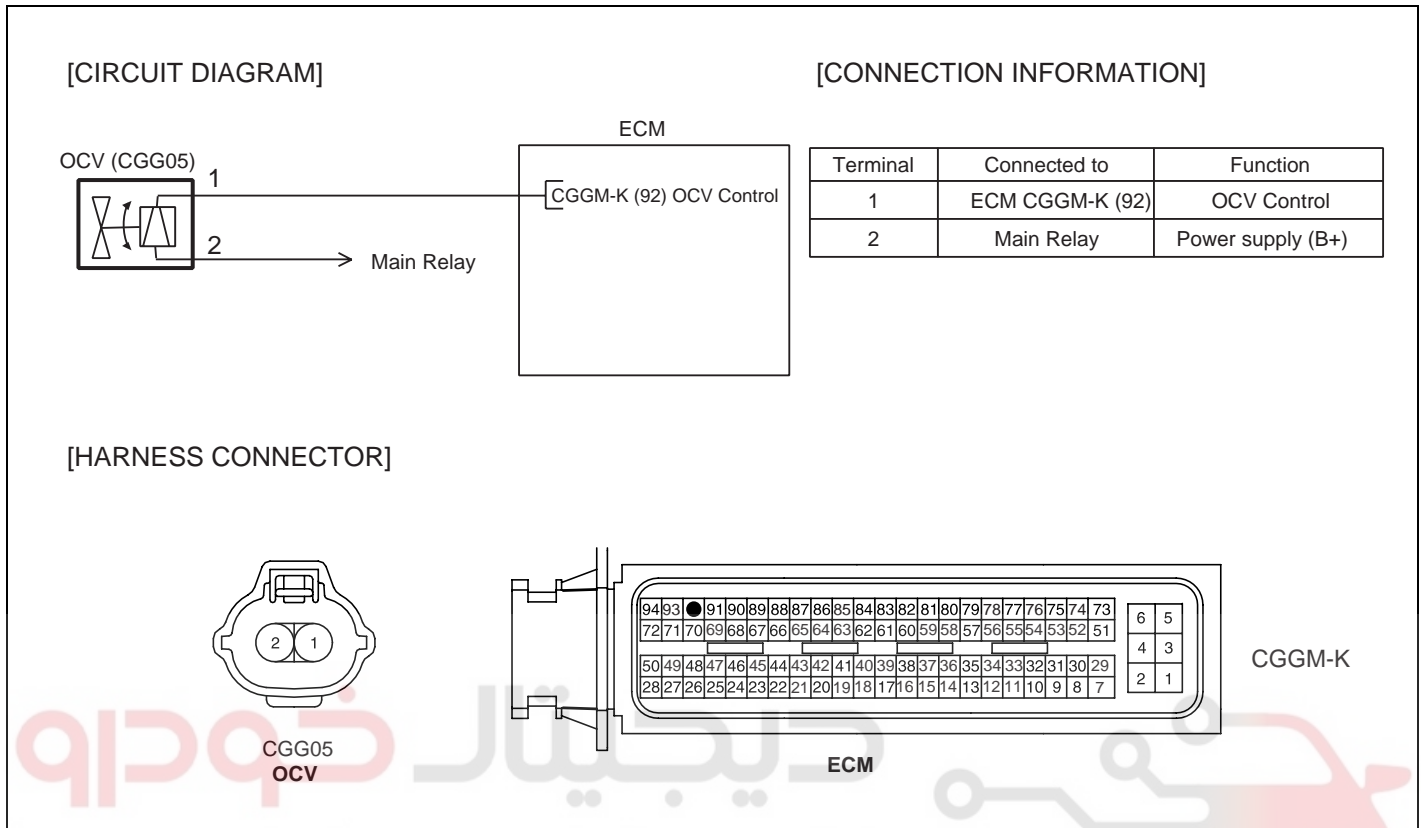


SHDFL6572L

GASOLINE ENGINE CONTROL SYSTEM

FL -83

(M/T)



شرکت دیجیتال خودرو (مسئولیت محدود)

SHDFL6902L

COMPONENT INSPECTION

اولین سامانه دیجیتال تعمیرکاری

1. Turn ignition switch OFF.
2. Disconnect OCV connector.
3. Measure resistance between OCV terminals 1 and 2.
4. Check that the resistance is within the specification.

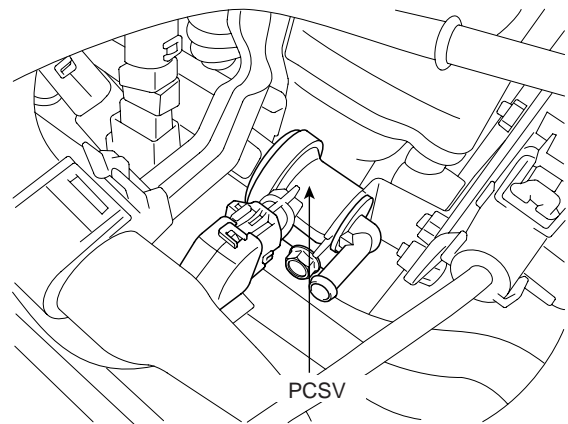
Specification: Refer to SPECIFICATION.

PURGE CONTROL SOLENOID VALVE (PCSV)

INSPECTION E9BFBDF2

FUNCTION AND OPERATION PRICIPLE

Purge Control Solenoid Valve (PCSV) is installed on the surge tank and controls the passage between the canister and the intake manifold. It is a solenoid valve and is open when the PCM grounds the valve control line. When the passage is open (PCSV ON), fuel vapors stored in the canister is transferred to the intake manifold.

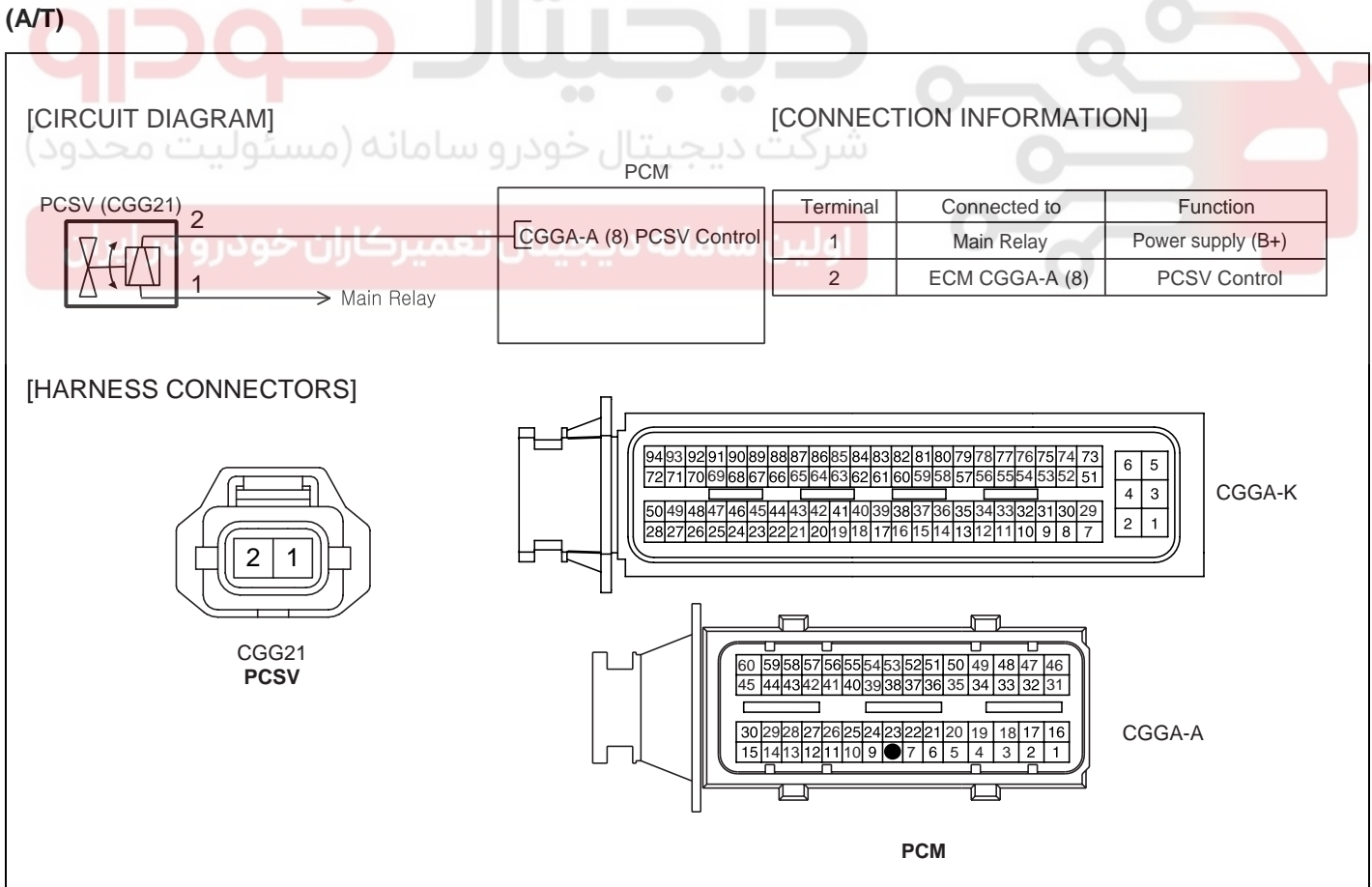


SHDFL6114L

SPECIFICATION

Item	Specification
Coil Resistance ()	16.0 at 20 (68)

CIRCUIT DIAGRAM

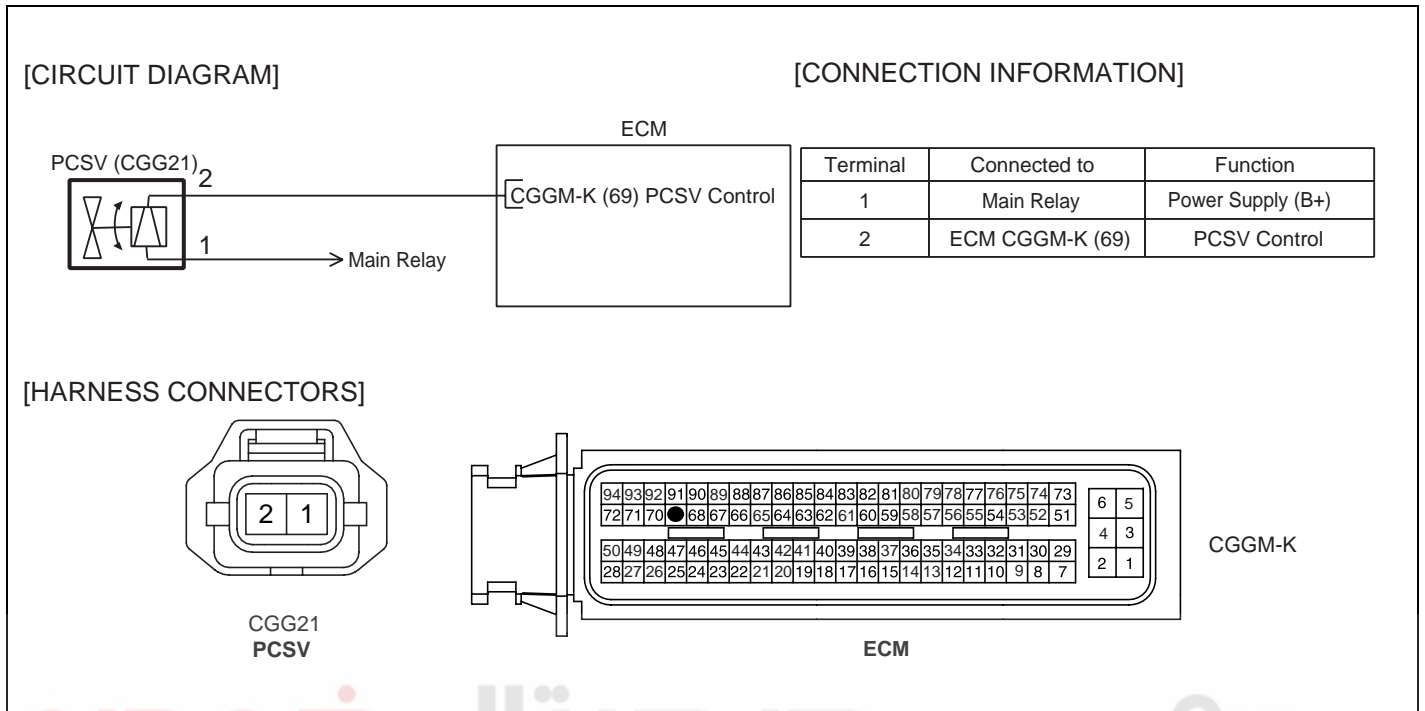


SHDFL6592L

GASOLINE ENGINE CONTROL SYSTEM

FL -85

(M/T)



SHDFL6593L

COMPONENT INSPECTION

1. Turn ignition switch OFF.
2. Disconnect PCSV connector.
3. Measure resistance between PCSV terminals 1 and 2.
4. Check that the resistance is within the specification.

Specification: Refer to SPECIFICATION.

FL -86

FUEL SYSTEM

DTC TROUBLESHOOTING PROCEDURES

INSPECTION CHART FOR DIAGNOSTIC TROUBLE CODES (DTC) E1F8B022

DTC	Description	MIL			Page
		Euro-III/IV	Euro-II	Leaded	
P0011	A Camshaft Position-Timing Over-Advanced or System Performance (Bank 1)				FL-90
P0012	A Camshaft Position-Timing Over-Retarded (Bank 1)				FL-96
P0016	Crankshaft Position-Camshaft Position Correlation (Bank 1 Sensor A)				FL-99
P0030	HO2S Heater Circuit (Bank 1 / Sensor 1)				FL-109
P0031	HO2S Heater Circuit Low (Bank 1 / Sensor 1)				FL-116
P0032	HO2S Heater Circuit High (Bank 1 / Sensor 1)				FL-119
P0036	HO2S Heater Control Circuit (Bank 1 / Sensor 2)				FL-122
P0037	HO2S Heater Circuit Low (Bank 1 / Sensor 2)				FL-129
P0038	HO2S Heater Circuit High (Bank 1 / Sensor 2)				FL-132
P0068	MAFS/MAPS-TPS Correlation				FL-135
P0075	Intake Valve Control Solenoid Circuit (Bank1)				FL-142
P0076	Intake Valve Control Solenoid Circuit Low (Bank 1)				FL-148
P0077	Intake Valve Control Solenoid Circuit High (Bank 1)				FL-151
P0106	Manifold Absolute Pressure/Barometric Pressure Circuit Range/Performance				FL-154
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input				FL-160
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input				FL-163
P0112	Intake Air Temperature Sensor1 Circuit Low Input				FL-167
P0113	Intake Air Temperature Sensor1 Circuit High Input				FL-173
P0116	Engine Coolant Temperature Circuit Range/Performance				FL-177
P0117	Engine Coolant Temperature Circuit Low Input				FL-183
P0118	Engine Coolant Temperature Circuit High Input				FL-186
P0121	Throttle/Pedal Position Sensor/Switch "A" Circuit Range/Performance				FL-190
P0122	Throttle/Pedal Position Sensor/Switch "A" Circuit Low Input				FL-196
P0123	Throttle/Pedal Position Sensor/Switch "A" Circuit High Input				FL-200
P0124	Throttle/Pedal Position Sensor/Switch "A" Circuit Intermittant				FL-205

DTC TROUBLESHOOTING PROCEDURES

FL -87

DTC	Description	MIL			Page
		Euro-III/IV	Euro-II	Leaded	
P0130	HO2S Circuit (Bank 1/ Sensor 1)				FL-209
P0131	HO2S Circuit Low Voltage (Bank 1 / Sensor 1)				FL-217
P0132	HO2S Circuit High Voltage (Bank 1 / Sensor 1)				FL-220
P0133	HO2S Circuit Slow Response (Bank 1 / Sensor 1)				FL-223
P0134	HO2S Circuit No Activity Detected (Bank 1 / Sensor 1)				FL-227
P0135	HO2S Heater Circuit (Bank 1 / Sensor 1)				FL-231
P0136	HO2S Circuit (Bank 1/ Sensor 2)				FL-235
P0137	HO2S Circuit Low Voltage (Bank 1 / Sensor 2)				FL-242
P0138	HO2S Circuit High Voltage (Bank 1 / Sensor 2)				FL-245
P0139	HO2S Circuit Slow Response (Bank 1 / Sensor 2)				FL-247
P0140	HO2S Circuit No Activity Detected (Bank 1 / Sensor 2)				FL-250
P0141	HO2S Heater Circuit (Bank 1 / Sensor 2)				FL-252
P0171	System Too Lean (Bank 1)				FL-255
P0172	System Too Rich (Bank 1)				FL-261
P0201	Cylinder 1-Injector Circuit/Open				FL-265
P0202	Cylinder 2-Injector Circuit/Open				FL-265
P0203	Cylinder 3-Injector Circuit/Open				FL-265
P0204	Cylinder 4-Injector Circuit/Open				FL-265
P0230	Fuel Pump Primary Circuit				FL-272
P0231	Electric Fuel Pump Relay-Open or Short Circuit				FL-278
P0232	Electric Fuel Pump Relay-Short Circuit				FL-281
P0261	Cylinder 1-Injector Circuit Low				FL-284
P0262	Cylinder 1-Injector Circuit High				FL-290
P0264	Cylinder 2-Injector Circuit Low				FL-284
P0265	Cylinder 2-Injector Circuit High				FL-290
P0267	Cylinder 3-Injector Circuit Low				FL-284
P0268	Cylinder 3-Injector Circuit High				FL-290
P0270	Cylinder 4-Injector Circuit Low				FL-284
P0271	Cylinder 4-Injector Circuit High				FL-290
P0300	Random/Multiple Cylinder Misfire Detected				FL-293
P0301	Cylinder 1-Misfire Detected				FL-302
P0302	Cylinder 2-Misfire Detected				FL-302

FL -88

FUEL SYSTEM

DTC	Description	MIL			Page
		Euro-III/IV	Euro-II	Leaded	
P0303	Cylinder 3-Misfire Detected				FL-302
P0304	Cylinder 4-Misfire Detected				FL-302
P0326	Knock Sensor 1 Circuit Range/Performance (Bank 1)				FL-308
P0327	Knock Sensor 1 Circuit Low Input				FL-313
P0328	Knock Sensor 1 Circuit High Input				FL-316
P0335	Crankshaft Position Sensor "A" Circuit				FL-318
P0336	Crankshaft Position Sensor "A" Circuit Range/Performance				FL-325
P0337	Crankshaft Position Sensor "A" Circuit Low Input				FL-328
P0338	Crankshaft Position Sensor "A" Circuit High Input				FL-331
P0339	Crankshaft Position Sensor "A" Circuit				FL-334
P0340	Camshaft Position Sensor "A" Circuit Malfunction (Bank 1 or Single Sensor)				FL-337
P0341	Camshaft Position Sensor "A" Circuit Range/Performance (Bank 1 or Single Sensor)				FL-344
P0342	Camshaft Position Sensor "A" Circuit Low Input				FL-348
P0343	Camshaft Position Sensor "A" Circuit High Input				FL-351
P0420	Catalyst System Efficiency below Threshold (Bank 1)				FL-355
P0444	Evap. Emission System-Purge Ctrl. Valve Circuit Open				FL-358
P0458	Evap. Emission System-Purge Control Valve Circuit Low				FL-364
P0459	Evap. Emission System-Purge Control Valve Circuit High				FL-367
P0501	Vehicle Speed Sensor A Range/Performance				FL-370
P0506	Idle Air Control System-RPM Lower Than Expected				FL-381
P0507	Idle Air Control System-RPM Higher Than Expected				FL-387
P0560	System Voltage				FL-391
P0561	System Voltage Unstable				FL-400
P0562	System Voltage Low				FL-404
P0563	System Voltage High				FL-408
P0605	Internal Control Module Read Only Memory(ROM) Error				FL-411
P0625	Generator Field/F Terminal Circuit Low				FL-414
P0626	Generator Field/F Terminal Circuit High				FL-420
P0650	Malfunction Indicator Lamp(MIL) Control Circuit				FL-423
P0700	TCU Request for MIL On				FL-431
P1505	Idle Charge Actuator Signal Low of Coil #1				FL-433

DTC TROUBLESHOOTING PROCEDURES

FL -89

DTC	Description	MIL			Page
		Euro-III/IV	Euro-II	Leaded	
P1506	Idle Charge Actuator Signal High of Coil #1				FL-441
P1507	Idle Charge Actuator Signal Low of Coil #2				FL-444
P1508	Idle Charge Actuator Signal High of Coil #2				FL-449
P1550	Knock sensor evaluation IC				FL-452
P1560	Knock control SPI (Serial Port Interface) check				FL-458
P2096	Post Catalyst Fuel Trim System Too Lean (Bank 1)				FL-459
P2097	Post Catalyst Fuel Trim System Too Rich (Bank 1)				FL-466
P2232	HO2S Signal Circuit Shorted to Heater Circuit (Sensor 2)				FL-470
U0001	CAN Communication Malfunction				FL-476
U0101	Serial Communication Problem with TCU (Timeout)				FL-482



: MIL ON & MEMORY
: MIL OFF & MEMORY

دیجیتال

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

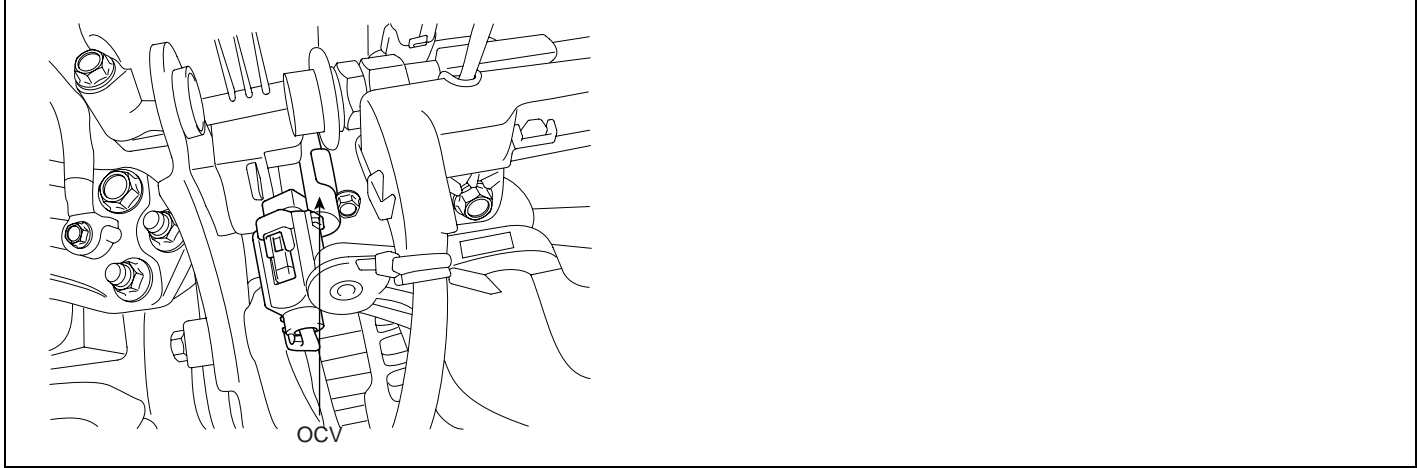


FL -90

FUEL SYSTEM

DTC P0011 "A" CAMSHAFT POSITION-TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1)

COMPONENT LOCATION ED215D26



SHDFL6701L

GENERAL DESCRIPTION E9952EAF

Different from the existing fixed cam phase angle type, CVVT(Continuously Variable Valve Timing) is the device which varies cam phase angle continuously to be optimum. And with engine oil pressure, it operates. CVVT consists of OCV(Oil Control Valve) and cam phaser. OCV, mounted on cylinder head, controls the amount and direction of oil delivered to cam phaser by oil valve which is connected to a solenoid. Cam phaser, rotating cam phaser rotor with pressure and amount of oil produced by OCV, rotates cam shaft forcefully for or against the rotating direction and finally, cam shaft phase changes. With the appliance of CVVT, engine power,fuel efficiency and the quality of exhaust gas are improved.

DTC DESCRIPTION E9947727

If there is a delay between the target angle and the real angle over 10 times, PCM sets DTC P0011.

DTC DETECTING CONDITION E9CB1E1C

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> • Slow response check 	<ul style="list-style-type: none"> • Poor connection • Contamination of Oil / Clog of Oil path • OCV • CVVT
Enable Conditions	<ul style="list-style-type: none"> • Time after engine start > 10~60s • Coolant temperature : 60~110 • Engine oil temperature : 60~110 • Reference position adaption completed • CVVT control condition activated 	
Threshold Value	<ul style="list-style-type: none"> • arget following delay > 10 times 	
Diagnostic Time		
MIL ON Condition	<ul style="list-style-type: none"> • 3 driving cycle 	

DTC TROUBLESHOOTING PROCEDURES

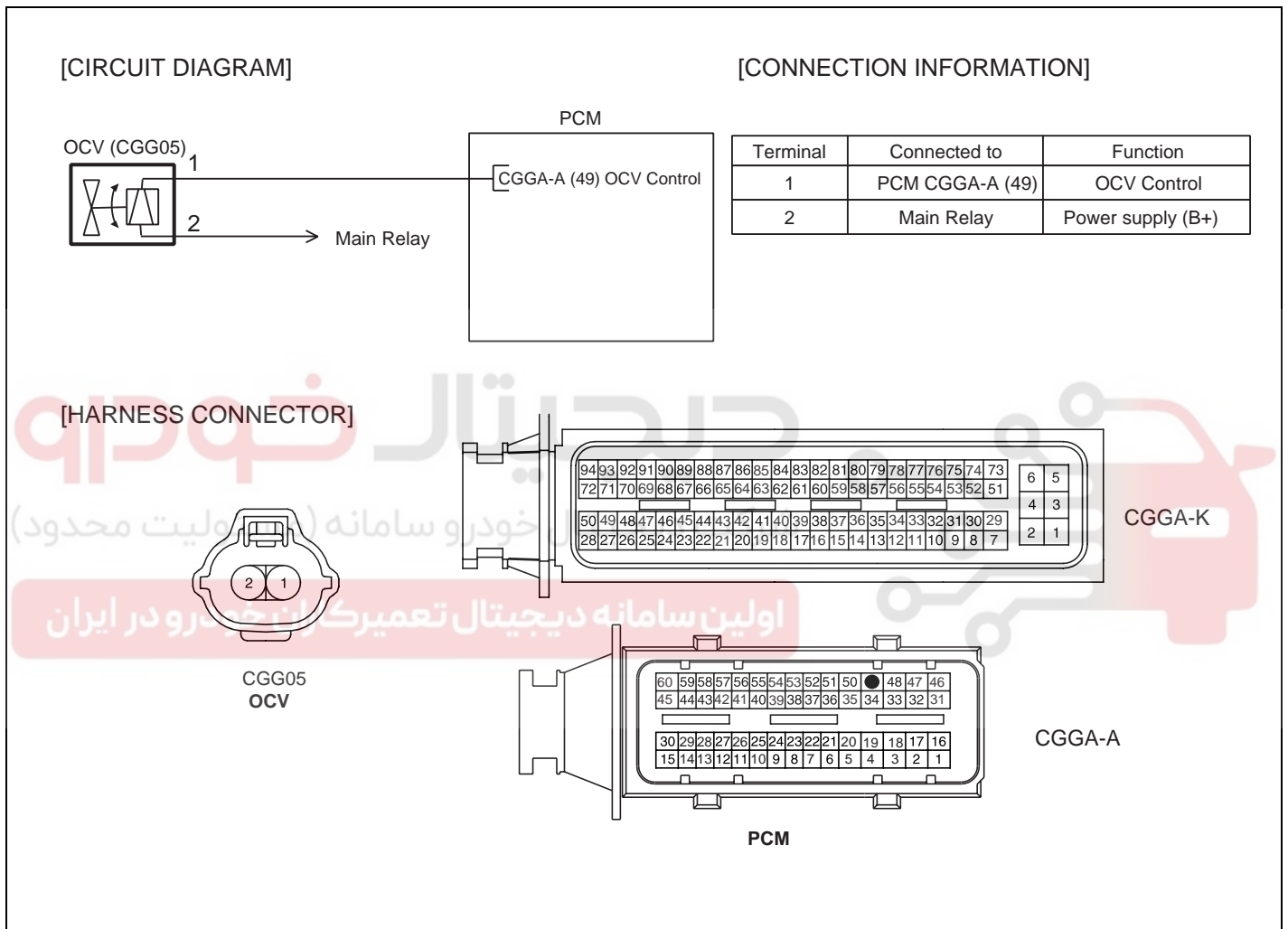
FL -91

SPECIFICATION EC0951F4

ITEM	SPECIFICATION
Coil Resistance ()	6.9 ~ 7.9 at 20 (68)

SCHEMATIC DIAGRAM EA118227

(A/T)

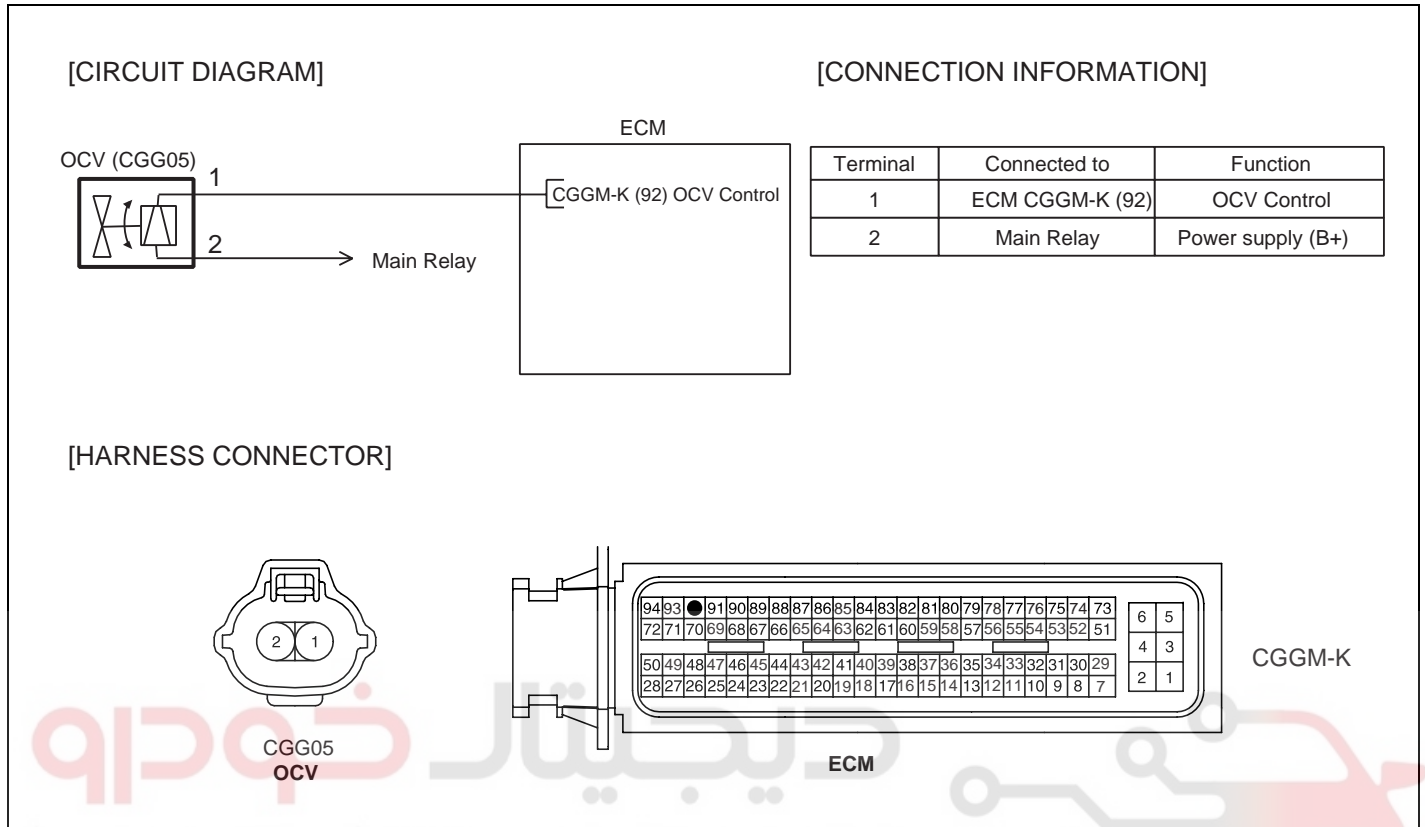


SHDFL6572L

FL -92

FUEL SYSTEM

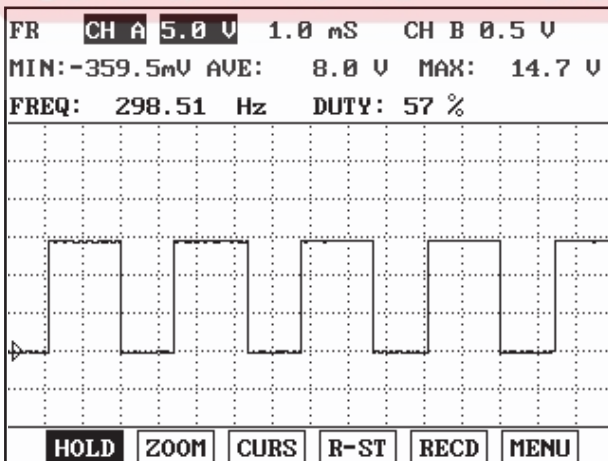
(M/T)



شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

SHDFL6902L

SIGNAL WAVEFORM & DATA E0516F4D



The ECM controls OCV by duty value.

LFJF302A

MONITOR SCANTOOL DATA E7499048

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu

DTC TROUBLESHOOTING PROCEDURES**FL -93**

4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

1.1 DIAGNOSTIC TROUBLE CODES			
Pxxxx DTC TITLE			
NUMBER OF DTC : 1 ITEMS			
PART	ERAS	DTAL	

1.4 AMBIENT CONDITIONS	
1. MIL STATUS :	ON / OFF
2. DTC STATUS :	PRESENT / HISTORY
3. DTC READNESS FLAG :	COMPLETE

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure

TERMINAL AND CONNECTOR INSPECTION E57CF4DF

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "System inspection" procedure.

FL -94

FUEL SYSTEM

SYSTEM INSPECTION ED8D10D4

1. Visual check.
 - 1) Check engine oil gauge.
 - 2) Check contamination of engine oil.
 - 3) Check contamination of OCV filter.
 - 4) Check clog of oil path.
 - 5) Is there any problem?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "Component inspection" procedure.

COMPONENT INSPECTION EBF2F007

1. Check OCV
 - 1) Connect scantool to Data Link Connector(DLC).
 - 2) Key "ON".
 - 3) Perform "Actuation Test" for OCV.

1.5 ACTUATION TEST		12/29
OIL CONTROL VALVE		
DURATION	UNTIL STOP KEY	
METHOD	ACTIVATION	
CONDITION	IG.KEY ON ENGINE OFF	
PRESS (STRT), IF YOU ARE READY !		
STRT	STOP	



LFJF304A

- 4) Does the OCV work normally? (Check clinking sound)

YES

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

NO

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

DTC TROUBLESHOOTING PROCEDURES

FL -95

VERIFICATION OF VEHICLE REPAIR E22BCCA1

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



FL -96

FUEL SYSTEM

DTC P0012 "A" CAMSHAFT POSITION-TIMING OVER-RETARDED (BANK 1)**COMPONENT LOCATION** E4AFF56D

Refer to DTC P0011.

GENERAL DESCRIPTION E0D16318

Refer to DTC P0011.

DTC DESCRIPTION EC2650FB

If the real angle can not follow the target angle over 10 times, PCM sets DTC P0012.

DTC DETECTING CONDITION EFD11967

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Target error check 	<ul style="list-style-type: none"> Poor connection Contamination of Oil / Clog of Oil path OCV CVVT
Enable Conditions	<ul style="list-style-type: none"> Time after engine start > 10~60s Coolant temperature : 60~110 Engine oil temperature : 60~110 Reference position adaption completed CVVT control condition activated 	
Threshold Value	<ul style="list-style-type: none"> Target following fail > 10 times 	
Diagnostic Time		
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SPECIFICATION E2EFE2C7

Refer to DTC P0011.

SCHEMATIC DIAGRAM EDCC7AFA

Refer to DTC P0011.

SIGNAL WAVEFORM & DATA EE8F2E11

Refer to DTC P0011.

MONITOR SCANTOOL DATA E9742416

Refer to DTC P0011.

TERMINAL AND CONNECTOR INSPECTION E318165A

Refer to DTC P0011.

DTC TROUBLESHOOTING PROCEDURES

FL -97

SYSTEM INSPECTION EC148FC7

1. Visual check.
 - 1) Check engine oil gauge.
 - 2) Check contamination of engine oil.
 - 3) Check contamination of OCV filter.
 - 4) Check clog of oil path.
 - 5) Is there any problem?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "Component inspection" procedure.

COMPONENT INSPECTION ECEC4693

1. Check OCV
 - 1) Connect scantool to Data Link Connector(DLC).
 - 2) Key "ON".
 - 3) Perform "Actuation Test" for OCV.



1.5 ACTUATION TEST		12/29
OIL CONTROL VALVE		
DURATION	UNTIL STOP KEY	
METHOD	ACTIVATION	
CONDITION	IG.KEY ON ENGINE OFF	
PRESS [STRT], IF YOU ARE READY !		
STRT	STOP	

LFJF307A

- 4) Does the OCV work normally? (Check clicking sound)

YES

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

NO

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

FL -98

FUEL SYSTEM

VERIFICATION OF VEHICLE REPAIR E59AA26F

Refer to DTC P0011.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

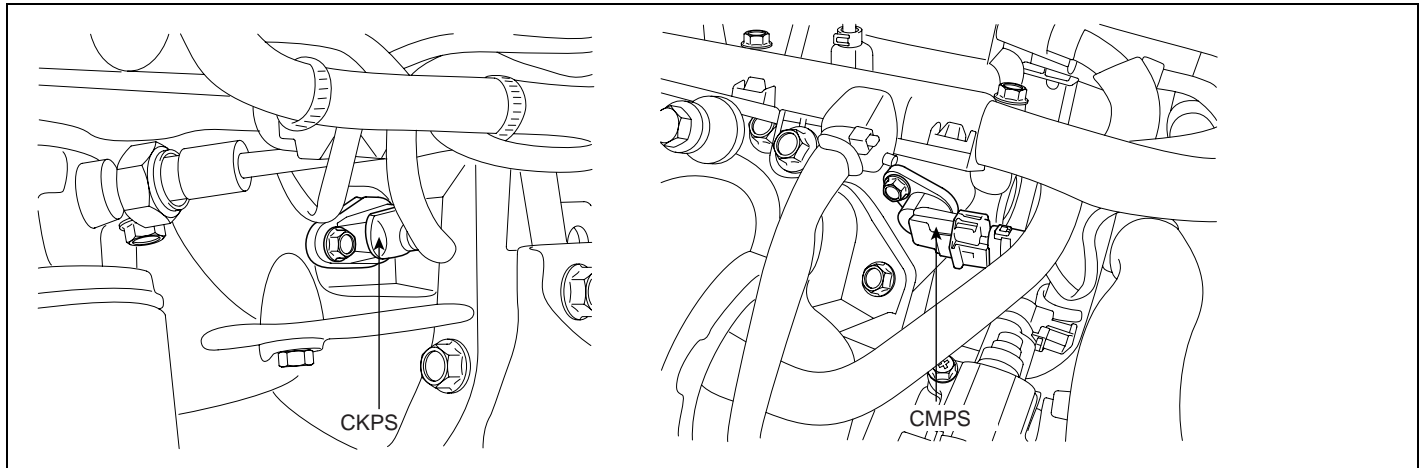


DTC TROUBLESHOOTING PROCEDURES

FL -99

DTC P0016 CRANKSHAFT POSITION-CAMSHAFT POSITION CORRELATION (BANK 1 SENSOR A)

COMPONENT LOCATION E042E8CD



SHDFL6702L

GENERAL DESCRIPTION EA7AB3F3

A Crankshaft Position Sensor (CKPS) is a magnetic type sensor that generates voltage using a sensor and a target wheel mounted on the crankshaft. The PCM calculates engine RPM by using the sensor's signal and controls the injection duration and the ignition timing.

Camshaft Position Sensor (CMPS) is a hall sensor and detects the camshaft position by using a hall element. It is related with Crankshaft Position Sensor (CKPS) and detects the piston position of the each cylinder which the CKPS can't detect. This CMPS signal is sent to the ECM and it uses CMPS signals for determining the ignition timing with CKPS signals. CMPS makes Sequential Injection possible.

DTC DESCRIPTION EA342374

If the deviation between CKPS and CMPS is bigger than the threshold value, ECM sets DTC P0016.

DTC DETECTING CONDITION EFC2D102

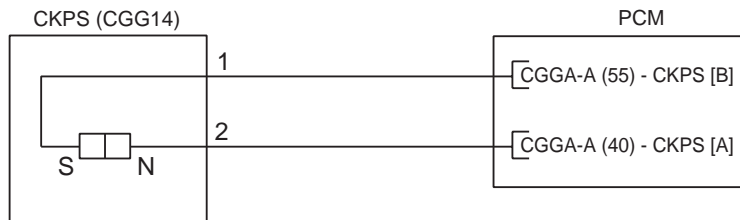
Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Camshaft and crankshaft alignment check 	<ul style="list-style-type: none"> Poor connection Contamination of Oil / Clog of Oil path OCV CVVT
Enable Conditions	<ul style="list-style-type: none"> There is no electrical error on OCV. The target valve timing = Reference valve timing Time after engine start > 10~60s Coolant temperature : 60~110 Engine oil temperature : 60~110 Reference position adaption completed CVVT control condition activated 	
Threshold Value	<ul style="list-style-type: none"> Average difference between Adapted reference position and currently measured position > 15° CA, or < -15° CA 	
Diagnostic Time	<ul style="list-style-type: none"> 2.6 sec 	
MIL ON Condition	<ul style="list-style-type: none"> DTC only 	

SCHEMATIC DIAGRAM

E9CD2F2B

(A/T)

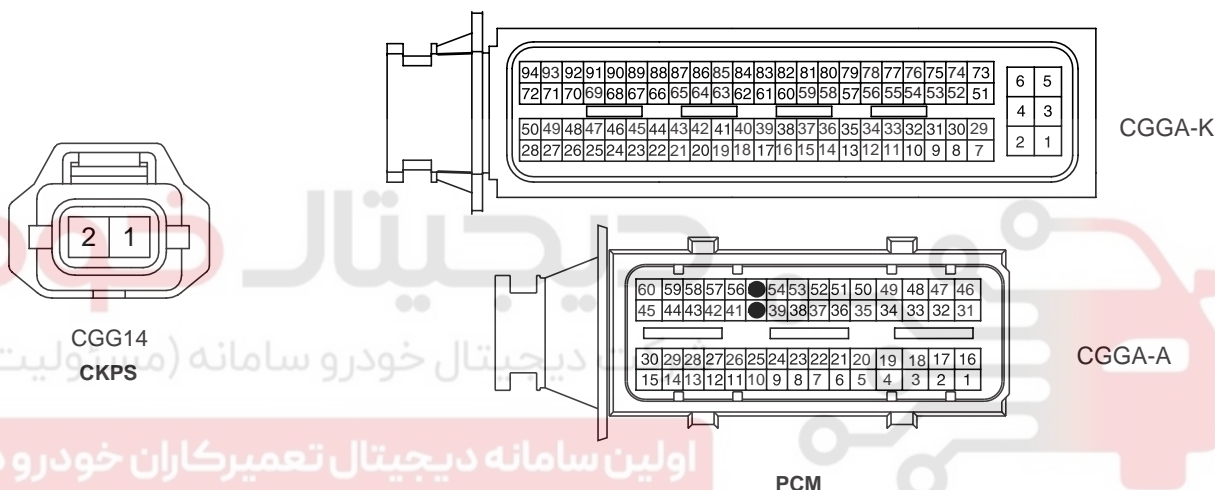
[CIRCUIT DIAGRAM]



[CONNECTION INFORMATION]

Terminal	Connected to	Function
1	PCM CGGA-A (55)	CKPS [B] Signal
2	PCM CGGA-A (40)	CKPS [A] Signal

[HARNESS CONNECTORS]

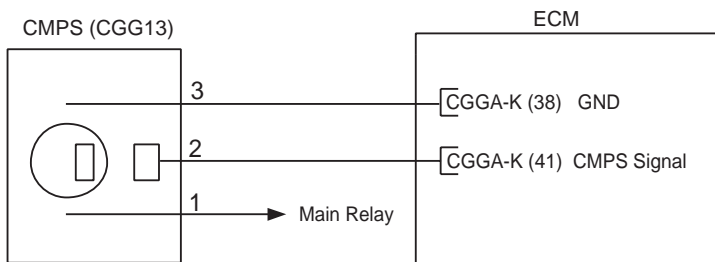


SHDFL6130L

DTC TROUBLESHOOTING PROCEDURES

FL -101

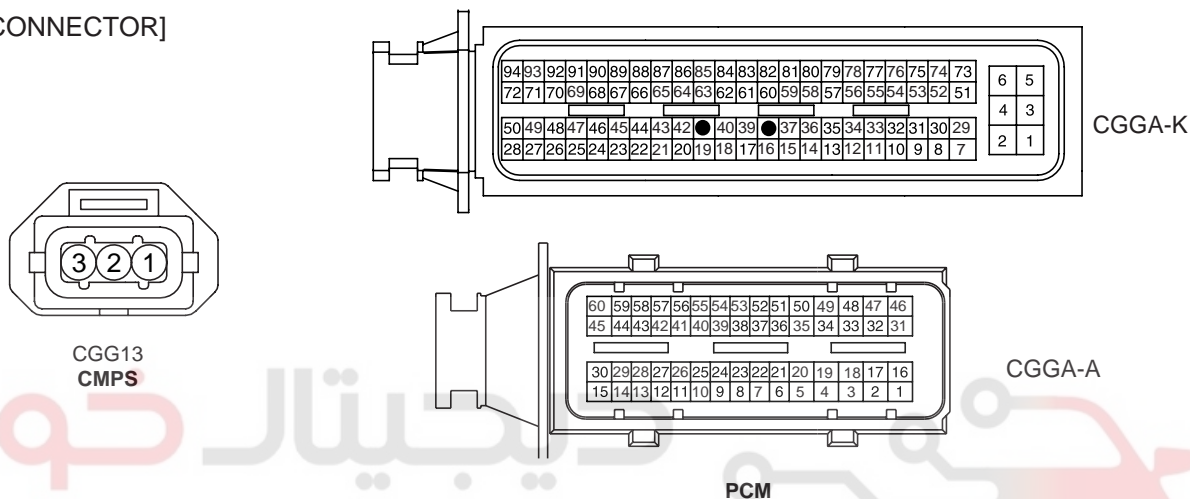
[CIRCUIT DIAGRAM]



[CONNECTION INFORMATION]

Terminal	Connected to	Function
1	Main Relay	Power Supply (B+)
2	PCM CGGA-K (41)	CMPS Signal
3	PCM CGGA-K (38)	Sensor Ground

[HARNESS CONNECTOR]



دیجیتال خودرو
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

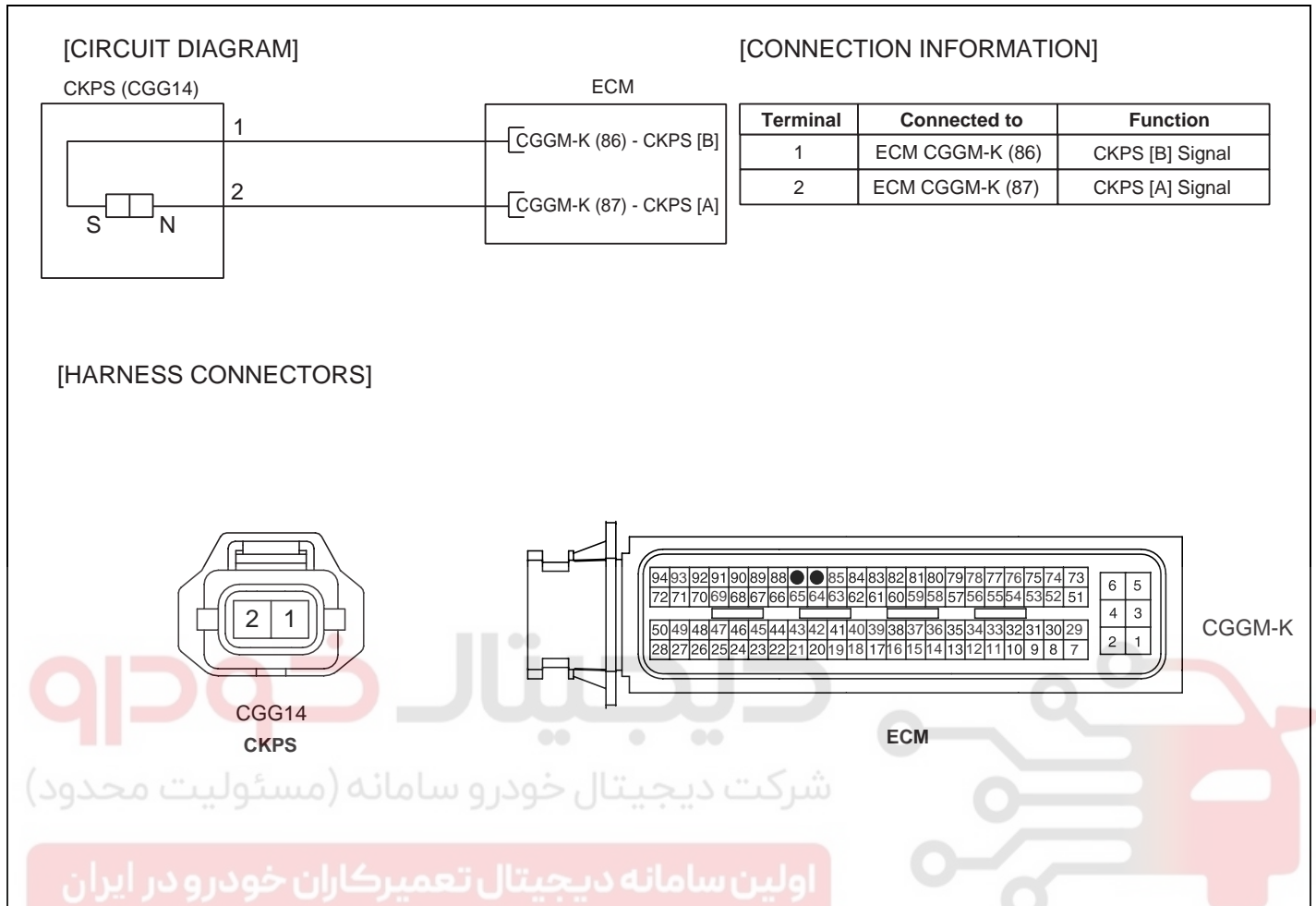
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

SHDFL6900L

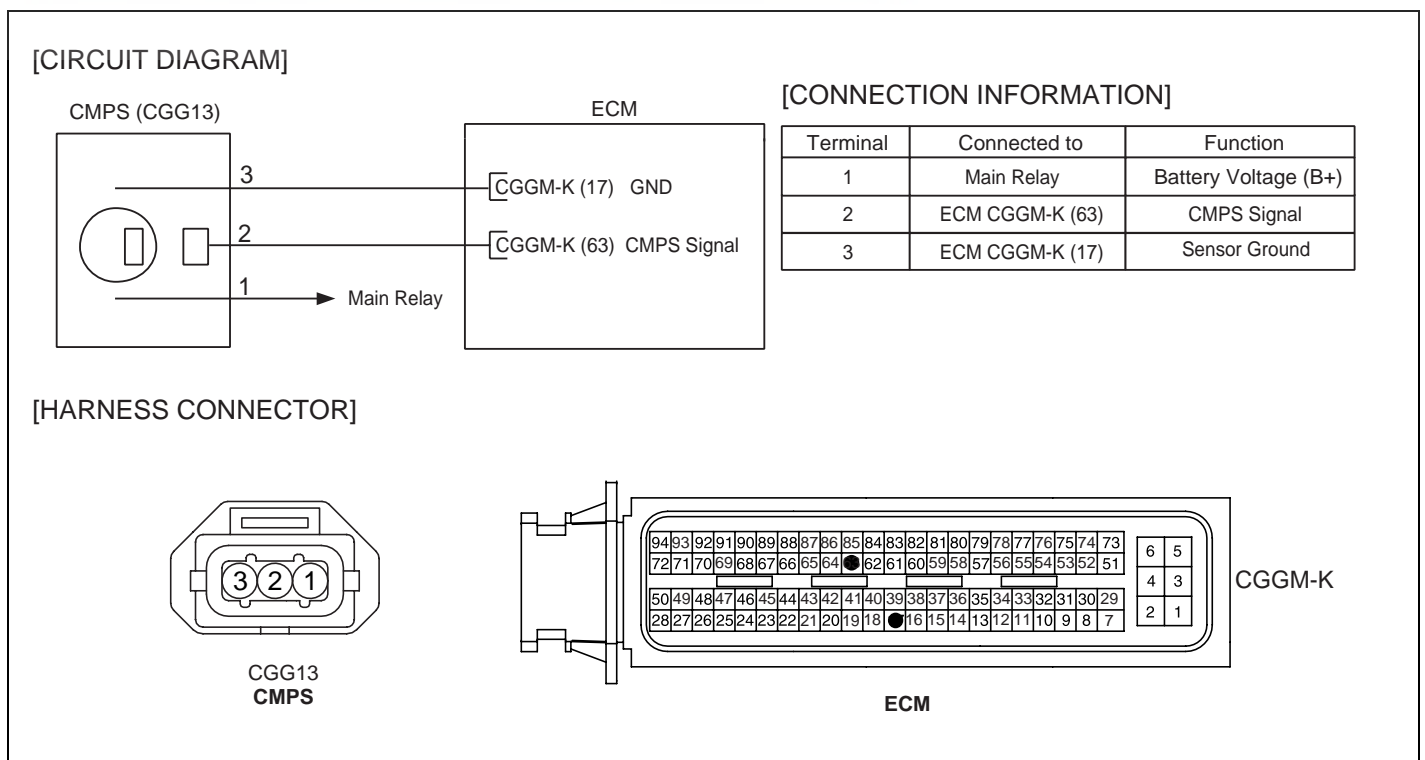
FL -102

FUEL SYSTEM

(M/T)



SHDFL6133L

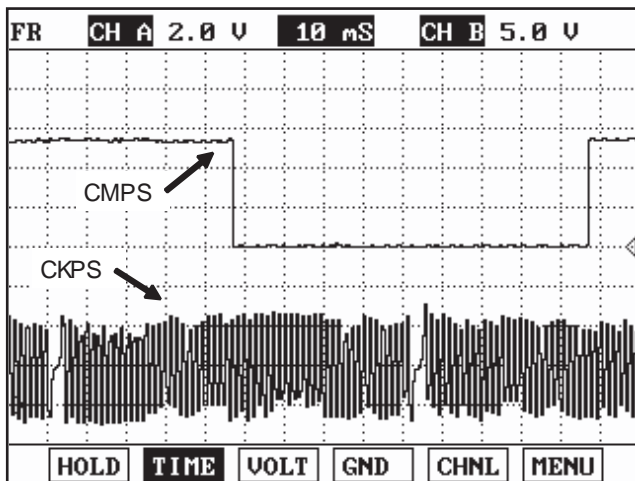


SHDFL6901L

DTC TROUBLESHOOTING PROCEDURES

FL -103

SIGNAL WAVEFORM & DATA E0375863



This example shows a typical Crankshaft Position Sensor(CKPS) and Camshaft Position Sensor(CMPS) waveform at idle. The PCM controls the injection and ignition timing by using these signals. Generally CKPS signal is used to detect the piston's position and CMPS signal is used to detect the Top Dead Center of each cylinder.

SHDFL6501L

MONITOR SCANTOOL DATA EB8BB110

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu.
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

<p style="text-align: center;">1.1 DIAGNOSTIC TROUBLE CODES</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">PXXXX DTC TITLE</div> <div style="border: 1px solid black; height: 100px; width: 100%;"></div> <p style="text-align: center;">NUMBER OF DTC : 1 ITEMS</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 33%;">PART</td> <td style="width: 33%;">ERAS</td> <td style="width: 33%;">DTAL</td> </tr> </table>	PART	ERAS	DTAL	<p style="text-align: center;">1.4 AMBIENT CONDITIONS</p> <p>1. MIL STATUS : ON / OFF</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">2. DTC STATUS : PRESENT / HISTORY</div> <p>3. DTC READNESS FLAG : COMPLETE</p>
PART	ERAS	DTAL		

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

FL -104

FUEL SYSTEM

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure

TERMINAL AND CONNECTOR INSPECTION ED289AA0

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "CMPS circuit inspection" procedure.

CMPS CIRCUIT INSPECTION

1. Key "OFF".
2. Disconnect the CMPS connector.
3. Key "ON".
4. Measure the voltage between terminal 1, 2, 3 of CMPS harness connector and chassis ground.

Specification :

Terminal 1 B+

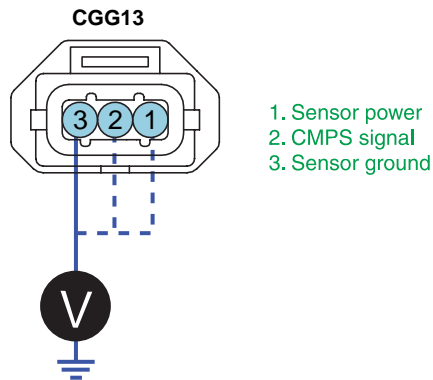
Terminal 2 Approx. 12V

Terminal 3 Approx. 0V



DTC TROUBLESHOOTING PROCEDURES

FL -105



SHDFL6502L

5. Is the measured voltage within specifications?

YES

Go to "CKPS circuit inspection" procedure.

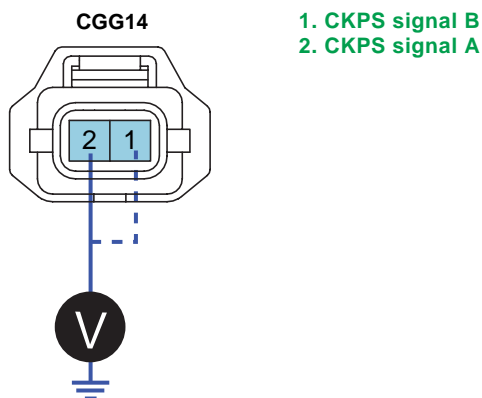
NO

Repair Open or Short in CMPS circuit, and go to " Verification of Vehicle Repair" procedure.

CKPS CIRCUIT INSPECTION

1. Key "OFF".
2. Disconnect CKPS connector.
3. Key "ON".
4. Measure the voltage Between terminal 1, 2 of CKPS harness connector and chassis ground.

Specification : Approx. 2.5 V



SHDFL6503L

5. Is the measured voltage within specifications?

YES

Go to "System Inspection" procedure.

FL -106

FUEL SYSTEM

NO

Repair Open in CKPS circuit, and go to " Verification of Vehicle Repair" procedure.

SYSTEM INSPECTION E8A950B4

1. Visual check.
 - 1) Check engine oil gauge.
 - 2) Check contamination of engine oil.
 - 3) Check contamination of OCV filter.
 - 4) Check clog of oil path.
 - 5) Is there any problem?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "Component inspection" procedure.

COMPONENT INSPECTION E5131553

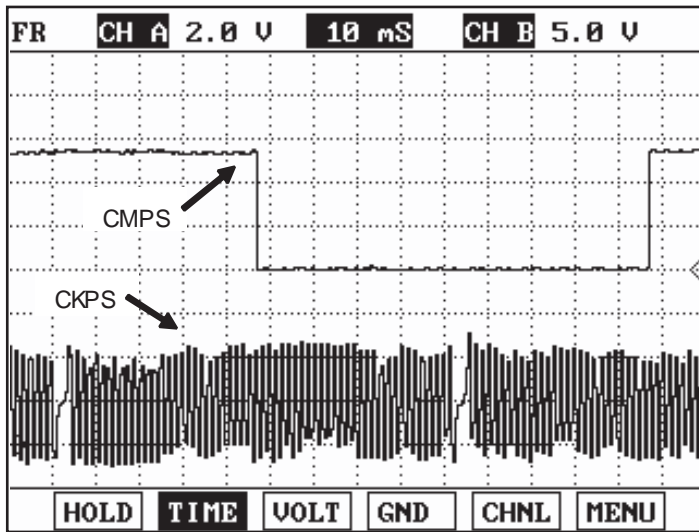
1. Check CMPS, CKPS.

- 1) Key "OFF". (Don't disconnect sensors.)
- 2) Select "vehicle scopemeter" in the menu, and connect channel A of scantool with terminal 2 of CKPS harness connector.
- 3) Connect Channel B of scantool with terminal 1 or 2 of CMPS harness connector.
- 4) Engine start. And check the signal waveforms.

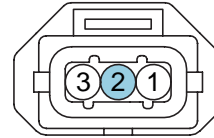


DTC TROUBLESHOOTING PROCEDURES

SPECIFICATION :

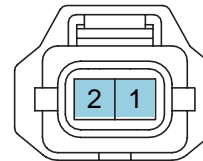


CGG13



- 1. Sensor power
- 2. CMPS signal
- 3. Sensor ground

CGG14



- 1. CKPS signal B
- 2. CKPS signal A

SHDFL6504L

5) Is the measured signal waveforms of CKPS/CMPS normal?

YES

Go to "OCV" procedure.

NO

Substitute with a known-good CKPS/CMPS and check for proper operation. If the problem is corrected, replace CKPS/CMPS and then go to "Verification of Vehicle Repair" procedure.

2. Check OCV.

- 1) Connect scantool to Data Link Connector(DLC).
- 2) Key "ON".
- 3) Perform "Actuation Test" for OCV.

1.5 ACTUATION TEST		12/29
OIL CONTROL VALVE		
DURATION	UNTIL STOP KEY	
METHOD	ACTIVATION	
CONDITION	IG.KEY ON ENGINE OFF	
PRESS [STRT], IF YOU ARE READY !		
STRT	STOP	

LFJF307A

4) Does the OCV work normally? (Check clinking sound)

YES

FL -108

FUEL SYSTEM

Go to "Check timing mark" procedure.

NO

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

3. Check timing mark.

- 1) Key "OFF".
- 2) Check timing mark.

SPECIFICATION : REFER TO "TIMING SYSTEM" IN EM GROUP.

3) Is timing mark normal?

YES

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

NO

Reset timing mark, and go to " Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E0A51A25

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

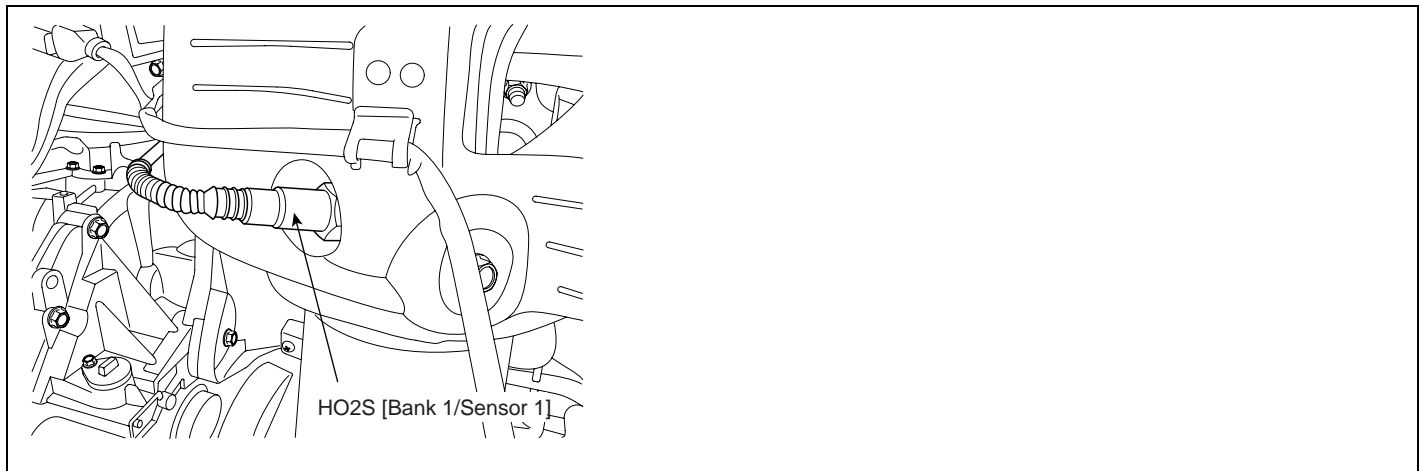


DTC TROUBLESHOOTING PROCEDURES

FL -109

DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 / SENSOR 1)

COMPONENT LOCATION EFB39510



SHDFL6705L

GENERAL DESCRIPTION ED05C2E5

In order to control emissions of the CO, HC and NOx components of the exhaust gas, heated oxygen sensor (HO2S), mounted on the front side and rear side of catalytic converter, detects the oxygen content in the exhaust gas. The front HO2S signal is used to control air/fuel ratio (closed loop fuel control) and the rear HO2S signal is used to monitor front HO2S and catalyst for proper operation.

The HO2S requires a minimum temperature to operate properly and provide a closed loop fuel control system. The HO2S contains the heater element to reduce its warming-up time and ensure its performance during all driving conditions. 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.

DTC DESCRIPTION E5A43C84

When ECM detects open in the heater control circuit(B1S1), ECM sets DTC P0030.

DTC DETECTING CONDITION E26295A2

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Heater check open 	<ul style="list-style-type: none"> Poor connection Open or Short to ground in power circuit Open in control circuit HO2S (B1/S1)
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> Open 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

B1S1 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

FL -110

FUEL SYSTEM

SPECIFICATION

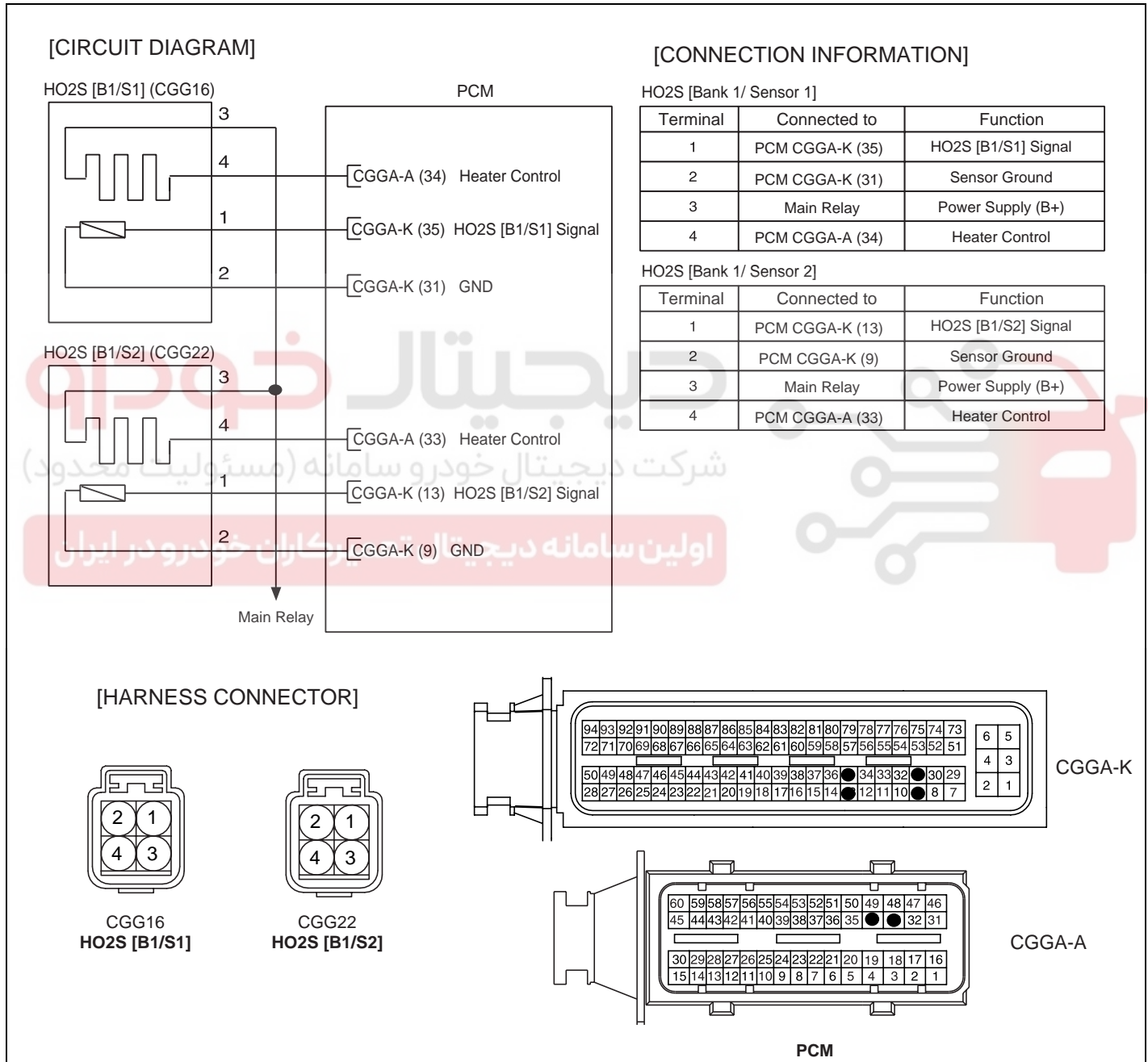
E8F48C59

ITEM	Specification
Heater Resistance()	Approx. 9.0 (20)

SCHEMATIC DIAGRAM

E83E016B

(A/T)



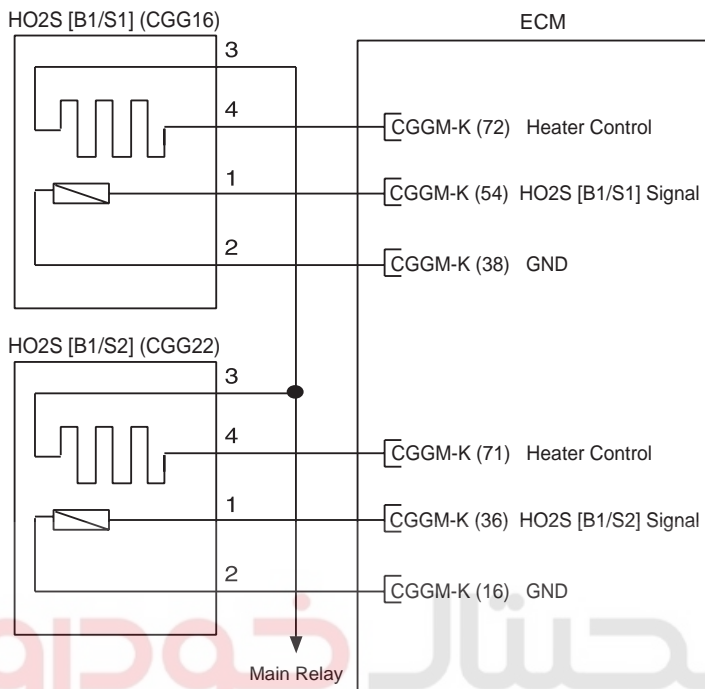
SHDFL6575L

DTC TROUBLESHOOTING PROCEDURES

FL -111

(M/T)

[CIRCUIT DIAGRAM]



[CONNECTION INFORMATION]

HO2S [Bank 1/ Sensor 1]

Terminal	Connected to	Function
1	ECM CGGM-K (54)	HO2S [B1/S1] Signal
2	ECM CGGM-K (38)	Sensor Ground
3	Main Relay	Power Supply (B+)
4	ECM CGGM-K (72)	Heater Control

HO2S [Bank 1/ Sensor 2]

Terminal	Connected to	Function
1	ECM CGGM-K (36)	HO2S [B1/S2] Signal
2	ECM CGGM-K (16)	Sensor Ground
3	Main Relay	Power Supply (B+)
4	ECM CGGM-K (71)	Heater Control

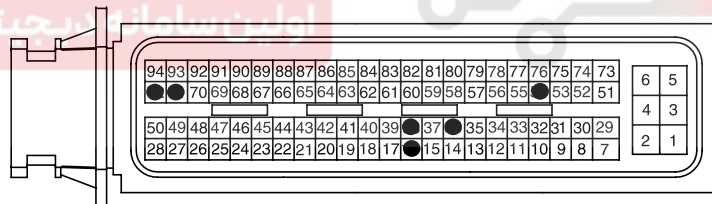
[HARNESS CONNECTOR]



CGG16
HO2S [B1/S1]



CGG22
HO2S [B1/S2]

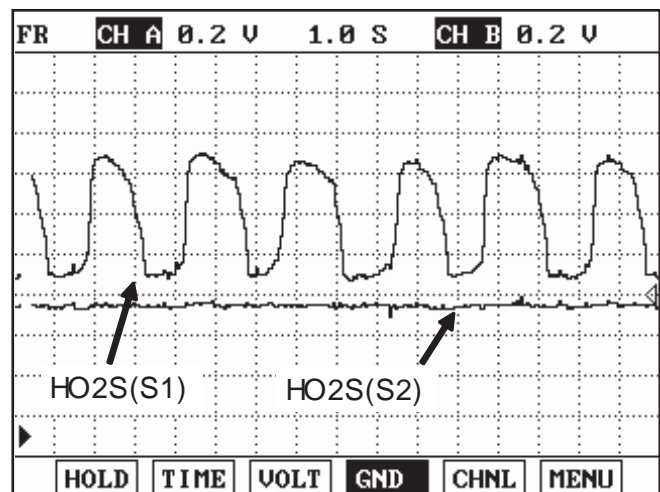
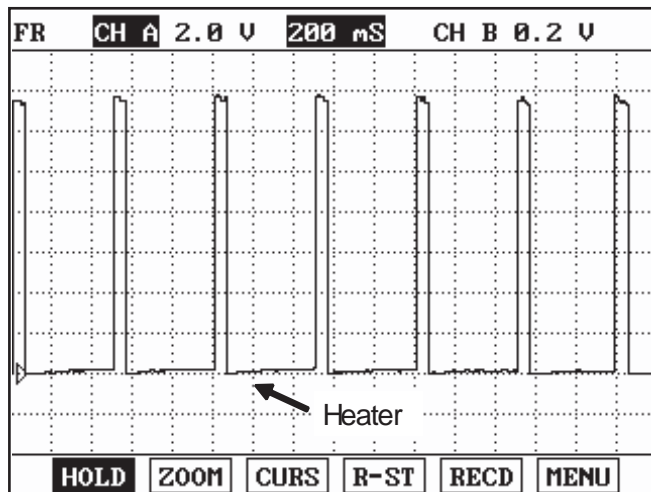


ECM

CGGM-K

SHDFL6576L

SIGNAL WAVEFORM & DATA ECAC6939



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 acceleration. 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 ECAC1430

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

<p>1.1 DIAGNOSTIC TROUBLE CODES</p> <p>PXXXX DTC TITLE</p> <p>NUMBER OF DTC : 1 ITEMS</p> <p>PART ERAS DTAL</p>	<p>1.4 AMBIENT CONDITIONS</p> <p>1. MIL STATUS : ON / OFF</p> <p>2. DTC STATUS : PRESENT / HISTORY</p> <p>3. DTC READNESS FLAG : COMPLETE</p>
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SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?

DTC TROUBLESHOOTING PROCEDURES

FL -113



- *History fault : DTC occurred but has been cleared.*
- *Present fault : DTC is occurring at present time.*

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure

TERMINAL AND CONNECTOR INSPECTION E724C06B

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?



شرکت دیجیتال خودرو (مسئولیت) **YES** (و)

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "Power Circuit Inspection" procedure.

POWER CIRCUIT INSPECTION EF395FB3

1. IG "OFF".
2. Disconnect HO2S(S1) connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 3 of HO2S(S1) harness connector and chassis ground.

Specification : B+

5. Is the measured voltage within specification?

YES

Go to "Control Circuit Inspection" procedure.

NO

Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedue.

FL -114

FUEL SYSTEM

CONTROL CIRCUIT INSPECTION EF70E5AC

1. IG "OFF".
2. Disconnect HO2S(S1) connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 4 of HO2S(S1) harness connector and chassis ground.

 Specification : Approx. 3.5V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

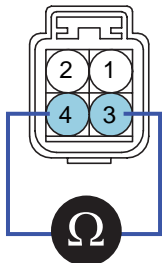
Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION E8D45360

1. Check resistance.
 - 1) IG "OFF".
 - 2) Disconnect HO2S(S1) connector.
 - 3) Measure resistance between terminal 3 and 4 of HO2S(S1)(Component Side)

SPECIFICATION :

ITEM	Specification
Heater Resistance()	Approx. 9.0 (20)

CGG16

1. HO2S(S1) Signal
2. Sensor Ground
3. HO2S(S1) Heater Power
4. HO2S(S1) Heater Control

SHDFL6507L

- 4) Is the measured resistance within specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor

DTC TROUBLESHOOTING PROCEDURES

FL -115

connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good HO2S(S1) and check for proper operation.
If the problem is corrected, replace HO2S(S1) and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EAB28BC2

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.



دیجیتال خودرو
شرکت دیجیتال خودرو سامانه (مستویک محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

FL -116

FUEL SYSTEM

DTC P0031 HO2S HEATER CIRCUIT LOW (BANK 1 / SENSOR 1)**COMPONENT LOCATION** E7A8360B

Refer to DTC P0030.

GENERAL DESCRIPTION E9C46753

Refer to DTC P0030.

DTC DESCRIPTION E9435D17

When ECM detects short to ground in the heater control circuit(B1S1), ECM sets DTC P0031.

DTC DETECTING CONDITION EB985EBB

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Heater check low 	<ul style="list-style-type: none"> Poor connection Short to ground in control circuit HO2S (B1/S1)
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> Short to ground 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

B1S1 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

SPECIFICATION E4E16472

Refer to DTC P0030.

SCHEMATIC DIAGRAM EFB6FFCB

Refer to DTC P0030.

SIGNAL WAVEFORM & DATA E04BB636

Refer to DTC P0030.

MONITOR SCANTOOL DATA EC1F064D

Refer to DTC P0030.

TERMINAL AND CONNECTOR INSPECTION E11B4B5C

Refer to DTC P0030.

DTC TROUBLESHOOTING PROCEDURES

FL -117

POWER CIRCUIT INSPECTION EDBC8AA1

1. IG "OFF".
2. Disconnect HO2S(S1) connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 3 of HO2S(S1) harness connector and chassis ground.

 Specification : B+

5. Is the measured voltage within specification?

YES

Go to "Control Circuit Inspection" procedure.

NO

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

CONTROL CIRCUIT INSPECTION E05FD55E

1. IG "OFF".
2. Disconnect HO2S(S1) connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 4 of HO2S(S1) harness connector and chassis ground.

 Specification : Approx. 3.5V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION E2FFB0B0

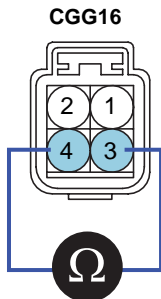
1. Check resistance.
 - 1) IG "OFF".
 - 2) Disconnect HO2S(S1) connector.
 - 3) Measure resistance between terminal 3 and 4 of HO2S(S1)(Component Side)

FL -118

FUEL SYSTEM

SPECIFICATION :

ITEM	Specification
Heater Resistance()	Approx. 9.0 (20)



1. HO2S(S1) Signal
2. Sensor Ground
3. HO2S(S1) Heater Power
4. HO2S(S1) Heater Control

SHDFL6507L

4) Is the measured resistance within specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good HO2S(S1) and check for proper operation.

If the problem is corrected, replace HO2S(S1) and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EF92881C

Refer to DTC P0030.

DTC TROUBLESHOOTING PROCEDURES

FL -119

DTC P0032 HO2S HEATER CIRCUIT HIGH (BANK 1 / SENSOR 1)**COMPONENT LOCATION** EA7DE951

Refer to DTC P0030.

GENERAL DESCRIPTION EEA66932

Refer to DTC P0030.

DTC DESCRIPTION E1EBE954

When ECM detects short to power in the heater control circuit(B1S1), ECM sets DTC P0032.

DTC DETECTING CONDITION EBB4A832

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Heater check high 	<ul style="list-style-type: none"> Poor connection Short to battery in control circuit HO2S (B1/S1)
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> Short to battery 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

B1S1 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

SPECIFICATION E6CA5908

Refer to DTC P0030.

SCHEMATIC DIAGRAM E43B4995

Refer to DTC P0030.

SIGNAL WAVEFORM & DATA EE58F2B9

Refer to DTC P0030.

MONITOR SCANTOOL DATA EB06888B

Refer to DTC P0030.

TERMINAL AND CONNECTOR INSPECTION EE84C271

Refer to DTC P0030.

FL -120

FUEL SYSTEM

POWER CIRCUIT INSPECTION E62FC44F

1. IG "OFF".
2. Disconnect HO2S(S1) connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 3 of HO2S(S1) harness connector and chassis ground.

Specification : B+

5. Is the measured voltage within specification?

YES

Go to "Control Circuit Inspection" procedure.

NO

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

CONTROL CIRCUIT INSPECTION ED58F1D4

1. IG "OFF".
2. Disconnect HO2S(S1) connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 4 of HO2S(S1) harness connector and chassis ground.

Specification : Approx. 3.5V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION E24F6E18

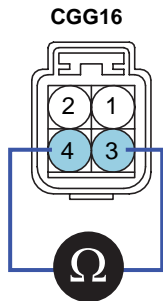
1. Check resistance.
 - 1) IG "OFF".
 - 2) Disconnect HO2S(S1) connector.
 - 3) Measure resistance between terminal 3 and 4 of HO2S(S1)(Component Side)

DTC TROUBLESHOOTING PROCEDURES

FL -121

SPECIFICATION :

ITEM	Specification
Heater Resistance()	Approx. 9.0 (20)



1. HO2S(S1) Signal
2. Sensor Ground
3. HO2S(S1) Heater Power
4. HO2S(S1) Heater Control

SHDFL6507L

4) Is the measured resistance within specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good HO2S(S1) and check for proper operation.

If the problem is corrected, replace HO2S(S1) and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EA5FBD29

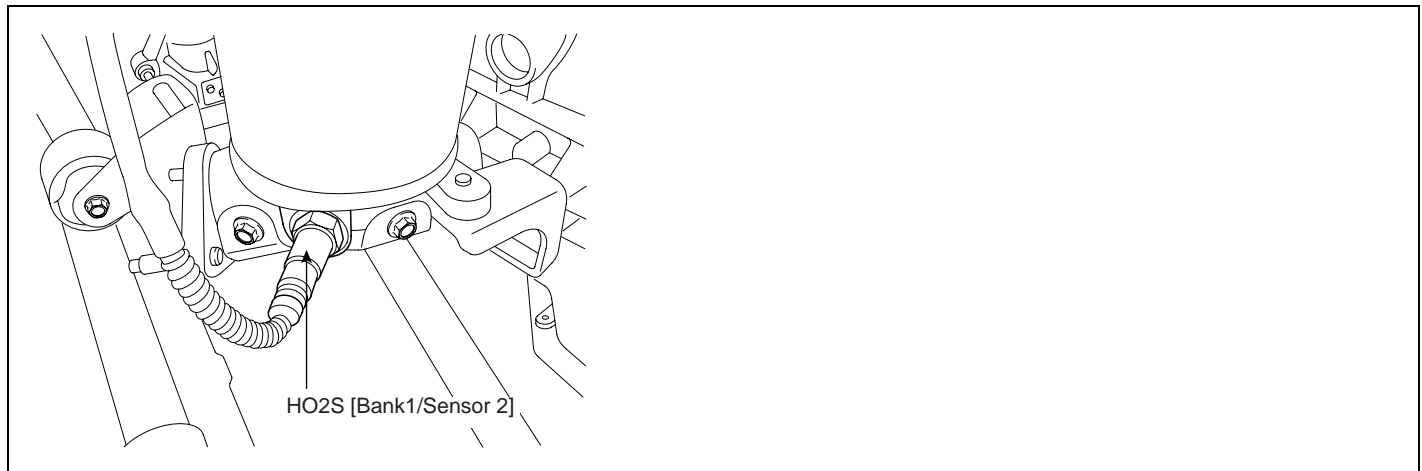
Refer to DTC P0030.

FL -122

FUEL SYSTEM

DTC P0036 HO2S HEATER CONTROL CIRCUIT (BANK 1 / SENSOR 2)

COMPONENT LOCATION E1F0F1D6



SHDFL6706L

GENERAL DESCRIPTION E70CD6D7

In order to control emissions of the CO, HC and NOx components of the exhaust gas, heated oxygen sensor (HO2S), mounted on the front side and rear side of catalytic converter, detects the oxygen content in the exhaust gas. The front HO2S signal is used to control air/fuel ratio (closed loop fuel control) and the rear HO2S signal is used to monitor front HO2S and catalyst for proper operation. The HO2S requires a minimum temperature to operate properly and provide a closed loop fuel control system. The HO2S contains the heater element to reduce its warming-up time and ensure its performance during all driving conditions. 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.

DTC DESCRIPTION E62B61DF

When ECM detects the open in the heater control circuit(B1S2), ECM sets DTC P0036.

DTC DETECTING CONDITION ED46EB9E

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Heater check open 	<ul style="list-style-type: none"> Poor connection Open or short to ground in power circuit Open in control circuit HO2S (B1/S2)
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> Open in control circuit 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

B1S1 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

DTC TROUBLESHOOTING PROCEDURES

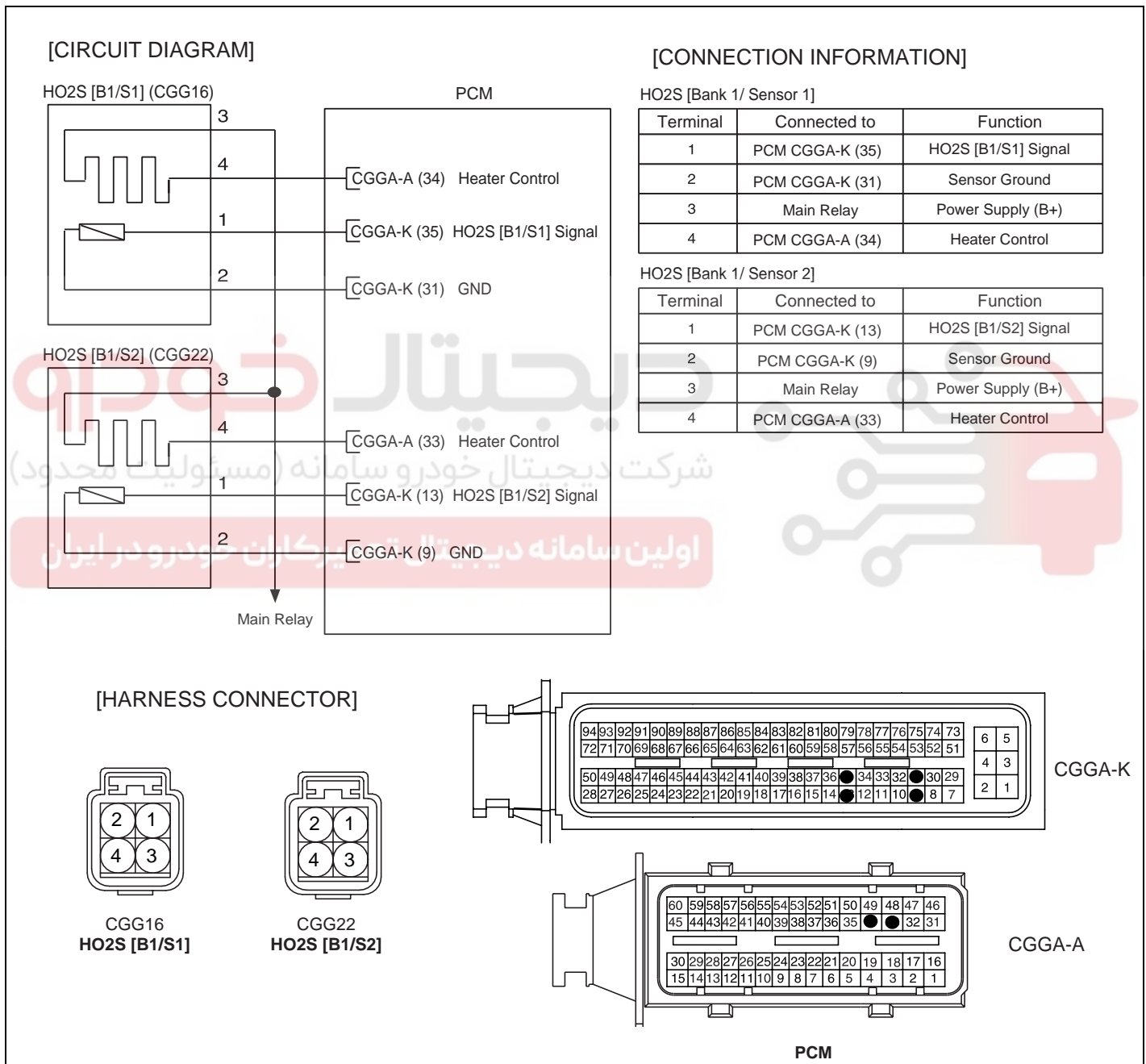
FL -123

SPECIFICATION E18B8B8A

ITEM	Specification
Heater Resistance()	Approx. 9.0 (20)

SCHEMATIC DIAGRAM E4CAEBED

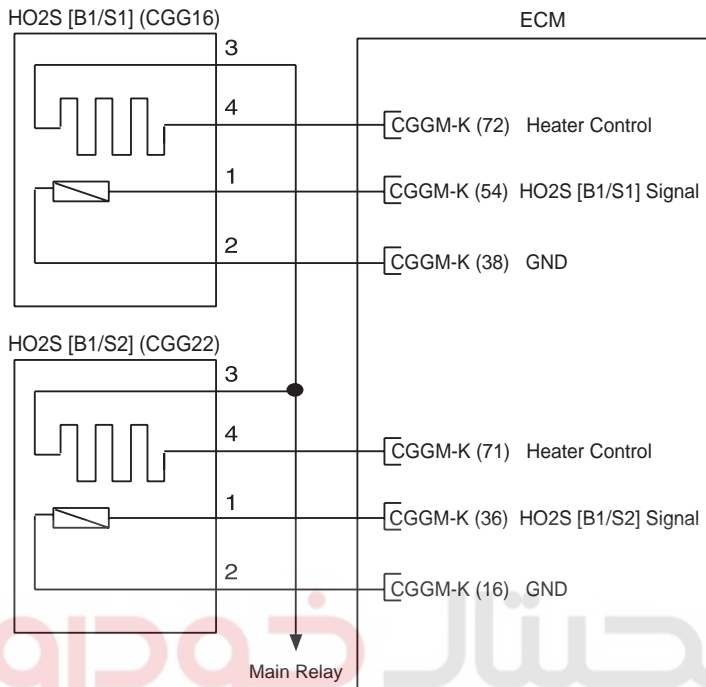
(A/T)



SHDFL6575L

(M/T)

[CIRCUIT DIAGRAM]



[CONNECTION INFORMATION]

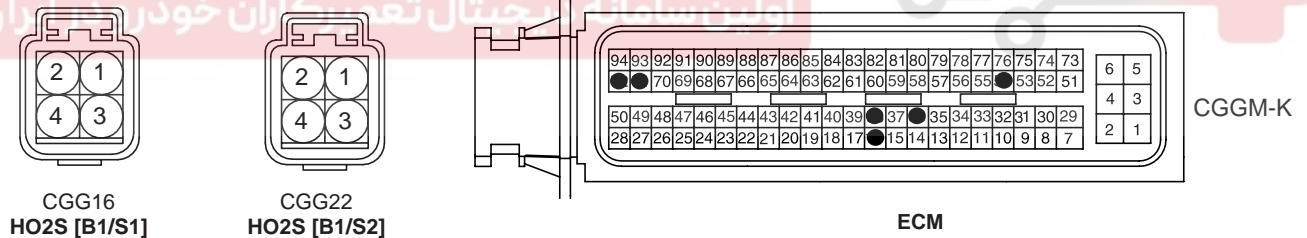
HO2S [Bank 1/ Sensor 1]

Terminal	Connected to	Function
1	ECM CGGM-K (54)	HO2S [B1/S1] Signal
2	ECM CGGM-K (38)	Sensor Ground
3	Main Relay	Power Supply (B+)
4	ECM CGGM-K (72)	Heater Control

HO2S [Bank 1/ Sensor 2]

Terminal	Connected to	Function
1	ECM CGGM-K (36)	HO2S [B1/S2] Signal
2	ECM CGGM-K (16)	Sensor Ground
3	Main Relay	Power Supply (B+)
4	ECM CGGM-K (71)	Heater Control

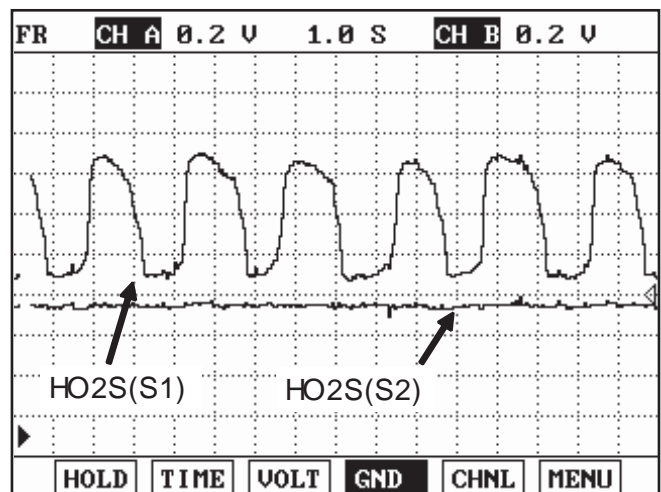
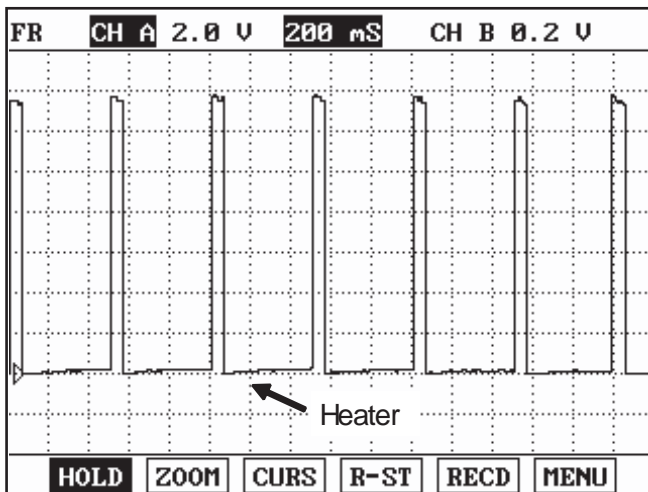
[HARNESS CONNECTOR]



DTC TROUBLESHOOTING PROCEDURES

FL -125

SIGNAL WAVEFORM & DATA EFCFB384



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 acceleration. 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 E8D60337

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

1.1 DIAGNOSTIC TROUBLE CODES		
PXXXX DTC TITLE		
NUMBER OF DTC : 1 ITEMS		
PART	ERAS	DTAL

1.4 AMBIENT CONDITIONS	
1. MIL STATUS :	ON / OFF
2. DTC STATUS :	PRESENT / HISTORY
3. DTC READNESS FLAG :	COMPLETE

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?

FL -126

FUEL SYSTEM



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure

TERMINAL AND CONNECTOR INSPECTION E2734587

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "Power Circuit Inspection" procedure.

POWER CIRCUIT INSPECTION E102A442

1. IG "OFF".
2. Disconnect HO2S(S2) connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 3 of HO2S(S2) harness connector and chassis ground.

Specification : B+

5. Is the measured voltage within specification?

YES

Go to "Control Circuit Inspection" procedure.

NO

Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedue.

DTC TROUBLESHOOTING PROCEDURES

FL -127

CONTROL CIRCUIT INSPECTION E6134011

1. IG "OFF".
2. Disconnect HO2S(S2) connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 4 of HO2S(S2) harness connector and chassis ground.

Specification : Approx. 3.5V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION EA070034

1. Check resistance.

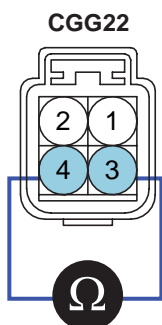
(1) IG "OFF".

- 2) Disconnect HO2S(S2) connector.

- 3) Measure resistance between terminal 3 and 4 of HO2S(S2) (Component Side)

SPECIFICATION :

ITEM	Specification
Heater Resistance()	Approx. 9.0 (20)



1. HO2S(S2) Signal
2. Sensor Ground
3. HO2S(S2) Heater Power
4. HO2S(S2) Heater Control

SHDFL6511L

- 4) Is the measured resistance within specification?

YES

FL -128

FUEL SYSTEM

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good HO2S(S2) and check for proper operation.
If the problem is corrected, replace HO2S(S2) and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E7B45CAF

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.



DTC TROUBLESHOOTING PROCEDURES

FL -129

DTC P0037 HO2S HEATER CIRCUIT LOW (BANK 1 / SENSOR 2)**COMPONENT LOCATION** E090F264

Refer to DTC P0036.

GENERAL DESCRIPTION E8D34D3A

Refer to DTC P0036.

DTC DESCRIPTION EC3AD487

When ECM detects short to ground in the heater control circuit(B1S2), ECM sets DTC P0037.

DTC DETECTING CONDITION E7A446E0

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Heater check low 	<ul style="list-style-type: none"> Poor connection Short to ground in control circuit HO2S (B1/S2)
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> Short to ground 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

B1S1 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

SPECIFICATION E927A84F

Refer to DTC P0036.

SCHEMATIC DIAGRAM E1C73C78

Refer to DTC P0036.

SIGNAL WAVEFORM & DATA EC282494

Refer to DTC P0036.

MONITOR SCANTOOL DATA EA35673F

Refer to DTC P0036.

TERMINAL AND CONNECTOR INSPECTION E913E549

Refer to DTC P0036.

FL -130

FUEL SYSTEM

POWER CIRCUIT INSPECTION

E9F62EB0

1. IG "OFF".
2. Disconnect HO2S(S2) connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 3 of HO2S(S2) harness connector and chassis ground.

Specification : B+

5. Is the measured voltage within specification?

YES

Go to "Control Circuit Inspection" procedure.

NO

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

CONTROL CIRCUIT INSPECTION

EEE5D10E

1. IG "OFF".
2. Disconnect HO2S(S2) connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 4 of HO2S(S2) harness connector and chassis ground.

Specification : Approx. 3.5V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION

EC9075AD

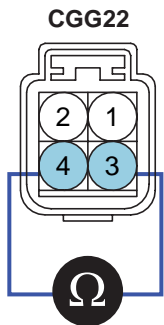
1. Check resistance (S2).
 - 1) IG "OFF".
 - 2) Disconnect HO2S(S2) connector.
 - 3) Measure resistance between terminal 3 and 4 of HO2S(S2) (Component Side)

DTC TROUBLESHOOTING PROCEDURES

FL -131

SPECIFICATION :

ITEM	Specification
Heater Resistance()	Approx. 9.0 (20)



1. HO2S(S2) Signal
2. Sensor Ground
3. HO2S(S2) Heater Power
4. HO2S(S2) Heater Control

SHDFL6511L

4) Is the measured resistance within specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good HO2S(S2) and check for proper operation.

If the problem is corrected, replace HO2S(S2) and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E1355EE8

Refer to DTC P0036.

FL -132

FUEL SYSTEM

DTC P0038 HO2S HEATER CIRCUIT HIGH (BANK 1 / SENSOR 2)**COMPONENT LOCATION** E8F10563

Refer to DTC P0036.

GENERAL DESCRIPTION EC418754

Refer to DTC P0036.

DTC DESCRIPTION E039C9CC

When ECM detects short to power in the heater control circuit, ECM sets DTC P0038.

DTC DETECTING CONDITION EB473C9C

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Heater check high 	<ul style="list-style-type: none"> Poor connection Short to power in control circuit HO2S (B1/S2)
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> Short to battery 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

B1S1 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

SPECIFICATION E0C7DFDD

Refer to DTC P0036.

SCHEMATIC DIAGRAM E41211A9

Refer to DTC P0036.

SIGNAL WAVEFORM & DATA EE684B49

Refer to DTC P0036.

MONITOR SCANTOOL DATA E951DDB0

Refer to DTC P0036.

TERMINAL AND CONNECTOR INSPECTION ECB3131A

Refer to DTC P0036.

DTC TROUBLESHOOTING PROCEDURES

FL -133

POWER CIRCUIT INSPECTION E9D16681

1. IG "OFF".
2. Disconnect HO2S(S2) connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 3 of HO2S(S2) harness connector and chassis ground.

Specification : B+

5. Is the measured voltage within specification?

YES

Go to "Control Circuit Inspection" procedure.

NO

Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedue.

CONTROL CIRCUIT INSPECTION E27CE581

1. IG "OFF".
2. Disconnect HO2S(S2) connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 4 of HO2S(S2) harness connector and chassis ground.

Specification : Approx. 3.5V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION EF6AA542

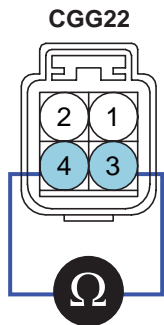
1. Check resistance (S2).
 - 1) IG "OFF".
 - 2) Disconnect HO2S(S2) connector.
 - 3) Measure resistance between terminal 3 and 4 of HO2S(S2) (Component Side)

FL -134

FUEL SYSTEM

SPECIFICATION :

ITEM	Specification
Heater Resistance()	Approx. 9.0 (20)



1. HO2S(S2) Signal
2. Sensor Ground
3. HO2S(S2) Heater Power
4. HO2S(S2) Heater Control

SHDFL6511L

4) Is the measured resistance within specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good HO2S(S2) and check for proper operation.

If the problem is corrected, replace HO2S(S2) and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E1CDCD3C

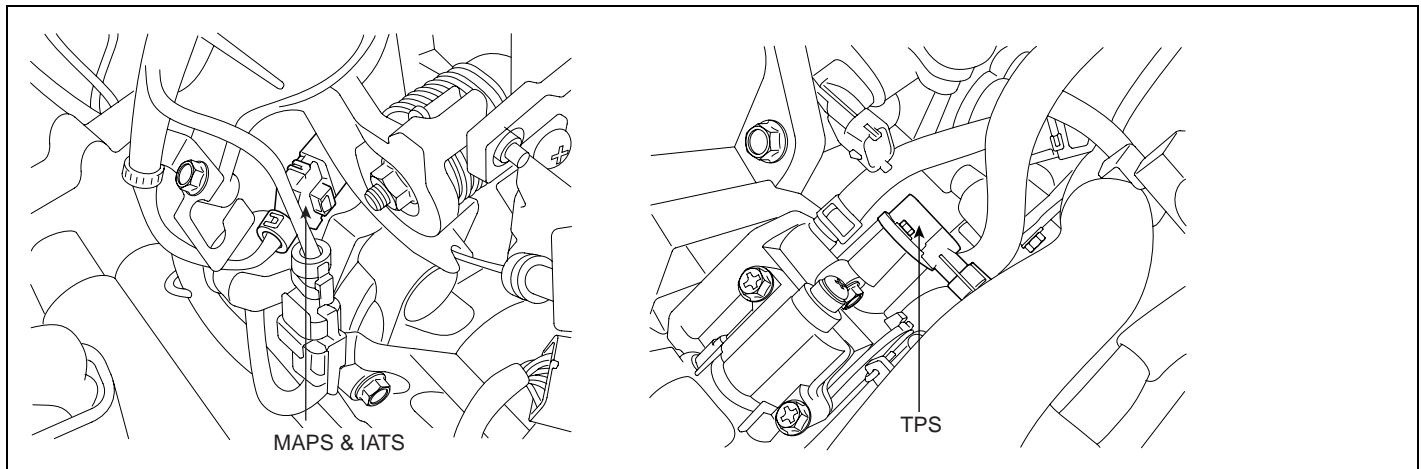
Refer to DTC P0036.

DTC TROUBLESHOOTING PROCEDURES

FL -135

DTC P0068 MAFS/MAPS-TPS CORRELATION

COMPONENT LOCATION EB6387DF



SHDFL6707L

GENERAL DESCRIPTION EBC56A03

The Throttle Position Sensor (TPS) is mounted on the throttle body and detects the opening angle of the throttle plate. The TPS has a variable resistor (potentiometer) whose characteristic is the resistance changing according to the throttle angle. During acceleration, the TPS resistance between the reference 5V and the signal terminal decreases and output voltage increases; during deceleration, the TPS resistance increases and TPS output voltage decreases. The ECM supplies a reference 5V to the TPS and the output voltage increases directly with the opening of the throttle valve. The TPS output voltage will vary from 0.2~0.8V at closed throttle to 4.3~4.8V at wide-open throttle. The ECM determines operating conditions such as idle (closed throttle), part load, acceleration/deceleration, and wide-open throttle from the TPS. Also The ECM uses the Mass Air Flow Sensor (MAFS) or Manifold Absolute Pressure Sensor (MAPS) signal along with the TPS signal to adjust fuel injection duration and ignition timing.

DTC DESCRIPTION E49D26C8

If the sensor input value of TPS is lower or higher than the threshold value which is depending on MAF(MAP) more 300sec, PCM sets DTC P0068.

DTC DETECTING CONDITION EDEB9773

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Rationality check (Correlation of actual and secondary load) 	<ul style="list-style-type: none"> Poor connection TPS MAFS(MAPS)
Enable Conditions	<ul style="list-style-type: none"> Correction factor for secondary load 1.2 or 0.8 	
Threshold Value	<ul style="list-style-type: none"> Time for secondary load adaptation 300s 	
Diagnostic Time	<ul style="list-style-type: none"> 1sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

FL -136

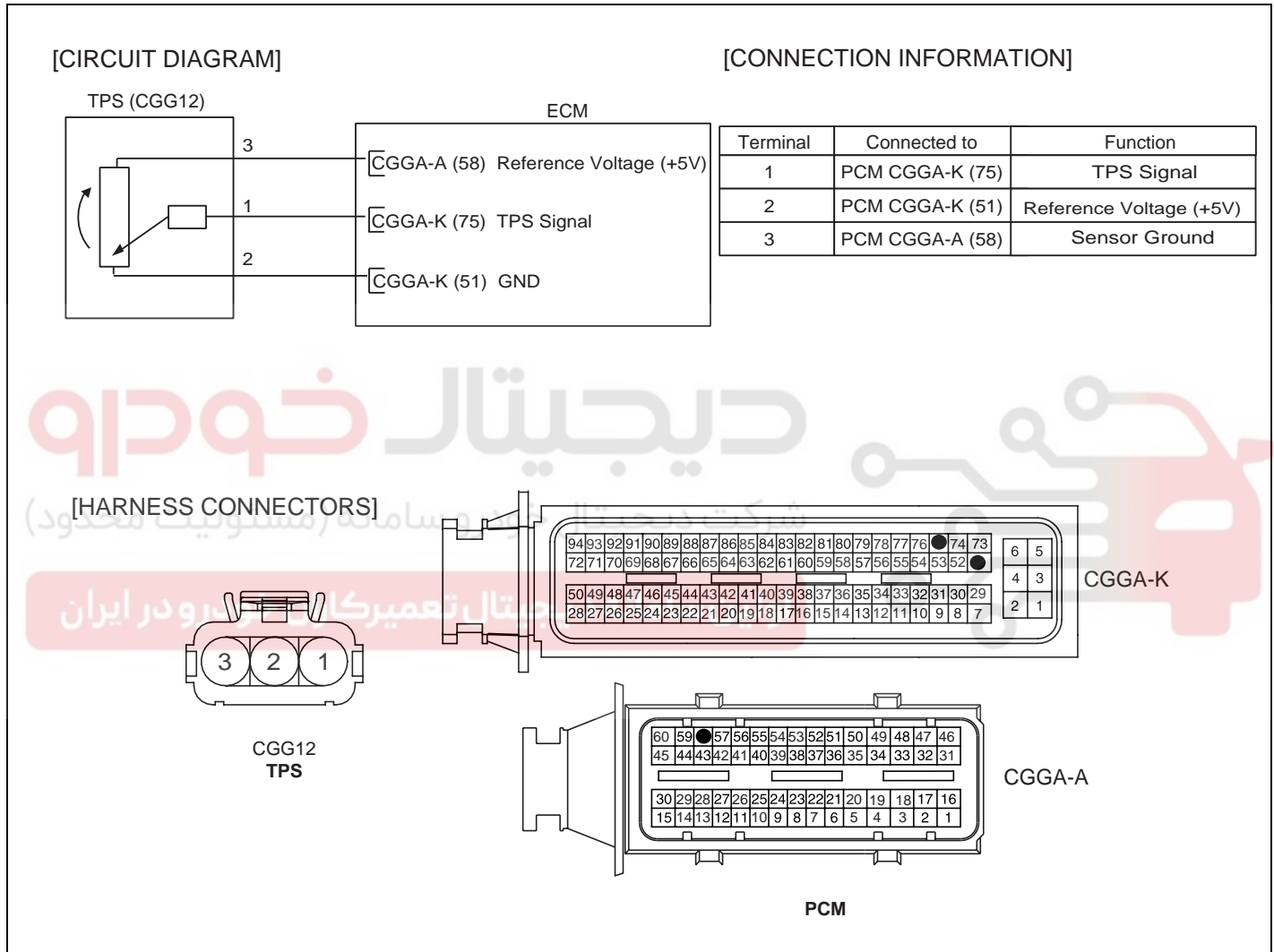
FUEL SYSTEM

SPECIFICATION ED8713AC

ITEM	Specification
TPS Resistance(k)	2k ± 20% (20)

SCHEMATIC DIAGRAM EFDA228F

(A/T)

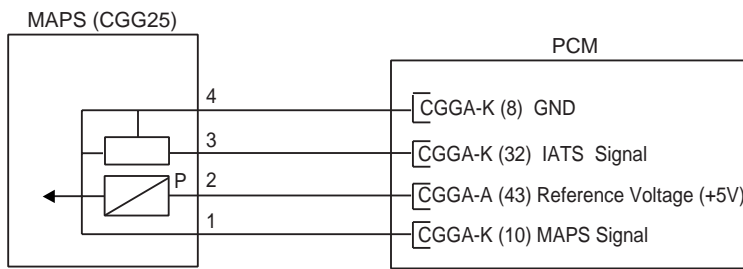


SHDFL6579L

DTC TROUBLESHOOTING PROCEDURES

FL -137

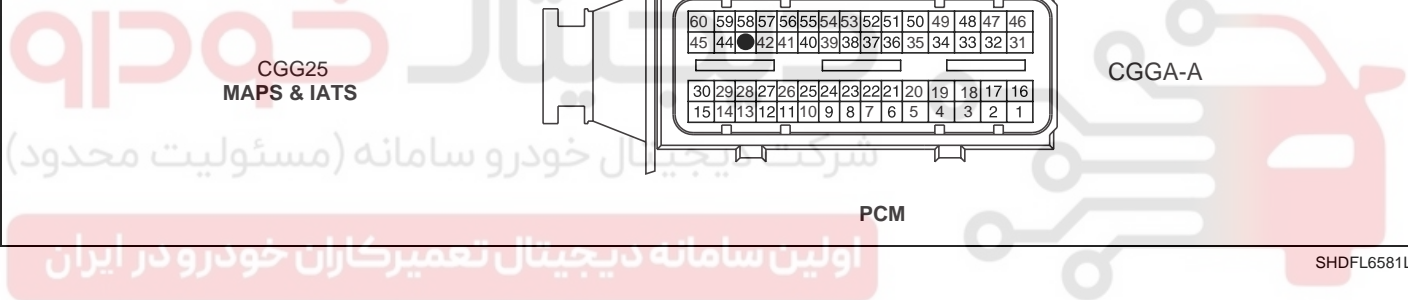
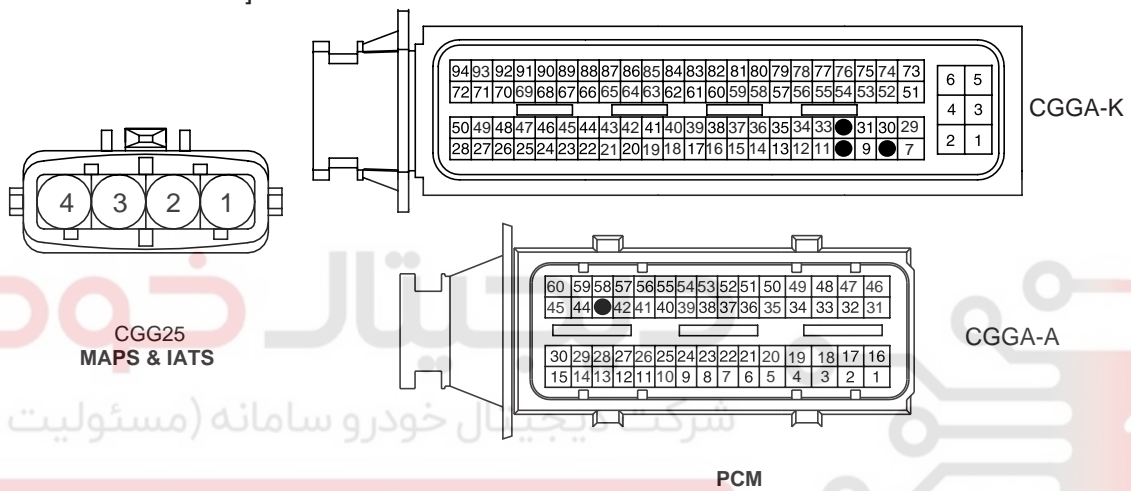
[CIRCUIT DIAGRAM]



[CONNECTION INFORMATION]

Terminal	Connected to	Function
1	PCM CGGA-K (10)	MAPS Signal
2	PCM CGGA-A (43)	Reference Voltage (+5V)
3	PCM CGGA-K (32)	IATS Signal
4	PCM CGGA-K (8)	Sensor Ground

[HARNESS CONNECTORS]

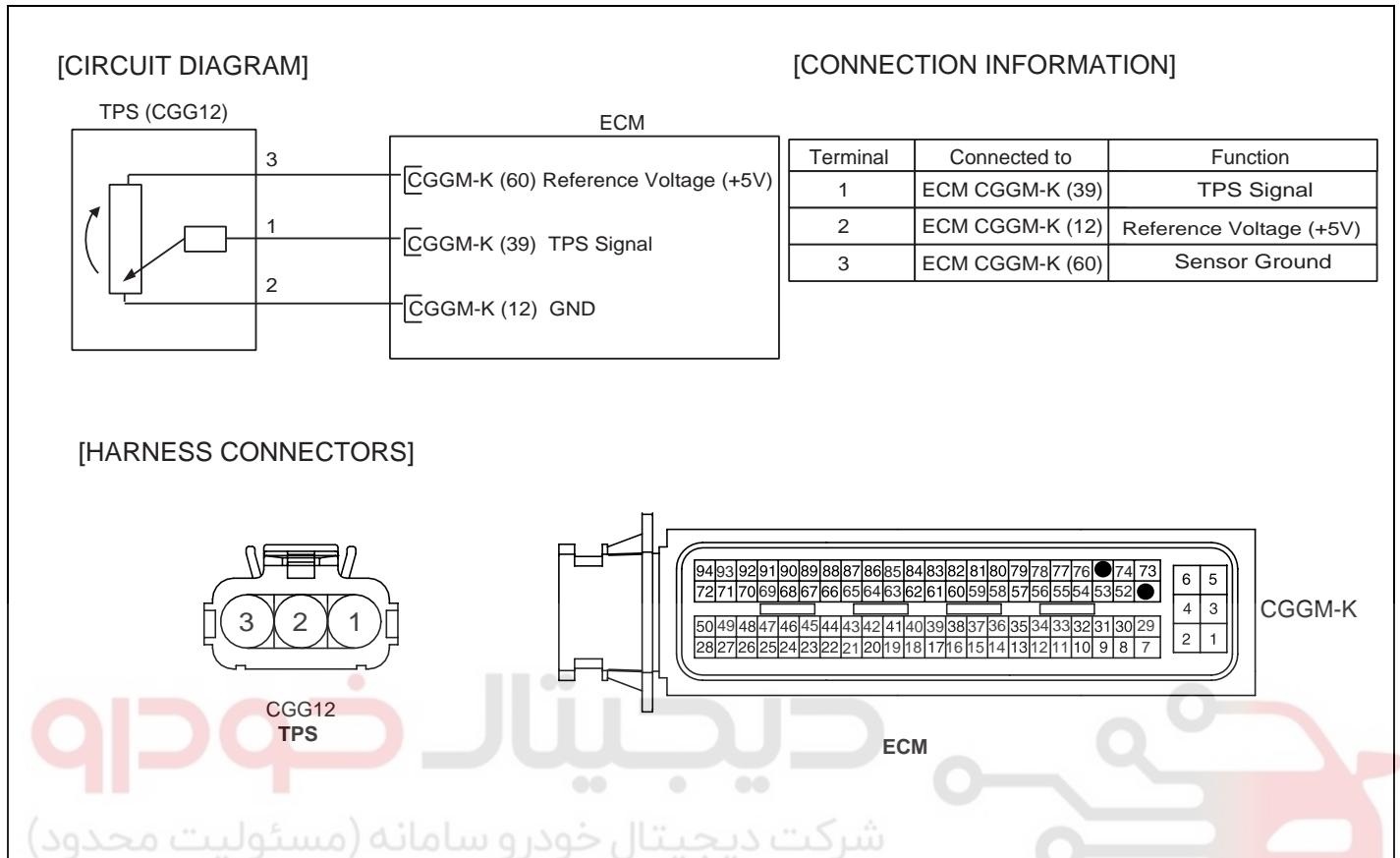


SHDFL6581L

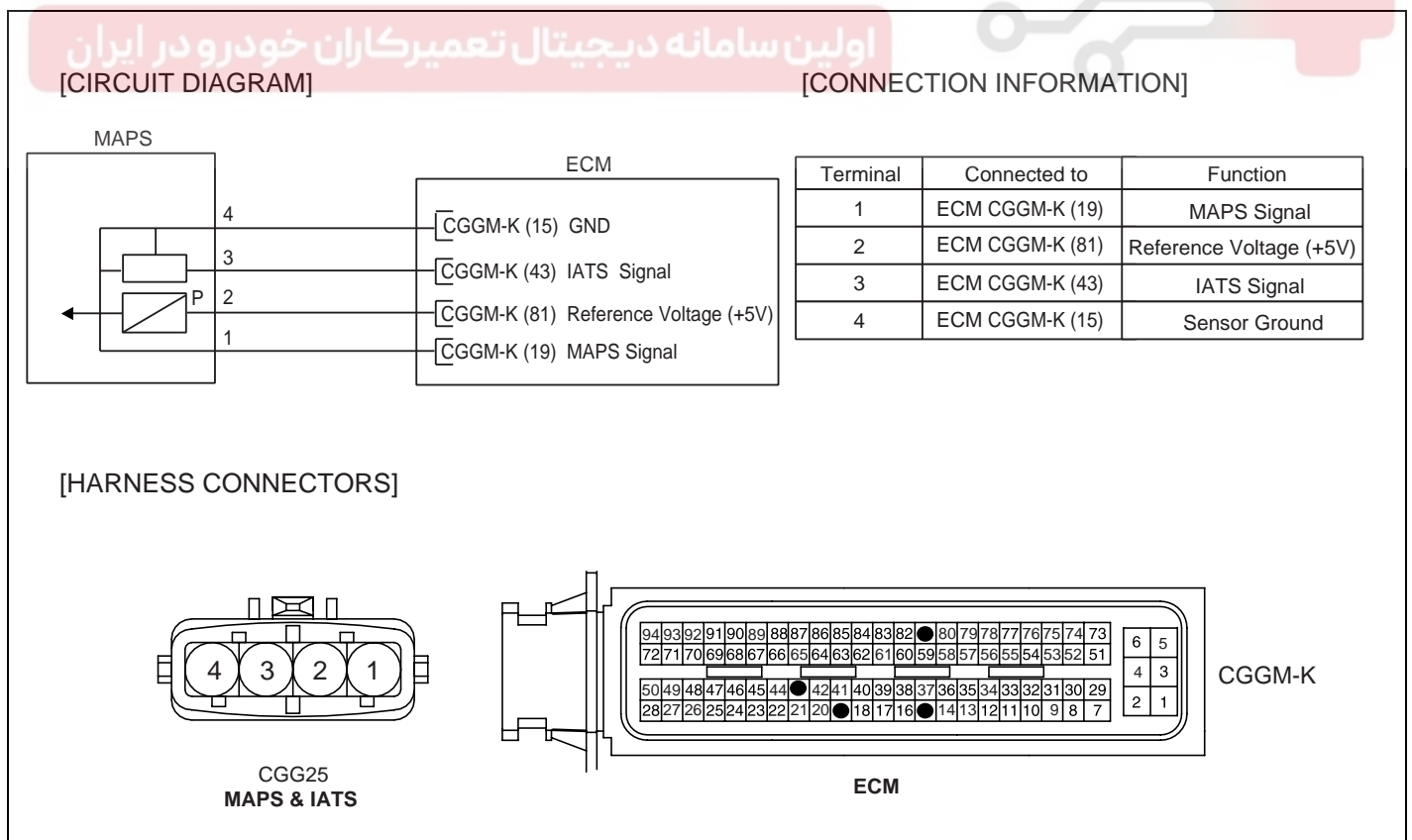
FL -138

FUEL SYSTEM

(M/T)



SHDFL6580L

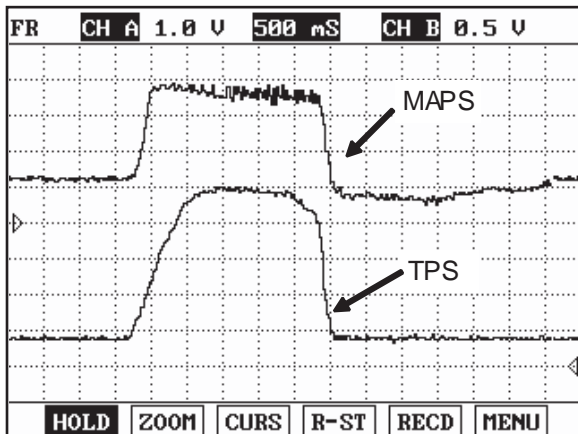


SHDFL6582L

DTC TROUBLESHOOTING PROCEDURES

FL -139

SIGNAL WAVEFORM & DATA E5E48710



SHDFL6512L

MONITOR SCANTOOL DATA EA0A262E

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

1.1 DIAGNOSTIC TROUBLE CODES	1.4 AMBIENT CONDITIONS
PXXXX DTC TITLE	1.MIL STATUS : ON / OFF
	2.DTC STATUS : PRESENT / HISTORY
	3.DTC READNESS FLAG : COMPLETE
NUMBER OF DTC : 1 ITEMS	
PART ERAS DTAL	

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

YES

FL -140

FUEL SYSTEM

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure

TERMINAL AND CONNECTOR INSPECTION E21F285F

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

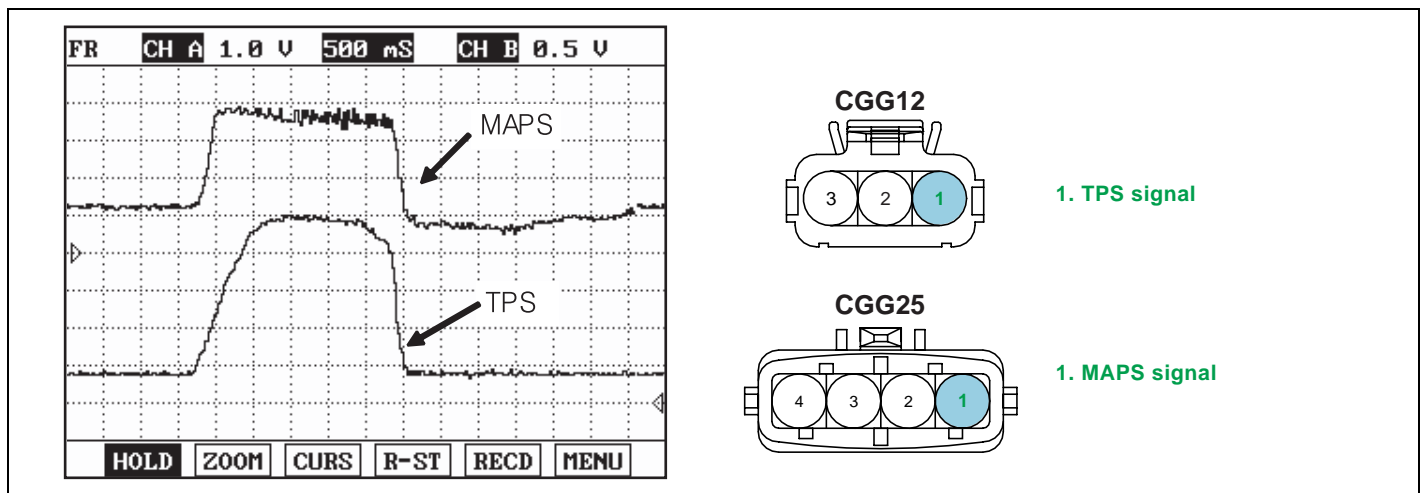
Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "Component inspection" procedure.

COMPONENT INSPECTION EE5C70D3

1. Check TPS
 - 1) Key "OFF". (Don't disconnect sensors.)
 - 2) Select "vehicle scopemeter" in the menu, and connect channel A of scantool with terminal 1 of TPS harness connector.
 - 3) Connect channel B of scantool with terminal 1 of MAPS harness connector.
 - 4) Engine start. And check the signal waveforms with stepping on accelerator pedal.



SHDFL6513L

- 5) Is the signal waveform within specifications?

DTC TROUBLESHOOTING PROCEDURES

FL -141

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute the sensor which outputs abnormal waveform with a known-good sensor and check for proper operation. If the problem is corrected, replace the sensor and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EB44C25A

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

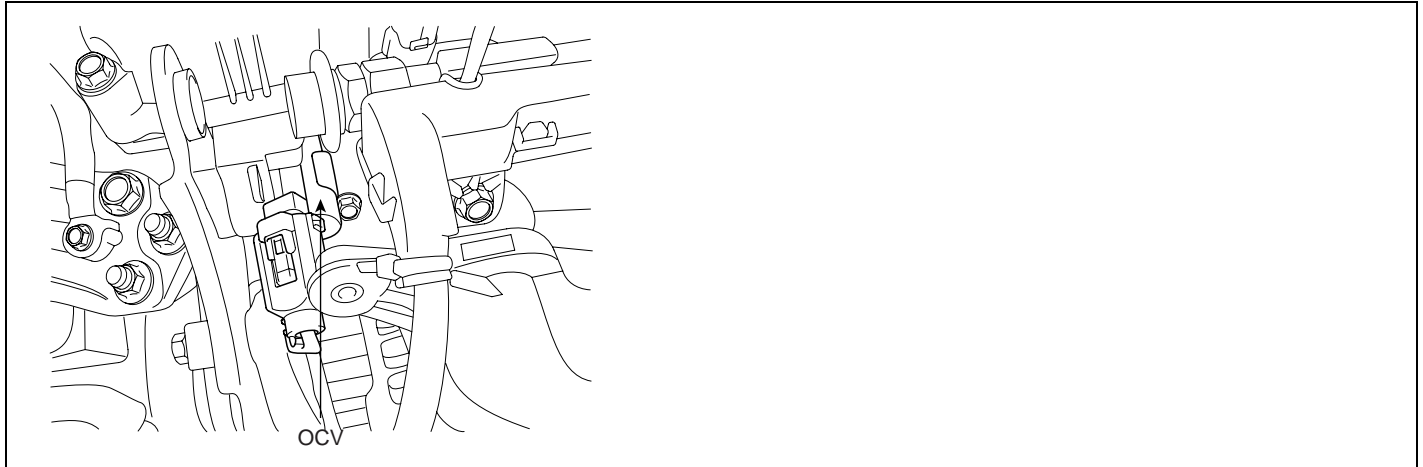


FL -142

FUEL SYSTEM

DTC P0075 INTAKE VALVE CONTROL SOLENOID CIRCUIT (BANK1)

COMPONENT LOCATION E5E33F31



SHDFL6701L

GENERAL DESCRIPTION EDE1A51B

Different from the existing fixed cam phase angle type, CVVT(Continuously Variable Valve Timing) is the device which varies cam phase angle continuously to be optimum. And with engine oil pressure, it operates. CVVT consists of OCV(Oil Control Valve) and cam phaser. OCV, mounted on cylinder head, controls the amount and direction of oil delivered to cam phaser by oil valve which is connected to a solenoid. Cam phaser, rotating cam phaser rotor with pressure and amount of oil produced by OCV, rotates cam shaft forcefully for or against the rotating direction and finally, cam shaft phase changes. With the appliance of CVVT, engine power,fuel efficiency and the quality of exhaust gas are improved.

DTC DESCRIPTION ED0DDC8E

When ECM detects open in the OCV control circuit, ECM sets DTC P0075.

DTC DETECTING CONDITION E8EA0D92

Item	Detecting Condition	Possible Cause
DTC Strategy	• Circuit continuity check, open	<ul style="list-style-type: none"> • Poor connection • Open or Short to ground in power circuit • Open in control circuit • OCV
Enable Conditions		
Threshold Value	• Disconnected	
Diagnostic Time	• Continuous	
MIL ON Condition	• 3 driving cycle	

SPECIFICATION E5A5DFC1

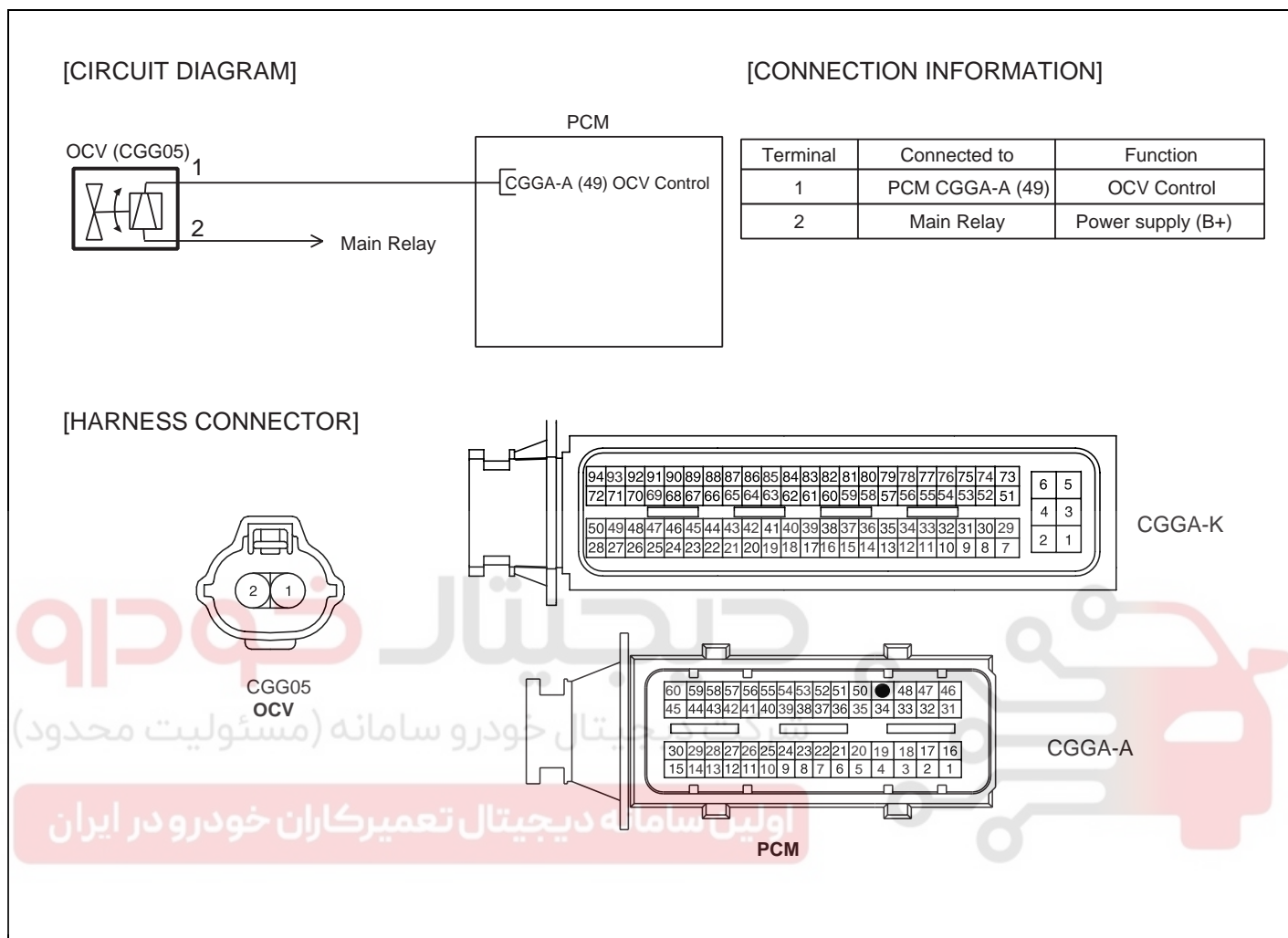
Temperature [()]	Coil Resistance ()
20 (68)	6.9 ~ 7.9

DTC TROUBLESHOOTING PROCEDURES

FL -143

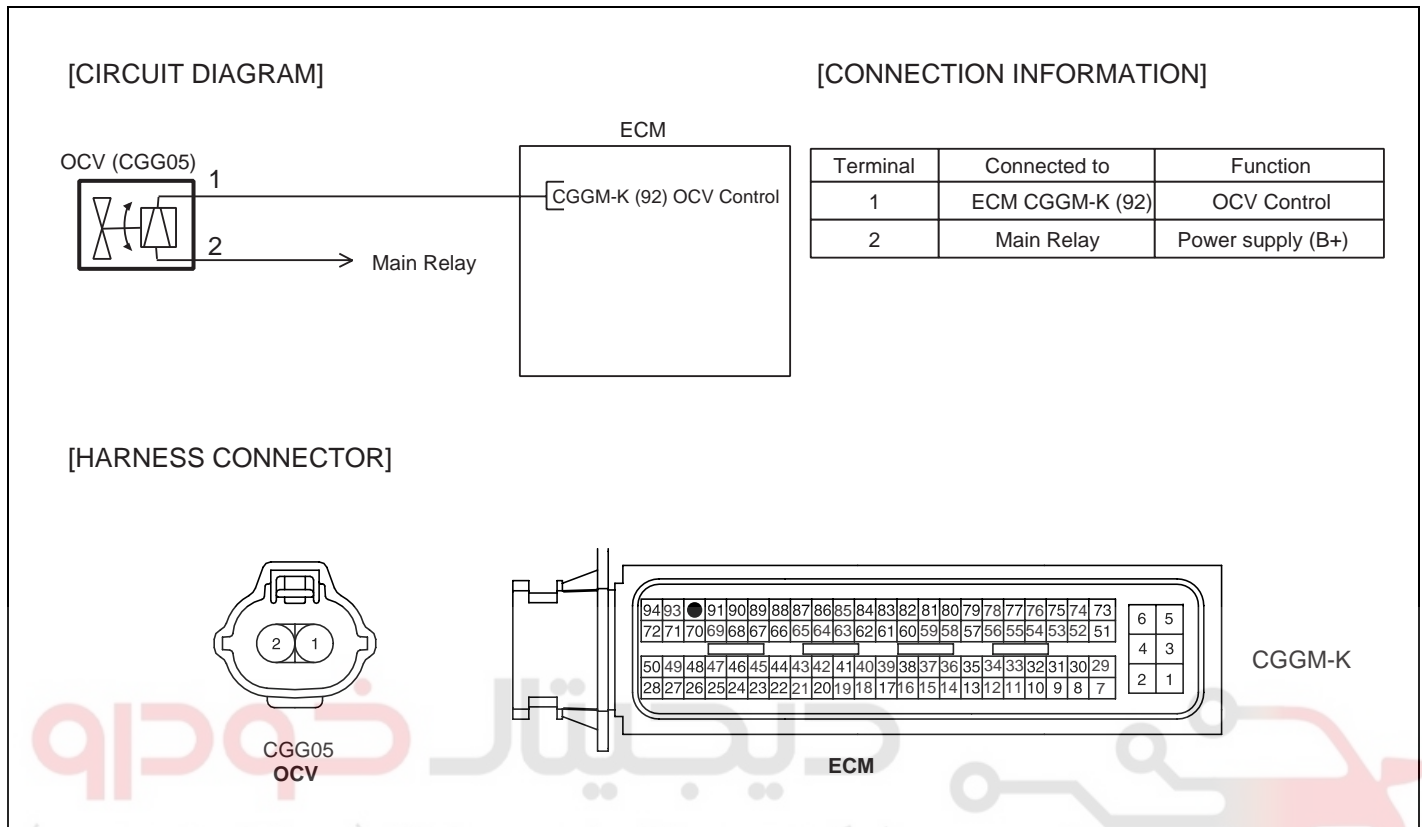
SCHEMATIC DIAGRAM EC8F34B1

(A/T)



SHDFL6572L

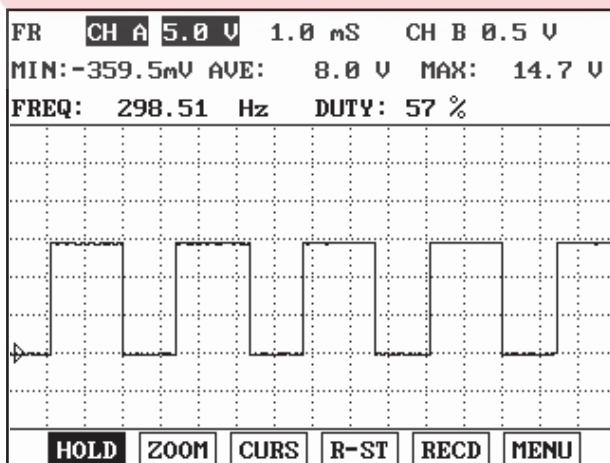
(M/T)



شرکت دیجیتالی خودرو سامانه (مسئولیت محدود)

SHDFL6902L

SIGNAL WAVEFORM & DATA E77C5BC7



The ECM controls OCV by duty value.

LFJF302A

MONITOR SCANTOOL DATA EA53B87D

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

DTC TROUBLESHOOTING PROCEDURES

FL -145

1.2 CURRENT DATA		28964
* CVVT STATUS	ON	
* ENGINE SPEED	648.8rpm	
* CAMSHAFT POSITION	26.9 °	
* CAMSHAFT POS.-TARGET	27.8 °	
ENG. OIL TEMPERATURE	98.7 °C	
CALCULATE OIL TEMPERAT	83.9 °C	
IGNITION TIMING - CYL1	6.8 °	
IGNITION TIMING - CYL2	5.3 °	

Idle

1.2 CURRENT DATA		28964
* CVVT STATUS	ON	
* ENGINE SPEED	2000.rpm	
* CAMSHAFT POSITION	7.6 °	
* CAMSHAFT POS.-TARGET	6.2 °	
ENG. OIL TEMPERATURE	91.5 °C	
CALCULATE OIL TEMPERAT	84.7 °C	
IGNITION TIMING - CYL1	53.2 °	
IGNITION TIMING - CYL2	51.8 °	

2000rpm
/w steady speed

SHDFL6514L

4. Is the "OCV" 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

Go to "Terminal and Connector Inspection" procedure.

TERMINAL AND CONNECTOR INSPECTION E8AA35B4

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "Power Circuit Inspection" procedure.

POWER CIRCUIT INSPECTION E5B083DE

1. IG "OFF".
2. Disconnect OCV connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 2 of OCV harness connector and chassis ground.

Specification : B+

FL -146

FUEL SYSTEM

5. Is the measured voltage within specification?

YES

Go to "Control Circuit Inspection" procedure.

NO

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

CONTROL CIRCUIT INSPECTION E2848E61

1. IG "OFF".
2. Disconnect OCV connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 1 of OCV harness connector and chassis ground.

Specification : Approx. 3.2V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION E1BE7BEF

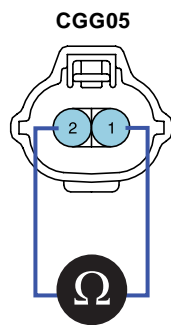
1. Check OCV.
 - 1) IG "OFF"
 - 2) Disconnect OCV connector.
 - 3) Measure resistance between terminal 1 and 2 of OCV connector.(Component Side)

SPECIFICATION :

Temperature [()]	Coil Resistance ()
20 (68)	6.9 ~ 7.9

DTC TROUBLESHOOTING PROCEDURES

FL -147



1. OCV Control
2. Sensor Power

SHDFL6517L

4) Is the measured resistance within specification ?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good OCV and check for proper operation.

If the problem is corrected, replace OCV and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR

EC9551C0

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

FL -148

FUEL SYSTEM

DTC P0076 INTAKE VALVE CONTROL SOLENOID CIRCUIT LOW (BANK 1)**COMPONENT LOCATION** EE623726

Refer to DTC P0075.

GENERAL DESCRIPTION EE1E1609

Refer to DTC P0075.

DTC DESCRIPTION E6B356D2

When PCM detects short to ground in OCV control circuit, ECM sets DTC P0076.

DTC DETECTING CONDITION E4049A58

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Circuit continuity check, low 	<ul style="list-style-type: none"> Poor connection Short to ground in control circuit OCV
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> Short circuit to ground 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SPECIFICATION E059D1EB

Refer to DTC P0075.

SCHEMATIC DIAGRAM E7F35EBD

Refer to DTC P0075.

SIGNAL WAVEFORM & DATA E5D2A602

Refer to DTC P0075.

MONITOR SCANTOOL DATA E6BF51D7

Refer to DTC P0075.

TERMINAL AND CONNECTOR INSPECTION E51510DC

Refer to DTC P0075.

POWER CIRCUIT INSPECTION EDECF488

1. IG "OFF".

DTC TROUBLESHOOTING PROCEDURES

FL -149

2. Disconnect OCV connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 2 of OCV harness connector and chassis ground.

Specification : B+

5. Is the measured voltage within specification?

YES

Go to "Control Circuit Inspection" procedure.

NO

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

CONTROL CIRCUIT INSPECTION EA9928BC

1. IG "OFF".
2. Disconnect OCV connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 2 of OCV harness connector and chassis ground.

Specification : Approx. 3.2V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

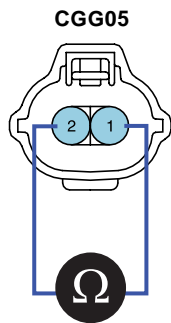
Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION EAAFF262

1. Check OCV.
 - 1) IG "OFF"
 - 2) Disconnect OCV connector.
 - 3) Measure resistance between terminal 1 and 2 of OCV connector.(Component Side)

SPECIFICATION :

Temperature [()]	Coil Resistance ()
20 (68)	6.9 ~ 7.9



1. OCV Control
2. Sensor Power

SHDFL6517L

4) Is the measured resistance within specification ?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good OCV and check for proper operation.

If the problem is corrected, replace OCV and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR

E0BA2985

Refer to DTC P0075.

DTC TROUBLESHOOTING PROCEDURES

FL -151

DTC P0077 INTAKE VALVE CONTROL SOLENOID CIRCUIT HIGH (BANK 1)**COMPONENT LOCATION** E4C30DC1

Refer to DTC P0075.

GENERAL DESCRIPTION E1DAB79C

Refer to DTC P0075.

DTC DESCRIPTION EF3CEB85

When ECM detects short to power in OCV control circuit, ECM sets DTC P0077.

DTC DETECTING CONDITION E3E697F9

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Circuit continuity check, high 	<ul style="list-style-type: none"> Poor connection Short to battery in control circuit OCV
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> Short circuit to battery 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SPECIFICATION E88574F9

Refer to DTC P0075.

SCHEMATIC DIAGRAM E0C32353

Refer to DTC P0075.

SIGNAL WAVEFORM & DATA EA9D559B

Refer to DTC P0075.

MONITOR SCANTOOL DATA E90C7F88

Refer to DTC P0075.

TERMINAL AND CONNECTOR INSPECTION ED9CF182

Refer to DTC P0075.

CONTROL CIRCUIT INSPECTION E3316347

1. Check short to ground.

FL -152

FUEL SYSTEM

- 1) IG "OFF".
- 2) Disconnect OCV connector.
- 3) IG "ON" & ENG "OFF".
- 4) Measure voltage between terminal 1 of OCV harness connector and chassis ground.

Specification : Approx. 3.2V

- 5) Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

Repair or replace as necessary and then, go to 'Verification of Vehicle Repair" procedure.

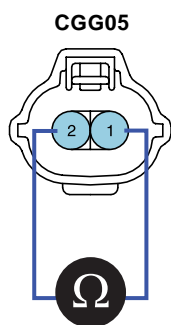
COMPONENT INSPECTION E5CEA785

1. Check OCV.

- 1) IG "OFF"
- 2) Disconnect OCV connector.
- 3) Measure resistance between terminal 1 and 2 of OCV harness connector.(Component Side)

SPECIFICATION : اولین سامانه دیجیتال تعمیرکاران خودرو

Temperature [()]	Coil Resistance ()
20 (68)	6.9 ~ 7.9



1. OCV Control
2. Sensor Power

SHDFL6517L

- 4) Is the measured resistance within specification ?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor

DTC TROUBLESHOOTING PROCEDURES**FL -153**

connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR E2EDD4C3

Refer to DTC P0075.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



FL -154

FUEL SYSTEM

DTC P0106 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT RANGE/PERFORMANCE

COMPONENT LOCATION EC8250FA



SHDFL6708L

GENERAL DESCRIPTION E66614FA

The amount of intake air flow must be inputted to ECM in order to determine the fuel injection quantity. MAPS(Manifold Absolute Pressure) calculates the amount of air indirectly as measuring the pressure inside of intake manifold. This mechanism is also called Speed-Density Type. MAPS transfers analog output signal which is proportional to the change of intake manifold pressure, then, with this signal and RPM, ECM calculates the amount of intake air flow. MAPS is mounted on surge tank to measure the pressure inside of intake manifold, and it consists of a piezo electric element and hybrid IC which amplifies output signal from the element. A piezo electric element is a sort of a diaphragm using piezo electric effect. One side of the diaphragm is surrounded with vacuum chamber while intake pressure is applied to the other side. Thus, signals are output by the transformation of diaphragm according to the change of pressure inside of intake manifold.

DTC DESCRIPTION EDA048FA

If intake manifold pressure is lower than the minimum threshold value or higher than the maximum threshold value according to RPM and TPS under normal TPS signal input condition, ECM sets DTC P0106.

DTC DETECTING CONDITION E0625D61

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Rationality check 	<ul style="list-style-type: none"> Poor connection MAPS
Enable Conditions	<ul style="list-style-type: none"> No TPS error detected Malfunction condition satisfied not less than 5 sec. 	
Threshold Value	<ul style="list-style-type: none"> Intake manifold pressure max. Threshold f(Eng. Speed, TPS) 	
Diagnostic Time	<ul style="list-style-type: none"> 3 sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

DTC TROUBLESHOOTING PROCEDURES

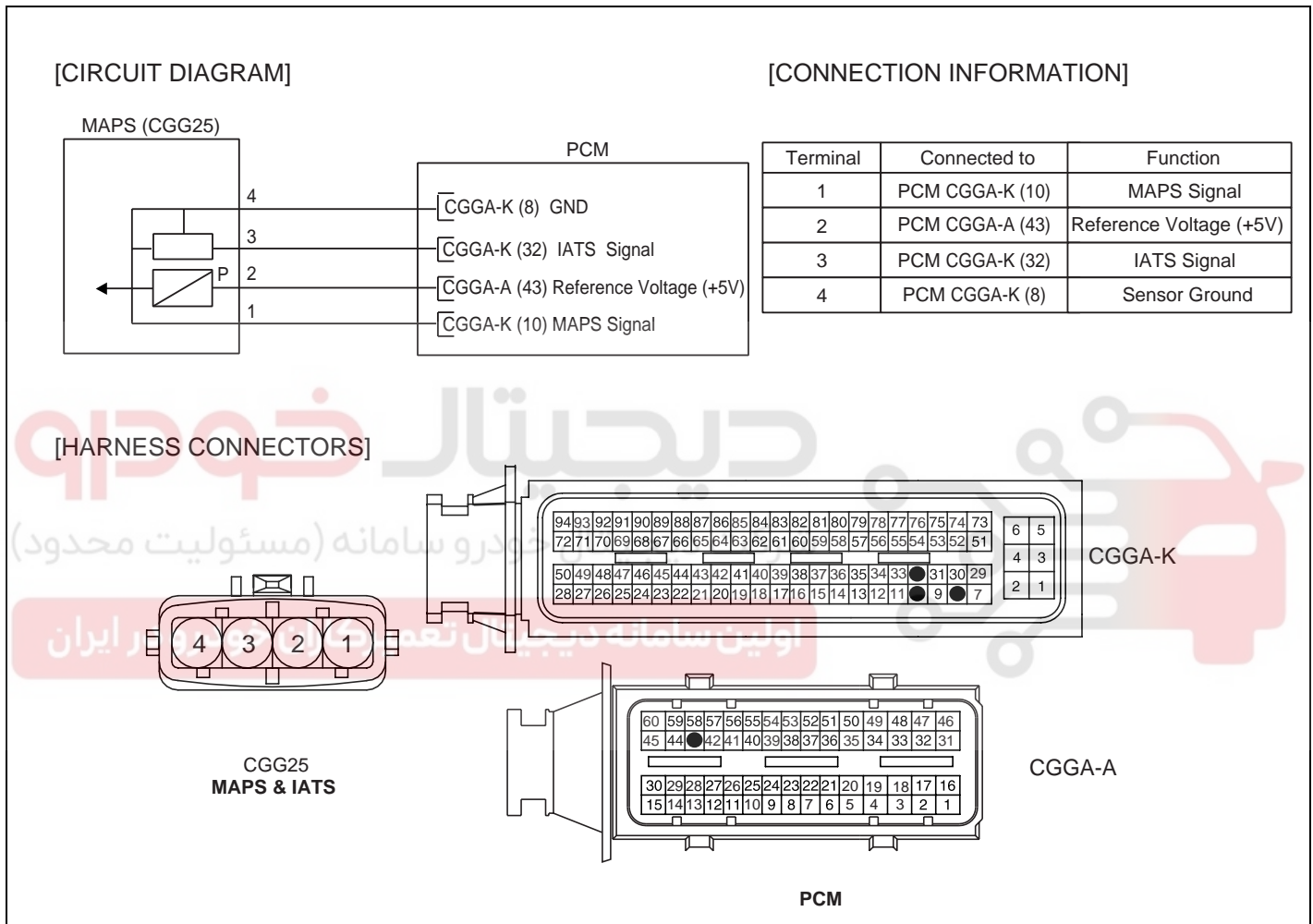
FL -155

SPECIFICATION E7017F1C

Pressure [Kpa]	20	46.7	101.32
Voltag [V]	0.79	1.84	4.0

SCHEMATIC DIAGRAM E4768EAC

(A/T)

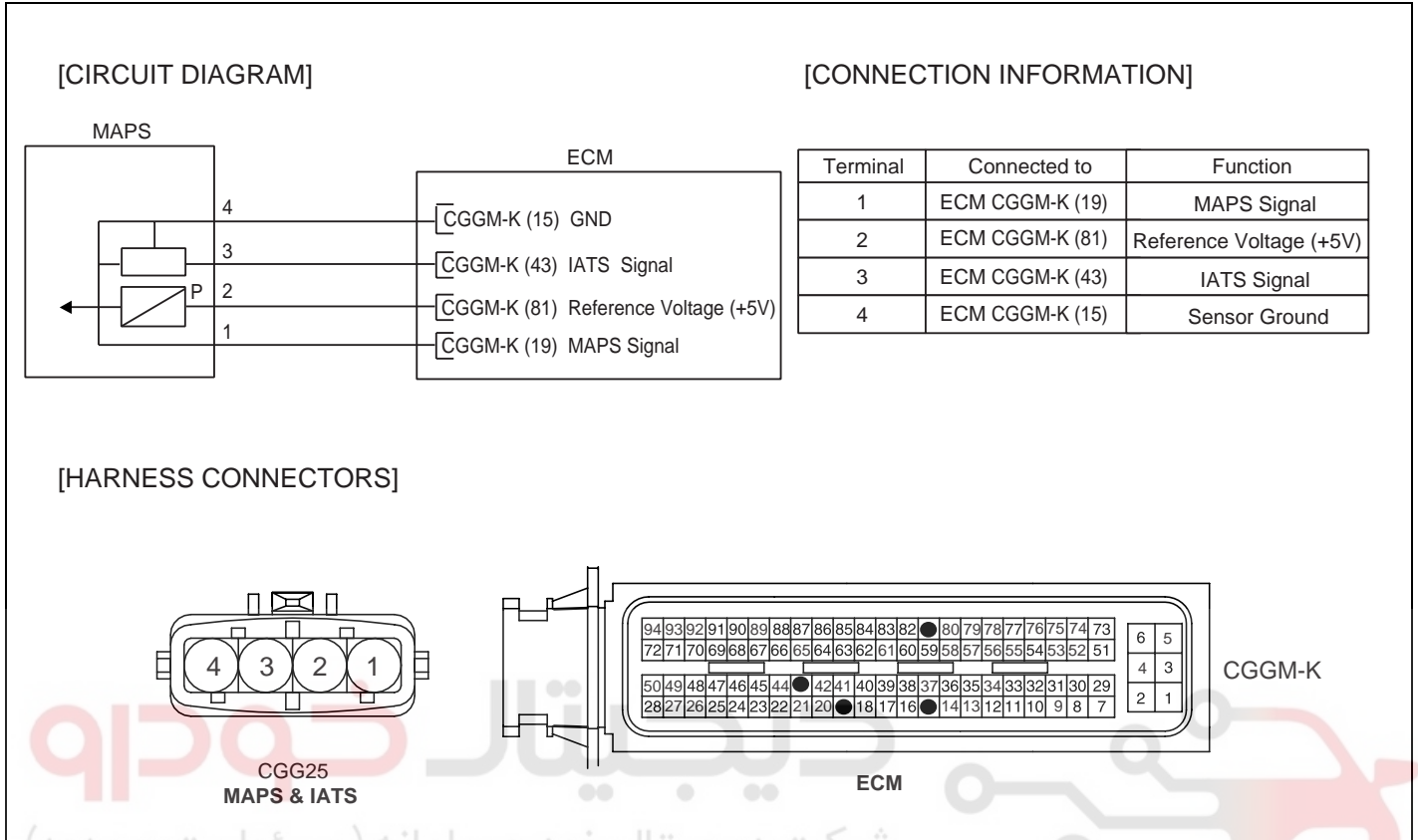


SHDFL6581L

FL -156

FUEL SYSTEM

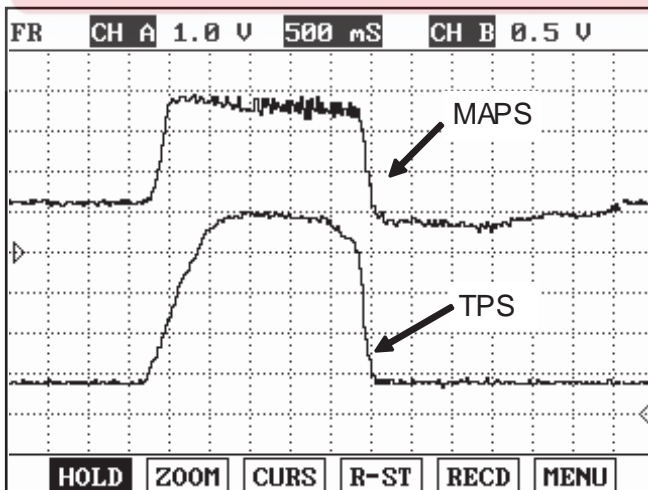
(M/T)



SHDFL6582L

SIGNAL WAVEFORM & DATA

E3904F65



As often as possible, the MAPS signal should be compared with the TPS signal. Check whether the MAPS and TPS signals increase at the same time when accelerating. During acceleration, the MAPS output voltage increases; during deceleration, the MAPS output voltage decreases.

LFJF360A

MONITOR SCANTOOL DATA

E4672D50

1. Connect scantool to Data Link Connector(DLC).

DTC TROUBLESHOOTING PROCEDURES

FL -157

2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

1.1 DIAGNOSTIC TROUBLE CODES	1.4 AMBIENT CONDITIONS
PXXXX DTC TITLE	1. MIL STATUS : ON / OFF
	2. DTC STATUS : PRESENT / HISTORY
	3. DTC READNESS FLAG : COMPLETE
NUMBER OF DTC : 1 ITEMS	
PART ERAS DTAL	

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure

TERMINAL AND CONNECTOR INSPECTION E168BE0C

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

FL -158

FUEL SYSTEM

NO

Go to " Voltage Inspection " procedure.

VOLTAGE INSPECTION E3659069

1. IG "OFF".
2. Disconnect MAPS connector.
3. IG "ON" & ENG "OFF".
4. Measure voltage between terminal 1, 2,4 of MAPS harness connector and chassis ground.

Specification :

Terminal 1 : Approx. 5V

Terminal 2 : Approx. 5V

Terminal 4 : Below 0V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection " procedure.

NO

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

COMPONENT INSPECTION ED7EB1B1

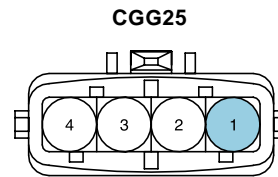
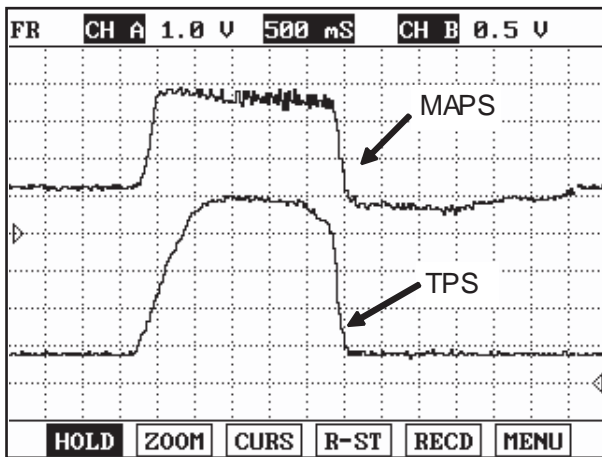
1. Check MAPS performance.
 - 1) IG "OFF".
 - 2) Connect CH A probe to terminal 1 of MAPS and CH B probe to terminal 1 of TPS connector.
 - 3) Warm up the engine to normal operating temperature.
 - 4) Measure signal waveform of MAPS and TPS together by stepping on and off the accelerator pedal.

Specification : Acceptable temperature range : (23 ±5)

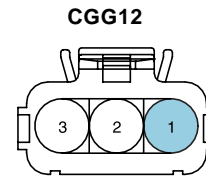
Pressure [Kpa]	20	46.7	101.32
Voltage [V]	0.79	1.84	4.0

DTC TROUBLESHOOTING PROCEDURES

FL -159



1. MAPS Signal



1. TPS Signal

SHDFL6519L

5) Is the measured signal waveform(Comparison response of TPS with MAPS) O.K.?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good MAPS and check for proper operation.

If the problem is corrected, replace MAPS and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E7DE2AB5

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

FL -160

FUEL SYSTEM

DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT

COMPONENT LOCATION E5824ACC

Refer to DTC P0106.

GENERAL DESCRIPTION E90DCDB0

Refer to DTC P0106.

DTC DESCRIPTION E273A163

If sensor signal input is lower than 0.25V during 3 sec, PCM sets DTC P0107.

DTC DETECTING CONDITION EECD5C53

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Signal check, low 	<ul style="list-style-type: none"> Poor connection Open or short to ground in power circuit Short to ground in signal circuit MAPS ECM
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> Sensor voltage 0.25 V 	
Diagnostic Time	<ul style="list-style-type: none"> 3 sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SPECIFICATION EE3A9D42

Refer to DTC P0106.

SCHEMATIC DIAGRAM EDF780F5

Refer to DTC P0106.

SIGNAL WAVEFORM & DATA E1B66CA3

Refer to DTC P0106.

MONITOR SCANTOOL DATA E75E516A

Refer to DTC P0106.

TERMINAL AND CONNECTOR INSPECTION EA61A038

Refer to DTC P0106.

DTC TROUBLESHOOTING PROCEDURES

FL -161

POWER SUPPLY CIRCUIT INSPECTION E7329199

1. IG "OFF".
2. Disconnect MAPS connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 2 of MAPS harness connector and chassis ground.

Specification : Approx. 5V

5. Is the measured voltage within specification?

YES

Go to "Signal Circuit Inspection" procedure.

NO

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

SIGNAL CIRCUIT INSPECTION E9C3C8D9

1. IG "OFF".
2. Disconnect MAPS connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage terminal 1 of MAPS harness connector and chassis ground.

Specification : Approx. 5V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION EA2ED8AF

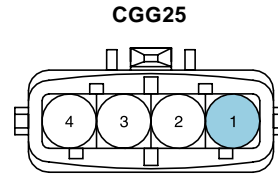
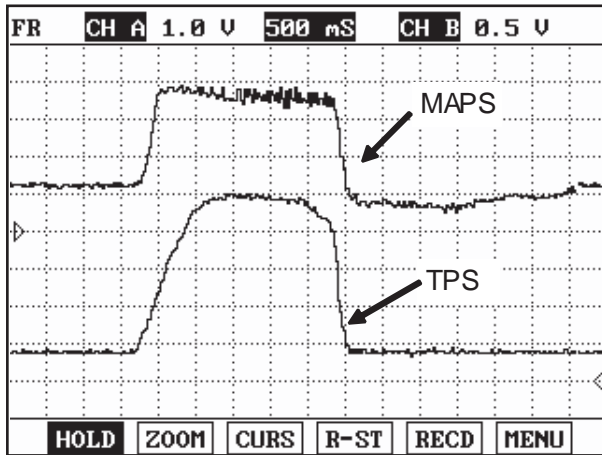
1. Check MAPS performance.
 - 1) IG "OFF".
 - 2) Connect CH A probe to terminal 1 of MAPS and CH B probe to terminal 1 of TPS connector.
 - 3) Warm up the engine to normal operating temperature.
 - 4) Measure signal waveform of MAPS and TPS together by stepping on and off the accellerator padel.

Specification : Acceptable temperature range : (23 ±5)

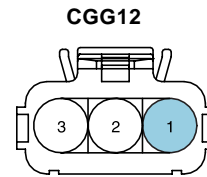
FL -162

FUEL SYSTEM

Pressure [Kpa]	20	46.7	101.32
Voltag [V]	0.79	1.84	4.0



1. MAPS Signal



1. TPS Signal

SHDFL6519L

5) Is the measured signal waveform(Comparison response of TPS with MAPS) O.K?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR EA1F8E01

Refer to DTC P0106.

DTC TROUBLESHOOTING PROCEDURES

FL -163

DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT**COMPONENT LOCATION** EBEE9A78

Refer to DTC P0106.

GENERAL DESCRIPTION E0FA4892

Refer to DTC P0106.

DTC DESCRIPTION E537DDAD

If sensor signal input is higher than 4.88V during 3 sec, ECM sets DTC P0108.

DTC DETECTING CONDITION E4552086

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Signal check, high 	<ul style="list-style-type: none"> Poor connection Open or short to power in signal circuit Open in ground circuit MAPS
Enable Conditions	<ul style="list-style-type: none"> Engine speed 30rpm or Not less than 5sec after engine start 	
Threshold Value	<ul style="list-style-type: none"> Sensor voltage > 4.88V 	
Diagnostic Time	<ul style="list-style-type: none"> 3 sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SPECIFICATION E42E31F2

Refer to DTC P0106.

SCHEMATIC DIAGRAM E19BE471

Refer to DTC P0106.

SIGNAL WAVEFORM & DATA E344A0DB

Refer to DTC P0106.

MONITOR SCANTOOL DATA EA3D2478

Refer to DTC P0106.

TERMINAL AND CONNECTOR INSPECTION EE20BB21

Refer to DTC P0106.

FL -164

FUEL SYSTEM

SIGNAL CIRCUIT INSPECTION E93BD892

1. Check open in harness.
 - 1) IG "OFF".
 - 2) Disconnect MAPS connector.
 - 3) IG "ON" & ENG "OFF"
 - 4) Measure voltage between terminal 1 of MAPS harness connector and chassis ground.

Specification : Approx. 5V

- 5) Is the measured voltage within specification?

YES

Go to "Check short to battery in harness" as follows.

NO

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

2. Check short to battery in harness.

- 1) IG "OFF".
- 2) Disconnect MAPS and ECM connector.
- 3) Measure resistance between terminal 1 and 2 MAPS harness connector.

Specification : Infinite

- 4) Is the measured resistance within specification?

YES

Go to "Ground Circuit Inspection" procedure.

NO

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

GROUND CIRCUIT INSPECTION E509F480

1. IG "OFF".
2. Disconnect MAPS connector.
3. Measure resistance between terminal 4 of MAPS harness connector and chassis ground.

Specification : Below 1

4. Is the measured resistance within specification?

YES

DTC TROUBLESHOOTING PROCEDURES

FL -165

Go to "Component Inspection" procedure.

NO

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

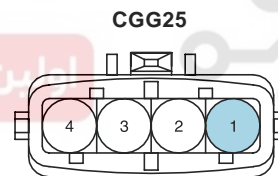
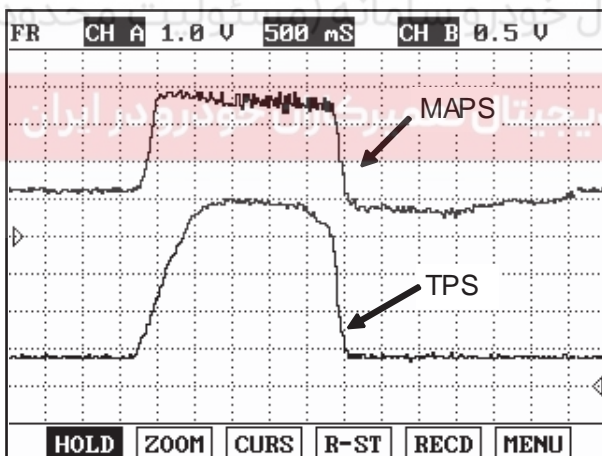
COMPONENT INSPECTION EED69474

1. Check MAPS performance.

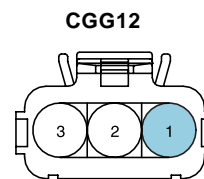
- 1) IG "OFF".
- 2) Connect CH A probe to terminal 1 of MAPS and CH B probe to terminal 1 of TPS connector.
- 3) Warm up the engine to normal operating temperature.
- 4) Measure signal waveform of MAPS and TPS together by stepping on and off the accellerator pedel.

Specification : Acepatable temperature range : (23 ±5)

Pressure [Kpa]	20	46.7	101.32
Voltag [V]	0.79	1.84	4.0



1. MAPS Signal



1. TPS Signal

SHDFL6519L

5) Is the measured signal waveform(Comparison response of TPS with MAPS) O.K?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

FL -166

FUEL SYSTEM

VERIFICATION OF VEHICLE REPAIR E7685115

Refer to DTC P0106.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

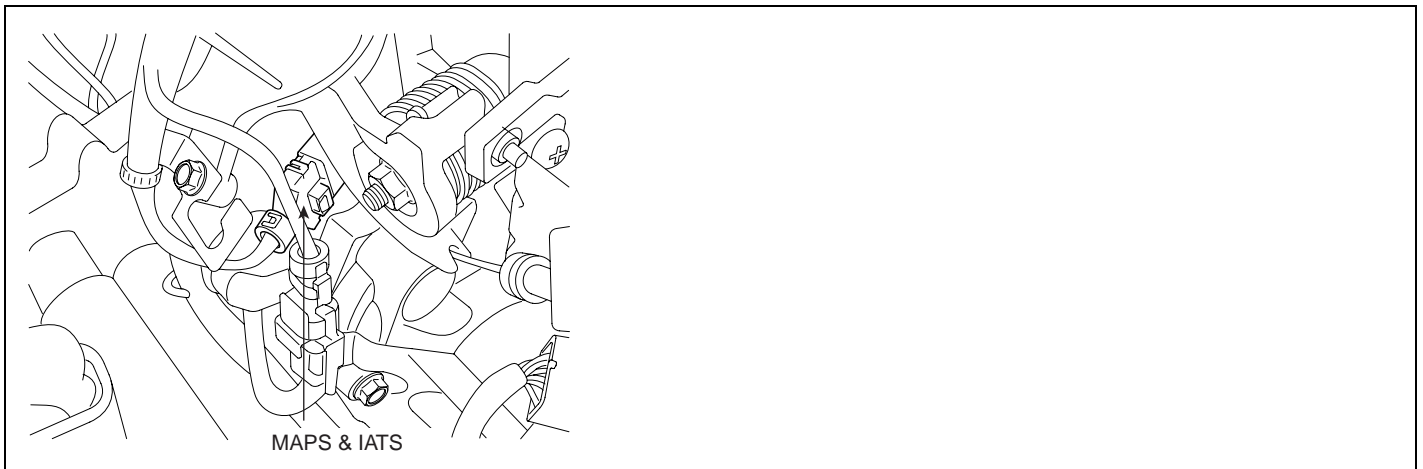


DTC TROUBLESHOOTING PROCEDURES

FL -167

DTC P0112 INTAKE AIR TEMPERATURE SENSOR1 CIRCUIT LOW INPUT

COMPONENT LOCATION E201D477



SHDFL6708L

GENERAL DESCRIPTION EFE7DA1D

The Intake Air Temperature (IAT) sensor measures the temperature of engine intake air. The Intake Air Temperature (IAT) sensor is a thermistor (a variable resistor that changes along with outside air temperature) in series with a fixed resistor in the ECM. The ECM applies 5V to the IAT sensor. The ECM monitors the voltage across the IAT sensor and converts it into a temperature reading. When the outside air temperature is cold the IAT sensor resistance is high, and when the outside air temperature is warm the IAT sensor resistance is low. Therefore, when the air temperature is cold the ECM will receive a high voltage input, and when the air temperature is warm the ECM will receive a low voltage input. The signal from IAT sensor is used for injection duration correction, ignition timing correction and idle speed correction (Air-density correction).

DTC DESCRIPTION ED7208FD

If measured temperature is higher than the maximum threshold value during 2sec, ECM sets DTC P0112. (In this case, the input signal voltage is the minimum threshold vaue.)

DTC DETECTING CONDITION E03A90DC

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Signal check, low 	<ul style="list-style-type: none"> Poor connection Short to ground in signal circuit IATS
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> Measured temperature > 126 	
Diagnostic Time	<ul style="list-style-type: none"> 2 sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

FL -168

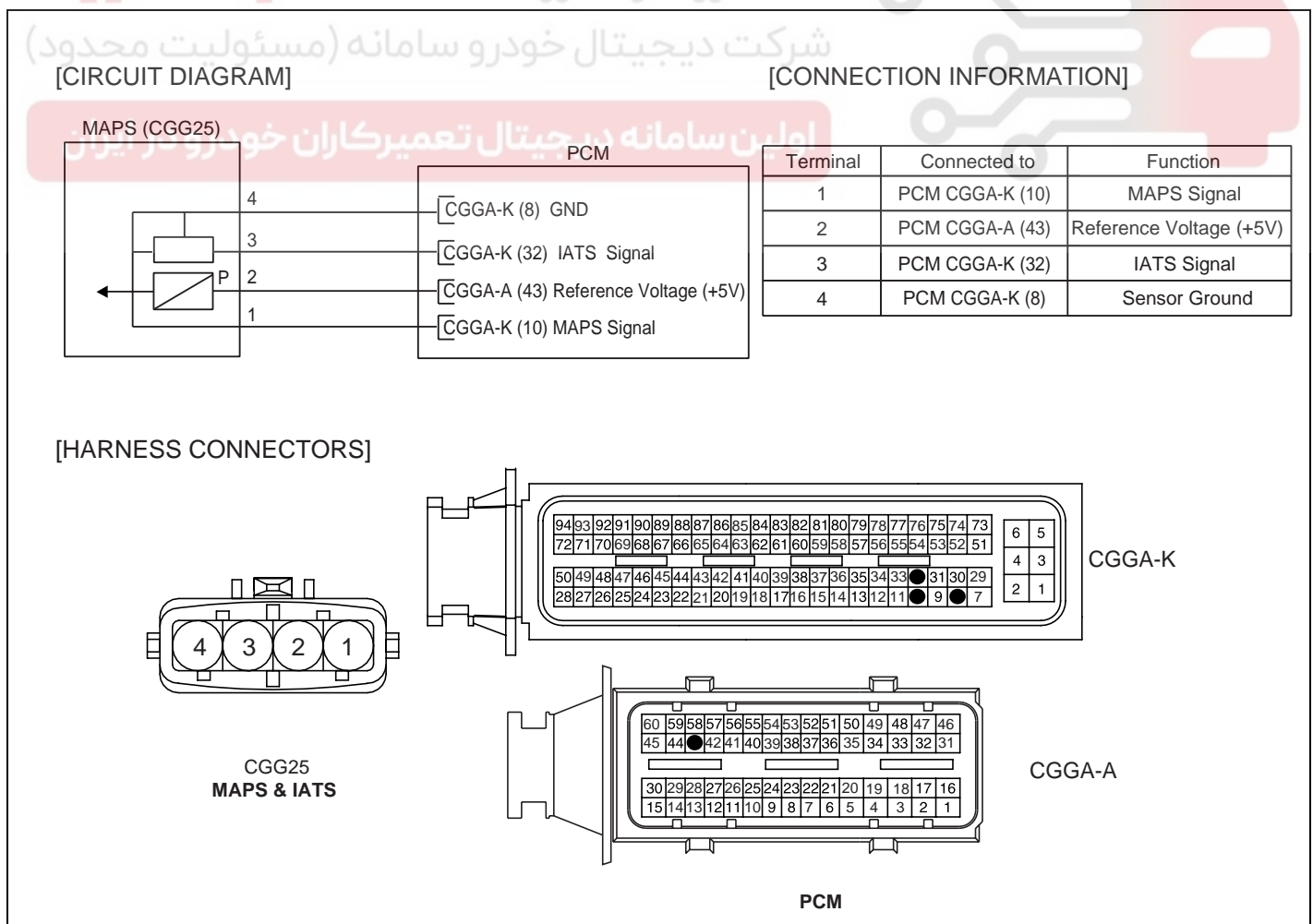
FUEL SYSTEM

SPECIFICATION E9D01858

Temperature [°C]	Resistance [Ω]
-40 (-40)	40.93 ~ 48.35
-30 (-22)	23.43 ~ 27.34
-20 (-4)	13.89 ~ 16.03
-10 (14)	8.50 ~ 9.71
0 (32)	5.38 ~ 6.09
10 (50)	3.48 ~ 3.90
20 (68)	2.31 ~ 2.57
25 (77)	1.90 ~ 2.10
30 (86)	1.56 ~ 1.74
40 (104)	1.08 ~ 1.21
60 (140)	0.54 ~ 0.62
80 (176)	0.29 ~ 0.34

SCHEMATIC DIAGRAM E5D13600

(A/T)

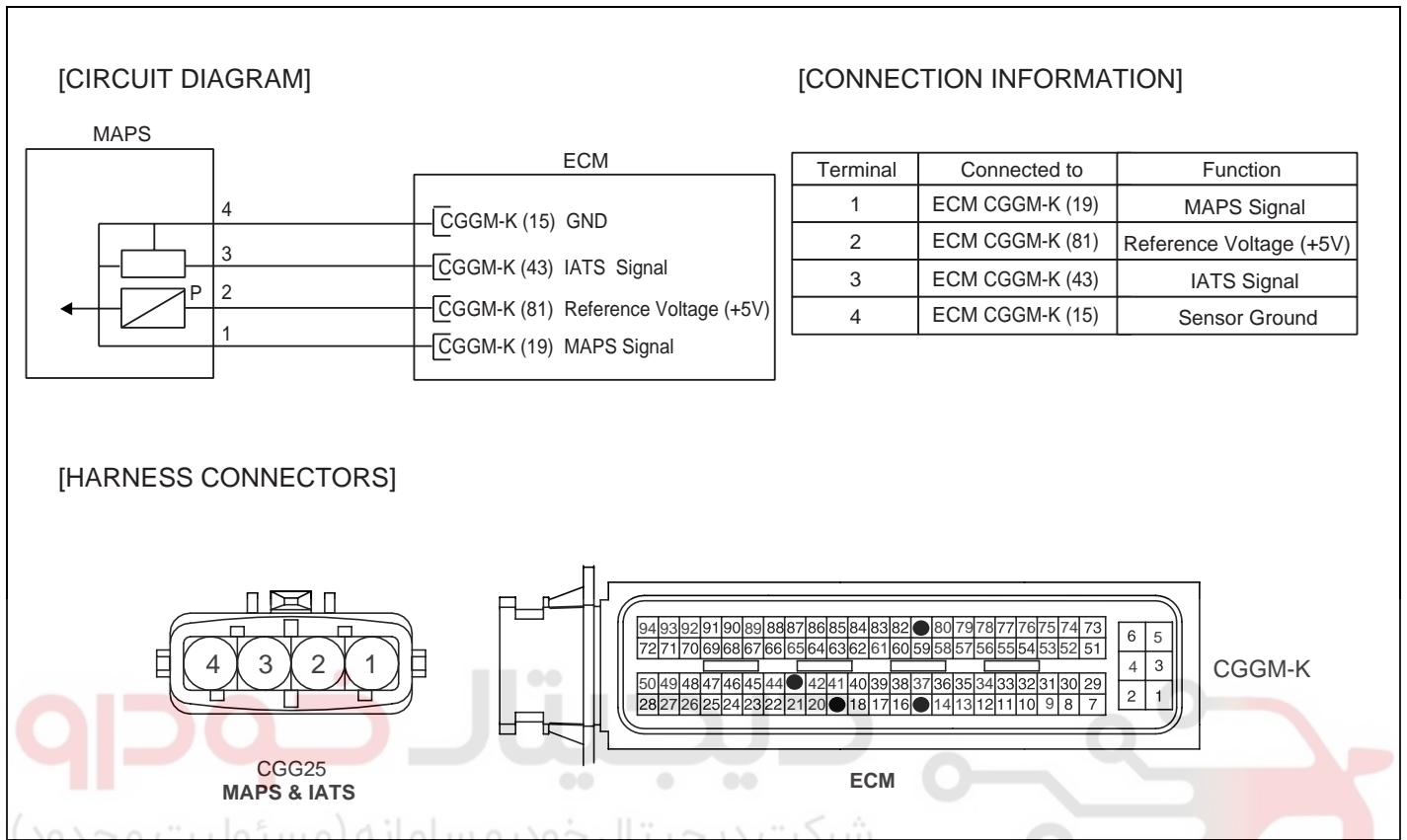


SHDFL6581L

DTC TROUBLESHOOTING PROCEDURES

FL -169

(M/T)



SHDFL6582L

MONITOR SCANTOOL DATA اولین سامانه دیجیتال

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

1.2 CURRENT DATA		32964
× ENGINE SPEED	648.8rpm	
× WATER TEMPERATURE	87.8 °C	
× INTAKE AIR TEMPERATURE	41.3 °C	
× ISC ACTUATOR DUTY	26.1 %	
NO.1 INJ. DURATION	2.9 nS	
NO.2 INJ. DURATION	2.9 nS	
NO.3 INJ. DURATION	2.9 nS	
NO.4 INJ. DURATION	2.9 nS	

Normal

1.2 CURRENT DATA		32964
× ENGINE SPEED	648.8rpm	
× WATER TEMPERATURE	87.7 °C	
× INTAKE AIR TEMPERATURE	24.7 °C	
× ISC ACTUATOR DUTY	25.7 %	
NO.1 INJ. DURATION	2.9 nS	
NO.2 INJ. DURATION	2.9 nS	
NO.3 INJ. DURATION	2.9 nS	
NO.4 INJ. DURATION	2.9 nS	

Abnormal(Short to ground)

SHDFL6524L

4. Is the "IATS" parameter displayed correctly?

YES

FL -170

FUEL SYSTEM

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, poorconnection, ending, corrosion, contamination, deterioration, or damage. Repair or replace asnecessary and go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal and Connector Inspection" procedure.

TERMINAL AND CONNECTOR INSPECTION E339381F

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to " Signal Circuit Inspection " procedure.

SIGNAL CIRCUIT INSPECTION E2089C09

1. IG "OFF".
2. Disconnect IATS connector.
3. IG "ON" & ENG "OFF".
4. Measure voltage between terminal 3 of IATS harness connector and chassis ground.

Specification : Approx. 5V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION E02B53E1

1. Check IATS resistance.
 - 1) IG "OFF".
 - 2) Disconnect IATS connector.
 - 3) Measure resistance between terminal 3 and 4 of IATS connector(Component Side).

DTC TROUBLESHOOTING PROCEDURES

FL -171

Specification :

Temperature [°C]	Resistance [Ω]
-40 (-40)	40.93 ~ 48.35
-30 (-22)	23.43 ~ 27.34
-20 (-4)	13.89 ~ 16.03
-10 (14)	8.50 ~ 9.71
0 (32)	5.38 ~ 6.09
10 (50)	3.48 ~ 3.90
20 (68)	2.31 ~ 2.57
25 (77)	1.90 ~ 2.10
30 (86)	1.56 ~ 1.74
40 (104)	1.08 ~ 1.21
60 (140)	0.54 ~ 0.62
80 (176)	0.29 ~ 0.34



SHDFL6526L

4) Is the measured resistance within specification ?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR E40744FF

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.

FL -172

FUEL SYSTEM

3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



DTC TROUBLESHOOTING PROCEDURES

FL -173

DTC P0113 INTAKE AIR TEMPERATURE SENSOR1 CIRCUIT HIGH INPUT**COMPONENT LOCATION** E78BF550

Refer to DTC P0112.

GENERAL DESCRIPTION EFCF4266

Refer to DTC P0112.

DTC DESCRIPTION E1EA8151

If measured temperature is lower than the minimum threshold value during 2sec, ECM sets DTC P0113.
(In this case, the input signal voltage is the maximum threshold vaue.)

DTC DETECTING CONDITION EC4E2388

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Signal check, high 	<ul style="list-style-type: none"> Poor connection Open or short to power in signal circuit Open in ground circuit IATS
Enable Conditions	<ul style="list-style-type: none"> Idle condition without fuel cut-off lasts less than 10 sec. Time after engine start > 18s Integrated air mass > 0.36kg Increase of measured temp. after start < 1.5 	
Threshold Value	<ul style="list-style-type: none"> Measured temperature < -43.5 	
Diagnostic Time	<ul style="list-style-type: none"> 2 sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SPECIFICATION EAED382C

Refer to DTC P0112.

SCHEMATIC DIAGRAM E3A892F9

Refer to DTC P0112.

MONITOR SCANTOOL DATA E617A8C0

Refer to DTC P0112.

TERMINAL AND CONNECTOR INSPECTION EB7837AB

Refer to DTC P0112.

SIGNAL CIRCUIT INSPECTION E0E8FBF2

1. Check open in harness.

1) IG "OFF".

FL -174**FUEL SYSTEM**

- 2) Disconnect IATS connector.
- 3) IG "ON" & ENG "OFF"
- 4) Measure voltage between terminal 3 of IATS harness connector and chassis ground.

Specification : Approx. 5V

- 5) Is the measured voltage within specification?

YES

Go to "Check short to ground in harness" as follows.

NO

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

2. Check short to ground in harness.

- 1) IG "OFF".
- 2) Disconnect IATS and ECM connector.
- 3) Measure resistance between terminal 3 and 4 of IATS harness connector.

Specification : Infinite

- 4) Is the measured resistance within specification?

YES اولین سامانه دیجیتال تعمیرکاران خودرو

Go to "Ground Circuit Inspection" procedure.

NO

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

GROUND CIRCUIT INSPECTION

E73DB22C

1. IG "OFF".
2. Disconnect IATS connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 3 of IATS harness connector and chassis ground(A)
5. Measure voltage between terminal 3 and 4 of IATS harness connector. (B)

Specification : "A" - "B" = Below 200mV

6. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

DTC TROUBLESHOOTING PROCEDURES

FL -175

NO

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

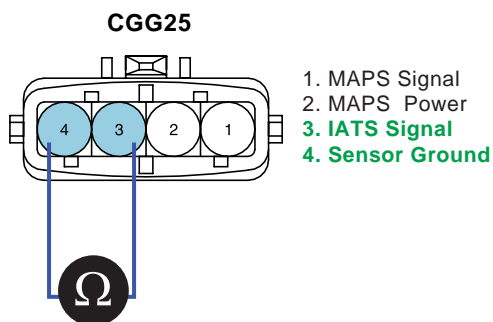
COMPONENT INSPECTION ED56F169

1. Check IATS resistance.

- 1) IG "OFF".
- 2) Disconnect IATS connector.
- 3) Measure resistance between terminal 3 and 4 of IATS connector(Component Side)

Specification :

Temperature [°C]	Resistance [Ω]
-40 (-40)	40.93 ~ 48.35
-30 (-22)	23.43 ~ 27.34
-20 (-4)	13.89 ~ 16.03
-10 (14)	8.50 ~ 9.71
0 (32)	5.38 ~ 6.09
10 (50)	3.48 ~ 3.90
20 (68)	2.31 ~ 2.57
25 (77)	1.90 ~ 2.10
30 (86)	1.56 ~ 1.74
40 (104)	1.08 ~ 1.21
60 (140)	0.54 ~ 0.62
80 (176)	0.29 ~ 0.34



SHDFL6860L

4) Is the measured resistance within specification ?

YES

FL -176

FUEL SYSTEM

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR EBF6AD6B

Refer to DTC P0112.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



DTC TROUBLESHOOTING PROCEDURES

FL -177

DTC P0116 ENGINE COOLANT TEMPERATURE CIRCUIT RANGE/PERFORMANCE

COMPONENT LOCATION E2869A08



SHDFL6709L

GENERAL DESCRIPTION E22BF954

The Engine Coolant Temperature (ECT) Sensor measures the temperature of engine coolant. The Engine Coolant Temperature (ECT) Sensor is located near the thermostat housing of the cylinder head. ECT Sensor is a thermistor (A Variable Resistor that Changes Along with ECT) in series with a fixed resistor in the Engine Control Module (ECM). The ECM applies 5 volts to the ECT sensor. The ECM monitors the voltage across the ECT sensor and converts it into a temperature reading. When the engine is cold the ECT sensor resistance is high, and when the engine is warm the ECT sensor resistance is low. Therefore, when the engine is cold the ECM will receive a high voltage input, and when the engine is warm the ECM will receive a low voltage input. The signal from ECT sensor is used for Injection control, ignition timing, idle speed and cooling fan control.

DTC DESCRIPTION EDF90895

If the measured coolant temperature is lower than the modeled temperature over the threshold value, P0116 is set.

DTC DETECTING CONDITION E905E84C

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Rationality check 	<ul style="list-style-type: none"> Poor connection ECTS
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> measured temp. - modeled temp. < -15 Modeled temp is expected coolant temperature calculated by ECU considering air mass, current modeled temp 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

FL -178

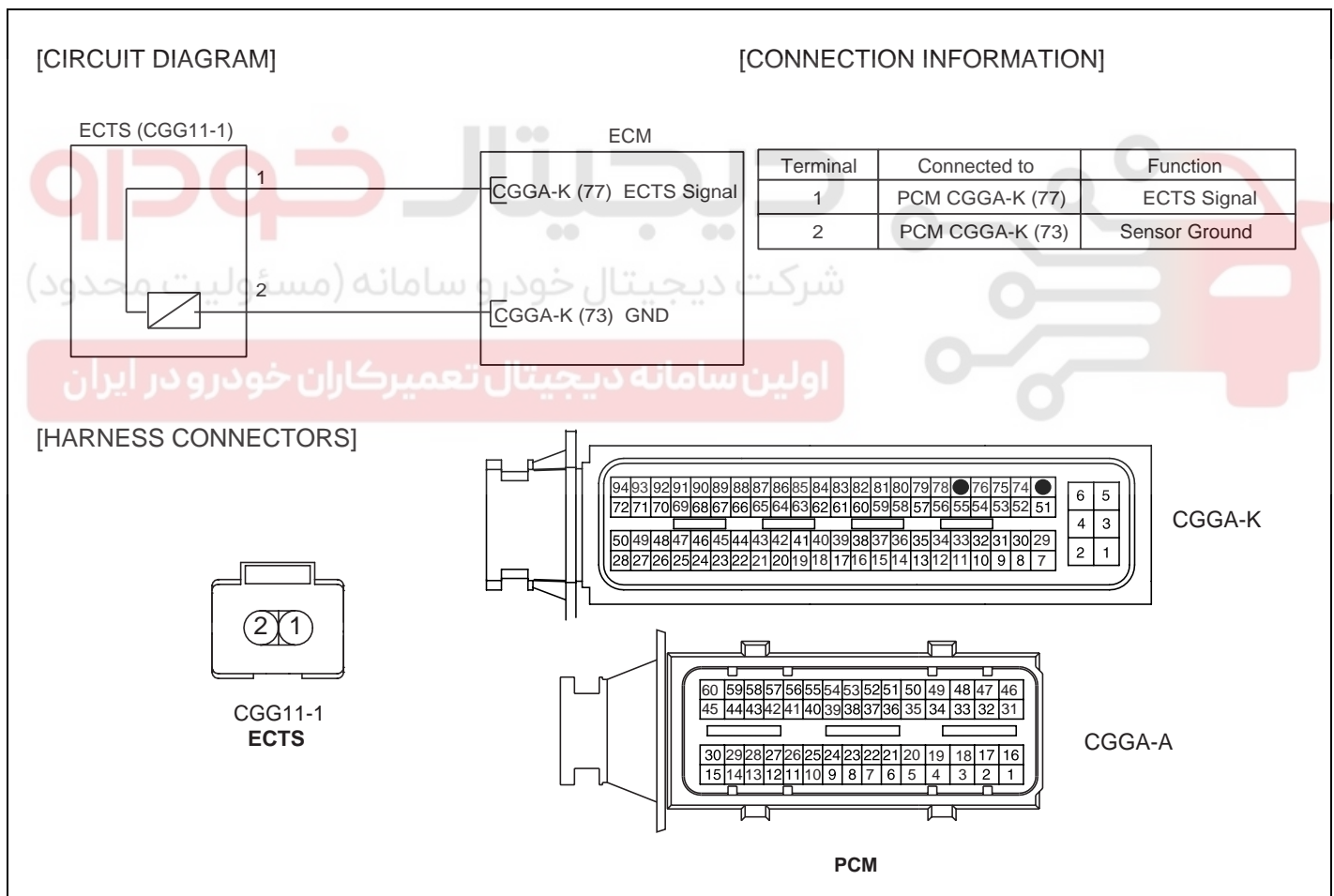
FUEL SYSTEM

SPECIFICATION E20B2FFD

Temperature [()]	Resistance (k)
-40 (-40)	48.14
-20)-4)	14.13 ~ 16.83
0 (32)	5.79
20 (68)	2.31 ~ 2.59
40 (104)	1.15
60 (140)	0.59
80 (176)	0.32

SCHEMATIC DIAGRAM E4E3D123

[AT]

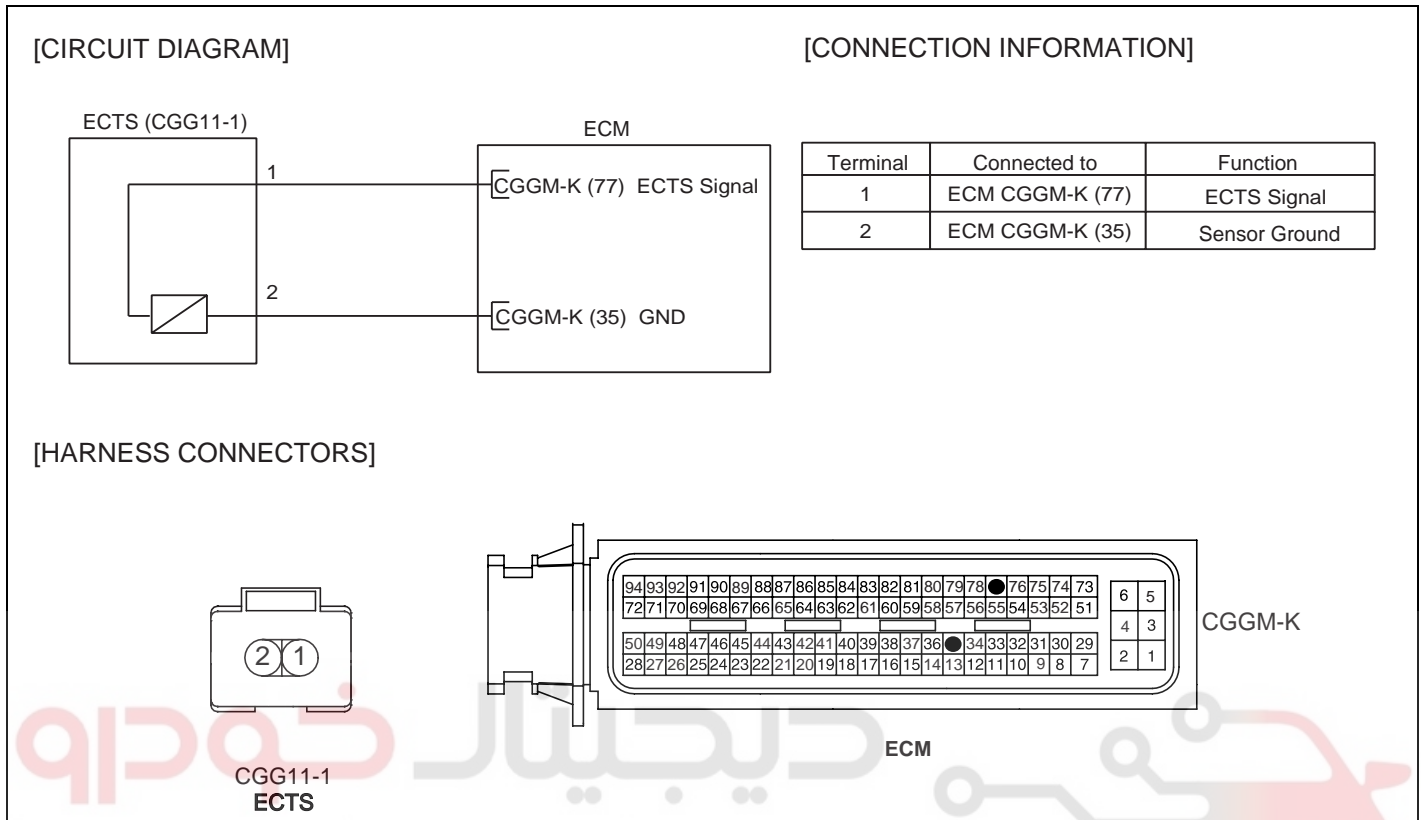


SHDFL6584L

DTC TROUBLESHOOTING PROCEDURES

FL -179

[MT]



SHDFL6585L

MONITOR SCANTOOL DATA EB2B639C

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

1.1 DIAGNOSTIC TROUBLE CODES	1.4 AMBIENT CONDITIONS
PXXXX DTC TITLE	1.MIL STATUS : ON / OFF
NUMBER OF DTC : 1 ITEMS	2.DTC STATUS : PRESENT / HISTORY
PART ERAS DTAL	3.DTC READNESS FLAG : COMPLETE

SHDFL6500L

FL -180

FUEL SYSTEM

6. Is parameter displayed "History(Not Present) fault"?



- *History fault : DTC occurred but has been cleared.*
- *Present fault : DTC is occurring at present time.*

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure.

TERMINAL AND CONNECTOR INSPECTION E0DA462F

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "Power Circuit Inspection" procedure.

VOLTAGE CHECK E3FCEDAE

1. IG "OFF".
2. Disconnect ECTS connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 1 of ECTS harness connector and chassis ground.
5. Measure voltage between terminal 2 of ECTS harness connector and chassis ground.

Specification : Terminal 1 Approx. 5V
Terminal 2 Approx. 0V

6. Is the measured voltage within specification ?

YES

Go to "Component Inspection" procedure.

DTC TROUBLESHOOTING PROCEDURES

FL -181

NO

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

COMPONENT INSPECTION E09CF030

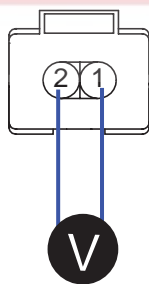
1. Check ECTS resistance.

- 1) IG "OFF".
- 2) Disconnect ECTS connector.
- 3) Measure resistance between terminal 1 and 2 of ECTS harness connector.(Component Side)

SPECIFICATION :

Temperature [()]	Resistance (k)
-40 (-40)	48.14
-20 (-4)	14.13 ~ 16.83
0 (32)	5.79
20 (68)	2.31 ~ 2.59
40 (104)	1.15
60 (140)	0.59
80 (176)	0.32

CGG11-1



1. ECTS Signal
2. Sensor ground

SHDFL6529L

4) Is the measured resistance within specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good ECTS and check for proper operation.

If the problem is corrected, replace ECTS and go to "Verification of Vehicle Repair" procedure.

FL -182

FUEL SYSTEM

VERIFICATION OF VEHICLE REPAIR EA4DAF97

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



DTC TROUBLESHOOTING PROCEDURES

FL -183

DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT**COMPONENT LOCATION** E388D9F7

Refer to DTC P0116.

GENERAL DESCRIPTION E7263860

Refer to DTC P0116.

DTC DESCRIPTION E1A71FDB

If measured temperature is higher than the maximum threshold value, ECM sets DTC P0117.
(In this case, the input signal voltage is the minimum threshold value.)

DTC DETECTING CONDITION EE390F8E

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Signal check, low 	<ul style="list-style-type: none"> Poor connection Short to ground in signal circuit ECTS
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> Measured temperature > 138.8 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SPECIFICATION E2DACCD1

Refer to DTC P0116.

SCHEMATIC DIAGRAM E0FA4AC0

Refer to DTC P0116.

MONITOR SCANTOOL DATA ED9B8524

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

1.2 CURRENT DATA 31/64		1.2 CURRENT DATA 31/64	
* ENGINE SPEED	648.8rpm	* ENGINE SPEED	888.8rpm
* WATER TEMPERATURE	82.5 °C	* WATER TEMPERATURE	62.2 °C
* INTAKE AIR TEMPERATURE	39.8 °C	* INTAKE AIR TEMPERATURE	39.7 °C
* ISC ACTUATOR DUTY	27.2 %	* ISC ACTUATOR DUTY	31.4 %
THROTTLE P. SENS(V)	8.3 V	TRANSAXLE RANGE SW	P, N
THROTTLE POSI. SENSOR	8.8 %	A/C ON CONDITION	OFF
ADAPTED THROTTLE ANGLE	6.5 %	A/C SWITCH	OFF
BATTERY VOLTAGE	14.2 V	MALFUNCTION IND. LAMP	OFF
FIX	SCRN	FULL	PART
GRPH	HELP	GRPH	HELP

Normal state

Fail Safe Mode

SHDFL6530L

4. Is the "ECTS" parameter 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, poorconnection, ending, corrosion, contamination, deterioration, or damage. Repair or replace asnecessary and go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal and Connector Inspection" procedure.

TERMINAL AND CONNECTOR INSPECTION E9A6144B

Refer to DTC P0116. اولین سامانه دیجیتال تعمیرکاران خودروهایی

SIGNAL CIRCUIT INSPECTION E8BD8998

1. IG "OFF".
2. Disconnect ECTS connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 1 of ECTS harness connector and chassis ground.

Specification : Approx. 5V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION E79BA0CD

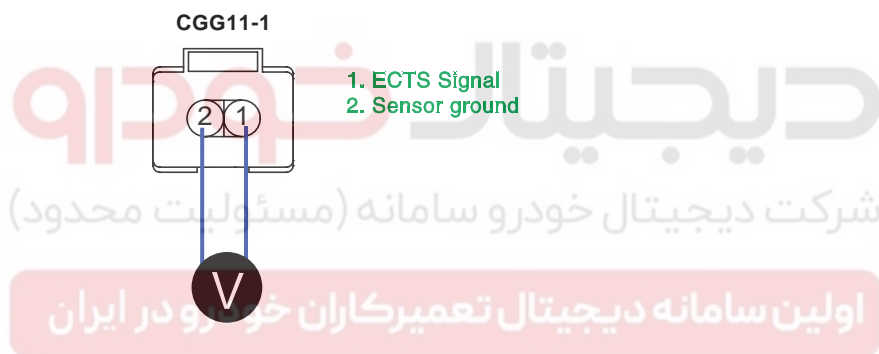
1. Check ECTS resistance.

DTC TROUBLESHOOTING PROCEDURES**FL -185**

- 1) IG "OFF".
- 2) Disconnect ECTS connector.
- 3) Measure resistance between terminal 1 and 2 of ECTS harness connector.(Component Side)

SPECIFICATION :

Temperature [()]	Resistance (k)
-40 (-40)	48.14
-20 (-4)	14.13 ~ 16.83
0 (32)	5.79
20 (68)	2.31 ~ 2.59
40 (104)	1.15
60 (140)	0.59
80 (176)	0.32



SHDFL6529L

- 4) Is the measured resistance within specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR EE12F8C1

Refer to DTC P0116.

FL -186

FUEL SYSTEM

DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT**COMPONENT LOCATION** EED28CC1

Refer to DTC P0116.

GENERAL DESCRIPTION E1F68FDE

Refer to DTC P0116.

DTC DESCRIPTION E2F44CE2

If measured temperature is lower than the minimum threshold value, ECM sets DTC P0118.
(In this case, the input signal voltage is the maximum threshold value.)

DTC DETECTING CONDITION E3D43711

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Signal check, high 	<ul style="list-style-type: none"> Poor connection Open or short to power in signal circuit Open in ground circuit ECTS
Enable Conditions	<ul style="list-style-type: none"> Increase of measured temp. after start < 2.3 	
Threshold Value	<ul style="list-style-type: none"> Measured temperature < -38.3 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SPECIFICATION E7C935C1

Refer to DTC P0116.

SCHEMATIC DIAGRAM E4430B99

Refer to DTC P0116.

MONITOR SCANTOOL DATA E3BDA00F

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

DTC TROUBLESHOOTING PROCEDURES

FL -187

1.2 CURRENT DATA 31/64		1.2 CURRENT DATA 31/64	
* ENGINE SPEED	648.8rpm	* ENGINE SPEED	888.8rpm
* WATER TEMPERATURE	82.5 °C	* WATER TEMPERATURE	62.2 °C
* INTAKE AIR TEMPERATURE	39.8 °C	* INTAKE AIR TEMPERATURE	39.7 °C
* ISC ACTUATOR DUTY	27.2 %	* ISC ACTUATOR DUTY	31.4 %
THROTTLE P. SENS(U)	8.3 V	TRANSAXLE RANGE SW	P, N
THROTTLE POSI. SENSOR	8.8 %	A/C ON CONDITION	OFF
ADAPTED THROTTLE ANGLE	6.5 %	A/C SWITCH	OFF
BATTERY VOLTAGE	14.2 V	MALFUNCTION IND. LAMP	OFF
FIX	SCRN	FULL	PART
GRPH	HELP	GRPH	HELP

Normal state

Fail Safe Mode

SHDFL6530L

4. Is the "ECTS" parameter 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

Go to "Terminal and Connector Inspection" procedure.

TERMINAL AND CONNECTOR INSPECTION EF501AED

Refer to DTC P0116. اولین سامانه دیجیتال تعمیرکاران خودرو

SIGNAL CIRCUIT INSPECTION E08D06C0

1. IG "OFF".
2. Disconnect ECTS connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 1 of ECTS harness connector and chassis ground.

Specification : Approx. 5V

5. Is the measured voltage within specification?

YES

Go to "Ground Circuit Inspection" procedure.

NO

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

GROUND CIRCUIT INSPECTION E0C1800F

1. IG "OFF".

FL -188

FUEL SYSTEM

2. Disconnect ECTS connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 1 of ECTS harness connector and chassis ground.(A)
5. Measure voltage between terminal 1 and 2 of ECTS harness connector.(B)

Specification : "A" - "B" = Below 200mV'

6. Is the measured voltage within specification?

YES

Go to "Component Inseption" procedure.

NO

Repair or replace as necessary and then, go to 'Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

EACCB61A

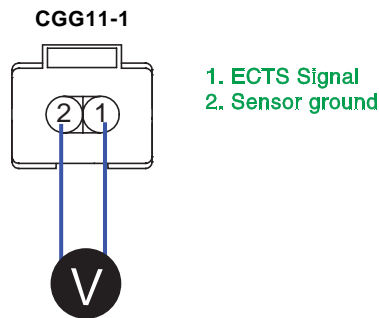
1. Check ECTS resistance.
 - 1) IG "OFF".
 - 2) Disconnect ECTS connector.
 - 3) Measure resistance between terminal 1 and 2 of ECTS connector.(Component Side)

SPECIFICATION :

Temperature [()]	Resistance (k)
-40 (-40)	48.14
-20)-4)	14.13 ~ 16.83
0 (32)	5.79
20 (68)	2.31 ~ 2.59
40 (104)	1.15
60 (140)	0.59
80 (176)	0.32

DTC TROUBLESHOOTING PROCEDURES

FL -189



SHDFL6529L

4) Is the measured resistance within specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good ECTS and check for proper operation.

If the problem is corrected, replace ECTS and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EB721DDF

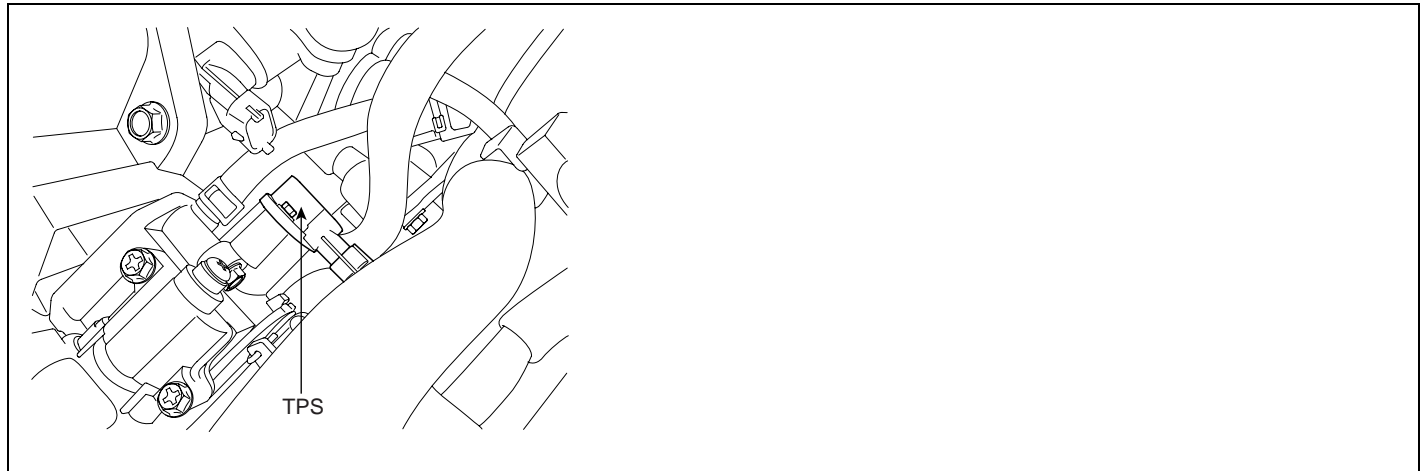
Refer to DTC P0116.

FL -190

FUEL SYSTEM

DTC P0121 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT RANGE/PERFORMANCE

COMPONENT LOCATION E9F204B1



SHDFL6710L

GENERAL DESCRIPTION E289AEB4

The Throttle Position Sensor (TPS) is mounted on the throttle body and detects the opening angle of the throttle plate. The TPS has a variable resistor (potentiometer) whose characteristic is the resistance changing according to the throttle angle. During acceleration, the TPS resistance between the reference 5V and the signal terminal decreases and output voltage increases; during deceleration, the TPS resistance increases and TPS output voltage decreases. The ECM supplies a reference 5V to the TPS and the output voltage increases directly with the opening of the throttle valve. The TPS output voltage will vary from 0.2~0.8V at closed throttle to 4.3~4.8V at wide-open throttle. The ECM determines operating conditions such as idle (closed throttle), part load, acceleration/deceleration, and wide-open throttle from the TPS. Also The ECM uses the Mass Air Flow Sensor (MAFS) or Manifold Absolute Pressure Sensor (MAPS) signal along with the TPS signal to adjust fuel injection duration and ignition timing.

DTC DESCRIPTION E3A0AA18

If the throttle angle signal changes above 30% in 5sec, PCM sets DTC P0121.

DTC DETECTING CONDITION E5824050

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Rationality check (Jittering) 	<ul style="list-style-type: none"> Poor connection TPS
Enable Conditions	<ul style="list-style-type: none"> Counter of signal switching 3 times 	
Threshold Value	<ul style="list-style-type: none"> Absolute value of the gradient of throttle angle > 30 	
Diagnostic Time	<ul style="list-style-type: none"> 5 sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

DTC TROUBLESHOOTING PROCEDURES

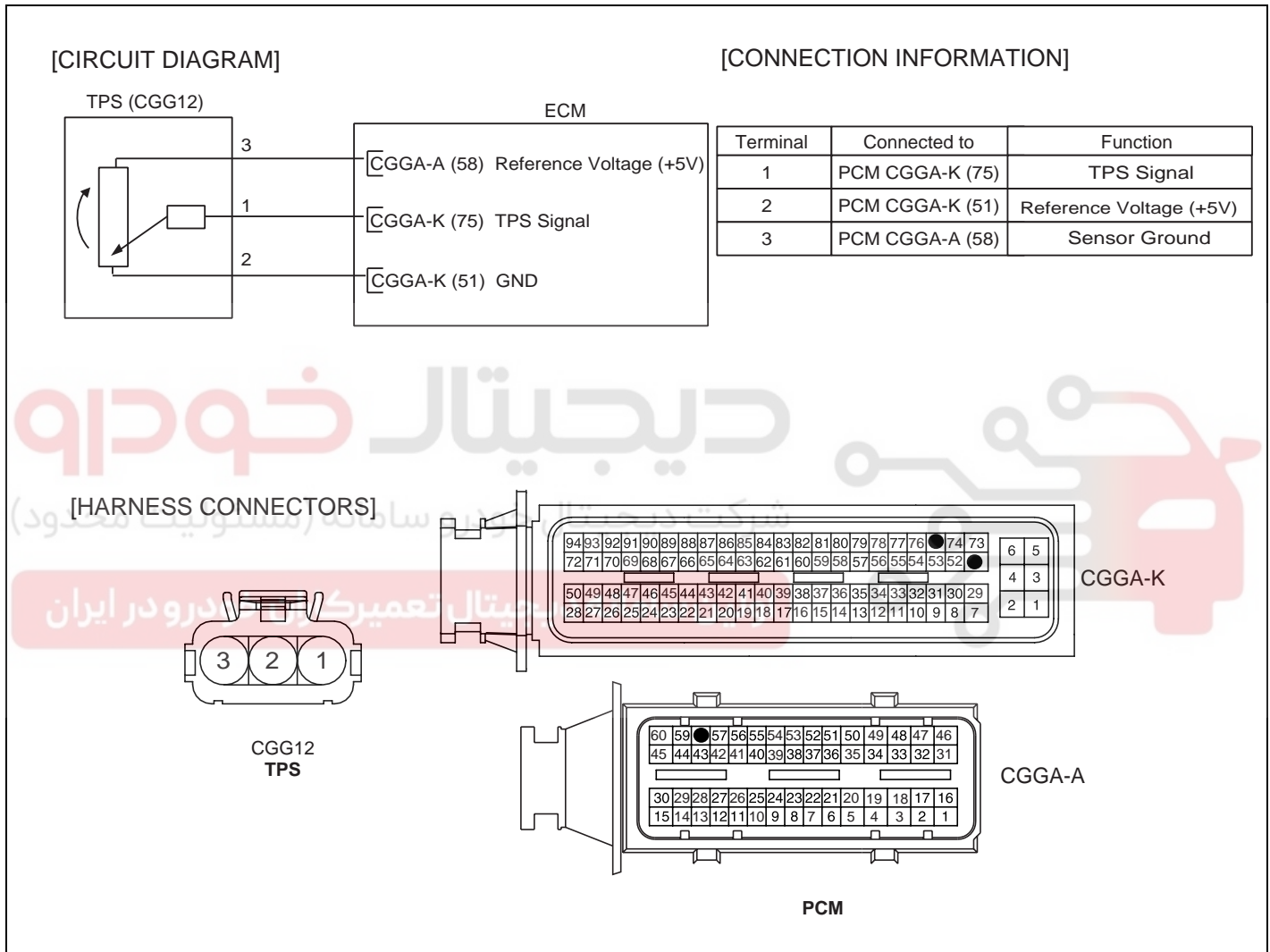
FL -191

SPECIFICATION E6B20FE2

ITEM	Specification
TPS Resistance (k)	2k ± 20% (20)

SCHEMATIC DIAGRAM EFCFF2D6

(A/T)

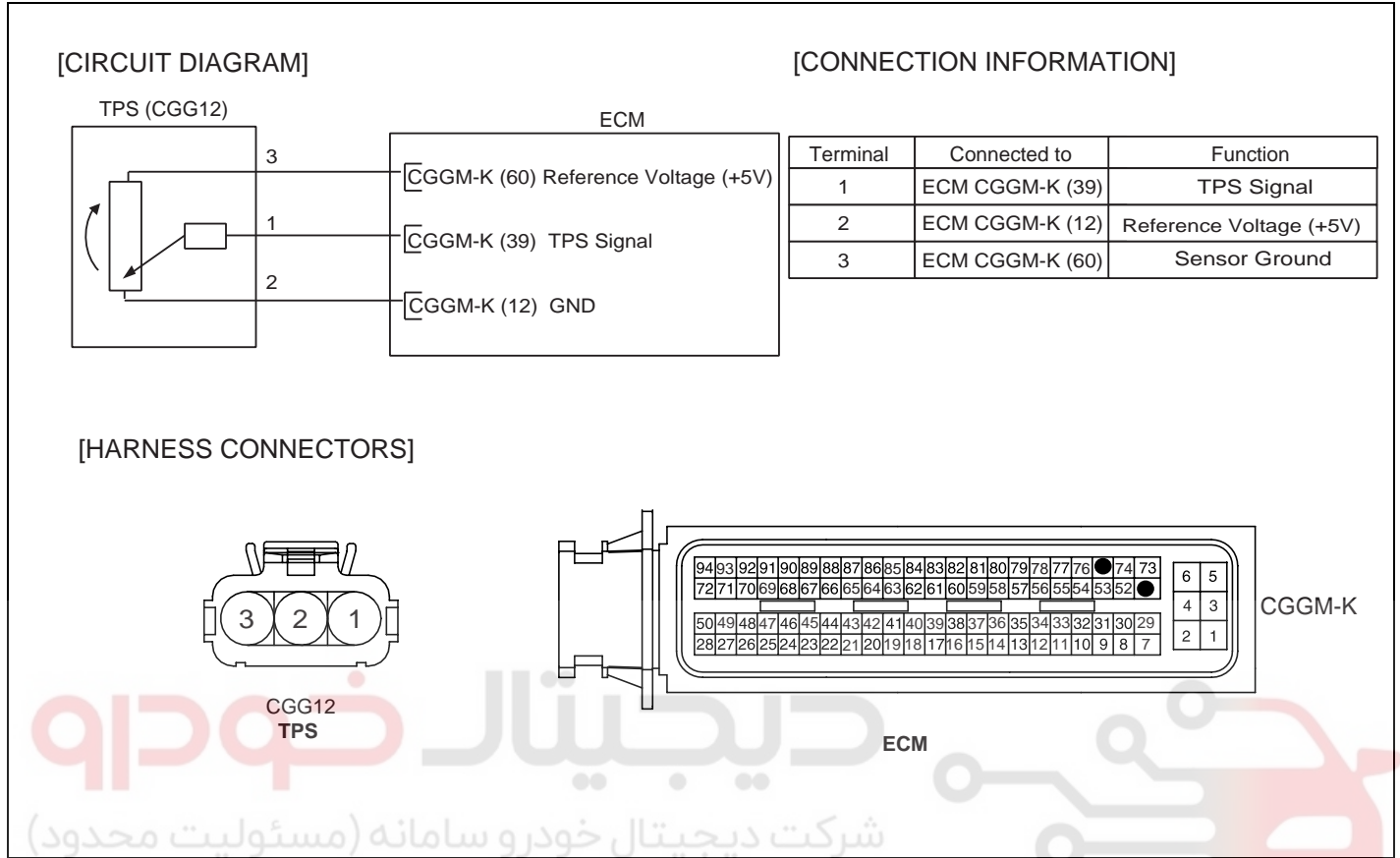


SHDFL6579L

FL -192

FUEL SYSTEM

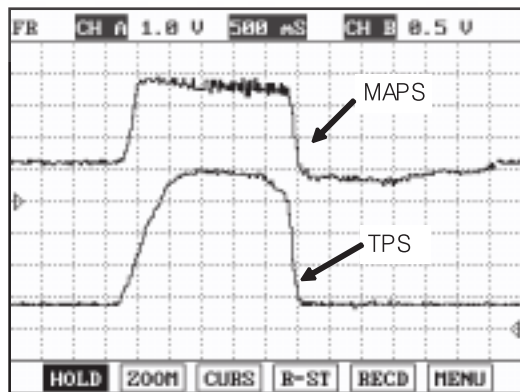
(M/T)



SHDFL6580L

SIGNAL WAVEFORM & DATA اولین سامانه دیجیتال تعمیرکاران خودروسازان

E9C0D3E1



SHDFL6533L

MONITOR SCANTOOL DATA

E56092B5

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu

DTC TROUBLESHOOTING PROCEDURES**FL -193**

4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

1.1 DIAGNOSTIC TROUBLE CODES				1.4 AMBIENT CONDITIONS	
Pxxxx DTC TITLE				1. MIL STATUS : ON / OFF	
				2. DTC STATUS : PRESENT / HISTORY	
				3. DTC READNESS FLAG : COMPLETE	
NUMBER OF DTC : 1 ITEMS					
PART	ERAS	DTAL			

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

شرکت دیجیتال خودرو (مسئولیت محدود)

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure

TERMINAL AND CONNECTOR INSPECTION E31F2A2A

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "TPS circuit inspection" procedure.

FL -194

FUEL SYSTEM

SIGNAL CIRCUIT INSPECTION EB4FE695

1. Key "OFF".
2. Disconnect TPS connector.
3. Key "ON".
4. Measure the voltage between terminal 1, 2, 3 of TPS harness connector and chassis ground.

Specification :

Terminal 1 : Approx. 5V

Terminal 2 : Approx. 0V

Terminal 3 : Approx. 5V

5. Is the measured voltage within specifications?

YES

Go to "Component inspection" procedure.

NO

Check for Open or Short in TPS circuit. Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

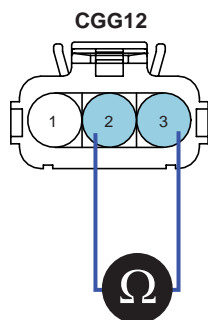
COMPONENT INSPECTION EB1B0A38

1. Check TPS resistance.

- 1) Key "OFF".
- 2) Disconnect TPS connector.
- 3) Measure the resistance between terminal 2 and 3 of TPS component side.

SPECIFICATION :

ITEM	Specification
TPS Resistance (k)	2k ± 20% (20)



1. Sensor signal
2. Sensor ground
3. Sensor power

SHDFL6535L

- 4) Is the measured resistance within specifications?

DTC TROUBLESHOOTING PROCEDURES**FL -195****YES**

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR EA5016B8

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.



FL -196

FUEL SYSTEM

DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW INPUT

COMPONENT LOCATION EC0E4769

Refer to DTC P0121.

GENERAL DESCRIPTION E7941000

Refer to DTC P0121.

DTC DESCRIPTION EC772F19

If the sensor input voltage is lower than the minimum threshold value during 0.5 sec under normal driving condition, PCM sets DTC P0122.

DTC DETECTING CONDITION EE41F293

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Signal check, low 	<ul style="list-style-type: none"> Poor connection Open or short to ground in power circuit Short to ground in signal circuit TPS
Enable Conditions	<ul style="list-style-type: none"> Engine speed 480 rpm 	
Threshold Value	<ul style="list-style-type: none"> Calculated signal from sensor voltage 3.1% 	
Diagnostic Time	<ul style="list-style-type: none"> 0.5 sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SPECIFICATION EB7C4A4C

Refer to DTC P0121.

SCHEMATIC DIAGRAM E70F39F1

Refer to DTC P0121.

SIGNAL WAVEFORM & DATA E3E05621

Refer to DTC P0121.

MONITOR SCANTOOL DATA E4DF5771

1. Connect scantool to Data Link Connector(DLC).
2. IG 'ON'.
3. Monitor the "TPS" parameters on the scantool.

DTC TROUBLESHOOTING PROCEDURES

FL -197

1.2 CURRENT DATA		25/64
× THROTTLE P. SNSR(V)	8.3 U	
× THROTTLE POSI.SENSOR	3.1 %	
× ADAPTED THROTTLE ANGLE	3.1 %	
× ENGINE SPEED	8.8 rpm	
ENGINE LOAD	99.8 %	
BATTERY VOLTAGE	12.6 U	
BATTERY CHARGING	99.7 %	
WATER TEMPERATURE	78.8 °C	

Normal state

Abnormal(Short to ground)

SHDFL6536L

4. Are the parameters 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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "Terminal and Connector Inspection" procedure.

TERMINAL AND CONNECTOR INSPECTION EFC0BC9A

Refer to DTC P0121.

POWER CIRCUIT INSPECTION EB0ED8FD

1. Key "OFF".
2. Disconnect TPS connector.
3. Key "ON".
4. Measure the voltage between terminal 3 of TPS harness connector and chassis ground.

Specification : Approx. 5V

5. Is the measured voltage within specifications?

YES

Go to "Signal circuit inspection" procedure.

NO

Check for Open or Short to ground in TPS circuit. Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

FL -198

FUEL SYSTEM

SIGNAL CIRCUIT INSPECTION E85A13CE

1. Key "OFF".
2. Disconnect TPS connector.
3. Key "ON".
4. Measure the voltage between terminal 1 of TPS harness connector and chassis ground.

Specification : Approx. 5V

5. Is the measured voltage within specification?

YES

Go to "Component inspection" procedure.

NO

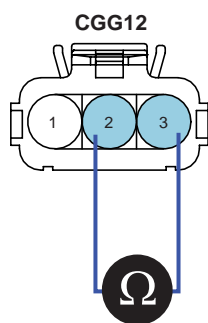
Repair Short to ground in signal circuit and go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION E4019C27

1. Check TPS resistance.
 - (1) Key "OFF".
 - (2) Disconnect TPS connector.
 - (3) Measure the resistance between terminal 2 and 3 of TPS component side.

SPECIFICATION :

ITEM	Specification
TPS Resistance (k)	2k ± 20% (20)



1. Sensor signal
2. Sensor ground
3. Sensor power

SHDFL6535L

- 4) Is the measured resistance within specifications?

YES

DTC TROUBLESHOOTING PROCEDURES**FL -199**

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR E57B3525

Refer to DTC P0121.

دیجیتال خودرو

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FL -200

FUEL SYSTEM

DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH INPUT

COMPONENT LOCATION E82DF57A

Refer to DTC P0121.

GENERAL DESCRIPTION EA6D8A32

Refer to DTC P0121.

DTC DESCRIPTION E81F52D9

If the sensor input voltage is higher than the maximum threshold value during 0.5 sec under normal driving condition, PCM sets DTC P0123.

DTC DETECTING CONDITION E16F3A17

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Signal check, high 	<ul style="list-style-type: none"> Poor connection Open or short to power in signal circuit Open in ground circuit TPS
Enable Conditions	<ul style="list-style-type: none"> Engine speed > 480 rpm 	
Threshold Value	<ul style="list-style-type: none"> Calculated signal from sensor voltage > 95.7% 	
Diagnostic Time	<ul style="list-style-type: none"> 0.5 sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SPECIFICATION ED70A231

Refer to DTC P0121.

SCHEMATIC DIAGRAM E1717665

Refer to DTC P0121.

SIGNAL WAVEFORM & DATA E5EA1800

Refer to DTC P0121.

MONITOR SCANTOOL DATA EFDD8D10

1. Connect scantool to Data Link Connector(DLC).
2. IG 'ON'.
3. Monitor the "TPS" parameters on the scantool.

DTC TROUBLESHOOTING PROCEDURES

FL -201

1.2 CURRENT DATA 25/64	
* THROTTLE P. SNSR(U)	8.3 V
* THROTTLE POSI. SENSOR	3.1 %
* ADAPTED THROTTLE ANGLE	3.1 %
* ENGINE SPEED	8.8 rpm
ENGINE LOAD	99.8 %
BATTERY VOLTAGE	12.6 V
BATTERY CHARGING	99.7 %
WATER TEMPERATURE	78.8 °C

Normal state

1.2 CURRENT DATA 25/64	
* THROTTLE P. SNSR(U)	5.8 V
* THROTTLE POSI. SENSOR	96.9 %
* ADAPTED THROTTLE ANGLE	3.1 %
* ENGINE SPEED	8.8 rpm
ENGINE LOAD	99.8 %
BATTERY VOLTAGE	12.6 V
BATTERY CHARGING	99.7 %
WATER TEMPERATURE	77.2 °C

Abnormal(Open or Short to power)

SHDFL6539L

4. Are the parameters 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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "Terminal and Connector Inspection" procedure.

TERMINAL AND CONNECTOR INSPECTION E0F3553E

Refer to DTC P0121.

POWER CIRCUIT INSPECTION E7C1A6AE

1. Key "OFF".
2. Disconnect TPS connector.
3. Key "ON".
4. Measure the voltage between terminal 3 of TPS harness connector and chassis ground.

Specification : Approx. 5V

5. Is the measured voltage within specifications?

YES

Go to "Ground circuit inspection" procedure.

NO

Check for Open or Short to ground in TPS circuit. Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

FL -202

FUEL SYSTEM

GROUND CIRCUIT INSPECTION EE3D0935

1. Key "OFF".
2. Disconnect TPS connector.
3. Key "ON".
4. Measure the voltage between terminal 3 of TPS harness connector and chassis ground.(A)
5. Measure the voltage between terminal 2 and 3 of TPS harness connector.(B)

Specification : "A" - "B" = Below 200mV

6. Is the measured voltage within specifications?

YES

Go to "Signal circuit inspection" procedure.

NO

Check for Open in ground circuit. Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

SIGNAL CIRCUIT INSPECTION E22FC7E4

1. Check for open in signal circuit.
 - 1) Key "OFF".
 - 2) Disconnect TPS connector.
 - 3) Key "ON".
 - 4) Measure the voltage between terminal 1 of TPS harness connector and chassis ground.

Specification : Approx. 5V

- 5) Is the measured voltage within specification?

YES

Go to "Check for Short in signal circuit" procedure.

NO

Repair Open or Short to power in signal circuit and go to "Verification of Vehicle Repair" procedure.

2. Check for short in signal circuit.
 - 1) Key "OFF".
 - 2) Disconnect TPS connector and ECM connector.
 - 3) Measure the resistance between terminal 1 and 3 of TPS harness connector.

Specification : Infinite

DTC TROUBLESHOOTING PROCEDURES**FL -203**

4) Is the measured resistance within specification ?

YES

Go to "Component inspection" procedure.

NO

Repair Short to power in signal circuit and go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

E8B81E02

1. Check TPS resistance.

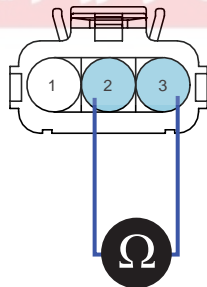
- 1) Key "OFF".
- 2) Disconnect TPS harness connector.
- 3) Measure the resistance between terminal 2 and 3 of TPS component side connector.

SPECIFICATION :

ITEM	Specification
TPS Resistance (k)	2k ± 20% (20)

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اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



1. Sensor signal
2. Sensor ground
3. Sensor power

SHDFL6535L

4) Is the measured resistance within specifications?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

FL -204

FUEL SYSTEM

VERIFICATION OF VEHICLE REPAIR E896179B

Refer to DTC P0121.

دیجیتال خودرو

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DTC TROUBLESHOOTING PROCEDURES

FL -205

DTC P0124 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT INTERMITTANT**COMPONENT LOCATION** E95C2D31

Refer to DTC P0121.

GENERAL DESCRIPTION EDC5F7E9

Refer to DTC P0121.

DTC DESCRIPTION EC4EDF4B

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 EBE48DAE

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Rationality check 	<ul style="list-style-type: none"> Poor connection TPS
Enable Conditions	<ul style="list-style-type: none"> Engine speed > 500rpm Coolant temperature > 75 No malfunction on the Vehicle speed sensor. 	
Threshold Value	<ul style="list-style-type: none"> Difference between engine loads measured by Map sensor and calculated from TPS signal > threshold f(throttle position) 	
Diagnostic Time	<ul style="list-style-type: none"> 0.25sec 	
MIL ON Condition	<ul style="list-style-type: none"> DTC only 	

SPECIFICATION E024D080

Refer to DTC P0121.

SCHEMATIC DIAGRAM ECFC9325

Refer to DTC P0121.

SIGNAL WAVEFORM & DATA ED80409A

Refer to DTC P0121.

MONITOR SCANTOOL DATA EEBF1D0C

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu

FL -206

FUEL SYSTEM

4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

1.1 DIAGNOSTIC TROUBLE CODES				1.4 AMBIENT CONDITIONS	
PXXXX DTC TITLE				1. MIL STATUS : ON / OFF	
				2. DTC STATUS : PRESENT / HISTORY	
				3. DTC READNESS FLAG : COMPLETE	
NUMBER OF DTC : 1 ITEMS					
PART	ERAS		DTAL		

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure

TERMINAL AND CONNECTOR INSPECTION EA434611

Refer to DTC P0121.

SIGNAL CIRCUIT INSPECTION EE5BEFA6

1. Ignition "OFF"
2. Disconnect TPS connector.
3. Ignition "ON"
4. Measure voltage between terminal "1", "2" and "3" of sensor harness connector and chassis ground

Specification :

Terminal 1 : Approx. 5V

Terminal 2 : Approx. 0V

Terminal 3 : Approx. 5V

DTC TROUBLESHOOTING PROCEDURES**FL -207**

5. Is the measured voltage within specifications?

YES

Go to "Component inspection" procedure.

NO

Check for Open or Short in TPS circuit. Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

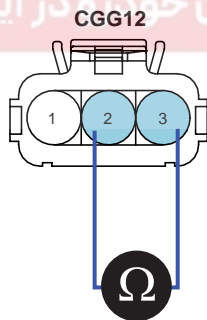
COMPONENT INSPECTION ECA9F00D

1. Check TPS.

- 1) Ignition "OFF"
- 2) Disconnect TPS connector
- 3) Measure resistance terminal 2 and 3 of TPS Component side connector.

SPECIFICATION :

ITEM	Specification
TPS Resistance (k)	2k \pm 20% (20)



1. Sensor signal
2. Sensor ground
3. Sensor power

SHDFL6535L

4) Is the measured resistance within specifications ?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

FL -208

FUEL SYSTEM

VERIFICATION OF VEHICLE REPAIR EC74F046

Refer to DTC P0121.

دیجیتال خودرو

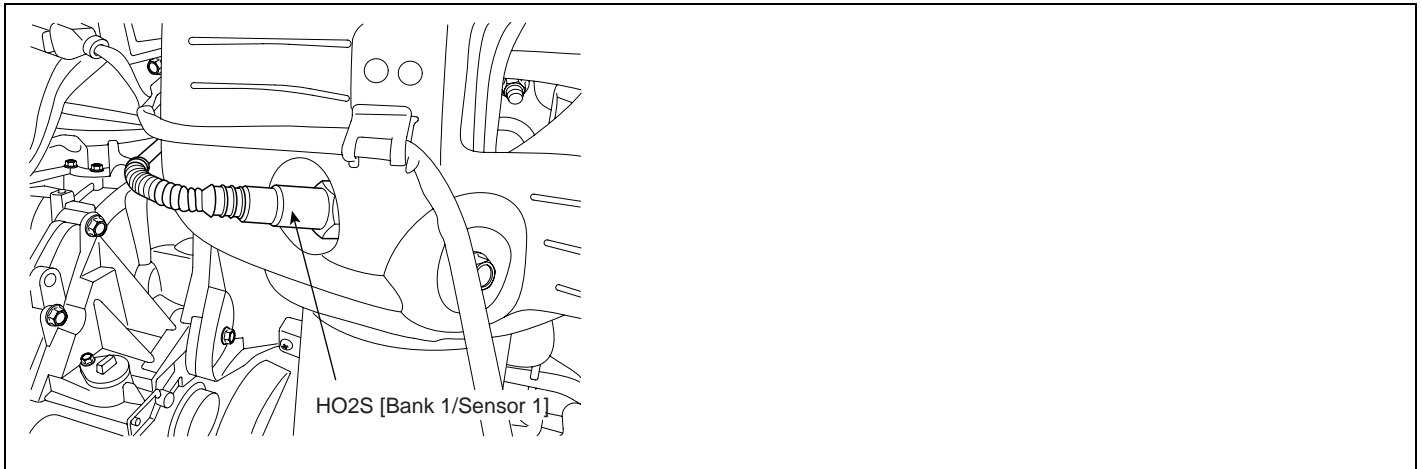
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



DTC TROUBLESHOOTING PROCEDURES

FL -209

DTC P0130 HO2S CIRCUIT (BANK 1/ SENSOR 1)**COMPONENT LOCATION** E943E34F

SHDFL6705L

GENERAL DESCRIPTION E2BF24B2

The heated oxygen sensors are mounted on the front side and the rear side of Catalytic Converter (warm-up catalytic converter), which detects the oxygen concentration in the exhaust gas. The front HO2S signal is used to control air/fuel ratio (closed loop fuel control) and the rear HO2S signal is used to monitor front HO2S and catalyst for proper operation. The heated oxygen sensor (HO2S) produces a voltage that varies between 0V and 1V. When the air/fuel ratio is lean, the oxygen concentration in the exhaust gas increases and the front HO2S outputs a low voltage (approximately 0 ~ 0.1 V). When the air/fuel ratio is rich, the oxygen concentration in the exhaust gas decreases and the front HO2S output a high voltage (approximately 0.8 ~ 1 V). The ECM constantly monitors the HO2S and increases or decreases the fuel injection duration by using the HO2S signal, which is called closed-loop fuel control operation.

DTC DESCRIPTION E2601B36

If ECM detects that the output signal satisfies the threshold values under enable conditions, ECM sets DTC P0130. (This DTC might be caused by the malfunction of Heater circuit, so, check the heater circuit first.)

FL -210

FUEL SYSTEM

DTC DETECTING CONDITION EEF4ADDF

Item		Detecting Condition	Possible Cause
DTC Strategy		<ul style="list-style-type: none"> Rationality check 	<ul style="list-style-type: none"> Poor connection Open or short power/ground in signal circuit HO2S (B1S1)
General Enable Conditions		<ul style="list-style-type: none"> Dew point end detected Required lambda = 1 Battery voltage > 10.7V Exhaust gas temperature (model) : 600 ~ 800 No upstream O2 sensor error or downstream O2 sensor ready 	
Case1	Enable Conditions	<ul style="list-style-type: none"> B1S2 sensor voltage > 0.5V 	
	Threshold Value	<ul style="list-style-type: none"> B1S1 sensor voltage : 0.06 ~ 0.4V 	
	Diagnostic Time	<ul style="list-style-type: none"> 25 sec 	
Case2	Enable Conditions	<ul style="list-style-type: none"> B1S2 sensor voltage < 0.1V 	
	Threshold Value	<ul style="list-style-type: none"> B1S1 sensor voltage : 0.6 ~ 1.08V 	
	Diagnostic Time	<ul style="list-style-type: none"> 10 sec 	
Case3	Enable Conditions	<ul style="list-style-type: none"> Time after dew point end detected > 10s 	
	Threshold Value	<ul style="list-style-type: none"> Counter of I usvk > 2V during 0.04 sec after heater on off I 5 times 	
MIL ONCondition		<ul style="list-style-type: none"> 3 driving cycle 	

usvk : Sum of the signal voltage change value (B1S1)

B1S1 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

SPECIFICATION E47D4EE0

Specification	0.1 ~ 0.9V
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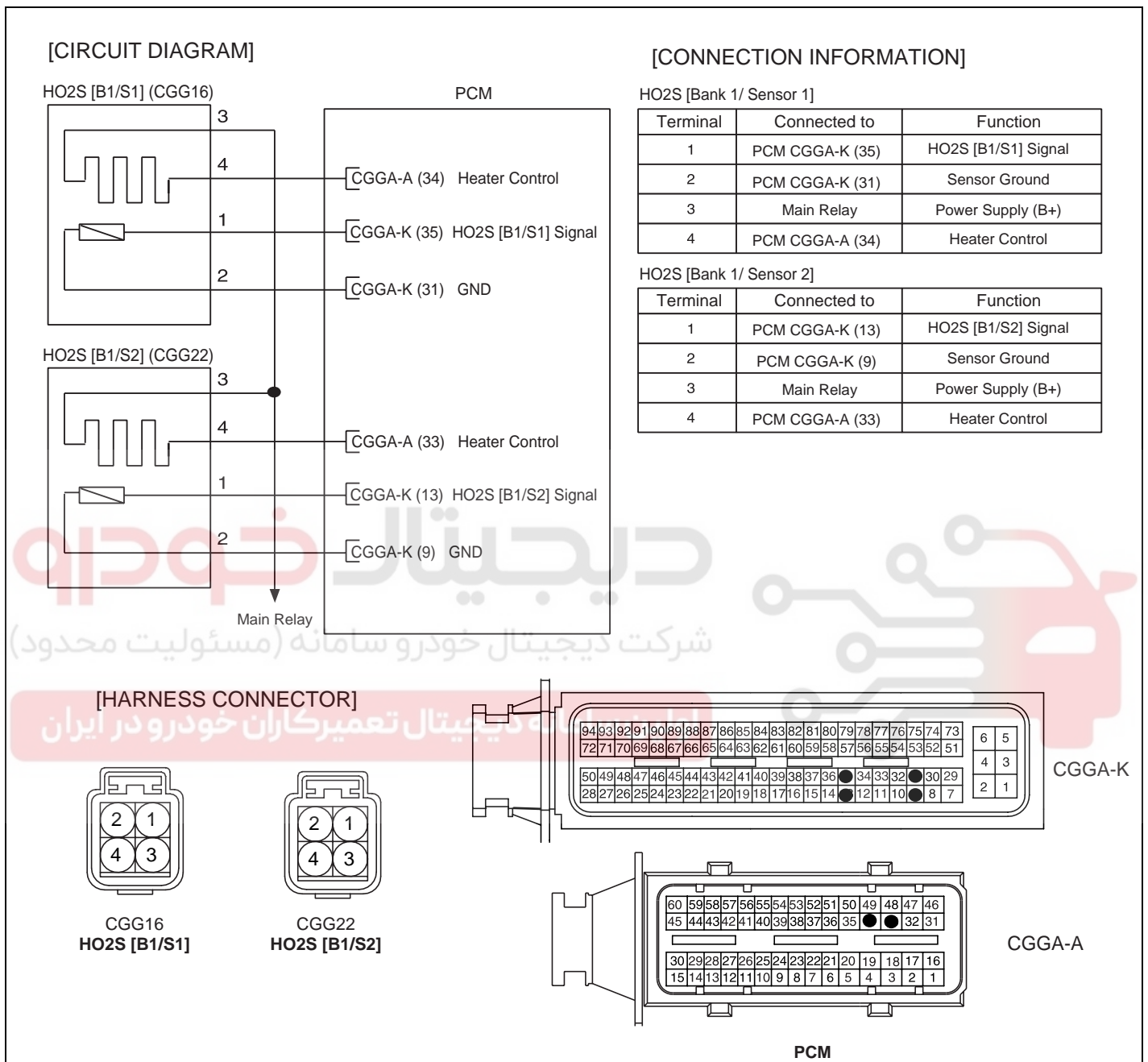
DTC TROUBLESHOOTING PROCEDURES

FL -211

SCHEMATIC DIAGRAM

E325B2D6

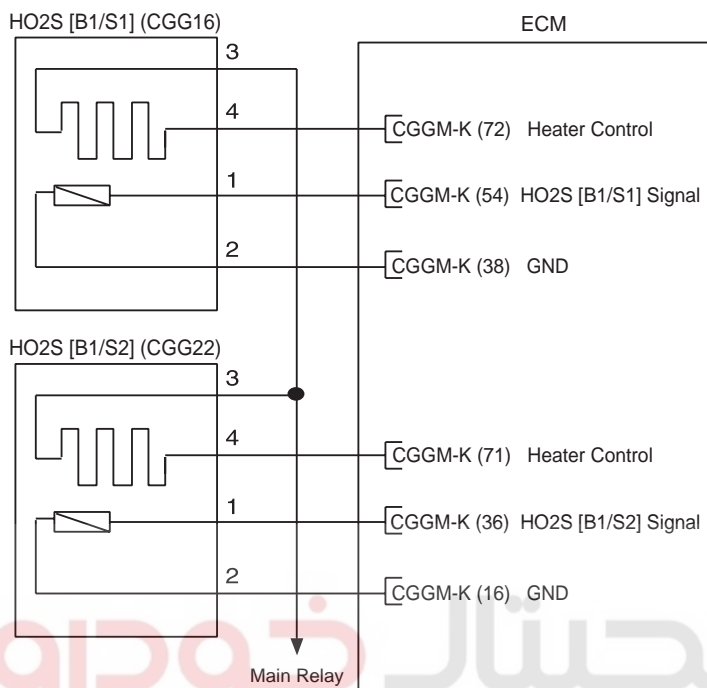
(A/T)



SHDFL6575L

(M/T)

[CIRCUIT DIAGRAM]



[CONNECTION INFORMATION]

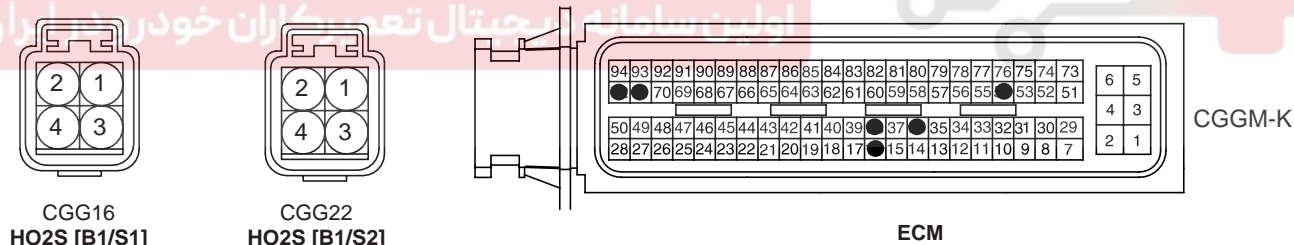
HO2S [Bank 1/ Sensor 1]

Terminal	Connected to	Function
1	ECM CGGM-K (54)	HO2S [B1/S1] Signal
2	ECM CGGM-K (38)	Sensor Ground
3	Main Relay	Power Supply (B+)
4	ECM CGGM-K (72)	Heater Control

HO2S [Bank 1/ Sensor 2]

Terminal	Connected to	Function
1	ECM CGGM-K (36)	HO2S [B1/S2] Signal
2	ECM CGGM-K (16)	Sensor Ground
3	Main Relay	Power Supply (B+)
4	ECM CGGM-K (71)	Heater Control

[HARNESS CONNECTOR]

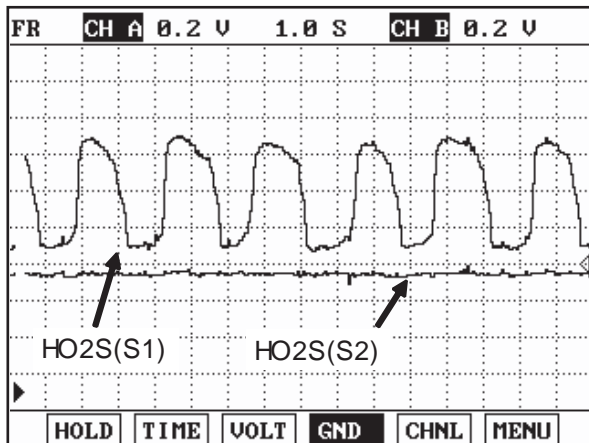


SHDFL6576L

DTC TROUBLESHOOTING PROCEDURES

FL -213

SIGNAL WAVEFORM & DATA E548E260



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 EE97EC0E

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

1.1 DIAGNOSTIC TROUBLE CODES	1.4 AMBIENT CONDITIONS
PXXXX DTC TITLE	1. MIL STATUS : ON / OFF
	2. DTC STATUS : PRESENT / HISTORY
	3. DTC READNESS FLAG : COMPLETE
NUMBER OF DTC : 1 ITEMS	
PART ERAS DTAL	

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

FL -214

FUEL SYSTEM

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure

TERMINAL AND CONNECTOR INSPECTION E43D5CBB

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to " Signal Circuit Inspection " procedure.

SIGNAL CIRCUIT INSPECTION EE94FE29

1. IG "OFF".
2. Disconnect HO2S(B1/S1) connector.
3. IG "ON" & ENG "OFF".
4. Measure voltage between terminal 1 of HO2S(B1/S1) and chassis ground.

Specification : Approx. 0.45V

5. Is the measured voltage within specification?

YES

Go to "Groud Circuit Inspection" procedure.

NO

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

GROUND CIRCUIT INSPECTION E8AA7C87

1. IG "OFF".
2. Disconnect HO2S(B1/S1) connector.

DTC TROUBLESHOOTING PROCEDURES

FL -215

3. Measure resistance between terminal 2 of HO2S(B1/S1) and chassis ground.

Specification : below 1

4. Is the measured resistance within specification?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION E31BDCA5

1. Visual Inspection.

- 1) IG "OFF"
- 2) Disconnect HO2S(B1/S1) connector.
- 3) Check that HO2S(B1/S1) is contaminated or damaged by foreign materials.
- 4) Has a problem been found?

YES

Go to "Check HO2S(B1/S1) performance" as follows.

NO اولین سامانه دیجیتال تعمیرکاران خودرو

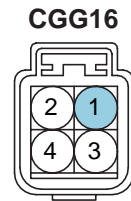
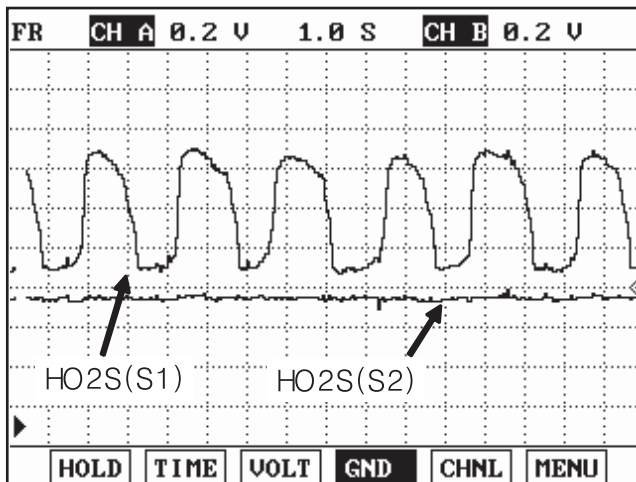
Substitute with a known - good HO2S(B1/S1) and check for proper operation.

If the problem is corrected, replace HO2S(B1/S1) and go to "Verification of Vehicle Repair" procedure.

2. Check HO2S(B1/S1) performance.

- 1) IG "OFF".
- 2) Connect probe to terminal 1 of HO2S(B1/S1) connector and select oscilloscope function with scantool.
- 3) Warm up the engine to normal operating temperature.
- 4) Measure signal waveform of HO2S(B1/S1) with scantool.





1. HO2S(S1) Signal
2. Sensor Ground
3. HO2S(S1) Heater Power
4. HO2S(S1) Heater Control

SHDFL6545L

5) Is the measured signal waveform within specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good HO2S(B1/S1) and check for proper operation.

If the problem is corrected, replace HO2S(B1/S1) and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E3728668

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

DTC TROUBLESHOOTING PROCEDURES

FL -217

DTC P0131 HO2S CIRCUIT LOW VOLTAGE (BANK 1 / SENSOR 1)**COMPONENT LOCATION** E5682504

Refer to DTC P0130.

GENERAL DESCRIPTION E06E445A

Refer to DTC P0130.

DTC DESCRIPTION EE169787

If the sensor output is below 0.06 V under enable conditions, ECM sets DTC P0131.
(This DTC might be caused by the malfunction of Heater circuit, so, check the heater circuit first.)

DTC DETECTING CONDITION E8077A75

Item		Detecting Condition	Possible Cause
DTC Strategy		<ul style="list-style-type: none"> Signal check, low 	<ul style="list-style-type: none"> Poor connection Short to ground in signal circuit HO2S (B1S1)
General Enable Conditions		<ul style="list-style-type: none"> Dew point end detected Required lambda = 1 Battery voltage > 10.7V Exhaust gas temperature (model) : 600 ~ 800 No upstream O2 sensor error or downstream O2 sensor ready 	
Case1	Enable Conditions	<ul style="list-style-type: none"> B1S2 sensor voltage > 0.5V 	
	Diagnostic Time	<ul style="list-style-type: none"> 25 sec 	
Case2	Enable Conditions	<ul style="list-style-type: none"> Sensor in cold condition 	
	Diagnostic Time	<ul style="list-style-type: none"> 0.1 sec 	
Case3	Threshold Value	<ul style="list-style-type: none"> Sensor voltage < 0.06V 	
MIL ONCondition		<ul style="list-style-type: none"> 3 driving cycle 	

B1S1 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

SPECIFICATION EA9413D8

Refer to DTC P0130.

SCHEMATIC DIAGRAM EA05E8ED

Refer to DTC P0130.

FL -218**FUEL SYSTEM****SIGNAL WAVEFORM & DATA** ECCD30EE

Refer to DTC P0130.

MONITOR SCANTOOL DATA E2D9C9B7

Refer to DTC P0130.

TERMINAL AND CONNECTOR INSPECTION E35D8BB1

Refer to DTC P0130.

SIGNAL CIRCUIT INSPECTION E84FE75C

1. IG "OFF".
2. Disconnect HO2S(B1/S1) connector.
3. IG "ON" & ENG "OFF".
4. Measure voltage between terminal 1 of HO2S(B1/S1) and chassis ground.

Specification : Approx. 0.45V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION EEBED95A

1. Visual Inspection.
 - 1) IG "OFF"
 - 2) Disconnect HO2S(B1/S1) connector.
 - 3) Check that HO2S(B1/S1) is contaminated or damaged by foreign materials.
 - 4) Has a problem been found?

YES

Go to "Check HO2S(B1/S1) performance" as follows.

NO

Substitute with a known - good HO2S(B1/S1) and check for proper operation.

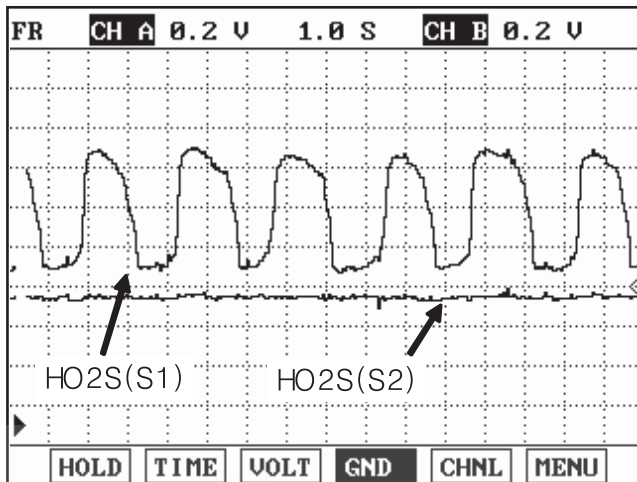
If the problem is corrected, replace HO2S(B1/S1) and go to "Verification of Vehicle Repair" procedure.

2. Check HO2S(B1/S1) performance.

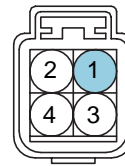
DTC TROUBLESHOOTING PROCEDURES

FL -219

- 1) IG "OFF".
- 2) Connect probe to terminal 1 of HO2S(B1/S1) connector and select oscilloscope function with scantool.
- 3) Warm up the engine to normal operating temperature.
- 4) Measure signal waveform of HO2S(B1/S1) with scantool.



CGG16



1. HO2S(S1) Signal
2. Sensor Ground
3. HO2S(S1) Heater Power
4. HO2S(S1) Heater Control

- 5) Is the measured signal waveform within specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good HO2S(B1/S1) and check for proper operation.

If the problem is corrected, replace HO2S(B1/S1) and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR

E708DFF5

Refer to DTC P0130.

FL -220

FUEL SYSTEM

DTC P0132 HO2S CIRCUIT HIGH VOLTAGE (BANK 1 / SENSOR 1)**COMPONENT LOCATION** EF2C0971

Refer to DTC P0130.

GENERAL DESCRIPTION E9943479

Refer to DTC P0130.

DTC DESCRIPTION E28943E6

If the sensor output is over 1.08 V under enable conditions, ECM sets P0132.
(This DTC might be caused by the malfunction of Heater circuit, so, check the heater circuit first.)

DTC DETECTING CONDITION E834A74A

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Signal check, high 	<ul style="list-style-type: none"> Poor connection Short to power in signal circuit HO2S (B1S1)
Enable Conditions	<ul style="list-style-type: none"> Dew point end detected Required lambda = 1 Battery voltage > 10.7V Exhaust gas temperature (model) : 600 ~ 800 No upstream O2 sensor error or downstream O2 sensor ready 	
Threshold Value	<ul style="list-style-type: none"> B1S1 sensor voltage > 1.08V 	
Diagnostic Time	<ul style="list-style-type: none"> 5 sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

B1S1 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

SPECIFICATION E3605342

Refer to DTC P0130.

SCHEMATIC DIAGRAM E0376524

Refer to DTC P0130.

SIGNAL WAVEFORM & DATA EEED4647

Refer to DTC P0130.

MONITOR SCANTOOL DATA EB1113C9

Refer to DTC P0130.

DTC TROUBLESHOOTING PROCEDURES

FL -221

TERMINAL AND CONNECTOR INSPECTION E294FB9E

Refer to DTC P0130.

SIGNAL CIRCUIT INSPECTION E1DC67A1

1. IG "OFF".
2. Disconnect HO2S(B1/S1) connector.
3. IG "ON" & ENG "OFF".
4. Measure voltage between terminal 1 of HO2S(B1/S1) and chassis ground.

 Specification : Approx. 0.45V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION EE89208F

1. Visual Inspection.
 - 1) IG "OFF"
 - 2) Disconnect HO2S(B1/S1) connector.
 - 3) Check that HO2S(B1/S1) is contaminated or damaged by foreign materials.
 - 4) Has a problem been found?

YES

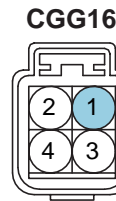
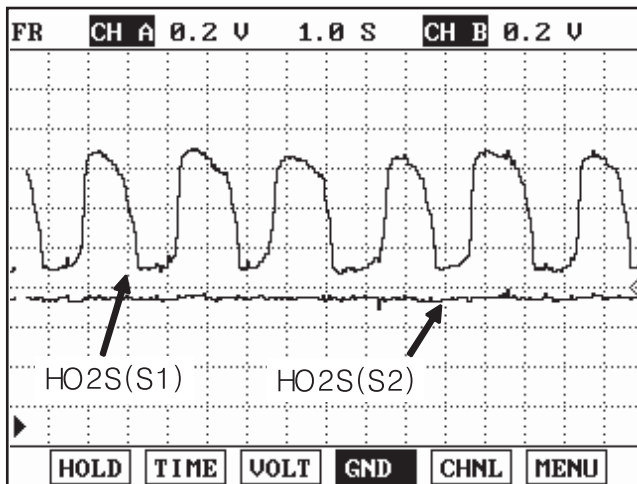
Go to "Check HO2S(B1/S1) performance" as follows.

NO

Substitute with a known - good HO2S(B1/S1) and check for proper operation.

If the problem is corrected, replace HO2S(B1/S1) and go to "Verification of Vehicle Repair" procedure.

2. Check HO2S(B1/S1) performance.
 - 1) IG "OFF".
 - 2) Connect probe to terminal 1 of HO2S(B1/S1) connector and select oscilloscope function with scantool.
 - 3) Warm up the engine to normal operating temperature.
 - 4) Measure signal waveform of HO2S(B1/S1) with scantool.



- 1. HO2S(S1) Signal
- 2. Sensor Ground
- 3. HO2S(S1) Heater Power
- 4. HO2S(S1) Heater Control

SHDFL6545L

5) Is the measured signal waveform within specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good HO2S(B1/S1) and check for proper operation.

If the problem is corrected, replace HO2S(B1/S1) and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR ECB2787F

Refer to DTC P0130.

DTC TROUBLESHOOTING PROCEDURES

FL -223

DTC P0133 HO2S CIRCUIT SLOW RESPONSE (BANK 1 / SENSOR 1)**COMPONENT LOCATION** E710F5A5

Refer to DTC P0130.

GENERAL DESCRIPTION EB941105

Refer to DTC P0130.

DTC DESCRIPTION ECF7BF1B

If there is abnormal response rate of HO2S under enable conditions, ECM sets DTC P0133.
(This DTC might be caused by the malfunction of Heater circuit, so, check the heater circuit first.)

DTC DETECTING CONDITION ED7F6969

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Response rate 	<ul style="list-style-type: none"> Poor connection leak or clog in intake air system Injector Fuel pressure HO2S (B1S1)
Enable Conditions	<ul style="list-style-type: none"> Required lambda = 1 Engine speed 1800 - 2800rpm Engine load 20 - 65% Exhaust gas temperature (model) > 450 	
Threshold Value	<ul style="list-style-type: none"> Cycle period of B1S1 signal > 2.85 sec 	
Diagnostic Time	<ul style="list-style-type: none"> 20 cycle 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

B1S1 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

SPECIFICATION EBC726AC

Refer to DTC P0130.

SCHEMATIC DIAGRAM E35203F2

Refer to DTC P0130.

SIGNAL WAVEFORM & DATA E189D290

Refer to DTC P0130.

MONITOR SCANTOOL DATA E371482F

Refer to DTC P0130.

FL -224

FUEL SYSTEM

SYSTEM INSPECTION

E9439150

1. Check leakage or clog of air.

- 1) Check contamination, clog and installation of gasket
Any damage or installation of throttle body gasket.
Any damage or installation of gasket between intake manifold and surge tank.
Clog or contamination of intake manifold and injector by foreign materials
Contamination and open stuck between surge tank and PCSV by foreign materials
Any damage or contamination of HO2S(B1/S1) by foreign materials.

2) Has a problem been found?

YES

Go to " Check Fuel Line" as follows.

NO

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

2. Check Fuel Line.

- 1) Check Clog, contamination and installation of Fuel Line as follows.
Connection for each connectors in Fuel Line.
Damage, interference and installation of vacuum hose connected to Fuel Line.
Bend, Leakage and squeeze of pipe in Fuel Line.

2) Has a problem been found?

YES

Go to "Check Fuel Pressure" as follows.

NO

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

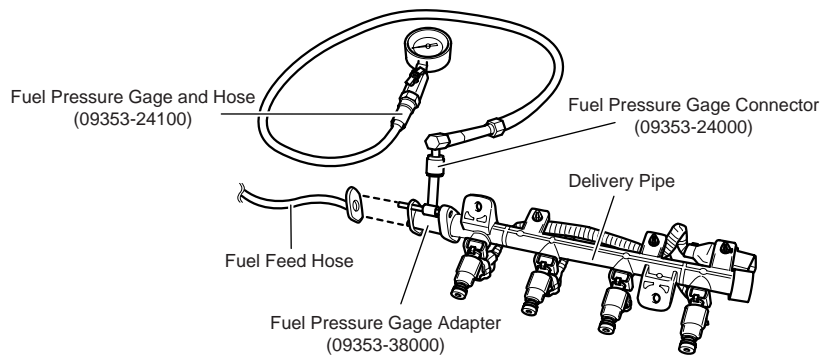
3. Check Fuel Pressure.

- 1) IG "OFF".
- 2) Disconnect fuel pump relay from junction box in passenger compartment.
- 3) Start engine and await until engine is off and then, IG "OFF".
- 4) Connect fuel pump relay again.
- 5) Connect fuel pressure gauge on the fuel filter with fuel pressure gauge adaptor.
- 6) Start engine again and measure fuel pressure.

Specification : Approx. 3.5kg/cm²

DTC TROUBLESHOOTING PROCEDURES

FL -225



EFNG335A

7) Is the fuel pressure normal?

YES

Go to "Component Inspection" procedure.

NO

Check any damage of fuel return hose or pipe.

Check any stuck of the valve in the fuel pressure regulator.

Repair or replace as necessary and then, go to 'Verification of Vehicle Repair' procedure.

COMPONENT INSPECTION E6719E72

1. Visual Inspection.

- 1) IG "OFF"
- 2) Disconnect HO2S(B1/S1) connector.
- 3) Check that HO2S(B1/S1) is contaminated or damaged by foreign materials.
- 4) Has a problem been found?

YES

Go to "Check HO2S(B1/S1) performance" as follows.

NO

Substitute with a known - good HO2S(B1/S1) and check for proper operation.

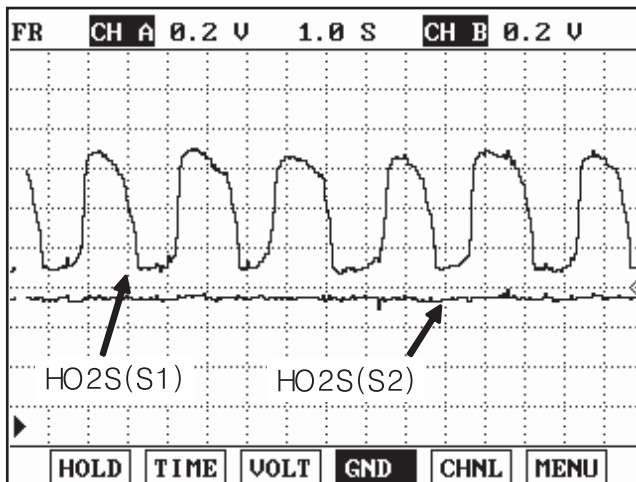
If the problem is corrected, replace HO2S(B1/S1) and go to "Verification of Vehicle Repair" procedure.

2. Check HO2S(B1/S1) performance.

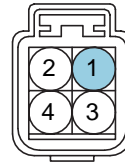
- 1) IG "OFF".
- 2) Connect probe to terminal 1 of HO2S(B1/S1) connector and select oscilloscope function with scantool.
- 3) Warm up the engine to normal operating temperature.
- 4) Measure signal waveform of HO2S(B1/S1) with scantool.

FL -226

FUEL SYSTEM



CGG16



1. HO2S(S1) Signal
2. Sensor Ground
3. HO2S(S1) Heater Power
4. HO2S(S1) Heater Control

SHDFL6545L

5) Is the measured signal waveform within specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good HO2S(B1/S1) and check for proper operation.

If the problem is corrected, replace HO2S(B1/S1) and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E8943F60

Refer to DTC P0130.

DTC TROUBLESHOOTING PROCEDURES

FL -227

DTC P0134 HO2S CIRCUIT NO ACTIVITY DETECTED (BANK 1 / SENSOR 1)**COMPONENT LOCATION** E094F915

Refer to DTC P0130.


GENERAL DESCRIPTION E6B55333

Refer to DTC P0130.

DTC DESCRIPTION E67AFBEA

If the signal output satisfies the threshold value under enable conditions, ECM sets DTC P0134.
(This DTC might be caused by the malfunction of Heater circuit, so, check the heater circuit first.)

DTC DETECTING CONDITION E1C13623

Item	Detecting Condition	Possible Cause	
DTC Strategy	<ul style="list-style-type: none"> Signal check, wiring interruption 	 <ul style="list-style-type: none"> Poor connection Open or short in signal circuit HO2S (B1S1) 	
General Enable Conditions	<ul style="list-style-type: none"> Dew point end detected Required lambda = 1 Battery voltage > 10.7V Exhaust gas temperature (model) : 600 ~ 800 No upstream O2 sensor error or downstream O2 sensor ready 		
Case1	Threshold Value		<ul style="list-style-type: none"> Sensor voltage : 0.4~0.6V
	Diagnostic Time		<ul style="list-style-type: none"> 5 sec
Case2	Enable Conditions		<ul style="list-style-type: none"> Exhaust gas temperature (model) > 600
	Threshold Value		<ul style="list-style-type: none"> Internal resistance > 20 k
MIL ONCondition	<ul style="list-style-type: none"> 3 driving cycle 		

B1S1 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

SPECIFICATION E55DF979

Refer to DTC P0130.

SCHEMATIC DIAGRAM ED5CCE5E

Refer to DTC P0130.

SIGNAL WAVEFORM & DATA E79D19A1

Refer to DTC P0130.

FL -228

FUEL SYSTEM

MONITOR SCANTOOL DATA E5043C66

Refer to DTC P0130.

TERMINAL AND CONNECTOR INSPECTION E63B1666

Refer to DTC P0130.

SIGNAL CIRCUIT INSPECTION ED65D552

1. IG "OFF".
2. Disconnect HO2S(B1/S1) connector.
3. IG "ON" & ENG "OFF".
4. Measure voltage between terminal 1 of HO2S(B1/S1) and chassis ground.

Specification : Approx. 0.45V

5. Is the measured voltage within specification?

YES

Go to "Groud Circuit Inspection" procedure.

NO

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

GROUND CIRCUIT INSPECTION E5912F26

1. IG "OFF".
2. Disconnect HO2S(B1/S1) connector.
3. Measure resistance between terminal 2 of HO2S(B1/S1) and chassis ground.

Specification : Approx. below 1

4. Is the measured resistance within specification?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION E66A66D4

1. Visual Inspection.
 - 1) IG "OFF"

DTC TROUBLESHOOTING PROCEDURES**FL -229**

- 2) Disconnect HO2S(B1/S1) connector.
- 3) Check that HO2S(B1/S1) is contaminated or damaged by foreign materials.
- 4) Has a problem been found?

YES

Go to "Check HO2S(B1/S1) performance" as follows.

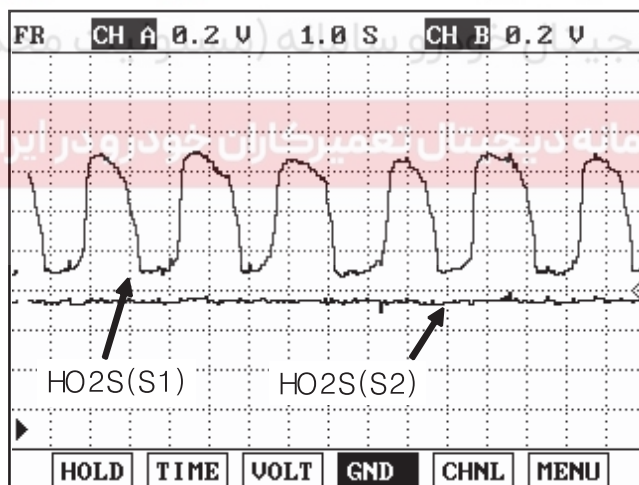
NO

Substitute with a known - good HO2S(B1/S1) and check for proper operation.

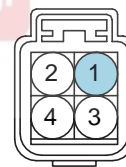
If the problem is corrected, replace HO2S(B1/S1) and go to "Verification of Vehicle Repair" procedure.

2. Check HO2S(B1/S1) performance.

- 1) IG "OFF".
- 2) Connect probe to terminal 1 of HO2S(B1/S1) connector and select oscilloscope function with scantool.
- 3) Warm up the engine to normal operating temperature.
- 4) Measure signal waveform of HO2S(B1/S1) with scantool.



CGG16



1. HO2S(S1) Signal
2. Sensor Ground
3. HO2S(S1) Heater Power
4. HO2S(S1) Heater Control

SHDFL6545L

5) Is the measured signal waveform within specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good HO2S(B1/S1) and check for proper operation.

If the problem is corrected, replace HO2S(B1/S1) and go to "Verification of Vehicle Repair" procedure.

FL -230

FUEL SYSTEM

VERIFICATION OF VEHICLE REPAIR EA177C0D

Refer to DTC P0130.

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DTC TROUBLESHOOTING PROCEDURES

FL -231

DTC P0135 HO2S HEATER CIRCUIT (BANK 1 / SENSOR 1)**COMPONENT LOCATION** E9067C9F

Refer to DTC P0130.

GENERAL DESCRIPTION EC643D3F

Refer to DTC P0130.

DTC DESCRIPTION E338B1C8

If ECM detects that the internal resistance of heater is out of threshold value, ECM sets DTC P0135.

DTC DETECTING CONDITION E7F7280F

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Heater current check 	<ul style="list-style-type: none"> Poor connection Open or short to ground in control circuit HO2S (B1S1)
Enable Conditions	<ul style="list-style-type: none"> Exhaust gas temperature (model) 200 575 Intake air temperature > -6 Battery voltage 10.7 16.1 V 	
Threshold Value	<ul style="list-style-type: none"> Internal resistance > threshold f(exhaust gas temp., heater power) 	
Diagnostic Time	<ul style="list-style-type: none"> Above 15 sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

B1S1 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

SPECIFICATION E664E77B

Refer to DTC P0130.

SCHEMATIC DIAGRAM E1760946

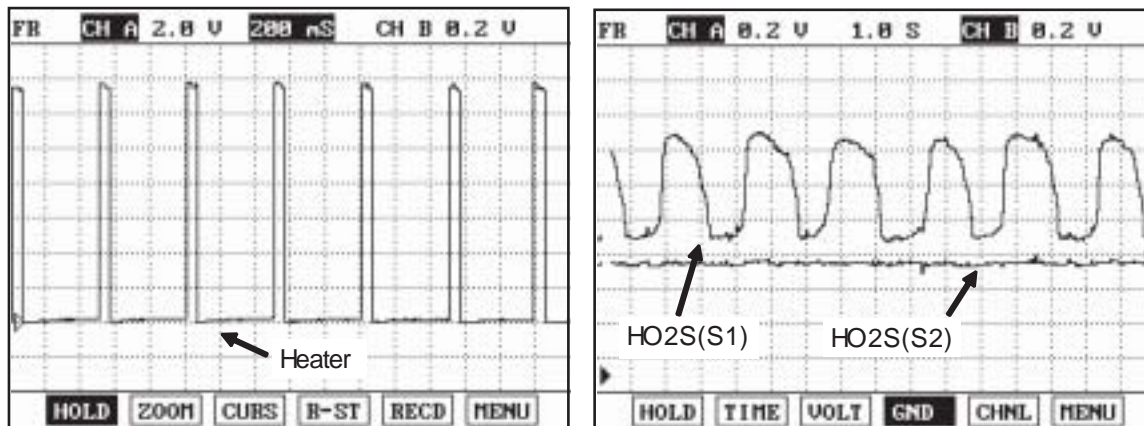
Refer to DTC P0130.

FL -232

FUEL SYSTEM

SIGNAL WAVEFORM & DATA

EFB3263B



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 acceleration. 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.

LFJF445A

MONITOR SCANTOOL DATA

E364922D

Refer to DTC P0130.

TERMINAL AND CONNECTOR INSPECTION

E639FD91

Refer to DTC P0130.

POWER CIRCUIT INSPECTION

EE0911F6

1. IG "OFF".
2. Disconnect HO2S(B1S1) connector.
3. IG "ON" & ENG "OFF".
4. Measure voltage between terminal 3 of HO2S(S1) harness connector and chassis ground.

Specification : B+

5. Is the measured voltage within specification?

YES

Go to "Control Circuit Inspection" procedure.

NO

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

CONTROL CIRCUIT INSPECTION

EE4A4182

1. IG "OFF".

DTC TROUBLESHOOTING PROCEDURES

FL -233

2. Disconnect HO2S(B1S1) connector.
3. IG "ON" & ENG "OFF"
4. Measure voltage between terminal 4 of HO2S(S1) harness connector and chassis ground.

Specification : Approx. 3.5V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

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

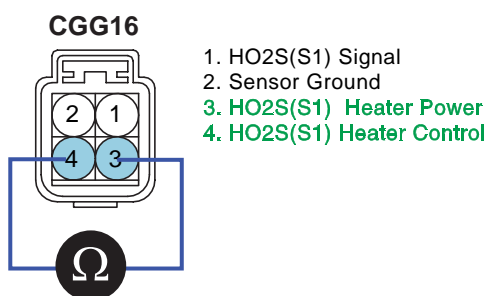
COMPONENT INSPECTION EC294473

1. Check Heater resistance.

- 1) IG "OFF".
- 2) Disconnect HO2S(B1S1) connector.
- 3) Measure resistance between terminal 3 and 4 of HO2S(B1S1) connector.(Component Side)

SPECIFICATION :

ITEM	Specification
Heater Resistance	Approx. 9.0



SHDFL6548L

- 4) Is the measured resistance within specification ?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

FL -234

FUEL SYSTEM

NO

Substitute with a known - good HO2S(B1/S1) and check for proper operation.
If the problem is corrected, replace HO2S(B1/S1) and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E7318133

Refer to DTC P0130.

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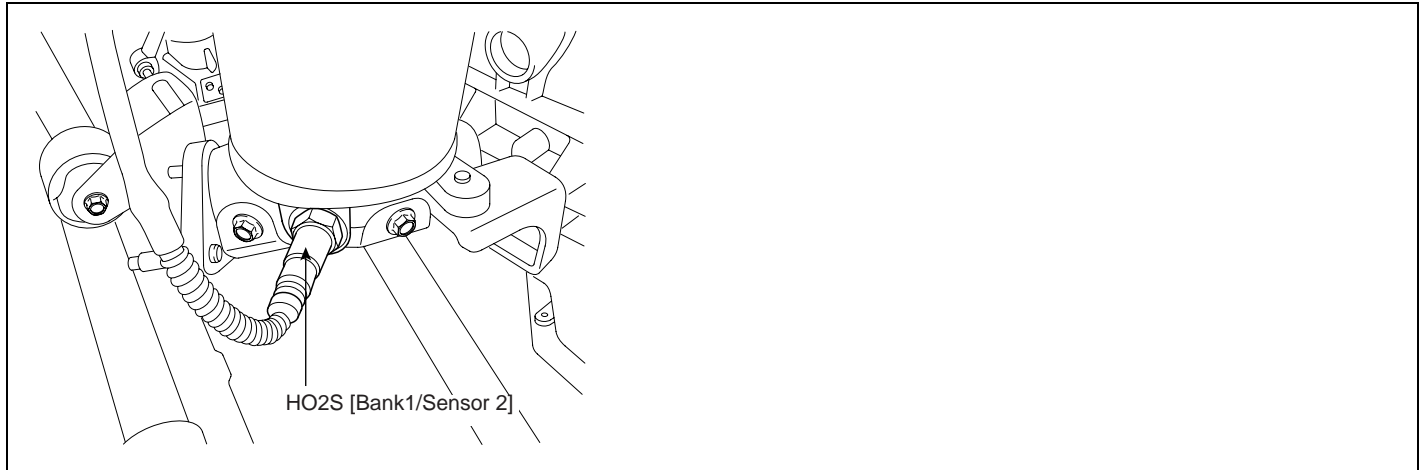


DTC TROUBLESHOOTING PROCEDURES

FL -235

DTC P0136 HO2S CIRCUIT (BANK 1/ SENSOR 2)

COMPONENT LOCATION E84F27F2



SHDFL6706L

GENERAL DESCRIPTION E51DB5FE

HO2S(B1/S2) is in the rear side of Catalytic Converter to check the proper operation of catalyst. Oxygen density after the catalytic converter has to be within specific range (around 0.5V when there is no acceleration and deceleration.)If the oxygen density changes in accordance with HO2S(B1/S1), it means the poor performance of catalytic converter.

DTC DESCRIPTION EA4DC7D2

In case the sensor output is 0.4~0.52 V during 600sec or the internal resistance is over 40 kΩ under enable conditions, ECM sets DTC P0136.

(This DTC might be caused by the malfunction of Heater circuit, so, check the heater circuit first.)

DTC DETECTING CONDITION E1991BA9

Item		Detecting Condition	Possible Cause
DTC Strategy		<ul style="list-style-type: none"> Signal check, wiring interruption 	<ul style="list-style-type: none"> Poor connection Open or short in signal circuit HO2S (B1S2)
General Enable Conditions		<ul style="list-style-type: none"> After enough heated Battery voltage 10.7V Catalyst temperature (model) > 300 	
Case1	Threshold Value	<ul style="list-style-type: none"> Sensor voltage : 0.4~0.52 V 	
	Diagnostic Time	<ul style="list-style-type: none"> 600 sec 	
Case2	Enable Conditions	<ul style="list-style-type: none"> Catalyst temperature (model) 600 	
	Threshold Value	<ul style="list-style-type: none"> Internal resistance 40 k 	
MIL ONCondition		<ul style="list-style-type: none"> 3 driving cycle 	

B1S2 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

FL -236

FUEL SYSTEM

SPECIFICATION

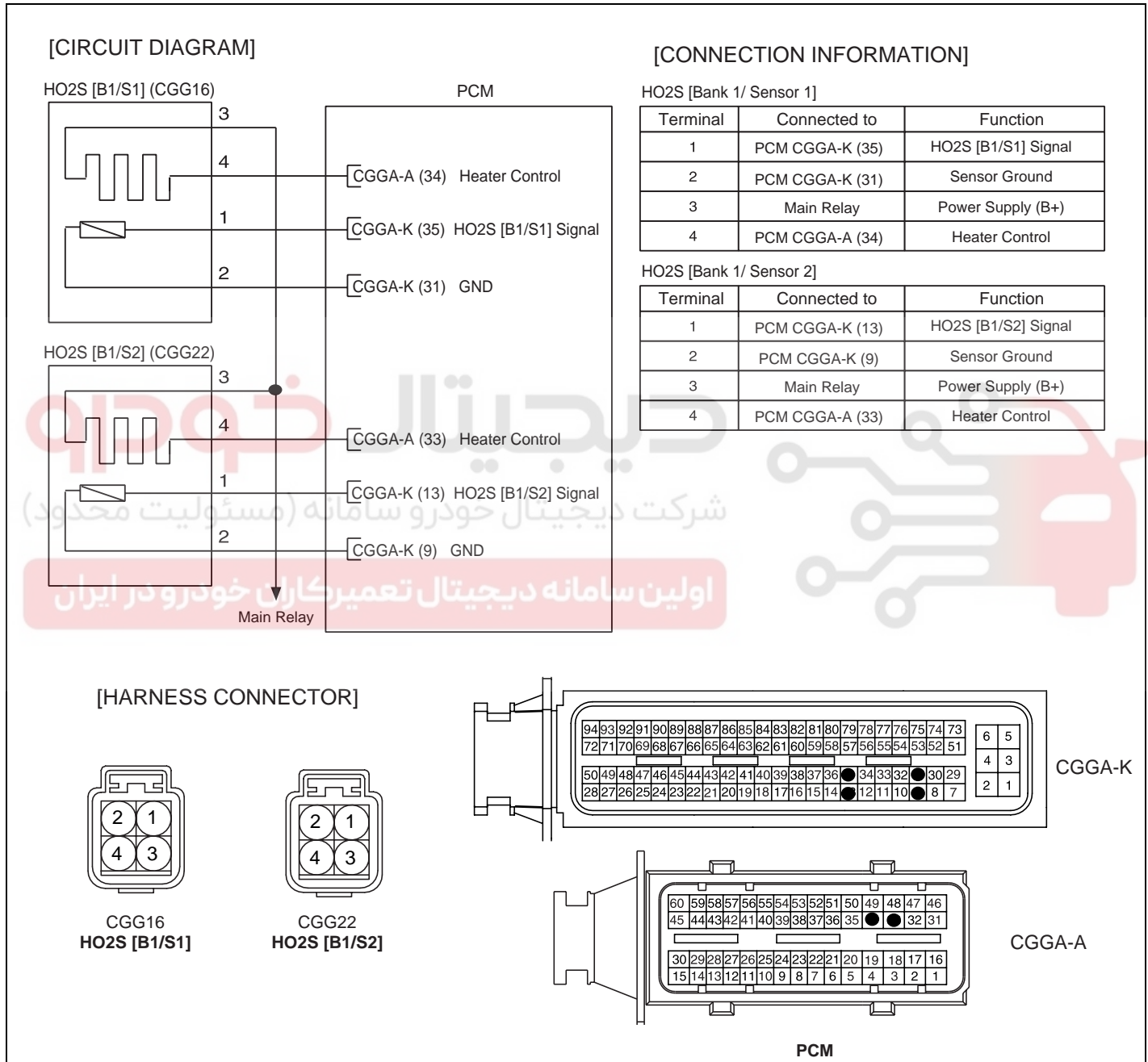
E0AE6050

Specification	0.1 ~ 0.9V
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SCHEMATIC DIAGRAM

EAF64397

(A/T)

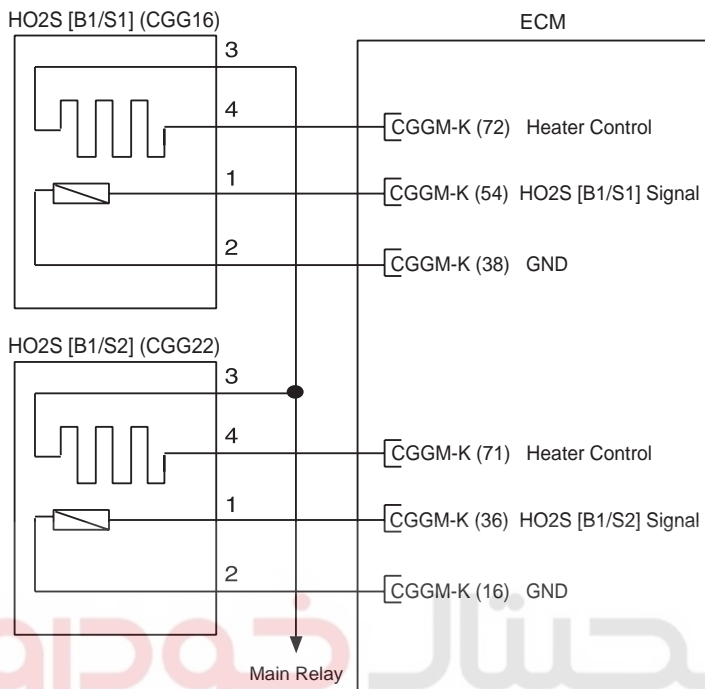


SHDFL6575L

DTC TROUBLESHOOTING PROCEDURES

(M/T)

[CIRCUIT DIAGRAM]



[CONNECTION INFORMATION]

HO2S [Bank 1/ Sensor 1]

Terminal	Connected to	Function
1	ECM CGGM-K (54)	HO2S [B1/S1] Signal
2	ECM CGGM-K (38)	Sensor Ground
3	Main Relay	Power Supply (B+)
4	ECM CGGM-K (72)	Heater Control

HO2S [Bank 1/ Sensor 2]

Terminal	Connected to	Function
1	ECM CGGM-K (36)	HO2S [B1/S2] Signal
2	ECM CGGM-K (16)	Sensor Ground
3	Main Relay	Power Supply (B+)
4	ECM CGGM-K (71)	Heater Control

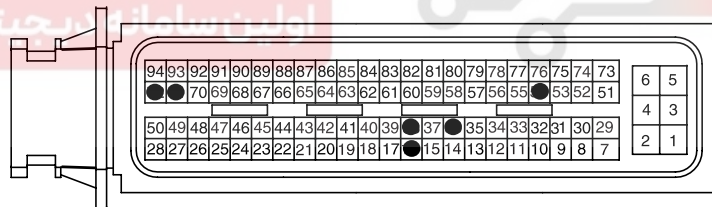
[HARNESS CONNECTOR]



CGG16
HO2S [B1/S1]



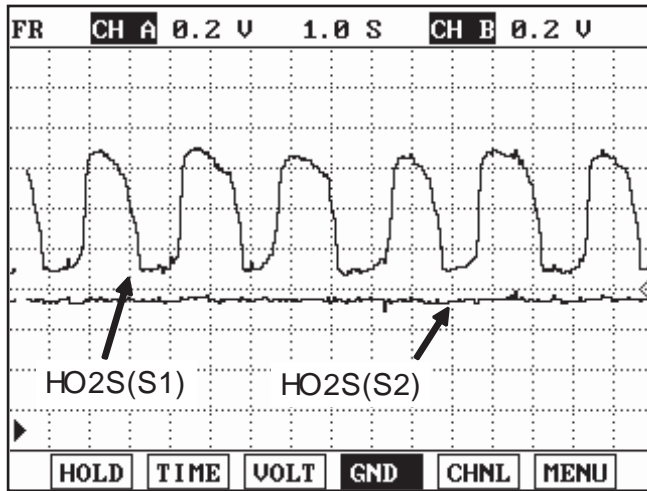
CGG22
HO2S [B1/S2]



ECM

CGGM-K

SIGNAL WAVEFORM & DATA ECC770BB



The amplitude of the signal output of the rear HO2S is small compared to the front HO2S because the rear HO2S detects emission gas purified by the catalytic converter. This is the normal signal waveform of the rear HO2S at idle.

LFJF451A

MONITOR SCANTOOL DATA E06DB2AF

1. Connect scantool to Data Link Connector(DLC).
2. (شرکت دیجیتال خودرو سامانه (مسئولیت "IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

<p>1.1 DIAGNOSTIC TROUBLE CODES</p> <p>PXXXX DTC TITLE</p> <p>NUMBER OF DTC : 1 ITEMS</p> <p>PART ERAS DTAL</p>	<p>1.4 AMBIENT CONDITIONS</p> <p>1. MIL STATUS : ON / OFF</p> <p>2. DTC STATUS : PRESENT / HISTORY</p> <p>3. DTC READNESS FLAG : COMPLETE</p>
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SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

DTC TROUBLESHOOTING PROCEDURES**FL -239****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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure

TERMINAL AND CONNECTOR INSPECTION E7731AD6

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to " Signal Circuit Inspection " procedure.

SIGNAL CIRCUIT INSPECTION E1EE012D

1. IG "OFF".
2. Disconnect HO2S(B1/S2) connector.
3. IG "ON" & ENG "OFF".
4. Measure voltage between terminal 1 of HO2S(B1/S2) and chassis ground.

Specification : Approx. 0.45V

5. Is the measured voltage within specification?

YES

Go to "Groud Circuit Inspection" procedure.

NO

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

GROUND CIRCUIT INSPECTION EF1DED9D

1. IG "OFF".
2. Disconnect HO2S(B1/S2) connector.

FL -240**FUEL SYSTEM**

3. Measure resistance between terminal 2 of HO2S(B1/S2) and chassis ground.

Specification : below 1

4. Is the measured resistance within specification?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION EBA58D2E

1. Visual Inspection.

- 1) IG "OFF"
- 2) Disconnect HO2S(B1/S2) connector.
- 3) Check that HO2S(B1/S2) is contaminated or damaged by foreign materials.
- 4) Has a problem been found?

شرکت دیجیتال خودرو (مسئولیت محدود) **YES**

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good HO2S(B1/S2) and check for proper operation.
If the problem is corrected, replace HO2S(B1/S2) and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EB5CC15E

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

DTC TROUBLESHOOTING PROCEDURES

FL -241

Go to the applicable troubleshooting procedure.

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FL -242

FUEL SYSTEM

DTC P0137 HO2S CIRCUIT LOW VOLTAGE (BANK 1 / SENSOR 2)**COMPONENT LOCATION** EE7A4219

Refer to DTC P0136.

GENERAL DESCRIPTION EE218E25

Refer to DTC P0136.

DTC DESCRIPTION ED28D5B1

If the sensor output is below 0.06V under enable conditions, ECM sets DTC P0137.
(This DTC might be caused by the malfunction of Heater circuit, so, check the heater circuit first.)

DTC DETECTING CONDITION E842FDA7

Item	Detecting Condition	Possible Cause	
DTC Strategy	<ul style="list-style-type: none"> Signal check, low 	<ul style="list-style-type: none"> Poor connection Short to ground in signal circuit HO2S (B1S2) 	
General Enable Conditions	<ul style="list-style-type: none"> After enough heated Battery voltage 10.7V Catalyst temperature (model) > 300 		
Case1	Enable Conditions		<ul style="list-style-type: none"> Engine speed : 1000 ~ 3800 rpm Engine load : 15~79 % No misfire and No purge valve error
	Threshold Value		<ul style="list-style-type: none"> B1S2 sensor voltage 0.06 V
	Diagnostic Time		<ul style="list-style-type: none"> 25 sec
Case2	Enable Conditions		<ul style="list-style-type: none"> Sensor in cold condition
	Threshold Value		<ul style="list-style-type: none"> B1S2 sensor voltage 0.06 V
	Diagnostic Time		<ul style="list-style-type: none"> 0.1 sec
MIL ONCondition	<ul style="list-style-type: none"> 3 driving cycle 		

B1S1 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

SPECIFICATION E30E7D3A

Refer to DTC P0136.

SCHEMATIC DIAGRAM E8E199C3

Refer to DTC P0136.

DTC TROUBLESHOOTING PROCEDURES

FL -243

SIGNAL WAVEFORM & DATA EDE9BDAF

Refer to DTC P0136.

MONITOR SCANTOOL DATA EECE19BA

Refer to DTC P0136.

TERMINAL AND CONNECTOR INSPECTION E5FB24B2

Refer to DTC P0136.

SIGNAL CIRCUIT INSPECTION E0F421AA

1. IG "OFF".
2. Disconnect HO2S(B1/S2) connector.
3. IG "ON" & ENG "OFF".
4. Measure voltage between terminal 1 of HO2S(B1/S2) and chassis ground.

Specification : Approx. 0.45V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION E6A4EC85

1. Visual Inspection.
 - 1) IG "OFF"
 - 2) Disconnect HO2S(B1/S2) connector.
 - 3) Check that HO2S(B1/S2) is contaminated or damaged by foreign materials.
 - 4) Has a problem been found?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good HO2S(B1/S2) and check for proper operation.

FL -244

FUEL SYSTEM

If the problem is corrected, replace HO2S(B1/S2) and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E24AB60D

Refer to DTC P0136.

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DTC TROUBLESHOOTING PROCEDURES

FL -245

DTC P0138 HO2S CIRCUIT HIGH VOLTAGE (BANK 1 / SENSOR 2)**COMPONENT LOCATION** E9BABC7

Refer to DTC P0136.

GENERAL DESCRIPTION E697E031

Refer to DTC P0136.

DTC DESCRIPTION E22B30E1

If the sensor output is over 1.08V under enable conditions, ECM sets DTC P0138.

(This DTC might be caused by the malfunction of Heater circuit, so, check the heater circuit first.)

DTC DETECTING CONDITION E9351476

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Signal check, high 	<ul style="list-style-type: none"> Poor connection Short to power in signal circuit HO2S (B1S2)
Enable Conditions	<ul style="list-style-type: none"> After enough heated Battery voltage 10.7V Catalyst temperature (model) > 300 	
Threshold Value	<ul style="list-style-type: none"> B1S2 sensor voltage 1.08 V 	
Diagnostic Time	<ul style="list-style-type: none"> 5 sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

B1S1 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

SPECIFICATION E1AA3E25

Refer to DTC P0136.

SCHEMATIC DIAGRAM EE3AEAC7

Refer to DTC P0136.

SIGNAL WAVEFORM & DATA E51E181F

Refer to DTC P0136.

MONITOR SCANTOOL DATA E6E6330F

Refer to DTC P0136.

TERMINAL AND CONNECTOR INSPECTION EAC7CB0F

Refer to DTC P0136.

FL -246

FUEL SYSTEM

SIGNAL CIRCUIT INSPECTION E737A5CD

1. IG "OFF".
2. Disconnect HO2S(B1/S2) connector.
3. IG "ON" & ENG "OFF".
4. Measure voltage between terminal 1 of HO2S(B1/S2) and chassis ground.

Specification : Approx. 0.45V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION E14AD3A3

1. Visual Inspection.
 - 1) IG "OFF"
 - 2) Disconnect HO2S(B1/S2) connector.
 - 3) Check that HO2S(B1/S2) is contaminated or damaged by foreign materials.
 - 4) Has a problem been found?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good HO2S(B1/S2) and check for proper operation.
If the problem is corrected, replace HO2S(B1/S2) and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E0A173CF

Refer to DTC P0136.

DTC TROUBLESHOOTING PROCEDURES

FL -247

DTC P0139 HO2S CIRCUIT SLOW RESPONSE (BANK 1 / SENSOR 2)**COMPONENT LOCATION** E4B5A31A

Refer to DTC P0136.

GENERAL DESCRIPTION EF2FDCDE

Refer to DTC P0136.

DTC DESCRIPTION E7CF902A

If the sensor output is over 0.15 V under enable conditions, ECM sets DTC P0139.
(This DTC might be caused by the malfunction of Heater circuit, so, check the heater circuit first.)

DTC DETECTING CONDITION E7C557AC

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Response rate 	<ul style="list-style-type: none"> Poor connection leak or clog in intake air system Injector Fuel pressure HO2S (B1S2)
Enable Conditions	<ul style="list-style-type: none"> Time after fuel cut-off 5 s Integrated air mass after fuel cut-off 15 g Time after dew point end detected 30 s 	
Threshold Value	<ul style="list-style-type: none"> B1S2 sensor voltage 0.15 V 	
Diagnostic Time	<ul style="list-style-type: none"> 0.2 sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

B1S1 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

SPECIFICATION EF665A82

Refer to DTC P0136.

SCHEMATIC DIAGRAM E7B39E9C

Refer to DTC P0136.

SIGNAL WAVEFORM & DATA EA79B074

Refer to DTC P0136.

MONITOR SCANTOOL DATA E2D82F46

Refer to DTC P0136.

SYSTEM INSPECTION EA24AE7B

1. Check leakage or clog of air.

FL -248

FUEL SYSTEM

- 1) Check contamination, clog and installation of gasket
Any damage or installation of throttle body gasket.
Any damage or installation of gasket between intake manifold and surge tank.
Clog or contamination of intake manifold and injector by foreign materials
Contamination and open stuck between surge tank and PCSV by foreign materials
Any damage or contamination of HO2S(B1/S2) by foreign materials.

- 2) Has a problem been found?

YES

Go to " Check Fuel Line" as follows.

NO

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

2. Check Fuel Line.

- 1) Check Clog, contamination and installation of Fuel Line as follows.
Connection for each connectors in Fuel Line.
Damage, interference and installation of vacuum hose connected to Fuel Line.
Bend, Leakage and squeeze of pipe in Fuel Line.

- 2) Has a problem been found?

YES

Go to "Check Fuel Pressure" as follows.

NO

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

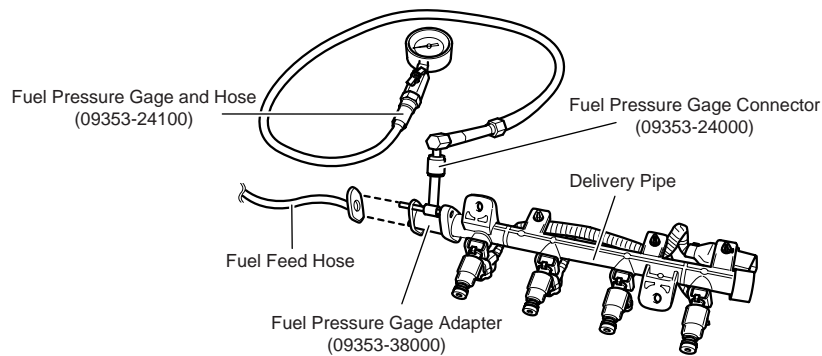
3. Check Fuel Pressure.

- 1) IG "OFF".
- 2) Disconnect fuel pump relay from junction box in passenger compartment.
- 3) Start engine and await until engine is off and then, IG "OFF".
- 4) Connect fuel pump relay again.
- 5) Connect fuel pressure gauge on the fuel filter with fuel pressure gauge adaptor.
- 6) Start engine again and measure fuel pressure.

Specification : Approx. 3.5kg/cm²

DTC TROUBLESHOOTING PROCEDURES

FL -249



EFNG335A

7) Is the fuel pressure normal?

YES

Go to "Component Inspection" procedure.

NO

Check any damage of fuel return hose or pipe.

Check any stuck of the valve in the fuel pressure regulator.

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

COMPONENT INSPECTION E98E3DEE

1. Visual Inspection.

- 1) IG "OFF"
- 2) Disconnect HO2S(B1/S2) connector.
- 3) Check that HO2S(B1/S2) is contaminated or damaged by foreign materials.
- 4) Has a problem been found?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good HO2S(B1/S2) and check for proper operation.

If the problem is corrected, replace HO2S(B1/S2) and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E0C692CF

Refer to DTC P0136.

FL -250

FUEL SYSTEM

DTC P0140 HO2S CIRCUIT NO ACTIVITY DETECTED (BANK 1 / SENSOR 2)**COMPONENT LOCATION** E9C79D80

Refer to DTC P0136.

GENERAL DESCRIPTION E59C7BE6

Refer to DTC P0136.

DTC DESCRIPTION E9EA2064

If there is not any signal activity, ECM sets DTC P0140.

(This DTC might be caused by the malfunction of Heater circuit, so, check the heater circuit first.)

DTC DETECTING CONDITION E6AA1200

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> No signal activity 	<ul style="list-style-type: none"> Poor connection Open or short in signal circuit HO2S (B1S2)
Enable Conditions	<ul style="list-style-type: none"> After oscillation check finished 	
Threshold Value	<ul style="list-style-type: none"> No signal activity 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

B1S1 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

SPECIFICATION EF32981B

Refer to DTC P0136.

SCHEMATIC DIAGRAM EDA61963

Refer to DTC P0136.

SIGNAL WAVEFORM & DATA E648E9E9

Refer to DTC P0136.

MONITOR SCANTOOL DATA E7932146

Refer to DTC P0136.

TERMINAL AND CONNECTOR INSPECTION E79C9EBA

Refer to DTC P0136.

DTC TROUBLESHOOTING PROCEDURES

FL -251

SIGNAL CIRCUIT INSPECTION EA0722E5

1. IG "OFF".
2. Disconnect HO2S(B1/S2) connector.
3. IG "ON" & ENG "OFF".
4. Measure voltage between terminal 1 of HO2S(B1/S2) and chassis ground.

Specification : Approx. 0.45V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION EE991AAE

1. Visual Inspection.
 - 1) IG "OFF"
 - 2) Disconnect HO2S(B1/S2) connector.
 - 3) Check that HO2S(B1/S2) is contaminated or damaged by foreign materials.
 - 4) Has a problem been found?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good HO2S(B1/S2) and check for proper operation.
If the problem is corrected, replace HO2S(B1/S2) and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EF987BBD

Refer to DTC P0136.

FL -252

FUEL SYSTEM

DTC P0141 HO2S HEATER CIRCUIT (BANK 1 / SENSOR 2)**COMPONENT LOCATION** E6E39198

Refer to DTC P0136.

GENERAL DESCRIPTION EFC2E57E

Refer to DTC P0136.

DTC DESCRIPTION E3BE439B

If the internal resistance of heater is over the threshold value under enable conditins, PCM sets DTC P0141.

DTC DETECTING CONDITION EEA143BB

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Heater current check 	<ul style="list-style-type: none"> Poor connection Open or short to ground in signal circuit HO2S (B1S2)
Enable Conditions	<ul style="list-style-type: none"> Exhaust gas temperature (modeled) 350 800 Intake air temperature > -6 Battery voltage 10.7 16.1V 	
Threshold Value	<ul style="list-style-type: none"> Internal resistance > threshold f (cat. temp., heater power) 	
Diagnostic Time	<ul style="list-style-type: none"> Above 15 sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

B1S2 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

SPECIFICATION E218BC46

Refer to DTC P0136.

SCHEMATIC DIAGRAM EB7F9AED

Refer to DTC P0136.

SIGNAL WAVEFORM & DATA E01E0531

Refer to DTC P0136.

MONITOR SCANTOOL DATA EF240C27

Refer to DTC P0136.

TERMINAL AND CONNECTOR INSPECTION E0F6F1A9

Refer to DTC P0136.

DTC TROUBLESHOOTING PROCEDURES

FL -253

POWER CIRCUIT INSPECTION E3F1AFE8

1. IG "OFF".
2. Disconnect HO2S(B1S2) connector.
3. IG "ON" & ENG "OFF".
4. Measure voltage between terminal 3 of HO2S(S2) harness connector and chassis ground.

Specification : B+

5. Is the measured voltage within specification?

YES

Go to "Control Circuit Inspection" procedure.

NO

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

CONTROL CIRCUIT INSPECTION EBD28F

1. IG "OFF".
2. Disconnect HO2S(B1S2) connector.
3. IG "ON" & ENG "OFF".
4. Measure voltage between terminal 4 of HO2S(S2) harness connector and chassis ground.

Specification : Approx. 3.5V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION E93455AA

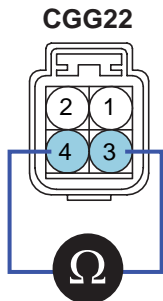
1. Check Heater resistance.
 - 1) IG "OFF".
 - 2) Disconnect HO2S(B1S2) connector.
 - 3) Measure resistance between terminal 3 and 4 of HO2S(B1S2) connector.(Component Side)

FL -254

FUEL SYSTEM

SPECIFICATION :

ITEM	Specification
Heater Resistance	Approx. 9.0 (20)



1. HO2S(S2) Signal
2. Sensor Ground
3. HO2S(S2) Heater Power
4. HO2S(S2) Heater Control

SHDFL6554L

- 4) Is the measured resistance within specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good HO2S and check for proper operation.

If the problem is corrected, replace HO2S and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E97F6A9B

Refer to DTC P0136.

DTC TROUBLESHOOTING PROCEDURES

FL -255


DTC P0171 SYSTEM TOO LEAN (BANK 1)**GENERAL DESCRIPTION** E68C9717

The catalyst's efficiency is demonstrated by its ability to oxidize CO and hydrocarbon emissions. The Powertrain Control Module (PCM) compares the output signals of the front and rear oxygen sensors to determine whether the output of the rear sensor is beginning to match the output of the front oxygen sensor. Air/fuel mixture compensation keeps the frequency of the front oxygen sensor high due to the changes from rich-to-lean combustion. The catalyst causes the rear oxygen sensor to have a lower frequency. As the catalyst wears, the rear oxygen sensor's signal trace begins to match the front oxygen sensor's signal trace. That is because the catalyst becomes saturated with oxygen and cannot use the oxygen to convert hydrocarbon and CO into H₂O and CO₂ with the same efficiency as when it was new. A completely worn catalyst shows a 100% match between the frequency of the front and rear sensors.

DTC DESCRIPTION E134B8FC

If the correction value of air-fuel ratio is higher than the threshold value, ECM sets DTC P0171.

DTC DETECTING CONDITION EAEE991D

Item		Detecting Condition	Possible Cause
DTC Strategy		<ul style="list-style-type: none"> Long-term fuel trim limit (an excessive fuel supply) 	 <ul style="list-style-type: none"> Poor connection Related sensor Intake air system Fuel pressure
General Enable Conditions		<ul style="list-style-type: none"> Coolant temperature > 70 Intake air temperature < 80 Throttle angle < 60% Closed loop control enabled No misfire Purge valve not activated No purge valve error No error of CVVT system No error on the related sensors (CKPS,TPS,CTS,ATS,upstream O2 sensor) 	
Case1	Enable Conditions	<ul style="list-style-type: none"> Engine speed : 1200~3800 rpm Engine load : 30~99.8 % Air mass : 40~190 kg/h 	
	Threshold Value	<ul style="list-style-type: none"> Correction value during driving > 1.23 	
	Diagnostic Time	<ul style="list-style-type: none"> 30 sec 	
Case2	Enable Conditions	<ul style="list-style-type: none"> Engine speed 920 rpm Air mass 24 kg/h 	
	Threshold Value	<ul style="list-style-type: none"> Correction value during idling > 7.5 % 	
	Diagnostic Time	<ul style="list-style-type: none"> 20 sec 	
MIL ONCondition		<ul style="list-style-type: none"> 3 driving cycle 	

MONITOR SCANTOOL DATA EE738DB4

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".

FL -256

FUEL SYSTEM

3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

1.1 DIAGNOSTIC TROUBLE CODES				1.4 AMBIENT CONDITIONS			
PXXXX DTC TITLE				1. MIL STATUS : ON / OFF			
				2. DTC STATUS : PRESENT / HISTORY			
				3. DTC READNESS FLAG : COMPLETE			
NUMBER OF DTC : 1 ITEMS							
PART	ERAS		DTAL				

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure

TERMINAL AND CONNECTOR INSPECTION E84E18BC

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

DTC TROUBLESHOOTING PROCEDURES

FL -257

Go to "System inspection" procedure.

SYSTEM INSPECTION E57B89AA

1. Air leakage check.

- 1) Check "Air intake system"
Check looseness, deterioration or contamination on throttle body and gasket.
Check contamination, damage or crack on intake manifold, ISCA and injectors.
- 2) Is there any leakage?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure

NO

Go to "Fuel line check" procedure.

2. Fuel line check.

- 1) Check "Fuel line system"
Check looseness of connectors on fuel line.
Check looseness, damage, or interference of vacuum hose on fuel line.
Check damage, leakage or bending on fuel line pipe.

- 2) Is fuel line normal?

YES

Go to "Fuel line pressure check" procedure.

NO

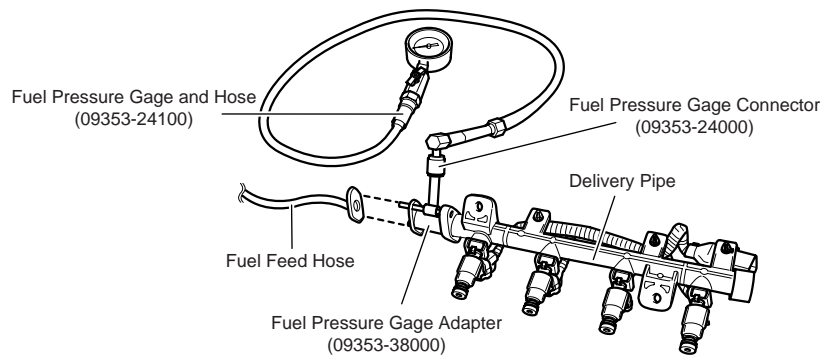
Repair as necessary and go to "Verification of vehicle Repair" procedure.

3. Fuel line pressure check.

- 1) Key "OFF".
- 2) Disconnect a fuel pump relay.
- 3) Engine start and wait until engine stop. and then key "OFF".
- 4) Connect a fuel pump relay.
- 5) Connect a fuel pressure guage to a fuel filter by a fuel pressure guage adaptor.
- 6) Engine start and measure a fuel pressure.

Specification : Approx. 3.5kg/cm²





EFNG335A

7) Is the fuel pressure normal?

YES

Go to "Component inspection" procedure.

NO

Check clogging on the fuel filter.

Check the valve in a fuel pressure regulator.

(If it has a problem, fuel happen to be leaked to a return line.)

Check the supply pressure of fuel pump.

Repair as necessary and go to "Verification of vehicle Repair" procedure.

COMPONENT INSPECTION ECB1F5F2

1. PCV(Positive Crankcase Ventilation) valve check.

- 1) Key "OFF".
- 2) Disconnect PCV valve.
- 3) Check the movement of plunger by putting in and out a thin stick.
- 4) Is the movement of plunger normal?

YES

Go to "PCSV check" procedure.

NO

Substitute with a known - good PCV valve and check for proper operation.

If the problem is corrected, replace PCV valve and go to "Verification of Vehicle Repair" procedure.

2. PCSV check.

- 1) Key "OFF".
- 2) Disconnect PCSV and vacuum hose.
- 3) Apply a vacuum by a hand vacuum gauge on PCSV.

DTC TROUBLESHOOTING PROCEDURES**FL -259**

4) Does PCSV keep the vacuum condition normally?

YES

Go to "Injector check" procedure.

NO

Substitute with a known - good PCSV and check for proper operation.

If the problem is corrected, replace PCSV and go to "Verification of Vehicle Repair" procedure.

3. Injector check.

1) Key "OFF".

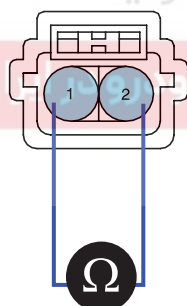
2) Disconnect injectors.

3) Check clog on injectors.

4) Measure the resistance between terminal 1 and 2 of injectors(Component side).

SPECIFICATION :

Temperature [()]	Resistance ()
20 (68)	13.8 ~ 15.2



1. Injector Power
2. Injector control

LFJF474A

5) Is the measured resistance within specifications?

YES

Go to "Sensors related to air/fuel ratio check" procedure.

NO

Repair or replace as necessary. And then, go to "Verification of Vehicle Repair" procedure.

4. Sensors related to air/fuel ratio check.

1) Check the output data of sensors related to air/fuel ratio (HO2S, MAPS, TPS, ECTS, PCSV, Injectors, etc) on scantool. (Refer to each DTC guide procedure.)

2) Are those sensors normal?

FL -260

FUEL SYSTEM

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Repair or replace as necessary. And then, go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E3947EB5

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.



DTC TROUBLESHOOTING PROCEDURES

FL -261

DTC P0172 SYSTEM TOO RICH (BANK 1)**GENERAL DESCRIPTION** EF1FDA79

Refer to DTC P0171.

DTC DESCRIPTION E98B9151

If the correction value of air-fuel ratio is lower than the threshold value, ECM sets DTC P0172.

DTC DETECTING CONDITION EBC3B4A2

Item	Detecting Condition	Possible Cause	
DTC Strategy	<ul style="list-style-type: none"> Long-term fuel trim limit (A short fuel supply) 	<ul style="list-style-type: none"> Poor connection Related sensor Intake air system Fuel pressure 	
General Enable Conditions	<ul style="list-style-type: none"> Coolant temperature > 70 Intake air temperature < 80 Throttle angle < 60% Closed loop control enabled No misfire Purge valve not activated No purge valve error No error of CVVT system No error on the related sensors (CKPS,TPS,CTS,ATS,upstream O2 sensor) 		
Case1	Enable Conditions		<ul style="list-style-type: none"> Engine speed : 1200~3800 rpm Engine load : 30~99.8 % Air mass : 40~190 kg/h
	Threshold Value		<ul style="list-style-type: none"> Correction value during driving < 0.77
	Diagnostic Time		<ul style="list-style-type: none"> 30 sec
Case2	Enable Conditions		<ul style="list-style-type: none"> Engine speed 920 rpm Air mass 24 kg/h
	Threshold Value		<ul style="list-style-type: none"> Correction value during idling > 7.5%
	Diagnostic Time		<ul style="list-style-type: none"> 20 sec
MIL ONCondition	<ul style="list-style-type: none"> 3 driving cycle 		

MONITOR SCANTOOL DATA ECE9792D

Refer to DTC P0171.

TERMINAL AND CONNECTOR INSPECTION E824DD0B

Refer to DTC P0171.

SYSTEM INSPECTION E2E581DE

- Air clog check

FL -262

FUEL SYSTEM

- 1) Check "Air intake system"
Check clog of air-cleaner.
Check deterioration or contamination on throttle body and gasket.
Check contamination, damage, stuck or clog on intake manifold, PCSV, ISCA and injectors.

- 2) Is there any problem?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure

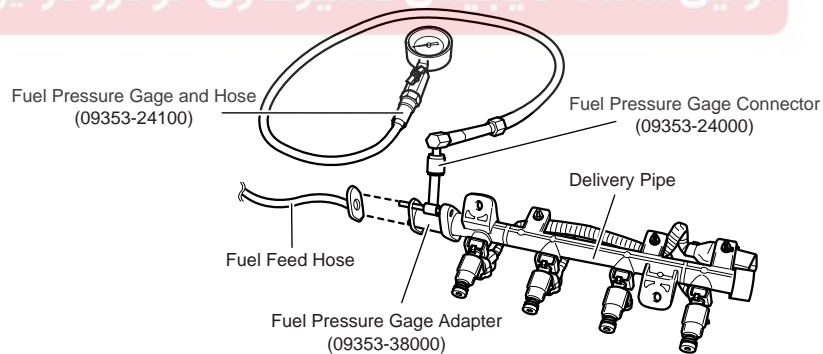
NO

Go to "Fuel pressure check" procedure

2. Fuel pressure check.

- 1) Key "OFF".
- 2) Disconnect a fuel pump relay.
- 3) Engine start and wait until engine stop. and then key "OFF".
- 4) Connect a fuel pump relay.
- 5) Connect a fuel pressure gauge to a fuel filter by a fuel pressure gauge adaptor.
- 6) Engine start and measure a fuel pressure.

Specification : Approx. 3.5kg/cm²



EFNG335A

- 7) Is the fuel pressure normal?

YES

Go to "Component inspection" procedure.

NO

Check the valve in a fuel pressure regulator.
(If it has a problem, fuel happen to be leaked to a return line.)
Check the supply pressure of fuel pump.
Repair as necessary and go to "Verification of vehicle Repair" procedure.

DTC TROUBLESHOOTING PROCEDURES

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COMPONENT INSPECTION E87CEA8D

1. PCV(Positive Crankcase Ventilation) valve check.

- 1) Key "OFF".
- 2) Disconnect PCV valve.
- 3) Check the movement of plunger by putting in and out a thin stick.
- 4) Is the movement of plunger normal?

YES

Go to "PCSV check" procedure.

NO

Substitute with a known - good PCV valve and check for proper operation.

If the problem is corrected, replace PCV valve and go to "Verification of Vehicle Repair" procedure.

2. PCSV check.

- 1) Key "OFF".
- 2) Disconnect PCSV and vacuum hose.
- 3) Apply a vacuum by a hand vacuum gauge on PCSV.
- 4) Does PCSV keep the vacuum condition normally?

YES

Go to "Injector check" procedure.

NO

Substitute with a known - good PCSV and check for proper operation.

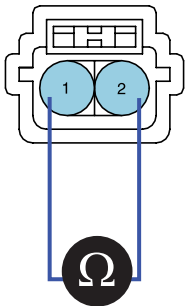
If the problem is corrected, replace PCSV and go to "Verification of Vehicle Repair" procedure.

3. Injector check.

- 1) Key "OFF".
- 2) Disconnect injectors.
- 3) Check clog on injectors.
- 4) Measure the resistance between terminal 1 and 2 of injectors(Component side).

SPECIFICATION :

Temperature [()]	Resistance ()
20 (68)	13.8 ~ 15.2



1. Injector Power
2. Injector control

LFJF474A

5) Is the measured resistance within specifications?

YES

Go to "Sensors related to air/fuel ratio check" procedure.

NO

Repair or replace as necessary. And then, go to "Verification of Vehicle Repair" procedure.

4. Sensors related to air/fuel ratio check.

1) Check the output data of sensors related to air/fuel ratio (HO2S, MAPS, TPS, ECTS, PCSV, Injectors, etc) on scantool. (Refer to each DTC guide procedure.)

2) Are those sensors normal?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Repair or replace as necessary. And then, go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E7265F36

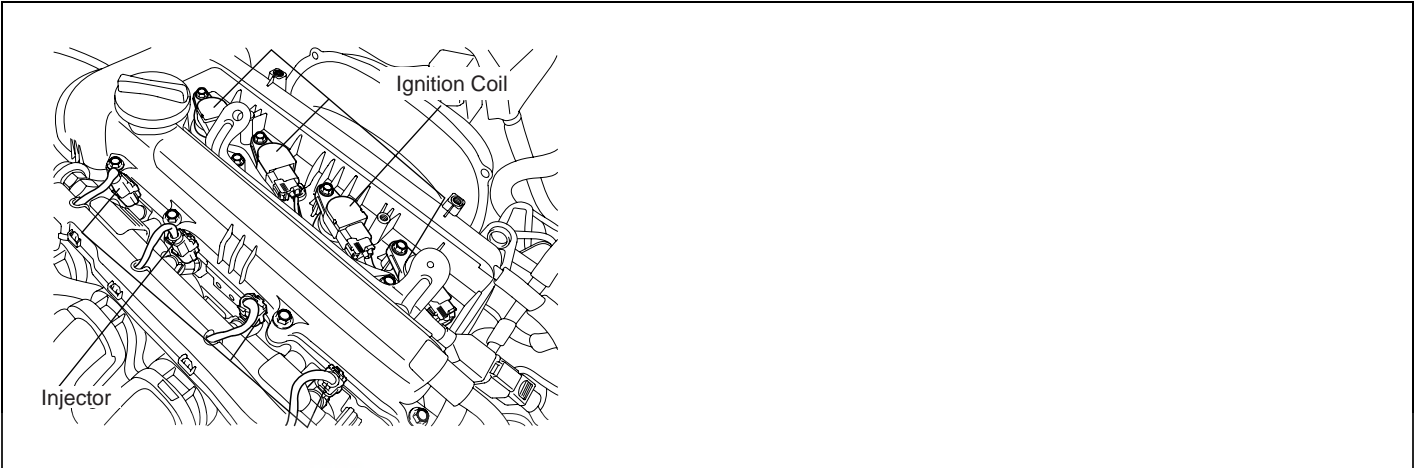
Refer to DTC P0171.

DTC TROUBLESHOOTING PROCEDURES

FL -265

DTC P0201	CYLINDER 1-INJECTOR CIRCUIT/OPEN
DTC P0202	CYLINDER 2-INJECTOR CIRCUIT/OPEN
DTC P0203	CYLINDER 3-INJECTOR CIRCUIT/OPEN
DTC P0204	CYLINDER 4-INJECTOR CIRCUIT/OPEN

COMPONENT LOCATION EFC89A98



GENERAL DESCRIPTION E858B18D

Electronically controlled fuel injector is a solenoid valve which supplies exactly calculated amount of fuel to engine for optimum combustion under various engine load and speed. To meet air-fuel ratio required in system, ECM regulates fuel injection quantity as controlling injector solenoid operating duration referring air flow to cylinders and output signals from HO2S. For this precise control, quick response of solenoid is required and for perfect combustion, injection characteristic is important.

DTC DESCRIPTION E68A4984

If there is Open in injector #1/2/3/4 circuit, PCM sets DTC P0201/P0202/P0203/P0204.

DTC DETECTING CONDITION EEADF90C

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Circuit continuity check, open 	<ul style="list-style-type: none"> Poor connection Open or short to ground in power circuit Open in control circuit Injector
Enable Conditions		
Threshold Value		
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

FL -266

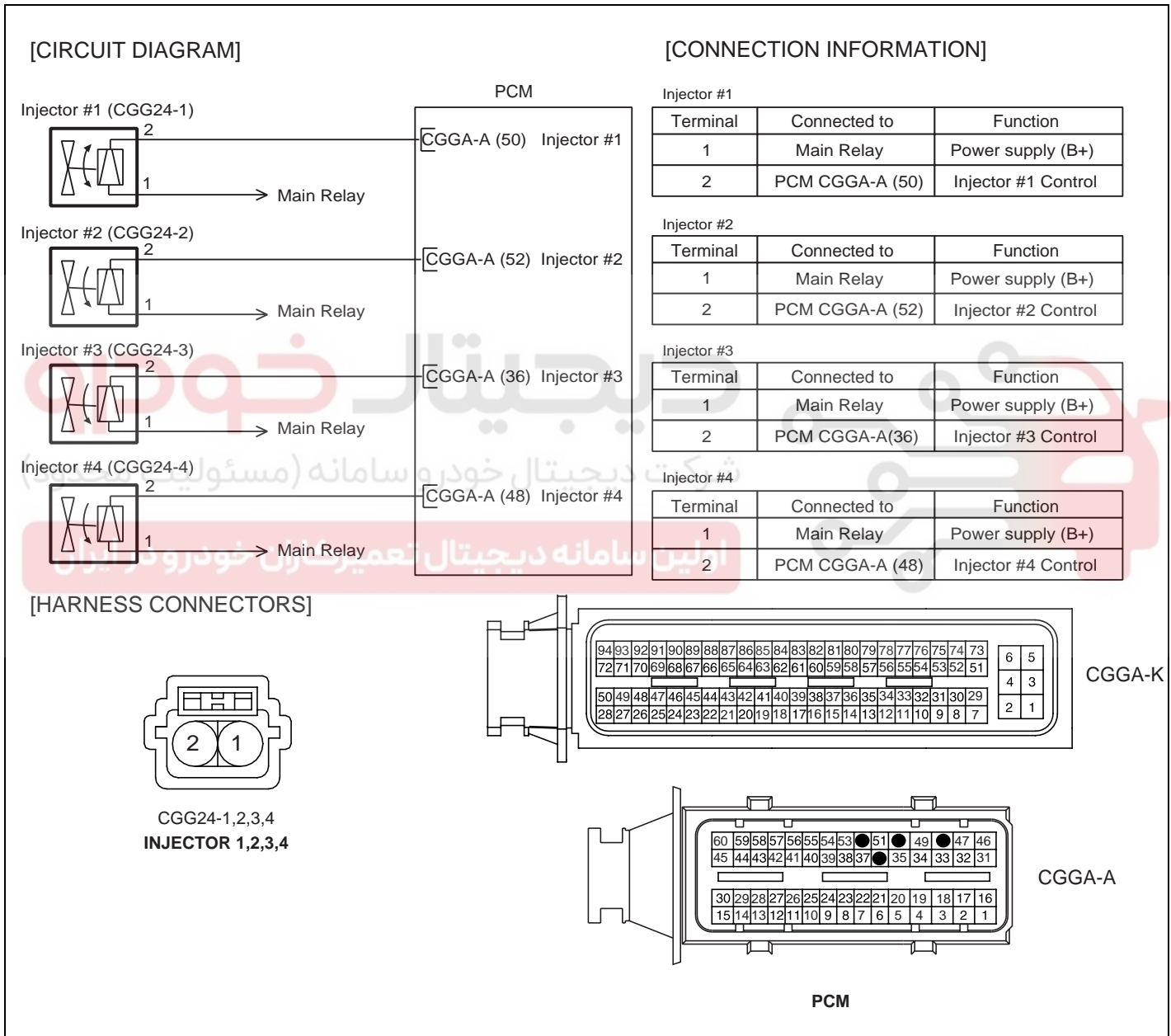
FUEL SYSTEM

SPECIFICATION E26F2273

Temperature ([])	Resistance ()
20 (68)	13.8 ~ 15.2

SCHEMATIC DIAGRAM ED2C1185

(A/T)

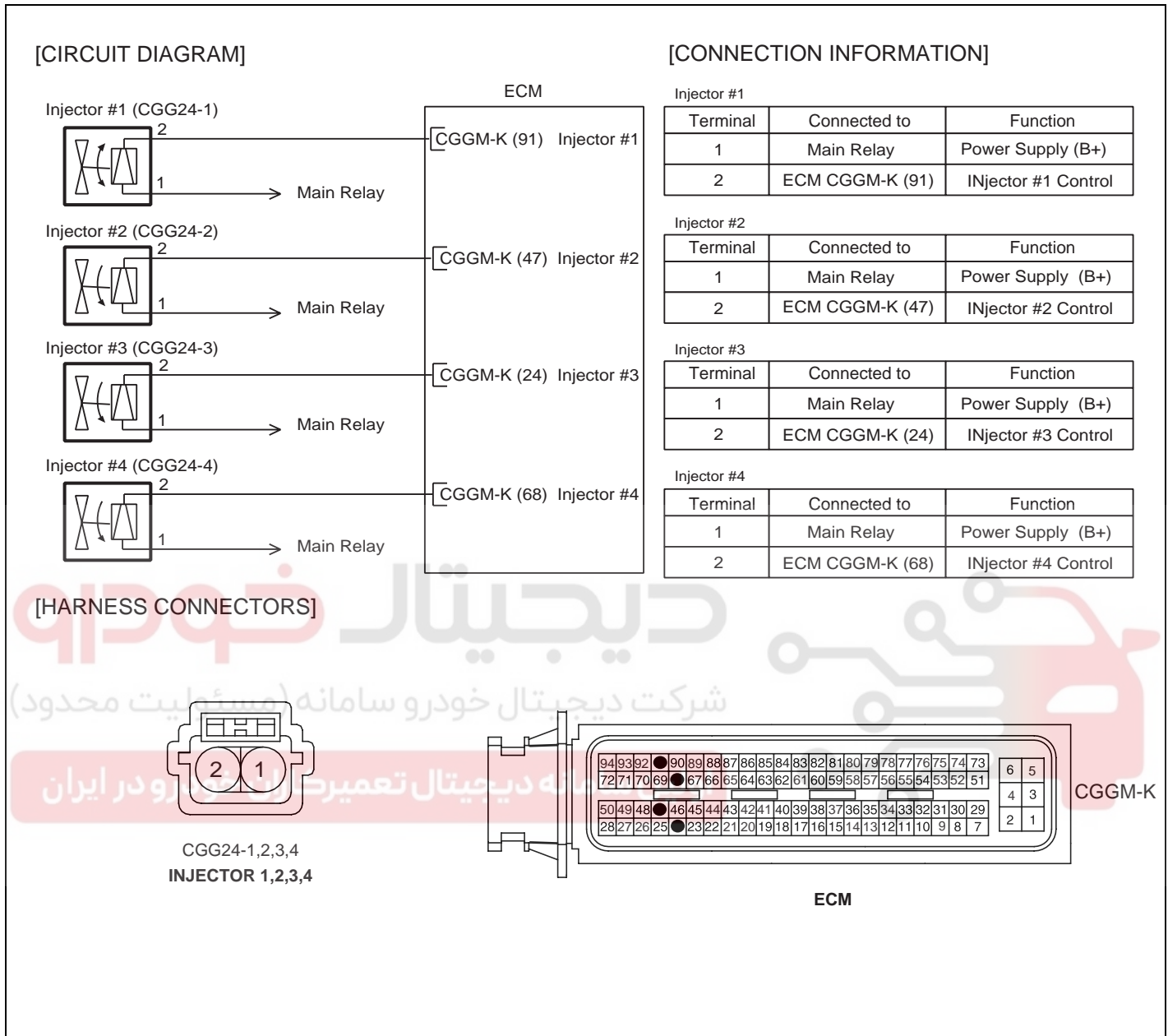


SHDFL6586L

DTC TROUBLESHOOTING PROCEDURES

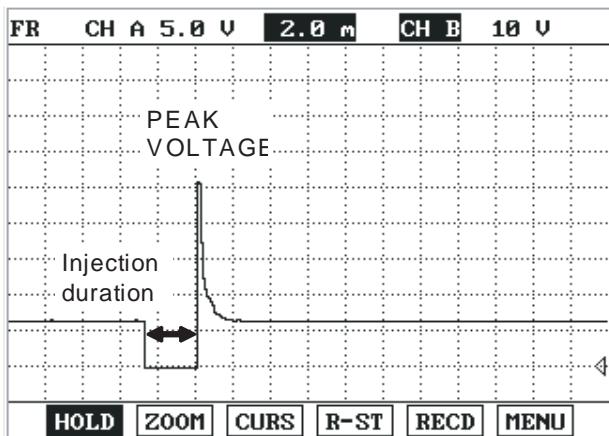
FL -267

(M/T)



SHDFL6587L

SIGNAL WAVEFORM & DATA EF3BACE9



When the ECM energizes the injector by grounding the control circuit, the circuit voltage should below (theoretically 0V) and the fuel is injected. When the ECM de-energizes the injector by opening control circuit, the fuel injector is closed and circuit voltage should be peak for a moment.

LFJF479A

MONITOR SCANTOOL DATA EB527791

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

1.2 CURRENT DATA		20564
ENGINE SPEED	648.8rpm	
NO.1 INJ. DURATION	2.9 nS	
NO.2 INJ. DURATION	2.9 nS	
NO.3 INJ. DURATION	2.9 nS	
NO.4 INJ. DURATION	2.9 nS	
IGNITION TIMING - CYL1	4.5 *	
IGNITION TIMING - CYL2	4.5 *	
IGNITION TIMING - CYL3	6.8 *	

Normal state

1.2 CURRENT DATA		20564
ENGINE SPEED	688.8rpm	
NO.1 INJ. DURATION	3.4 nS	
NO.2 INJ. DURATION	3.8 nS	
NO.3 INJ. DURATION	3.5 nS	
NO.4 INJ. DURATION	3.5 nS	
IGNITION TIMING - CYL1	28.3 *	
IGNITION TIMING - CYL2	28.3 *	
IGNITION TIMING - CYL3	14.2 *	

Abnormal State (#2 error)

4. Is the "Injector" parameter 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, poorconnection, ending, corrosion, contamination, deterioration, or damage. Repair or replace asnecessary and go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal and Connector Inspection" procedure.

SHDFL6555L

DTC TROUBLESHOOTING PROCEDURES

FL -269

TERMINAL AND CONNECTOR INSPECTION E9F848F3

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to " Power Circuit Inspection " procedure.

POWER CIRCUIT INSPECTION E0497831

1. IG "OFF".
2. Disconnect injector connector.
3. IG "ON" & ENG "OFF".
4. Measure voltage between terminal 1 of injector harness connector and chassis ground.

Specification : B+

5. Is the measured voltage within specification?

YES

Go to "Control Circuit Inspection" procedure.

NO

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

CONTROL CIRCUIT INSPECTION E6578DDB

1. IG "OFF".
2. Disconnect injector connector.
3. IG "ON" & ENG "OFF".
4. Measure voltage between terminal 2 of injector harness connector and chassis ground.

Specification : 3.5V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

FL -270

FUEL SYSTEM

NO

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

COMPONENT INSPECTION E799234E

1. Check injector resistance.
 - 1) IG "OFF".
 - 2) Disconnect injector connector.
 - 3) Measure resistance between terminal 1 and 2 of injector connector.(Component Side)

SPECIFICATION :

Temperature ([])	Resistance ()
20 (68)	13.8 ~ 15.2



LFJF483A

- 4) Is the measured resistance within specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR E4968525

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.

DTC TROUBLESHOOTING PROCEDURES

FL -271

3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

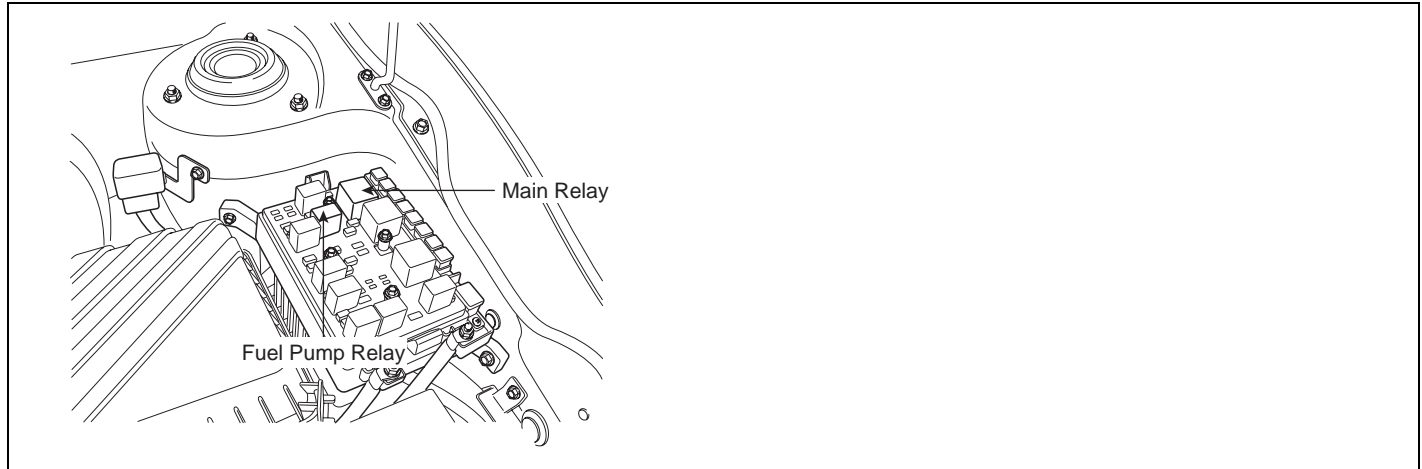


FL -272

FUEL SYSTEM

DTC P0230 FUEL PUMP PRIMARY CIRCUIT

COMPONENT LOCATION E75641EA



SLDFL7704L

GENERAL DESCRIPTION EA1CBD00

The PCM provides ground to one side of the coil in the fuel pump relay to control the fuel pump relay. The other side of the fuel pump relay coil is connected to fuel pump relay, which activates when the ignition switch is ON. The PCM monitors the control circuit between the fuel pump relay and the ECM. When the ignition switch is turned ON, the PCM energizes the fuel pump relay, which sends power to the fuel pump.

DTC DESCRIPTION EF3066CA

If there is Open in fuel pump circuit, PCM sets DTC P0230.

DTC DETECTING CONDITION E1FA6A1B

Item	Detecting Condition	Possible Cause
DTC Strategy	• Circuit continuity check, open	<ul style="list-style-type: none"> • Poor connection • Open or short to ground in power circuit • Open in control circuit • Fuel pump relay
Enable Conditions		
Threshold Value	• Disconnected	
Diagnostic Time	• Continuous	
MIL ON Condition	• DTC only	

SPECIFICATION E98A7E1C

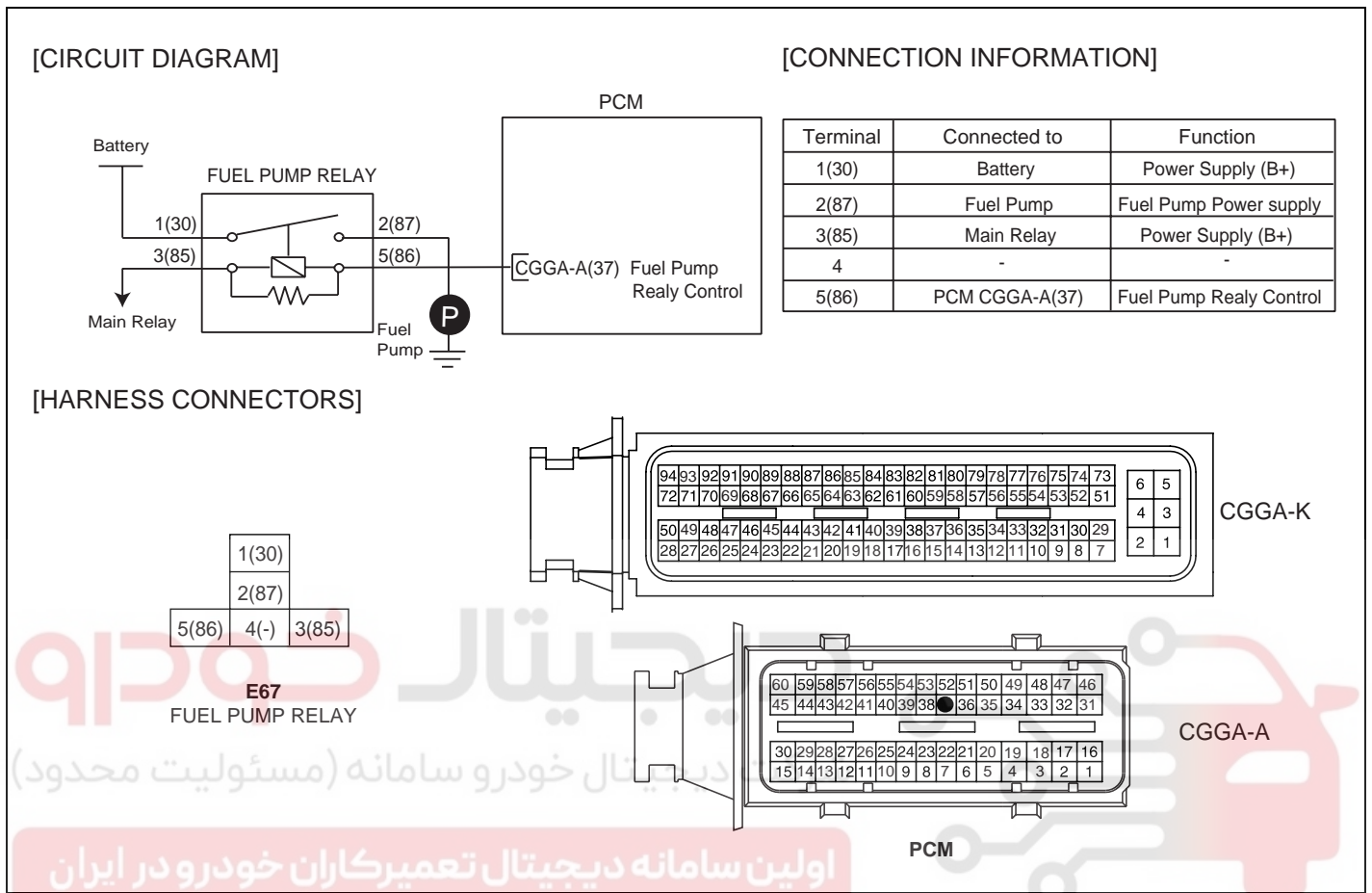
Temperature [()]	Coil Resistance ()
20 (68)	70.0 ~ 120.0

DTC TROUBLESHOOTING PROCEDURES

FL -273

SCHEMATIC DIAGRAM E5A7E4C8

(A/T)

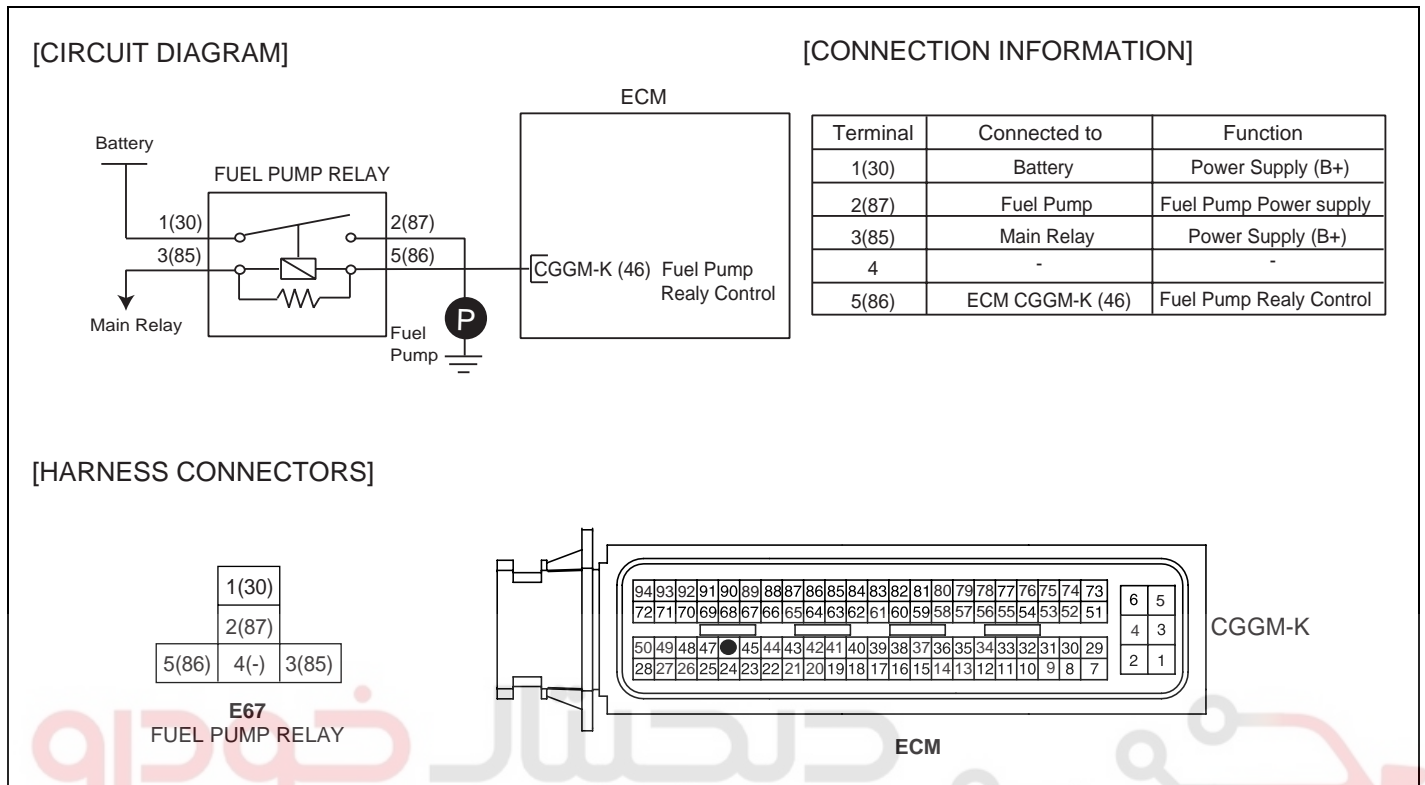


SLDFL7588L

FL -274

FUEL SYSTEM

(M/T)



SLDFL7589L

MONITOR SCANTOOL DATA

E1BC9286

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

1.1 DIAGNOSTIC TROUBLE CODES	1.4 AMBIENT CONDITIONS
PXXXX DTC TITLE	1.MIL STATUS : ON / OFF
	2.DTC STATUS : PRESENT / HISTORY
	3.DTC READNESS FLAG : COMPLETE
NUMBER OF DTC : 1 ITEMS	
PART ERAS DTAL	

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?

DTC TROUBLESHOOTING PROCEDURES

FL -275



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure

TERMINAL AND CONNECTOR INSPECTION E0AFB209

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "Fuel pump relay circuit inspection" procedure.

POWER CIRCUIT INSPECTION EE25D650

1. Key "OFF".
2. Disconnect fuel pump relay.
3. Key "ON".
4. Measure the voltage between terminal 1 and 3 of fuel pump relay harness connector.

Specification : B+

5. Is the measured voltage within specifications?

YES

Go to "Control circuit inspection" procedure.

NO

Check "Fuel Pump 15A" fuse between fuel pump relay and main relay.
 Check "ECU A 30A" fuse between fuel pump relay and battery.
 Repair Open or Short in power circuit, and go to "Verification of vehicle Repair" procedure.

FL -276

FUEL SYSTEM

CONTROL CIRCUIT INSPECTION EADD4993

1. Key "OFF".
2. Disconnect fuel pump relay.
3. Key "ON".
4. Measure the voltage between terminal 5 of fuel pump relay harness connector and chassis ground.

 Specification : Approx. 3.5V

5. Is the measured voltage within specifications?

YES

Go to "Component inspection" procedure.

NO

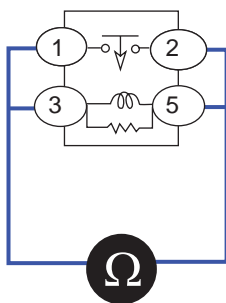
Repair Open in control circuit, and go to "Verification of vehicle Repair" procedure.

COMPONENT INSPECTION E0621149

1. Fuel pump relay check.
 - 1) Key "OFF".
 - 2) Disconnect fuel pump relay.
 - 3) Measure the resistance between terminal 1 and 2 of fuel pump relay component side.
 - 4) Measure the resistance between terminal 3 and 5 of fuel pump relay component side.

SPECIFICATION :

Terminal	Power Approval
1~2	NO
3~5	YES (70 ~ 120)



EFNG314A

- 5) Is the measured resistance within specification?

DTC TROUBLESHOOTING PROCEDURES

FL -277

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR E439A0E0

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.



FL -278

FUEL SYSTEM

DTC P0231 ELECTRIC FUEL PUMP RELAY-OPEN OR SHORT CIRCUIT**COMPONENT LOCATION** E92C914D

Refer to DTC P0230.

GENERAL DESCRIPTION E3456D41

Refer to DTC P0230.

DTC DESCRIPTION EED592D4

If there is Short to ground in fuel pump circuit, PCM sets DTC P0231.

DTC DETECTING CONDITION E26C9123

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Circuit continuity check, low 	<ul style="list-style-type: none"> Poor connection Short to ground in control circuit Fuel pump relay
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> Short circuit to Ground 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> DTC only 	

SPECIFICATION E703CF27

Refer to DTC P0230.

SCHEMATIC DIAGRAM E4AB31EB

Refer to DTC P0230.

MONITOR SCANTOOL DATA ED998B24

Refer to DTC P0230.

TERMINAL AND CONNECTOR INSPECTION EFBF5A60

Refer to DTC P0230.

FUEL PUMP RELAY CIRCUIT INSPECTION E7B8AB11

1. Key "OFF".
2. Disconnect fuel pump relay.
3. Key "ON".

DTC TROUBLESHOOTING PROCEDURES**FL -279**

4. Measure the voltage between terminal 5 of fuel pump relay harness connector and chassis ground.

Specification : Approx. 3.5V

5. Is the measured voltage within specifications?

YES

Go to "Component inspection" procedure.

NO

Repair short to ground in control circuit, and go to "Verification of vehicle Repair" procedure.

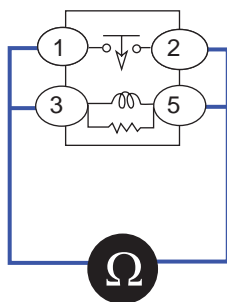
COMPONENT INSPECTION E3DC545A

1. Fuel pump relay check.

- 1) Key "OFF".
- 2) Disconnect fuel pump relay.
- 3) Measure the resistance between terminal 1 and 2 of fuel pump relay component side.
- 4) Measure the resistance between terminal 3 and 5 of fuel pump relay component side.

SPECIFICATION :

Terminal	Power Approval
1~2	NO
3~5	YES (70 ~ 120)



EFNG314A

- 5) Is the measured resistance within specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

FL -280

FUEL SYSTEM

NO

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

VERIFICATION OF VEHICLE REPAIR EAB89542

Refer to DTC P0230.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



DTC TROUBLESHOOTING PROCEDURES

FL -281

DTC P0232 ELECTRIC FUEL PUMP RELAY-SHORT CIRCUIT**COMPONENT LOCATION** E44DF6B5

Refer to DTC P0230.

GENERAL DESCRIPTION E73F216D

Refer to DTC P0230.

DTC DESCRIPTION E00118B2

If there is Short to battery in fuel pump circuit, PCM sets DTC P0232.

DTC DETECTING CONDITION E462A2BF

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Circuit continuity check, high 	<ul style="list-style-type: none"> Poor connection Short to power in control circuit Fuel pump relay
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> Short circuit to battery 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> DTC only 	

SPECIFICATION E39BD634

Refer to DTC P0230.

SCHEMATIC DIAGRAM EE7402B7

Refer to DTC P0230.

MONITOR SCANTOOL DATA EF5CFD71

Refer to DTC P0230.

TERMINAL AND CONNECTOR INSPECTION EEE3BEB

Refer to DTC P0230.

FUEL PUMP RELAY CIRCUIT INSPECTION EE149E4E

1. Key "OFF".
2. Disconnect fuel pump relay.
3. Key "ON".

FL -282

FUEL SYSTEM

4. Measure the voltage between terminal 5 of fuel pump relay harness connector and chassis ground.

Specification : Approx. 3.5V

5. Is the measured voltage within specifications?

YES

Go to "Component inspection" procedure.

NO

Repair short to power in control circuit, and go to "Verification of vehicle Repair" procedure.

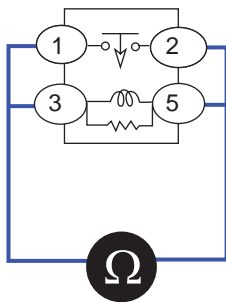
COMPONENT INSPECTION E2739A53

1. Fuel pump relay check.

- 1) Key "OFF".
- 2) Disconnect fuel pump relay.
- 3) Measure the resistance between terminal 1 and 2 of fuel pump relay component side.
- 4) Measure the resistance between terminal 3 and 5 of fuel pump relay component side.

SPECIFICATION :

Terminal	Power Approval
1~2	NO
3~5	YES (70 ~ 120)



EFNG314A

- 5) Is the measured resistance within specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

DTC TROUBLESHOOTING PROCEDURES**FL -283****NO**

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

VERIFICATION OF VEHICLE REPAIR EB149F7B

Refer to DTC P0230.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

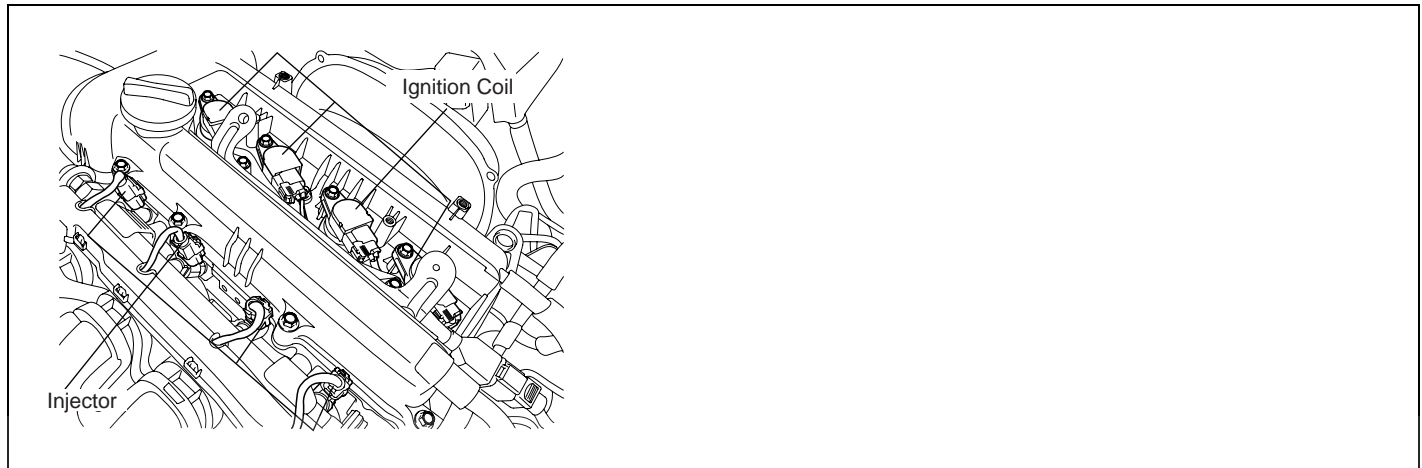


FL -284

FUEL SYSTEM

DTC P0261	CYLINDER 1-INJECTOR CIRCUIT LOW
DTC P0264	CYLINDER 2-INJECTOR CIRCUIT LOW
DTC P0267	CYLINDER 3-INJECTOR CIRCUIT LOW
DTC P0270	CYLINDER 4-INJECTOR CIRCUIT LOW

COMPONENT LOCATION E8C6F5F8



GENERAL DESCRIPTION E2F85DED

Electronically controlled fuel injector is a solenoid valve which supplies exactly calculated amount of fuel to engine for optimum combustion under various engine load and speed. To meet air-fuel ratio required in system, ECM regulates fuel injection quantity as controlling injector solenoid operating duration referring air flow to cylinders and output signals from HO2S. For this precise control, quick response of solenoid is required and for perfect combustion, injection characteristic is important.

DTC DESCRIPTION E1EBB7CD

If there is Short to ground in injector #1/2/3/4 circuit, PCM sets DTC P0261/P0264/P0267/P0270.

DTC DETECTING CONDITION ECC6C6C3

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Circuit continuity check, low 	<ul style="list-style-type: none"> Poor connection Short to ground in control circuit Injector
Enable Conditions		
Threshold Value		
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

DTC TROUBLESHOOTING PROCEDURES

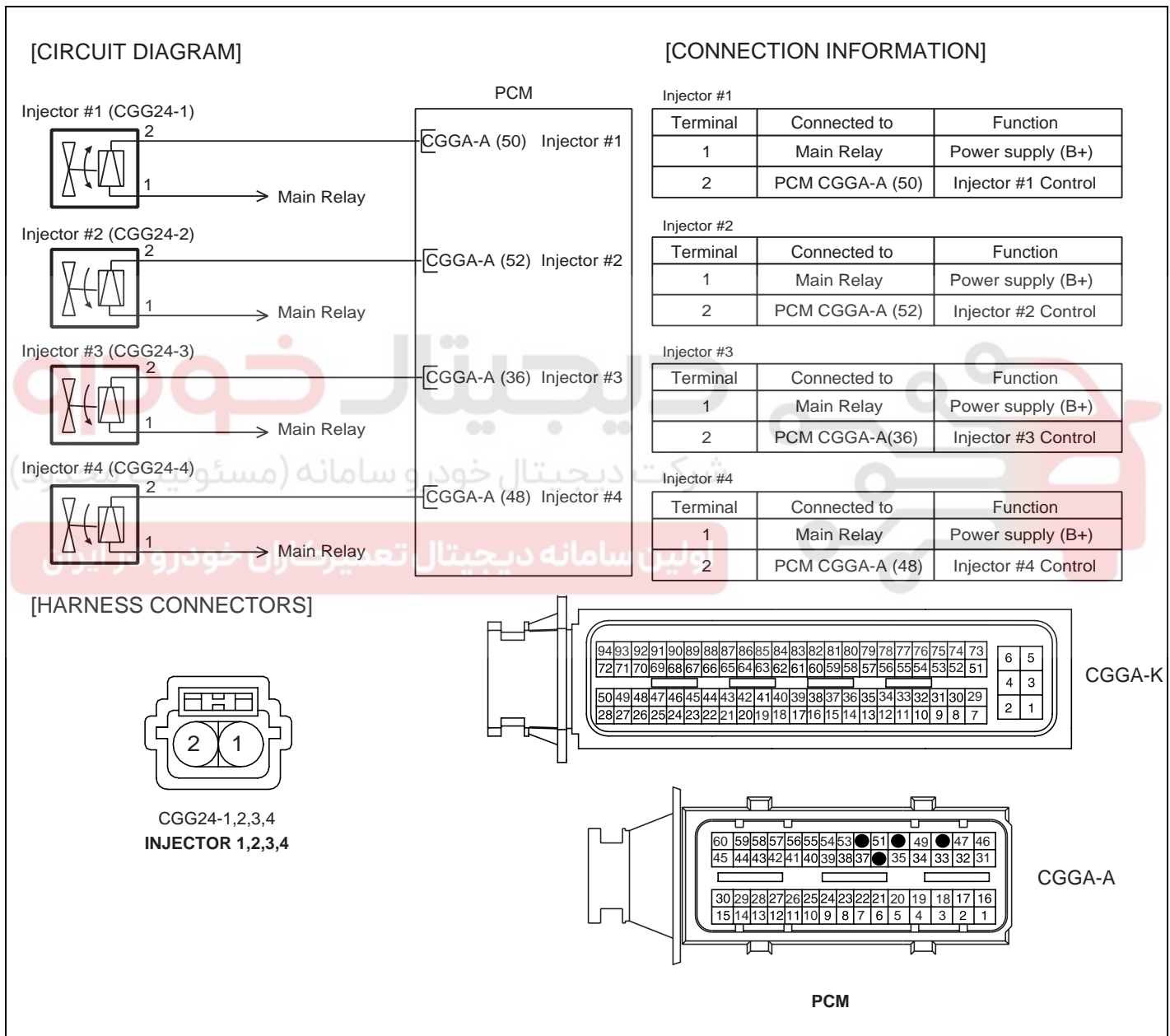
FL -285

SPECIFICATION E5BC3BBB

Temperature ([])	Resistance ()
20 (68)	13.8 ~ 15.2

SCHEMATIC DIAGRAM EF03D161

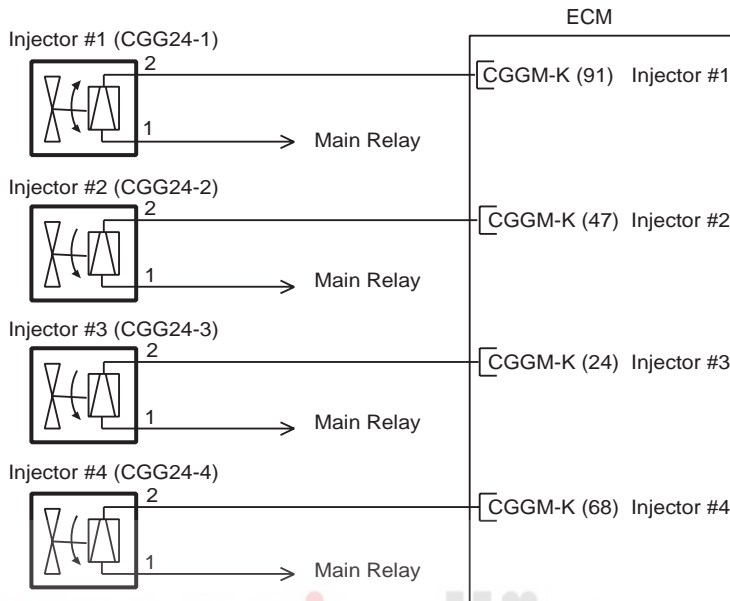
(A/T)



SHDFL6586L

(M/T)

[CIRCUIT DIAGRAM]



[CONNECTION INFORMATION]

Injector #1

Terminal	Connected to	Function
1	Main Relay	Power Supply (B+)
2	ECM CGGM-K (91)	INjector #1 Control

Injector #2

Terminal	Connected to	Function
1	Main Relay	Power Supply (B+)
2	ECM CGGM-K (47)	INjector #2 Control

Injector #3

Terminal	Connected to	Function
1	Main Relay	Power Supply (B+)
2	ECM CGGM-K (24)	INjector #3 Control

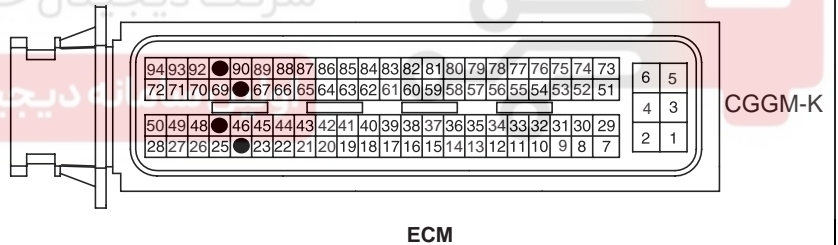
Injector #4

Terminal	Connected to	Function
1	Main Relay	Power Supply (B+)
2	ECM CGGM-K (68)	INjector #4 Control

[HARNESS CONNECTORS]



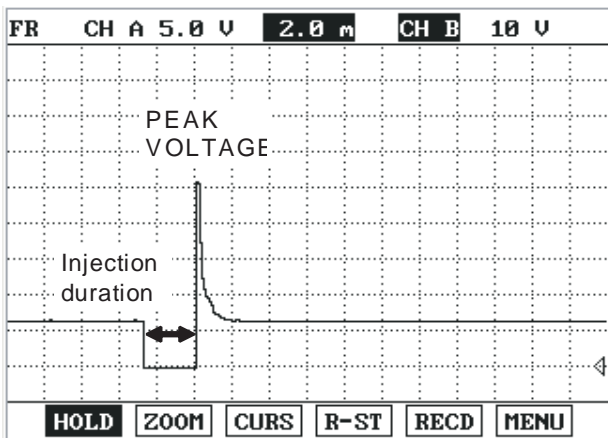
CGG24-1,2,3,4
INJECTOR 1,2,3,4



SHDFL6587L

DTC TROUBLESHOOTING PROCEDURES

SIGNAL WAVEFORM & DATA E624B3C8



When the ECM energizes the injector by grounding the control circuit, the circuit voltage should below (theoretically 0V) and the fuel is injected. When the ECM de-energizes the injector by opening control circuit, the fuel injector is closed and circuit voltage should be peak for a moment.

LFJF479A

MONITOR SCANTOOL DATA E890EA0B

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

1.2 CURRENT DATA 20564	
× ENGINE SPEED	648.8rpm
× NO.1 INJ.DURATION	2.9 nS
× NO.2 INJ.DURATION	2.9 nS
× NO.3 INJ.DURATION	2.9 nS
× NO.4 INJ.DURATION	2.9 nS
IGNITION TIMING - CYL1	4.5 °
IGNITION TIMING - CYL2	4.5 °
IGNITION TIMING - CYL3	6.8 °

Normal state

1.2 CURRENT DATA 20564	
× ENGINE SPEED	688.8rpm
× NO.1 INJ.DURATION	3.4 nS
× NO.2 INJ.DURATION	3.8 nS
× NO.3 INJ.DURATION	3.5 nS
× NO.4 INJ.DURATION	3.5 nS
IGNITION TIMING - CYL1	28.3 °
IGNITION TIMING - CYL2	28.3 °
IGNITION TIMING - CYL3	14.2 °

Abnormal State (#2 error)

SHDFL6564L

4. Is the "Injector" parameter 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, poorconnection, ending, corrosion, contamination, deterioration, or damage. Repair or replace asnecessary and go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal and Connector Inspection" procedure.

FL -288

FUEL SYSTEM

TERMINAL AND CONNECTOR INSPECTION E2C34101

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to " Control Circuit Inspection " procedure.

CONTROL CIRCUIT INSPECTION EAEB912E

1. IG "OFF".
2. Disconnect injector connector.
3. IG "ON" & ENG "OFF".
4. Measure voltage between terminal 2 of injector harness connector and chassis ground.

Specification : Approx. 3.5V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION EEAF943A

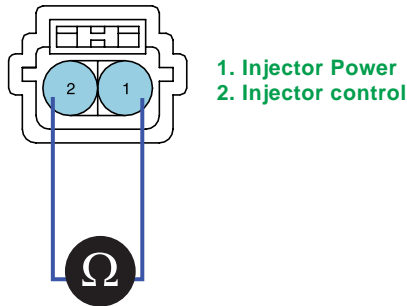
1. Check injector resistance.
 - 1) IG "OFF".
 - 2) Disconnect injector connector.
 - 3) Measure resistance between terminal 1 and 2 of injector connector.(Component Side)

SPECIFICATION :

Temperature ([])	Resistance ()
20 (68)	13.8 ~ 15.2

DTC TROUBLESHOOTING PROCEDURES

FL -289



LFJF483A

4) Is the measured resistance within specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good injector and check for proper operation.

If the problem is corrected, replace injector and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR

E3F8C1AF

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

FL -290

FUEL SYSTEM

DTC P0262	CYLINDER 1-INJECTOR CIRCUIT HIGH
DTC P0265	CYLINDER 2-INJECTOR CIRCUIT HIGH
DTC P0268	CYLINDER 3-INJECTOR CIRCUIT HIGH
DTC P0271	CYLINDER 4-INJECTOR CIRCUIT HIGH

COMPONENT LOCATION E7038B99

Refer to DTC P0261.

GENERAL DESCRIPTION E8842D0E

Refer to DTC P0261.

DTC DESCRIPTION EA290DA0

If there is Short to battery in injector #1/2/3/4 circuit, PCM sets DTC P0262/P0265/P0268/P0271.

DTC DETECTING CONDITION EB6B7D91

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Circuit continuity check, high 	<ul style="list-style-type: none"> Poor connection Short to power in control circuit Injector
Enable Conditions		
Threshold Value		
Diagnostic Time	<ul style="list-style-type: none"> Continuouss 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SPECIFICATION EE209080

Refer to DTC P0261.

SCHEMATIC DIAGRAM E2AEBA4

Refer to DTC P0261.

SIGNAL WAVEFORM & DATA EE1534DD

Refer to DTC P0261.

MONITOR SCANTOOL DATA EC9EC089

Refer to DTC P0261.

TERMINAL AND CONNECTOR INSPECTION EEEEEFA7

Refer to DTC P0261.

DTC TROUBLESHOOTING PROCEDURES

FL -291

CONTROL CIRCUIT INSPECTION ED5B1B32

1. IG "OFF".
2. Disconnect injector connector.
3. IG "ON" & ENG "OFF".
4. Measure voltage between terminal 2 of injector harness connector and chassis ground.

 Specification : Approx. 3.5V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

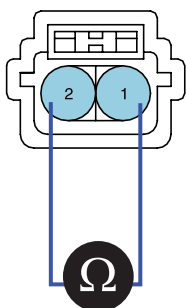
Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION E2B481BD

1. Check injector resistance.
 - (1) IG "OFF".
 - 2) Disconnect injector connector.
 - 3) Measure resistance between terminal 1 and 2 of injector connector.(Component Side)

SPECIFICATION :

Temperature ([])	Resistance ()
20 (68)	13.8 ~ 15.2



1. Injector Power
2. Injector control

LFJF483A

- 4) Is the measured resistance within specification?

YES

FL -292

FUEL SYSTEM

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR EF27F1D4

Refer to DTC P0261.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

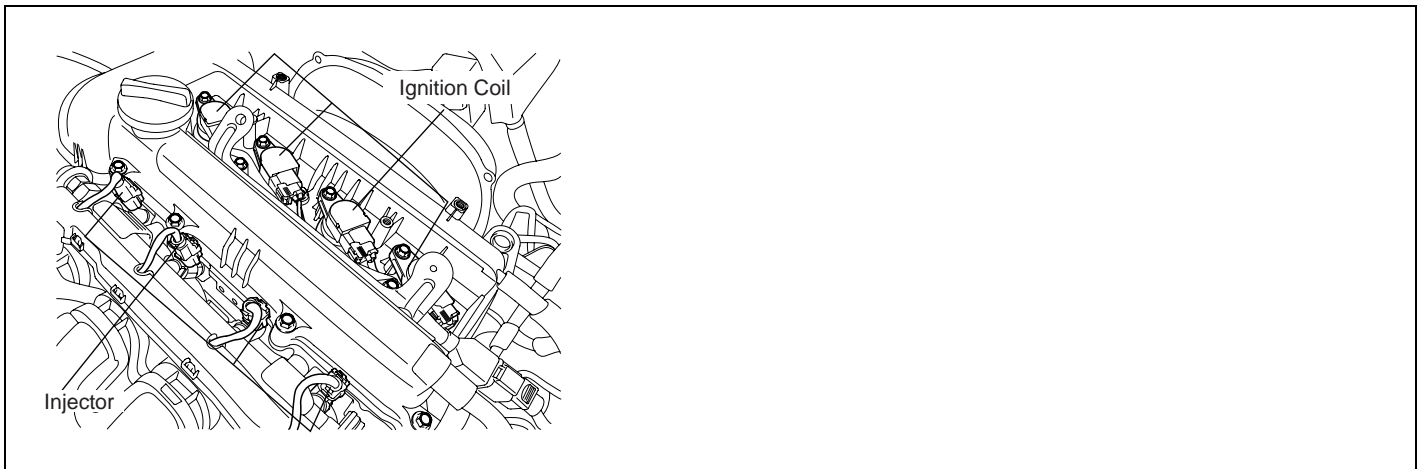


DTC TROUBLESHOOTING PROCEDURES

FL -293

DTC P0300 RANDOM/MULTIPLE CYLINDER MISFIRE DETECTED**COMPONENT LOCATION**

E6531342



SHDFL6711L

GENERAL DESCRIPTION

EDE49EC4

Misfires can be caused by lack of combustion in a cylinder due to absence of spark, poor fuel metering, poor compression, or many other causes. Even a small number of misfires may result in excessive exhaust emissions due to the unburned mixture. Increased misfire rates cause damage to the catalytic converter. The PCM monitors the crankshaft speed variation to determine if any misfiring generated. The PCM identifies the specific cylinder in which the misfire has occurred and counts individual misfire events by monitoring changes in the crankshaft rotation for each cylinder. A random misfire indicates one or more cylinders are misfiring.

DTC DESCRIPTION

E002FA14

If a misfire exists that exceeds the threshold value, P0300 is set.

FL -294

FUEL SYSTEM

DTC DETECTING CONDITION

ECBAA73A

Item		Detecting Condition	Possible Cause
DTC Strategy		<ul style="list-style-type: none"> Engine roughness through crankshaft speed fluctuation 	<ul style="list-style-type: none"> Poor connection Ignition system Fuel system Intake/exhaust air system Ignition timing Injector
Enable Conditions		<ul style="list-style-type: none"> Engine speed 400 4520 rpm Engine load > Zero torque line Eng. load change 41.2 200 %/cycle Eng. speed change 2105 4839 rpm/s Intake air temperature > -6 	
Case1	Threshold Value	<ul style="list-style-type: none"> Misfire rate > 3.25% per 1000 rev. 	
	Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
	MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	
Case2	Threshold Value	<ul style="list-style-type: none"> Misfire rate > 2.5~22.2% per 200 rev. (Depends on driving conditions) 	
	Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
	MIL ON Condition	<ul style="list-style-type: none"> Immediately (Blink) 	

SPECIFICATION

E97744CE

Ignition Coil Resistance (Primary)
0.75 ± 15% at 20 (68)

MONITOR SCANTOOL DATA

E85055D5

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

DTC TROUBLESHOOTING PROCEDURES

FL -295

1.1 DIAGNOSTIC TROUBLE CODES				1.4 AMBIENT CONDITIONS	
PXXXX DTC TITLE				1.MIL STATUS : ON / OFF	
				2.DTC STATUS : PRESENT / HISTORY	
				3.DTC READNESS FLAG : COMPLETE	
NUMBER OF DTC : 1 ITEMS					
PART	ERAS		DTAL		

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure

TERMINAL AND CONNECTOR INSPECTION E8967C27

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "System inspection" procedure.

SYSTEM INSPECTION E5BE9740

1. Spark plug check.
 - 1) Remove cylinder' s spark plugs.

FL -296

FUEL SYSTEM

- 2) Visually/physically inspect the following items:
 - Damaged insulation, Worn electrodes, Oil or fuel fouled, Loose terminals and cracks
 - Check for plug gap : 1.0 - 1.1 mm (0.039 - 0.043 in.)
 - Check if the spark plug for the relevant cylinder is lighter in color than the other plugs.

- 3) 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 "Compression pressure check" procedure.

2. Compression pressure check.

- 1) Warm up the engine to normal operating temperature.
- 2) Disconnect the spark plug cables. And remove the spark plugs and fuel pump relay.
- 3) Crank the engine to remove any foreign material in the cylinders.
- 4) Put compression pressure gauge into spark plug hole.
- 5) Check compression pressure at each cylinder.

Specification : Approx. 15 kg/cm²

- 6) Is compression pressure for each cylinder displayed within specifications?

YES

Go to "Ignition system check" procedure.

NO

Add a small amount of oil through the spark plug hole, and repeat above steps.

If the addition of oil causes the compression to rise, the cause is a worn or damaged piston ring or cylinder inner surface.

If the compression remains the same, the cause is a burnt or defective valve seat, or pressure is leaking from the gasket.

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

3. Ignition system check

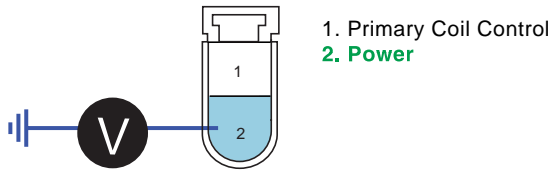
- 1) Key "OFF".
- 2) Disconnect Ignition coil connector.
- 3) Do visual inspection.
Check contamination or damage on ignition coil.
- 4) Key "ON".
- 5) Measure the voltage between terminal 2 of ignition coil #1, #2, #3, #4 harness connector and chassis ground.

Specification : Approx. B+

DTC TROUBLESHOOTING PROCEDURES

FL -297

CGG18-1,2,3,4



SLDFL7800L

6) Is the measured voltage within specifications?

YES

Go to "Ignition coil check" procedure.

NO

Repair Open or Short to ground in power circuit, and go to "Verification of Vehicle Repair" procedure.

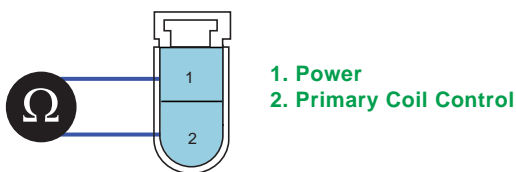
4. Ignition coil check

- 1) Measure the resistance between terminal 1 and 2 of ignition coil connector #1, #2, #3, #4. (Component side / Primary coil)

SPECIFICATION :

Ignition Coil Resistance (Primary)
0.75 ± 15% at 20 (68)

CGG18-1,2,3,4



SLDFL7801L

2) Is the measured resistance within specifications?

YES

Go to "Timing mark check" procedure.

FL -298

FUEL SYSTEM

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.

5. 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.

6. 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.

7. PCV(Positive Crankcase Ventilation) valve check.

- 1) Key "OFF".
- 2) Disconnect PCV valve.
- 3) Check the movement of plunger by putting in and out a thin stick.
- 4) Is the movement of plunger normal?

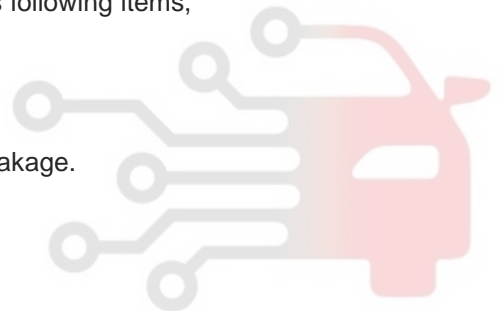
YES

Go to "Injector check" procedure.

NO

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

8. Injector check.



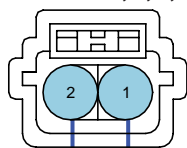
DTC TROUBLESHOOTING PROCEDURES**FL -299**

- 1) Key "OFF".
- 2) Remove injectors.
- 3) Check leakage or clog on injectors.
- 4) Measure the resistance between terminal 1 and 2. (Component side)

SPECIFICATION :

Temperature [()]	Resistance ()
20 (68)	13.8 ~ 15.2

CGG24-1,2,3,4



1. Power
2. Injector Control

دیجیتال خودرو
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)



- 5) Is the measured resistance within specification?

YES

Go to "Fuel line check" procedure.

NO

Substitute with a known - good injector and check for proper operation.

If the problem is corrected, replace injector and go to "Verification of Vehicle Repair" procedure.

9. Fuel line check.

- 1) Check clog, contamination and damage on fuel line.
 - Splits, kinks and improper connections of fuel line pipe.
 - Interference, damage and improper connections of vacuum hose on fuel line.
 - Improper connection of connectors on fuel line.

- 2) Is the fuel line normal?

YES

Go to "Fuel pressure check" procedure.

NO

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

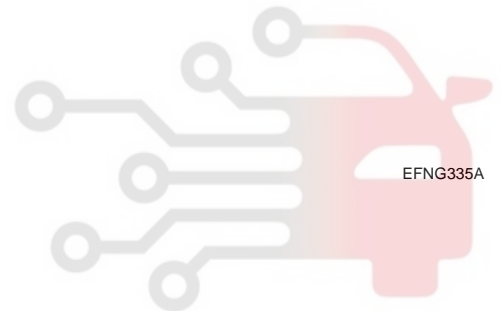
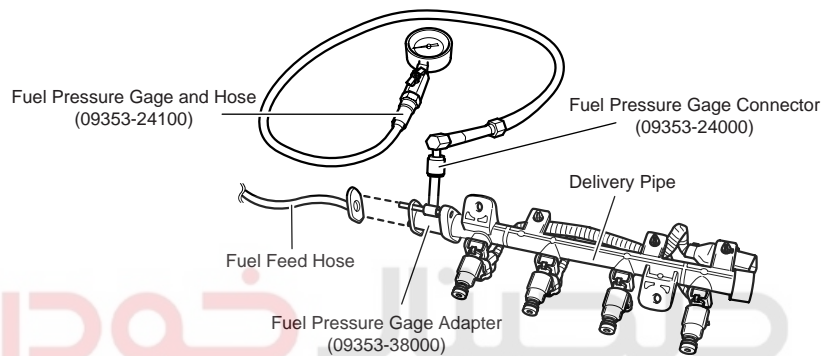
10. Fuel pressure check.

FL -300

FUEL SYSTEM

- 1) Key "OFF".
- 2) Disconnect a fuel pump relay.
- 3) Engine start and wait until engine stop. and then key "OFF".
- 4) Install fuel pump relay.
- 5) Start the engine , and record fuel pressure.
- 6) Connect fuel pressure guage using the correct adaptor.

Specification : Approx. 3.5 kg/cm²



- 7) Is the fuel pressure normal?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Check clogging on the fuel filter.
 Check the fuel supply and return line.
 Repair as necessary and go to "Verification of vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EA7BADF6

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

DTC TROUBLESHOOTING PROCEDURES**FL -301**

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



FL -302

FUEL SYSTEM

DTC P0301	CYLINDER 1-MISFIRE DETECTED
DTC P0302	CYLINDER 2-MISFIRE DETECTED
DTC P0303	CYLINDER 3-MISFIRE DETECTED
DTC P0304	CYLINDER 4-MISFIRE DETECTED

COMPONENT LOCATION ED143DCC

Refer to DTC P0300.

GENERAL DESCRIPTION E0DB7EFB

Refer to DTC P0300.

DTC DESCRIPTION E27341C1

If there happen misfires over the threshold value at #1/2/3/4 cylinder, PCM sets DTC P0301/P0302/P0303/P0304.

DTC DETECTING CONDITION E4306920

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Engine roughness through crankshaft speed fluctuation 	<ul style="list-style-type: none"> Poor connection Ignition system Fuel system Intake/exhaust air system Ignition timing Injector
Enable Conditions	<ul style="list-style-type: none"> Time after engine start > 25sec No error on CKPS. No rough road driving condition No fuel-cut condition 	
Threshold Value	<ul style="list-style-type: none"> Misfire rate / cylinder > 10% of total misfire rate 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SPECIFICATION EC622CE7

Refer to DTC P0300.

MONITOR SCANTOOL DATA E6B0D051

Refer to DTC P0300.

TERMINAL AND CONNECTOR INSPECTION E942046E

Refer to DTC P0300.

SYSTEM INSPECTION E2DA7DF6

1. Spark plug check.
 - 1) Remove cylinder' s spark plugs.

DTC TROUBLESHOOTING PROCEDURES**FL -303**

- 2) Visually/physically inspect the following items:
- Damaged insulation, Worn electrodes, Oil or fuel fouled, Loose terminals and cracks
 - Check for plug gap : 1.0 - 1.1 mm (0.039 - 0.043 in.)
 - Check if the spark plug for the relevant cylinder is lighter in color than the other plugs.

- 3) 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 "Compression pressure check" procedure.

2. Compression pressure check.

- 1) Warm up the engine to normal operating temperature.
- 2) Disconnect the spark plug cables. And remove the spark plugs and fuel pump relay.
- 3) Crank the engine to remove any foreign material in the cylinders.
- 4) Put compression pressure gauge into spark plug hole.
- 5) Check compression pressure at each cylinder.

Specification : Approx. 15 kg/cm²

- 6) Is compression pressure for each cylinder displayed within specifications?

YES

Go to "Ignition system check" procedure.

NO

Add a small amount of oil through the spark plug hole, and repeat above steps.
If the addition of oil causes the compression to rise, the cause is a worn or damaged piston ring or cylinder inner surface.

If the compression remains the same, the cause is a burnt or defective valve seat, or pressure is leaking from the gasket.

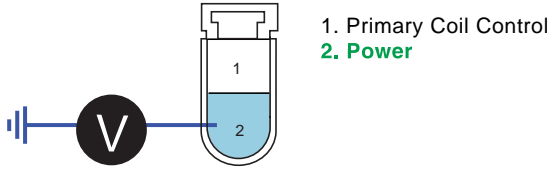
Repair as necessary and go to "Verification of Vehicle Repair" procedure.

3. Ignition system check

- 1) Key "OFF".
- 2) Disconnect Ignition coil connector.
- 3) Do visual inspection.
Check contamination or damage on ignition coil.
- 4) Key "ON".
- 5) Measure the voltage between terminal 2 of ignition coil #1, #2, #3, #4 harness connector and chassis ground.

Specification : Approx. B+

CGG18-1,2,3,4



SLDFL7800L

6) Is the measured voltage within specifications?

YES

Go to "Ignition coil check" procedure.

NO

Repair Open or Short to ground in power circuit, and go to "Verification of Vehicle Repair" procedure.

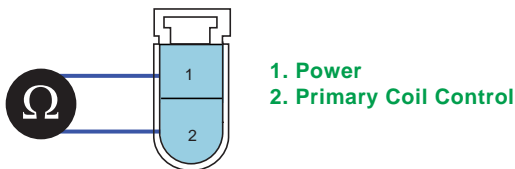
4. Ignition coil check

- 1) Measure the resistance between terminal 1 and 2 of ignition coil connector #1, #2, #3, #4.
(Component side / Primary coil)

SPECIFICATION :

Ignition Coil Resistance (Primary)
0.75 ± 15% at 20 (68)

CGG18-1,2,3,4



SLDFL7801L

2) Is the measured resistance within specifications?

YES

Go to "Timing mark check" procedure.

DTC TROUBLESHOOTING PROCEDURES**FL -305****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.

5. 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.

6. 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.

7. PCV(Positive Crankcase Ventilation) valve check.

- 1) Key "OFF".
- 2) Disconnect PCV valve.
- 3) Check the movement of plunger by putting in and out a thin stick.
- 4) Is the movement of plunger normal?

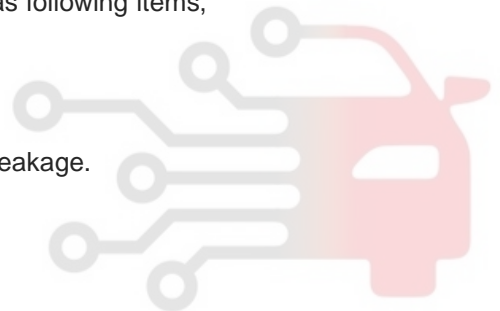
YES

Go to "Injector check" procedure.

NO

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

8. Injector check.



FL -306

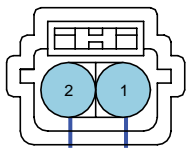
FUEL SYSTEM

- 1) Key "OFF".
- 2) Remove injectors.
- 3) Check leakage or clog on injectors.
- 4) Measure the resistance between terminal 1 and 2. (Component side)

SPECIFICATION :

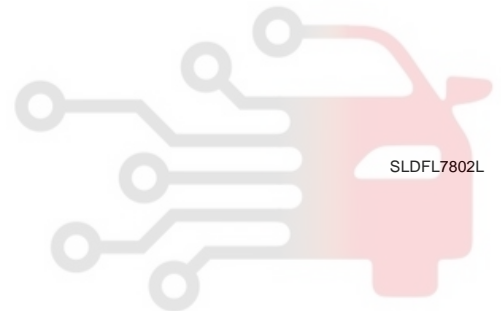
Temperature [()]	Resistance ()
20	13.8 ~ 15.2

CGG24-1,2,3,4



1. Power
2. Injector Control

دیجیتال خودرو
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)



- 5) Is the measured resistance within specification?

YES

Go to "Fuel line check" procedure.

NO

Substitute with a known - good injector and check for proper operation.

If the problem is corrected, replace injector and go to "Verification of Vehicle Repair" procedure.

9. Fuel line check.

- 1) Check clog, contamination and damage on fuel line.
 - Splits, kinks and improper connections of fuel line pipe.
 - Interference, damage and improper connections of vacuum hose on fuel line.
 - Improper connection of connectors on fuel line.

- 2) Is the fuel line normal?

YES

Go to "Fuel pressure check" procedure.

NO

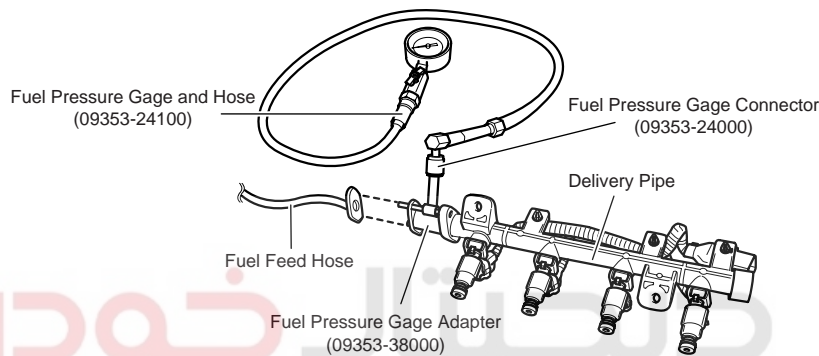
Repair as necessary and go to "Verification of Vehicle Repair" procedure.

10. Fuel pressure check.

DTC TROUBLESHOOTING PROCEDURES**FL -307**

- 1) Key "OFF".
- 2) Disconnect a fuel pump relay.
- 3) Engine start and wait until engine stop. and then key "OFF".
- 4) Install fuel pump relay.
- 5) Start the engine , and record fuel pressure.
- 6) Connect fuel pressure guage using the correct adaptor.

Specification : Approx. 3.5 kg/cm²



- 7) Is the fuel pressure normal?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Check clogging on the fuel filter.
 Check the fuel supply and return line.
 Repair as necessary and go to "Verification of vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR ECA05B36

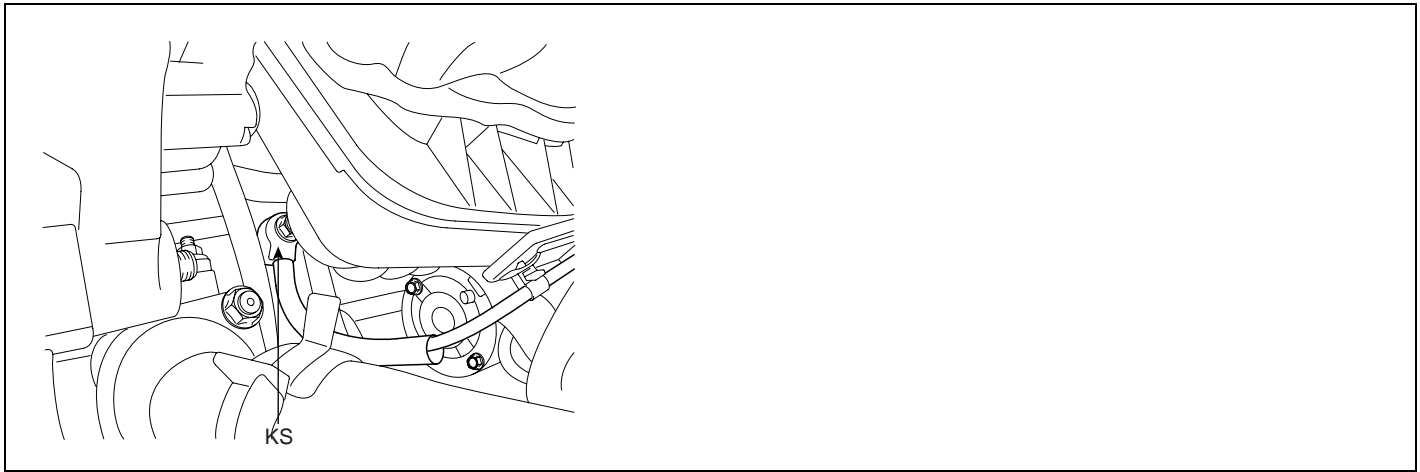
Refer to DTC P0300.

FL -308

FUEL SYSTEM

DTC P0326 KNOCK SENSOR 1 CIRCUIT RANGE/PERFORMANCE (BANK 1)

COMPONENT LOCATION EAB67BDD



SHDFL6712L

GENERAL DESCRIPTION EECB5D3B

Knocking is a phenomenon characterized by undesirable vibration and noise that can cause engine damage. A knock sensor (KS) is mounted on the cylinder block and senses engine knocking. A knocking vibration from the cylinder block is applied as pressure to the piezoelectric element. A knock sensor (KS) detects vibration when RPM rises or drops and generates voltages based on this vibration. The PCM controls the ignition timing based on the amplitude and frequency of the knock sensor signal. For example, if engine knocking occurs, the ignition timing is retarded to prevent it.

DTC DESCRIPTION E0B99D8C

If the number of knock sensor errors is over 25 times, PCM sets P0326.

DTC DETECTING CONDITION EFAE848D

Item	Detecting Condition	Possible Cause
DTC Strategy	• Rationality check	<ul style="list-style-type: none"> • Poor connection • Open or short in signal circuit • Knock sensor
Enable Conditions		
Threshold Value	• Number of knock sensor errors 25	
Diagnostic Time	• Continuous	
MIL ON Condition	• DTC only	

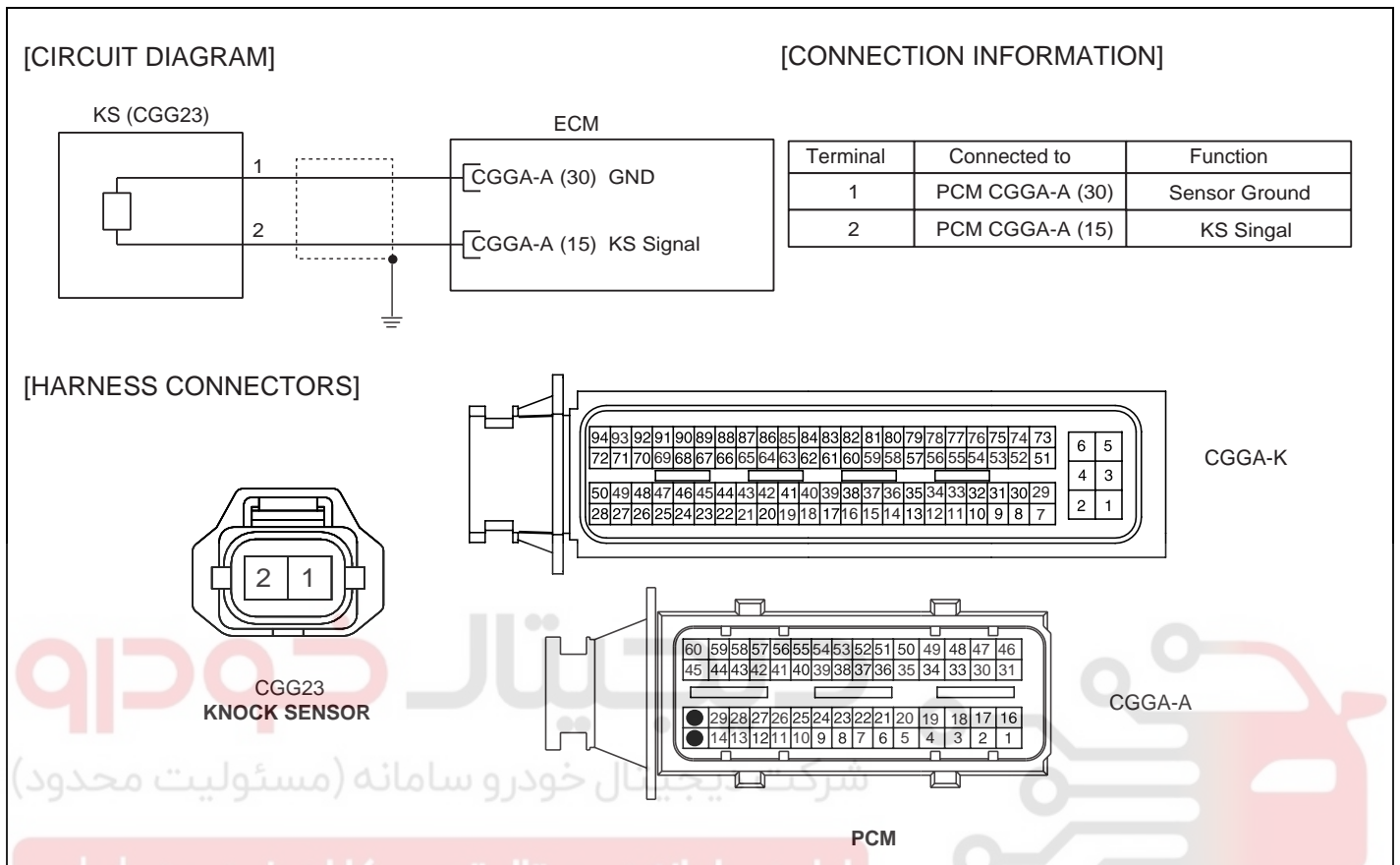
SPECIFICATION E97D8CB7

Item	Specification
Capacitance (pF)	950 ~ 1,350

DTC TROUBLESHOOTING PROCEDURES

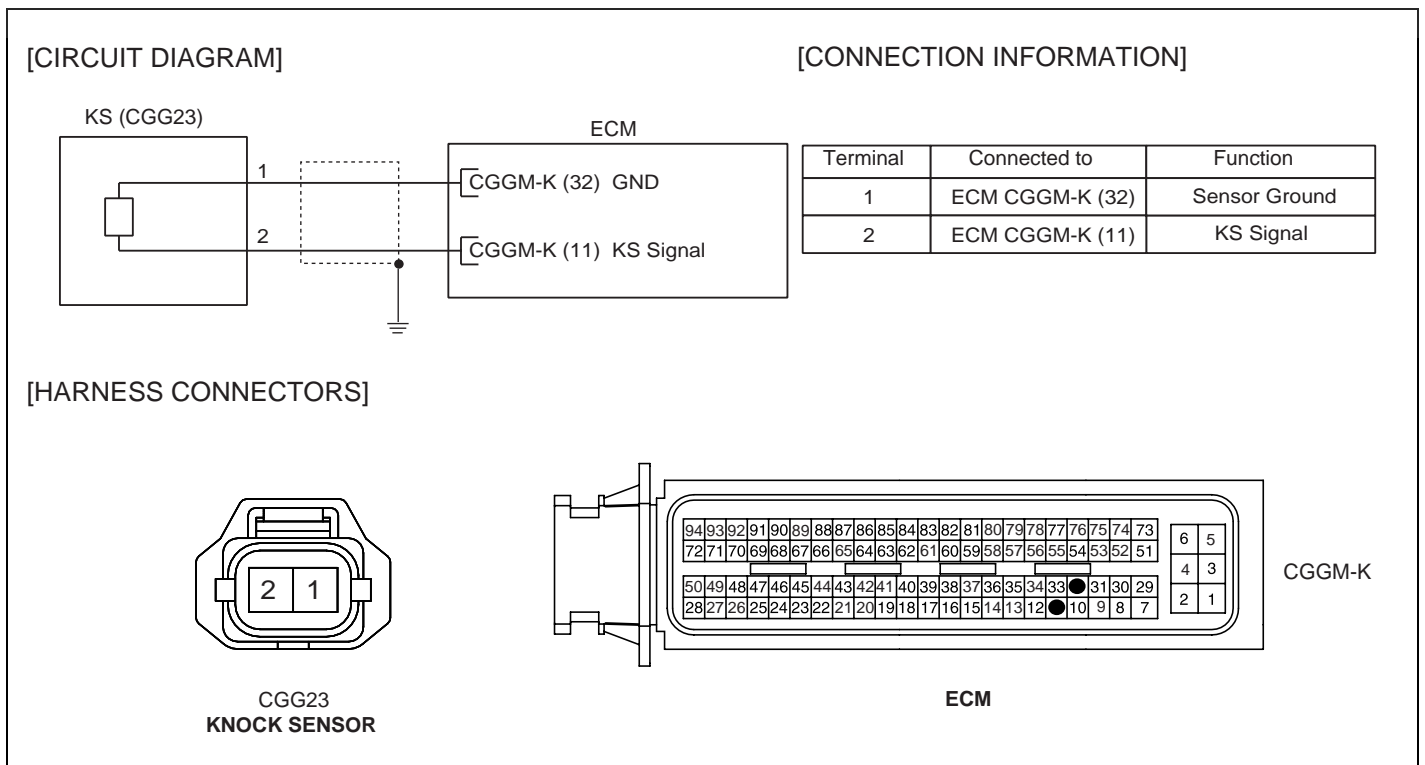
SCHEMATIC DIAGRAM EC1A6249

(A/T)



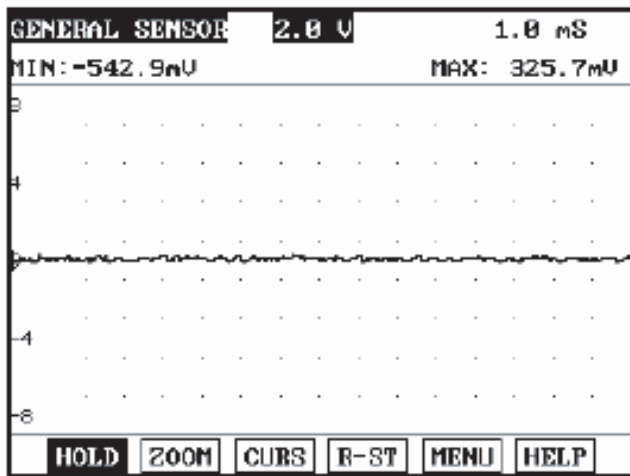
SHDFL6590L

(M/T)



SHDFL6591L

SIGNAL WAVEFORM & DATA E102BD2B



This is a normal signal waveform of knock sensor. Generally, there would be much more noise on knock sensor signal than the others.

LFJF564A

MONITOR SCANTOOL DATA EA0AEBD7

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

<p>1.1 DIAGNOSTIC TROUBLE CODES</p> <p>PXXXX DTC TITLE</p> <p>NUMBER OF DTC : 1 ITEMS</p> <p>PART ERAS DTAL</p>	<p>1.4 AMBIENT CONDITIONS</p> <p>1.MIL STATUS : ON / OFF</p> <p>2.DTC STATUS : PRESENT / HISTORY</p> <p>3.DTC READNESS FLAG : COMPLETE</p>
---	--

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

DTC TROUBLESHOOTING PROCEDURES**FL -311****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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure

TERMINAL AND CONNECTOR INSPECTION EDF5850F

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "Knock sensor circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION EB3CB825

1. Check voltage.
 - 1) Key "OFF".
 - 2) Disconnect Knock sensor connector.
 - 3) Key "ON".
 - 4) Measure the voltage between terminal 1 of knock sensor harness connector and chassis ground.
 - 5) Measure the voltage between terminal 2 of knock sensor harness connector and chassis ground.



Specification : Approx 2.4V

- 6) Is the measured voltage within specification?

YES

Go to "Check Short in signal circuit" procedure.

NO

Repair Open or Short in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

2. Check Short in signal circuit.
 - 1) Key "OFF".

FL -312

FUEL SYSTEM

- 2) Disconnect Knock sensor connector and ECM connector.
- 3) Measure the resistance between terminal 1 and 2 of knock sensor harness connector.

Specification : Infinite

- 4) Is the measured resistance within specifications?

YES

Go to "Component inspection" procedure.

NO

Repair Short in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION EABEB210

1. Check Knock sensor.
 - 1) Substitute with a known - good Knock sensor and check for proper operation.
 - 2) Is the signal normal?

YES

Replace Knock sensor and go to "Verification of Vehicle Repair" procedure.

NO

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E7E08C03

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

DTC TROUBLESHOOTING PROCEDURES

FL -313

DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW INPUT**COMPONENT LOCATION** EF041BB2

Refer to DTC P0326.

GENERAL DESCRIPTION E452FA04

Refer to DTC P0326.

DTC DESCRIPTION E71259D6

If normalized reference signal is less than the lower limit based on RPM , P0327 is set.

DTC DETECTING CONDITION ED9FDC58

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Signal check 	<ul style="list-style-type: none"> Poor connection Open or short to ground in signal circuit Knock sensor
Enable Conditions	<ul style="list-style-type: none"> Engine speed 2440rpm 	
Threshold Value	<ul style="list-style-type: none"> Normalized reference level lower limit, f(rpm) 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> DTC only 	

SPECIFICATION E28A260A

Refer to DTC P0326.

SCHEMATIC DIAGRAM EAF4ED5F

Refer to DTC P0326.

SIGNAL WAVEFORM & DATA E64CCEF1

Refer to DTC P0326.

MONITOR SCANTOOL DATA EC0A7A2E

Refer to DTC P0326.

TERMINAL AND CONNECTOR INSPECTION E2B16A66

Refer to DTC P0326.

SIGNAL CIRCUIT INSPECTION E0F7303C

1. Check voltage.

FL -314

FUEL SYSTEM

- 1) Key "OFF".
- 2) Disconnect Knock sensor connector.
- 3) Key "ON".
- 4) Measure the voltage between terminal 1 of knock sensor harness connector and chassis ground.
- 5) Measure the voltage between terminal 2 of knock sensor harness connector and chassis ground.

Specification : Approx 2.4V

- 6) Is the measured voltage within specification?

YES

Go to "Component inspection" procedure.

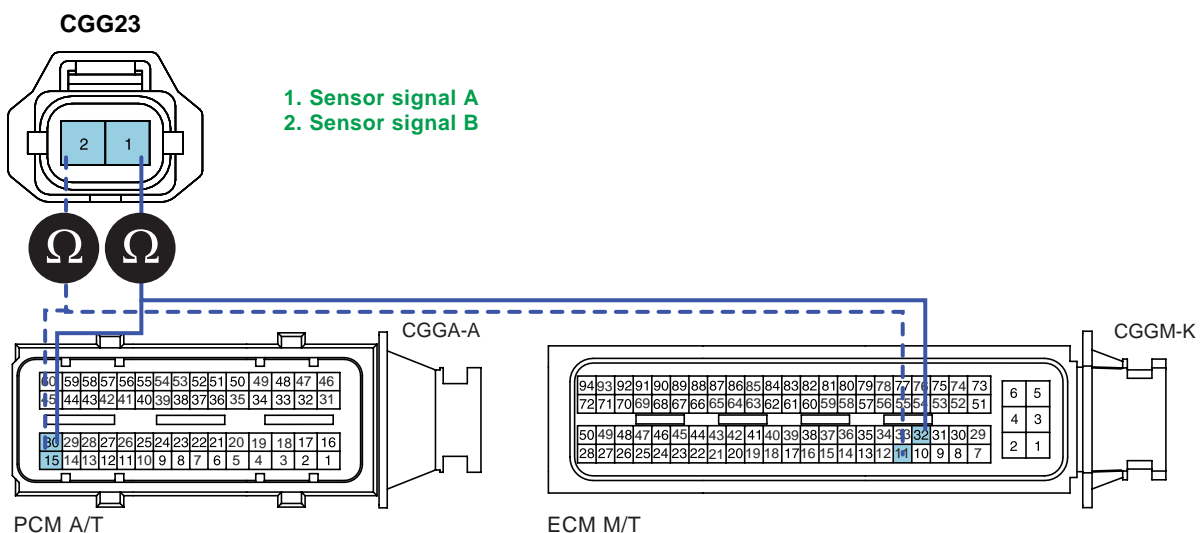
NO

Go to "Check resistance" procedure.

2. Check resistance.

- 1) Key "OFF".
- 2) Disconnect Knock sensor connector and ECM connector.
- 3) Measure the resistance between terminal 1 of knock sensor harness connector and 30/CGGA-A of PCM harness connector. [A/T]
Measure the resistance between terminal 2 of knock sensor harness connector and 15/CGGA-A of PCM harness connector. [A/T]
- 4) Measure the resistance between terminal 1 of knock sensor harness connector and 32/CGGM-K of ECM harness connector. [M/T]
Measure the resistance between terminal 2 of knock sensor harness connector and 11/CGGM-K of ECM harness connector. [M/T]

Specification : Below 1



SHDFL6571L

DTC TROUBLESHOOTING PROCEDURES

FL -315

5) Is the measured resistance within specifications?

YES

Repair Short to ground in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

NO

Repair Open in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

EA09854E

1. Check Knock sensor.

1) Substitute with a known - good Knock sensor and check for proper operation.

2) Is the signal normal?

YES

Replace Knock sensor and go to "Verification of Vehicle Repair" procedure.

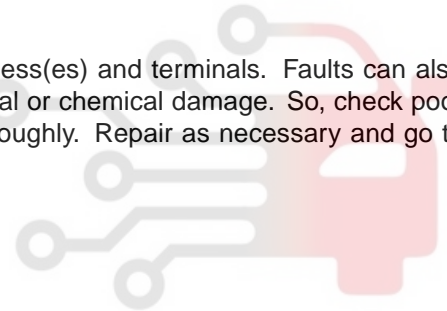
NO

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR

E940AC30

Refer to DTC P0326.



FL -316

FUEL SYSTEM

DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH INPUT**COMPONENT LOCATION** E7921FD4

Refer to DTC P0326.

GENERAL DESCRIPTION E4EBE265

Refer to DTC P0326.

DTC DESCRIPTION E2422C7D

If the normalized reference signal exceeds the upper limit based on engine RPM , P0328 is set .

DTC DETECTING CONDITION E54F5AD0

Item	Detecting Condition	Possible Cause
DTC Strategy	• Signal check	<ul style="list-style-type: none"> • Poor connection • Short to power in signal circuit • Knock sensor
Enable Conditions	• Coolant temperature 40	
Threshold Value	• Normalized reference level upper limit, f(rpm)	
Diagnostic Time	• Continuous	
MIL ON Condition	• DTC only	

SPECIFICATION E1E9BA4F

Refer to DTC P0326.

SCHEMATIC DIAGRAM EBD79873

Refer to DTC P0326.

SIGNAL WAVEFORM & DATA E0564A62

Refer to DTC P0326.

MONITOR SCANTOOL DATA EEF9F7B7

Refer to DTC P0326.

TERMINAL AND CONNECTOR INSPECTION EF086F6D

Refer to DTC P0326.

SIGNAL CIRCUIT INSPECTION E5E3E312

1. Check voltage.

DTC TROUBLESHOOTING PROCEDURES

FL -317

- 1) Key "OFF".
- 2) Disconnect Knock sensor connector.
- 3) Key "ON".
- 4) Measure the voltage between terminal 1 of knock sensor harness connector and chassis ground.
- 5) Measure the voltage between terminal 2 of knock sensor harness connector and chassis ground.

 Specification : Approx 2.4V

- 6) Is the measured voltage within specification?

YES

Go to "Component inspection" procedure.

NO

Repair Short to power in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION E17154F0

1. Check Knock sensor.

- 1) Substitute with a known - good Knock sensor and check for proper operation.
- 2) Is the signal normal?

YES

Replace Knock sensor and go to "Verification of Vehicle Repair" procedure.

NO

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EE617AD4

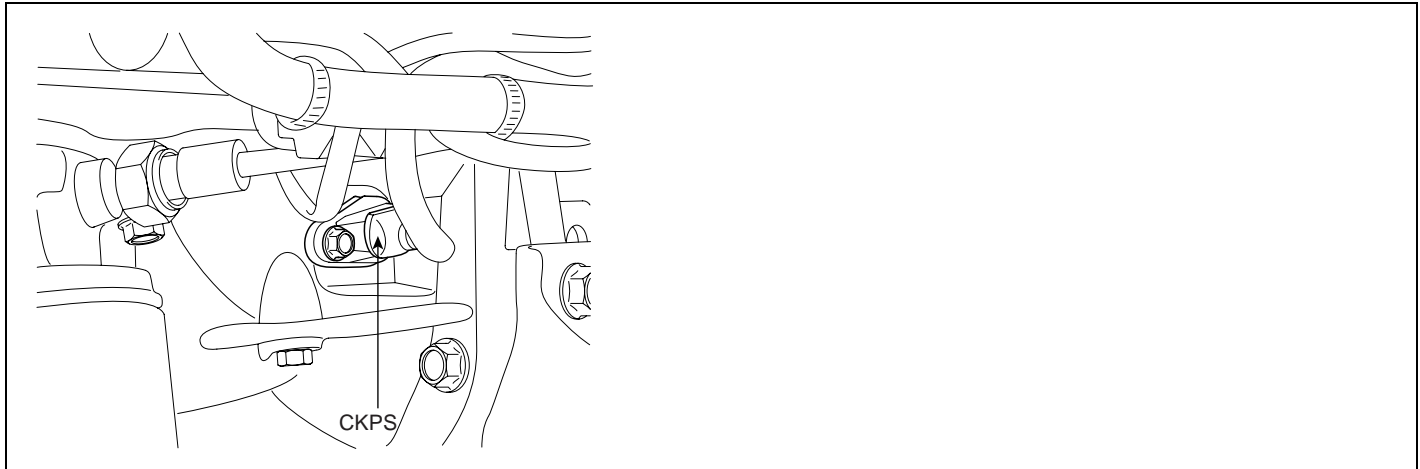
Refer to DTC P0326.

FL -318

FUEL SYSTEM

DTC P0335 CRANKSHAFT POSITION SENSOR A CIRCUIT

COMPONENT LOCATION E05E8D5C



SHDFL6713L

GENERAL DESCRIPTION EC2862ED

A Crankshaft Position Sensor (CKPS) is a magnetic type sensor that generates voltage using a sensor and a target wheel mounted on the crankshaft; there are 58 slots in the target wheel where one is longer than the others. When the slot in the wheel aligns with the sensor, the sensor voltage outputs low. When the metal (tooth) in the wheel aligns with the sensor, the sensor voltage outputs high. During one crankshaft rotation there are 58 rectangular signals and one longer signal. The PCM calculates engine RPM by using the sensor's signal and controls the injection duration and the ignition timing. Using the signal differences caused by the longer slot, the PCM identifies which cylinder is at top dead center.

DTC DESCRIPTION EA01A93E

If CKPS cannot find reference mark 2 or more times during starting , P0335 is set .

DTC DETECTING CONDITION EC3C8209

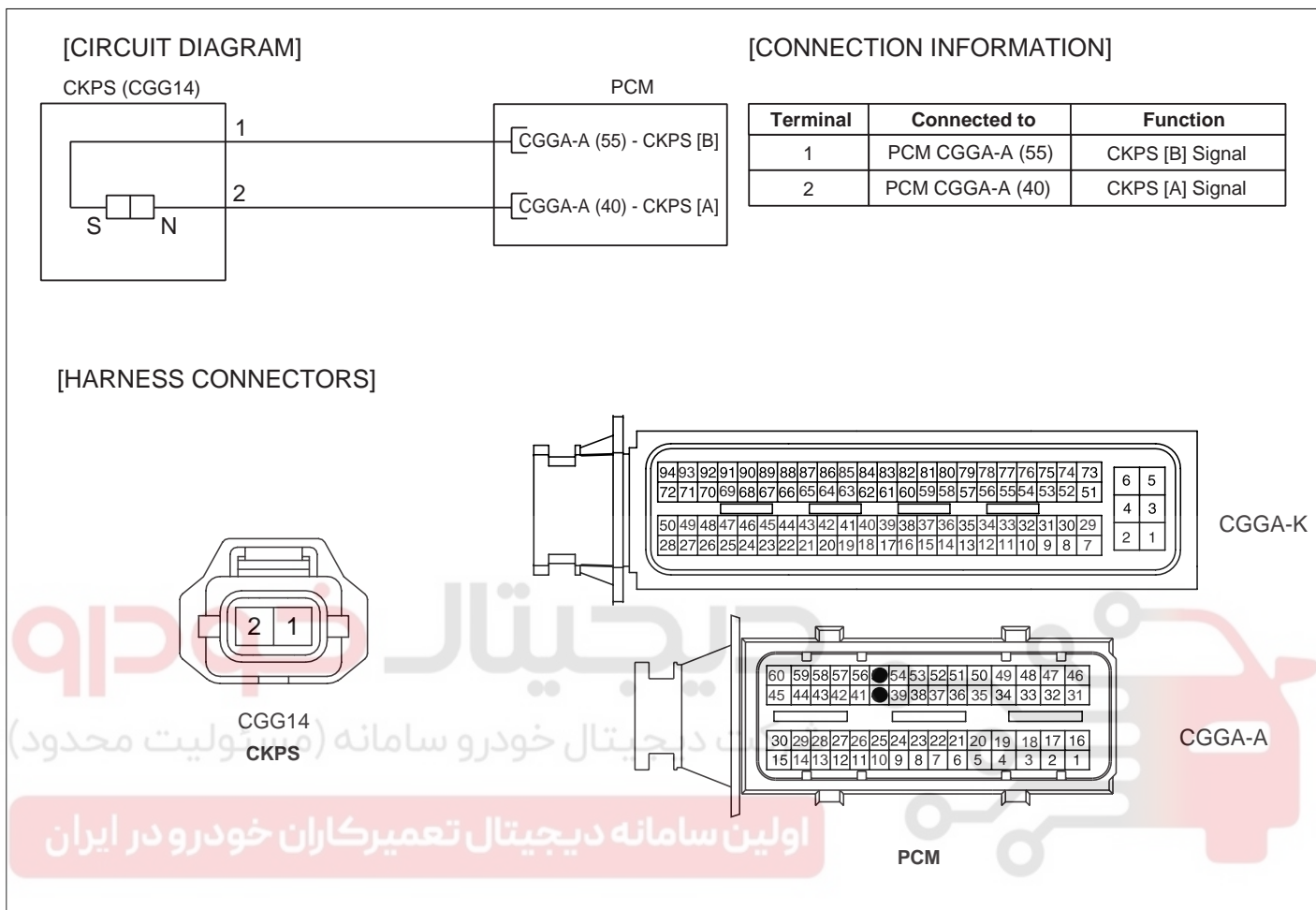
Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Reference mark check (During cranking) 	<ul style="list-style-type: none"> Poor connection Open or short in signal circuit CKPS
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> No reference mark 2 times 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

DTC TROUBLESHOOTING PROCEDURES

FL -319

SCHEMATIC DIAGRAM ECB72724

(A/T)

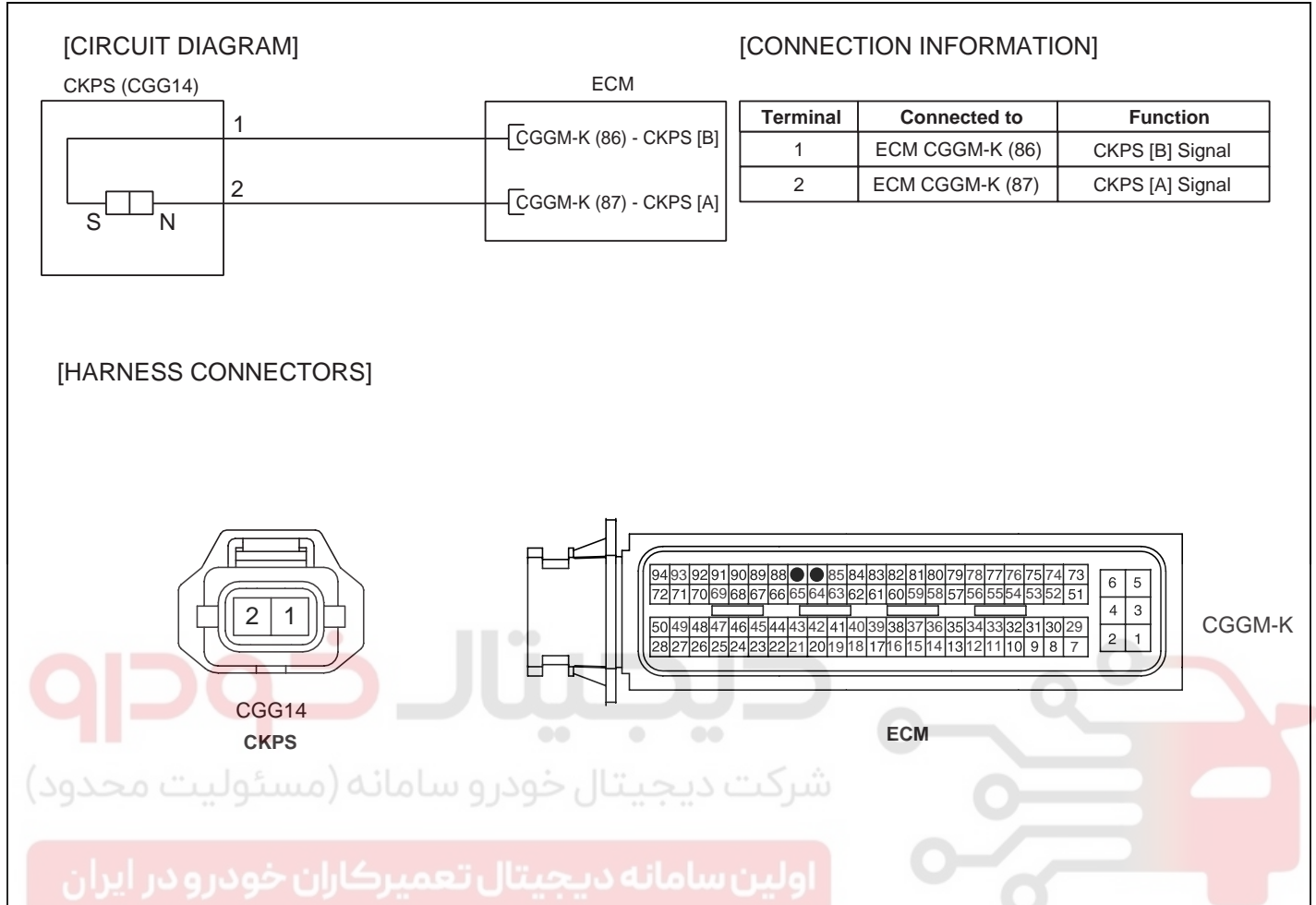


SHDFL6130L

FL -320

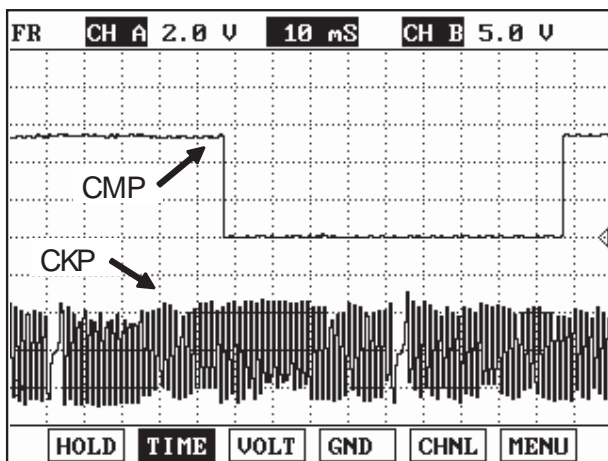
FUEL SYSTEM

(M/T)

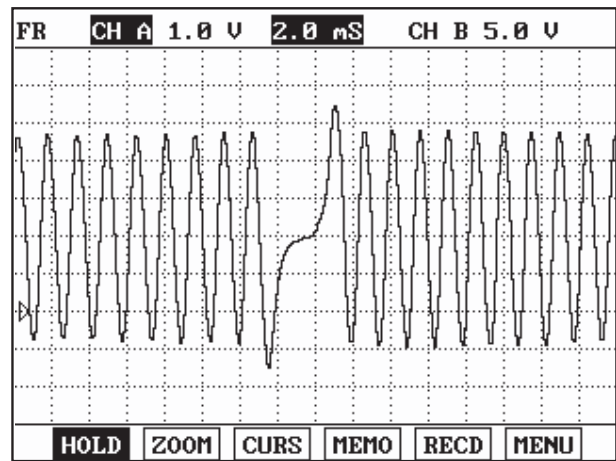


SHDFL6133L

SIGNAL WAVEFORM & DATA E8099008



CKP-CMP



CKP

This example shows a typical Crankshaft Position Sensor (CKPS) and Camshaft Position Sensor (CMPS) waveform at idle. The PCM controls the injection and ignition timing by using these signals. Generally CKPS signal is used to detect the piston's position and CMPS signal is used to detect the Top Dead Center of each cylinder.

SHDFL6805L

DTC TROUBLESHOOTING PROCEDURES

FL -321

MONITOR SCANTOOL DATA E257F586

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

1.1 DIAGNOSTIC TROUBLE CODES				1.4 AMBIENT CONDITIONS	
PXXXX DTC TITLE				1. MIL STATUS : ON / OFF	
				2. DTC STATUS : PRESENT / HISTORY	
				3. DTC READNESS FLAG : COMPLETE	
NUMBER OF DTC : 1 ITEMS					
PART	ERAS	DTAL			

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure

TERMINAL AND CONNECTOR INSPECTION EA9811BB

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

FL -322

FUEL SYSTEM

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "CKPS circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION EE43D87A

1. Check Open in signal circuit.
 - 1) Key "OFF".
 - 2) Disconnect CKPS connector.
 - 3) Key "ON".
 - 4) Measure the voltage between terminal 1 / 2 of CKPS harness connector and chassis ground.

Specification : Approx 2.5V

- 5) Is the measured voltage within specification?

YES

Go to "Check Short in signal circuit" procedure.

NO

Go to "Check Short to ground in signal circuit" procedure.

2. Check Short to ground in signal circuit.

- 1) Key "OFF".
- 2) Disconnect CKPS connector and ECM connector.
- 3) Measure the resistance between 1 / 2 of CKPS harness connector and chassis ground.

Specification : Infinite

- 4) Is the measured resistance within specifications?

YES

Repair Open in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

NO

Repair Short to ground in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

3. Check Short in signal circuit.

- 1) Key "OFF".
- 2) Disconnect CKPS connector and ECM connector.
- 3) Measure the resistance between 1 and 2 of CKPS harness connector.



DTC TROUBLESHOOTING PROCEDURES**FL -323**

Specification : Infinite

- 4) Is the measured resistance within specifications?

YES

Go to "Component inspection" procedure.

NO

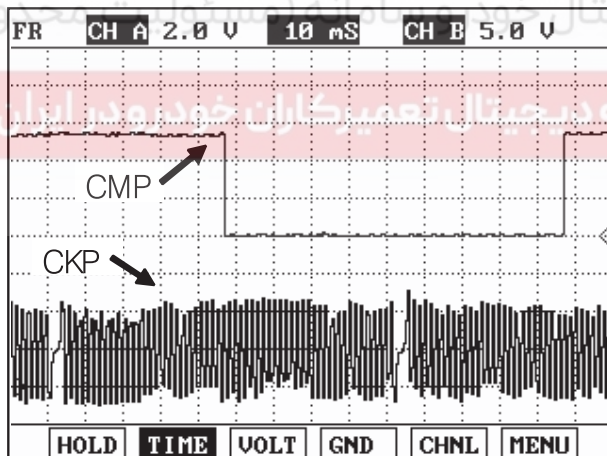
Repair Short in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

EA174886

1. Check CKPS.

- 1) Key "ON". (Don't disconnect sensors.)
- 2) Select "vehicle scopemeter" in the menu, and connect channel A of scantool with terminal 1 of CKPS harness connector.
- 3) Engine start. And check the signal waveforms.

SPECIFICATION :

1. CKPS signal B
2. CKPS signal A

SHDFL6809L

- 4) Is the measured signal waveform O.K?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good CKPS and check for proper operation.

If the problem is corrected, replace CKPS and go to "Verification of Vehicle Repair" procedure.

FL -324

FUEL SYSTEM

VERIFICATION OF VEHICLE REPAIR E9FBEC79

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



DTC TROUBLESHOOTING PROCEDURES

FL -325

DTC P0336 CRANKSHAFT POSITION SENSOR A CIRCUIT RANGE/PERFORMANCE**COMPONENT LOCATION** EFC35686

Refer to DTC P0335.

GENERAL DESCRIPTION E3793204

Refer to DTC P0335.

DTC DESCRIPTION E924511D

If CKPS cannot find reference mark 14 or more times after starting, P0336 is set.

DTC DETECTING CONDITION EDFE7F54

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Reference mark check (After starting) 	<ul style="list-style-type: none"> Poor connection Open or short in signal circuit CKPS
Enable Conditions	<ul style="list-style-type: none"> Vehicle speed < 1kph or > 25kph Engine speed Idle speed 	
Threshold Value	<ul style="list-style-type: none"> No reference mark > 14 times 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SCHEMATIC DIAGRAM EE2D9644

Refer to DTC P0335.

SIGNAL WAVEFORM & DATA E3876CEE

Refer to DTC P0335.

MONITOR SCANTOOL DATA E6B12239

Refer to DTC P0335.

TERMINAL AND CONNECTOR INSPECTION E60C3E75

Refer to DTC P0335.

SIGNAL CIRCUIT INSPECTION EE237FC5

1. Key "OFF".
2. Disconnect CKPS connector.

FL -326

FUEL SYSTEM

3. Key "ON".
4. Measure the voltage between terminal 1 / 2 of CKPS harness connector and chassis ground.

Specification : Approx 2.5V

5. Is the measured voltage within specification?

YES

Go to "Component inspection" procedure.

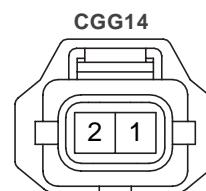
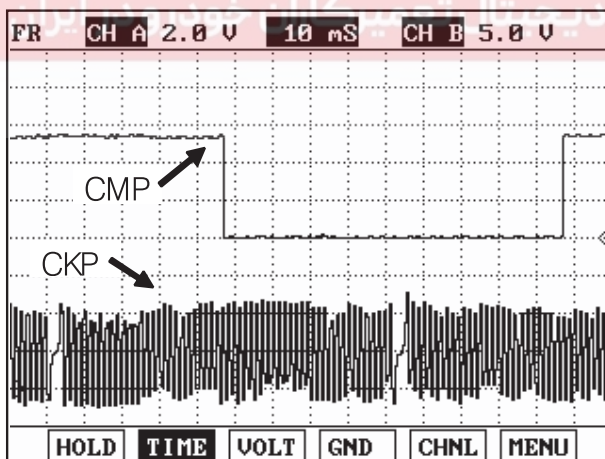
NO

Repair Open or Short in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION EC6DC375

1. Check CKPS.
 - 1) Key "ON". (Don't disconnect sensors.)
 - 2) Select "vehicle scopemeter" in the menu, and connect channel A of scantool with terminal 1 of CKPS harness connector.
 - 3) Engine start. And check the signal waveforms.

SPECIFICATION : شرکت دیجیتال خودرو سامانه (مسئول)



1. CKPS signal B
2. CKPS signal A

SHDFL6809L

- 4) Is the measured signal waveform O.K?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

DTC TROUBLESHOOTING PROCEDURES**FL -327**

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

VERIFICATION OF VEHICLE REPAIR E684F432

Refer to DTC P0335.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



FL -328

FUEL SYSTEM

DTC P0337 CRANKSHAFT POSITION SENSOR A CIRCUIT LOW INPUT**COMPONENT LOCATION** EF8C6DF9

Refer to DTC P0335.

GENERAL DESCRIPTION E29A64BB

Refer to DTC P0335.

DTC DESCRIPTION E91F071A

If the number of input signal between the standard positions is smaller than the normal value over 7 times, PCM sets DTC P0337.

DTC DETECTING CONDITION E6BE91AD

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Reference mark check 	<ul style="list-style-type: none"> Poor connection Open or short in signal circuit CKPS
Enable Conditions	<ul style="list-style-type: none"> Vehicle speed < 1kph or > 25kph Engine speed Idle speed 	
Threshold Value	<ul style="list-style-type: none"> 1 less tooth detected 	
Diagnostic Time	<ul style="list-style-type: none"> More than 7 times 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SCHEMATIC DIAGRAM E481C2E2

Refer to DTC P0335.

SIGNAL WAVEFORM & DATA EEC03632

Refer to DTC P0335.

MONITOR SCANTOOL DATA EE56448C

Refer to DTC P0335.

TERMINAL AND CONNECTOR INSPECTION EC677537

Refer to DTC P0335.

SIGNAL CIRCUIT INSPECTION E581D9C2

1. Check Oepn in signal circuit.

1) Key "OFF".

DTC TROUBLESHOOTING PROCEDURES**FL -329**

- 2) Disconnect CKPS connector.
- 3) Key "ON".
- 4) Measure the voltage between terminal 1 / 2 of CKPS harness connector and chassis ground.

Specification : Approx 2.5V

- 5) Is the measured voltage within specification?

YES

Go to "Component inspection" procedure.

NO

Go to "Check Short to ground in signal circuit" procedure.

2. Check Short to ground in signal circuit.

- 1) Key "OFF".
- 2) Disconnect CKPS connector and ECM connector.
- 3) Measure the resistance between 1 / 2 of CKPS harness connector and chassis ground.

Specification : Infinite

- 4) Is the measured resistance within specifications?

YES

Repair Open in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

NO

Repair Short to ground in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

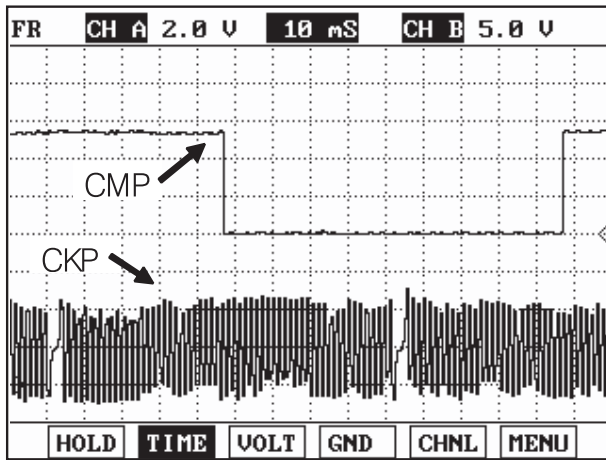
EB06B0E8

1. Check CKPS.
 - 1) Key "ON". (Don't disconnect sensors.)
 - 2) Select "vehicle scopemeter" in the menu, and connect channel A of scantool with terminal 1 of CKPS harness connector.
 - 3) Engine start. And check the signal waveforms.

FL -330

FUEL SYSTEM

SPECIFICATION :



- 1. CKPS signal B
- 2. CKPS signal A

SHDFL6809L

4) Is the measured signal waveform O.K?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good CKPS and check for proper operation.

If the problem is corrected, replace CKPS and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E1C1B897

Refer to DTC P0335.

DTC TROUBLESHOOTING PROCEDURES

FL -331

DTC P0338 CRANKSHAFT POSITION SENSOR A CIRCUIT HIGH INPUT**COMPONENT LOCATION** E561BABE

Refer to DTC P0335.

GENERAL DESCRIPTION E26F34B8

Refer to DTC P0335.

DTC DESCRIPTION EB717737

If the number of input signal between the standard positions is larger than the normal value over 7 times, PCM sets DTC P0338.

DTC DETECTING CONDITION EA6754BA

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Reference mark check 	<ul style="list-style-type: none"> Poor connection Open or short in signal circuit CKPS
Enable Conditions	<ul style="list-style-type: none"> Vehicle speed 1kph or 25kph Engine speed Idle speed 	
Threshold Value	<ul style="list-style-type: none"> 1 more tooth detected 	
Diagnostic Time	<ul style="list-style-type: none"> More than 7 times 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SCHEMATIC DIAGRAM E0EE6BF7

Refer to DTC P0335.

SIGNAL WAVEFORM & DATA E8233A61

Refer to DTC P0335.

MONITOR SCANTOOL DATA E20F4F6B

Refer to DTC P0335.

TERMINAL AND CONNECTOR INSPECTION E7FFEFCE

Refer to DTC P0335.

SIGNAL CIRCUIT INSPECTION E7ADCC02

1. Check Oepn in signal circuit.

1) Key "OFF".

FL -332**FUEL SYSTEM**

- 2) Disconnect CKPS connector.
- 3) Key "ON".
- 4) Measure the voltage between terminal 1 / 2 of CKPS harness connector and chassis ground.

Specification : Approx 2.5V

- 5) Is the measured voltage within specification?

YES

Go to "Check Short in signal circuit" procedure.

NO

Repair Open in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

2. Check Short in signal circuit.

- 1) Key "OFF".
- 2) Disconnect CKPS connector and ECM connector.
- 3) Measure the resistance between 1 and 2 of CKPS harness connector.

Specification : Infinite

- 4) Is the measured resistance within specifications?

YES

Go to "Component inspection" procedure.

NO

Repair Short in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

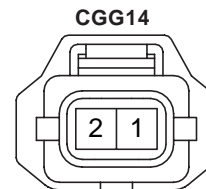
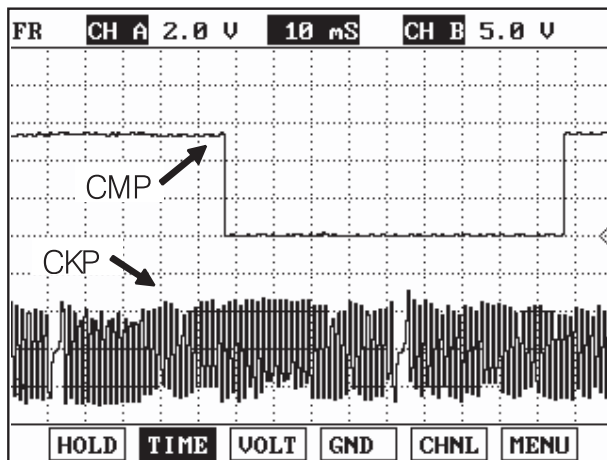
COMPONENT INSPECTION E3A1341A

1. Check CKPS.
 - 1) Key "ON". (Don't disconnect sensors.)
 - 2) Select "vehicle scopemeter" in the menu, and connect channel A of scantool with terminal 1 of CKPS harness connector.
 - 3) Engine start. And check the signal waveforms.

DTC TROUBLESHOOTING PROCEDURES

FL -333

SPECIFICATION :



1. CKPS signal B
2. CKPS signal A

SHDFL6809L

4) Is the measured signal waveform O.K?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good CKPS and check for proper operation.

If the problem is corrected, replace CKPS and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E95D51AA

Refer to DTC P0335.

FL -334

FUEL SYSTEM

DTC P0339 CRANKSHAFT POSITION SENSOR A CIRCUIT**COMPONENT LOCATION** E0C17604

Refer to DTC P0335.

GENERAL DESCRIPTION E45F4A55

Refer to DTC P0335.

DTC DESCRIPTION E02BCAC2

If there is no signal from CKPS while there is CMPS signal, PCM sets DTC P0339.

DTC DETECTING CONDITION E0BCCE1B

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Signal check 	<ul style="list-style-type: none"> Poor connection Open or short in signal circuit CKPS
Enable Conditions	<ul style="list-style-type: none"> There is no malfunction on CMPS. 	
Threshold Value	<ul style="list-style-type: none"> No signal over 8 times during cranking No signal over 10 times after cranking 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SCHEMATIC DIAGRAM EE000BD9

Refer to DTC P0335.

SIGNAL WAVEFORM & DATA EBB5C189

Refer to DTC P0335.

MONITOR SCANTOOL DATA E8BDA163

Refer to DTC P0335.

TERMINAL AND CONNECTOR INSPECTION E0BA39DE

Refer to DTC P0335.

SIGNAL CIRCUIT INSPECTION E1CF1AEC

- Check Oepn in signal circuit.
 - Key "OFF".
 - Disconnect CKPS connector.

DTC TROUBLESHOOTING PROCEDURES

FL -335

- 3) Key "ON".
- 4) Measure the voltage between terminal 1 / 2 of CKPS harness connector and chassis ground.

Specification : Approx 2.5V

- 5) Is the measured voltage within specification?

YES

Go to "Component inspection" procedure.

NO

Go to "Check Short to ground in signal circuit" procedure.

2. Check Short to ground in signal circuit.

- 1) Key "OFF".
- 2) Disconnect CKPS connector and ECM connector.
- 3) Measure the resistance between 1 / 2 of CKPS harness connector and chassis ground.

Specification : Infinite

- 4) Is the measured resistance within specifications?

YES

Repair Open in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

NO

Repair Short to ground in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

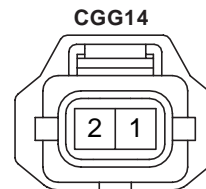
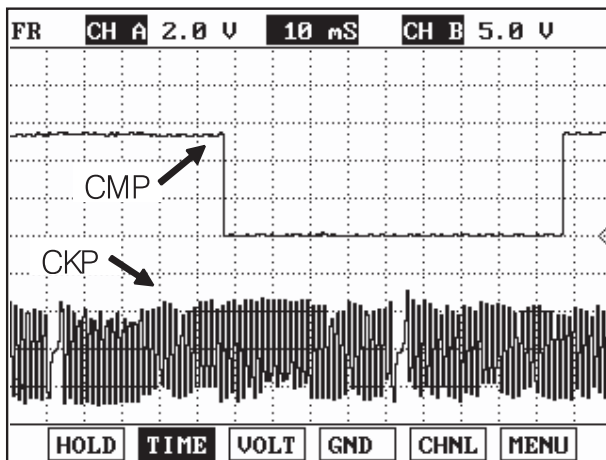
COMPONENT INSPECTION E011A48B

1. Check CKPS.
 - 1) Key "ON". (Don't disconnect sensors.)
 - 2) Select "vehicle scopemeter" in the menu, and connect channel A of scantool with terminal 1 of CKPS harness connector.
 - 3) Engine start. And check the signal waveforms.

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FUEL SYSTEM

SPECIFICATION :



1. CKPS signal B
2. CKPS signal A

SHDFL6809L

4) Is the measured signal waveform O.K?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good CKPS and check for proper operation.

If the problem is corrected, replace CKPS and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E37BC8D7

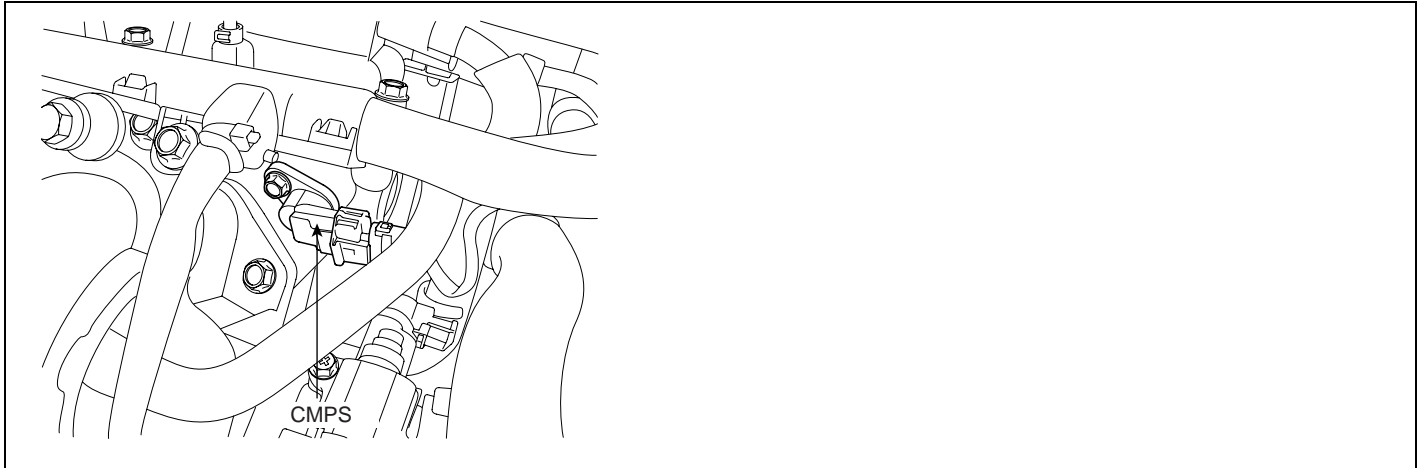
Refer to DTC P0335.

DTC TROUBLESHOOTING PROCEDURES

FL -337

DTC P0340 CAMSHAFT POSITION SENSOR A CIRCUIT MALFUNCTION (BANK 1 OR SINGLE SENSOR)

COMPONENT LOCATION E60BCA57



SHDFL6714L

GENERAL DESCRIPTION E1093581

Camshaft Position Sensor (CMPS) is a hall sensor and detects the camshaft position by using a hall element. It is related with Crankshaft Position Sensor (CKPS) and detects the piston position of the each cylinder which the CKPS can't detect. The CMPS are installed on engine head cover and uses a target wheel installed on the camshaft. This sensor has a hall-effect IC which output voltage changes when magnetic field is made on the IC with current flow. When teeth on the target wheel trigger the sensor, output voltage is 12V. If not, it is 0V. These CMP signal is sent to the PCM and used for determining the ignition timing along with CKP signal. CMPS makes Sequential Injection possible.

DTC DESCRIPTION ED6269FB

If signal input phase is abnormal, PCM sets DTC P0340.

DTC DETECTING CONDITION E7E469F7

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> • Sensor wrong mounted (check the assembling state) 	<ul style="list-style-type: none"> • Poor connection • abnormal assembling state • CMPS
Enable Conditions	<ul style="list-style-type: none"> • The count of Phase edges detection > 8 times 	
Threshold Value	<ul style="list-style-type: none"> • Abnormal phase edges (High or Low) 	
Diagnostic Time		
MIL ON Condition	<ul style="list-style-type: none"> • 3 driving cycle 	

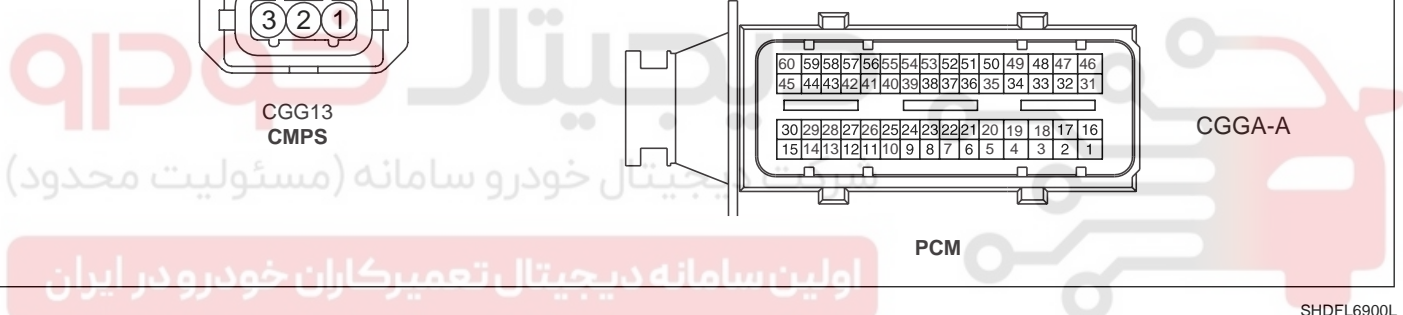
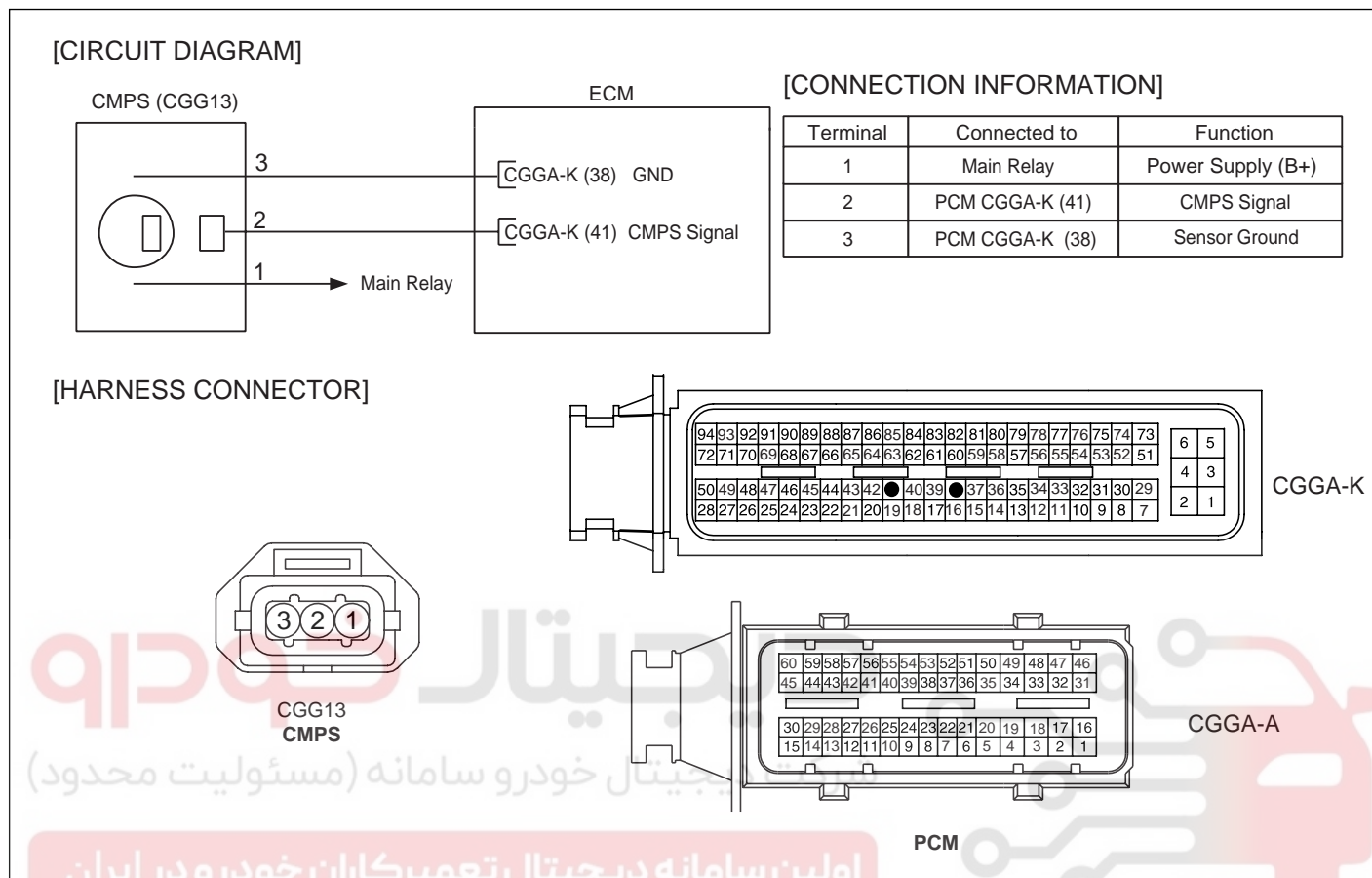
FL -338

FUEL SYSTEM

SCHEMATIC DIAGRAM

E8C18BD5

(A/T)

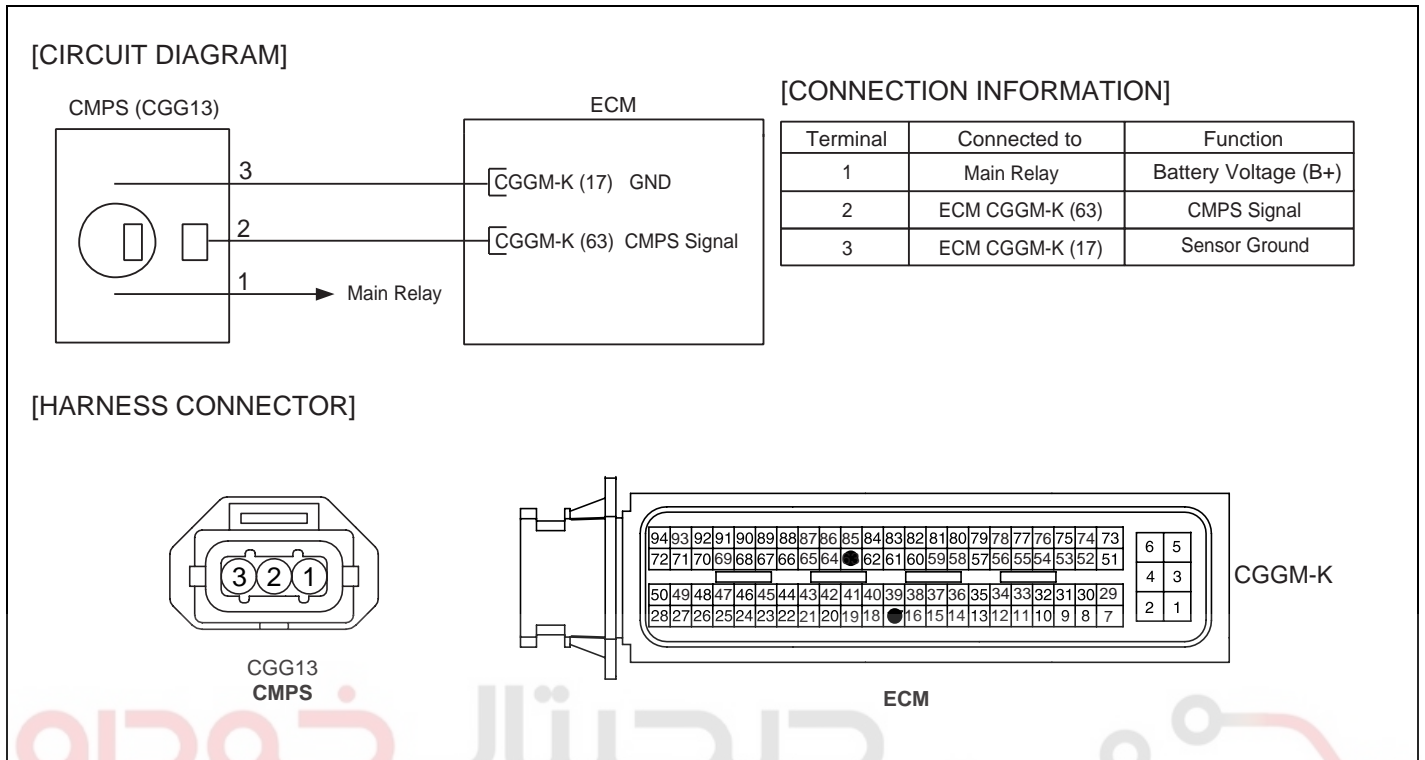


SHDFL6900L

DTC TROUBLESHOOTING PROCEDURES

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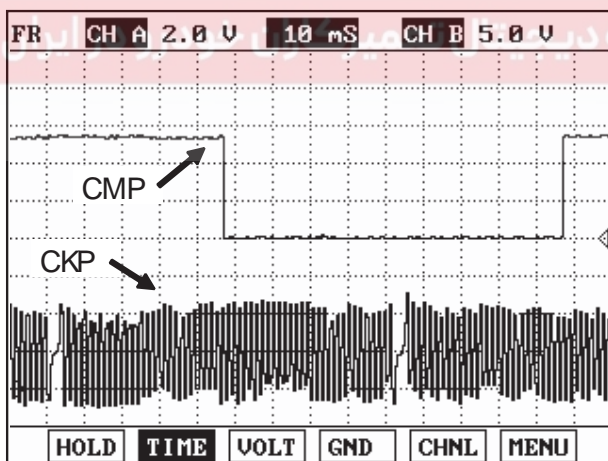
(M/T)



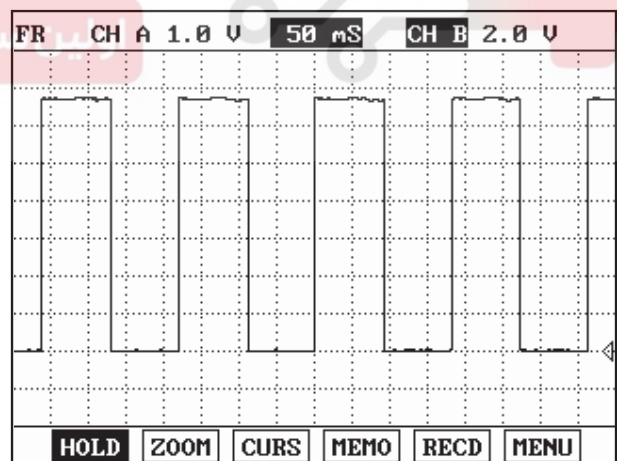
SHDFL6901L

SIGNAL WAVEFORM & DATA

E8FD47C7



CKP-CMP



CMP

This example shows a typical Crankshaft Position Sensor (CkPS) and Camshaft Position Sensor (CMPS) waveform at idle. The PCM controls the injection and ignition timing by using these signals. Generally CkPS signal is used to detect the piston's position and CMPS signal is used to detect the Top Dead Center of each cylinder.

SHDFL6810L

MONITOR SCANTOOL DATA

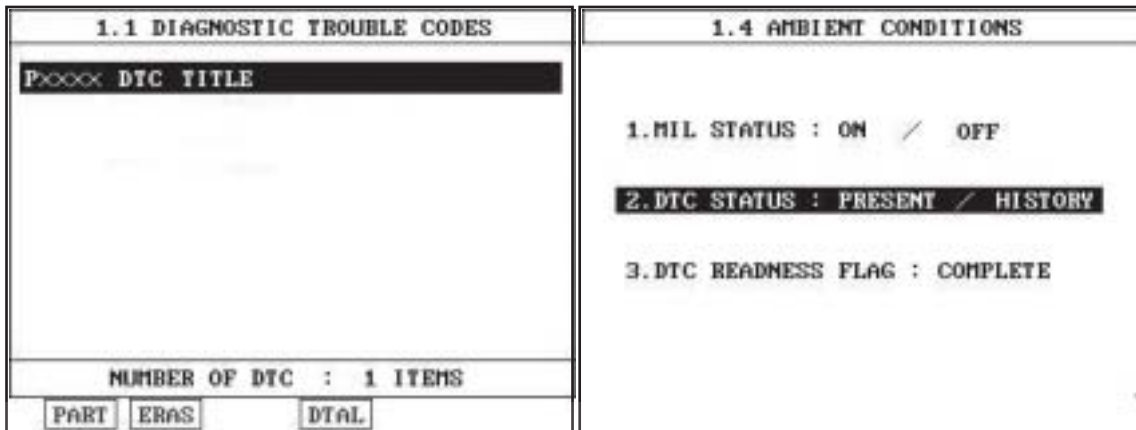
E6499DA0

1. Connect scantool to Data Link Connector (DLC).
2. IG "ON".

FL -340

FUEL SYSTEM

3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.



EFNG321A

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure.

TERMINAL AND CONNECTOR INSPECTION E4BF7B20

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

DTC TROUBLESHOOTING PROCEDURES

FL -341

Go to "CMPS Power circuit inspection" procedure.

POWER CIRCUIT INSPECTION E1A145CB

1. Key "OFF".
2. Disconnect CMPS connector.
3. key "ON".
4. Measure the voltage between terminal 1 of CMPS harness connector and chassis ground.

Specification : B+

5. Is the measured voltage within specification ?

YES

Go to "Signal circuit inspection" procedure.

NO

Repair Open or Short circuit and then, go to "Verification of Vehicle Repair" procedure.

SIGNAL CIRCUIT INSPECTION ED990529

1. Check Open in signal circuit.
 - 1) Key "OFF".
 - 2) Disconnect CMPS connector.
 - 3) Key "ON".
 - 4) Measure the voltage between terminal 2 of CMPS harness connector and chassis ground.

Specification : Approx 12V

- 5) Is the measured voltage within specification?

YES

Go to "Short to power circuit inspection" procedure

NO

Repair Open in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

2. Check Short to power in signal circuit.
 - 1) Key "OFF".
 - 2) Disconnect CMPS connector and PCM connector.
 - 3) Measure the resistance between terminal 1 and 2 of CMPS harness connector.

Specification : Infinite

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FUEL SYSTEM

4) Is the measured resistance within specifications?

YES

Go to "Ground circuit inspection" procedure.

NO

Repair Short to power in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

GROUND CIRCUIT INSPECTION E70D2F55

1. Key "OFF".
2. Disconnect CMPS connector.
3. Key "ON".
4. Measure the voltage between terminal 2 of CMPS harness connector and chassis ground.(A)
5. Measure the voltage between terminal 2 and 3 of CMPS harness connector.(B)

Specification : "A" - "B" = Below 200mV

6. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

Repair Open in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION EFF7315C

1. CMPS visual check.
 - 1) Key "OFF".
 - 2) Check physical condition of CMPS.
 - 3) Check the projection of cam-shaft visually after remove the CMPS.
 - 4) Is everything O.K?

YES

Go to "CMPS check" procedure.

NO

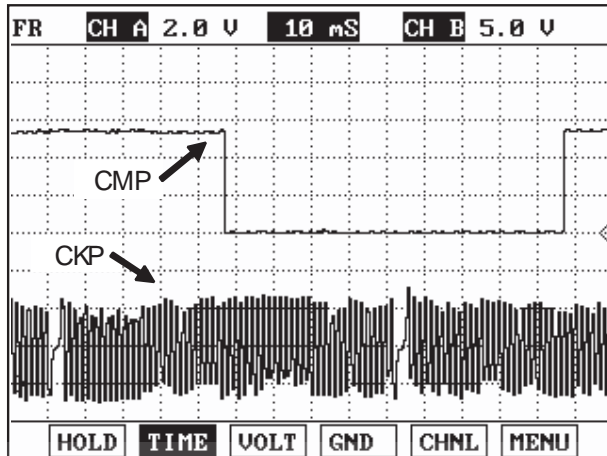
Repair as necessary and then, go to "Verification of Vehicle Repair" procedure.

2. CMPS check.

- 1) Key "ON". (Don't disconnect sensors.)

DTC TROUBLESHOOTING PROCEDURES**FL -343**

- 2) Select "vehicle scopemeter" in the menu, and connect channel A of scantool with terminal 2 of CMPS harness connector.
- 3) Engine start. And check the signal waveforms.

SPECIFICATION :

1. Sensor power
2. CMPS signal
3. Sensor ground

SHDFL6815L

- 4) Is the signal waveform within specifications?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR E95BF8E

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

FL -344

FUEL SYSTEM

DTC P0341 CAMSHAFT POSITION SENSOR A CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR)

COMPONENT LOCATION E88EB0F0

Refer to DTC P0340.

GENERAL DESCRIPTION EDFEF2D0

Refer to DTC P0340.

DTC DESCRIPTION EFB888BB

If signal input phase is abnormal over 12 times , PCM sets DTC P0341.

DTC DETECTING CONDITION E043175F

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Intermittent contact (check the wiring state) 	<ul style="list-style-type: none"> Poor connection Open or short in power/ground/ signal circuit CMPS
Enable Conditions	<ul style="list-style-type: none"> Sensor signal requested 	
Threshold Value	<ul style="list-style-type: none"> The count of Phase edges detection failure > 12 times 	
Diagnostic Time		
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SCHEMATIC DIAGRAM E92BB02D

Refer to DTC P0340.

SIGNAL WAVEFORM & DATA ECED4564

Refer to DTC P0340.

MONITOR SCANTOOL DATA E3312133

Refer to DTC P0340.

TERMINAL AND CONNECTOR INSPECTION E1FD34DE

Refer to DTC P0340.

POWER CIRCUIT INSPECTION E6F488FD

- Key "OFF".
- Disconnect CMPS connector.

DTC TROUBLESHOOTING PROCEDURES

FL -345

3. key "ON".
4. Measure the voltage between terminal 1 of CMPS harness connector and chassis ground.

Specification : B+

5. Is the measured voltage within specification ?

YES

Go to "Signal circuit inspection" procedure.

NO

Repair Open or Short circuit and then, go to "Verification of Vehicle Repair" procedure.

SIGNAL CIRCUIT INSPECTION E1C7B02F

1. Check Open in signal circuit.
 - 1) Key "OFF".
 - 2) Disconnect CMPS connector.
 - 3) Key "ON".
 - 4) Measure the voltage between terminal 2 of CMPS harness connector and chassis ground.

Specification : Approx 12V

- 5) Is the measured voltage within specification?

YES

Go to "Short to power circuit inspection" procedure

NO

Repair Open in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

2. Check Short to power in signal circuit.
 - 1) Key "OFF".
 - 2) Disconnect CMPS connector and PCM connector.
 - 3) Measure the resistance between terminal 1 and 2 of CMPS harness connector.

Specification : Infinite

- 4) Is the measured resistance within specifications?

YES

Go to "Ground circuit inspection" procedure.

NO

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FUEL SYSTEM

Repair Short to power in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

GROUND CIRCUIT INSPECTION EA3CB217

1. Key "OFF".
2. Disconnect CMPS connector.
3. Key "ON".
4. Measure the voltage between terminal 2 of CMPS harness connector and chassis ground.(A)
5. Measure the voltage between terminal 2 and 3 of CMPS harness connector.(B)

Specification : "A" - "B" = Below 200mV

6. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

Repair Open in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION ECB7CD17

1. CMPS visual check.
 - 1) Key "OFF".
 - 2) Check physical condition of CMPS.
 - 3) Check the projection of cam-shaft visually after remove the CMPS.
 - 4) Is everything O.K?

YES

Go to "CMPS check" procedure.

NO

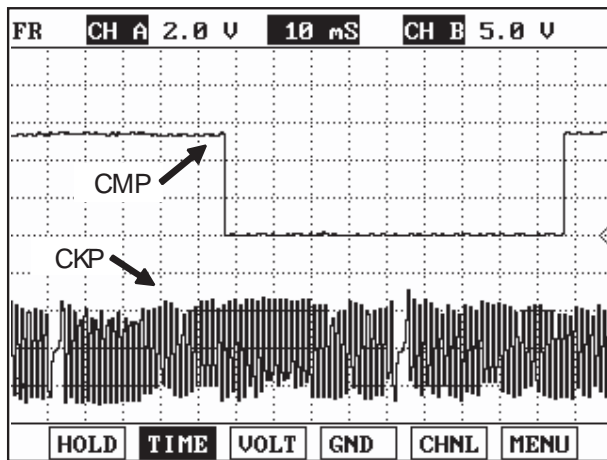
Repair as necessary and then, go to "Verification of Vehicle Repair" procedure.

2. CMPS check.
 - 1) Key "ON". (Don't disconnect sensors.)
 - 2) Select "vehicle scopemeter" in the menu, and connect channel A of scantool with terminal 2 of CMPS harness connector.
 - 3) Engine start. And check the signal waveforms.

DTC TROUBLESHOOTING PROCEDURES

FL -347

SPECIFICATION :



1. Sensor power
2. CMPS signal
3. Sensor ground

SHDFL6815L

4) Is the signal waveform within specifications?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR EE9599FC

Refer to DTC P0340.

FL -348

FUEL SYSTEM

DTC P0342 CAMSHAFT POSITION SENSOR A CIRCUIT LOW INPUT**COMPONENT LOCATION** E3871E9C

Refer to DTC P0340.

GENERAL DESCRIPTION E0C838F9

Refer to DTC P0340.

DTC DESCRIPTION E4BA1EFE

If the signal input is low with no phase edge PCM sets DTC P0342.

DTC DETECTING CONDITION E5476275

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Signal check, Low 	<ul style="list-style-type: none"> Poor connection Short to ground in signal circuit CMPS
Enable Conditions	<ul style="list-style-type: none"> Sensor signal requested 	
Threshold Value	<ul style="list-style-type: none"> Signal low and no phase edge 	
Diagnostic Time		
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SCHEMATIC DIAGRAM EC579A04

Refer to DTC P0340.

SIGNAL WAVEFORM & DATA E149F5D1

Refer to DTC P0340.

MONITOR SCANTOOL DATA EDD771EF

Refer to DTC P0340.

TERMINAL AND CONNECTOR INSPECTION E7FF826C

Refer to DTC P0340.

POWER CIRCUIT INSPECTION ED4C880A

1. Key "OFF".
2. Disconnect CMPS connector.
3. Key "ON".

DTC TROUBLESHOOTING PROCEDURES**FL -349**

4. Measure the voltage between terminal 1 of CMPS harness connector and chassis ground.

Specification : B+

5. Is the measured voltage within specification ?

YES

Go to "Signal circuit inspection" procedure.

NO

Repair Open or Short circuit and then, go to "Verification of Vehicle Repair" procedure.

SIGNAL CIRCUIT INSPECTION E45B2327

1. Check Short in signal circuit.

- 1) Key "OFF".
- 2) Disconnect CMPS connector.
- 3) Key "ON".
- 4) Measure the voltage between terminal 2 of CMPS harness connector and chassis ground.

Specification : Approx 12V

- 5) Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

Repair Short to ground in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION E97F51DF

1. CMPS visual check.

- 1) Key "OFF".
- 2) Check physical condition of CMPS.
- 3) Check the projection of cam-shaft visually after remove the CMPS.
- 4) Is everything O.K?

YES

Go to "CMPS check" procedure.

NO

Repair as necessary and then, go to "Verification of Vehicle Repair" procedure.

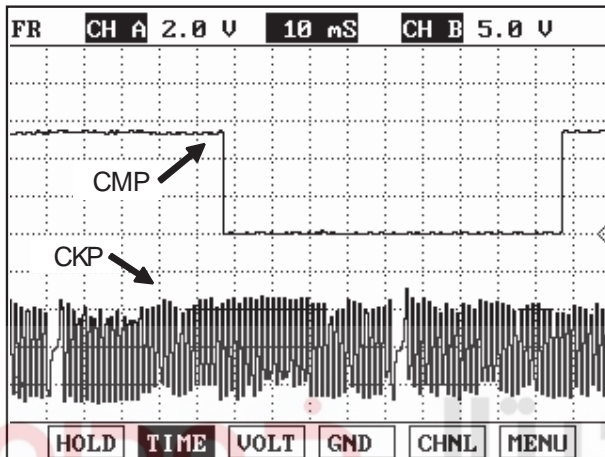
FL -350

FUEL SYSTEM

2. CMPS check.

- 1) Key "ON". (Don't disconnect sensors.)
- 2) Select "vehicle scopemeter" in the menu, and connect channel A of scantool with terminal 2 of CMPS harness connector.
- 3) Engine start. And check the signal waveforms.

SPECIFICATION :



1. Sensor power
2. CMPS signal
3. Sensor ground

- 4) Is the signal waveform within specifications?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR

E2ABB22F

Refer to DTC P0340.

DTC TROUBLESHOOTING PROCEDURES

FL -351

DTC P0343 CAMSHAFT POSITION SENSOR A CIRCUIT HIGH INPUT**COMPONENT LOCATION** E34177C6

Refer to DTC P0340.

GENERAL DESCRIPTION E8186A45

Refer to DTC P0340.

DTC DESCRIPTION E84C59E2

If the signal input is high with no phase edge PCM sets DTC P0343.

DTC DETECTING CONDITION E28886F9

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Signal check, High 	<ul style="list-style-type: none"> Poor connection Open in signal/ground circuit Short to power in signal circuit CMPS
Enable Conditions	<ul style="list-style-type: none"> Sensor signal requested 	
Threshold Value	<ul style="list-style-type: none"> Signal high and no phase edge 	
Diagnostic Time		
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SCHEMATIC DIAGRAM E3AD0D93

Refer to DTC P0340.

SIGNAL WAVEFORM & DATA E8281E3D

Refer to DTC P0340.

MONITOR SCANTOOL DATA E79A28EB

Refer to DTC P0340.

TERMINAL AND CONNECTOR INSPECTION E07B1A36

Refer to DTC P0340.

POWER CIRCUIT INSPECTION E3C0AEEA

1. Key "OFF".
2. Disconnect CMPS connector.
3. Key "ON".

FL -352**FUEL SYSTEM**

4. Measure the voltage between terminal 1 of CMPS harness connector and chassis ground.

Specification : B+

5. Is the measured voltage within specification ?

YES

Go to "Ground circuit inspection" procedure.

NO

Repair Open or Short circuit and then, go to "Verification of Vehicle Repair" procedure.

GROUND CIRCUIT INSPECTION EEA29AFD

1. Key "OFF".
2. Disconnect CMPS connector.
3. Key "ON".
4. Measure the voltage between terminal 2 of CMPS harness connector and chassis ground.(A)
5. Measure the voltage between terminal 2 and 3 of CMPS harness connector.(B)

Specification : "A" - "B" = Below 200mV

6. Is the measured voltage within specification?

YES

Go to "Signal circuit inspection" procedure.

NO

Repair Open in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

SIGNAL CIRCUIT INSPECTION EDE74761

1. Check Open in signal circuit.
 - 1) Key "OFF".
 - 2) Disconnect CMPS connector.
 - 3) Key "ON".
 - 4) Measure the voltage between terminal 2 of CMPS harness connector and chassis ground.

Specification : Approx 12V

- 5) Is the measured voltage within specification?

YES

Go to "Short to power circuit inspection" procedure.

DTC TROUBLESHOOTING PROCEDURES**FL -353****NO**

Repair Open in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

2. Check Short to power in signal circuit.
 - 1) Key "OFF".
 - 2) Disconnect CMPS connector and PCM connector.
 - 3) Measure the resistance between terminal 1 and 2 of CMPS harness connector.

Specification : Infinite

- 4) Is the measured resistance within specifications?

YES

Go to "Component inspection" procedure.

NO

Repair Short to power in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION ECF0DB37

1. CMPS visual check.
 - 1) Key "OFF".
 - 2) Check physical condition of CMPS.
 - 3) Check the projection of cam-shaft visually after remove the CMPS.
 - 4) Is everything O.K?

YES

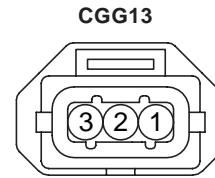
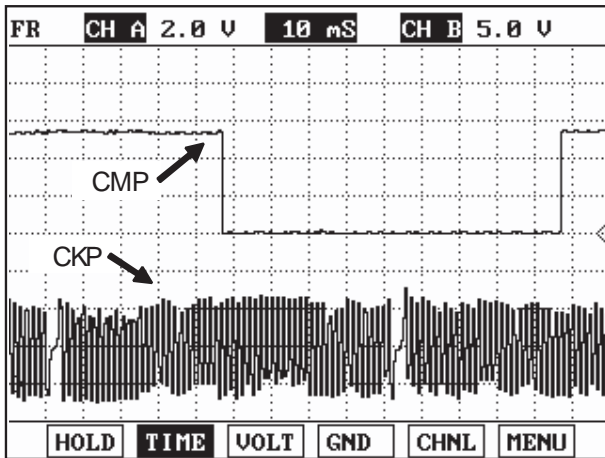
Go to "CMPS check" procedure.

NO

Repair as necessary and then, go to "Verification of Vehicle Repair" procedure.

2. CMPS check.
 - 1) Key "ON". (Don't disconnect sensors.)
 - 2) Select "vehicle scopemeter" in the menu, and connect channel A of scantool with terminal 2 of CMPS harness connector.
 - 3) Engine start. And check the signal waveforms.

SPECIFICATION :



- 1. Sensor power
- 2. CMPS signal
- 3. Sensor ground

SHDFL6815L

4) Is the signal waveform within specifications?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR E35A614A

Refer to DTC P0340.

DTC TROUBLESHOOTING PROCEDURES

FL -355

DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1)**GENERAL DESCRIPTION** EBA1736C

The catalyst's efficiency is demonstrated by its ability to oxidize CO and hydrocarbon emissions. The Powertrain Control Module (PCM) compares the output signals of the front and rear oxygen sensors to determine whether the output of the rear sensor is beginning to match the output of the front oxygen sensor. Air/fuel mixture compensation keeps the frequency of the front oxygen sensor high due to the changes from rich-to-lean combustion. The catalyst causes the rear oxygen sensor to have a lower frequency. As the catalyst wears, the rear oxygen sensor's signal trace begins to match the front oxygen sensor's signal trace. That is because the catalyst becomes saturated with oxygen and cannot use the oxygen to convert hydrocarbon and CO into H₂O and CO₂ with the same efficiency as when it was new. A completely worn catalyst shows a 100% match between the frequency of the front and rear sensors.

DTC DESCRIPTION EED0C43F

If amplitude of B1S2 is different from the model value during 60 sec under enable conditions, PCM sets DTC P0420.

DTC DETECTING CONDITION ECC08B0F

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Oxygen storage capacity (Deterioration of Catalytic efficiency) 	<ul style="list-style-type: none"> Exhaust system B1S2 Catalyst converter
Enable Conditions	<ul style="list-style-type: none"> Engine speed 1280 - 3000rpm Engine load 28.8 - 65.3 % Catalyst temp.(model) 500 - 800 Closed loop control There is not misfire. There is not malfunction on HO2S / PCSV / ECTS. 	
Threshold Value	<ul style="list-style-type: none"> Difference of 'amplitude of downstream O2 sensor' and 'amplitude of model signal' > 0.75 	
Diagnostic Time	<ul style="list-style-type: none"> 60 sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

B1S1 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

MONITOR SCANTOOL DATA EE6EFD76

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

FL -356

FUEL SYSTEM

1.1 DIAGNOSTIC TROUBLE CODES				1.4 AMBIENT CONDITIONS	
PXXXX DTC TITLE				1.MIL STATUS : ON / OFF	
				2.DTC STATUS : PRESENT / HISTORY	
				3.DTC READNESS FLAG : COMPLETE	
NUMBER OF DTC : 1 ITEMS					
PART	ERAS	DTAL			

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure

SYSTEM INSPECTION E94DEEDE

1. Exhaust gas system check.

- 1) Visual check.
 - Check air leakage at junction of HO2S or Catalyst converter.
 - Check looseness, poor connection, or damage.
- 2) Is there something wrong?

YES

Repair as necessary and then, go to "Verification of Vehicle Repair" procedure.

NO

Go to "Component inspection" procedure.

COMPONENT INSPECTION E54540A4

1. Rear HO2S(B1S2) check.

- 1) B1S2 visual check

DTC TROUBLESHOOTING PROCEDURES

FL -357

- Check assembling state of B1S2. (Check the interference between sensor wiring and exhaust pipe.)
- Check corrosion, contamination, or damage on sensor terminal and connector.

2) Is there something wrong?

YES

Repair as necessary and then, go to "Verification of Vehicle Repair" procedure.

NO

Go to "Catalyst converter check" procedure.

2. Catalyst converter check.

1) Catalyst converter visual check.

- Check discoloration by over-heating.
- Check deflection or crack(hole).
- Check noise.

2) Check whether the catalyst converter is genuine.

3) After erase the DTC, drive the vehicle more than 60sec according to "Enable Conditions" (Refer to "DTC Detecting Condition"). And then, confirm DTC.

4) Is there something wrong?

YES

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

NO

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E28FF538

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

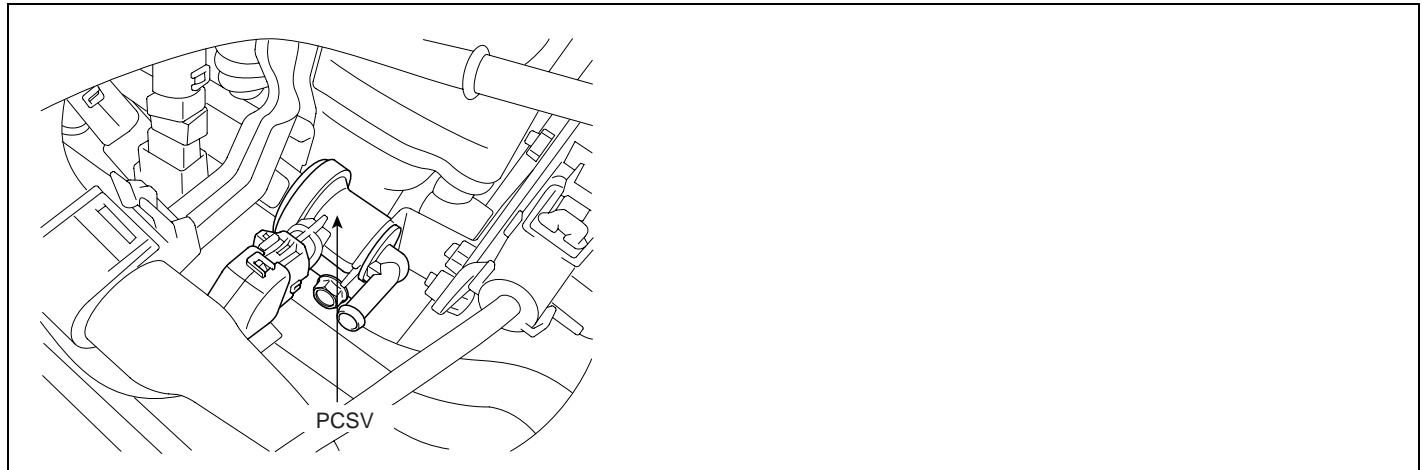
Go to the applicable troubleshooting procedure.

FL -358

FUEL SYSTEM

DTC P0444 EVAP. EMISSION SYSTEM-PURGE CTRL. VALVE CIRCUIT OPEN

COMPONENT LOCATION EB59027B



SHDFL6715L

GENERAL DESCRIPTION E4A19E62

The purge solenoid is a pneumatic device that meters the air and fuel (purge) vapor flow to the purge port. In a sense, the purge solenoid is comparable to a fuel injector, because the metered purge flow follows the same slope and offset characteristics. However, the purge solenoid normally runs with a duty cycle at a fixed frequency because the opening response is significantly slower than a fuel injector. It would not be practical to run the solenoid synchronously with engine events except perhaps at very low RPM. The normal frequencies for the purge solenoid are between 8 and 20 Hz.

DTC DESCRIPTION E8F71709

If there is an Open in the PCSV circuit, the PCM sets DTC P0444.

DTC DETECTING CONDITION E54D60EF

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Circuit continuity check, open 	<ul style="list-style-type: none"> Poor connection Open or Short to ground in power circuit Open in control circuit PCSV
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> Disconnected 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

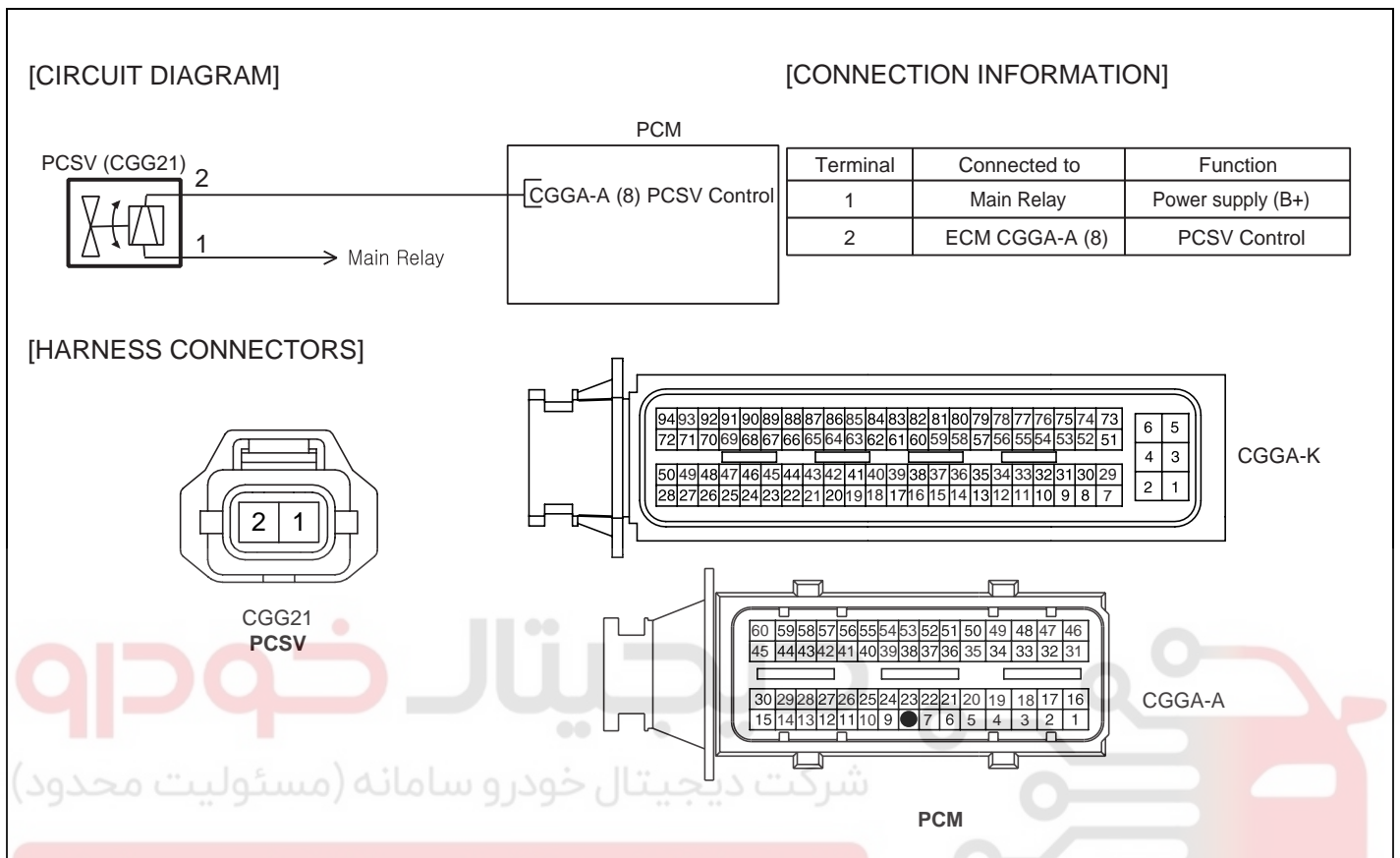
SPECIFICATION EA523915

Temperature [()]	Coil Resistance ()
20 (68)	16.0

DTC TROUBLESHOOTING PROCEDURES

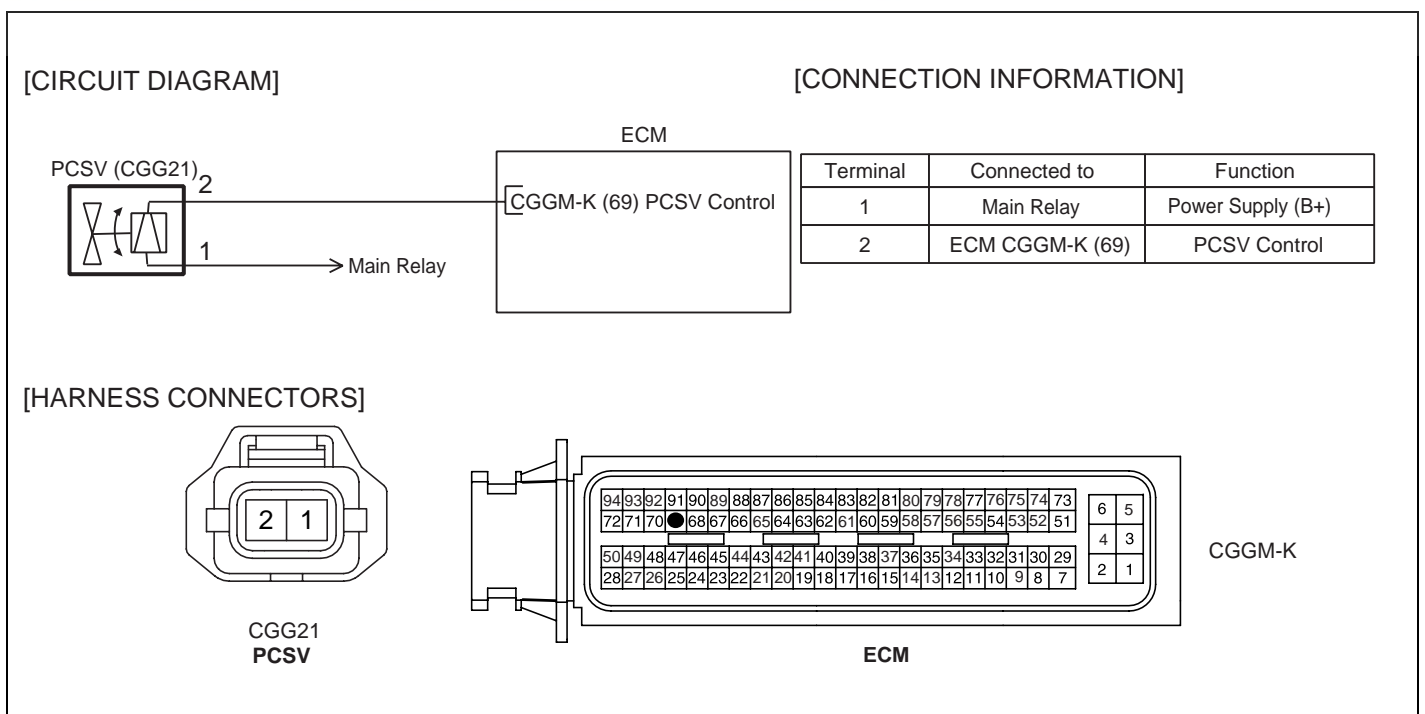
SCHEMATIC DIAGRAM EF74BDA9

(A/T)



SHDFL6592L

(M/T)

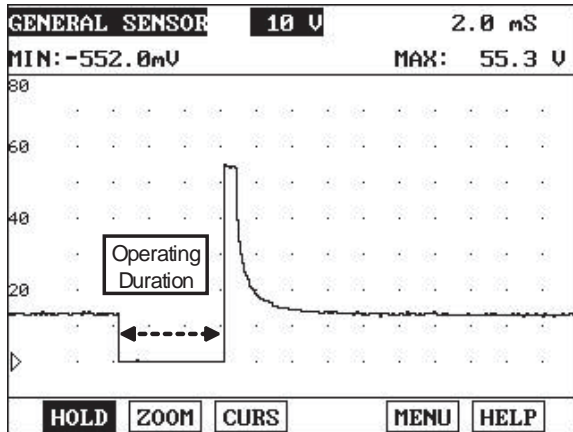


SHDFL6593L

FL -360

FUEL SYSTEM

SIGNAL WAVEFORM & DATA E36477BB



LFJF600A

MONITOR SCANTOOL DATA E73FA6CA

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

1.1 DIAGNOSTIC TROUBLE CODES	1.4 AMBIENT CONDITIONS
PXXXX DTC TITLE	1.MIL STATUS : ON / OFF
	2.DTC STATUS : PRESENT / HISTORY
	3.DTC READNESS FLAG : COMPLETE
NUMBER OF DTC : 1 ITEMS	
PART ERAS DTAL	

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

YES

DTC TROUBLESHOOTING PROCEDURES**FL -361**

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure

TERMINAL AND CONNECTOR INSPECTION EBE6CC8D

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "PCSV circuit inspection" procedure.

POWER CIRCUIT INSPECTION E89B19A6

1. Key "OFF".
2. Disconnect PCSV connector.
3. key "ON".
4. Measure the voltage between terminal 1 of PCSV harness connector and chassis ground.



Specification : B+

5. Is the measured voltage within specification ?

YES

Go to "Control circuit inspection" procedure.

NO

Repair Open or Short to ground circuit and then, go to "Verification of Vehicle Repair" procedure.

CONTROL CIRCUIT INSPECTION E0C1D739

1. Key "OFF".
2. Disconnect PCSV connector.
3. Key "ON".

FL -362

FUEL SYSTEM

4. Measure the voltage between terminal 2 of PCSV harness connector and chassis ground.

Specification : Approx 3.5V

5. Is the measured voltage within specification?
6. Go to "Component inspection" procedure.

NO

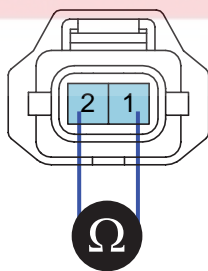
Repair Open circuit and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION EBD27B82

1. PCSV check.
- 1) Key "OFF".
 - 2) Disconnect PCSV harness connector.
 - 3) Measure the resistance between terminal 1 and 2 of PCSV harness connector.(Component side)

SPECIFICATION :

Temperature [()]	Coil Resistance ()
20 (68)	16.0



1. PCSV power
2. PCSV control

SHDFL6819L

- 4) Is the measured resistance within specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

DTC TROUBLESHOOTING PROCEDURES

FL -363

VERIFICATION OF VEHICLE REPAIR E2F6EF2A

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



FL -364

FUEL SYSTEM

DTC P0458 EVAP. EMISSION SYSTEM-PURGE CONTROL VALVE CIRCUIT LOW

COMPONENT LOCATION EB0BA0A7

Refer to DTC P0444.

GENERAL DESCRIPTION EAE9C491

Refer to DTC P0444.

DTC DESCRIPTION E11397A4

If there is Short to ground in PCSV circuit, PCM sets DTC P0458.

DTC DETECTING CONDITION E1884D51

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Circuit continuity check, low 	<ul style="list-style-type: none"> Poor connection Short to ground in control circuit PCSV
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> Short circuit to ground 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SPECIFICATION E2DD2F44

Refer to DTC P0444.

SCHEMATIC DIAGRAM E8E263A8

Refer to DTC P0444.

SIGNAL WAVEFORM & DATA E70A8A6B

Refer to DTC P0444.

MONITOR SCANTOOL DATA E53DC674

Refer to DTC P0444.

TERMINAL AND CONNECTOR INSPECTION E95F0F98

Refer to DTC P0444.

DTC TROUBLESHOOTING PROCEDURES

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POWER CIRCUIT INSPECTION EF114D84

1. Key "OFF".
2. Disconnect PCSV connector.
3. Key "ON".
4. Measure the voltage between terminal 1 of PCSV harness connector and chassis ground.

 Specification : B+

5. Is the measured voltage within specification ?

YES

Go to "Control circuit inspection" procedure.

NO

Repair circuit as necessary and then, go to "Verification of Vehicle Repair" procedure.

CONTROL CIRCUIT INSPECTION EA793496

1. Key "OFF".
2. Disconnect PCSV connector.
3. Key "ON".
4. Measure the voltage between terminal 2 of PCSV harness connector and chassis ground.

 Specification : Approx 3.5V

5. Is the measured voltage within specification?
6. Go to "Component inspection" procedure.

NO

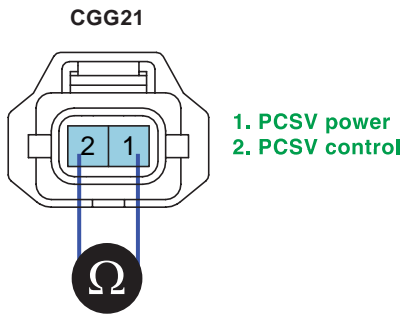
Repair Short to ground circuit and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION EEEB4AD0

1. PCSV check.
 - 1) Key "OFF".
 - 2) Disconnect PCSV harness connector.
 - 3) Measure the resistance between terminal 1 and 2 of PCSV harness connector.(Component side)

SPECIFICATION :

Temperature [()]	Coil Resistance ()
20 (68)	16.0



SHDFL6819L

4) Is the measured resistance within specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR

E44FFBB8

Refer to DTC P0444.

DTC TROUBLESHOOTING PROCEDURES

FL -367

DTC P0459 EVAP. EMISSION SYSTEM-PURGE CONTROL VALVE CIRCUIT HIGH**COMPONENT LOCATION** E2086037

Refer to DTC P0444.

GENERAL DESCRIPTION EB666B42

Refer to DTC P0444.

DTC DESCRIPTION EA3CC17C

If there is Short to power in PCSV circuit, PCM sets DTC P0459.

DTC DETECTING CONDITION E6539382

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Circuit continuity check, high 	<ul style="list-style-type: none"> Poor connection Short to power in control circuit PCSV
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> Short circuit to battery 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SPECIFICATION EC3100F6

Refer to DTC P0444.

SCHEMATIC DIAGRAM EB27433A

Refer to DTC P0444.

SIGNAL WAVEFORM & DATA E5C9A144

Refer to DTC P0444.

MONITOR SCANTOOL DATA E05FF0E5

Refer to DTC P0444.

TERMINAL AND CONNECTOR INSPECTION EF6CDB6A

Refer to DTC P0444.

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FUEL SYSTEM

POWER CIRCUIT INSPECTION E3866706

1. Key "OFF".
2. Disconnect PCSV connector.
3. Key "ON".
4. Measure the voltage between terminal 1 of PCSV harness connector and chassis ground.

Specification : B+

5. Is the measured voltage within specification ?

YES

Go to "Control circuit inspection" procedure.

NO

Repair circuit as necessary and then, go to "Verification of Vehicle Repair" procedure.

CONTROL CIRCUIT INSPECTION E55BD66B

1. Key "OFF".
2. Disconnect PCSV connector.
3. Key "ON".
4. Measure the voltage between terminal 2 of PCSV harness connector and chassis ground.

Specification : Approx 3.5V

5. Is the measured voltage within specification?

YES

Go to "Component inspection" procedure.

NO

Repair Short to power circuit and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION E5A8B89F

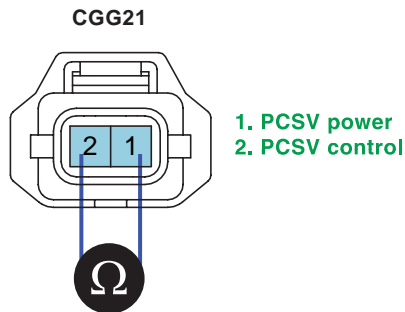
1. PCSV check.
 - 1) Key "OFF".
 - 2) Disconnect PCSV harness connector.
 - 3) Measure the resistance between terminal 1 and 2 of PCSV harness connector.(Component side)

DTC TROUBLESHOOTING PROCEDURES

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SPECIFICATION :

Temperature [()]	Coil Resistance ()
20 (68)	16.0



SHDFL6819L

4) Is the measured resistance within specification?

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR

E7BEF522

Refer to DTC P0444.

FL -370

FUEL SYSTEM

DTC P0501 VEHICLE SPEED SENSOR A RANGE/PERFORMANCE**GENERAL DESCRIPTION** ED3CF4DB

The wheel speed sensor is the essential component that the PCM uses to calculate vehicle speed. This wheel speed sensor is the active hall-sensor type and good at temperature and noise characteristic. Digital wave is produced as tone wheel rotate according as hall sensor principle. Frequency of duty wave is changed in proportion to rotation of tone wheel and PCM gets vehicle speed through ABS/ESP control unit or the wheel speed sensor(In case of non-ABS/ESP vehicle).

DTC DESCRIPTION E1D429F1

If the vehicle speed signal is below 1.0 Km/h during 2 sec under enable conditions, PCM sets P0501.

DTC DETECTING CONDITION E597E164

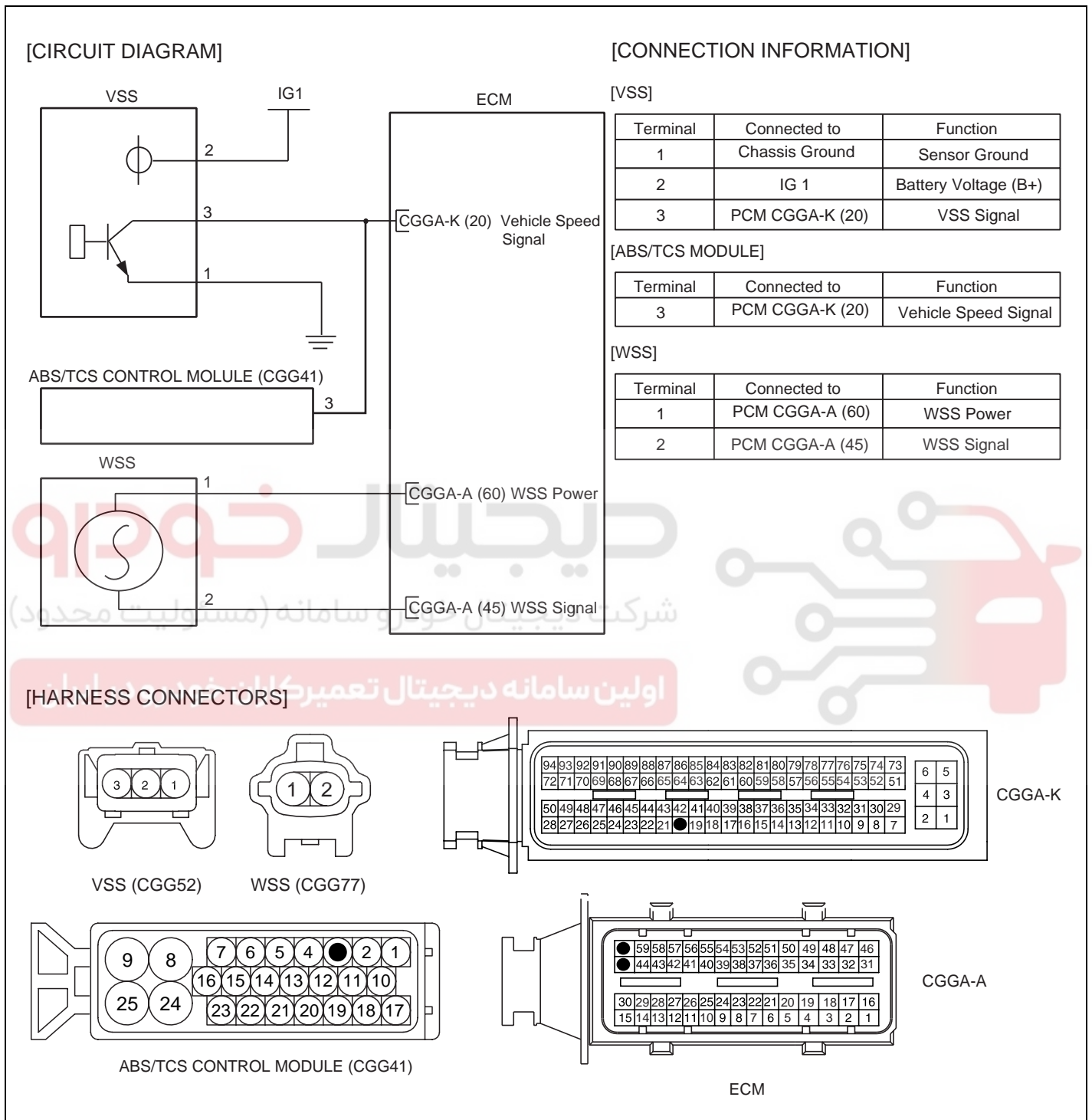
Item		Detecting Condition	Possible Cause
DTC Strategy		<ul style="list-style-type: none"> Signal check (implausible) 	
Case1	Enable Conditions	<ul style="list-style-type: none"> Engine speed > 3000rpm Engine load > 49.5% Coolant temperature > - 6 Gear position : D or R 	[ABS/TCS Vehicle] <ul style="list-style-type: none"> Poor connection Open or short in signal circuit ABS/TCSModule [Non-ABS/TCS Vehicle] <ul style="list-style-type: none"> Poor connection Open or short in power circuit Open or short in signal circuit WSS
	Threshold Value	<ul style="list-style-type: none"> Vehicle speed signal during fuel injection < 1.0 kPh 	
Case2	Enable Conditions	<ul style="list-style-type: none"> Engine speed : 1520~3520rpm Coolant temperature > - 6 	
	Threshold Value	<ul style="list-style-type: none"> Vehicle speed signal during fuel cut-off < 1.0 kPh 	
Diagnostic Time		<ul style="list-style-type: none"> 2 sec 	
MIL ON Condition		<ul style="list-style-type: none"> 3 driving cycle 	

DTC TROUBLESHOOTING PROCEDURES

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SCHEMATIC DIAGRAM EA1BB458

[A/T]

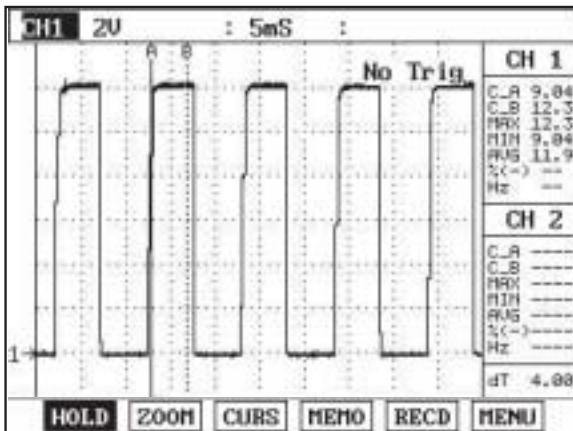


SLDFL7594L

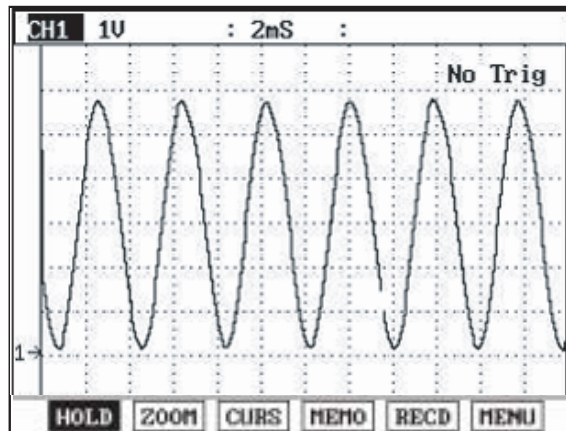
DTC TROUBLESHOOTING PROCEDURES

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SIGNAL WAVEFORM & DATA E7D61871



Vehicle Speed from ABSM/TCSM To ECM (0V~12V)



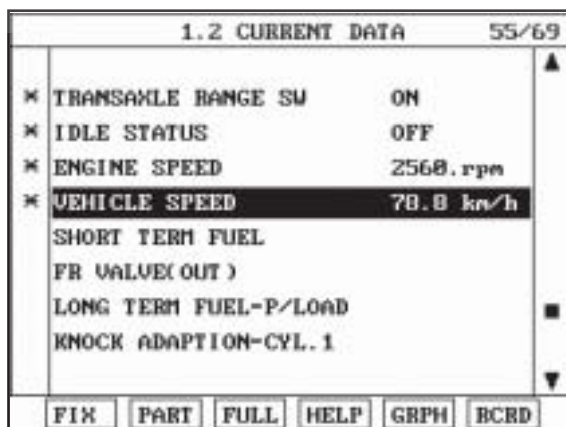
Vehicle Speed from Wheel Speed Sensor

SLDFL7820L

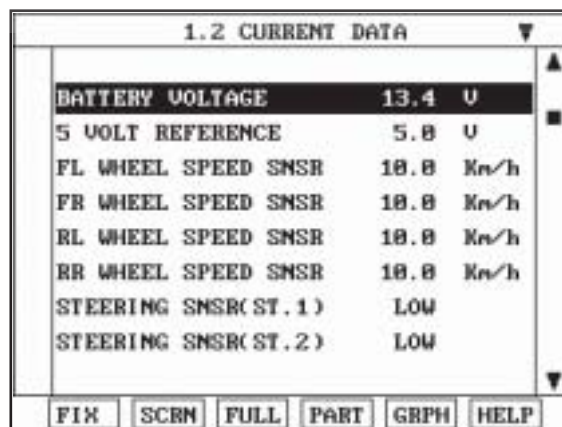
MONITOR SCANTOOL DATA EC1AD939

ABS/ESP VEHICLE

1. Connect scantool to Data Link Connector(DLC).
2. Engine start and drive the vehicle on the road.
3. Monitor the "VSS" parameters on the scantool.(ENG. Control)
4. Monitor the "WHEEL SPEED SENSOR-FR" parameter on the Scantool. (ABS Control or ESP Control)



ENG. Control



ABS Control or ESP Control

LFJF608A

5. Are the parameters displayed correctly? (Compare with the vehicle speed guage.)

YES

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

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FUEL SYSTEM

NO

Check the DTCs on ABS(ESP) Module first. If there are DTCs on ABS(ESP) Module, Refer to the Trouble Shooting Guide for ABS(ESP). But, if there isn't DTC on ABS(ESP) Module, go to "Terminal & Connector Inspection" procedure.

TERMINAL AND CONNECTOR INSPECTION E84B96D8**ABS/TCS VEHICLE**

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

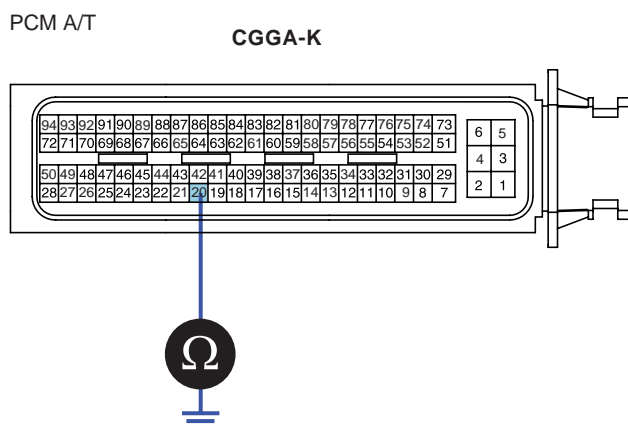
NO

Go to "Signal Circuit Inspection" procedure.

SIGNAL CIRCUIT INSPECTION E93C0BF6

1. Check short to ground in harness.
 - 1) Key "OFF".
 - 2) Disconnect PCM connector.
 - 3) Disconnect ABS/ESP control unit connector.
 - 4) Measure resistance between terminal 20/CGGA-K of PCM harness connector and chassis ground. [A/T]
Measure resistance between terminal 64/CGGM-K of ECM harness connector and chassis ground. [M/T]

Specification : Infinite



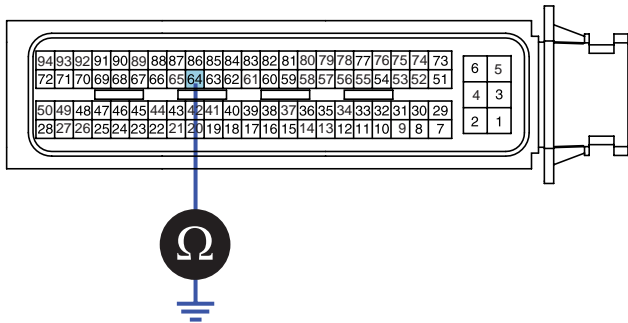
20. Speed Signal

DTC TROUBLESHOOTING PROCEDURES

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ECM M/T

CGGM-K



64. Speed Signal

SHDFL6822L

5) Is the measured resistance within specification?

YES

Go to "Check open in harness" as follows.

NO

Repair short to ground in harness, and go to "Verification of Vehicle Repair" procedure.

2. Check for open in harness.

1) Key "OFF".

2) Disconnect PCM connector.

3) Disconnect ABS/ESP control unit connector.

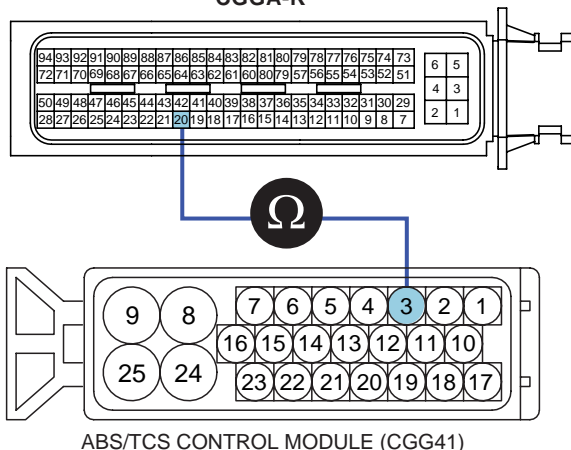
4) Measure resistance between terminal 20/CGGA-K of PCM harness connector and terminal 3/CGG41 of ABS/TCS control module harness connector.(A/T)
Measure resistance between terminal 64/CGGM-K of ECM harness connector and terminal 3/CGG41 of ABS/TCS control module harness connector.(M/T)



Specification : Approx. below 1

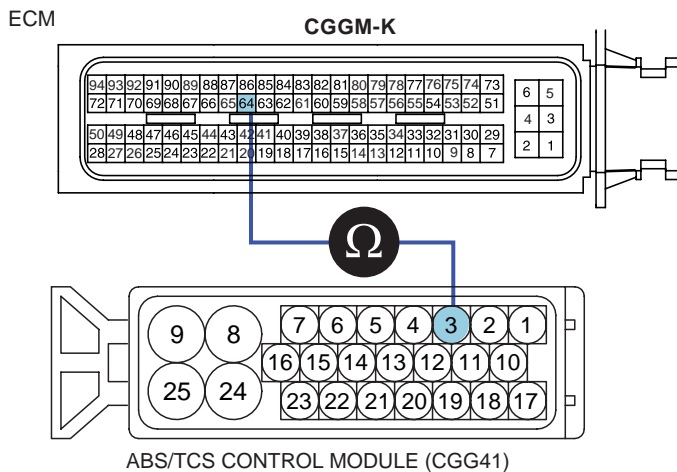
PCM

CGGA-K



20. Speed Signal

SLDFL7823L



64. Speed Signal

SLDFL7824L

5) Is the measured resistance within specifications?

YES

Go to "Component inspection" procedure.

NO

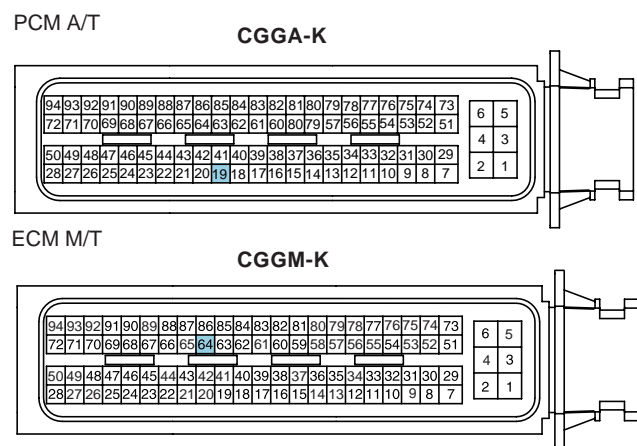
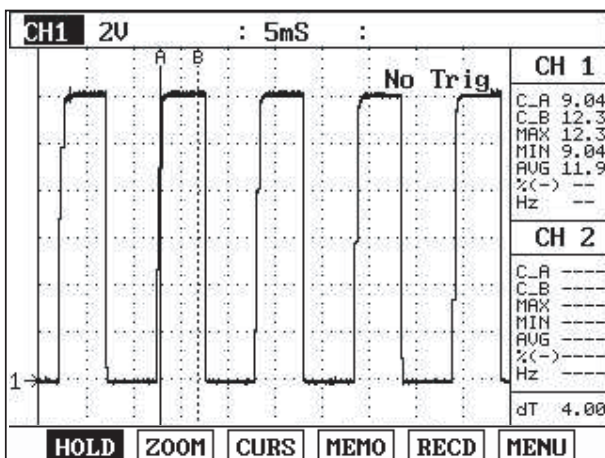
Repair Open circuit and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION E022D3F1

ABS/TCS VEHICLE اولین سامانه دیجیتال تعمیرکاران خود

1. ENG "ON".
2. Measure signal waveform of Vehicle Speed from ABS/ESP Control Module to ECM while driving.

SPECIFICATION :



SLDFL7825L

3. Is the signal waveform normal?

YES

DTC TROUBLESHOOTING PROCEDURES**FL -377**

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good ABS or ESP control unit and check for proper operation. If the problem is corrected, replace ABS or ESP control unit and go to "Verification of Vehicle Repair" procedure.

MONITOR SCANTOOL DATA E15EE8A4**NON-ABS/TCS VEHICLE**

1. Connect scantool to Data Link Connector(DLC).
2. Engine start and drive the vehicle on the road.
3. Monitor the "VSS" parameters on the scantool.

1.2 CURRENT DATA		55/69
* TRANSAXLE RANGE SW	ON	▲
* IDLE STATUS	OFF	
* ENGINE SPEED	2560. rpm	
* VEHICLE SPEED	78.8 km/h	
SHORT TERM FUEL		
FR VALUE(OUT)		
LONG TERM FUEL-P/LOAD		
KNOCK ADAPTION-CYL. 1		■
FIX	PART	FULL
HELP	GRPH	BCRD



LFJF613B

4. Are the parameters displayed correctly? (Compare with the vehicle speed guage.)

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "W/Harness Inspection " procedure.

TERMINAL AND CONNECTOR INSPECTION E7BC2CD1**NON-ABS/TCS VEHICLE**

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.

FL -378

FUEL SYSTEM

3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "Power Circuit Inspection" procedure.

POWER CIRCUIT INSPECTION EBC1EE62

1. Key "ON".
2. Measure voltage between terminal 1/CGG77 of the wheel speed sensor harness connector and chassis ground. (Don't disconnect the WSS connector.)

Specification : Approx. B+



SLDFL7826L

3. Is the measured voltage within specification?

YES

Go to "Signal Circuit Inspection" procedure.

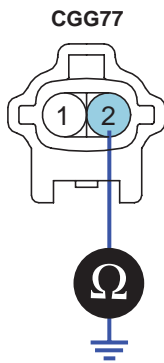
NO

Repair open or short to ground in harness, and go to "Verification of Vehicle Repair" procedure.

SIGNAL CIRCUIT INSPECTION EBEEC2AC

1. Key "ON".
2. Measure the voltage between terminal 2/CGG77 of wheel speed sensor harness connector and chassis ground. (Don't disconnect the WSS connector.)

Specification : 0.7 V or 1.4 V



- 1. Power
- 2. Signal

SLDFL7827L

3. Is the measured voltage within specifications?

YES

Go to "Component Inspection" as follows.

NO

Repair Open or Short in harness, and go to "Verification of Vehicle Repair" procedure.

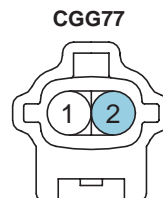
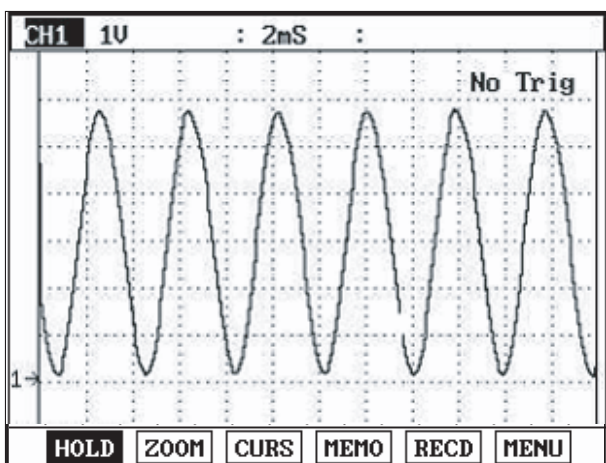
COMPONENT INSPECTION

EFC2B666

NON-ABS/TCS VEHICLE

1. Engine "ON".
2. Measure signal waveform of wheel speed sensor while driving.

SPECIFICATION :



- 1. Power
- 2. Signal

SLDFL7828L

3. Is the signal waveform normal?

YES

FL -380

FUEL SYSTEM

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR E7FB22AA

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

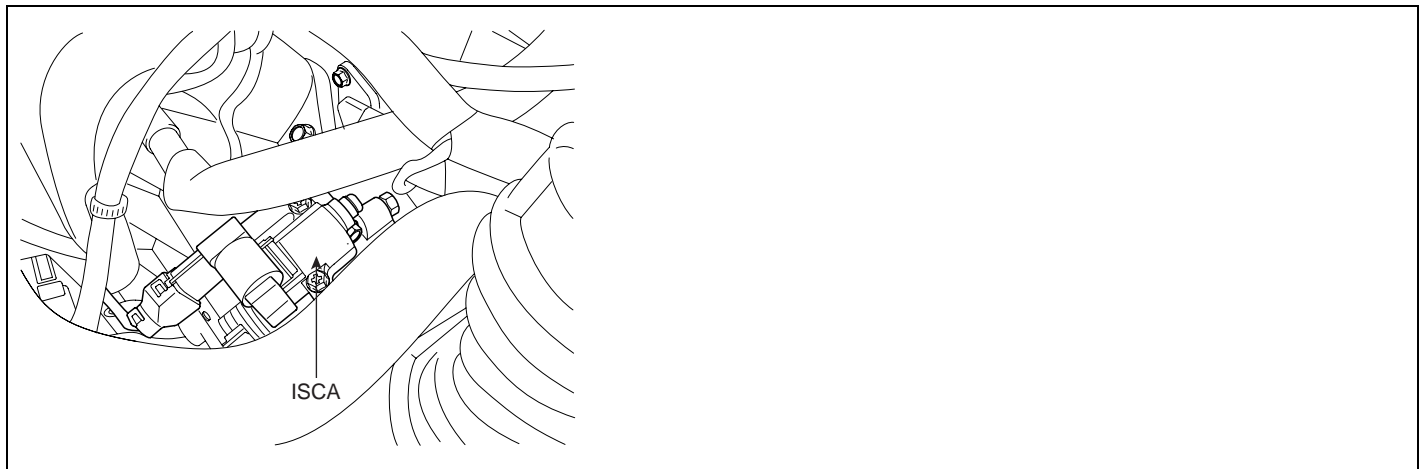


DTC TROUBLESHOOTING PROCEDURES

FL -381

DTC P0506 IDLE AIR CONTROL SYSTEM-RPM LOWER THAN EXPECTED

COMPONENT LOCATION ED232B25



SHDFL6716L

GENERAL DESCRIPTION E10DAF1C

The ISCA (Idle Speed Control Actuator) is designed to maintain a steady desired idle speed. Idle airflow is adjusted through the idle air actuator in order to maintain the desired idle speed under various load conditions. Load conditions vary due to numerous factors, such as engine temperature, air conditioning, electrical load and power steering load.

DTC DESCRIPTION E10D475E

If actual engine speed is more than 100 rpm lower than desired engine speed, P0506 is set.

DTC DETECTING CONDITION E790A7A6

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Rationality check, low 	<ul style="list-style-type: none"> Poor connection Clog in intake air system Carbon pile ISCA
Enable Conditions	<ul style="list-style-type: none"> Vehicle speed = 0 Coolant temperature > 70 Intake air temperature > -6 No purge valve error Idle status No error on the related sensors. (VSS,ECTS,IATS,etc) Idle speed control torque > 14.84% Engine load < 35% 	
Threshold Value	<ul style="list-style-type: none"> Desired engine speed - Engine speed 100rpm 	
Diagnostic Time	<ul style="list-style-type: none"> 8 sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

FL -382

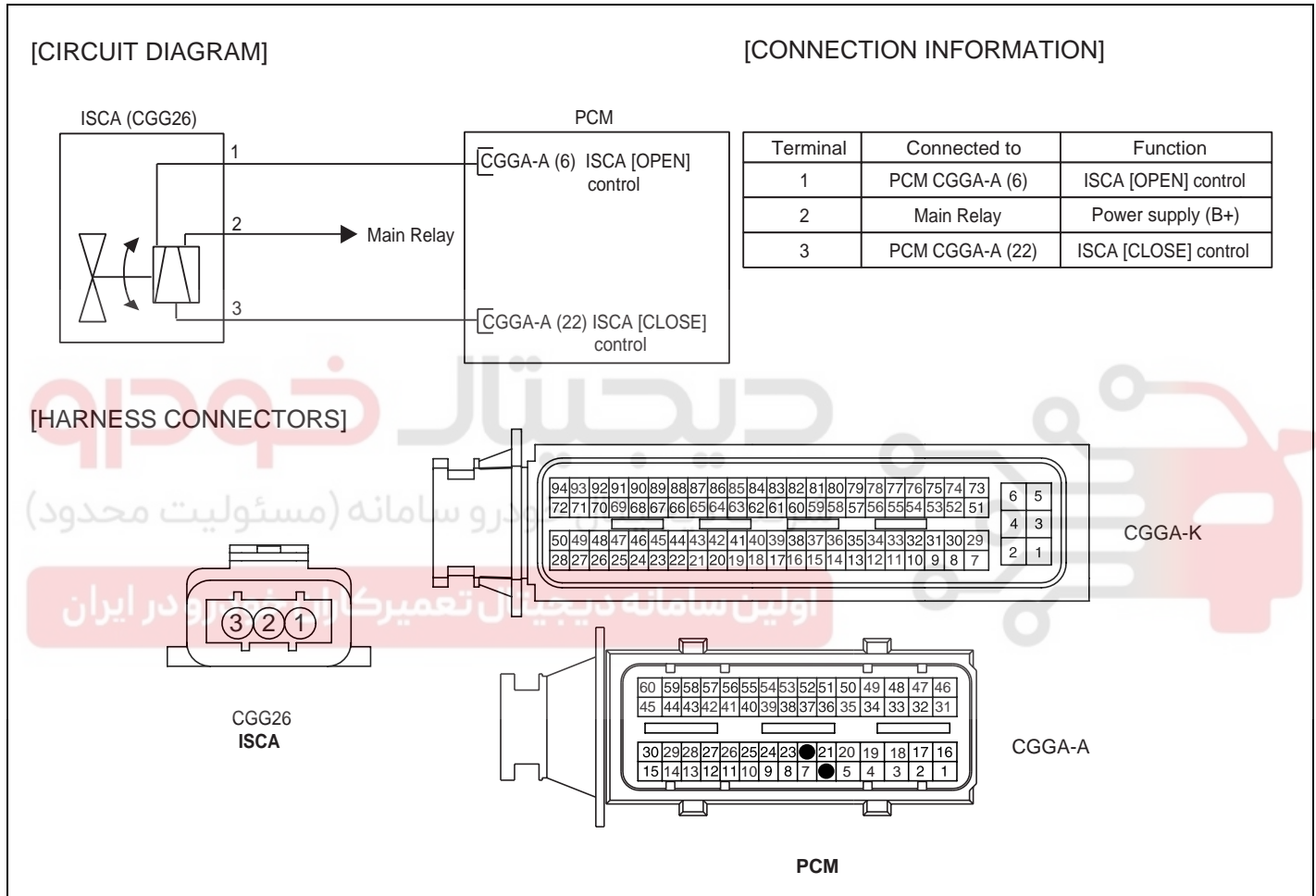
FUEL SYSTEM

SPECIFICATION EA7D3827

Temperature [()]	Closing Coil Resistance ()	Opening Coil Resistance ()
20 (68)	14.6 ~ 16.2	11.1 ~ 12.7

SCHEMATIC DIAGRAM E4B5D04D

(A/T)

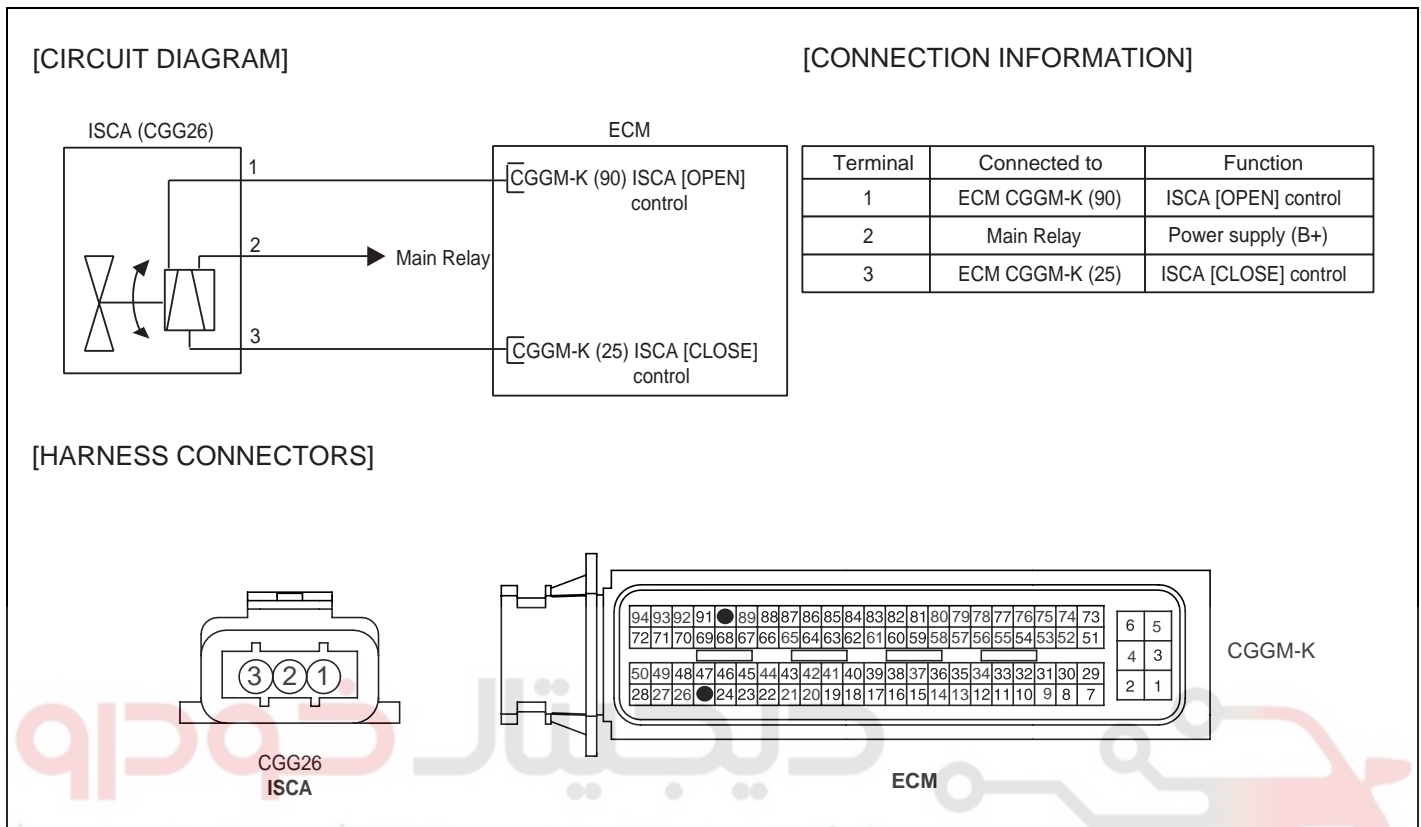


SHDFL6596L

DTC TROUBLESHOOTING PROCEDURES

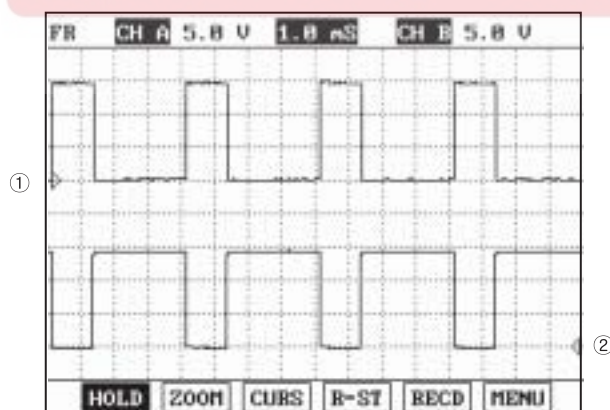
FL -383

(M/T)



SHDFL6597L

SIGNAL WAVEFORM & DATA E1E0FD65



- ① Closing control duty signal at idle
- ② Opening control duty signal at idle

EFNG334A

MONITOR SCANTOOL DATA E14F33A0

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu

FL -384

FUEL SYSTEM

4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

1.1 DIAGNOSTIC TROUBLE CODES				1.4 AMBIENT CONDITIONS	
Pxxxx DTC TITLE				1. MIL STATUS : ON / OFF	
				2. DTC STATUS : PRESENT / HISTORY	
				3. DTC READNESS FLAG : COMPLETE	
NUMBER OF DTC : 1 ITEMS					
PART	ERAS	DTAL			

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

شرکت دیجیتال خودرو (مسئولیت محدود)

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure

TERMINAL AND CONNECTOR INSPECTION E77C051A

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "System inspection" procedure.

DTC TROUBLESHOOTING PROCEDURES

FL -385

SYSTEM INSPECTION EF8FCD37

1. Visual Inspection.

1) Check "Air intake/exhaust system."

Check looseness, deterioration or contamination on air cleaner, throttle body and gasket.
Check contamination, damage or clog on exhaust gas system.

2) Is the air intake/exhaust system O.K.?

YES

Go to "Component inspection" procedure.

NO

Repair as necessary and go to "Verification of vehicle Repair" procedure.

COMPONENT INSPECTION E1040077

1. ISCA visual check.

1) Key "OFF".

2) Disassemble ISCA.

3) Check contamination, damage or stuck on ISCA.

4) Check the operating sound when key turns "OFF" to "ON".

5) Is ISCA O.K.?

YES

Go to "ISCA check" procedure.

NO

Substitute with a known - good ISCA and check for proper operation.

If the problem is corrected, replace ISCA and go to "Verification of Vehicle Repair" procedure.

2. ISCA check.

1) Key "OFF".

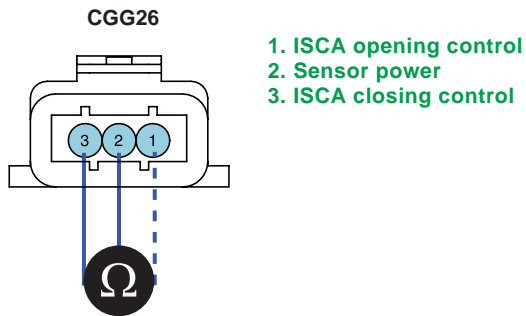
2) Disassemble ISCA.

3) Measure the resistance between terminal 1 and 2 of ISCA harness connector. (Component side)

4) Measure the resistance between terminal 2 and 3 of ISCA harness connector. (Component side)

SPECIFICATION :

Temperature [()]	Closing Coil Resistance ()	Opening Coil Resistance ()
20 (68)	14.6 ~ 16.2	11.1 ~ 12.7



SHDFL6829L

5) Is the measured resistance within specifications?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good ISCA and check for proper operation.

If the problem is corrected, replace ISCA and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR

E0529ACE

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

DTC TROUBLESHOOTING PROCEDURES

FL -387

DTC P0507 IDLE AIR CONTROL SYSTEM-RPM HIGHER THAN EXPECTED

COMPONENT LOCATION E61ADFF5

Refer to DTC P0506.

GENERAL DESCRIPTION E126A0D5

Refer to DTC P0506.

DTC DESCRIPTION EFB451BB

If actual engine speed is more than 200 RPM higher than desired engine speed, P0507 is set.

DTC DETECTING CONDITION EAFA225E

Item		Detecting Condition	Possible Cause
DTC Strategy		<ul style="list-style-type: none"> Rationality check, high 	<ul style="list-style-type: none"> Poor connection Leak in intake air system Carbon pile ISCA
General Enable Conditions		<ul style="list-style-type: none"> Vehicle speed = 0 Coolant temperature > 70 Intake air temperature > -6 No purge valve error Idle status No error on the related sensors. (VSS,ECTS,IATS,etc) 	
Case 1	Enable Conditions	<ul style="list-style-type: none"> Idle speed control torque -15% Idle speed controller control duty 17.97% 	
	Threshold Value	<ul style="list-style-type: none"> Desired engine speed - Engine speed -200rpm 	
Case 2	Threshold Value	<ul style="list-style-type: none"> Fuel cut-off 3times 	
Diagnostic Time		<ul style="list-style-type: none"> 15 sec 	
MIL ON Condition		<ul style="list-style-type: none"> 3 driving cycle 	

SPECIFICATION E92C01BE

Refer to DTC P0506.

SCHEMATIC DIAGRAM E7AF04E7

Refer to DTC P0506.

SIGNAL WAVEFORM & DATA EA6A6F23

Refer to DTC P0506.

FL -388**FUEL SYSTEM****MONITOR SCANTOOL DATA** EAEAA384

Refer to DTC P0506.

TERMINAL AND CONNECTOR INSPECTION E405C7CF

Refer to DTC P0506.

POWER CIRCUIT INSPECTION E8569B8B

1. Key "OFF".
2. Disconnect ISCA connector.
3. Key "ON".
4. Measure the voltage between terminal 2 of ISCA harness connector and chassis ground.

Specification : B+

5. Is the measured voltage within specification?

YES

Go to "Control circuit inspection" procedure.

NO

Repair Open or Short in power circuit and then, go to "Verification of Vehicle Repair" procedure.

CONTROL CIRCUIT INSPECTION E109594E

1. Key "OFF".
2. Disconnect ISCA connector and Key "ON".
3. Measure the voltage between terminal 1 of ISCA harness connector and chassis ground.
4. Measure the voltage between terminal 3 of ISCA harness connector and chassis ground.

Specification : 1.3~1.7 V (at terminal 1), Approx 1.7~2.1V (at terminal 3)

5. Is the measured voltage within specification?

YES

Go to "System inspection" procedure.

NO

Repair Open or Short in control circuit and then, go to "Verification of Vehicle Repair" procedure.

SYSTEM INSPECTION EB069289

1. Visual inspection.

DTC TROUBLESHOOTING PROCEDURES

FL -389

- 1) Key "OFF".
- 2) Check intake air system
Check assembling state and damage on throttle body gasket.
Check assembling/sealing state and damage on MAFS and PCV valve.
- 3) Is everything O.K.?

YES

Go to "Component inspection" procedure.

NO

Repair as necessary and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION E6E61A32

1. ISCA visual check.

- 1) Key "OFF".
- 2) Disassemble ISCA.
- 3) Check contamination, damage or stuck on ISCA.
- 4) Check the operating sound when key turns "OFF" to "ON".

5) Is ISCA O.K.?

YES

Go to "ISCA check" procedure.

NO

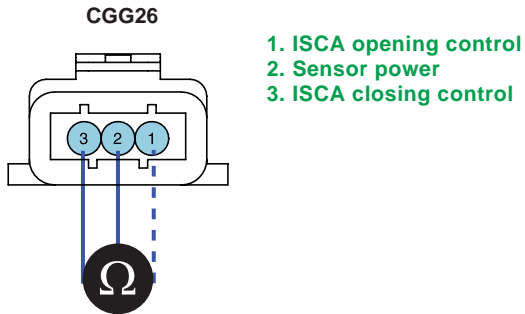
Substitute with a known - good ISCA and check for proper operation.
If the problem is corrected, replace ISCA and go to "Verification of Vehicle Repair" procedure.

2. ISCA check.

- 1) Key "OFF".
- 2) Disassemble ISCA.
- 3) Measure the resistance between terminal 1 and 2 of ISCA harness connector. (Component side)
- 4) Measure the resistance between terminal 2 and 3 of ISCA harness connector. (Component side)

SPECIFICATION :

Temperature [()]	Closing Coil Resistance ()	Opening Coil Resistance ()
20 (68)	14.6 ~ 16.2	11.1 ~ 12.7



SHDFL6829L

5) Is the measured resistance within specifications?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good ISCA and check for proper operation.

If the problem is corrected, replace ISCA and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR

EC624588

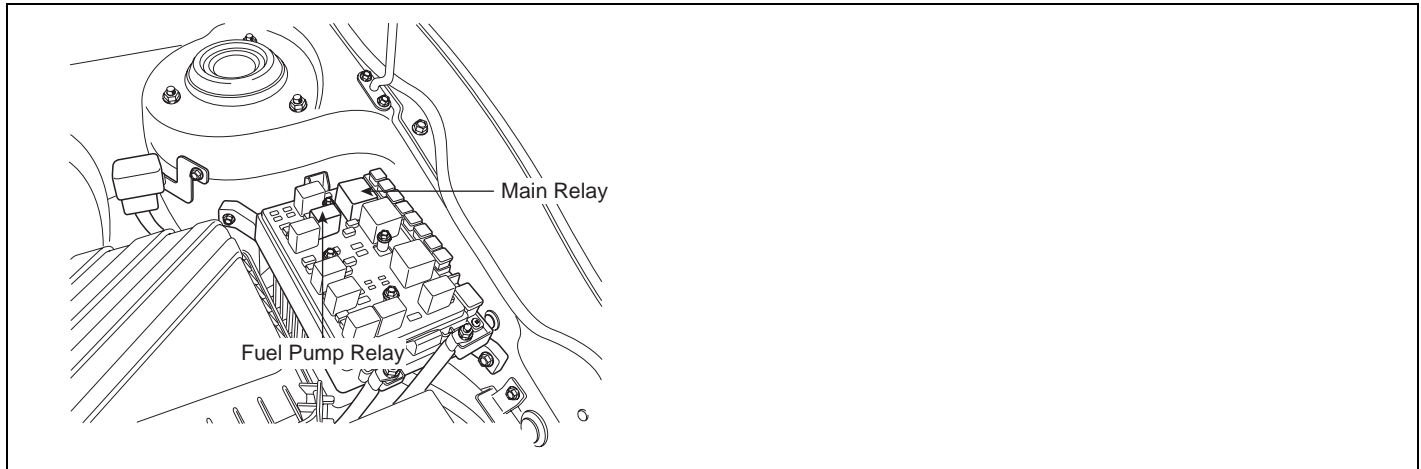
Refer to DTC P0506.

DTC TROUBLESHOOTING PROCEDURES

FL -391

DTC P0560 SYSTEM VOLTAGE

COMPONENT LOCATION EA24EF89



SLDFL7704L

GENERAL DESCRIPTION EBD08E7B

The purpose of the System Voltage is to detect an excessively low or high system voltage that may be caused by a malfunctioning charging system.

System Voltage is the ignition voltage potential at the Powertrain Control Module (PCM). PCM measures and compares voltage from ignition key and each relay. With this mechanism, PCM knows if the main relay switch turns on after IG on or if turns OFF after IG off.

DTC DESCRIPTION E4AB3001

If ECM detects malfunction in power supply system, ECM sets DTC P0560.

DTC DETECTING CONDITION EB130A7D

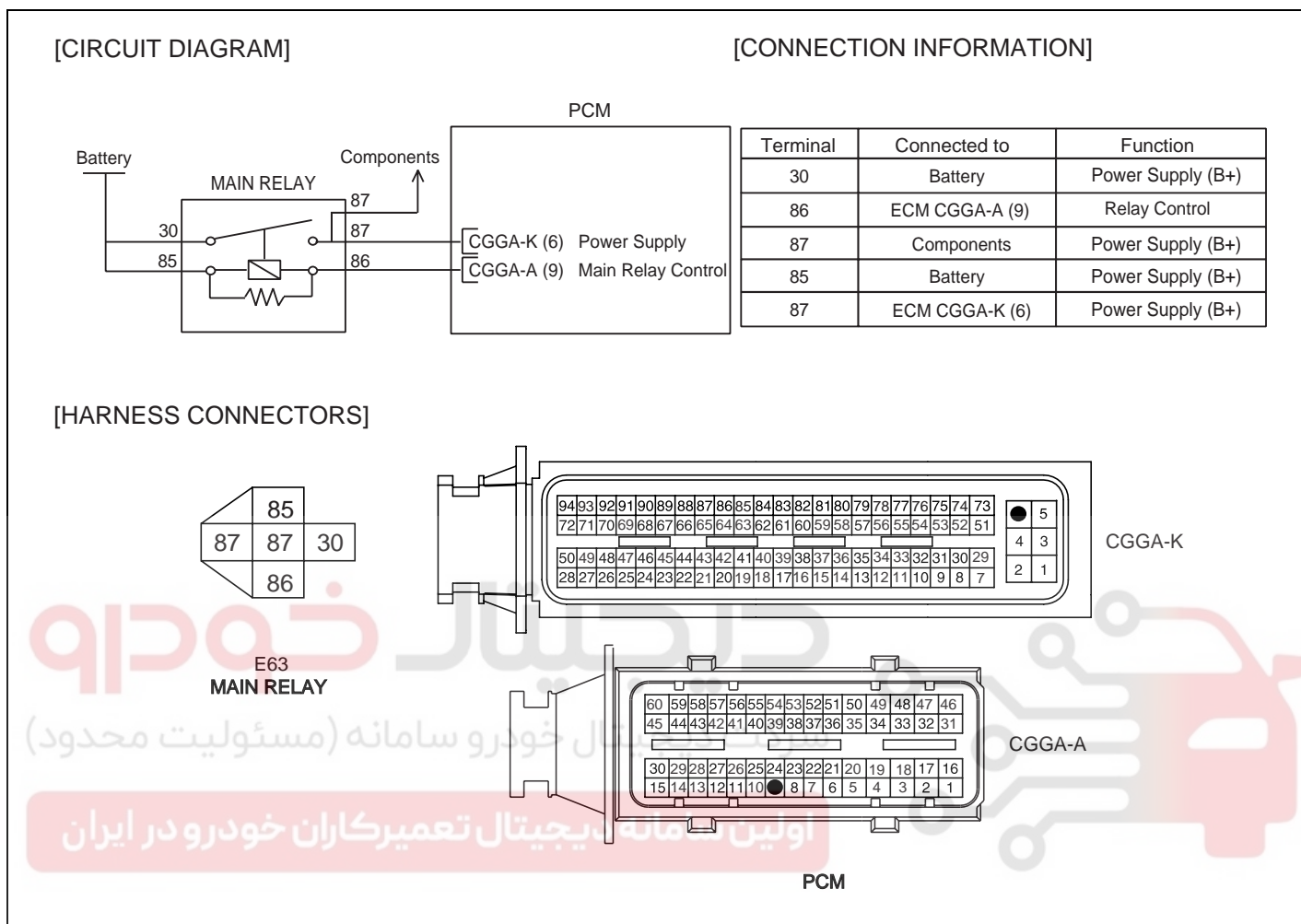
Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Rationality check 	<ul style="list-style-type: none"> Poor connection Open / Short Main relay
Enable Conditions		
Threshold Value		
Diagnostic Time		
MIL ON Condition	<ul style="list-style-type: none"> DTC only 	

FL -392

FUEL SYSTEM

SCHEMATIC DIAGRAM EFFC81D8

(A/T)

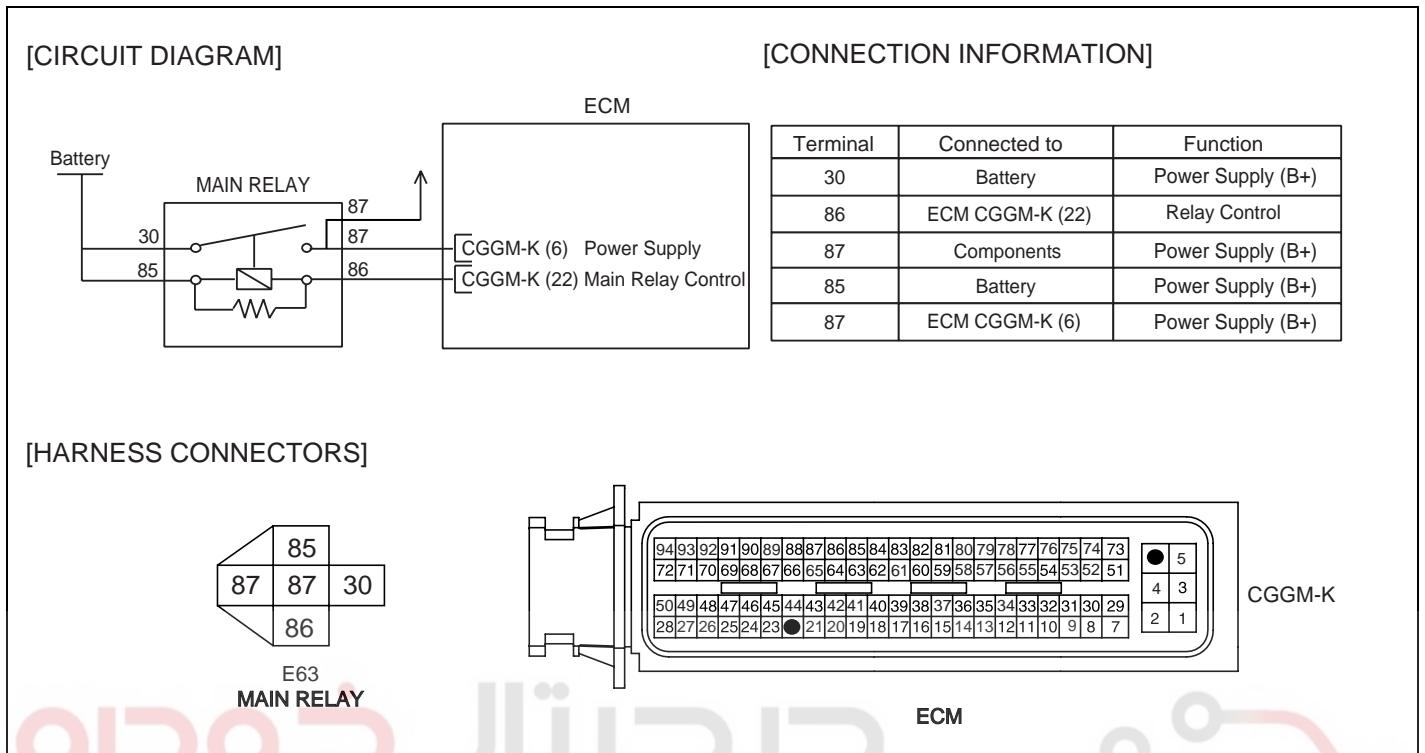


SLDFL7598L

DTC TROUBLESHOOTING PROCEDURES

FL -393

(M/T)



SLDFL7599L

MONITOR SCANTOOL DATA E3B1E8BC

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

1.1 DIAGNOSTIC TROUBLE CODES	1.4 AMBIENT CONDITIONS
Pxxxx DTC TITLE	1. MIL STATUS : ON / OFF
	2. DTC STATUS : PRESENT / HISTORY
	3. DTC READNESS FLAG : COMPLETE
NUMBER OF DTC : 1 ITEMS	
PART ERAS DTAL	

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?

FL -394

FUEL SYSTEM



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure

TERMINAL AND CONNECTOR INSPECTION E69F3762

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "Main relay circuit inspection" procedure.

POWER CIRCUIT INSPECTION EC681D85

1. Key "OFF".
2. Disconnect Main relay and Key "ON".
3. Measure the voltage between terminal 30 of main relay harness connector and chassis ground.
4. Measure the voltage between terminal 85 of main relay harness connector and chassis ground.

Specification : B+

5. Is the measured voltage within specification?

YES

Go to "Control circuit inspection" procedure.

NO

Check the fuse(ECU A 30A) between battery and main relay.
Repair Open in power circuit and then go to "Verification of vehicle Repair" procedure.

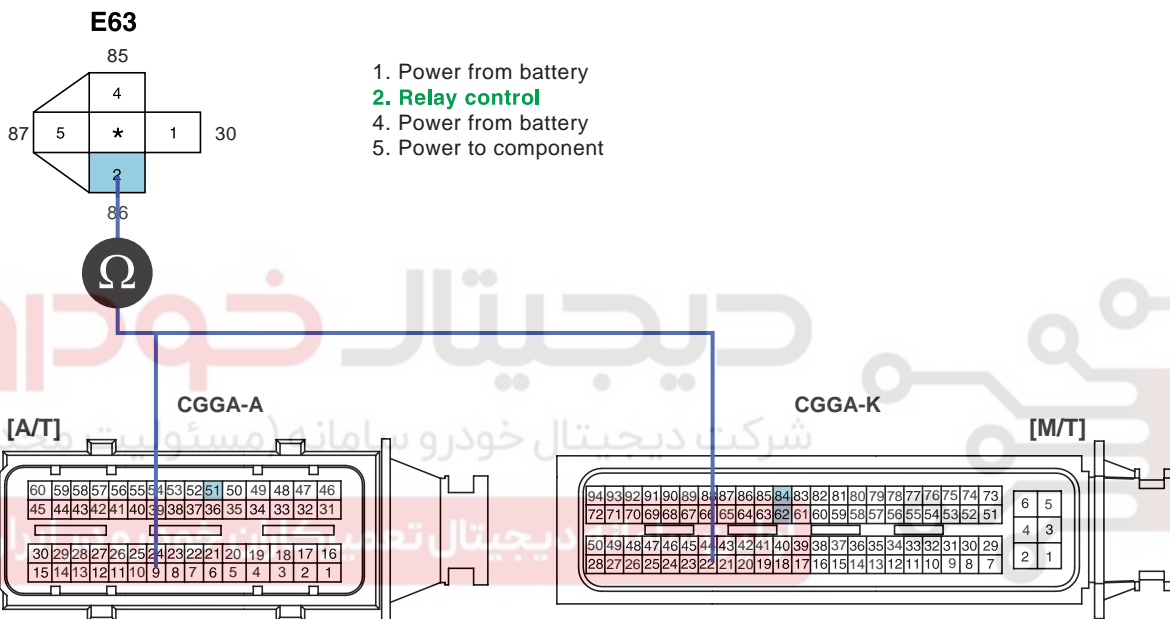
DTC TROUBLESHOOTING PROCEDURES

FL -395

CONTROL CIRCUIT INSPECTION EBD5CBAA

1. Key "OFF".
2. Disconnect main relay and ECM connector.
3. Measure the resistance between terminal 86 of main relay harness connector and terminal 9/CGGA-A of PCM harness connector. (AT)
4. Measure the resistance between terminal 86 of main relay harness connector and terminal 22/CGGM-K of ECM harness connector. (MT)

Specification : Approx 1



SLDFL7832L

5. Is the measured resistance within specification?

YES

Go to "Power supply circuit inspection" procedure.

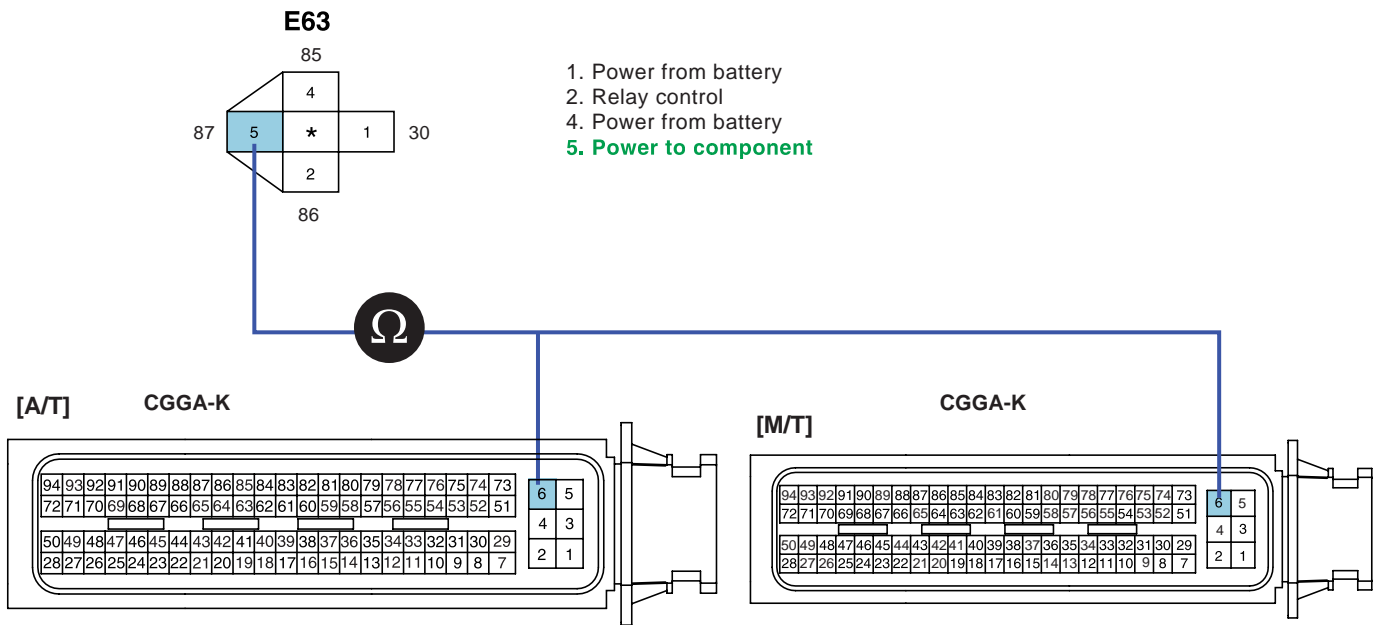
NO

Repair Open in control circuit and then go to "Verification of vehicle Repair" procedure.

POWER SUPPLY CIRCUIT INSPECTION

1. Key "OFF".
2. Disconnect main relay and ECM connector.
3. Measure the resistance between terminal 87 of main relay harness connector and terminal 6/CGGA-K of PCM harness connector. (AT)
Measure the resistance between terminal 87 of main relay harness connector and terminal 6/CGGM-K of ECM harness connector.(MT)

Specification : Approx 1



SLDFL7833L

4. Is the measured resistance within specification?

YES

Go to "Component inspection" procedure.

NO

Repair Open in power supply circuit and then go to "Verification of vehicle Repair" procedure.

SYSTEM INSPECTION

E4174D7A

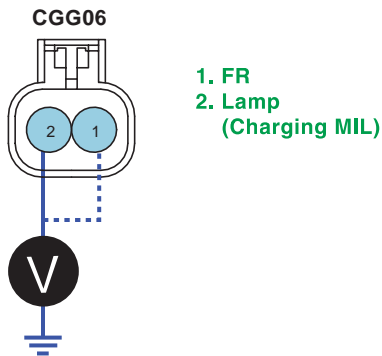
1. Alternator circuit check

- 1) Key "OFF".
- 2) Disconnect alternator connector.
- 3) Key "ON".
- 4) Measure the voltage between 1, 2/CGG06 of alternator harness connector and chassis ground.

Specification : 10.5~12 V

DTC TROUBLESHOOTING PROCEDURES

FL -397



SHDFL6836L

5) Is the measured voltage within specification ?

YES

Go to "Component inspection" procedure.

NO

Repair as necessary and then go to "Verification of vehicle Repair" procedure.

COMPONENT INSPECTION

EAAE6001

1. Main Relay Check

- 1) Key "OFF".
- 2) Disconnect main relay.
- 3) Measure the resistance between terminal 30 and 87 of main relay. (Component side)
- 4) Measure the resistance between terminal 85 and 86 of main relay. (Component side)

SPECIFICATION :

Terminal	Power Approval
30~87	NO
85~86	YES (Approx. 70 ~ 120)

5) Is the measured resistance within specifications?

YES

Go to "Alternator Check" procedure.

NO

Substitute with a known - good Main relay and check for proper operation.

If the problem is corrected, replace Main relay and go to "Verification of Vehicle Repair" procedure.

2. Alternator check

FL -398

FUEL SYSTEM

- 1) Key "OFF".
- 2) Check the tension of alternator belt.
- 3) Check corrosion, damage or looseness of Battery terminal and Alternator terminal.
- 4) Engine start.
- 5) Operate electrical parts(Head lamp, Defogger, etc).
- 6) Measure the voltage at 2000rpm.

Specification : Approx 12.5V ~ 14.5V

- 7) Is the measured voltage within specifications ?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR EB88246D

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

DTC TROUBLESHOOTING PROCEDURES

FL -399

DTC P0561 SYSTEM VOLTAGE UNSTABLE**COMPONENT LOCATION** ECC92BEC

Refer to DTC P0560.

GENERAL DESCRIPTION EB03822A

Refer to DTC P0560.

DTC DESCRIPTION E22DA454

If the system voltage is below 2.54V during 0.2 sec, PCM sets DTC P0561.

DTC DETECTING CONDITION E07A8D19

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Rationality check 	<ul style="list-style-type: none"> Poor connection Open/short to ground in control circuit Charging system Main relay
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> Voltage < 2.54 V 	
Diagnostic Time	<ul style="list-style-type: none"> 0.2 sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SCHEMATIC DIAGRAM E5021544

Refer to DTC P0560.

MONITOR SCANTOOL DATA ED413A11

Refer to DTC P0560.

TERMINAL AND CONNECTOR INSPECTION ED3A13D9

Refer to DTC P0560.

POWER CIRCUIT INSPECTION E9EDF20F

- Key "OFF".
- Disconnect Main relay and Key "ON".
- Measure the voltage between terminal 30 of main relay harness connector and chassis ground.
- Measure the voltage between terminal 85 of main relay harness connector and chassis ground.

Specification : B+

FL -400**FUEL SYSTEM**

5. Is the measured voltage within specification?

YES

Go to "Control circuit inspection" procedure.

NO

Check the fuse(ECU A 30A) between battery and main relay.

Repair Open in power circuit and then go to "Verification of vehicle Repair" procedure.

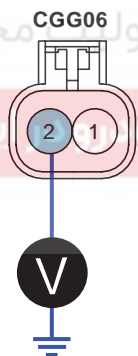
SYSTEM INSPECTION

E842F588

1. Alternator circuit check.

- 1) Key "OFF".
- 2) Disconnect alternator connector.
- 3) Key "ON".
- 4) Measure the voltage between 2/CGG06 of alternator harness connector and chassis ground.

Specification : 10.5~12 V



1. FR
2. Lamp (Charging MIL)

SLDFL7836L

5) Is the measured voltage within specification ?

YES

6) Go to "Component inspection" procedure.

NO

Repair as necessary and then go to "Verification of vehicle Repair" procedure..

COMPONENT INSPECTION

E62BDF8C

1. Main relay check.

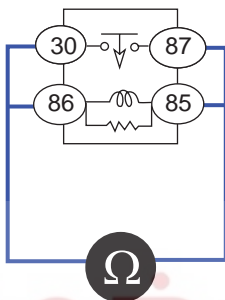
- 1) Key "OFF".
- 2) Disconnect Main relay.

DTC TROUBLESHOOTING PROCEDURES**FL -401**

- 3) Measure the resistance between terminal 30 and 87 of main relay. (Component side)
- 4) Measure the resistance between terminal 85 and 86 of main relay. (Component side)

SPECIFICATION :

Terminal	Power Approval
30~87	NO
85~86	YES (Approx. 70 ~ 120)



- 5) Is the measured resistance within specifications?

YES

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Go to "Alternator check" procedure.

NO

Substitute with a known - good Main relay and check for proper operation.

If the problem is corrected, replace Main relay and go to "Verification of Vehicle Repair" procedure.

2. Alternator check.

- 1) Key "OFF".
- 2) Check the tension of alternator belt.
- 3) Check corrosion, damage or looseness of Battery terminal and Alternator terminal.
- 4) Engine start.
- 5) Operate electrical parts(Head lamp, Defogger, etc).
- 6) Measure the voltage at 2000rpm.

Specification : Approx 12.5V ~ 14.5V

- 7) Is the measured voltage within specifications?

YES

FL -402

FUEL SYSTEM

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR EDE62DB9

Refer to DTC P0560.

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DTC TROUBLESHOOTING PROCEDURES

FL -403

DTC P0562 SYSTEM VOLTAGE LOW**COMPONENT LOCATION** ED9D6457

Refer to DTC P0560.

GENERAL DESCRIPTION EA7DBC5B

Refer to DTC P0560.

DTC DESCRIPTION E0BEB601

If the system voltage is 2.54~10 V during 0.2 sec, PCM sets DTC P0562.

DTC DETECTING CONDITION E9BD7326

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Voltage check, low 	<ul style="list-style-type: none"> Poor connection Short to ground in control circuit Charging system Main relay
Enable Conditions	<ul style="list-style-type: none"> Time after engine start > 120 sec Vehicle speed > 25kph 	
Threshold Value	<ul style="list-style-type: none"> Voltage : 2.54 ~ 10 V 	
Diagnostic Time	<ul style="list-style-type: none"> 0.2 sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SCHEMATIC DIAGRAM E0863CFB

Refer to DTC P0560.

MONITOR SCANTOOL DATA E695909A

Refer to DTC P0560.

TERMINAL AND CONNECTOR INSPECTION EA2255C8

Refer to DTC P0560.

POWER CIRCUIT INSPECTION E1B726A6

1. Key "OFF".
2. Disconnect Main relay and Key "ON".
3. Measure the voltage between terminal 30 of main relay harness connector and chassis ground.
4. Measure the voltage between terminal 85 of main relay harness connector and chassis ground.

Specification : B+

FL -404**FUEL SYSTEM**

5. Is the measured voltage within specification?

YES

Go to "System inspection" procedure.

NO

Check the fuse(ECU A 30A) between battery and main relay.

Repair Open or short to ground in power circuit and then go to "Verification of vehicle Repair" procedure.

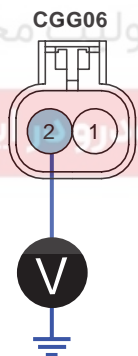
SYSTEM INSPECTION

E141F5D0

1. Alternator circuit check.

- 1) Key "OFF".
- 2) Disconnect alternator connector.
- 3) Key "ON".
- 4) Measure the voltage between 2/CGG06 of alternator harness connector and chassis ground.

Specification : 10.5~12 V



1. FR
2. Lamp
(Charging MIL)

SLDFL7836L

5) Is the measured voltage within specification?

YES

6) Go to "Component inspection" procedure.

NO

Repair as necessary and then go to "Verification of vehicle Repair" procedure.

COMPONENT INSPECTION

E9DB428D

1. Main relay check.

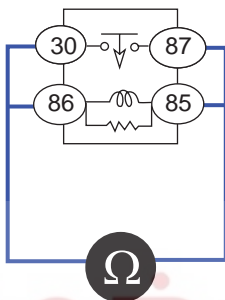
- 1) Key "OFF".
- 2) Disconnect Main relay.

DTC TROUBLESHOOTING PROCEDURES**FL -405**

- 3) Measure the resistance between terminal 30 and 87 of main relay. (Component side)
- 4) Measure the resistance between terminal 85 and 86 of main relay. (Component side)

SPECIFICATION :

Terminal	Power Approval
30~87	NO
85~86	YES (Approx. 70 ~ 120)



- 5) Is the measured resistance within specifications?

YES

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Go to "Alternator check" procedure.

NO

Substitute with a known - good Main relay and check for proper operation.

If the problem is corrected, replace Main relay and go to "Verification of Vehicle Repair" procedure.

2. Alternator check.

- 1) Key "OFF".
- 2) Check the tension of alternator belt.
- 3) Check corrosion, damage or looseness of Battery terminal and Alternator terminal.
- 4) Engine start.
- 5) Operate electrical parts(Head lamp, Defogger, etc).
- 6) Measure the voltage at 2000rpm.

Specification : Approx 12.5V ~ 14.5V

- 7) Is the measured voltage within specifications?

YES

FL -406

FUEL SYSTEM

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR EBF4D90C

Refer to DTC P0560.

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DTC TROUBLESHOOTING PROCEDURES

FL -407

DTC P0563 SYSTEM VOLTAGE HIGH**COMPONENT LOCATION** EC0A7A2C

Refer to DTC P0560.

GENERAL DESCRIPTION EB563720

Refer to DTC P0560.

DTC DESCRIPTION EA7BF391

If the system voltage is over 17 V during 0.2 sec, PCM sets DTC P0563.

DTC DETECTING CONDITION E2FDDB83

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Voltage check, high 	<ul style="list-style-type: none"> Poor connection Charging system Main relay
Enable Conditions	<ul style="list-style-type: none"> Time after engine start > 120 sec Vehicle speed > 10 kph 	
Threshold Value	<ul style="list-style-type: none"> Voltage > 17 V 	
Diagnostic Time	<ul style="list-style-type: none"> 0.2 sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SCHEMATIC DIAGRAM EA868371

Refer to DTC P0560.

MONITOR SCANTOOL DATA E9C8DB0D

Refer to DTC P0560.

TERMINAL AND CONNECTOR INSPECTION E683E490

Refer to DTC P0560.

POWER CIRCUIT INSPECTION E3971070

1. Key "OFF".
2. Disconnect Main relay and Key "ON".
3. Measure the voltage between terminal 30 of main relay harness connector and chassis ground.
4. Measure the voltage between terminal 85 of main relay harness connector and chassis ground.

Specification : B+

FL -408**FUEL SYSTEM**

5. Is the measured voltage within specification?

YES

Go to "System inspection" procedure.

NO

Check the fuse(ECU A 30A) between battery and main relay.
Repair short in power circuit and then go to "Verification of vehicle Repair" procedure.

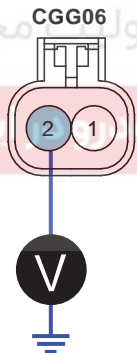
SYSTEM INSPECTION

E7CB3B62

1. Alternator circuit check.

- 1) Key "OFF".
- 2) Disconnect alternator connector.
- 3) Key "ON".
- 4) Measure the voltage between 2/CGG06 of alternator harness connector and chassis ground.

Specification : 10.5~12 V



1. FR
2. Lamp (Charging MIL)

SLDFL7836L

5) Is the measured voltage within specification?

YES

6) Go to "Component inspection" procedure.

NO

Repair as necessary and then go to "Verification of vehicle Repair" procedure.

COMPONENT INSPECTION

E23BE9BD

1. Main relay check.

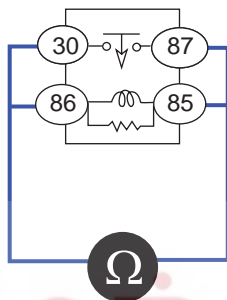
- 1) Key "OFF".
- 2) Disconnect Main relay.

DTC TROUBLESHOOTING PROCEDURES**FL -409**

- 3) Measure the resistance between terminal 30 and 87 of main relay. (Component side)
- 4) Measure the resistance between terminal 85 and 86 of main relay. (Component side)

SPECIFICATION :

Terminal	Power Approval
30~87	NO
85~86	YES (Approx. 70 ~ 120)



- 5) Is the measured resistance within specifications?

YES

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Go to "Alternator check" procedure.

NO

Substitute with a known - good Main relay and check for proper operation.

If the problem is corrected, replace Main relay and go to "Verification of Vehicle Repair" procedure.

2. Alternator check.

- 1) Key "OFF".
- 2) Check the tension of alternator belt.
- 3) Check corrosion, damage or looseness of Battery terminal and Alternator terminal.
- 4) Engine start.
- 5) Operate electrical parts(Head lamp, Defogger, etc).
- 6) Measure the voltage at 2000rpm.

Specification : Approx 12.5V ~ 14.5V

- 7) Is the measured voltage within specifications?

YES

FL -410

FUEL SYSTEM

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR EFCE81F1

Refer to DTC P0560.

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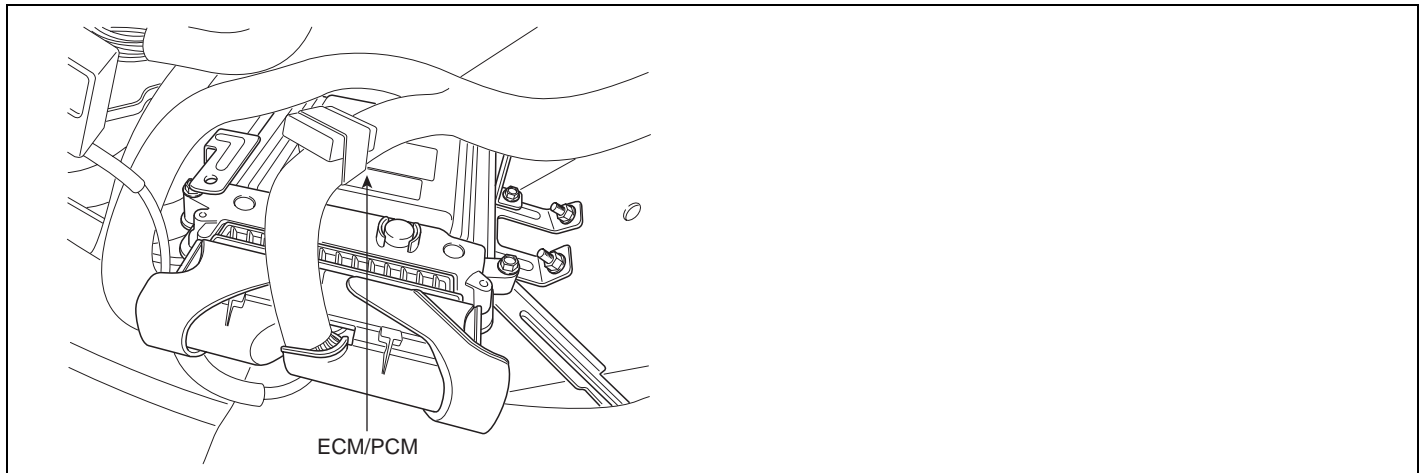


DTC TROUBLESHOOTING PROCEDURES

FL -411

DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY(ROM) ERROR

COMPONENT LOCATION EA5EEB2D



SLDFL7700L

GENERAL DESCRIPTION EFC6F5CD

PCM monitors errors through checksum. Every information consists of the combination of 0 and 1, checksum means summing up all values in a row. Thus, errors are recognized comparing checksum value and the memory value at PCM.

DTC DESCRIPTION E7B3E4B7

ECM detects the signal exchanges between micro-processor and sensor/actuator.

DTC DETECTING CONDITION E284C5ED

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Rationality check (The internal ROM check) 	1. Poor connection
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> Each check sum of several blocks (Actual check sum check sum data) 	
Diagnostic Time		
MIL ON Condition	<ul style="list-style-type: none"> Immediately 	

MONITOR SCANTOOL DATA EEA3815E

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.

FL -412

FUEL SYSTEM

5. Read "DTC Status" parameter.

1.1 DIAGNOSTIC TROUBLE CODES			1.4 AMBIENT CONDITIONS		
PXXXX DTC TITLE			1.MIL STATUS : ON / OFF		
			2.DTC STATUS : PRESENT / HISTORY		
			3.DTC READNESS FLAG : COMPLETE		
NUMBER OF DTC : 1 ITEMS					
PART	ERAS	DTAL			

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure.

TERMINAL AND CONNECTOR INSPECTION E70EC471

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

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

DTC TROUBLESHOOTING PROCEDURES

FL -413

VERIFICATION OF VEHICLE REPAIR EC8DA6FE

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

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FL -414

FUEL SYSTEM

DTC P0625 GENERATOR FIELD/F TERMINAL CIRCUIT LOW**GENERAL DESCRIPTION** ED5DACDA

Alternator output and power demand of all electrical loads and systems must be matched to each other as ideally as possible so that the entire system is reliable and trouble-free in operation. The ECM monitors alternator output deviation from the signal of the FR terminal of the alternator when the engine is running.

DTC DESCRIPTION EB9F600D

ECM sets DTC P0625 if the ECM detects that the alternator's output duty signal is 100%.

DTC DETECTING CONDITION E852B069

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Input signal check 	<ul style="list-style-type: none"> Short to Ground in harness Poor connection or damaged harness
Enable Conditions	<ul style="list-style-type: none"> Engine start after keeping ignition ON more than 2 sec. 	
Threshold Value	<ul style="list-style-type: none"> Duty calculated by Alternator PWM signal = 100% 	
Diagnostic Time	<ul style="list-style-type: none"> 3 sec. 	
MIL ON Condition	<ul style="list-style-type: none"> DTC only 	

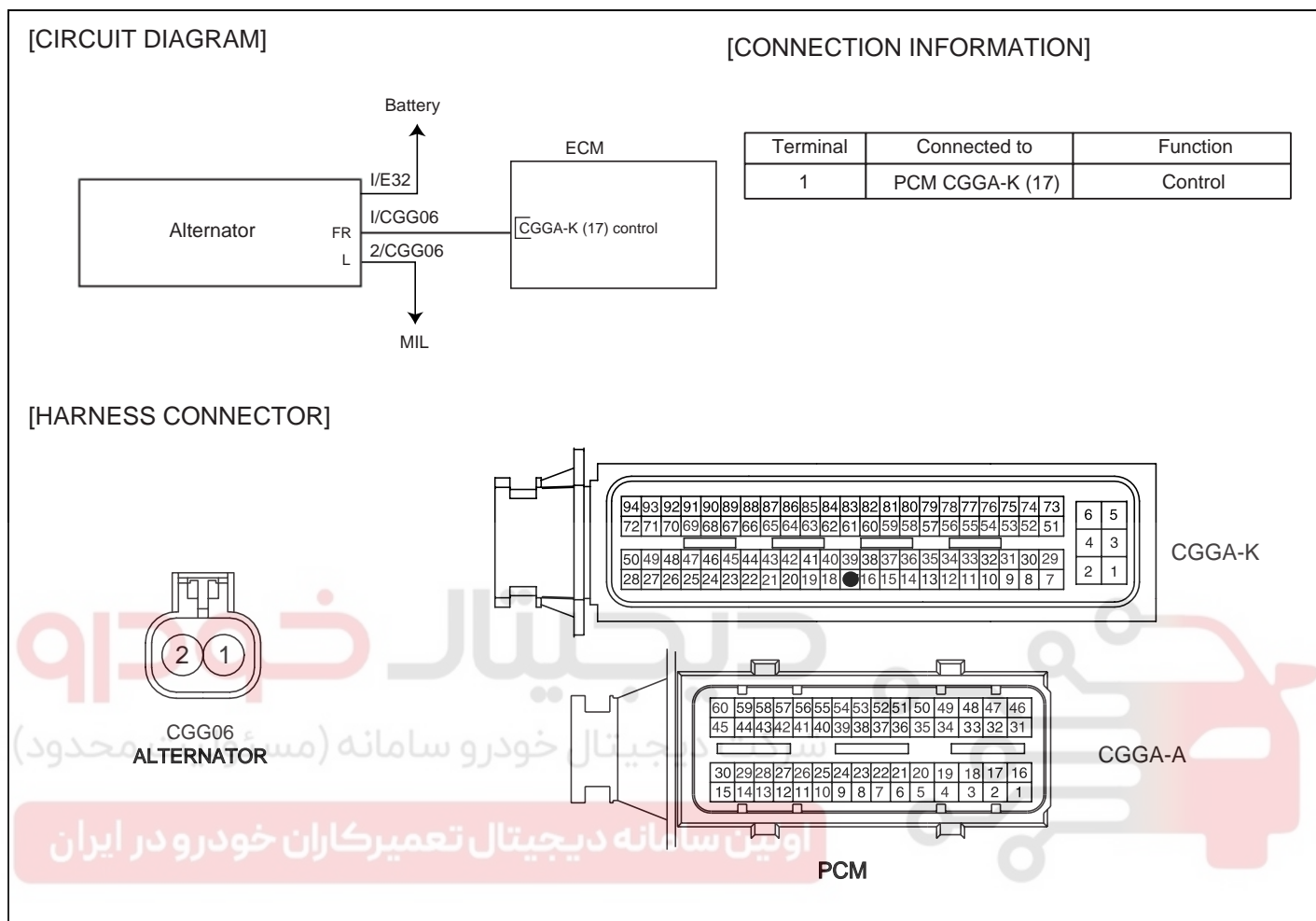
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DTC TROUBLESHOOTING PROCEDURES

FL -415

SCHEMATIC DIAGRAM E47BCC57

(A/T)

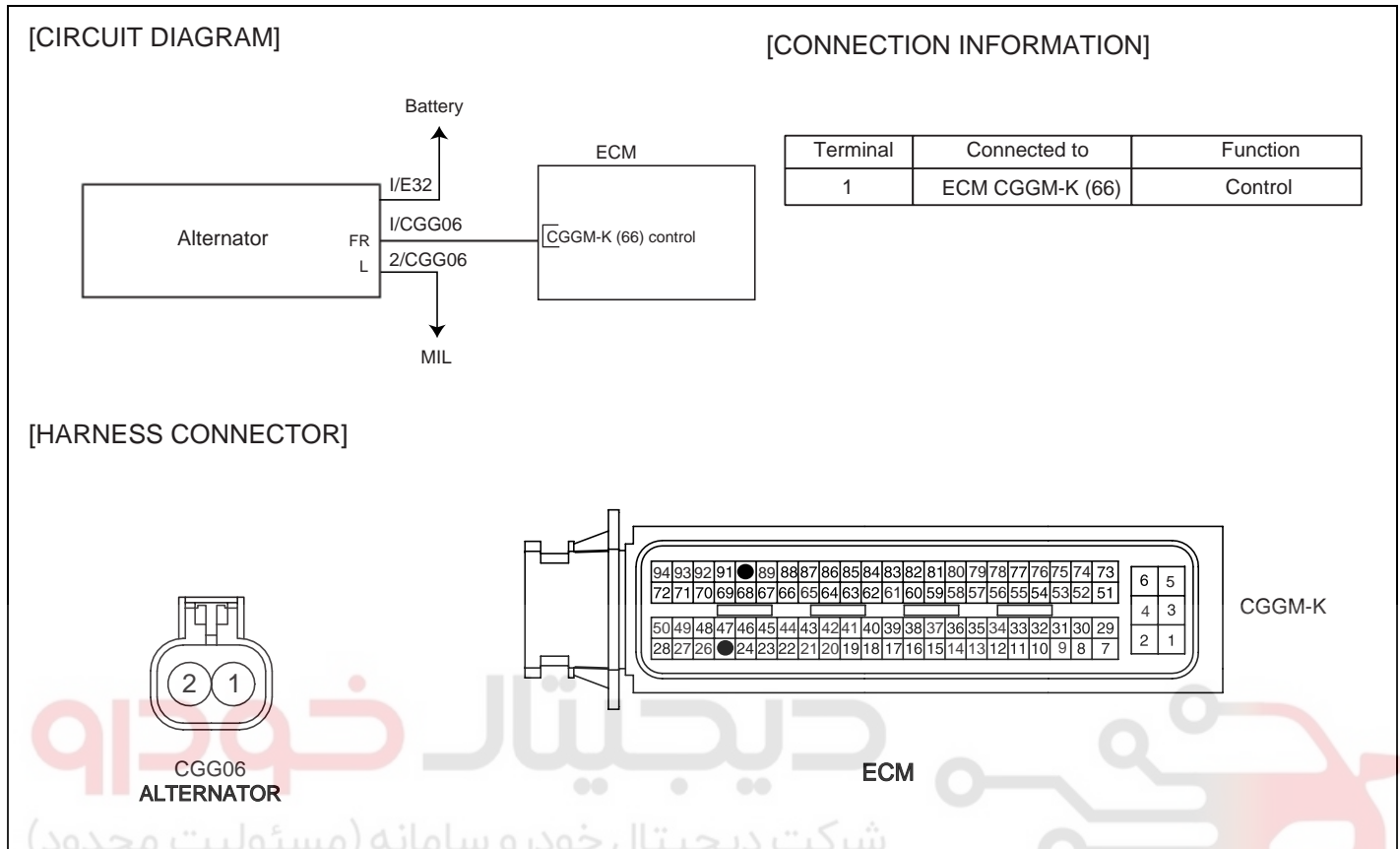


SLDFL7903L

FL -416

FUEL SYSTEM

(M/T)



SLDFL7904L

SIGNAL WAVEFORM AND DATA

EB9CE36C

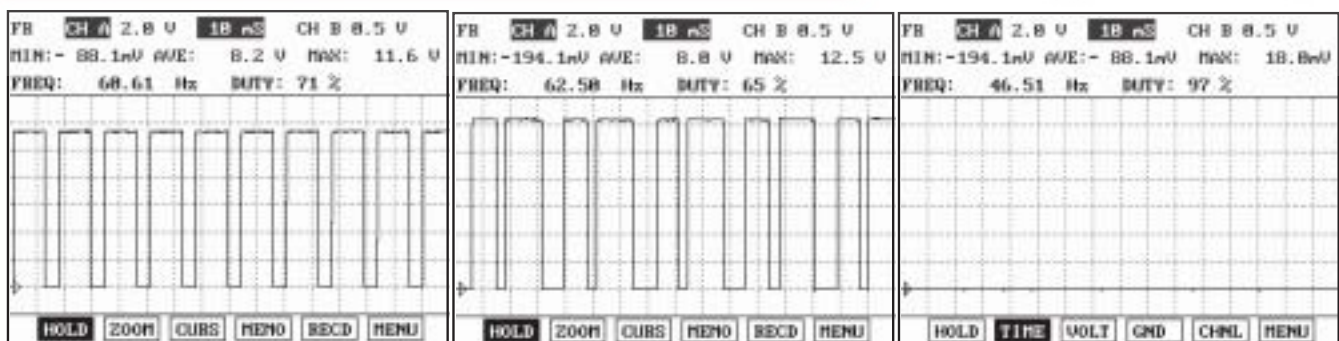


Fig. 1

Fig. 2

Fig. 3

- Signal waveform at alternator #1 terminal
- Fig. 1) Normal waveform with ignition "ON"
 - Fig. 2) All electrical load "OFF" with idle
 - Fig. 3) A/C, Rear defrost, Head lamp "ON" with idle

SHDFL6837L

MONITOR SCANTOOL DATA

E033EA3A

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".

DTC TROUBLESHOOTING PROCEDURES**FL -417**

3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

1.1 DIAGNOSTIC TROUBLE CODES				1.4 AMBIENT CONDITIONS			
PXXXX DTC TITLE				1.MIL STATUS : ON / OFF			
				2.DTC STATUS : PRESENT / HISTORY			
				3.DTC READNESS FLAG : COMPLETE			
NUMBER OF DTC : 1 ITEMS							
PART	ERAS		DTAL				

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure.

TERMINAL AND CONNECTOR INSPECTION EDE716D0

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

FL -418

FUEL SYSTEM

Go to "System inspection" procedure.

SYSTEM INSPECTION E9FA52E9

1. Start the engine and raise the engine speed to 2,500~3,000 RPM
2. Turn ON all electrical loads by turning on the headlamps, and by turning on the high blower motor, etc
3. Monitor the battery(ignition) voltage parameter on the Scantool data list

SPECIFICATION :

Ambient temperature ()	Reference Voltage(V)
-20(-4)	Approx. 14.2~15.4
20(68)	Approx. 14.0~15.0
60(140)	Approx. 13.7~14.9
80(176)	Approx. 13.5~14.7

4. Is the battery voltage within the specification?

YES

Go to next step as below.

NO

Possibility of charging system malfunction. Repair or replace alternator and battery. Refer to Charging System group in Workshop manual. And then go to "Verification of Vehicle Repair" procedure.

CONTROL CIRCUIT INSPECTION E77F5702

1. With ignition OFF, disconnect alternator connector.
2. Ignition "ON" & Engine "OFF".
3. Measure voltage between terminals 1 of the alternator harness connector and chassis ground.

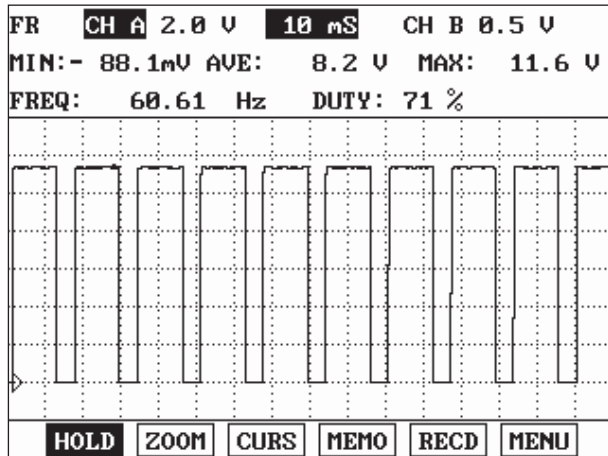
Specification : Approx. 9~11V



Normal waveform with ignition "ON"

DTC TROUBLESHOOTING PROCEDURES

FL -419



SHDFL6839L

4. Is voltage within the specification?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR ED9D41CE

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

FL -420

FUEL SYSTEM

DTC P0626 GENERATOR FIELD/F TERMINAL CIRCUIT HIGH**GENERAL DESCRIPTION** E5427623

Refer to DTC P0625.

DTC DESCRIPTION EEC43819

ECM sets DTC P0626 if the ECM detects that the alternator's output duty signal is 0%.

DTC DETECTING CONDITION E383D0E6

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Input signal check 	<ul style="list-style-type: none"> Open or Short to Power in harness Faulty charging system
Enable Conditions	<ul style="list-style-type: none"> Battery voltage < 16V Engine speed : 600 ~ 4000 Engine coolant temp. > 75 	
Threshold Value	<ul style="list-style-type: none"> Duty calculated by Alternator PWM signal = 0% 	
Diagnostic Time	<ul style="list-style-type: none"> 100 sec. 	
MIL ON Condition	<ul style="list-style-type: none"> DTC only 	

SCHEMATIC DIAGRAM E3F7B53E

Refer to DTC P0625.

SIGNAL WAVEFORM AND DATA E43DF825

Refer to DTC P0625.

MONITOR SCANTOOL DATA E57DF2E6

Refer to DTC P0625.

TERMINAL AND CONNECTOR INSPECTION EC7C6D31

Refer to DTC P0625.

SYSTEM INSPECTION E80BF9E6

1. Start the engine and raise the engine speed to 2,500~3,000 RPM
2. Turn ON all electrical loads by turning on the headlamps, and by turning on the high blower motor, etc
3. Monitor the battery(ignition) voltage parameter on the Scantool data list

DTC TROUBLESHOOTING PROCEDURES

FL -421

SPECIFICATION :

Ambient temperature ()	Reference Voltage(V)
-20(-4)	Approx. 14.2~15.4
20(68)	Approx. 14.0~15.0
60(140)	Approx. 13.7~14.9
80(176)	Approx. 13.5~14.7

4. Is the battery voltage within the specification?

YES

Go to next step as below.

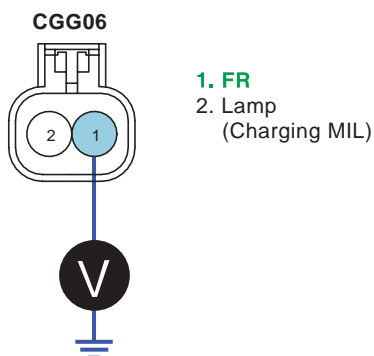
NO

Possibility of charging system malfunction. Repair or replace alternator and battery. Refer to Charging System group in Workshop manual. And then go to "Verification of Vehicle Repair" procedure.

CONTROL CIRCUIT INSPECTION E54B2F29

1. With ignition OFF, disconnect alternator connector.
2. Ignition "ON" & Engine "OFF".
3. Measure voltage between terminals 1 of the alternator harness connector and chassis ground.

Specification : Approx. 9~11V



SHDFL6838L



Normal waveform with ignition "ON"

4. Is voltage within the specification?

YES

FL -422

FUEL SYSTEM

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR E7E505DC

Refer to DTC P0625.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



DTC TROUBLESHOOTING PROCEDURES

FL -423

DTC P0650 MALFUNCTION INDICATOR LAMP(MIL) CONTROL CIRCUIT**GENERAL DESCRIPTION** EAB052CF

A Malfunction Indicator Lamp (MIL) is used to notify the driver of malfunctions within the monitored powertrain (engine and transaxle) systems that have an effect on emissions.

DTC DESCRIPTION E80017CF

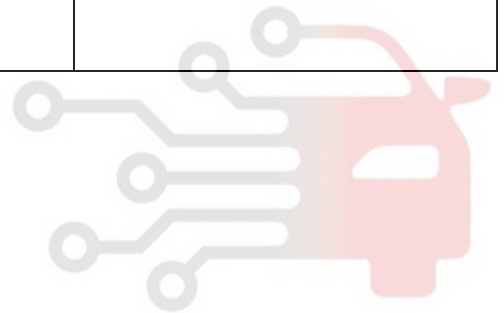
If there is Open, Short to ground or Short to power in MIL circuit, PCM sets DTC P0650.

DTC DETECTING CONDITION EC27C255

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Circuit continuity check, high, low, or open 	<ul style="list-style-type: none"> Poor connection Open or short in power/control circuit Instrument cluster
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> Short circuit to battery, ground, or disconnected 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	

شرکت دیجیتال خودرو (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



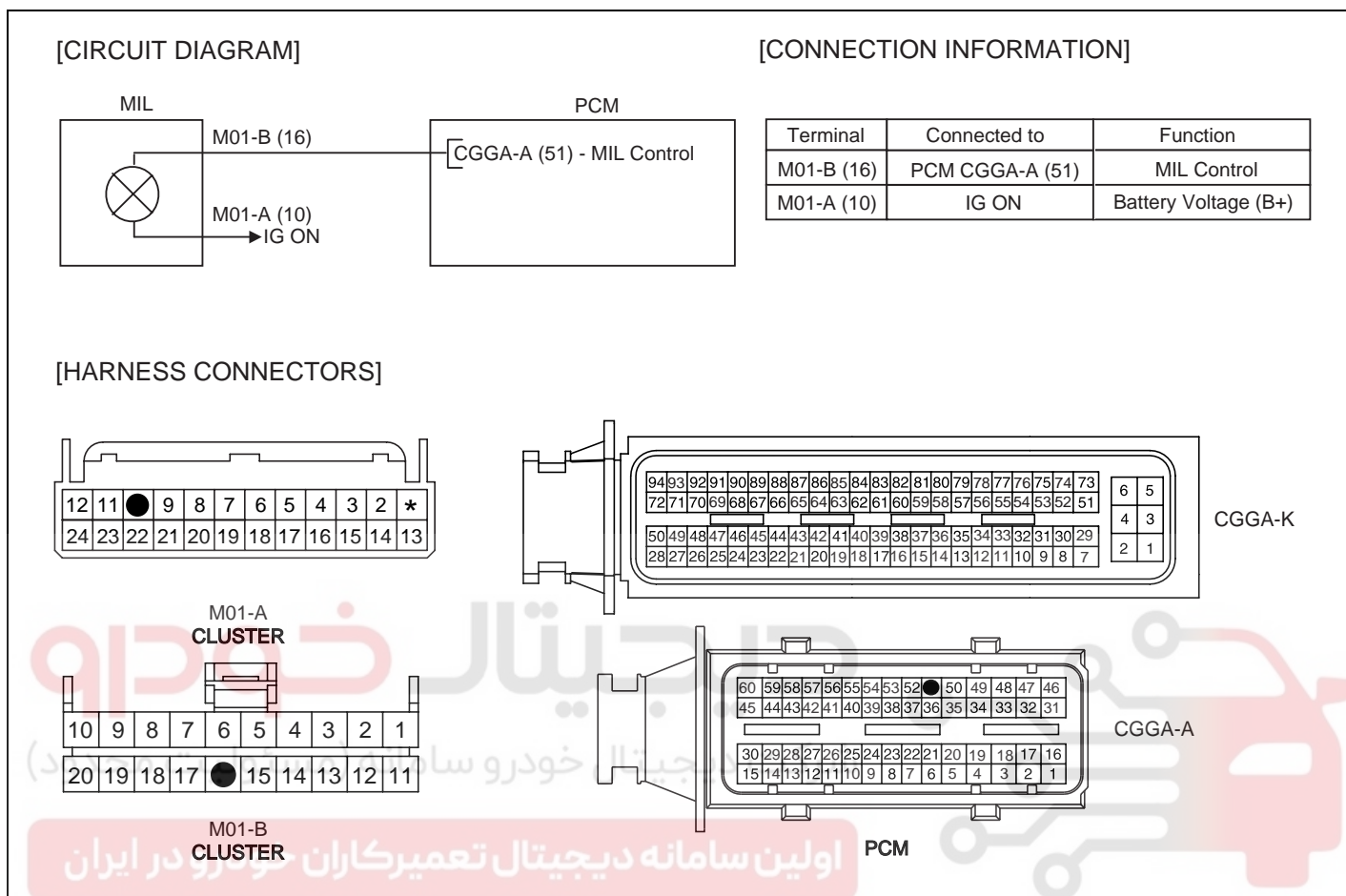
FL -424

FUEL SYSTEM

SCHEMATIC DIAGRAM

E240BDC5

(A/T)



SLDFL7600L

DTC TROUBLESHOOTING PROCEDURES

FL -425

(M/T)

[CIRCUIT DIAGRAM]

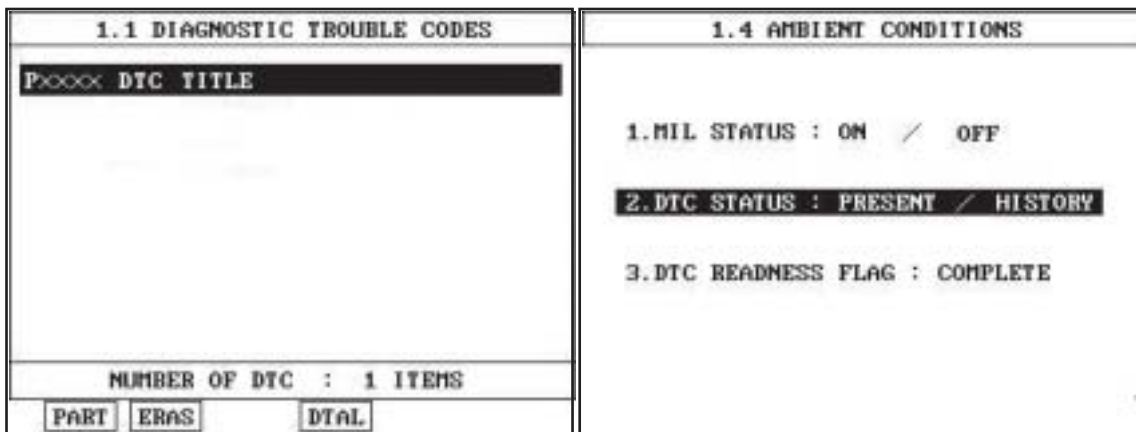
[CONNECTION INFORMATION]

Terminal	Connected to	Function
M01-B (16)	PCM CGGM-K (70)	MIL Control
M01-A (10)	IG ON	Battery Voltage (B+)

[HARNESS CONNECTORS]

MONITOR SCANTOOL DATA E8FC1EFA

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.



EFNG321A

6. Is parameter displayed "History(Not Present) fault"?



- *History fault : DTC occurred but has been cleared.*
- *Present fault : DTC is occurring at present time.*

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal and connector inspection" procedure.

TERMINAL AND CONNECTOR INSPECTION E751E1DF

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "MIL circuit inspection" procedure.

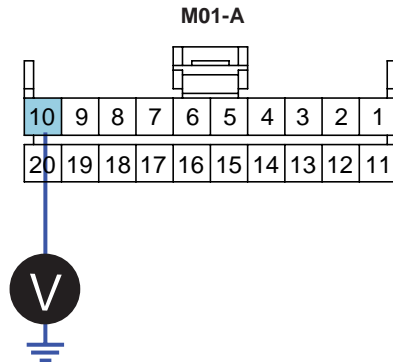
POWER CIRCUIT INSPECTION EC232BAC

1. Key "OFF".
2. Disconnect Cluster connector(M01-A).

DTC TROUBLESHOOTING PROCEDURES**FL -427**

3. Measure the voltage between terminal 10 of Cluster harness connector and chassis ground.

Specification : B+



SLDFL7840L

4. Is the measured voltage within specification?

YES

Go to "Control circuit inspection" procedure.

NO

Check the fuse (CLUSTER 10A) between Battery and Engine MIL.

Repair Open or Short in power circuit, and then go to "Verification of vehicle Repair" procedure.

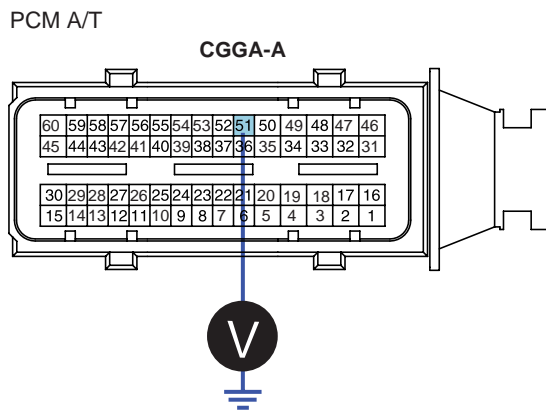
CONTROL CIRCUIT INSPECTION E4A7905C

1. Key "OFF".
2. Disconnect PCM connector.
3. Key "ON".
4. Measure the voltage between terminal 51/CGGA-A of PCM harness connector and chassis ground. [A/T]
Measure the voltage between terminal 70/CGGM-K of ECM harness connector and chassis ground. [M/T]

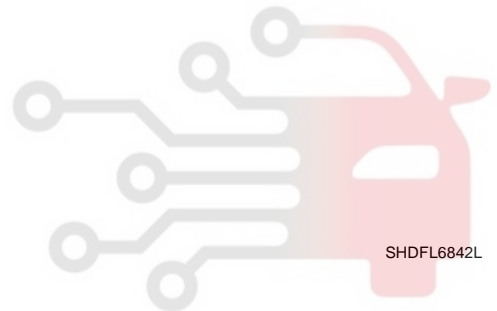
Specification : B+

FL -428

FUEL SYSTEM



SHDFL6841L



SHDFL6842L

شرکت دیجیتال خودرو (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

5. Is the measured voltage within specification?

YES

Go to "Component inspection" procedure.

NO

Check the MIL bulb.

Repair Open or Short in control circuit, and then go to "Verification of vehicle Repair" procedure.

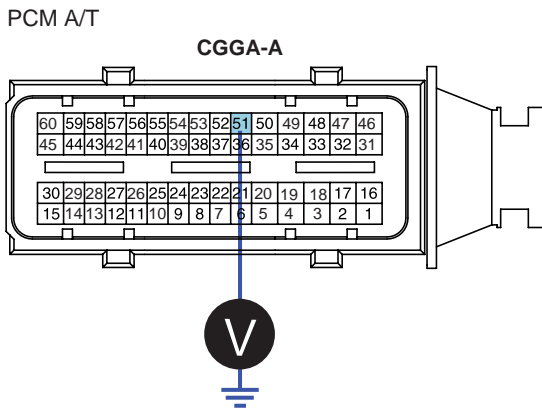
COMPONENT INSPECTION E16C3A51

1. Key "OFF".
2. Disconnect ECM connector.
3. Short terminal 51 of PCM harness connector to Ground. [A/T]
Short terminal 70 of ECM harness connector to Ground. [M/T]

Specification : Lighting Engine MIL lamp on cluster.

DTC TROUBLESHOOTING PROCEDURES

FL -429



SHDFL6841L



SHDFL6842L

4. Is the Engine MIL lamp lighting normally?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR EF6FC6F8

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

FL -430

FUEL SYSTEM

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

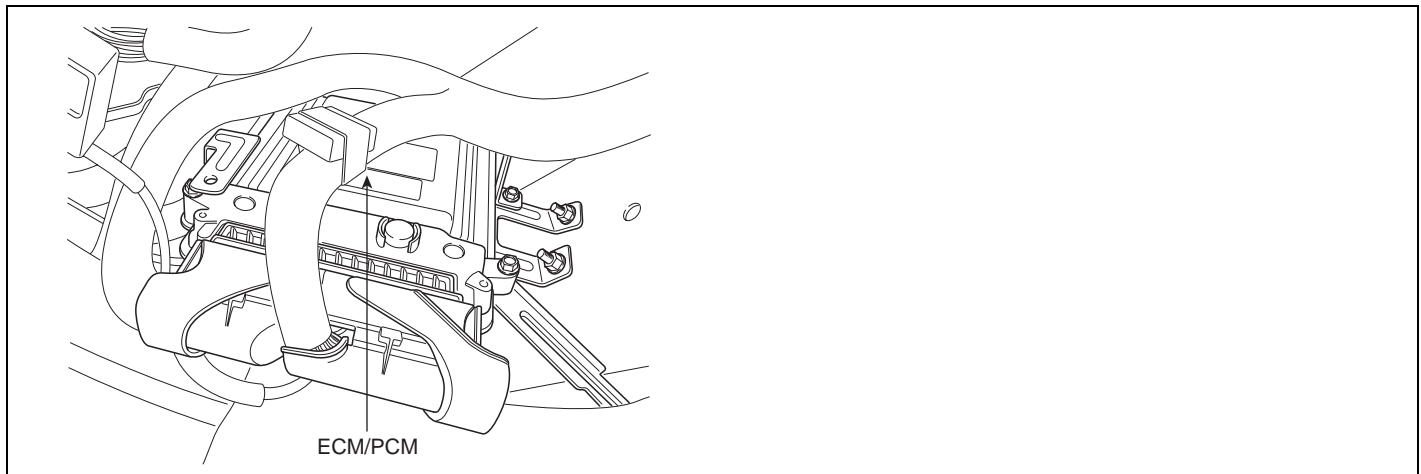


DTC TROUBLESHOOTING PROCEDURES

FL -431

DTC P0700 TCU REQUEST FOR MIL ON

COMPONENT LOCATION EAFD32B7



SLDFL7700L

DTC DESCRIPTION E5020FC3

If there is(are) DTC(s) of auto-transmission, ECM sets DTC P0700. In this case, check DTC(s) of auto-transmission and repair it.

DTC DETECTING CONDITION EC45C445

Item	Detecting Condition	Possible Cause
DTC Strategy	• Signal interference	<ul style="list-style-type: none"> • Poor connection • TCM • ECM
Enable Conditions		
Threshold Value	• When TCM demands	
Diagnostic Time		

MONITOR SCANTOOL DATA EBA96BD6

1. Connect scantool to Data Link Connector(DLC).
2. Warm up the engine to normal operating temperature.
3. Monitor A/T DTC(Diagnostics Trouble Code) on the scantool. Then refer to "Automatic-Transmission's DTC Guide".

VERIFICATION OF VEHICLE REPAIR E35A14D6

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Clear the DTCs and Operate the vehicle within DTC Enable conditions in General information.
3. Are any DTCs present ?

FL -432

FUEL SYSTEM

YES

Go to the applicable troubleshooting procedure.

NO

System is performing to specification at this time.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

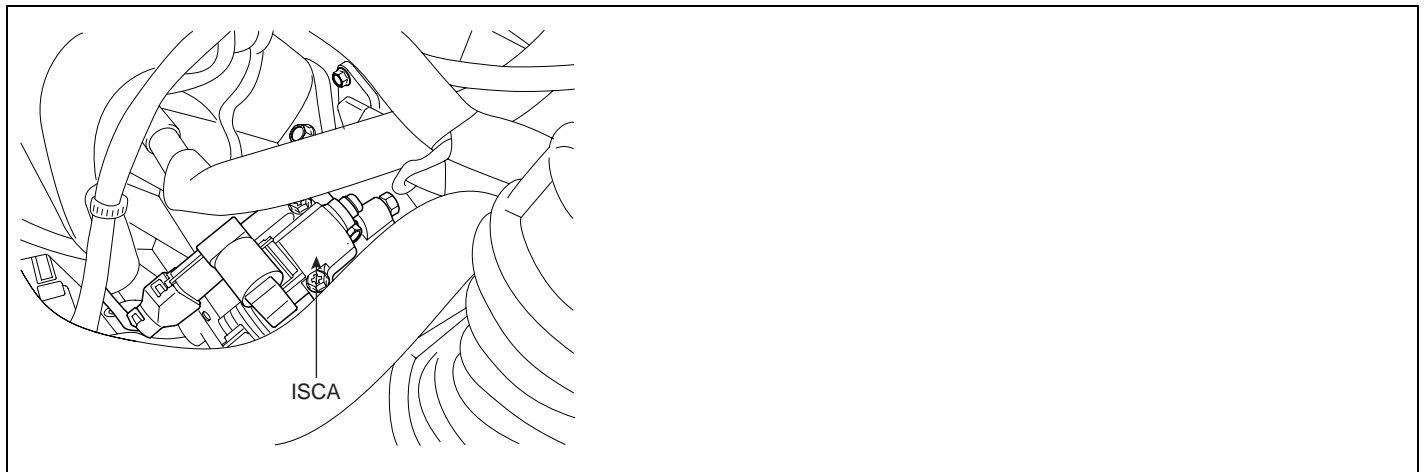


DTC TROUBLESHOOTING PROCEDURES

FL -433

DTC P1505 IDLE CHARGE ACTUATOR SIGNAL LOW OF COIL #1

COMPONENT LOCATION EC34032D



SHDFL6716L

GENERAL DESCRIPTION EA49B4F7

The ISCA (Idle Speed Control Actuator) is designed to maintain a steady desired idle speed. Idle airflow is adjusted through the idle air actuator in order to maintain the desired idle speed under various load conditions. Load conditions vary due to numerous factors, such as engine temperature, air conditioning, electrical load and power steering load.

DTC DESCRIPTION E90B1490

If there is Open or Short to ground in ISCA(opening coil) circuit, ECM sets DTC P1505.

DTC DETECTING CONDITION E11F40CF

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> • Circuit continuity check, low (opening coil) 	<ul style="list-style-type: none"> • Poor connection • Open or short to ground in control circuit • ISCA
Enable Conditions	<ul style="list-style-type: none"> • Vehicle speed = 0 • Coolant temperature > 70 • Intake air temperature > -6 • Idle status • No purge valve error • No error on the related sensors. (VSS,ECTS,IATS,etc) 	
Threshold Value	<ul style="list-style-type: none"> • Shorted to ground or disconnected 	
Diagnostic Time	<ul style="list-style-type: none"> • Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> • 3 driving cycle 	

FL -434

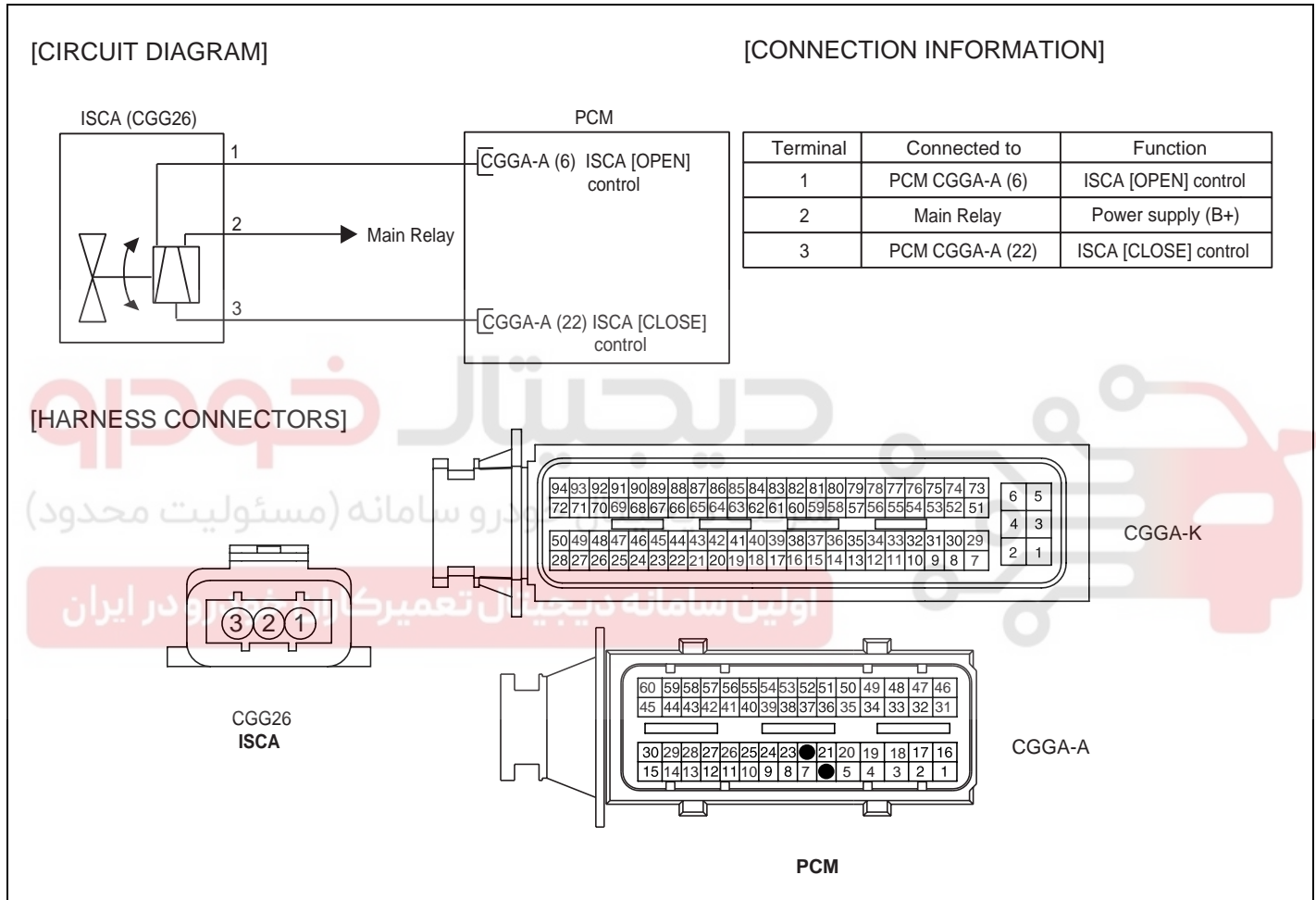
FUEL SYSTEM

SPECIFICATION E62503F3

Temperature [()]	Closing Coil Resistance ()	Opening Coil Resistance ()
20 (68)	14.6 ~ 16.2	11.1 ~ 12.7

SCHEMATIC DIAGRAM E1D57499

(A/T)

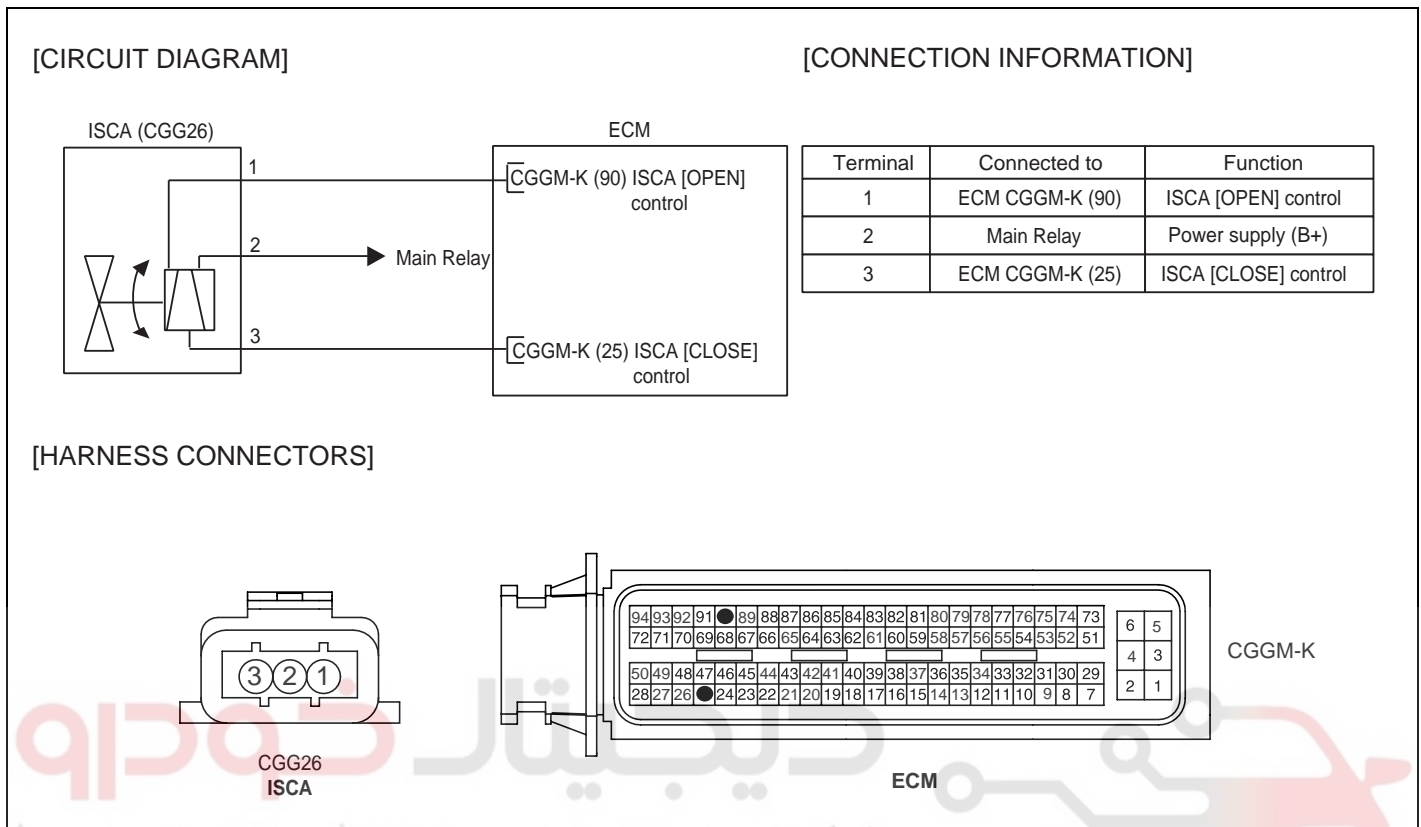


SHDFL6596L

DTC TROUBLESHOOTING PROCEDURES

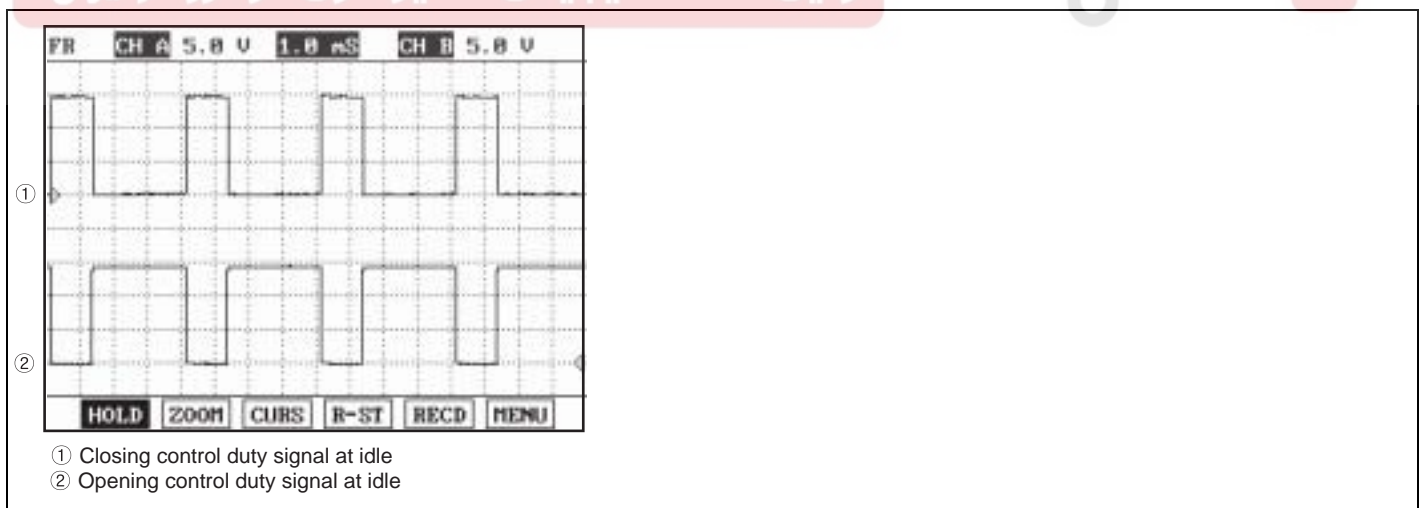
FL -435

(M/T)



SIGNAL WAVEFORM & DATA

E686A859



LFJF616A

MONITOR SCANTOOL DATA

EF666D90

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu

FL -436

FUEL SYSTEM

4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

1.1 DIAGNOSTIC TROUBLE CODES				1.4 AMBIENT CONDITIONS	
Pxxxx DTC TITLE				1. MIL STATUS : ON / OFF	
				2. DTC STATUS : PRESENT / HISTORY	
				3. DTC READNESS FLAG : COMPLETE	
NUMBER OF DTC : 1 ITEMS					
PART	ERAS	DTAL			

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

شرکت دیجیتال خودرو (مسئولیت محدود)

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure.

TERMINAL AND CONNECTOR INSPECTION E9C3CDE2

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "Power circuit inspection" procedure.

DTC TROUBLESHOOTING PROCEDURES

FL -437

POWER CIRCUIT INSPECTION E8262B65

1. Key "OFF".
2. Disconnect ISCA connector.
3. Key "ON".
4. Measure the voltage between terminal 2 of ISCA harness connector and chassis ground.

 Specification : B+

5. Is the measured voltage within specification?

YES

Go to "Control circuit inspection" procedure.

NO

Repair Open or Short in power circuit and then, go to "Verification of Vehicle Repair" procedure.

CONTROL CIRCUIT INSPECTION E4323D8C

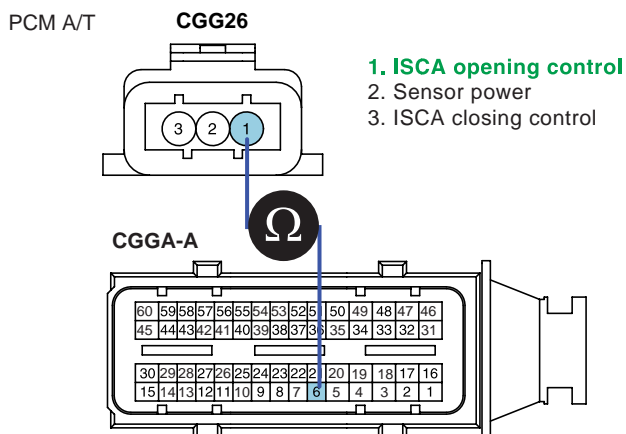
1. Check Open in control circuit.

اولین سامانه دیجیتال تعمیرکاران خود را Key "OFF".

- 2) Disconnect ISCA connector and ECM connector.

- 3) Measure the resistance between terminal 1 of ISCA harness connector and terminal 6/CGGA-A of PCM harness connector. [A/T]
Measure the resistance between terminal 1 of ISCA harness connector and terminal 90/CGGM-K of ECM harness connector. [M/T]

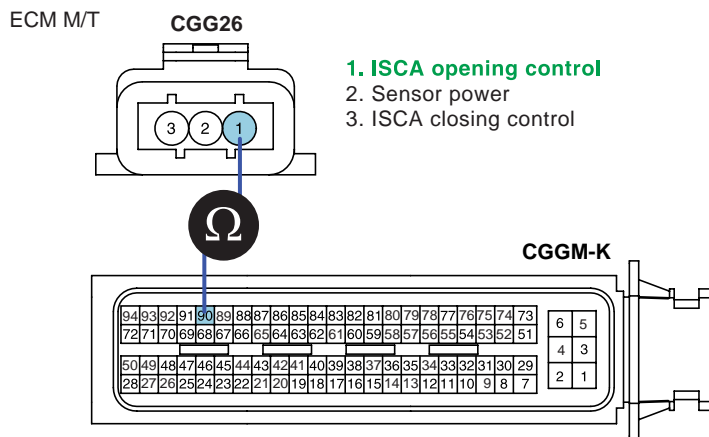
 Specification : Below Approx 1



SHDFL6844L

FL -438

FUEL SYSTEM



SHDFL6845L

4) Is the measured resistance within specification?

YES

Go to "Check Short in Control circuit" procedure.

NO

Repair Open in control circuit and then, go to "Verification of Vehicle Repair" procedure.

2. Check Short in control circuit.

1) Key "OFF".

2) Disconnect ISCA connector and ECM connector.

3) Measure the resistance between terminal 1 of ISCA harness connector and chassis ground.

Specification : Infinite

4) Is the measured resistance within specification?

YES

Go to "Component inspection" procedure.

NO

Repair Short to ground in control circuit and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

ECB88417

1. ISCA visual check.

1) Key "OFF".

2) Disassemble ISCA.

3) Check contamination, damage or stuck on ISCA.

4) Check the operating sound when key turns "OFF" to "ON".

DTC TROUBLESHOOTING PROCEDURES

FL -439

5) Is ISCA O.K.?

YES

Go to "ISCA check" procedure.

NO

Substitute with a known - good ISCA and check for proper operation.

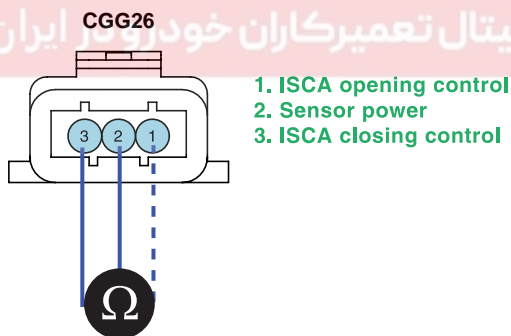
If the problem is corrected, replace ISCA and go to "Verification of Vehicle Repair" procedure.

2. ISCA check.

- 1) Key "OFF".
- 2) Disassemble ISCA.
- 3) Measure the resistance between terminal 1 and 2 of ISCA harness connector. (Component side)
- 4) Measure the resistance between terminal 2 and 3 of ISCA harness connector. (Component side)

SPECIFICATION :

Temperature [()]	Closing Coil Resistance ()	Opening Coil Resistance ()
20 (68)	14.6 ~ 16.2	11.1 ~ 12.7



SHDFL6847L

5) Is the measured resistance within specifications?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good ISCA and check for proper operation.

If the problem is corrected, replace ISCA and go to "Verification of Vehicle Repair" procedure.

FL -440

FUEL SYSTEM

VERIFICATION OF VEHICLE REPAIR E2D9B9AF

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



DTC TROUBLESHOOTING PROCEDURES

FL -441

DTC P1506 IDLE CHARGE ACTUATOR SIGNAL HIGH OF COIL #1**COMPONENT LOCATION** E149049D

Refer to DTC P1505.

GENERAL DESCRIPTION E785106E

Refer to DTC P1505.

DTC DESCRIPTION ECA64C69

If there is Short to power in ISCA(opening coil) circuit, PCM sets DTC P1506.

DTC DETECTING CONDITION EC7B2050

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Circuit continuity check, high (opening coil) 	<ul style="list-style-type: none"> Poor connection Short to power in control circuit ISCA
Enable Conditions	<ul style="list-style-type: none"> Vehicle speed = 0 Coolant temperature > 70 Intake air temperature > -6 Idle status No purge valve error No error on the related sensors. (VSS,ECTS,IATS,etc) 	
Threshold Value	<ul style="list-style-type: none"> Shorted to battery voltage 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SPECIFICATION EC16E4D4

Refer to DTC P1505.

SCHEMATIC DIAGRAM ECFC50B1

Refer to DTC P1505.

SIGNAL WAVEFORM & DATA EAA8C396

Refer to DTC P1505.

MONITOR SCANTOOL DATA E5D87251

Refer to DTC P1505.

FL -442

FUEL SYSTEM

TERMINAL AND CONNECTOR INSPECTION E3E8CA35

Refer to DTC P1505.

CONTROL CIRCUIT INSPECTION E210525C

1. Key "OFF".
2. Disconnect ISCA connector.
3. Key "ON".
4. Measure the voltage between terminal 1 of ISCA harness connector and chassis ground.

 Specification : 1.3~1.7 V

5. Is the measured voltage within specification?

YES

Go to "Component inspection" procedure.

NO

Repair Short to power in control circuit and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION E547A0C9

1. ISCA visual check.
 - 1) Key "OFF".
 - 2) Disassemble ISCA.
 - 3) Check contamination, damage or stuck on ISCA.
 - 4) Check the operating sound when key turns "OFF" to "ON".
 - 5) Is ISCA O.K?

YES

Go to "ISCA check" procedure.

NO

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

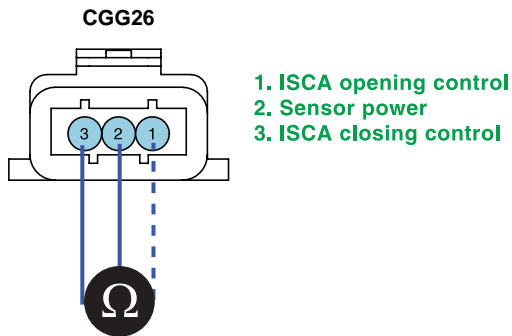
2. ISCA check.
 - 1) Key "OFF".
 - 2) Disassemble ISCA.
 - 3) Measure the resistance between terminal 1 and 2 of ISCA harness connector. (Component side)
 - 4) Measure the resistance between terminal 2 and 3 of ISCA harness connector. (Component side)

DTC TROUBLESHOOTING PROCEDURES

FL -443

SPECIFICATION :

Temperature [()]	Closing Coil Resistance ()	Opening Coil Resistance ()
20 (68)	14.6 ~ 16.2	11.1 ~ 12.7



SHDFL6847L

5) Is the measured resistance within specifications?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good ISCA and check for proper operation.

If the problem is corrected, replace ISCA and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR

E102DE68

Refer to DTC P1505.

FL -444

FUEL SYSTEM

DTC P1507 IDLE CHARGE ACTUATOR SIGNAL LOW OF COIL #2**COMPONENT LOCATION** E18C9F0D

Refer to DTC P1505.

GENERAL DESCRIPTION E59FDE5F

Refer to DTC P1505.

DTC DESCRIPTION ED55390B

If there is Open or Short to ground in ISCA(closing coil) circuit, PCM sets DTC P1507.

DTC DETECTING CONDITION EA4102CD

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Circuit continuity check, low (Closing coil) 	<ul style="list-style-type: none"> Poor connection Open or short to ground in control circuit ISCA
Enable Conditions	<ul style="list-style-type: none"> Vehicle speed = 0 Coolant temperature > 70 Intake air temperature > -6 Idle status No purge valve error No error on the related sensors. (VSS,ECTS,IATS,etc) 	
Threshold Value	<ul style="list-style-type: none"> Shorted to ground or disconnected 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SPECIFICATION E454DC87

Refer to DTC P1505.

SCHEMATIC DIAGRAM E50DED37

Refer to DTC P1505.

SIGNAL WAVEFORM & DATA E4B27BB0

Refer to DTC P1505.

MONITOR SCANTOOL DATA E27235C5

Refer to DTC P1505.

DTC TROUBLESHOOTING PROCEDURES

FL -445

TERMINAL AND CONNECTOR INSPECTION E5BB6ED1

Refer to DTC P1505.

POWER CIRCUIT INSPECTION E90F01BF

1. Key "OFF".
2. Disconnect ISCA connector.
3. Key "ON".
4. Measure the voltage between terminal 2 of ISCA harness connector and chassis ground.

Specification : B+

5. Is the measured voltage within specification?

YES

Go to "Control circuit inspection" procedure.

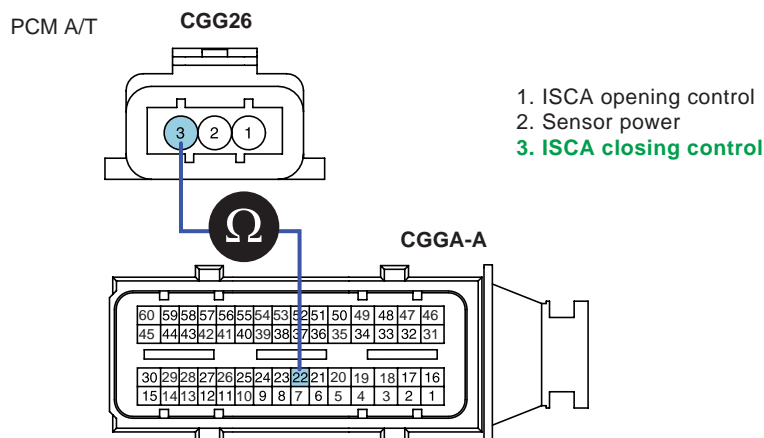
NO

Repair Open or Short in power circuit and then, go to "Verification of Vehicle Repair" procedure.

CONTROL CIRCUIT INSPECTION EF78331A

1. Check Open in control circuit.
 - 1) Key "OFF".
 - 2) Disconnect ISCA connector and ECM connector.
 - 3) Measure the resistance between terminal 3 of ISCA harness connector and terminal 22/CGGA-A of PCM harness connector. [A/T]
Measure the resistance between terminal 3 of ISCA harness connector and terminal 25/CGGM-K of ECM harness connector. [M/T]

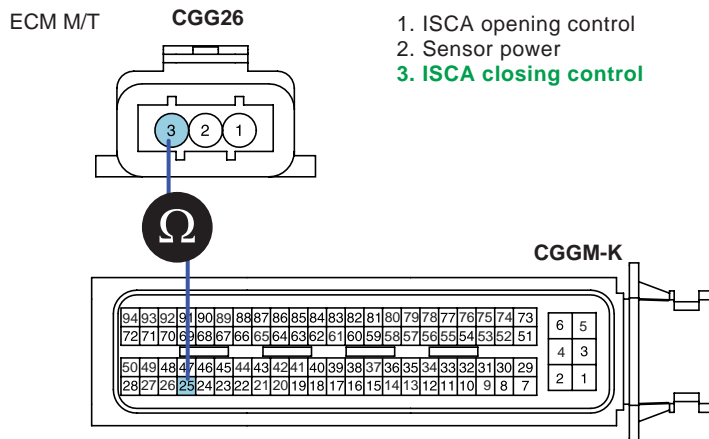
Specification : Below Approx 1



SHDFL6849L

FL -446

FUEL SYSTEM



SHDFL6850L

4) Is the measured resistance within specification?

YES

Go to "Check Short in Control circuit" procedure.

NO

Repair Open in control circuit and then, go to "Verification of Vehicle Repair" procedure.

2. Check Short in control circuit.

1) Key "OFF".

2) Disconnect ISCA connector and ECM connector.

3) Measure the resistance between terminal 3 of ISCA harness connector and chassis ground.

Specification : Infinite

4) Is the measured resistance within specification?

YES

Go to "Component inspection" procedure.

NO

Repair Short to ground in control circuit and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

E940C178

1. ISCA visual check.

1) Key "OFF".

2) Disassemble ISCA.

3) Check contamination, damage or stuck on ISCA.

4) Check the operating sound when key turns "OFF" to "ON".

DTC TROUBLESHOOTING PROCEDURES

FL -447

5) Is ISCA O.K.?

YES

Go to "ISCA check" procedure.

NO

Substitute with a known - good ISCA and check for proper operation.

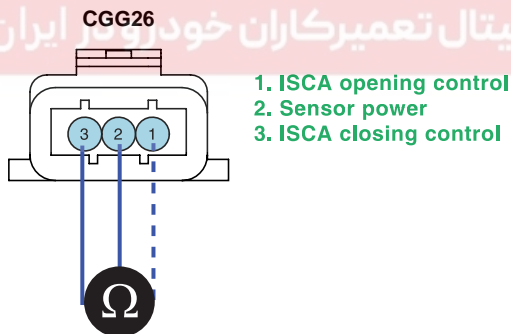
If the problem is corrected, replace ISCA and go to "Verification of Vehicle Repair" procedure.

2. ISCA check.

- 1) Key "OFF".
- 2) Disassemble ISCA.
- 3) Measure the resistance between terminal 1 and 2 of ISCA harness connector. (Component side)
- 4) Measure the resistance between terminal 2 and 3 of ISCA harness connector. (Component side)

SPECIFICATION :

Temperature [()]	Closing Coil Resistance ()	Opening Coil Resistance ()
20 (68)	14.6 ~ 16.2	11.1 ~ 12.7



SHDFL6847L

5) Is the measured resistance within specifications?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good ISCA and check for proper operation.

If the problem is corrected, replace ISCA and go to "Verification of Vehicle Repair" procedure.

FL -448

FUEL SYSTEM

VERIFICATION OF VEHICLE REPAIR EBAF9215

Refer to DTC P1505.

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DTC TROUBLESHOOTING PROCEDURES

FL -449

DTC P1508 IDLE CHARGE ACTUATOR SIGNAL HIGH OF COIL #2**COMPONENT LOCATION** E0980421

Refer to DTC P1505.

GENERAL DESCRIPTION EAA0AAA4

Refer to DTC P1505.

DTC DESCRIPTION E3B6D824

If there is Short to power in ISCA(closing coil) circuit, PCM sets DTC P1508.

DTC DETECTING CONDITION E9C362DE

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Circuit continuity check, high (closing coil) 	<ul style="list-style-type: none"> Poor connection Short to power in control circuit ISCA
Enable Conditions	<ul style="list-style-type: none"> Vehicle speed = 0 Coolant temperature > 70 Intake air temperature > -6 Idle status No purge valve error No error on the related sensors. (VSS,ECTS,IATS,etc) 	
Threshold Value	<ul style="list-style-type: none"> Shorted to battery voltage 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

SPECIFICATION E4F46E08

Refer to DTC P1505.

SCHEMATIC DIAGRAM EBA37263

Refer to DTC P1505.

SIGNAL WAVEFORM & DATA EFDAB1DD

Refer to DTC P1505.

MONITOR SCANTOOL DATA E1B43939

Refer to DTC P1505.

FL -450**FUEL SYSTEM****TERMINAL AND CONNECTOR INSPECTION** E646E7EA

Refer to DTC P1505.

CONTROL CIRCUIT INSPECTION EEB21FA4

1. Key "OFF".
2. Disconnect ISCA connector.
3. Key "ON".
4. Measure the voltage between terminal 3 of ISCA harness connector and chassis ground.

Specification : 1.7~2.1V

5. Is the measured voltage within specification?

YES

Go to "Component inspection" procedure.

NO

Repair Short to power in control circuit and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION EF48E18C

1. ISCA visual check.
 - 1) Key "OFF".
 - 2) Disassemble ISCA.
 - 3) Check contamination, damage or stuck on ISCA.
 - 4) Check the operating sound when key turns "OFF" to "ON".
 - 5) Is ISCA O.K?

YES

Go to "ISCA check" procedure.

NO

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

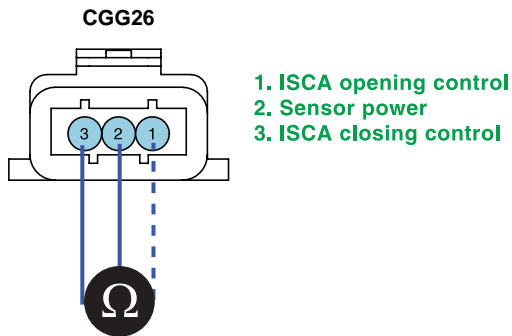
2. ISCA check.
 - 1) Key "OFF".
 - 2) Disassemble ISCA.
 - 3) Measure the resistance between terminal 1 and 2 of ISCA harness connector. (Component side)
 - 4) Measure the resistance between terminal 2 and 3 of ISCA harness connector. (Component side)

DTC TROUBLESHOOTING PROCEDURES

FL -451

SPECIFICATION :

Temperature [()]	Closing Coil Resistance ()	Opening Coil Resistance ()
20 (68)	14.6 ~ 16.2	11.1 ~ 12.7



SHDFL6847L

5) Is the measured resistance within specifications?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good ISCA and check for proper operation.

If the problem is corrected, replace ISCA and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR

E83ABD36

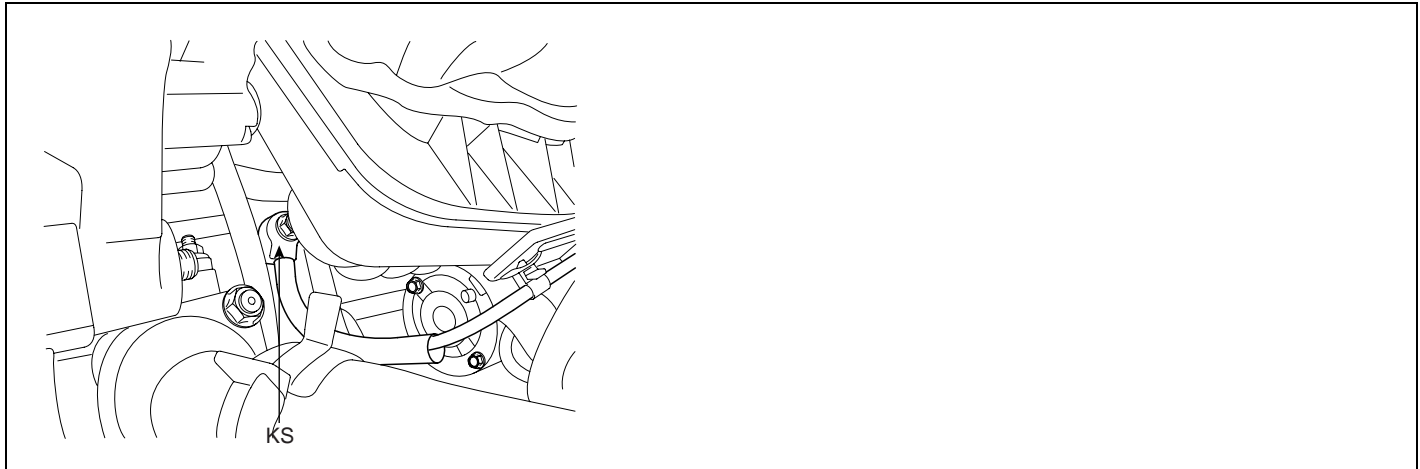
Refer to DTC P1505.

FL -452

FUEL SYSTEM

DTC P1550 KNOCK SENSOR EVALUATION IC

COMPONENT LOCATION EA36C2E8



SHDFL6712L

GENERAL DESCRIPTION EB3EB545

Knocking is a phenomenon characterized by undesirable vibration and noise that can cause engine damage. A knock sensor (KS) is mounted on the cylinder block and senses engine knocking. A knocking vibration from the cylinder block is applied as pressure to the piezoelectric element. A knock sensor (KS) detects vibration when RPM rises or drops and generates voltages based on this vibration. The PCM controls the ignition timing based on the amplitude and frequency of the knock sensor signal. For example, if engine knocking occurs, the ignition timing is retarded to prevent it.

DTC DESCRIPTION E2230365

If the knock sensor signal is outside the acceptable parameter, P1550 is set.

DTC DETECTING CONDITION E8A9F7BD

Item		Detecting Condition	Possible Cause
CASE 1	DTC Strategy	<ul style="list-style-type: none"> Circuit continuity check, pulse test 	<ul style="list-style-type: none"> Poor connection Open or short in control circuit Knock sensor
	Threshold Value	<ul style="list-style-type: none"> Integrator value difference (End value - Start value) 4V 	
CASE 2	DTC Strategy	<ul style="list-style-type: none"> Circuit continuity check, zero test 	
	Threshold Value	<ul style="list-style-type: none"> Integrator gradient 200 V/sec 	
CASE 3	DTC Strategy	<ul style="list-style-type: none"> Parity check 	
	Threshold Value	<ul style="list-style-type: none"> Number of parity errors 5 	
Diagnostic Time		<ul style="list-style-type: none"> Continuous 	

DTC TROUBLESHOOTING PROCEDURES

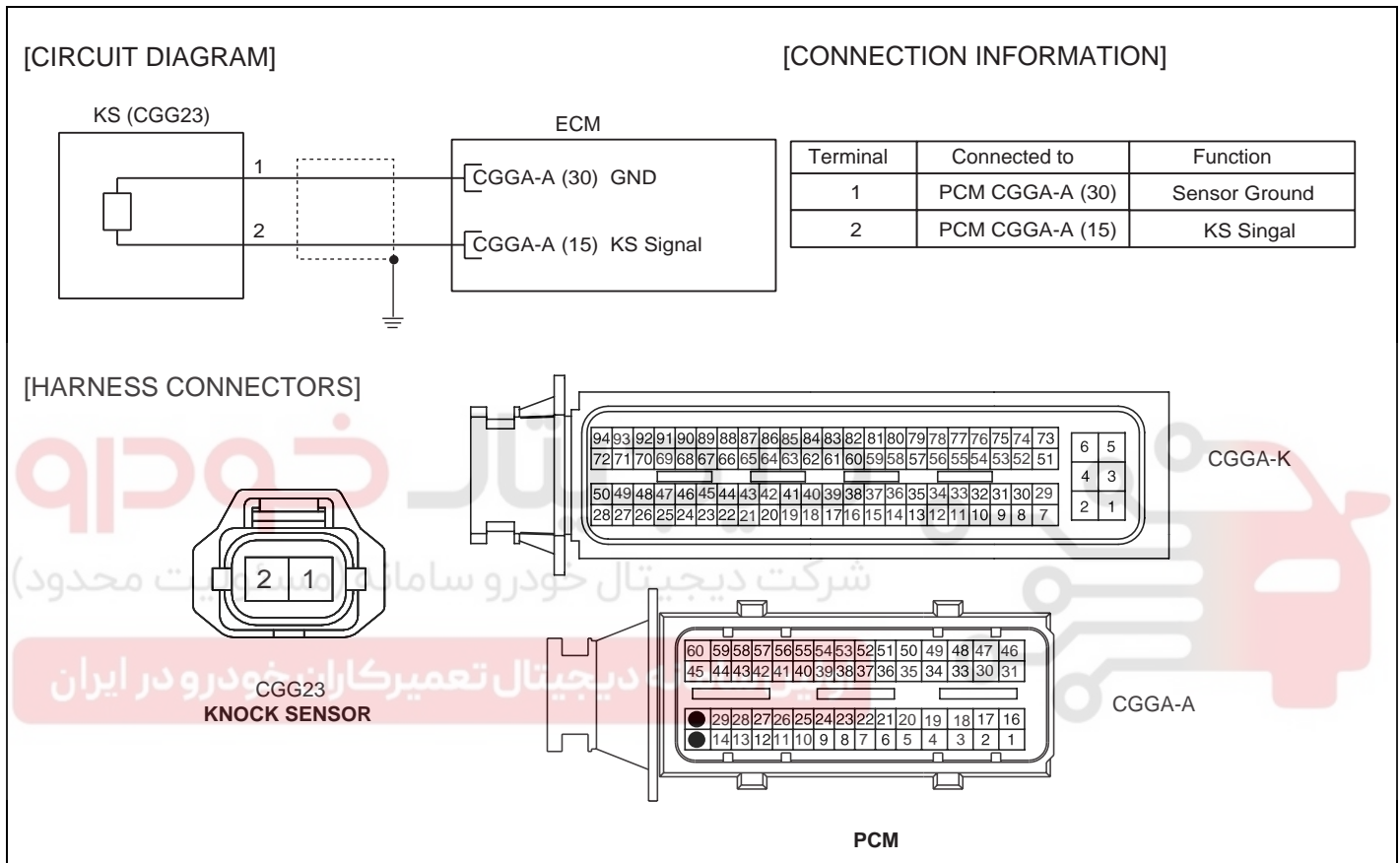
FL -453

SPECIFICATION EB2244AA

Item	Specification
Capacitance (pF)	950 ~ 1,350

SCHEMATIC DIAGRAM EF7E85C1

(A/T)



SHDFL6590L

FL -454

FUEL SYSTEM

(M/T)

[CIRCUIT DIAGRAM]

[CONNECTION INFORMATION]

Terminal	Connected to	Function
1	ECM CGGM-K (32)	Sensor Ground
2	ECM CGGM-K (11)	KS Signal

[HARNESS CONNECTORS]

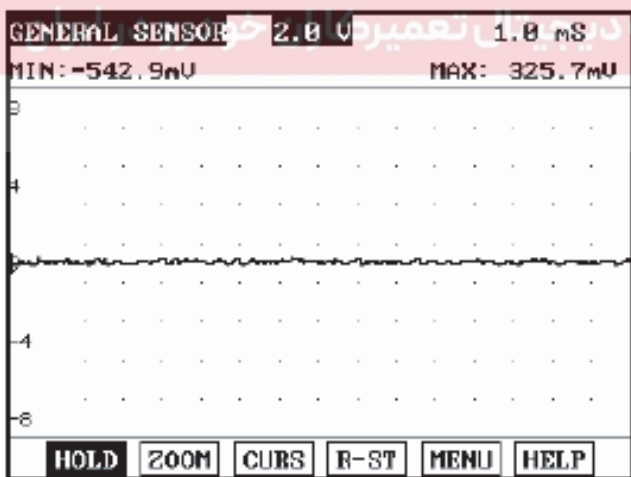
CGG23
KNOCK SENSOR

ECM

SHDFL6591L

SIGNAL WAVEFORM & DATA

EB90F2F3



This is a normal signal waveform of knock sensor. Generally, there would be much more noise on knock sensor signal than the others.

LFJF564A

MONITOR SCANTOOL DATA

ECBB081C

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu

DTC TROUBLESHOOTING PROCEDURES

FL -455

4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

1.1 DIAGNOSTIC TROUBLE CODES				1.4 AMBIENT CONDITIONS	
Pxxxx DTC TITLE				1. MIL STATUS : ON / OFF	
				2. DTC STATUS : PRESENT / HISTORY	
				3. DTC READNESS FLAG : COMPLETE	
NUMBER OF DTC : 1 ITEMS					
PART	ERAS	DTAL			

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

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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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure.

TERMINAL AND CONNECTOR INSPECTION EA43C50A

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "Knock sensor circuit inspection" procedure.

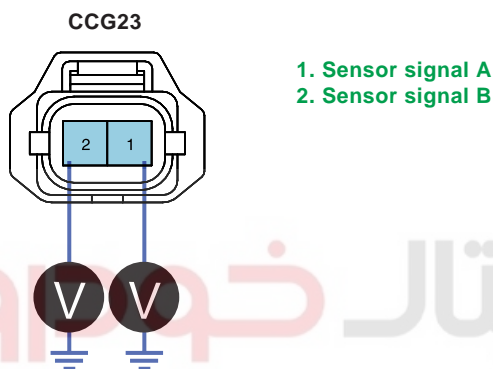
FL -456

FUEL SYSTEM

SIGNAL CIRCUIT INSPECTION EDAD4AF4

1. Key "OFF".
2. Disconnect Knock sensor connector.
3. Key "ON".
4. Measure the voltage between terminal 1 of knock sensor harness connector and chassis ground.
5. Measure the voltage between terminal 2 of knock sensor harness connector and chassis ground.

Specification : Approx 2.4V



6. Is the measured voltage within specification?

YES

Go to "Component inspection" procedure.

NO

Repair Open or Short in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION E5F46AF2

1. Check Knock sensor.
 - 1) Substitute with a known - good Knock sensor and check for proper operation.
 - 2) Is the signal normal?

YES

Replace Knock sensor and go to "Verification of Vehicle Repair" procedure.

NO

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

DTC TROUBLESHOOTING PROCEDURES

FL -457

VERIFICATION OF VEHICLE REPAIR E9FA2E97

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

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FL -458

FUEL SYSTEM

DTC P1560 KNOCK CONTROL SPI (SERIAL PORT INTERFACE) CHECK**COMPONENT LOCATION** E2674D1E

Refer to DTC P1550.

GENERAL DESCRIPTION E46F69E7

Refer to DTC P1550.

DTC DESCRIPTION E9E4B4E7

Knock sensor signal is inputted to CPU through SPI(Serial Port Interface). By the way, if there is malfunction between SPI and CPU, PCM sets DTC P1560.

DTC DETECTING CONDITION ED8653EE

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> SPI communication check 	<ul style="list-style-type: none"> Poor connection
Enable Conditions		
Threshold Value	<ul style="list-style-type: none"> Number of SPI errors 1 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	

SPECIFICATION EC6431C8

Refer to DTC P1550.

SCHEMATIC DIAGRAM E460AA35

Refer to DTC P1550.

SIGNAL WAVEFORM & DATA E499DDF4

Refer to DTC P1550.

MONITOR SCANTOOL DATA EEC1BDDF

Refer to DTC P1550.

TERMINAL AND CONNECTOR INSPECTION EAFBC4D3

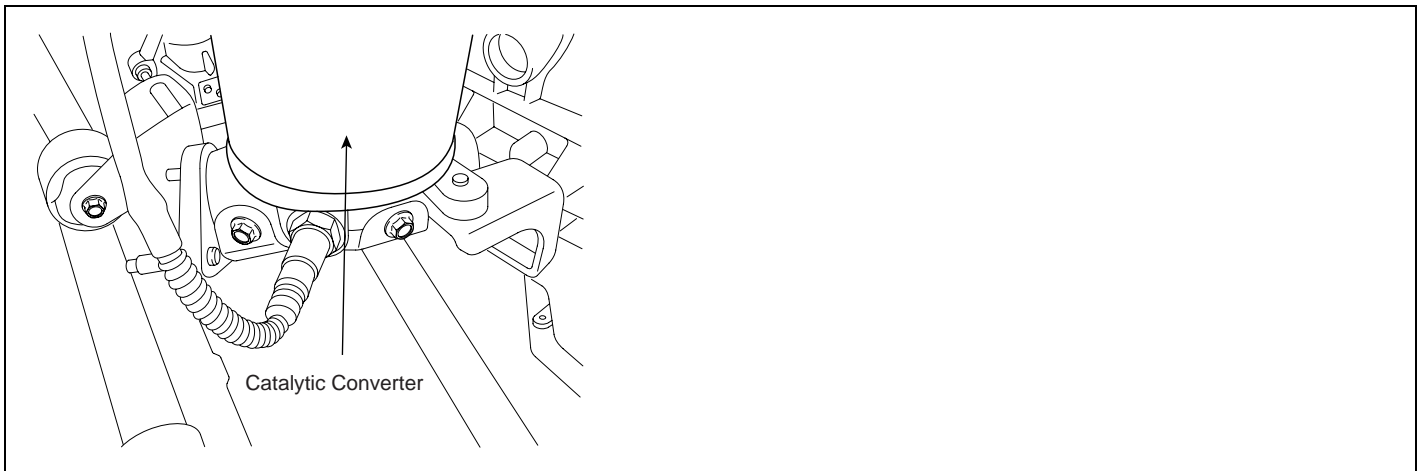
Refer to DTC P1550.

VERIFICATION OF VEHICLE REPAIR E39FAA04

Refer to DTC P1550.

DTC TROUBLESHOOTING PROCEDURES

FL -459

DTC P2096 POST CATALYST FUEL TRIM SYSTEM TOO LEAN (BANK 1)**COMPONENT LOCATION** EBD1E7DF

SHDFL6718L

GENERAL DESCRIPTION E898F138

The catalyst's efficiency is demonstrated by its ability to oxidize CO and hydrocarbon emissions. The Powertrain Control Module (PCM) compares the output signals of the front and rear oxygen sensors to determine whether the output of the rear sensor is beginning to match the output of the front oxygen sensor. Air/fuel mixture compensation keeps the frequency of the front oxygen sensor high due to the changes from rich-to-lean combustion. The catalyst causes the rear oxygen sensor to have a lower frequency. As the catalyst wears, the rear oxygen sensor's signal trace begins to match the front oxygen sensor's signal trace. That is because the catalyst becomes saturated with oxygen and cannot use the oxygen to convert hydrocarbon and CO into H₂O and CO₂ with the same efficiency as when it was new. A completely worn catalyst shows a 100% match between the frequency of the front and rear sensors.

DTC DESCRIPTION E012151D

If the B1S1 signal is advanced compared to the B1S2 controller value, P2096 is stored.

FL -460

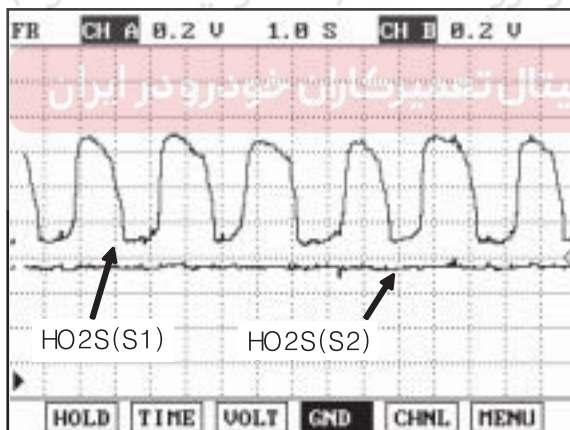
FUEL SYSTEM

DTC DETECTING CONDITION E2AE1A6F

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> O2 sensor characteristic line shift 	<ul style="list-style-type: none"> Catalyst converter HO2S (B1/S1)
Enable Conditions	<ul style="list-style-type: none"> Dew point end detected Required lambda = 1 Battery voltage 10.7V Exhaust gas temperature (model) 600 ~ 800 No upstream O2 sensor error or downstream O2 sensor ready 1000rpm Engine speed 3800rpm Engine load : 15 ~ 80 % 	
Threshold Value	<ul style="list-style-type: none"> The second controller by B1S2 1sec 	
Diagnostic Time	<ul style="list-style-type: none"> 15 sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

B1S1 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

SIGNAL WAVEFORM & DATA ED925F79



LFJF669A

MONITOR SCANTOOL DATA EEB311C6

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

DTC TROUBLESHOOTING PROCEDURES

FL -461

1.1 DIAGNOSTIC TROUBLE CODES				1.4 AMBIENT CONDITIONS	
Pxxxx DTC TITLE				1.MIL STATUS : ON / OFF	
				2.DTC STATUS : PRESENT / HISTORY	
				3.DTC READNESS FLAG : COMPLETE	
NUMBER OF DTC : 1 ITEMS					
PART	ERAS		DTAL		

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure

SYSTEM INSPECTION E97B3D39

1. Check clog on Exhaust gas system

- 1) Key "OFF".
- 2) Check clog on muffler or catalyst converter.
- 3) Is Exhaust gas system O.K?

YES

Go to "Intake air system check" procedure.

NO

Repair as necessary and go to "Verification of vehicle Repair" procedure.

2. Intake air system check.

- 1) Check leakage on Intake air system
Check looseness, deterioration or contamination on throttle body and gasket.
Check contamination, damage or crack on intake manifold, ISCA and injectors.
Check for contamination or sticking on the ISCA assembly.

FL -462

FUEL SYSTEM

2) Is there any leakage?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure

NO

Go to "Fuel line check" procedure.

3. Fuel line check.

1) Check "Fuel line system"

Check looseness of connectors on fuel line.

Check looseness, damage, or interference of vacuum hose on fuel line.

Check damage, leakage or bending on fuel line pipe.

2) Is fuel line normal?

YES

Go to "Fuel line pressure check" procedure.

NO

Repair as necessary and go to "Verification of vehicle Repair" procedure.

4. Fuel line pressure check. شرکت دیجیتال خودرو سامانه

1) Key "OFF".

2) Disconnect a fuel pump relay.

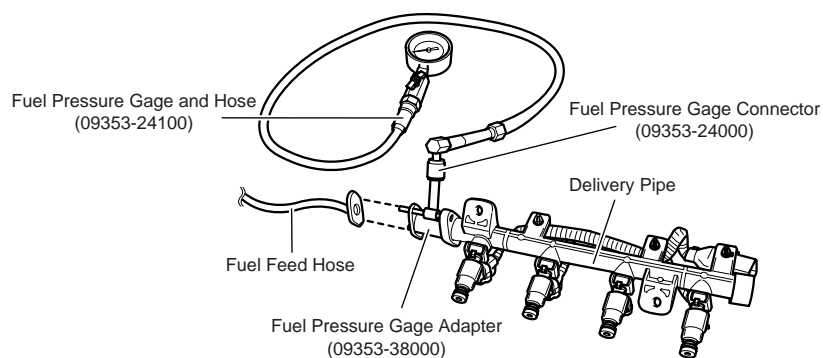
3) Engine start and wait until engine stop. and then key "OFF".

4) Connect a fuel pump relay.

5) Connect fuel pressure guage using the correct adapter.

6) Start the engine and record fuel pressure.

Specification : Approx. 3.5 kg/cm²



EFNG335A

DTC TROUBLESHOOTING PROCEDURES**FL -463**

7) Is the fuel pressure normal?

YES

Go to "Component inspection" procedure.

NO

Check clogging on the fuel filter.

Check the supply pressure of fuel pump.

Repair as necessary and go to "Verification of vehicle Repair" procedure

COMPONENT INSPECTION

E8B3E798

1. PCV(Positive Crankcase Ventilation) valve check.

- 1) Key "OFF".
- 2) Disconnect PCV valve.
- 3) Check the movement of plunger by putting in and out a thin stick.
- 4) Is the movement of plunger normal?

YES

Go to "injectors check" procedure.

NO

Substitute with a known - good PCV valve and check for proper operation.

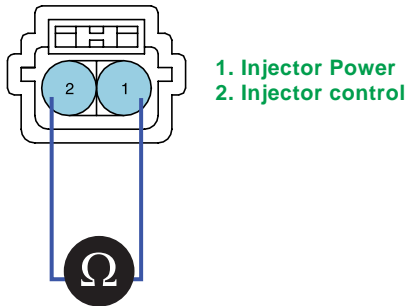
If the problem is corrected, replace PCV valve and go to "Verification of Vehicle Repair" procedure.

2. Injector check

- 1) Key "OFF".
- 2) Disconnect injectors.
- 3) Check clog on injectors.
- 4) Measure the resistance between terminal 1 and 2 of injectors(Component side).

SPECIFICATION :

Temperature [()]	Resistance ()
20 (68)	13.8 ~ 15.2



LFJF483A

5) Is the measured resistance within specifications ?

YES

Go to "Sensors related to air/fuel ratio check" procedure.

NO

Substitute with a known - good Injector and check for proper operation.

If the problem is corrected, replace Injector and go to "Verification of Vehicle Repair" procedure.

3. Sensors related to air/fuel ratio check.

1) Check the output data of sensors related to air/fuel ratio (HO2S, MAPS, TPS, ECTS, PCSV, Injectors, etc) on scantool. (Refer to each DTC guide procedure.)

2) Are those sensors normal?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Repair or replace as necessary. And then, go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E4D50472

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

DTC TROUBLESHOOTING PROCEDURES

FL -465

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

دیجیتال خودرو

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FL -466

FUEL SYSTEM

DTC P2097 POST CATALYST FUEL TRIM SYSTEM TOO RICH (BANK 1)**COMPONENT LOCATION** E2199524

Refer to DTC P2096.

GENERAL DESCRIPTION E662A2F0

Refer to DTC P2096.

DTC DESCRIPTION ED81F107

If the B1S1 signal is retarded compared to the B1S2 controller value, P2097 is stored.

DTC DETECTING CONDITION EA58BAD8

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> O2 sensor characteristic line shift 	<ul style="list-style-type: none"> Catalyst converter HO2S (B1S1)
Enable Conditions	<ul style="list-style-type: none"> Dew point end detected Required lambda = 1 Battery voltage > 10.7V Exhaust gas temperature (model) :600 ~ 800 Catalyst temperature(modeled) > 300 No upstream O2 sensor error or downstream O2 sensor ready There is no misfire 	
Threshold Value	<ul style="list-style-type: none"> The second controller by B1S2 < -1 sec 	
Diagnostic Time	<ul style="list-style-type: none"> 15 sec 	
MIL ON Condition	<ul style="list-style-type: none"> 3 driving cycle 	

B1S1 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

SIGNAL WAVEFORM & DATA E05FDC3B

Refer to DTC P2096.

MONITOR SCANTOOL DATA EEE4141C

Refer to DTC P2096.

SYSTEM INSPECTION E8B2A447

- Check clog on Exhaust gas system
 - Key "OFF".
 - Check clog on muffler or catalyst converter.

DTC TROUBLESHOOTING PROCEDURES**FL -467**

3) Is Exhaust gas system O.K?

YES

Go to "Intake air system check" procedure.

NO

Repair as necessary and go to "Verification of vehicle Repair" procedure.

2. Intake air system check.

1) Check clog on Intake air system"

Check clog of air-cleaner.

Check deterioration or contamination on throttle body and gasket.

Check for contamination or sticking on the ISCA assembly. Is there any problem?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure

NO

Go to "Fuel line check" procedure.

3. Fuel line pressure check.

1) Key "OFF".

2) Disconnect a fuel pump relay.

3) Engine start and wait until engine stop. and then key "OFF".

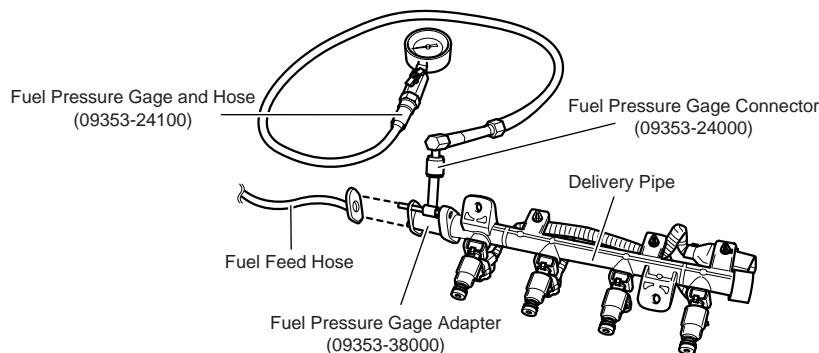
4) Connect a fuel pump relay.

5) Connect fuel pressure guage using the correct adapter.

6) Start the engine and record fuel pressure.



Specification : Approx. 3.5 kg/cm²



EFNG335A

7) Is the fuel pressure normal?

FL -468

FUEL SYSTEM

YES

Go to "Component inspection" procedure.

NO

Check clog or stuck of the valve in a fuel pressure regulator.
Check the supply pressure of fuel pump.
Repair as necessary and go to "Verification of vehicle Repair" procedure.

COMPONENT INSPECTION EF488B1B

1. PCV(Positive Crankcase Ventilation) valve check.

- 1) Key "OFF".
- 2) Disconnect PCV valve.
- 3) Check the movement of plunger by putting in and out a thin stick.
- 4) Is the movement of plunger normal?

YES

Go to "PCSV check" procedure.

NO

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

2. PCSV check.

- 1) Key "OFF".
- 2) Disconnect PCSV and vacuum hose.
- 3) Apply a vacuum by a hand vacuum gauge on PCSV.
- 4) Does PCSV keep the vacuum condition normally?

YES

Go to "Injector check" procedure.

NO

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

3. Injector check

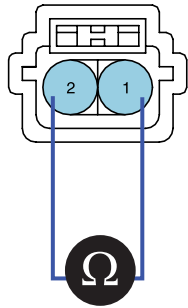
- 1) Key "OFF".
- 2) Disconnect injectors.
- 3) Check clog on injectors.
- 4) Measure the resistance between terminal 1 and 2 of injectors(Component side).

DTC TROUBLESHOOTING PROCEDURES

FL -469

SPECIFICATION :

Temperature [()]	Resistance ()
20 (68)	13.8 ~ 15.2



1. Injector Power
2. Injector control

LFJF483A

5) Is the measured resistance within specifications ?

YES

Go to "Sensors related to air/fuel ratio check" procedure.

NO

Substitute with a known - good Injector and check for proper operation.

If the problem is corrected, replace Injector and go to "Verification of Vehicle Repair" procedure.

4. Sensors related to air/fuel ratio check.

1) Check the output data of sensors related to air/fuel ratio (HO2S, MAPS, TPS, ECTS, PCSV, Injectors, etc) on scantool. (Refer to each DTC guide procedure.)

2) Are those sensors normal?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Repair or replace as necessary. And then, go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E16E4999

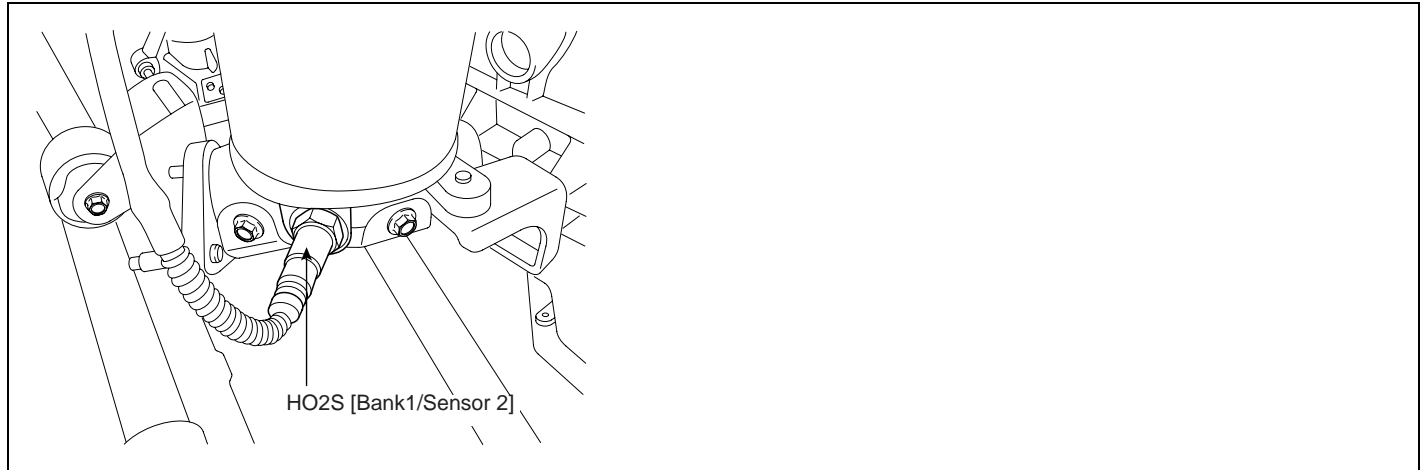
Refer to DTC P2096.

FL -470

FUEL SYSTEM

DTC P2232 HO2S SIGNAL CIRCUIT SHORTED TO HEATER CIRCUIT (SENSOR 2)

COMPONENT LOCATION E4636DC0



SHDFL6706L

GENERAL DESCRIPTION EF626D90

HO2S(B1/S2) is in the rear side of Catalytic Converter to check the proper operation of catalyst. Oxygen density after the catalytic converter has to be within specific range (around 0.5V when there is no acceleration and deceleration.)If the oxygen density changes in accordance with HO2S(B1/S1), it means the poor performance of catalytic converter.

DTC DESCRIPTION E4460F29

If the counter that records rapid signal voltage changes is more than 5times, P2232 is set

DTC DETECTING CONDITION E7AAE7E7

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> Rationality check 	<ul style="list-style-type: none"> Poor connection Short to power in signal circuit HO2S (B1S2)
Enable Conditions	<ul style="list-style-type: none"> After enough heated Battery voltage > 10.7V Catalyst temperature (model) > 300 Time after dew point end detected > 10 sec 	
Threshold Value	<ul style="list-style-type: none"> Counter of [ushk > 2V within 0.04 sec after heater on / off] > 5 times 	
Diagnostic Time	<ul style="list-style-type: none"> 3 driving cycle 	

ushk : Sum of the signal voltage change value (B1S2)

B1S1 : upstream oxygen sensor / B1S2 : downstream oxygen sensor

SPECIFICATION E67DFC20

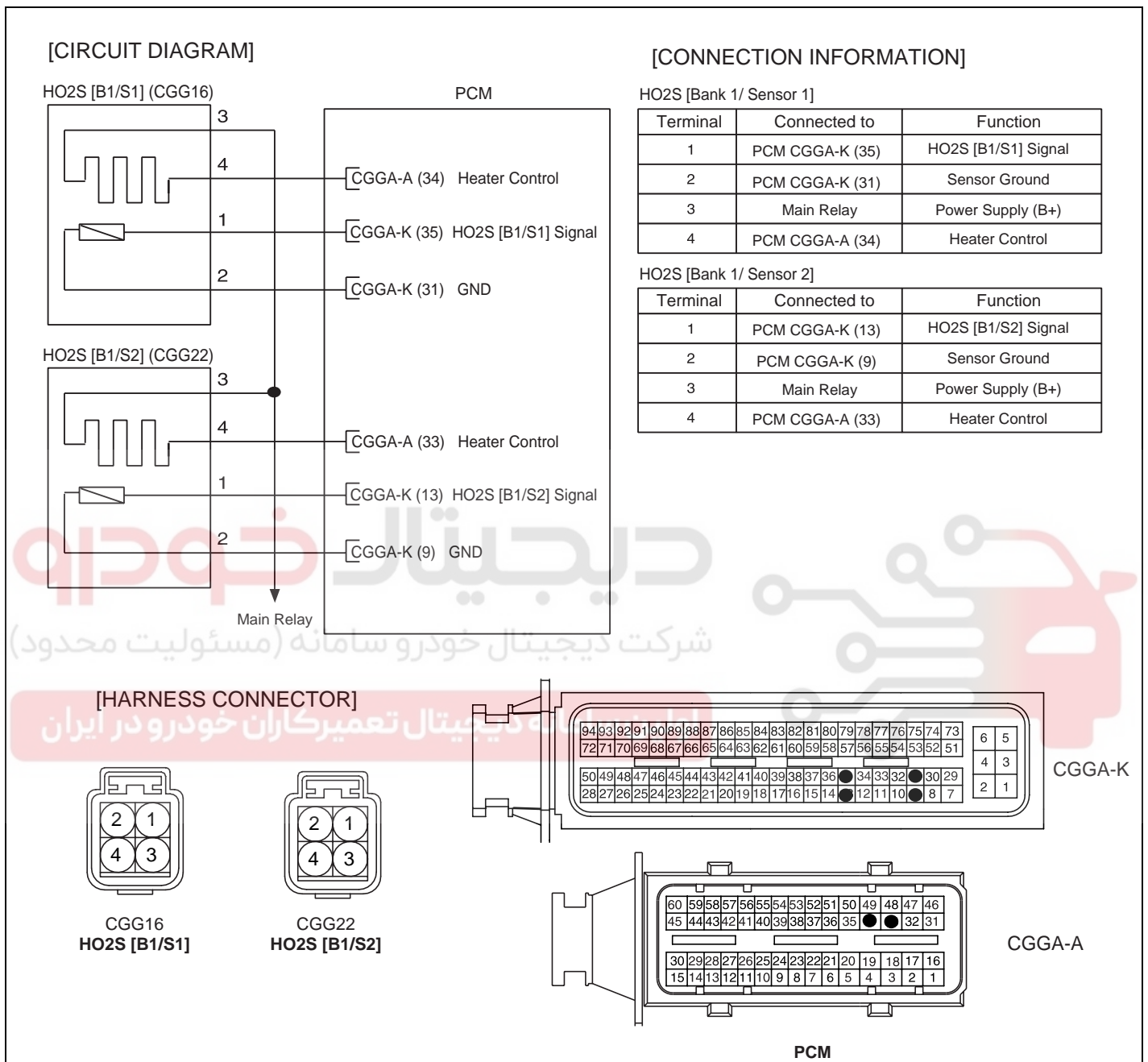
Specification	0.1 ~ 0.9V
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DTC TROUBLESHOOTING PROCEDURES

FL -471

SCHEMATIC DIAGRAM EDF37C70

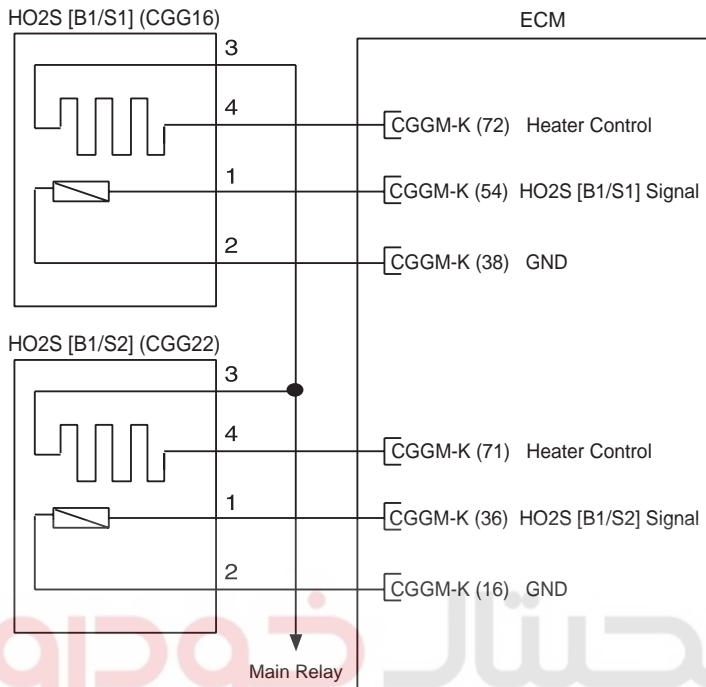
(A/T)



SHDFL6575L

(M/T)

[CIRCUIT DIAGRAM]



[CONNECTION INFORMATION]

HO2S [Bank 1/ Sensor 1]

Terminal	Connected to	Function
1	ECM CGGM-K (54)	HO2S [B1/S1] Signal
2	ECM CGGM-K (38)	Sensor Ground
3	Main Relay	Power Supply (B+)
4	ECM CGGM-K (72)	Heater Control

HO2S [Bank 1/ Sensor 2]

Terminal	Connected to	Function
1	ECM CGGM-K (36)	HO2S [B1/S2] Signal
2	ECM CGGM-K (16)	Sensor Ground
3	Main Relay	Power Supply (B+)
4	ECM CGGM-K (71)	Heater Control

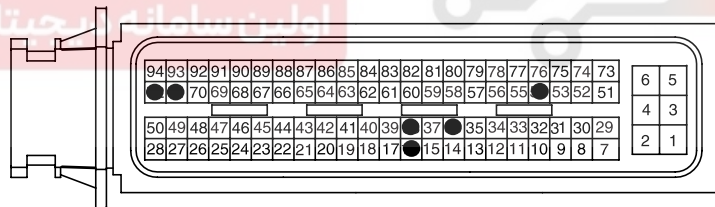
[HARNESS CONNECTOR]



CGG16
HO2S [B1/S1]



CGG22
HO2S [B1/S2]



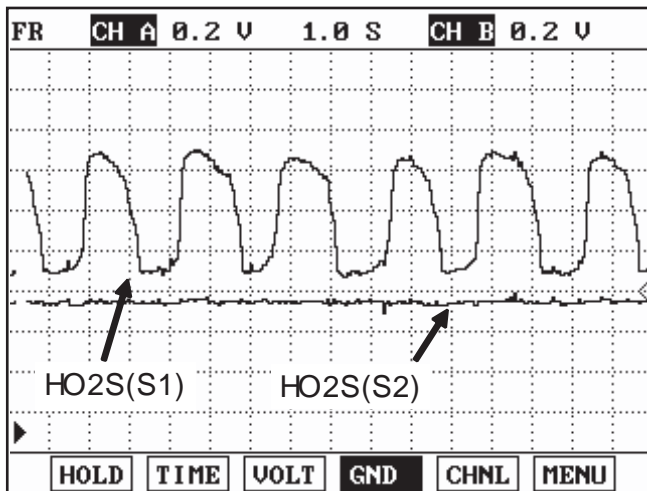
ECM

CGGM-K

DTC TROUBLESHOOTING PROCEDURES

FL -473

SIGNAL WAVEFORM & DATA E1EF560E



The amplitude of the signal output of the rear HO2S is small compared to the front HO2S because the rear HO2S detects emission gas purified by the catalytic converter. This is the normal signal waveform of the rear HO2S at idle.

LFJF451A

MONITOR SCANTOOL DATA E47010AD

1. Connect scantool to Data Link Connector(DLC).
2. IG "ON".
3. Select "Diagnostic Trouble Codes(DTCs)" mode, and then Press F4(DTAL) to check DTC's information from the DTCs menu
4. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions noted in the DTC detecting condition.
5. Read "DTC Status" parameter.

<p>1.1 DIAGNOSTIC TROUBLE CODES</p> <p>PXXXX DTC TITLE</p> <p>NUMBER OF DTC : 1 ITEMS</p> <table border="1" style="width: 100%;"> <tr> <td>PART</td> <td>ERAS</td> <td>DTAL</td> </tr> </table>	PART	ERAS	DTAL	<p>1.4 AMBIENT CONDITIONS</p> <p>1. MIL STATUS : ON / OFF</p> <p>2. DTC STATUS : PRESENT / HISTORY</p> <p>3. DTC READNESS FLAG : COMPLETE</p>
PART	ERAS	DTAL		

SHDFL6500L

6. Is parameter displayed "History(Not Present) fault"?



- History fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

FL -474

FUEL SYSTEM

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal & Connector Inspection" procedure.

TERMINAL AND CONNECTOR INSPECTION EFD71C48

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "B1S2 circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION ED1833FD

1. IG "OFF".
2. Disconnect HO2S(B1/S2) connector.
3. IG "ON" & ENG "OFF".
4. Measure voltage between terminal 1 of HO2S(B1/S2) and chassis ground.

Specification : Approx. 0.45V

5. Is the measured voltage within specification?

YES

Go to "Component Inspection" procedure.

NO

Repair short to power in signal circuit and then, go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION E3CC0C85

1. Visual Inspection.
 - 1) IG "OFF"

DTC TROUBLESHOOTING PROCEDURES

FL -475

- 2) Disconnect HO2S(B1/S2) connector.
- 3) Check that HO2S(B1/S2) is contaminated or damaged by foreign materials.
- 4) Has a problem been found?

YES

Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage. So, check poor connections and the related circuit between ECM and component thoroughly. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known - good HO2S(B1/S2) and check for proper operation.
If the problem is corrected, replace HO2S(B1/S2) and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EA3DFB20

After a repair, it is essential to verify that the fault has been corrected.

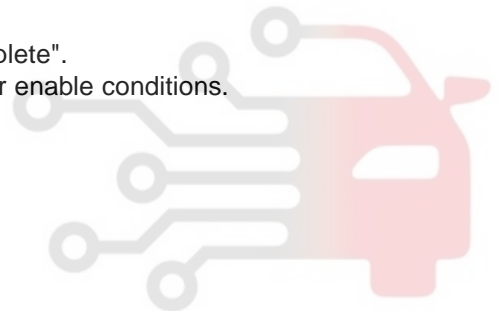
1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.



FL -476

FUEL SYSTEM

DTC U0001 CAN COMMUNICATION MALFUNCTION

GENERAL DESCRIPTION E1B6FFD2

As vehicles electronically controlled, various control unit is applied to vehicle and several units are controlled based on the signals from the sensors. Therefore sharing signals of sensors and information is required. To meet this requirement, CAN communication type, which is insensible to external noises and whose communication speed is fast, is applied to power train control.

Sharing signals from RPM, APS, gear shifting, torque reduction in ESP, ABS and various modules, additive control is performed.

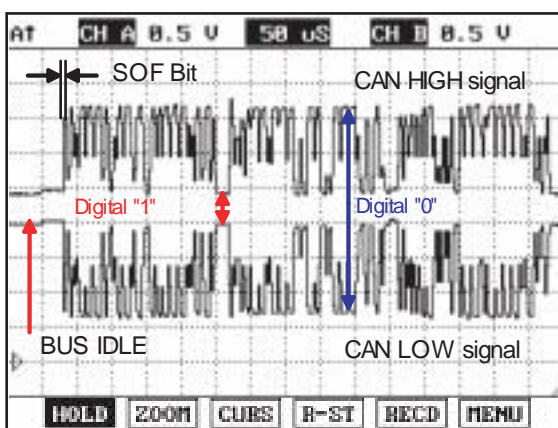
DTC DESCRIPTION E59C79C6

If it is impossible to communicate through internal or external CAN line over 500ms, PCM sets DTC U0001.

DTC DETECTING CONDITION E2038774

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> CAN communication status check 	<ul style="list-style-type: none"> Poor connection Open/Short PCM
Enable Conditions	<ul style="list-style-type: none"> Battery voltage > 10.7V Ignition on, no start phase 	
Threshold Value	<ul style="list-style-type: none"> Bus-Off time on external CAN > 500ms Bus-Off time on internal CAN > 500ms 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 5 sec 	

SIGNAL WAVEFORM & DATA E40BA96F



Monitoring CAN HIGH and LOW simultaneously is important in monitoring CAN communication waveform. When CAN HIGH signal rise to 3.5V and LOW signal drops to 1.5V - voltage difference between HIGH and LOW signal is 2V - at BUS IDLE state(DIGITAL "1") whose reference voltage is 2.5V, "0" is recognized. Besides, comparing HIGH and LOW signal if opposite waveform is detected with the reference voltage of 2.5V, Check if current CAN signal is transfers correctly. Continuous "0"signal above 6BIT means the occurrence of error in CAN communication. 1BIT is easily distinguished as calculating the time when "SOF"(START OF FRAME) which notifies the start of frame occurs. Check if "0"signal above 6BIT is detected continuously when monitoring CAN communication waveform.

LFJF636A

DTC TROUBLESHOOTING PROCEDURES

FL -477

MONITOR SCANTOOL DATA E45773B5

1. Connect scantool to Data Link Connector(DLC).
2. Warm up the engine to normal operating temperature.
3. Monitor the "CAN" parameters on the scantool.
 - Check the value of current data displayed normally.
 - Check "Transaxle Range Switch" and "Torque Required from TCU" parameters among ECU's current data. (AT vehicle only)
 - Check "TPS", "RPM", and "Idle Status" parameters among TCU's current data. (AT vehicle only)
 - Check "RPM" and "TPS" parameters among ABS's current data. (ABS or ESP vehicle only)
4. Are the parameters 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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "Terminal and connector inspection" procedure.

TERMINAL AND CONNECTOR INSPECTION E36CCAC1

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

Repair as necessary and go to "Verification of vehicle Repair" procedure.

NO

Go to "CAN communication circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION E0CC0F94

1. Check CAN BUS Short to Ground.
 - 1) Key "OFF".
 - 2) Disconnect PCM connector.
 - 3) Measure the resistance between terminal 12/27 of PCM harness connector and chassis ground. [A/T]
 - 4) Measure the resistance between terminal 62/84 of PCM(ECM) harness connector and chassis ground. [M/T]

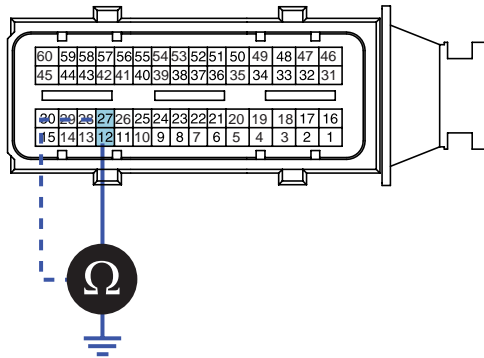
Specification : Infinite

FL -478

FUEL SYSTEM

PCM A/T

CGGA-A

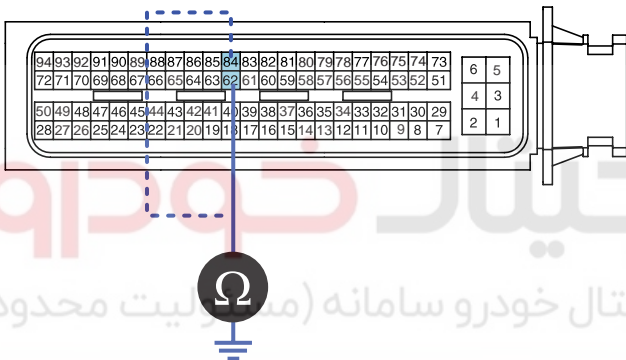


12. CAN High
27. CAN Low

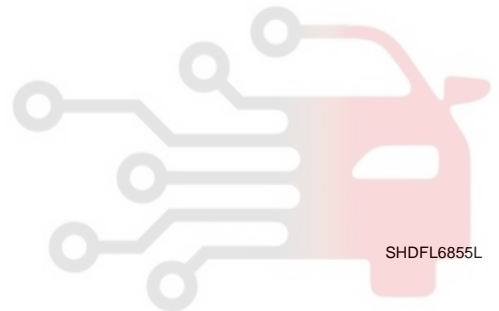
SHDFL6854L

ECM M/T

CGGM-K



84. CAN High
62. CAN Low



SHDFL6855L

شرکت دیجیتال خودرو (محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

5) Is the measured resistance within specification?

YES

Go to "CAN BUS Terminus Resistance Check(Harness side)" procedure.

NO

Repair Short in signal circuit and then go to "Verification of vehicle Repair" procedure.

2. CAN BUS Terminus Resistance Check(Harness side)

- 1) Key "OFF".
- 2) Disconnect PCM connector.
- 3) Measure the resistance between terminal 12 and 27 of PCM harness connector. [A/T]
Measure the resistance between terminal 62 and 84 of ECM harness connector. [M/T]

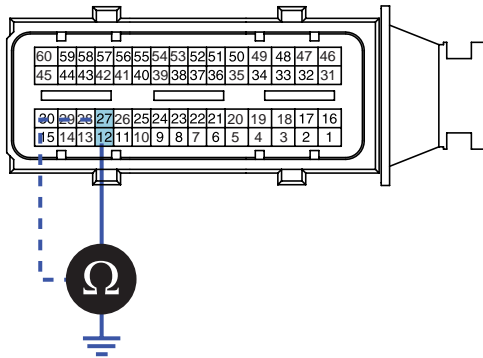
Specification : 120 ± 10

DTC TROUBLESHOOTING PROCEDURES

FL -479

PCM A/T

CGGA-A

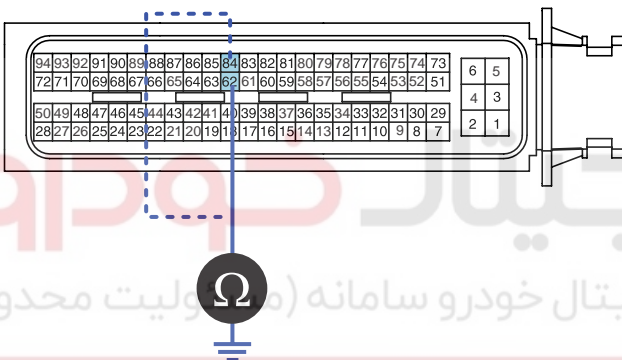


12. CAN High
27. CAN Low

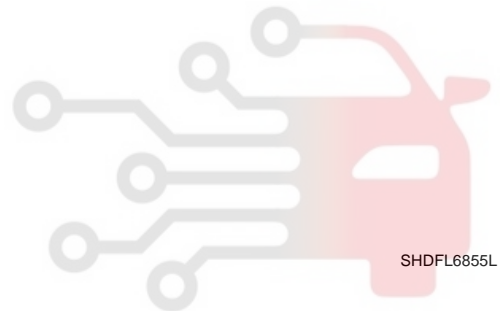
SHDFL6854L

ECM M/T

CGGM-K



84. CAN High
62. CAN Low



SHDFL6855L

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (م)ولیت محدود

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

4) Is the measured resistance within specification?

YES

Go to "Component Inspection" procedure.

NO

In case the measured resistance is around 1.0 : Repair Short in signal circuit and then go to "Verification of vehicle Repair" procedure.

In case the measured resistance is Infinite : Repair Open in signal circuit and then go to "Verification of vehicle Repair" procedure.

COMPONENT INSPECTION E51C92DA

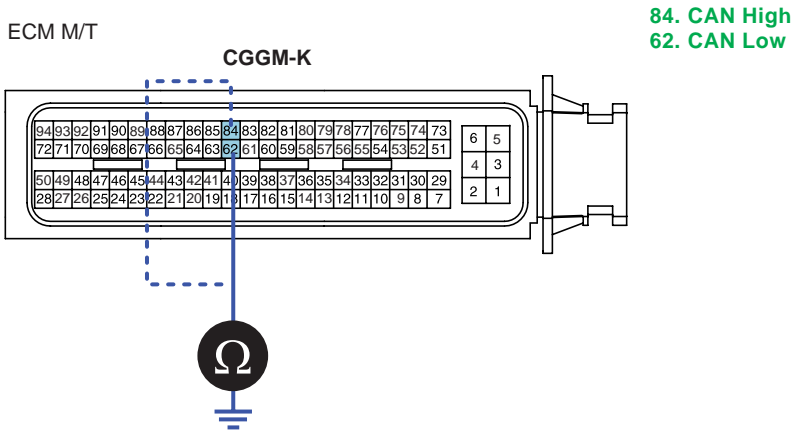
1. CAN BUS Terminus Resistance Check (Component side)

- 1) Key "OFF".
- 2) Disconnect PCM connector.
- 3) Measure the resistance between terminal 12 and 27 of PCM connector. [A/T]
Measure the resistance between terminal 62 and 84 of ECM connector. [M/T]
(Component side)

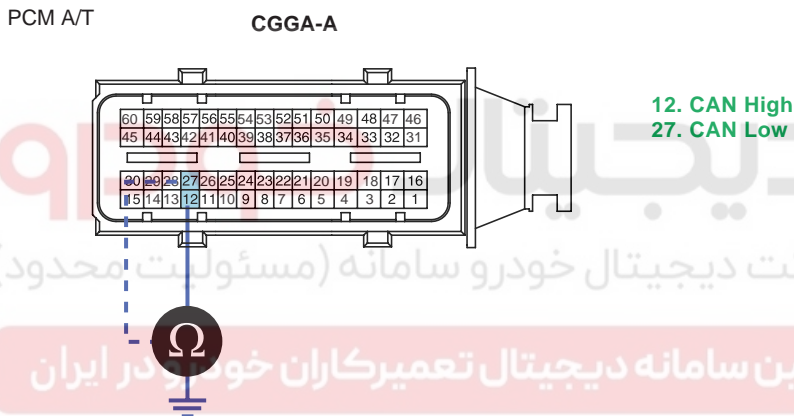
FL -480

FUEL SYSTEM

Specification : 120 ± 10



SHDFL6855L



SHDFL6854L

4) Is the measured resistance within specification?

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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and go to "Verification of vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR E33C3422

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.

DTC TROUBLESHOOTING PROCEDURES

FL -481

3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



FL -482

FUEL SYSTEM

DTC U0101 SERIAL COMMUNICATION PROBLEM WITH TCU (TIMEOUT)**GENERAL DESCRIPTION** E37A2D51

As vehicles electronically controlled, various control unit is applied to vehicle and several units are controlled based on the signals from the sensors. Therefore sharing signals of sensors and information is required. To meet this requirement, CAN communication type, which is insensible to external noises and whose communication speed is fast, is applied to power train control.

Sharing signals from RPM, APS, gear shifting, torque reduction in ESP, ABS and various modules, additive control is performed.

DTC DESCRIPTION E9D6143F

If there is no message from TCU to ECM through external CAN line over 500 ms, PCU sets DTC U0101.

DTC DETECTING CONDITION E3387A41

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> CAN communication status check 	<ul style="list-style-type: none"> Poor connection PCM
Enable Conditions	<ul style="list-style-type: none"> TCU is not coming via internal CAN 	
Threshold Value	<ul style="list-style-type: none"> No message time from TCU via external CAN > 500ms 	
Diagnostic Time	<ul style="list-style-type: none"> Continuous 	
MIL ON Condition	<ul style="list-style-type: none"> 5 sec 	

MONITOR SCANTOOL DATA E02DDF72

1. Connect scantool to Data Link Connector(DLC).
2. Warm up the engine to normal operating temperature.
3. Monitor the "CAN" parameters on the scantool.
 - Check "Transaxle type, Torque control request, etc" at the ECU service data mode.
 - Check "TPS, RPM, IDLE STATE, etc" at the TCU service data mode.
4. Are the parameters 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, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and go to "Verification of vehicle Repair" procedure..

NO

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

DTC TROUBLESHOOTING PROCEDURES

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VERIFICATION OF VEHICLE REPAIR E5E99FEC

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Press F4(DTAL) and confirm that "DTC Readiness Flag" indicates "Complete".
If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES

System performing to specification at this time. Clear the DTC.

NO

Go to the applicable troubleshooting procedure.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

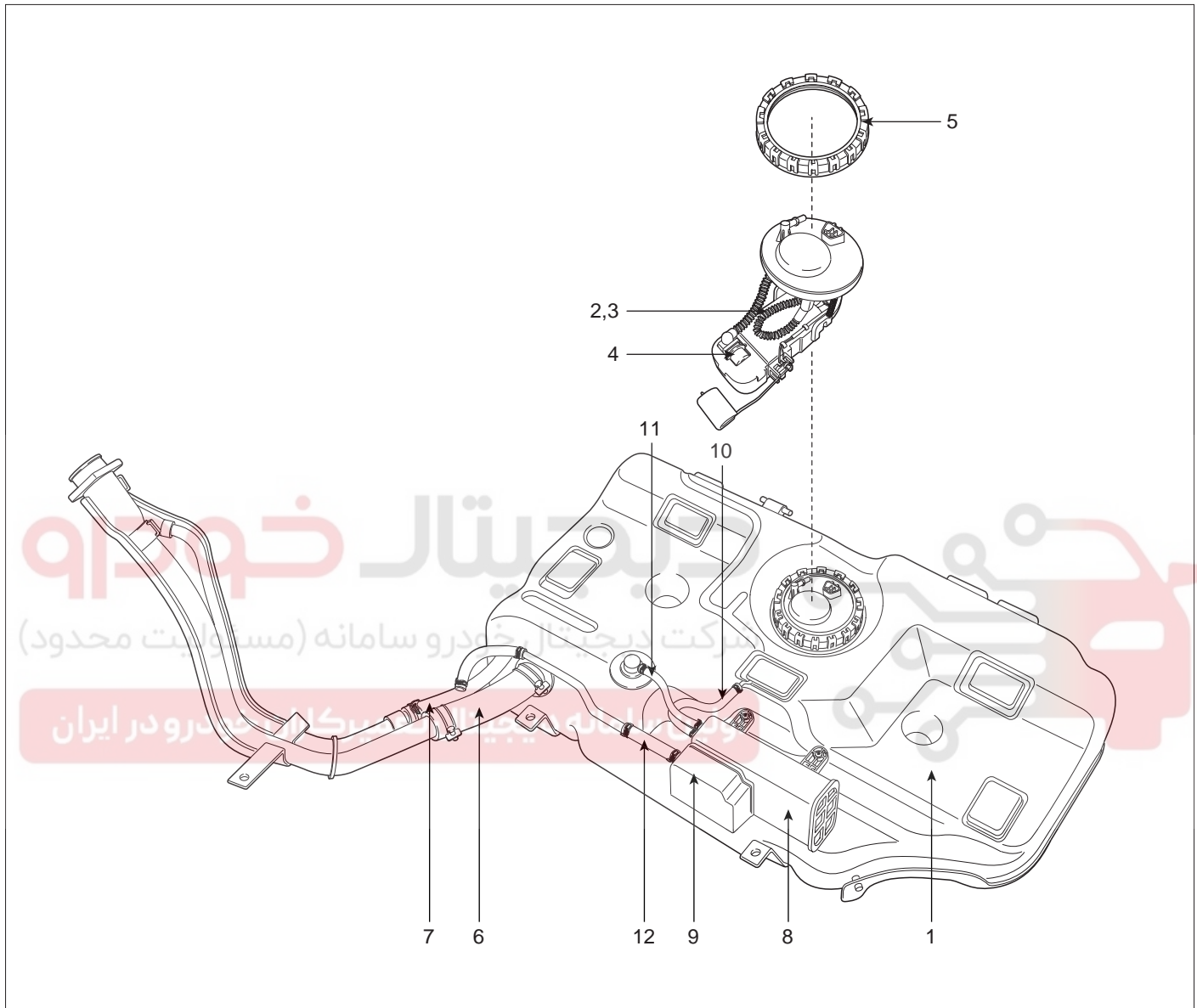


FL -484

FUEL SYSTEM

FUEL DELIVERY SYSTEM

COMPONENT LOCATION EC930F2D



- | | |
|----------------------------|---------------------------------------|
| 1. Fuel Tank | 7. Leveling Hose |
| 2. Fuel Pump | 8. Canister |
| 3. Fuel Filter | 9. Fuel Tank Air Filter |
| 4. Fuel Pressure Regulator | 10. Hose (Canister ↔ Intake Manifold) |
| 5. Fuel Pump Plate Cover | 11. Hose (Canister ↔ Fuel Tank) |
| 6. Fuel Filler Hose | 12. Hose (Canister ↔ Atmosphere) |

SLDFL7122L

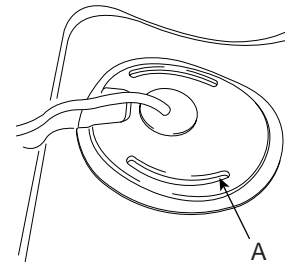
FUEL DELIVERY SYSTEM

FL -485

FUEL PRESSURE TEST E037A0D2

1. PREPARING

1. Remove the rear seat cushion (Refer to "SEAT" in BD group).
2. Open the service cover (A).



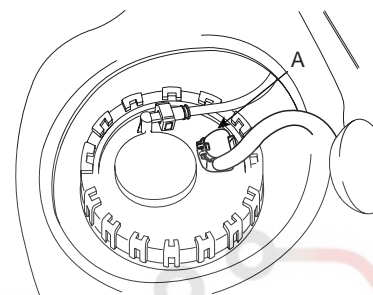
2. RELEASE THE INTERNAL PRESSURE

1. Disconnect the fuel pump connector (A).
2. Start the engine and wait until fuel in fuel line is exhausted.
3. After the engine stalls, turn the ignition switch to OFF position and disconnect the negative (-) terminal from the battery.



NOTE

Be sure to reduce the fuel pressure before disconnecting the fuel feed hose, otherwise fuel will spill out.



3. INSTALL THE SPECIAL SERVICE TOOL (SST) FOR MEASURING THE FUEL PRESSURE

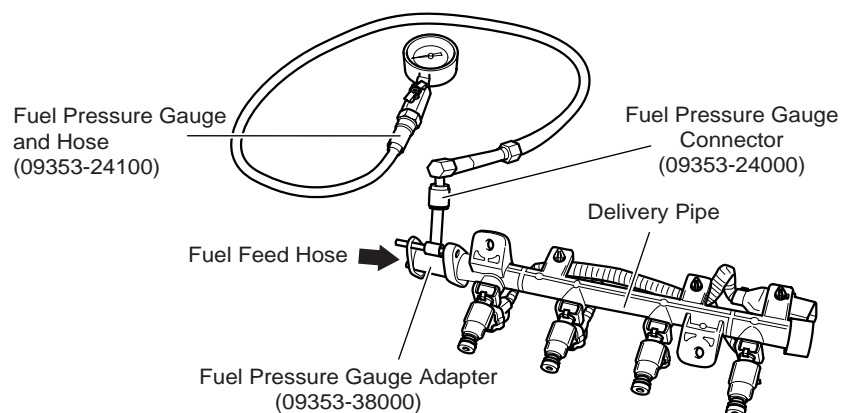
1. Disconnect the fuel feed hose from the delivery pipe.



CAUTION

Cover the hose connection with a shop towel to prevent splashing of fuel caused by residual pressure in the fuel line.

2. Install the Fuel Pressure Gauge Adapter (09353-38000) between the delivery pipe and the fuel feed hose.
3. Connect the Fuel Pressure Gauge Connector (09353-24000) to the Fuel Pressure Gauge Adapter (09353-38000).
4. Connect the Fuel Pressure Gauge and Hose (09353-24100) to Fuel Pressure Gauge Connector (09353-24000).
5. Connect the fuel feed hose to the Fuel Pressure Gauge Adapter (09353-38000).



SLDFL7123L

FL -486

FUEL SYSTEM

4. INSPECT FUEL LEAKAGE ON CONNECTION

1. Connect the battery negative (-) terminal.
2. Apply battery voltage to the fuel pump terminal and activate the fuel pump. With fuel pressure applied, check that there is no fuel leakage from the fuel pressure gauge or connection part.

5. FUEL PRESURE TEST

1. Diconnect the negative (-) terminal from the battery.
2. Connect the fuel pump connector.
3. Connect the battery negative (-) terminal.
4. Start the engine and measure the fuel pressure at idle.

Standard Value: 338 ~ 348 kpa (3.45 ~ 3.55 kgf/cm², 49.0 ~ 50.5 psi)

- If the measured fuel pressure differs from the standard value, perform the necessary repairs using the table below.

Condition	Probable Cause	Suspected Area
Fuel Pressure too low	Clogged fuel filter	Fuel filter
	Fuel leak on the fuel-pressure regulator that is assembled on fuel pump because of poor seating of the fuel-pressure regulator.	Fuel Pressure Regulator
Fuel Pressure too High	Sticking fuel pressure regulator	Fuel Pressure Regulator

5. Stop the engine and check for a change in the fuel pressure gauge reading.

After engine stops, the gage reading should hold for about 5 minutes

- Observing the declination of the fuel pressure when the gage reading drops and perform the necessary repairs using the table below.

Condition	Probable Cause	Supected Area
Fuel pressure drops slowly after engine is stopped	Injector leak	Injector
Fuel pressure drops immediately after engine is stopped	The check valve within the fuel pump is open	Fuel Pump

SMGFL6906N

FUEL DELIVERY SYSTEM

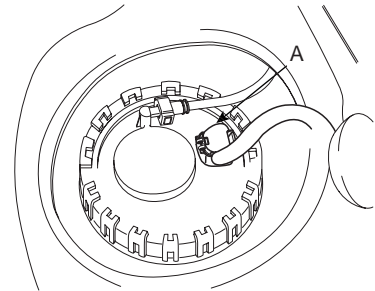
FL -487

6. RELEASE THE INTERNAL PRESSURE

1. Disconnect the fuel pump connector (A).
2. Start the engine and wait until fuel in fuel line is exhausted.
3. After the engine stalls, turn the ignition switch to OFF position and disconnect the negative (-) terminal from the battery.

**NOTE**

Be sure to reduce the fuel pressure before disconnecting the fuel feed hose, otherwise fuel will spill out.

**7. REMOVE THE SPECIAL SERVICE TOOL (SST) AND CONNECT THE FUEL LINE**

1. Disconnect the Fuel Pressure Gage and Hose (09353-24100) from the Fuel Pressure Gage Connector (09353-24000).
2. Disconnect the Fuel Pressure Gage Connector (09353-24000) from the Fuel Pressure Gage Adapter (09353-38000).
3. Disconnect the fuel feed hose from the Fuel Pressure Gage Adapter (09353-38000).
4. Disconnect the Fuel Pressure Gage Adapter (09353-38000) from the delivery pipe.

**CAUTION**

Cover the hose connection with a shop towel to prevent splashing of fuel caused by residual pressure in the fuel line.

5. Connect the fuel feed hose to the delivery pipe.

8. INSPECT FUEL LEAKAGE ON CONNECTION

1. Connect the battery negative (-) terminal.
2. Apply battery voltage to the fuel pump terminal and activate the fuel pump. With fuel pressure applied, check that there is no fuel leakage from the fuel pressure gauge or connection part.
3. If the vehicle is normal, connect the fuel pump connector.

SLDFL7124L

FL -488

FUEL SYSTEM

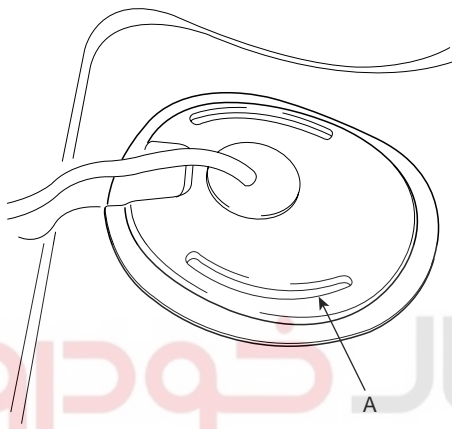
FUEL PUMP

REMOVAL (INCLUDING FUEL FILTER AND FUEL PRESSURE REGULATOR)

E4FE6C40

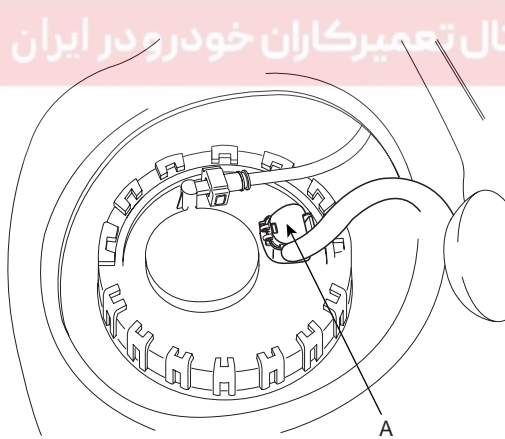
1. Preparation

- 1) Remove the rear seat cushion (Refer to "SEAT" in BD group).
- 2) Open the service cover (A).



SLDF17137D

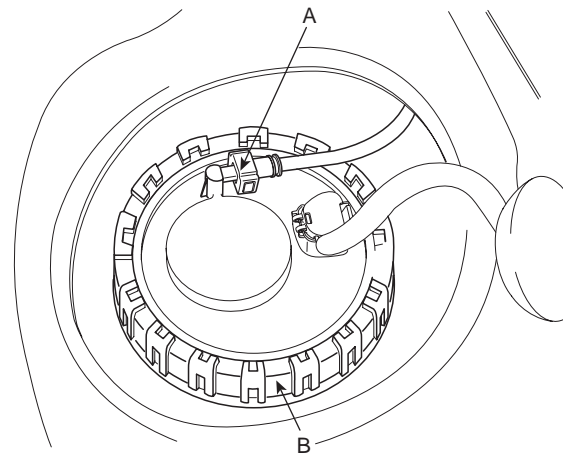
- 3) Disconnect the fuel pump connector (A).



SLDFL7141L

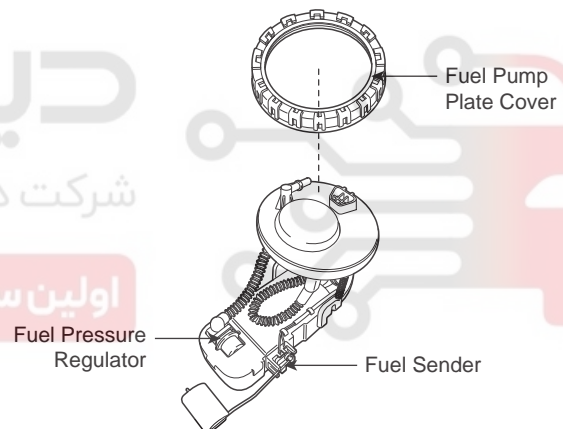
- 4) Start the engine and wait until fuel in fuel line is exhausted.
- 5) After engine stalls, turn the ignition switch to OFF position.

2. Disconnect the fuel feed tube quick-connector (A).



SLDFL7142L

3. Unscrew the fuel pump plate cover (B) with the special service tool (SST No.: 09310-2B100) and remove the fuel pump assembly.



SLDFL7143L

INSTALLATION

E6BA234D

Installation is reverse of removal.

Fuel Pump Plate Cover Tightening : 60.0 ~ 70.0
N·m (6.1 ~ 7.1 kgf·m, 44.3 ~ 51.6 lbf·ft)

FUEL DELIVERY SYSTEM

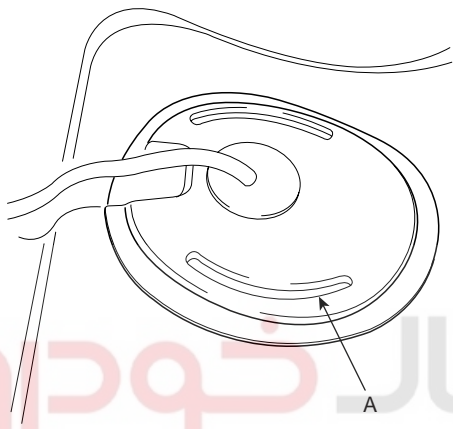
FL -489

FUEL TANK

REMOVAL (INCLUDING FUEL FILTER AND FUEL PRESSURE REGULATOR) EFF11F9F

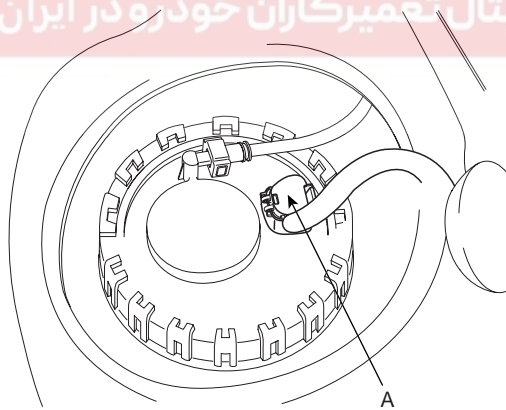
1. Preparation

- 1) Remove the rear seat cushion (Refer to "SEAT" in BD group).
- 2) Open the service cover (A).



SLDF17137D

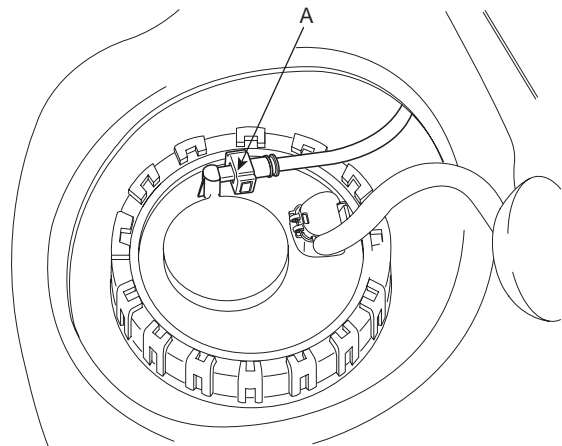
- 3) Disconnect the fuel pump connector (A).



SLDFL7141L

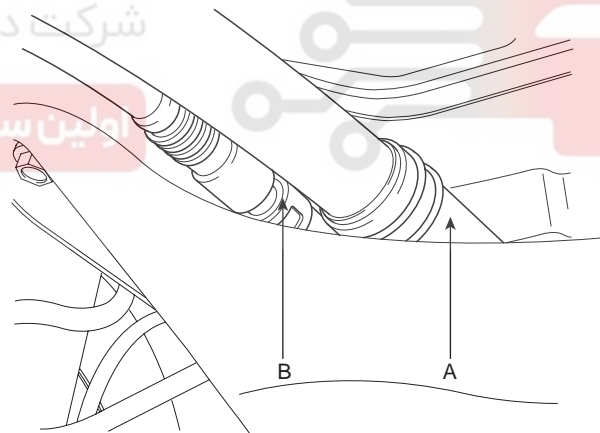
- 4) Start the engine and wait until fuel in fuel line is exhausted.
- 5) After engine stalls, turn the ignition switch to OFF position.

2. Disconnect the fuel feed quick-connector (A).



SLDFL7144L

3. Lift the vehicle.
4. Remove the muffler assembly (Refer "INTAKE AND EXHAUST SYSTEM" in EM group).
5. Support the fuel tank with a jack.
6. Disconnect the fuel filler hose (A) and the leveling hose (B).

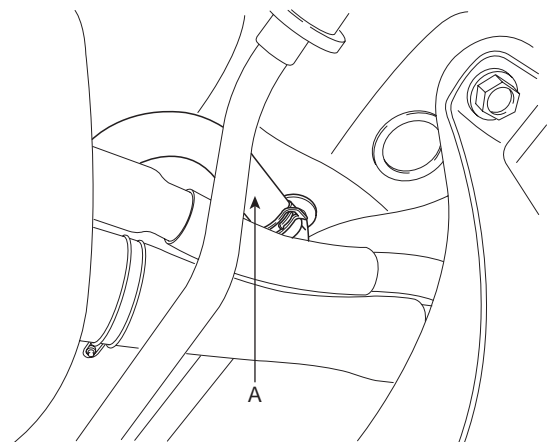


SLDF17146D

FL -490

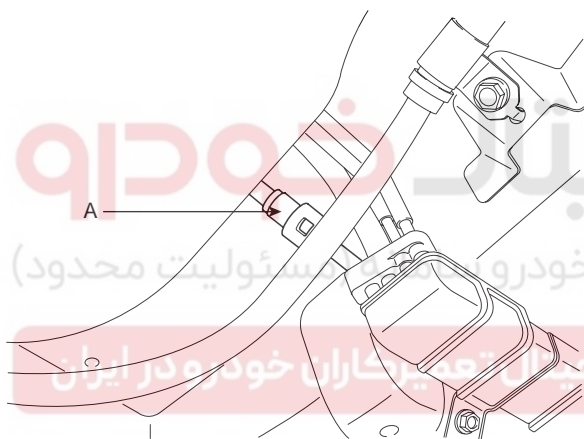
FUEL SYSTEM

7. Disconnect the vacuum hose (A).



SLDF17147D

8. Disconnect the vacuum tube (A).



SLDF17148D

9. Unscrew the fuel tank band mounting nuts and remove the fuel tank.

INSTALLATION E7F648CA

Installation is reverse of removal.

Fuel Tank Band Mounting Nuts : 39.2 ~ 54.0 N·m
(4.0 ~ 5.5 kgf·m, 28.9 ~ 39.8 lbf·ft)

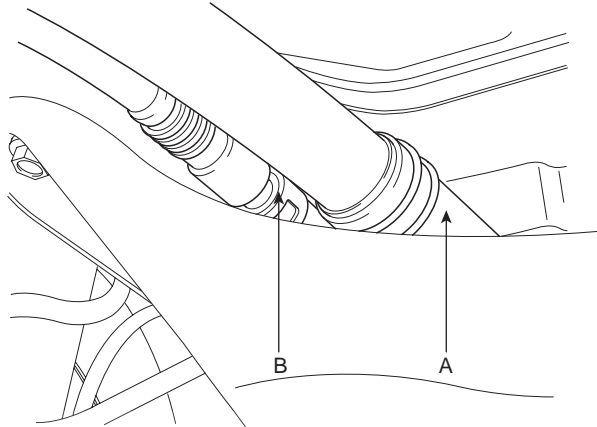
FUEL DELIVERY SYSTEM

FL -491

FILLER-NECK ASSEMBLY

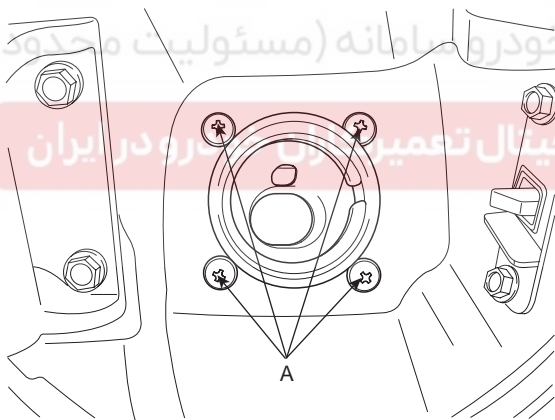
REMOVAL E03693A7

1. Disconnect the fuel filler hose (A) and the leveling hose (B).



SLDF17146D

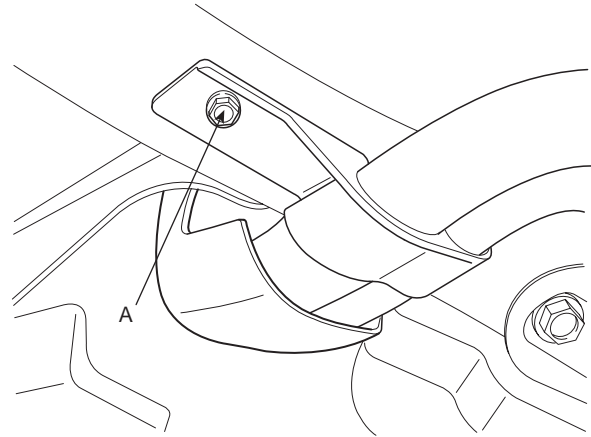
2. Open the fuel filler door and unfasten the filler-neck assembly mounting screws (A).



SCMFL6655D

3. Remove the rear-LH wheel, tire, and the inner wheel house.

4. Remove the bracket mounting bolts (A) and remove the filler-neck assembly.



SLDF17150D

INSTALLATION EE2B25A4

1. Installation is reverse of removal.

