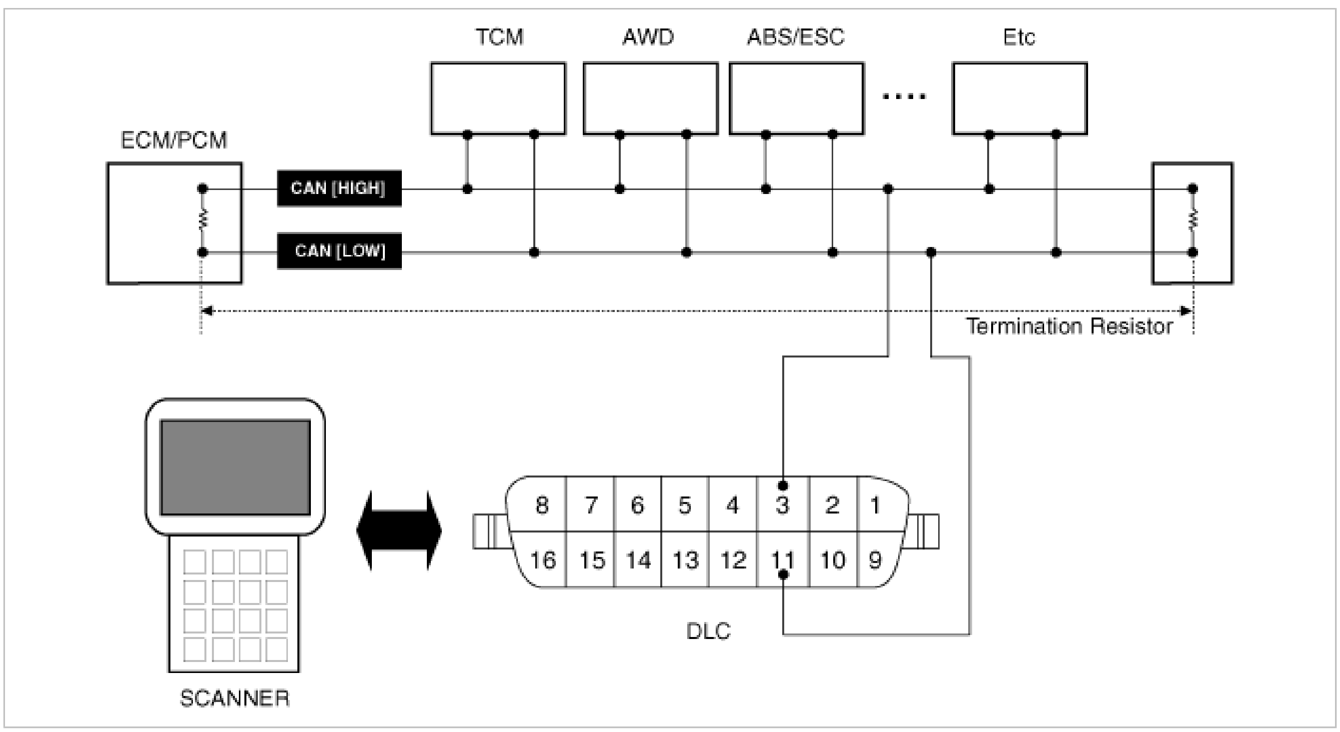
OBD-II review

1. Overview

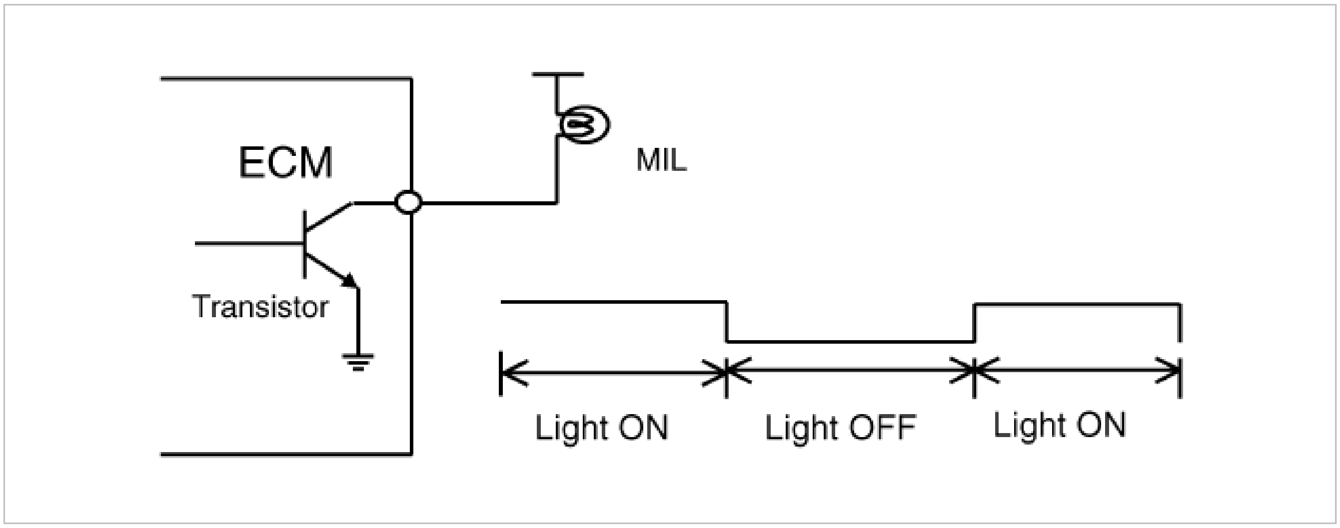
The California Air Resources Board (CARB) began regulation of On Board Diagnostics (OBD) for vehicles sold in california beginning with the 1988 model year. The first phase, OBD-I, required monitoring of the fuel metering system, Exhust Gas Recirculation (EGR) system and additional emission related components. The Malfunction Indicator Lamp (MIL) was required to light and alert the driver of the fault and the need for repair of the emission control system. Associated with the MIL was a fault code or Diagnostic Trouble Code (DTC) idenfying the specific area of the fault.
The OBD system was proposed by CARB to improve air quality by identifying vehicle exceeding emission standards. Passage of the Federal Clean Air Act Amendments in 1990 has also prompted the Environmental Protection Agency (EPA) to develop On Board Diagnostic requirements. CARB OBD-II regulations were followed until 1999 when the federal regulations were used.
The OBD-II system meets government regulations by monitoring the emission control system. When a system or component exceeds emission threshold or a component operates outside tolerance, a DTC will be stored and the MIL illuminated.
The diagnostic executive is a computer program in the Engine Control Module (ECM) or PowertrainControl Module (PCM) that coordinates the OBD-II self-monitoring system. This program controls all the monitors and interactions, DTC and MIL operation, freeze frame data and scan tool interface.
Freeze frame data describes stored engine conditions, such as state of the engine, state of fuel control, spark, RPM, load and warm status at the point the first fault is detected. Previously stored conditions will be replaced only if a fuel or misfire fault is detected. This data is accessible with the scan tool to assist in repairing the vehicle.
The center of the OBD-II system is a microprocessor called the Engine Control Module (ECM) or Powertrain Control Module(PCM).
The ECM or PCM receives input from sensors and other electronic components (switches, relays, and others) based on information received and programmed into its memory (keep alive random access memory, and others), the ECM or PCM generates output signals to control various relays, solenoids and actuators.

2. Configuration of hardware and related terms

1) GST (Generic scan tool)



2) MIL (Malfunction indication lamp) - MIL activity by transistor



The Malfunction Indicator Lamp (MIL) is connected between ECM or PCM-terminal Malfunction Indicator Lamp and battery supply (open collector amplifier).
In most cars, the MIL will be installed in the instrument panel. The lamp amplifier can not be damaged by a short circuit. Lamps with a power dissipation much greater than total dissipation of the MIL and lamp in the tester may cause a fault indication.
▷ At ignition ON and engine revolution (RPM)< MIN. RPM, the MIL is switched ON for an optical check by the driver.
3) MIL illumination

When the ECM or PCM detects a malfunction related emission during the first driving cycle, the DTC and engine data are stored in the freeze frame memory. The MIL is illuminated only when the ECM or PCM detects the same malfunction related to the DTC in two consecutive driving cycles.
4) MIL elimination

● Misfire and Fuel System Malfunctions:
For misfire or fuel system malfunctions, the MIL may be eliminated if the same fault does not reoccur during monitoring in three subsequent sequential driving cycles in which conditions are similar to those under which the malfunction was first detected.
● All Other Malfunctions:
For all other faults, the MIL may be extinguished after three subsequent sequential driving cycles during which the monitoring system responsible for illuminating the MIL functions without detecting the malfunction and if no other malfunction has been identified that would independently illuminate the MIL according to the requirements outlined above.
5) Erasing a fault code

The diagnostic system may erase a fault code if the same fault is not re-registered in at least 40 engine warm-up cycles, and the MIL is not illuminated for that fault code.
6) Communication Line (CAN)

- Bus Topology : Line (bus) structure
- Wiring : Twisted pair wire
- Off Board DLC Cable Length : Max. 5m
- Data Transfer Rate
- Diagnostic : 500 kbps
- Service Mode (Upgrade, Writing VIN) : 500 or 1Mbps)

7) Driving cycle

A driving cycle consists of engine start up, and engine shut off.
8) Warm-up cycle

A warm-up cycle means sufficient vehicle operation such that the engine coolant temperature has risen by at least 40 degrees Fahrenheit from engine starting and reaches a minimum temperature of at least 160 degrees Fahrenheit.
9) Trip cycle

A trip means vehicle operation (following an engine-off period) of duration and driving mode such that all components and systems are monitored at least once by the diagnostic system except catalyst efficiency or evaporative system monitoring when a steady-speed check is used, subject to the limitation that the manufacturer-defined trip monitoring conditions shall all be encountered at least once during the first engine start portion of the applicable FTP cycle.

10) DTC format

- Diagnostic Trouble Code (SAE J2012)
- DTCs used in OBD-II vehicles will begin with a letter and are followed by four numbers.

The letter of the beginning of the DTC identifies the function of the monitored device that has failed. A "P" indicates a powertrain device, "C" indicates a chassis device. "B" is for body device and "U" indicates a network or data link code. The first number indicates if the code is generic (common to all manufacturers) or if it is manufacturer specific. A "0" & "2" indicates generic, "1" indicates manufacturer-specific. The second number indicates the system that is affected with a number between 1 and 7.
The following is a list showing what numbers are assigned to each system.

1. Fuel and air metering
2. Fuel and air metering(injector circuit malfunction only)
3. Ignition system or misfire
4. Auxiliary emission controls
5. Vehicle speed controls and idle control system
6. Computer output circuits
7. Transmission

The last two numbers of the DTC indicates the component or section of the system where the fault is located.
11) Freeze frame data

When a freeze frame event is triggered by an emission related DTC, the ECM or PCM stores various vehicle information as it existed the moment the fault ocurred. The DTC number along with the engine data can be useful in aiding a technician in locating the cause of the fault. Once the data from the 1st driving cycle DTC ocurrence is stored in the freeze frame memory, it will remain there even when the fault ocurrs again (2nd driving cycle) and the MIL is illuminated.

- Freeze Frame List

1) Calculated Load Value
2) Engine RPM
3) Fuel Trim
4) Fuel Pressure (if available)
5) Vehicle Speed (if available)
6) Coolant Temperature
7) Intake Manifold Pressure (if available)
8) Closed-or Open-loop operation
9) Fault code

3. OBD-II system readiness tests

1) Catalyst monitoring

The catalyst efficiency monitor is a self-test strategy within the ECM or PCM that uses the downstream Heated Oxygen Sensor (HO2S) to determine when a catalyst has fallen below the minimum level of effectiveness in its ability to control exhaust emission.
2) Misfire monitoring

Misfire is defined as the lack of proper combustion in the cylinder due to the absence of spark, poor fuel metering, or poor compression. Any combustion that does not occur within the cylinder at the proper time is also a misfire. The misfire detection monitor detects fuel, ignition or mechanically induced misfires. The intent is to protect the catalyst from permanent damage and to alert the customer of an emission failure or an inspection maintenance failure by illuminating the MIL . When a misfire is detected, special software called freeze frame data is enabled. The freeze frame data captures the operational state of the vehicle when a fault is detected from misfire detection monitor strategy.
3) Fuel system monitoring

The fuel system monitor is a self-test strategy within the ECM or PCM that monitors the adaptive fuel table The fuel control system uses the adaptive fuel table to compensate for normal variability of the fuel system components caused by wear or aging. During normal vehicle operation, if the fuel system appears biased lean or rich, the adaptive value table will shift the fuel delivery calculations to remove bias.
4) Engine cooling system monitoring

The cooling system monitoring is a self-test strategy within the ECM or PCM that monitors ECTS (Engine Coolant Temperature Sensor) and thermostat about circuit continuity, output range, rationality faults.
5) O2 sensor monitoring

OBD-II regulations require monitoring of the upstream Heated O2 Sensor (H2OS) to detect if the deterioration of the sensor has exceeded thresholds. An additional HO2S is located downstream of the Warm-Up Three Way Catalytic Converter (WU-TWC) to determine the efficiency of the catalyst.
Although the downstream H2OS is similar to the type used for fuel control, it functions differently. The downstream HO2S is monitored to determine if a voltage is generated. That voltage is compared to a calibrated acceptable range.
6) Evaporative emission system monitoring

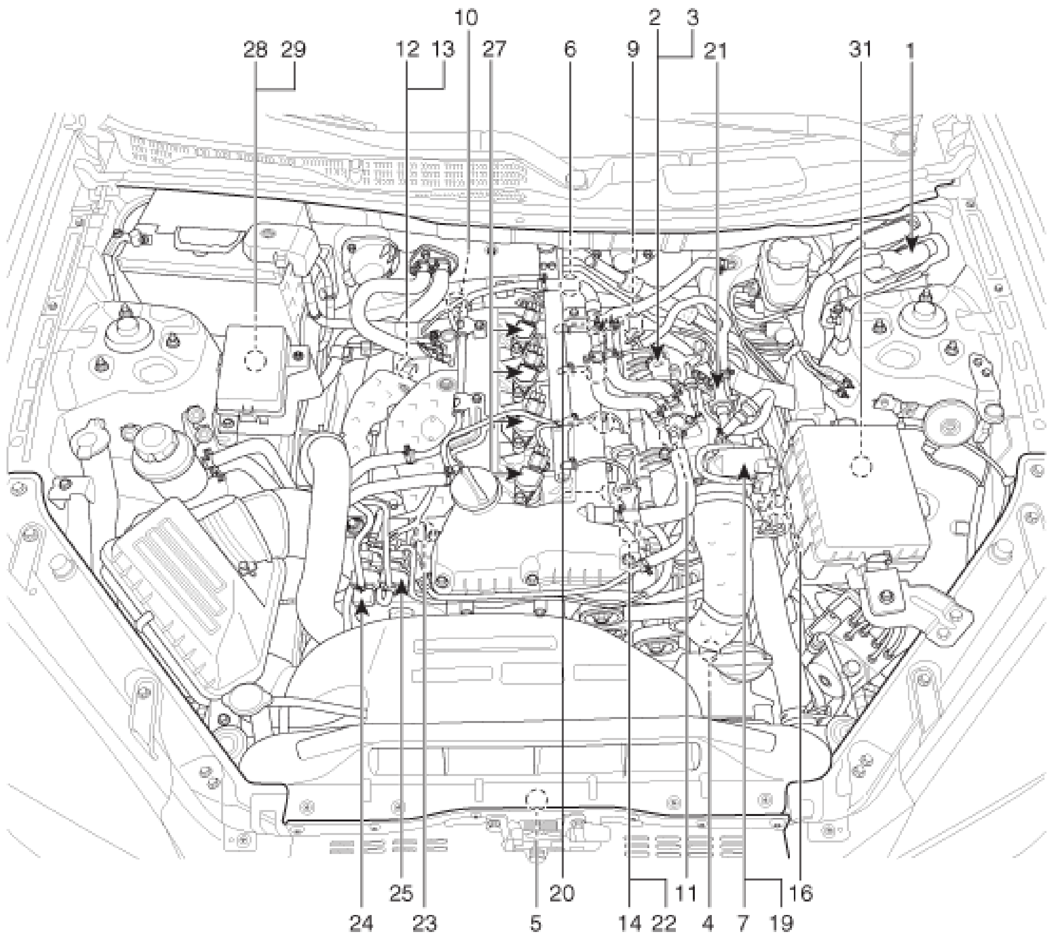
The EVAP. monitoring is a self-test strategy within the ECM or PCM that tests the integrity of the EVAP. system. The complete evaporative system detects a leak or leaks that cumulatively are greater than or equal to a leak caused by a 0.040 inch and 0.020 inch diameter orifice.
7) Air conditioning system monitoring

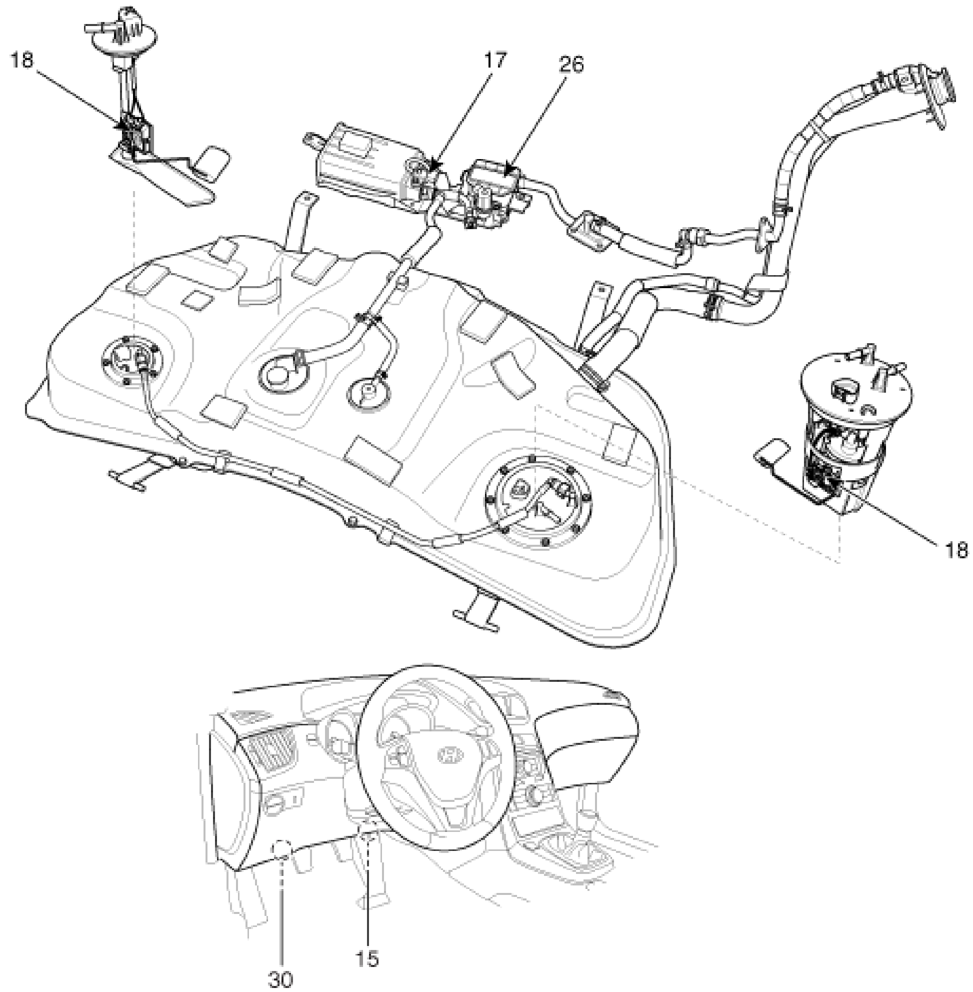
The A/C system monitoring is a self-test strategy within the ECM or PCM that monitors malfunction of all A/C system components at A/C ON.
8) Comprehensive components monitoring

The comprehensive components monitoring is a self-test strategy within the ECM or PCM that detects fault of any electronic powertrain components or system that provides input to the ECM or PCM and is not exclusively an input to any other OBD-II monitor.
9) A/C system component monitoring

Requirement:
If a vehicle incorporates an engine control strategy that alters off idle fuel and/or spark control when the A/C system is on, the OBD II system shall monitor all electronic air conditioning system components for malfunctions that cause the system to fail to invoke the alternate control while the A/C system is on or cause the system to invoke the alternate control while the A/C system is off.
Additionally, the OBD II system shall monitor for malfunction all electronic air conditioning system components that are used as part of the diagnostic strategy for any other monitored system or component.
Implementation plan:
No engine control strategy incorporated that alters offidle fuel and/or spark control when A/C system is on. Malfuction of A/C system components is not used as a part of the diagnostic strategy for other monitored system or component.

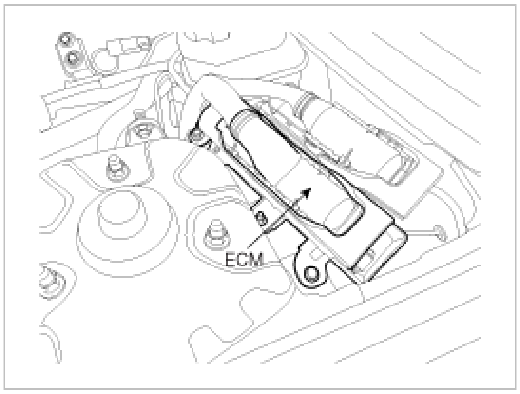
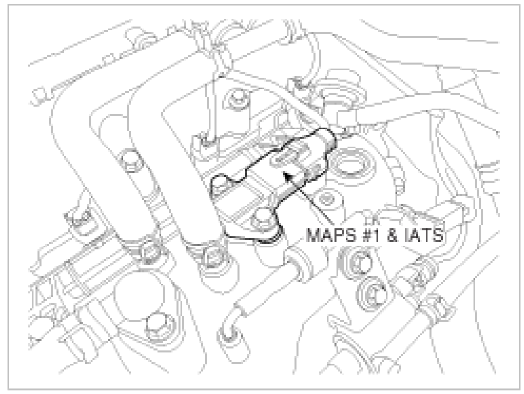
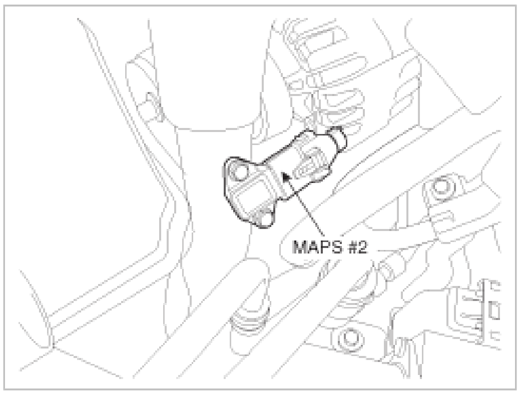
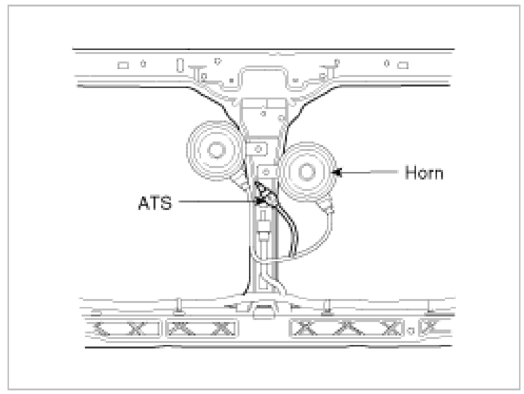
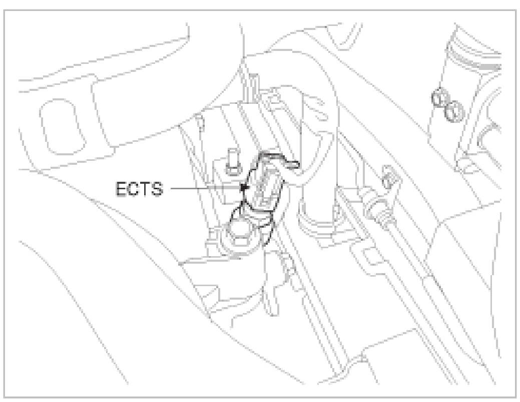
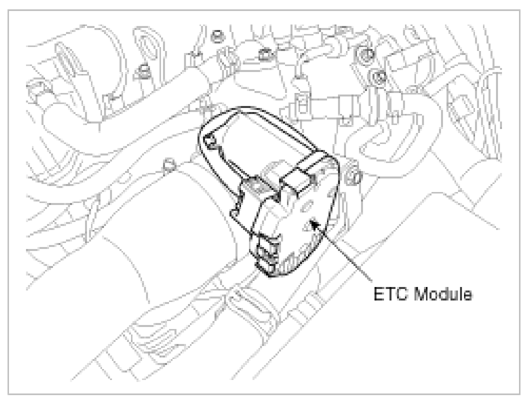
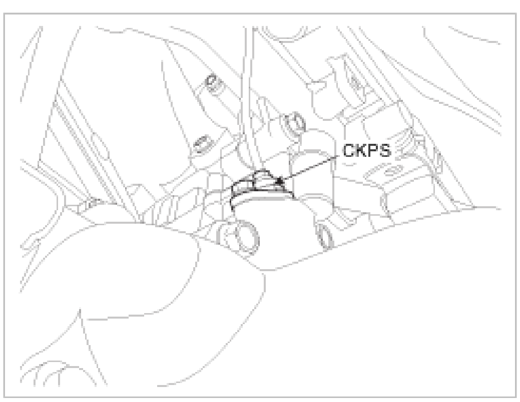
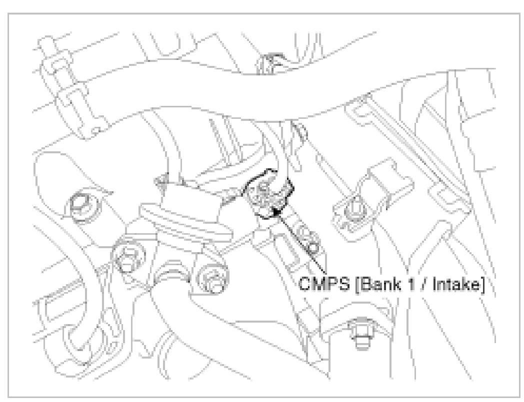
Components Location

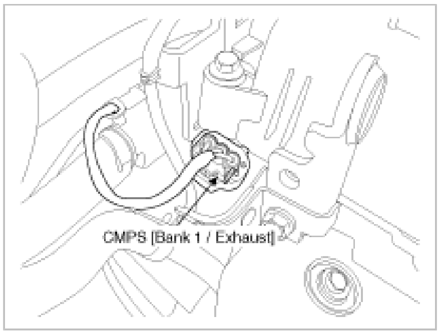


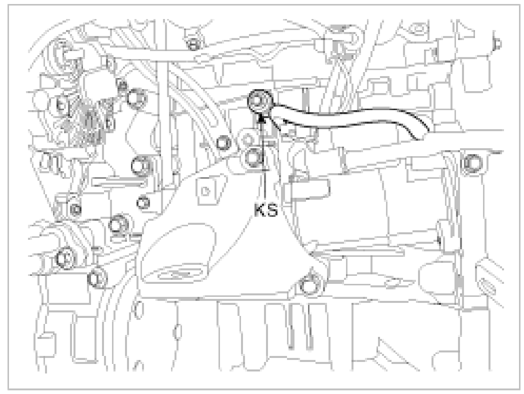


1. ECM (Engine Control Module) 2. Manifold Absolute Pressure Sensor (MAPS) #1 3. Intake Air Temperature Sensor (IATS) 4. Manifold Absolute Pressure Sensor (MAPS) #2 5. Ambient Temperature Sensor (ATS) 6. Engine Coolant Temperature Sensor (ECTS) 7. Throttle Position Sensor (TPS) [integrated into ETC Module] 8. Crankshaft Position Sensor (CKPS) 9. Camshaft Position Sensor (CMPS) [Bank 1 / Intake] 10. Camshaft Position Sensor (CMPS) [Bank 1 / Exhaust] 11. Knock Sensor (KS) 12. Heated Oxygen Sensor (HO2S) [Bank 1 / Sensor 1] 13. Heated Oxygen Sensor (HO2S) [Bank 1 / Sensor 2] 14. CVVT Oil Temperature Sensor (OTS) 15. Accelerator Position Sensor (APS) 16. A/C Pressure Transducer (APT)	17. Fuel Tank Pressure Sensor (FTPS) 18. Fuel Level Sensor (FLS) 19. ETC Motor [integrated into ETC Module] 20. Injector 21. Purge Control Solenoid Valve (PCSV) 22. CVVT Oil Control Valve (OCV) [Bank 1 / Intake] 23. CVVT Oil Control Valve (OCV) [Bank 1 / Exhaust] 24. WGT Control Solenoid Valve 25. RCV Control Solenoid Valve 26. Canister Close Valve (CCV) 27. Ignition Coil 28. Main Relay 29. Fuel Pump Relay 30. Data Link Connector (DLC) [16 Pin] 31. Multi-Purpose Check Connector [20 Pin]

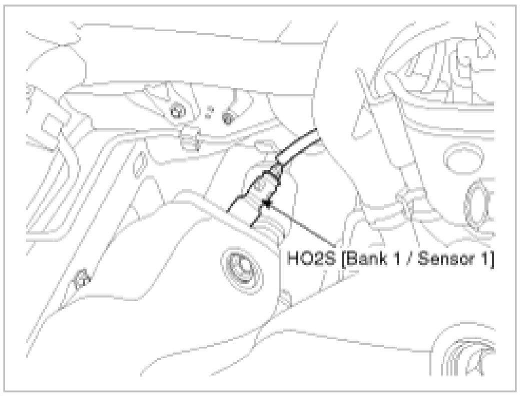
1. ECM (Engine Control Module)	2. Manifold Absolute Pressure Sensor (MAPS) #1 3. Intake Air Temperature Sensor (IATS)

	
4. Manifold Absolute Pressure Sensor (MAPS) #2	5. Ambient Temperature Sensor (ATS)
	
6. Engine Coolant Temperature Sensor (ECTS)	7. Throttle Position Sensor (TPS) [integrated into ETC Module] 19. ETC Motor [integrated into ETC Module]
	
8. Crankshaft Position Sensor (CKPS)	9. Camshaft Position Sensor (CMPS) [Bank 1 / Intake]
	
10. Camshaft Position Sensor (CMPS) [Bank 1 / Exhaust]	11. Knock Sensor (KS)

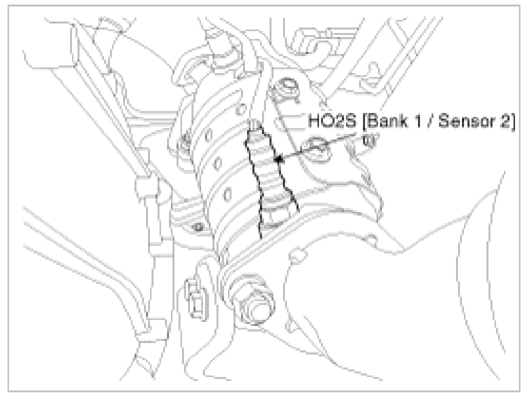




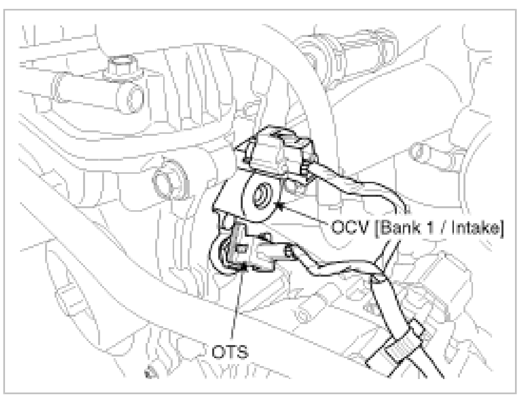
12. Heated Oxygen Sensor (HO2S) [Bank 1 / Sensor 1]



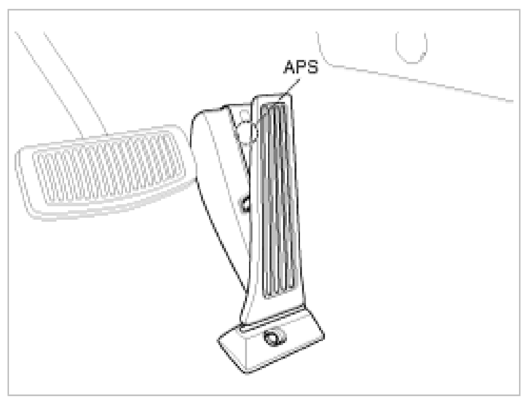
13. Heated Oxygen Sensor (HO2S) [Bank 1 / Sensor 2]



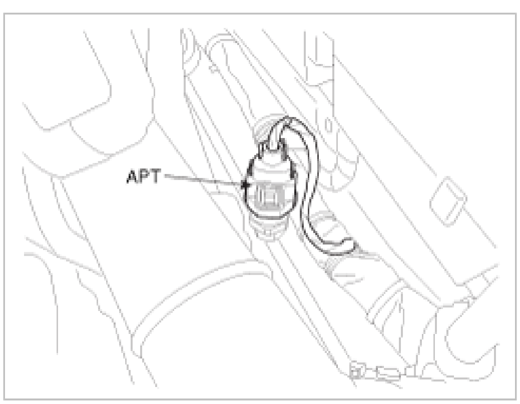
14. CVVT Oil Temperature Sensor (OTS)
22. CVVT Oil Control Valve (OCV) [Bank 1 / Intake]



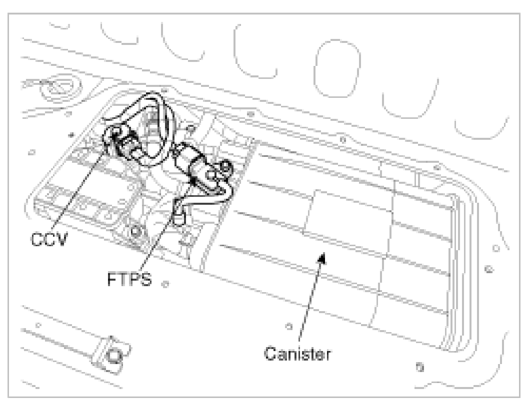
15. Accelerator Position Sensor (APS)



16. A/C Pressure Transducer (APT)

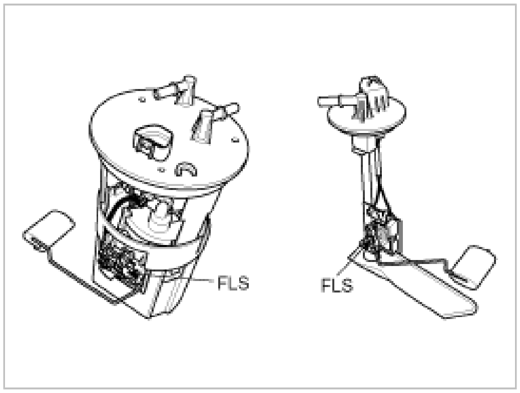
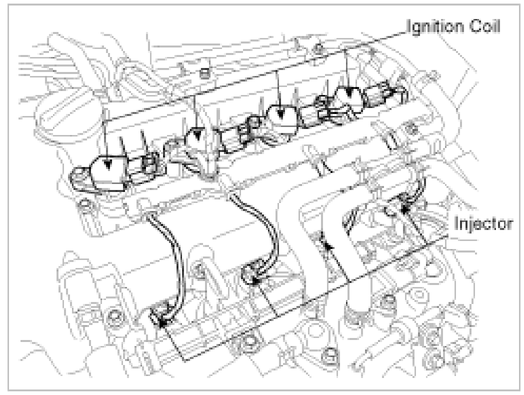
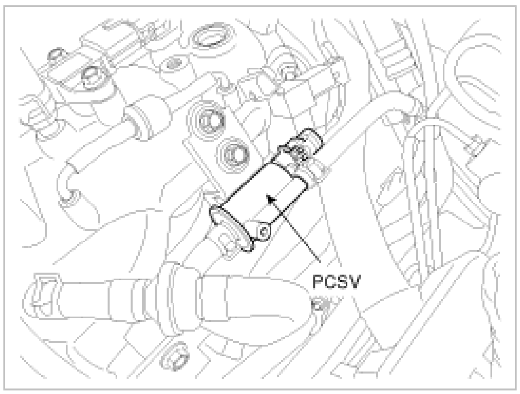
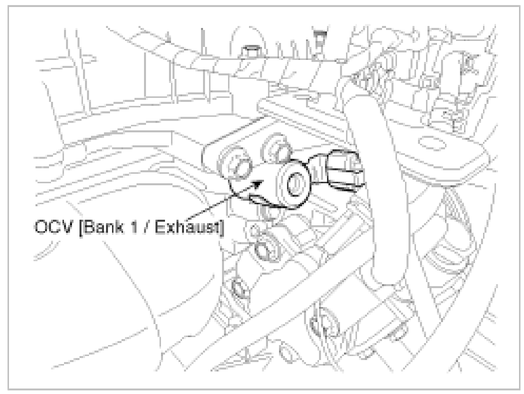
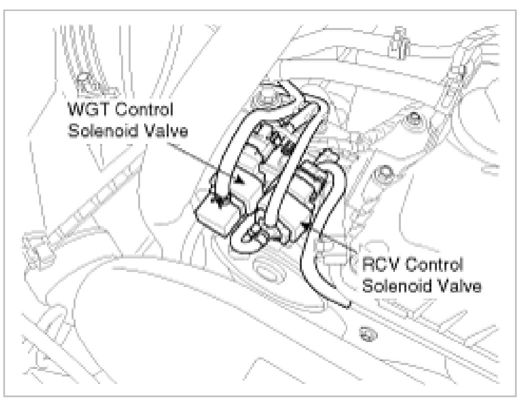
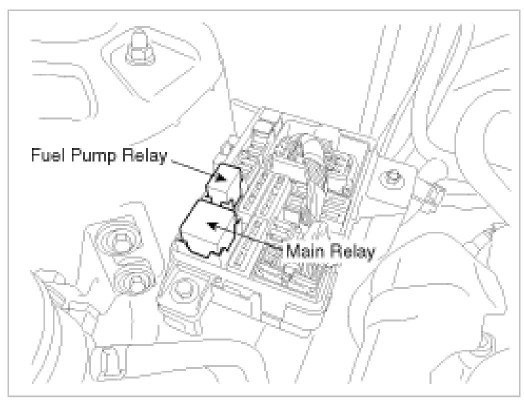


17. Fuel Tank Pressure Sensor (FTPS)
26. Canister Close Valve (CCV)



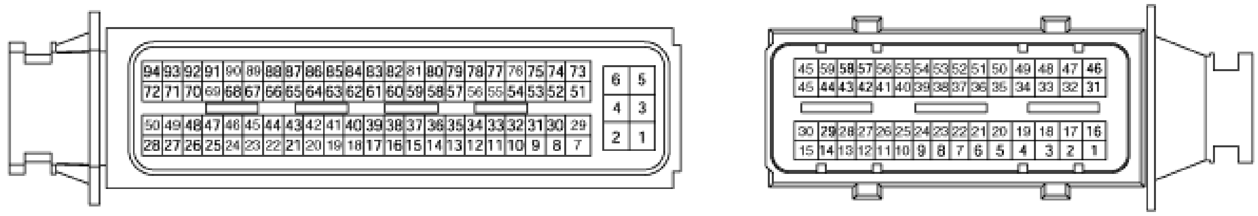
18. Fuel Level Sensor (FLS)

20. Injector

	27. Ignition Coil
	
21. Purge Control Solenoid Valve (PCSV)	23. CVVT Oil Control Valve (OCV) [Bank 1 / Exhaust]
	
24. WGT Control Solenoid Valve 25. RCV Control Solenoid Valve	28. Main Relay 29. Fuel Pump Relay
	

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > Engine Control Module (ECM) > Schematic Diagrams

ECM Terminal And Input/Output signal



Connector [CHG-K] Connector [CHG-A]

ECM Terminal Function

Connector [CHG-K]

Pin No.	Description	Connected to
1	Power ground	Chassis Ground
2	Battery power (B+)	Ignition Switch
3	Power ground	Chassis Ground
4	Battery power (B+)	Main Relay
5	Power ground	Chassis Ground
6	Battery power (B+)	Battery
7	-	
8	Fuel Level Sensor (FLS) [MIDDLE] singal input	Fuel Level Sensor (FLS)
9	Fuel Level Sensor (FLS) [TOTAL] singal input	Fuel Level Sensor (FLS)
10	Manifold Absolute Pressure Sensor (MAPS) #2 signal input	Manifold Absolute Pressure Sensor (MAPS) #2
11	Sensor ground	Manifold Absolute Pressure Sensor (MAPS) #2
12	Knock Sensor (KS) signal input	Knock Sensor (KS)
13	Sensor ground	Accelerator Position Sensor (APS) 2
14	Sensor ground	Engine Coolant Temperature Sensor (ECTS)
15	Camshaft Position Sensor (CMPS) [Bank 1/Exhaust] signal input	Camshaft Position Sensor (CMPS) [Bank 1/Exhaust]
16	Sensor ground	Heated Oxygen Sensor (HO2S) [Bank 1/Sensor 1]
17	Crankshaft Position Sensor (CKPS) signal input	Crankshaft Position Sensor (CKPS)
18	-	
19	-	
20	-	
21	Ambient Temperature Sensor (ATS) signal input	Ambient Temperature Sensor (ATS)
22	-	
23	-	
24	-	
25	Injector (Cylinder #1) control output	Injector (Cylinder #1)
26	Injector (Cylinder #3) control output	Injector (Cylinder #3)

27	Injector (Cylinder #4) control output	Injector (Cylinder #4)
28	Injector (Cylinder #2) control output	Injector (Cylinder #2)
29	-	
30	Sensor power (+5V)	Manifold Absolute Pressure Sensor (MAPS) #1
31	Manifold Absolute Pressure Sensor (MAPS) #1 signal input	Manifold Absolute Pressure Sensor (MAPS) #1
32	Throttle Position Sensor (TPS) 2 signal input	Throttle Position Sensor (TPS) 2
33	Engine Coolant Temperature Sensor (ECTS) signal input	Engine Coolant Temperature Sensor (ECTS)
34	Sensor ground	Knock Sensor (KS)
35	Accelerator Position Sensor (APS) 2 signal input	Accelerator Position Sensor (APS) 2
36	Sensor power (+5V)	Accelerator Position Sensor (APS) 2
37	Sensor ground	Camshaft Position Sensor (CMPS) [Bank 1/Exhaust]
38	Heated Oxygen Sensor (HO2S) [Bank 1/Sensor 1] signal input	Heated Oxygen Sensor (HO2S) [Bank 1/Sensor 1]
39	Sensor ground	Crankshaft Position Sensor (CKPS)
40	Vehicle speed signal input	ABS/ESC Control Unit
41	-	
42	-	
43	Sensor power (+5V)	Manifold Absolute Pressure Sensor (MAPS) #2, A/C Pressure Transducer (APT)
44	Sensor ground	Ambient Temperature Sensor (ATS)
45	-	
46	-	
47	WGT Control Solenoid Valve control output	WGT Control Solenoid Valve
48	RCV Control Solenoid Valve control output	RCV Control Solenoid Valve
49	-	
50	-	
51	Battery power (B+)	Main Relay
52	Sensor ground	Fuel Tank Pressure Sensor (FTPS)
53	Intake Temperature Sensor (IATS) signal input	Intake Temperature Sensor (IATS)
54	A/C Pressure Transducer (APT) signal input	A/C Pressure Transducer (APT)
55	-	
56	-	
57	Sensor ground	A/C Pressure Transducer (APT)
58	CVVT Oil Temperature Sensor (OTS) signal input	CVVT Oil Temperature Sensor (OTS)
59	Sensor ground	Throttle Position Sensor (TPS) 1,2
60	Sensor power (+5V)	Accelerator Position Sensor (APS) 1
61	Sensor ground	Accelerator Position Sensor (APS) 1
62	Camshaft Position Sensor (CMPS) [Bank 1/Intake] signal input	Camshaft Position Sensor (CMPS) [Bank 1/Intake]
63	Sensor power (+5V)	Throttle Position Sensor (TPS) 1,2
64	Main Relay control output	Main Relay

65	Cooling Fan Relay [Low] control output	Cooling Fan Relay [Low]
66	CVVT Oil Control (OCV) Valve [Bank 1/Intake] control output	CVVT Oil Control Valve (OCV) [Bank 1/Intake]
67	Purge Control Solenoid Valve (PCSV) control output	Purge Control Solenoid Valve (PCSV)
68	CVVT Oil Control (OCV) Valve [Bank 1/Exhaust] control output	CVVT Oil Control Valve (OCV) [Bank 1/Exhaust]
69	Immobilizer Lamp control output	Immobilizer Lamp [Without Button Engine Start System]
70	Fuel Pump Relay control output	Fuel Pump Relay
71	ETC Motor [+] control output	ETC Motor
72	ETC Motor [-] control output	ETC Motor
73	Fuel Tank Pressure Sensor (FTPS) signal input	Fuel Tank Pressure sensor (FTPS)
74	Sensor ground	Manifold Absolute Pressure Sensor (MAPS) #1
75	Immobilizer communication line	Smart Key Control Module [With Button Engine Start System] Immobilizer Control Module [Without Button Engine Start System]
76	-	
77	CAN [High]	Other control module, Data Link Connector (DLC), Multi-Purpose Check Connector
78	CAN [Low]	Other control module, Data Link Connector (DLC), Multi-Purpose Check Connector
79	Sensor ground	CVVT Oil Temperature Sensor (OTS)
80	Throttle Position Sensor (TPS) 1 signal input	Throttle Position Sensor (TPS) 1
81	-	
82	Accelerator Position Sensor (APS) 1 signal input	Accelerator Position Sensor (APS) 1
83	Sensor ground	Camshaft Position Sensor (CMPS) [Bank 1/Intake]
84	Heated Oxygen Sensor (HO2S) [Bank 1/Sensor 2] signal input	Heated Oxygen Sensor (HO2S) [Bank 1/Sensor 2]
85	Sensor ground	Heated Oxygen Sensor (HO2S) [Bank 1/Sensor 2]
86	Engine speed signal output	Power Distribution Module (PDM)
87	A/C Compressor Relay control output	A/C Compressor Relay
88	Cooling Fan Relay [High] control output	Cooling Fan Relay [High]
89	-	
90	-	
91	Canister Close Valve (CCV) control output	Canister Close Valve (CCV)
92	Malfunction Indicator Lamp (MIL) control output	Malfunction Indicator Lamp (MIL)
93	Heated Oxygen Sensor (HO2S) [Bank 1/Sensor 1] Heater control output	Heated Oxygen Sensor (HO2S) [Bank 1/Sensor 1]
94	Heated Oxygen Sensor (HO2S) [Bank 1/Sensor 2] Heater control output	Heated Oxygen Sensor (HO2S) [Bank 1/Sensor 2]

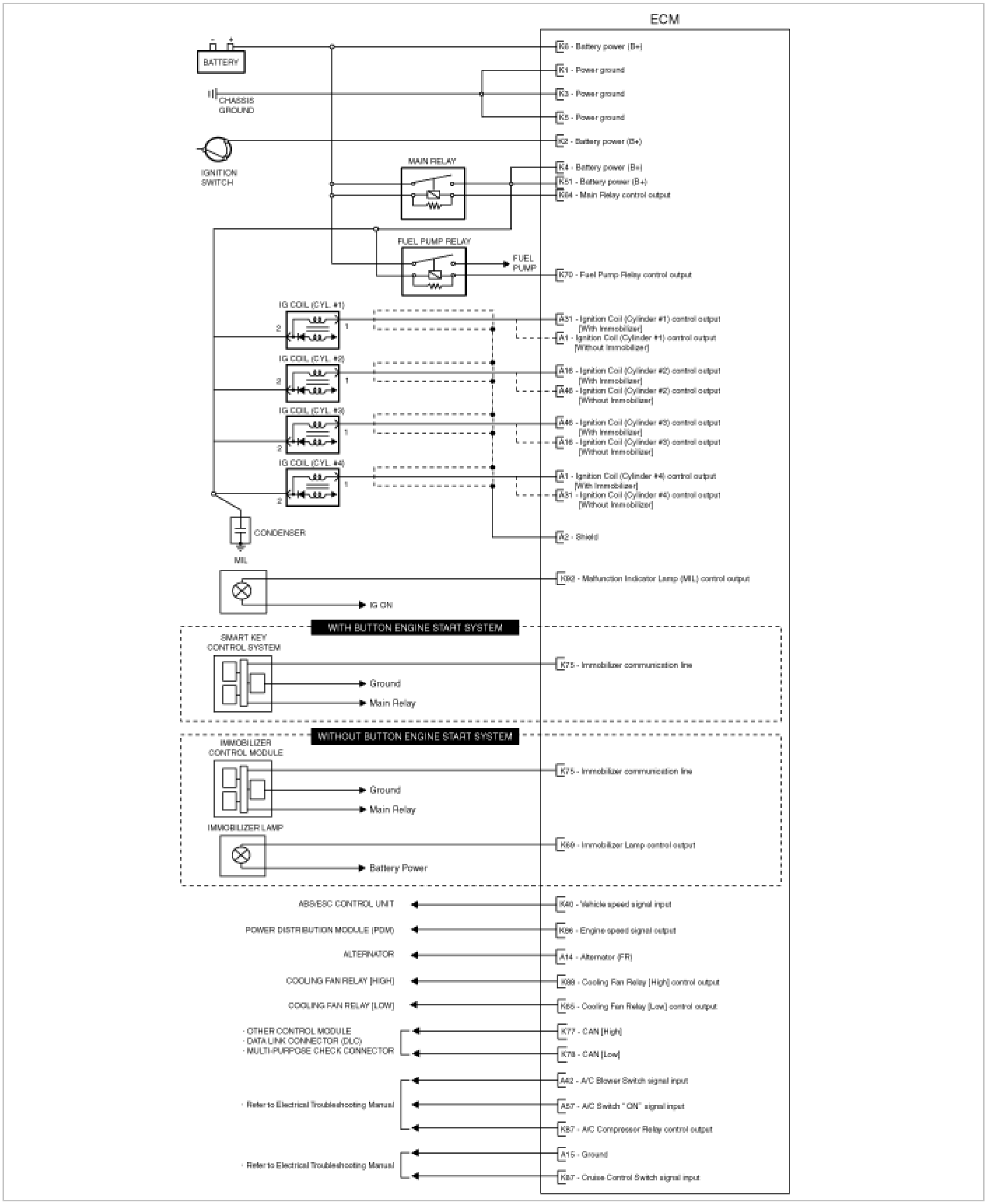
Connector [CHG-A]

Pin No.	Description	Connected to

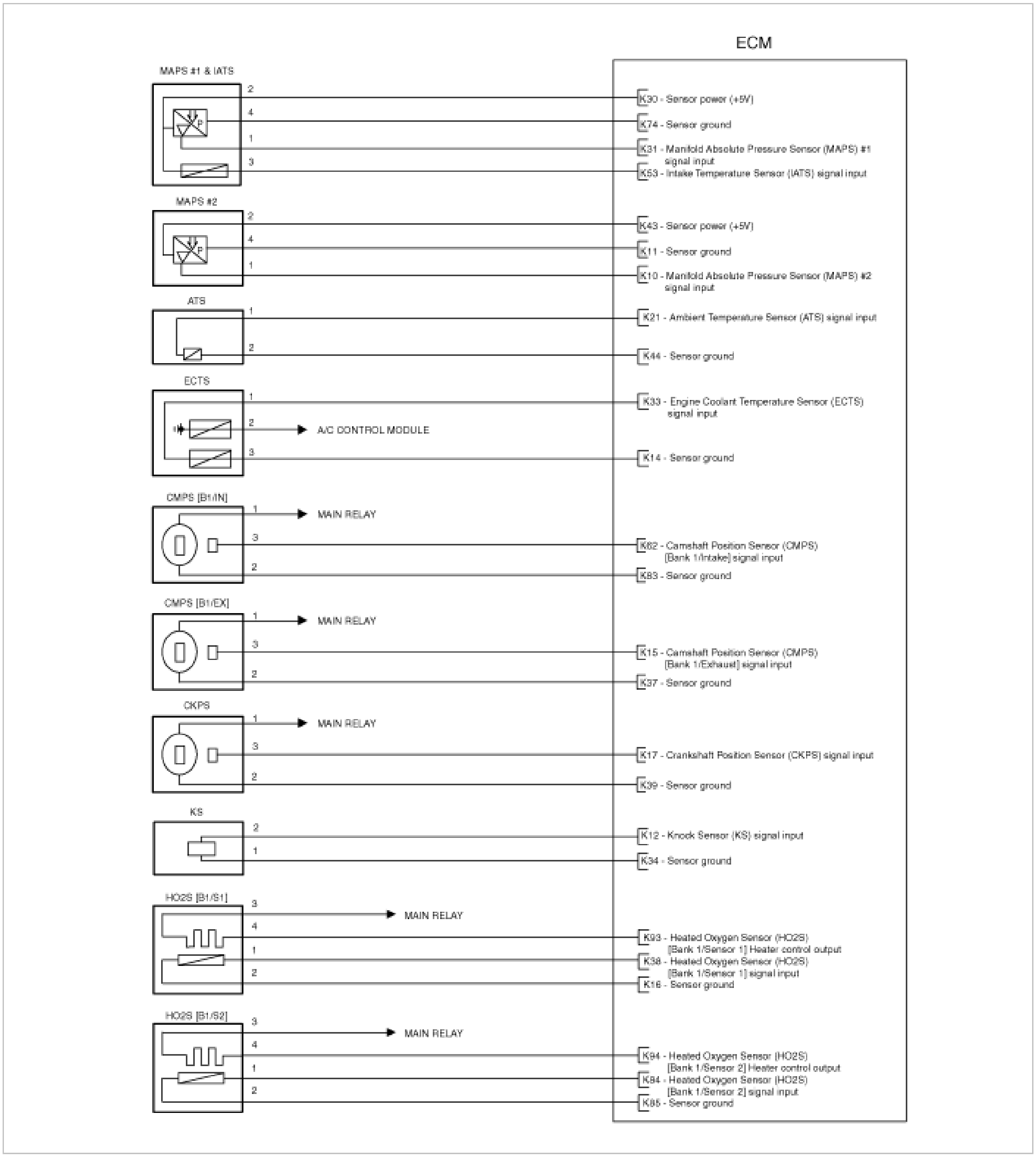
1	Ignition Coil (Cylinder #4) control output [With Immobilizer]	Ignition Coil (Cylinder #4) [With Immobilizer]
	Ignition Coil (Cylinder #1) control output [Without Immobilizer]	Ignition Coil (Cylinder #1) [Without Immobilizer]
2	Shield	Ignition Coil (Cylinder #1,2,3,4)
3	-	
4	-	
5	-	
6	-	
7	-	
8	-	
9	-	
10	-	
11	-	
12	-	
13	-	
14	Alternator (FR)	Alternator
15	Ground	Cruise Control Switch
16	Ignition Coil (Cylinder #2) control output [With Immobilizer]	Ignition Coil (Cylinder #2) [With Immobilizer]
	Ignition Coil (Cylinder #3) control output [Without Immobilizer]	Ignition Coil (Cylinder #3) [Without Immobilizer]
17	-	
18	-	
19	-	
20	-	
21	-	
22	-	
23	-	
24	-	
25	-	
26	-	
27	-	
28	-	
29	Brake Switch 1 signal input	Brake Switch
30	Cruise Control Switch signal input	Cruise Control Switch
31	Ignition Coil (Cylinder #1) control output [With Immobilizer]	Ignition Coil (Cylinder #1) [With Immobilizer]
	Ignition Coil (Cylinder #4) control output [Without Immobilizer]	Ignition Coil (Cylinder #4) [Without Immobilizer]
32	-	
33	-	
34	-	

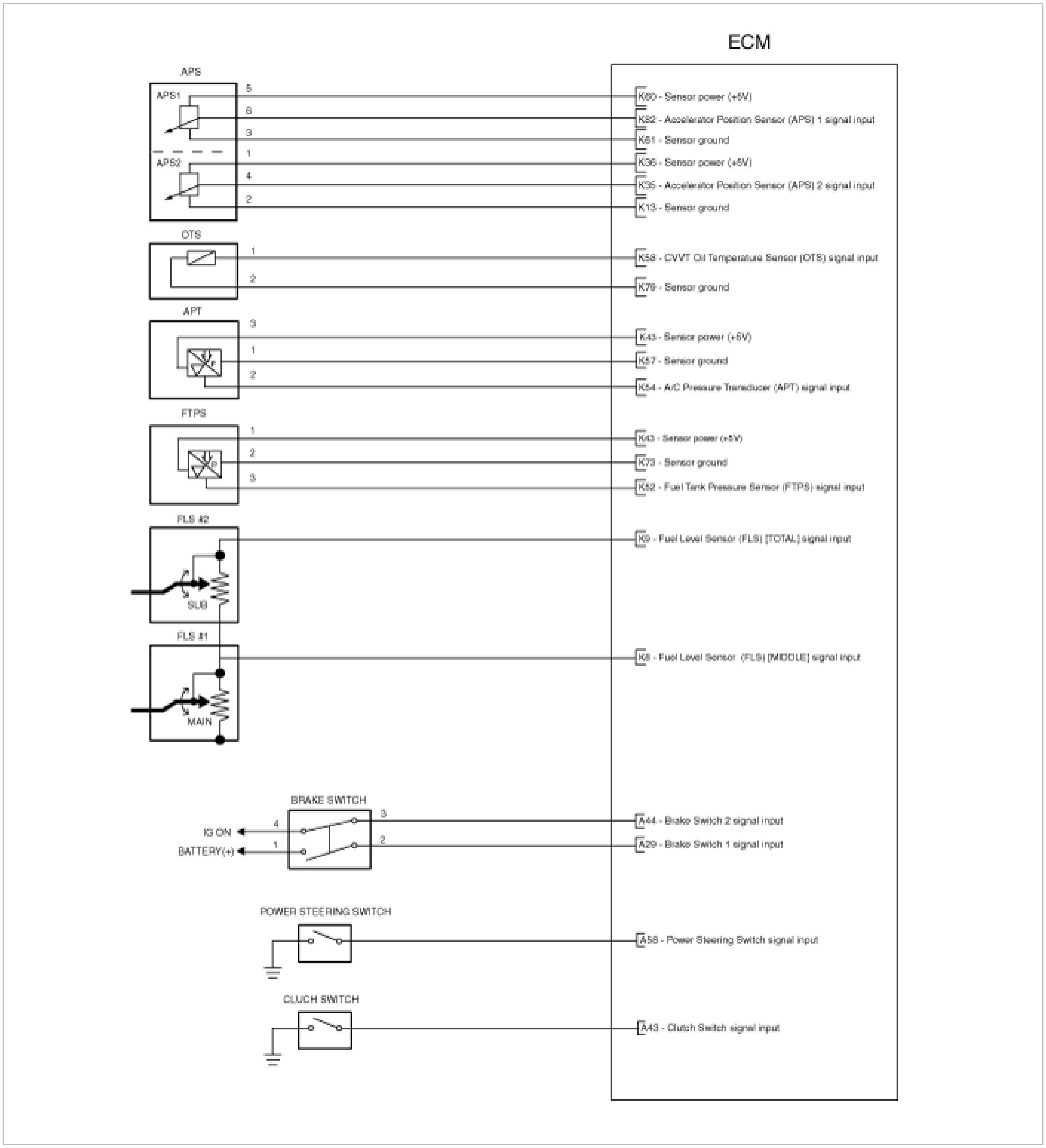
35	-	
36	-	
37	-	
38	-	
39	-	
40	-	
41	-	
42	A/C Blower Switch signal input	A/C Control Module
43	Clutch Switch signal input	Clutch Switch
44	Brake Switch 2 signal input	Brake Switch
45	-	
46	Ignition Coil (Cylinder #3) control output [With Immobilizer]	Ignition Coil (Cylinder #3) [With Immobilizer]
	Ignition Coil (Cylinder #2) control output [Without Immobilizer]	Ignition Coil (Cylinder #2) [Without Immobilizer]
47	-	
48	-	
49	-	
50	-	
51	-	
52	-	
53	-	
54	-	
55	-	
56	-	
57	A/C Switch “ON” signal input	A/C Control Module
58	Power Steering Switch signal input	Power Steering Switch
59	-	
60	-	

Circuit Diagram

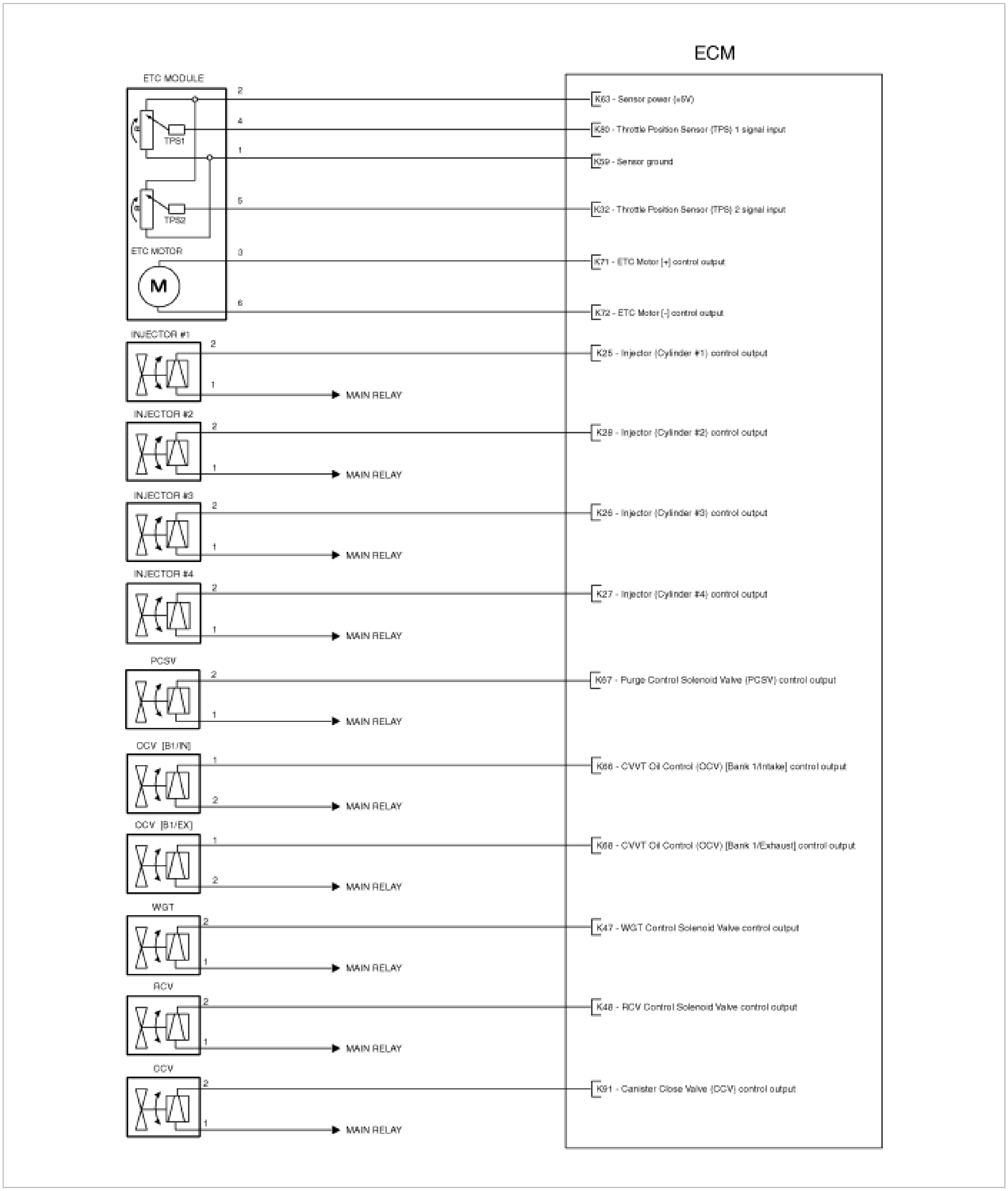


ECM
BATTERY
CHASSIS GROUND
IGNITION SWITCH
MAIN RELAY
FUEL PUMP RELAY
FUEL PUMP
IG COIL (CYL. #1)
IG COIL (CYL. #2)
IG COIL (CYL. #3)
IG COIL (CYL. #4)
CONDENSER
MIL
IG ON
K6 - Battery power (B+)
K1 - Power ground
K3 - Power ground
K5 - Power ground
K2 - Battery power (B+)
K4 - Battery power (B+)
K51 - Battery power (B+)
K64 - Main Relay control output
K70 - Fuel Pump Relay control output
A31 - Ignition Coil (Cylinder #1) control output [With Immobilizer]
A1 - Ignition Coil (Cylinder #1) control output [Without Immobilizer]
A16 - Ignition Coil (Cylinder #2) control output [With Immobilizer]
A46 - Ignition Coil (Cylinder #2) control output [Without Immobilizer]
A46 - Ignition Coil (Cylinder #3) control output [With Immobilizer]
A16 - Ignition Coil (Cylinder #3) control output [Without Immobilizer]
A1 - Ignition Coil (Cylinder #4) control output [With Immobilizer]
A31 - Ignition Coil (Cylinder #4) control output [Without Immobilizer]
A2 - Shield
K92 - Malfunction Indicator Lamp (MIL) control output
WITH BUTTON ENGINE START SYSTEM
SMART KEY CONTROL SYSTEM
Ground
Main Relay
K75 - Immobilizer communication line
WITHOUT BUTTON ENGINE START SYSTEM
IMMOBILIZER CONTROL MODULE
Ground
Main Relay
K75 - Immobilizer communication line
IMMOBILIZER LAMP
Battery Power
K59 - Immobilizer Lamp control output
ABS/ESC CONTROL UNIT
K40 - Vehicle speed signal input
POWER DISTRIBUTION MODULE (PDM)
K86 - Engine speed signal output
ALTERNATOR
A14 - Alternator (FR)
COOLING FAN RELAY [HIGH]
K88 - Cooling Fan Relay [High] control output
COOLING FAN RELAY [LOW]
K65 - Cooling Fan Relay [Low] control output
· OTHER CONTROL MODULE
· DATA LINK CONNECTOR (DLC)
· MULTI-PURPOSE CHECK CONNECTOR
K77 - CAN [High]
K78 - CAN [Low]
· Refer to Electrical Troubleshooting Manual
A42 - A/C Blower Switch signal input
A57 - A/C Switch "ON" signal input
K67 - A/C Compressor Relay control output
· Refer to Electrical Troubleshooting Manual
A15 - Ground
K87 - Cruise Control Switch signal input


ECM
MAPS #1 & IATS
K30 - Sensor power (+5V)
K74 - Sensor ground
K31 - Manifold Absolute Pressure Sensor (MAPS) #1 signal input
K53 - Intake Temperature Sensor (IATS) signal input
MAPS #2
K43 - Sensor power (+5V)
K11 - Sensor ground
K10 - Manifold Absolute Pressure Sensor (MAPS) #2 signal input
ATS
K21 - Ambient Temperature Sensor (ATS) signal input
K44 - Sensor ground
ECTS
K33 - Engine Coolant Temperature Sensor (ECTS) signal input
A/C CONTROL MODULE
K14 - Sensor ground
CMPS [B1/IN]
MAIN RELAY
K62 - Camshaft Position Sensor (CMPS) [Bank 1/Intake] signal input
K83 - Sensor ground
CMPS [B1/EX]
MAIN RELAY
K15 - Camshaft Position Sensor (CMPS) [Bank 1/Exhaust] signal input
K37 - Sensor ground
CKPS
MAIN RELAY
K17 - Crankshaft Position Sensor (CKPS) signal input
K39 - Sensor ground
KS
K12 - Knock Sensor (KS) signal input
K34 - Sensor ground
HO2S [B1/S1]
MAIN RELAY
K93 - Heated Oxygen Sensor (HO2S) [Bank 1/Sensor 1] Heater control output
K38 - Heated Oxygen Sensor (HO2S) [Bank 1/Sensor 1] signal input
K16 - Sensor ground
HO2S [B1/S2]
MAIN RELAY
K94 - Heated Oxygen Sensor (HO2S) [Bank 1/Sensor 2] Heater control output
K84 - Heated Oxygen Sensor (HO2S) [Bank 1/Sensor 2] signal input
K85 - Sensor ground



ECM
APS
APS1
APS2
5
6
3
1
4
2
K60 - Sensor power (+5V)
K82 - Accelerator Position Sensor (APS) 1 signal input
K61 - Sensor ground
K36 - Sensor power (+5V)
K35 - Accelerator Position Sensor (APS) 2 signal input
K13 - Sensor ground
OTS
K58 - CVVT Oil Temperature Sensor (OTS) signal input
K79 - Sensor ground
APT
K43 - Sensor power (+5V)
K57 - Sensor ground
K54 - A/C Pressure Transducer (APT) signal input
FTPS
K43 - Sensor power (+5V)
K73 - Sensor ground
K52 - Fuel Tank Pressure Sensor (FTPS) signal input
FLS #2
SUB
K9 - Fuel Level Sensor (FLS) [TOTAL] signal input
FLS #1
MAIN
K8 - Fuel Level Sensor (FLS) [MIDDLE] signal input
BRAKE SWITCH
IG ON
BATTERY(+)
A44 - Brake Switch 2 signal input
A29 - Brake Switch 1 signal input
POWER STEERING SWITCH
A58 - Power Steering Switch signal input
CLUCH SWITCH
A43 - Clutch Switch signal input



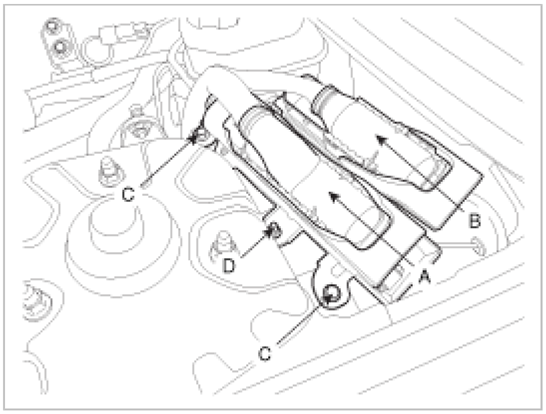
ECM
ETC MODULE
TPS1
TPS2
ETC MOTOR
M
K63 - Sensor power (+5V)
K80 - Throttle Position Sensor (TPS) 1 signal input
K59 - Sensor ground
K32 - Throttle Position Sensor (TPS) 2 signal input
K71 - ETC Motor [+] control output
K72 - ETC Motor [-] control output
INJECTOR #1
K25 - Injector (Cylinder #1) control output
MAIN RELAY
INJECTOR #2
K28 - Injector (Cylinder #2) control output
MAIN RELAY
INJECTOR #3
K26 - Injector (Cylinder #3) control output
MAIN RELAY
INJECTOR #4
K27 - Injector (Cylinder #4) control output
MAIN RELAY
PCSV
K67 - Purge Control Solenoid Valve (PCSV) control output
MAIN RELAY
OCV [B1/IN]
K86 - CVVT Oil Control (OCV) [Bank 1/Intake] control output
MAIN RELAY
OCV [B1/EX]
K88 - CVVT Oil Control (OCV) [Bank 1/Exhaust] control output
MAIN RELAY
WGT
K47 - WGT Control Solenoid Valve control output
MAIN RELAY
RCV
K48 - RCV Control Solenoid Valve control output
MAIN RELAY
CCV
K91 - Canister Close Valve (CCV) control output
MAIN RELAY

Removal

NOTE

In the case of the vehicle equipped with immobilizer, perform "Key Teaching" procedure together (Refer to "Immobilizer" in BE group).

1. Turn ignition switch OFF and disconnect the negative (-) battery cable.
2. Remove the front strut assembly (Refer to "FRONT SUSPENSION SYSTEM" in SS group).
3. Disconnect the ECM Connector (A).



4. Disconnect the TCM connector (B) [A/T].
5. Remove the ECM bracket installation bolts (C) and nut (D).

Installation

NOTE

In the case of the vehicle equipped with immobilizer, perform "Key Teaching" procedure together (Refer to "Immobilizer" in BE group).

1. Installation is reverse of removal.

ECM bracket installation bolt/nut:
9.8 ~ 11.8 N.m (1.0 ~ 1.2 kgf.m, 7.2 ~ 8.7 lb-ft)

ECM Problem Inspection Procedure

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

Specification: Below 1Ω

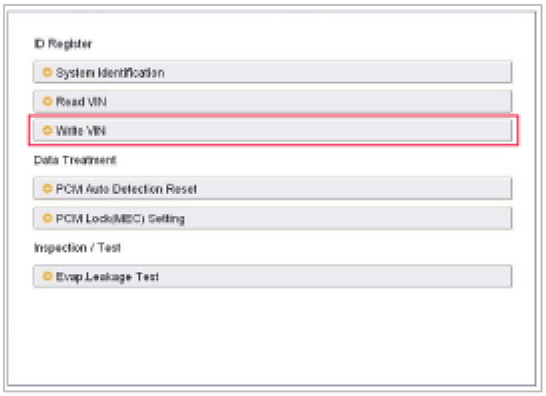
2. TEST ECM CONNECTOR: Disconnect the ECM connector and visually check the ground terminals on ECM side and harness side for bent pins or poor contact pressure. If the problem is found, repair it.
3. If problem is not found in Step 1 and 2, the ECM could be faulty. If so, replace the ECM with a new one,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

VIN Programming Procedure

VIN (Vehicle Identification Number) is a number that has the vehicle's information (Maker, Vehicle Type, Vehicle Line/Series, Body Type, Engine Type, Transmission Type, Model Year, Plant Location and so forth. For more information, please refer to the group "GI" in this SERVICE MANUAL). When replacing an ECM, the VIN must be programmed in the ECM. If there is no VIN in ECM memory, the fault code (DTC P0630) is set.

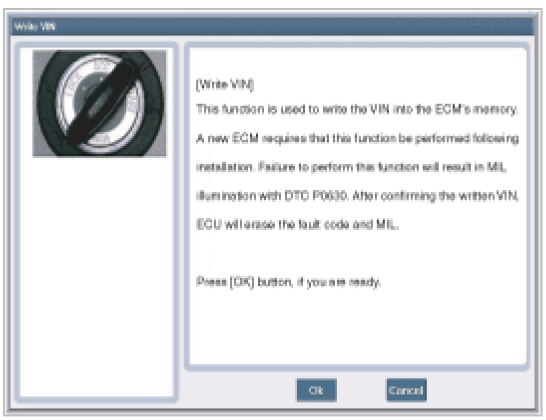
> **CAUTION**
>
> The programmed VIN cannot be changed. When writing the VIN, confirm the VIN carefully

1. Select "VIN Writing" function in "Vehicle S/W Management".
2. Select "Write VIN" in "ID Resister".



3. Input the VIN.

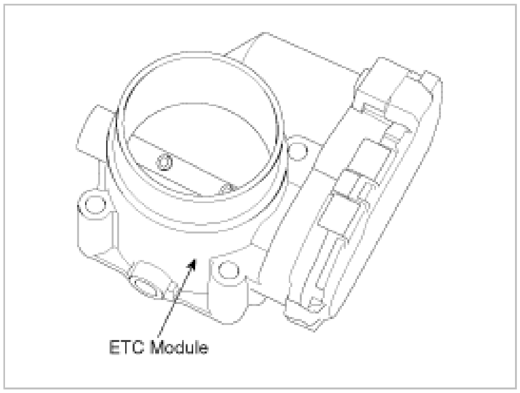
> **WARNING**
>
> Before inputing the VIN, confirm the VIN again because the programmed VIN cannot be changed.

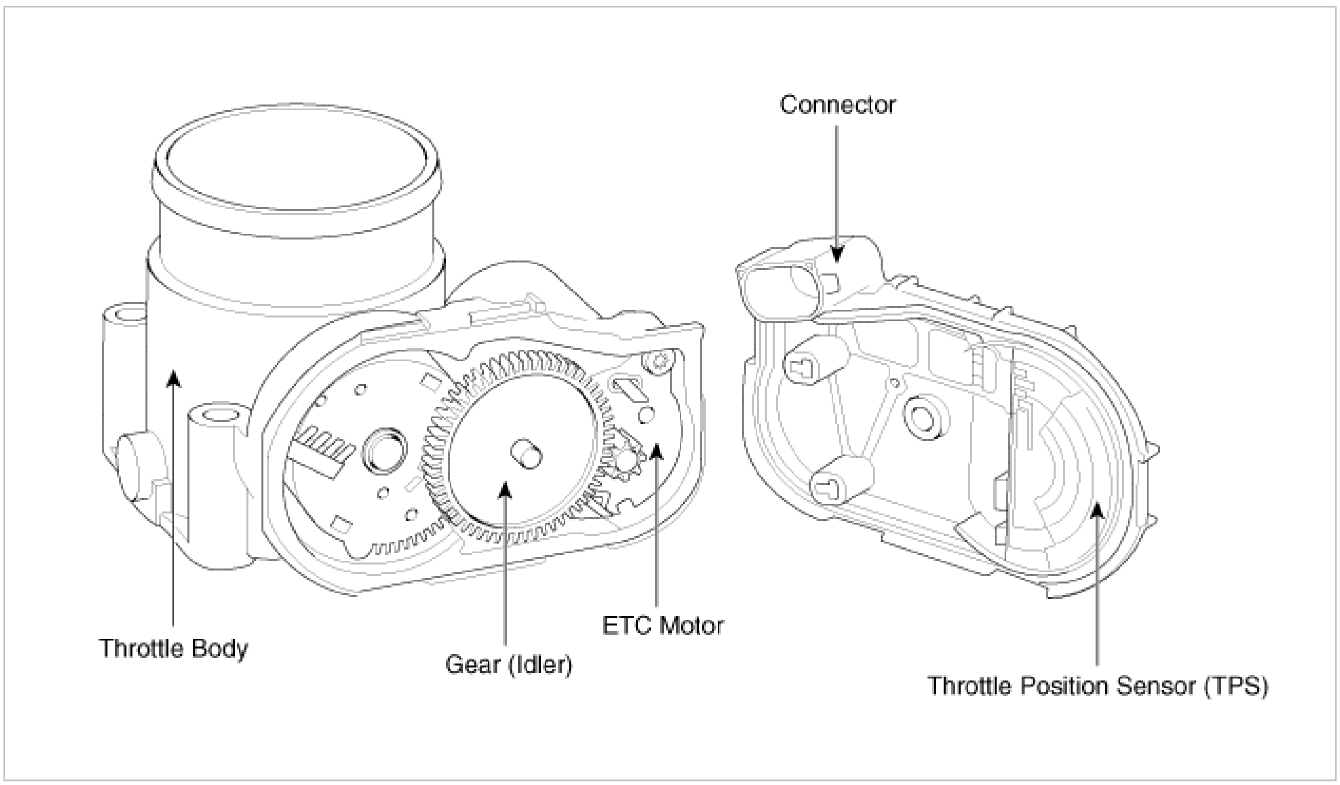


4. Turn the ignition switch OFF, then back ON.

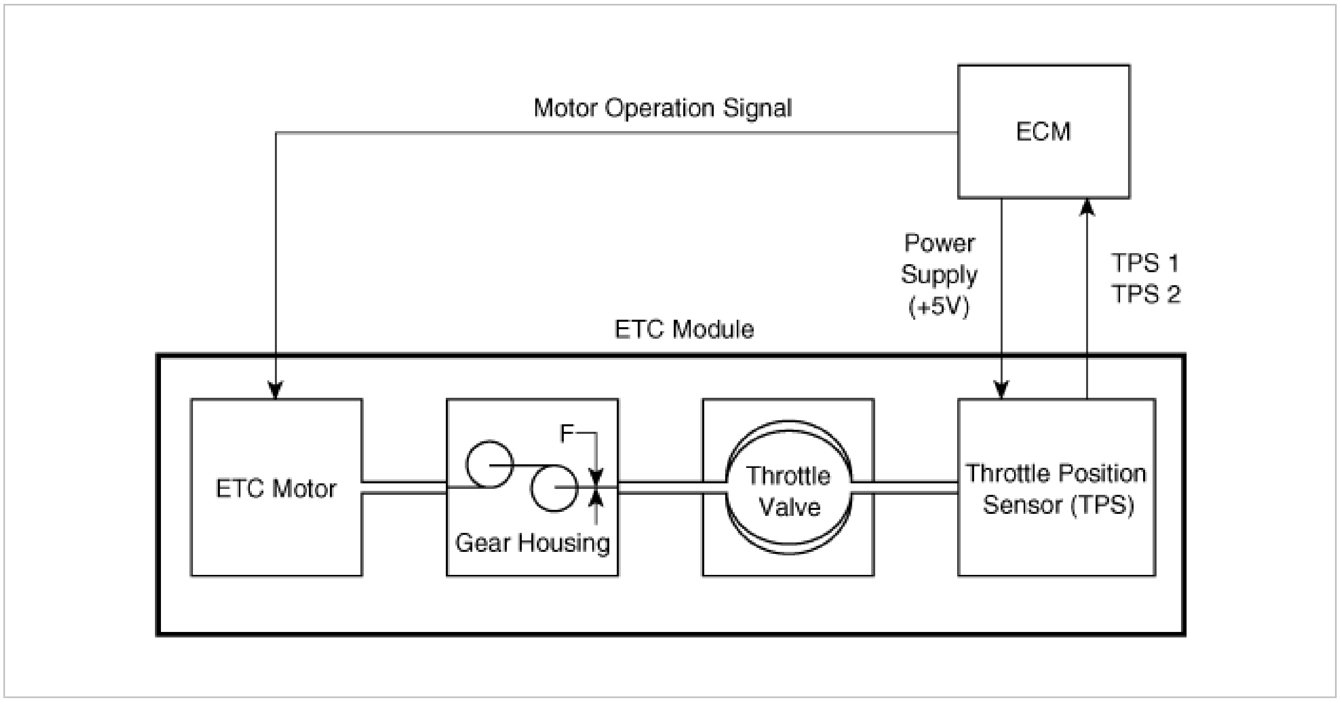
Description

The Electronic Throttle Control (ETC) System consists of a throttle body with an integrated control motor and throttle position sensor (TPS). Instead of the traditional throttle cable, an Accelerator Position Sensor (APS) is used to receive driver input. The ECM uses the APS signal to calculate the target throttle angle; the position of the throttle is then adjusted via ECM control of the ETC motor. The TPS signal is used to provide feedback regarding throttle position to the ECM. Using ETC, precise control over throttle position is possible; the need for external cruise control modules/cables is eliminated.





Schematic Diagram


Motor Operation Signal
ECM
Power
Supply
(+5V)
TPS 1
TPS 2
ETC Module
ETC Motor
F
Gear Housing
Throttle
Valve
Throttle Position
Sensor (TPS)

Fail-Safe Mode

Item	Fail-Safe	
ETC Motor	Throttle valve stuck at 5°	
TPS	TPS 1 fault	Replace it with TPS2
	TPS 2 fault	Replace it with TPS1
	TPS 1,2 fault	Throttle valve stuck at 5°
APS	TPS 1 fault	Replace it with TPS2
	TPS 2 fault	Replace it with TPS1
	TPS 1,2 fault	Throttle valve stuck at 5°

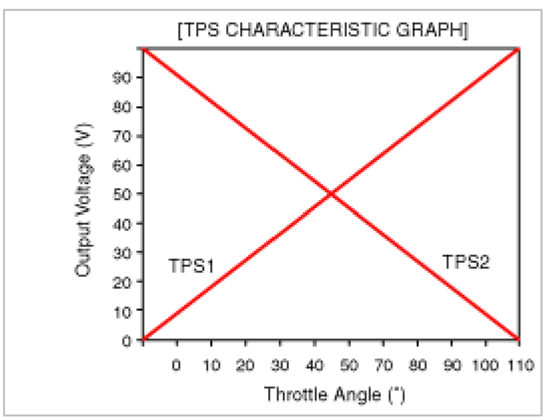
NOTE

When throttle value is stuck at 5°, engine speed is limited at below 1,500rpm and vehicle speed at maximum 40 ~ 50 km/h (25 ~ 31 mph)

Specification

[Throttle Position Sensor (TPS)]

Throttle Angle(°)	Output Voltage(V)	
	TPS1	**TPS2**
0	0.0	5.0
10	0.48	4.52
20	0.95	4.05
30	1.43	3.57
40	1.90	3.10
50	2.38	2.62
60	2.86	2.14
70	3.33	1.67
80	3.81	1.19
90	4.29	0.71
100	4.76	0.24
105	5.0	0
C.T (6 ~ 15°)	0.29 ~ 0.71	4.29 ~ 4.71
W.O.T (93 ~ 102°)	4.43 ~ 4.86	0.14 ~ 0.57



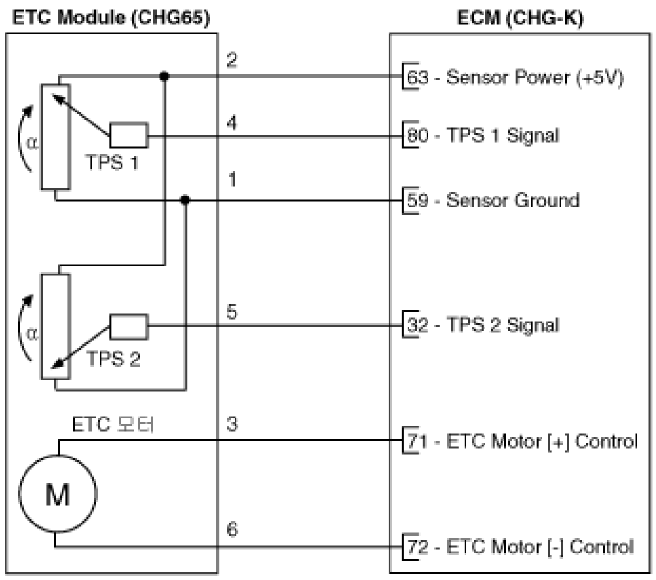
Item	Sensor Resistance(kΩ)
TPS1	0.875 ~ 1.625 [20°C(68°F)]
TPS2	0.875 ~ 1.625 [20°C(68°F)]

[ETC Motor]

Item	Specification
Coil Resistance (Ω)	1.2 ~ 1.8 [20°C(68°F)]

Circuit Diagram

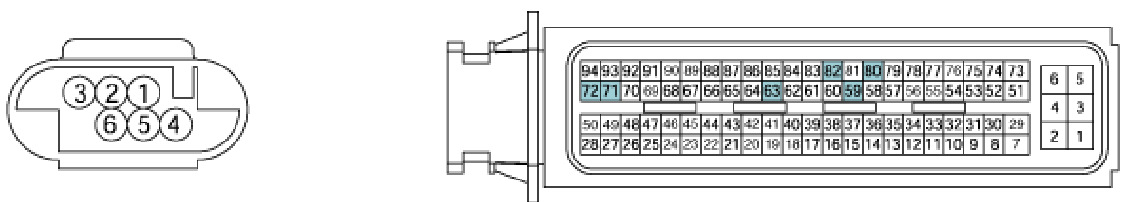
[Circuit Diagram]



[Connection Information]

Terminal	Connected to	Function
1	ECM CHG-K (59)	Sensor Ground
2	ECM CHG-K (63)	Sensor Power (+5V)
3	ECM CHG-K (71)	ETC Motor [+] Control
4	ECM CHG-K (80)	TPS 1 Signal
5	ECM CHG-K (82)	TPS 2 Signal
6	ECM CHG-K (72)	ETC Motor [-] Control

[Harness Connector]



CHG65
ETC Module

CHG-K
ECM

Inspection

Throttle Position Sensor (TPS)

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

Throttle Angle	Output Voltage (V)	
	TPS 1	TPS 2
C.T	0.25 ~ 0.9	Min.4.0
W.O.T	Min.4.0	0.25 ~ 0.9

3. Turn the ignition switch OFF and disconnect the scantool from the DLC.
4. Disconnect the ETC module connector and measure the resistance between the ETC module terminals 1 and 2.

Specification: Refer to "Specification"

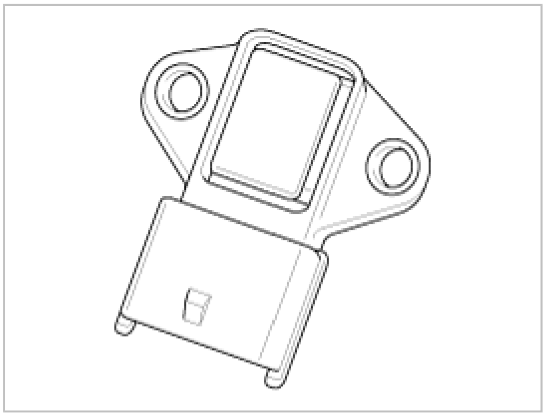
ETC Motor

1. Turn the ignition switch OFF.
2. Disconnect the ETC module connector.
3. Measure resistance between the ETC module terminals 3 and 6.
4. Check that the resistance is within the specification.

Specification: Refer to "Specification"

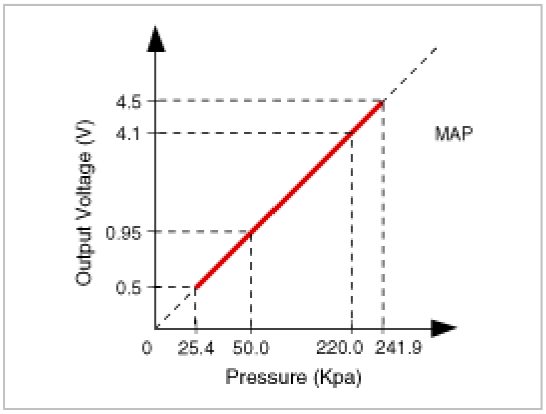
Description

Manifold Absolute Pressure Sensor (MAPS) are installed on the surge tank (MAPS #1) and the intercooler outlet pipe (MAPS #2) and sense pressure in front of the throttle body and pressure in intake manifold. It calculates mass air flow indirectly (Speed-density type) and transfers this analog signal proportional to the pressure to the ECM. The ECM calculates the intake air quantity and engine speed based on this signal.
This MAPS consists of a piezo-electric element and a 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 apply to the both sides of it respectively. That is, this sensor outputs the silicon variation proportional to pressure change by voltage.



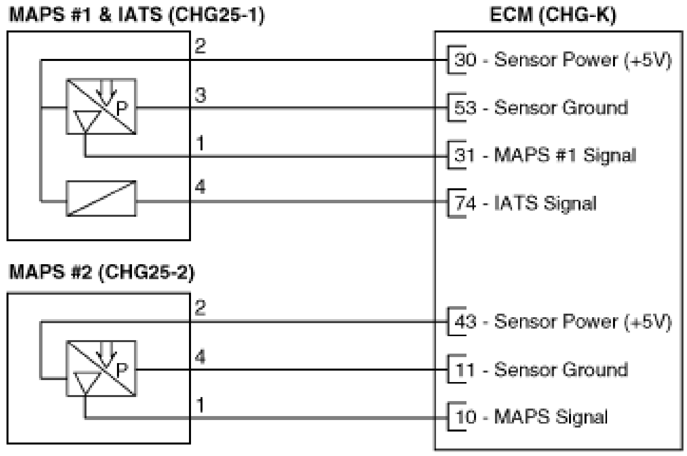
Specification

Pressure (kPa)	Output Voltage (V)
25.4	0.5
50.0	0.95
220.0	4.10
241.9	4.5



Circuit Diagram

[Circuit Diagram]



[Connection Information]

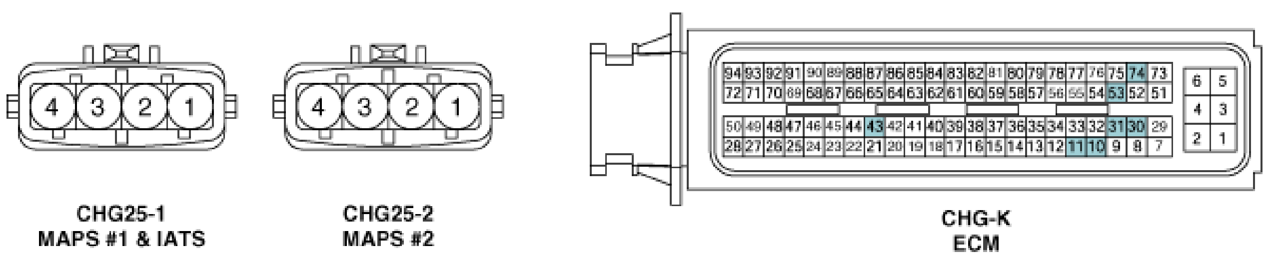
MAPS #1 & IATS (CHG25-1)

Terminal	Connected to	Function
1	ECM CHG-K (31)	MAPS #1 Signal
2	ECM CHG-K (30)	Sensor Power (+5V)
3	ECM CHG-K (53)	Sensor Ground
4	ECM CHG-K (74)	IATS Signal

MAPS #2 (CHG25-2)

Terminal	Connected to	Function
1	ECM CHG-K (10)	MAPS #2 Signal
2	ECM CHG-K (43)	Sensor Power (+5V)
3	-	-
4	ECM CHG-K (11)	Sensor Ground

[Harness Connector]



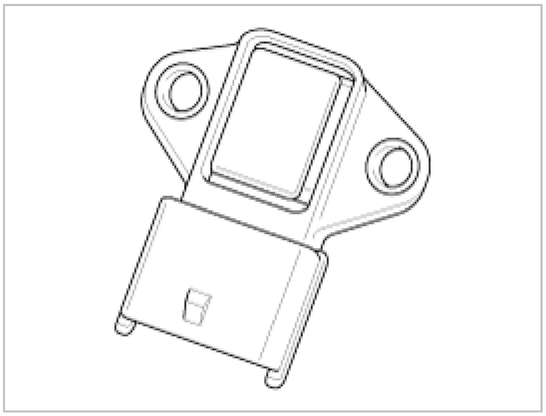
Inspection

1. Connect a scantool on the Data Link Connector (DLC).
2. Measure the output voltage of the MAPS at idle and IG ON.

Specification: Refer to "Specification"

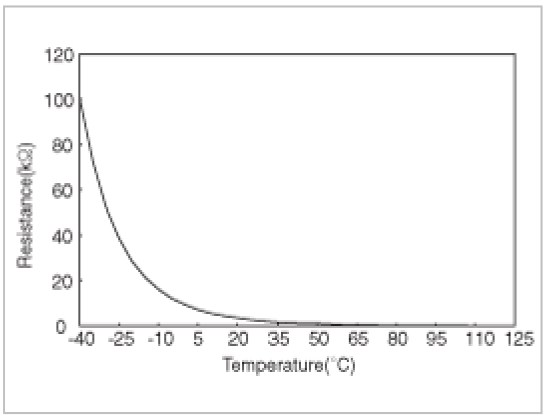
Description

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 ECM 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.



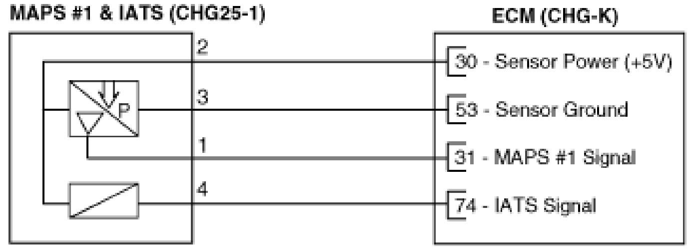
Specification

Temperature [°C(°F)]	Resistance (kΩ)
-40(-40)	40.93 ~ 48.35
-20(-4)	13.89 ~ 16.03
0(32)	5.38 ~ 6.09
10(50)	3.48 ~ 3.90
20(68)	2.31 ~ 2.57
40(104)	1.08 ~ 1.21
50(122)	1.56 ~ 1.74
60(140)	0.54 ~ 0.62
80(176)	0.29 ~ 0.34



Circuit Diagram

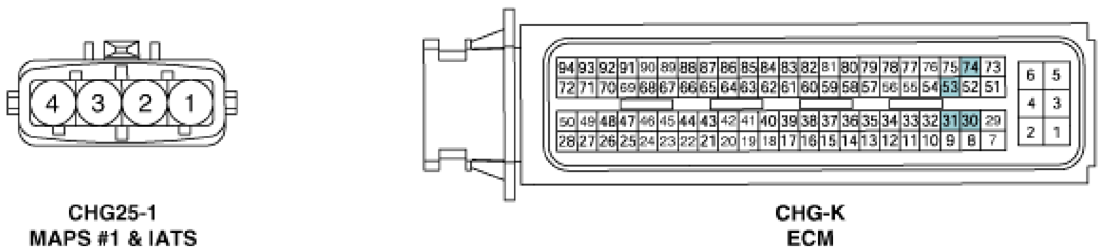
[Circuit Diagram]



[Connection Information]

Terminal	Connected to	Function
1	ECM CHG-K (31)	MAPS #1 Signal
2	ECM CHG-K (30)	Sensor Power (+5V)
3	ECM CHG-K (53)	Sensor Ground
4	ECM CHG-K (74)	IATS Signal

[Harness Connector]



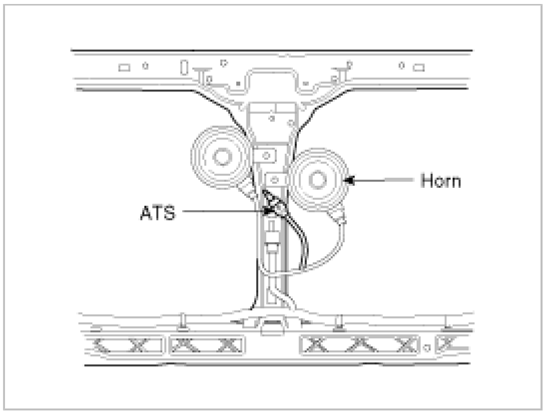
Inspection

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

Specification: Refer to “Specification”

Description

Ambient Temperature Sensor (ATS) is installed on the front-end module and senses the ambient temperature. This sensor is exposed to the ambient air temperature in front of the radiator. The ATS is a Negative Temperature Coefficient (NTC)-type sensor and its resistance is in inverse proportion to the temperature.



GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > Ambient Temperature Sensor (ATS) > Specifications

Specification

Temperature [°C(°F)]	Resistance (kΩ)
-40 (-40)	55.61 ~ 66.21
-20 (-4)	18.76 ~ 21.37
0 (32)	7.26 ~ 7.95
20 (68)	3.18 ~ 3.37
25 (77)	2.63 ~ 2.77
40 (104)	1.50 ~ 1.62
60 (140)	0.76 ~ 0.84
80 (176)	0.40 ~ 0.45

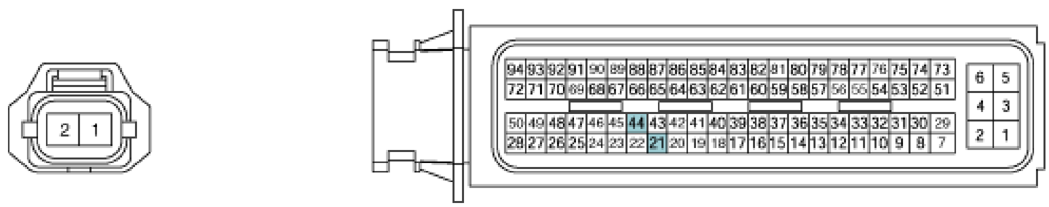
Circuit Diagram

[Circuit Diagram]

[Connection Information]

Terminal	Connected to	Function
1	ECM CHG-K (21)	ATS Signal
2	ECM CHG-K (44)	Sensor Ground

[Harness Connector]



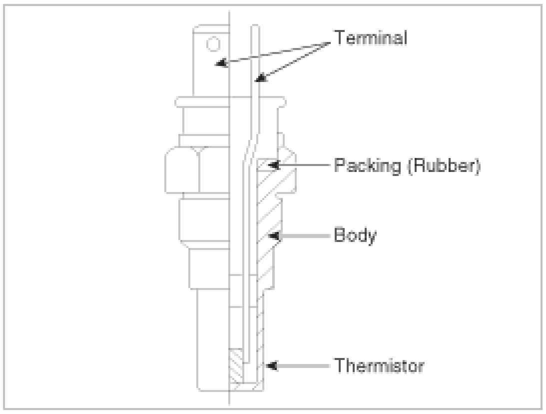
Inspection

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

Specification: Refer to “Specification”

Description

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 ECM is supplied to the ECTS via a resistor in the ECM. That is, the resistor in the ECM 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 ECM 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

Temperature		Resistance (kΩ)
°C	°F	
-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

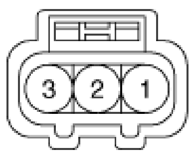
Circuit Diagram

[Circuit Diagram]

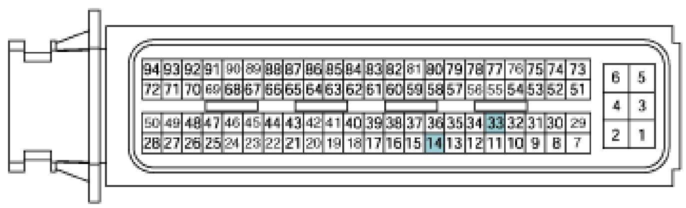
[Connection Information]

Terminal	Connected to	Function
1	ECM CHG-K (33)	ECTS Signal
2	-	-
3	ECM CHG-K (14)	Sensor Ground

[Harness Connector]



CHG11
ECTS



CHG-K
ECM

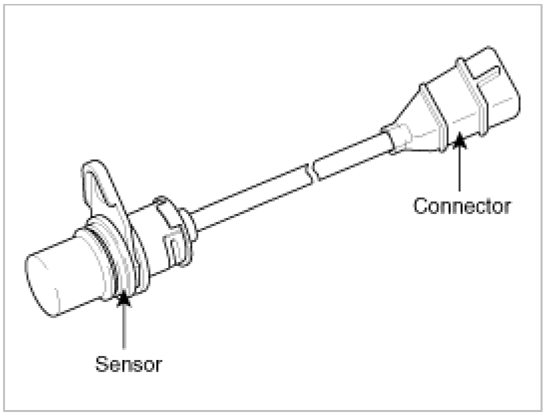
Inspection

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

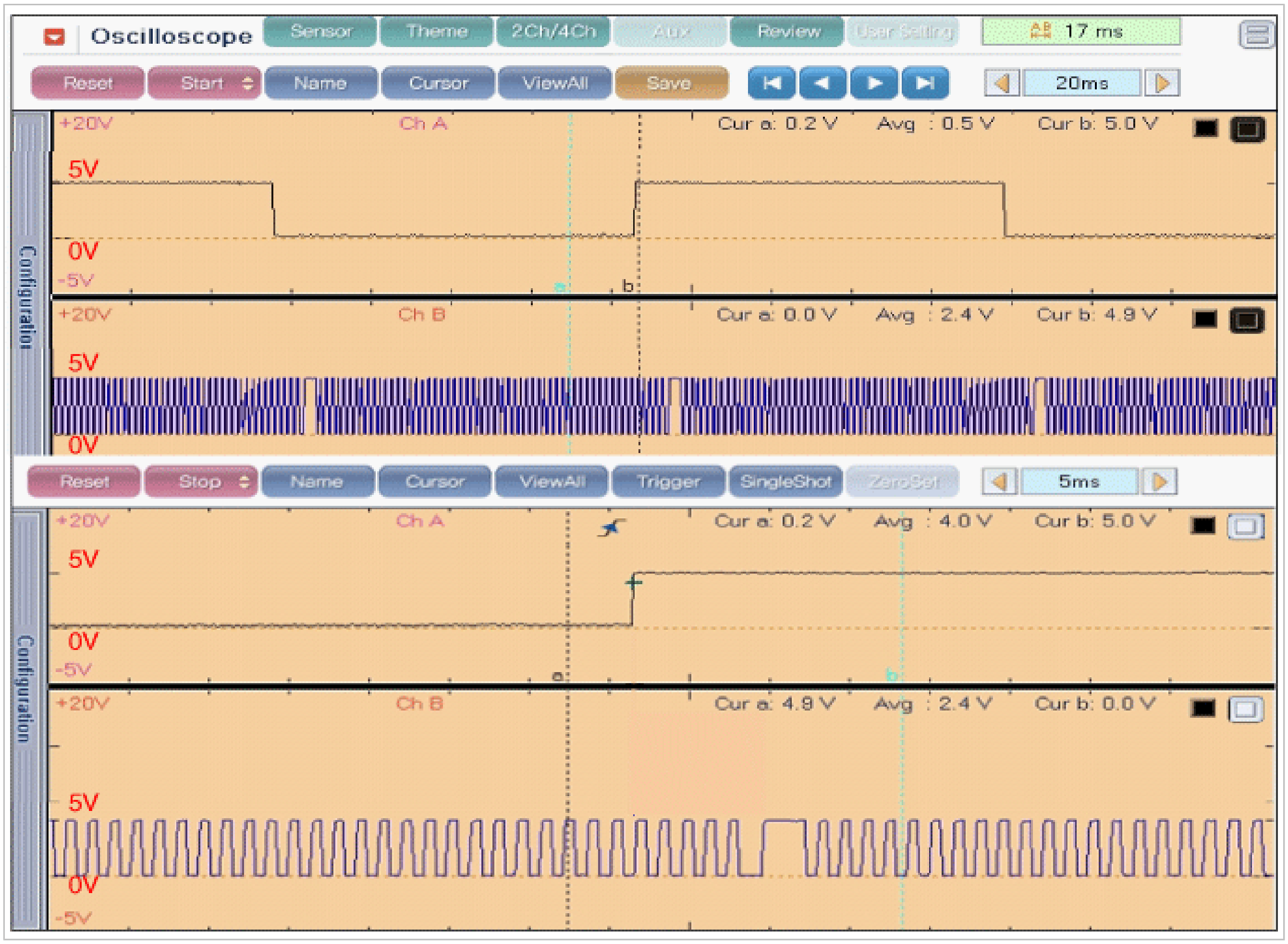
Specification: Refer to “Specification”

Description

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, the engine may stop because of CKPS signal missing.
This sensor is installed on transaxle housing or the cylinder block and generates alternating current by magnetic flux field which is made by the sensor and the target wheel when the engine rotates. The target wheel consists of 58 slots and 2 missing slots on 360 CA (Crank Angle).

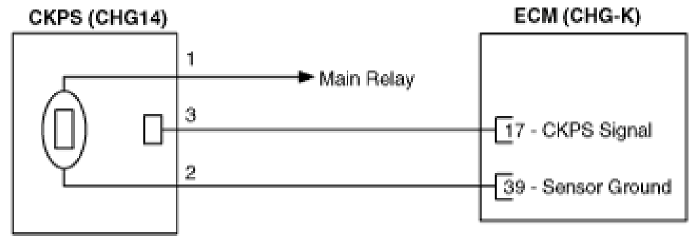


Wave Form


Oscilloscope
Sensor
Theme
2Ch/4Ch
Review
17 ms
Reset
Start
Name
Cursor
ViewAll
Save
20ms
+20V
Ch A
Cur a: 0.2 V
Avg : 0.5 V
Cur b: 5.0 V
5V
0V
-5V
+20V
Ch B
Cur a: 0.0 V
Avg : 2.4 V
Cur b: 4.9 V
5V
0V
Configuration
Reset
Stop
Name
Cursor
ViewAll
Trigger
SingleShot
ZeroSet
5ms
+20V
Ch A
Cur a: 0.2 V
Avg : 4.0 V
Cur b: 5.0 V
5V
0V
-5V
+20V
Ch B
Cur a: 4.9 V
Avg : 2.4 V
Cur b: 0.0 V
5V
0V
-5V
Configuration

Circuit Diagram

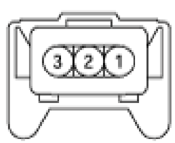
[Circuit Diagram]



[Connection Information]

Terminal	Connected to	Function
1	Main Relay	Battery Power (B+)
2	ECM CHG-K (39)	CKPS Signal
3	ECM CHG-K (17)	Sensor Ground

[Harness Connector]



CHG14
CKPS

CHG-K
ECM

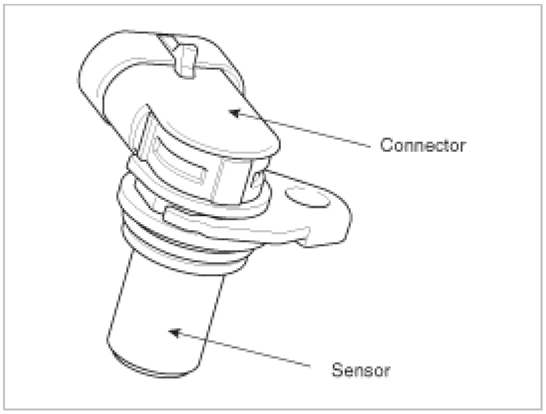
Inspection

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

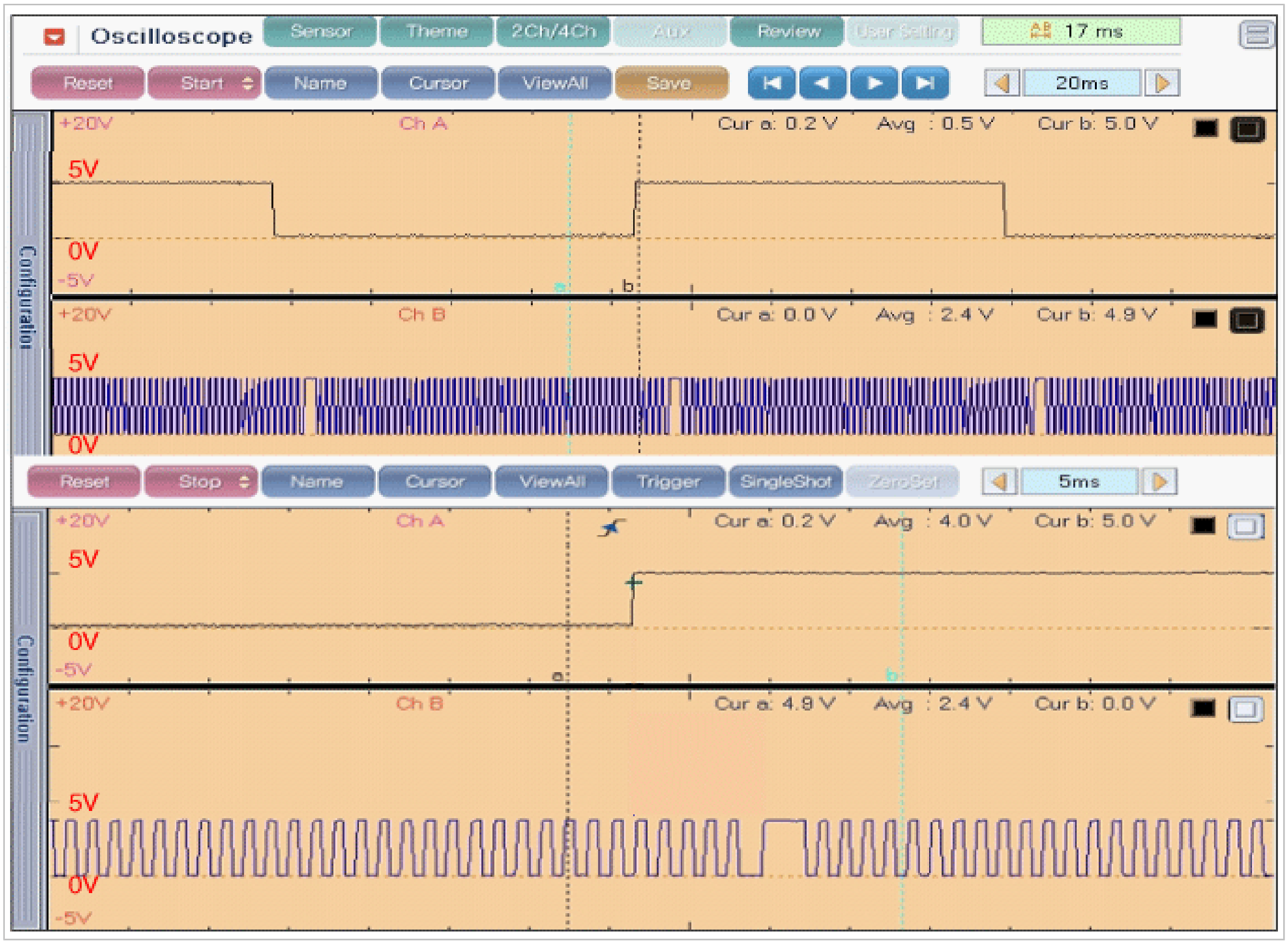
Specification: Refer to "Wave Form"

Description

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 cant detect. The two CMPS are installed on engine head cover of bank 1 and 2 respectively and use 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. So the seqential injection of the 6 cylinders is impossible without CMPS signal.

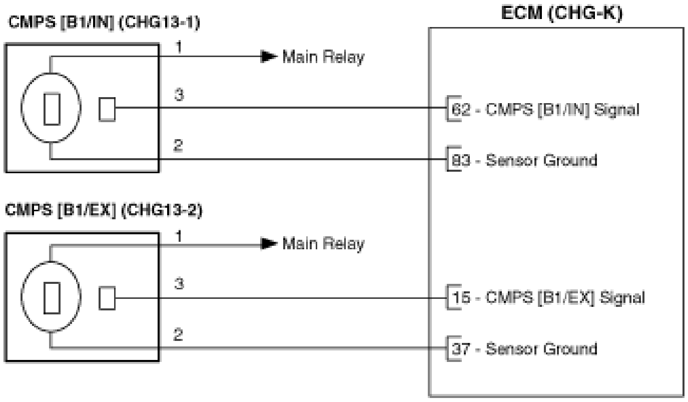


Wave Form


Oscilloscope
Sensor
Theme
2Ch/4Ch
Review
17 ms
Reset
Start
Name
Cursor
ViewAll
Save
20ms
+20V
Ch A
Cur a: 0.2 V
Avg : 0.5 V
Cur b: 5.0 V
5V
0V
-5V
+20V
Ch B
Cur a: 0.0 V
Avg : 2.4 V
Cur b: 4.9 V
5V
0V
Configuration
Reset
Stop
Name
Cursor
ViewAll
Trigger
SingleShot
ZeroSet
5ms
+20V
Ch A
Cur a: 0.2 V
Avg : 4.0 V
Cur b: 5.0 V
5V
0V
-5V
+20V
Ch B
Cur a: 4.9 V
Avg : 2.4 V
Cur b: 0.0 V
5V
0V
-5V
Configuration

Circuit Diagram

[Circuit Diagram]



[Connection Information]

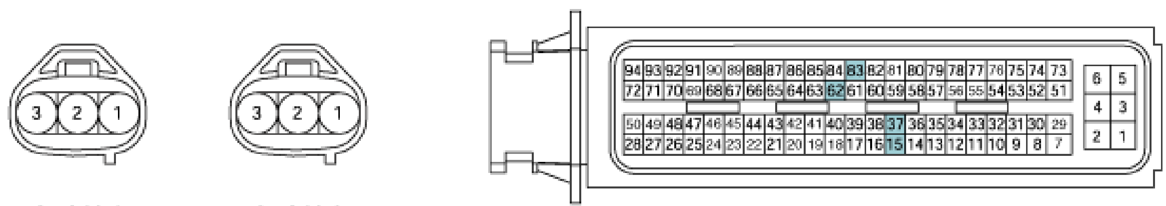
CMPS [B1/IN] (CHG13-1)

Terminal	Connected to	Function
1	Main Relay	Battery Power (B+)
2	ECM CHG-K (83)	Sensor Ground
3	ECM CHG-K (62)	CMPS [B1/IN] Signal

CMPS [B1/EX] (CHG13-2)

Terminal	Connected to	Function
1	Main Relay	Battery Power (B+)
2	ECM CHG-K (37)	Sensor Ground
3	ECM CHG-K (15)	CMPS [B1/EX] Signal

[Harness Connector]



CHG13-1
CMPS [B1/IN]

CHG13-2
CMPS [B1/EX]

CHG-K
ECM

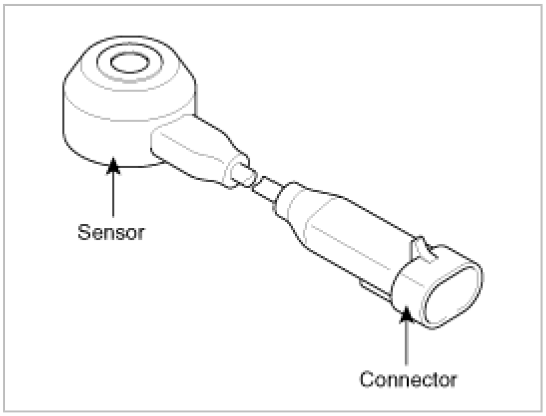
Inspection

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

Specification: Refer to “Wave Form”

Description

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

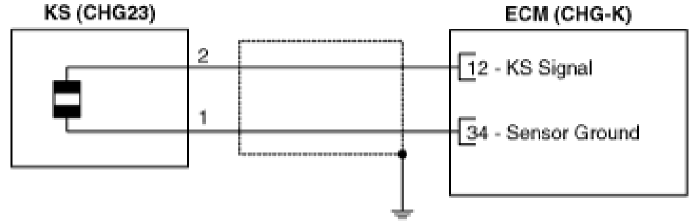


Specification

Item	Specification
Capacitance (pF)	1,480 ~ 2,220

Circuit Diagram

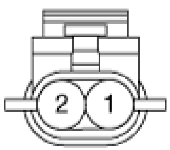
[Circuit Diagram]



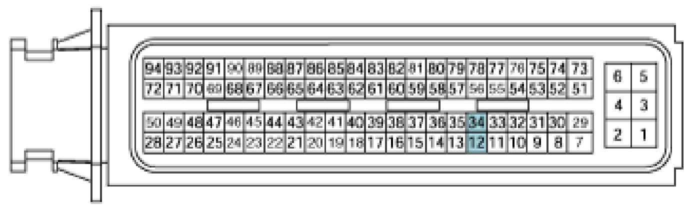
[Connection Information]

Terminal	Connected to	Function
1	ECM CHG-K (34)	KS Signal
2	ECM CHG-K (12)	Sensor Ground

[Harness Connector]



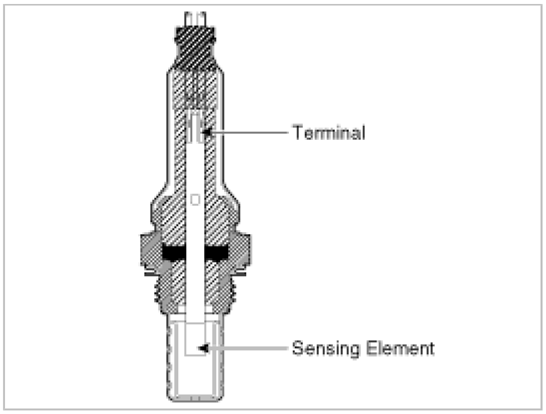
CHG23
KNOCK SENSOR



CHG-K
ECM

Description

Heated Oxygen Sensor (HO2S) consists of the zirconium and the 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 ECM. 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°C (698°F). So it has a heater which is controlled by the ECM duty signal.
When the exhaust gas temperature is lower than the specified value, the heater warms the sensor tip.

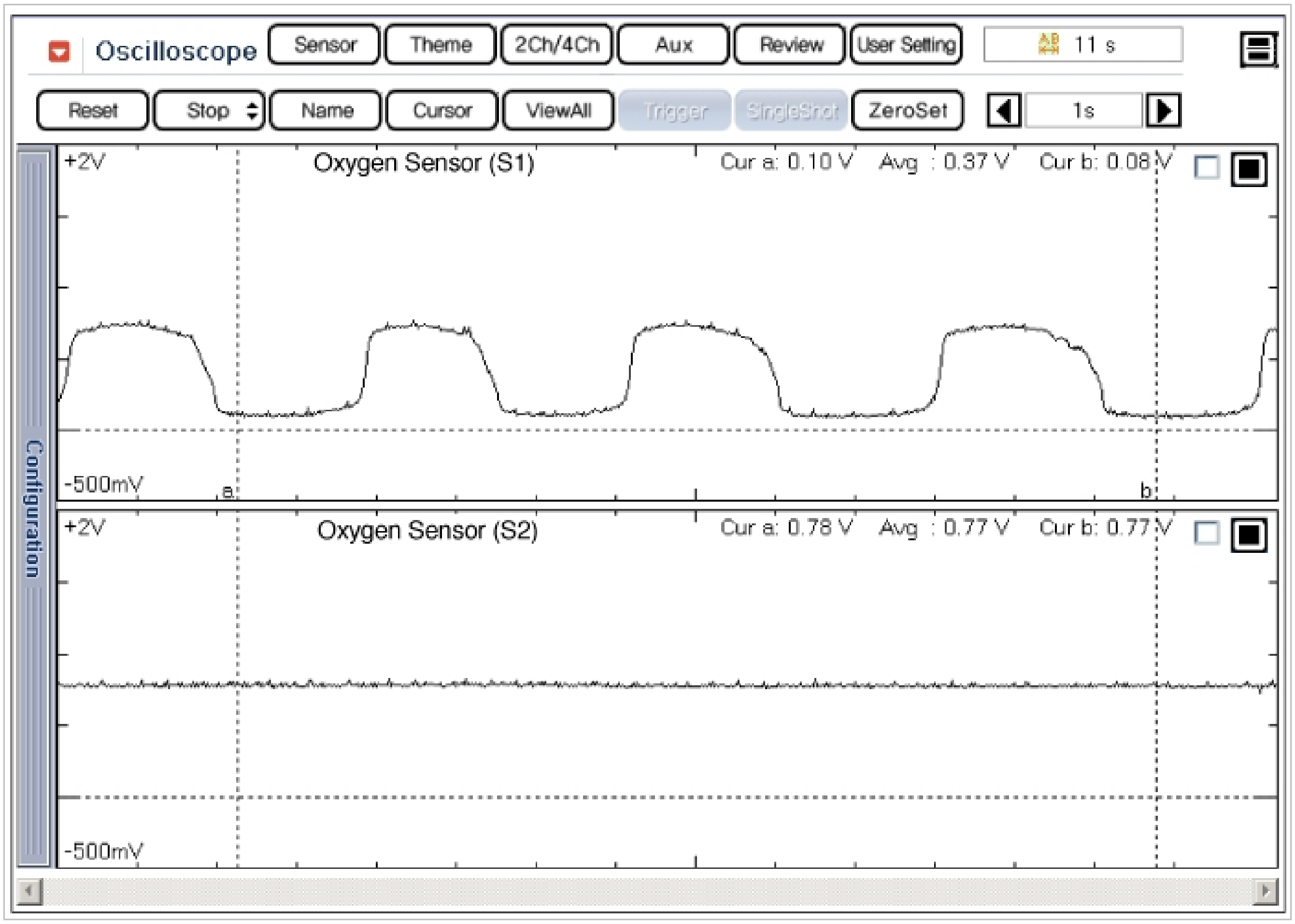


Specification

A/F Ratio (λ)	Output Voltage(V)
RICH	0.80 ~ 0.92
LEAN	0.04 ~ 0.1

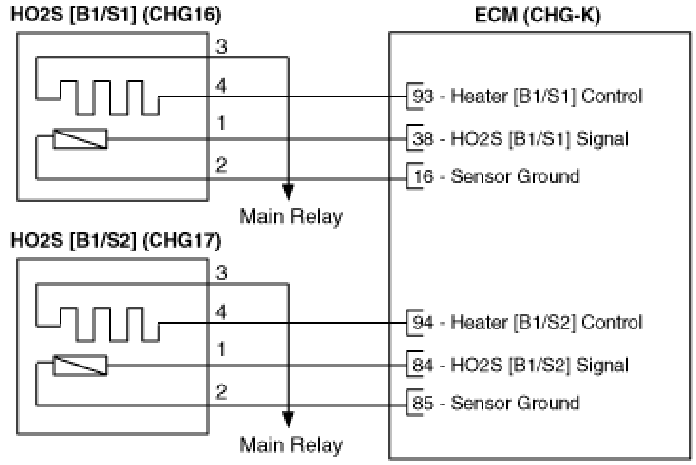
Item	Specification
Heater Resistance (Ω)	3.3 ~ 4.1Ω[21°C(69.8°F)]

Wave Form


Oscilloscope
Sensor
Theme
2Ch/4Ch
Aux
Review
User Setting
11 s
Reset
Stop
Name
Cursor
ViewAll
Trigger
SingleShot
ZeroSet
1s
Configuration
+2V
Oxygen Sensor (S1)
Cur a: 0.10 V
Avg : 0.37 V
Cur b: 0.08 V
-500mV
a
b
+2V
Oxygen Sensor (S2)
Cur a: 0.78 V
Avg : 0.77 V
Cur b: 0.77 V
-500mV

Circuit Diagram

[Circuit Diagram]



[Connection Information]

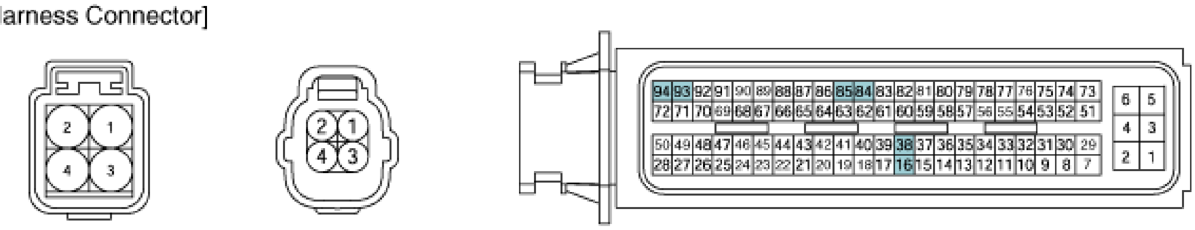
HO2S [B1/S1] (CHG16)

Terminal	Connected to	Function
1	ECM CHG-K (38)	HO2S [B1/S1] Signal
2	ECM CHG-K (16)	Sensor Ground
3	Main Relay	Battery Power (B+)
4	ECM CHG-K (93)	Heater [B1/S1] Control

HO2S [B1/S2] (CHG17)

Terminal	Connected to	Function
1	ECM CHG-K (84)	HO2S [B1/S2] Signal
2	ECM CHG-K (85)	Sensor Ground
3	Main Relay	Battery Power (B+)
4	ECM CHG-K (94)	Heater [B1/S2] Control

[Harness Connector]



CHG16
HO2S [B1/S1]

CHG17
HO2S [B1/S2]

CHG-K
ECM

Inspection

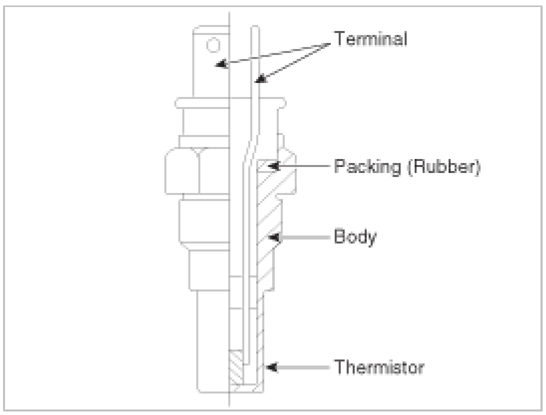
1. Turn the ignition switch OFF.
2. Disconnect the HO2S connector.
3. Measure resistance between the HO2S terminals 3 and 4.
4. Check that the resistance is within the specification.

Specification: Refer to "Specification"

Description

Continuous Variable Valve Timing (CVVT) system advances or retards the valve timing of the intake and exhaust valve in accordance with the ECM control signal which is calculated by the engine speed and load.
By controlling CVVT, the valve over-lap or under-lap occurs, which makes better fuel economy and reduces exhaust gases (NOx, HC) and improves engine performance through reduction of pumping loss, internal EGR effect, improvement of combustion stability, improvement of volumetric efficiency, and increase of expansion work.
This system consist of
- the CVVT Oil Control Valve (OCV) which supplies the engine oil to the cam phaser or runs out the engine oil from the cam phaser in accordance with the ECM PWM (Pulse With Modulation) control signal,
- the CVVT Oil Temperature Sensor (OTS) which measures the engine oil temperature,
- and the Cam Phaser which varies the cam phase by using the hydraulic force of the engine oil.

The engine oil getting out of the CVVT oil control valve varies the cam phase in the direction (Intake Advance/Exhaust Retard) or opposite direction (Intake Retard/Exhaust Advance) of the engine rotation by rotating the rotor connected with the camshaft inside the cam phaser.



Specification

Temperature [°C(°F)]	Resistance (kΩ)
-40(-40)	52.15
-20(-4)	16.52
0(32)	6.0
20(68)	2.45
40(104)	1.11
60(140)	0.54
80(176)	0.29

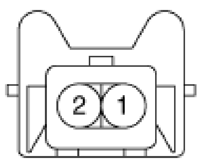
Circuit Diagram

[Circuit Diagram]

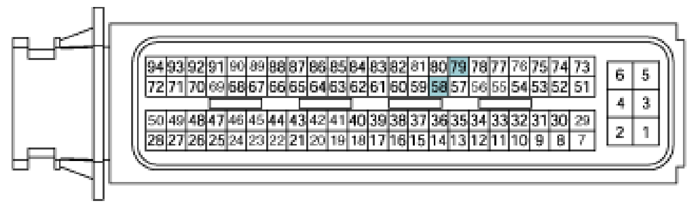
[Connection Information]

Terminal	Connected to	Function
1	ECM CHG-K (58)	OTS Signal
2	ECM CHG-K (79)	Sensor Ground

[Harness Connector]



CHG03
OTS



CHG-K
ECM

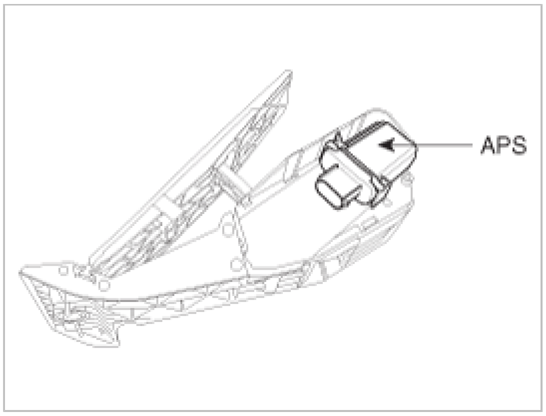
Inspection

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

Specification: Refer to “Specification”

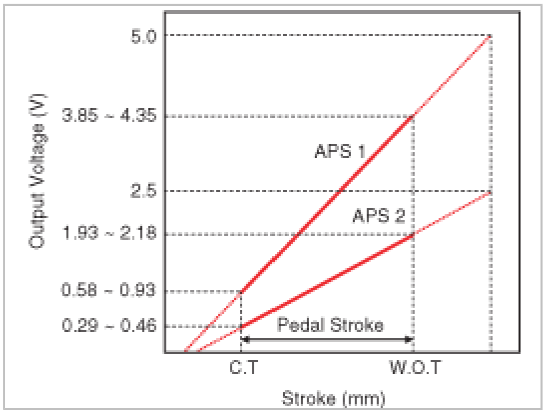
Description

Accelerator Position Sensor (APS) is installed on the accelerator pedal module and detects the rotation angle of the accelerator pedal. The APS is one of the most important sensors in engine control system, so it consists of the two sensors which adapt individual sensor power and ground line. The second sensor monitors the first sensor and its output voltage is half of the first one. If the ratio of the sensor 1 and 2 is out of the range (approximately 1/2), the diagnostic system judges that it is abnormal.



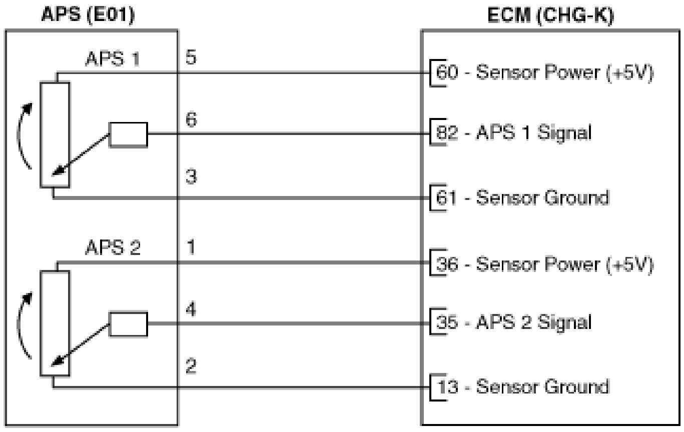
Specification

Accelerator Position	Output Voltage (V)	
	APS1	APS2
C.T	0.58 ~ 0.93	0.29 ~ 0.46
W.O.T	3.85 ~ 4.35	1.93 ~ 2.18



Circuit Diagram

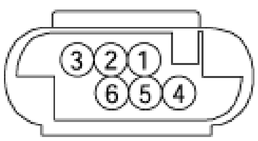
[Circuit Diagram]



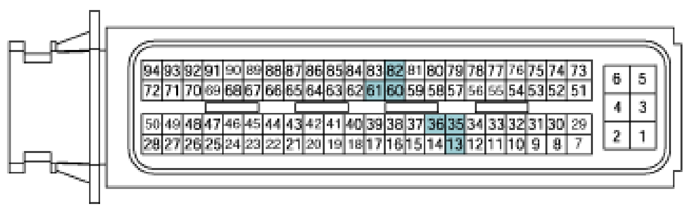
[Connection Information]

Terminal	Connected to	Function
1	ECM CHG-K (36)	APS 2 Sensor Power (+5V)
2	ECM CHG-K (13)	APS 2 Sensor Ground
3	ECM CHG-K (61)	APS 1 Sensor Ground
4	ECM CHG-K (35)	APS 2 Signal
5	ECM CHG-K (60)	APS 1 Sensor Power (+5V)
6	ECM CHG-K (82)	APS 1 Signal

[Harness Connector]



E01
APS



CHG-K
ECM

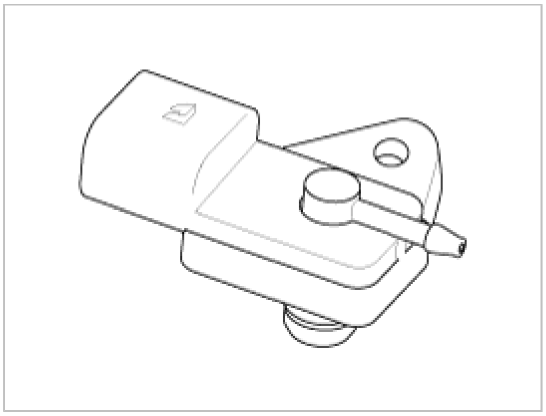
Inspection

1. Connect a scantool on the Data Link Connector (DLC).
2. Turn the ignition switch ON.
3. Measure the output voltage of the APS 1 and 2 at C.T and W.O.T.

Specification: Refer to “Specification”

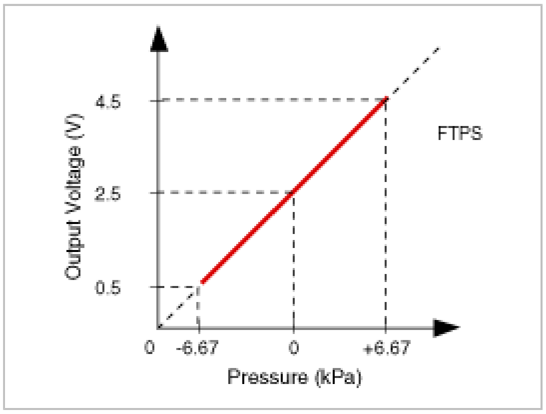
Description

Fuel Tank Pressure Sensor (FTPS) is a component of the evaporative emission control system and is installed on the fuel tank, the fuel pump, or the canister. It checks the purge control solenoid valve operation and detects a leakage of the system.



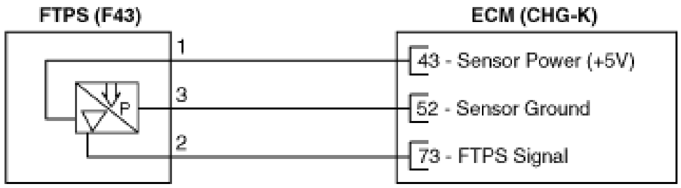
Specification

Pressure (kPa)	Output Voltage (V)
-6.67	0.5
0	2.5
+6.67	4.5



Circuit Diagram

[Circuit Diagram]

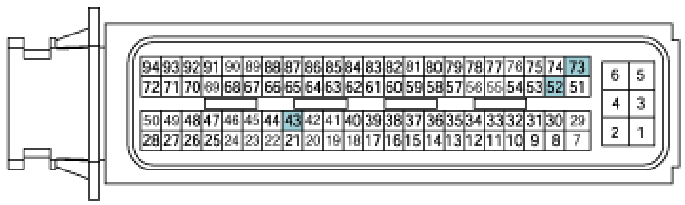


[Connection Information]

Terminal	Connected to	Function
1	ECM CHG-K (43)	Sensor Power (+5V)
2	ECM CHG-K (73)	FTPS Signal
3	ECM CHG-K (52)	Sensor Ground

[Harness Connector]

F43
FTPS



CHG-K
ECM

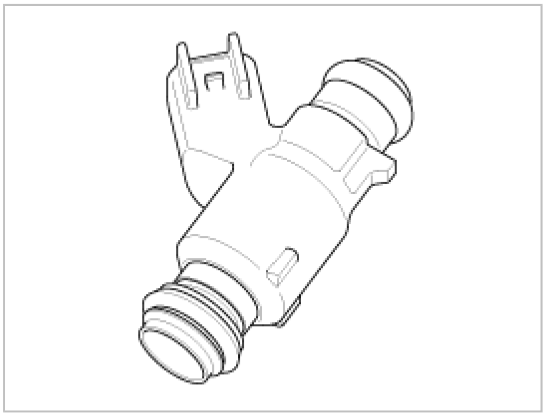
Inspection

1. Connect a scantool on the Data Link Connector (DLC).
2. Measure the output voltage of the FTPS.

Specification: Refer to "Specification"

Description

Based on information from various sensors, the ECM determines 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 ECM controls each injector by grounding the control circuit. When the ECM energizes the injector by grounding the control circuit, the circuit voltage should be low (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.

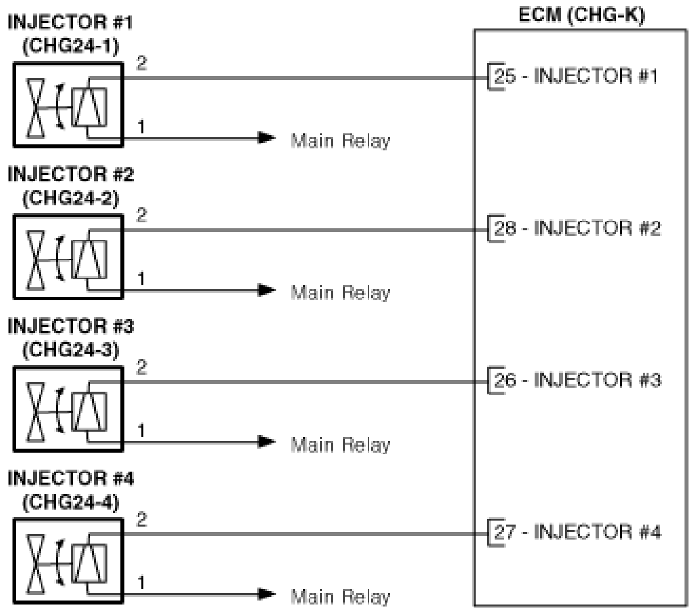


Specification

Item	Specification
Coil Resistance (Ω)	13.8 ~ 15.2 [20°C(68°F)]

Circuit Diagram

[Circuit Diagram]



[Connection Information]

INJECTOR #1 (CHG24-1)

Terminal	Connected to	Function
1	Main Relay	Battery Power (B+)
2	ECM CHG-K (25)	Injector #1 Control

INJECTOR #2 (CHG24-2)

Terminal	Connected to	Function
1	Main Relay	Battery Power (B+)
2	ECM CHG-K (28)	Injector #2 Control

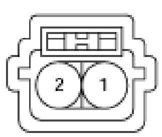
INJECTOR #3 (CHG24-3)

Terminal	Connected to	Function
1	Main Relay	Battery Power (B+)
2	ECM CHG-K (26)	Injector #3 Control

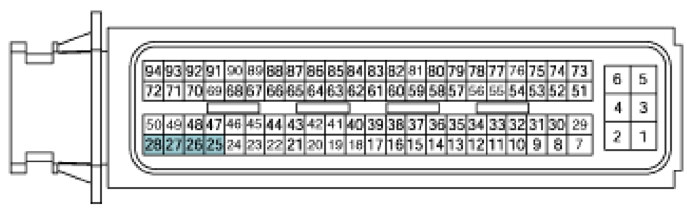
INJECTOR #4 (CHG24-4)

Terminal	Connected to	Function
1	Main Relay	Battery Power (B+)
2	ECM CHG-K (27)	Injector #4 Control

[Harness Connector]



CHG24-1,2,3,4
INJECTOR #1,2,3,4



CHG-K
ECM

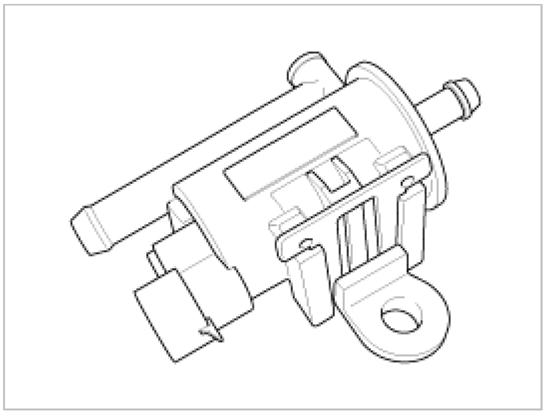
Inspection

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

Specification: Refer to “Specification”

Description

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 ECM grounds the valve control line. When the passage is open (PCSV ON), fuel vapor stored in the canister is transferred to the intake manifold.



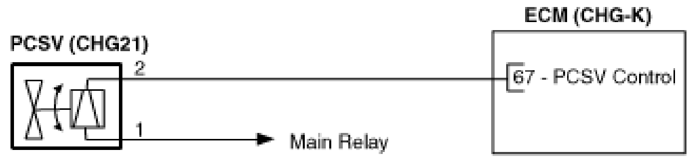
GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > Purge Control Solenoid Valve (PCSV) > Specifications

Specification

Item	Specification
Coil Resistance (Ω)	19.0 ~ 22.0 [20°C(68°F)]

Circuit Diagram

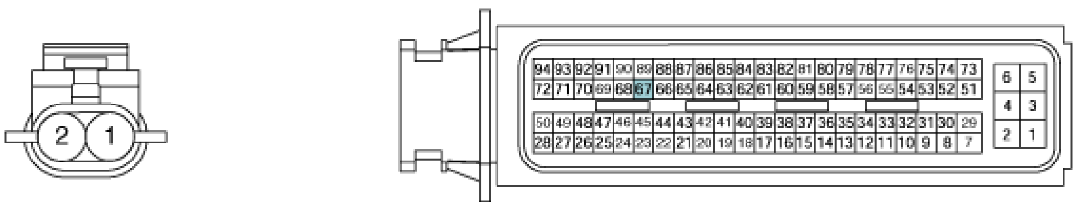
[Circuit Diagram]



[Connection Information]

Terminal	Connected to	Function
1	Main Relay	Battery Power (B+)
2	ECM CHG-K (67)	PCSV Control

[Harness Connector]



CHG21
PCSV

CHG-K
ECM

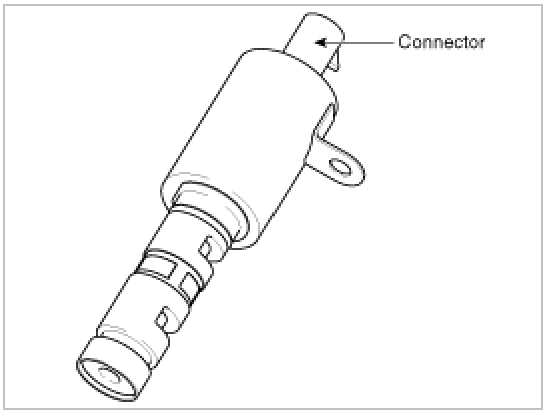
Inspection

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

Specification: Refer to “Specification”

Description

Continuous Variable Valve Timing (CVVT) system advances or retards the valve timing of the intake and exhaust valve in accordance with the ECM control signal which is calculated by the engine speed and load.
By controlling CVVT, the valve over-lap or under-lap occurs, which makes better fuel economy and reduces exhaust gases (NOx, HC) and improves engine performance through reduction of pumping loss, internal EGR effect, improvement of combustion stability, improvement of volumetric efficiency, and increase of expansion work.
This system consist of
-the CVVT Oil Control Valve (OCV) which supplies the engine oil to the cam phaser or runs out the engine oil from the cam phaser in accordance with the ECM PWM (Pulse With Modulation) control signal,
- the CVVT Oil Temperature Sensor (OTS) which measures the engine oil temperature,
-and the Cam Phaser which varies the cam phase by using the hydraulic force of the engine oil.
The engine oil getting out of the CVVT oil control valve varies the cam phase in the direction (Intake Advance/Exhaust Retard) or opposite direction (Intake Retard/Exhaust Advance) of the engine rotation by rotating the rotor connected with the camshaft inside the cam phaser.



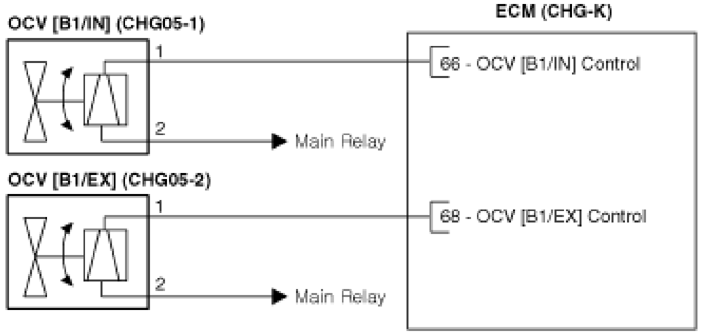
GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > CVVT Oil Control Valve (OCV) > Specifications

Specification

Item	Specification
Coil Resistance (Ω)	6.9 ~ 7.9 [20°C(68°F)]

Circuit Diagram

[Circuit Diagram]



[Connection Information]

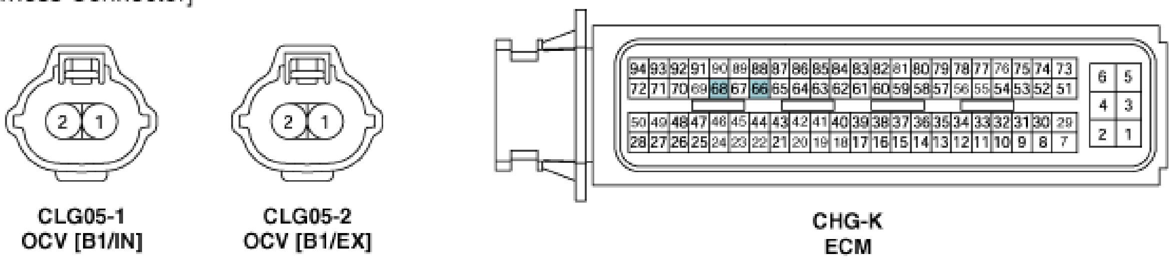
OCV [B1/IN] (CHG05-1)

Terminal	Connected to	Function
1	ECM CHG-K (66)	OCV [B1/IN] Control
2	Main Relay	Battery Power (B+)

OCV [B1/EX] (CHG05-2)

Terminal	Connected to	Function
1	ECM CHG-K (68)	OCV [B1/EX] Control
2	Main Relay	Battery Power (B+)

[Harness Connector]



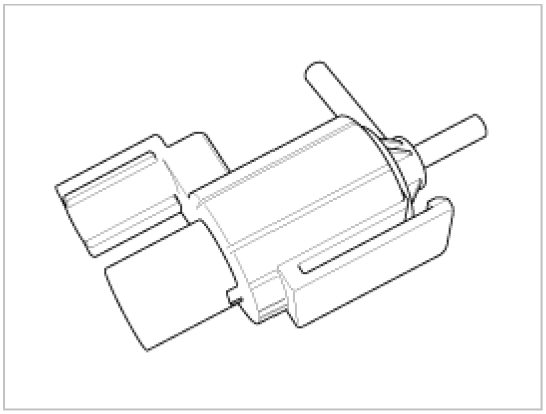
Inspection

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

Specification: Refer to “Specification”

Description

WGT (Waste Gate Turbocharger) Control Solenoid Valve is mounted to the cylinder head and operates the WGT actuator which controls the by-pass passage of the turbocharger turbine.
When the turbine internal pressure is too high, engine knocking can occur in the gasoline engine because of excessive boost pressure. To reduce compressor boost the ECM opens the waste gate valve allowing exhaust gas to by-pass the turbocharger turbine and slows the compressor operation.



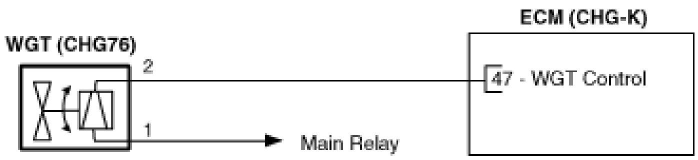
GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > WGT Control Solenoid Valve > Specifications

Specification

Item	Specification
Coil Resistance (Ω)	28.3 ~ 31.1 [20°C(68°F)]

Circuit Diagram

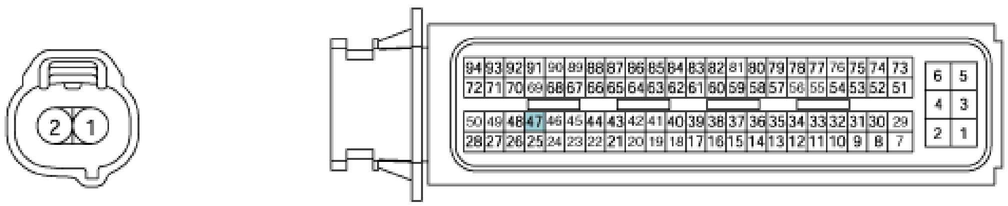
[Circuit Diagram]



[Connection Information]

Terminal	Connected to	Function
1	Main Relay	Battery Power (B+)
2	ECM CHG-K (47)	Valve Control

[Harness Connector]



CHG76
WGT

CHG-K
ECM

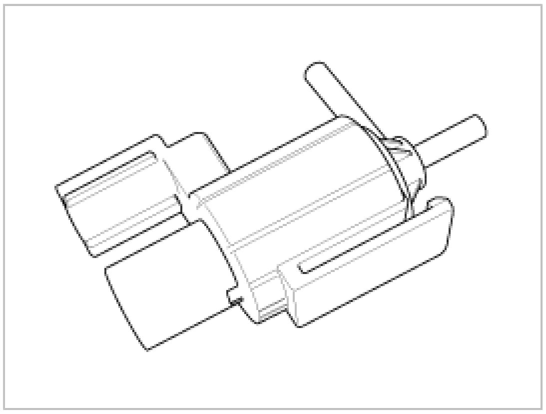
Inspection

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

Specification: Refer to “Specification”

Description

RCV (Recirculation Valve) Control Solenoid Valve is installed on the cylinder head and operates the RCV actuator which controls the by-pass passage of the turbocharger compressor.
When the throttle is closed, while the engine is running at cruise rpm (tip-out), the turbocharger boost pressure raises rapidly. The pressure wave strikes a compressor blades causing a knocking noise. To prevent this the ECM opens the recirculation valve which allows excessive boost pressure to vent back to the air cleaner side of the turbocharger compressor.



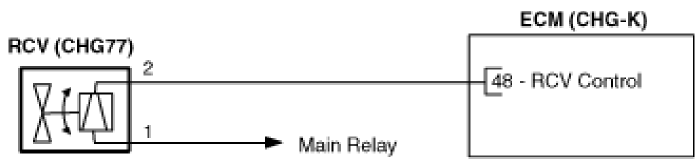
GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > RCV Control Solenoid Valve > Specifications

Specification

Item	Specification
Coil Resistance (Ω)	28.3 ~ 31.1 [20°C(68°F)]

Circuit Diagram

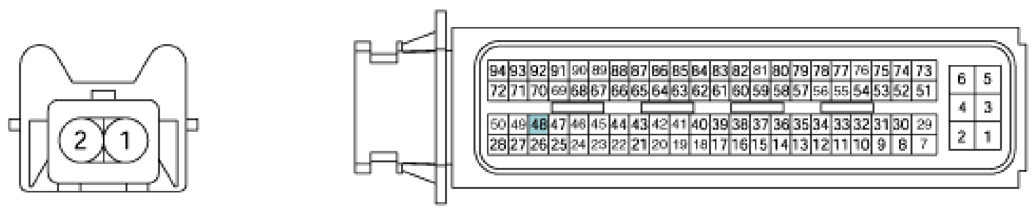
[Circuit Diagram]



[Connection Information]

Terminal	Connected to	Function
1	Main Relay	Battery Power (B+)
2	ECM CHG-K (48)	Valve Control

[Harness Connector]



CHG77
RCV

CHG-K
ECM

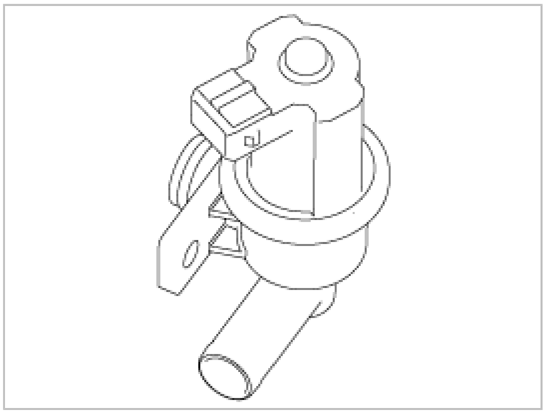
Inspection

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

Specification: Refer to “Specification”

Description

Canister Close Valve (CCV) is installed on the canister ventilation line. It seals evaporative emission control system by shutting the canister from the atmosphere when leakage detecting system operates.



Specification

Item	Specification
Coil Resistance (Ω)	23.0 ~ 26.0 [20°C(68°F)

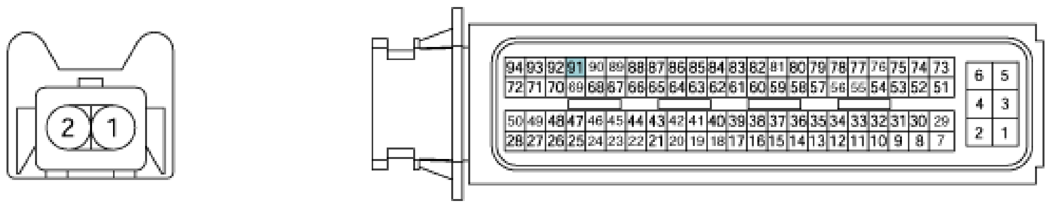
Circuit Diagram

[Circuit Diagram]

[Connection Information]

Terminal	Connected to	Function
1	Main Relay	Battery Power (B+)
2	ECM CHG-K (91)	CCV Control

[Harness Connector]



F12
CCV

CHG-K
ECM

Inspection

1. Turn the ignition switch OFF.
2. Disconnect the CCV connector.
3. Measure resistance between the CCV terminal 5 and6.
4. Check that the resistance is within the specification.

Specification: Refer to "Specification"

5. Disconnect the vapor hose connected with the canister from the CCV.
6. Connect a vacuum pump to the nipple.
7. Ground the CCV control line and apply battery voltage to the CCV power supply line.
8. Apply vacuum and check the valve operation.

Specification: Vacuum maintained

Inspection Chart For Diagnostic Trouble Codes (DTC)

DTC	Description	MIL
P0011	"A" Camshaft Position-Timing Over-Advanced or System Performance (Bank 1)	●
P0014	"B" Camshaft Position-Timing Over-Advanced or System Performance (Bank 1)	●
P0016	Crankshaft Position-Camshaft Position Correlation (Bank 1 Sensor A)	●
P0017	Crankshaft Position-Camshaft Position Correlation (Bank 1 Sensor B)	●
P0030	HO2S Heater Control Circuit (Bank 1 / Sensor 1)	●
P0031	HO2S Heater Control Circuit Low (Bank 1 / Sensor 1)	●
P0032	HO2S Heater Control Circuit High (Bank 1 / Sensor 1)	●
P0034	Turbocharger/Supercharger Bypass Valve Control Circuit Low	●
P0035	Turbocharger/Supercharger Bypass Valve Control Circuit High	●
P0036	HO2S Heater Control Circuit (Bank 1 / Sensor 2)	●
P0037	HO2S Heater Control Circuit Low (Bank 1 / Sensor 2)	●
P0038	HO2S Heater Control Circuit High (Bank 1 / Sensor 2)	●
P0049	Turbocharger/Supercharger Turbine Overspeed	●
P0068	MAP(MAF)-Throttle Position Sensor Correlation	●
P0071	Ambient Air Temperature Circuit Range / Performance	●
P0072	Ambient Air Temperature Circuit Low	●
P0073	Ambient Air Temperature Circuit High	●
P0076	Intake Valve Control Solenoid Circuit-Low (Bank 1)	●
P0077	Intake Valve Control Solenoid Circuit-High (Bank 1)	●
P0079	Exhaust Valve Control Solenoid Circuit Low (Bank 1)	●
P0080	Exhaust Valve Control Solenoid Circuit High (Bank 1)	●
P0106	Manifold Absolute Pressure/Barometric Pressure Circuit Range / Performance	●
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	●
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input	●
P0111	Intake Air Temperature Sensor 1 Circuit Range / Performance	●
P0112	Intake Air Temperature Sensor 1 Circuit Low Input	●
P0113	Intake Air Temperature Sensor 1 Circuit High Input	●
P0116	Engine Coolant Temperature Circuit Range / Performance	●
P0117	Engine Coolant Temperature Circuit Low Input	●
P0118	Engine Coolant Temperature Circuit High Input	●
P0119	Engine Coolant Temperature Circuit Intermittent	●
P0121	Throttle Position Sensor 1 Signal Circuit Range / Performance	●
P0122	Throttle Position Sensor 1 Signal Circuit Low Input	●
P0123	Throttle Position Sensor 1 Signal Circuit High Input	●
P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	●
P0128	Coolant Thermostat (Coolant Temperature below Thermostat Regulating Temperature)	●

P0130	O2 Sensor Circuit (Bank 1 / Sensor 1)	●
P0131	O2 Sensor Circuit Low Voltage(Bank 1 / Sensor 1)	●
P0132	O2 Sensor Circuit High Voltage(Bank 1 / Sensor 1)	●
P0133	O2 Sensor Circuit Slow Response (Bank 1 / Sensor 1)	●
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	●
P0136	O2 Sensor Circuit (Bank 1 / Sensor 2)	●
P0137	O2 Sensor Circuit Low Voltage (Bank 1 / Sensor 2)	●
P0138	O2 Sensor Circuit High Voltage (Bank 1 / Sensor 2)	●
P0139	O2 Sensor Circuit Slow Response(Bank 1 / Sensor 2)	●
P0140	O2 Sensor Circuit No Activity Detected (Bank 1 / Sensor 2)	●
P0170	Fuel Trim (Bank 1)	●
P0196	Engine Oil Temperature Sensor-Range / Performance	●
P0197	Engine Oil Temperature Sensor Low Input	●
P0198	Engine Oil Temperature Sensor High Input	●
P0221	Throttle/Pedal Position Sensor/Switch "B" Circuit Range / Performance	●
P0222	Throttle/Pedal Position Sensor/Switch "B" Circuit Low Input	●
P0223	Throttle/Pedal Position Sensor/Switch "B" Circuit High Input	●
P0230	Fuel Pump Primary Circuit	▲
P0234	Turbocharger/Supercharger Overboost Condition	●
P0236	Turbocharger/Supercharger Boost Sensor "A" Circuit Range/Perform	●
P0237	Turbocharger/Supercharger Boost Sensor "A" Circuit Low	●
P0238	Turbocharger/Supercharger Boost Sensor "A" Circuit High	●
P0244	Turbocharger/Supercharger Wastegate Sol. "A" Range / Performance	●
P0245	Turbocharger/Supercharger Wastegate Sol. "A" Low	●
P0246	Turbocharger/Supercharger Wastegate Sol. "A" High	●
P0261	Cylinder 1 Injector Circuit Low	●
P0262	Cylinder 1 Injector Circuit High	●
P0264	Cylinder 2 Injector Circuit Low	●
P0265	Cylinder 2 Injector Circuit High	●
P0267	Cylinder 3 Injector Circuit Low	●
P0268	Cylinder 3 Injector Circuit High	●
P0270	Cylinder 4 Injector Circuit Low	●
P0271	Cylinder 4 Injector Circuit High	●
P0299	Turbocharger/Supercharger Underboost	▲
P0300	Random/Multiple Cylinder Misfire Detected	●
P0301	Cylinder 1-Misfire detected	●
P0302	Cylinder 2-Misfire detected	●
P0303	Cylinder 3-Misfire detected	●
P0304	Cylinder 4-Misfire detected	●

P0315	Crankshaft Position System Not Learned	▲
P0326	Knock Sensor 1 Circuit Range / Performance (Bank 1)	●
P0335	Crankshaft Position Sensor "A" Circuit	●
P0336	Crankshaft Position Sensor "A" Circuit Range / Performance	●
P0340	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)	●
P0341	Camshaft Position Sensor "A" Circuit Range / Performance (Bank 1)	●
P0365	Camshaft Position Sensor "B" Circuit Malfunction (Bank 1)	●
P0366	Camshaft Position Sensor "B" Circuit Range / Performance (Bank 1)	●
P0420	Catalyst System Efficiency below Threshold (Bank 1)	●
P0441	Evaporative Emission System Incorrect Purge Flow	●
P0442	Evaporative Emission System-Leak detected (small leak)	●
P0444	Evaporative Emission System-Purge Control Valve Circuit Open	●
P0445	Evaporative Emission System-Purge Control Valve Circuit Shorted	●
P0447	Evaporative Emission System-Vent Control Circuit Open	●
P0448	Evaporative Emission System-Vent Control Circuit Shorted	●
P0449	Evaporative Emission System-Vent Valve / Solenoid Circuit	●
P0451	Evaporative Emission System-Pressure Sensor Range / Performance	●
P0452	Evaporative Emission System-Pressure Sensor Low Input	●
P0453	Evaporative Emission System-Pressure Sensor High Input	●
P0454	Evaporative Emission System-Pressure Sensor Intermittent	●
P0455	Evaporative Emission System-Leak detected(Large leak)	●
P0456	Evaporative Emission System-Leak detected (very small leak)	●
P0461	Fuel Level Sensor "A" Circuit Range / Performance	●
P0462	Fuel Level Sensor "A" Circuit Low Input	●
P0463	Fuel Level Sensor "A" Circuit High Input	●
P0464	Fuel Level Sensor "A" Circuit Intermittent	●
P0504	Brake Switch "A" / "B" Correlation	▲
P0506	Idle Air Control System-RPM Lower than Expected	●
P0507	Idle Air Control System-RPM Higher than Expected	●
P0532	A/C Refrigerant Pressure Sensor "A" Circuit Low Input	▲
P0533	A/C Refrigerant Pressure Sensor "A" Circuit High Input	▲
P0551	Power Steering Pressure Sensor/Switch Circuit Range / Performance	▲
P0560	System Voltage	▲
P0562	System Voltage Low	●
P0563	System Voltage High	●
P0564	Cruise Control Multi-Function Input A Circuit	▲
P0605	Internal Control Module Read Only Memory(ROM) Error	●
P0625	Generator Field/F Terminal Circuit Low	▲
P0626	Generator Field/F Terminal Circuit High	▲

P0630	VIN Not Programmed or Incompatible-ECM/PCM	●
P0638	Throttle Actuator Control Range / Performance (Bank 1)	●
P0642	Sensor Reference Voltage "A" Circuit Low	●
P0643	Sensor Reference Voltage "A" Circuit High	●
P0646	A/C Clutch Relay Control Circuit Low	▲
P0647	A/C Clutch Relay Control Circuit High	▲
P0650	Malfunction Indicator Lamp (MIL) Control Circuit	▲
P0652	Sensor Reference Voltage "B" Circuit Low	●
P0653	Sensor Reference Voltage "B" Circuit High	●
P0698	Sensor Reference Voltage "C" Circuit Low	●
P0699	Sensor Reference Voltage "C" Circuit High	●
P06A4	Sensor Reference Voltage "D" Circuit Low	●
P06A5	Sensor Reference Voltage "D" Circuit High	●
P0704	Clutch Switch Input Circuit Malfunction	▲
P2066	Fuel Level Sensor "B" Performance	●
P2067	Fuel Level Sensor "B" Circuit Low	●
P2068	Fuel Level Sensor "B" Circuit High	●
P2069	Fuel Level Sensor "B" Circuit Intermittent	●
P2096	Post Catalyst Fuel Trim System too Lean (Bank 1)	●
P2097	Post Catalyst Fuel Trim System too Rich (Bank 1)	●
P2101	Throttle Actuator Control Motor Circuit Range / Performance	●
P2104	Limp Home Mode - Forced Idle	●
P2105	Limp Home Mode - Force Engine Shutdown	●
P2106	Lime Home Mode - Force Limited Power	●
P2110	Throttle Actuator Control System - Forced Limited RPM	●
P2118	Throttle Actuator Control Motor Current Range / Performance	●
P2119	Throttle Actuator Control Throttle Body Range / Performance	●
P2122	Throttle/Pedal Position Sensor/Switch "D" Circuit Low Input	●
P2123	Throttle/Pedal Position Sensor/Switch "D" Circuit High Input	●
P2127	Throttle/Pedal Position Sensor/Switch "E" Circuit Low Input	●
P2128	Throttle/Pedal Position Sensor/Switch "E" Circuit High Input	●
P2138	Throttle/Pedal Position Sensor/Switch D/E Voltage Correlation	●
P2159	Vehicle Speed Sensor "B" Range / Performance(Wheel Speed Sensor)	●
P2187	System too Lean at Idle (←Additive) (Bank 1)	●
P2188	System too Rich at Idle (Bank 1)	●
P2191	System too Lean at Higher Load (←Multiple) (Bank 1)	●
P2192	System too Rich at Higher Load (Bank 1)	●
P2227	Barometric Pressure Circuit Range / Performance	●
P2228	Barometric Pressure Circuit Low Input	●

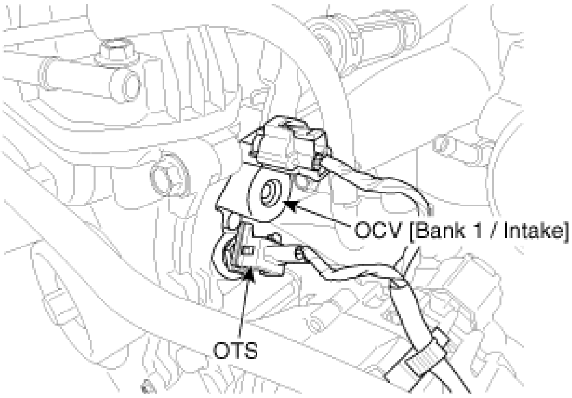
P2229	Barometric Pressure Circuit High Input	●
P2261	Turbocharger/Supercharger Bypass Valve - Mechanical	●
P2610	ECM/PCM Internal Engine Off Timer Performance	●
U0001	High Speed CAN Communication Bus off	●
U0101	Lost Communication With TCM	●

NOTE

●: MIL ON & Memory
▲: MIL OFF & Memory

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0011 \'A\' Camshaft Position-Timing Over-Advanced or System Performance (Bank 1)

Component Location



General Description

The CVVT (Continuously Variable Valve Timing) system is installed to the chain sprocket of the camshafts. This system controls the camshaft to provide the optimal valve timing for whole driving condition. The ECM controls the Oil Control Valve (OCV), based on the signals output from air flow, throttle position and engine coolant temperature. The CVVT controller regulates the camshaft angle using oil pressure through the OCV. As result, the relative position between the camshaft and the crankshaft becomes optimal, and the engine torque improves, fuel economy improves, exhaust emissions decrease under overall driving conditions.

DTC Description

The deviation of the camshaft position from the target point is evaluated during stable driving condition. The ECM accumulates this deviation for a certain period and sets DTC P0011 when the accumulated deviation is too high. The target camshaft position is predetermined value depending on engine speed and throttle angle in the ECM.

DTC Detecting Condition

Item		Detecting Condition	Possible Cause
DTC Strategy	Case1	• Deviation check between actual CAM position and CAM setpoint position in case of changing setpoint (slow response of actuator)	• Oil leak • Oil Control Valve • CVVT Assembly
	Case2	• Deviation check between actual CAM position and CAM setpoint position (steady deviation)	
Enable Conditions	Case1	• CVVT control active • Camshaft setpoint moving by more than 12°CRK within less than 0.70 sec. • Camshaft setpoint moved more than 5 times since engine start • 11V < Battery voltage < 16V • 600 to 1500< Engine speed(RPM) < 5000 • No relevant failure • 20°C(68°F) < Engine oil temp. < 110°C(230°F)	
	Case2	• CVVT control active • Camshaft setpoint moved more than 5 times since engine start • Camshaft setpoint not close to full retard position • 11V < Battery voltage < 16V • 600 to 1500 < Engine speed(RPM) < 5000 • No relevant failure • 20°C(68°F) < Engine oil temp. < 110°C(230°F)	

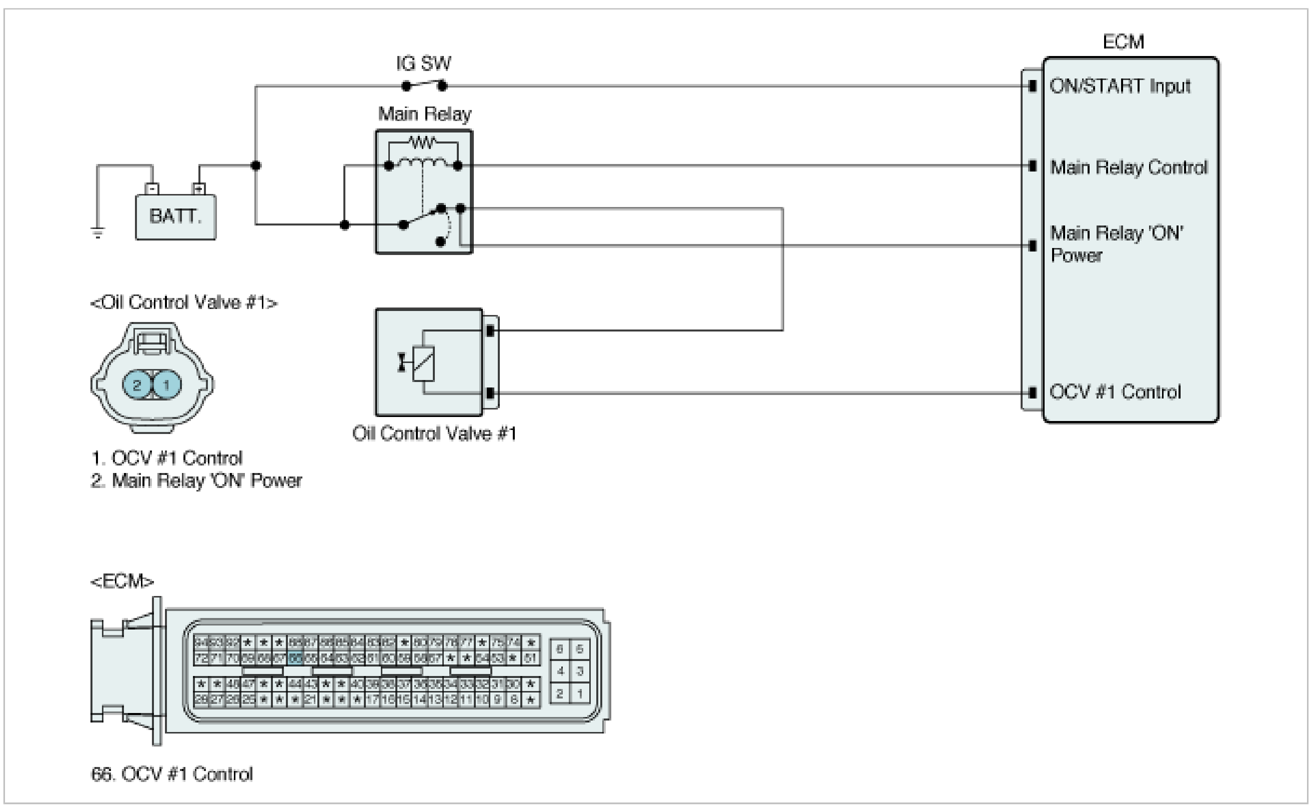
Threshold Value	Case1	• CAM position movement < 3.4 °CRK within 0.8 sec. (with CAM setpoint moving by 12 °CRK)	
	Case2	• Integral of Camshaft position actual value - Camshaft position setpoint > 45°CRK/sec.	
Diagnostic Time	Case1	• 600 sec.	
	Case2	• 180 sec.	
MIL On Condition		• 2 Driving Cycles	

Specification

Intake OCV	Normal Parameter
Insulation Resistance (Ω)	**Above 50 MΩ**

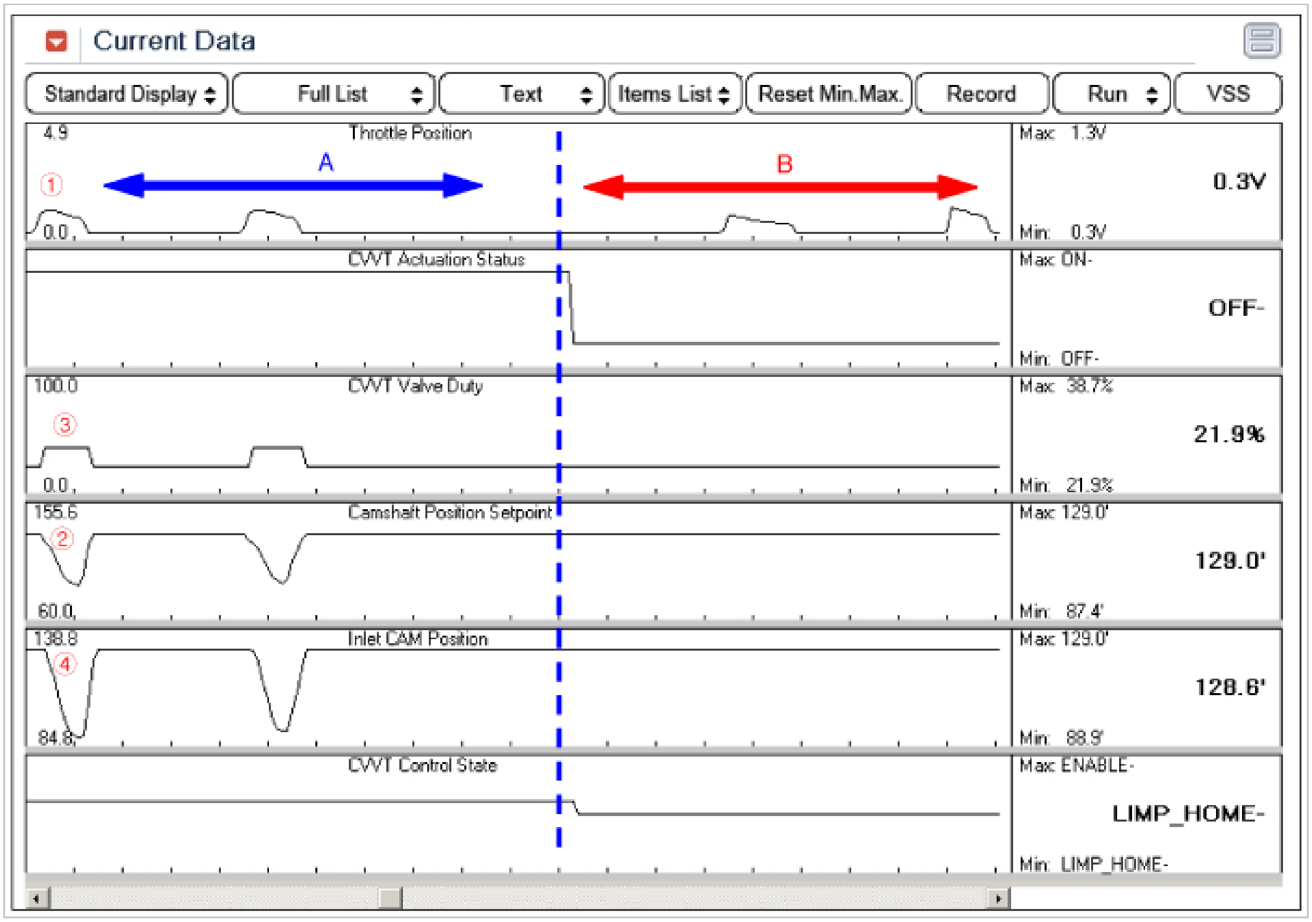
Temp.(°C)	Temp.(°F)	Resistance(Ω)	Temp.(°C)	Temp.(°F)	Resistance(Ω)
0	32	6.2 ~ 7.4	60	140	8.0 ~ 9.2
10	50	6.5 ~ 7.7	70	158	8.3 ~ 9.5
20	68	6.9 ~ 7.9	80	176	8.6 ~ 9.8
30	86	7.1 ~ 8.3	90	194	8.9 ~ 10.1
40	104	7.4 ~ 8.6	100	212	9.2 ~ 10.4
50	122	7.7 ~ 8.9			

Diagnostic Circuit Diagram



Signal Waveform & Data

1. Connect GDS and select Data Analysis.
2. After warming-up, check following items.

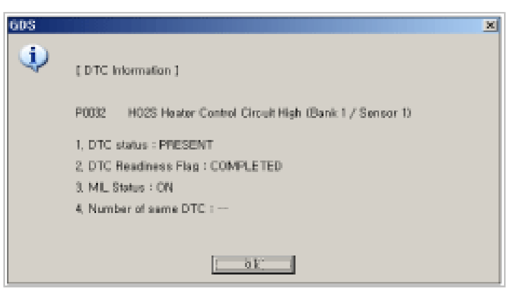


3. Data analysis
   - ▸ A Sector : CVVT works
   - ▸ B Sector : Limp Home Mode (CVVT doesn't work.)
   - ▸ CVVT Control Flow (A Sector)

   : Acceleration pedal(①) shift → Engine RPM change → Camshaft Position Setpoint (②) change → CVVT Valve Duty(③) change → Inlet CAM Position(④) change

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Component Inspection

■ **Check OCV and Filter**

1. Check resistance of OCV
   (1) Ignition "OFF"
   (2) Disconnect intake OCV connector.
   (3) Measure resistance between power and control terminals of OCV. (Component Side)

Specification : Approx. 6.9~7.9Ω at 20°C(68°F)

   (4) Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Replace OCV and then go to "Verification of Vehicle Repair" procedure

2. Check operation of OCV
   (1) Start the engine and let it idle.
   (2) With OCV connector still disconnected, apply 12V to power terminal and connect ground to control terminal of the OCV (Component side).
   Specification :

Test Condition	Disconnect OCV connector	Apply battery voltage
Normal Value	Normal engine speed	Rough idle or engine stall

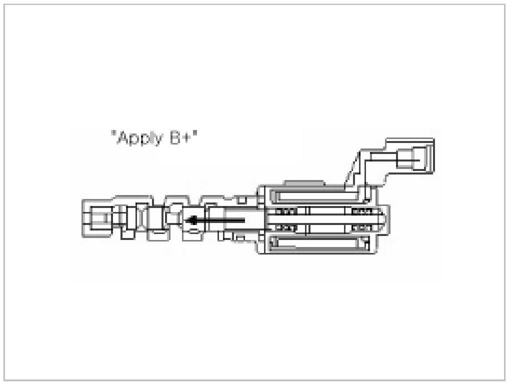
   (3) Has a problem been found?

YES	▸ Go to next step as below
NO	▸ Go to "Check CVVT(Continuously Variable Valve Timing) Assembly" procedure

3. Check OCV and Filter
   (1) Ignition"OFF"
   (2) Check OCV filter for sticking or contamination.
   (3) Remove the OCV and visually check the spool column of OCV for contamination
   (4) Has a problem been found?

YES	▸ Clean or replace as necessary and then go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

   (5) Apply 12V to power terminal and connect ground to control terminal of the OCV(Component side).
   (6) Verify that a "clicking" sound is heard when applying the battery voltage.
   (7) Repeat this procedure 4 or 5 times to ensure intake OCV reliability.

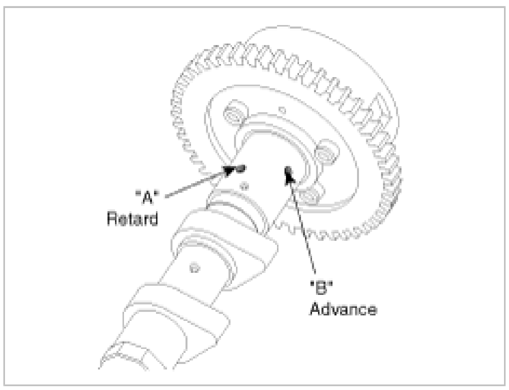


(8) Is OCV working properly?

YES	▸ Go to next step as below
NO	▸ Check OCV for contamination, deterioration, or damage. 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.

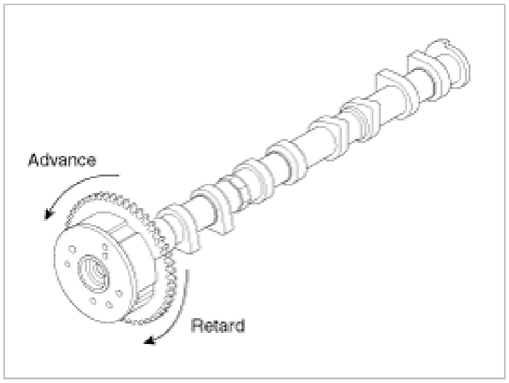
■ **Check CVVT(Continuously Variable Valve Timing) Assembly**

1. Remove the CVVT assembly. Refer to "Removal Procedure" in Workshop Manual
2. Check that the CVVT assembly is locked.
3. The one of the 2 holes on the cam journal is for advances(upper) and the rest is for retards(lower). Apply masking tape to all oil path holes except the one advance hole("B") indicated by the arrow as shown in the figure.



4. To release the CVVT lock pin, wrap some tape around the tip of an air pressure adapter and apply low air pressure of approx. 150kPa(1.5kg/cm², 21 psi) to the exposed camshaft port. Wrap a shop towel or rag around the CVVT because residual oil may leak out of the unit when applying air pressure
5. With low air pressure applied, turn the CVVT to the ADVANCE direction as indicated in the figure.

> NOTE
>
> If too much air leaks when applying the low air pressure, the CVVT lock pin may not release and the CVVT may not turn.



6. Allow the CVVT assembly to move in the ADVANCE and DELAY directions to ensure there is no binding and that it moves freely.(Movable smoothly in the range about 20°)
7. Turn the CVVT by hand and make sure it locks in the maximum delay angle position.
8. Is CVVT assembly working properly?

YES	▸ Go to next step as below
NO	▸ Replace the CVVT assembly and go to "Verification of Vehicle Repair" procedure

Terminal and Connector Inspection

1. 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.
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	▸ Check valve timing. Refer to "P0016: Crankshaft Position-Camshaft Position Correlation(Bank1)" procedure. Repair as necessary and go to "Verification of Vehicle Repair" procedure

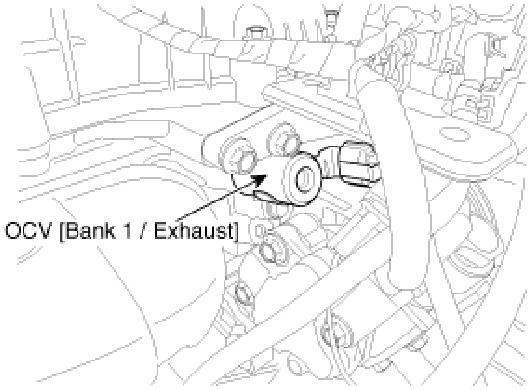
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The CVVT (Continuously Variable Valve Timing) system is installed to the chain sprocket of the exhaust camshaft. There is no variation in valve timing of the exhaust cam because the exhaust camshaft is driven by the timing belt. The timing of the intake cam is varied by the relative operation the CVVT vane to the housing. The CVVT controller regulates the intake camshaft angle using oil pressure through the OCV(Oil Control Valve). As result, the relative position between the camshaft and the crankshaft becomes optimal, and the engine torque improves, fuel economy improves, exhaust emissions decrease by changing the valve open/close timing of the intake camshaft.

DTC Description

The deviation of the camshaft position from the target point is evaluated during stable driving condition. The ECM accumulates this deviation for a certain period and sets DTC P0014 when the accumulated deviation is too high. The target camshaft position is predetermined value depending on engine speed and throttle angle in the ECM.

DTC Detecting Condition

Item		Detecting Condition	Possible Cause
DTC Strategy	Case1	• Deviation check between actual CAM position and CAM setpoint position in case of changing setpoint (slow response of actuator)	• Oil leak • Oil Control Valve • CVVT Assembly
	Case2	• Deviation check between actual CAM position and CAM setpoint position (steady deviation)	
Enable Conditions	Case1	• CVVT control active • Camshaft setpoint moving by more than 12°CRK within less than 0.70 sec. • Camshaft setpoint moved more than 5 times since engine start • 11V < Battery voltage < 16V • 600 to 1500< Engine speed(RPM) < 5000 • No relevant failure • 20°C(68°F) < Engine oil temp. < 110°C(230°F)	
	Case2	• CVVT control active • Camshaft setpoint moved more than 5 times since engine start • Camshaft setpoint not close to full retard position • 11V < Battery voltage < 16V • 600 to 1500 < Engine speed(RPM) < 5000 • No relevant failure • 20°C(68°F) < Engine oil temp. < 110°C(230°F)	

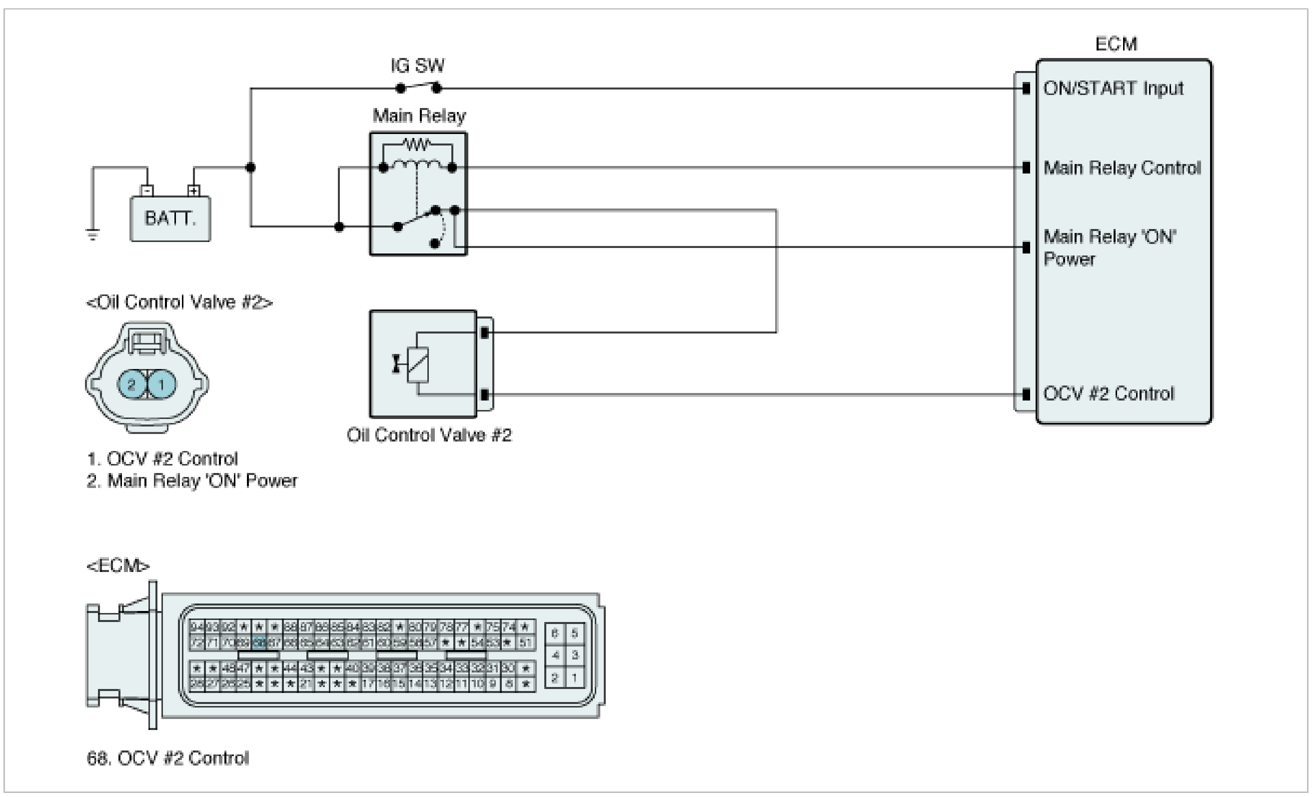
Threshold Value	Case1	• CAM position movement < 3.4 °CRK within 0.8 sec. (with CAM setpoint moving by 12 °CRK)	
	Case2	• Integral of Camshaft position actual value - Camshaft position setpoint > 45°CRK/sec.	
Diagnostic Time	Case1	• 600 sec.	
	Case2	• 180 sec.	
MIL On Condition		• 2 Driving Cycles	

Specification

Intake OCV	Normal Parameter
Insulation Resistance (Ω)	**Above 50 MΩ**

Temp.(°C)	Temp.(°F)	Resistance(Ω)	Temp.(°C)	Temp.(°F)	Resistance(Ω)
0	32	6.2 ~ 7.4	60	140	8.0 ~ 9.2
10	50	6.5 ~ 7.7	70	158	8.3 ~ 9.5
20	68	6.9 ~ 7.9	80	176	8.6 ~ 9.8
30	86	7.1 ~ 8.3	90	194	8.9 ~ 10.1
40	104	7.4 ~ 8.6	100	212	9.2 ~ 10.4
50	122	7.7 ~ 8.9			

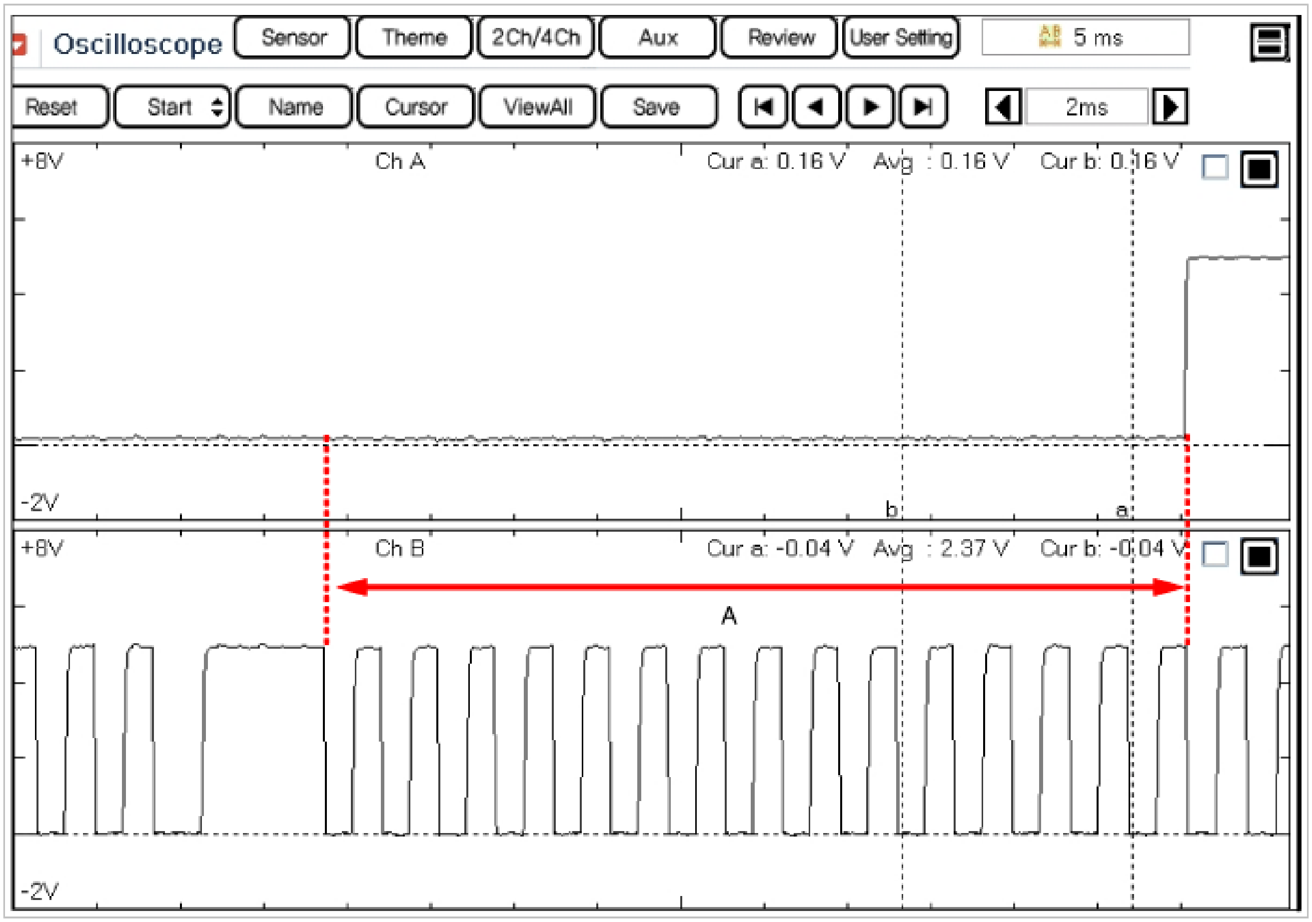
Diagnostic Circuit Diagram

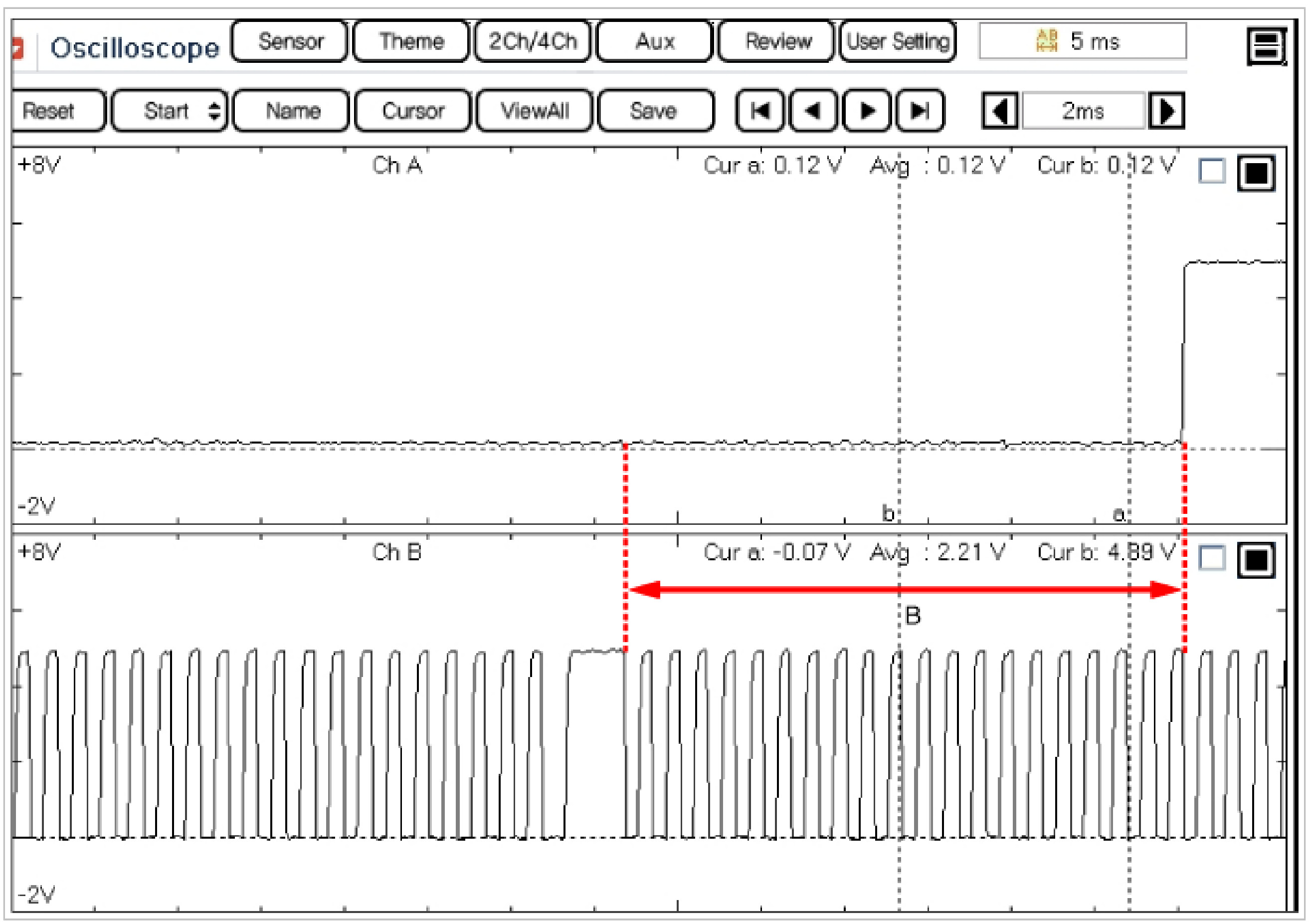


Signal Waveform & Data

1. Set up an oscilloscope as follows :
   Channel A (+): Signal terminal of the CMPS #2(back probe), (-): ground
   Channel B (+): Signal terminal of the CKPS(back probe), (-): ground

2. Start the engine and check for signal waveform compared with reference waveform as below.

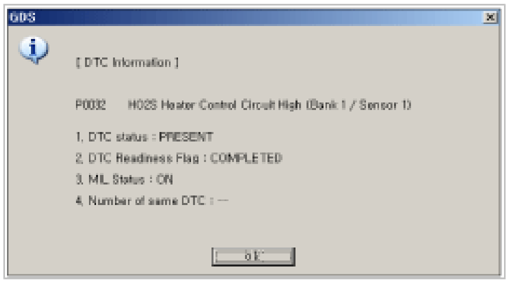




A : CMPS and CKPS waveform of exhaust shaft at idle
B : CMPS and CKPS waveform of exhaust cam shaft at acceleration
(Tooth number is changed by CVVT operation)

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Component Inspection

■ **Check OCV and Filter**

1. Check resistance of OCV
   (1) Ignition "OFF"
   (2) Disconnect intake OCV connector.
   (3) Measure resistance between power and control terminals of OCV. (Component Side)

   Specification : Approx. 6.9~7.9Ω at 20°C(68°F)

   (4) Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Replace OCV and then go to "Verification of Vehicle Repair" procedure

2. Check operation of OCV
   (1) Start the engine and let it idle.
   (2) With OCV connector still disconnected, apply 12V to power terminal and connect ground to control terminal of the OCV (Component side).
   Specification :

Test Condition	Disconnect OCV connector	Apply battery voltage

Normal Value	Normal engine speed	Rough idle or engine stall

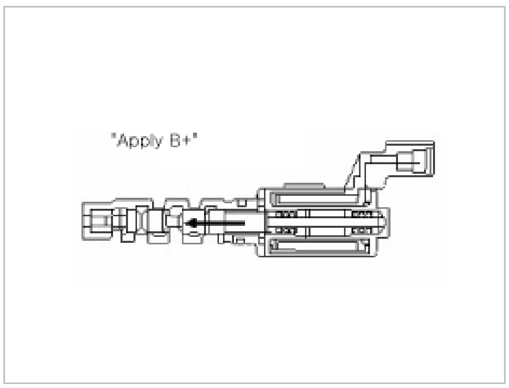
(3) Has a problem been found?

YES	▸ Go to next step as below
NO	▸ Go to "Check CVVT(Continuously Variable Valve Timing) Assembly" procedure

3. Check OCV and Filter
   (1) Ignition"OFF"
   (2) Check OCV filter for sticking or contamination.
   (3) Remove the OCV and visually check the spool column of OCV for contamination
   (4) Has a problem been found?

YES	▸ Clean or replace as necessary and then go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

   (5) Apply 12V to power terminal and connect ground to control terminal of the OCV(Component side).
   (6) Verify that a "clicking" sound is heard when applying the battery voltage.
   (7) Repeat this procedure 4 or 5 times to ensure intake OCV reliability.

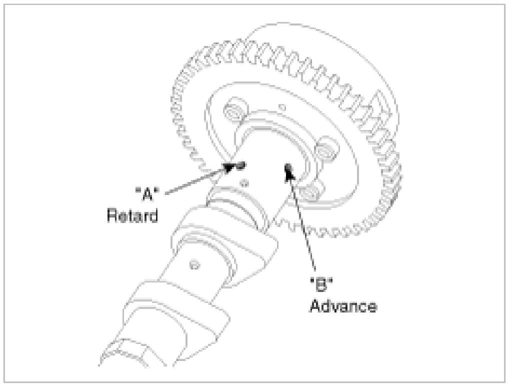


   (8) Is OCV working properly?

YES	▸ Go to next step as below
NO	▸ Check OCV for contamination, deterioration, or damage. 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.

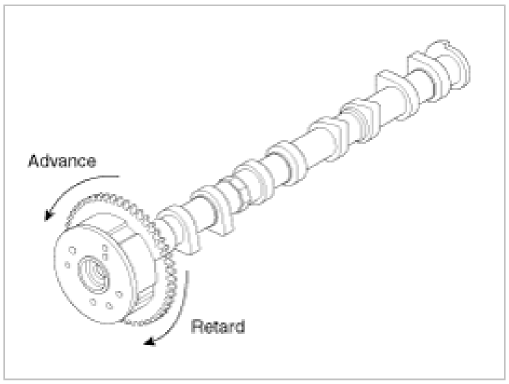
■ Check CVVT(Continuously Variable Valve Timing) Assembly

1. Remove the CVVT assembly. Refer to "Removal Procedure" in Workshop Manual
2. Check that the CVVT assembly is locked.
3. The one of the 2 holes on the cam journal is for advances(upper) and the rest is for retards(lower). Apply masking tape to all oil path holes except the one advance hole("B") indicated by the arrow as shown in the figure.



4. To release the CVVT lock pin, wrap some tape around the tip of an air pressure adapter and apply low air pressure of approx. 150kPa(1.5kg/cm², 21 psi) to the exposed camshaft port. Wrap a shop towel or rag around the CVVT because residual oil may leak out of the unit when applying air pressure
5. With low air pressure applied, turn the CVVT to the ADVANCE direction as indicated in the figure.

> NOTE
>
> If too much air leaks when applying the low air pressure, the CVVT lock pin may not release and the CVVT may not turn.



6. Allow the CVVT assembly to move in the ADVANCE and DELAY directions to ensure there is no binding and that it moves freely.(Movable smoothly in the range about 20°)
7. Turn the CVVT by hand and make sure it locks in the maximum delay angle position.
8. Is CVVT assembly working properly?

YES	▸ Go to next step as below
NO	▸ Replace the CVVT assembly and go to "Verification of Vehicle Repair" procedure

Terminal and Connector Inspection

1. 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.
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	▸ Check valve timing. Refer to "P0016: Crankshaft Position-Camshaft Position Correlation(Bank1)" procedure. Repair as necessary and go to "Verification of Vehicle Repair" procedure

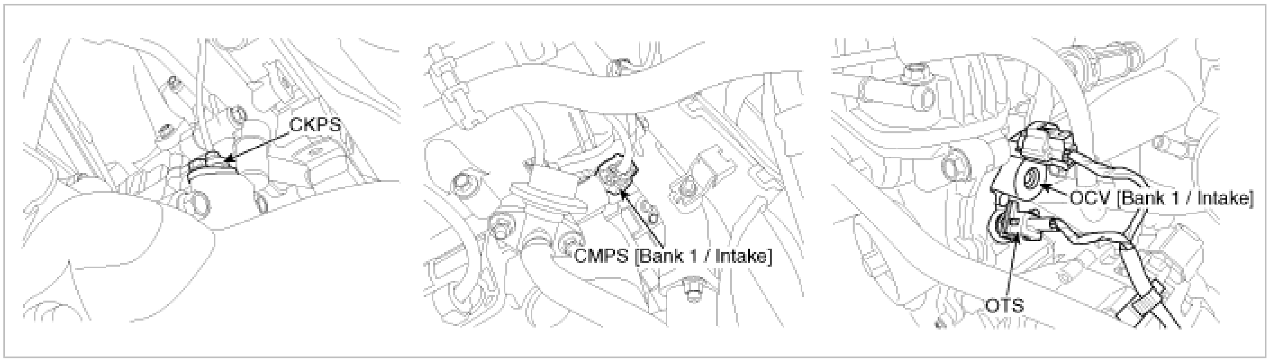
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The CVVT (Continuously Variable Valve Timing) system is installed to the chain sprocket of the camshafts. This system controls the camshaft to provide the optimal valve timing for whole driving condition. The ECM controls the Oil Control Valve(OCV), based on the signals output from air flow, throttle position and engine coolant temperature. The CVVT controller regulates the camshaft angle using oil pressure through the OCV. As result, the relative position between the camshaft and the crankshaft becomes optimal, and the engine torque improves, fuel economy improves, exhaust emissions decrease under overall driving conditions.

DTC Description

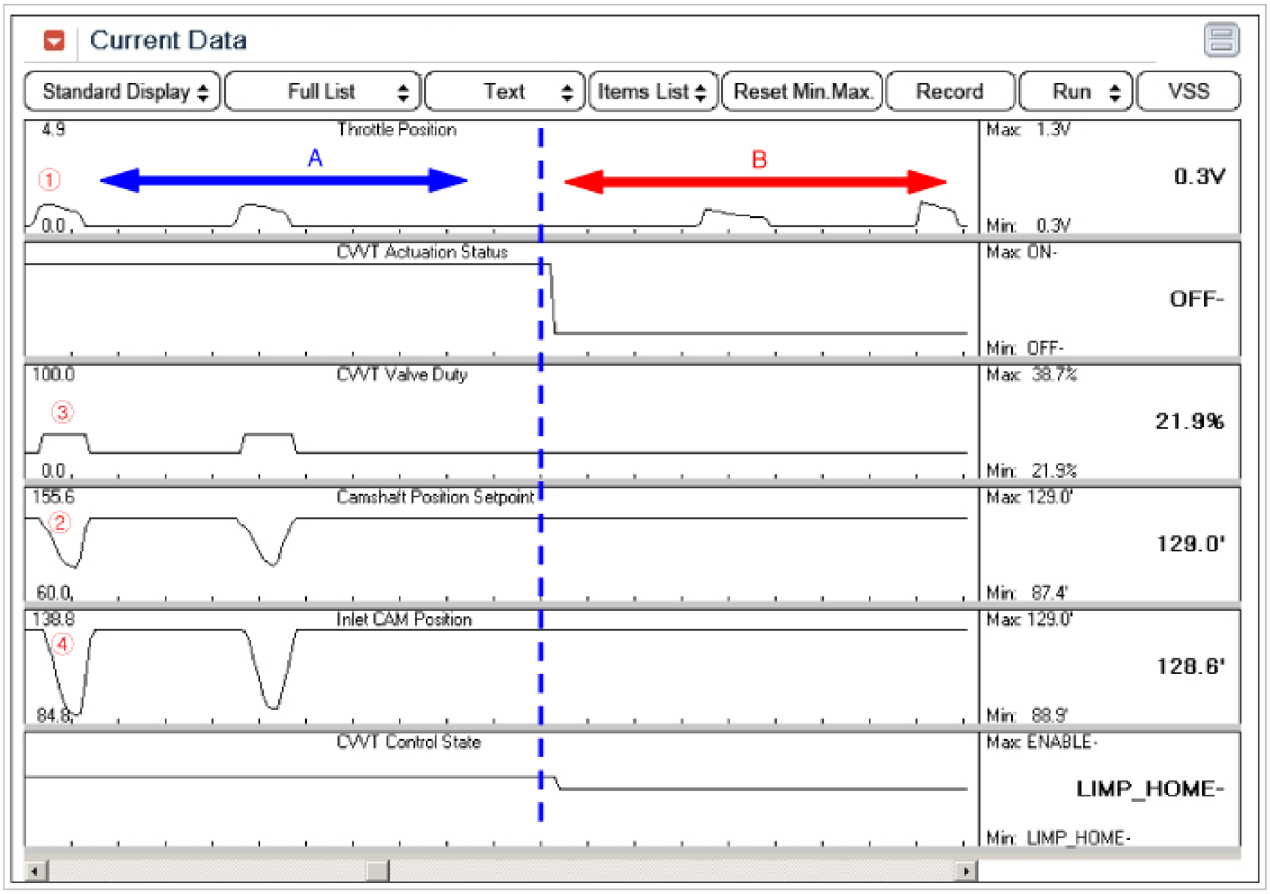
This diagnosis checks the camshaft position plausibility whether the expected range plus some margin is not violated that might be caused by a wrong engine repair, or a chain/belt misalignment. DTC P0016 is set when actual camshaft position is too much retarded or advanced than full retard position or full advance position. To continue the adjustment in such case could lead to a damage of the engine by hitting the valves with the piston.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Camshaft edge in CVVT full retard position out of Range compared to Reference position	• Valve timing • Oil Control Valve • CVVT Assembly
Enable Conditions	• Camshaft position adaptation value is valid	
Threshold Value	• Camshaft position adaptation < -15 °CRK • Camshaft position adaptation > +15 °CRK	
Diagnostic Time	• 80 rev.	
Mil On Condition	• 2 Driving Cycles	

Signal Waveform & Data

1. Connect GDS and select Data Analysis.
2. After warming-up, check following items.

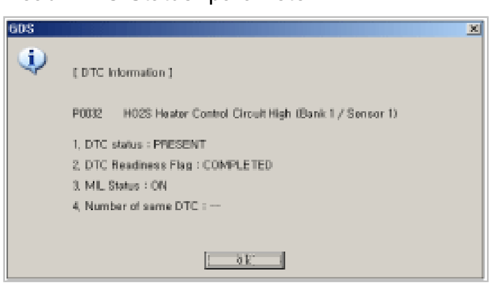


3. Data analysis
   - ▶ A Sector : CVVT works
   - ▶ B Sector : Limp Home Mode (CVVT doesn't work.)
   - ▶ CVVT Control Flow (A Sector)

   : Acceleration pedal(①) shift → Engine RPM change → Camshaft Position Setpoint (②) change → CVVT Valve Duty(③) change → Inlet CAM Position(④) change

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.


GDS

[DTC Information]

P0032 HO2S Heater Control Circuit High (Bank 1 / Sensor 1)

1. DTC status : PRESENT
2. DTC Readiness Flag : COMPLETED
3. MIL Status : ON
4. Number of same DTC : —

ok

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

NOTE

- History (Not Present) fault : DTC occurred but has been cleared.
- Present fault : DTC is occurring at present time.

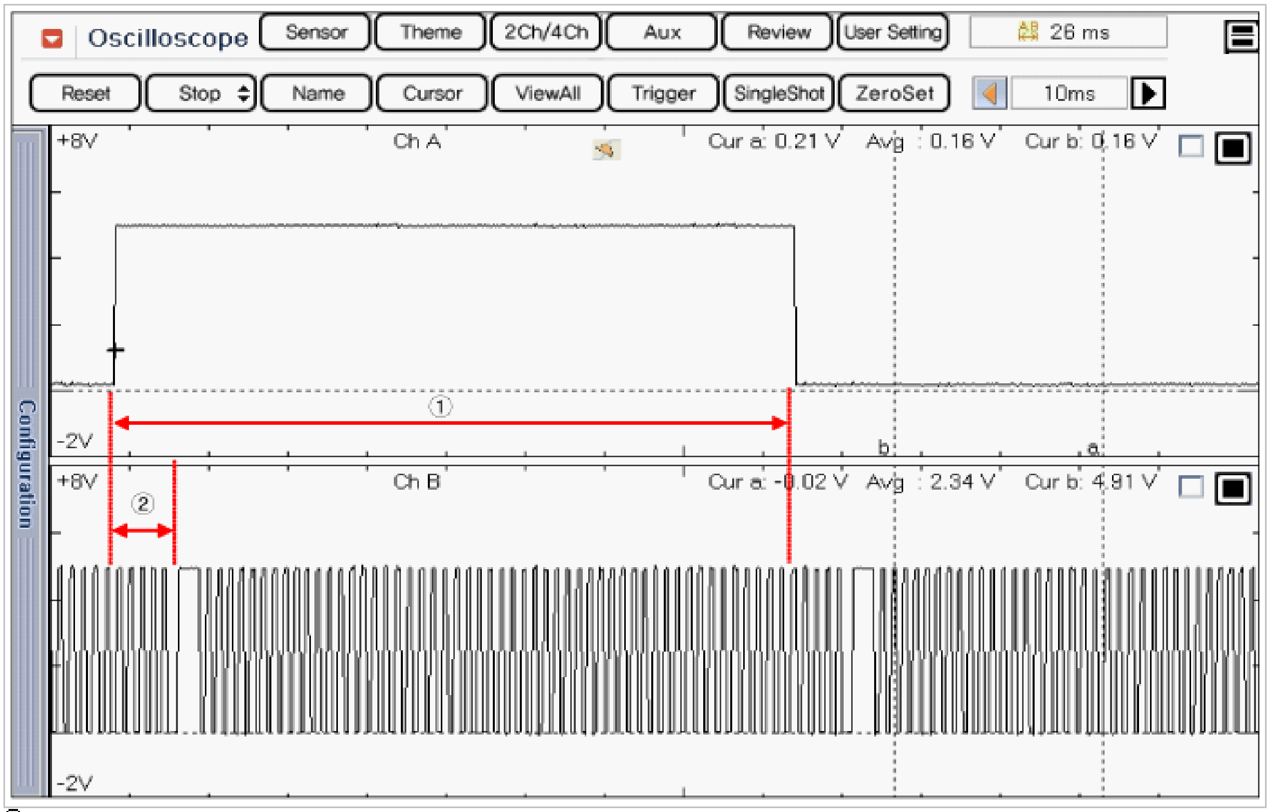
YES	▶ Fault is intermittent caused by poor contact in the sensor's and/or ECM's connector or was repaired and ECM memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending,

	corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.
NO	▸ Go to next step as below

Component Inspection

1. Timing Inspection
   (1) With ignition "OFF", set up an oscilloscope as follows :
   Channel A (+): Signal terminal of the CMPS(back probe), (-): ground
   Channel B (+): Signal terminal of the CKPS(back probe), (-): ground

   (2) Start the engine and check for signal waveform whether synchronize with camshaft sensor or not and tooth is missing refer to sample waveforms as below



① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS.
② There are 3~5 signals of CKPS between the switching point of CMPS and the missing tooth of CKPS.

   (3) Is the signal waveform normal?

YES	▸ Go to next step as below
NO	▸ Check that the crankshaft and camshaft are correctly aligned the matching marks of the pulleys for the followings. • Alignment of the timing belt • Alignment of the camshaft timing chain ▸ Readjust or repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ **Check OCV and Filter**

1. Check operation of OCV
   (1) Ignition "OFF"

   (2) Disconnect intake OCV connector.

   (3) Start the engine and let it idle.

   (4) With OCV connector still disconnected, apply 12V to power terminal and connect ground to control terminal of the OCV (Component side).

Specification :

Test Condition	Disconnect OCV connector	Apply battery voltage
Normal Value	Normal engine speed	Rough idle or engine stall

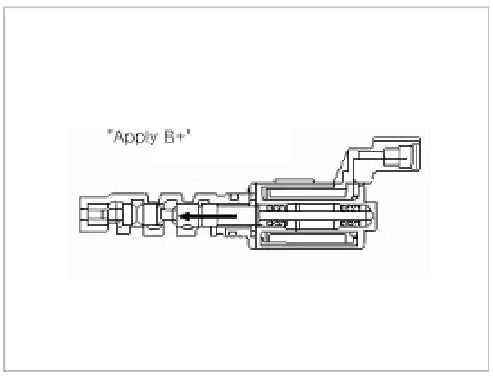
(5) Has a problem been found?

YES	▸ Go to next step as below
NO	▸ Go to "Check CVVT(Continuously Variable Valve Timing) Assembly" procedure

2. Check OCV and Filter
   (1) Ignition"OFF"
   (2) Check OCV filter for sticking or contamination.
   (3) Remove the OCV and visually check the spool column of OCV for contamination
   (4) Has a problem been found?

YES	▸ Clean or replace as necessary and then go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

   (5) Apply 12V to power terminal and connect ground to control terminal of the OCV(Component side).
   (6) Verify that a "clicking" sound is heard when applying the battery voltage.
   (7) Repeat this procedure 4 or 5 times to ensure intake OCV reliability.

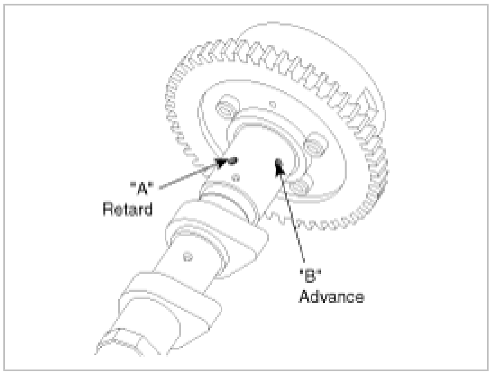


   (8) Is OCV working properly?

YES	▸ Go to next step as below
NO	▸ Check OCV for contamination, deterioration, or damage. 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.

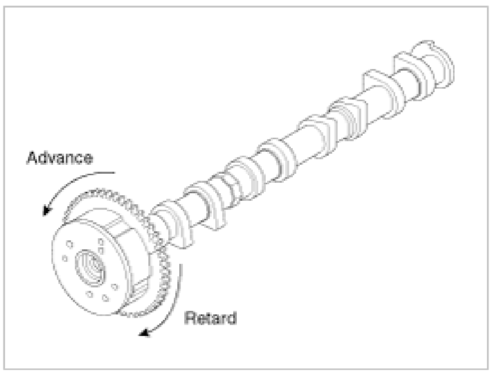
■ **Check CVVT(Continuously Variable Valve Timing) Assembly**

1. Remove the CVVT assembly. Refer to "Removal Procedure" in Workshop Manual
2. Check that the CVVT assembly is locked.
3. The one of the 2 holes on the cam journal is for advances(upper) and the rest is for retards(lower). Apply masking tape to all oil path holes except the one advance hole("B") indicated by the arrow as shown in the figure.



4. To release the CVVT lock pin, wrap some tape around the tip of an air pressure adapter and apply low air pressure of approx. 150kPa(1.5kg/cm², 21 psi) to the exposed camshaft port. Wrap a shop towel or rag around the CVVT because residual oil may leak out of the unit when applying air pressure
5. With low air pressure applied, turn the CVVT to the ADVANCE direction as indicated in the figure.

> NOTE
>
> If too much air leaks when applying the low air pressure, the CVVT lock pin may not release and the CVVT may not turn.



6. Allow the CVVT assembly to move in the ADVANCE and DELAY directions to ensure there is no binding and that it moves freely.(Movable smoothly in the range about 20°)
7. Turn the CVVT by hand and make sure it locks in the maximum delay angle position.
8. Is CVVT assembly working properly?

YES	▸ Go to next step as below
NO	▸ Replace the CVVT assembly and go to "Verification of Vehicle Repair" procedure

Terminal and Connector Inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

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

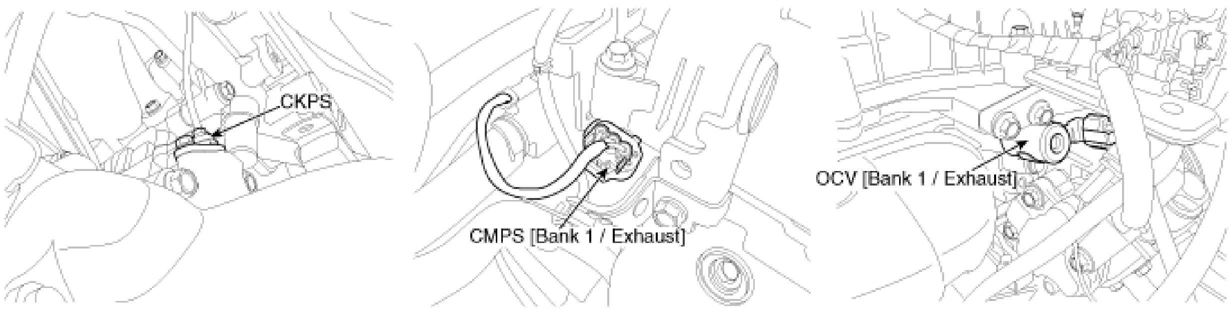
1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" and confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions

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.

Component Location



General Description

The CVVT (Continuously Variable Valve Timing) system is installed to the chain sprocket of the camshafts. This system controls the camshaft to provide the optimal valve timing for whole driving condition. The ECM controls the Oil Control Valve(OCV), based on the signals output from air flow, throttle position and engine coolant temperature. The CVVT controller regulates the camshaft angle using oil pressure through the OCV. As result, the relative position between the camshaft and the crankshaft becomes optimal, and the engine torque improves, fuel economy improves, exhaust emissions decrease under overall driving conditions.

DTC Description

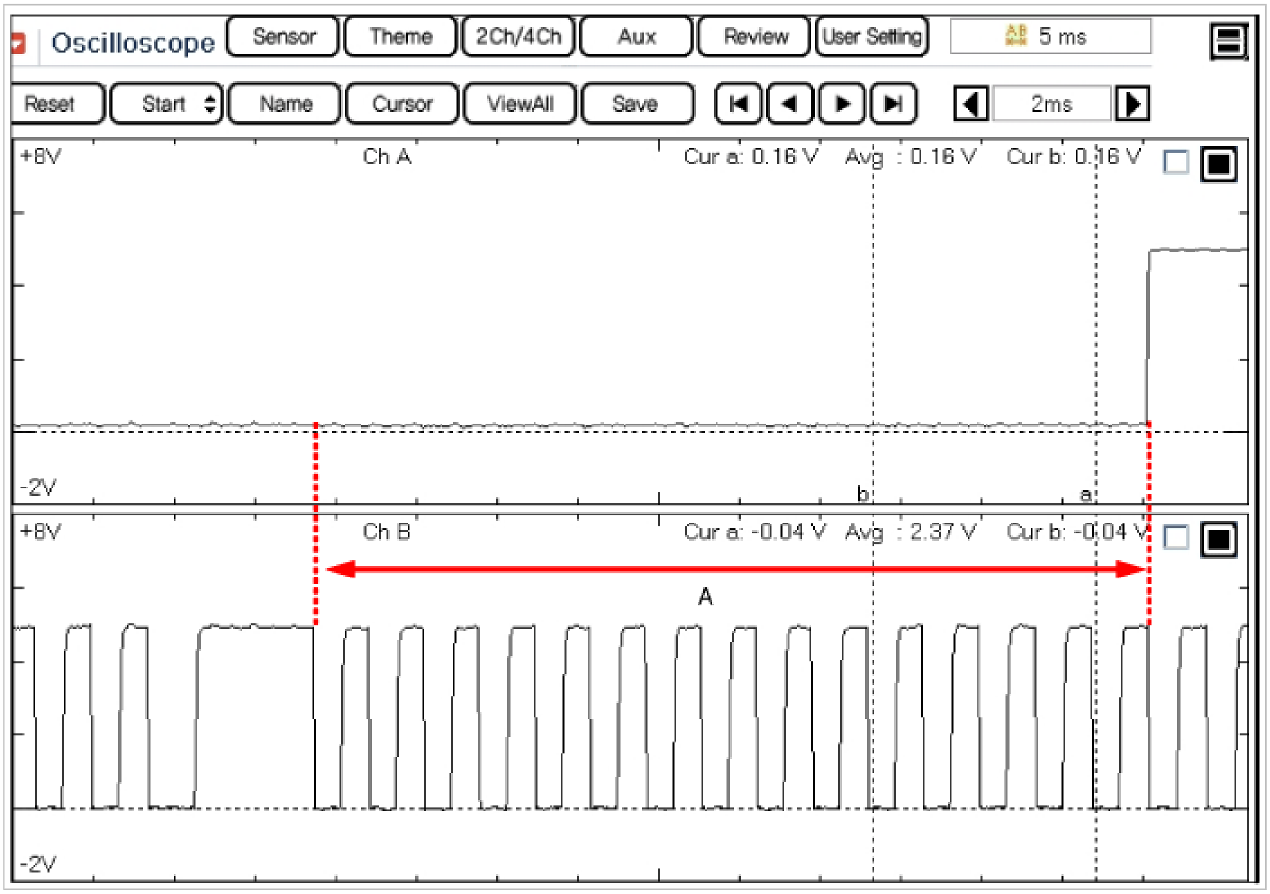
This diagnosis checks the camshaft position plausibility whether the expected range plus some margin is not violated that might be caused by a wrong engine repair, or a chain/belt misalignment. DTC P0017 is set when actual camshaft position is too much retarded or advanced than full retard position or full advance position. To continue the adjustment in such case could lead to a damage of the engine by hitting the valves with the piston.

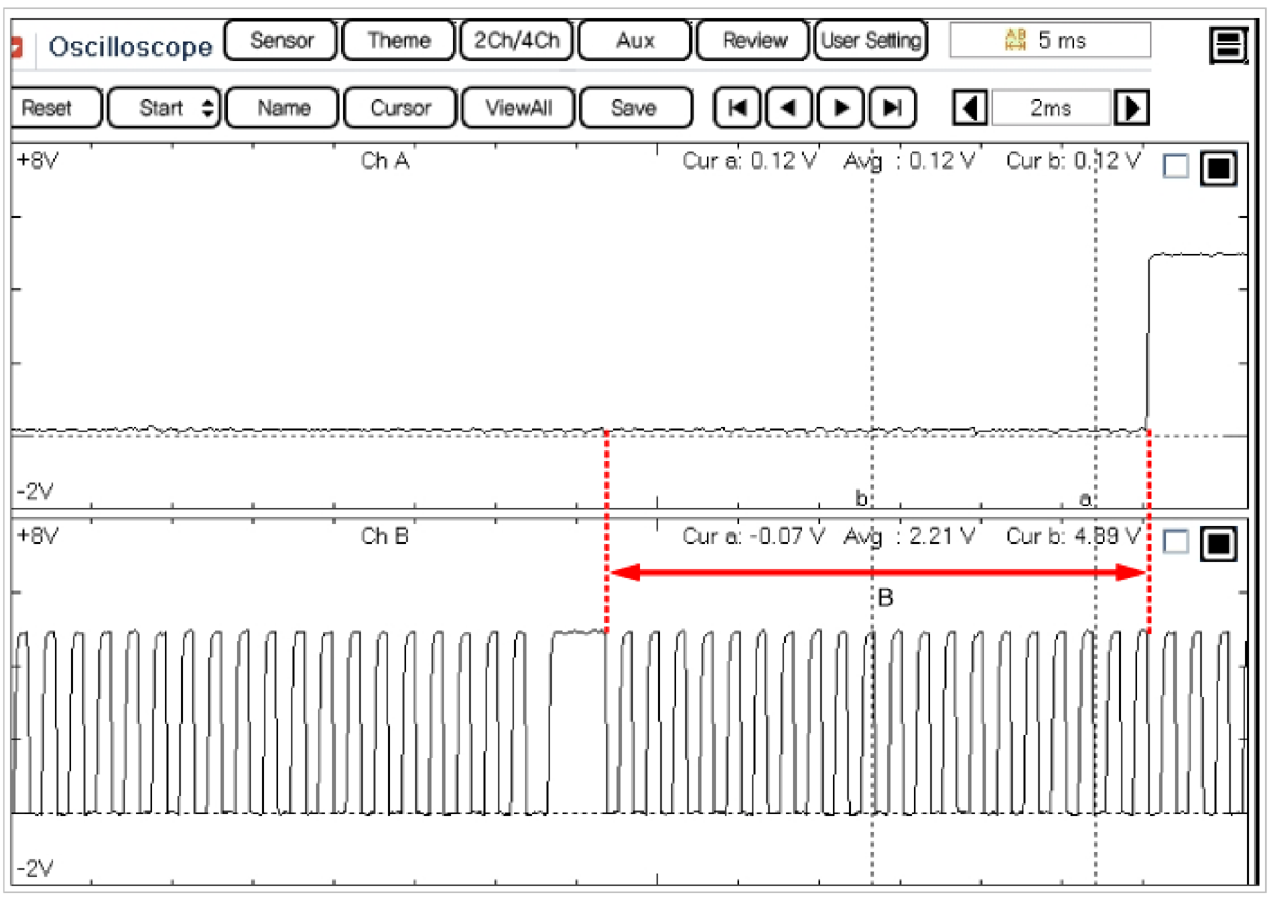
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Camshaft edge in CVVT full retard position out of Range compared to Reference position	• Valve timing • Oil Control Valve • CVVT Assembly
Enable Conditions	• Camshaft position adaptation value is valid	
Threshold Value	• Camshaft position adaptation < -15 °CRK • Camshaft position adaptation > +15 °CRK	
Diagnostic Time	• 80 rev.	
Mil On Condition	• 2 Driving Cycles	

Signal Waveform & Data

1. Set up an oscilloscope as follows :
   Channel A (+): Signal terminal of the CMPS #2(back probe), (-): ground
   Channel B (+): Signal terminal of the CKPS(back probe), (-): ground
2. Start the engine and check for signal waveform compared with reference waveform as below.

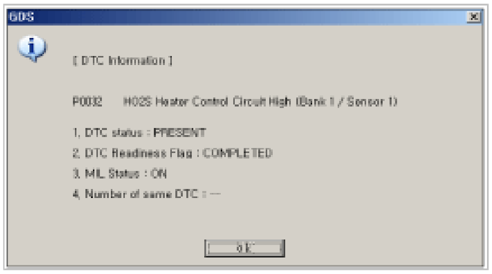




A : CMPS and CKPS waveform of exhaust shaft at idle
B : CMPS and CKPS waveform of exhaust cam shaft at acceleration
(Tooth number is changed by CVVT operation)

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

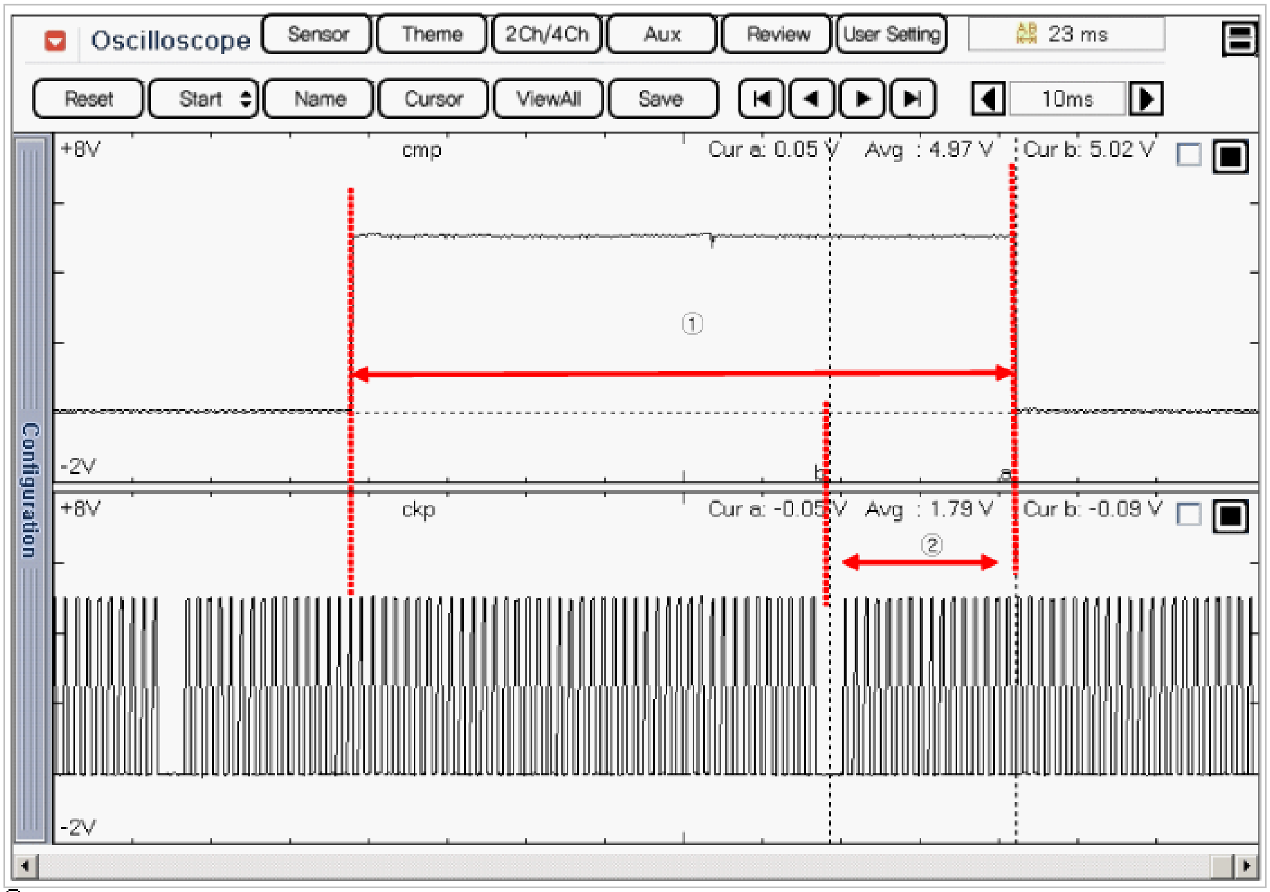
> **NOTE**
>
> - History (Not Present) fault : DTC occurred but has been cleared.
> - Present fault : DTC is occurring at present time.

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 next step as below

Component Inspection

1. Timing Inspection
   (1) With ignition "OFF", set up an oscilloscope as follows :
   Channel A (+): Signal terminal of the CMPS(back probe), (-): ground
   Channel B (+): Signal terminal of the CKPS(back probe), (-): ground

   (2) Start the engine and check for signal waveform whether synchronize with camshaft sensor or not and tooth is missing refer to sample waveforms as below



① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS.
② There are 3~5 signals of CKPS between the switching point of CMPS and the missing tooth of CKPS.

(3) Is the signal waveform normal?

YES	▸ Go to next step as below
NO	▸ Check that the crankshaft and camshaft are correctly aligned the matching marks of the pulleys for the followings. • Alignment of the timing belt • Alignment of the camshaft timing chain ▸ Readjust or repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ **Check OCV and Filter**

1. Check operation of OCV
   (1) Ignition "OFF"
   (2) Disconnect intake OCV connector.
   (3) Start the engine and let it idle.
   (4) With OCV connector still disconnected, apply 12V to power terminal and connect ground to control terminal of the OCV (Component side).

Specification :

Test Condition	Disconnect OCV connector	Apply battery voltage
Normal Value	Normal engine speed	Rough idle or engine stall

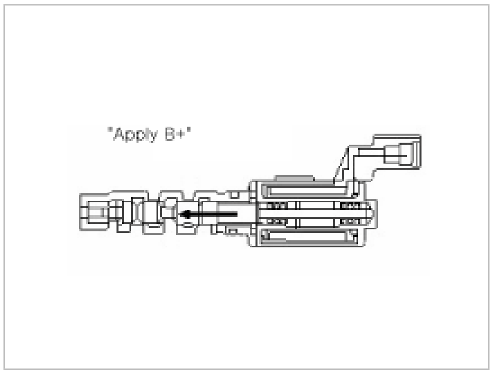
(5) Has a problem been found?

YES	▸ Go to next step as below
NO	▸ Go to "Check CVVT(Continuously Variable Valve Timing) Assembly" procedure

2. Check OCV and Filter
   (1) Ignition"OFF"
   (2) Check OCV filter for sticking or contamination.
   (3) Remove the OCV and visually check the spool column of OCV for contamination
   (4) Has a problem been found?

YES	▸ Clean or replace as necessary and then go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

   (5) Apply 12V to power terminal and connect ground to control terminal of the OCV(Component side).
   (6) Verify that a "clicking" sound is heard when applying the battery voltage.
   (7) Repeat this procedure 4 or 5 times to ensure intake OCV reliability.

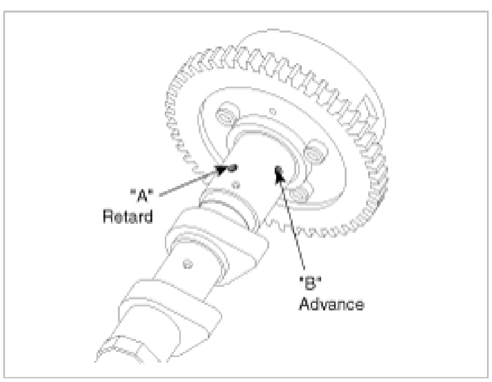


   (8) Is OCV working properly?

YES	▸ Go to next step as below
NO	▸ Check OCV for contamination, deterioration, or damage. 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.

■ Check CVVT(Continuously Variable Valve Timing) Assembly

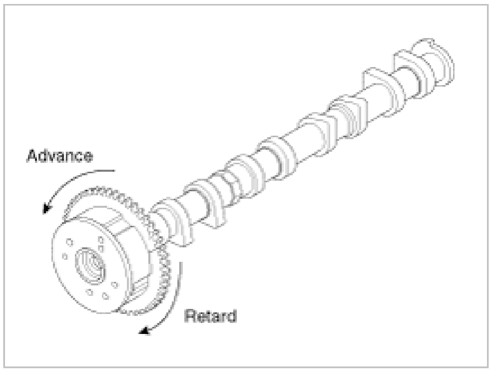
1. Remove the CVVT assembly. Refer to "Removal Procedure" in Workshop Manual
2. Check that the CVVT assembly is locked.
3. The one of the 2 holes on the cam journal is for advances(upper) and the rest is for retards(lower). Apply masking tape to all oil path holes except the one advance hole("B") indicated by the arrow as shown in the figure.



4. To release the CVVT lock pin, wrap some tape around the tip of an air pressure adapter and apply low air pressure of approx. 150kPa(1.5kg/cm², 21 psi) to the exposed camshaft port. Wrap a shop towel or rag around the CVVT because residual oil may leak out of the unit when applying air pressure
5. With low air pressure applied, turn the CVVT to the ADVANCE direction as indicated in the figure.

NOTE

If too much air leaks when applying the low air pressure, the CVVT lock pin may not release and the CVVT may not turn.



6. Allow the CVVT assembly to move in the ADVANCE and DELAY directions to ensure there is no binding and that it moves freely.(Movable smoothly in the range about 20°)
7. Turn the CVVT by hand and make sure it locks in the maximum delay angle position.
8. Is CVVT assembly working properly?

YES	▶ Go to next step as below
NO	▶ Replace the CVVT assembly and go to "Verification of Vehicle Repair" procedure

Terminal and Connector Inspection

1. 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.
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	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

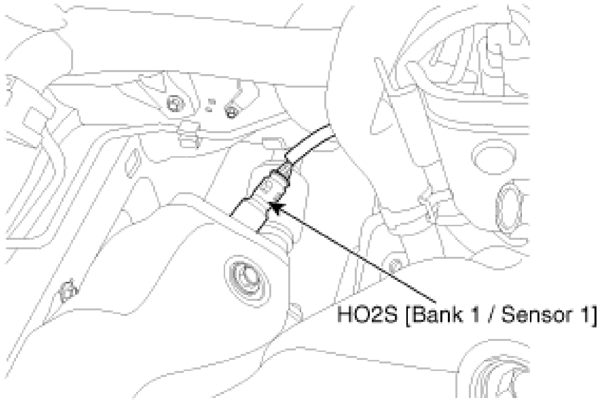
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The normal operating temperature of the HO2S(Heated Oxygen Sensor) ranges from 350 to 850°C(662 to 1562°F). The HO2S heater greatly decreases the amount of time required for fuel control to become active. The ECM provides a pulse width modulated control circuit to adjust current through the heater. When the HO2S is cold, the value of the resistance is low and the current in the circuit is high. On the contrary, if the temperature in the resistor of the sensor rises, the current drops gradually.

DTC Description

The ECM determines if a front HO2S heater fault has occurred and sets DTC P0030 if the front HO2S heater control driver inside the ECM fails, if HO2S is not operational (after an elapse of predetermined time) since engine start, or when the front HO2S tip temperature is out of normal working range.

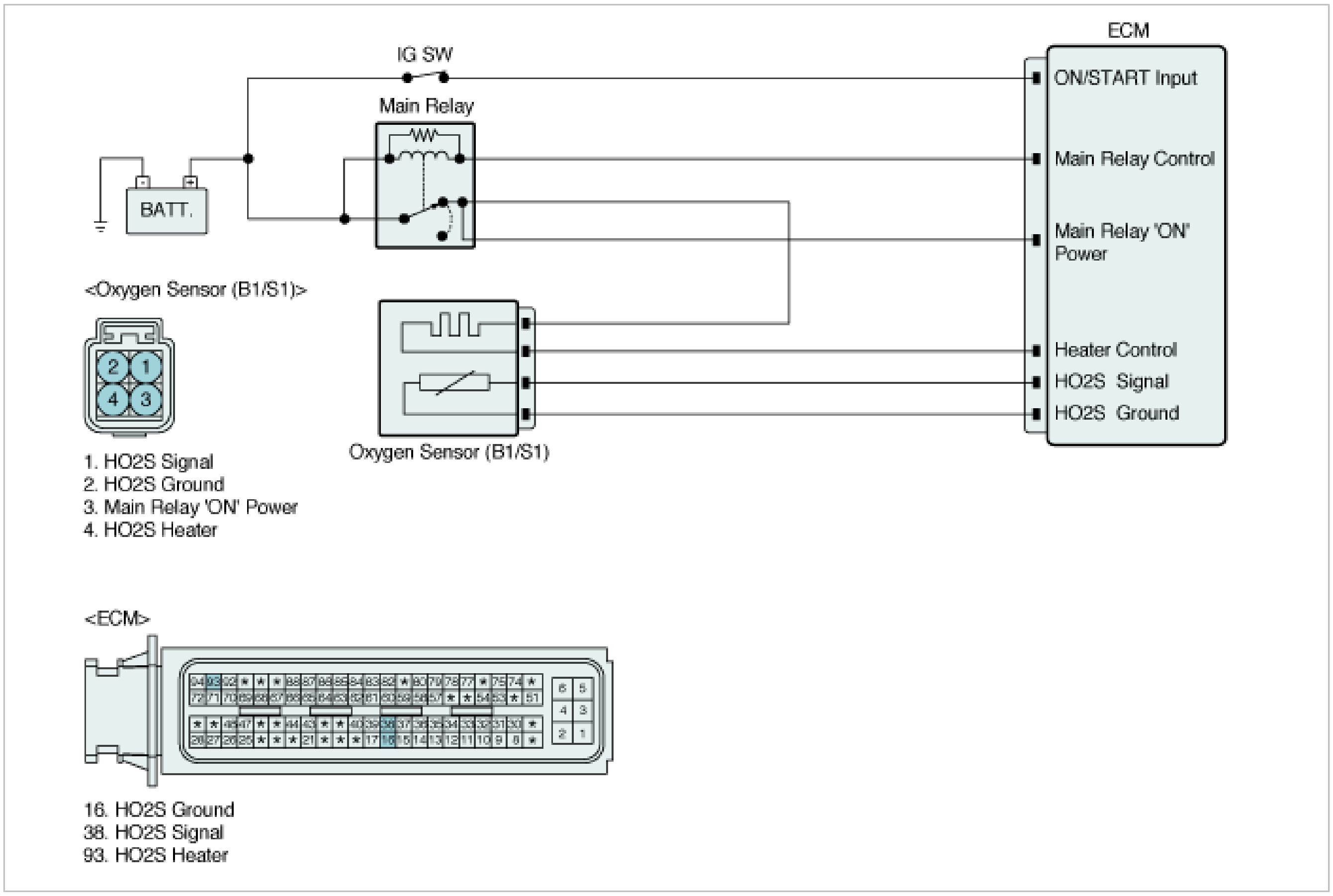
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Evaluate O2 sensor Element Temperature via measuring Element Resistance	• Related fuse blown or missing • Heater control circuit open or short • Power supply circuit open or short • Contact resistance in connectors • Faulty HO2S
Enable Conditions	• O2 sensor pre-heating phase finished (dew point passed) • No relevant failure • Coolant temperature drop since the last engine stop > 25°C(77°F) • 10V< Battery voltage <16V • 3.5%< O2 sensor heater control duty < 96.5% • O2 sensor operative ready (to ensure no open circuit failure present)	
Threshold Value	• HO2S internal resistance > 2500Ω~9500Ω	
Diagnostic Time	• 90 sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

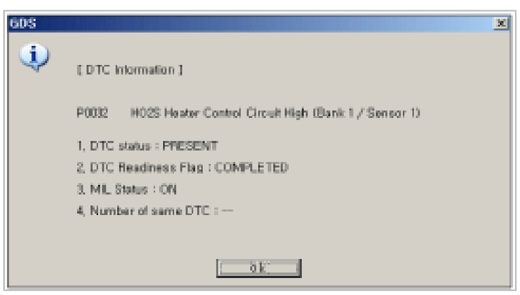
Temp.(°C)	Temp.(°F)	Heater Resistance (Ω)
18~20	64~82	3.3 ~ 4.1

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Power Circuit Inspection

1. Ignition "OFF"
2. Disconnect HO2S connector
3. Ignition "ON" & Engine "OFF"
4. Measure voltage between power terminal of HO2S(B1/S1) heater harness connector and chassis ground.

Specification : B+

5. Is voltage within the specification?

YES	▸ Go to "Control Circuit Inspection" procedure
NO	▸ Check for an open in the power supply circuit between the main relay and the HO2S. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure NOTE HO2S must have a clean air reference to function properly. The air is obtained by way of the sensor wire(s). Do not attempt to repair the wire(s), connector, or the terminals.

Control Circuit Inspection

1. Measure voltage between control terminal of HO2S(B1/S1) heater harness connector and chassis ground.

Specification : Approx. 4~5V

2. Is voltage within the specification?

YES	▸ Go to "Component Inspection" procedure
NO	▸ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure NOTE HO2S must have a clean air reference to function properly. The air is obtained by way of the sensor wire(s). Do not attempt to repair the wire(s), connector, or the terminals.

Terminal and Connector Inspection

1. 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.
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 next step as below

Component Inspection

1. Ignition "OFF"
2. Measure resistance between power and control terminals of HO2S(B1/S1) heater(Component Side).
   Specification

Temp.(°C)	Temp.(°F)	Heater Resistance (Ω)

18~20	64~82	3.3 ~ 4.1

3. Is resistance within the specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check HO2S for contamination, deterioration, or damage. Substitute with a known-good HO2S and check for proper operation. If the problem is corrected, replace HO2S and then go to "Verification of Vehicle Repair" procedure

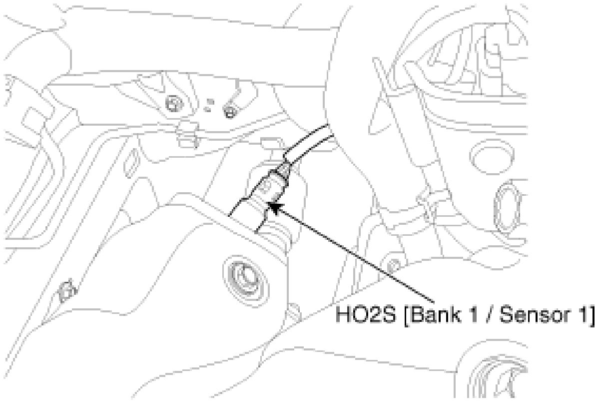
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The normal operating temperature of the HO2S(Heated Oxygen Sensor) ranges from 350 to 850°C(662 to 1562°F). The HO2S heater greatly decreases the amount of time required for fuel control to become active. The ECM provides a pulse width modulated control circuit to adjust current through the heater. When the HO2S is cold, the value of the resistance is low and the current in the circuit is high. On the contrary, if the temperature in the resistor of the sensor rises, the current drops gradually.

DTC Description

ECM sets DTC P0031 if the ECM detects that the front HO2S heater control circuit is short to ground.

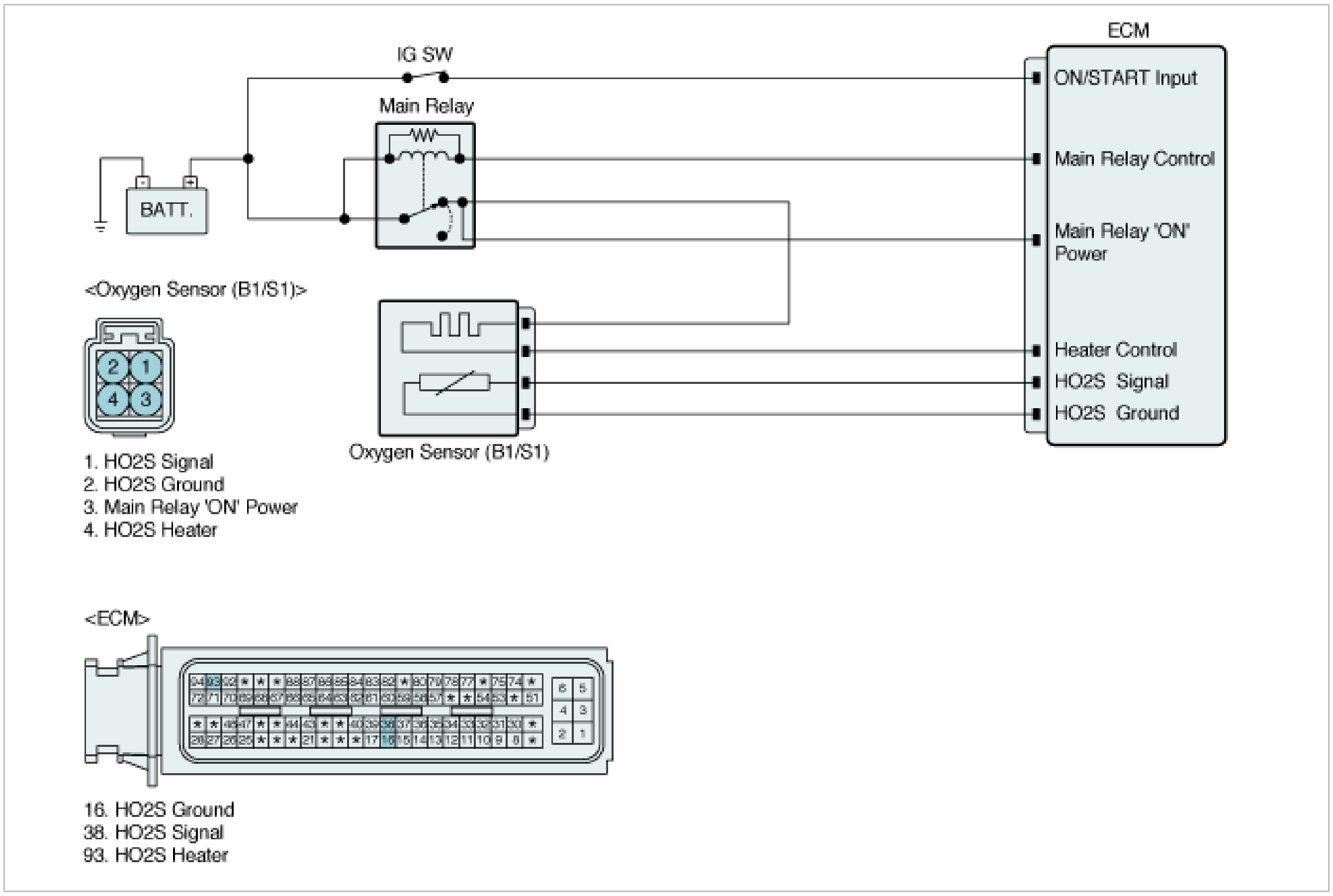
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Related fuse blown or missing • Open or short to ground in power supply or control harness • Poor connection or damaged harness • Faulty HO2S
Enable Conditions	• No relevant failure • 10V< Battery voltage <16V • 3.5%< O2 sensor heater control duty <96.5%	
Threshold Value	• HO2S Heater Output < Lower Threshold	
Diagnostic Time	• 10sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

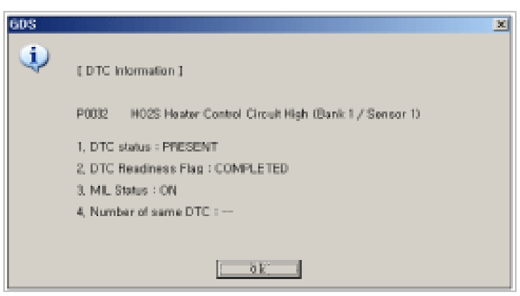
Temp.(°C)	Temp.(°F)	Heater Resistance (Ω)
18~20	64~82	3.3 ~ 4.1

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Power Circuit Inspection

1. Ignition "OFF"
2. Disconnect HO2S sensor connector
3. Ignition "ON" & Engine "OFF"
4. Measure voltage between power terminal of the HO2S heater harness connector and chassis ground.

Specification : B+

5. Is voltage within the specification?

YES	▸ Go to "Control Circuit Inspection" procedure
NO	▸ Check for an open in the power supply circuit between the main relay and the HO2S. Especially check for "SENSOR2 FUSE 15A" is installed and not blown. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure NOTE HO2S must have a clean air reference to function properly. The air is obtained by way of the sensor wire(s). Do not attempt to repair the wire(s), connector, or the terminals.

Control Circuit Inspection

1. Measure voltage between control terminal of the HO2S heater harness connector and chassis ground.

Specification : Approx. 4~5V

2. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure NOTE HO2S must have a clean air reference to function properly. The air is obtained by way of the sensor wire(s). Do not attempt to repair the wire(s), connector, or the terminals.

Terminal and Connector Inspection

1. 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.
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 next step as below

Component Inspection

1. Ignition "OFF"
2. Measure resistance between power and control terminals of HO2S(B1/S1) heater(Component Side).
Specification

Temp.(°C)	Temp.(°F)	Heater Resistance (Ω)
18~20	64~82	3.3 ~ 4.1

3. Is resistance within the specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check HO2S for contamination, deterioration, or damage. Substitute with a known-good HO2S and check for proper operation. If the problem is corrected, replace HO2S and then go to "Verification of Vehicle Repair" procedure

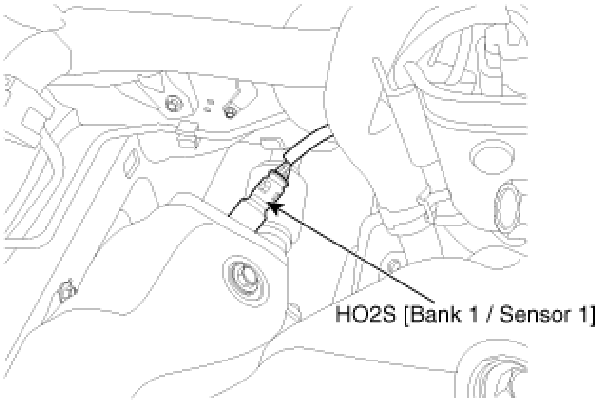
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The normal operating temperature of the HO2S(Heated Oxygen Sensor) ranges from 350 to 850°C(662 to 1562°F). The HO2S heater greatly decreases the amount of time required for fuel control to become active. The ECM provides a pulse width modulated control circuit to adjust current through the heater. When the HO2S is cold, the value of the resistance is low and the current in the circuit is high. On the contrary, if the temperature in the resistor of the sensor rises, the current drops gradually.

DTC Description

ECM sets DTC P0032 if the ECM detects that the front HO2S heater control line is open or short to battery circuit.

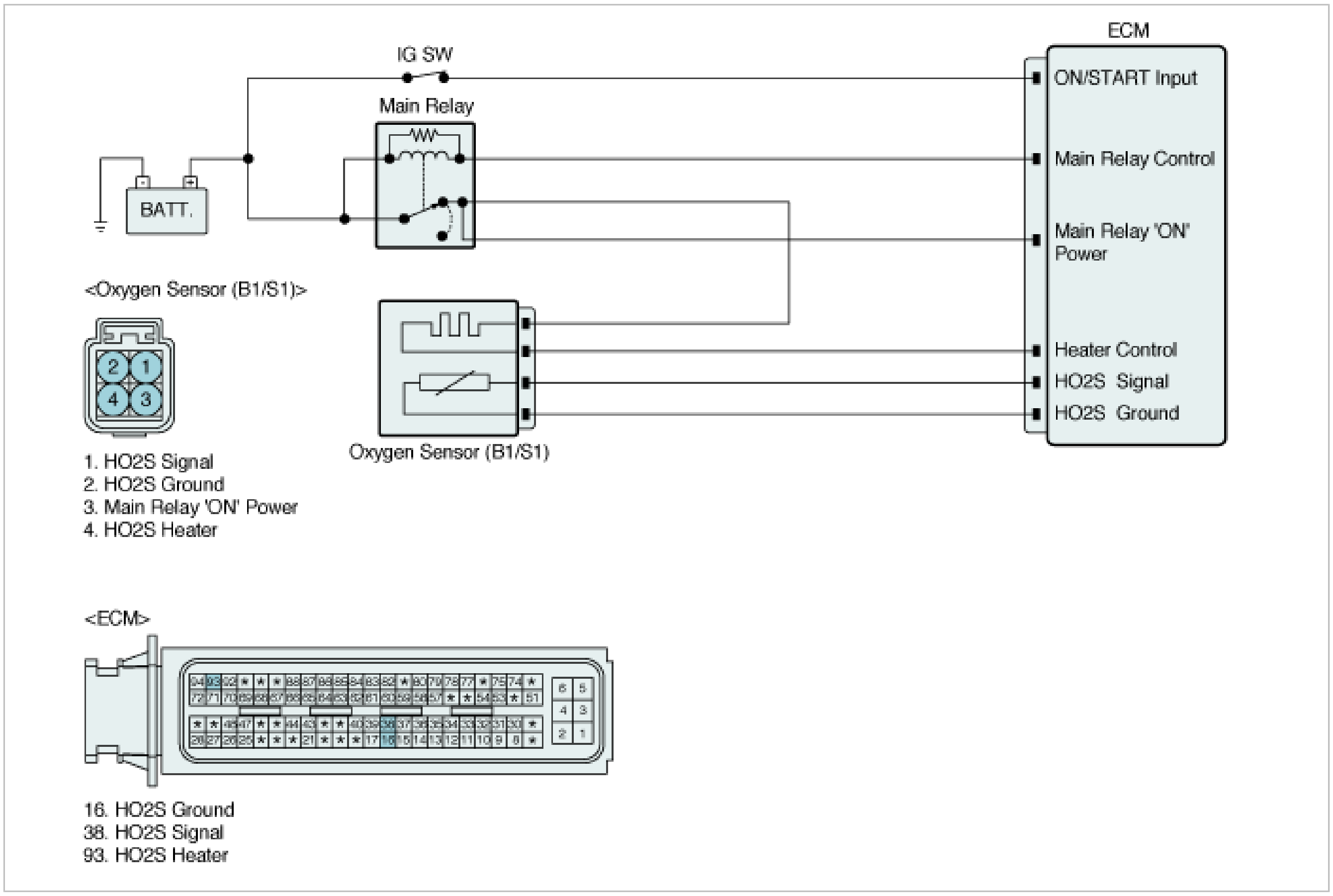
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Open or short to battery in control harness • Poor connection or damaged harness • Faulty HO2S
Enable Conditions	• No relevant failure • 10V< Battery voltage <16V • 3.5%< O2 sensor heater control duty <96.5%	
Threshold Value	• HO2S Heater Output > Upper Threshold	
Diagnostic Time	• 10sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

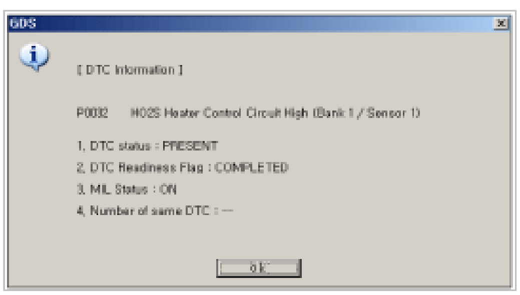
Temp.(°C)	Temp.(°F)	Heater Resistance (Ω)
18~20	64~82	3.3 ~ 4.1

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Control Circuit Inspection

1. Ignition "OFF"
2. Disconnect HO2S sensor connector
3. Ignition "ON" & Engine "OFF"
4. Measure voltage between control terminal of the HO2S heater harness connector and chassis ground.

Specification : Approx. 4~5V

5. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure NOTE HO2S must have a clean air reference to function properly. The air is obtained by way of the sensor wire(s). Do not attempt to repair the wire(s), connector, or the terminals.

Terminal and Connector Inspection

1. 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.
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 next step as below

Component Inspection

1. Ignition "OFF"
2. Measure resistance between power and control terminals of HO2S(B1/S1) heater(Component Side).
Specification

Temp.(°C)	Temp.(°F)	Heater Resistance (Ω)
18~20	64~82	3.3 ~ 4.1

3. Is resistance within the specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check HO2S for contamination, deterioration, or damage. Substitute with a known-good HO2S and check for proper operation. If the problem is corrected, replace HO2S and then go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

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

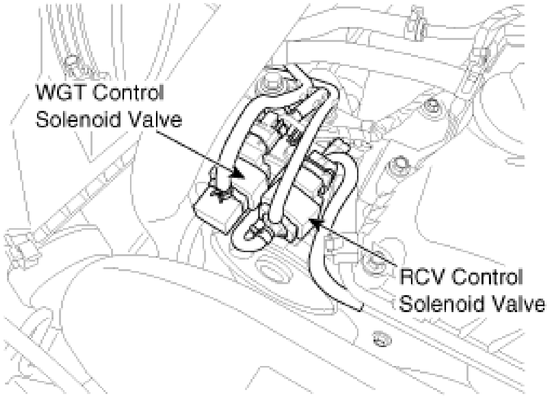
1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" and confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within

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.

Component Location



General Description

If suddenly closing the throttle body during driving, the boost pressure within the pipes increase. This increased pressure does not flow into the intake but transfers in the opposite direction and creates a Tipout Surge1), caused by sudden increase in pressure at the impeller within the compressor. This may result in making collision sound. This device helps reduce the collision sound by discharging the highly increased pressure before the compressor rather than after the compressor. Usually positive pressure is connected to the actuator. The RCV is closed at this time. When decelerating after acceleration, the solenoid valve will operate. This act will create a vacuum state connecting the negative pressure to the actuator, which lets it overcome the spring force and pull the diaphragm. At this state, the air entering the combustor does not affect the compressor wheel and exerts action within the air cleaner.

DTC Description

ECM sets DTC P0034 if the ECM detects that the bypass valve control circuit is open/short to ground or power circuit is open.

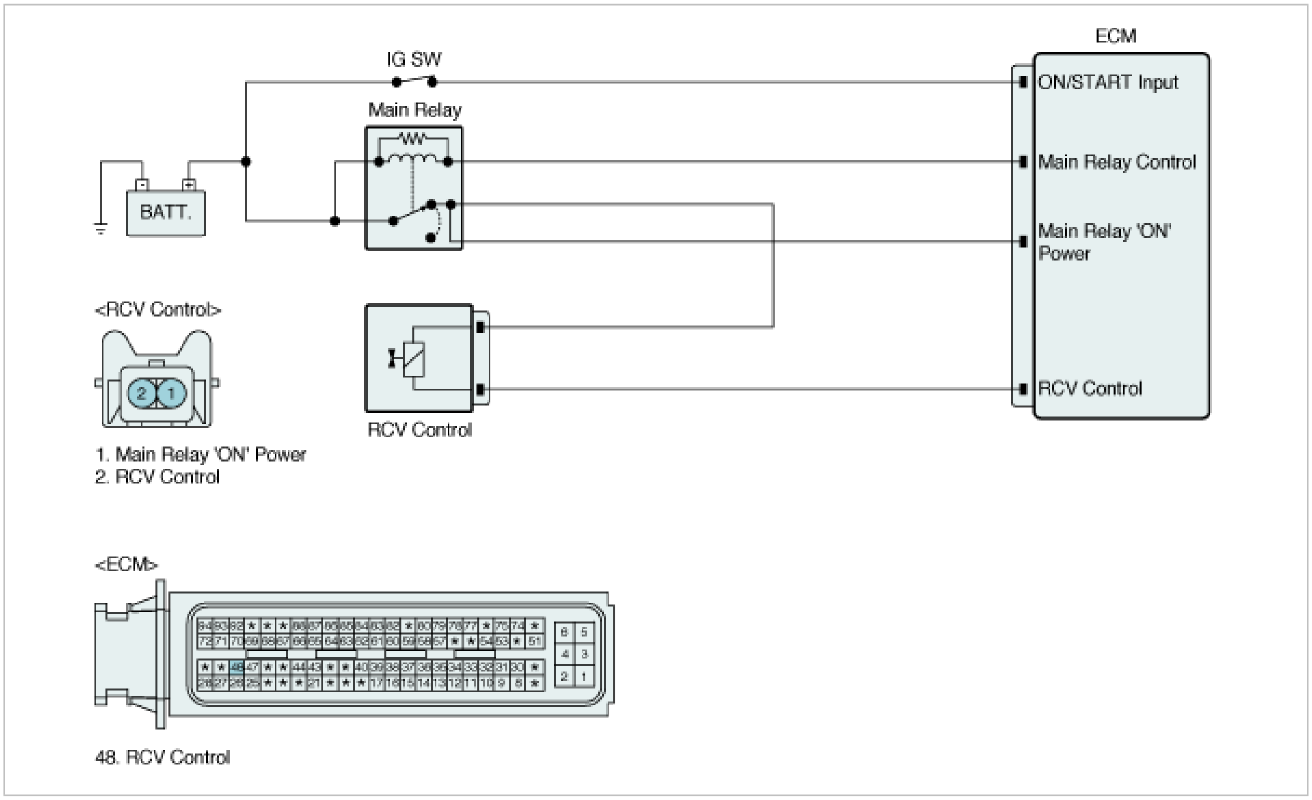
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Short to ground in signal harness • Poor connection or damaged harness • Faulty RCV
Enable Conditions	• 10V< Battery voltage <16V	
Threshold Value	• ECM power stage diagnosis	
Diagnostic Time	• 1sec	
Mil On Condition	• 2 Driving Cycles	

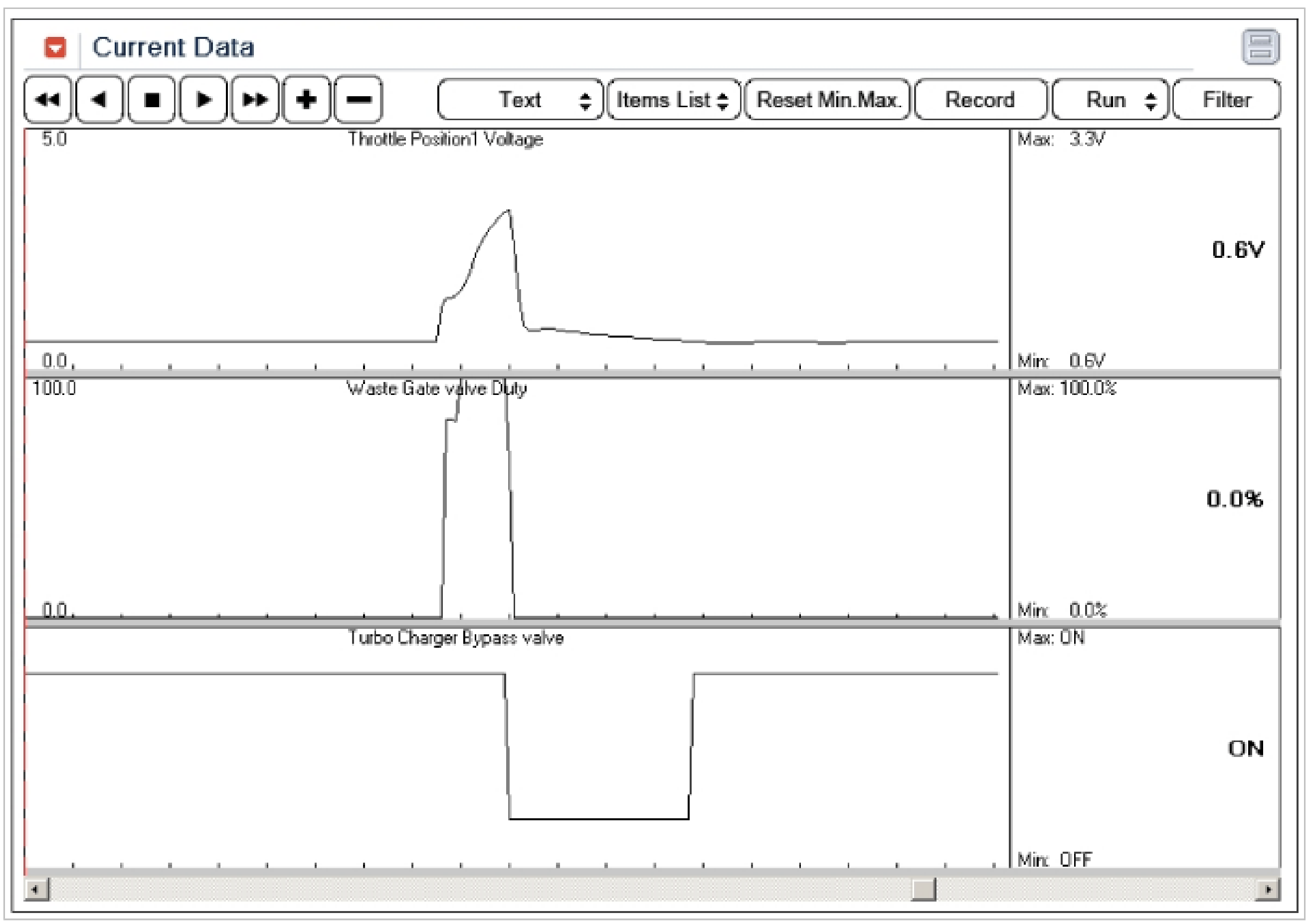
Specification

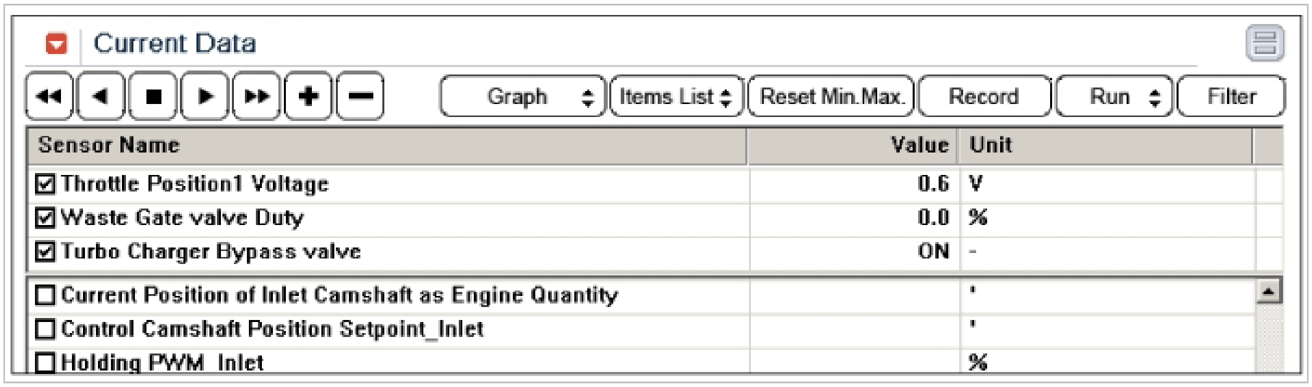
Temp.(°C)	Temp.(°F)	Resistance(Ω)
20	82	28.3 ~ 31.1

Diagnostic Circuit Diagram



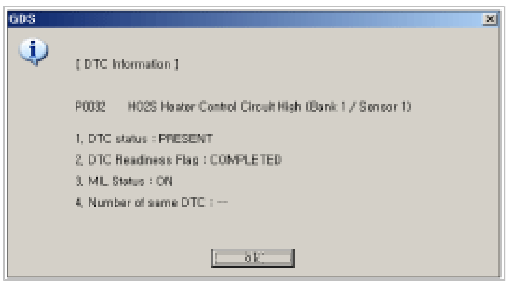
Signal Waveform & Data





Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. 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.
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 next step as below

Control Circuit Inspection

■ **Check for short to ground in control circuit**

1. Ignition "OFF".

2. Disconnect RCV Control connector and ECM connector.
3. Measure resistance between control terminal of the RCV Control harness connector and chassis ground.

Specification : Infinite

4. Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Repair open or short to ground in control harness and go to "Verification of Vehicle Repair" procedure

■ **Check for open in Control harness**

1. Ignition "OFF"
2. Measure resistance between signal terminal of sensor harness connector and RCV Control terminal of the ECM harness connector.

Specification : Approx. 0Ω

3. Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Power Circuit Inspection

1. Ignition "OFF"
2. Disconnect RCV Control connector
3. Ignition "ON" & Engine "OFF"
4. Measure voltage between power terminal of the RCV Control harness connector and chassis ground.

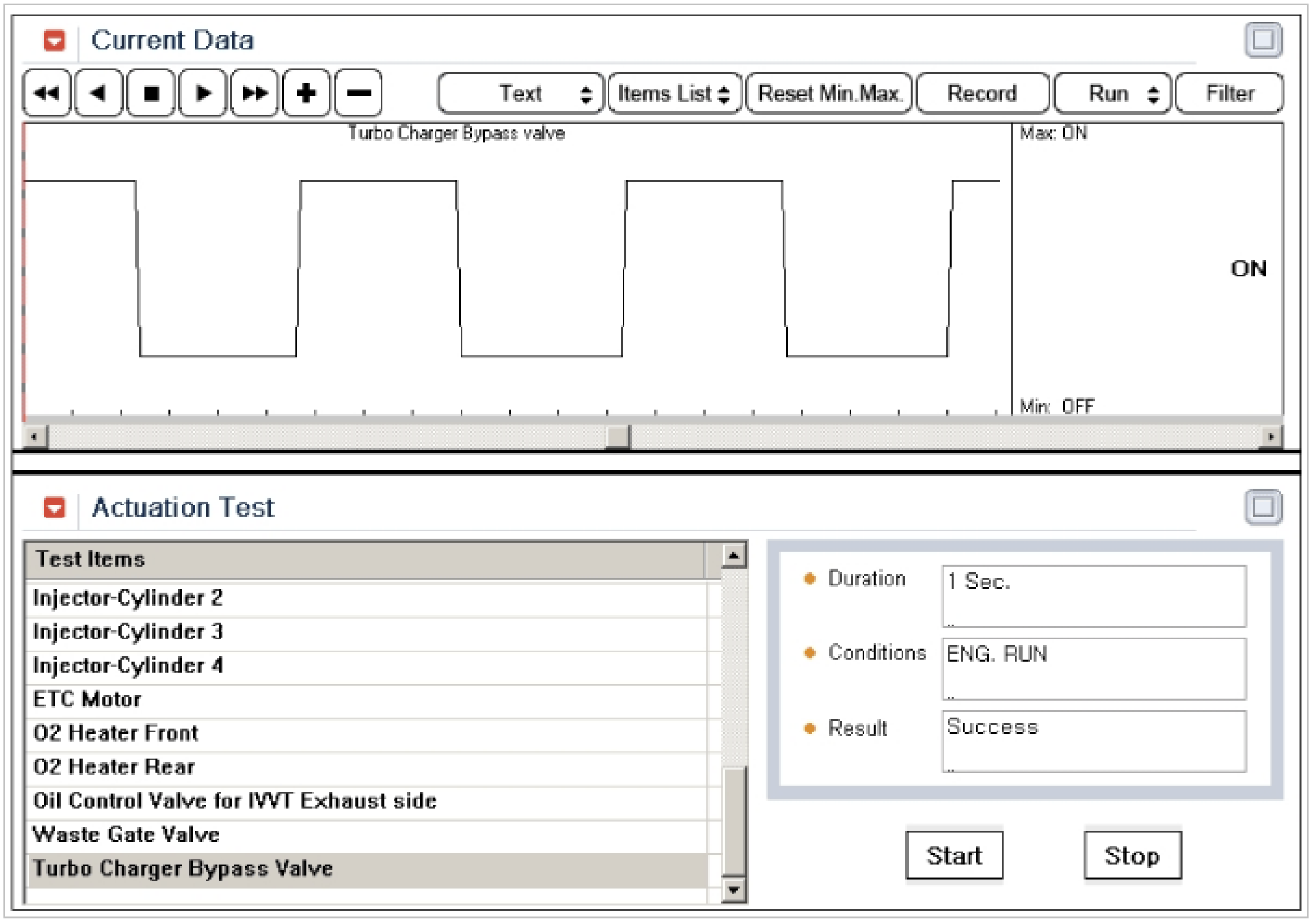
Specification : B+

5. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Select 'Actuation Test' mode and execute 'Turbo Charger Bypass Valve' item.



2. Is the waveform normal?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

3. Resistance Inspection
   (1) Ignition "OFF"
   (2) Measure resistance between power terminal and control terminal of the sensor connector (Component side)
   Specification

Temp.(°C)	Temp.(°F)	Resistance(Ω)
20	82	28.3 ~ 31.1

4. Is resistance within the specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Substitute with a known - good RCV and check for proper operation. If the problem is corrected, replace RCV and go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

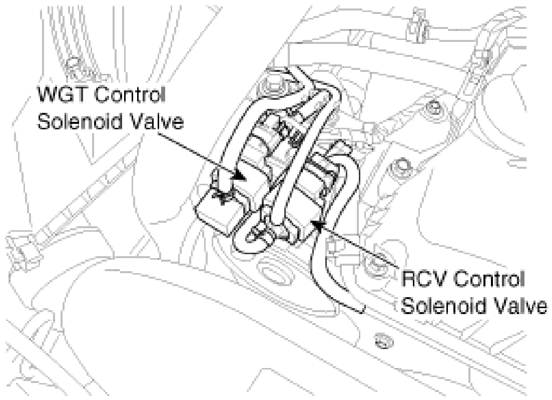
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.

2. Click "DTC Status" 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.

Component Location



General Description

If suddenly closing the throttle body during driving, the boost pressure within the pipes increase. This increased pressure does not flow into the intake but transfers in the opposite direction and creates a Tipout Surge1), caused by sudden increase in pressure at the impeller within the compressor. This may result in making collision sound. This device helps reduce the collision sound by discharging the highly increased pressure before the compressor rather than after the compressor. Usually positive pressure is connected to the actuator. The RCV is closed at this time. When decelerating after acceleration, the solenoid valve will operate. This act will create a vacuum state connecting the negative pressure to the actuator, which lets it overcome the spring force and pull the diaphragm. At this state, the air entering the combustor does not affect the compressor wheel and exerts action within the air cleaner.

DTC Description

ECM sets DTC P0035 if the ECM detects that the bypass valve control circuit is short to battery.

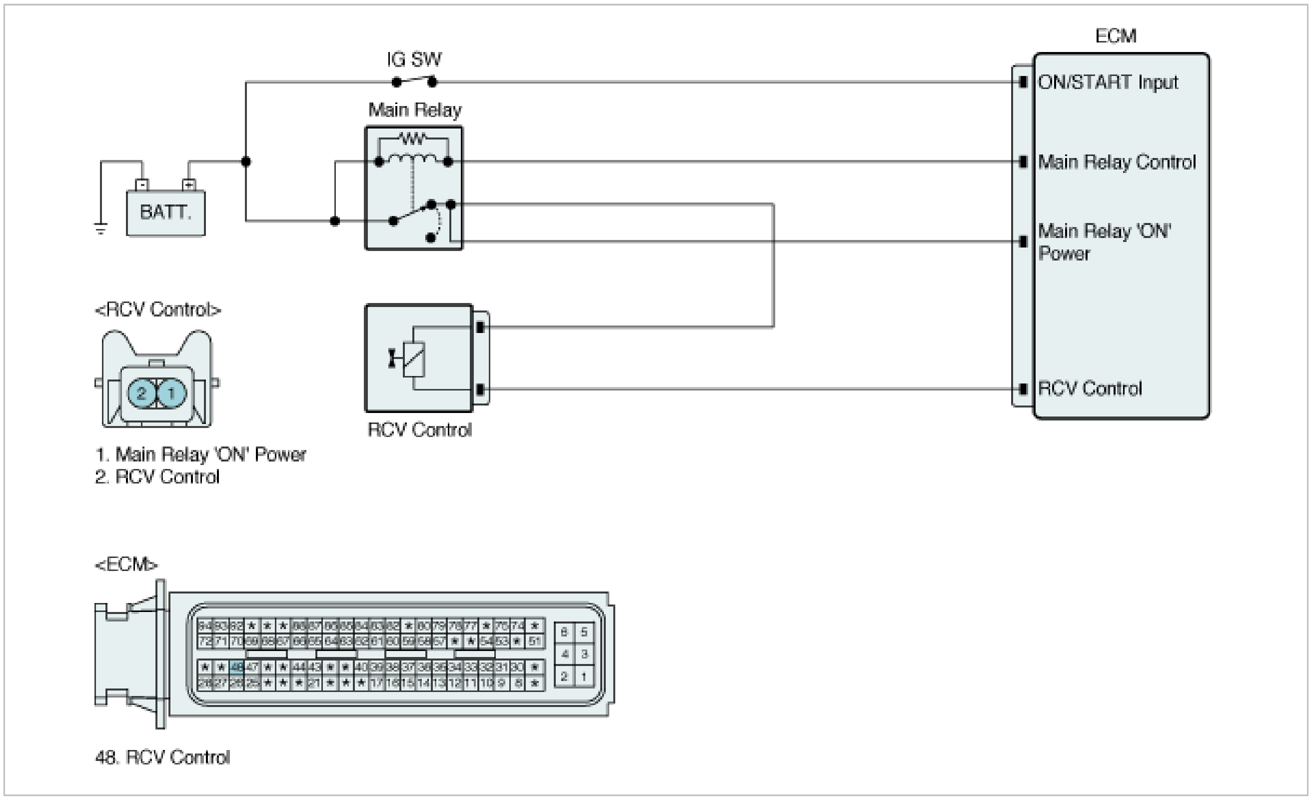
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Poor connection or damaged harness • short to battery in control harness • Faulty RCV
Enable Conditions	• 10V< Battery voltage <16V	
Threshold Value	• IG ON	
Diagnostic Time	• 1sec	
Mil On Condition	• 2 Driving Cycles	

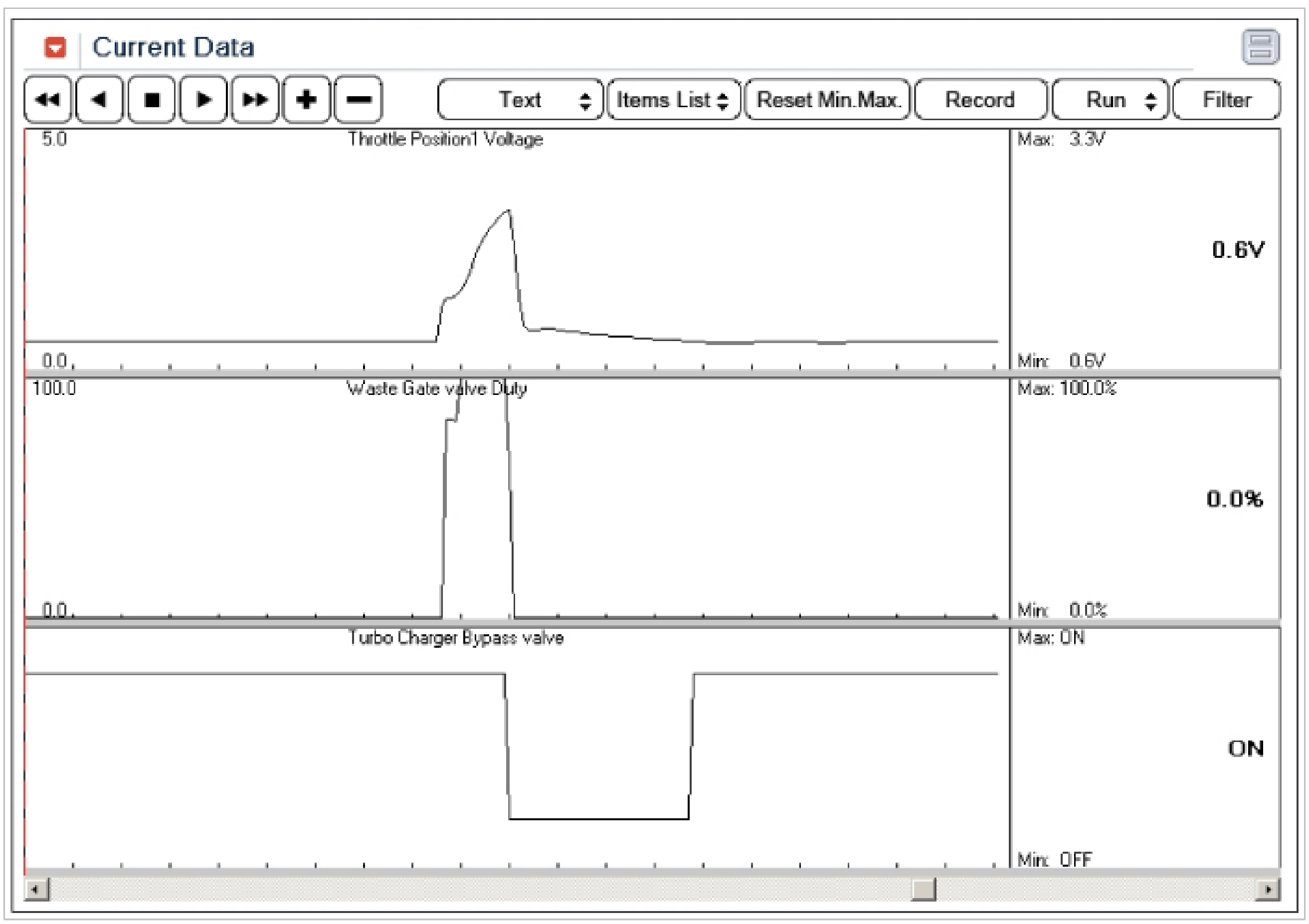
Specification

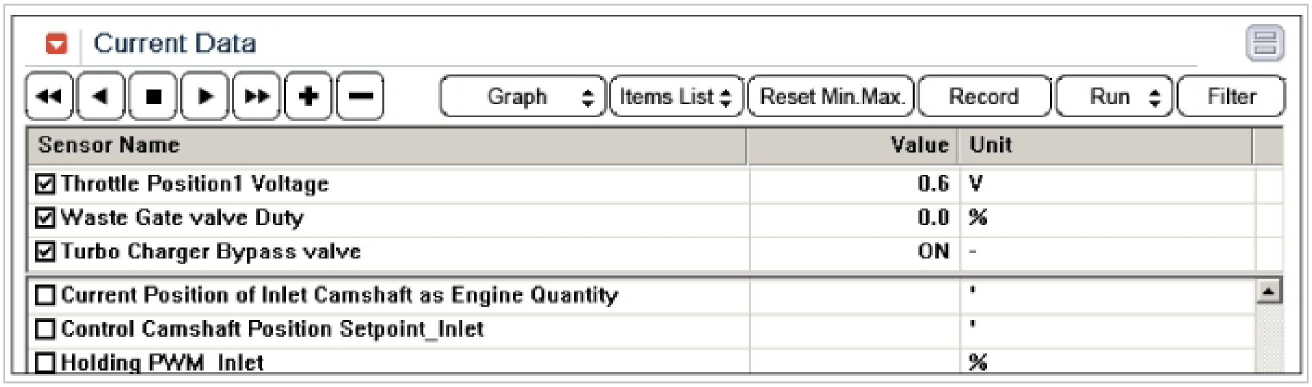
Temp.(°C)	Temp.(°F)	Resistance(Ω)
20	82	28.3 ~ 31.1

Diagnostic Circuit Diagram



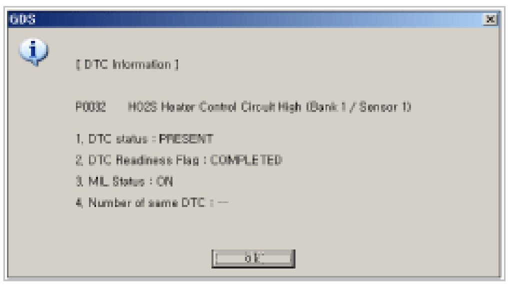
Signal Waveform & Data





Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. 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.
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 next step as below

Control Circuit Inspection

■ **Check for short to power in control circuit**

1. Ignition "OFF".

2. Disconnect RCV Control connector and ECM connector.
3. Ignition "ON".
4. Measure voltage between control terminal of the RCV Control harness connector and chassis ground.

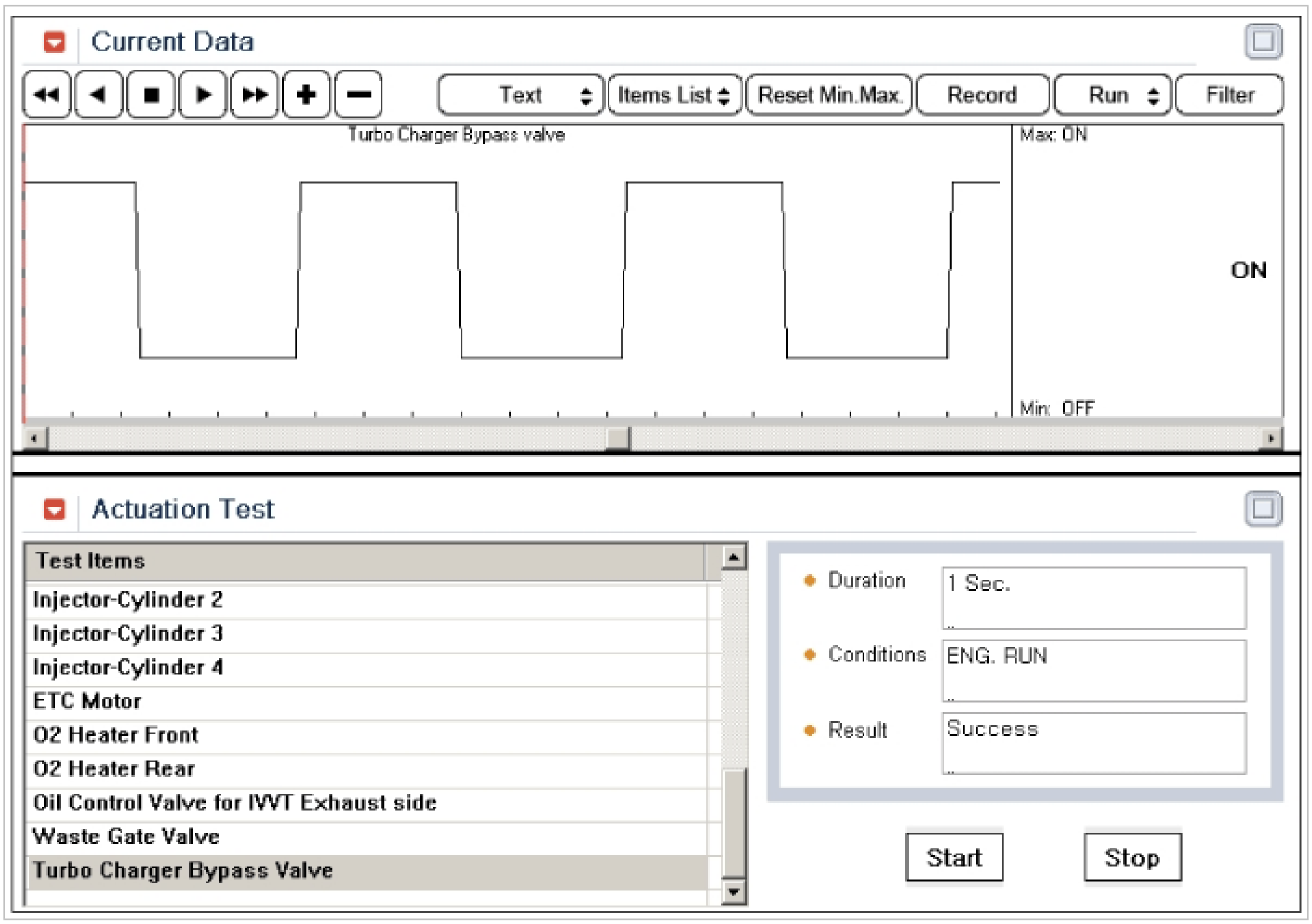
Specification : 0 V

5. Is Voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Repair open or short to ground in control harness and go to "Verification of Vehicle Repair" procedure

Component Inspection

1. Select 'Actuation Test' mode and execute 'Turbo Charger Bypass Valve' item.



2. Is the waveform normal?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

3. Resistance Inspection
   (1) Ignition "OFF"
   (2) Measure resistance between power terminal and control terminal of the sensor connector (Component side)
   Specification

Temp.(°C)	Temp.(°F)	Resistance(Ω)
20	82	28.3 ~ 31.1

4. Is resistance within the specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Substitute with a known - good RCV and check for proper operation. If the problem is corrected, replace RCV and go to "Verification of Vehicle Repair" procedure.

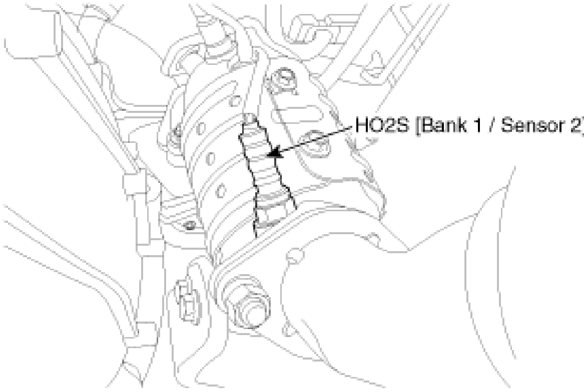
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The normal operating temperature of the HO2S(Heated Oxygen Sensor) ranges from 350 to 850°C(662 to 1562°F). The HO2S heater greatly decreases the amount of time required for fuel control to become active. The ECM provides a pulse width modulated control circuit to adjust current through the heater. When the HO2S is cold, the value of the resistance is low and the current in the circuit is high. On the contrary, if the temperature in the resistor of the sensor rises, the current drops gradually.

DTC Description

The ECM determines when a rear HO2S heater fault occurs and sets DTC P0036 if measured rear HO2S resistance is lower than the predetermined threshold.

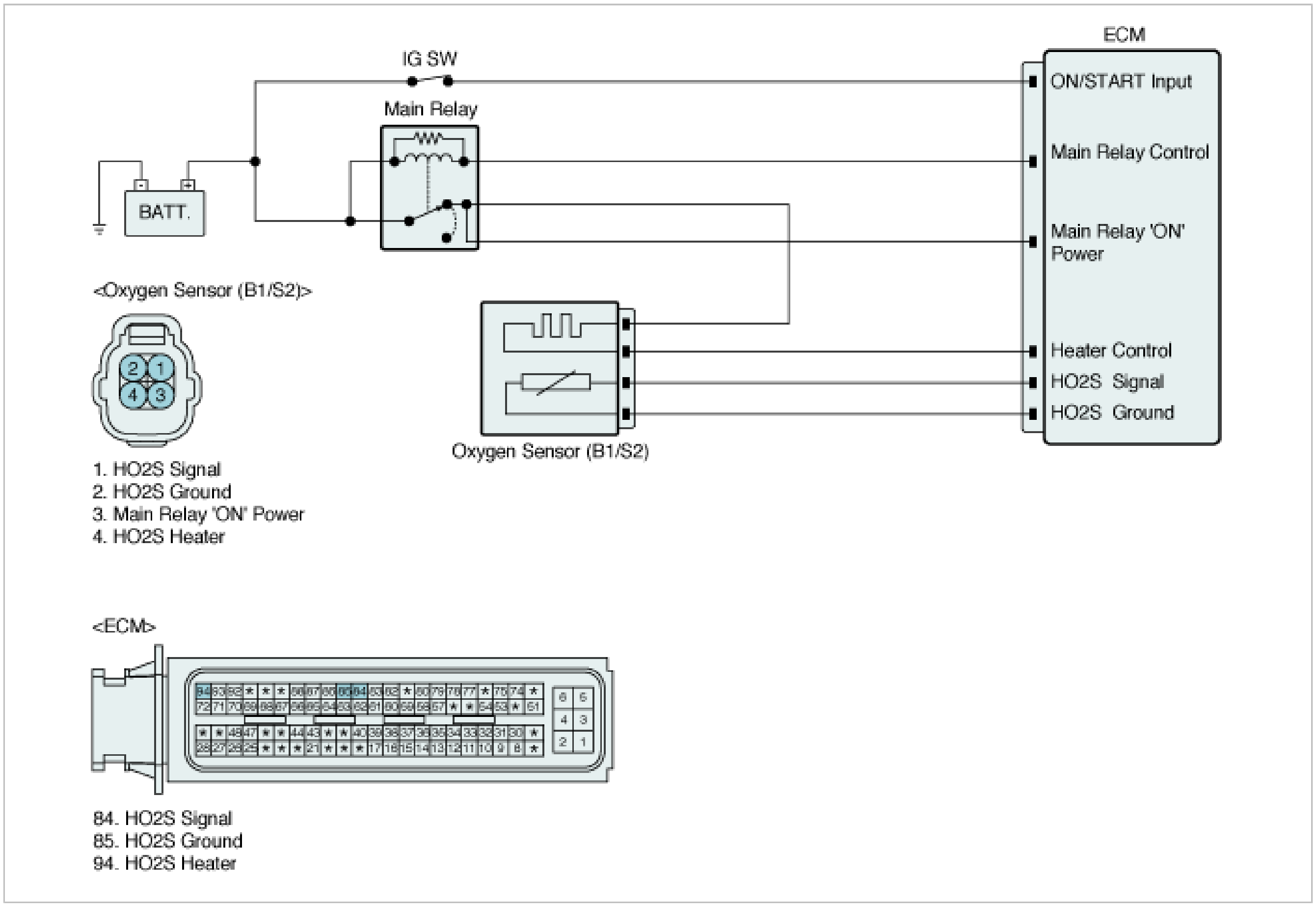
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Evaluate O2 sensor Element Temperature via measuring Element Resistance	• Related fuse blown or missing • Heater control circuit open or short • Power supply circuit open or short • Poor connection or damaged harness • Faulty HO2S
Enable Conditions	• O2 sensor pre-heating phase finished (dew point passed) • No relevant failure • Coolant temperature drop since the last engine stop > 25°C(77°F) • 10V< Battery voltage <16V • 3.5%< O2 sensor heater control duty < 96.5% • O2 sensor operative ready (to ensure no open circuit failure present)	
Threshold Value	• Too slow O2 sensor tip-temperature increase after Start causing too low catalyst diagnosis result(O2 Sensor Heater Power < 20% of Nominal Heater Power)	
Diagnostic Time	• 130 sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

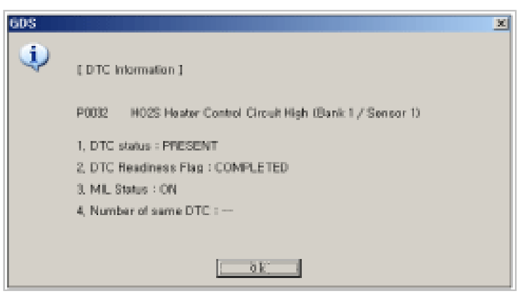
Temp.(°C)	Temp.(°F)	Heater Resistance (Ω)
18~20	64~82	3.3 ~ 4.1

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Power Circuit Inspection

1. Ignition "OFF"
2. Disconnect HO2S sensor connector
3. Ignition "ON" & Engine "OFF"
4. Measure voltage between power terminal of the HO2S heater harness connector and chassis ground.

Specification : B+

5. Is voltage within the specification?

YES	▸ Go to "Control Circuit Inspection" procedure
NO	▸ Check for an open in the power supply circuit between the main relay and the HO2S. Especially check for "SENSOR2 FUSE 15A" is installed and not blown. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure NOTE HO2S must have a clean air reference to function properly. The air is obtained by way of the sensor wire(s). Do not attempt to repair the wire(s), connector, or the terminals.

Control Circuit Inspection

1. Measure voltage between control terminal of the HO2S heater harness connector and chassis ground.

Specification : Approx. 4~5V

2. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure. NOTE HO2S must have a clean air reference to function properly. The air is obtained by way of the sensor wire(s). Do not attempt to repair the wire(s), connector, or the terminals.

Terminal and Connector Inspection

1. 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.
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 next step as below

Component Inspection

1. Ignition "OFF"

2. Measure resistance between power terminal and control terminal of the sensor connector (Component side)
   Specification

Temp.(°C)	Temp.(°F)	Heater Resistance (Ω)
18~20	64~82	3.3 ~ 4.1

3. Is resistance within the specification?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Check HO2S for contamination, deterioration, or damage. Substitute with a known-good HO2S and check for proper operation. If the problem is corrected, replace HO2S and then go to "Verification of Vehicle Repair" procedure

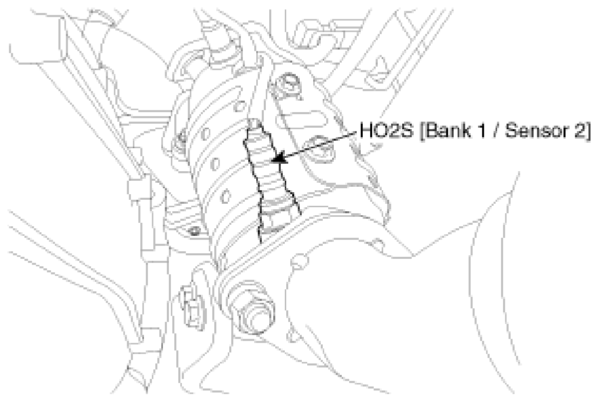
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The normal operating temperature of the HO2S(Heated Oxygen Sensor) ranges from 350 to 850°C(662 to 1562°F). The HO2S heater greatly decreases the amount of time required for fuel control to become active. The ECM provides a pulse width modulated control circuit to adjust current through the heater. When the HO2S is cold, the value of the resistance is low and the current in the circuit is high. On the contrary, if the temperature in the resistor of the sensor rises, the current drops gradually.

DTC Description

ECM sets DTC P0037 if the ECM detects that the rear HO2S heater control line is short to ground.

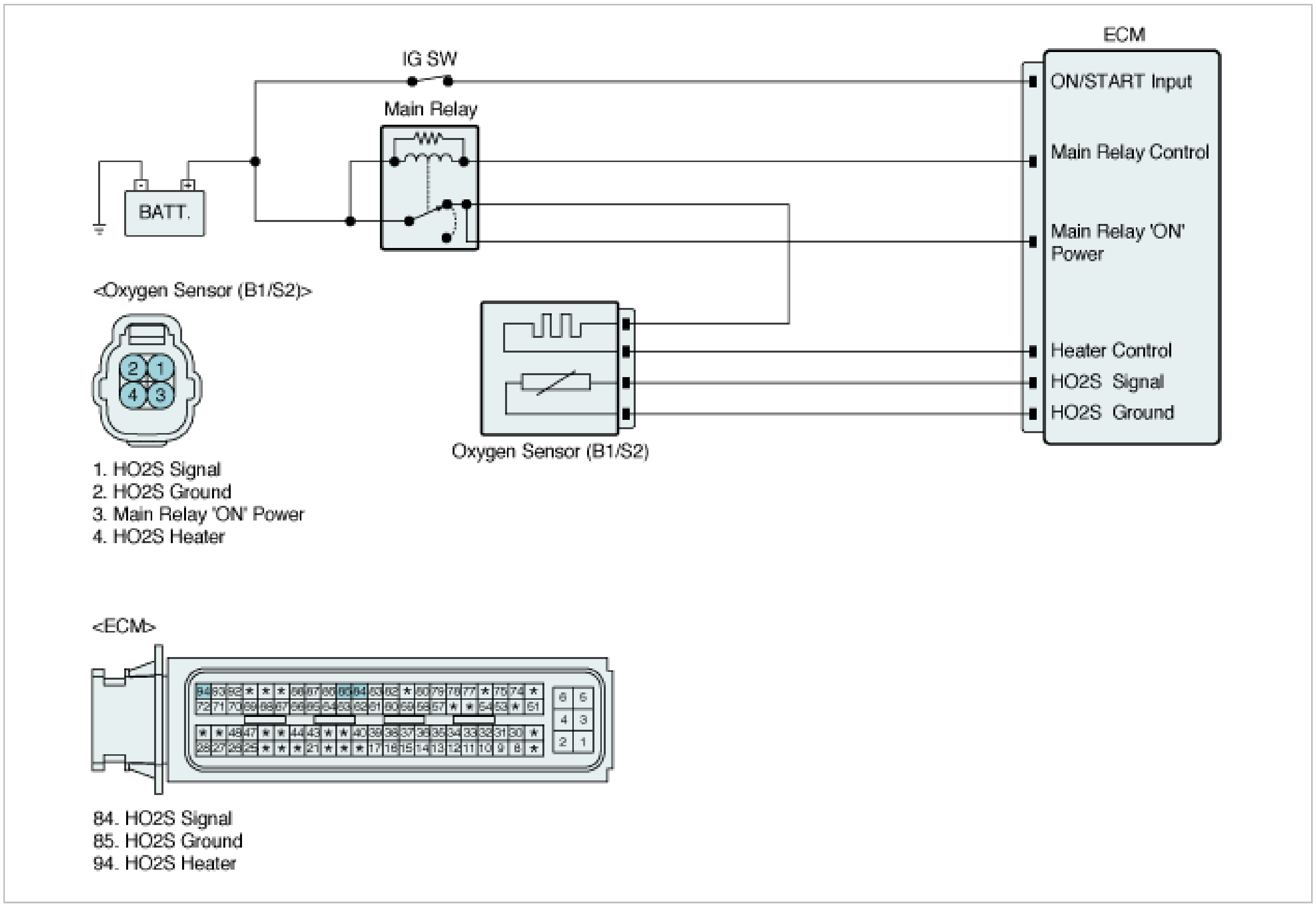
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Related fuse blown or missing • Open or short to ground in power supply or control harness • Poor connection or damaged harness • Faulty HO2S
Enable Conditions	• No relevant failure • 10V< Battery voltage <16V • 3.5%< O2 sensor heater control duty <96.5%	
Threshold Value	• Short circuit to ground	
Diagnostic Time	• 10sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

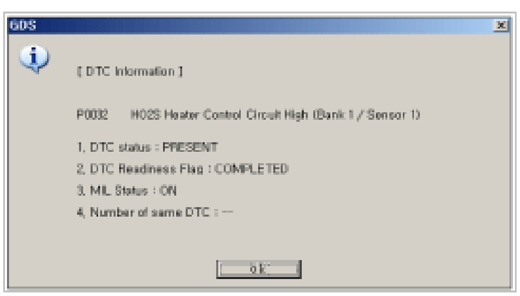
Temp.(°C)	Temp.(°F)	Heater Resistance (Ω)
18~20	64~82	3.3 ~ 4.1

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Power Circuit Inspection

1. Ignition "OFF"
2. Disconnect HO2S sensor connector
3. Ignition "ON" & Engine "OFF"
4. Measure voltage between power terminal of the HO2S heater harness connector and chassis ground.

Specification : B+

5. Is voltage within the specification?

YES	▶ Go to "Control Circuit Inspection" procedure
NO	▶ Check for an open in the power supply circuit between the main relay and the HO2S. Especially check for "SENSOR2 FUSE 15A" is installed and not blown. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure NOTE HO2S must have a clean air reference to function properly. The air is obtained by way of the sensor wire(s). Do not attempt to repair the wire(s), connector, or the terminals.

Control Circuit Inspection

1. Measure voltage between control terminal of the HO2S heater harness connector and chassis ground.

Specification : Approx. 4~5V

2. Is voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure NOTE HO2S must have a clean air reference to function properly. The air is obtained by way of the sensor wire(s). Do not attempt to repair the wire(s), connector, or the terminals.

Terminal and Connector Inspection

1. 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.
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 next step as below

Component Inspection

1. Ignition "OFF"
2. Measure resistance between power terminal and control terminal of the sensor connector (Component side)
Specification

Temp.(°C)	Temp.(°F)	Heater Resistance (Ω)
18~20	64~82	3.3 ~ 4.1

3. Is resistance within the specification?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Check HO2S for contamination, deterioration, or damage. Substitute with a known-good HO2S and check for proper operation. If the problem is corrected, replace HO2S and then go to "Verification of Vehicle Repair" procedure

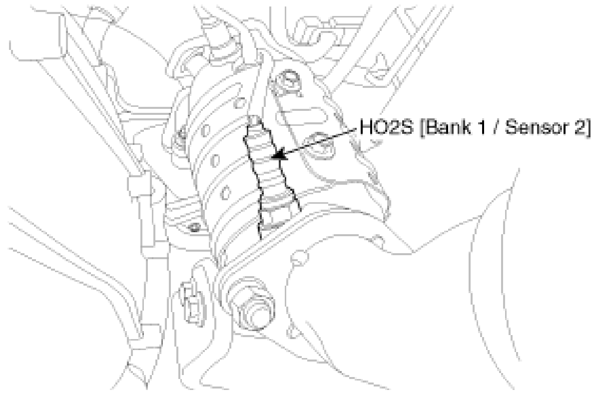
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The normal operating temperature of the HO2S(Heated Oxygen Sensor) ranges 350 to 850°C(662 to 1562°F). The HO2S heater greatly decreases the amount of time required for fuel control to become active. The ECM provides a pulse width modulated control circuit to adjust current through the heater. When the HO2S is cold, the value of the resistance is low and the current in the circuit is high. On the contrary, the temperature in the resistor of the sensor rises, the current drops gradually.

DTC Description

ECM sets DTC P0038 if the ECM detects that the rear HO2S heater control line is open or short to battery line.

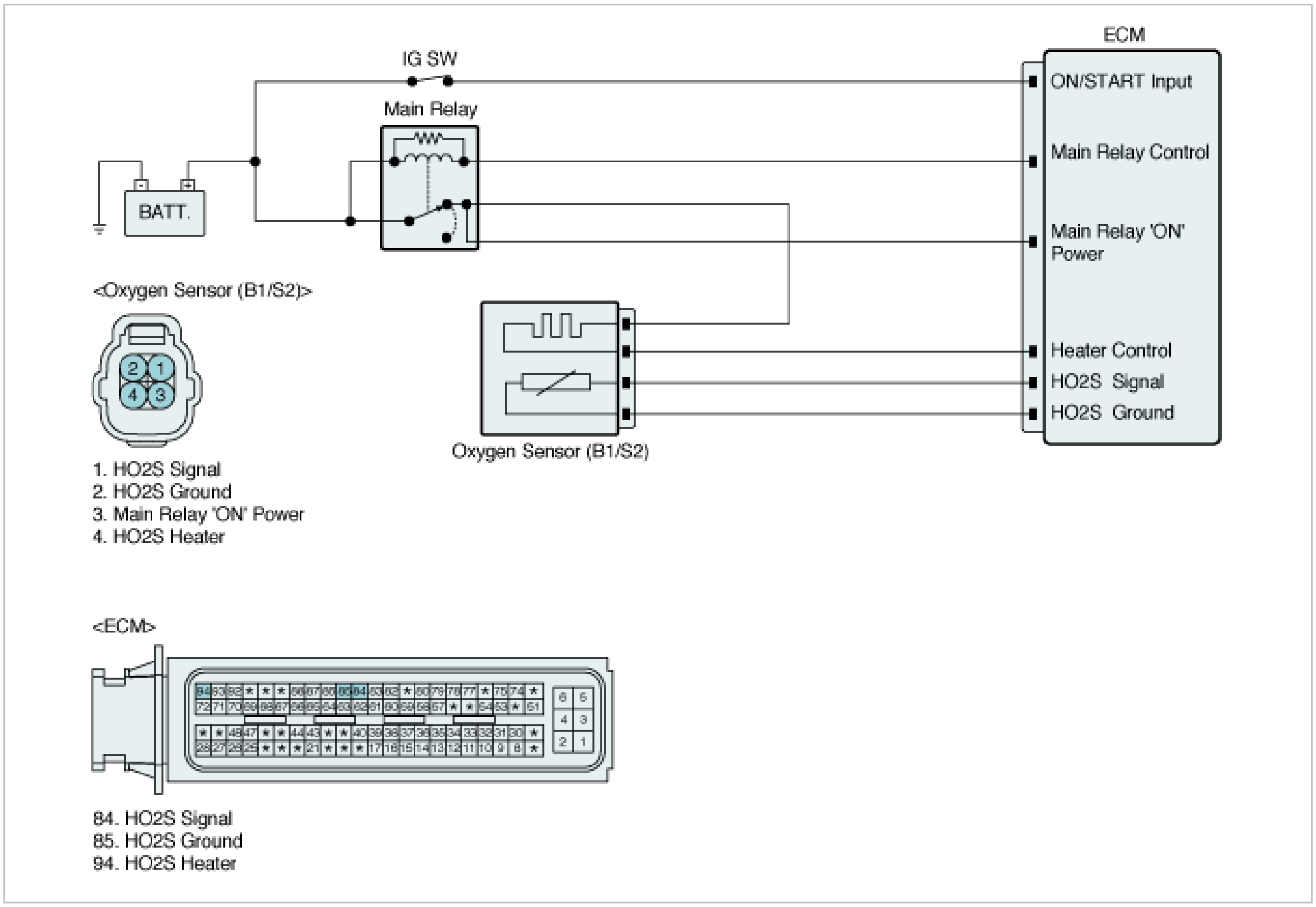
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Open or short to battery in control harness • Poor connection or damaged harness • Faulty HO2S
Enable Conditions	• No relevant failure • 10V< Battery voltage <16V • 3.5%< O2 sensor heater control duty <96.5%	
Threshold Value	• Open circuit or short circuit to battery	
Diagnostic Time	• 10sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

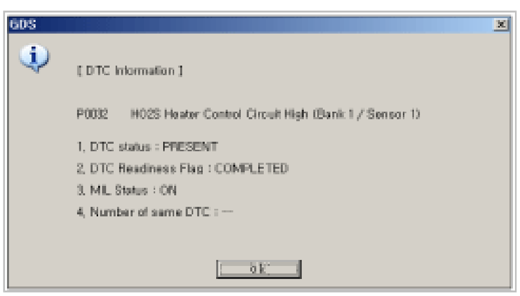
Temp.(°C)	Temp.(°F)	Heater Resistance (Ω)
18~20	64~82	3.3 ~ 4.1

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Control Circuit Inspection

1. Ignition "OFF"
2. Disconnect HO2S sensor connector
3. Ignition "ON" & Eng. "OFF"
4. Measure voltage between control terminal of the HO2S heater harness connector and chassis ground.

Specification : Approx. 4~5V

5. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure. NOTE HO2S must have a clean air reference to function properly. The air is obtained by way of the sensor wire(s). Do not attempt to repair the wire(s), connector, or the terminals.

Terminal and Connector Inspection

1. 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.
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 next step as below

Component Inspection

1. Ignition "OFF"
2. Measure resistance between power terminal and control terminal of the sensor connector (Component side)
   Specification

Temp.(°C)	Temp.(°F)	Heater Resistance (Ω)
18~20	64~82	3.3 ~ 4.1

3. Is resistance within the specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check HO2S for contamination, deterioration, or damage. Substitute with a known-good HO2S and check for proper operation. If the problem is corrected, replace HO2S and then go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

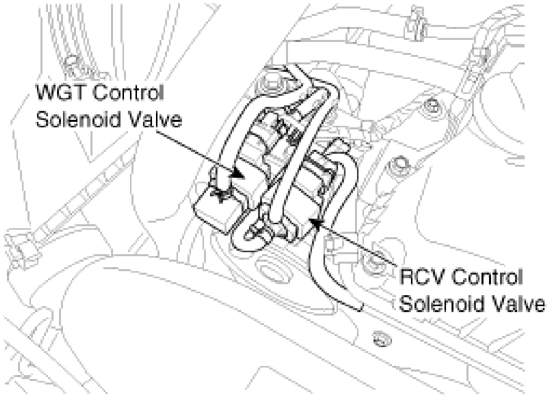
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.

2. Click "DTC Status" 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.

Component Location



General Description

The turbo charger uses exhaust energy to rotate the turbine. The turbine rotates the compressor to the axis in order to compress the intake air. The compressed intake air is cooled through the intercooler, and provided it with the engine. The efficiency of the engine increases (NA compared 30~40%) and also drops the quantity of harmful exhaust gas.

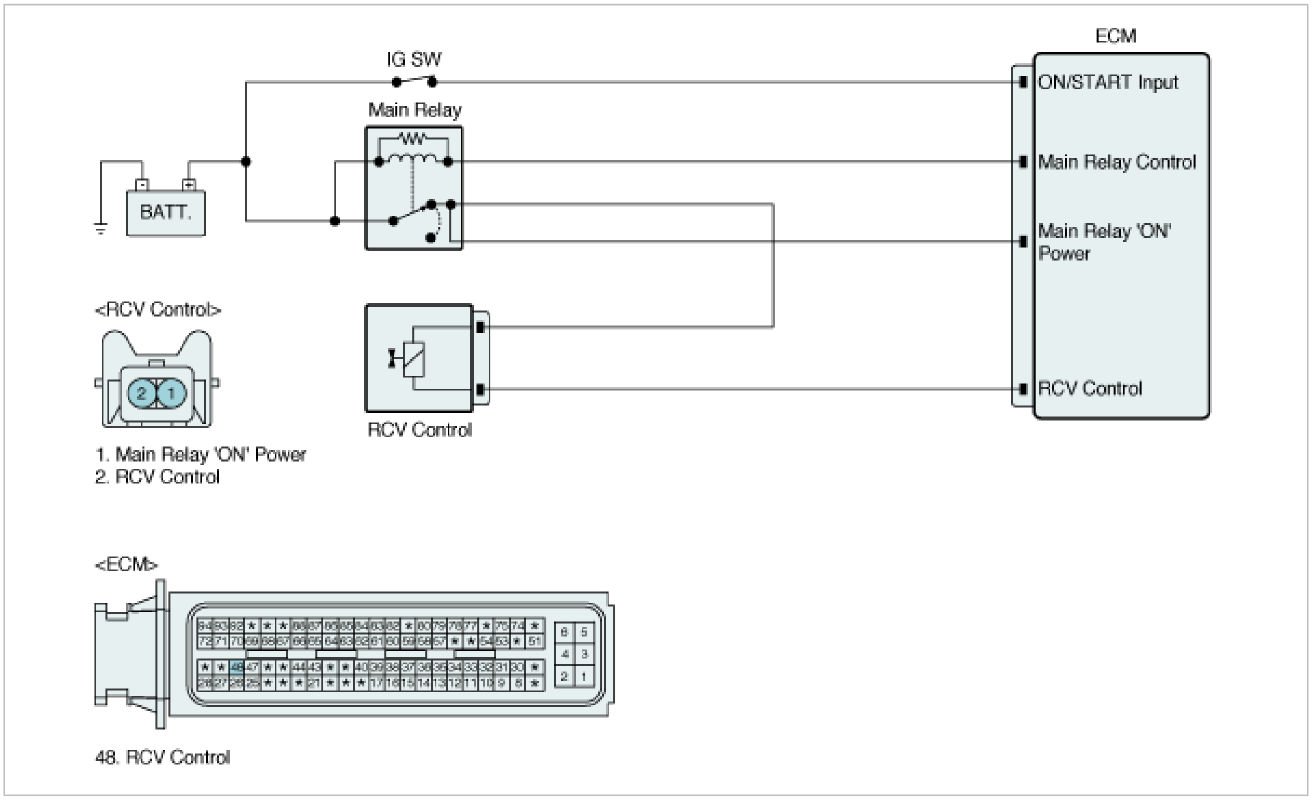
DTC Description

ECM sets DTC P0049 if the ECM detects that turbine speed of turbo charger is more than 172,000 rpm.

DTC Detecting Condition

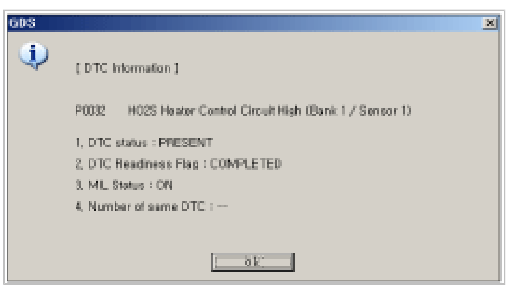
Item	Detecting Condition	Possible Cause
DTC Strategy	• Plausibility check	• Detected for following DTC check • Air leak in intake(Turbecharger to ETC) • Restriction in intake(Air Filter to Turbocharger) • WGT/RCV Control Air line check • Faulty RCV • Faulty PUT(Boost sensor) • Faulty Turbocharger
Enable Conditions	• -	
Threshold Value	• Turbocharger speed > 172000rpm	
Diagnostic Time	• 5 sec	
Mil On Condition	• 2 Driving cycles	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

System Inspection

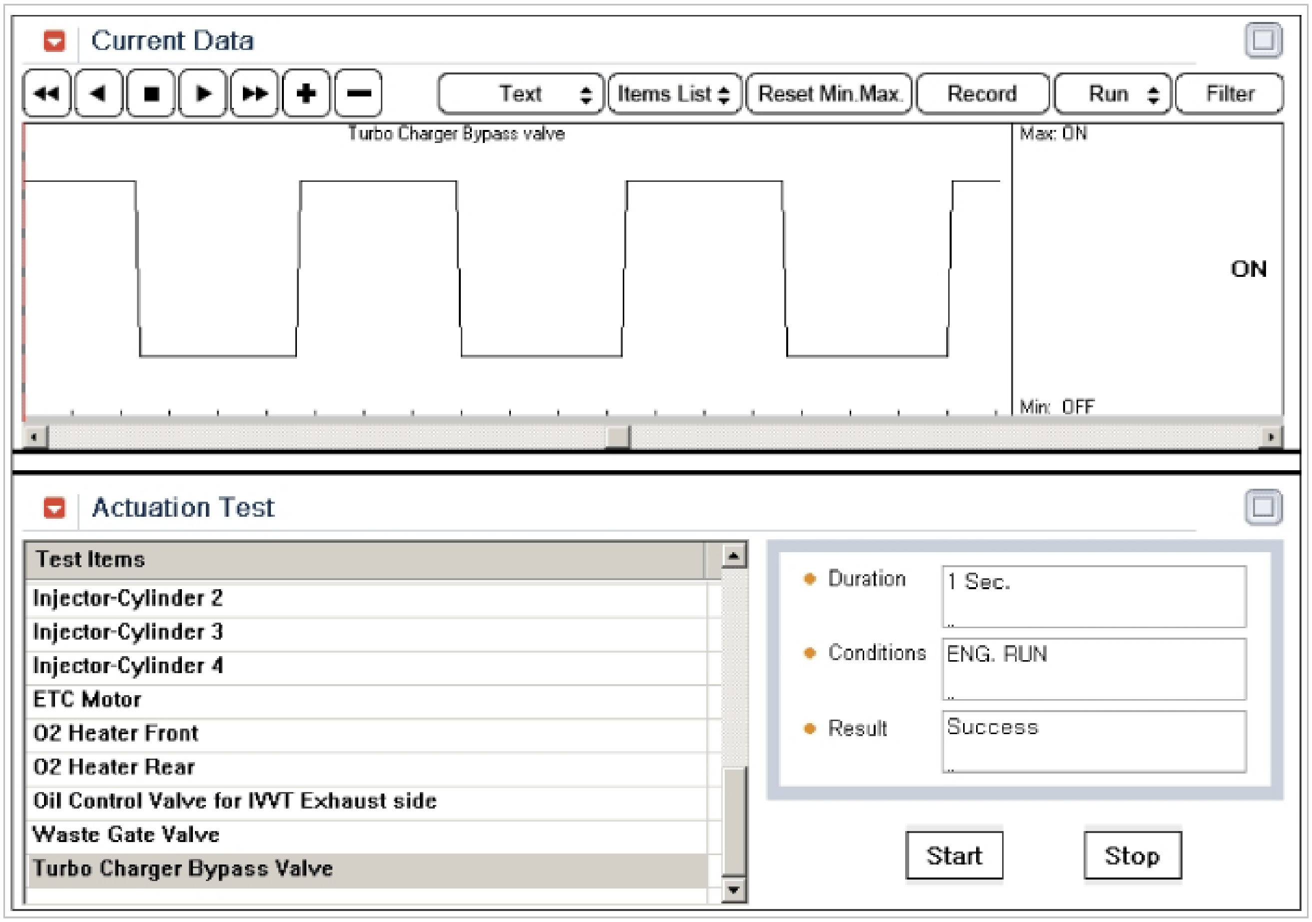
■ **Check leakage in ingake system**

1. Visually/physically inspect
   Intake system blocked or leakage inspection (First, Inspect contamination, gasket)
   ▸ Air cleaner blocked
   ▸ Inspect intake hose between turbo charger and ETS.(Blocked or leakage)
   ▸ Inspect waste gate valve and Recirculation valve (RCV) control hose blocked /leak /assemble improperly.
2. Was a problem found?

YES	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

■ RCV Actuation Test

1. Select 'Actuation Test' mode and execute 'Turbo Charger Bypass Valve' item.



2. Is the waveform normal?

YES	▸ Go to next step as below
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ RCV Resistance Inspection

1. Ignition "OFF"
2. Measure resistance between power terminal and control
   Specification

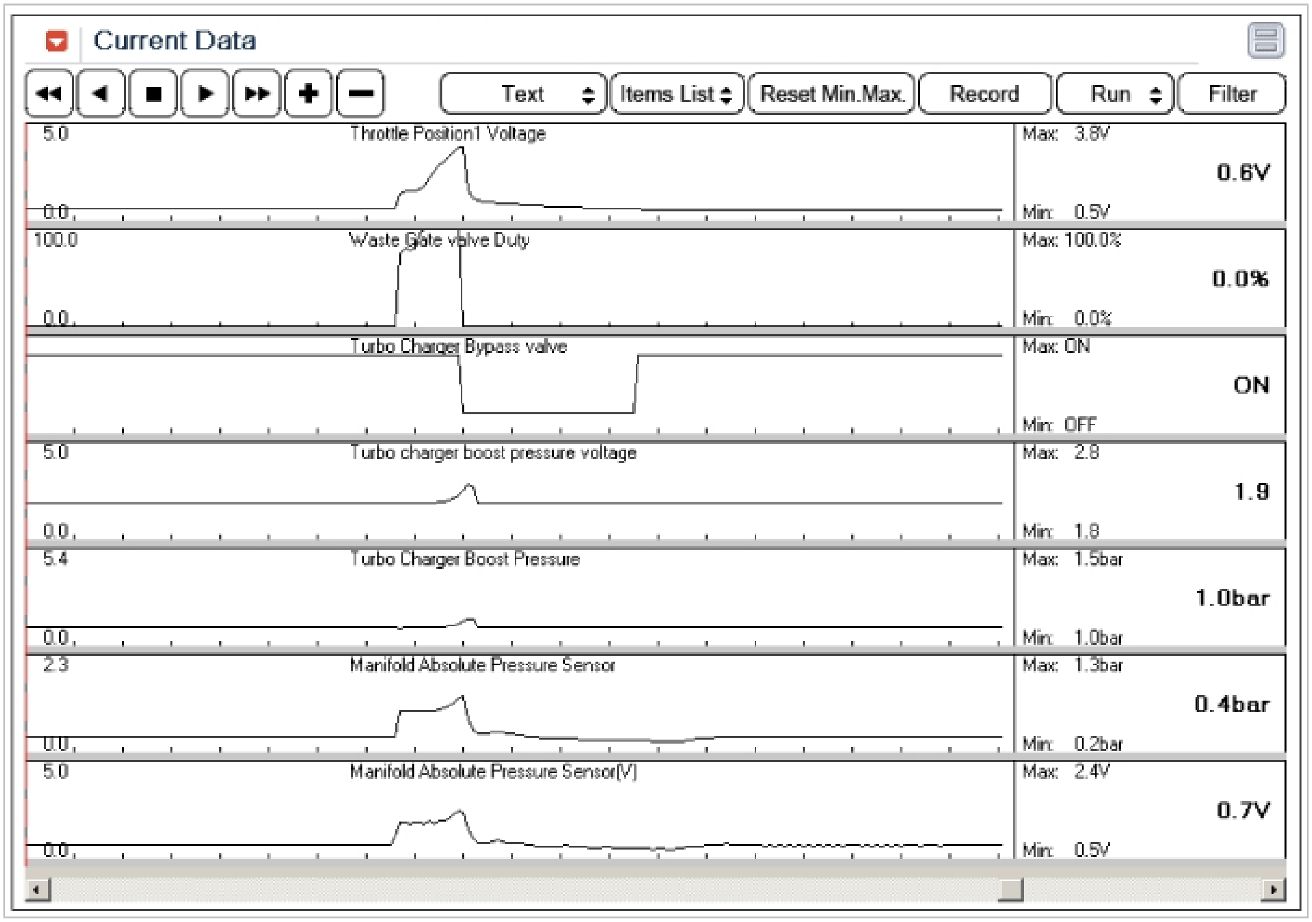
Temp.(°C)	Temp.(°F)	Resistance(Ω)
20	82	28.3 ~ 31.1

3. Is resistance within the specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Substitute with a known - good RCV and check for proper operation. If the problem is corrected, replace RCV and go to "Verification of Vehicle Repair" procedure.

■ **Turbo Charger Boost Sensor(PUT) Inspection**

1. Select sensor data related to turbo charger.
2. Monitor sensor data at accelerating.



3. Is the waveform normal?

YES	▸ Substitute with a known-good Turbo Charger and check for proper operation. If the problem is corrected, replace Turbo Charger and then go to "Verification of Vehicle Repair" procedure
NO	▸ Substitute with a known-good Boost Sensor and check for proper operation. If the problem is corrected, replaceBoost Senser and then go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

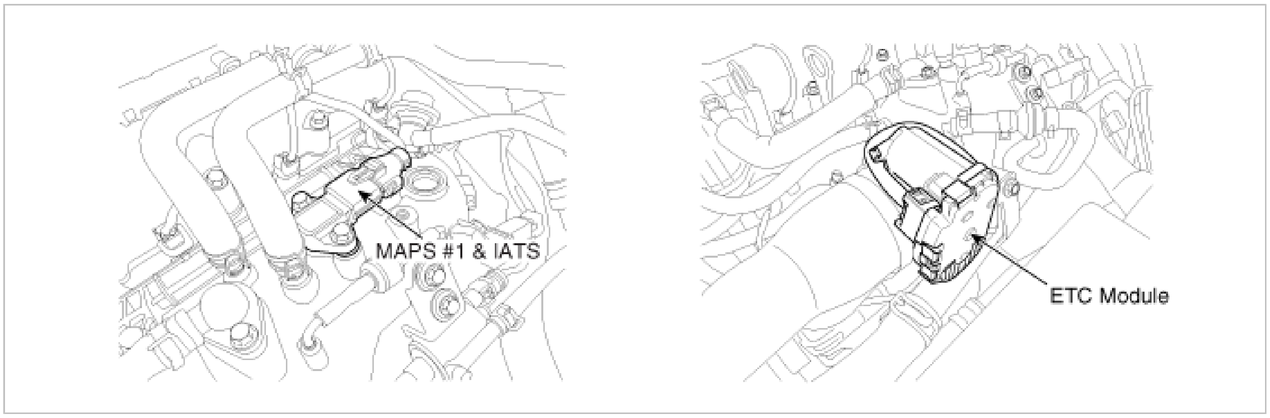
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The amount of intake air flow must be inputted to ECM in order to determine the fuel injection qantity. 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 outputted by the transformation of diagphragm according to the change of pressure inside of intake manifold.

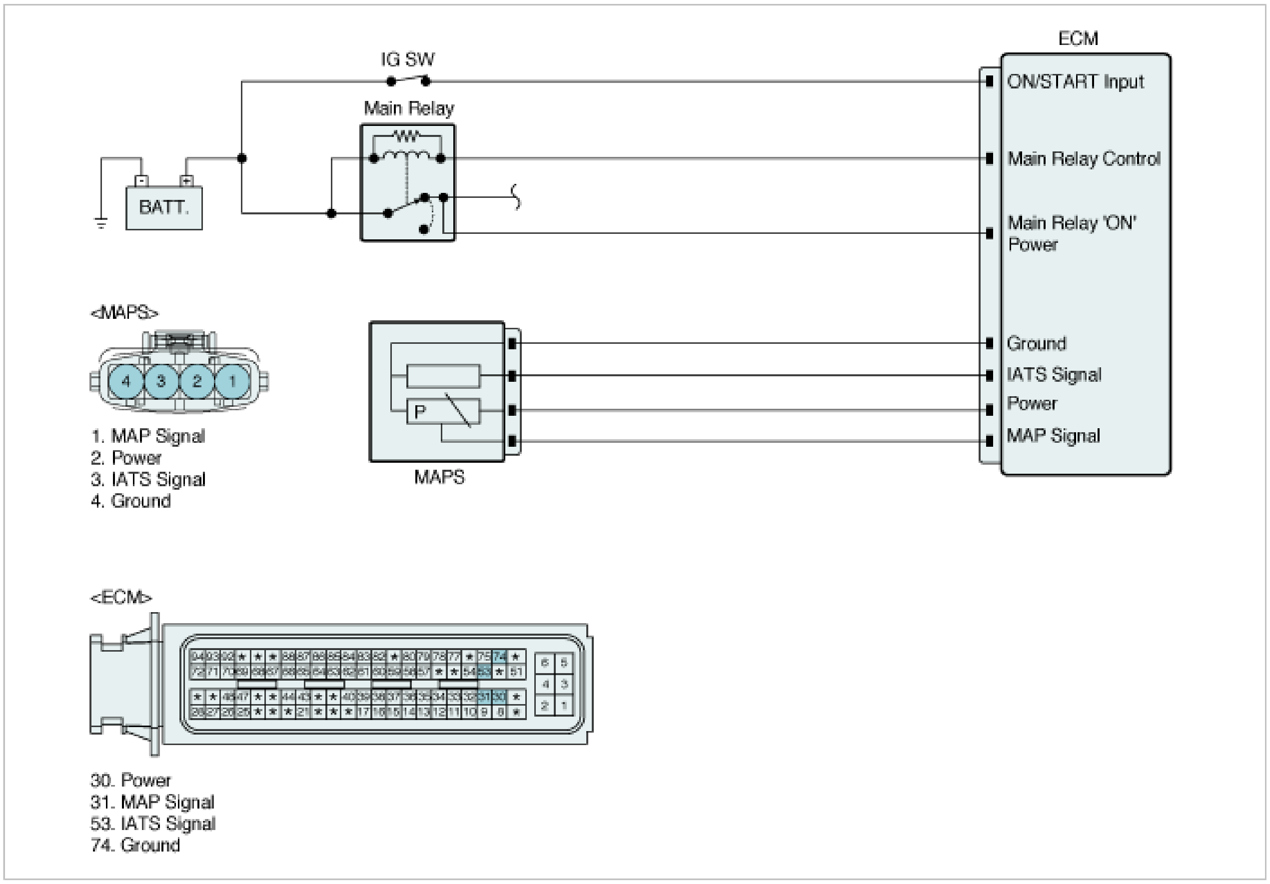
DTC Description

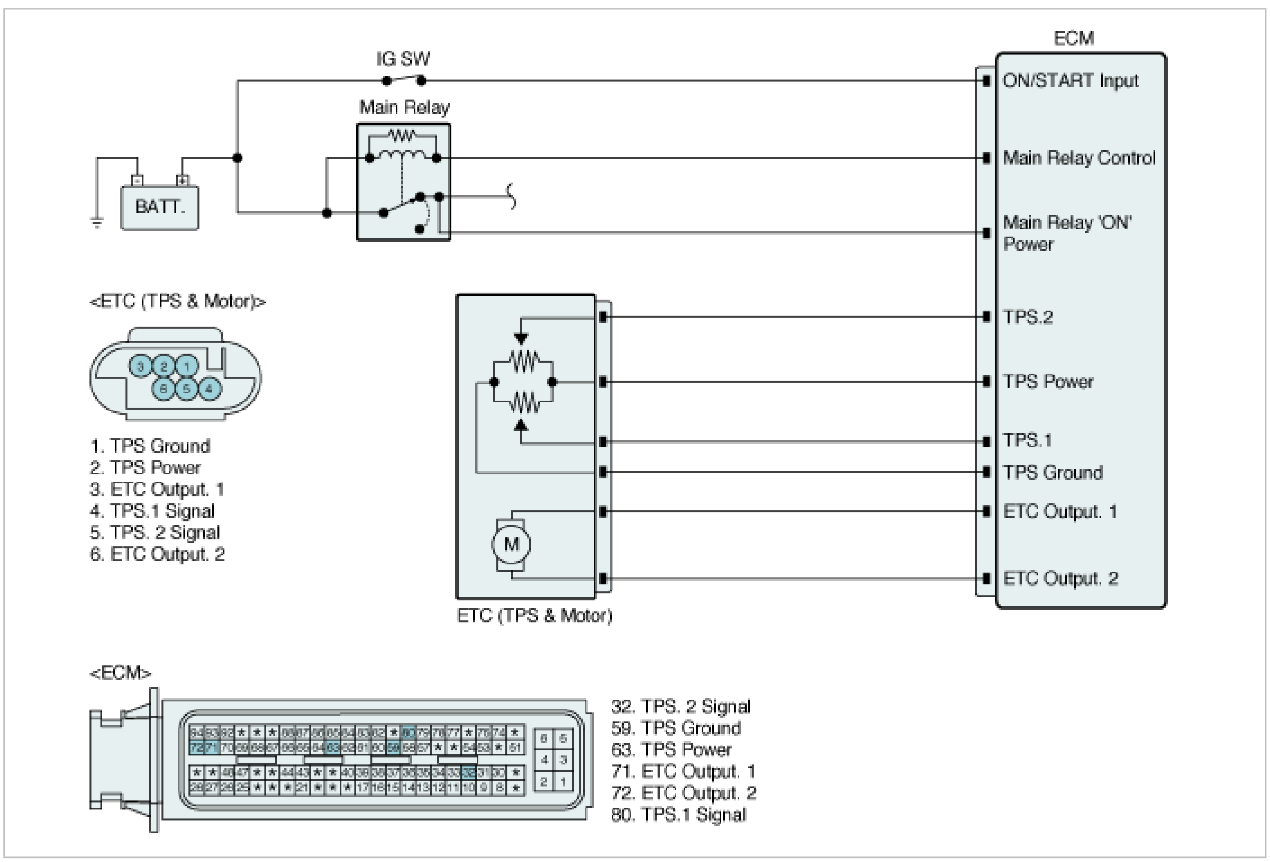
ECM compares the MAPS output and calculated MAPS value while enable condition is met. If the acutal MAP value is higher than Maximum threshold or lower than Minimum threshold for a pre-determined time, ECM determines that a fault exists and a DTC is stored.

DTC Detecting Condition

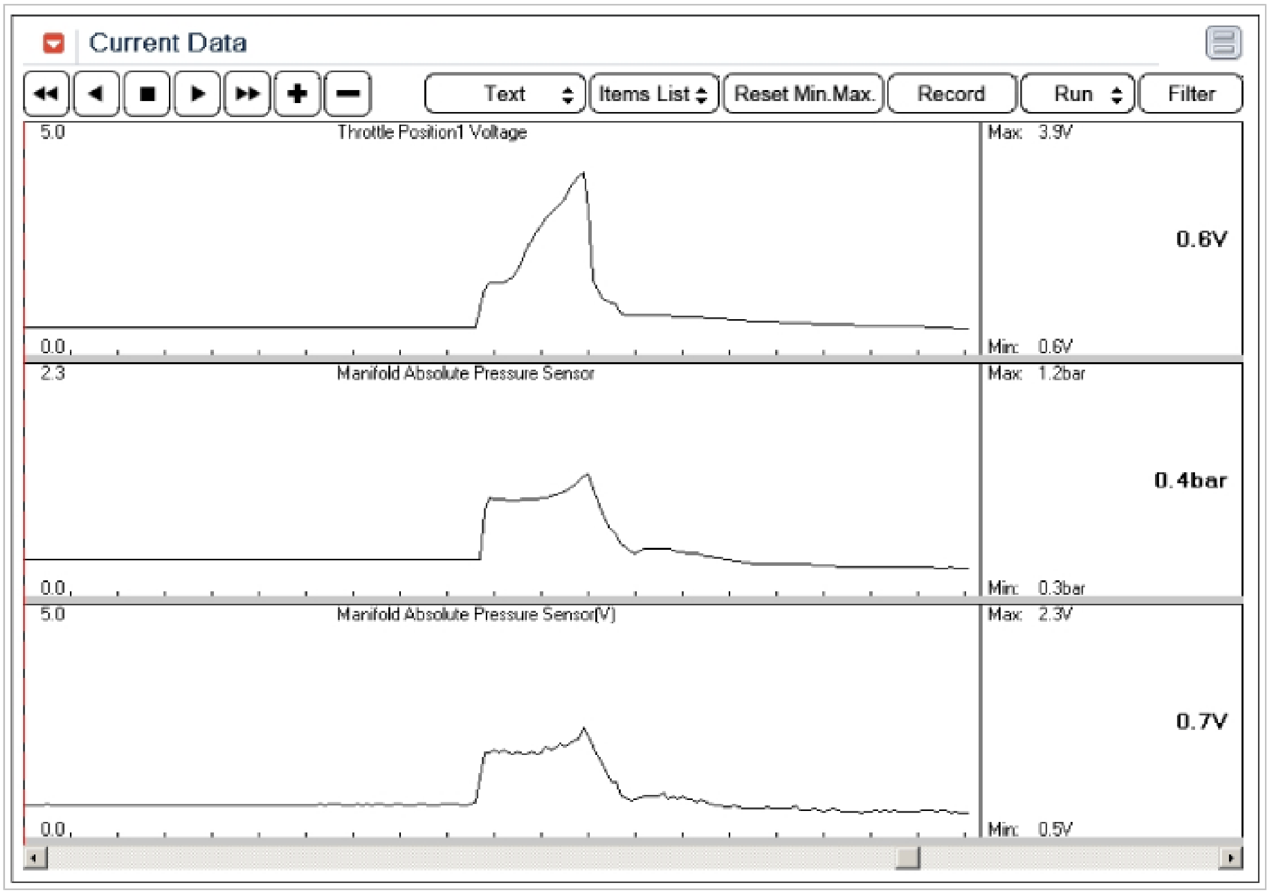
Item		Detecting Condition	Possible Cause
Case 1	DTC Strategy	• Circuit Range / Performance Problem (During acceleration)	
	Enable Conditions	• Engine RPM > 1000 rpm • 10 V≤ Battery voltage ≤ 16V • Signal change > 12°/sec	• Dirty air cleaner. • Oil Cap or Dipstick missing or not installed correctly. • Air leak in intake system • Contact resistance in connectors. • Faulty MAPS or TPS
	Threshold Value	• MAP(Model) > 0.9ATM. But, MAP(Measured) < 0.6ATM • Deviation value of fuel trim control > 20% or < -20%	
Case 2	DTC Strategy	• Circuit Range / Performance Problem	
	Enable Conditions	• Engine RPM > 1000 rpm • 10 V≤ Battery voltage ≤ 16V	
	Threshold Value	• MAP(Model) - MAP(Measured) > 280 hPa • Deviation value of fuel trim control > 20% or < -20%	
Diagnostic Time		• It depends on the driving conditions.	
Mil On Condition		• 2 Driving Cycles	

Diagnostic Circuit Diagram





Signal Waveform & Data



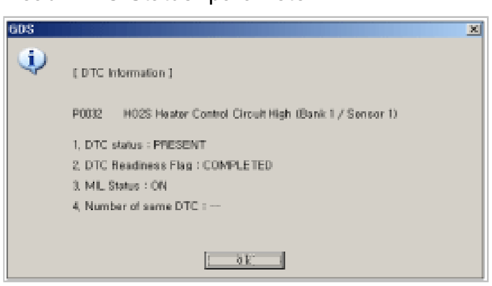
As often as possible, the MAPS signal should be compared with the TPS signal. Check whether the MAPS and TPS signals increase at the same time when accelerating. During acceleration, the MAPS output voltage increases;during deceleration, the MAPS output voltage decreases.

Monitor DTC Status

NOTE

If any DTCs relating to TPS or MAP are stored, do ALL REPAIRS associated with those codes before proceeding with further troubleshooting

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. 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.
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 next step as below

Voltage Inspection

1. IG "OFF".
2. Disconnect MAPS connector.
3. IG "ON" & ENG "OFF".
4. Measure voltage between each of signal / power / ground terminals of MAPS harness connector and chassis ground.

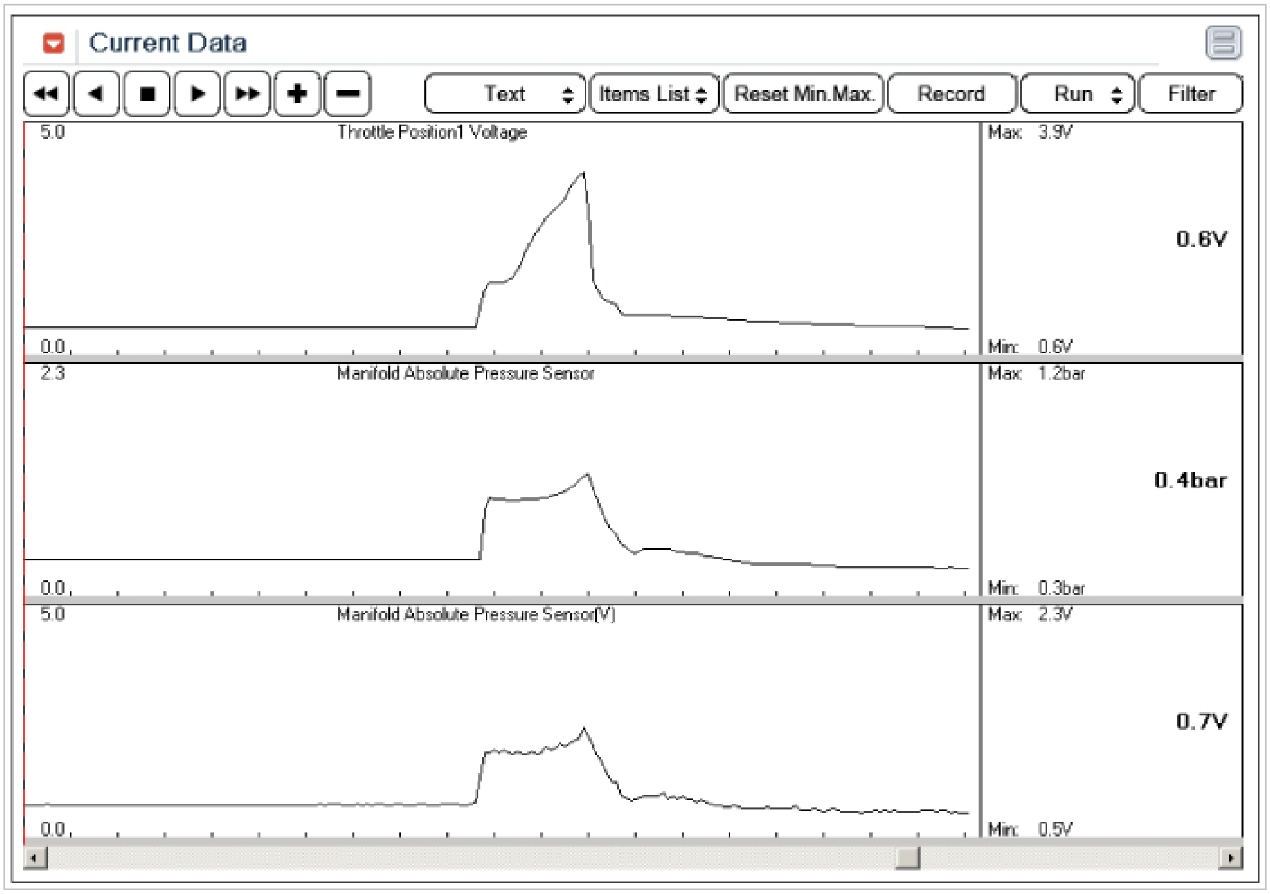
Specification : MAP signal terminal : Approx. 0V
Power terminal : Approx. 5V
Ground terminal : Approx. 0V

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

1. Check MAPS performance.
   (1) IG "OFF".
   (2) Connnect CH A probe to signal terminal of TPS and CH B probe to signal terminal of MAPS 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 pedal.



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

YES	▸ Thoroughly check connectors for looseness, poor connection, bending, corrosion, ontamination, deterioration, or damage. Repair or replace as necessary and go to "Verificatio 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

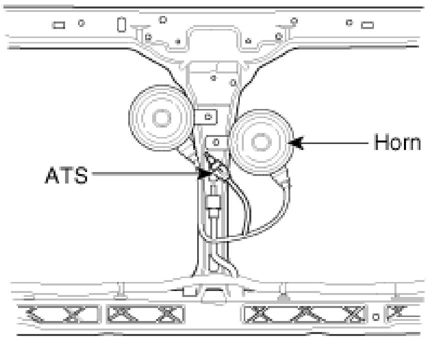
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0071 Ambient Air Temperature Circuit Range / Performance

Component Location



General Description

A value from modeling that have been retrieved from an intake air temperature sensor has been currently been in use for outside temperature detection. However, it is difficult to use this value due to the properties of the turbo charger, because the temperature shows a great increase during the charging. Therefore, the outside temperature sensor is installed in front of the radiator to directly measure the outside temperature.

DTC Description

ECM sets DTC P0071 when the variation of measured ambient air temperature from cold(or warm) engine start is out of range in threshold value(refer to Detecting condition).

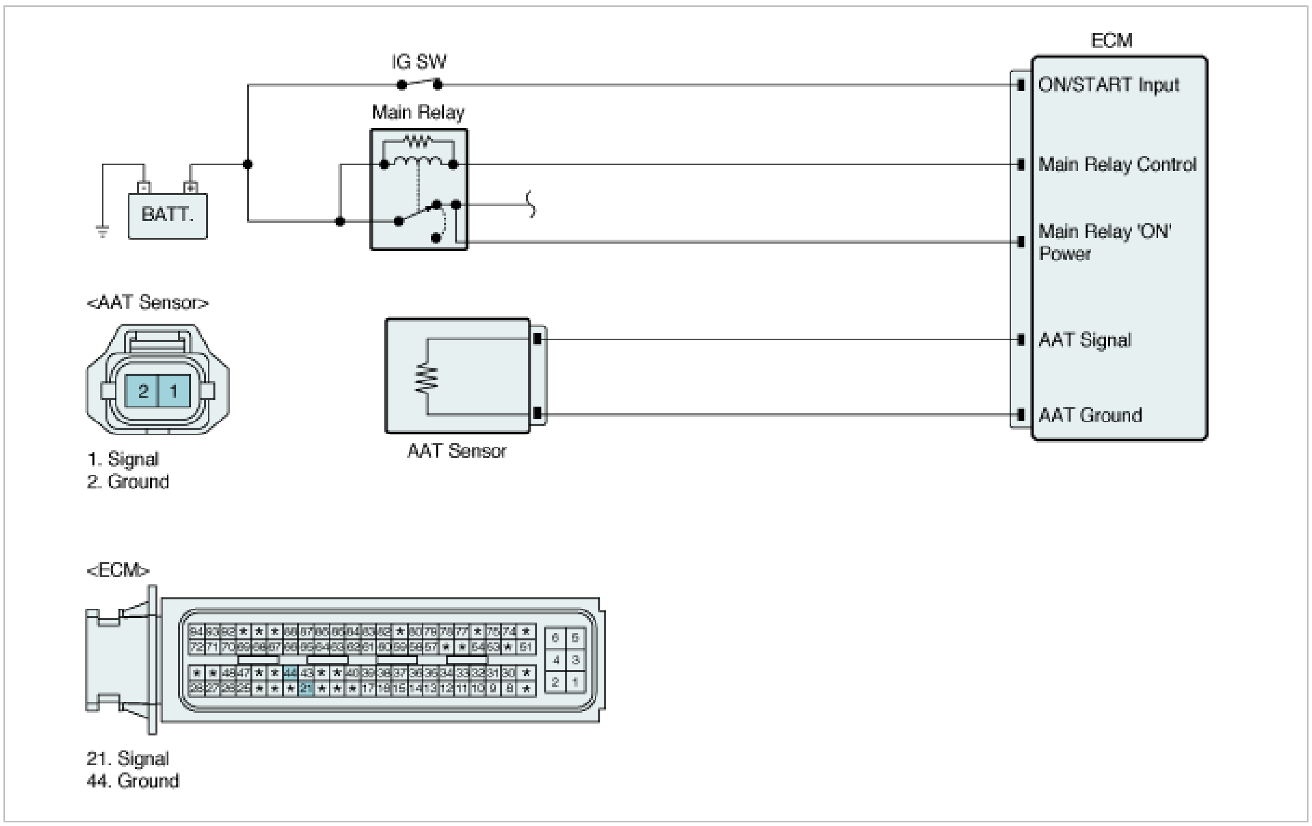
DTC Detecting Condition

Item		Detecting Condition	Possible Cause
DTC Strategy		• Plausibility check	• Faulty AAT
Enable Conditions	Case1	• modeled Temp. AAT < 190.5 °C • change of IAT(between two measurements) <1.5 °C • change of AAT(between two measurements)<1.5 °C • 79.5 °C < ECT Temp. < 105.0 °C	
	Case2	• 1500rpm < engine speed < 4000rpm • 35kg/h <mass air flow < 200kg/h • pressure quotient(PUT/AMP) <1.5 • 43.5mph < Vehicle speed < 81mph • Failure not detected for DTCs	
	Case3	• Time after start < 180 sec • change of IAT (between two measurements) <1.5 °C • change of AAT (between two measurements) <5.25 °C • engine off time > 450 min • ECT temp.(at engine start) - ECT temp.(at engine stop) > 40 °C • ECT temp. < 34 °C • Failure not detected for DTCs	
Threshold Value	Case1	• measured AAT - modeled AAT <=-15 °C (hot engine)	
	Case2	• measured AAT - modeled AAT >= 15 °C (hot engine)	
	Case3	• measured AAT - modeled AAT >= 12 °C (cold engine)	
Diagnostic Time		• immediately	
MIL On Condition		• 2 Driving Cycles	

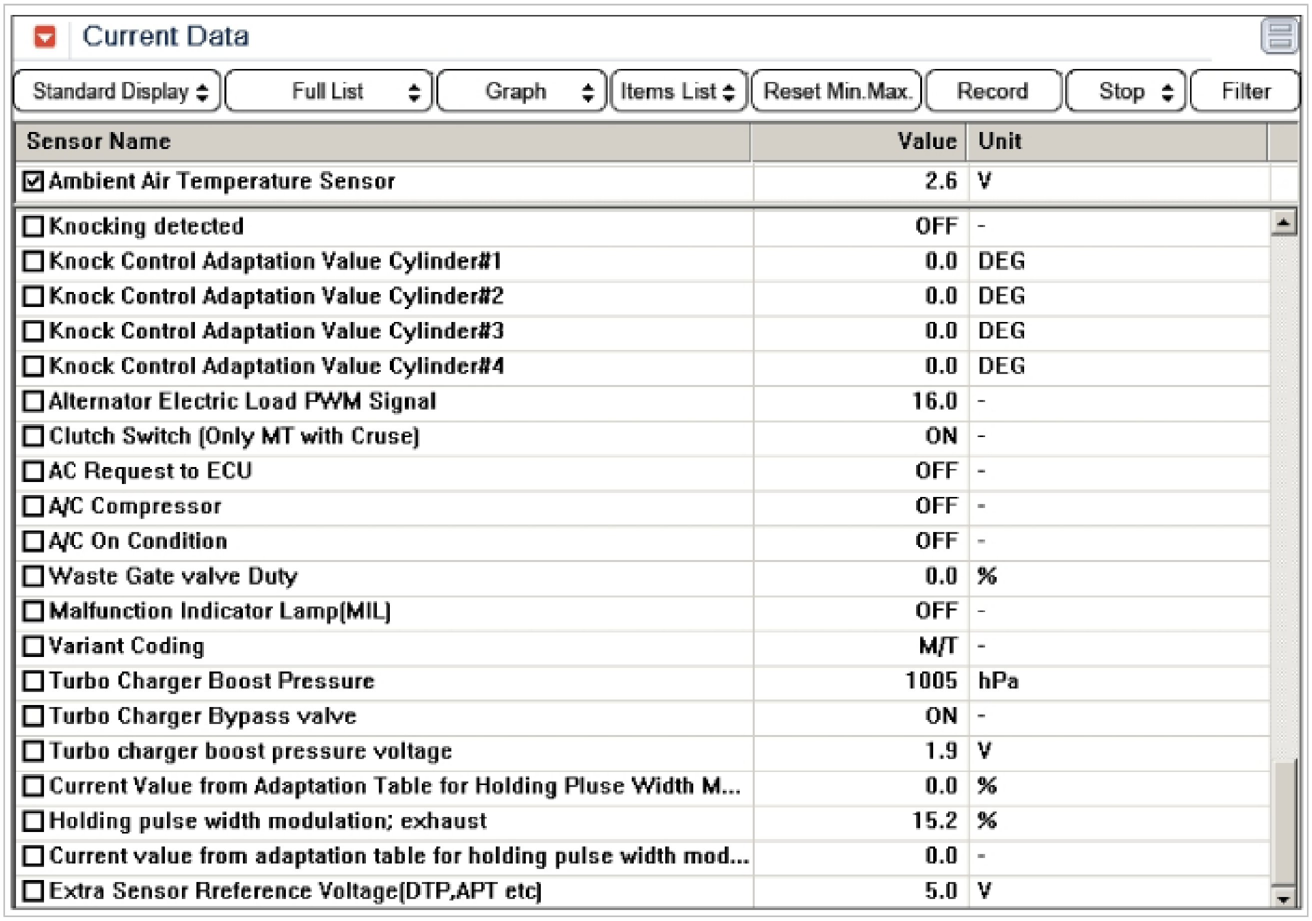
Specification

AAT Temp.(°C)	AAT Temp.(°F)	Resistance(KΩ)
-40	**-40**	**55.61 ~ 66.21**
-20	-4	18.76 ~ 21.37
0	32	7.62 ~ 7.95
20	68	3.18 ~ 3.37
25	77	2.63 ~ 2.77
40	104	1.50 ~ 1.62
60	140	0.76 ~ 0.84
80	176	0.40 ~ 0.45

Diagnostic Circuit Diagram



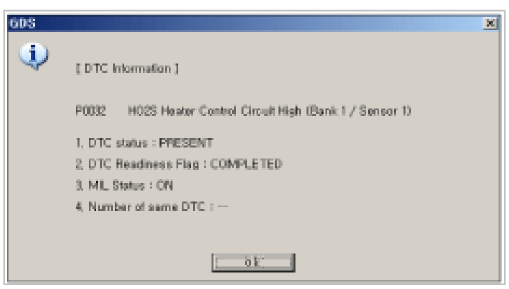
Signal Waveform & Data



Sensor Name	Value	Unit
☑ Ambient Air Temperature Sensor	2.6	V
☐ Knocking detected	OFF	-
☐ Knock Control Adaptation Value Cylinder#1	0.0	DEG
☐ Knock Control Adaptation Value Cylinder#2	0.0	DEG
☐ Knock Control Adaptation Value Cylinder#3	0.0	DEG
☐ Knock Control Adaptation Value Cylinder#4	0.0	DEG
☐ Alternator Electric Load PWM Signal	16.0	-
☐ Clutch Switch (Only MT with Cruse)	ON	-
☐ AC Request to ECU	OFF	-
☐ A/C Compressor	OFF	-
☐ A/C On Condition	OFF	-
☐ Waste Gate valve Duty	0.0	%
☐ Malfunction Indicator Lamp(MIL)	OFF	-
☐ Variant Coding	M/T	-
☐ Turbo Charger Boost Pressure	1005	hPa
☐ Turbo Charger Bypass valve	ON	-
☐ Turbo charger boost pressure voltage	1.9	V
☐ Current Value from Adaptation Table for Holding Pluse Width M...	0.0	%
☐ Holding pulse width modulation; exhaust	15.2	%
☐ Current value from adaptation table for holding pulse width mod...	0.0	-
☐ Extra Sensor Rreference Voltage(DTP,APT etc)	5.0	V

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. 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.
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 next step as below

Component Inspection

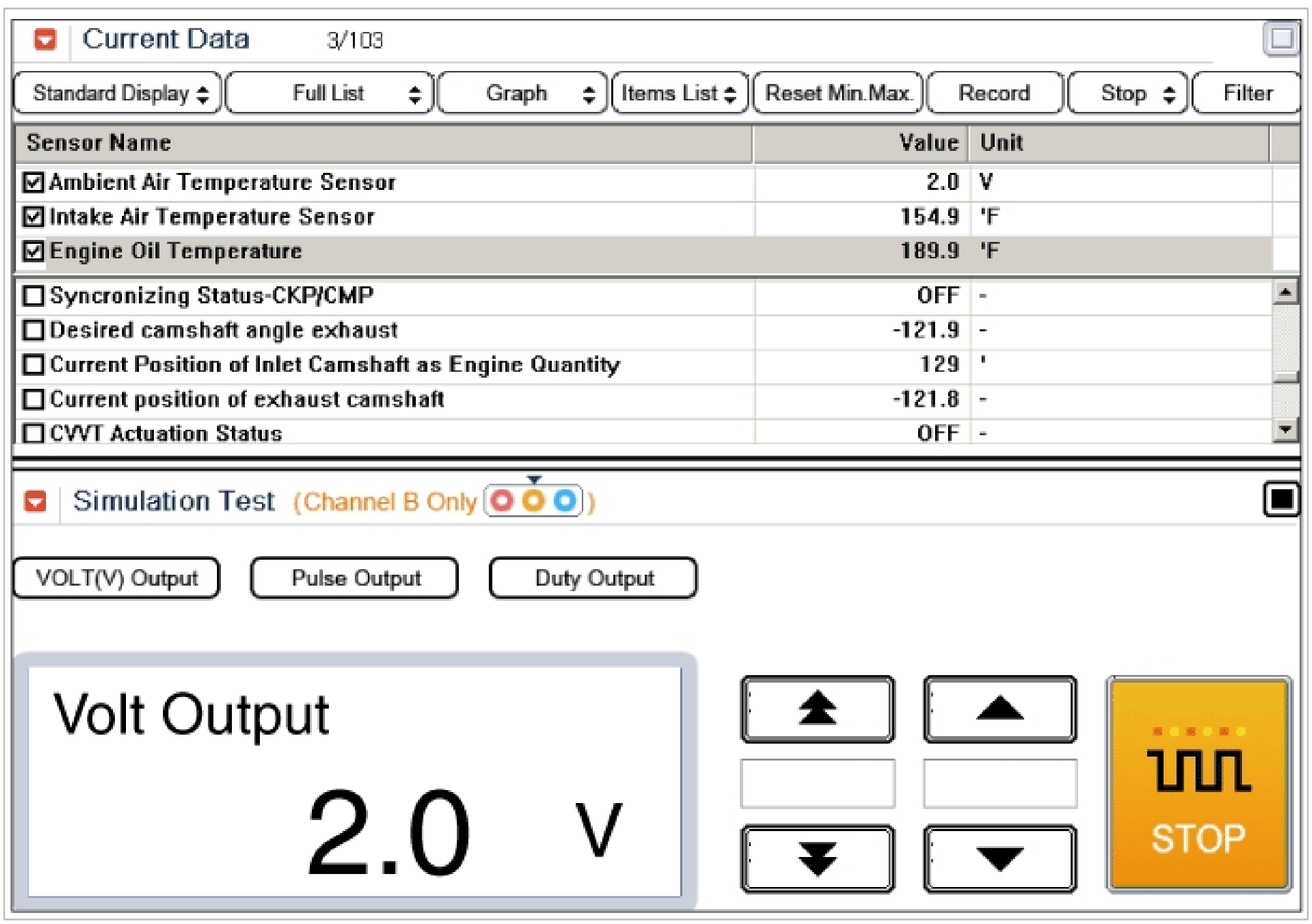
■ **AAT Visually Inspect**

1. Was a problem found?

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Go to next step as below

■ **AAT Simulation Inspect**

1. IG KEY OFF
2. Disconnect AAT connector.
3. IG KEY ON
4. Perform voltage simulation to signal circuit of AAT.



5. Does the simulation frequency make AAT value change ?

YES	▶ Go to next step as below

NO	▸ Substitute with a known-good AAT and check for proper operation. If the problem is corrected, replace AAT and then go to "Verification of Vehicle Repair" procedure

■ **Resistance Inspection**

1. Ignition "OFF"
2. Measure resistance between power terminal and control terminal of the sensor connector (Component side)
   Specification

AAT Temp.(°C)	AAT Temp.(°F)	Resistance(KΩ)
-40	**-40**	**55.61 ~ 66.21**
-20	-4	18.76 ~ 21.37
0	32	7.62 ~ 7.95
20	68	3.18 ~ 3.37
25	77	2.63 ~ 2.77
40	104	1.50 ~ 1.62
60	140	0.76 ~ 0.84
80	176	0.40 ~ 0.45

3. Is resistance within the specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Substitute with a known - good AAT and check for proper operation. If the problem is corrected, replace AAT and go to "Verification of Vehicle Repair" procedure.

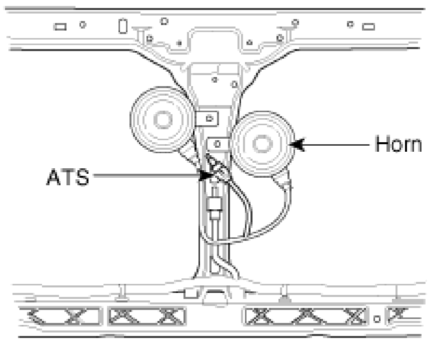
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

A value from modeling that have been retrieved from an intake air temperature sensor has been currently been in use for outside temperature detection. However, it is difficult to use this value due to the properties of the turbo charger, because the temperature shows a great increase during the charging. Therefore, the outside temperature sensor is installed in front of the radiator to directly measure the outside temperature.

DTC Description

ECM sets DTC P0072 if the ECM detects ambient air temperature signal circuit is short to ground.

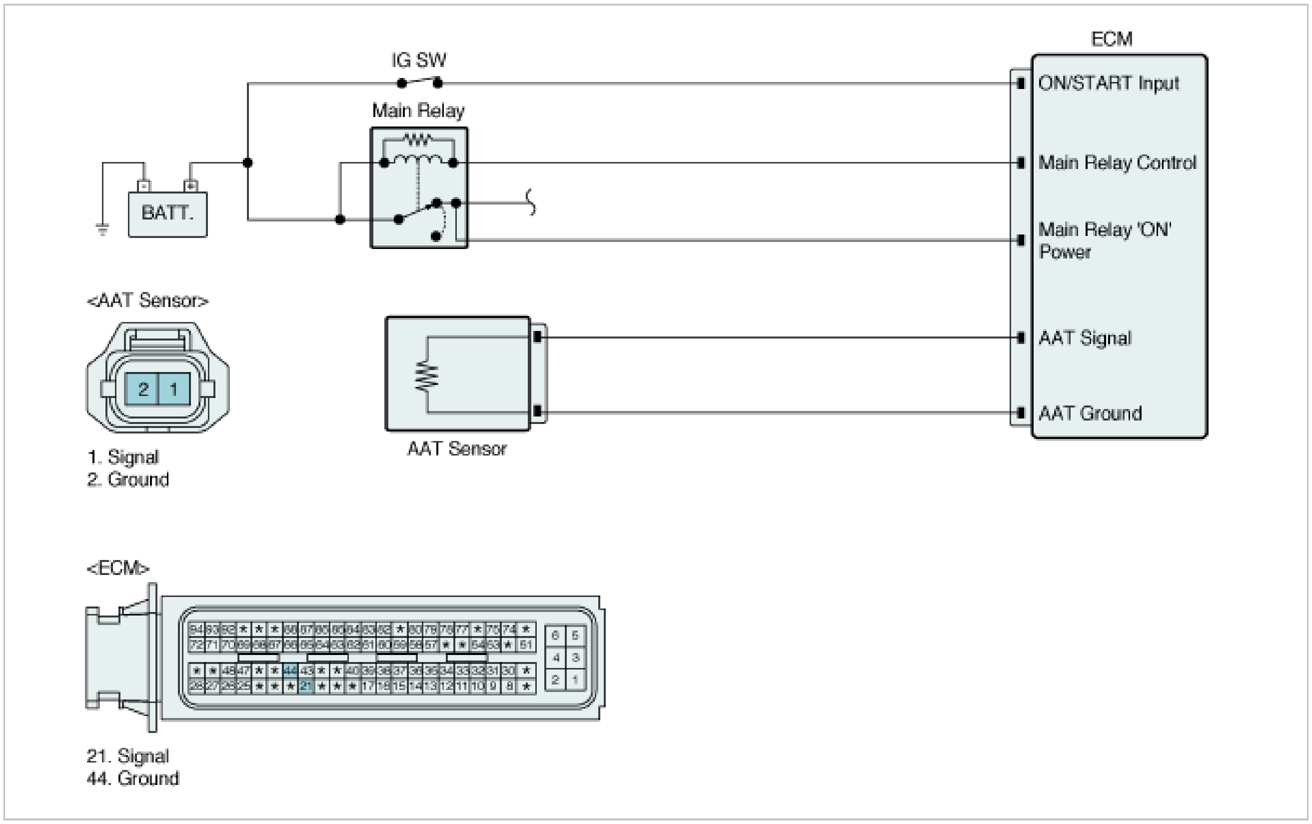
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Short to ground in signal harness • Poor connection or damaged harness • Faulty AAT
Enable Conditions	• 10V < Battery voltage < 16V • Time after start > 0 sec • Vehicle speed >0km/h	
Threshold Value	• Sensor voltage < 0.024V	
Diagnostic Time	• 1sec	
Mil On Condition	• 2 Driving Cycles	

Specification

AAT Temp.(°C)	AAT Temp.(°F)	Resistance(KΩ)
-40	**-40**	**55.61 ~ 66.21**
-20	-4	18.76 ~ 21.37
0	32	7.62 ~ 7.95
20	68	3.18 ~ 3.37
25	77	2.63 ~ 2.77
40	104	1.50 ~ 1.62
60	140	0.76 ~ 0.84
80	176	0.40 ~ 0.45

Diagnostic Circuit Diagram



Signal Waveform & Data

Current Data

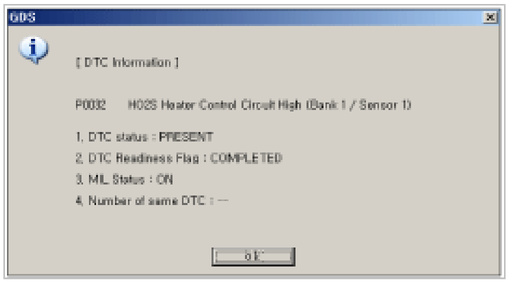
Standard Display | Full List | Graph | Items List | Reset Min.Max. | Record | Stop | Filter

Sensor Name	Value	Unit
☑ Ambient Air Temperature Sensor	2.6	V
☐ Knocking detected	OFF	-
☐ Knock Control Adaptation Value Cylinder#1	0.0	DEG
☐ Knock Control Adaptation Value Cylinder#2	0.0	DEG
☐ Knock Control Adaptation Value Cylinder#3	0.0	DEG
☐ Knock Control Adaptation Value Cylinder#4	0.0	DEG
☐ Alternator Electric Load PWM Signal	16.0	-
☐ Clutch Switch (Only MT with Cruse)	ON	-
☐ AC Request to ECU	OFF	-
☐ A/C Compressor	OFF	-
☐ A/C On Condition	OFF	-
☐ Waste Gate valve Duty	0.0	%
☐ Malfunction Indicator Lamp(MIL)	OFF	-
☐ Variant Coding	M/T	-
☐ Turbo Charger Boost Pressure	1005	hPa
☐ Turbo Charger Bypass valve	ON	-
☐ Turbo charger boost pressure voltage	1.9	V
☐ Current Value from Adaptation Table for Holding Pluse Width M...	0.0	%
☐ Holding pulse width modulation; exhaust	15.2	%
☐ Current value from adaptation table for holding pulse width mod...	0.0	-
☐ Extra Sensor Rreference Voltage(DTP,APT etc)	5.0	V

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode

2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. 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.
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 next step as below

Signal Circuit Inspection

1. Ignition "OFF".
2. Disconnect AAT Control connector.
3. Measure voltage between signal terminal of the AAT signal harness connector and chassis ground.

Specification :5 V

4. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Repair open or short to ground in control harness and go to "Verification of Vehicle Repair" procedure

Component Inspection

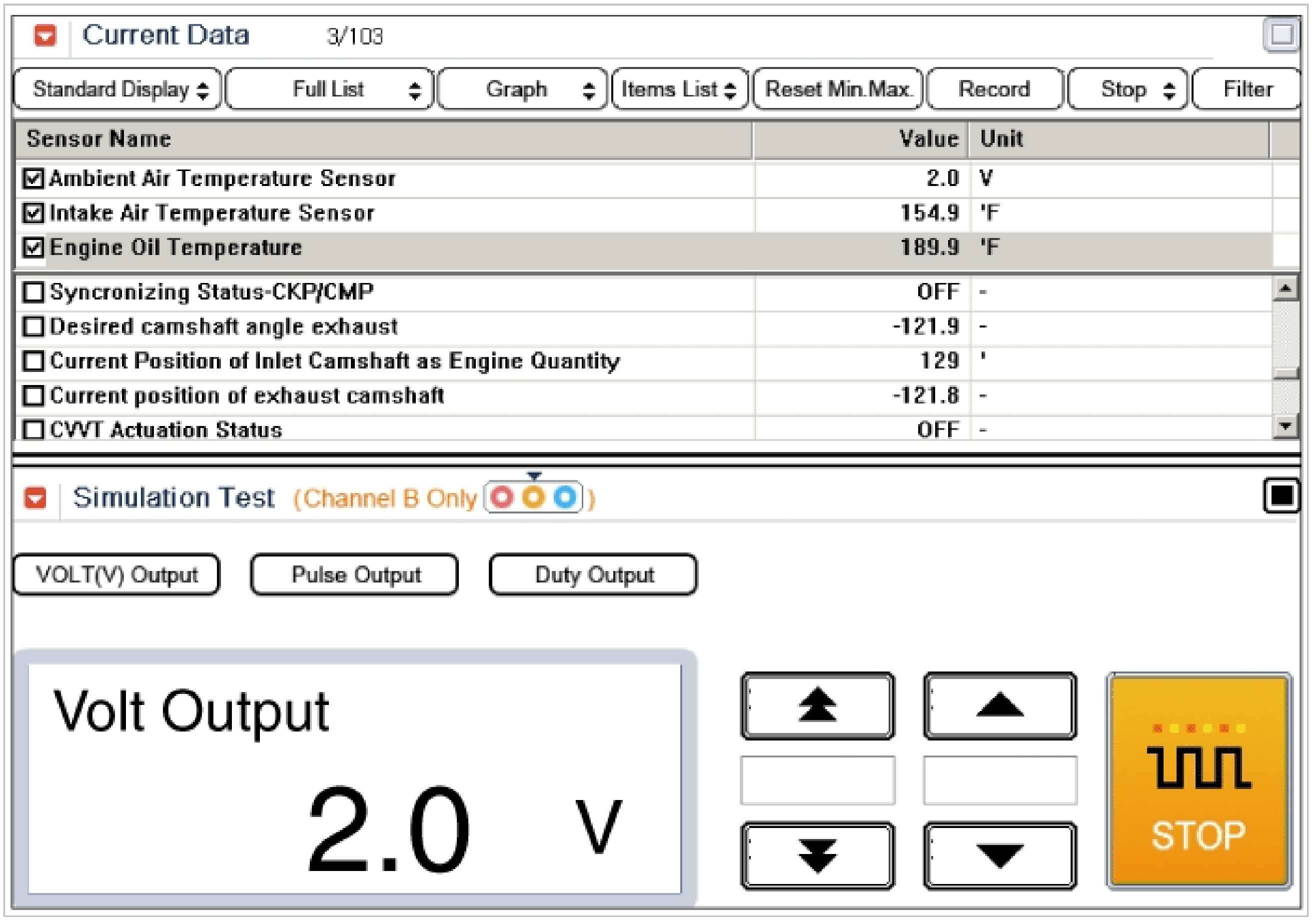
■ **AAT Visually Inspect**

1. Was a problem found?

YES	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

■ **AAT Simulation Inspect**

1. IG KEY OFF
2. Disconnect AAT connector.
3. IG KEY ON
4. Perform voltage simulation to signal circuit of AAT.



5. Does the simulation frequency make AAT value change ?

YES	▸ Go to next step as below
NO	▸ Substitute with a known-good AAT and check for proper operation. If the problem is corrected, replace AAT and then go to "Verification of Vehicle Repair" procedure

■ **Resistance Inspection**

1. Ignition "OFF"
2. Measure resistance between power terminal and control terminal of the sensor connector (Component side)
   Specification

AAT Temp.(°C)	AAT Temp.(°F)	Resistance(KΩ)
-40	**-40**	**55.61 ~ 66.21**
-20	-4	18.76 ~ 21.37
0	32	7.62 ~ 7.95
20	68	3.18 ~ 3.37

25	77	2.63 ~ 2.77
40	104	1.50 ~ 1.62
60	140	0.76 ~ 0.84
80	176	0.40 ~ 0.45

3. Is resistance within the specification?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Substitute with a known - good AAT and check for proper operation. If the problem is corrected, replace AAT and go to "Verification of Vehicle Repair" procedure.

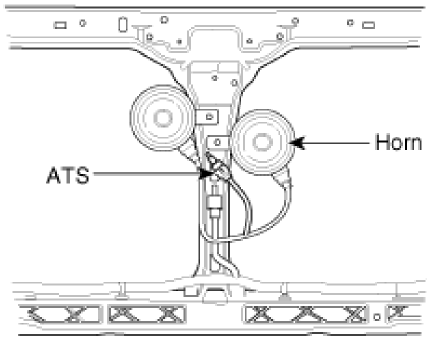
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

A value from modeling that have been retrieved from an intake air temperature sensor has been currently been in use for outside temperature detection. However, it is difficult to use this value due to the properties of the turbo charger, because the temperature shows a great increase during the charging. Therefore, the outside temperature sensor is installed in front of the radiator to directly measure the outside temperature.

DTC Description

ECM sets DTC P0072 if the ECM detects ambient air temperature signal circuit is short to battery or open.

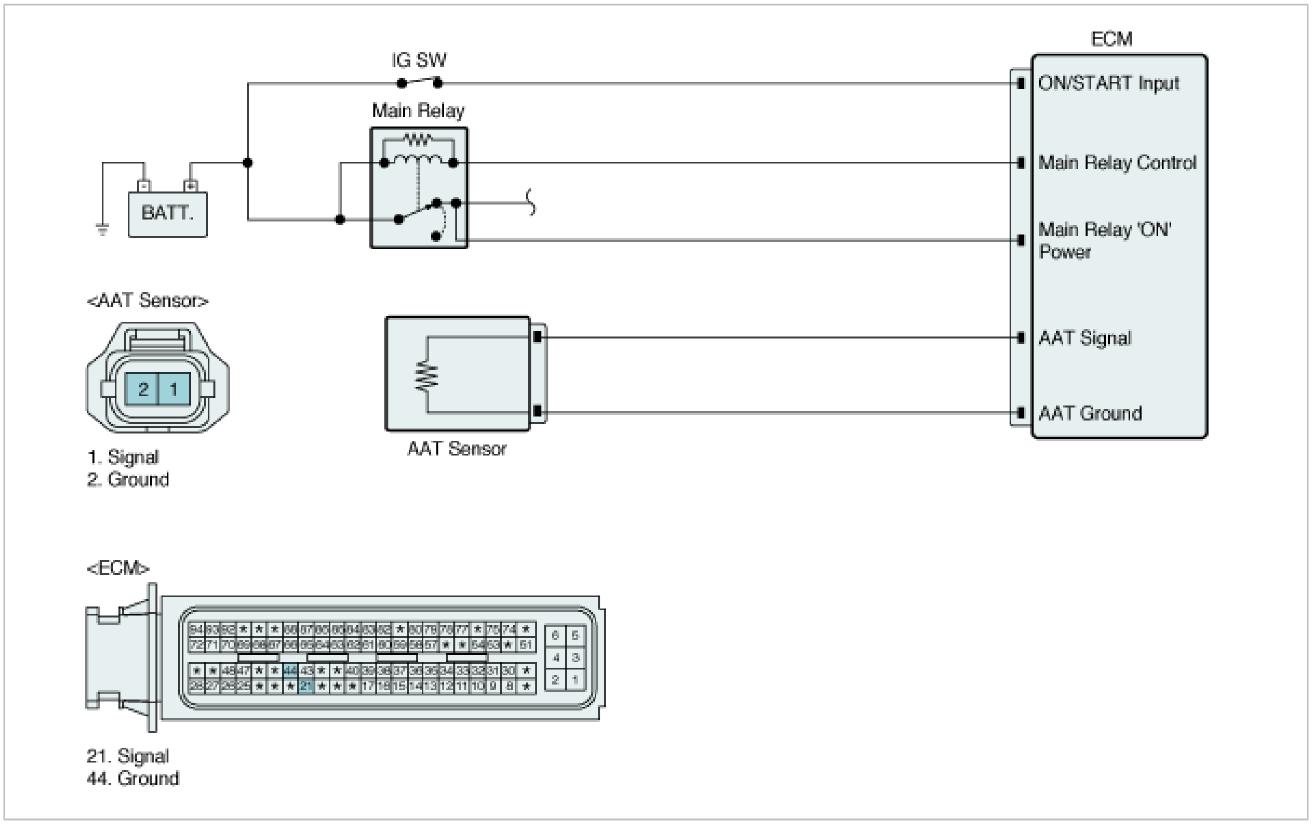
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Poor connection or damaged harness • short to battery in control harness • Open in ground circuit • Open in signal circuit • Faulty AAT
Enable Conditions	• 10V < Battery voltage < 16V • Time after start > 0 sec • Vehicle speed >0km/h	
Threshold Value	• Sensor voltage < 0.024V	
Diagnostic Time	• 1sec	
Mil On Condition	• 2 Driving Cycles	

Specification

AAT Temp.(°C)	AAT Temp.(°F)	Resistance(KΩ)
-40	**-40**	**55.61 ~ 66.21**
-20	-4	18.76 ~ 21.37
0	32	7.62 ~ 7.95
20	68	3.18 ~ 3.37
25	77	2.63 ~ 2.77
40	104	1.50 ~ 1.62
60	140	0.76 ~ 0.84
80	176	0.40 ~ 0.45

Diagnostic Circuit Diagram



Signal Waveform & Data

Current Data

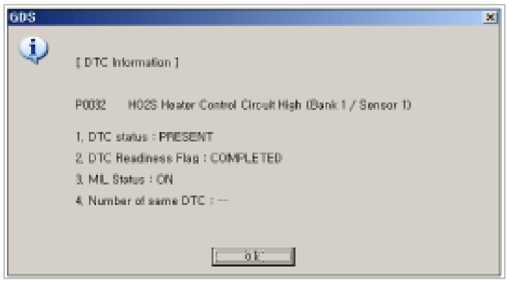
Standard Display | Full List | Graph | Items List | Reset Min.Max. | Record | Stop | Filter

Sensor Name	Value	Unit
☑ Ambient Air Temperature Sensor	2.6	V
☐ Knocking detected	OFF	-
☐ Knock Control Adaptation Value Cylinder#1	0.0	DEG
☐ Knock Control Adaptation Value Cylinder#2	0.0	DEG
☐ Knock Control Adaptation Value Cylinder#3	0.0	DEG
☐ Knock Control Adaptation Value Cylinder#4	0.0	DEG
☐ Alternator Electric Load PWM Signal	16.0	-
☐ Clutch Switch (Only MT with Cruse)	ON	-
☐ AC Request to ECU	OFF	-
☐ A/C Compressor	OFF	-
☐ A/C On Condition	OFF	-
☐ Waste Gate valve Duty	0.0	%
☐ Malfunction Indicator Lamp(MIL)	OFF	-
☐ Variant Coding	M/T	-
☐ Turbo Charger Boost Pressure	1005	hPa
☐ Turbo Charger Bypass valve	ON	-
☐ Turbo charger boost pressure voltage	1.9	V
☐ Current Value from Adaptation Table for Holding Pluse Width M...	0.0	%
☐ Holding pulse width modulation; exhaust	15.2	%
☐ Current value from adaptation table for holding pulse width mod...	0.0	-
☐ Extra Sensor Rreference Voltage(DTP,APT etc)	5.0	V

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode

2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. 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.
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 next step as below

Signal Circuit Inspection

1. Ignition "OFF".
2. Disconnect AAT Control connector.
3. Measure voltage between signal terminal of the AAT signal harness connector and chassis ground.

Specification :5 V

4. Is voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Repair open or short to ground in control harness and go to "Verification of Vehicle Repair" procedure

Ground Circuit Inspection

1. IG "OFF".
2. Disconnect AAT connector.

3. IG "ON" & ENG "OFF".
4. Measure voltage between signal terminals of AAT harness connector and chassis ground.(Fig.1)
5. Measure voltage between signal terminals and ground terminal of AAT connector.(Fig.2)

Specification : (Fig.1) - (Fig.2) = below 200mV

6. 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

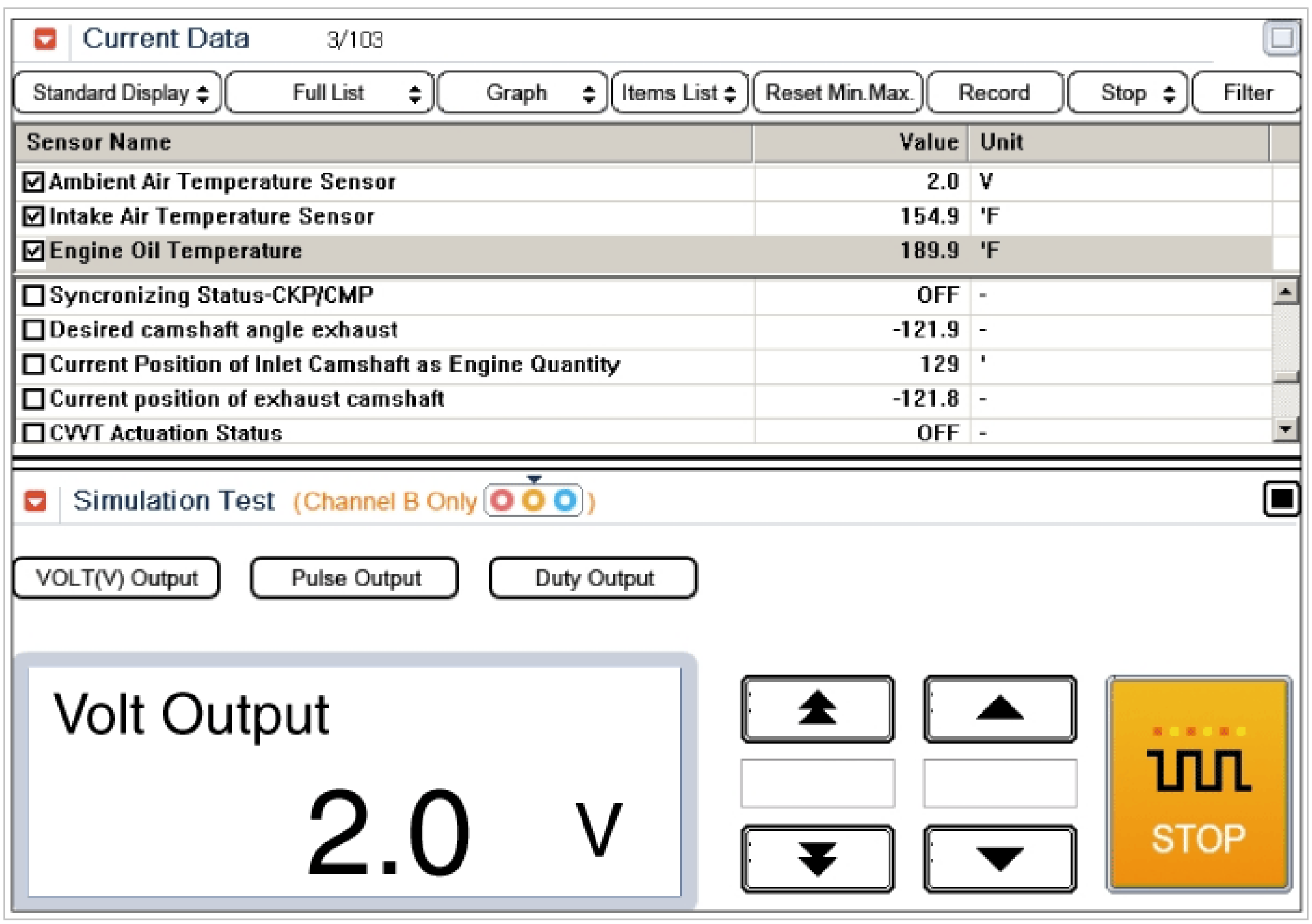
■ AAT Visually Inspect

1. Was a problem found?

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Go to next step as below

■ AAT Simulation Inspect

1. IG KEY OFF
2. Disconnect AAT connector.
3. IG KEY ON
4. Perform voltage simulation to signal circuit of AAT.



5. Does the simulation frequency make AAT value change ?

YES	▸ Go to next step as below
NO	▸ Substitute with a known-good AAT and check for proper operation. If the problem is corrected, replace AAT and then go to "Verification of Vehicle Repair" procedure

■ **Resistance Inspection**

1. Ignition "OFF"
2. Measure resistance between power terminal and control terminal of the sensor connector (Component side)
   Specification

AAT Temp.(°C)	AAT Temp.(°F)	Resistance(KΩ)
-40	**-40**	**55.61 ~ 66.21**
-20	-4	18.76 ~ 21.37
0	32	7.62 ~ 7.95
20	68	3.18 ~ 3.37
25	77	2.63 ~ 2.77
40	104	1.50 ~ 1.62
60	140	0.76 ~ 0.84
80	176	0.40 ~ 0.45

3. Is resistance within the specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Substitute with a known - good AAT and check for proper operation. If the problem is corrected, replace AAT and go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

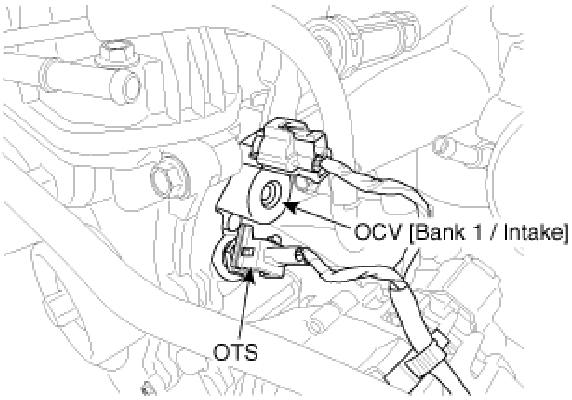
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0076 Intake Valve Control Solenoid Circuit-Low (Bank 1)

Component Location



General Description

The CVVT (Continuously Variable Valve Timing) system built on the camshaft helps the engine decrease the exhaust gas and increase engine power and fuel economy by changing the valve open/close timing of the camshaft continuously. The valve control solenoid, the main control part of the CVVT, changes the direction of the oil path through the CVVT by the duty control of the ECM and changes the open and close timing of the intake and exhaust valves.

DTC Description

ECM sets DTC P0076 if the ECM detects that the intake valve control solenoid control circuit is short to ground.

DTC Detecting Condition

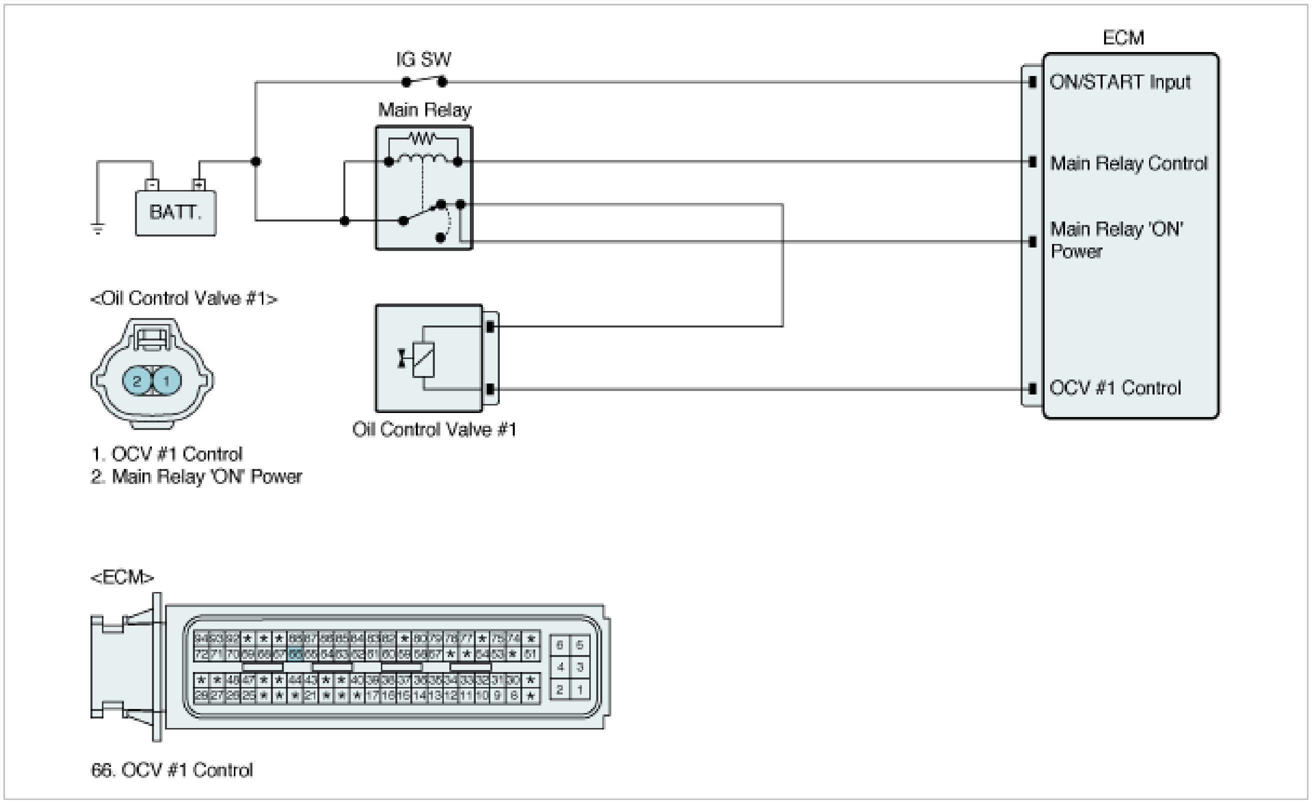
Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Short to ground in control circuit • Poor connection or damaged harness • Faulty Intake Valve Control Solenoid
Enable Conditions	• 10V < Battery voltage < 16V	
Threshold Value	• Short circuit to ground or open circuit	
Diagnostic Time	• 2sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

Oil Control Valve	Normal Parameter At 20°C (68°F)
Insulation Resistance	Above 50 MΩ

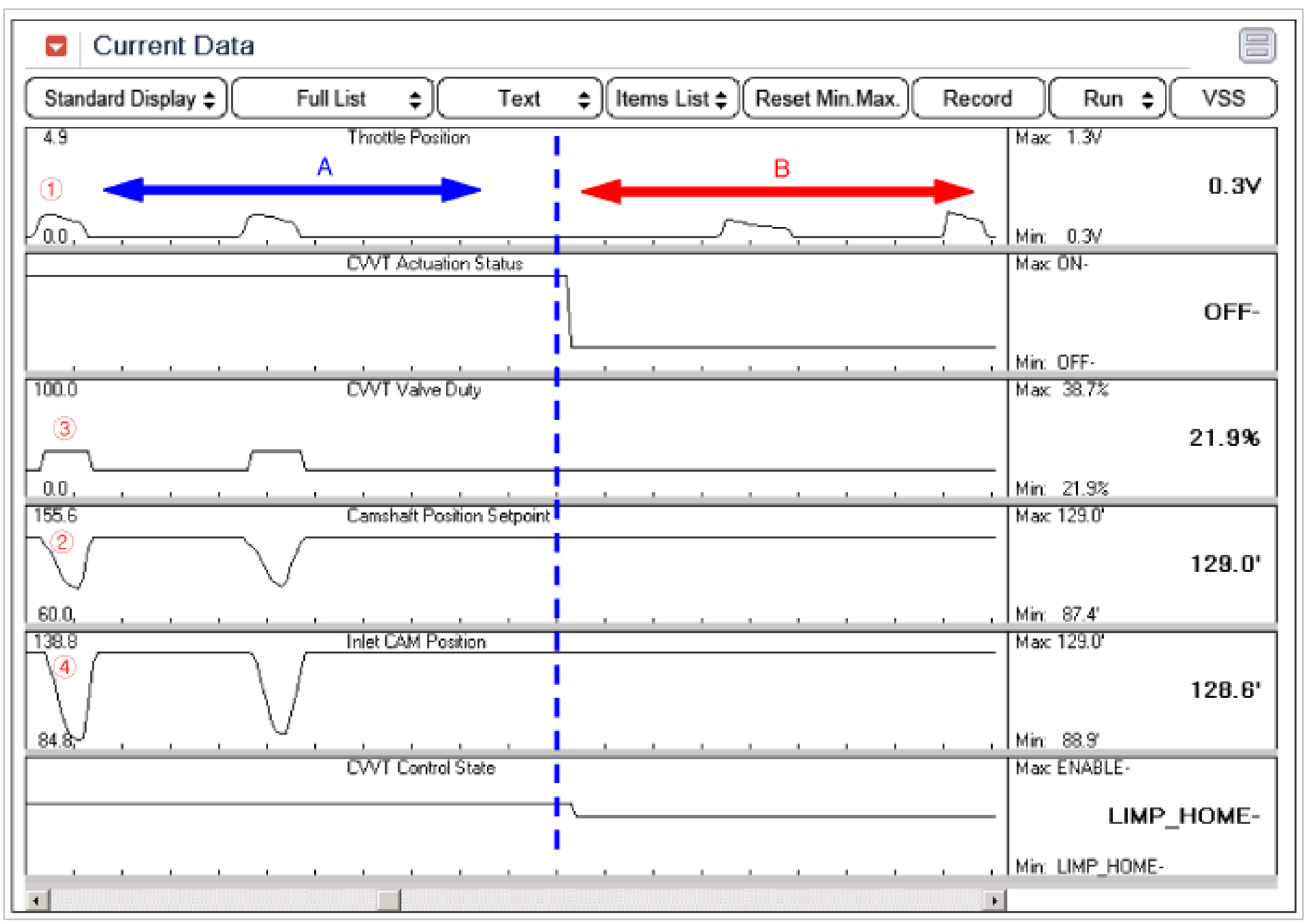
Temp.(°C)	Temp.(°F)	Resistance(Ω)	Temp.(°C)	Temp.(°F)	Resistance(Ω)
0	32	6.2 ~ 7.4	60	140	8.0 ~ 9.2
10	50	6.5 ~ 7.7	70	158	8.3 ~ 9.5
20	68	6.9 ~ 7.9	80	176	8.6 ~ 9.8
30	86	7.1 ~ 8.3	90	194	8.9 ~ 10.1
40	104	7.4 ~ 8.6	100	212	9.2 ~ 10.4
50	122	7.7 ~ 8.9			

Diagnostic Circuit Diagram



Signal Waveform & Data

1. Connect GDS and select Data Analysis.
2. After warming-up, check following items.

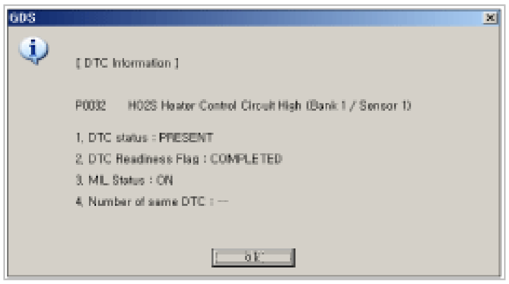


3. Data analysis

▸ A Sector : CVVT works
▸ B Sector : Limp Home Mode (CVVT doesn't work.)
▸ CVVT Control Flow (A Sector)
: Acceleration pedal(①) shift → Engine RPM change → Camshaft Position Setpoint (②) change → CVVT Valve Duty(③) change → Inlet CAM Position(④) change

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Component Inspection

1. Ignition "OFF"
2. Disconnect oil control valve connector
3. Measure resistance between power terminal and control terminal of the solenoid connector(Component side).
Specification

Temp.(°C)	Temp.(°F)	Resistance(Ω)
0	32	6.2 ~ 7.4
10	50	6.5 ~ 7.7
20	68	6.9 ~ 7.9
30	86	7.1 ~ 8.3
40	104	7.4 ~ 8.6
50	122	7.7 ~ 8.9
60	140	8.0 ~ 9.2
70	158	8.3 ~ 9.5
80	176	8.6 ~ 9.8
90	194	8.9 ~ 10.1
100	212	9.2 ~ 10.4

4. Is resistance within specification?

YES	▸ Go to next step as below
NO	▸ Check oil control valve for contamination, deterioration, or damage. Substitute with a known-good solenoid and check for proper operation. If the problem is corrected, replace solenoid and then go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

1. Ignition "ON" &Engine "OFF"
2. Measure voltage between power terminal of the oil control valve harness connector and chassis ground.

Specification : Approx. B+

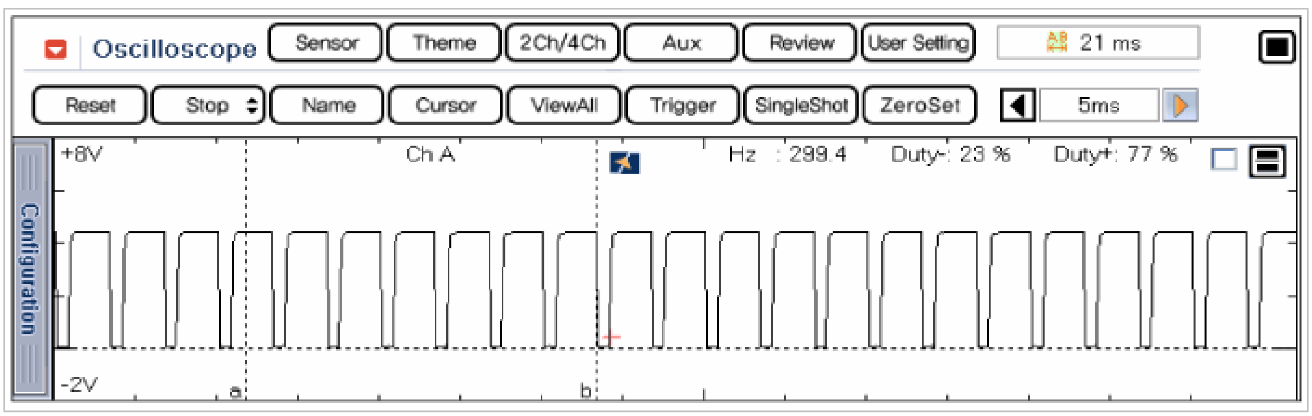
3. Is voltage within specification?

YES	▸ Go to "Control Circuit Inspection" procedure.
NO	▸ Repair open or short to ground in the power supply circuit and go to "Verification of Vehicle Repair" procedure

Control circuit inspection

1. Measure voltage between control terminal of the oil control valve harness connector and chassis ground.

Specification : Approx. 3~4V



NOTE

Signal waveform in control circuit with ignition ON &Engine OFF

2. Is voltage within specification?

YES	▸ Go to "Terminal and Connector Inspection" procedure.
NO	▸ Repair short to ground in control circuit and go to "Verification of Vehicle Repair" procedure.

Terminal and Connector Inspection

1. 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.
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	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

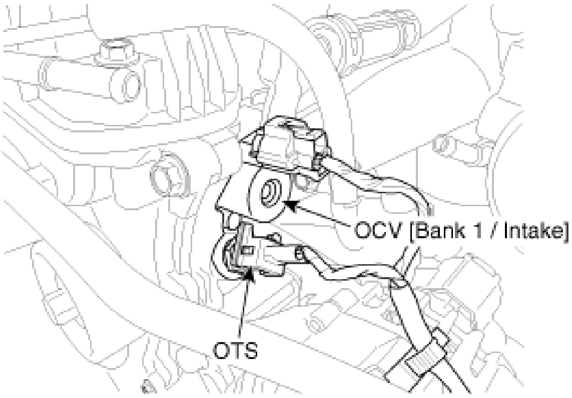
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The CVVT (Continuously Variable Valve Timing) system built on the camshaft helps the engine decrease the exhaust gas and increase engine power and fuel economy by changing the valve open/close timing of the camshaft continuously. The valve control solenoid, the main control part of the CVVT, changes the direction of the oil path through the CVVT by the duty control of the ECM and changes the open and close timing of the intake and exhaust valves.

DTC Description

ECM sets DTC P0077 if the ECM detects that the OCV control circuit is open or short to battery.

DTC Detecting Condition

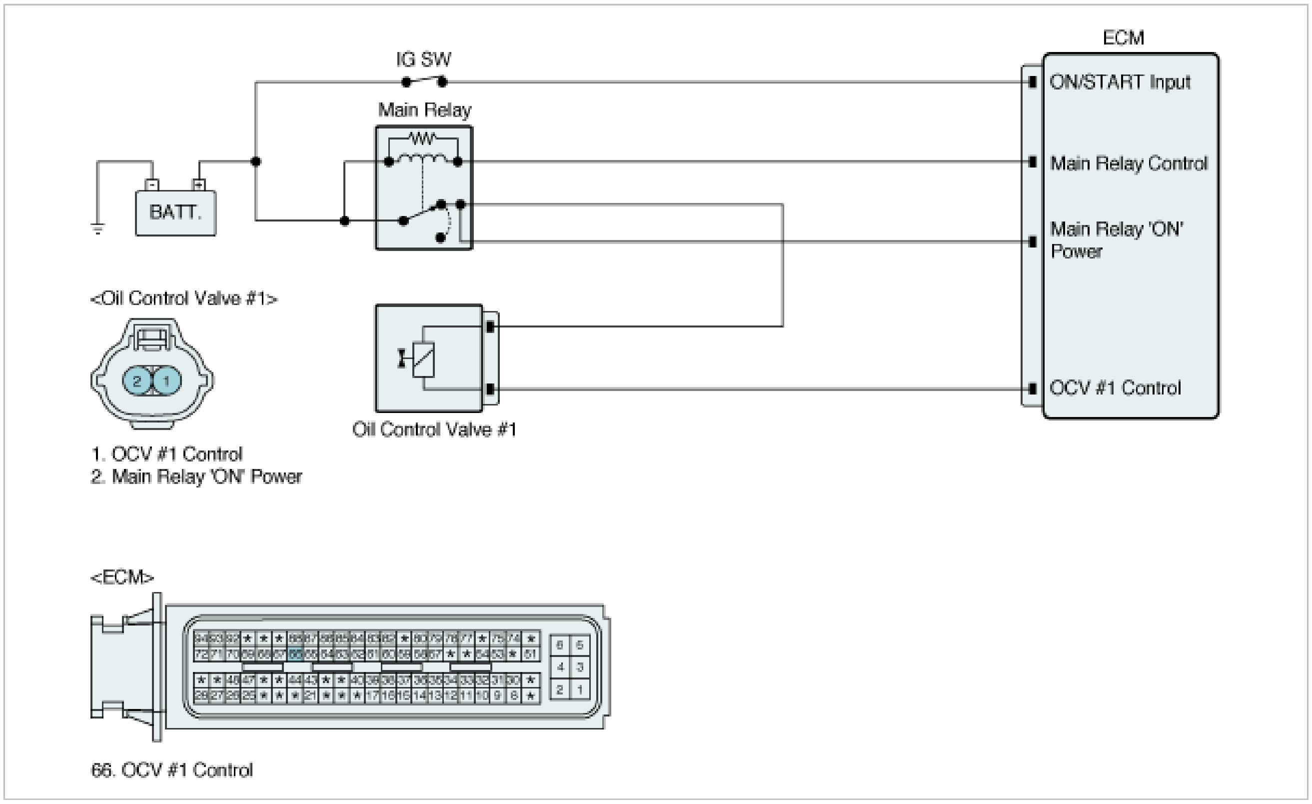
Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Open or short to battery in control circuit • Poor connection or damaged harness • Faulty Intake Valve Control Solenoid
Enable Conditions	• 10V < Battery voltage < 16V	
Threshold Value	• Short circuit to battery	
Diagnostic Time	• 2sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

Oil Control Valve	Normal Parameter At 20°C (68°F)
Insulation Resistance	Above 50 MΩ

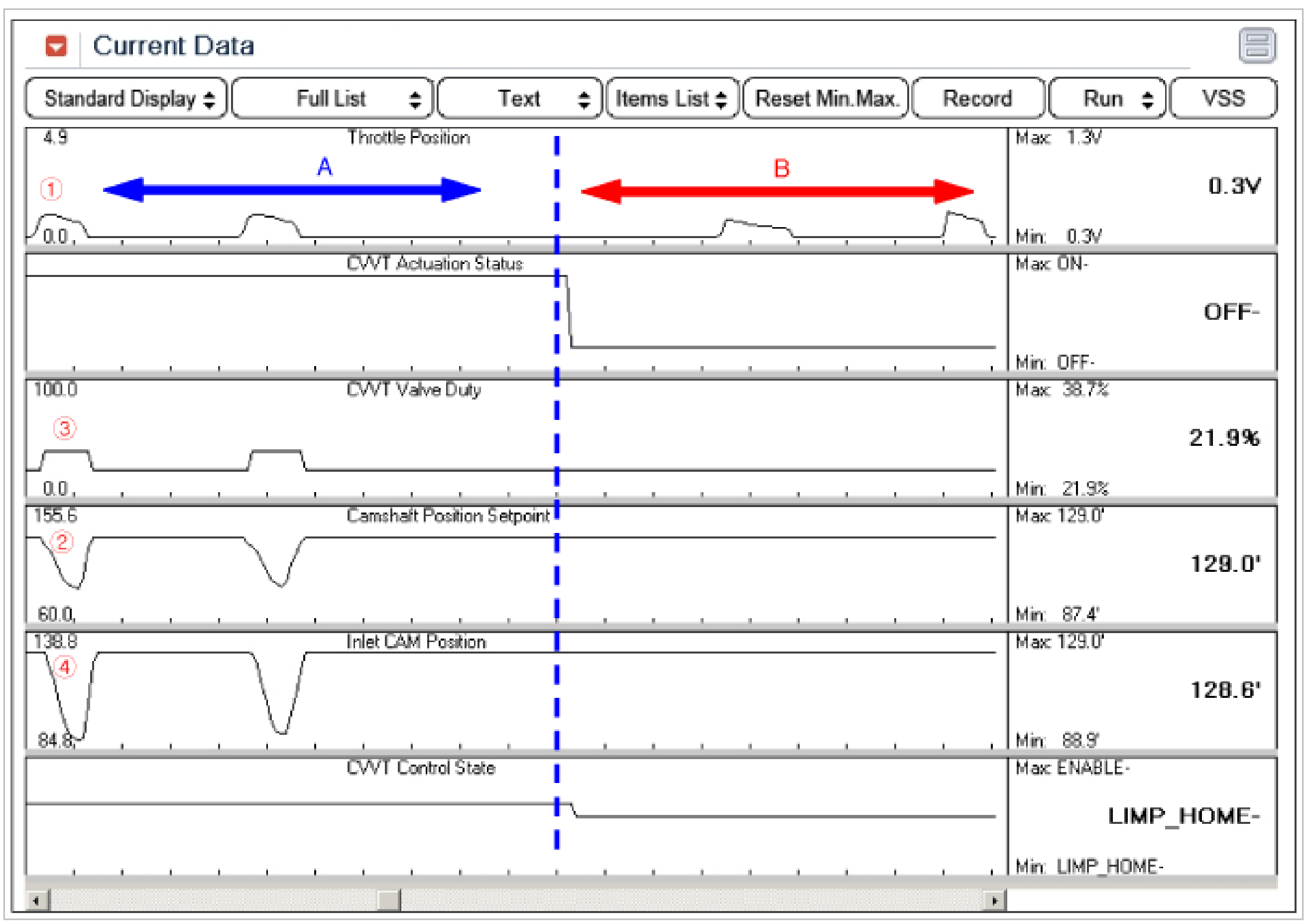
Temp.(°C)	Temp.(°F)	Resistance(Ω)	Temp.(°C)	Temp.(°F)	Resistance(Ω)
0	32	6.2 ~ 7.4	60	140	8.0 ~ 9.2
10	50	6.5 ~ 7.7	70	158	8.3 ~ 9.5
20	68	6.9 ~ 7.9	80	176	8.6 ~ 9.8
30	86	7.1 ~ 8.3	90	194	8.9 ~ 10.1
40	104	7.4 ~ 8.6	100	212	9.2 ~ 10.4
50	122	7.7 ~ 8.9			

Diagnostic Circuit Diagram



Signal Waveform & Data

1. Connect GDS and select Data Analysis.
2. After warming-up, check following items.

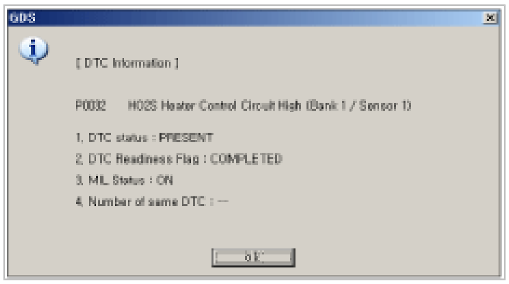


3. Data analysis

▸ A Sector : CVVT works
▸ B Sector : Limp Home Mode (CVVT doesn't work.)
▸ CVVT Control Flow (A Sector)
: Acceleration pedal(①) shift → Engine RPM change → Camshaft Position Setpoint (②) change → CVVT Valve Duty(③) change → Inlet CAM Position(④) change

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Component Inspection

1. Ignition "OFF"
2. Disconnect oil control valve connector
3. Measure resistance between power terminal and control terminal of the solenoid connector(Component side).
Specification

Temp.(°C)	Temp.(°F)	Resistance(Ω)
0	32	6.2 ~ 7.4
10	50	6.5 ~ 7.7
20	68	6.9 ~ 7.9
30	86	7.1 ~ 8.3
40	104	7.4 ~ 8.6
50	122	7.7 ~ 8.9
60	140	8.0 ~ 9.2
70	158	8.3 ~ 9.5
80	176	8.6 ~ 9.8
90	194	8.9 ~ 10.1
100	212	9.2 ~ 10.4

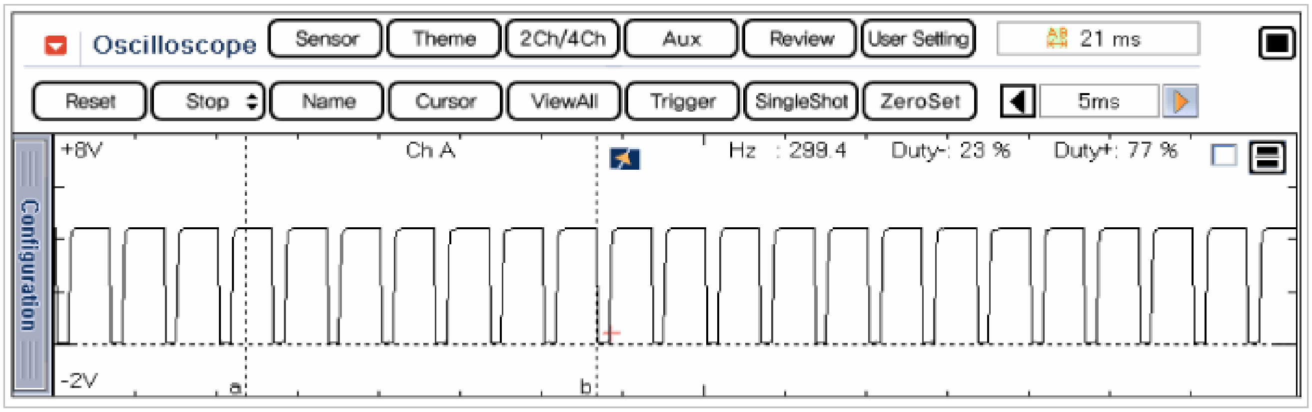
4. Is resistance within specification?

YES	▸ Go to next step as below
NO	▸ Check oil control valve for contamination, deterioration, or damage. Substitute with a known-good solenoid and check for proper operation. If the problem is corrected, replace solenoid and then go to "Verification of Vehicle Repair" procedure

Control Circuit inspection

1. Measure voltage between control terminal of the oil control valve harness connector and chassis ground.

Specification : Approx. 3~4V



NOTE

Signal waveform in control circuit with ignition ON &Engine OFF

2. Is voltage within specification?

YES	▸ Go to "Terminal and Connector Inspection" procedure.
NO	▸ Repair short to ground in control circuit and go to "Verification of Vehicle Repair" procedure.

Terminal and Connector Inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

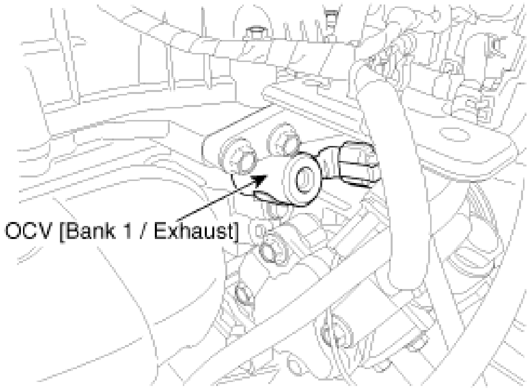
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The CVVT (Continuously Variable Valve Timing) system built on the camshaft helps the engine decrease the exhaust gas and increase engine power and fuel economy by changing the valve open/close timing of the camshaft continuously. The valve control solenoid, the main control part of the CVVT, changes the direction of the oil path through the CVVT by the duty control of the ECM and changes the open and close timing of the intake and exhaust valves.

DTC Description

ECM sets DTC P0079 if the ECM detects that the exhaust valve control solenoid control circuit is short to ground.

DTC Detecting Condition

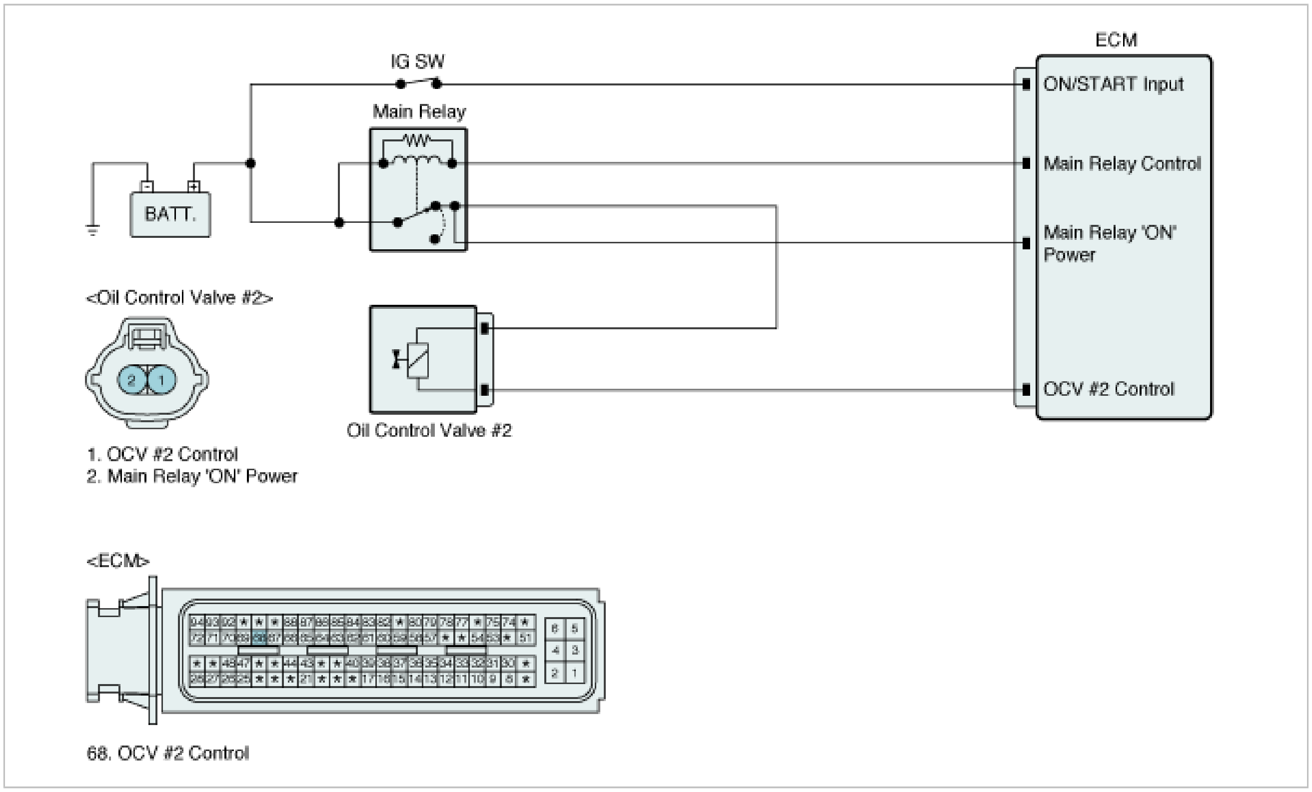
Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Short to ground in control circuit • Poor connection or damaged harness • Faulty Exhaust Valve Control Solenoid
Enable Conditions	• 10V < Battery voltage < 16V	
Threshold Value	• Short circuit to ground or open circuit	
Diagnostic Time	• 2sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

Oil Control Valve	Normal Parameter At 20°C (68°F)
Insulation Resistance	Above 50 MΩ

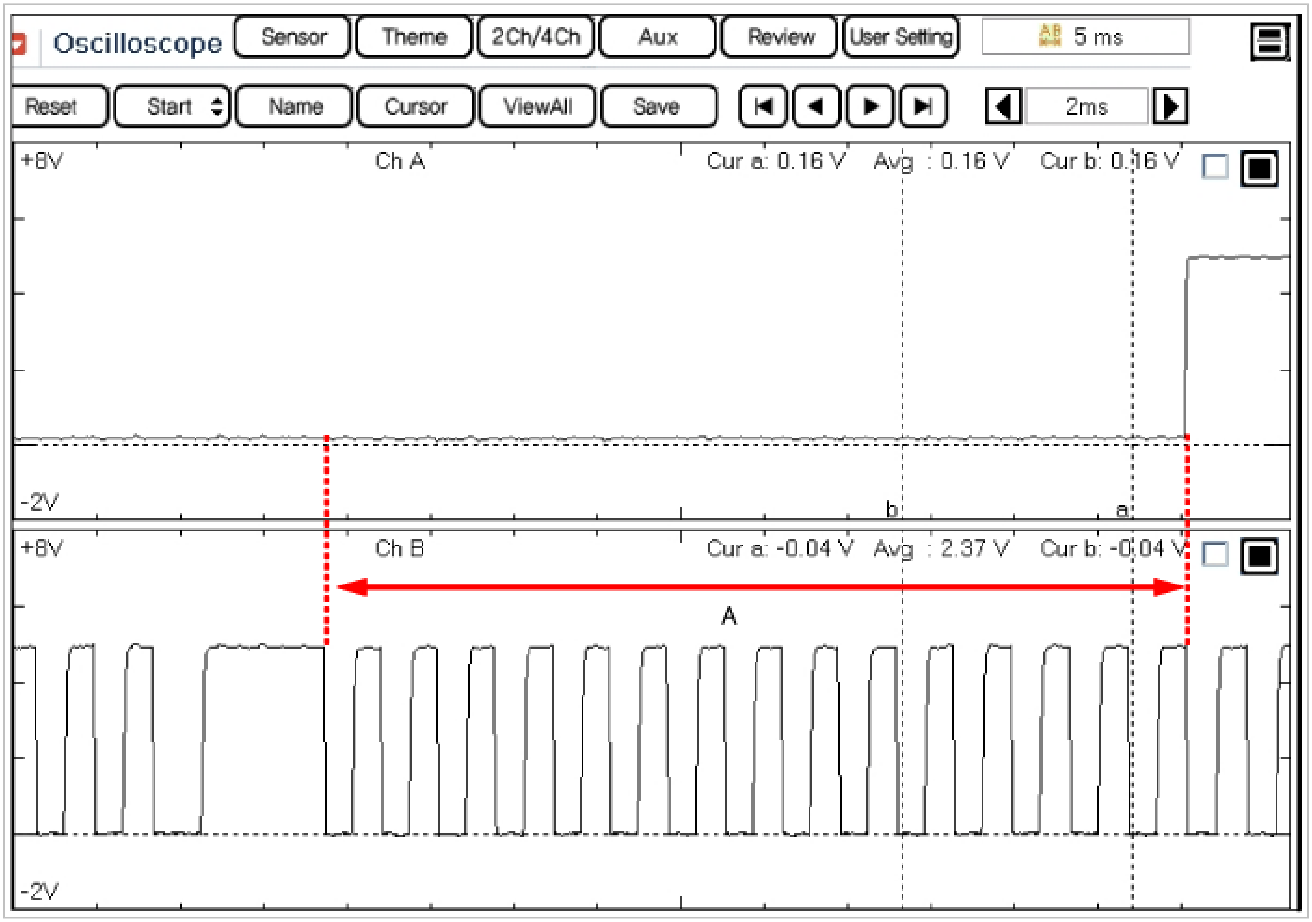
Temp.(°C)	Temp.(°F)	Resistance(Ω)	Temp.(°C)	Temp.(°F)	Resistance(Ω)
0	32	6.2 ~ 7.4	60	140	8.0 ~ 9.2
10	50	6.5 ~ 7.7	70	158	8.3 ~ 9.5
20	68	6.9 ~ 7.9	80	176	8.6 ~ 9.8
30	86	7.1 ~ 8.3	90	194	8.9 ~ 10.1
40	104	7.4 ~ 8.6	100	212	9.2 ~ 10.4
50	122	7.7 ~ 8.9			

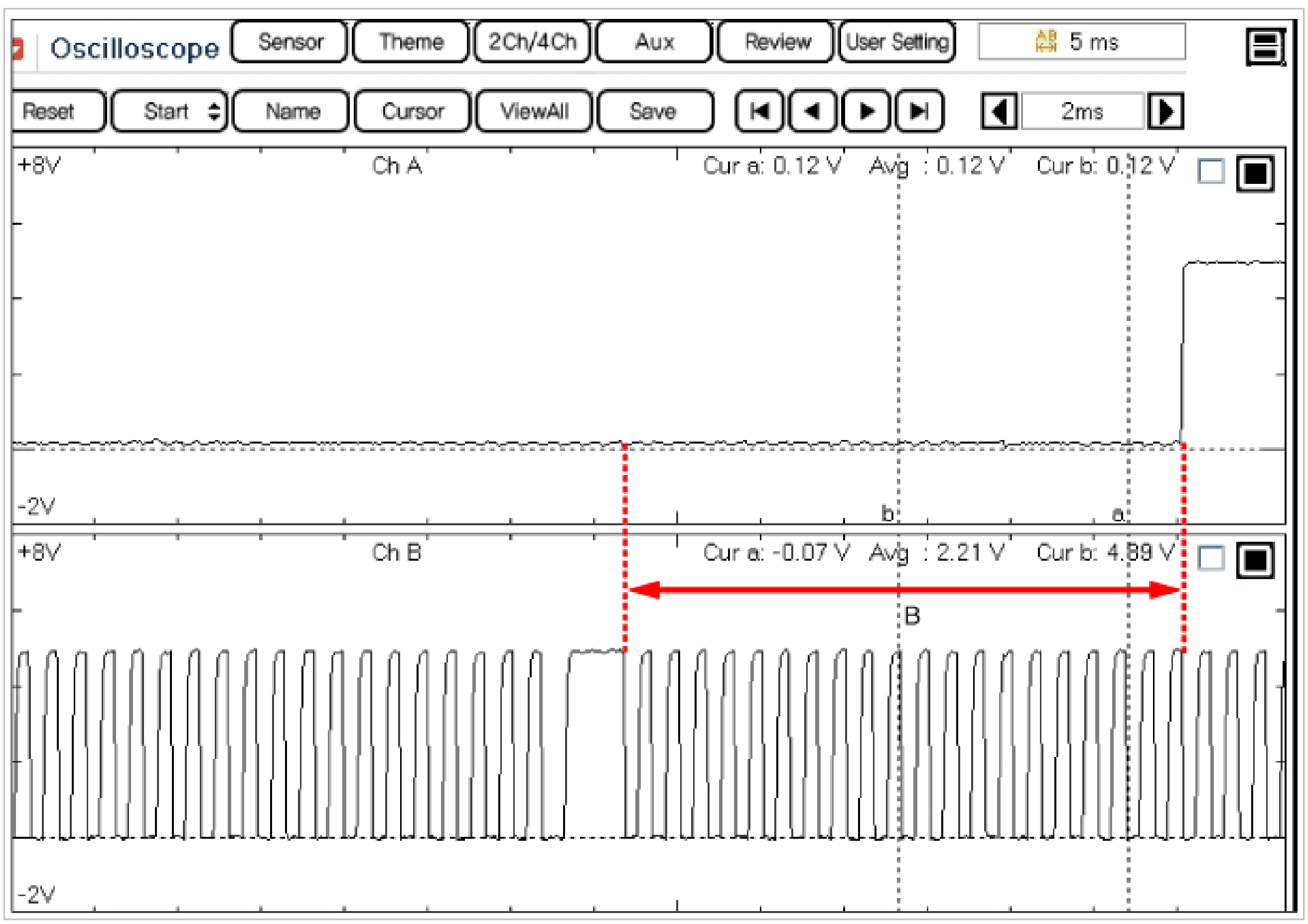
Diagnostic Circuit Diagram



Signal Waveform & Data

1. Set up an oscilloscope as follows :
   Channel A (+): Signal terminal of the CMPS #2(back probe), (-): ground
   Channel B (+): Signal terminal of the CKPS(back probe), (-): ground
2. Start the engine and check for signal waveform compared with reference waveform as below.



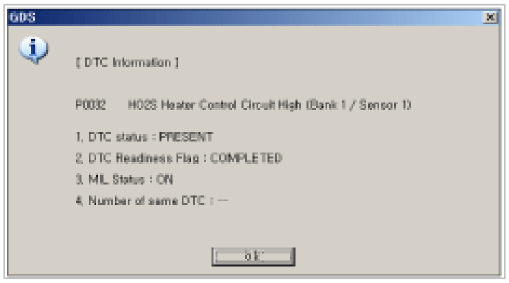


A : CMPS and CKPS waveform of exhaust shaft at idle

B : CMPS and CKS waveform of exhaust cam shaft at acceleration
(Tooth number is changed by CVVT operation)

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Component Inspection

1. Ignition "OFF"
2. Disconnect oil control valve connector
3. Measure resistance between power terminal and control terminal of the solenoid connector(Component side).
Specification

Temp.(°C)	Temp.(°F)	Resistance(Ω)
0	32	6.2 ~ 7.4
10	50	6.5 ~ 7.7
20	68	6.9 ~ 7.9
30	86	7.1 ~ 8.3
40	104	7.4 ~ 8.6
50	122	7.7 ~ 8.9
60	140	8.0 ~ 9.2
70	158	8.3 ~ 9.5
80	176	8.6 ~ 9.8
90	194	8.9 ~ 10.1
100	212	9.2 ~ 10.4

4. Is resistance within specification?

YES	▸ Go to next step as below
NO	▸ Check oil control valve for contamination, deterioration, or damage. Substitute with a known-good solenoid and check for proper operation. If the problem is corrected, replace solenoid and then go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

1. Ignition "ON" & Engine "OFF"
2. Measure voltage between power terminal of the oil control valve harness connector and chassis ground.

Specification : Approx. B+

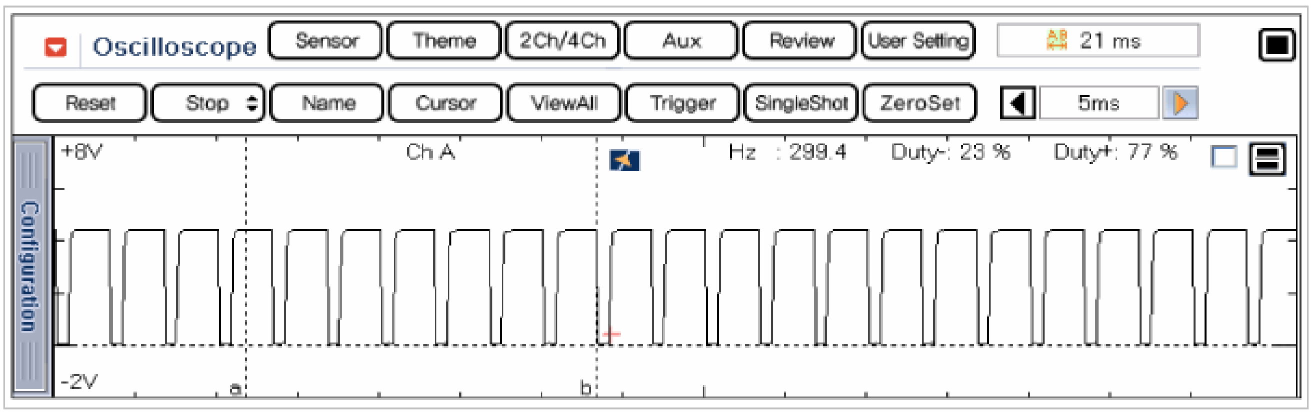
3. Is voltage within specification?

YES	▸ Go to "Control Circuit Inspection" procedure.
NO	▸ Repair open or short to ground in the power supply circuit and go to "Verification of Vehicle Repair" procedure

Control circuit inspection

1. Measure voltage between control terminal of the oil control valve harness connector and chassis ground.

Specification : Approx. 3~4V



NOTE

Signal waveform in control circuit with ignition ON & Engine OFF

2. Is voltage within specification?

YES	▸ Go to "Terminal and Connector Inspection" procedure.
NO	▸ Repair short to ground in control circuit and go to "Verification of Vehicle Repair" procedure.

Terminal and Connector Inspection

1. 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.
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
	▸ Check for poor connection between ECM and component: backed out terminal, improper mating,

NO	broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

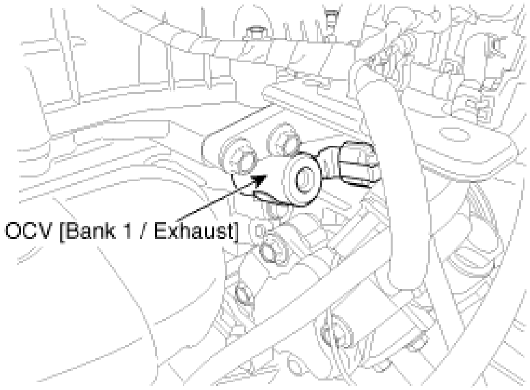
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0080 Exhaust Valve Control Solenoid Circuit High (Bank 1)

Component Location



General Description

The CVVT (Continuously Variable Valve Timing) system built on the camshaft helps the engine decrease the exhaust gas and increase engine power and fuel economy by changing the valve open/close timing of the camshaft continuously. The valve control solenoid, the main control part of the CVVT, changes the direction of the oil path through the CVVT by the duty control of the ECM and changes the open and close timing of the intake and exhaust valves.

DTC Description

ECM sets DTC P0080 if the ECM detects that the OCV control circuit is open or short to battery.

DTC Detecting Condition

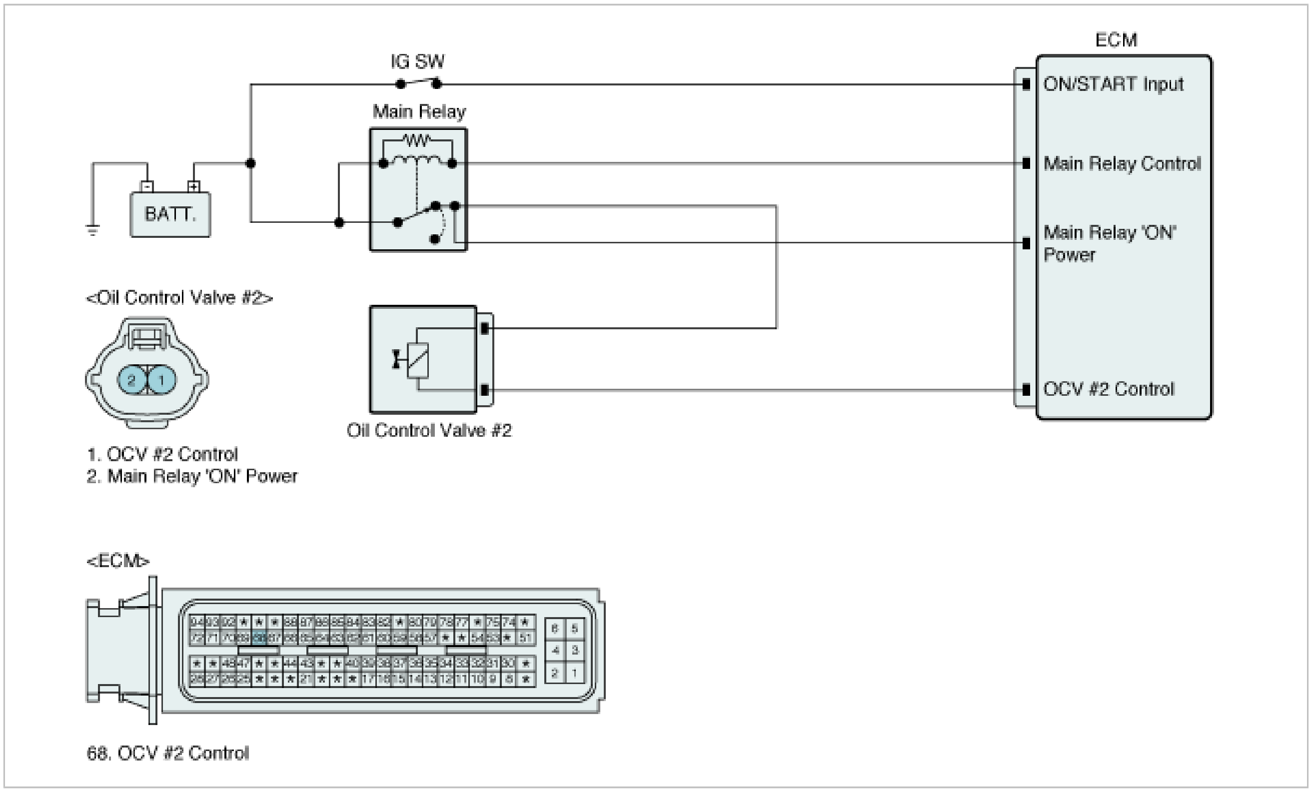
Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Open or short to battery in control circuit • Poor connection or damaged harness • Faulty Exhaust Valve Control Solenoid
Enable Conditions	• 10V < Battery voltage < 16V	
Threshold Value	• Short circuit to battery	
Diagnostic Time	• 2sec.	
Mil On Condition	• -	

Specification

Oil Control Valve	Normal Parameter At 20°C (68°F)
Insulation Resistance	**Above 50 MΩ**

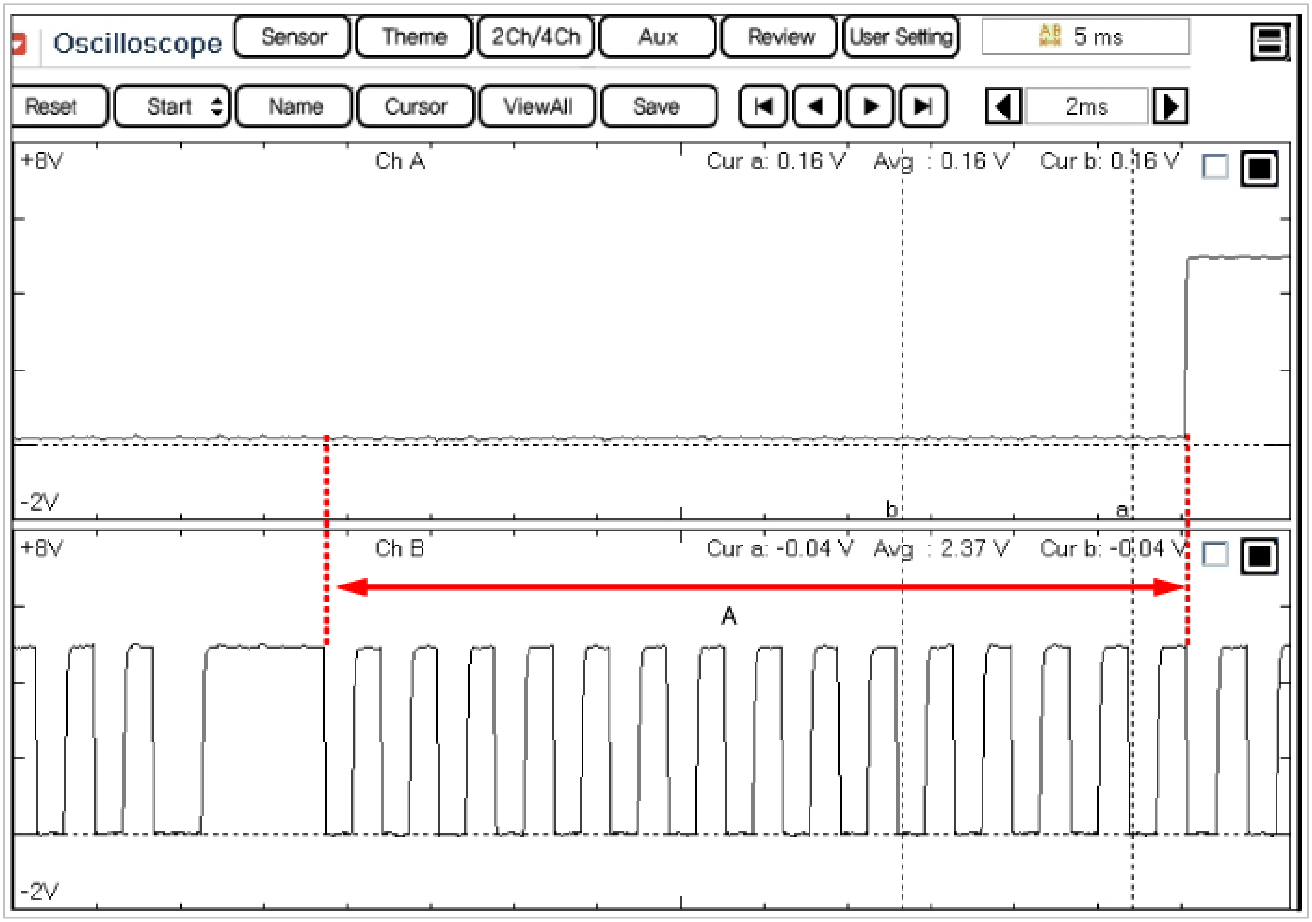
Temp.(°C)	Temp.(°F)	Resistance(Ω)	Temp.(°C)	Temp.(°F)	Resistance(Ω)
0	32	6.2 ~ 7.4	60	140	8.0 ~ 9.2
10	50	6.5 ~ 7.7	70	158	8.3 ~ 9.5
20	68	6.9 ~ 7.9	80	176	8.6 ~ 9.8
30	86	7.1 ~ 8.3	90	194	8.9 ~ 10.1
40	104	7.4 ~ 8.6	100	212	9.2 ~ 10.4
50	122	7.7 ~ 8.9			

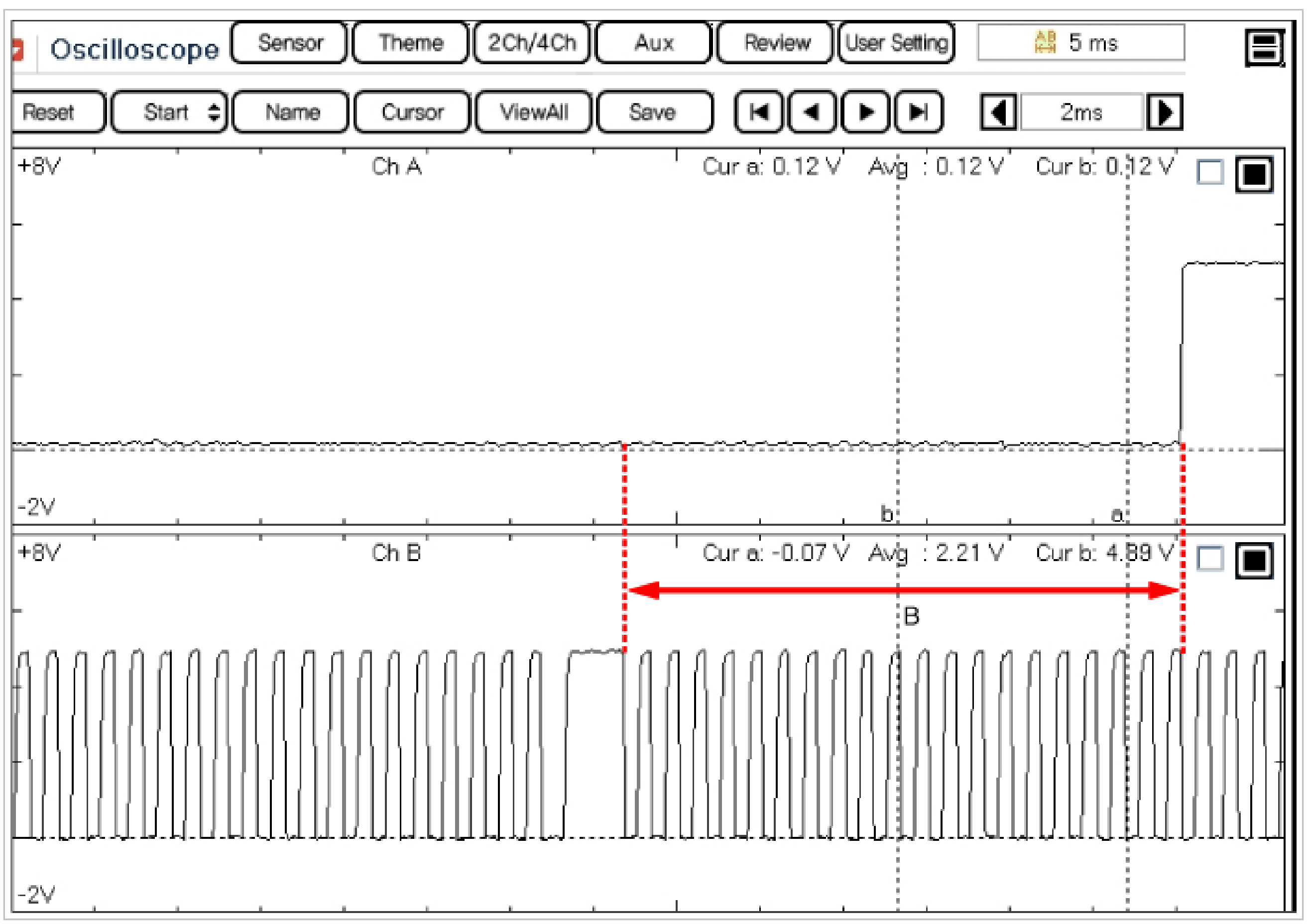
Diagnostic Circuit Diagram



Signal Waveform & Data

1. Set up an oscilloscope as follows :
   Channel A (+): Signal terminal of the CMPS #2(back probe), (-): ground
   Channel B (+): Signal terminal of the CKPS(back probe), (-): ground
2. Start the engine and check for signal waveform compared with reference waveform as below.



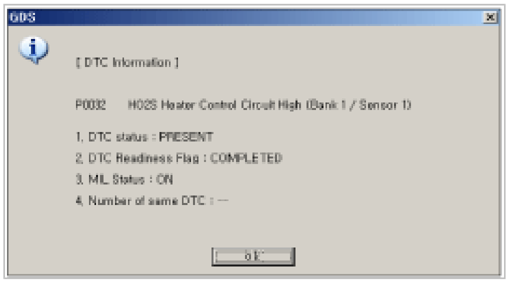


A : CMPS and CKPS waveform of exhaust shaft at idle

B : CMPS and CKPS waveform of exhaust cam shaft at acceleration
(Tooth number is changed by CVVT operation)

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Component Inspection

1. Ignition "OFF"
2. Disconnect oil control valve connector
3. Measure resistance between power terminal and control terminal of the solenoid connector(Component side).
   Specification

Temp.(°C)	Temp.(°F)	Resistance(Ω)
0	32	6.2 ~ 7.4
10	50	6.5 ~ 7.7
20	68	6.9 ~ 7.9
30	86	7.1 ~ 8.3
40	104	7.4 ~ 8.6
50	122	7.7 ~ 8.9
60	140	8.0 ~ 9.2
70	158	8.3 ~ 9.5
80	176	8.6 ~ 9.8
90	194	8.9 ~ 10.1
100	212	9.2 ~ 10.4

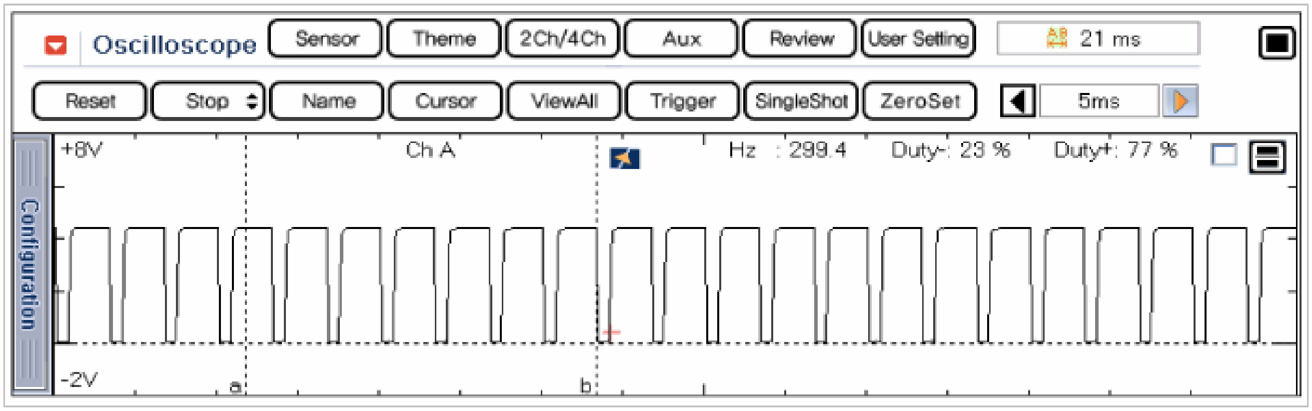
4. Is resistance within specification?

YES	▸ Go to next step as below
NO	▸ Check oil control valve for contamination, deterioration, or damage. Substitute with a known-good solenoid and check for proper operation. If the problem is corrected, replace solenoid and then go to "Verification of Vehicle Repair" procedure

Control circuit inspection

1. Measure voltage between control terminal of the oil control valve harness connector and chassis ground.

Specification : Approx. 3~4V



NOTE

Signal waveform in control circuit with ignition ON & Engine OFF

2. Is voltage within specification?

YES	▸ Go to "Terminal and Connector Inspection" procedure.
NO	▸ Repair short to ground in control circuit and go to "Verification of Vehicle Repair" procedure.

Terminal and Connector Inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

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

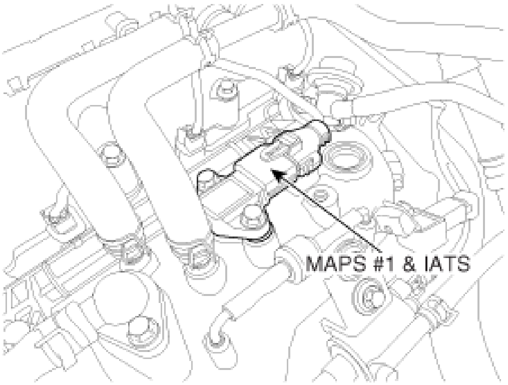
1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" and confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

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

YES	
NO	▸ Go to the applicable troubleshooting procedure.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0106 Manifold Absolute Pressure/Barometric Pressure Circuit Range/Performance

Component Location



General Description

The amount of intake air flow must be inputted to ECM in order to determine the fuel injection qantity. 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 outputted by the transformation of diagphragm according to the change of pressure inside of intake manifold.

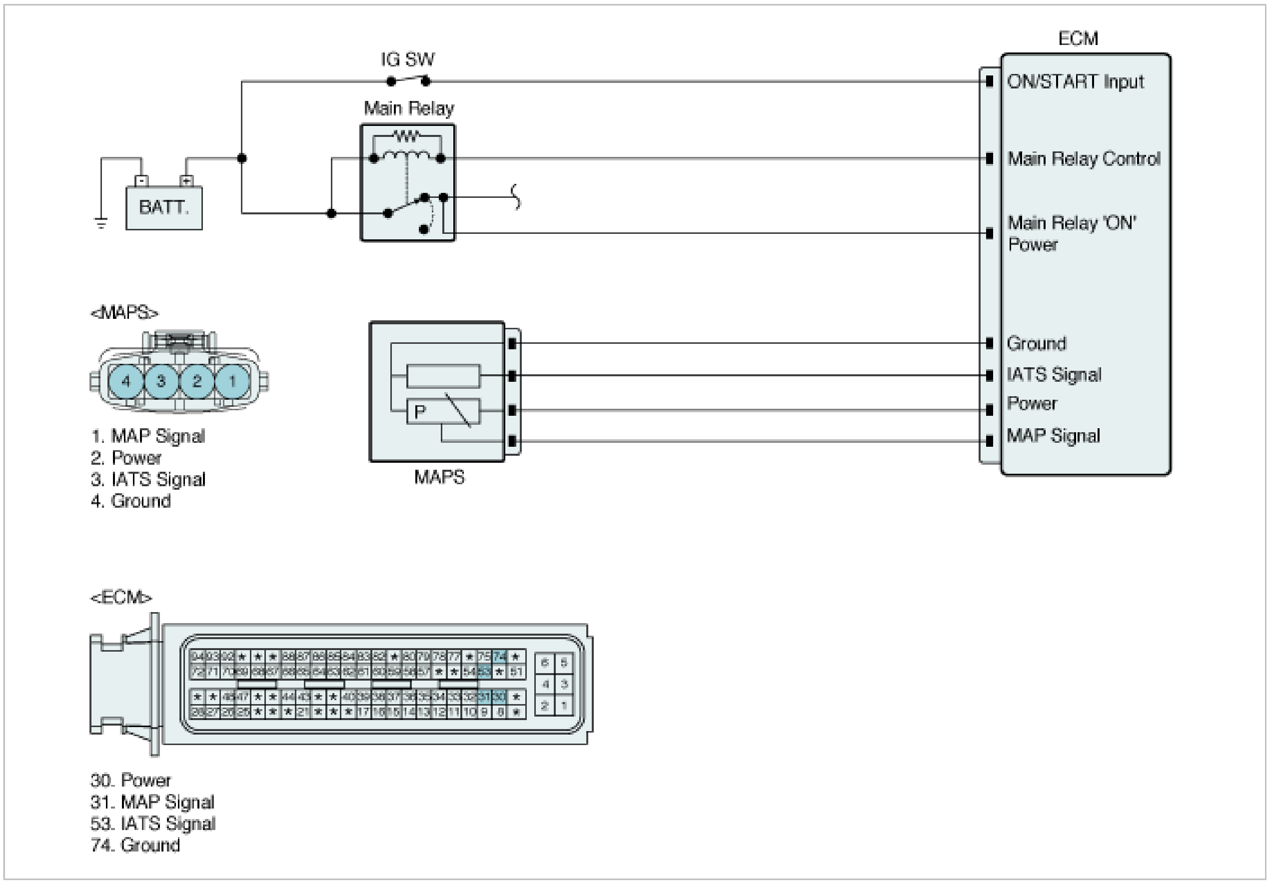
DTC Description

ECM compares the MAPS output and calculated MAPS value while enable condition is met. If the acutal MAP value is higher than Maximum threshold or lower than Minimum threshold for a pre-determined time, ECM determines that a fault exists and a DTC is stored.

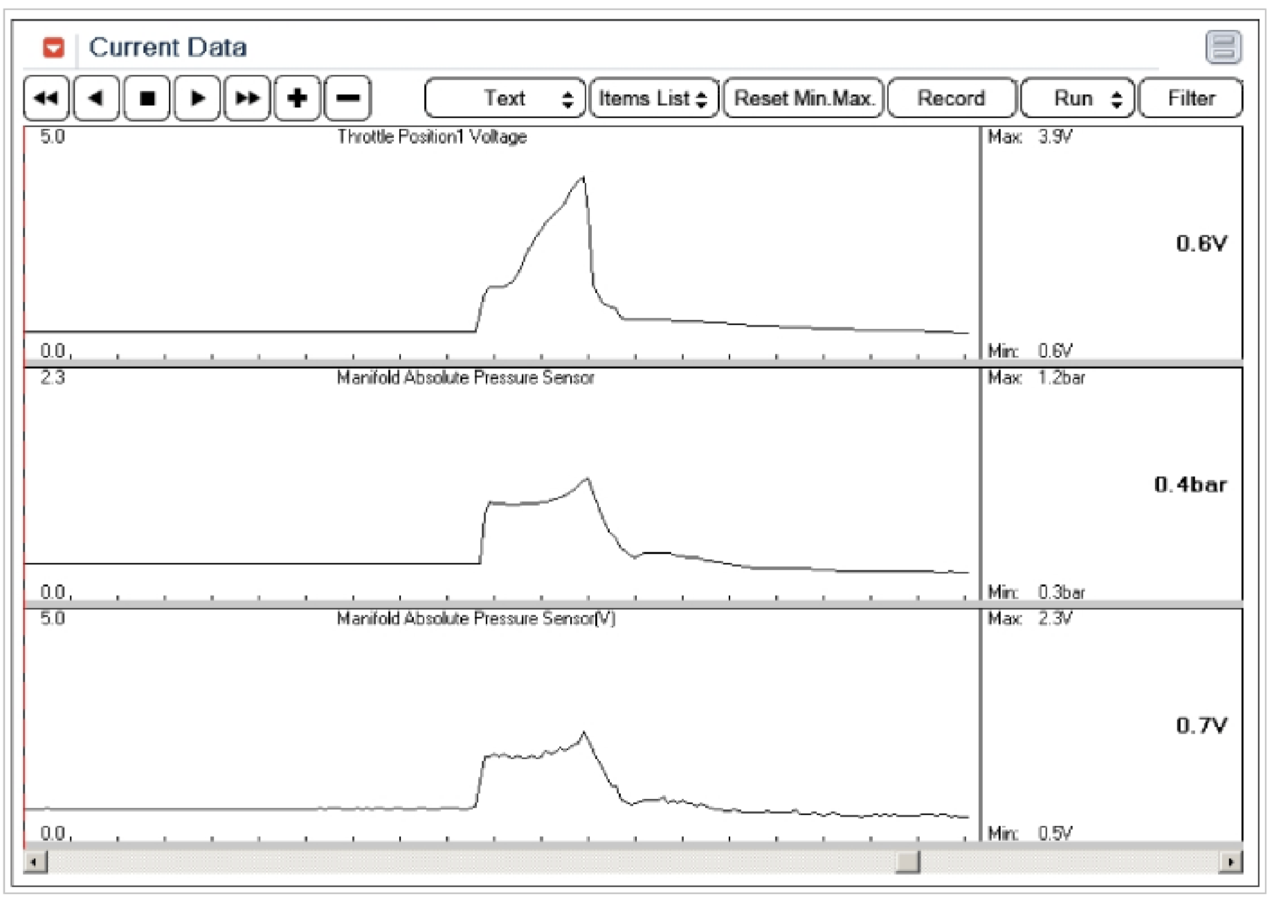
DTC Detecting Condition

Item		Detecting Condition	Possible Cause
Case 1	DTC Strategy	• Circuit Range / Performance Problem (During acceleration)	• Dirty air cleaner • Oil Cap or Dipstick missing or not installed correctly. • Air leak in intake system • Contact resistance in connectors. • Faulty MAPS or TPS
	Enable Conditions	• Engine RPM > 1000 rpm • 10 V ≤ Battery voltage ≤ 16V • Signal change > 12°/sec	
	Threshold Value	• MAP(Model) > 0.9ATM. But, MAP(Measured) < 0.6ATM • Deviation value of fuel trim control > 20% or < -20%	
Case 2	DTC Strategy	• Circuit Range / Performance Problem	
	Enable Conditions	• Engine RPM > 1000 rpm • 10 V ≤ Battery voltage ≤ 16V	
	Threshold Value	• MAP(Model) - MAP(Measured) > 280 hPa • Deviation value of fuel trim control > 20% or < -20%	
Diagnostic Time		• It depends on the driving conditions.	
Mil On Condition		• 2 Driving Cycles	

Diagnostic Circuit Diagram



Signal Waveform & Data



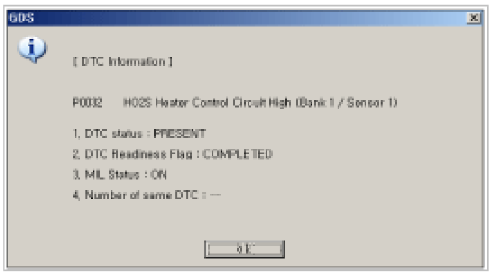
As often as possible, the MAPS signal should be compared with the TPS signal. Check whether the MAPS and TPS signals increase at the same time when accelerating. During acceleration, the MAPS output voltage increases;during deceleration, the

MAPS output voltage decreases.

Monitor DTC Status

> **NOTE**
>
> If any DTCs relating to TPS or MAP are stored, do ALL REPAIRS associated with those codes before proceeding with further troubleshooting

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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 next step as below

Voltage Inspection

1. IG "OFF".
2. Disconnect MAPS connector.
3. IG "ON" &ENG "OFF".
4. Measure voltage between each of signal / power / ground terminals of MAPS harness connector and chassis ground.

Specification : MAP signal terminal : Approx. 0V
Power terminal : Approx. 5V
Ground terminal : Approx. 0V

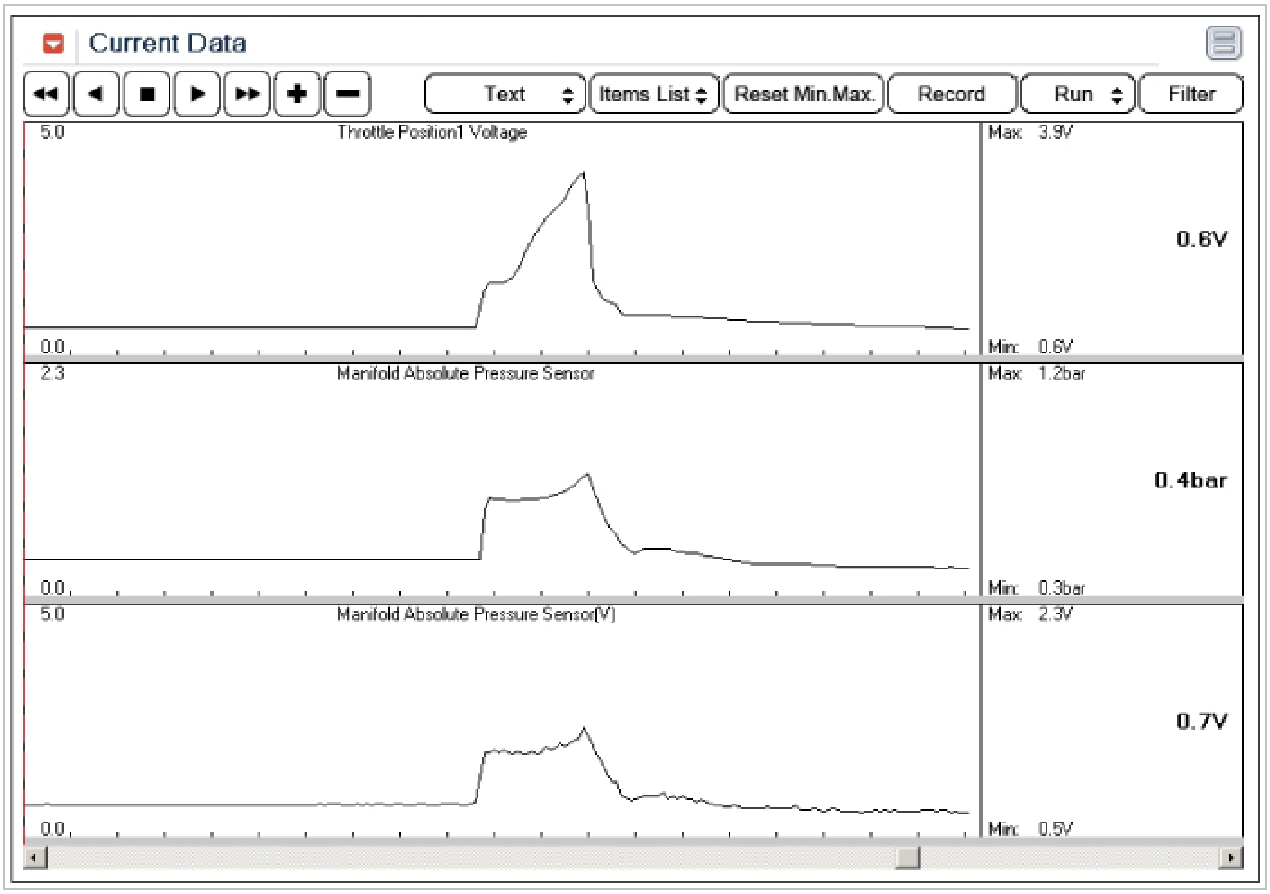
5. Is the measured voltage within specification ?

YES	▸ Go to "Component Inspection " procedure.
NO	▸ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Check MAPS performance.
   (1) IG "OFF".
   (2) Connnect CH A probe to signal terminal of TPS and CH B probe to signal terminal of MAPS 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 pedal.

Specification :



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

YES	▸ 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 MAPS and check for proper operation. If the problem is corrected, replace MAPS and go to "Verification of Vehicle Repair" procedure.

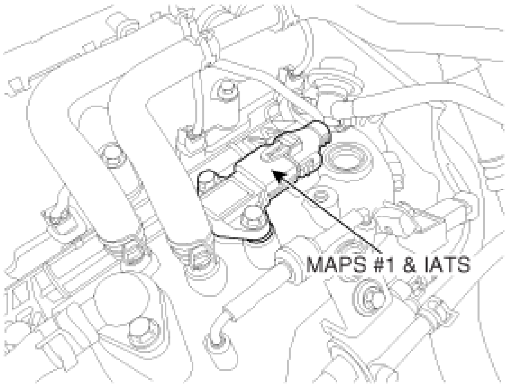
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The amount of intake air flow must be inputted to ECM in order to determine the fuel injection qantity. 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 outputted by the transformation of diagphragm according to the change of pressure inside of intake manifold.

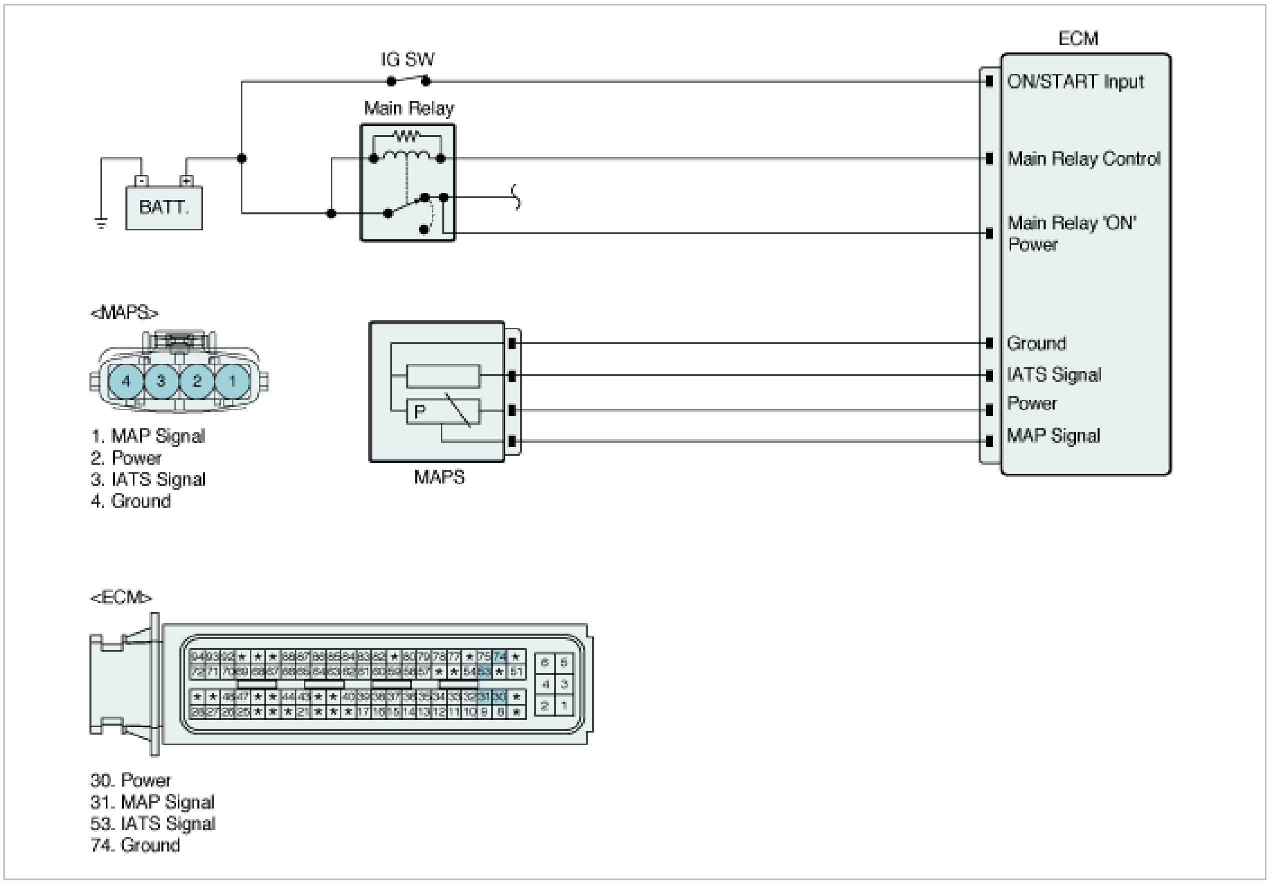
DTC Description

If sensor signal input is lower than 0.1V during 0.1 sec, ECM sets DTC P0107.

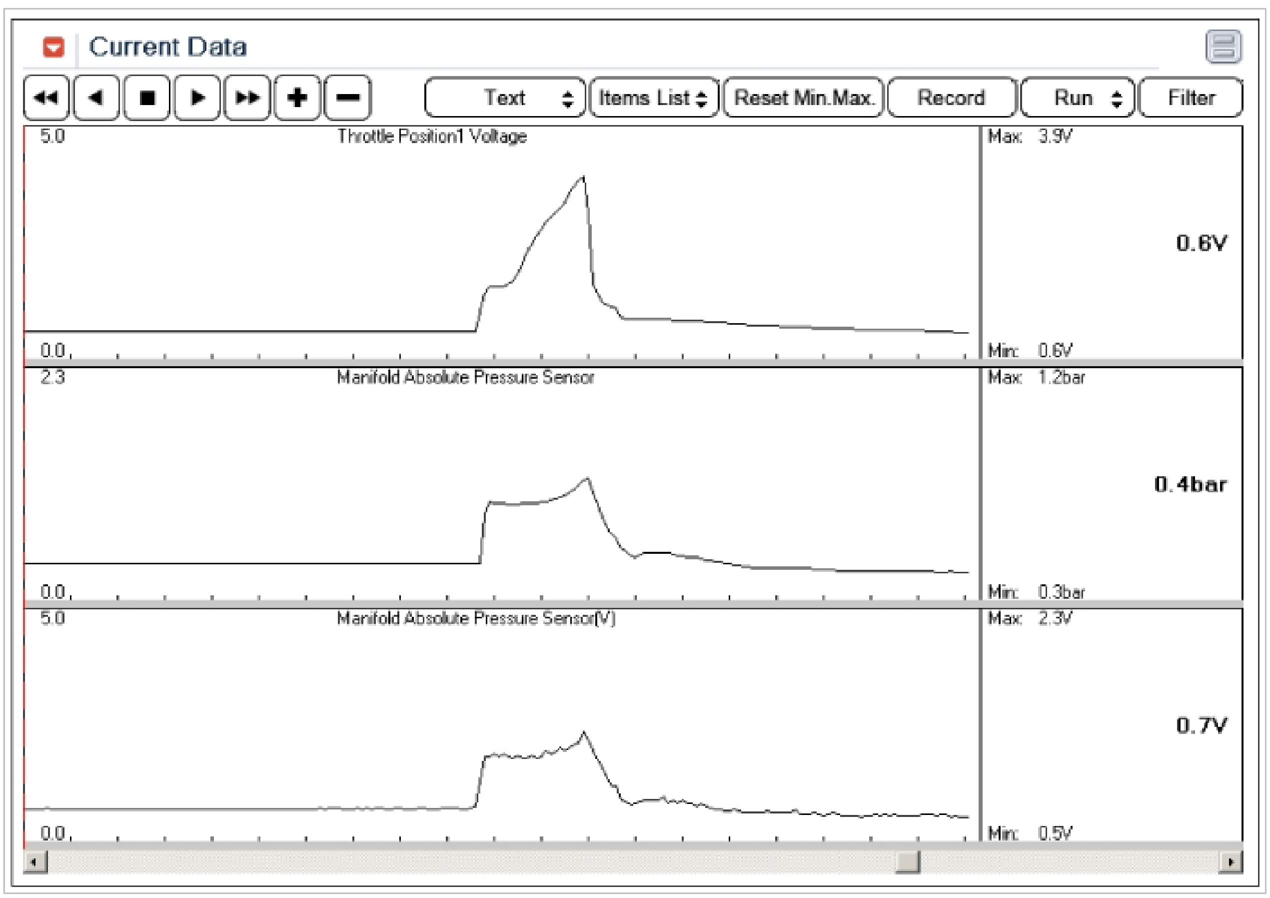
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Poor connection • Open or short to ground in power circuit • Open or Short to ground in signal circuit • MAPS • ECM
Enable Conditions	• 10V < Battery voltage < 16V	
Threshold Value	• Sensor voltage < 0.1 V	
Diagnostic Time	• 0.1 sec	
Mil On Condition	• 2 driving cycle	

Diagnostic Circuit Diagram



Signal Waveform & Data



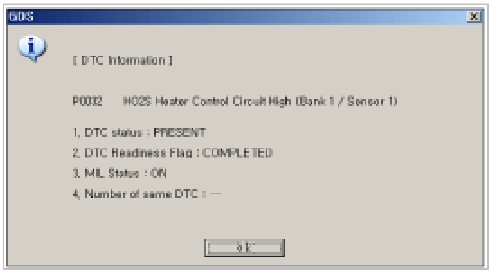
As often as possible, the MAPS signal should be compared with the TPS signal. Check whether the MAPS and TPS signals increase at the same time when accelerating. During acceleration, the MAPS output voltage increases;during deceleration, the

MAPS output voltage decreases.

Monitor DTC Status

> **NOTE**
>
> If any DTCs relating to TPS or MAP are stored, do ALL REPAIRS associated with those codes before proceeding with further troubleshooting

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. 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.
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 next step as below

Power Circuit Inspection

1. IG "OFF".
2. Disconnect MAPS connector.
3. IG "ON" &ENG "OFF"
4. Measure the voltage between power terminal 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

1. Check for short to Ground in signal harness
   (1) IG "OFF".
   (2) Disconnect MAPS and ECM connector.
   (3) Measure the resistance between signal terminal of MAPS harness connector and chassis ground.

   Specification : Infinite

   (4) Is the measured resistance within specification ?

YES	▸ Go to next procedure.
NO	▸ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

2. Check for Open in signal harness
   (1) IG "OFF".
   (2) Disconnect MAPS and ECM connector.
   (3) Measure the resistance between signal terminal of MAPS and ECM.

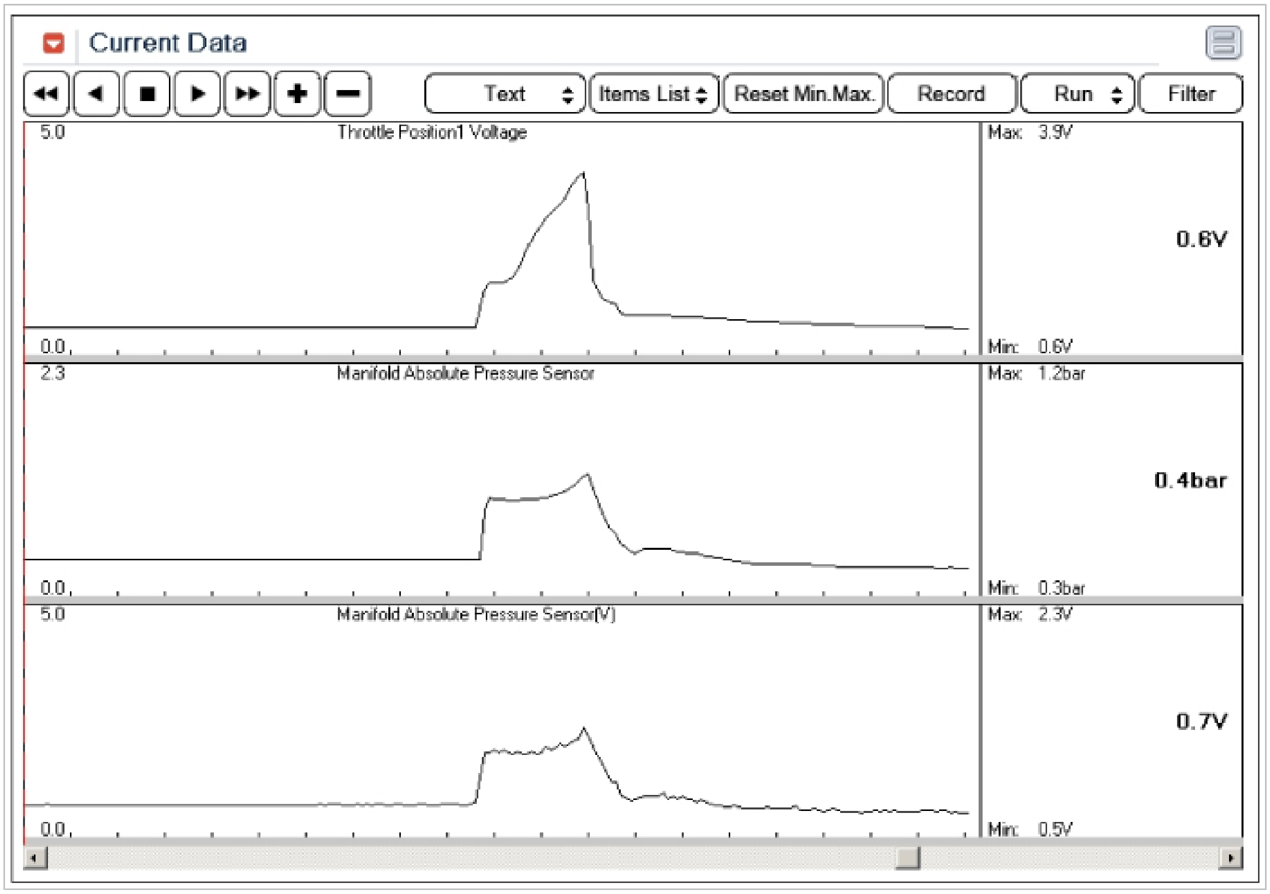
   Specification : Approx. 0Ω

   (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

1. Check MAPS performance.
   (1) IG "OFF".
   (2) Connnect CH A probe to signal terminal of TPS and CH B probe to signal terminal of MAPS 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 pedal.



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

YES	▸ Thoroughly check connectors for looseness, poor connection, bending, corrosion, ontamination, deterioration, or damage. Repair or replace as necessary and go to "Verificatio 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.

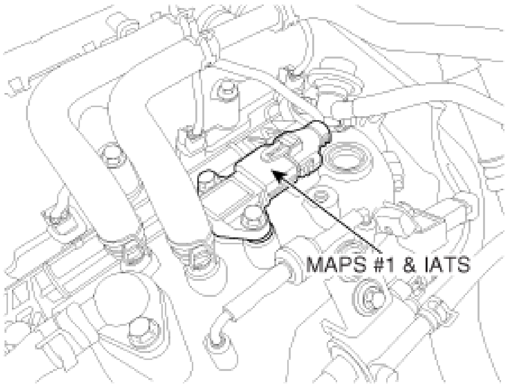
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The amount of intake air flow must be inputted to ECM in order to determine the fuel injection qantity. 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 outputted by the transformation of diagphragm according to the change of pressure inside of intake manifold.

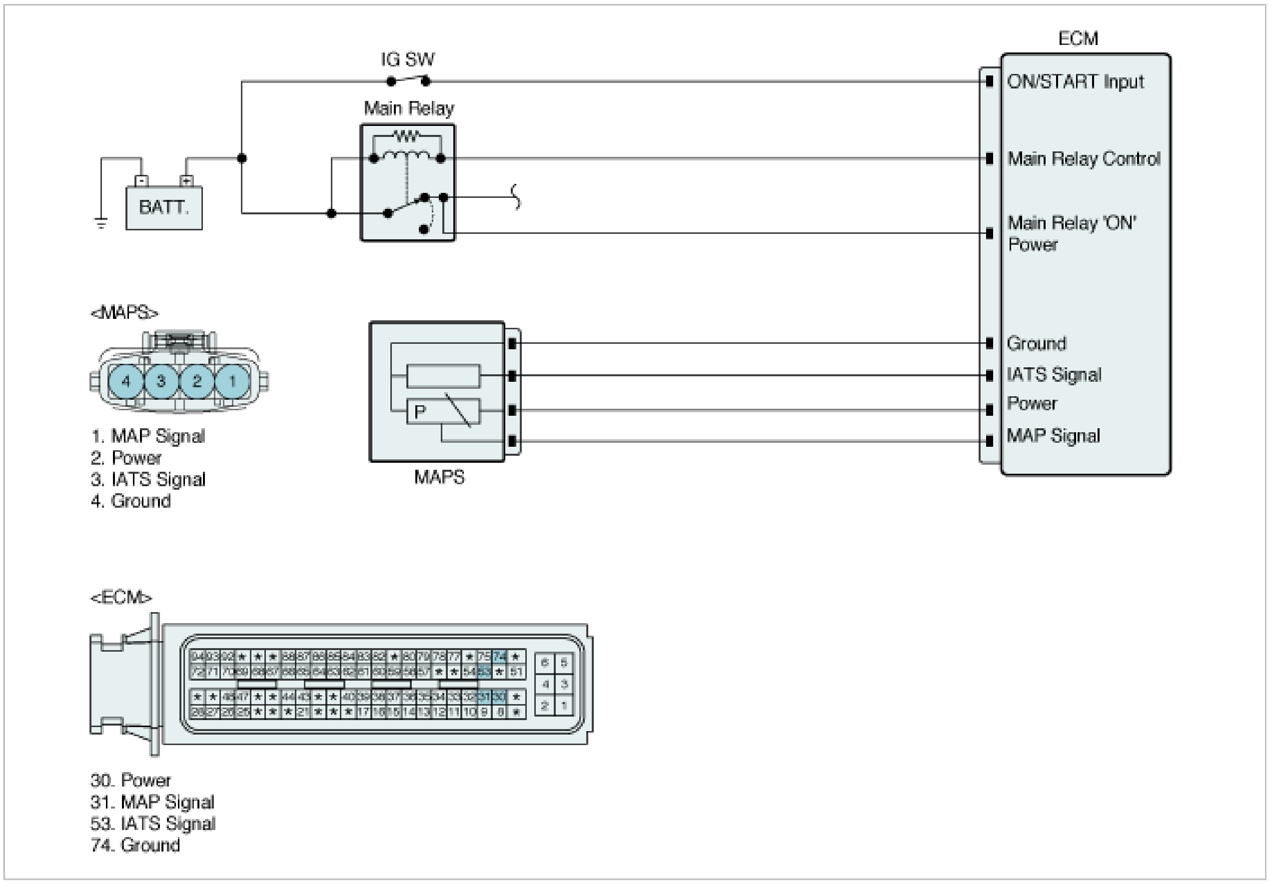
DTC Description

If sensor signal input is higher than 4.85V during 0.1sec, ECM sets DTC P0108.

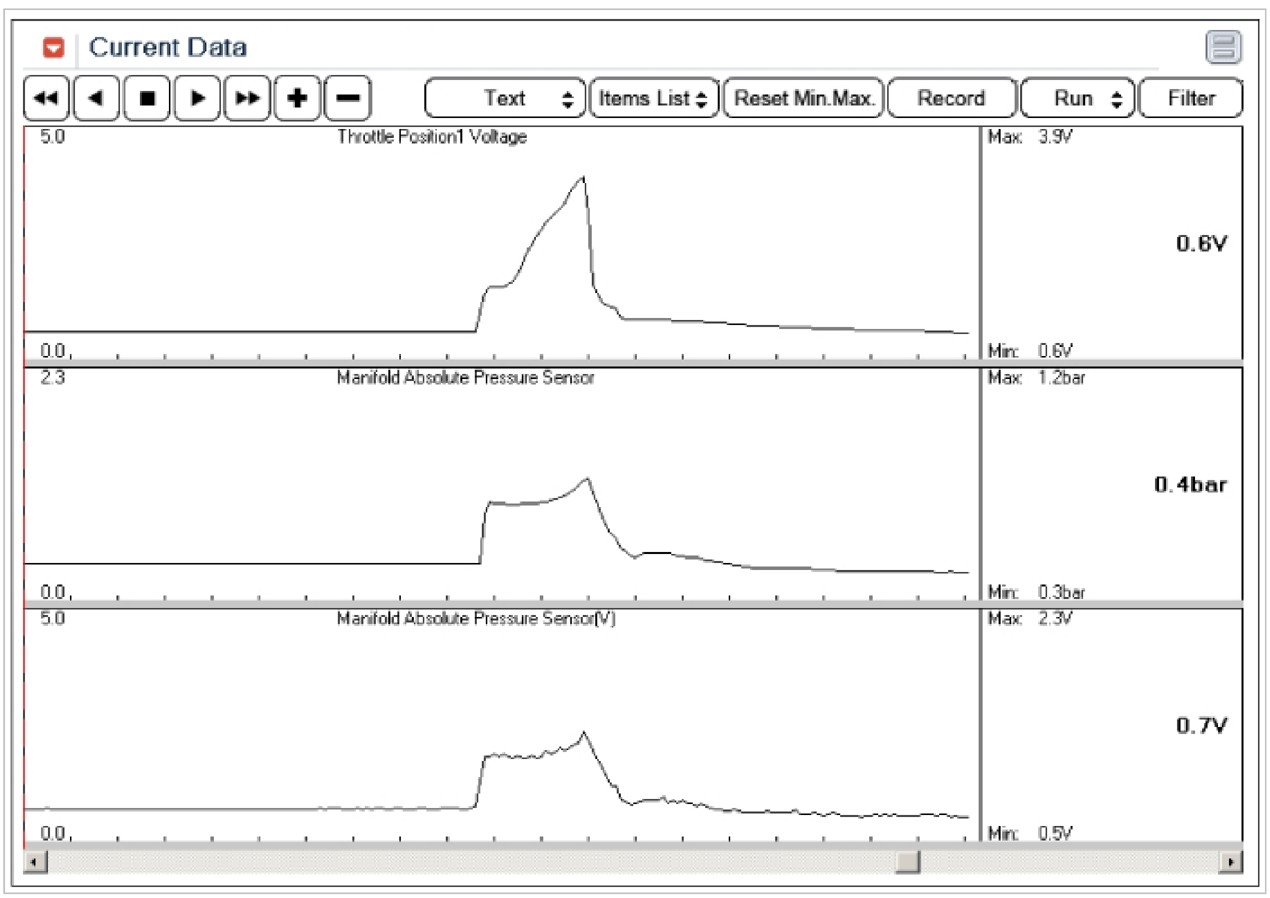
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Poor connection • Short to power in signal circuit • Open in ground circuit • MAPS • ECM
Enable Conditions	• 10V < Battery voltage < 16V	
Threshold Value	• Sensor voltage > 4.85V	
Diagnostic Time	• 0.1 sec	
Mil On Condition	• 2 driving cycle	

Diagnostic Circuit Diagram



Signal Waveform & Data



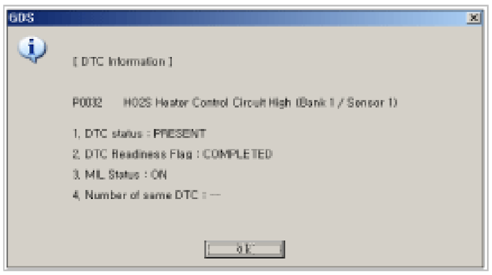
As often as possible, the MAPS signal should be compared with the TPS signal. Check whether the MAPS and TPS signals increase at the same time when accelerating. During acceleration, the MAPS output voltage increases;during deceleration, the

MAPS output voltage decreases.

Monitor DTC Status

> **NOTE**
>
> If any DTCs relating to TPS or MAPS are stored, do ALL REPAIRS associated with those codes before proceeding with further troubleshooting

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. 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.
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 next step as below

Signal Circuit Inspection

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

Specification : 0V

5. Is the measured voltage within specification ?

YES	▶ Go to next step as below

NO	▸ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

Ground Circuit Inspection

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

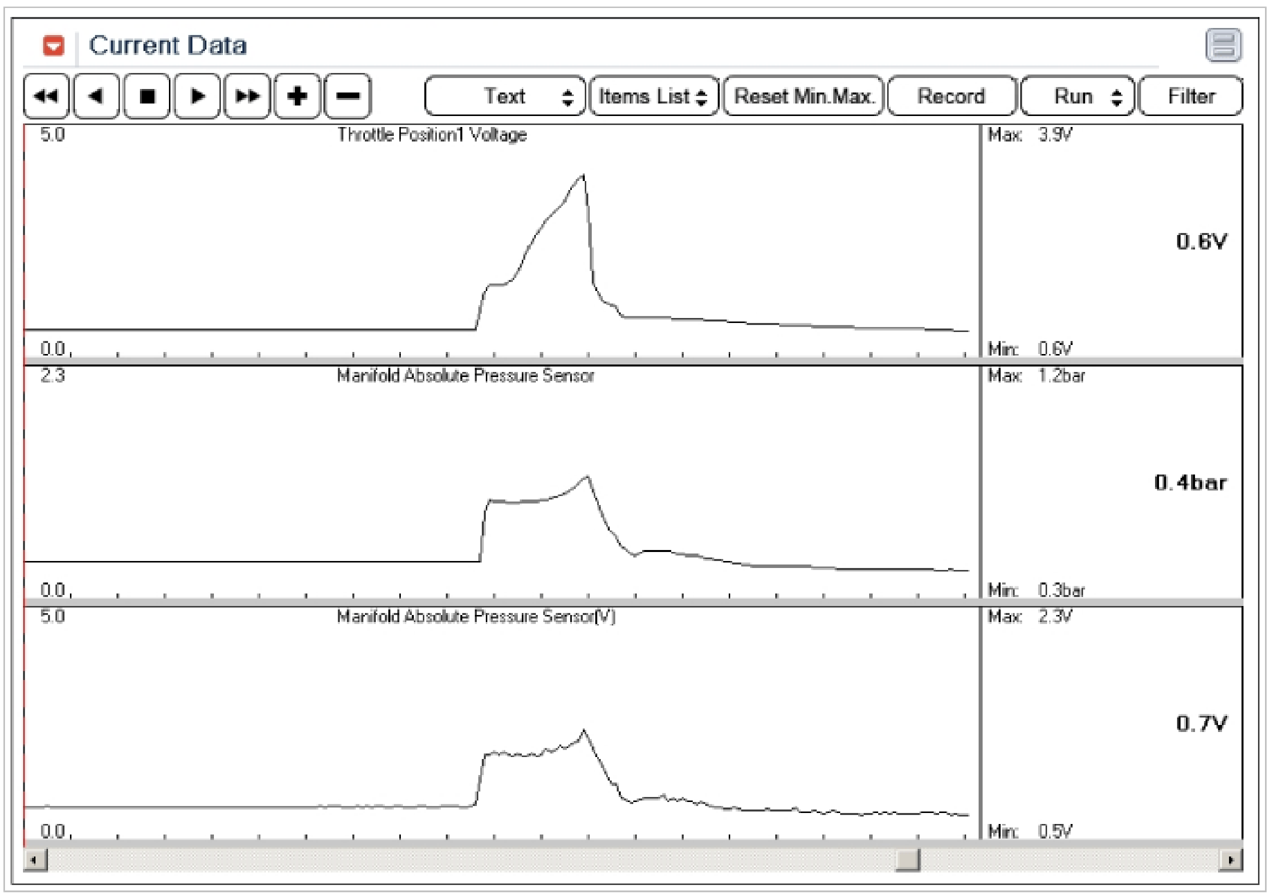
Specification : Below 1Ω

3. Is the measured resistance within specification ?

YES	▸ Go to next step as below
NO	▸ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Check MAPS performance.
   (1) IG "OFF".
   (2) Connnect CH A probe to signal terminal of TPS and CH B probe to signal terminal of MAPS 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 pedal.



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

YES	▸ Thoroughly check connectors for looseness, poor connection, bending, corrosion, ontamination, deterioration, or damage. Repair or replace as necessary and go to "Verificatio 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

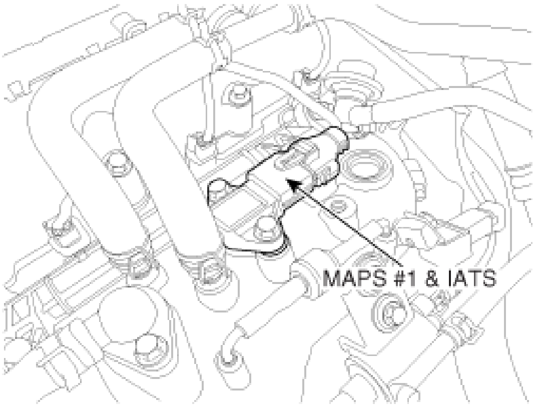
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0111 Intake Air Temperature Sensor 1 Circuit Range / Performance

Component Location



General Description

The Intake Air Temperature Sensor (IATS) is installed into the Manifold Absolute Pressure Sensor (MAPS). The IATS uses a thermistor whose resistance changes with the temperature. The electrical resistance of the IATS decreases as the temperature increases, and increases as the temperature decreases. The 5 V power source in the ECM is supplied to the IATS via a resistor in the ECM. That is, the resistor in the ECM and the thermistor in the IATS are connected in series. When the resistance value of the thermistor in IATS changes according to the intake air temperature, the signal voltage also changes. Using this signal, the information of the intake air temperature, the ECM corrects basic fuel injection duration and ignition timing.

DTC Description

The purpose of this diagnosis is to detect a stuck intake air temperature signal. The diagnostic function checks whether after a variation of the calculated intake air temperature also a variation of the measured intake air temperature is detected.ECM sets DTC P0111 when the variation of measured intake air temperature from engine start is smaller than threshold while variation of calculated intake air temperature by ECM is greater than threshold.

DTC Detecting Condition

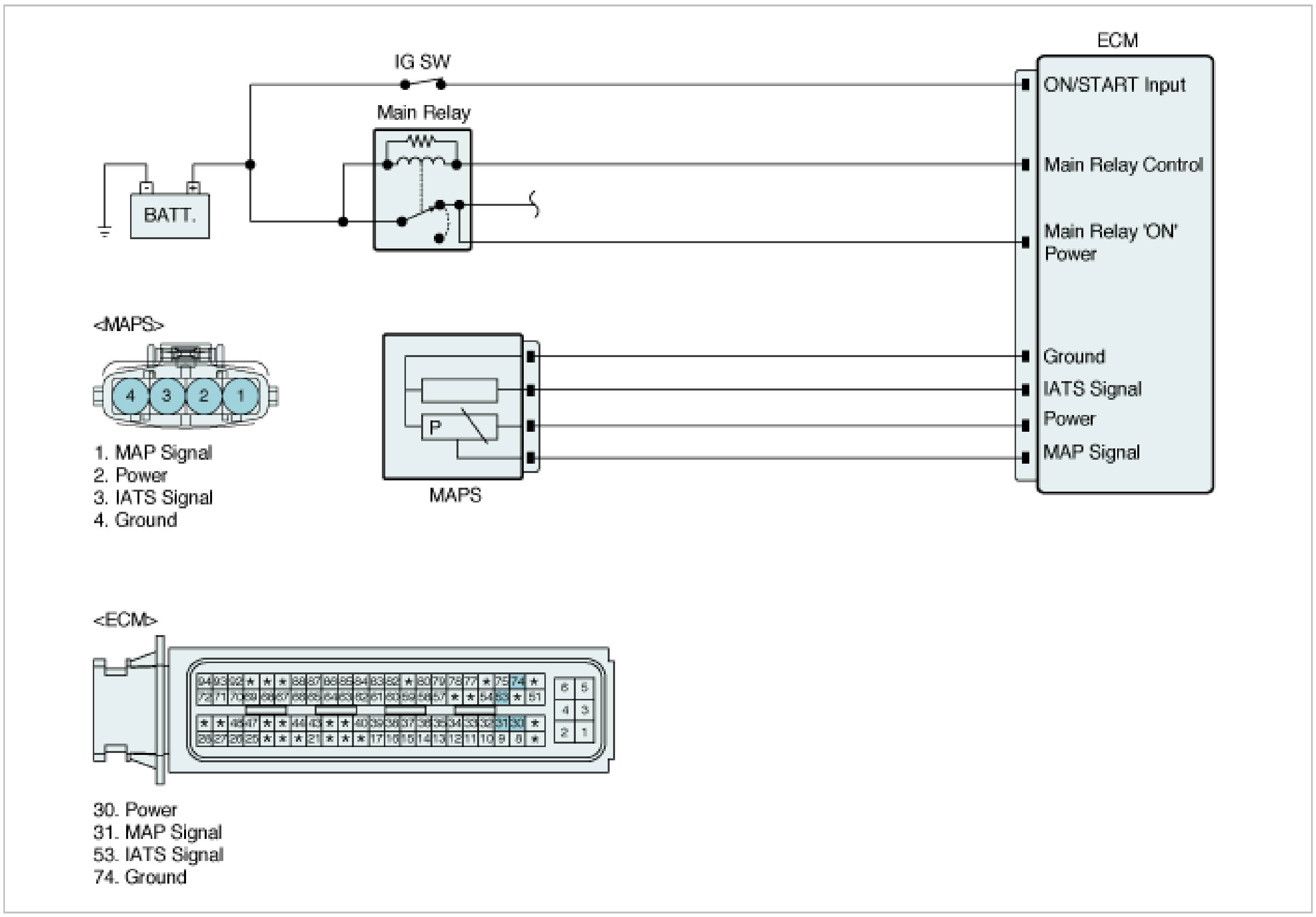
Item		Detecting Condition	Possible Cause
DTC Strategy		• Plausibility check	• Poor connection or damaged harness • Faulty IAT sensor
Enable Conditions	Case1	• Engine running • Battery voltage > 6V • No relevant failure • Engine Coolant Temp. ≥ 73°C(163°F) • ECT at engine start - ECT at Eng. stop at previous driving cycle > 5.3°C(41.5°F) • Cumulative time for IAT signal increase check (low load driving condition : air flow < 20kg/h) > 200 sec. • Cumulative time for IAT signal decrease check (high load driving condition : air flow > 40kg/h) > 160 sec.	
	Case2	• Ignition "ON" • Battery voltage ≥ 6V • No Intake Air Temp.(IAT) sensor electrical error	
Threshold Value	Case1	• Signal stuck : Intake air temperature signal variation since Engine Start < 1.5 °C ~40 °C	
	Case2	• Noisy signal : IAT - IAT moving mean value > 8 °C	
Diagnostic Time	Case1	• Immediate	

	Case2	• 0.5 sec.	
MIL On Condition		• 2 Driving Cycles	

Specification

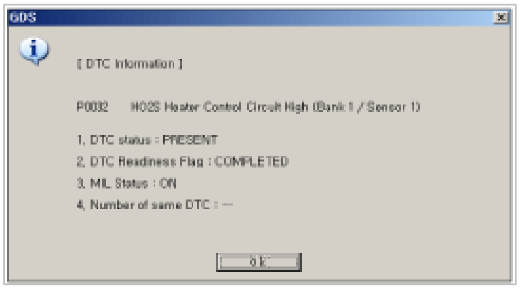
Temp.(°C)	Temp.(°F)	Resistance(kΩ)	Temp.(°C)	Temp.(°F)	Resistance(kΩ)
-10	14	8.5~9.7	20	68	2.3~2.5
0	32	5.4~6.1	30	86	1.6~1.7
10	50	3.5~3.9	80	176	Approx. 0.3

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. 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.
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

1. Ignition "OFF"
2. Disconnect IATS connector3) Measure the resistance between signal terminal and
3. Measure the resistance between signal terminal and ground terminal of the sensor connector(Component side).
   Specification

Temp.(°C)	Temp.(°F)	Resistance(kΩ)
-10	14	8.5~9.7
0	32	5.4~6.1
10	50	3.5~3.9
20	68	2.3~2.5
30	86	1.6~1.7
80	176	Approx. 0.3

4. Is resistance within the specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

NO	▸ Check IATS for contamination, deterioration, or damage. Substitute with a known-good IATS and check for proper operation. If the problem is corrected, replace IATS and then go to "Verification of Vehicle Repair" procedure

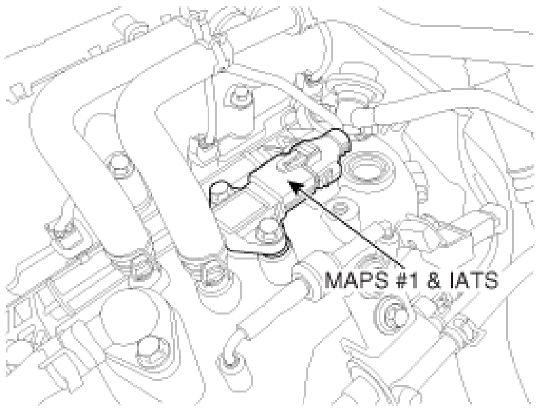
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Intake Air Temperature Sensor (IATS) is installed into the Manifold Absolute Pressure Sensor (MAPS). The IATS uses a thermistor whose resistance changes with the temperature. The electrical resistance of the IATS decreases as the temperature increases, and increases as the temperature decreases. The 5 V power source in the ECM is supplied to the IATS via a resistor in the ECM. That is, the resistor in the ECM and the thermistor in the IATS are connected in series. When the resistance value of the thermistor in IATS changes according to the intake air temperature, the signal voltage also changes. Using this signal, the information of the intake air temperature, the ECM corrects basic fuel injection duration and ignition timing.

DTC Description

ECM sets DTC P0112 if the ECM detects signal voltage lower than the possible range of a properly operating IATS.

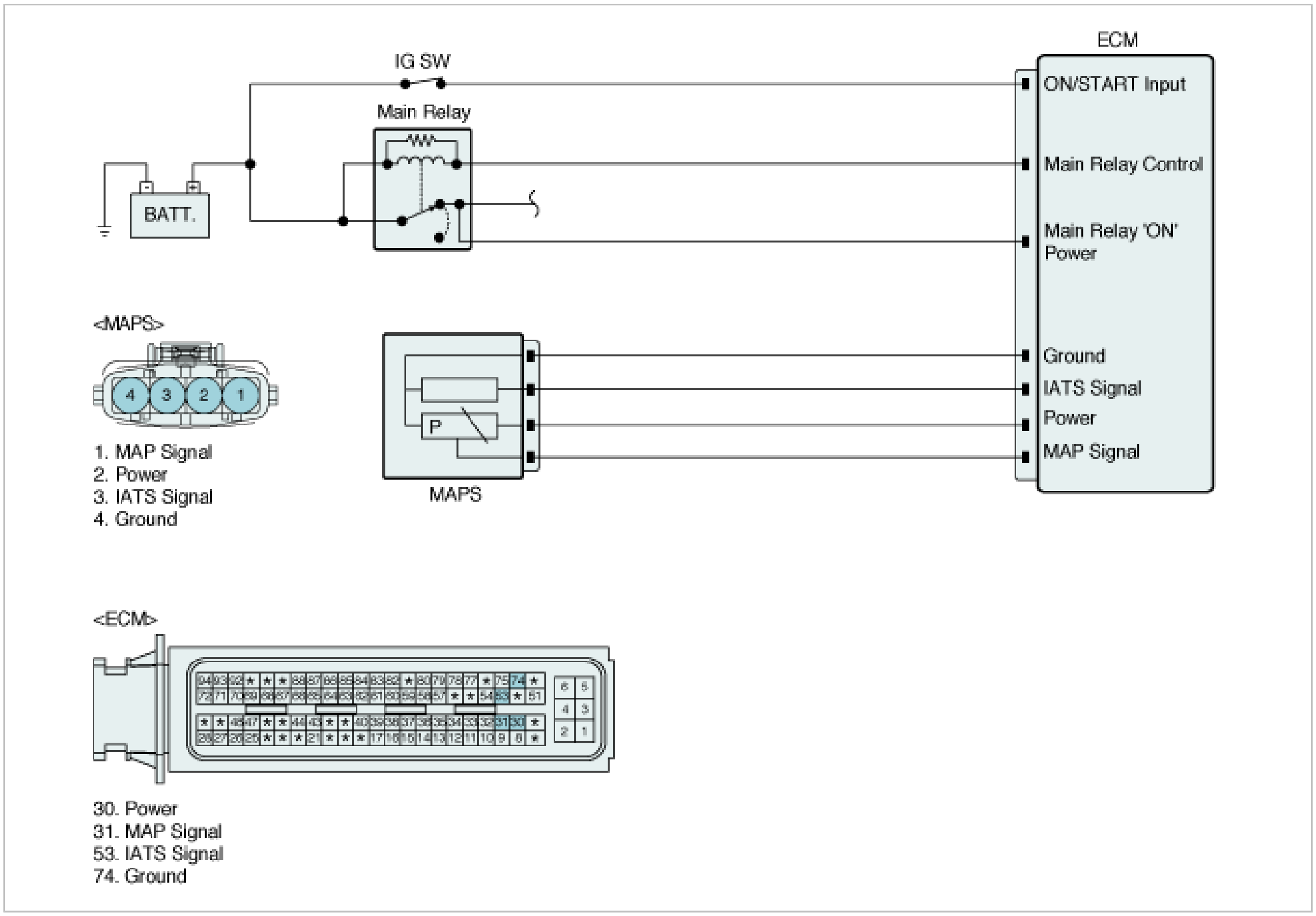
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage range check	• Short to ground in signal harness • Poor connection or damaged harness • Faulty IAT sensor
Enable Conditions	• Battery voltage >6V	
Threshold Value	• IAT voltage < 0.22V	
Diagnostic Time	• 10sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

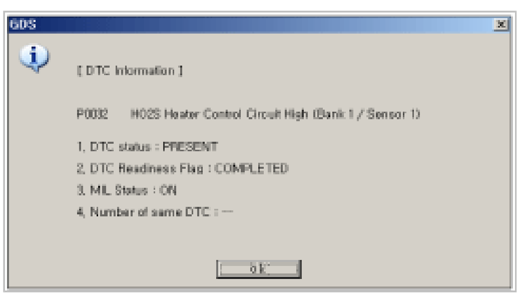
Temp.(°C)	Temp.(°F)	Resistance(kΩ)	Temp.(°C)	Temp.(°F)	Resistance(kΩ)
-10	14	8.5~9.7	20	68	2.3~2.5
0	32	5.4~6.1	30	86	1.6~1.7
10	50	3.5~3.9	80	176	Approx. 0.3

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Signal Circuit Inspection

1. Ignition "OFF"
2. Disconnect IAT sensor connector
3. Measure the resistance between signal terminal of IATS harness connector and chassis ground.

Specification : Infinite

4. Is resistance within the specification?

YES	▶ Go to next step as below
NO	▶ Repair as necessary and go to "W/Harness Inspection" procedure.

Terminal and Connector Inspection

1. 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.
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

1. Ignition "OFF"
2. Disconnect IATS connector3) Measure the resistance between signal terminal and
3. Measure the resistance between signal terminal and ground terminal of the sensor connector(Component side).
   Specification

Temp.(°C)	Temp.(°F)	Resistance(kΩ)
-10	14	8.5~9.7
0	32	5.4~6.1
10	50	3.5~3.9
20	68	2.3~2.5
30	86	1.6~1.7
80	176	Approx. 0.3

4. Is resistance within the specification?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Check IATS for contamination, deterioration, or damage. Substitute with a known-good IATS and check for proper operation. If the problem is corrected, replace IATS and then go to "Verification of Vehicle Repair" procedure

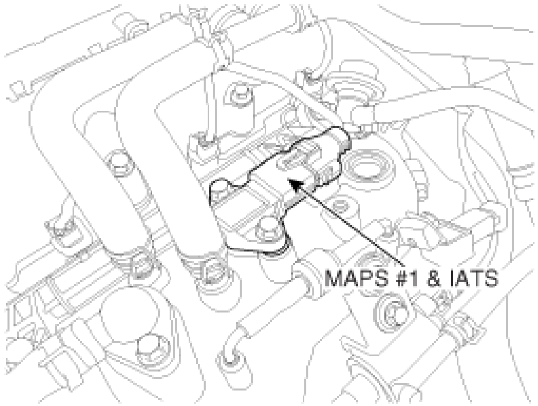
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Intake Air Temperature Sensor (IATS) is installed into the Manifold Absolute Pressure Sensor (MAPS). The IATS uses a thermistor whose resistance changes with the temperature. The electrical resistance of the IATS decreases as the temperature increases, and increases as the temperature decreases. The 5 V power source in the ECM is supplied to the IATS via a resistor in the ECM. That is, the resistor in the ECM and the thermistor in the IATS are connected in series. When the resistance value of the thermistor in IATS changes according to the intake air temperature, the signal voltage also changes. Using this signal, the information of the intake air temperature, the ECM corrects basic fuel injection duration and ignition timing.

DTC Description

ECM sets DTC P0113 if the ECM detects signal voltage higher than the possible range of a properly operating IATS.

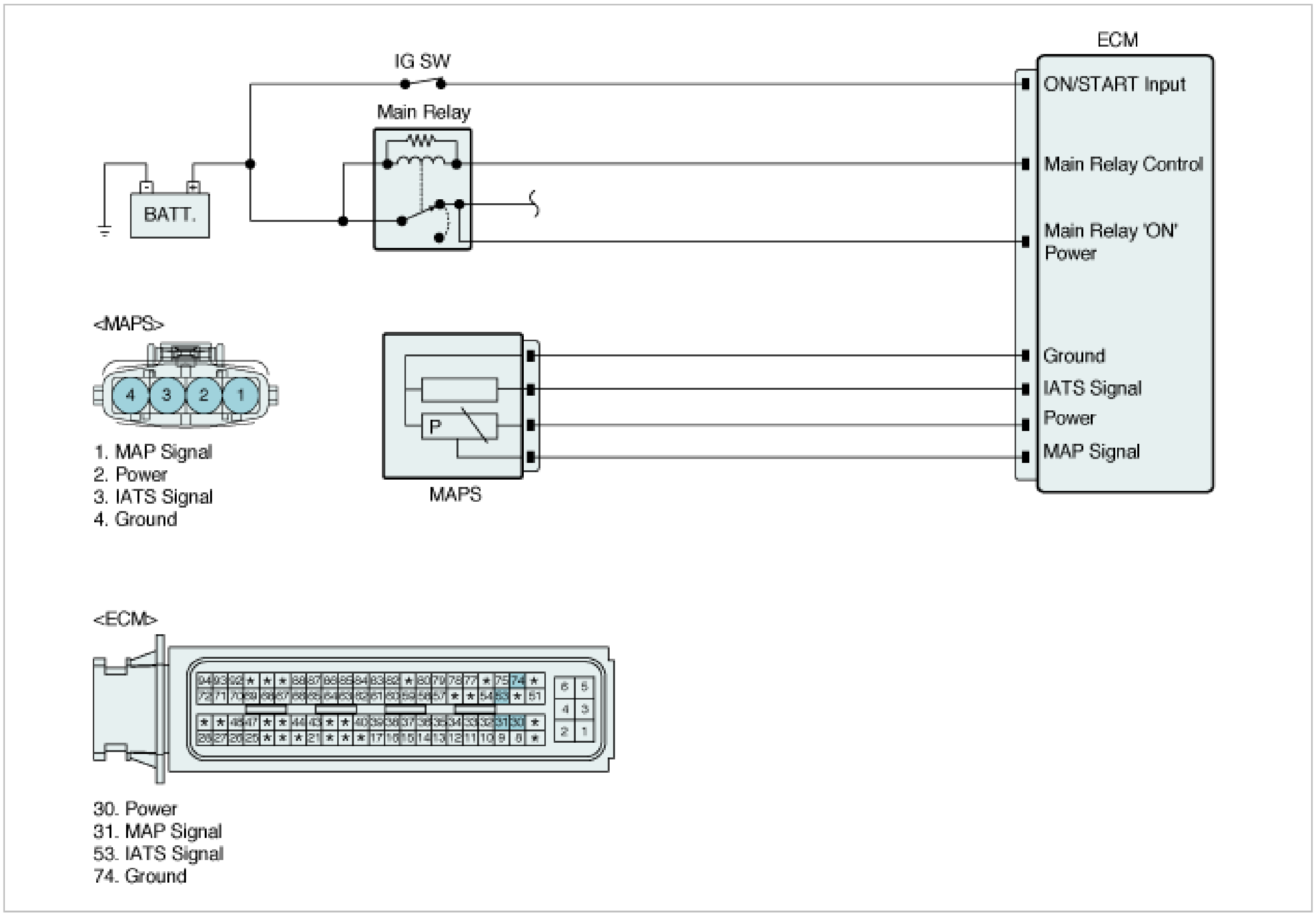
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage range check	• Short to battery in signal harness • Open in signal or ground circuit • Poor connection or damaged harness • Faulty IAT sensor
Enable Conditions	• Battery voltage >6V • Time after start > 105 sec., if Air temperature at Start > -30 °C(-22°F)	
Threshold Value	• IAT voltage > 4.93V	
Diagnostic Time	• 10sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

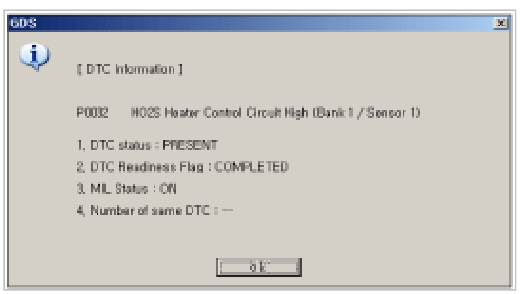
Temp.(°C)	Temp.(°F)	Resistance(kΩ)	Temp.(°C)	Temp.(°F)	Resistance(kΩ)
-10	14	8.5~9.7	20	68	2.3~2.5
0	32	5.4~6.1	30	86	1.6~1.7
10	50	3.5~3.9	80	176	Approx. 0.3

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Ground circuit inspection

1. Ignition "OFF"
2. Disconnect IATS connector
3. Measure the resistance between ground terminal of IATS harness connector and chassis ground.

Specification : Approx. 0Ω

4. Is resistance within the specification?

YES	▶ Go to next step as below
NO	▶ Repair open circuit and go to "Verification of Vehicle Repair" procedure

Signal Circuit Inspection

1. Ignition "ON" & Engine "OFF"
2. Measure the voltage between signal terminal of IATS harness connector and chassis ground.

Specification : Approx. 5V

3. Is voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Check for open or short to battery in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Terminal and Connector Inspection

1. 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.
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 next step as below

Component Inspection

1. Ignition "OFF"
2. Disconnect IATS connector3) Measure the resistance between signal terminal and
3. Measure the resistance between signal terminal and ground terminal of the sensor connector(Component side).
   Specification

Temp.(°C)	Temp.(°F)	Resistance(kΩ)
-10	14	8.5~9.7
0	32	5.4~6.1
10	50	3.5~3.9
20	68	2.3~2.5
30	86	1.6~1.7

80	176	Approx. 0.3

4. Is resistance within the specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check IATS for contamination, deterioration, or damage. Substitute with a known-good IATS and check for proper operation. If the problem is corrected, replace IATS and then go to "Verification of Vehicle Repair" procedure

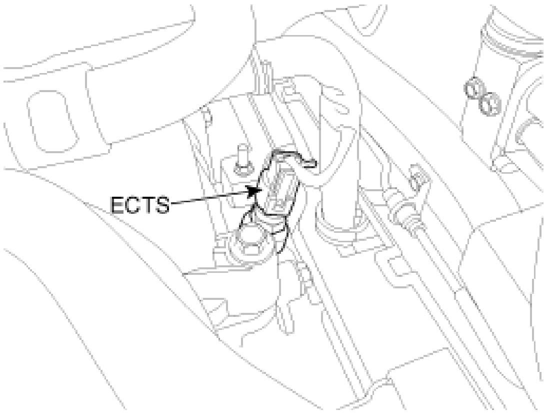
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The 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 ECM is supplied to the ECTS via a resistor in the ECM. That is, the resistor in the ECM 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 ECM increases the fuel injection duration and controls the ignition timing using the information of engine coolant temperature to avoid engine stalling and improve drivability.

DTC Description

ECM sets DTC P0116 if the ECM detects stuck low, high or implausible high ECT signal.

DTC Detecting Condition

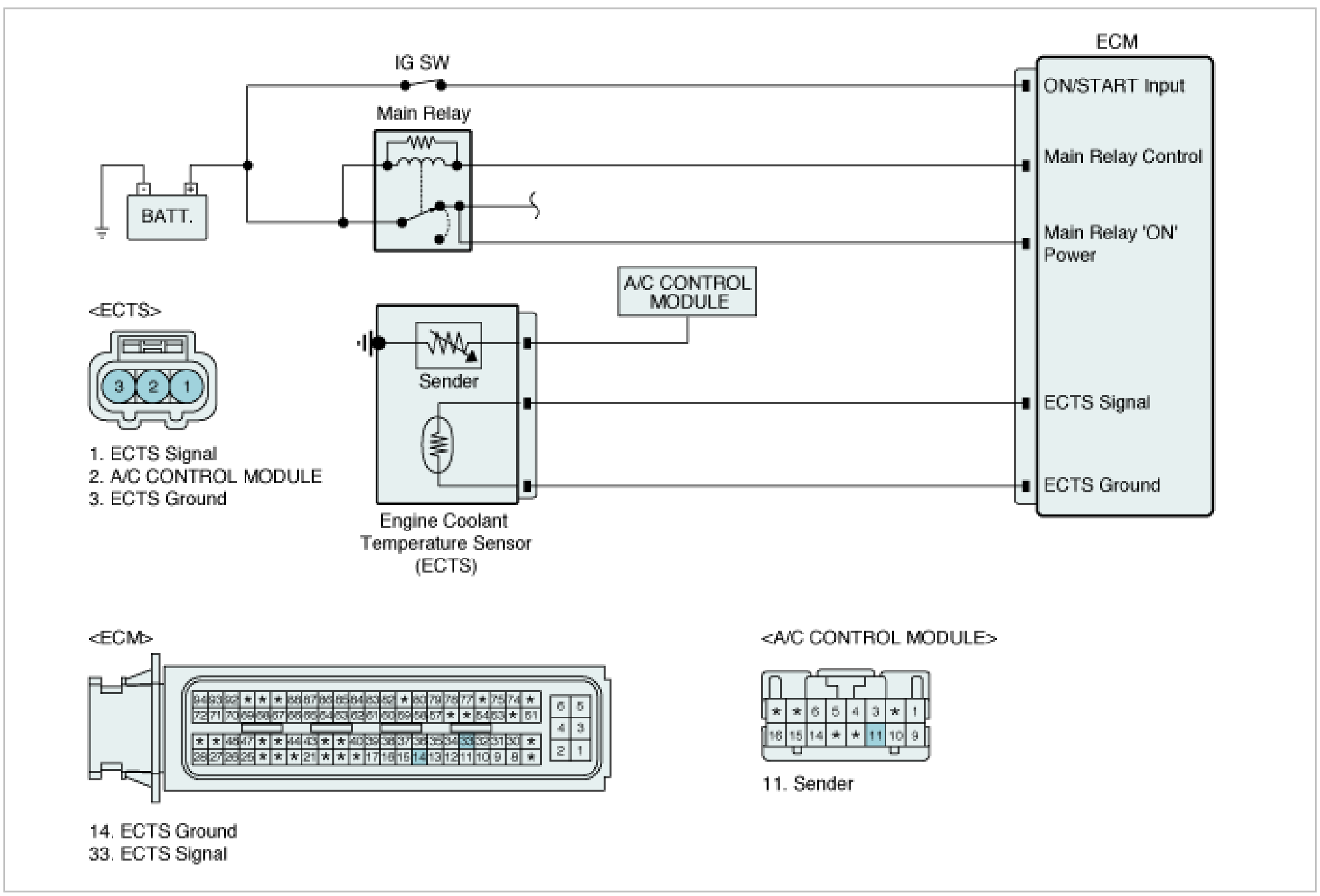
Item		Detecting Condition & Fail Safe	Possible Cause
DTC Strategy	Case1	• Signal Stuck Low	• Poor connection or damaged harness • Faulty ECT sensor • Faulty cooling system
	Case2	• Signal Stuck High	
	Case3	• Signal implausible high	
Enable Conditions	Case1	• No relevant failure • 6V< Battery voltage • Coolant temperature at Start < 76°C(169°F)	
	Case2	• No relevant failure • 11V< Battery voltage <16V • Coolant temperature at Start >76°C(169°F) • -10°C(14°F)< Intake air temp. <70°C(158°F) • -10°C(14°F)< Ambient temperature • More than 250 sec. (cumulative) Part Load driving condition(engine rpm >1400,vehicle speed >22 mph and MAF >20 kg/h) • More than 200 sec. (cumulative) Low Load driving condition(trailing fuel cut off or idle with vehicle speed <12mph)	
	Case3	• No relevant failure • Oil temp. at engine stop of previous driving cycle >70°C (158°F) • Coolant temp. at engine stop of previous driving cycle	

		>70°C(158°F) • Oil temp. at start <35°C(95°F) • ntake air temp. at start <35°C(95°F)	
Threshold Value	Case1	• Modeled coolant temp. increase > Threshold But measured coolant temp. increase <Threshold	
	Case2	• Coolant temperature signal variation since engine Start < 2.25 °C(4°F)	
	Case3	• Coolant temperature in start > 53 °C(127°F)(In case of coolant temp.> threshold but oil temp. & intake air temp < threshold)	
Diagnostic Time		• Immediate	
MIL On Condition		• 2 Driving Cycles	

Specification

Temp.(°C)	Temp.(°F)	Resistance(kΩ)	Temp.(°C)	Temp.(°F)	Resistance(kΩ)
-20	-4	14.1 ~ 16.8	40	104	Approx. 1.2
0	32	Approx. 5.8	60	140	Approx. 0.6
20	68	2.3 ~ 2.6	80	176	Approx. 0.3

Diagnostic Circuit Diagram

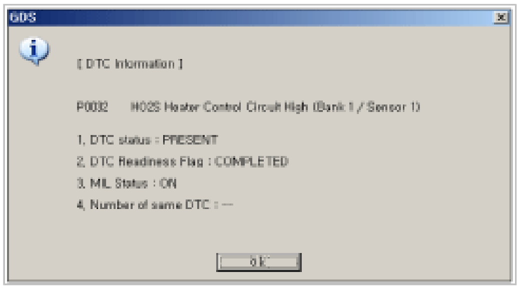


Monitor DTC Status

NOTE

If any DTCs relating to ECTS are stored, do ALL REPAIRS associated with those codes before proceeding with further troubleshooting

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Monitor Scantool Data

1. Allow the engine to cool completely
2. Run the cold engine at idle for 5 minutes and observe cooling fan status.

> NOTE
>
> Ensure that the A/C is OFF

3. Check the engine coolant temperature parameter at idle with the scantool.
4. Is the engine coolant temperature increase to above 50°C(122°F)

YES	▶ Go to "Terminal and Connector Inspection" procedure
NO	▶ Go to next step as below

5. Are the cooling fans running when engine coolant temperature is low(less than approximately 98°C(208°F)) with A/C OFF?

YES	▶ Check for short circuit in cooling fan harness or cooling fan relay. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ - With ignition "ON", Install scantool and select "COOLING FAN RELAY" on the Actuation Test mode. - Activates "COOLING FAN RELAY" by pressing "STRT(F1)" key - Repeat this procedure 4 or 5 times to ensure cooling fan reliability. - If cooling fan works properly, go to next step as below

	- If NG, check for intermittent fault caused by poor contact in the sensor's and/or ECM's connector. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

System Inspection

1. Coolant Level Inspection
   (1) Check the cooling system coolant level.
   (2) Is the coolant in the reservoir at the proper level?

YES	▸ Go to next step as below
NO	▸ Repair or add engine coolant as necessary and go to "Verification of Vehicle Repair" procedure

2. Thermostat Inspection
   (1) Check if the thermostat bypass valve is stuck in the open position or if the correct type of thermostat was installed. Replace thermostat as necessary and go to "Verification of Vehicle Repair" procedure
   (2) Check the valve opening temperature of the thermostat

Specification(Valve opening temperature) : 80~84°C(176~183°F)

   (3) If the opening temperature is not as specified, Replace thermostat as necessary and go to "Verification of Vehicle Repair" procedure.If OK, go to next step as below

3. ECT Sensor Inspection
   (1) Ignition "OFF"
   (2) Disconnect ECTS connector
   (3) Measure the resistance between signal terminal and ground terminal of ECTS connector. (Component side)
   Specification

Temp.(°C)	Temp.(°F)	Resistance(kΩ)
-20	-4	14.1 ~ 16.8
0	32	Approx. 5.8
20	68	2.3 ~ 2.6
40	104	Approx. 1.2
60	140	Approx. 0.6
80	176	Approx. 0.3

   (4) Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Check ECTS for contamination, deterioration, or damage. Substitute with a known-good ECTS and check for proper operation. If the problem is corrected, replace ECTS and then go to "Verification of Vehicle Repair" procedure.

Terminal and Connector Inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

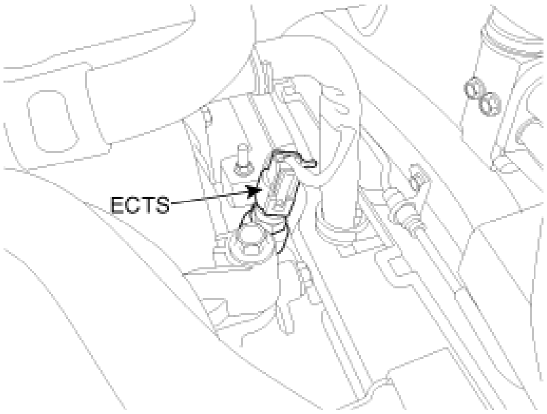
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0117 Engine Coolant Temperature Circuit Low Input

Component Location



General Description

The 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 ECM is supplied to the ECTS via a resistor in the ECM. That is, the resistor in the ECM 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 ECM increases the fuel injection duration and controls the ignition timing using the information of engine coolant temperature to avoid engine stalling and improve drivability.

DTC Description

ECM sets DTC P0117 if the ECM detects signal voltage lower than the possible range of a properly operating ECTS.

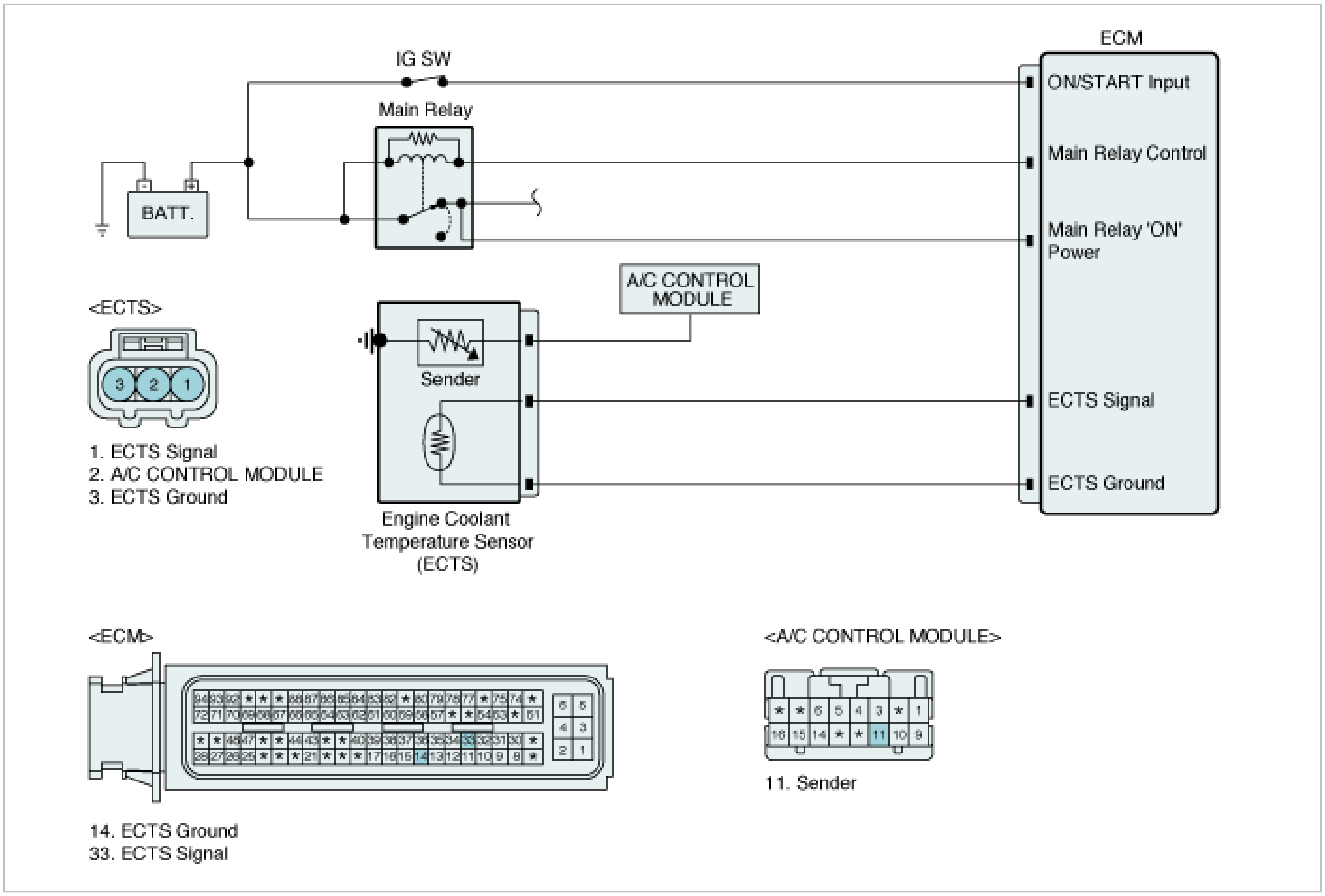
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage range check	• Short to ground in signal harness • Poor connection or damaged harness • Faulty ECT sensor
Enable Conditions	• Battery voltage >6V	
Threshold Value	• ECTS voltage < 0.39V	
Diagnostic Time	• 1sec.	
Fail Safe	• 2 Driving Cycles	

Specification

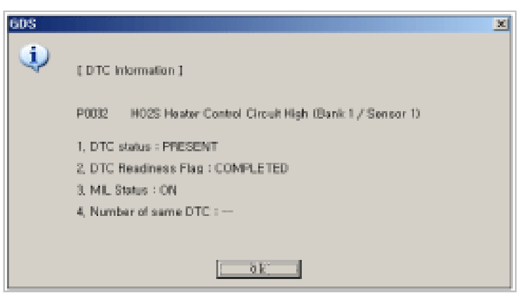
Temp.(°C)	Temp.(°F)	Resistance(kΩ)	Temp.(°C)	Temp.(°F)	Resistance(kΩ)
-20	-4	14.1 ~ 16.8	40	104	Approx. 1.2
0	32	Approx. 5.8	60	140	Approx. 0.6
20	68	2.3 ~ 2.6	80	176	Approx. 0.3

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Signal Circuit Inspection

1. Ignition "OFF"
2. Disconnect ECTS connector.
3. Measure the resistance between signal terminal of ECTS harness connector and chassis ground.

Specification : Infinite

4. Is the resistance within the specification?

YES	▶ Go to "Terminal and Connector Inspection" procedure
NO	▶ Repair short to ground in harness and go to "Verification of Vehicle Repair" procedure

Terminal and Connector Inspection

1. 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.
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

1. Measure the resistance between signal terminal and ground terminal of ECTS connector. (Component side)
   Specification

Temp.(°C)	Temp.(°F)	Resistance(kΩ)
-20	-4	14.1 ~ 16.8
0	32	Approx. 5.8
20	68	2.3 ~ 2.6
40	104	Approx. 1.2
60	140	Approx. 0.6
80	176	Approx. 0.3

2. Is resistance within the specification?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ Check ECTS for contamination, deterioration, or damage. Substitute with a known-good ECTS and check for proper operation. If the problem is corrected, replace ECTS and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

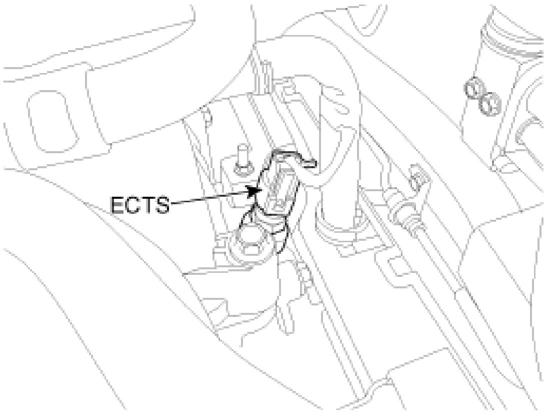
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The 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 ECM is supplied to the ECTS via a resistor in the ECM. That is, the resistor in the ECM 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 ECM increases the fuel injection duration and controls the ignition timing using the information of engine coolant temperature to avoid engine stalling and improve drivability.

DTC Description

ECM sets DTC P0118 if the ECM detects signal voltage higher than the possible range of a properly operating ECTS.

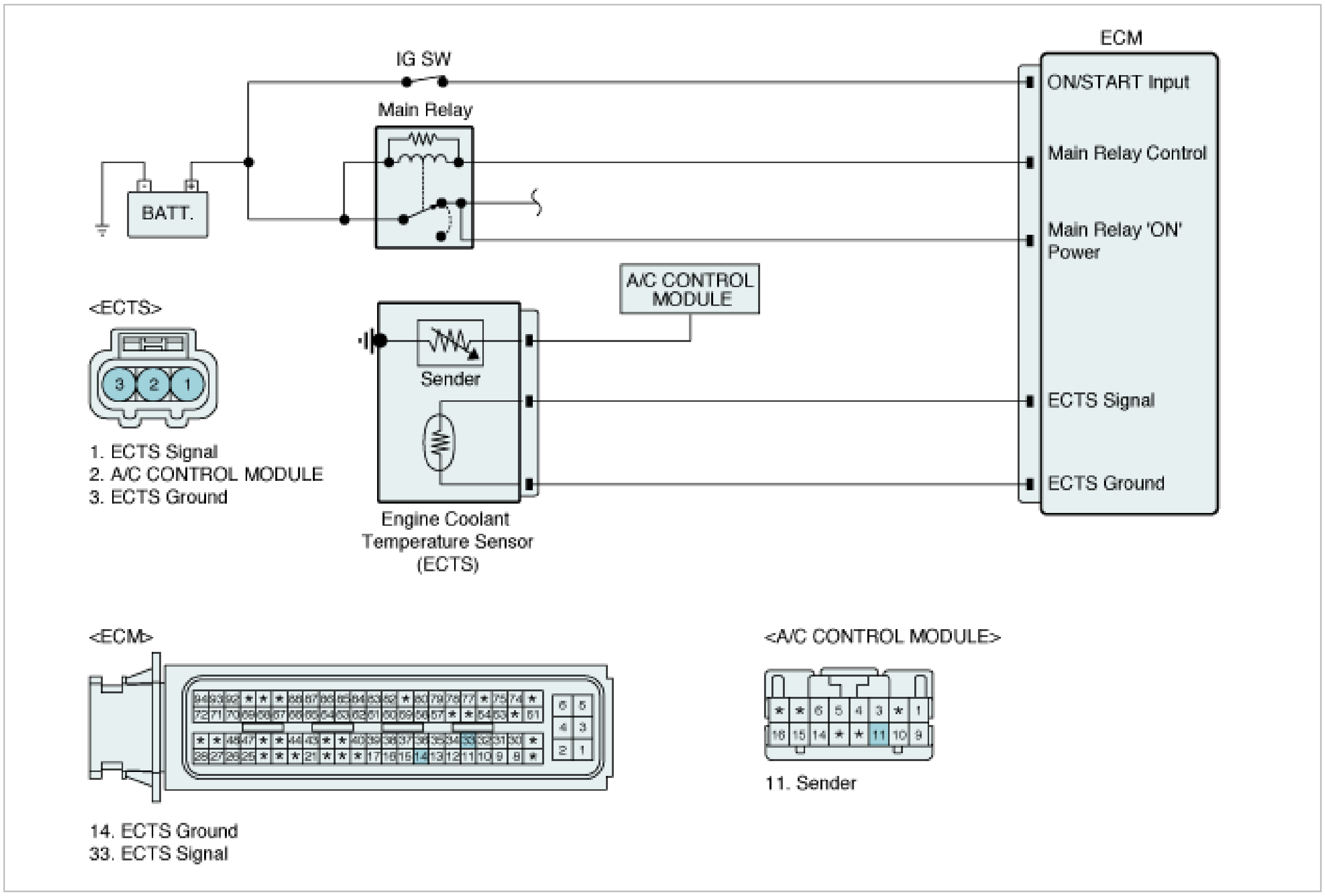
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage range check	• Short to battery in signal harness • Open in signal or ground circuit • Poor connection or damaged harness • Faulty ECT sensor
Enable Conditions	• 6V< Battery voltage • IAT >-30°C(-22°F) or IAT <-30°C(-22°F) • Time after start > 60sec.	
Threshold Value	• ECTS voltage > 4.94V	
Diagnostic Time	• 1sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

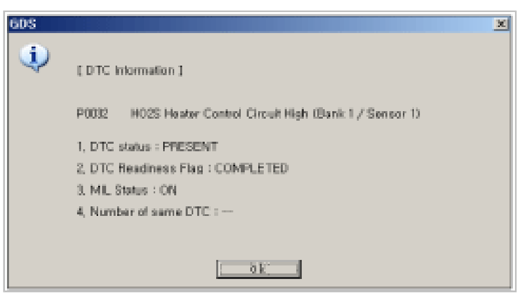
Temp.(°C)	Temp.(°F)	Resistance(kΩ)	Temp.(°C)	Temp.(°F)	Resistance(kΩ)
-20	-4	14.1 ~ 16.8	40	104	Approx. 1.2
0	32	Approx. 5.8	60	140	Approx. 0.6
20	68	2.3 ~ 2.6	80	176	Approx. 0.3

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Ground circuit inspection

1. Ignition "OFF"
2. Disconnect ECTS connector
3. Measure the resistance between ground terminal of ECTS harness connector and chassis ground.

Specification : Approx. 0Ω

4. Is the resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Repair open circuit and go to "Verification of Vehicle Repair" procedure

Signal Circuit Inspection

1. Check for short to battery in signal harness
   (1) Disconnect ECM connector.
   (2) Ignition "ON" & Engine "OFF"
   (3) Measure the voltage between signal terminal of the sensor harness connector and chassis ground.

   Specification : Approx. 0V

   (4) Is voltage within the specification?

YES	▸ Go to "Terminal and Connector Inspection" procedure
NO	▸ Check for short to battery or open in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

2. Check for open in signal harness
   (1) Ignition "OFF"
   (2) Measure the resistance between signal terminal of ECTS harness connector and signal connector of ECM harness connector.

   Specification : Approx. 0Ω

   (3) Is the resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Check for open in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Terminal and Connector Inspection

1. 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.
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 next step as below

Component Inspection

1. Measure the resistance between signal terminal and ground terminal of ECTS connector. (Component side)
   Specification

Temp.(°C)	Temp.(°F)	Resistance(kΩ)
-20	-4	14.1 ~ 16.8
0	32	Approx. 5.8
20	68	2.3 ~ 2.6
40	104	Approx. 1.2
60	140	Approx. 0.6
80	176	Approx. 0.3

2. Is resistance within the specification?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ Check ECTS for contamination, deterioration, or damage. Substitute with a known-good ECTS and check for proper operation. If the problem is corrected, replace ECTS and then go to "Verification of Vehicle Repair" procedure.

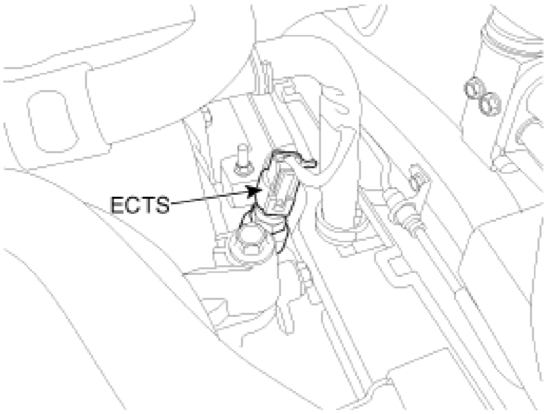
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The 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 ECM is supplied to the ECTS via a resistor in the ECM. That is, the resistor in the ECM 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 ECM increases the fuel injection duration and controls the ignition timing using the information of engine coolant temperature to avoid engine stalling and improve drivability.

DTC Description

ECM sets DTC P0119 if the ECM detects signal increasing ratio exceeds the possible range of a properly operating ECTS.

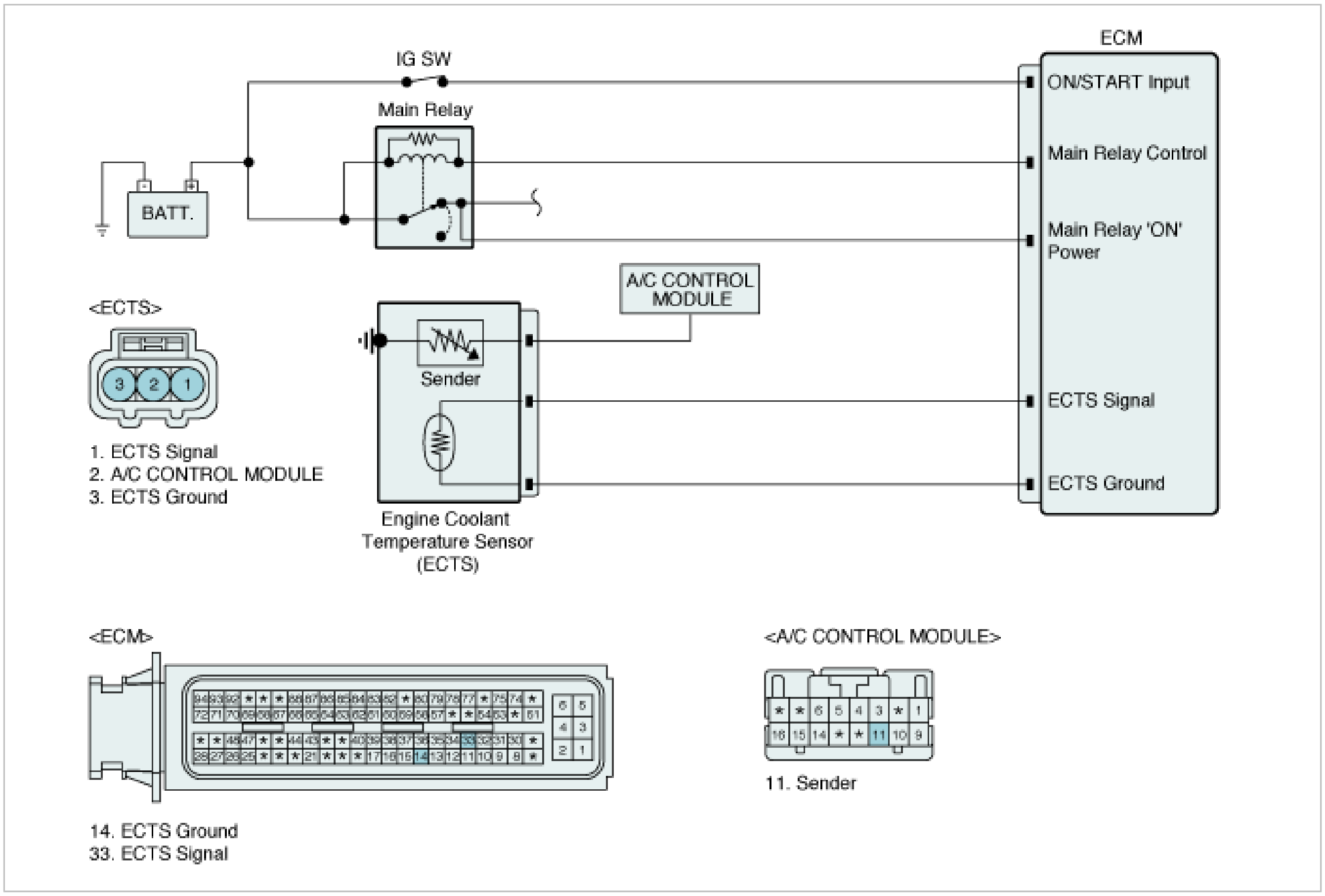
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Signal noise check	• Poor connection or damaged harness • Faulty ECT sensor
Enable Conditions	• No relevant failure • Battery voltage >6V	
Threshold Value	• Signal variation > 5°C(9°F)	
Diagnostic Time	• 0.5 sec.	
MIL On Condition	• 2 Driving Cycles	

Specification

Temp.(°C)	Temp.(°F)	Resistance(kΩ)	Temp.(°C)	Temp.(°F)	Resistance(kΩ)
-20	-4	14.1 ~ 16.8	40	104	Approx. 1.2
0	32	Approx. 5.8	60	140	Approx. 0.6
20	68	2.3 ~ 2.6	80	176	Approx. 0.3

Diagnostic Circuit Diagram

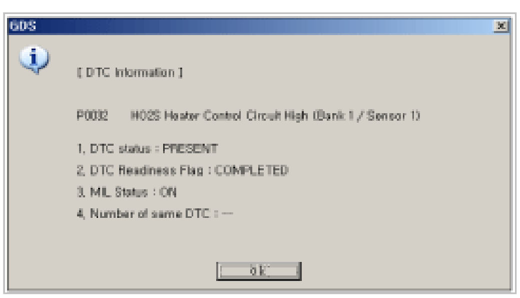


Monitor DTC Status

NOTE

If any DTCs relating to ECTS are stored, do ALL REPAIRS associated with those codes before proceeding with further troubleshooting

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Monitor GDS Data

1. Allow the engine to cool completely
2. Run the cold engine at idle for 5 minutes and observe cooling fan status.

> NOTE
>
> Ensure that the A/C is OFF

3. Check the engine coolant temperature parameter at idle with the GDS.
4. Is the engine coolant temperature increase to above 50°C(122°F)

YES	▸ Go to "Terminal and Connector Inspection" procedure
NO	▸ Go to next step as below

5. Are the cooling fans running when engine coolant temperature is low(less than approximately 98°C(208°F)) with A/C OFF?

YES	▸ Check for short circuit in cooling fan harness or cooling fan relay. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ - With ignition "ON", Install scantool and select "COOLING FAN RELAY" on the Actuation Test mode. - Activates "COOLING FAN RELAY" by pressing "STRT(F1)" key - Repeat this procedure 4 or 5 times to ensure cooling fan reliability. - If cooling fan works properly, go to next step as below - If NG, check for intermittent fault caused by poor contact in the sensor's and/or ECM's connector. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

System Inspection

1. Coolant Level Inspection
   (1) Check the cooling system coolant level.
   (2) Is the coolant in the reservoir at the proper level?

YES	▸ Go to next step as below
NO	▸ Repair or add engine coolant as necessary and go to "Verification of Vehicle Repair" procedure

2. Thermostat Inspection
   (1) Check if the thermostat bypass valve is stuck in the open position or if the correct type of thermostat was installed. Replace thermostat as necessary and go to "Verification of Vehicle Repair" procedure
   (2) Check the valve opening temperature of the thermostat

   Specification(Valve opening temperature) : 80~84°C(176~183°F)

   (3) If the opening temperature is not as specified, Replace thermostat as necessary and go to "Verification of Vehicle Repair" procedure.If OK, go to next step as below
3. ECT Sensor Inspection
   (1) Ignition "OFF"

(2) Disconnect ECTS connector

(3) Measure the resistance between signal terminal and ground terminal of ECTS connector. (Component side)

Specification

Temp.(°C)	Temp.(°F)	Resistance(kΩ)
-20	-4	14.1 ~ 16.8
0	32	Approx. 5.8
20	68	2.3 ~ 2.6
40	104	Approx. 1.2
60	140	Approx. 0.6
80	176	Approx. 0.3

(4) Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Check ECTS for contamination, deterioration, or damage. Substitute with a known-good ECTS and check for proper operation. If the problem is corrected, replace ECTS and then go to "Verification of Vehicle Repair" procedure.

Terminal and Connector Inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

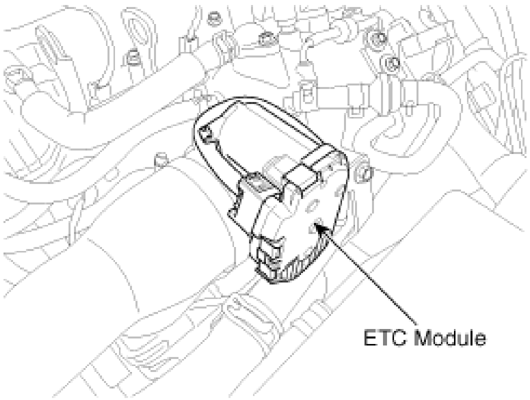
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Electronic Throttle Control(ETC) system is made of the components throttle body, Throttle Position Sensor(TPS)1&2 and Accelerator Position Sensor(APS) 1&2. TPS1&2 are sharing the same source voltage and ground. The throttle valve opening is control by throttle motor which is controlled by Engine Control Module(ECM). The opposite position indicator shows inverted signal characteristics. TPS1 output voltage increases smoothly in proportion with the throttle valve opening angle after starting. TPS2 output voltage decreases in inverse proportion with the throttle valve opening angle after starting. TPS provides feedback to the ECM to control the throttle motor in order to control the throttle valve opening angle properly in response to the driving condition.

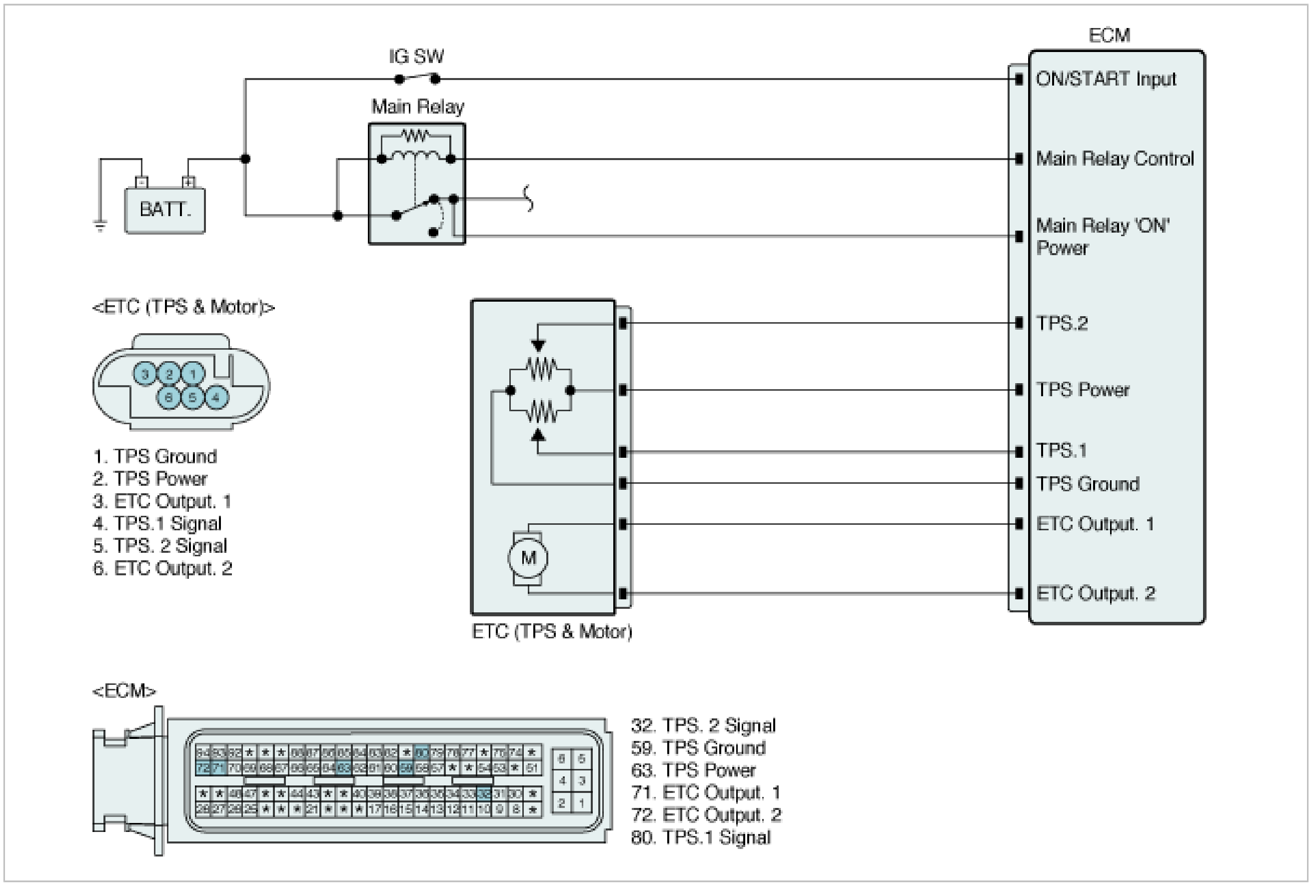
DTC Description

The DTC P0121 is set when the intake manifold model filtered reduced area controller is out of range in low or high load.

DTC Detecting Condition

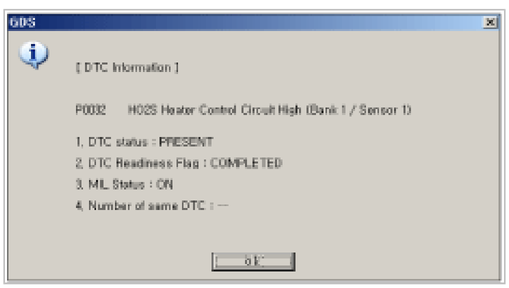
Item	Detecting Condition	Possible Cause
DTC Strategy	• Plausibility check between TPS1 and TPS2	• Faulty TPS1 • Poor connection or damaged harness
Enable Conditions	• No engine stop and engine start • No TPS adaptation request • No relevant failure	
Threshold Value	• An absolute value of TPS2 - TPS1 > 7.6%	
Diagnostic Time	• 0.3sec.	
MIL On Condition	• 1 Driving Cycle	
Fail Safe	• Forced limited power mode : When the DTC is set, the ECM reduces engine torque by 25% of normal value. • The ECM uses TPS2 signal to monitor the controlled opening angle of the throttle valve.	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

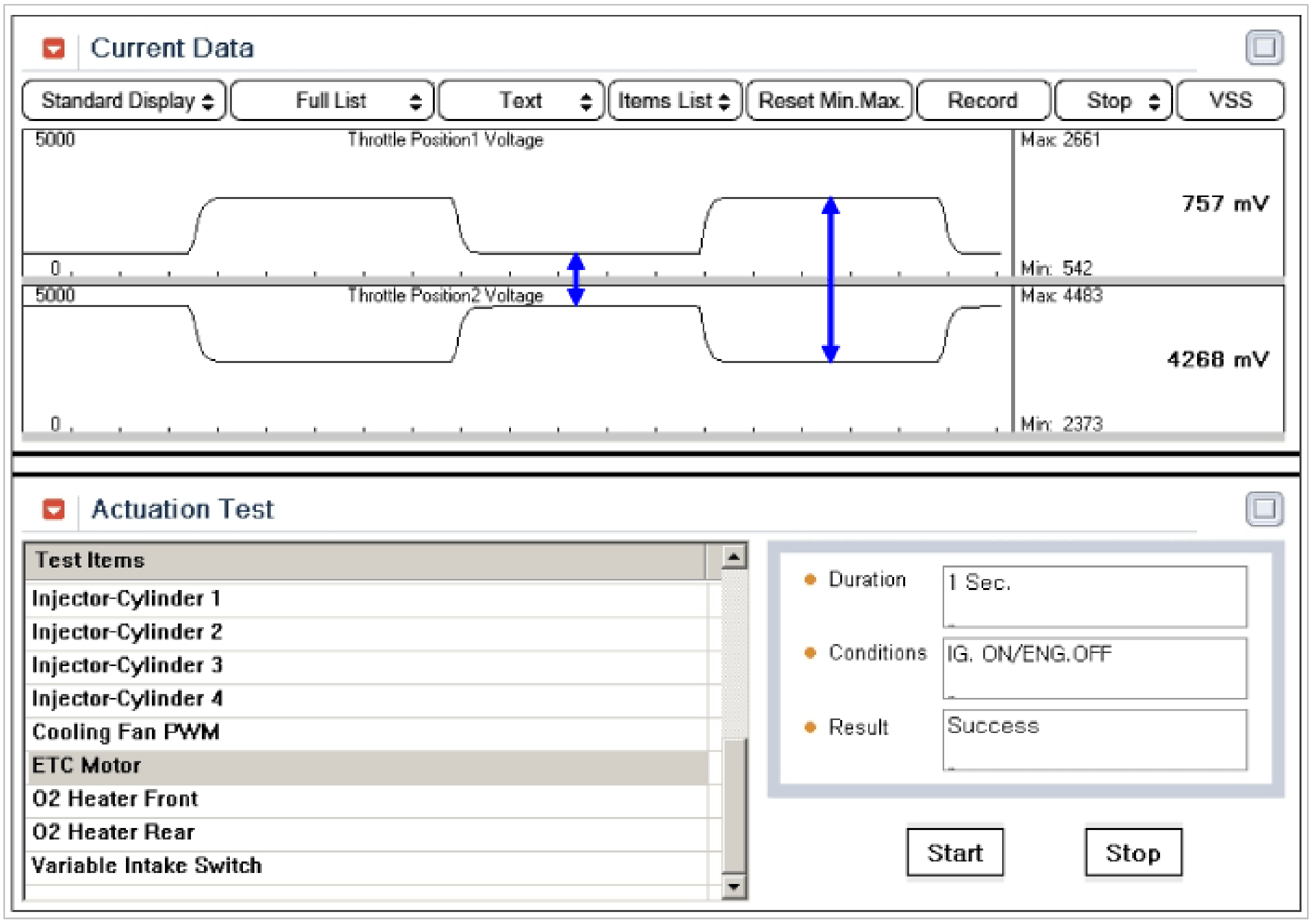
Terminal and connection inspection

1. 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.
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

1. Select 'Actuation Test' mode and execute 'ETC motor' item.



▶ During 'ETC Motor' test, TPS1 and TPS2 show symmetrical movements.

2. Is the waveform normal?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Check ETC for contamination, deterioration, or damage. Substitute with a known-good ETC and check for proper operation. If the problem is corrected, replace TPS and then go to "Verification of Vehicle Repair" procedure.

NOTE

It is necessary to perform the TPS adaptation procedure after the ETC assembly or ECM replacing.
■ TPS adaptation procedure
Ignition "OFF" and then "ON" without cranking. Wait for 10 seconds under enable conditions.
→ Enable conditions : Battery >10V & Intake Air Temp. >5.3°C(41.5°F) & 5.3°C(41.5°F) < Engine CoolantTemp. < 99.8°C(211.6°F)

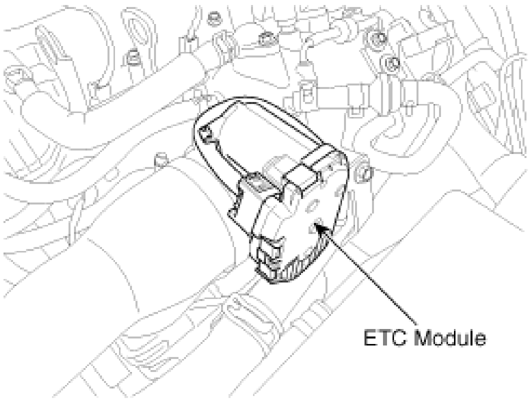
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Electronic Throttle Control(ETC) system is made of the components throttle body, Throttle Position Sensor(TPS)1&2 and Accelerator Position Sensor(APS) 1&2. TPS1&2 are sharing the same source voltage and ground. The throttle valve opening is control by throttle motor which is controlled by Engine Control Module(ECM). The opposite position indicator shows inverted signal characteristics. TPS1 output voltage increases smoothly in proportion with the throttle valve opening angle after starting. TPS2 output voltage decreases in inverse proportion with the throttle valve opening angle after starting. TPS provides feedback to the ECM to control the throttle motor in order to control the throttle valve opening angle properly in response to the driving condition.

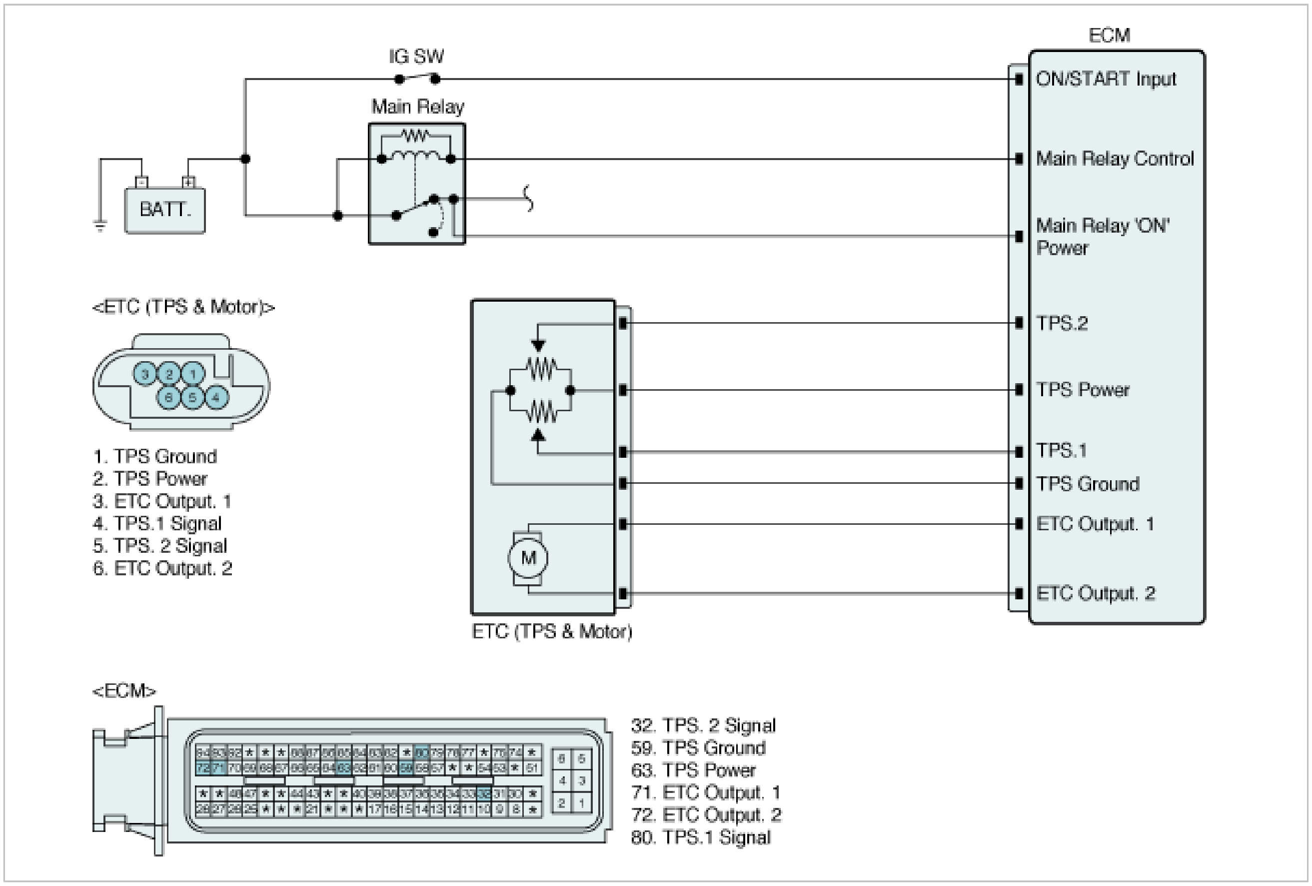
DTC Description

ECM sets DTC P0122 if the ECM detects signal voltage lower than the possible range of a properly operating TPS1.

DTC Detecting Condition

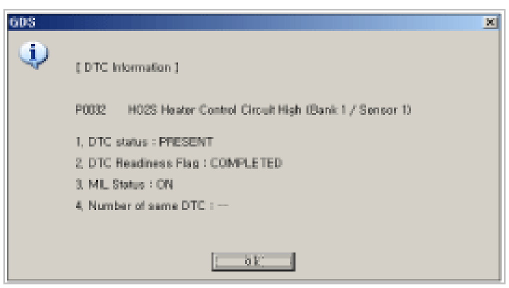
Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage range check	• Open in power supply or signal harness • Short to ground in power supply or signal harness • Poor connection or damaged harness • Faulty TPS1
Enable Conditions	• Ignition "ON"	
Threshold Value	• TPS1 < 0.12V	
Diagnostic Time	• 0.05 sec.	
MIL On Condition	• 1 Driving Cycle	
Fail Safe	• Forced limited power mode : When the DTC is set, the ECM reduces engine torque by 25% of normal value. • The ECM uses TPS2 signal to monitor the controlled opening angle of the throttle valve.	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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

■ Power Circuit Preliminary Inspection

1. IG KEY OFF.
2. Disconnect ETC connector.
3. IG KEY ON.
4. Measure voltage between TPS power circuit of ETC harness connector and chassis ground.

Specification : Approx. 5V

5. Is voltage within the specification?

YES	▶ Go to 'Signal Circuit Inspection' procedure.
NO	▶ Go to next procedure.

■ Check for Short to Ground in Power Circuit

1. IG KEY OFF.
2. Disconnect ETC connector.
3. IG KEY ON.
4. Measure resistance between TPS power terminal of ETC harness connector and chassis ground.

Specification : Infinite

5. Is resistance within specification?

YES	▶ Go to next procedure.
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ Check Open in Power Circuit

1. IG KEY OFF.
2. Disconnect ETC connector and ECM connector.
3. Measure resistance between both ends of TPS Power line.

Specification : Below 1Ω

4. Is resistance within specification?

YES	▶ Go to next procedure.
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Signal Circuit Inspection

■ **Check for Short to Ground in Signal Circuit**

1. IG KEY OFF.
2. Disconnect ETC connector.
3. Measure resistance between TPS1 signal terminal of ETC harness connector and chassis ground.

Specification : Infinite

4. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ **Check for Open in Signal Circuit**

1. IG KEY OFF.
2. Disconnect ETC connector and ECM connector.
3. Measure resistance between both ends of TPS1 signal line.

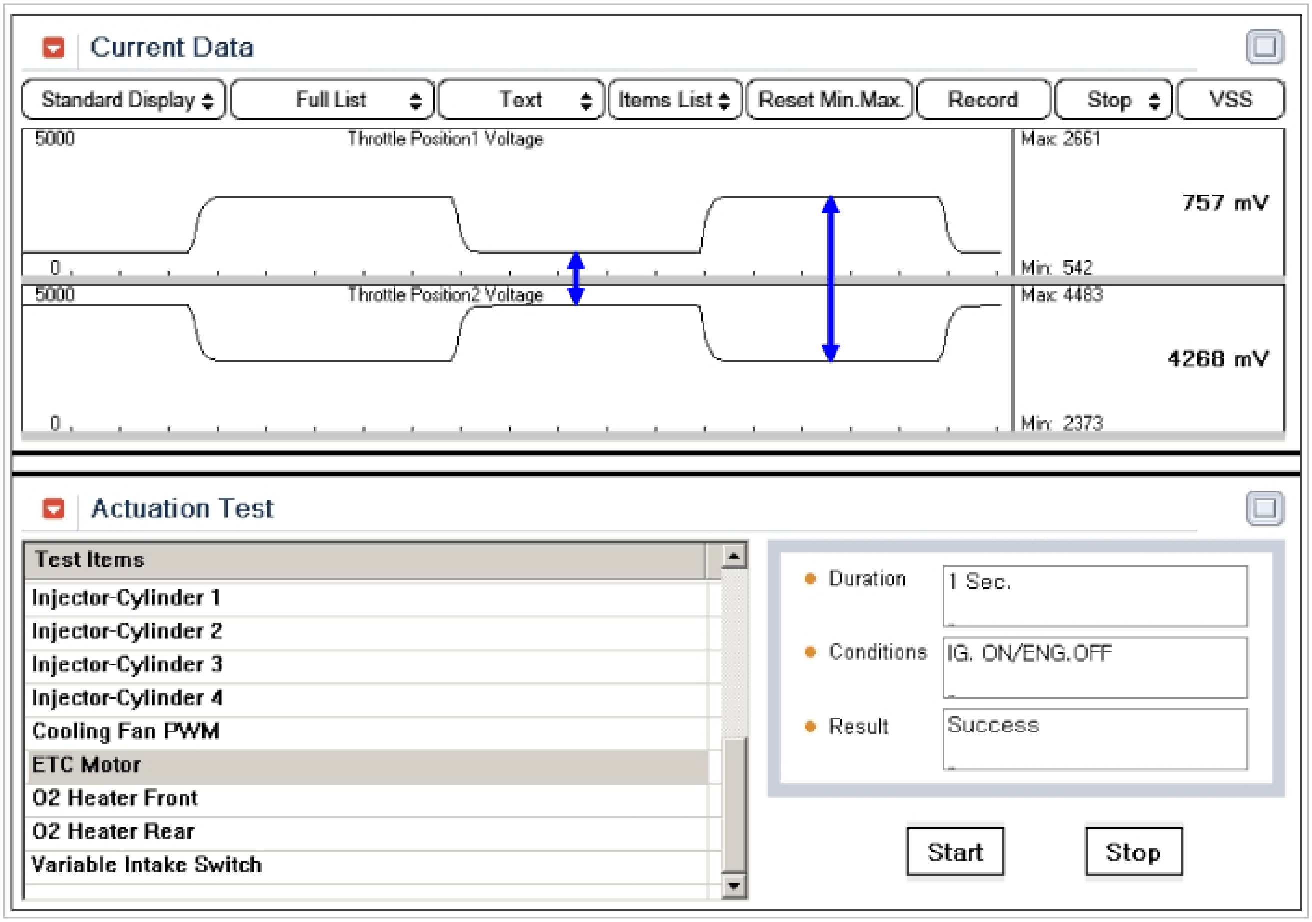
Specification : Below 1Ω.

4. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Select 'Actuation Test' mode and execute 'ETC motor' item.



▸ During 'ETC Motor' test, TPS1 and TPS2 show symmetrical movements.

2. Is the waveform normal?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check ETC for contamination, deterioration, or damage. Substitute with a known-good ETC and check for proper operation. If the problem is corrected, replace TPS and then go to "Verification of Vehicle Repair" procedure.

NOTE

It is necessary to perform the TPS adaptation procedure after the ETC assembly or ECM replacing.
■ TPS adaptation procedure
Ignition "OFF" and then "ON" without cranking. Wait for 10 seconds under enable conditions.
→ Enable conditions : Battery >10V & Intake Air Temp. >5.3°C(41.5°F) & 5.3°C(41.5°F) < Engine CoolantTemp. < 99.8°C(211.6°F)

Verification of Vehicle Repair

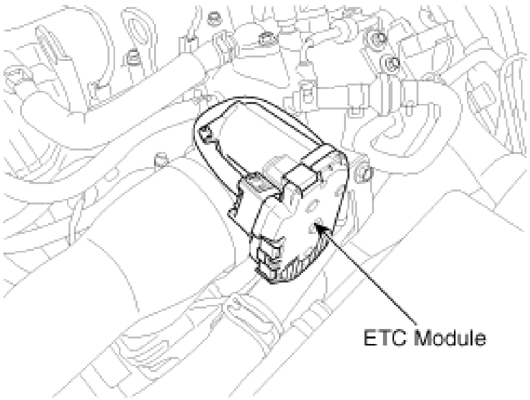
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0123 Throttle Position Sensor 1 Signal Circuit High Input

Component Location



General Description

The Electronic Throttle Control(ETC) system is made of the components throttle body, Throttle Position Sensor(TPS)1&2 and Accelerator Position Sensor(APS) 1&2. TPS1&2 are sharing the same source voltage and ground. The throttle valve opening is control by throttle motor which is controlled by Engine Control Module(ECM). The opposite position indicator shows inverted signal characteristics. TPS1 output voltage increases smoothly in proportion with the throttle valve opening angle after starting. TPS2 output voltage decreases in inverse proportion with the throttle valve opening angle after starting. TPS provides feedback to the ECM to control the throttle motor in order to control the throttle valve opening angle properly in response to the driving condition.

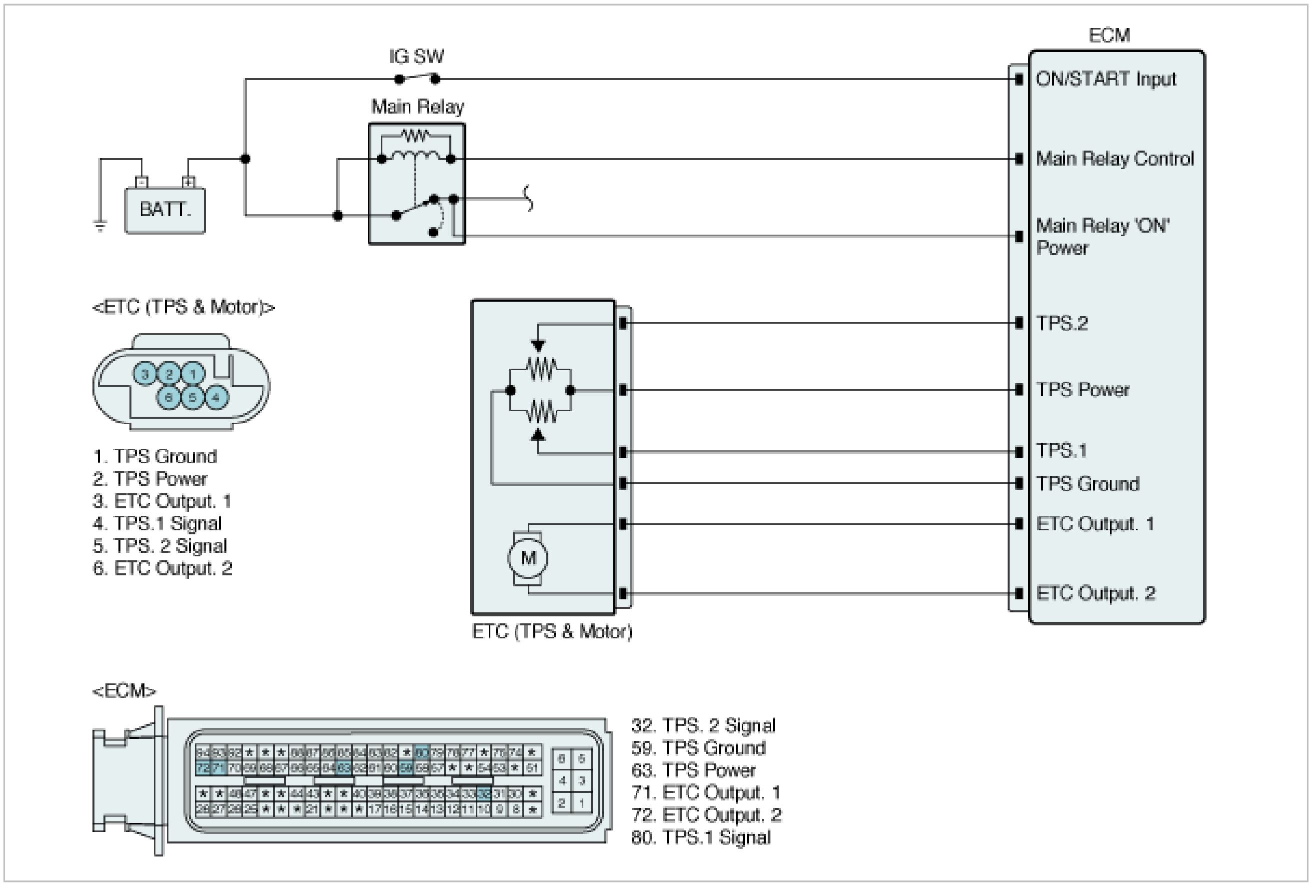
DTC Description

ECM sets DTC P0123 if the ECM detects signal voltage higher than the possible range of a properly operating TPS1.

DTC Detecting Condition

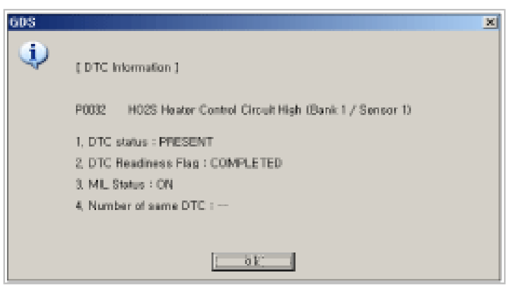
Item		Detecting Condition	Possible Cause
DTC Strategy		• Short to Battery or Open circuit	• Open in ground circuit • Short to battery in signal circuit • Poor connection or damaged harness • Faulty TPS1
Case1	Enable Conditions	• Ignition "ON"	
	Threshold Value	• TPS1 > 4.9V	
Case2	Enable Conditions	• Ignition "ON" • In idle status • Target throttle angle < 58% • MAF Limphome detected or TPS2 failure detected	
	Threshold Value	• TPS1 > 3.0V	
Diagnostic Time		• 0.05 sec.	
MIL On Condition		• 1 driving cycle	
Fail Safe		• Forced limited power mode : When the DTC is set, the ECM reduces engine torque by 25% of normal value. • The ECM uses TPS2 signal to monitor the controlled opening angle of the throttle valve.	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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 "Ground Circuit Inspection" procedure

Ground Circuit Inspection

■ **Check for Open in Ground Circuit**

1. IG KEY OFF.
2. Disconnect ETC connector and ECM connector.
3. Measure resistance between both ends of TPS ground line.

Specification : Below 1Ω.

4. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Signal Circuit Inspection

■ **Check for Short to Power in Signal Circuit**

1. IG KEY OFF.
2. Disconnect ETC connector.
3. IG KEY ON.
4. Measure voltage between TPS1 signal terminal of ETC harness connector and chassis ground.

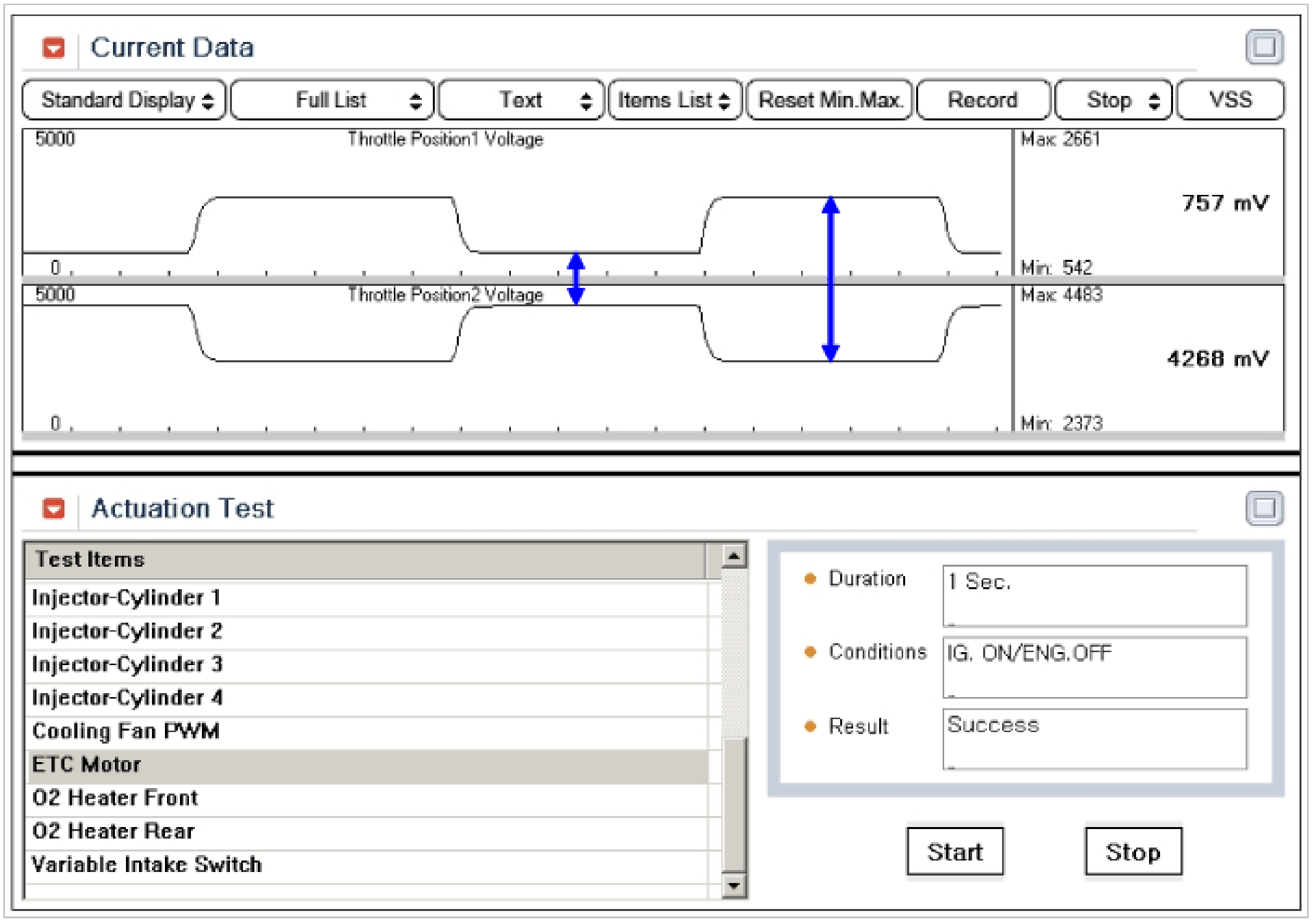
Specification : Approx. 0 V

5. Is voltage within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Select 'Actuation Test' mode and execute 'ETC motor' item.



▸ During 'ETC Motor' test, TPS1 and TPS2 show symmetrical movements.

2. Is the waveform normal?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check ETC for contamination, deterioration, or damage. Substitute with a known-good ETC and check for proper operation. If the problem is corrected, replace TPS and then go to "Verification of Vehicle Repair" procedure.

NOTE

It is necessary to perform the TPS adaptation procedure after the ETC assembly or ECM replacing.
■ TPS adaptation procedure
Ignition "OFF" and then "ON" without cranking. Wait for 10 seconds under enable conditions.
→ Enable conditions : Battery >10V & Intake Air Temp. >5.3°C(41.5°F) & 5.3°C(41.5°F) < Engine CoolantTemp. < 99.8°C(211.6°F)

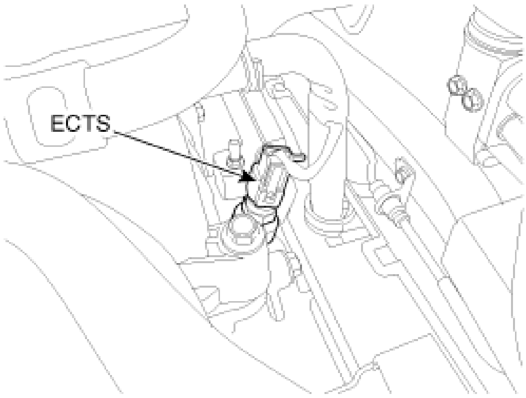
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

An Engine Coolant Temperature Sensor (ECTS) monitors the temperature of the coolant. This input is used by the ECM for engine control and as an enabling criteria for related diagnostics. The air flow coming into the engine is accumulated and used to determine if the engine has been driven within conditions that would allow the engine coolant to heat up normally to the thermostat regulating temperature. If the coolant temperature does not reach regulating temperature of the thermostat, diagnostics that use engine coolant temperature as enabling criteria, may not run when expected.
This DTC will set when there has been excessive time to reach a minimum coolant temperature required for closed loop fuel control.

DTC Description

The purpose of this diagnosis is to monitor the minimum coolant temperature that enables lambda closed loop control after start. Minimum coolant temperature to run lambda control must be reached before the threshold time predetermined according to intake air temperature at start. If the lambda control is not active because of low engine coolant temperature within predetermined minimum time after start, the ECM sets DTC P0125.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Coolant temperature too low for Lambda regulation	• Faulty cooling system • Faulty ECT sensor • Poor connection or damaged harness
Enable Conditions	• Coolant temp. at start < 5°C(50°F) • Minimum time(0°C : approx.50sec, 8°C : approx.100sec, 20°C : 200sec., 36°C : 300sec.) after start versus coolant temperature at Start • No relevant failure • 11V < Battery voltage < 16V	
Threshold Value	• Coolant temperature signal < 5 °C	
Diagnostic Time	• Immediate	
Mil On Condition	• 2 Driving Cycles	

Specification

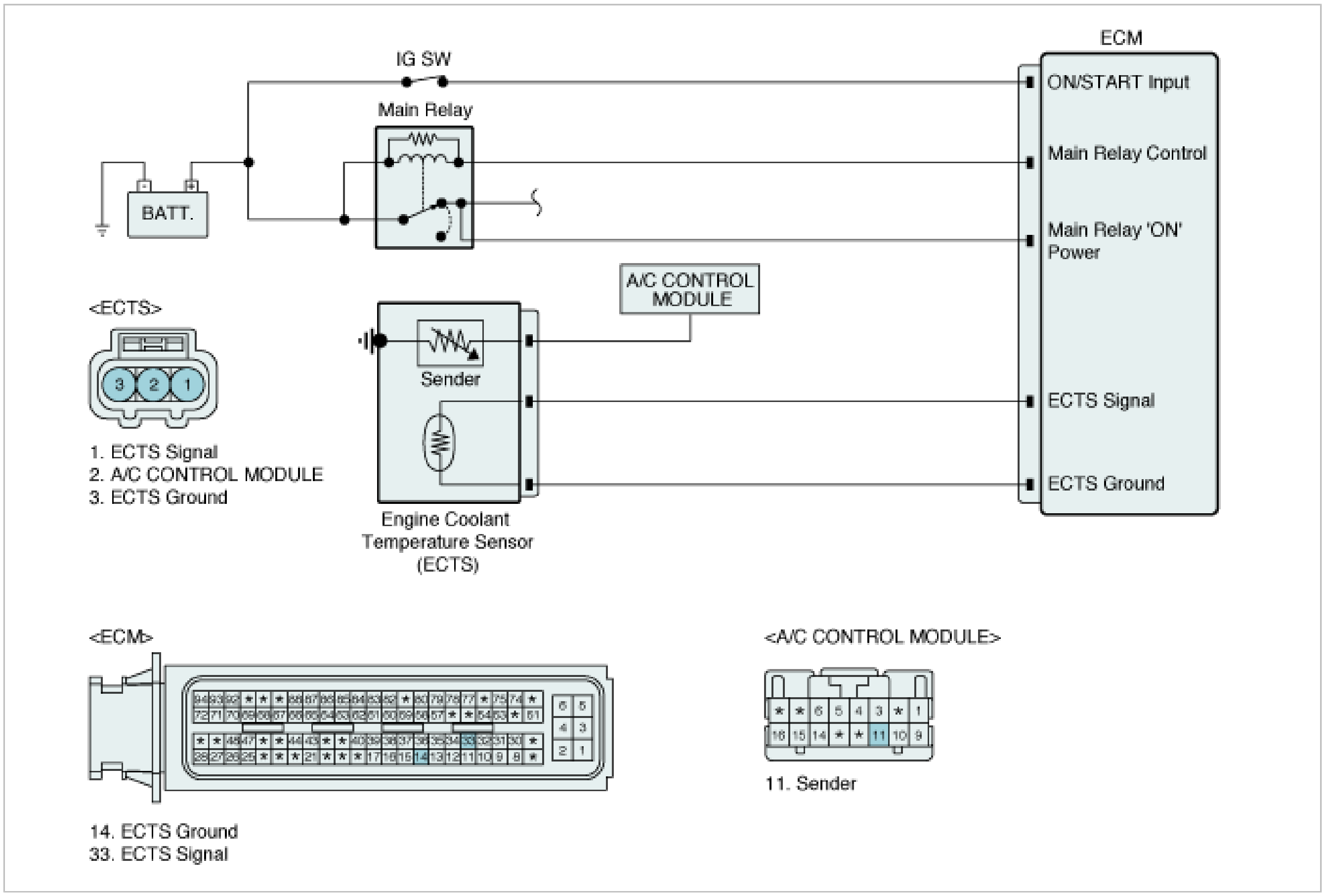
[ECTS]

Temp.(°C)	Resistance(kΩ)	Temp.(°C)	Resistance(kΩ)
-20	14.1 ~ 16.8	40	Approx. 1.2
0	Approx. 5.8	60	Approx. 0.6
20	2.3 ~ 2.6	80	Approx. 0.3

[THERMOSTAT]

THERMOSTAT	Normal Parameter
Valve Opening Temp.	80~84°C
Valve Closing Temp.	77°C
Full Open Lift	Approx. 8mm(95°C)

Diagnostic Circuit Diagram

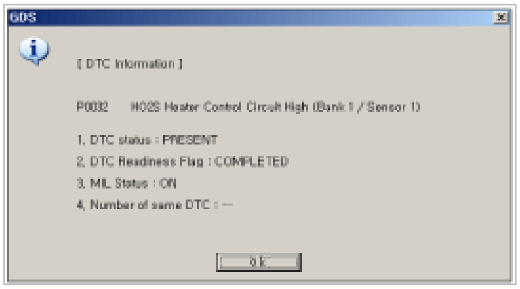


Monitor DTC Status

NOTE

If any codes relating to ECTs are stored, do ALL REPAIRS associated with those codes before proceeding with this troubleshooting

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Monitor GDS Data

1. Allow the engine to cool completely
2. Run the cold engine at idle for 5 minutes and observe cooling fan status.

> NOTE
>
> Ensure that the A/C is OFF

3. Check the engine coolant temperature parameter at idle with the scantool.
4. Is the engine coolant temperature increase to above 50°C (122°F)

YES	▶ Go to "Terminal and Connector Inspection" procedure
NO	▶ Go to next step as below

5. Are the cooling fans running when engine coolant temperature is low (less than approximately 98°C(208°F)) with A/C OFF?

YES	▶ Check for short circuit in cooling fan harness or cooling fan relay. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ -With ignition "ON", Install scantool and select "COOLING FAN RELAY" on the Actuation Test mode. - Activates "COOLING FAN RELAY" by click "Start" button. - Repeat this procedure 4 or 5 times to ensure cooling fan reliability. - If cooling fan works properly, go to next step as below - If NG, check for intermittent fault caused by poor contact in the sensor’s and/or ECM’s connector. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

System Inspection

1. Coolant Level Inspection

(1) Check the cooling system coolant level.

(2) Is the coolant in the reservoir at the proper level?

YES	▸ Go to next step as below.
NO	▸ Repair or add engine coolant as necessary and go to "Verification of Vehicle Repair" procedure.

2. Thermostat Inspection
   (1) Check if the thermostat bypass valve is stuck in the open position or if the correct type of thermostat was installed. Replace thermostat as necessary and go to "Verification of Vehicle Repair" procedure
   (2) Check the valve opening temperature of the thermostat

   Specification(Valve opening temperature) : 80~84°C(176~183°F)

   (3) If the opening temperature is not as specified, Replace thermostat as necessary and go to "Verification of Vehicle Repair" procedure.ECM
   If OK, go to next step as below

3. ECT Sensor Inspection
   (1) Ignition "OFF"
   (2) Disconnect ECTS connector
   (3) Measure the resistance between signal terminal and ground terminal of ECTS connector. (Component side)
   Specification :

Temp.(°C)	Resistance(kΩ)
-20	14.1 ~ 16.8
0	Approx. 5.8
20	2.3 ~ 2.6
40	Approx. 1.2
60	Approx. 0.6
80	Approx. 0.3

   (4) Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Check ECTS for contamination, deterioration, or damage. Substitute with a known-good ECTS and check for proper operation. If the problem is corrected, replace ECTS and then go to "Verification of Vehicle Repair" procedure.

Terminal and Connector Inspection

1. 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.
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 next step as below

Verification of Vehicle Repair

After a repair, it is essential to verify that the fault has been corrected.
1. Connect GDS and select "DTC Analysis" mode.

2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0128 Coolant Thermostat (Coolant Temperature below Thermostat Regulating Temperature)

General Description

An Engine Coolant Temperature Sensor (ECTS) monitors the temperature of the coolant. This input is used by the ECM for engine control and as an enabling criteria for same diagnostics. The air flow coming into the engine is accumulated and used to determine if the engine has been driven within conditions that would allow the engine coolant to heat up normally to the thermostat regulating temperature. If the coolant temperature does not reach regulating temperature of the thermostat, diagnostics that use engine coolant temperature as enabling criteria, may not run when expected.
This DTC will set when there has been excessive time to reach a minimum coolant temperature required for closed loop fuel control.

DTC Description

An open stuck thermostat means an increase of the engine warm up time and can cause emission increase as well. To detect open stuck thermostat, the ECM checks measured coolant temperature as soon as calculated coolant temperature reaches threshold and sets DTC P0128 when measured coolant temperature is lower than threshold. If same code is set again in the next driving cycle, MIL is illuminated.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Coolant temp.not reached warm up state	• Faulty cooling system • Faulty ECT sensor • Poor connection or damaged harness
Enable Conditions	• Fuel-cut off phase <20% • Low load phase < 50% • 11V < Battery voltage < 16V • Intake air temperature decrease compared to Start Intake air temperature > -10°C(-14°F) • -10°C(14°F) < Coolant temperature at start < 54.4°C (131°F) • -10°C(14°F) < Intake air temperature at start • No high engine speed(4800rpm) with vehicle stopped • No relevant failure • Ambient temperature > -10°C(-14°F) • Percentage of high vehicle speed phase (Vehicle speed > 87 mph) < 90%	
Threshold Value	• Measured coolant temp. < 74°C(165°F) When modelled coolant temp. > 85°C(185°F)	
Diagnostic Time	• 10~30 min. depending on coolant temperature at start and driving pattern	
Mil On Condition	• 2 Driving Cycles	

Specification

[ECTS]

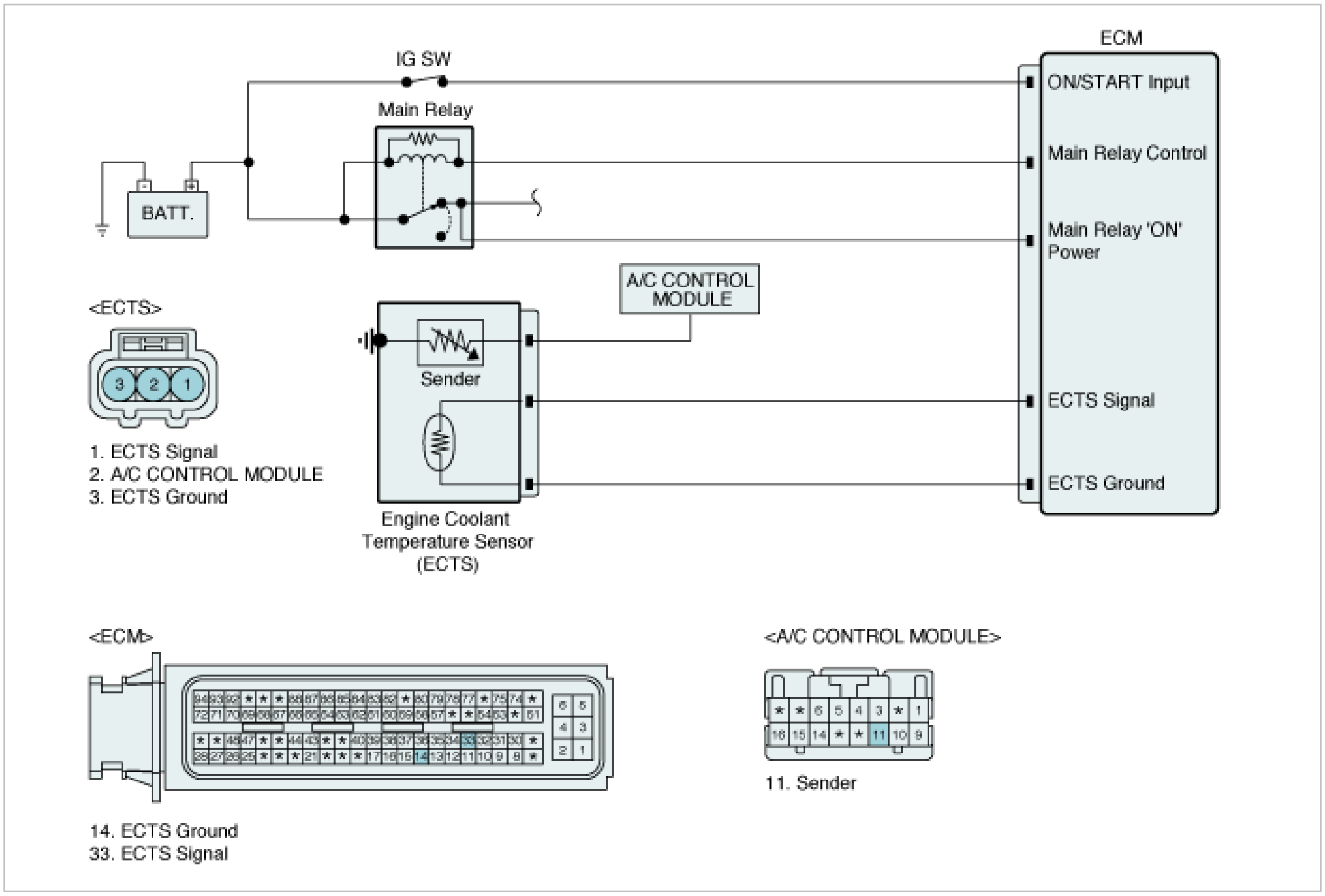
Temp.(°C)	Resistance(kΩ)	Temp.(°C)	Resistance(kΩ)
-20	14.1 ~ 16.8	40	Approx. 1.2
0	Approx. 5.8	60	Approx. 0.6
20	2.3 ~ 2.6	80	Approx. 0.3

[THERMOSTAT]

THERMOSTAT	Normal Parameter
Valve Opening Temp.	80~84°C

Valve Closing Temp.	77°C
Full Open Lift	Approx. 8mm(95°C)

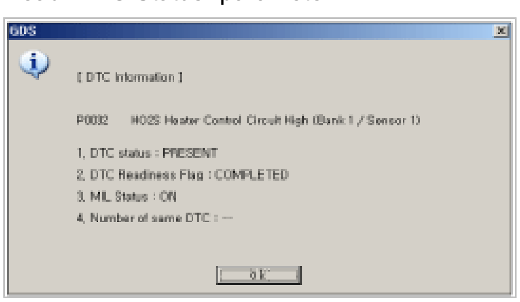
Diagnostic Circuit Diagram



Monitor DTC Status

NOTE
If any codes relating to ECTs are stored, do ALL REPAIRS associated with those codes before proceeding with this troubleshooting

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Monitor GDS Data

1. Allow the engine to cool completely
2. Run the cold engine at idle for 5 minutes and observe cooling fan status.

NOTE

Ensure that the A/C is OFF

3. Check the engine coolant temperature parameter at idle with the GDS.
4. Is the engine coolant temperature increase to above 50°C (122°F)

YES	▶ Go to "Terminal and Connector Inspection" procedure
NO	▶ Go to next step as below

5. Are the cooling fans running when engine coolant temperature is low (less than approximately 98°C(208°F)) with A/C OFF?

YES	▶ Check for short circuit in cooling fan harness or cooling fan relay. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ -With ignition "ON", Install scantool and select "COOLING FAN RELAY" on the Actuation Test mode. - Activates "COOLING FAN RELAY" by click "Start" button. - Repeat this procedure 4 or 5 times to ensure cooling fan reliability. - If cooling fan works properly, go to next step as below - If NG, check for intermittent fault caused by poor contact in the sensor's and/or ECM's connector. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

System Inspection

1. Coolant Level Inspection
   (1) Check the cooling system coolant level.
   (2) Is the coolant in the reservoir at the proper level?

YES	▶ Go to next step as below.
NO	▶ Repair or add engine coolant as necessary and go to "Verification of Vehicle Repair" procedure.

2. Thermostat Inspection
   (1) Check if the thermostat bypass valve is stuck in the open position or if the correct type of thermostat was installed. Replace thermostat as necessary and go to "Verification of Vehicle Repair" procedure
   (2) Check the valve opening temperature of the thermostat

Specification(Valve opening temperature) : 80~84°C(176~183°F)

(3) If the opening temperature is not as specified, Replace thermostat as necessary and go to "Verification of Vehicle Repair" procedure.
If OK, go to next step as below

3. ECT Sensor Inspection
   (1) Ignition "OFF"
   (2) Disconnect ECTS connector
   (3) Measure resistance between terminals 1 and 3 of the sensor connector(Component side)
   Specification :

Temp.(°C)	Resistance(kΩ)
-20	14.1 ~ 16.8
0	Approx. 5.8
20	2.3 ~ 2.6
40	Approx. 1.2
60	Approx. 0.6
80	Approx. 0.3

   (4) Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Check ECTS for contamination, deterioration, or damage. Substitute with a known-good ECTS and check for proper operation. If the problem is corrected, replace ECTS and then go to "Verification of Vehicle Repair" procedure

Terminal and Connector Inspection

1. 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.
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 next step as below

Verification of Vehicle Repair

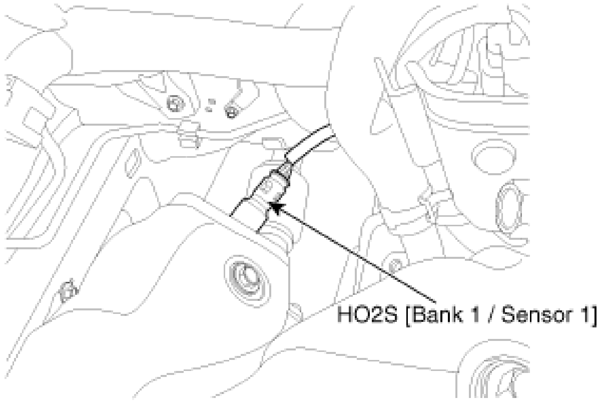
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0130 O2 Sensor Circuit(Bank 1 / Sensor 1)

Component Location



General Description

The HO2S(Heated Oxygen Sensor) is used to supply the ECM with information regarding the composition of the air/fuel mixture. The HO2S is positioned in the exhaust pipe ahead of the TWC. To measure the oxygen content, the HO2S requires a supply of ambient air as a reference. Since this is supplied through the wiring, the lead must not be clamped or damaged in any other way. The HO2S produces a voltage that varies between 0.1V and 0.9V under normal operating conditions. The Engine Control Module (ECM) monitors this voltage and determines if the exhaust gas is lean or rich. If the voltage input at the ECM is under approx. 0.45V the exhaust is lean, and if the voltage input is over approx. 0.45V the exhaust is rich. The ECM constantly monitors the HO2S signal during closed loop operation and compensates for a rich or lean condition by decreasing or increasing injector pulse width as necessary.

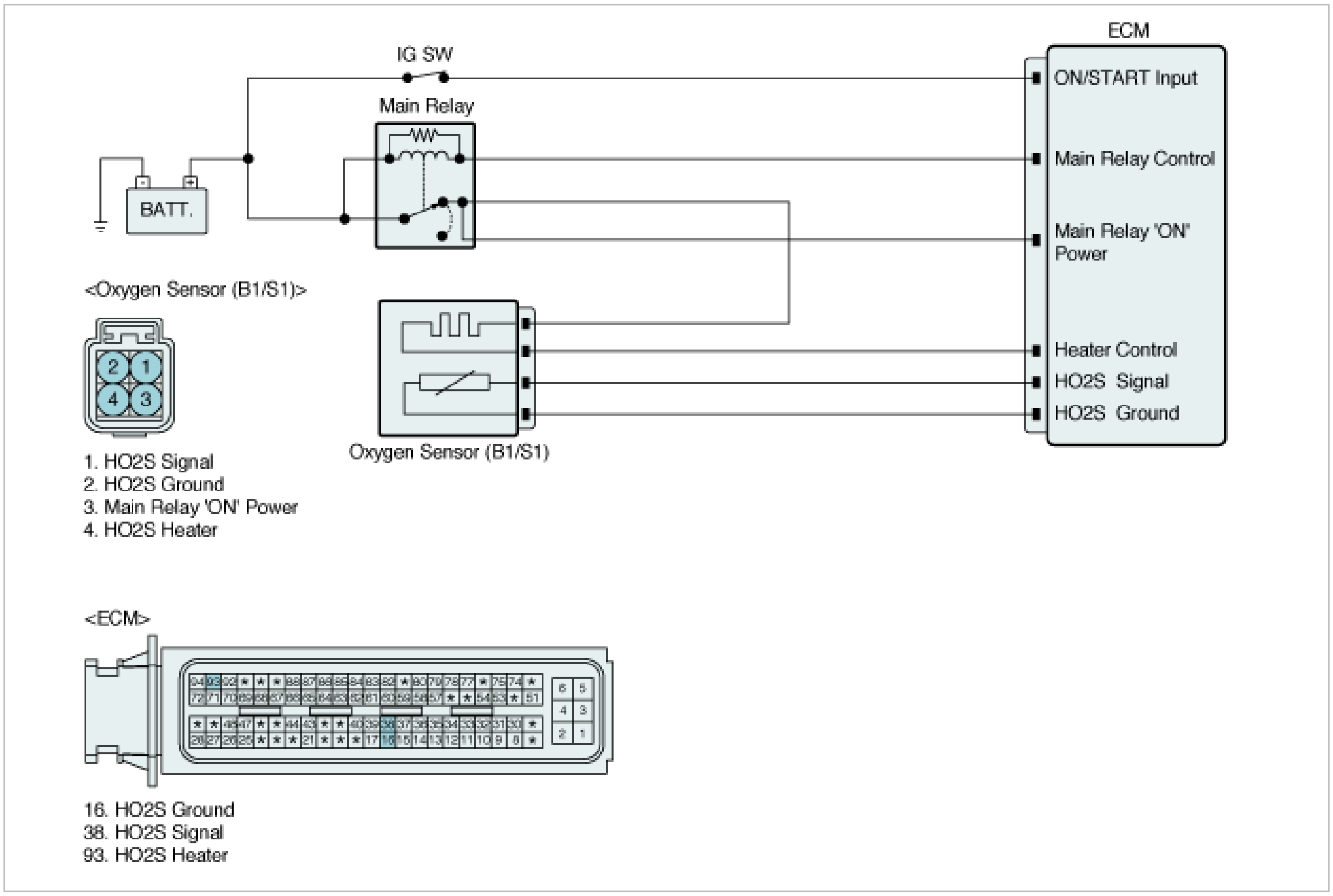
DTC Description

ECM sets DTC P0130 if the ECM detects that the front HO2S signal circuit is open.

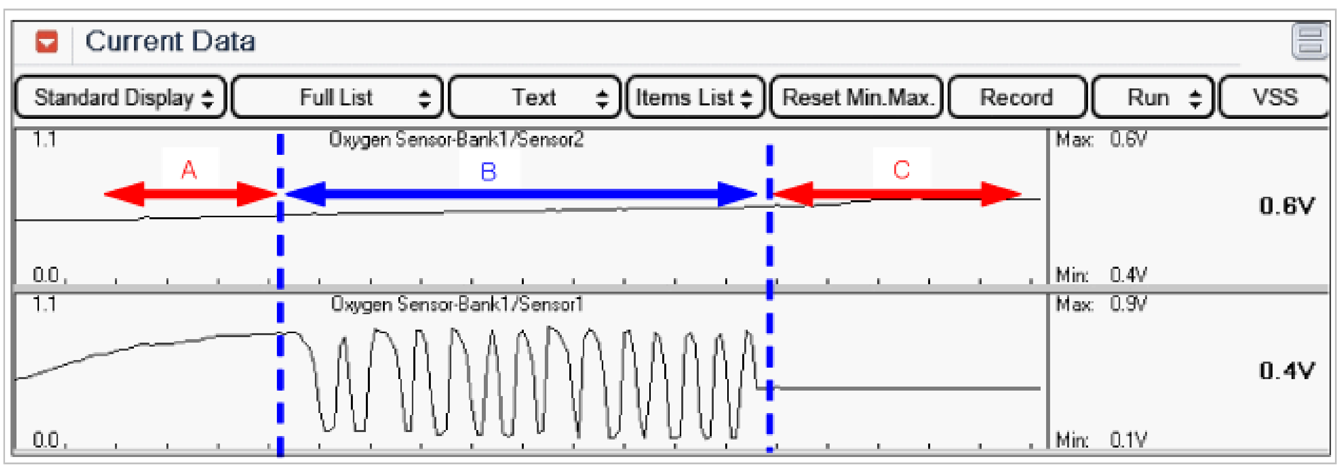
DTC Detecting Condition

Item		Detecting Condition	Possible Cause
DTC Strategy	Case 1	• Voltage range check	• Open in signal harness • Open in ground harness • Poor connection or damaged harness • Faulty Heated O2 Sensor (HO2S)
	Case 2	• Check time for O2 sensor readiness detection(to start feedback control)	
Enable Conditions	Case 1	• 10V< Battery voltage <16V • O2 sensor pre-heating phase finished • Exhaust gas temperature > 650°C(1202°F) • Lambda close loop control activated	
	Case 2	• Minimum time after start versus coolant temperature at start(-40°C : 90sec./-20°C : 60sec./0°C : 53sec./15°C : 32sec./55°C : 32sec.)	
Threshold Value	Case 1	• 0.38V< HO2S < 0.47V	
	Case 2	• O2 sensor operative ready	
Diagnostic Time	Case 1	• 10sec.	
	Case 2	• 32~90 sec (depending on start coolant temp.)	
MIL On Condition		• 2 Driving Cycles	

Diagnostic Circuit Diagram



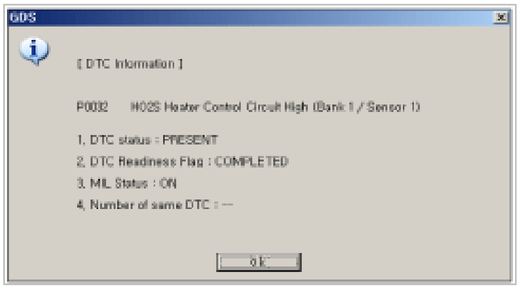
Signal Waveform & Data



- Sector A : Before Oxygen Sensor(B1S1) activated
- Sector B : Normal signal of Oxygen Sensor(B1S1) during idle
- Sector C : Line break in signal circuit

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Ground Circuit Inspection

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

Specification : Approx. 0Ω

4. Is resistance within the specification?

YES	▶ Go to "Signal circuit inspection" procedure
NO	▶ Go to next step as below **NOTE** HO2S must have a clean air reference to function properly. The air is obtained by way of the sensor wire(s). Do not attempt to repair the wire(s), connector, or the terminals.

Signal Circuit Inspection

1. Ignition "ON" & Engine "OFF"
2. Measure voltage between signal terminal of HO2S(B1S1) harness connector and chassis ground

Specification : Approx. 0.4~0.5V

3. Is voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure **NOTE** HO2S must have a clean air reference to function properly. The air is obtained by way of the

	sensor wire(s). Do not attempt to repair the wire(s), connector, or the terminals.

Terminal and Connector Inspection

1. 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.
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 next step as below

Component Inspection

1. Visually/physically inspect the following items:
   - Ensure that the HO2S is securely installed.
   - Silicon contamination. This contamination will be indicated by a white powdery coating on the portion of the sensor exposed to the exhaust stream and this will result in a but false(high) voltage signal
   - Fuel, engine coolant or oil contamination
   - Use of improper sealant
   - If contamination is evident on the HO2S, Fix the source of the sensor contamination before replacing the sensor to prevent future contamination. Go to "Verification of Vehicle Repair" procedure.
2. Warm up the engine to normal operating temperature and let it idle.
3. Connect Scantool and monitor the O2 SNSR VOL.-B1/S1 parameter on the Scantool data list

Specification : Verify signal is switching from rich(above 0.45V) to lean(below 0.45V) a minimum of 3 times in 10 seconds (voltage will vary between 0.1 and 0.9V) at idle. (Refer to "Signal Waveform & Data)

4. Is sensor switching properly?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check HO2S for contamination, deterioration, or damage. Substitute with a known-good HO2S and check for proper operation. If the problem is corrected, replace HO2S and then go to "Verification of Vehicle Repair" procedure

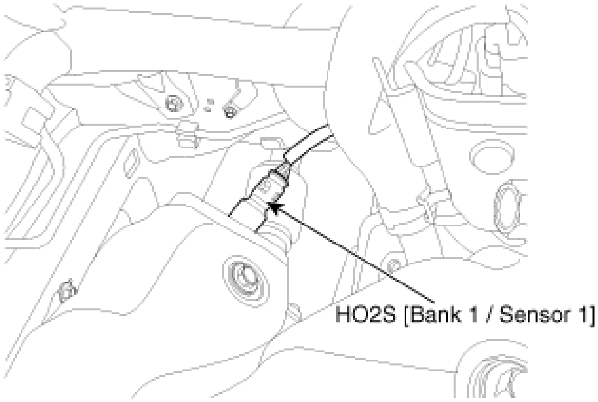
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The HO2S(Heated Oxygen Sensor) is used to supply the ECM with information regarding the composition of the air/fuel mixture. The HO2S is positioned in the exhaust pipe ahead of the TWC. To measure the oxygen content, the HO2S requires a supply of ambient air as a reference. Since this is supplied through the wiring, the lead must not be clamped or damaged in any other way. The HO2S produces a voltage that varies between 0.1V and 0.9V under normal operating conditions. The Engine Control Module (ECM) monitors this voltage and determines if the exhaust gas is lean or rich. If the voltage input at the ECM is under approx. 0.45V the exhaust is lean, and if the voltage input is over approx. 0.45V the exhaust is rich. The ECM constantly monitors the HO2S signal during closed loop operation and compensates for a rich or lean condition by decreasing or increasing injector pulse width as necessary.

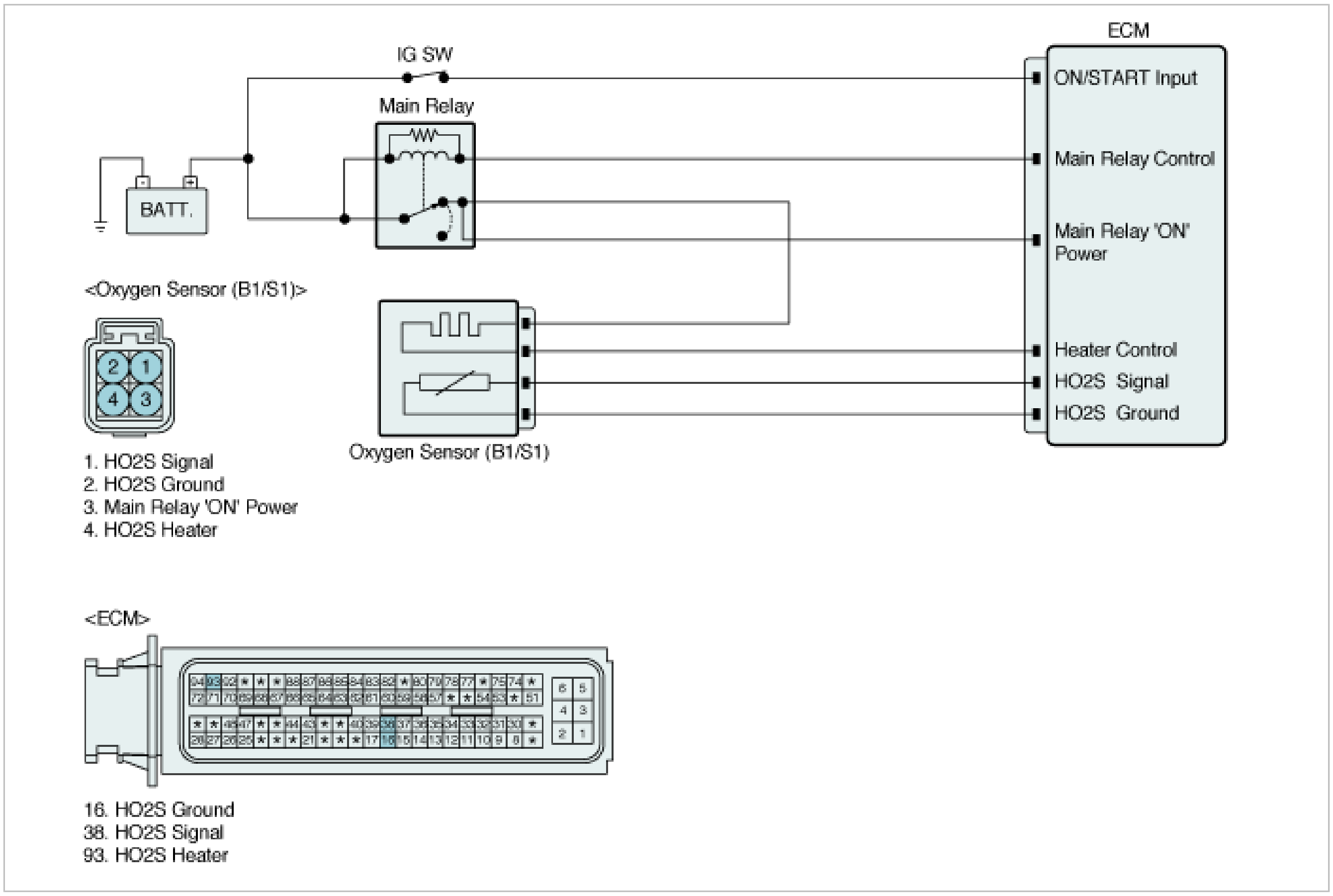
DTC Description

ECM sets DTC P0131 if the HO2S(B1S1) voltage remains excessively low for a predetermined time.

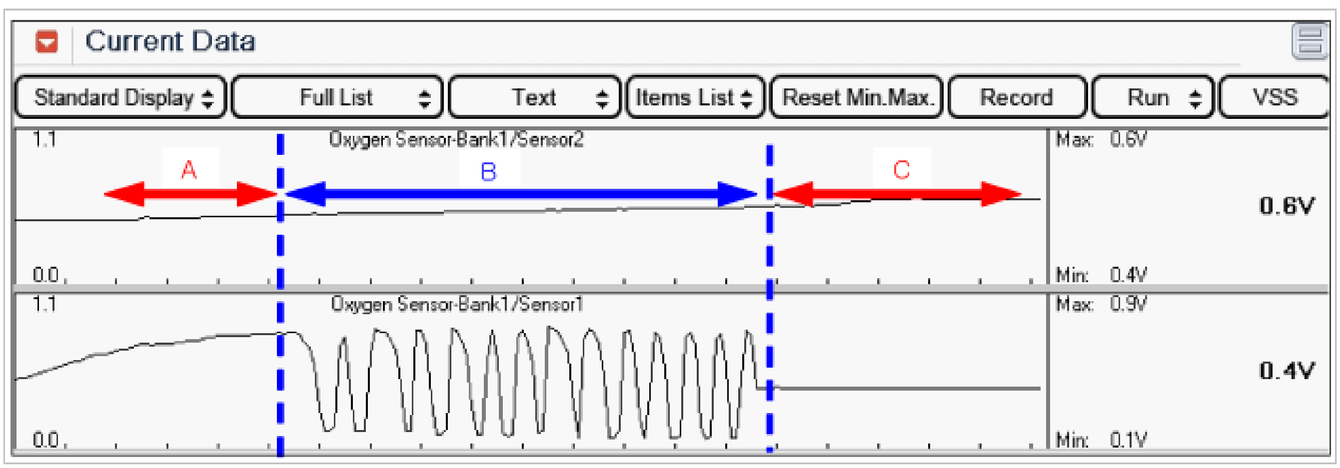
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage range check	• Short to ground in signal harness • Poor connection or damaged harness • Faulty Heated O2 Sensor (HO2S)
Enable Conditions	• Lambda close loop activated • Lambda controller on max. limit during 10 sec. • Canister purge valve closed • No relevant failure • 10V< Battery voltage <16V	
Threshold Value	• HO2S(B1S1) < 0.02V	
Diagnostic Time	• 60sec.	
Mil On Condition	• 2 Driving Cycles	

Diagnostic Circuit Diagram



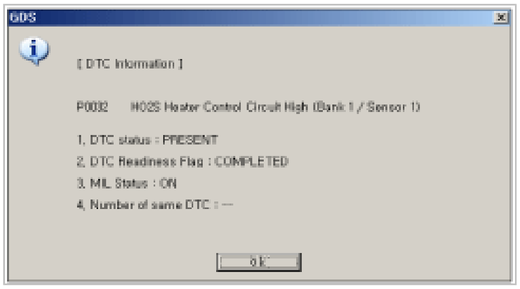
Signal Waveform & Data



- Sector A : Before Oxygen Sensor(B1S1) activated
- Sector B : Normal signal of Oxygen Sensor(B1S1) during idle
- Sector C : Line break in signal circuit

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Signal Circuit Inspection

1. Ignition "OFF"
2. Disconnect ECM and HO2S connector
3. Measure resistance between signal terminal of HO2S(B1S1) harness connector and chassis ground

Specification : Infinite

4. Is resistance within the specification?

YES	▶ Go to next step as below
NO	▶ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure **NOTE** HO2S must have a clean air reference to function properly. The air is obtained by way of the sensor wire(s). Do not attempt to repair the wire(s), connector, or the terminals.

Terminal and Connector Inspection

1. 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.
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 next step as below

Component Inspection

1. Visually/physically inspect the following items:

- Ensure that the HO2S is securely installed.
- Silicon contamination. This contamination will be indicated by a white powdery coating on the portion of the sensor exposed to the exhaust stream and this will result in a but false(high) voltage signal
- Fuel, engine coolant or oil contamination
- Use of improper sealant
- If contamination is evident on the HO2S, Fix the source of the sensor contamination before replacing the sensor to prevent future contamination. Go to "Verification of Vehicle Repair" procedure.

2. Warm up the engine to normal operating temperature and let it idle.
3. Connect Scantool and monitor the O2 SNSR VOL.-B1/S1 parameter on the Scantool data list

Specification : Verify signal is switching from rich(above 0.45V) to lean(below 0.45V) a minimum of 3 times in 10 seconds (voltage will vary between 0.1 and 0.9V) at idle. (Refer to "Signal Waveform & Data)

4. Is sensor switching properly?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Check HO2S for contamination, deterioration, or damage. Substitute with a known-good HO2S and check for proper operation. If the problem is corrected, replace HO2S and then go to "Verification of Vehicle Repair" procedure

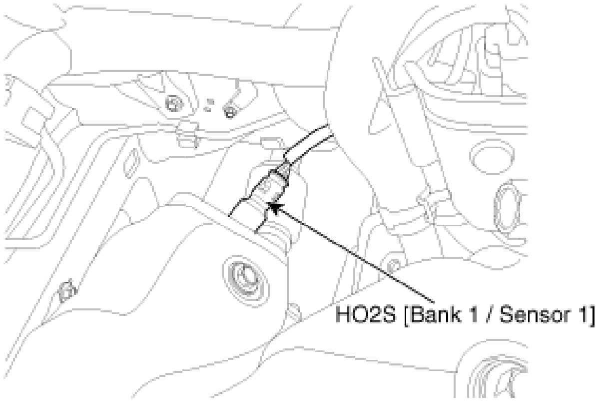
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The HO2S(Heated Oxygen Sensor) is used to supply the ECM with information regarding the composition of the air/fuel mixture. The HO2S is positioned in the exhaust pipe ahead of the TWC. To measure the oxygen content, the HO2S requires a supply of ambient air as a reference. Since this is supplied through the wiring, the lead must not be clamped or damaged in any other way. The HO2S produces a voltage that varies between 0.1V and 0.9V under normal operating conditions. The Engine Control Module (ECM) monitors this voltage and determines if the exhaust gas is lean or rich. If the voltage input at the ECM is under approx. 0.45V the exhaust is lean, and if the voltage input is over approx. 0.45V the exhaust is rich. The ECM constantly monitors the HO2S signal during closed loop operation and compensates for a rich or lean condition by decreasing or increasing injector pulse width as necessary.

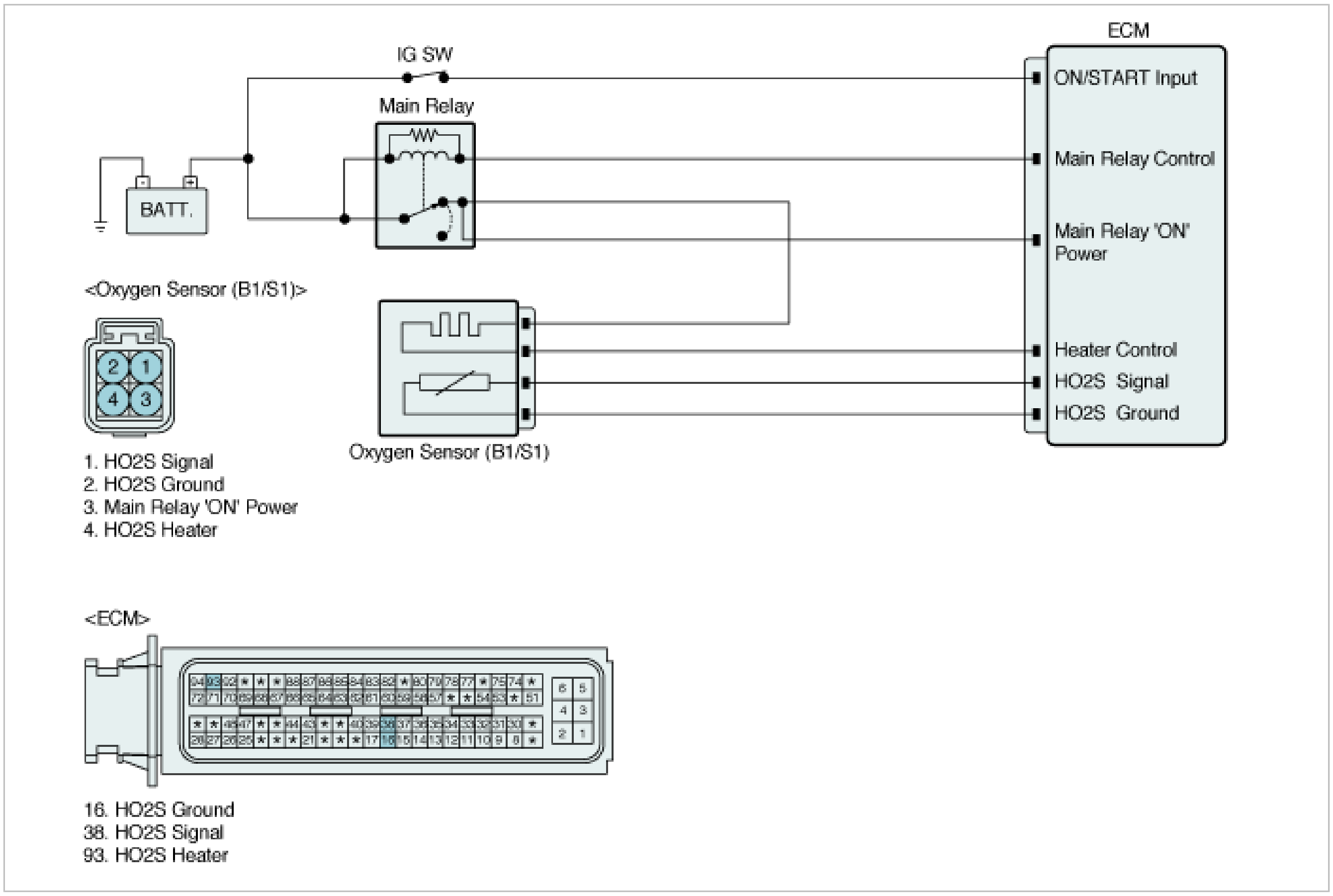
DTC Description

ECM sets DTC P0132 if the HO2S(B1S1) voltage remains excessively high for a predetermined time.

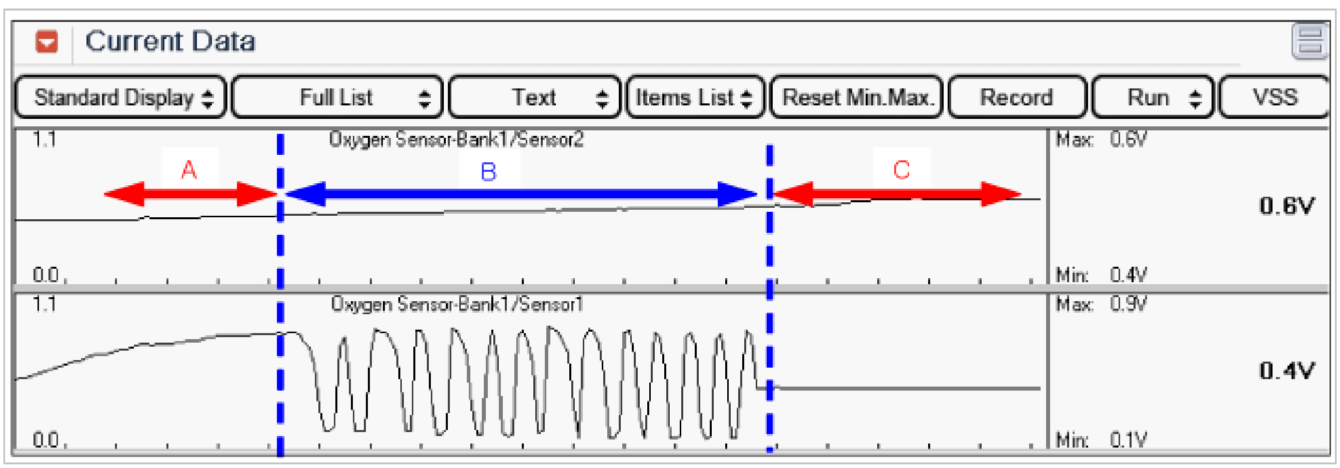
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage range check	• Short to Battery in signal harness • Poor connection or damaged harness • Faulty Heated O2 Sensor (HO2S)
Enable Conditions	• 10V < Battery voltage < 16V	
Threshold Value	• Sensor Voltage >1.2V	
Diagnostic Time	• 1 Seconds	
Mil On Condition	• 2 Driving Cycles	

Diagnostic Circuit Diagram



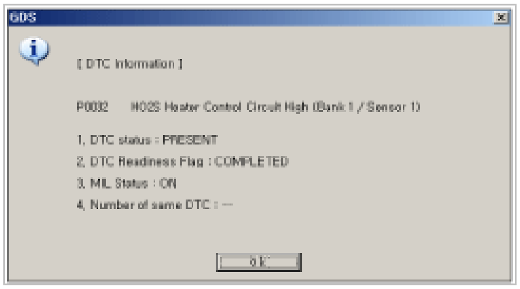
Signal Waveform & Data



- Sector A : Before Oxygen Sensor(B1S1) activated
- Sector B : Normal signal of Oxygen Sensor(B1S1) during idle
- Sector C : Line break in signal circuit

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Signal Circuit Inspection

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

Specification : Approx. 0.4~0.5V

5. Is voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure **NOTE** HO2S must have a clean air reference to function properly. The air is obtained by way of the sensor wire(s). Do not attempt to repair the wire(s), connector, or the terminals.

Terminal and Connector Inspection

1. 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.
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 next step as below

Component Inspection

1. Visually/physically inspect the following items:
   - Ensure that the HO2S is securely installed.
   - Silicon contamination. This contamination will be indicated by a white powdery coating on the portion of the sensor exposed to the exhaust stream and this will result in a but false(high) voltage signal
   - Fuel, engine coolant or oil contamination
   - Use of improper sealant
   - If contamination is evident on the HO2S, Fix the source of the sensor contamination before replacing the sensor to prevent future contamination. Go to "Verification of Vehicle Repair" procedure.
2. Warm up the engine to normal operating temperature and let it idle.
3. Connect Scantool and monitor the O2 SNSR VOL.-B1/S1 parameter on the Scantool data list

   Specification : Verify signal is switching from rich(above 0.45V) to lean(below 0.45V) a minimum of 3 times in 10 seconds (voltage will vary between 0.1 and 0.9V) at idle. (Refer to "Signal Waveform & Data)

4. Is sensor switching properly?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Check HO2S for contamination, deterioration, or damage. Substitute with a known-good HO2S and check for proper operation. If the problem is corrected, replace HO2S and then go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

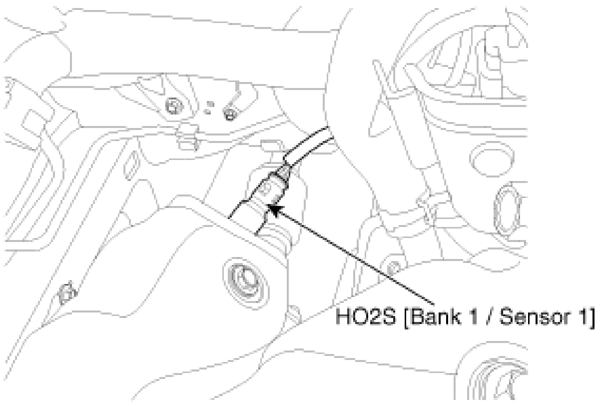
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0133 O2 Sensor Circuit Slow Response (Bank 1 / Sensor 1)

Component Location



General Description

The HO2S(Heated Oxygen Sensor) is used to supply the ECM with information regarding the composition of the air/fuel mixture. The HO2S is positioned in the exhaust pipe ahead of the TWC. To measure the oxygen content, the HO2S requires a supply of ambient air as a reference. Since this is supplied through the wiring, the lead must not be clamped or damaged in any other way. The HO2S produces a voltage that varies between 0.1V and 0.9V under normal operating conditions. The Engine Control Module (ECM) monitors this voltage and determines if the exhaust gas is lean or rich. If the voltage input at the ECM is under approx. 0.45V the exhaust is lean, and if the voltage input is over approx. 0.45V the exhaust is rich. The ECM constantly monitors the HO2S signal during closed loop operation and compensates for a rich or lean condition by decreasing or increasing injector pulse width as necessary.

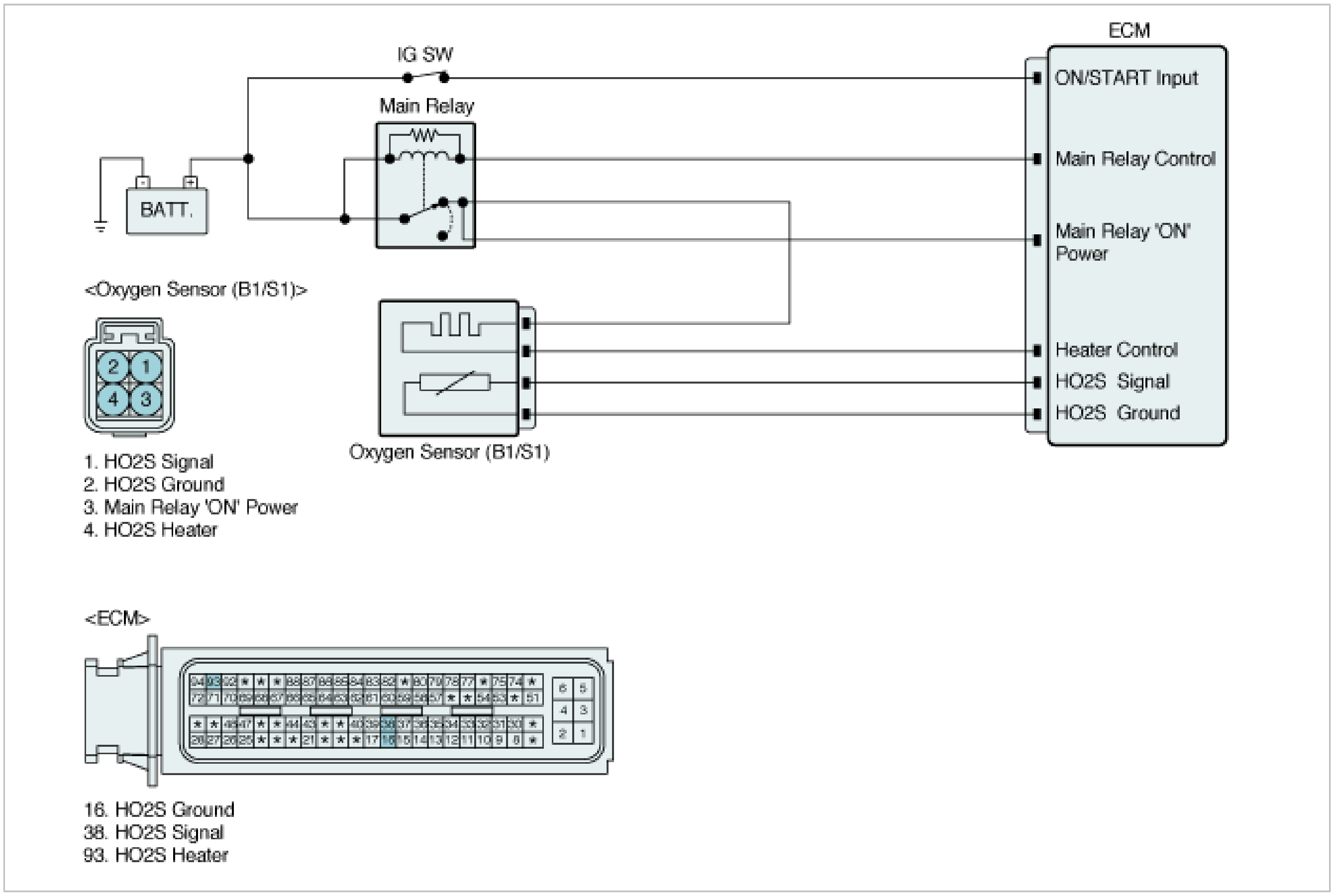
DTC Description

The ECM monitors the HO2S(B1/S1) transition frequency for predetermined time. During the monitoring period, the ECM calculates transition times that the front HO2S switches from rich to lean and from lean to rich. With this information, an average frequency for all switches can be determined. The ECM sets DTC P0133 when the average frequency is too slow.

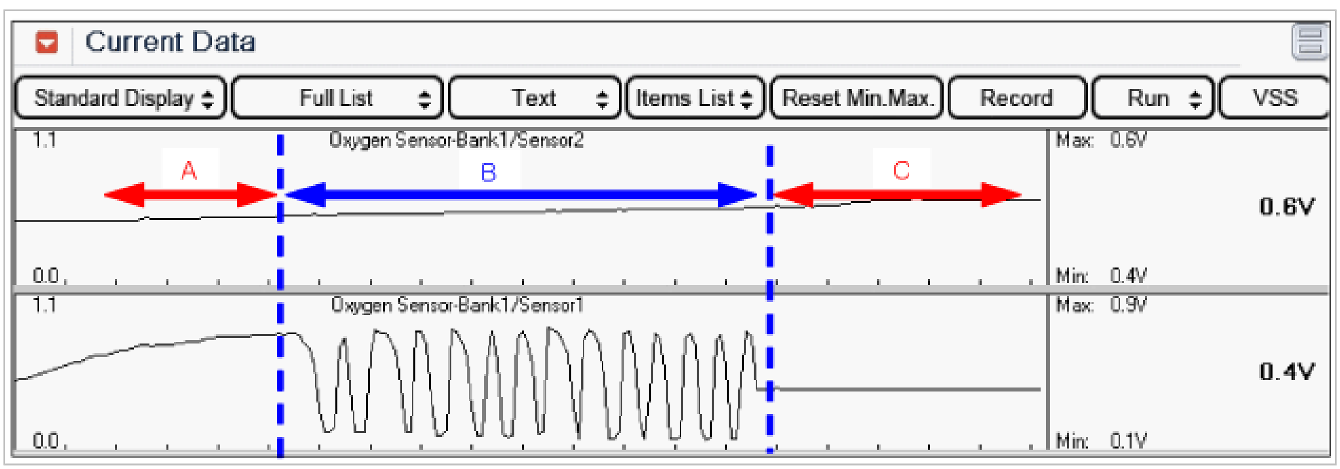
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Check Lambda control regulation frequency	• Leak in intake or exhaust system • Poor connection or damaged harness • HO2S contamination
Enable Conditions	• Coolant temperature >73°C(163°F) • 550°C(1022°F)< Catalyst temperature model <850°C (1562°F) • Vehicle speed >3mph • 1300< Engine speed(rpm) <3200rpm • 0.3g/rev.< MAF <0.8g/rev. • Canister load <0.5 • Lambda control active • Stable driving condition • No opening/closing of canister purge valve • 70kPa(700hPa)< Ambient pressure • No relevant failure • 11V< Battery voltage <16V	
Threshold Value	• Average Ratio between measured and maximum allowed frequency >1	
Diagnostic Time	• 50 lambda controller cycles	
Mil On Condition	• 2 Driving Cycles	

Diagnostic Circuit Diagram



Signal Waveform & Data



- Sector A : Before Oxygen Sensor(B1S1) activated
- Sector B : Normal signal of Oxygen Sensor(B1S1) during idle
- Sector C : Line break in signal circuit

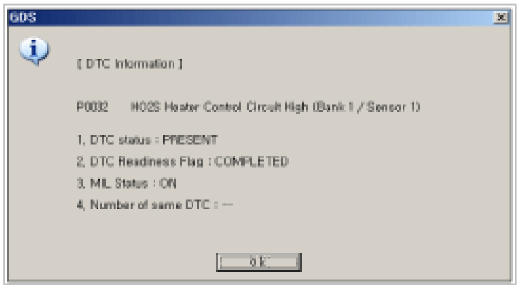
Monitor DTC Status

NOTE

If any DTCs relating to HO2S are stored, do ALL REPAIRS associated with those codes before proceeding with further troubleshooting

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.

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



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Air Leakage Inspection

1. Visually/physically inspect the following items:
   - Vacuum hoses for splits, kinks and improper connections.
   - Exhaust system between HO2S and Three way catalyst for air leakage
   - EVAP system for leakage
   - PCV hose for proper installation
2. Was a problem found in any of the above areas?

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Go to next step as below

Visual/Physical Inspection

1. Visually/physically inspect the following items:
   - Check for corrosion on terminals
   - Check for terminal tension (at the HO2S and at the ECM)
   - Check for damaged wiring
   - Check the HO2S ground circuit for a good connection
   - Check front and rear HO2S for connections being reversed.
2. Was a problem found in any of the above areas?

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Go to next step as below

Component Inspection

1. Visually/physically inspect the following items:
   - Ensure that the HO2S is securely installed.
   - Silicon contamination. This contamination will be indicated by a white powdery coating on the portion of the sensor

exposed to the exhaust stream and this will result in a but false(high) voltage signal
- Fuel, engine coolant or oil contamination
- Use of improper sealant
- If contamination is evident on the HO2S, Fix the source of the sensor contamination before replacing the sensor to prevent future contamination. Go to "Verification of Vehicle Repair" procedure.

2. Warm up the engine to normal operating temperature and let it idle.
3. Connect Scantool and monitor the O2 SNSR VOL.-B1/S1 parameter on the Scantool data list

Specification : Verify signal is switching from rich(above 0.45V) to lean(below 0.45V) a minimum of 3 times in 10 seconds (voltage will vary between 0.1 and 0.9V) at idle. (Refer to "Signal Waveform & Data)

4. Is sensor switching properly?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check HO2S for contamination, deterioration, or damage. Substitute with a known-good HO2S and check for proper operation. If the problem is corrected, replace HO2S and then go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

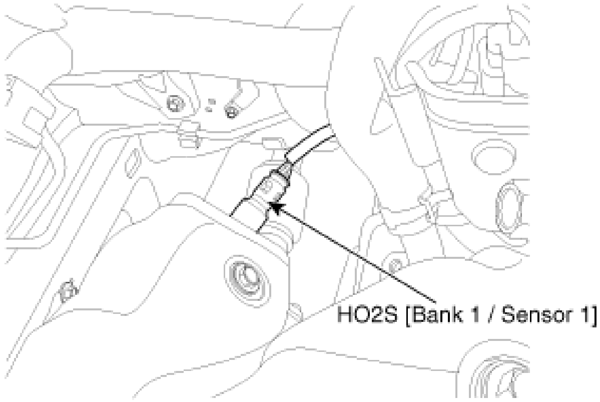
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0134 O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)

Component Location



General Description

The HO2S(Heated Oxygen Sensor) is used to supply the ECM with information regarding the composition of the air/fuel mixture. The HO2S is positioned in the exhaust pipe ahead of the TWC. To measure the oxygen content, the HO2S requires a supply of ambient air as a reference. Since this is supplied through the wiring, the lead must not be clamped or damaged in any other way. The HO2S produces a voltage that varies between 0.1V and 0.9V under normal operating conditions. The Engine Control Module (ECM) monitors this voltage and determines if the exhaust gas is lean or rich. If the voltage input at the ECM is under approx. 0.45V the exhaust is lean, and if the voltage input is over approx. 0.45V the exhaust is rich. The ECM constantly monitors the HO2S signal during closed loop operation and compensates for a rich or lean condition by decreasing or increasing injector pulse width as necessary.

DTC Description

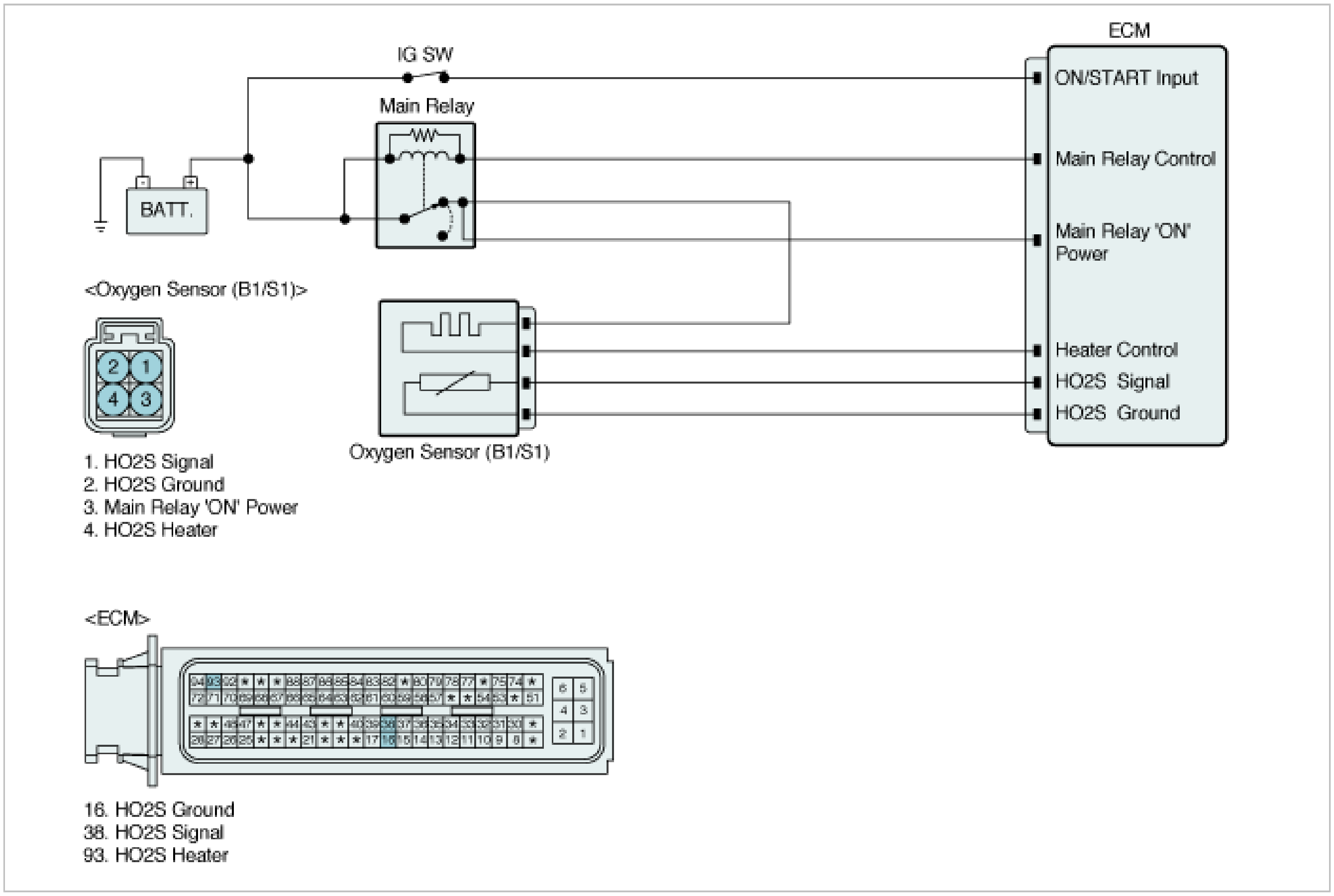
1. Signal amplitude plausibility error : In order to determine the signal amplitude plausibility, the ECM monitors front HO2S signal level from rich to lean and from lean to rich. The ECM sets DTC P0134, If the difference of the signal transition level is too small.
2. Signal plausibility error during fuel cut-off : ECM sets DTC P0134, if the HO2S(B1S1) signal is too high during fuel cut-off period for a predetermined time.

DTC Detecting Condition

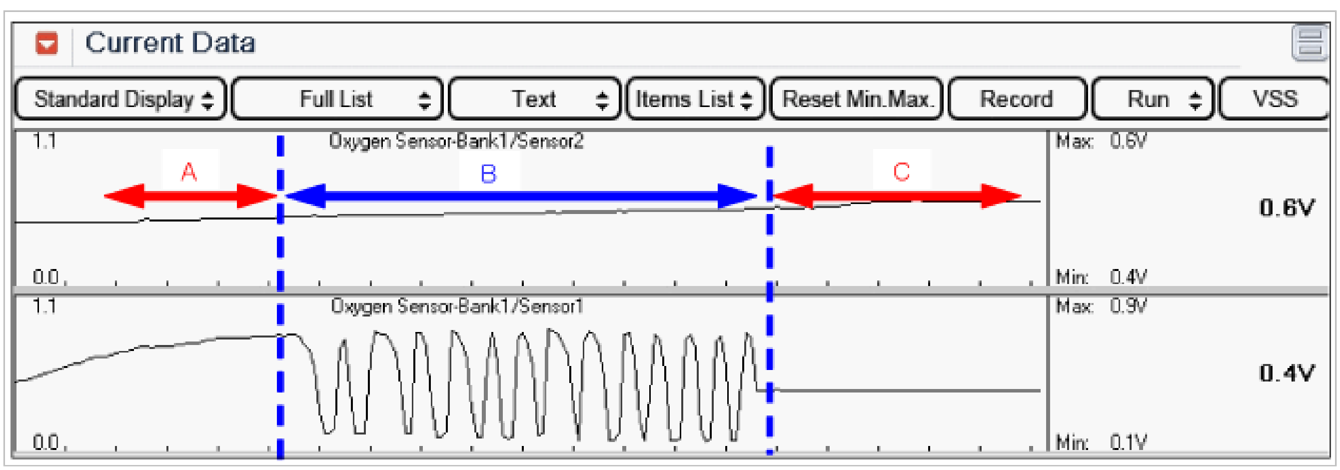
Item		Detecting Condition	Possible Cause
DTC Strategy	Case 1	• Signal plausibility during fuel cut-off	• Poor connection or damaged harness • HO2S contamination
	Case 2	• Signal amplitude plausibility	
Enable Conditions	Case 1	• O2 sensor operative readiness detected • O2 sensor pre-heating phase finished • 12g< Integrated Mass Air Flow since Fuel Cut-Off begin <250g • No relevant failure • 10V< Battery voltage <16V	
	Case 2	• O2 sensor pre-heating phase finished • 5< Number of lambda controller P jumps since Lambda control activation • Closed loop lambda controller output not limited to min./max. limit • O2 sensor signal lean half period <2sec. • O2 sensor signal rich half period <2sec. • No relevant failure • 10V< Battery voltage <16V	

Threshold Value	Case 1	• HO2S(B1S1) voltage at fuel-cut mode > 0.3V	
	Case 2	• Upstream O2 sensor signal amplitude < 0.20 V	
Diagnostic Time	Case 1	• 5 sec.	
	Case 2	• 120 sec.	
MIL On Condition		• 2 Driving Cycles	

Diagnostic Circuit Diagram



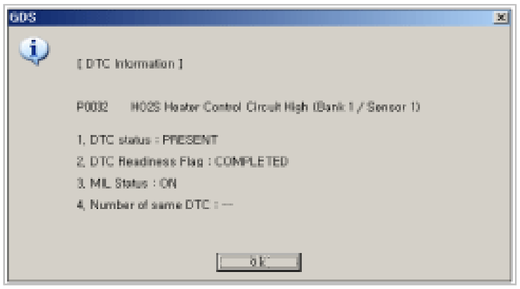
Signal Waveform & Data



- Sector A : Before Oxygen Sensor(B1S1) activated
- Sector B : Normal signal of Oxygen Sensor(B1S1) during idle
- Sector C : Line break in signal circuit

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. Ignition "ON" & Engine "OFF"
2. Monitor the O2 SNSR VOL.-B1/S1 parameter on the GDS data list while wiggling the wiring harness and related connectors.
3. The value should remain more or less unchanged. If not, check for the following conditions:
   - Check for corrosion on terminals
   - Check for terminal tension (at the HO2S and at the ECM)
   - Check for damaged wiring
   - Check the HO2S ground circuit for a good connection
   - Check the 15A sensor2 fuse
   - Check front and rear HO2S for connections being reversed.
4. Was a problem found in any of the above areas?

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Go to next step as below

Component Inspection

1. Visually/physically inspect the following items:
   - Ensure that the HO2S is securely installed.
   - Silicon contamination. This contamination will be indicated by a white powdery coating on the portion of the sensor exposed to the exhaust stream and this will result in a but false(high) voltage signal
   - Fuel, engine coolant or oil contamination
   - Use of improper sealant
   - If contamination is evident on the HO2S, Fix the source of the sensor contamination before replacing the sensor to prevent future contamination. Go to "Verification of Vehicle Repair" procedure.

2. Warm up the engine to normal operating temperature and let it idle.
3. Connect Scantool and monitor the O2 SNSR VOL.-B1/S1 parameter on the Scantool data list

Specification : Verify signal is switching from rich(above 0.45V) to lean(below 0.45V) a minimum of 3 times in 10 seconds (voltage will vary between 0.1 and 0.9V) at idle. (Refer to "Signal Waveform & Data)

4. Is sensor switching properly?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Check HO2S for contamination, deterioration, or damage. Substitute with a known-good HO2S and check for proper operation. If the problem is corrected, replace HO2S and then go to "Verification of Vehicle Repair" procedure

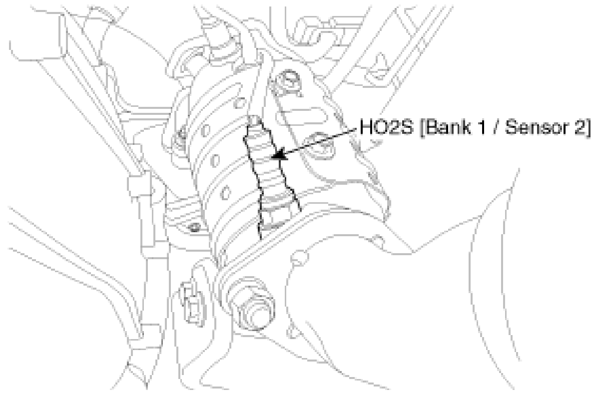
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The rear heated oxygen sensor is mounted on the rear side of the Catalytic Converter (warm-up catalytic converter) or in the rear exhaust pipe, which is able to detect catalyst efficiency. The rear heated oxygen sensor (HO2S) produces a voltage between 0V and 1V. This rear heated oxygen sensor is used to estimate the oxygen storage capability. If a catalyst has good conversion properties, the oxygen fluctuations are smoothed by the oxygen storage capacity of the catalyst. If the conversion provided by the catalyst is low due to aging, poisoning or misfiring, then the oxygen fluctuations are similar to signals from the front oxygen sensor.

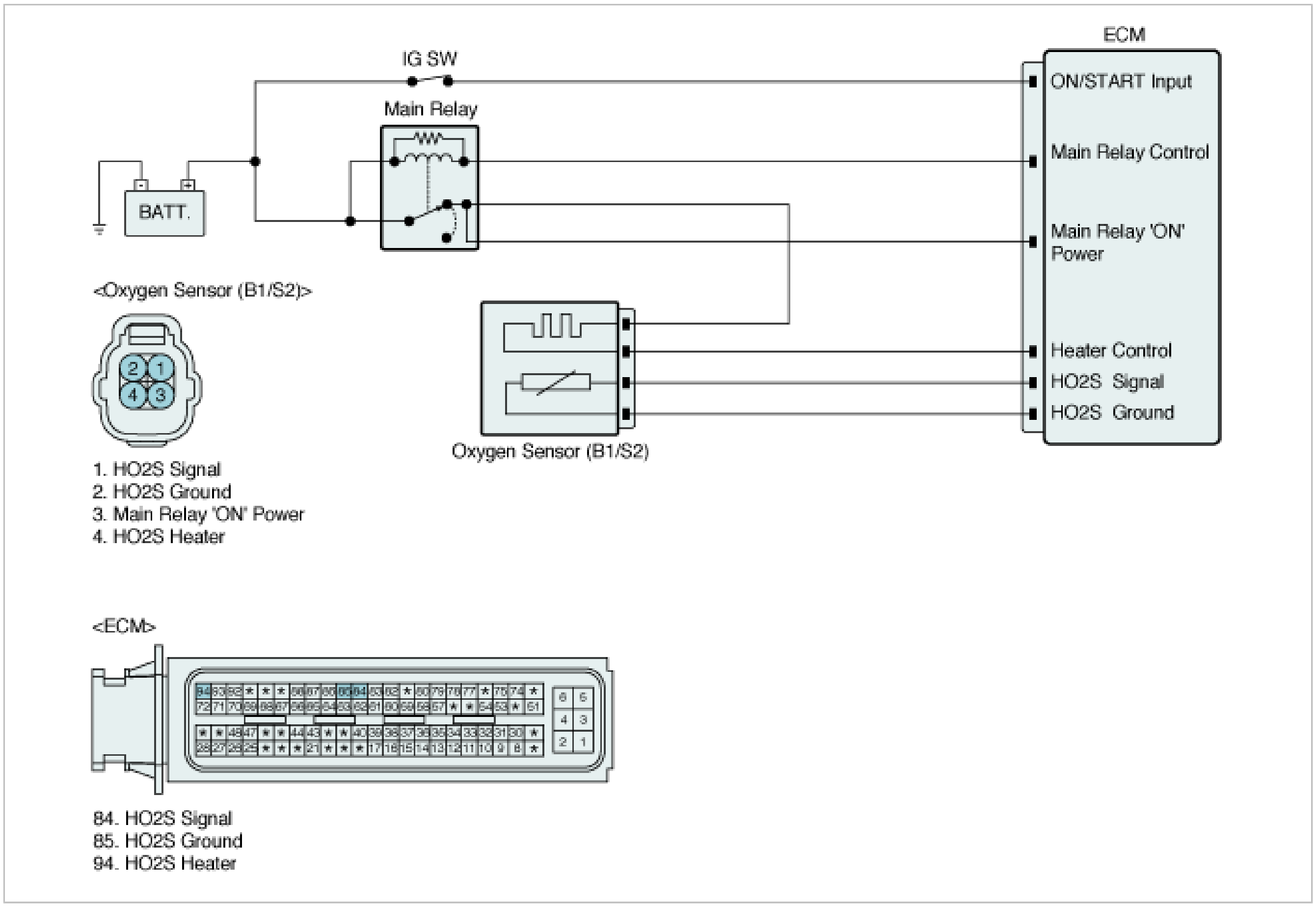
DTC Description

ECM sets DTC P0136 if the ECM detects that the rear HO2S signal circuit is open.

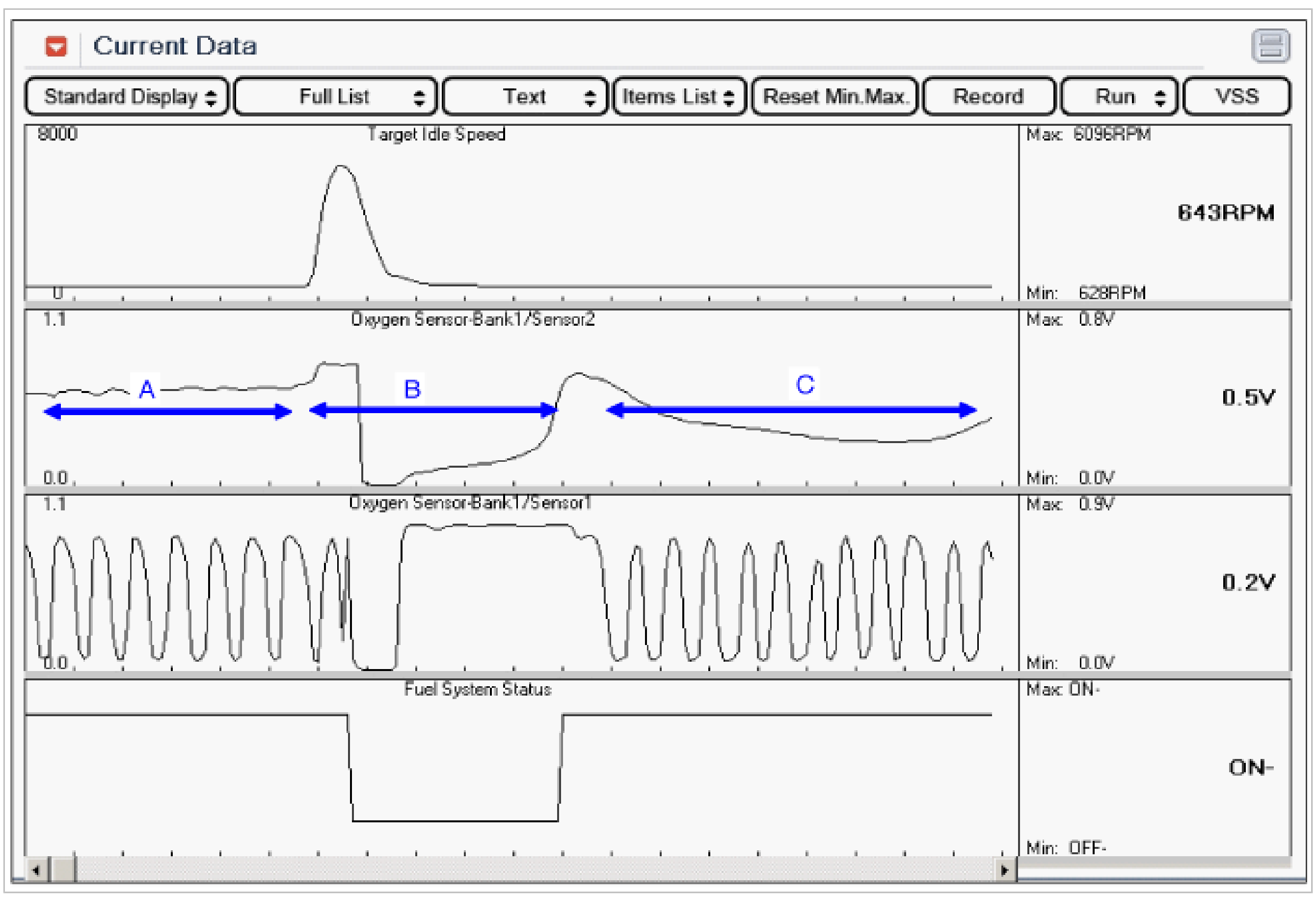
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage range check	• Open in signal harness • Open in ground harness • Poor connection or damaged harness • Faulty Heated O2 Sensor (HO2S)
Enable Conditions	• O2 Sensor operative readiness • O2 Sensor preheating and full heating phases finished • No relevant failure • 10V < Battery voltage < 16V	
Threshold Value	• 0.37 < Downstream O2 Sensor voltage < 0.49V & sensor element resistance > 60kΩ	
Diagnostic Time	• 30 sec.	
Mil On Condition	• 2 Driving Cycles	

Diagnostic Circuit Diagram



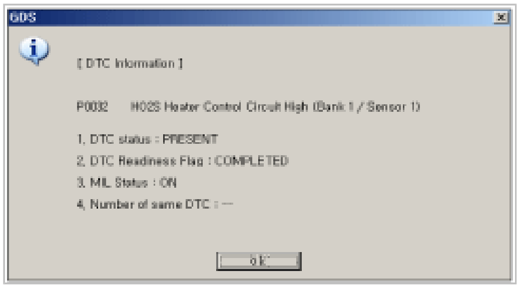
Signal Waveform & Data



- ▸ Sector A : Signal Normal
- ▸ Sector B : Signal Fluctuation
- ▸ Sector C : Signal Recovery

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Ground Circuit Inspection

1. Ignition "OFF"
2. Disconnect HO2S connectors
3. Measure resistance between ground terminal of HO2S(B1S2) harness connector and chassis ground

Specification : Approx. 0Ω

4. Is resistance within the specification?

YES	▸ Go to "Signal circuit inspection" procedure
NO	▸ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure **NOTE** HO2S must have a clean air reference to function properly. The air is obtained by way of the sensor wire(s). Do not attempt to repair the wire(s), connector, or the terminals.

Signal Circuit Inspection

1. Ignition "ON" & Engine "OFF"
2. Measure voltage between signal terminal of HO2S(B1S2) harness connector and chassis ground

Specification : Approx. 0.4~0.5V

3. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure NOTE HO2S must have a clean air reference to function properly. The air is obtained by way of the sensor wire(s). Do not attempt to repair the wire(s), connector, or the terminals.

Terminal and Connector Inspection

1. 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.
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 next step as below

Component Inspection

1. With ignition "OFF", reconnect the HO2S connector
2. Warm up the engine to normal operating temperature and let it idle.
3. Connect GDS and monitor the O2 SNSR VOL.-B1/S2 parameter on the Scantool data list.

Specification : Above 0.7V at idle

4. Is sensor data near the specified value?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check HO2S for contamination, deterioration, or damage. Substitute with a known-good HO2S and check for proper operation. If the problem is corrected, replace HO2S and then go to "Verification of Vehicle Repair" procedure

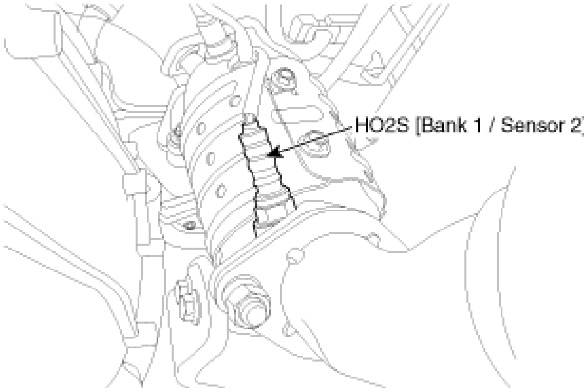
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The rear heated oxygen sensor is mounted on the rear side of the Catalytic Converter (warm-up catalytic converter) or in the rear exhaust pipe, which is able to detect catalyst efficiency. The rear heated oxygen sensor (HO2S) produces a voltage between 0V and 1V. This rear heated oxygen sensor is used to estimate the oxygen storage capability. If a catalyst has good conversion properties, the oxygen fluctuations are smoothed by the oxygen storage capacity of the catalyst. If the conversion provided by the catalyst is low due to aging, poisoning or misfiring, then the oxygen fluctuations are similar to signals from the front oxygen sensor.

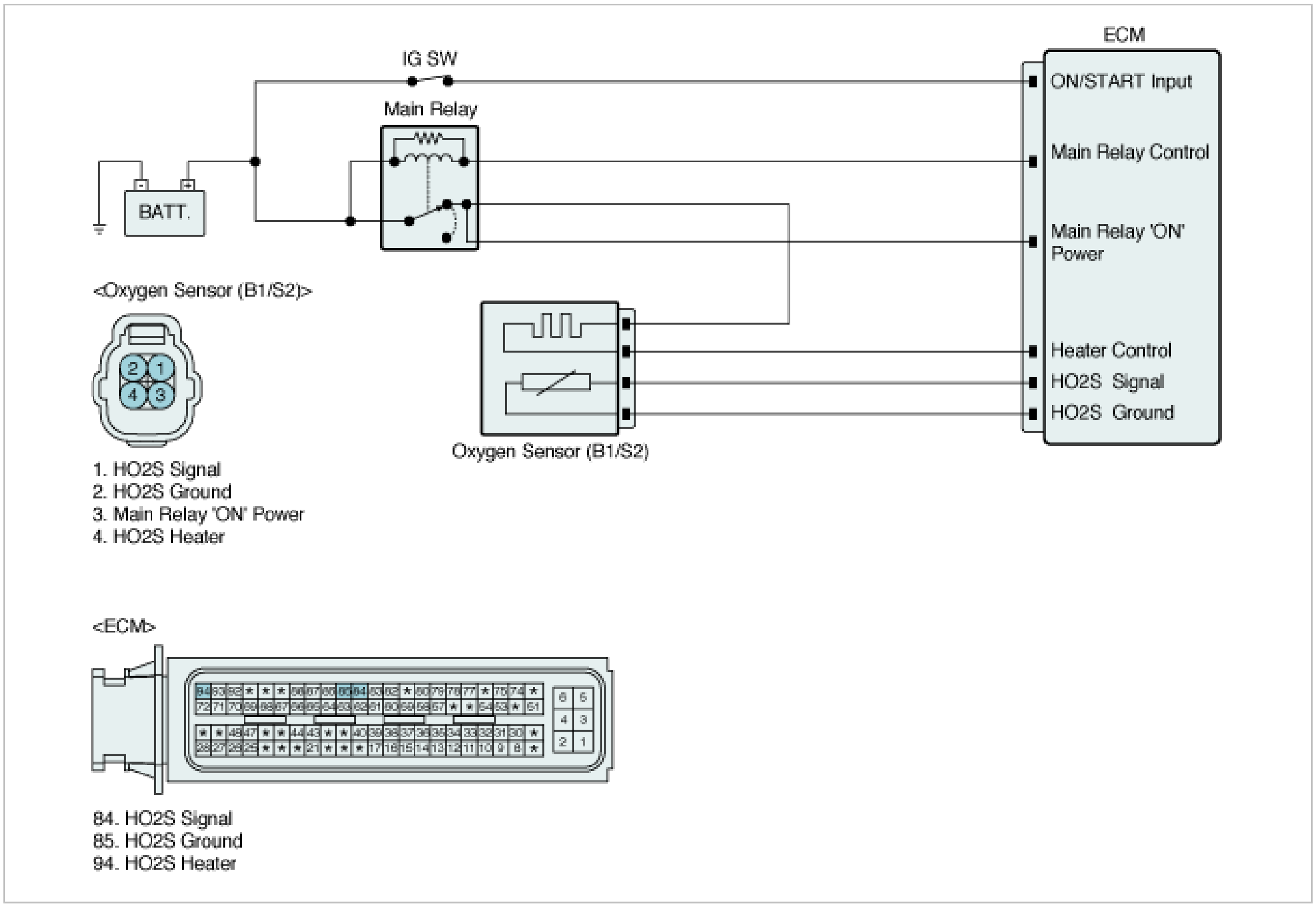
DTC Description

ECM sets DTC P0137 if the HO2S(B1S2) voltage remains excessively low for a predetermined time

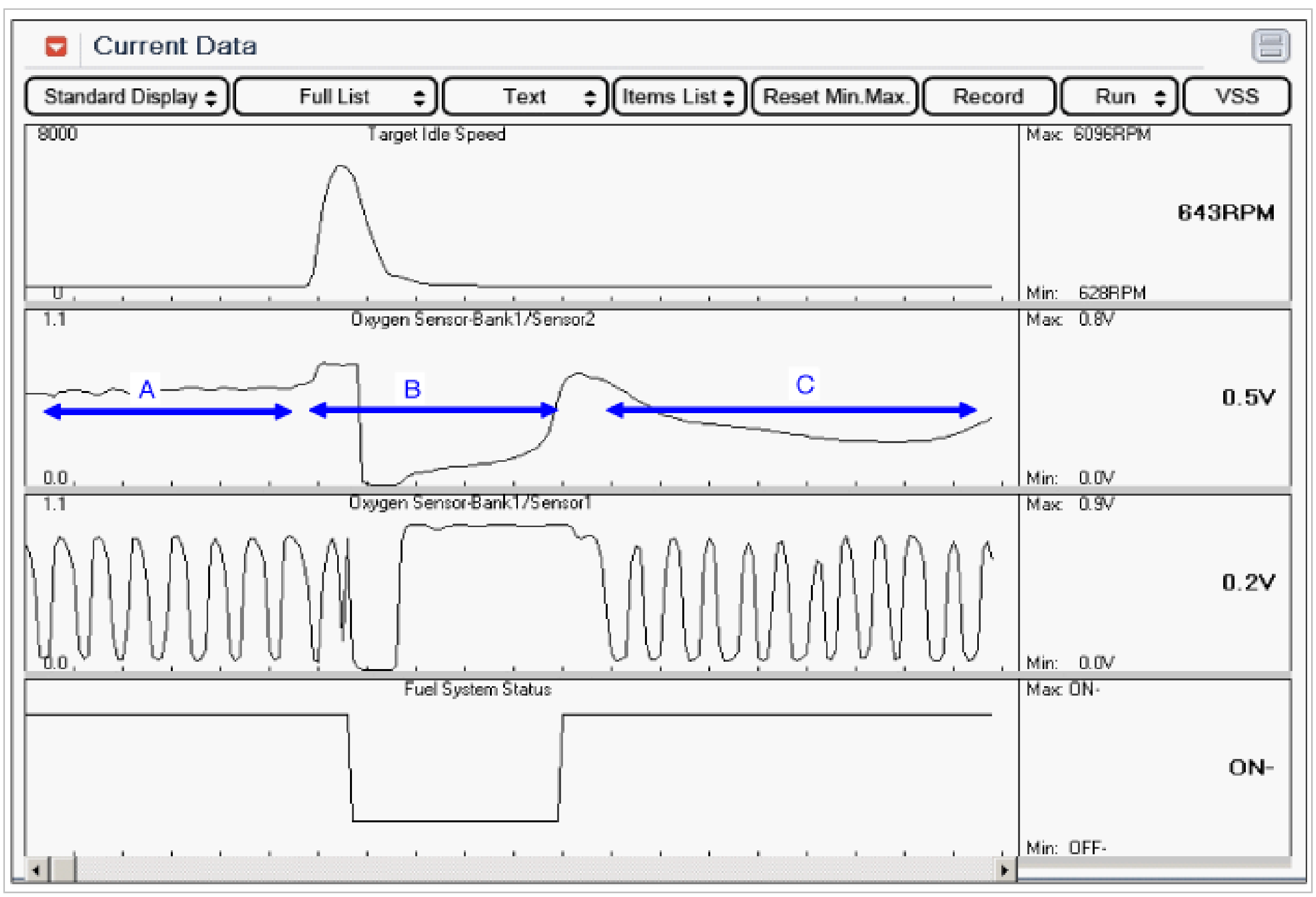
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage range check(short circuit to ground)	• Short to ground in signal harness • Poor connection or damaged harness • Faulty Heated O2 Sensor (HO2S)
Enable Conditions	• Lambda close loop control active • Lambda controller not at max. limit • Catalyst purge after fuel cut-off not active • No relevant failure • 10V< Battery voltage <16V	
Threshold Value	• HO2S(B1S2) < 0.02V & Internal resistance < 15Ω	
Diagnostic Time	• 35 sec.	
Mil On Condition	• 2 Driving Cycles	

Diagnostic Circuit Diagram



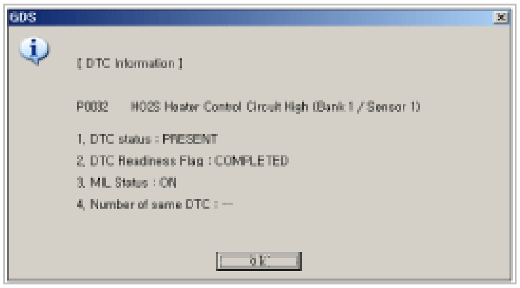
Signal Waveform & Data



- Sector A : Signal Normal
- Sector B : Signal Fluctuation
- Sector C : Signal Recovery

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Signal Circuit Inspection

1. Ignition "OFF"
2. Disconnect ECM and HO2S connector
3. Measure resistance between signal terminal of HO2S(B1S2) harness connector and chassis ground

Specification : Infinite

4. Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure **NOTE** HO2S must have a clean air reference to function properly. The air is obtained by way of the sensor wire(s). Do not attempt to repair the wire(s), connector, or the terminals.

Terminal and Connector Inspection

1. 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.
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 next step as below

Component Inspection

1. With ignition "OFF", reconnect the HO2S connector
2. Warm up the engine to normal operating temperature and let it idle.
3. Connect Scantool and monitor the O2 SNSR VOL.-B1/S2 parameter on the Scantool data list.

Specification : Above 0.7V at idle

4. Is sensor data near the specified value?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check HO2S for contamination, deterioration, or damage. Substitute with a known-good HO2S and check for proper operation. If the problem is corrected, replace HO2S and then go to "Verification of Vehicle Repair" procedure

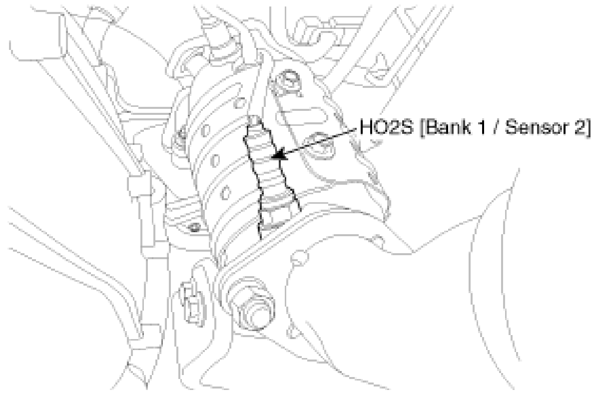
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The rear heated oxygen sensor is mounted on the rear side of the Catalytic Converter (warm-up catalytic converter) or in the rear exhaust pipe, which is able to detect catalyst efficiency. The rear heated oxygen sensor (HO2S) produces a voltage between 0V and 1V. This rear heated oxygen sensor is used to estimate the oxygen storage capability. If a catalyst has good conversion properties, the oxygen fluctuations are smoothed by the oxygen storage capacity of the catalyst. If the conversion provided by the catalyst is low due to aging, poisoning or misfiring, then the oxygen fluctuations are similar to signals from the front oxygen sensor.

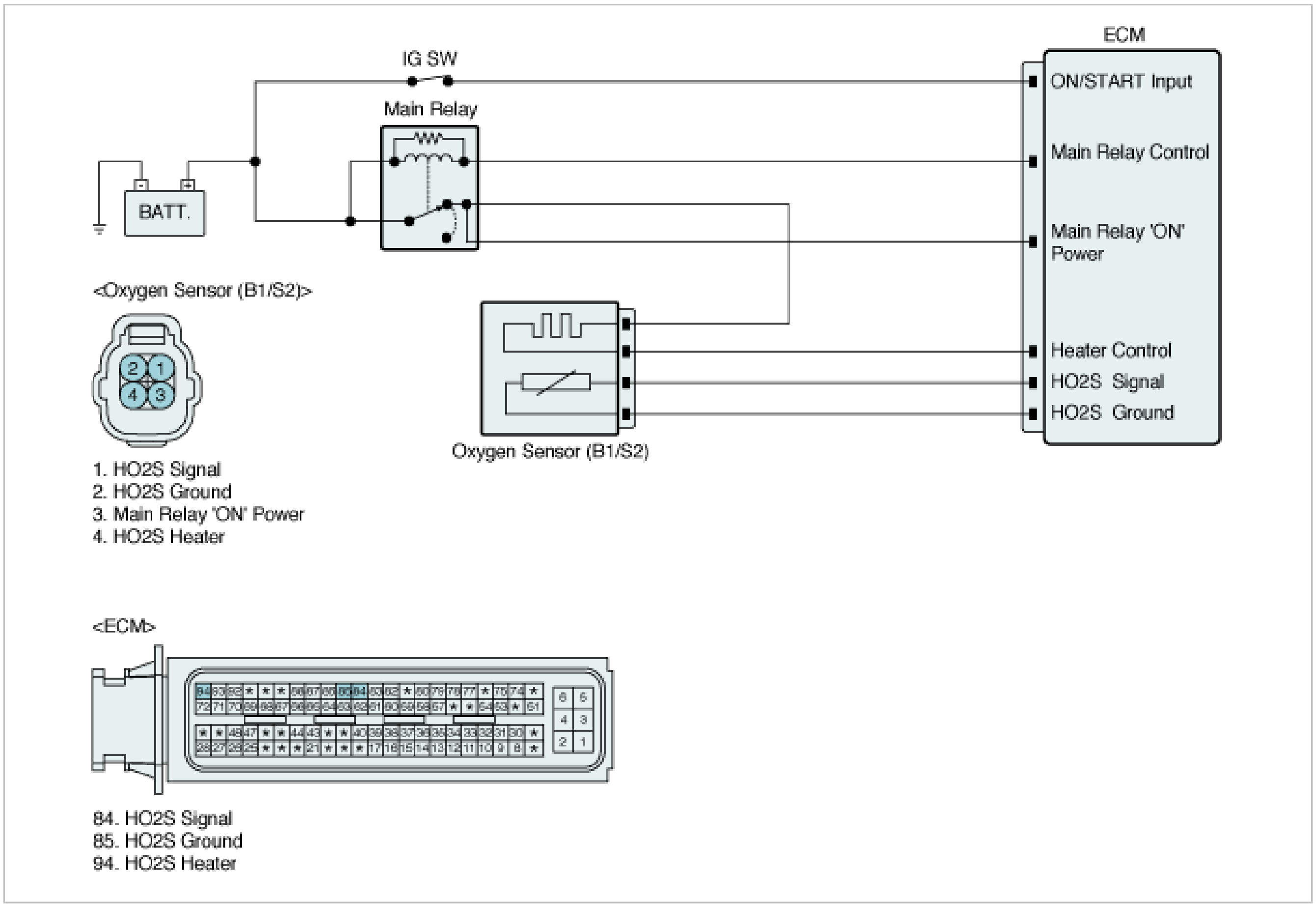
DTC Description

ECM sets DTC P0138 if the HO2S(B1S2) voltage remains excessively high for a predetermined time.

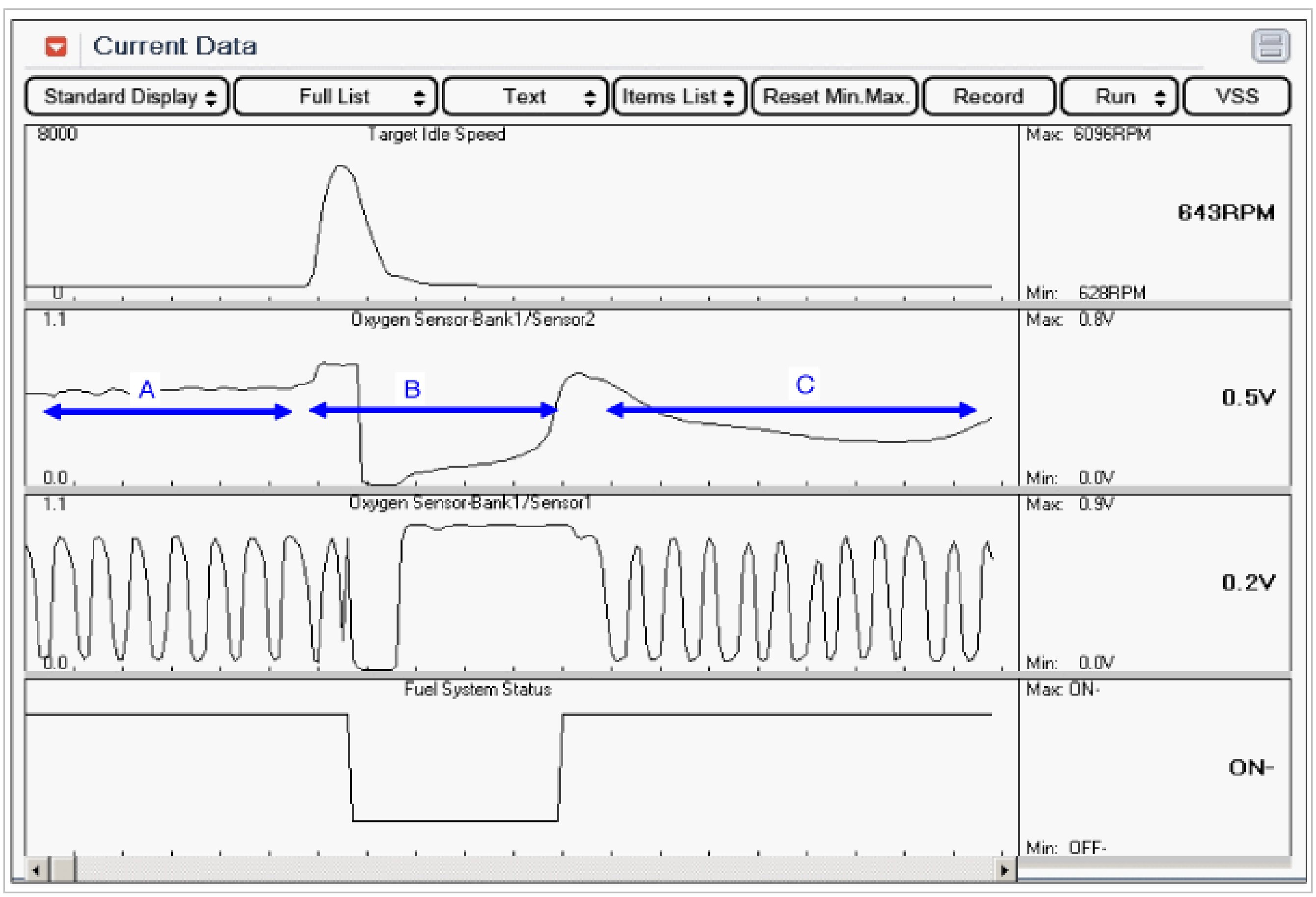
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage range check(short circuit to battery)	• Short to Battery in signal harness • Poor connection or damaged harness • Faulty Heated O2 Sensor (HO2S)
Enable Conditions	• 10V< Battery voltage <16V	
Threshold Value	• 1.2V< HO2S(B1S2)	
Diagnostic Time	• 1sec.	
Mil On Condition	• 2 Driving Cycles	

Diagnostic Circuit Diagram



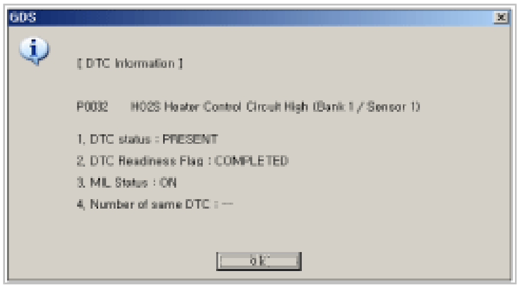
Signal Waveform & Data



- Sector A : Signal Normal
- Sector B : Signal Fluctuation
- Sector C : Signal Recovery

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Signal Circuit Inspection

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

Specification : Approx. 0.4~0.5V

5. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure **NOTE** HO2S must have a clean air reference to function properly. The air is obtained by way of the sensor wire(s). Do not attempt to repair the wire(s), connector, or the terminals.

Terminal and Connector Inspection

1. 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.

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 next step as below

Component Inspection

1. With ignition "OFF", reconnect the HO2S connector
2. Warm up the engine to normal operating temperature and let it idle.
3. Connect Scantool and monitor the O2 SNSR VOL.-B1/S2 parameter on the Scantool data list.

Specification : Above 0.7V at idle

4. Is sensor data near the specified value?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check HO2S for contamination, deterioration, or damage. Substitute with a known-good HO2S and check for proper operation. If the problem is corrected, replace HO2S and then go to "Verification of Vehicle Repair" procedure

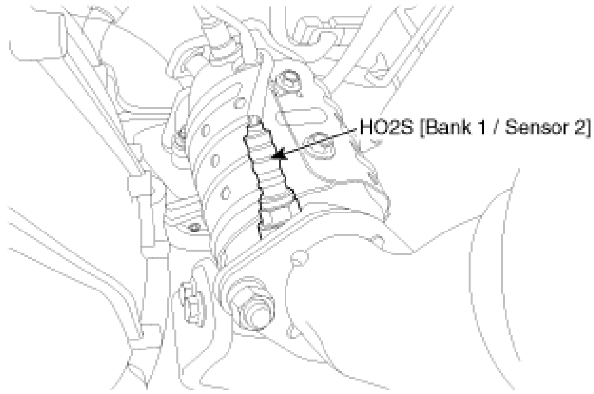
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The rear heated oxygen sensor is mounted on the rear side of the Catalytic Converter (warm-up catalytic converter) or in the rear exhaust pipe, which is able to detect catalyst efficiency. The rear heated oxygen sensor (HO2S) produces a voltage between 0V and 1V. This rear heated oxygen sensor is used to estimate the oxygen storage capability. If a catalyst has good conversion properties, the oxygen fluctuations are smoothed by the oxygen storage capacity of the catalyst. If the conversion provided by the catalyst is low due to aging, poisoning or misfiring, then the oxygen fluctuations are similar to signals from the front oxygen sensor.

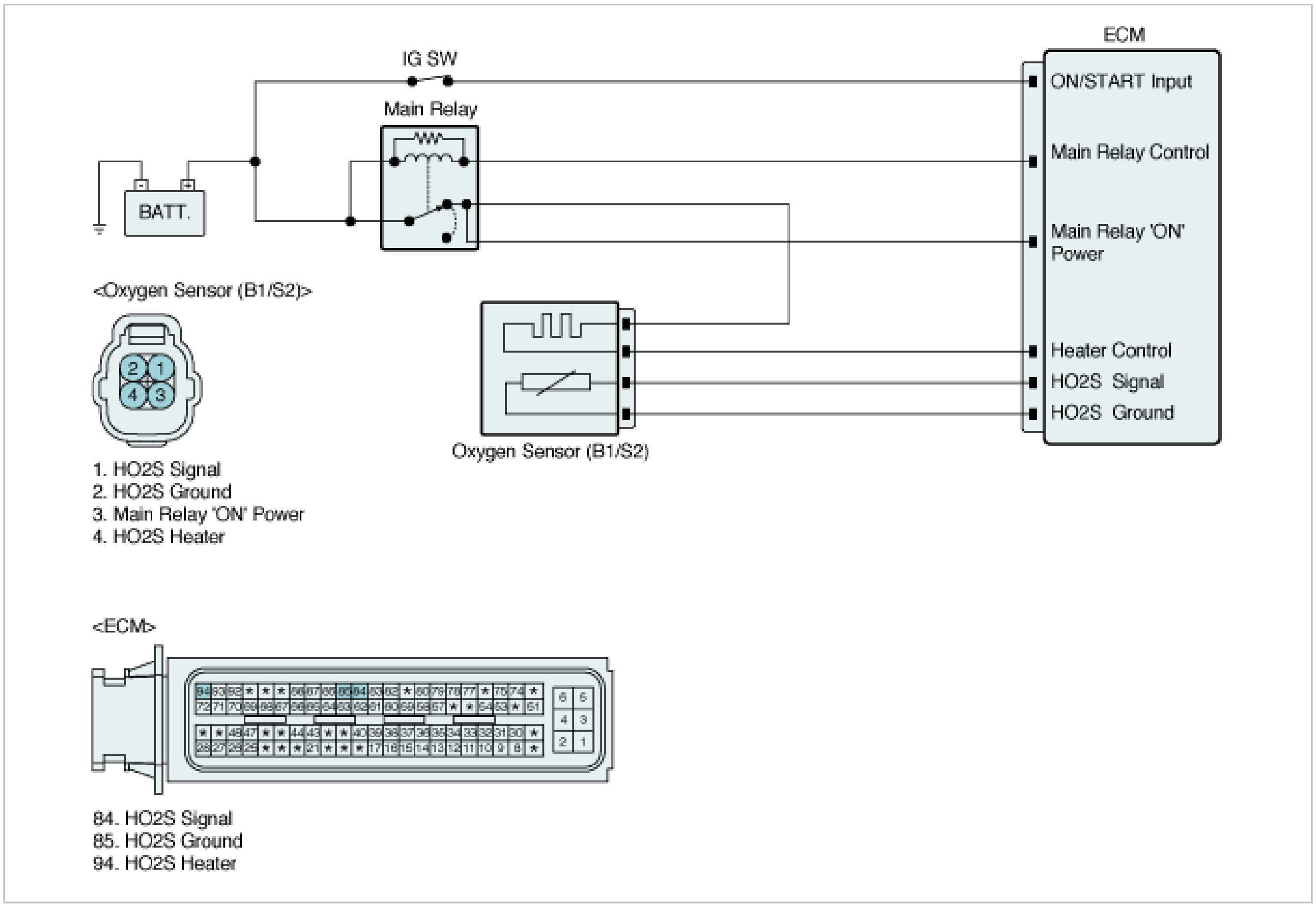
DTC Description

The ECM monitors rich-lean switching time of rear heated oxygen sensor (HO2S) after fuel cut-off to validate dynamic behavior of rear heated oxygen sensor (HO2S). After detection of fuel cut-off engine operating state, the ECM measures rich-lean switching time of the rear heated oxygen sensor (HO2S) signal and compares it to the predetermined limit value. DTC P0139 is set when the switching time is bigger than the limit value.

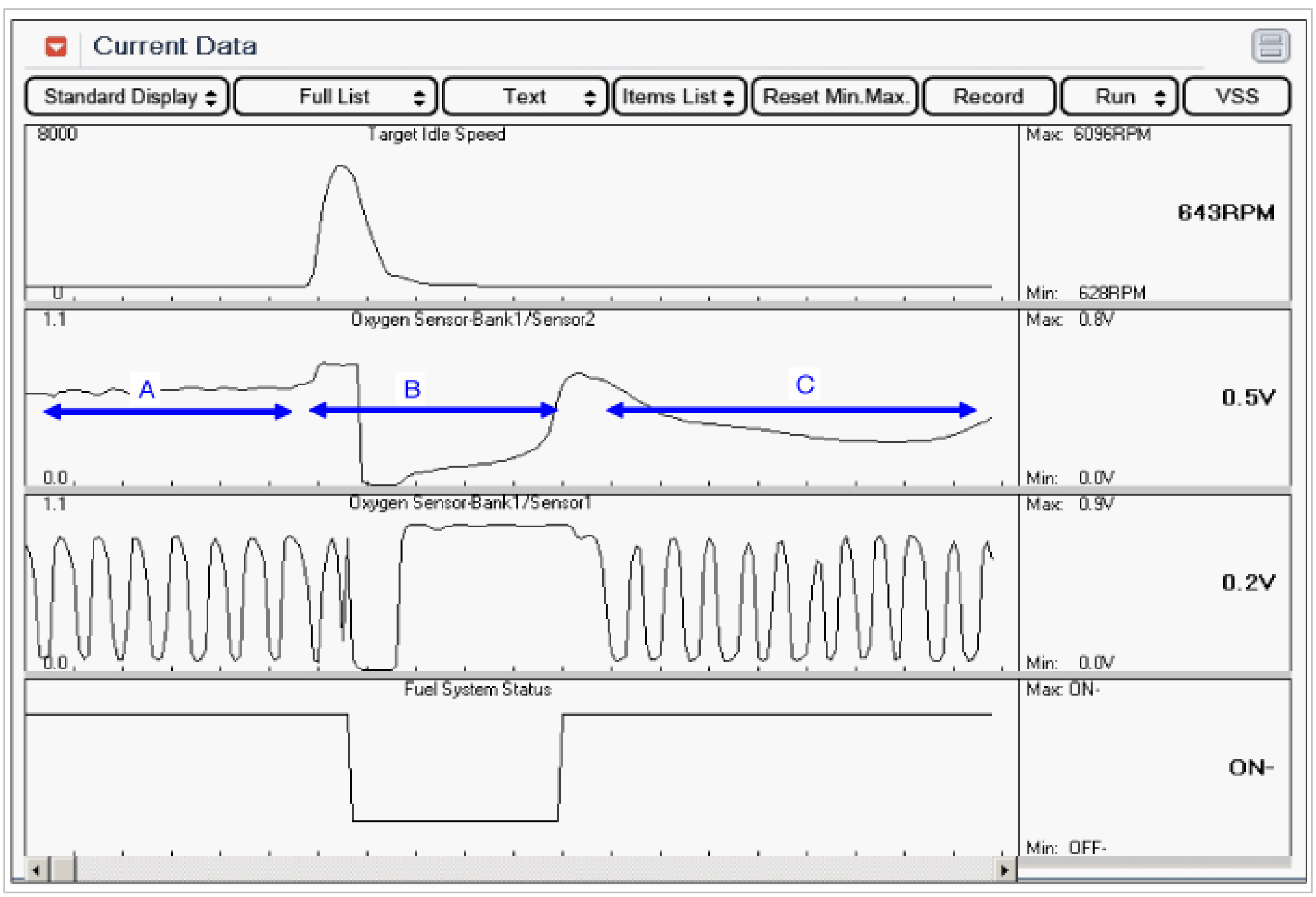
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Slow response(Switching time check at entry in fuel cut off)	• Leak in intake or exhaust system • Faulty fuel system. • Front and rear HO2S connections reversed. • Poor connection or damaged harness • HO2S contamination
Enable Conditions	• Coolant temperature >73°C(163°F) • Downstream O2 sensor readiness detected • Downstream O2 sensor pre-heating phase finished • 400°C(752°F)< Catalyst temperature model • 0.6V< Downstream O2 sensor signal at entry into fuel cut-off • No relevant failure • 11V< Battery voltage <16V	
Threshold Value	• Average ratio between measured and maximum allowed rich to lean switching time entering fuel cut-off >1	
Diagnostic Time	• 4 valid fuel cut-off phases	
Mil On Condition	• 2 Driving Cycles	

Diagnostic Circuit Diagram



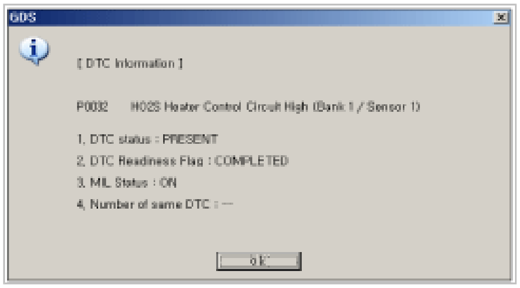
Signal Waveform & Data



- ▸ Sector A : Signal Normal
- ▸ Sector B : Signal Fluctuation
- ▸ Sector C : Signal Recovery

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Exhaust System Inspection

1. Check the exhaust system for an exhaust leak near the engine.
2. Was an exhaust leak found?

YES	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

Air Leakage Inspection

1. Visually/physically inspect the following items:
   - Vacuum hoses for splits, kinks and improper connections.
   - Exhaust system between HO2S and Three way catalyst for air leakage
   - EVAP system for leakage
   - PCV hose for proper installation
2. Was a problem found in any of the above areas?

YES	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

Visual/Physical Inspection

1. Visually/physically inspect the following items:
   - Check for corrosion on terminals
   - Check for terminal tension (at the HO2S and at the ECM)
   - Check for damaged wiring
   - Check the HO2S ground circuit for a good connection
   - Check front and rear HO2S for connections being reversed.
2. Was a problem found in any of the above areas?

YES	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

Component Inspection

1. Visually/physically inspect the following conditions:
   - Ensure that the sensor is securely installed
   - Check for corrosion on terminals
   - Check for damaged wiring
   - Repair as necessary and go to next step
2. Warm up the engine to normal operating temperature and let it idle.
3. Connect GDS and monitor the O2 SNSR VOL.-B1/S2 parameter on the Scantool data list.

   Specification : Above 0.6V at idle

4. Is sensor data near the specified value?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check HO2S for contamination, deterioration, or damage. Substitute with a known-good HO2S and check for proper operation. If the problem is corrected, replace HO2S and then go to "Verification of Vehicle Repair" procedure

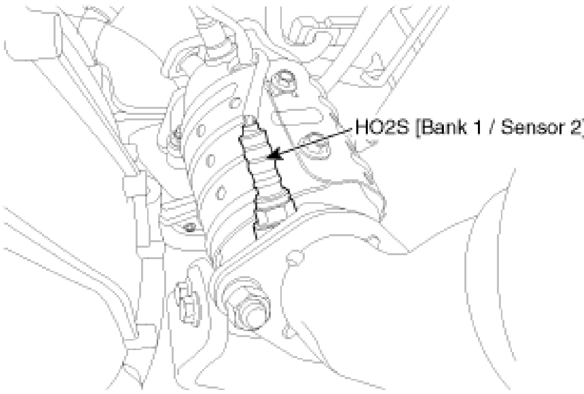
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The rear heated oxygen sensor is mounted on the rear side of the Catalytic Converter (warm-up catalytic converter) or in the rear exhaust pipe, which is able to detect catalyst efficiency. The rear heated oxygen sensor (HO2S) produces a voltage between 0V and 1V. This rear heated oxygen sensor is used to estimate the oxygen storage capability. If a catalyst has good conversion properties, the oxygen fluctuations are smoothed by the oxygen storage capacity of the catalyst. If the conversion provided by the catalyst is low due to aging, poisoning or misfiring, then the oxygen fluctuations are similar to signals from the front oxygen sensor.

DTC Description

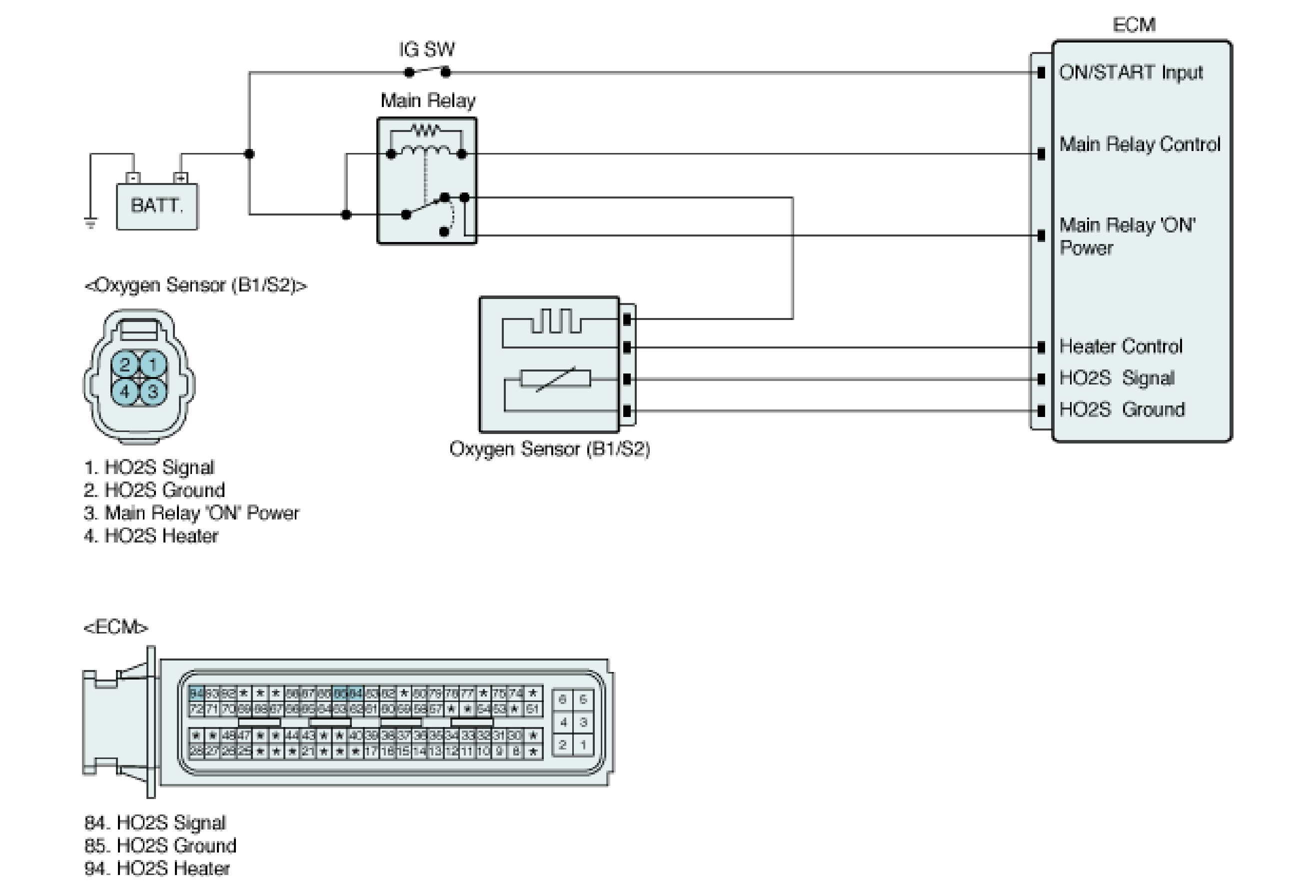
Due to possible oxygen sensor defects (e.g. reference air poisoning) or faults in the injection system (e.g. leaking fuel injector), the rear oxygen sensor may not provide the expected lean or rich signal level during fuel cut-off or full load condition. Hence, the oxygen sensor signal is checked for plausibility during this engine operating states.There are 2 cases which DTC P0140 sets.
(I) Signal monitoring during fuel cut-off: The ECM monitors rear O2 sensor signal level during fuel cut-off which normally shows near 0V and sets DTC P0140 when signal level is too high.
(II) Signal monitoring after fuel cut-off: The ECM monitors rear O2 sensor signal level after leaving fuel cut-off and sets DTC P0140 when signal remains at or below 0.6V.

DTC Detecting Condition

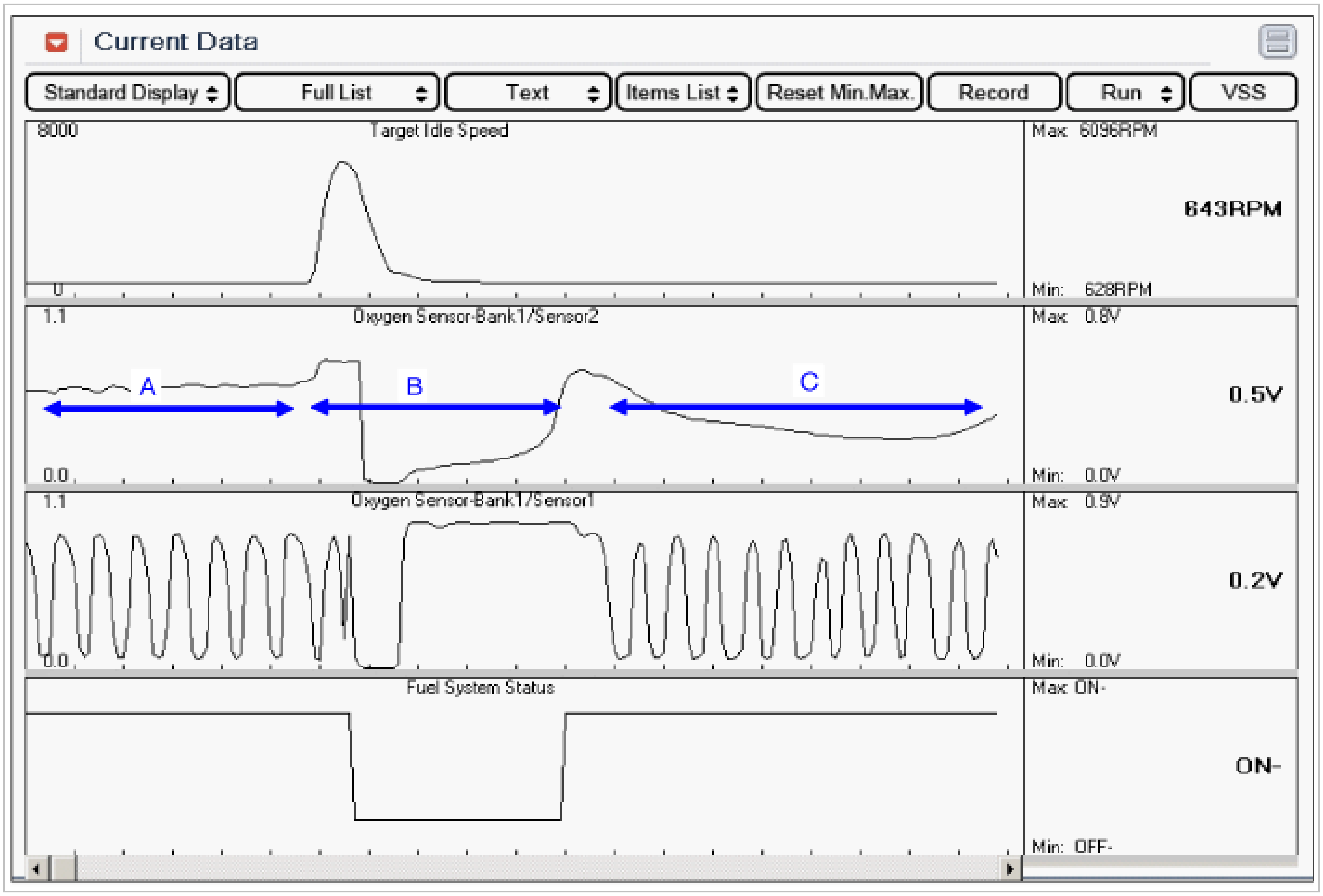
Item		Detecting Condition	Possible Cause
DTC Strategy	Case 1	• Signal plausability with rich mixture (during catalyst purge after fuel cut-off)	
	Case 2	• Signal plausibility with lean mixture (during fuel cut-off)	
Enable Conditions	Case 1	• Coolant temperature >73°C(163°F) • Downstream O2 sensor operative readiness detected • Downstream O2 sensor pre-heating phase finished • 4g< Integrated Mass Air Flow in last Fuel Cut-Off • Downstream O2 sensor signal at end of last fuel cut off <0.3V • Integrated air mass flow in Part Load >150g • Minimum upstream O2 sensor voltage during Catalyst Purge phase >0.6V • Modelled catalyst temperature >400°C(752°F) • No relevant failure • 11V< Battery voltage <16V	• Poor connection or damaged harness • HO2S contamination
		• Downstream O2 sensor operative readiness detected • Downstream O2 sensor pre-heating phase finished	

	Case 2	• 12g< Integrated mass air flow since fuel cut-off begin <250g • No relevant failure • 10V< Battery voltage <16V	
Threshold Value	Case 1	• Max. downstream HO2S <0.6V during catalyst purge after fuel cut-off	
	Case 2	• Downstram HO2S >0.3V during fuel cut-off phase	
Diagnostic Time	Case 1	• 3 valid fuel cut-off followed by catalyst enrichment phases	
	Case 2	• 5 sec.	
MIL On Condition		• 2 Driving Cycles	

Diagnostic Circuit Diagram



Signal Waveform & Data

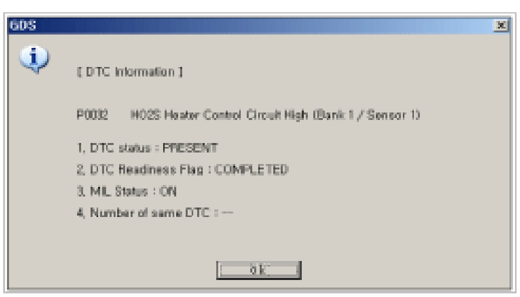


- Sector A : Signal Normal
- Sector B : Signal Fluctuation
- Sector C : Signal Recovery

Monitor DTC Status

> **NOTE**
>
> If any DTCs relating to HO2S are stored, do ALL REPAIRS associated with those codes before proceeding with further troubleshooting

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. Ignition "ON" & Engine "OFF"
2. Monitor the O2 SNSR VOL.-B1/S2 parameter on the GDS data list while wiggling the wiring harness and related connectors. Refer to "Signal Waveform & Data" in the "General Information" procedure.
3. The value should remain more or less unchanged. If not, check for the following conditions:
   - Check for corrosion on terminals
   - Check for terminal tension (at the HO2S and at the ECM)
   - Check for damaged wiring
   - Check the HO2S ground circuit for a good connection
   - Check the 15A sensor2 fuse
   - Check front and rear HO2S for connections being reversed.
4. Was a problem found in any of the above areas?

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Go to next step as below

Component Inspection

1. Visually/physically inspect the following conditions:
   - Ensure that the sensor is securely installed
   - Check for corrosion on terminals
   - Check for damaged wiring
   - Repair as necessary and go to next step
2. Warm up the engine to normal operating temperature and let it idle.
3. Connect Scantool and monitor the O2 SNSR VOL.-B1/S2 parameter on the Scantool data list.

Specification : Above 0.6V at idle

4. Is sensor data near the specified value?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Check HO2S for contamination, deterioration, or damage. Substitute with a known-good HO2S and check for proper operation. If the problem is corrected, replace HO2S and then go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

General Description

In order to provide the best possible combination of drivability, fuel economy and emission control, the ECM uses a closed loop air/fuel metering system. The ECM monitors the HO2S signal voltage and adjusts fuel delivery based it in closed loop fuel control. Changes in fuel delivery will be indicated by the long-term and the short-term fuel trim values. The ideal fuel trim value is around 0%. The ECM will add fuel when the HO2S signal is indicating a lean condition. Additional fuel is indicated by fuel trim values that are above 0%. The ECM will reduce fuel when the HO2S signal is indicating a rich condition. Reduction in fuel is indicated by fuel trim values that are below 0%. The DTC relevant to fuel trim will be set when the amount reaches excessive levels because of a lean or rich condition.

General Description

If the fuel trim values reaches the maximum or minimum threshold, then feedback control is no longer possible and emissions will be increased. The ECM sets DTC P0170 if no proportional fuel adaptation occurs for a defined time after the short term fuel trim has reached its minimum or maximum threshold.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Monitoring deviation of short term fuel trim control	• Air leakage or restriction in intake or exhaust system • Dirty engine oil or oil level too high • Front HO2S or MAFS contamination • Fuel system • EVAP system • Faulty sensor signals
Enable Conditions	• No relevant failure • Lambda control active • Coolant temperature>73°C(163°F)	
Threshold Value	• +50 % < Short Term Trim < -30 %	
Diagnostic Time	• 90sec.	
Mil On Condition	• 2 Driving Cycles	

Signal Waveform & Data

1. Scan Tool Display for HO2S

Test Condition		Scan Tool Parameter	
		O2 SNSR VOL.-B1/S1	SNSRO2 SNSR VOL.-B1/S2
Normal Value when circuit is normal	Idle after warm up	Signal is switching from rich (above 0.45V) to lean (below 0.45V) a minimum of 3 times in 10 seconds.	above 0.7V
HO2S(B1S1) signal circuit open		Approx. 0.43~0.45V	-
HO2S(B1S2) signal circuit open		-	Approx. 0.43~0.45V

2. MAPS Terminal voltage with pressure

Pressure (kPa)	Approx. 20	Approx. 35	Approx. 60	Approx. 95	Approx. 101
Voltage(V)	Approx. 0.7~0.8	Approx. 1.3~1.4	Approx. 2.3~2.4	Approx. 3.7~3.8	Approx. 3.9~4.1

3. Scan Tool Display for TPS

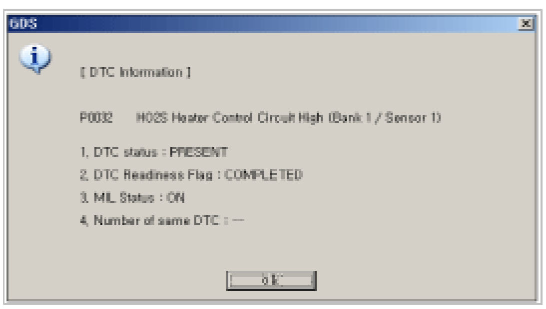
Test Condition		GDS Parameter
		TPS VOLTAGE

Normal value with ignition "ON" & engine "OFF"	Accelerator pedal released	0.20~0.47V
Normal value with engine ON & accelerator pedal fully depressed		4.2~4.7V
Abnormal value with ignition "ON" & engine "OFF"	Power circuit open	0.01V
	Ground cicuit open	4.99V
	TPS signal circuit open	4.99V
	TPS signal circuit short to ground	Approx. 0V
	TPS signal circuit short to battery	Above 4.99V

Monitor DTC Status

> **NOTE**
>
> If any DTCs relating to INJECTOR,HO2S,ECTS, or MAFS are stored, do ALL REPAIRS associated with those codes before proceeding with further troubleshooting

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Monitor Actuation Test

> **NOTE**
>
> The main purpose of this test is to identify potential engine mechanical condition problems and fuel and ignition systems problems that are not common to all cylinders. For best results, perform this test while maintaining as steady an rpm reading as possible.Caution! Before beginning tests; set the parking brake, place gear selector in P or N and block drive wheels for safety.

1. Warm up the engine to normal operating temperature and let it idle.
2. Install GDS and select INJECTOR #1 parameter on the Actuation Test mode
3. Monitor engine rpm and shut off the injector #1 by pressing "STRT(F1)" key
4. Repeat procedure on all injectors and record the engine rpm.

Specification : All cylinders should show an even RPM drop.

5. Was each cylinder's rpm drop within the same value?

YES	▶ Go to next step as below
NO	▶ Cylinders with the least amount of RPM drop are not contributing their share of power. Go to "Fuel Injector Inspection" procedure and check the suspect cylinders NOTE If the RPM loss between cylinders is quite large(200RPM or more) and engine has high mileage, there is possibility of engine wear. Perform compression test with pressure gauge to check the engine wear

Check intake/exhaust system for restriction or leakage

1. Visually/physically inspect the air leakage in intake/exhaust system for the following areas:
   - 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. Visually/physically inspect the restriction in intake/exhaust system for the following areas:
   - Air cleaner filter element for excessive dirt or for any foreign objects
   - Throttle body inlet for damage or for any foreign objects
   - Throttle bore and throttle plate for chocking and for any foreign objects
   - Restricted exhaust system
3. Was a problem found in any of the above areas?

YES	▶ Replace or repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Go to next step as below

4. Inspect the leakage in EVAP. system for the following conditions:
   (1) Check the EVAP canister for fuel saturation. If the EVAP canister is full of fuel, visually and physically inspect the EVAP and fuel system.Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure. If OK, go to next step.
   (2) Remove the manifold side vacuum hose from the EVAP canister purge valve.
   (3) Using a hand vacuum pump apply specified vacuum(Approx. 15 in, Hg) to the manifold side of the valve
   (4) Does the valve hold vacuum?

YES	▶ Go to next step as below
NO	▶ Repair air leakage and go to "Verification of Vehicle Repair" procedure

Sensor Inspection

NOTE

Refer to "Signal Waveform & Data" in the "General Information" procedure

1. Visually/physically inspect the HO2S for the following conditions:
   - Ensure that the HO2S is securely installed.
   - Silicon contamination. This contamination will be indicated by a white powdery coating on the portion of the sensor exposed to the exhaust stream and this will result in a but false(high) voltage signal
   - Fuel, engine coolant or oil contamination
   - Use of improper sealant
   - If contamination is evident on the HO2S, Fix the source of the sensor contamination before replacing the sensor to prevent future contamination. Go to "Verification of Vehicle Repair" procedure.GDS
2. Visually/physically inspect the MAFS for the following conditions:
   - Contamination or deterioration
   - Poor connection or damaged harness
3. Check for an intermittent TPS false signal. TPS signal displayed on a scantool should increase steadily when depressing accelerator pedal after starting.
4. Verify that the ECM ground connections are clean and properly tightened.
5. If test result is NG, repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.If OK, go to next step as below.

NOTE

If the contamination is evident on the HO2S or MAFS. Fix the source of the sensor contamination before replacing the sensor to prevent future contamination.

Positive Crankcase Ventilation System Inspection

1. Check the engine oil level. The oil level should be between the min. and max. marking. Fill to the correct oil level
2. Check crankcase ventilation valve for improper installation, damaged o-rings and malfunctioning .
3. Warm up the engine to normal operating temperature
4. Connect GDS and note the "SHORT TERM FUEL-B1" parameter on the Scantool data list.
5. Disconnect and plug the positive crankcase ventilation at the intake manifold side
6. Monitor the "SHORT TERM FUEL-B1" parameter on the Scantool data list once again.

Specification : The value should remain more or less unchanged

7. Is the displayed value within the specified value?

YES	▸ Go to next step as below
NO	▸ Check the PCV(Positive Crankcase Ventilation) valve for operation properly. Refer to "EM" group in Workshop Manual. If OK, check that engine oil is diluted with fuel. Change the oil or filter as necessary and go to "Verification of Vehicle Repair" procedure

Fuel System Inspection

1. Fuel Line Pressure Inspection
   (1) Check the fuel for excessive water, alcohol, or other contaminants. Replace contaminated fuel as necessary.
   (2) Install a fuel pressure gage
   (3) Inspect fuel pressure with normal idle status

Specification : 338~348kPa(3.45~3.55kg/cm²)

(4) Is fuel pressure within the specified value?

YES	▸ Go to next step as below
NO	▸ Inspect the suspected area. Refer to table as below. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

Condition	Possible 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	Fuel Pump(Fuel Pressure Regulator)
Fuel Pressure too High	Sticking fuel pressure regulator	Fuel Pump(Fuel Pressure Regulator)

2. Fuel Pressure Hold Inspection
   (1) Stop the engine and check for a change in the fuel pressure gauge reading.

Specification : After engine stops, the gauge reading should hold for minimum 5 minutes

(2) Is fuel pressure within the specified value?

YES	▸ Visually/physically inspect the engine mechanical problem for the following: - Worn cylinder - Worn valve - Worn piston or piston ring Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Inspect the suspected area. Refer to table as below. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

Condition	Possible Cause	Suspected Area
Fuel pressure drops slowly	Injector leak	Injector
Fuel pressure drops immediately	Stuck open in check valve of the fuel pump	Fuel pump

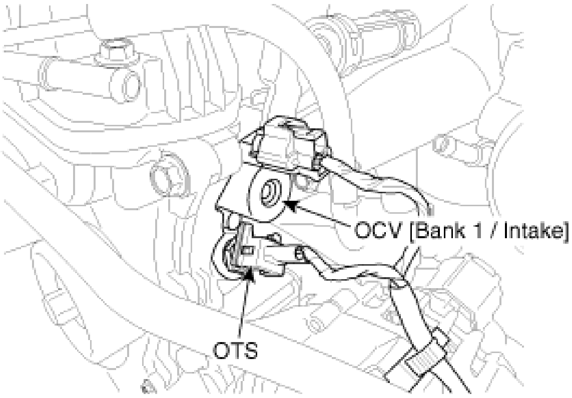
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The fluid of the CVVT is the engine oil and its density changes according to the engine oil temperature. At this time the Oil Temperature Sensor (OTS) helps compensation against the temperature differences. The Oil Temperature Sensor measures the engine oil temperature before the engine oil comes into the Oil-flow Control Valve (OCV).
According to the measured temperature, the Engine Control Module (ECM) compensates the oil-flow control valve operation time.

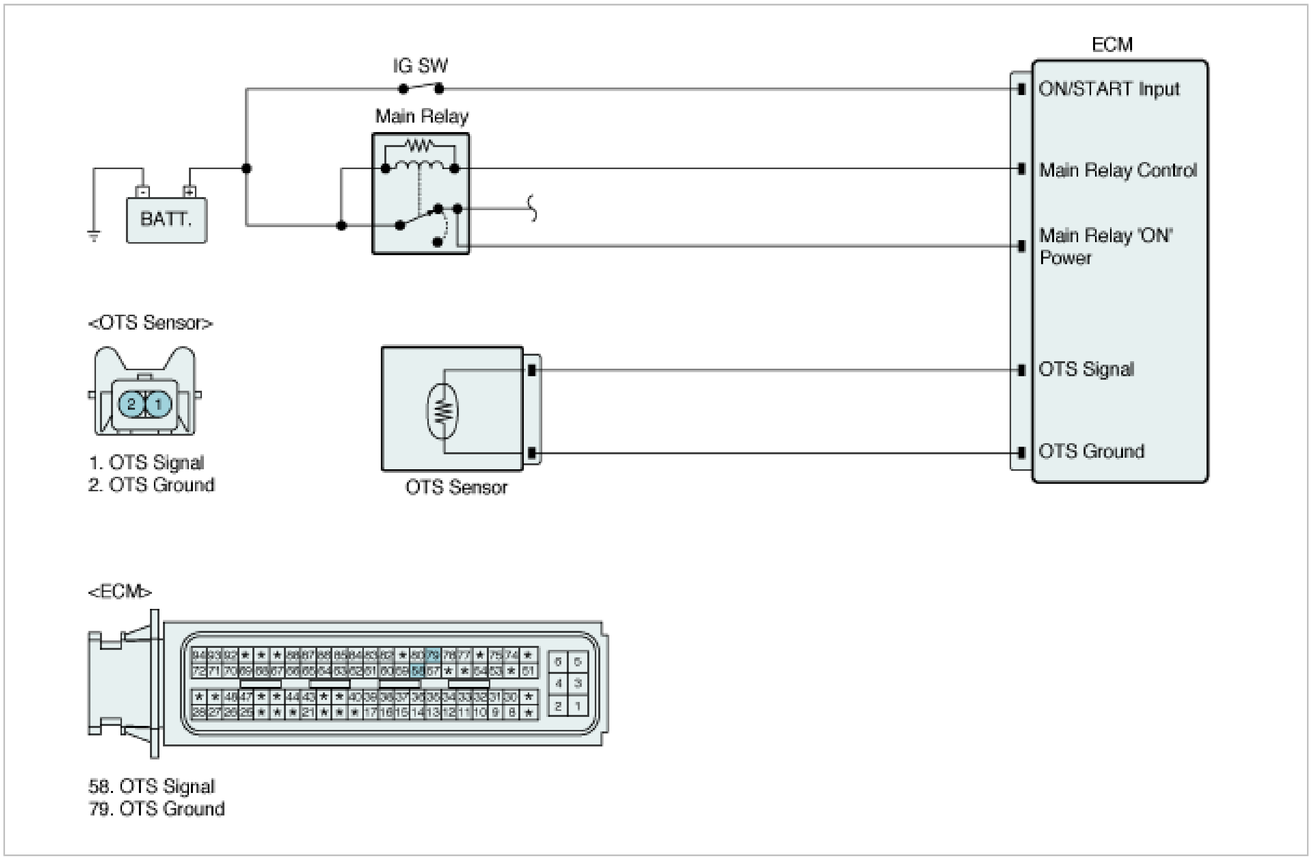
DTC Description

ECM compares the engine oil temperature, coolant and intake air temperature. ECM sets DTC P0196 when the variation of measured engine oil temperature is out of range in threshold value.

DTC Detecting Condition

Item		Detecting Condition	Possible Cause
DTC Strategy		• Plausabilbty check	• Faulty OTS
Enable Conditions	Case1	• difference between highest and lowest modeld oil Temp. < 30…100 °C • engine coolant Temp. > 85 °C • coolant Temp.(at start) < 53.25 °C • 6V <battery voltage < 16V • Faiure not detected for DTCs	
	Case2	• 6V <battery voltage <16V • Faiure not detected for DTCs	
Threshold Value	Case1	• difference between highest and lowest modeld oil Temp. < 2...35 °C	
	Case2	• modelde oil Temp. > 70 °C, measurde oil Temp. < 20 °C , coolant Temp.(at start) < 40 °C	
	Case3	• coolant Temp. <70 °C, measurde oil Temp. > 100 °C	
Diagnostic Time	Case1	• 10 sec	
	Case2	• 15 sec	
	Case3		
MIL On Condition		• 2 Driving Cycles	

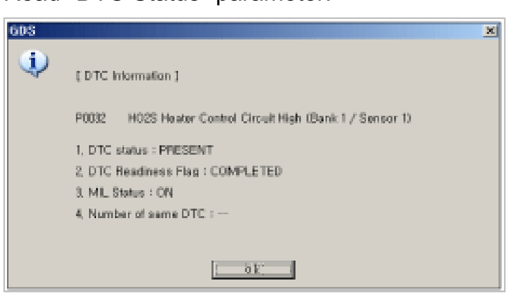
Diagnostic Circuit Diagram



Signal Waveform & Data

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. 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.
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 next step as below

Component Inspection

■ **OTS Simulation Inspect**

1. IG KEY OFF
2. Disconnect OTS connector.
3. IG KEY ON
4. Perform voltage simulation to signal circuit of OTS.

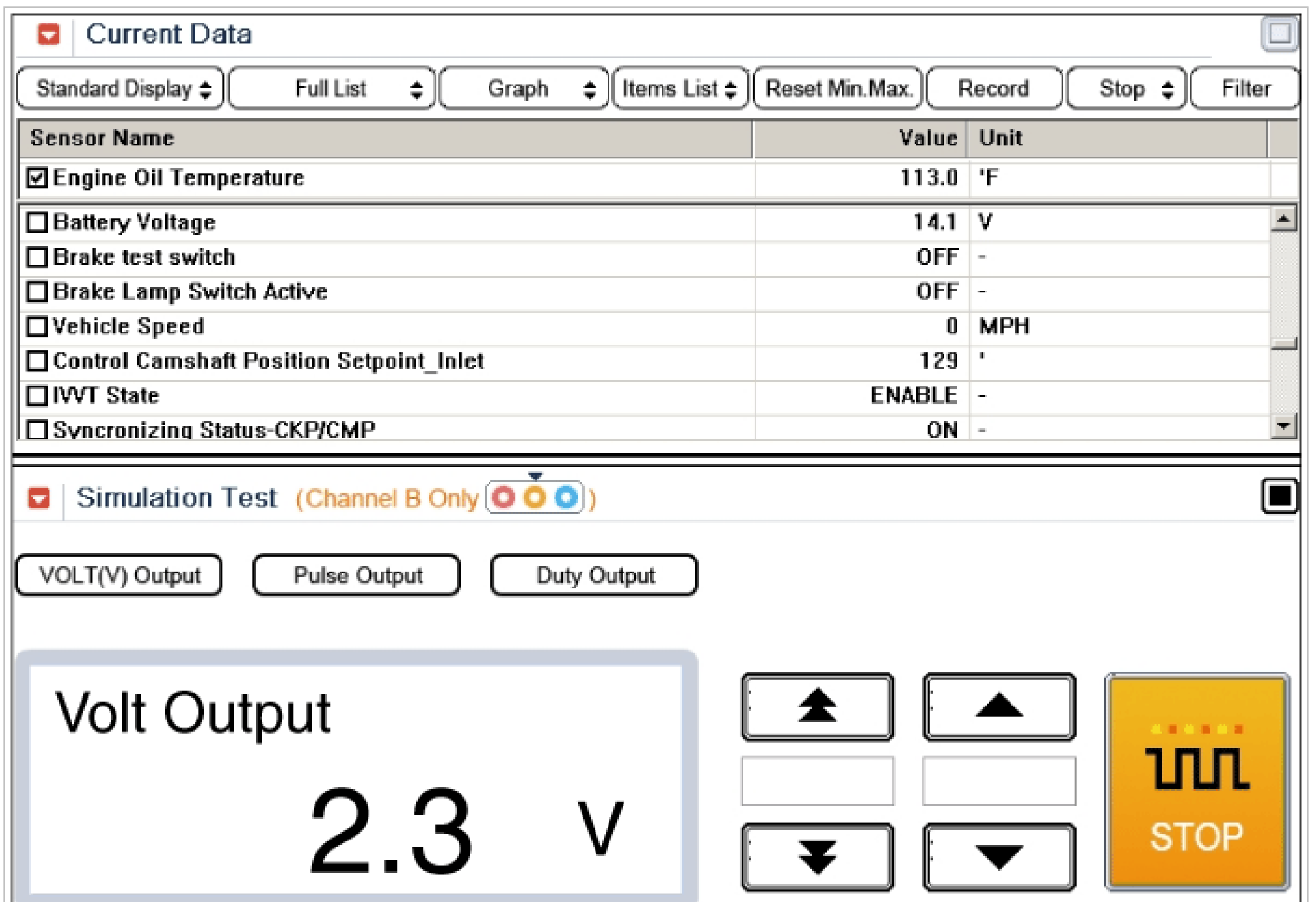


Fig.1

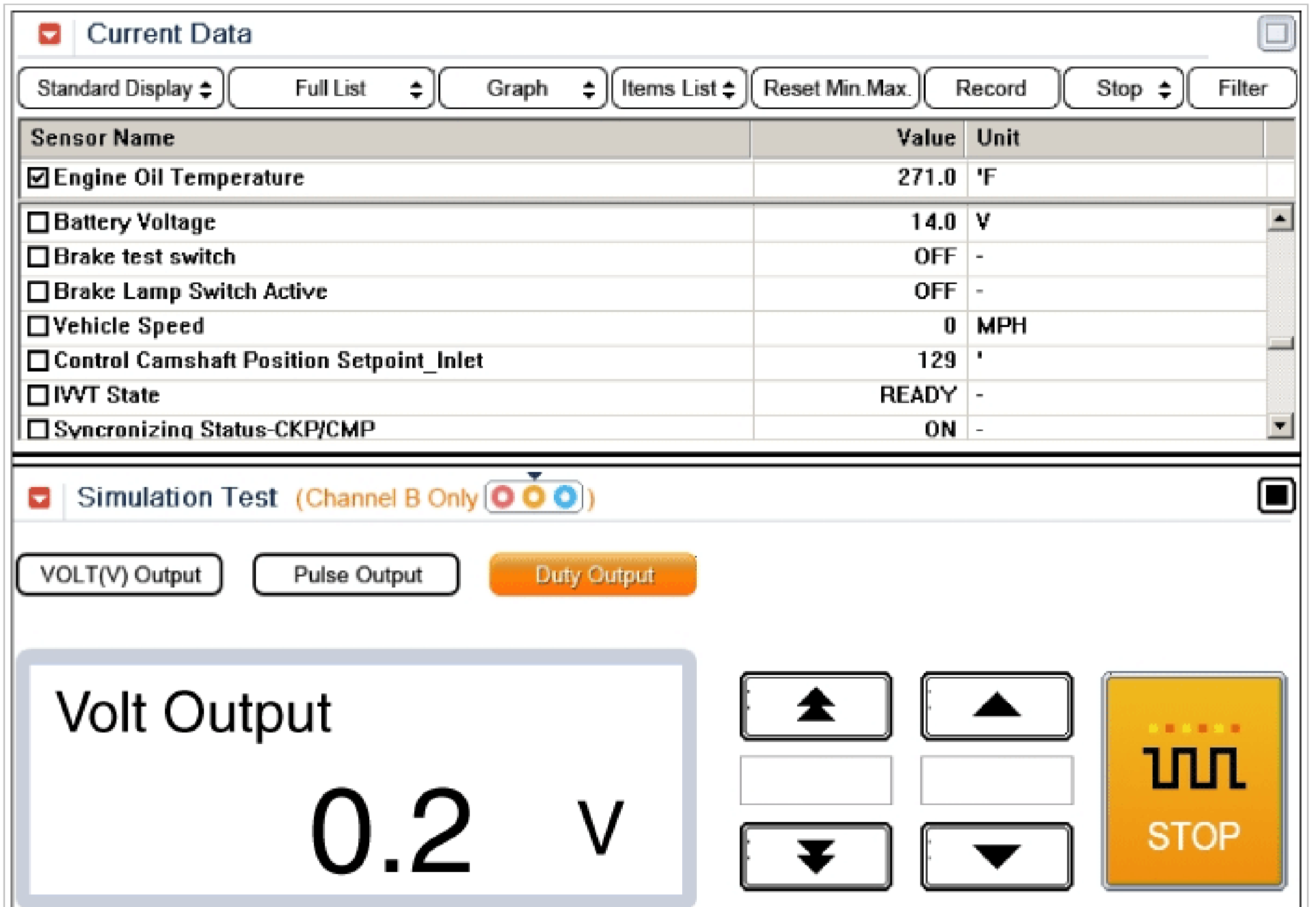


Fig.2

Fig 1) (2.3V Simulation)

Fig 2) (0.2V Simulation)

5. Does the simulation frequency make AAT value change ?

YES	▸ Go to next step as below
NO	▸ Substitute with a known-good OTS and check for proper operation. If the problem is corrected, replace OTS and then go to "Verification of Vehicle Repair" procedure

■ **Resistance Inspection**

1. Ignition "OFF"
2. Measure resistance between power terminal and control terminal of the sensor connector (Component side)

AAT Temp.(°C)	AAT Temp.(°F)	Resistance(KΩ)
-40	-40	52.15
-20	-4	16.52
0	32	6
20	68	2.45
40	104	1.11
60	140	0.54
80	176	0.29

3. Is resistance within the specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of

	Vehicle Repair" procedure
NO	▸ Substitute with a known - good RCV and check for proper operation. If the problem is corrected, replace RCV and go to "Verification of Vehicle Repair" procedure.

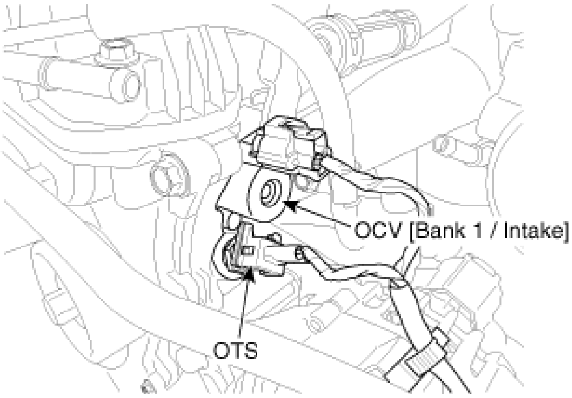
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The fluid of the CVVT is the engine oil and its density changes according to the engine oil temperature. At this time the Oil Temperature Sensor (OTS) helps compensation against the temperature differences. The Oil Temperature Sensor measures the engine oil temperature before the engine oil comes into the Oil-flow Control Valve (OCV).According to the measured temperature, the Engine Control Module (ECM) compensates the oil-flow control valve operation time.

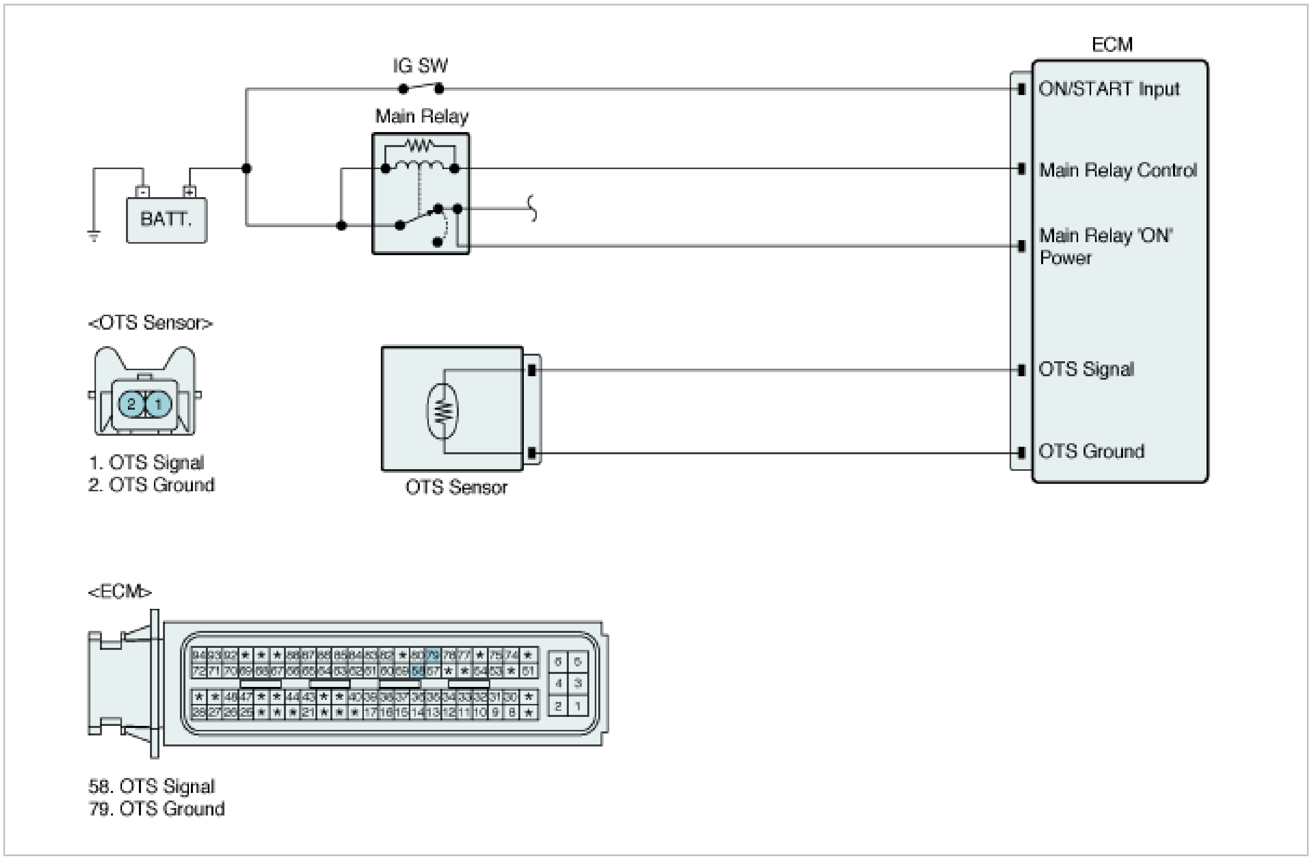
DTC Description

ECM sets DTC P0197 if the ECM detects engine oil temperature signal circuit is short to ground.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical check	• Short to ground in signal harness • Poor connection or damaged harness • Faulty OTS
Enable Conditions	• -9.8 °C < ECT < 100 °C • time after start > 300 sec • 6V <Battery voltage < 16V	
Threshold Value	• oil Temp. >153 °C	
Diagnostic Time	• 5 sec	
Mil On Condition	• 2 Driving Cycles	

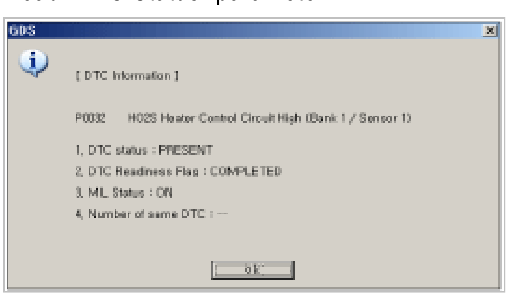
Diagnostic Circuit Diagram



Signal Waveform & Data

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. 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.
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 next step as below

Signal Circuit Inspection

1. IG KEY OFF.
2. Disconnect OTS connector.
3. Measure resistance between OTS signal terminal of OTS harness connector and chassis ground.

Specification : 5V

4. Is voltage within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ **OTS Simulation Inspect**

1. IG KEY OFF
2. Disconnect OTS connector.
3. IG KEY ON
4. Perform voltage simulation to signal circuit of OTS.

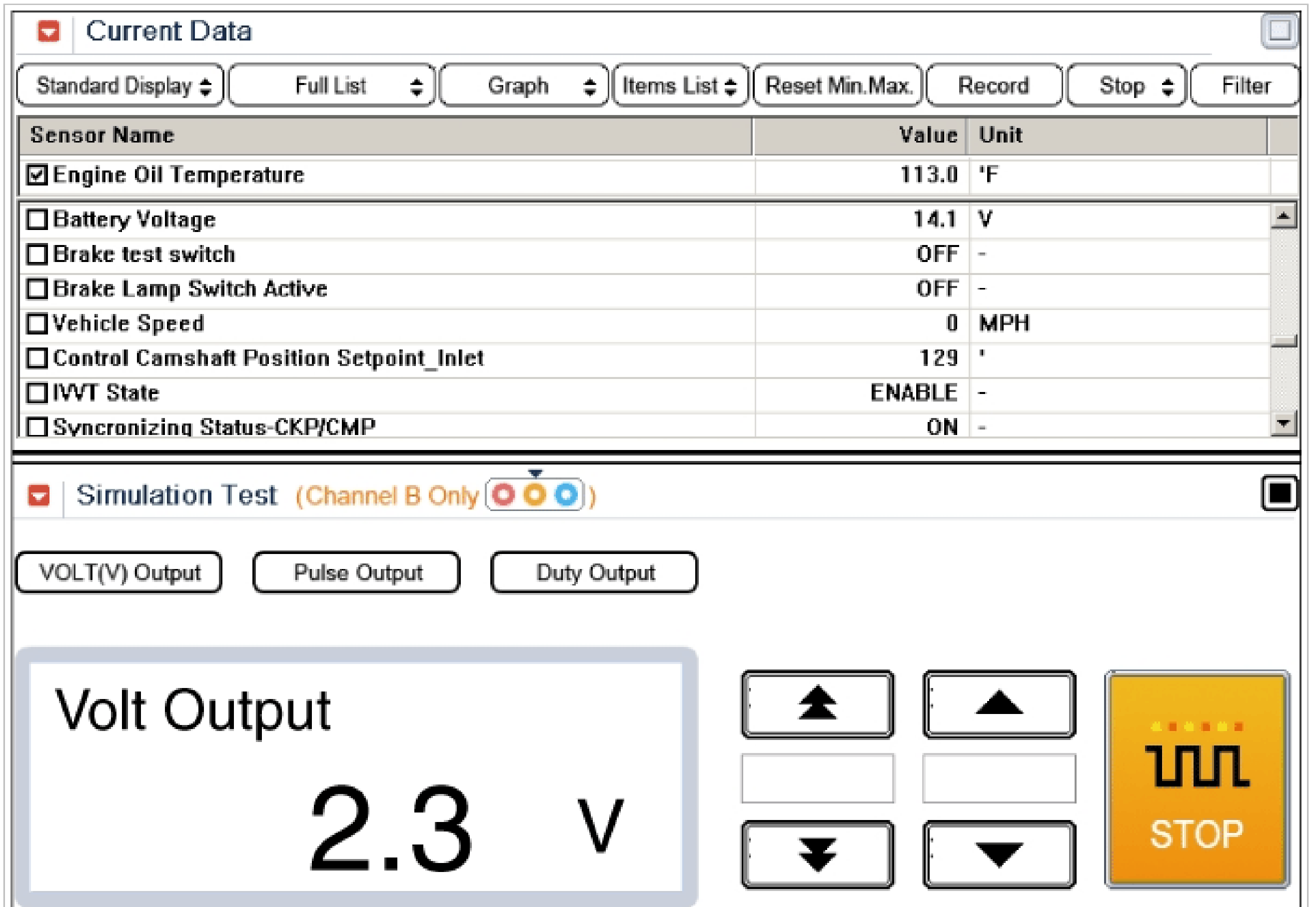

Current Data
Standard Display
Full List
Graph
Items List
Reset Min.Max.
Record
Stop
Filter
Sensor Name
Value
Unit
Engine Oil Temperature
113.0
'F
Battery Voltage
14.1
V
Brake test switch
OFF
-
Brake Lamp Switch Active
OFF
-
Vehicle Speed
0
MPH
Control Camshaft Position Setpoint_Inlet
129
'
IVVT State
ENABLE
-
Syncronizing Status-CKP/CMP
ON
-
Simulation Test
(Channel B Only)
VOLT(V) Output
Pulse Output
Duty Output
Volt Output
2.3
V
STOP

Fig.1

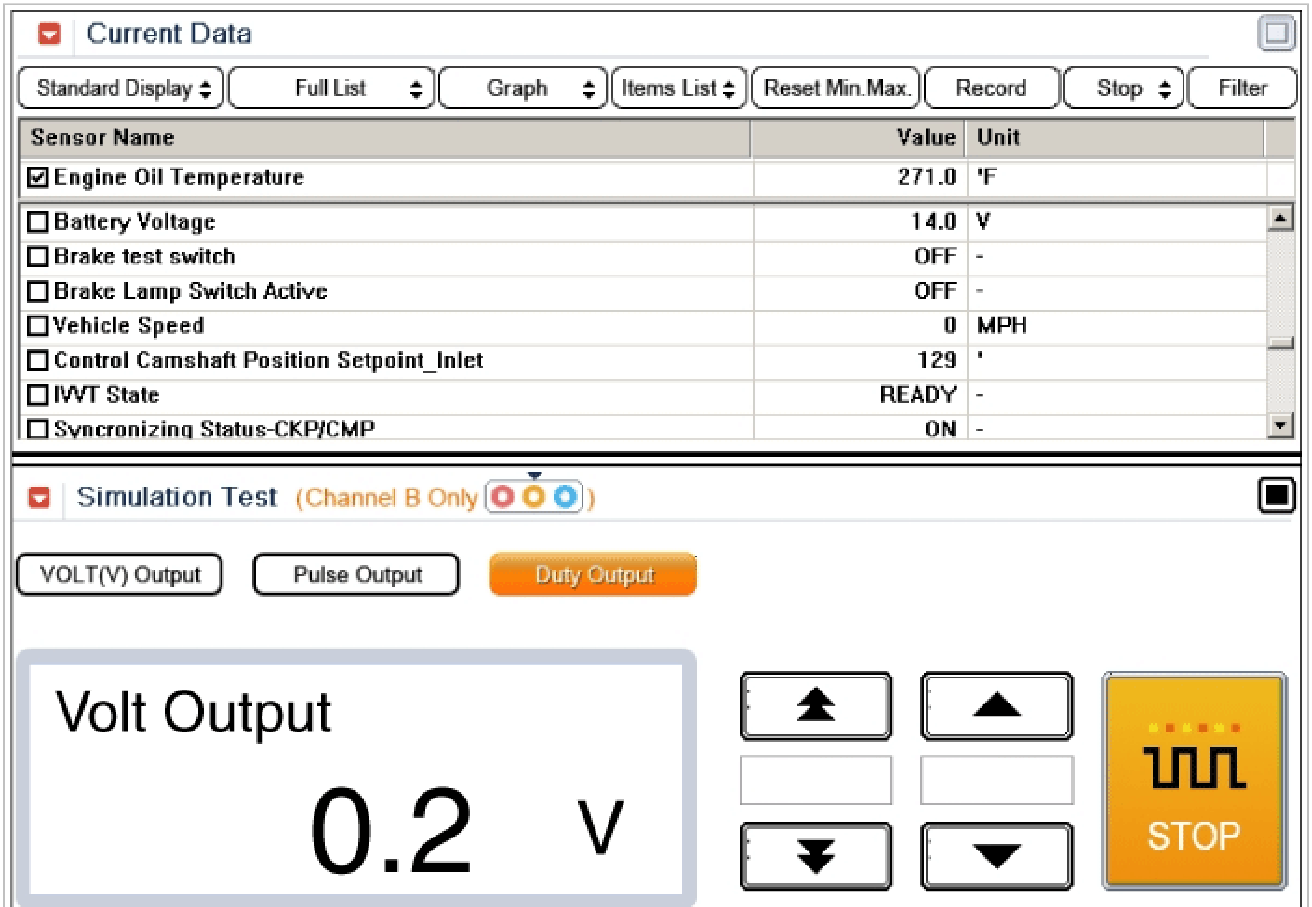


Fig.2

Fig 1) (2.3V Simulation)

Fig 2) (0.2V Simulation)

5. Does the simulation frequency make AAT value change ?

YES	▸ Go to next step as below
NO	▸ Substitute with a known-good OTS and check for proper operation. If the problem is corrected, replace OTS and then go to "Verification of Vehicle Repair" procedure

■ **Resistance Inspection**

1. Ignition "OFF"
2. Measure resistance between power terminal and control terminal of the sensor connector (Component side)

AAT Temp.(°C)	AAT Temp.(°F)	Resistance(KΩ)
-40	-40	52.15
-20	-4	16.52
0	32	6
20	68	2.45
40	104	1.11
60	140	0.54
80	176	0.29

3. Is resistance within the specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of

	Vehicle Repair" procedure
NO	▸ Substitute with a known - good RCV and check for proper operation. If the problem is corrected, replace RCV and go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

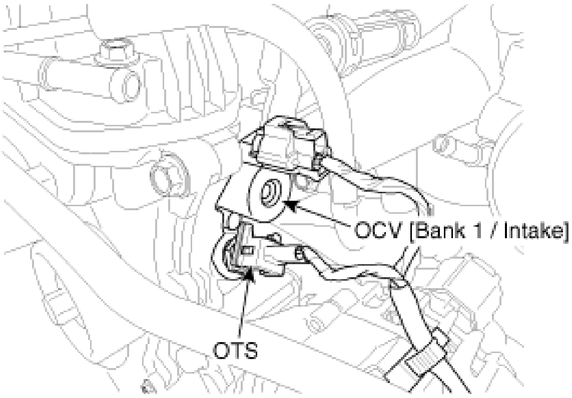
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0198 Engine Oil Temperature Sensor High Input

Component Location



General Description

The fluid of the CVVT is the engine oil and its density changes according to the engine oil temperature. At this time the Oil Temperature Sensor (OTS) helps compensation against the temperature differences. The Oil Temperature Sensor measures the engine oil temperature before the engine oil comes into the Oil-flow Control Valve (OCV).According to the measured temperature, the Engine Control Module (ECM) compensates the oil-flow control valve operation time.

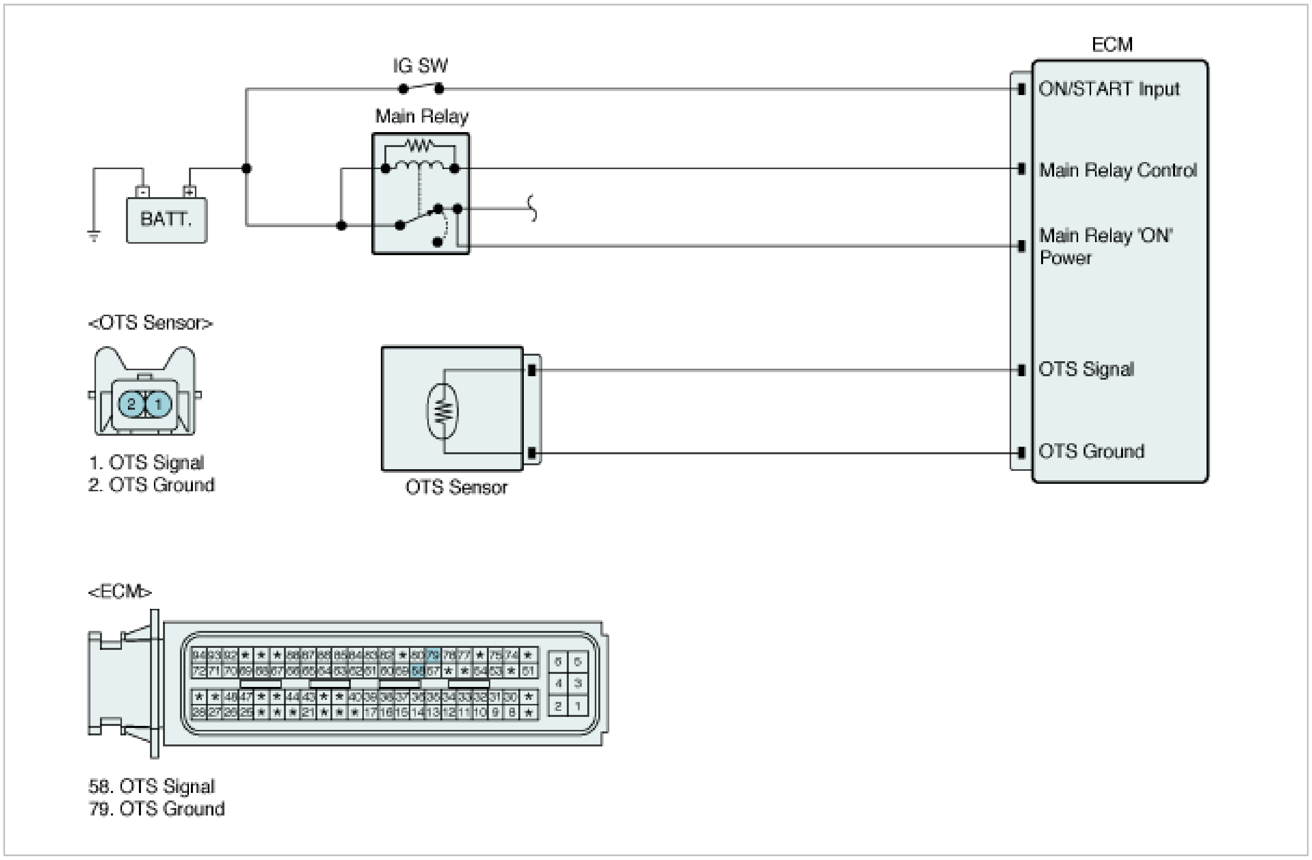
DTC Description

ECM sets DTC P0198 if the ECM detects engine oil temperature signal circuit is open or short to battery.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical check	• Poor connection or damaged harness • short to battery in control harness • Faulty OTS
Enable Conditions	• 10V < Battery voltage < 16V • Faiure not detected for DTCs • -9.8 °C < ECT < 100 °C • time after start > 300 sec	
Threshold Value	• oil Temp. < -36 °C	
Diagnostic Time	• 5 sec	
Mil On Condition	• 2Driving Cycles	

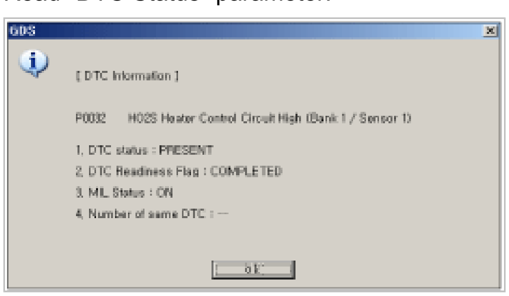
Diagnostic Circuit Diagram



Signal Waveform & Data

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. 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.
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 next step as below

Signal Circuit Inspection

1. IG KEY OFF.
2. Disconnect OTS connector.
3. Measure resistance between OTS signal terminal of OTS harness connector and chassis ground.

Specification : 5V

4. Is voltage within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Ground Circuit Inspection

1. IG "OFF".
2. Disconnect AAT connector.
3. IG "ON" & ENG "OFF".
4. Measure voltage between signal terminals of AAT harness connector and chassis ground.(Fig.1)
5. Measure voltage between signal terminals and ground terminal of AAT connector.(Fig.2)

Specification : (Fig.1) - (Fig.2) = below 200mV

6. Is voltage within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure..

Component Inspection

■ **OTS Simulation Inspect**

1. IG KEY OFF
2. Disconnect OTS connector.
3. IG KEY ON

4. Perform voltage simulation to signal circuit of OTS.

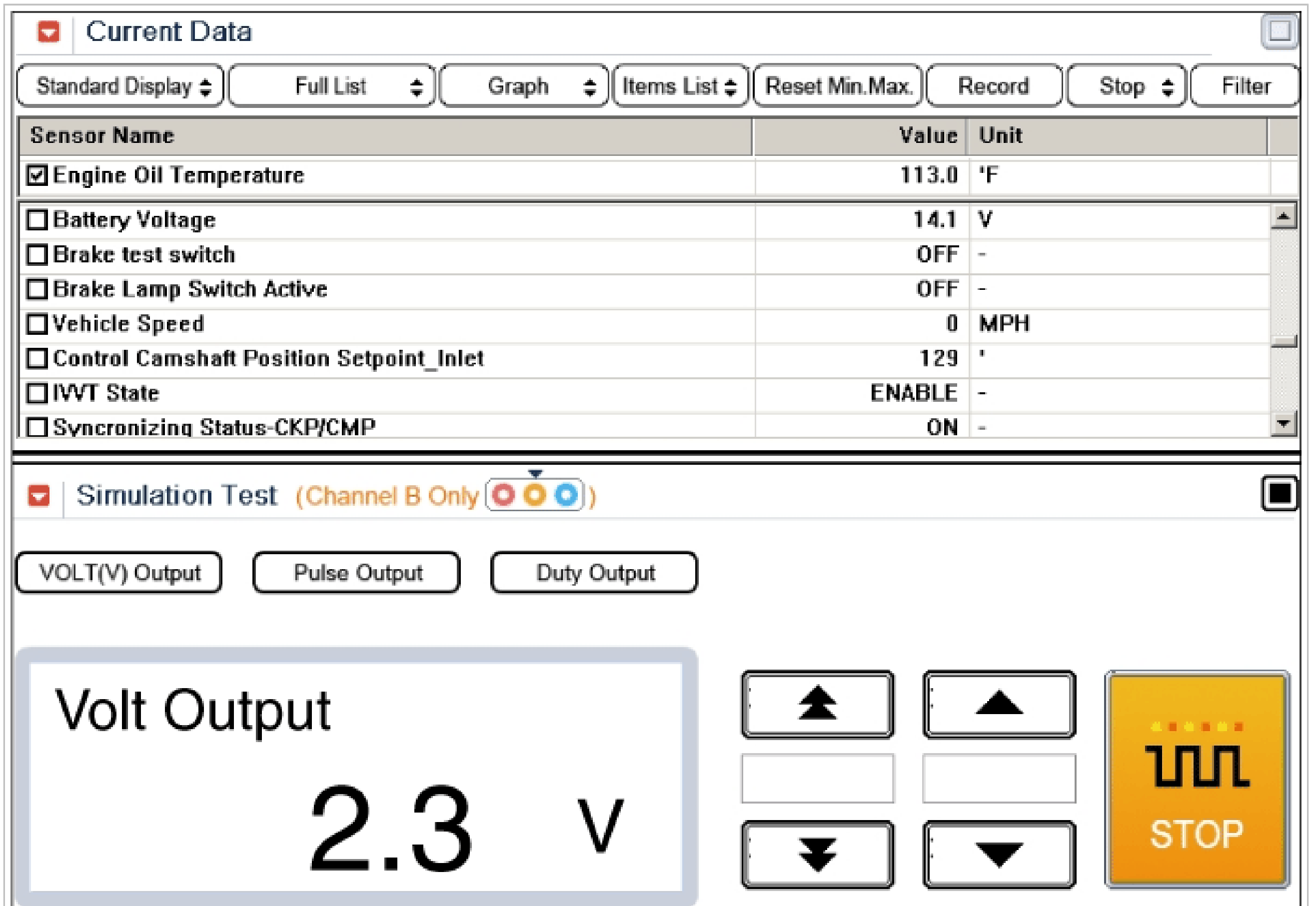


Fig.1

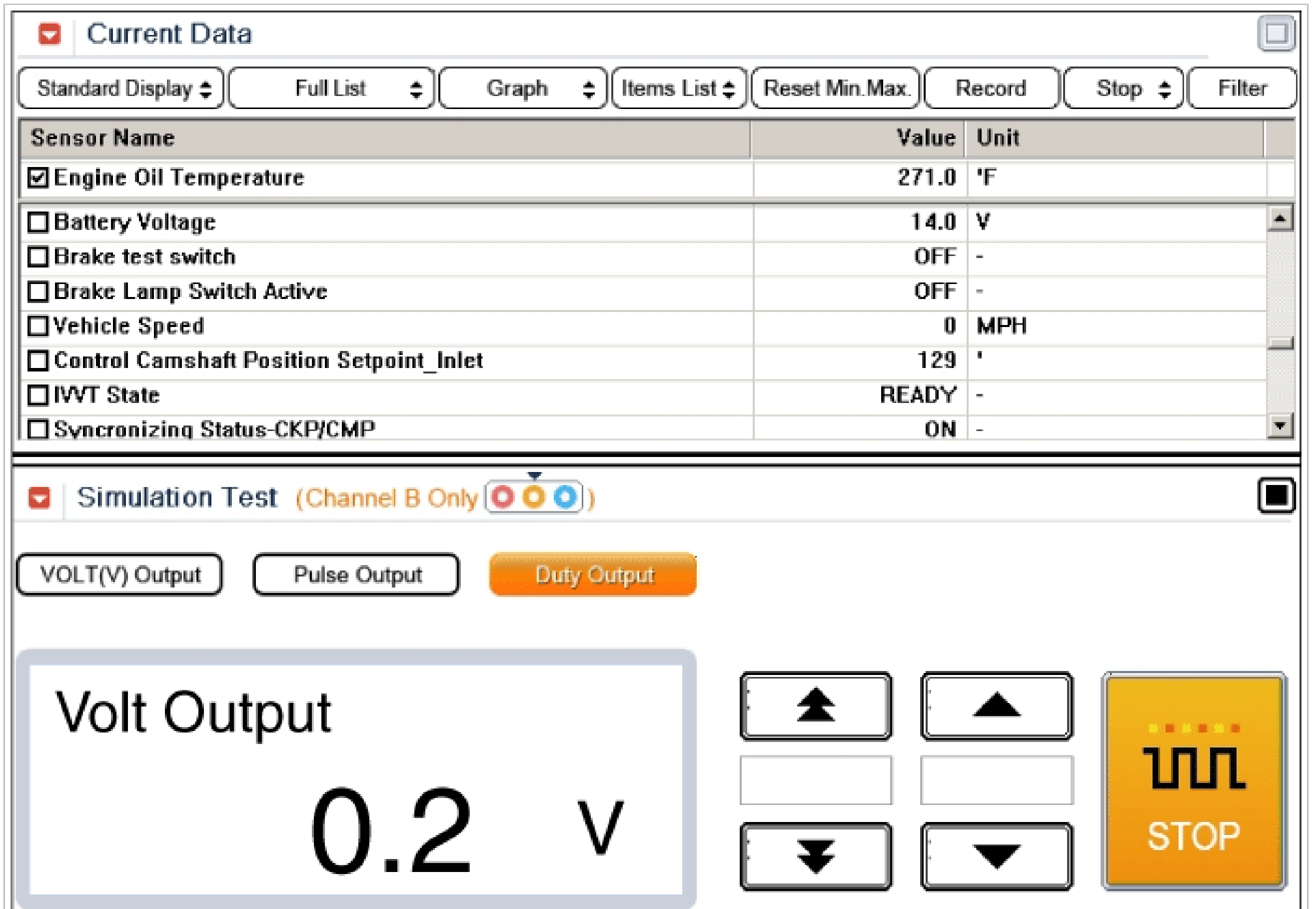


Fig.2

Fig 1) (2.3V Simulation)
Fig 2) (0.2V Simulation)

5. Does the simulation frequency make AAT value change ?

YES	▶ Go to next step as below
NO	▶ Substitute with a known-good OTS and check for proper operation. If the problem is corrected, replace OTS and then go to "Verification of Vehicle Repair" procedure

■ **Resistance Inspection**

1. Ignition "OFF"
2. Measure resistance between power terminal and control terminal of the sensor connector (Component side)

AAT Temp.(°C)	AAT Temp.(°F)	Resistance(KΩ)
-40	-40	52.15
-20	-4	16.52
0	32	6
20	68	2.45
40	104	1.11
60	140	0.54
80	176	0.29

3. Is resistance within the specification?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of

	Vehicle Repair" procedure
NO	▸ Substitute with a known - good RCV and check for proper operation. If the problem is corrected, replace RCV and go to "Verification of Vehicle Repair" procedure.

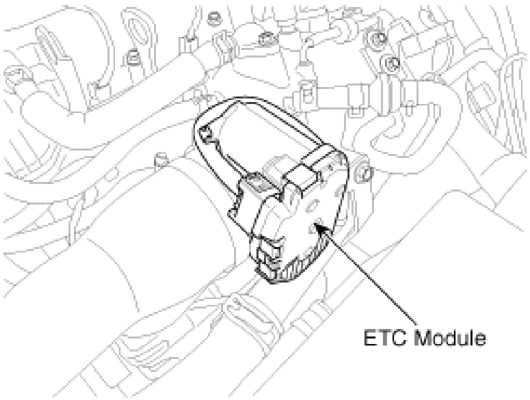
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Electronic Throttle Control(ETC) system is made of the components throttle body, Throttle Position Sensor(TPS)1&2 and Accelerator Position Sensor(APS) 1&2. TPS1&2 are sharing the same source voltage and ground. The throttle valve opening is control by throttle motor which is controlled by Engine Control Module(ECM). The opposite position indicator shows inverted signal characteristics. TPS1 output voltage increases smoothly in proportion with the throttle valve opening angle after starting. TPS2 output voltage decreases in inverse proportion with the throttle valve opening angle after starting. TPS provides feedback to the ECM to control the throttle motor in order to control the throttle valve opening angle properly in response to the driving condition.

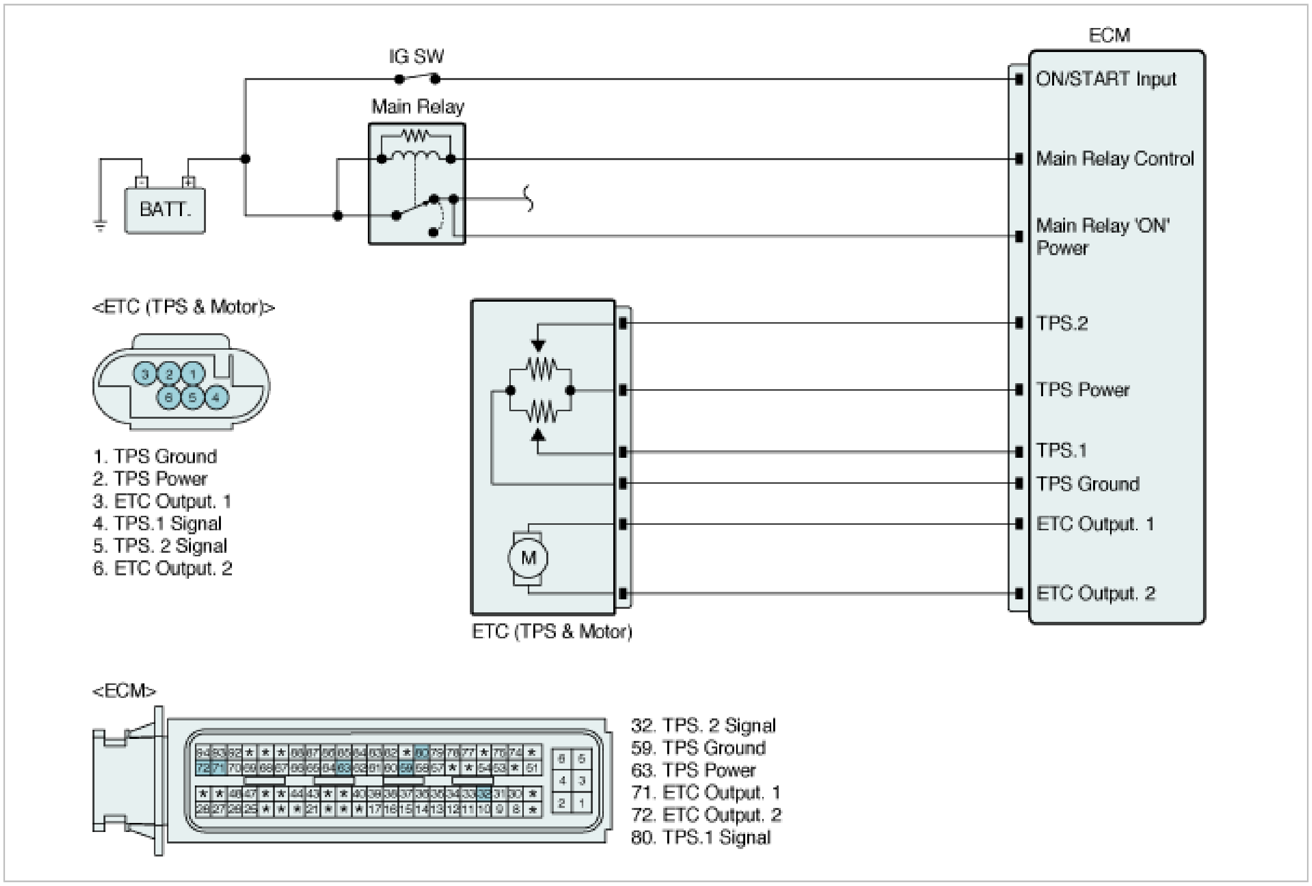
DTC Description

The DTC P0221 is set when the intake manifold model filtered reduced area controller is out of range in low or high load.

DTC Detecting Condition

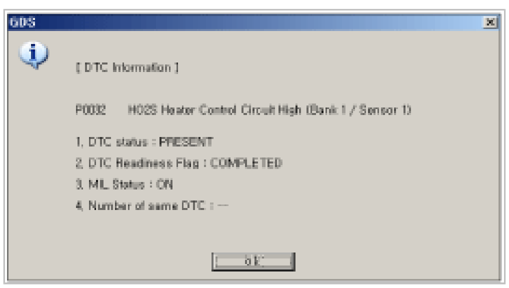
Item	Detecting Condition	Possible Cause
DTC Strategy	• Plausibility check between TPS1 and TPS2	• Faulty TPS2 • Poor connection or damaged harness
Enable Conditions	• No engine stop and engine start • No TPS adaptation request • No relevant failure	
Threshold Value	• An absolute value of TPS2 - TPS1 > 7.6%	
Diagnostic Time	• 0.3sec.	
MIL On Condition	• 1 Driving Cycle	
Fail Safe	• Forced limited power mode : When the DTC is set, the ECM reduces engine torque by 25% of normal value. • The ECM uses TPS1 signal to monitor the controlled opening angle of the throttle valve.	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

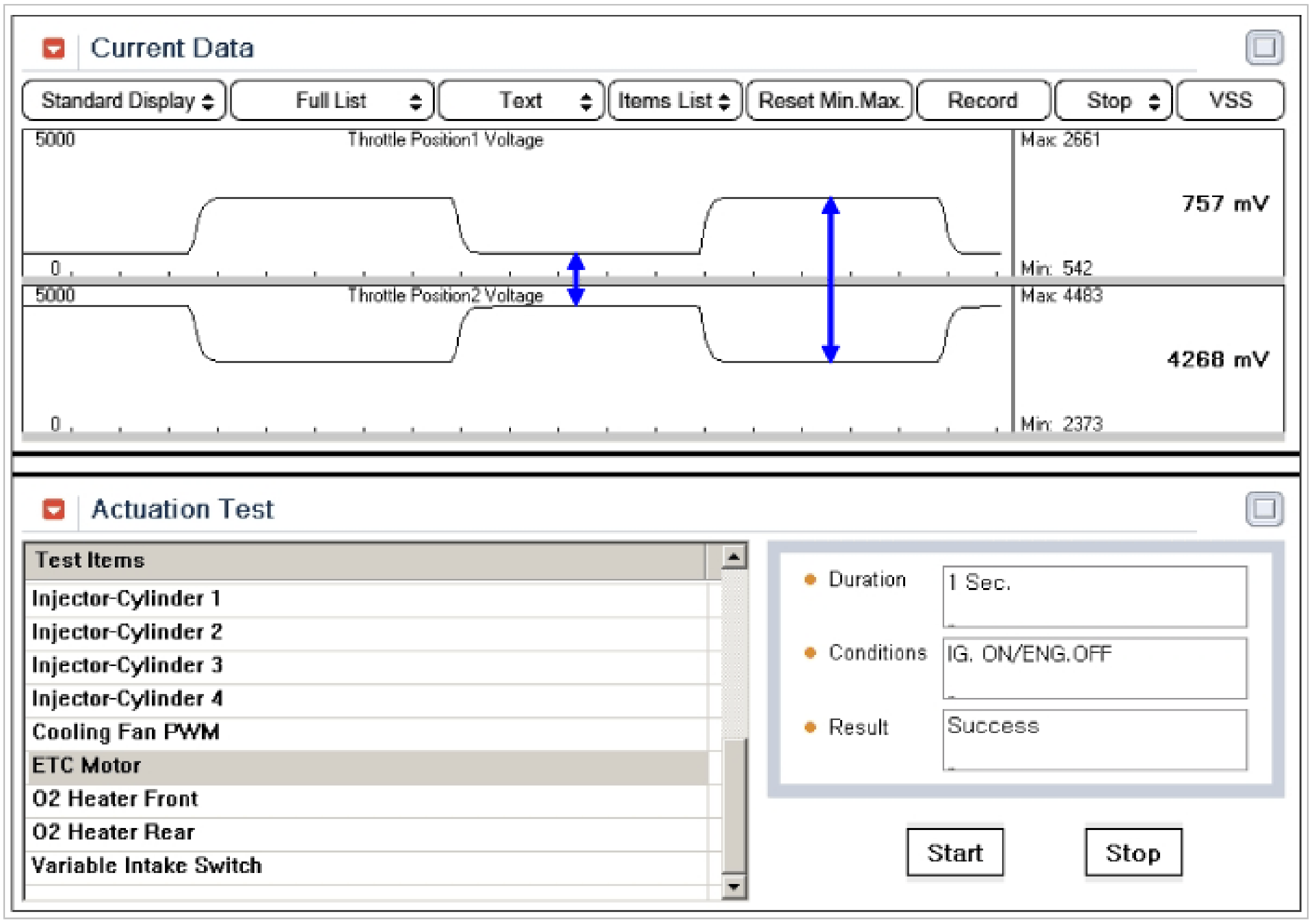
Terminal and connection inspection

1. 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.
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

1. Select 'Actuation Test' mode and execute 'ETC motor' item.



▸ During 'ETC Motor' test, TPS1 and TPS2 show symmetrical movements.

2. Is the waveform normal?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check ETC for contamination, deterioration, or damage. Substitute with a known-good ETC and check for proper operation. If the problem is corrected, replace TPS and then go to "Verification of Vehicle Repair" procedure.

> **NOTE**
>
> It is necessary to perform the TPS adaptation procedure after the ETC assembly or ECM replacing.
> ■ TPS adaptation procedure
> Ignition "OFF" and then "ON" without cranking. Wait for 10 seconds under enable conditions.
> → Enable conditions : Battery >10V & Intake Air Temp. >5.3°C(41.5°F) & 5.3°C(41.5°F) < Engine CoolantTemp. < 99.8°C(211.6°F)

Verification of Vehicle Repair

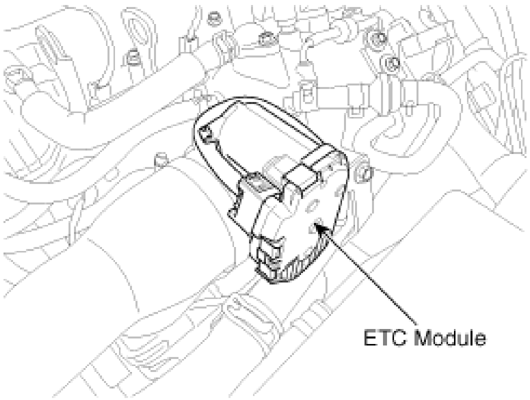
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0222 Throttle/Pedal Position Sensor/Switch \'B\' Circuit Low Input

Component Location



General Description

The Electronic Throttle Control(ETC) system is made of the components throttle body, Throttle Position Sensor(TPS)1&2 and Accelerator Position Sensor(APS) 1&2. TPS1&2 are sharing the same source voltage and ground. The throttle valve opening is control by throttle motor which is controlled by Engine Control Module(ECM). The opposite position indicator shows inverted signal characteristics. TPS1 output voltage increases smoothly in proportion with the throttle valve opening angle after starting. TPS2 output voltage decreases in inverse proportion with the throttle valve opening angle after starting. TPS provides feedback to the ECM to control the throttle motor in order to control the throttle valve opening angle properly in response to the driving condition.

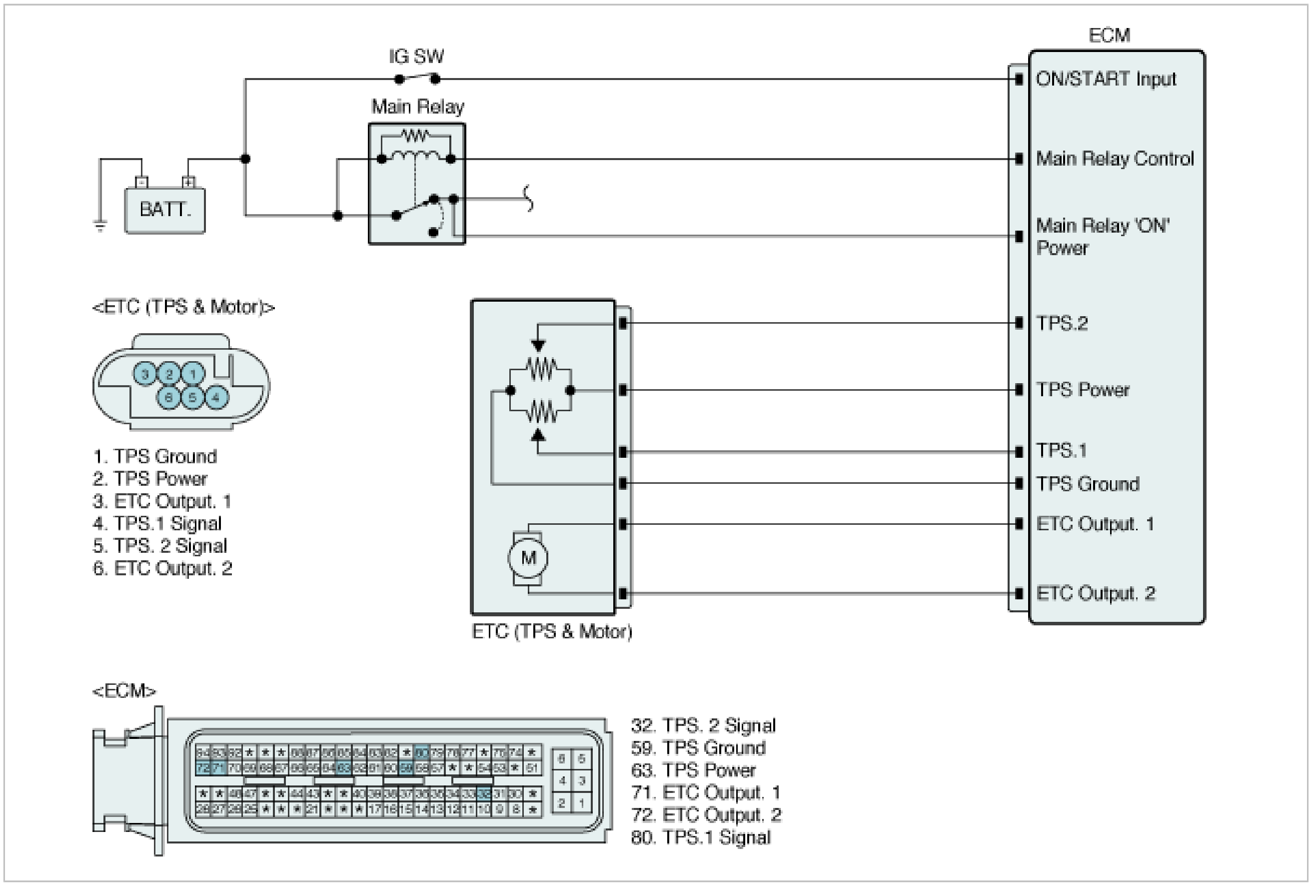
DTC Description

ECM sets DTC P0222 if the ECM detects signal voltage lower than the possible range of a properly operating TPS2.

DTC Detecting Condition

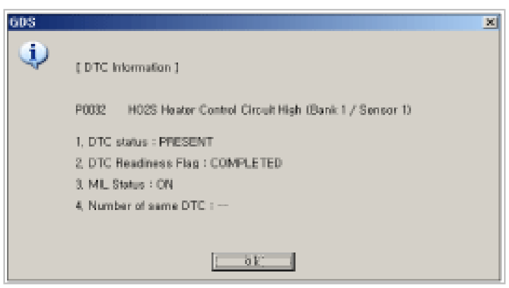
Item		Detecting Condition	Possible Cause
DTC Strategy		• Short to Ground or Open circuit	• Open in power supply harness or signal harness • Short to ground in power supply or signal harness • Poor connection or damaged harness • Faulty TPS2
Case1	Enable Conditions	• Ignition "ON"	
	Threshold Value	• TPS2 < 0.1V	
Case2	Enable Conditions	• Ignition "ON" • In idle status • Target throttle angle < 58% • MAF Limphome detected or TPS1 failure detected	
	Threshold Value	• TPS2 at idle < 2.0V	
Diagnostic Time		• 0.05 sec.	
MIL On Condition		• 1 driving cycle	
Fail Safe		• Forced limited power mode : When the DTC is set, the ECM reduces engine torque by 25% of normal value. • The ECM uses TPS1 signal to monitor the controlled opening angle of the throttle valve.	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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

■ Power Circuit Preliminary Inspection

1. IG KEY OFF.
2. Disconnect ETC connector.
3. IG KEY ON.
4. Measure voltage between TPS power circuit of ETC harness connector and chassis ground.

Specification : Approx. 5V

5. Is voltage within the specification?

YES	▸ Go to 'Signal Circuit Inspection' procedure.
NO	▸ Go to next procedure.

■ Check for Short to Ground in Power Circuit

1. IG KEY OFF.
2. Disconnect ETC connector.
3. IG KEY ON.
4. Measure resistance between TPS power terminal of ETC harness connector and chassis ground.

Specification : Infinite

5. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ Check Open in Power Circuit

1. IG KEY OFF.
2. Disconnect ETC connector and ECM connector.
3. Measure resistance between both ends of TPS Power line.

Specification : Below 1Ω

4. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Signal Circuit Inspection

■ **Check for Short to Ground in Signal Circuit**

1. IG KEY OFF.
2. Disconnect ETC connector.
3. Measure resistance between TPS2 signal terminal of ETC harness connector and chassis ground.

Specification : Infinite

4. Is resistance within specification?

YES	▶ Go to next procedure.
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ **Check for Open in Signal Circuit**

1. IG KEY OFF.
2. Disconnect ETC connector and ECM connector.
3. Measure resistance between both ends of TPS2 signal line.

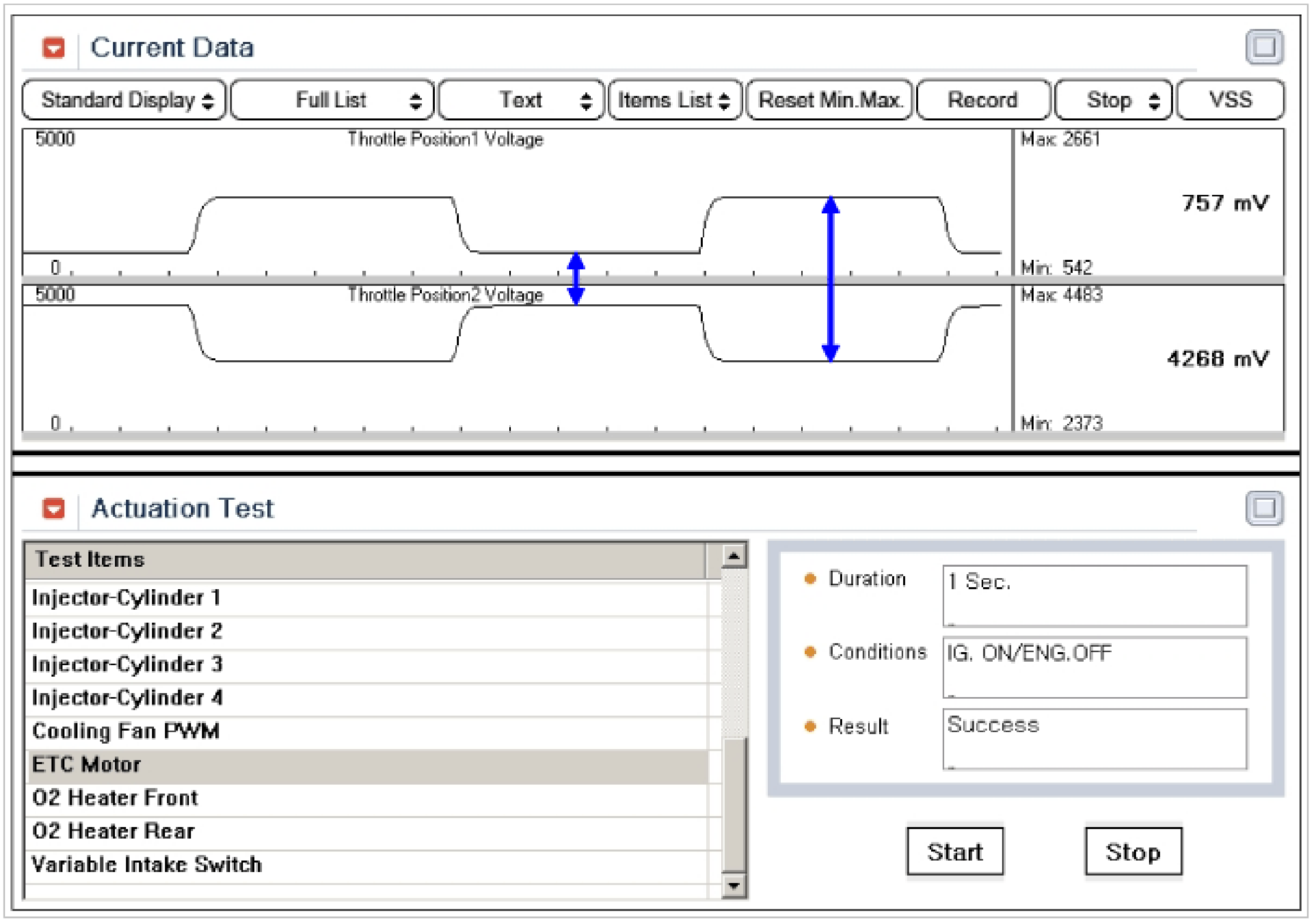
Specification : Below 1Ω.

4. Is resistance within specification?

YES	▶ Go to next procedure.
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Select 'Actuation Test' mode and execute 'ETC motor' item.



▸ During 'ETC Motor' test, TPS1 and TPS2 show symmetrical movements.

2. Is the waveform normal?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check ETC for contamination, deterioration, or damage. Substitute with a known-good ETC and check for proper operation. If the problem is corrected, replace TPS and then go to "Verification of Vehicle Repair" procedure.

NOTE

It is necessary to perform the TPS adaptation procedure after the ETC assembly or ECM replacing.
■ TPS adaptation procedure
Ignition "OFF" and then "ON" without cranking. Wait for 10 seconds under enable conditions.
→ Enable conditions : Battery >10V & Intake Air Temp. >5.3°C(41.5°F) & 5.3°C(41.5°F) < Engine CoolantTemp. < 99.8°C(211.6°F)

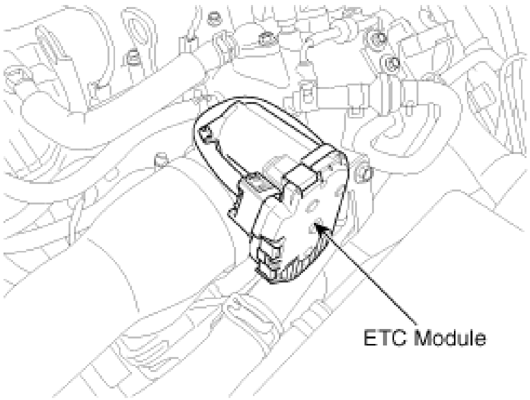
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Electronic Throttle Control(ETC) system is made of the components throttle body, Throttle Position Sensor(TPS)1&2 and Accelerator Position Sensor(APS) 1&2. TPS1&2 are sharing the same source voltage and ground. The throttle valve opening is control by throttle motor which is controlled by Engine Control Module(ECM). The opposite position indicator shows inverted signal characteristics. TPS1 output voltage increases smoothly in proportion with the throttle valve opening angle after starting. TPS2 output voltage decreases in inverse proportion with the throttle valve opening angle after starting. TPS provides feedback to the ECM to control the throttle motor in order to control the throttle valve opening angle properly in response to the driving condition.

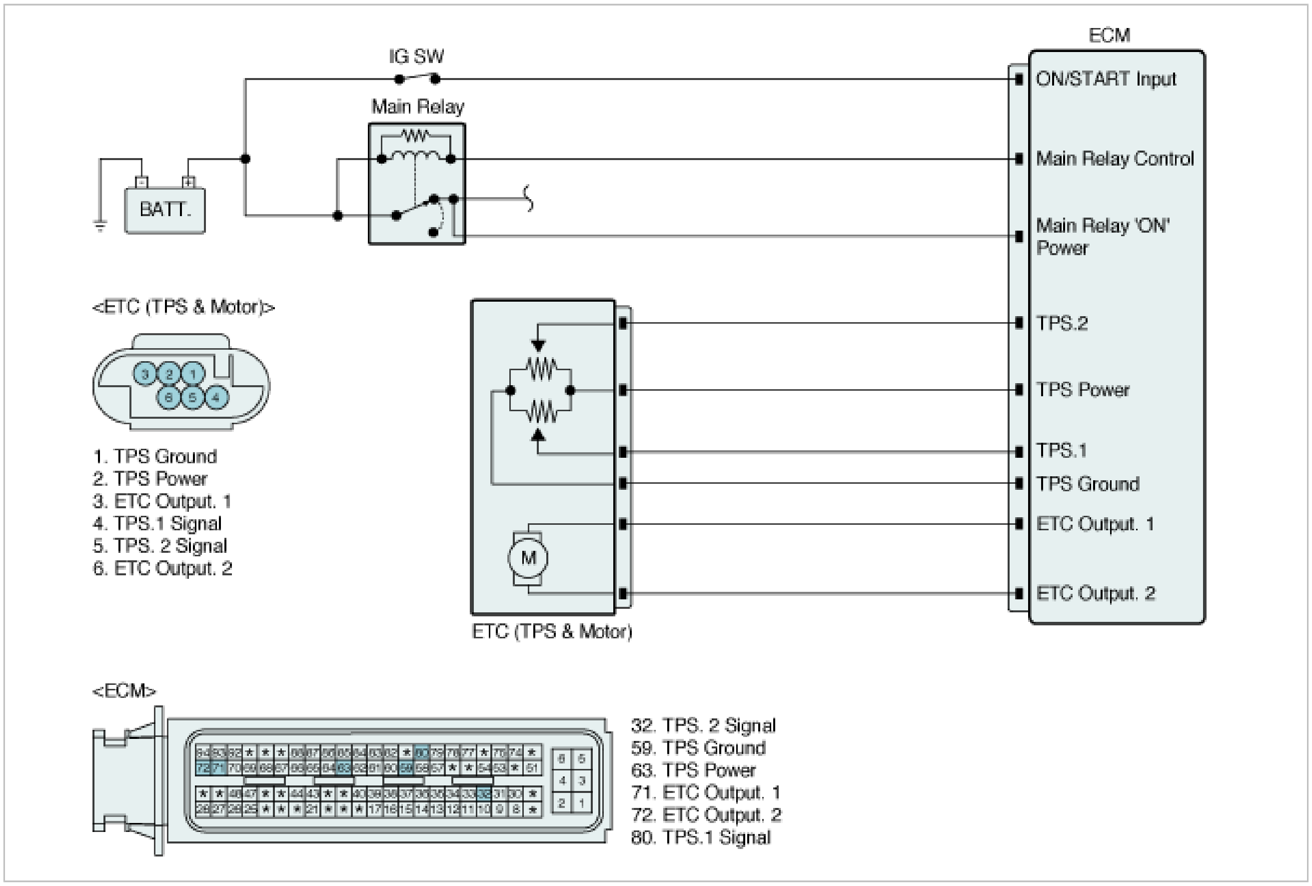
DTC Description

ECM sets DTC P0223 if the ECM detects signal voltage higher than the possible range of a properly operating TPS2.

DTC Detecting Condition

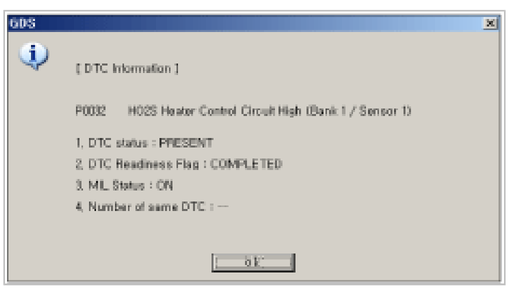
Item	Detecting Condition	Possible Cause
DTC Strategy	• Short to Battery or Open circuit	• Open in ground circuit • Short to battery in signal circuit • Poor connection or damaged harness • Faulty TPS2
Enable Conditions	• Ignition "ON"	
Threshold Value	• TPS2 > 4.9V	
Diagnostic Time	• 0.05 sec.	
MIL On Condition	• 1 Driving Cycle	
Fail Safe	• Forced limited power mode : When the DTC is set, the ECM reduces engine torque by 25% of normal value. • The ECM uses TPS1 signal to monitor the controlled opening angle of the throttle valve.	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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 "Ground Circuit Inspection" procedure

Ground Circuit Inspection

■ Check for Open in Ground Circuit

1. IG KEY OFF.
2. Disconnect ETC connector and ECM connector.
3. Measure resistance between both ends of TPS ground line.

Specification : Below 1Ω.

4. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Signal Circuit Inspection

■ Check for Short to Power in Signal Circuit

1. IG KEY OFF.
2. Disconnect ETC connector.
3. IG KEY ON.
4. Measure voltage between TPS1 signal terminal of ETC harness connector and chassis ground.

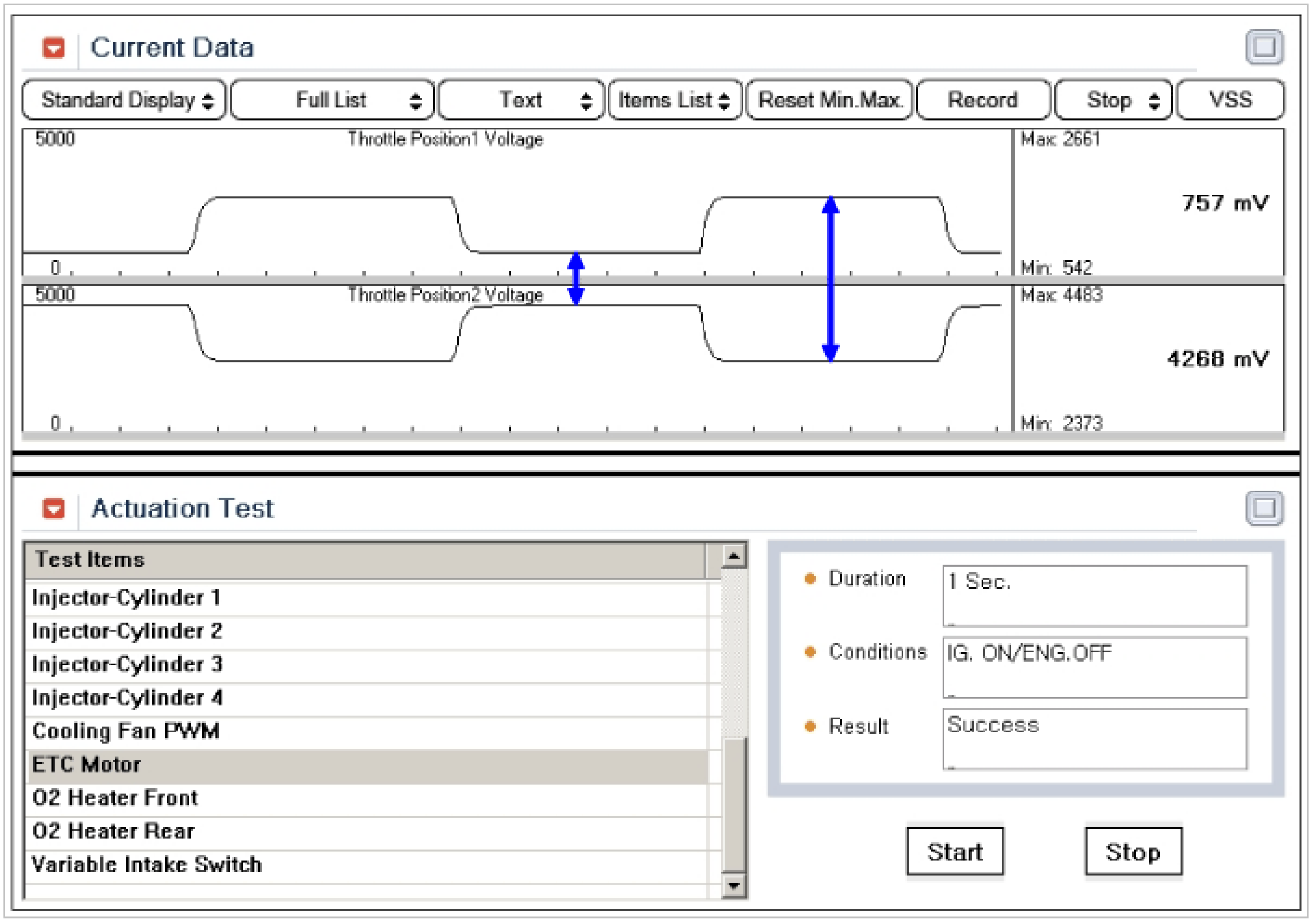
Specification : Approx. 0 V

5. Is voltage within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Select 'Actuation Test' mode and execute 'ETC motor' item.



▸ During 'ETC Motor' test, TPS1 and TPS2 show symmetrical movements.

2. Is the waveform normal?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check ETC for contamination, deterioration, or damage. Substitute with a known-good ETC and check for proper operation. If the problem is corrected, replace TPS and then go to "Verification of Vehicle Repair" procedure.

NOTE

It is necessary to perform the TPS adaptation procedure after the ETC assembly or ECM replacing.
■ TPS adaptation procedure
Ignition "OFF" and then "ON" without cranking. Wait for 10 seconds under enable conditions.
→ Enable conditions : Battery >10V & Intake Air Temp. >5.3°C(41.5°F) & 5.3°C(41.5°F) < Engine CoolantTemp. < 99.8°C(211.6°F)

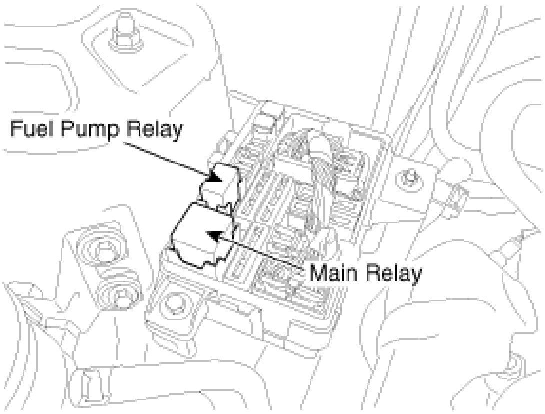
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The ECM 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 ECM monitors the control circuit between the fuel pump relay and the ECM. When the ignition switch is turned ON, the ECM energizes the fuel pump relay, which sends power to the fuel pump.

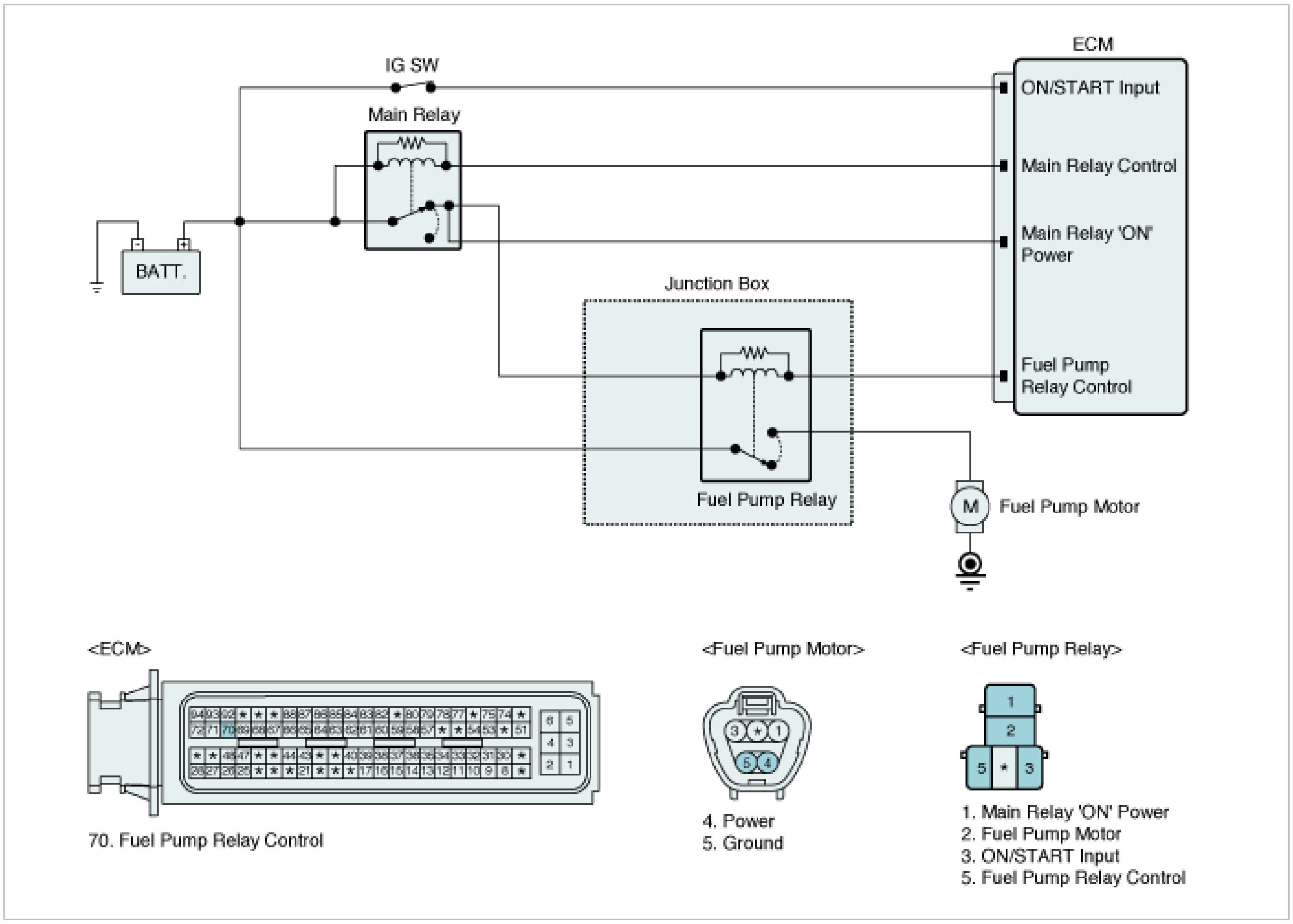
DTC Description

ECM sets DTC P0230 if the ECM detects the fuel pump relay control circuit is open, short to ground or battery.

DTC Detecting Condition

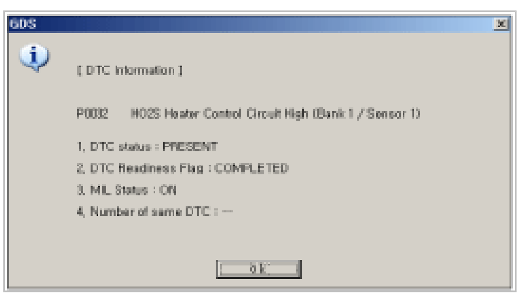
Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical check	• Open or short in harness • Poor connection or damaged harness • Faulty fuel pump relay
Enable Conditions	• 10V < Battery voltage < 16V	
Threshold Value	• Open or short circuit	
Diagnostic Time	• 1.5sec.	
Mil On Condition	• -	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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.

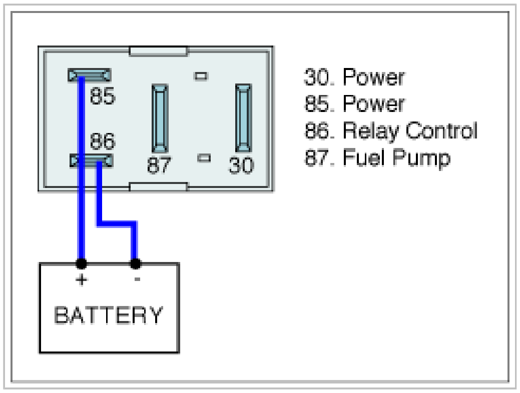
NO	▸ Go to next step as below

Component Inspection

1. With Ignition OFF, remove the fuel pump relay
2. Measure resistance between terminals 85 and 86 of the fuel pump relay(Component side)

Specification : Approx. 70~120Ω at 20°C(68°F)

3. Apply 12V and a ground to 85 and 86 terminals of the fuel pump relay(Components side).



4. Check if the main relay works well when it is energized. (If the fuel pump relay works normally, a clicking sound can be heard.)
5. Does the fuel pump relay operate normally?

YES	▸ Go to next step as below
NO	▸ Check fuel pump relay for contamination, deterioration, or damage. Substitute with a known-good fuel pump relay and check for proper operation. If the problem is corrected, replace fuel pump relay and then go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

1. Ignition "ON" & Engine "OFF".
2. Measure voltage between power supply terminals of fuel pump relay harness and chassis ground.

Specification : Approx. B+

3. Is voltage within the specification?

YES	▸ Go to "Control Circuit Inspection" procedure
NO	▸ Check for an open or short to ground in the power supply circuit. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Control Circuit Inspection

1. Measure voltage between control terminal of Fuel Pump Relay harness connector and chassis ground.

Specification : 4~5V

2. Is voltage within the specification?

YES	▸ Go to next step as below

NO	▸ Check for open or short in control circuit. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Terminal and Connector Inspection

1. 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.
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	▸ Thoroughly check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

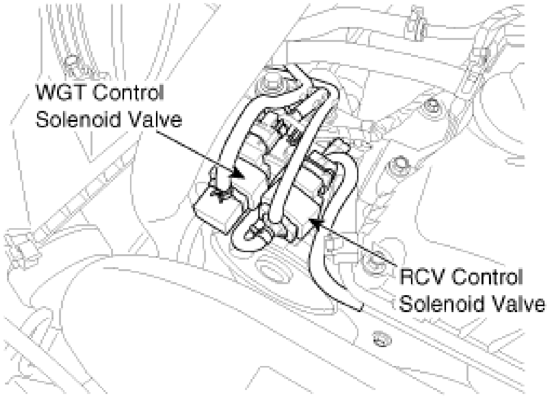
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

It has a function where it measures air that is flown into the intake manifold and serves this signal to the ECM. The inputted signal is computes the intake air amount, which is further used to determine the ignition timing and suitable amount of fuel to the relevant load. The MAP sensor is divided into the sensor installed the intake manifold and the sensor installed in between the intercooler and throttle body. The reason for using 2 sensors is to determine the ignition timing and suitable amount of fuel when the change of negative pressure for the intake manifold at the time where there is sudden increase or decrease in speed in after and before the throttle body.

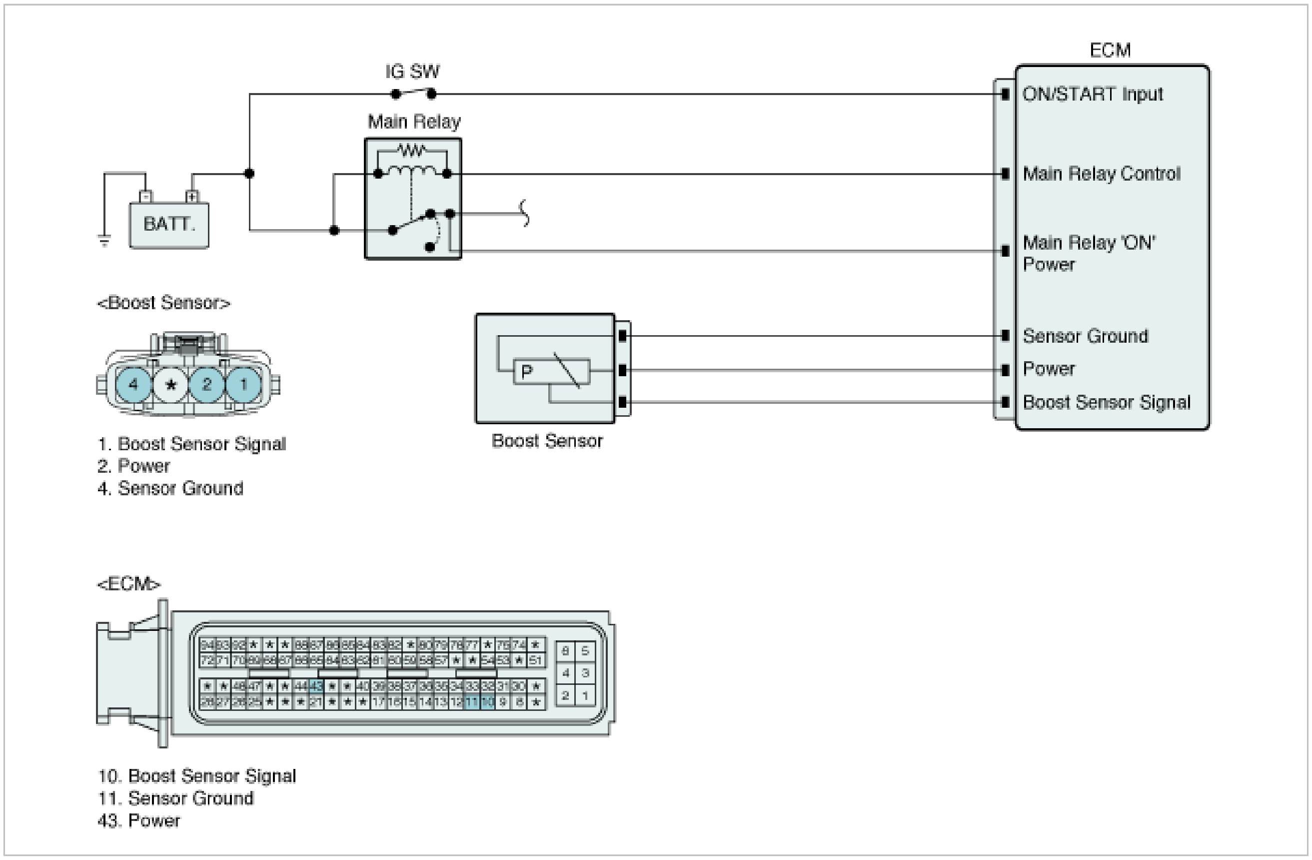
DTC Description

ECM sets DTC P0234 if the ECM detects that booster pressure of turbo charger is more than 1.4 ~ 2.2 bar.

DTC Detecting Condition

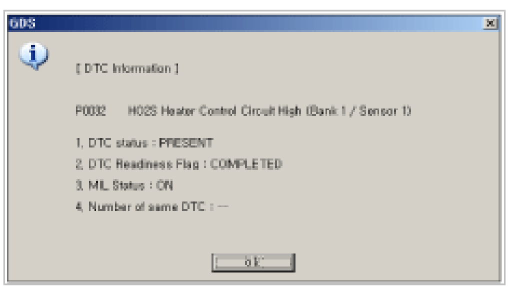
Item	Detecting Condition	Possible Cause
DTC Strategy	• Plausibility check	• Inspect Air cleaner • intake side leakage • intake side Blocked • Inspect waste gate valve and Recirculation valve (RCV) control hose blocked /leak /assemble improperly. • Faulty Boost Sensor
Enable Conditions	• charge pressure >530hPa (0.53 bar) • Failure not detected for DTCs	
Threshold Value	• measured pressure up throttle >1400…2200hPa (1.4 bar … 2.2 bar)	
Diagnostic Time	• 2 sec	
MIL On Condition	• 2 Driving cycles	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

System Inspection

■ **Inspect Intake system**

1. Visually/physically inspect
   Intake system blocked or leakage inspection (First, Inspect contamination, gasket)
   ▸ Air cleaner blocked
   ▸ Inspect intake hose between turbo charger and ETS.(Blocked or leakage)
   ▸ Inspect waste gate valve and Recirculation valve (RCV) control hose blocked /leak /assemble improperly.
2. Was a problem found?

YES	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

3. Was a problem found?

YES	▸ Go to next step as below
NO	▸ Substitute with a known-good Solenoid Valve and check for proper operation. If the problem is corrected, replace Solenoid Valve and then go to "Verification of Vehicle Repair" procedure

Terminal and Connector Inspection

1. 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.
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	▸ Check valve timing. Refer to "P0016: Crankshaft Position-Camshaft Position Correlation(Bank1)" procedure. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Component Inspection

■ **Inspect Resistance**

1. Ignition "OFF".
2. Disconnect waste gate valve connector and RCV connector.
3. Measure resistance between control terminal and power terminal of the WGT connector. (Component side)
4. Measure resistance between control terminal and power terminal of the RCV connector. (Component side)
   Specification :

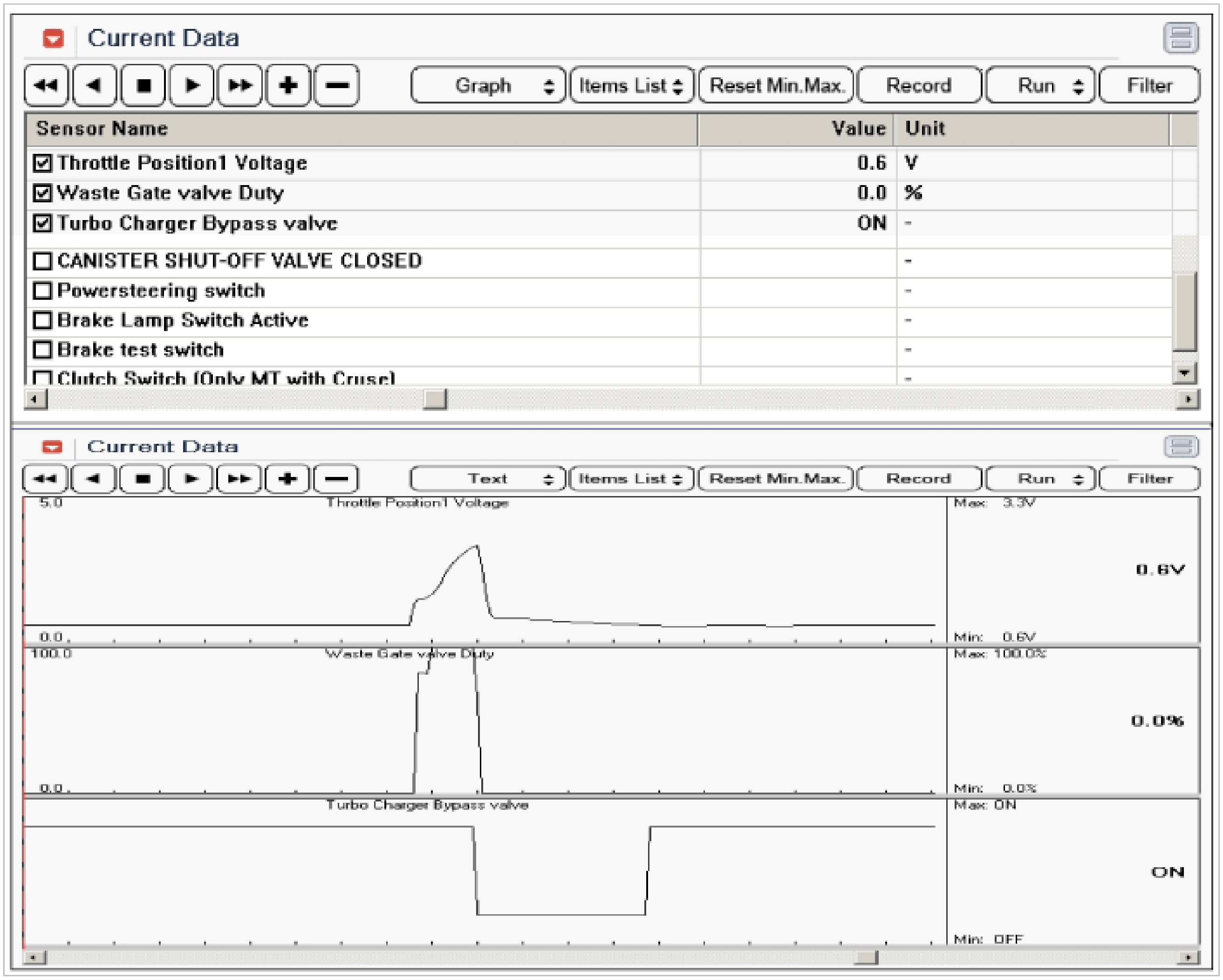
Waste gate valve / RCV	
Item	**Specification**
coil resistance	28.3 ~ 31.1 (20°C)

5. Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Check RCV for contamination, deterioration, or damage. Substitute with a known-good injector and check for proper operation. If the problem is corrected, replace RCV and then go to "Verification of Vehicle Repair" procedure

■ **Inspect Signal Waveform**

1. Monitor sensor data and signal waveform at accelerating.



2. Is the waveform normal?

YES	▶ Go to next step as below
NO	▶ Check injector for contamination, deterioration, or damage. Substitute with a known-good BPS and check for proper operation. If the problem is corrected, replace injector and then go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

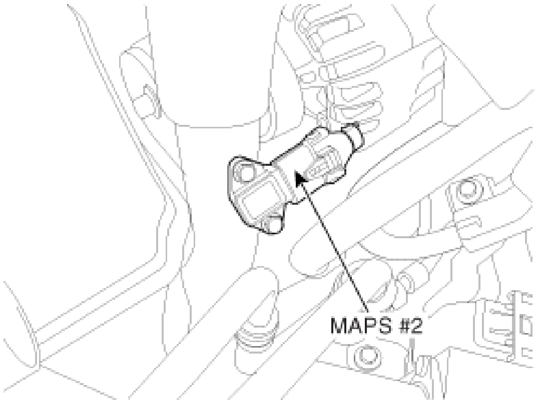
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0236 Turbocharger/SuperCharger Boost Sensor \'A\' Circuit Range/Perform

Component Location



General Description

It has a function where it measures air that is flown into the intake manifold and serves this signal to the ECM. The inputted signal is computes the intake air amount, which is further used to determine the ignition timing and suitable amount of fuel to the relevant load. The MAP sensor is divided into the sensor installed the intake manifold and the sensor installed in between the intercooler and throttle body. The reason for using 2 sensors is to determine the ignition timing and suitable amount of fuel when the change of negative pressure for the intake manifold at the time where there is sudden increase or decrease in speed in after and before the throttle body.

DTC Description

The ECM checks the state of the pressure based on the state of engine and if it senses that the pressure is out of the normal range, this DTC P0236 is set up.

DTC Detectiong Condition

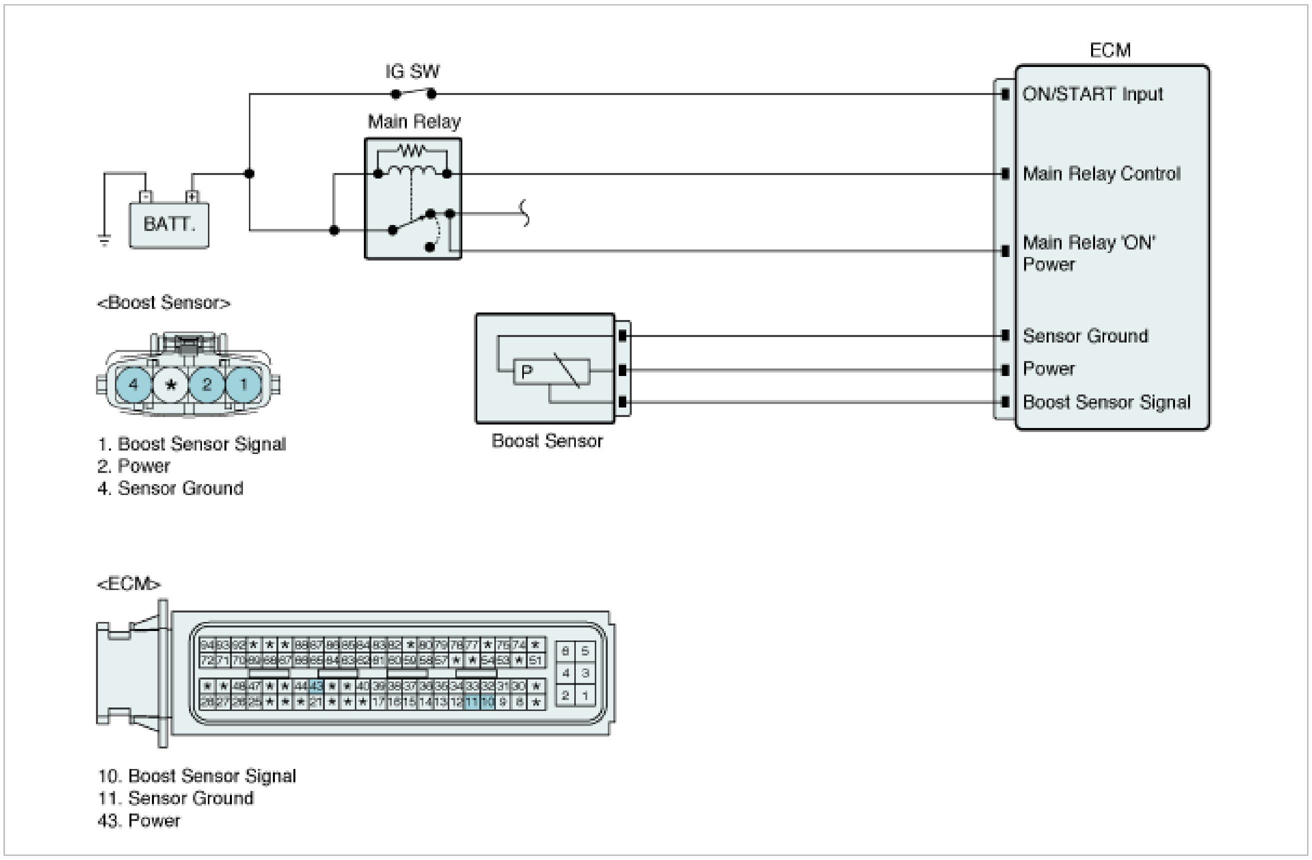
Item		Detecting Condition	Possible Cause
DTC Strategy		• Plausibility check	• Boost Pressure Sensor(PUT)
Enable Conditions	Case1	Turbocharger boost sensor out of range (engine off) • engine off time > 10 sec • Vehicle speed <0.6 mph • 0.8V < PUT voltage < 4.9V • 0.1V < MAP voltage < 4.85V • 0.1V < pressure up throttle sensor voltage < 4.7V • engine operating state off	
	Case2	Turbocharger boost sensor out of range (engine on) • engine operating state out of start • throttle position > -1°TPS(modelde throttle position setpoint) • 0.35 < Pressure quotient(Manifold pressure/Ambient Pressure < 1	
Threshold Value	Case1	Turbocharger boost sensor out of range (engine off) • turbocharger boost pressure-manifold air pressure > 100hPa • barometric pressure-turbocharger boost > 100hPa • barometric pressure-manifold air pressure < 100hPa	
	Case2	Turbocharger boost sensor out of range (engine on) • barometric pressure-pressure up throttle > 500hPa • pressure up throttle-pressure up trottle(full load) < 0hPa • barometric pressure-pressure up throttle during full load >	

		2716hPa	
Diagnostic Time		• immediately	
MIL On Condition		• 2 Driving cycles	

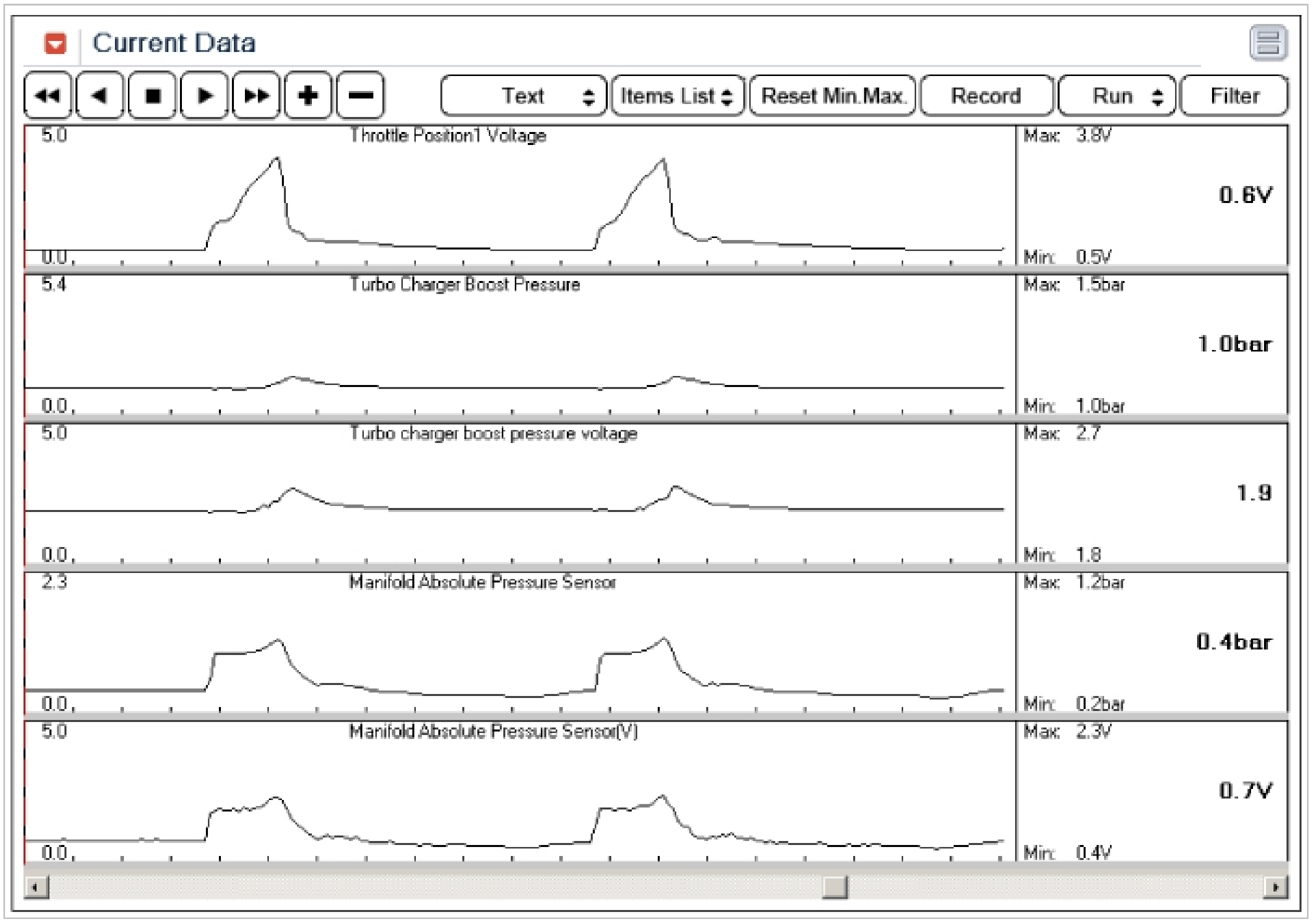
Specification

Pressure (kPa)	Voltage (V)
25.4	0.5
50	0.95
220	4.1
241.9	4.5

Diagnostic Circuit Diagram

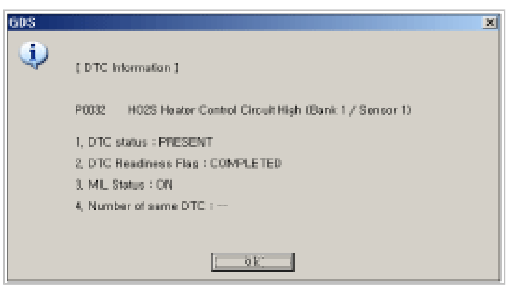


Signal Waveform & Data



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.


GDS

[DTC Information]

P0032 HO2S Heater Control Circuit High (Bank 1 / Sensor 1)

1. DTC status : PRESENT
2. DTC Readiness Flag : COMPLETED
3. MIL Status : ON
4. Number of same DTC : --

OK

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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. 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.
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	▸ Check valve timing. Refer to "P0016: Crankshaft Position-Camshaft Position Correlation(Bank1)" procedure. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Component Inspection

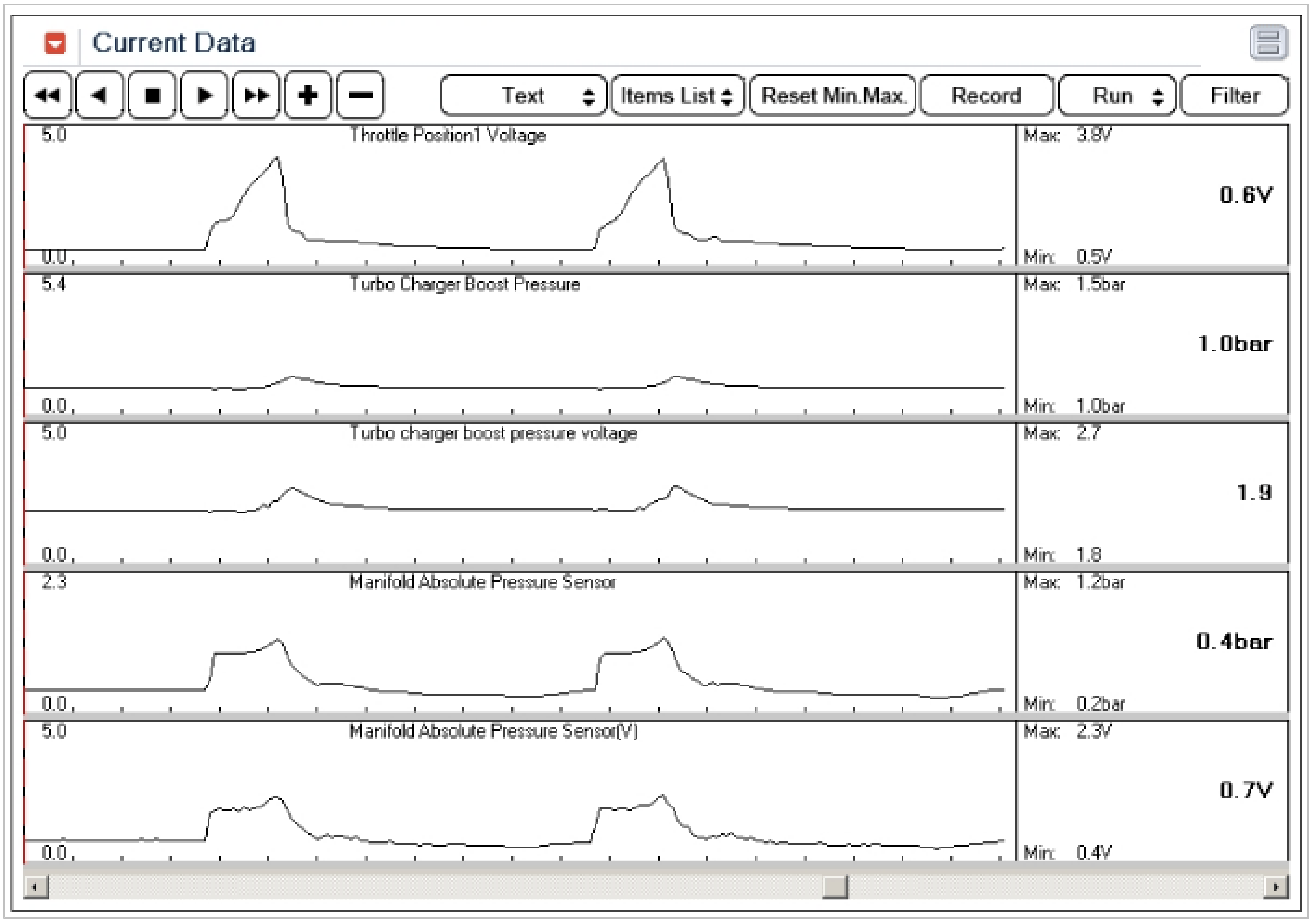
■ **Visually/physically inspect the Boost Pressure Sensor(PUT) for the following conditions:**

1. Contamination or deterioration
2. Poor connection or damaged harness
3. Was a problem found?

YES	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

■ **PUT Inspect Signal Waveform**

1. Monitor sensor data and signal waveform at accelerating.



2. Is the waveform normal?

YES	▸ Go to next step as below

NO	▸ Check PUT for contamination, deterioration, or damage. Substitute with a known-good PUT and check for proper operation. If the problem is corrected, replace PUT and then go to "Verification of Vehicle Repair" procedure

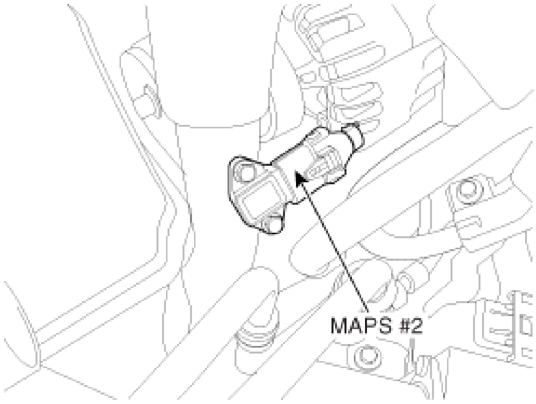
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

It has a function where it measures air that is flown into the intake manifold and serves this signal to the ECM. The inputted signal is computes the intake air amount, which is further used to determine the ignition timing and suitable amount of fuel to the relevant load. The MAP sensor is divided into the sensor installed the intake manifold and the sensor installed in between the intercooler and throttle body. The reason for using 2 sensors is to determine the ignition timing and suitable amount of fuel when the change of negative pressure for the intake manifold at the time where there is sudden increase or decrease in speed in after and before the throttle body.

DTC Description

The ECM monitors the signal voltages of the booster pressure sensor and if its voltages are too low, this DTC P0237 is set up.

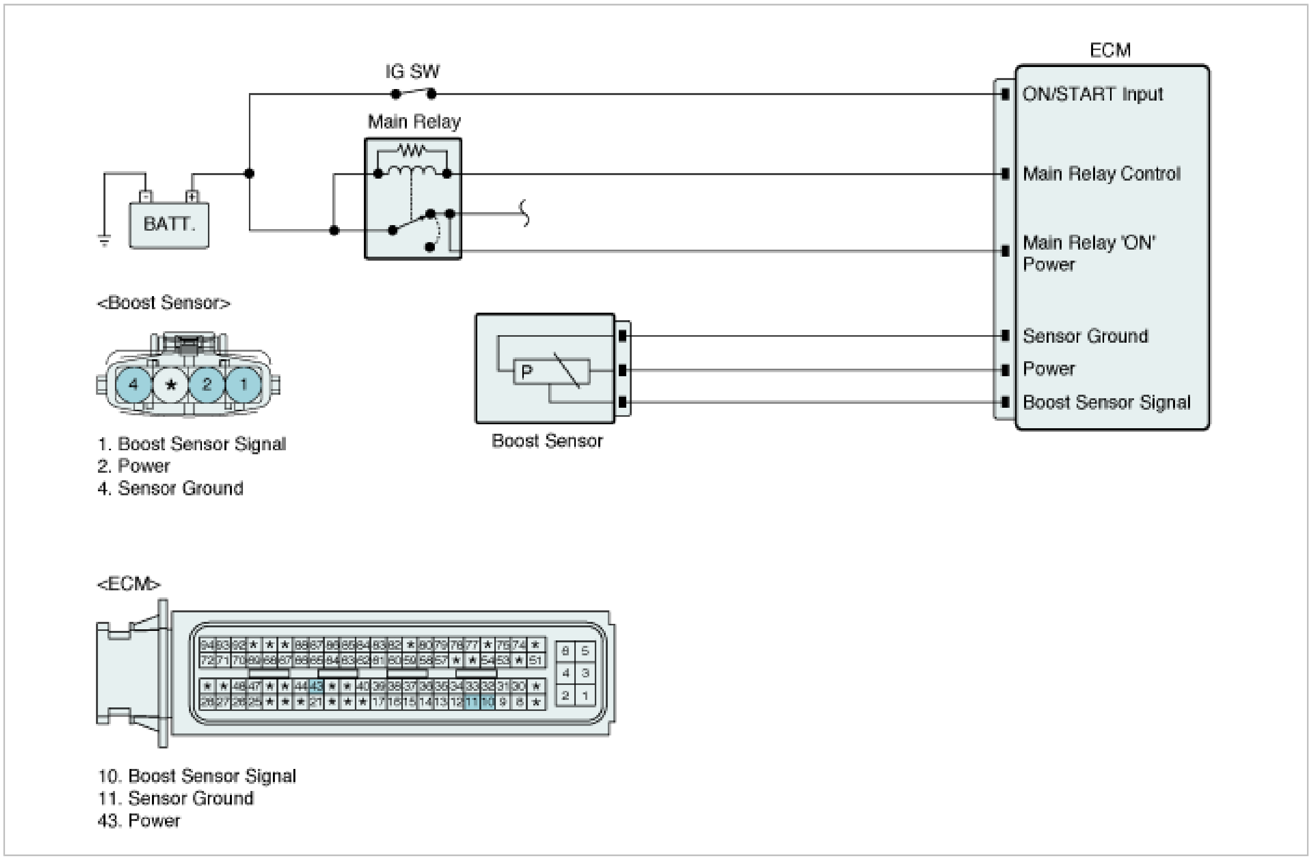
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Short to ground in signal harness • Poor connection or damaged harness • Faulty PUT
Enable Conditions	• 10V < Battery voltage <16V	
Threshold Value	• PUT voltage < 0.92 V	
Diagnostic Time	• 1 sec	
MIL On Condition	• 2 Driving cycles	

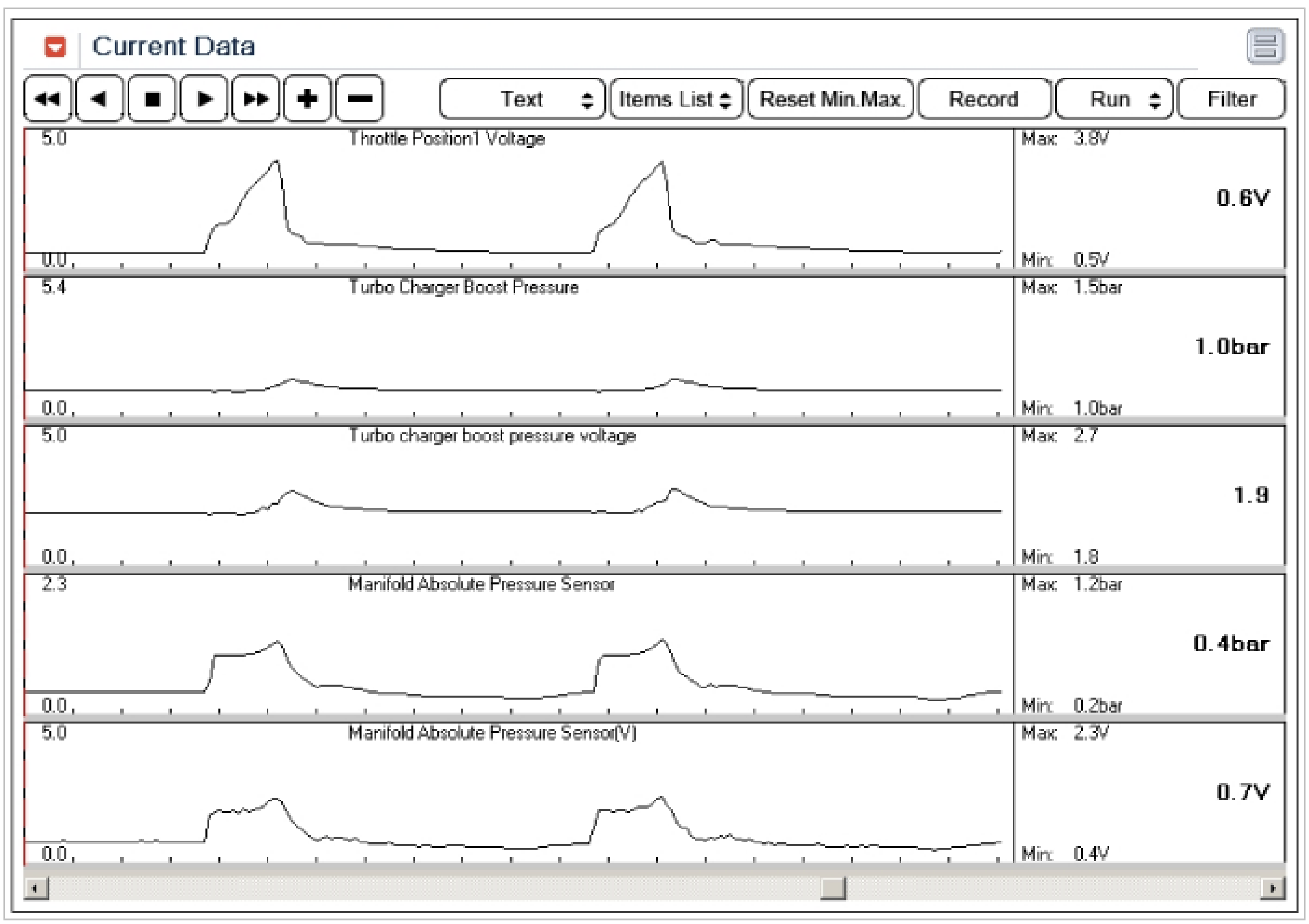
Specification

Pressure (kPa)	Voltage (V)
25.4	0.5
50	0.95
220	4.1
241.9	4.5

Diagnostic Circuit Diagram

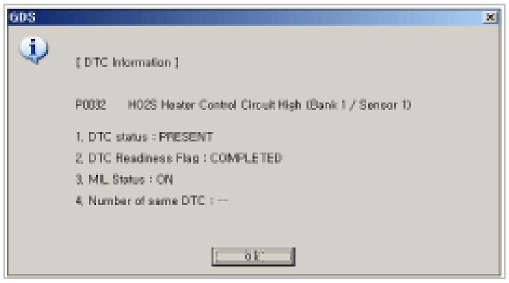


Signal Waveform & Data



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. 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.
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	▸ Check valve timing. Refer to "P0016: Crankshaft Position-Camshaft Position Correlation(Bank1)" procedure. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

1. Ignition "ON" & Engine "OFF"
2. Measure voltage between power terminal of the PUT harness connector and chassis ground.

Specification : 5 V

3. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

Signal Circuit Inspection

1. Ignition "OFF".
2. Disconnect PUT Control connector and ECM connector.

3. Measure resistance between signal terminal of the PUT signal harness connector and chassis ground.

Specification : 0 Ω

4. Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

■ **Check for Open in signal harness**

1. IG "OFF".
2. Disconnect PUT and ECM connector.
3. Measure the resistance between signal terminal of PUT and ECM.

Specification : Approx. 0Ω

4. Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

Component Inspection

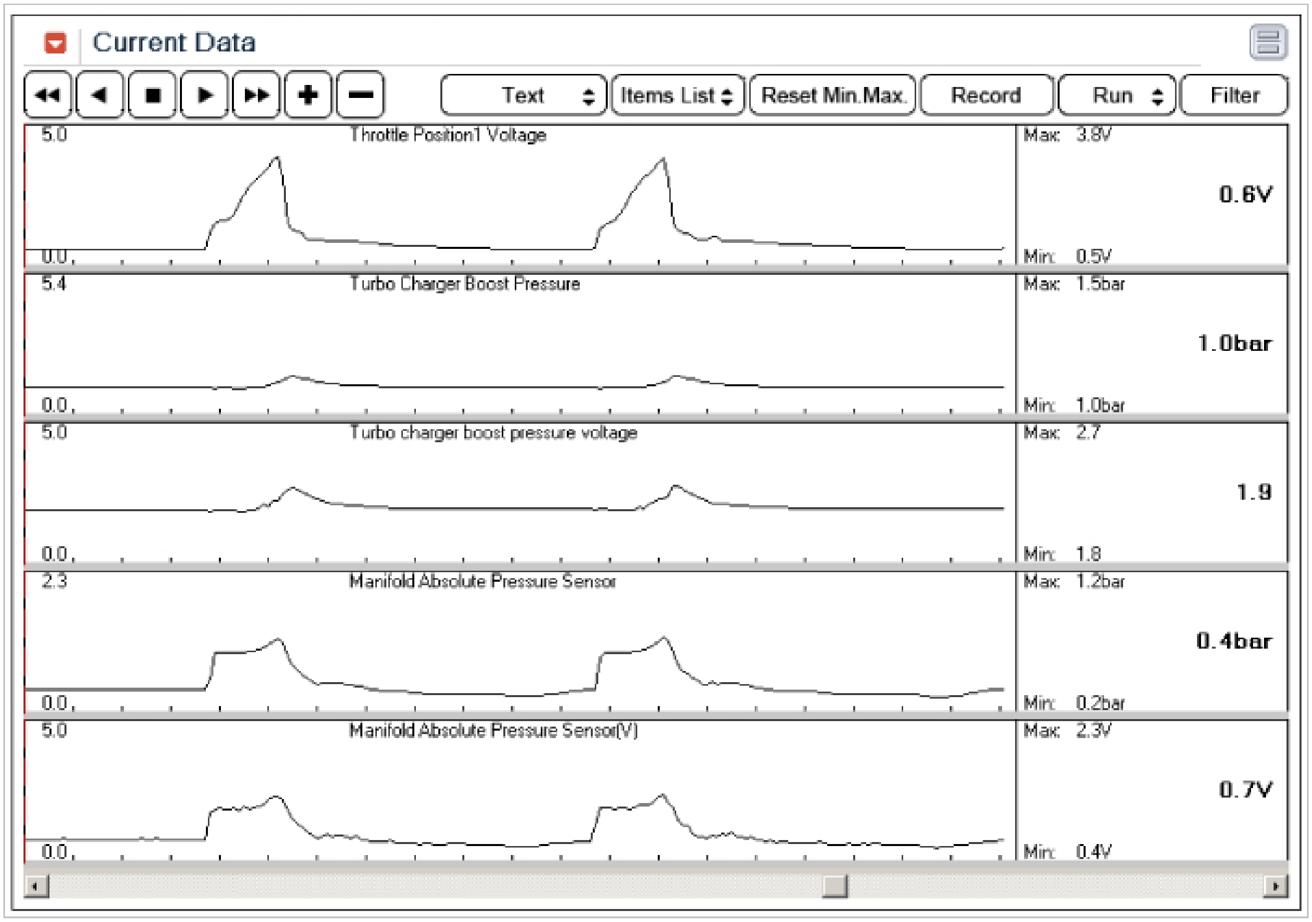
■ **Visually/physically inspect the Boost Pressure Sensor(PUT) for the following conditions:**

1. Contamination or deterioration
2. Poor connection or damaged harness
3. Was a problem found?

YES	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

■ **PUT Inspect Signal Waveform**

1. Monitor sensor data and signal waveform at accelerating.



2. Is the waveform normal?

YES	▶ Go to next step as below
NO	▶ Check PUT for contamination, deterioration, or damage. Substitute with a known-good PUT and check for proper operation. If the problem is corrected, replace PUT and then go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

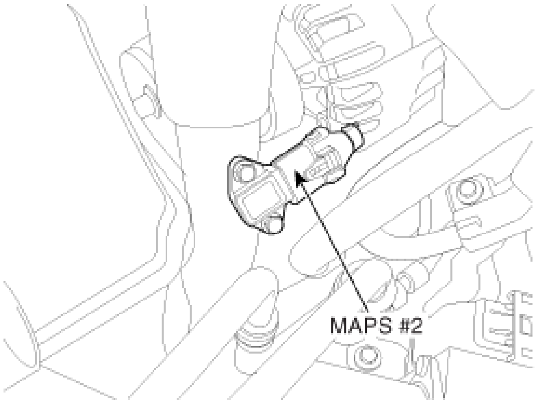
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0238 Turbocharger/Supercharger Boost Sensor \'A\' Circuit High

Component Location



General Description

It has a function where it measures air that is flown into the intake manifold and serves this signal to the ECM. The inputted signal is computes the intake air amount, which is further used to determine the ignition timing and suitable amount of fuel to the relevant load. The MAP sensor is divided into the sensor installed the intake manifold and the sensor installed in between the intercooler and throttle body. The reason for using 2 sensors is to determine the ignition timing and suitable amount of fuel when the change of negative pressure for the intake manifold at the time where there is sudden increase or decrease in speed in after and before the throttle body.

DTC Description

The ECM monitors the signal voltages of the booster pressure sensor and if its voltages are too high, this DTC P0238 is set up.

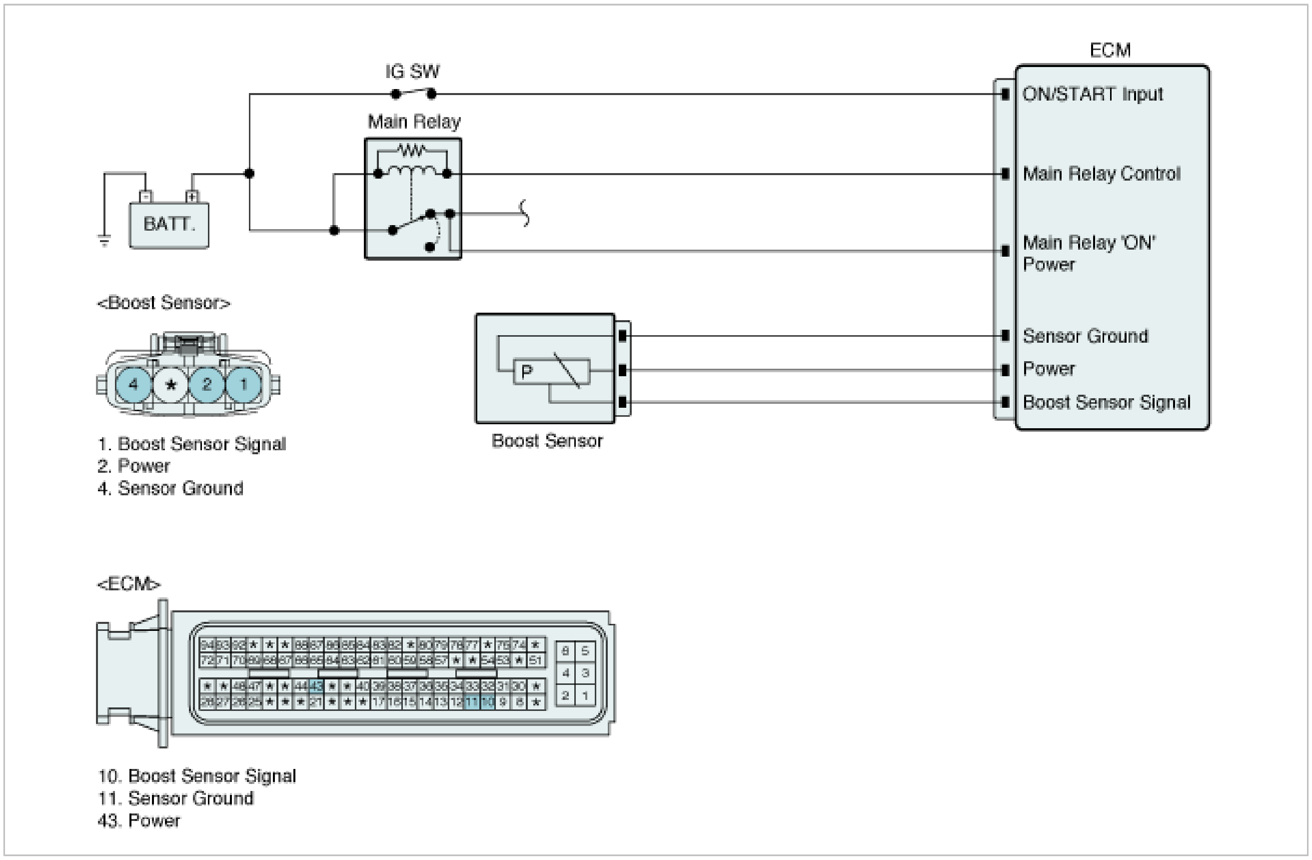
DTC Detectiong Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Poor connection • Short to power in signal circuit • Open in ground circuit
Enable Conditions	• 10V < Battery voltage <16V	
Threshold Value	• PUT voltage > 4.7 V	
Diagnostic Time	• 1 sec	
MIL On Condition	• 2 Driving cycles	

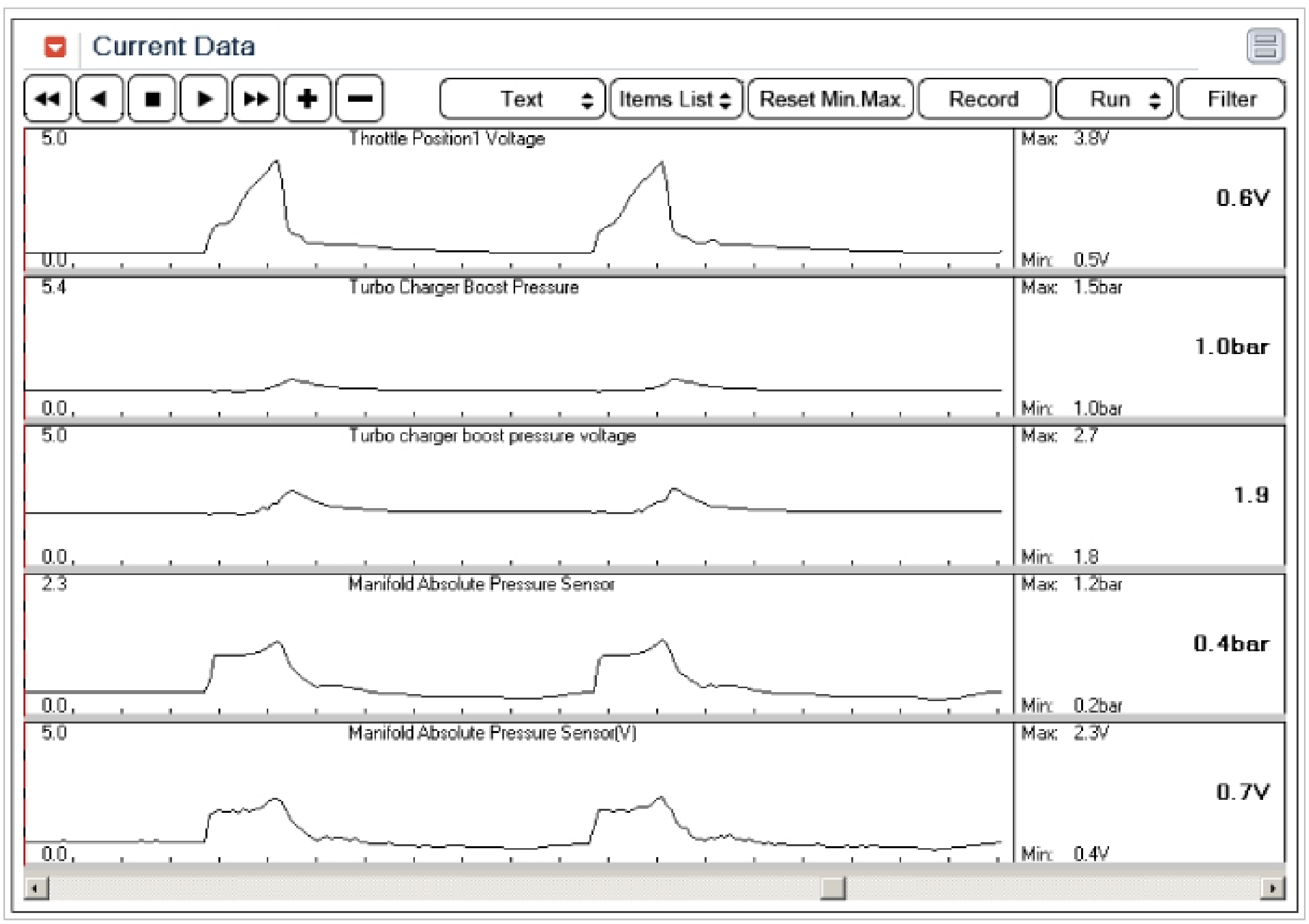
Specification

Pressure (kPa)	Voltage (V)
25.4	0.5
50	0.95
220	4.1
241.9	4.5

Diagnostic Circuit Diagram

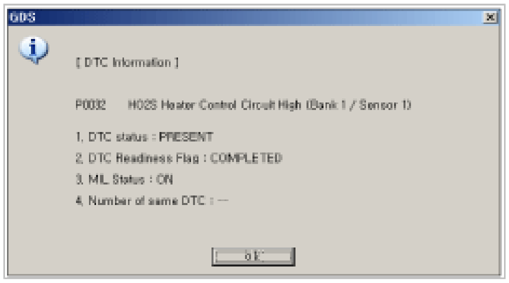


Signal Waveform & Data



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. 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.
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	▶ Check valve timing. Refer to "P0016: Crankshaft Position-Camshaft Position Correlation(Bank1)" procedure. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Signal Circuit Inspection

1. IG "OFF".
2. Disconnect PUT connector.
3. IG "ON" & Eng. "OFF"
4. Measure the voltage between signal terminal of the PUT harness connector and chassis ground.

Specification : 0V

5. Is voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

Component Inspection

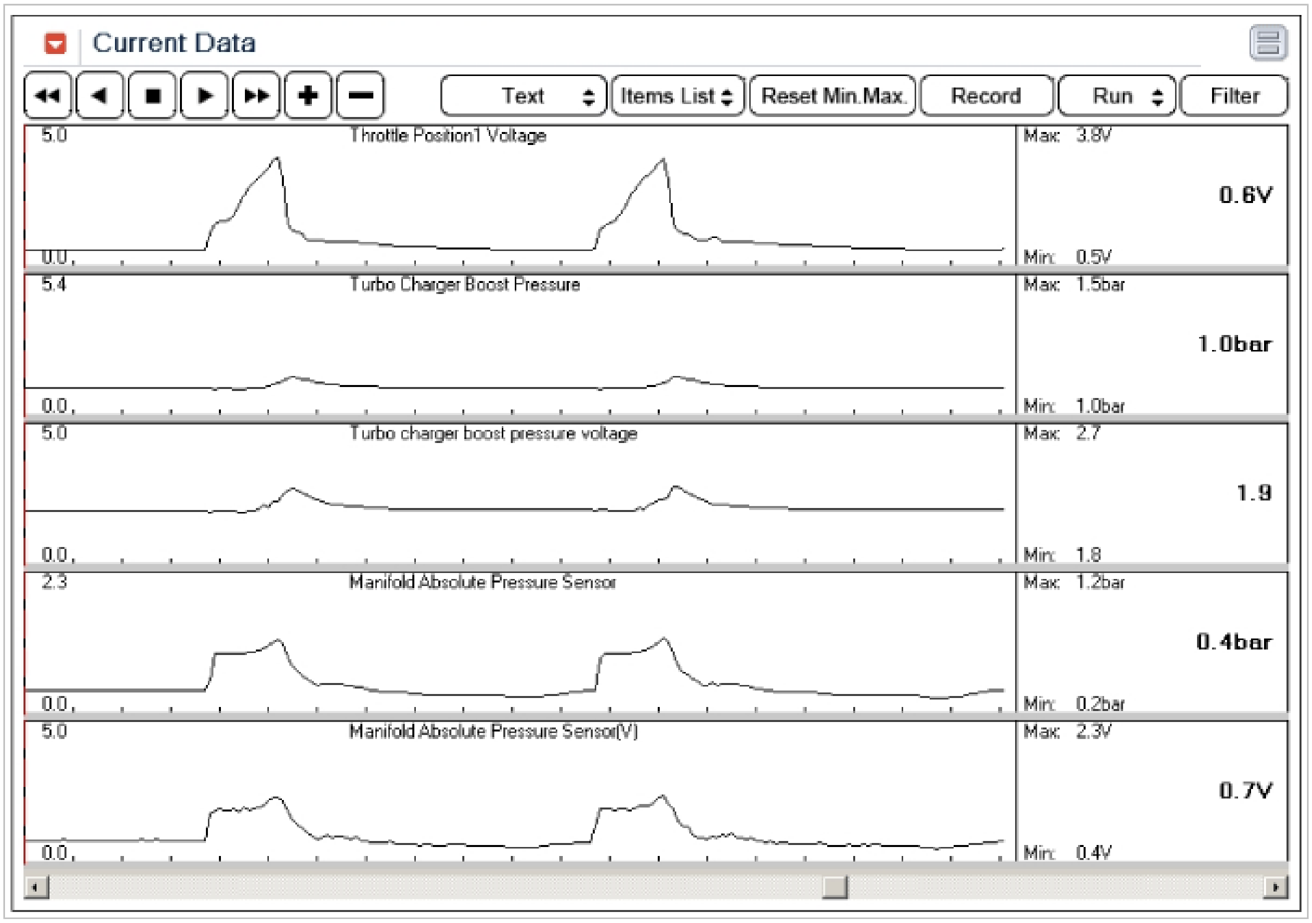
■ **Visually/physically inspect the Boost Pressure Sensor(PUT) for the following conditions:**

1. Contamination or deterioration
2. Poor connection or damaged harness
3. Was a problem found?

YES	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

■ **PUT Inspect Signal Waveform**

1. Monitor sensor data and signal waveform at accelerating.



2. Is the waveform normal?

YES	▸ Go to next step as below
NO	▸ Check PUT for contamination, deterioration, or damage. Substitute with a known-good PUT and check for proper operation. If the problem is corrected, replace PUT and then go to "Verification of Vehicle Repair" procedure

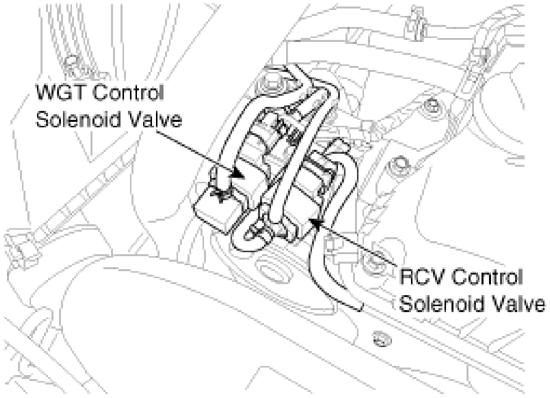
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

In the case of selecting a turbine housing with a small area for the purpose of supplementing the lack of torque, the gasoline engine may create knocking in high speed. This device secures a solution to prevent this type of problem, where the exhaust gas is by passed at the turbine entrance that restraints the turbine revolution and provides the most suitable boost pressure.

DTC Description

The ECM monitors the learning value of the vacuum pressure control in order to operate the waste-gate actuator and if its value is over a certain allowed range,this DTC P0244 is set up.

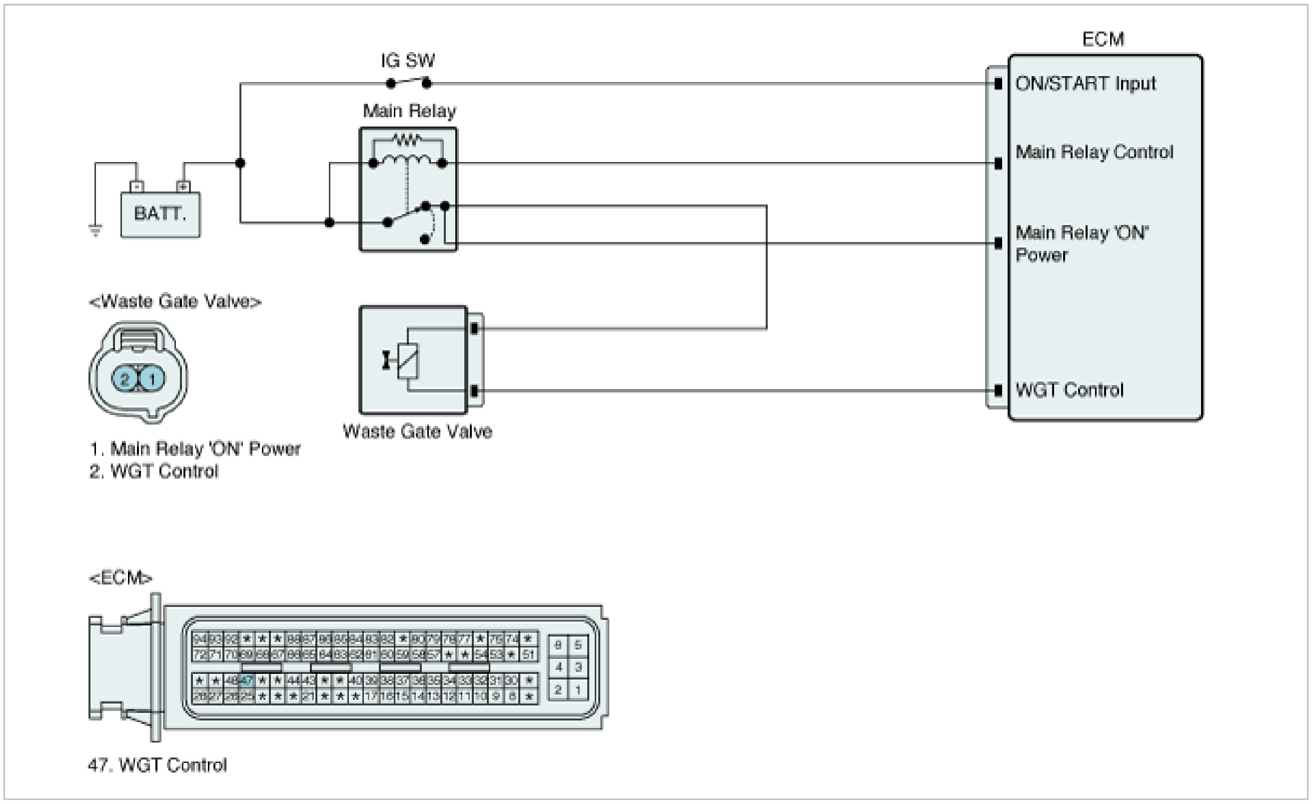
DTC Detectiong Condition

Item		Detecting Condition	Possible Cause
DTC Strategy		• Plausibility check	• Waste gate valve
Enable Conditions		• engine operating state out start	
Threshold Value	case 1	• 100hPa < pressure charge air adaptation< -100hPa	
	case 2	• 280hPa < pressure up threttle adaptation< -280hPa	
Diagnostic Time		• immediately	
MIL On Condition		• 2 Driving cycles	

Specification

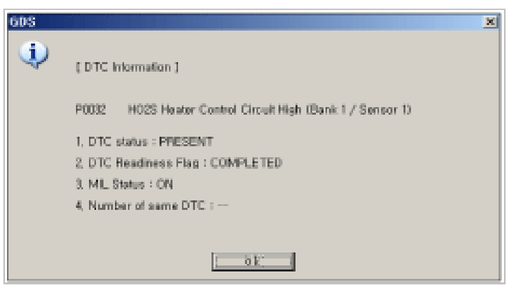
Item	Specification
Coil Resistance (Ω)	28.3 ~ 31.1 (20°C)

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. 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.

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	▸ Check valve timing. Refer to "P0016: Crankshaft Position-Camshaft Position Correlation(Bank1)" procedure. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Component Inspection

■ **Inspect Resistance**

1. Ignition "OFF"
2. Disconnect WGT connector.
3. Measure resistance between control terminal and power terminal of the WGT connector. (Component side)
Specification

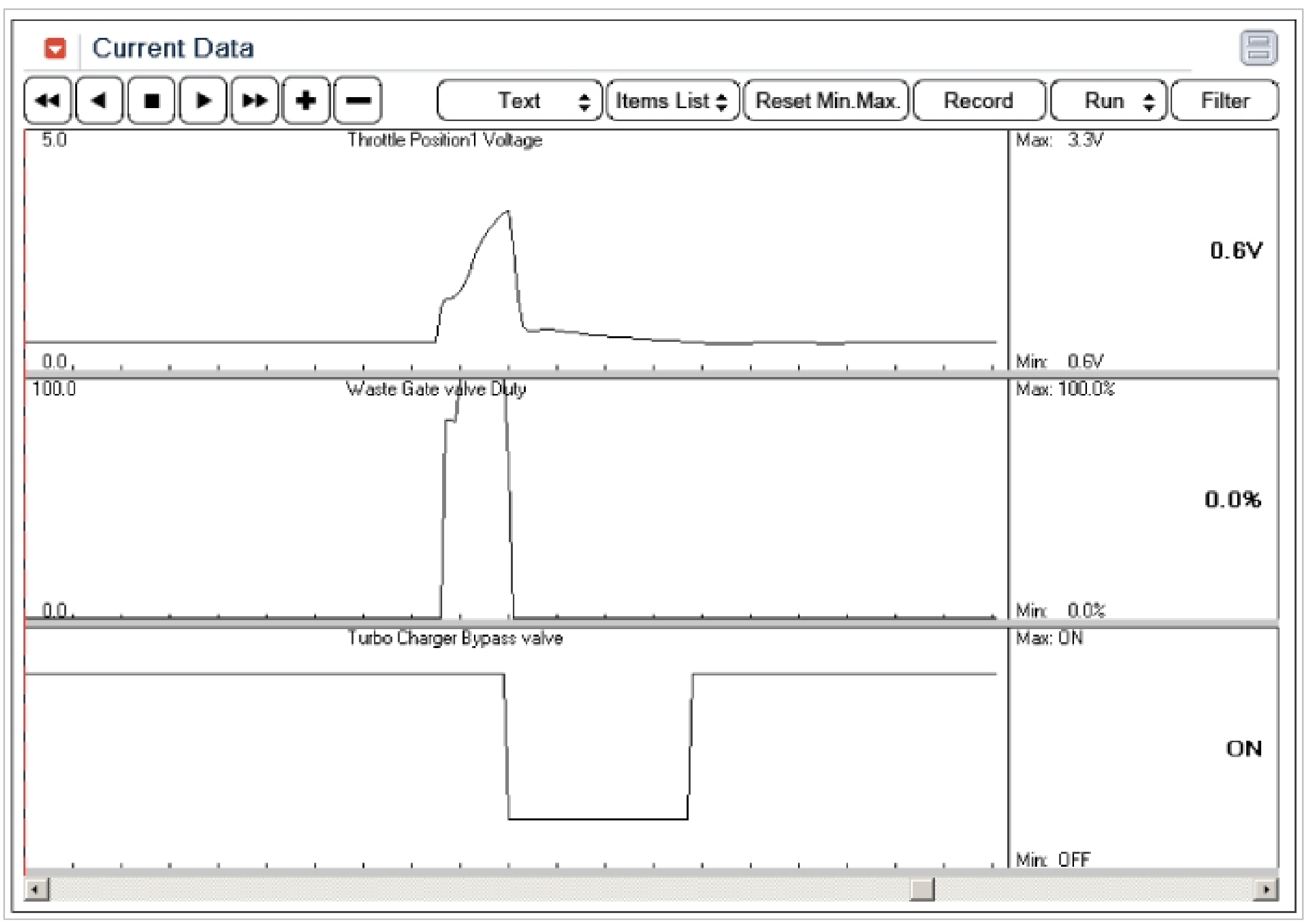
Item	Specification
Coil Resistance (Ω)	28.3 ~ 31.1 (20°C)

4. Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

■ **Inspect Signal Waveform**

1. Monitor sensor data and signal waveform at accelerating.



2. Is the waveform normal?

YES	▶ Go to next step as below
NO	▶ Check WGT for contamination, deterioration, or damage. Substitute with a known-good WGT and check for proper operation. If the problem is corrected, replace WGT and then go to "Verification of Vehicle Repair" procedure

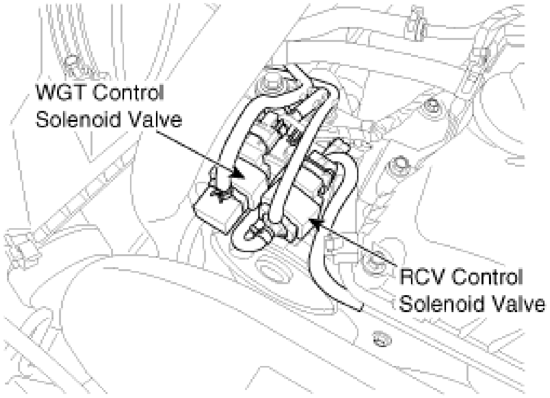
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

In the case of selecting a turbine housing with a small area for the purpose of supplementing the lack of torque, the gasoline engine may create knocking in high speed. This device secures a solution to prevent this type of problem, where the exhaust gas is by passed at the turbine entrance that restraints the turbine revolution and provides the most suitable boost pressure.

DTC Description

ECM sets DTC P0245 if the ECM detects that wastegate solenoid valve control circuit is short to ground.

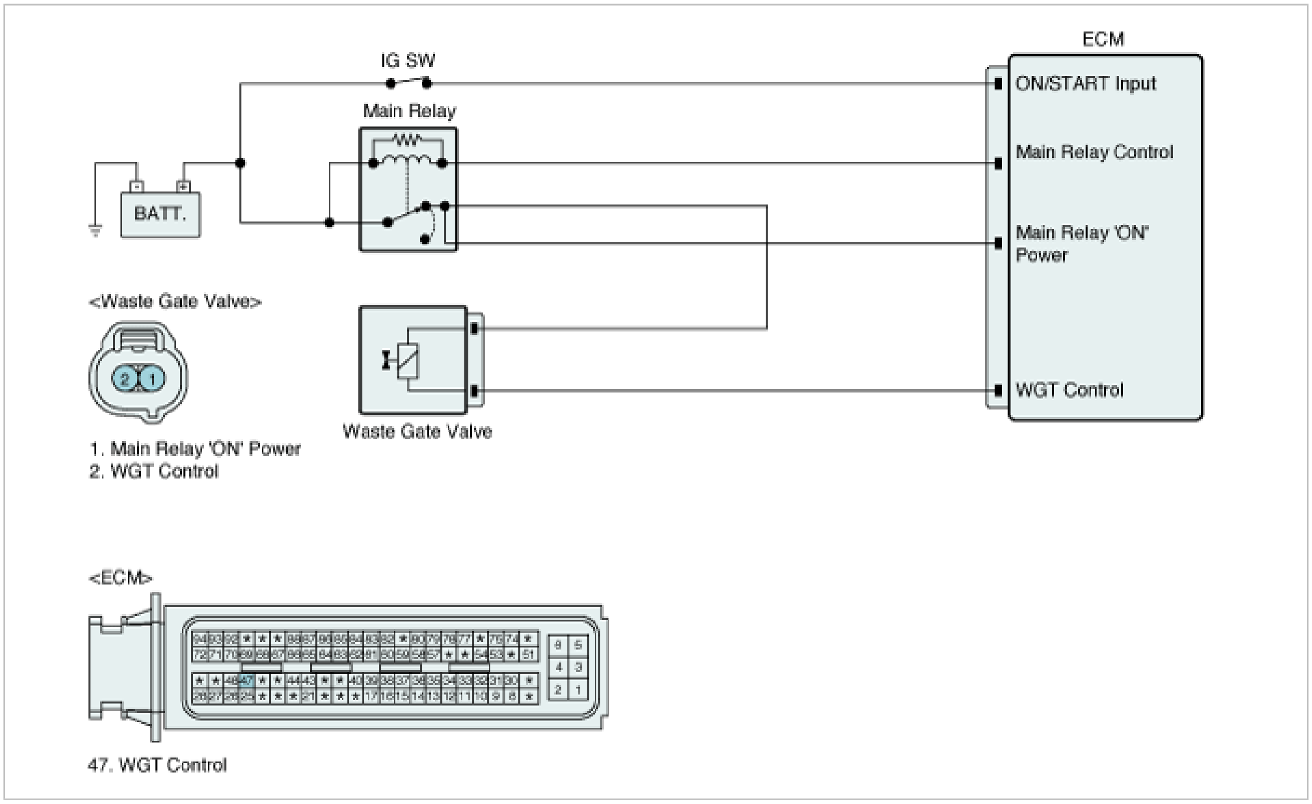
DTC Detectiong Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Poor connection • Short to power in signal circuit • Open in ground circuit
Enable Conditions	• Waste gate PWM < 98.44%	
Threshold Value	• ECM power atage diagnosis	
Diagnostic Time	• 1 sec	
MIL On Condition	• 2 Driving cycles	

Specification

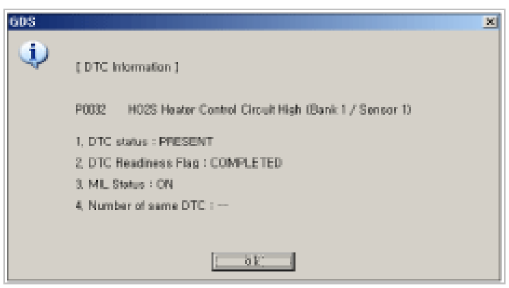
Item	Specification
Coil Resistance (Ω)	28.3 ~ 31.1 (20°C)

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. 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.

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	▸ Check valve timing. Refer to "P0016: Crankshaft Position-Camshaft Position Correlation(Bank1)" procedure. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

■ **Check open in power circuit**

1. Ignition "ON" & Engine "OFF"
2. Measure voltage between power terminal of the WGT harness connector and chassis ground.

Specification : Approx. B+

3. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

Control Circuit Inspection

■ **Check for short to ground in control circuit**

1. Ignition "OFF".
2. Disconnect WGT connector and ECM connector.
3. Measure voltage between control terminal of the WGT harness connector and chassis ground.

Specification: Approx. 4.3 V

4. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ **Inspect Resistance**

1. Ignition "OFF"
2. Disconnect WGT connector.
3. Measure resistance between control terminal and power terminal of the WGT connector. (Component side)
Specification

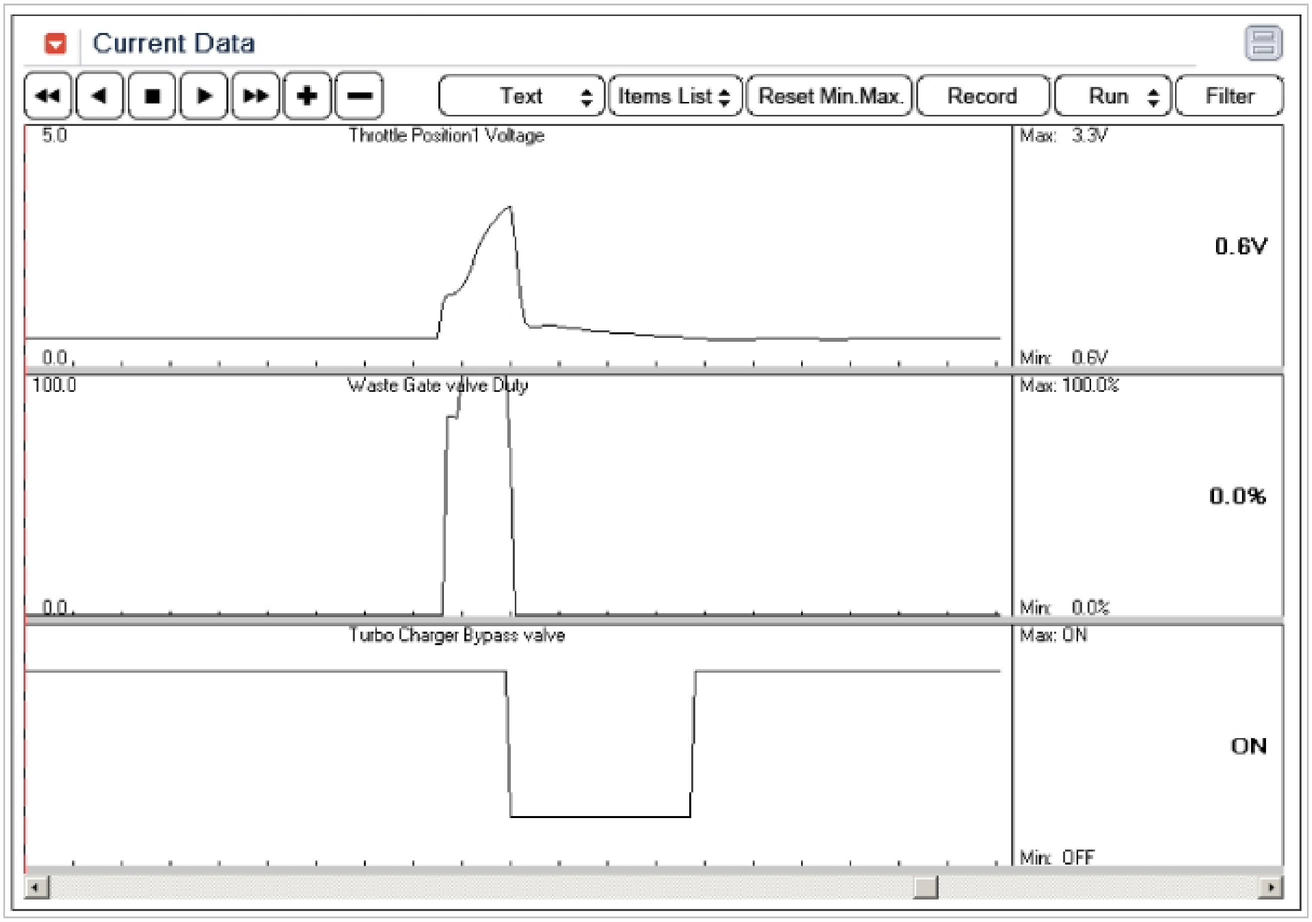
Item	Specification
Coil Resistance (Ω)	28.3 ~ 31.1 (20°C)

4. Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

■ **Inspect Signal Waveform**

1. Monitor sensor data and signal waveform at accelerating.



2. Is the waveform normal?

YES	▸ Go to next step as below
NO	▸ Check WGT for contamination, deterioration, or damage. Substitute with a known-good WGT and check for proper operation. If the problem is corrected, replace WGT and then go to "Verification of Vehicle Repair" procedure

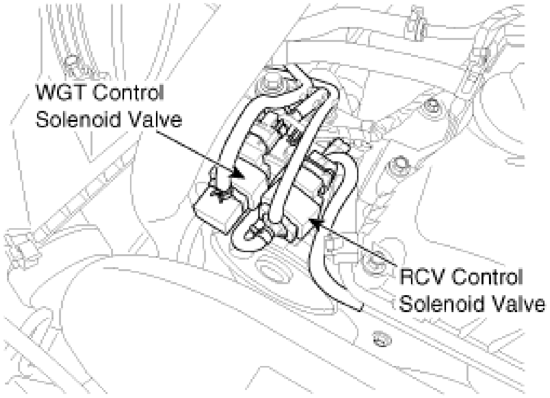
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

In the case of selecting a turbine housing with a small area for the purpose of supplementing the lack of torque, the gasoline engine may create knocking in high speed. This device secures a solution to prevent this type of problem, where the exhaust gas is by passed at the turbine entrance that restraints the turbine revolution and provides the most suitable boost pressure.

DTC Description

ECM sets DTC P0246 if the ECM detects that wastegate solenoid valve control circuit is short to battery or open.

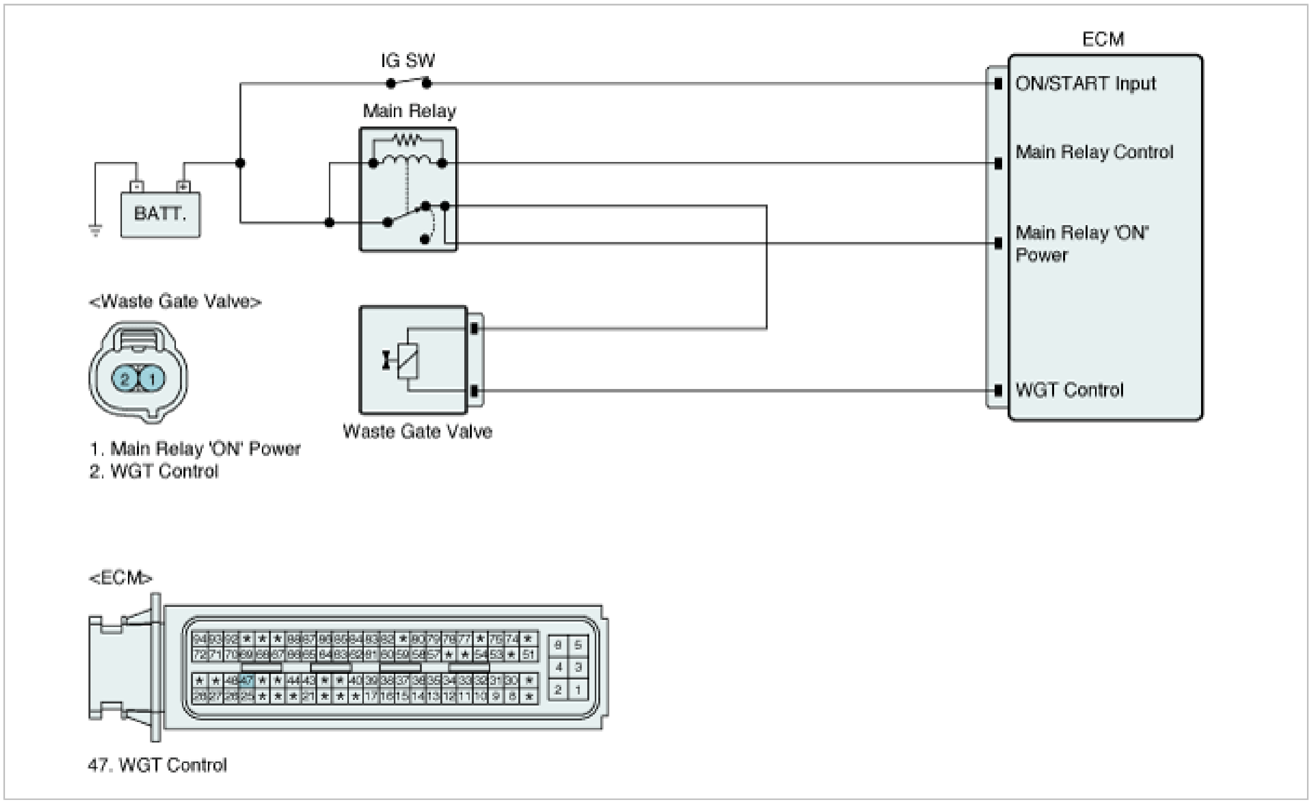
DTC Detectiong Condition

Item		Detecting Condition	Possible Cause
DTC Strategy		• Plausibility check	• Open or short to battery in control harness. • Poor connection or damaged harness
Enable Conditions	Case 1	• WGT PWM > 1.56%	
	Case 2	• 1.56% < WGT PWM < 98.44%	
Threshold Value		• WGT pressure >1400…2200hPa	
Diagnostic Time		• 1 sec	
MIL On Condition		• 2 Driving cycles	

Specification

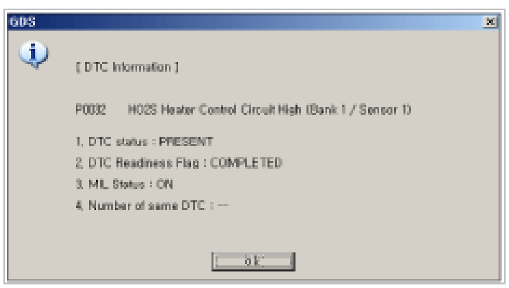
Item	Specification
Coil Resistance (Ω)	28.3 ~ 31.1 (20°C)

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. 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.

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	▸ Check valve timing. Refer to "P0016: Crankshaft Position-Camshaft Position Correlation(Bank1)" procedure. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Control Circuit Inspection

1. Measure voltage between control terminal of the WGT harness connector and chassis ground.

Specification : Approx. 4.3 V

2. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Check control circuit for open or short. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ **Inspect Resistance**

1. Ignition "OFF"
2. Disconnect WGT connector.
3. Measure resistance between control terminal and power terminal of the WGT connector. (Component side)
Specification

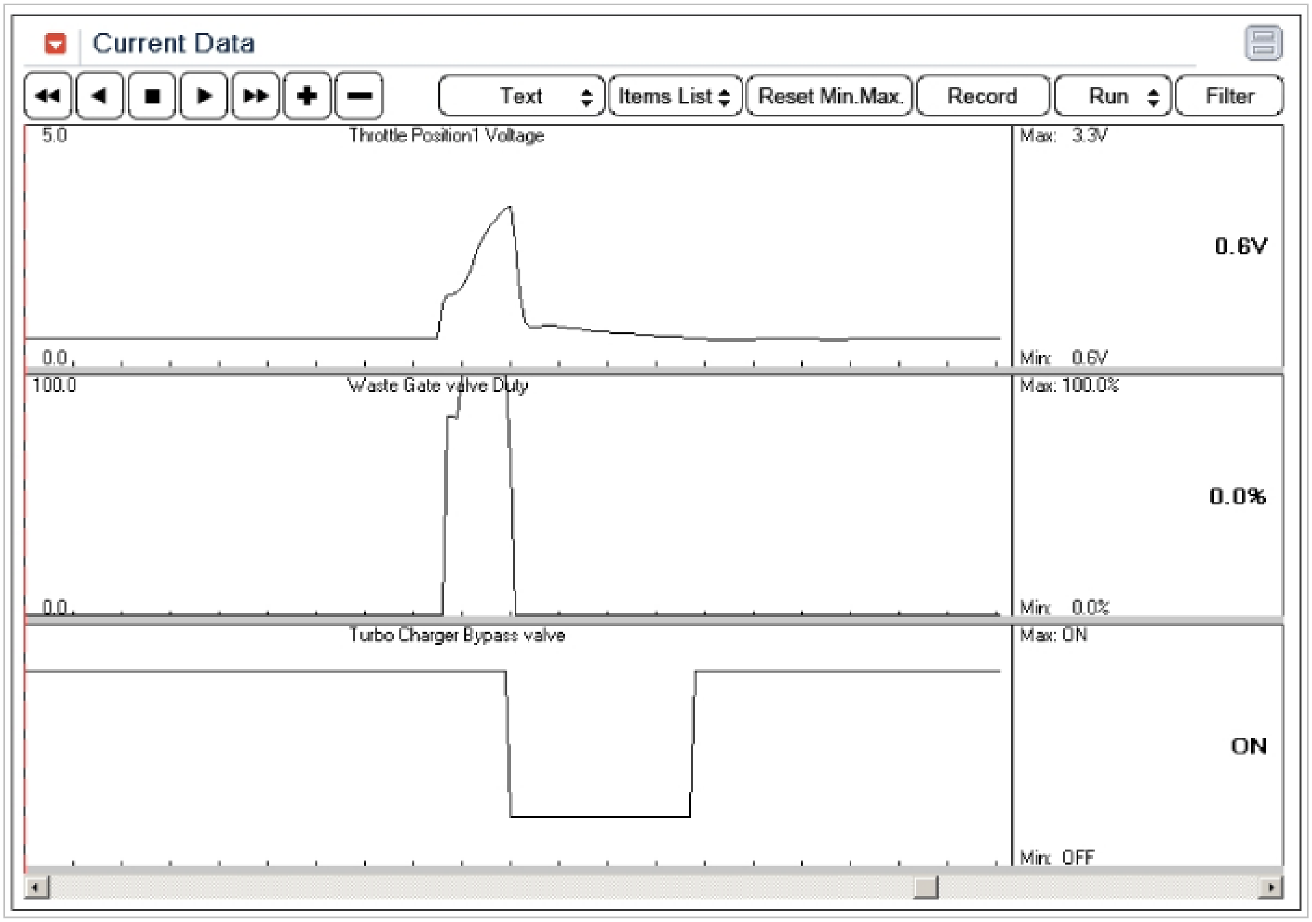
Item	Specification
Coil Resistance (Ω)	28.3 ~ 31.1 (20°C)

4. Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

■ **Inspect Signal Waveform**

1. Monitor sensor data and signal waveform at accelerating.



2. Is the waveform normal?

YES	▸ Go to next step as below
NO	▸ Check WGT for contamination, deterioration, or damage. Substitute with a known-good WGT and check for proper operation. If the problem is corrected, replace WGT and then go to "Verification of Vehicle Repair" procedure

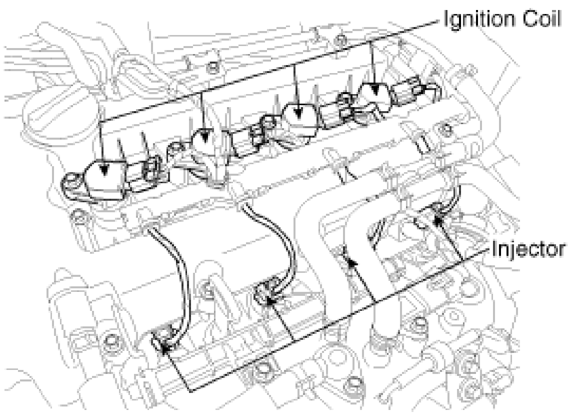
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

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

DTC Description

ECM sets DTC P0261 if the ECM detects that injector (Cylinder #1) control circuit is shorted to ground.

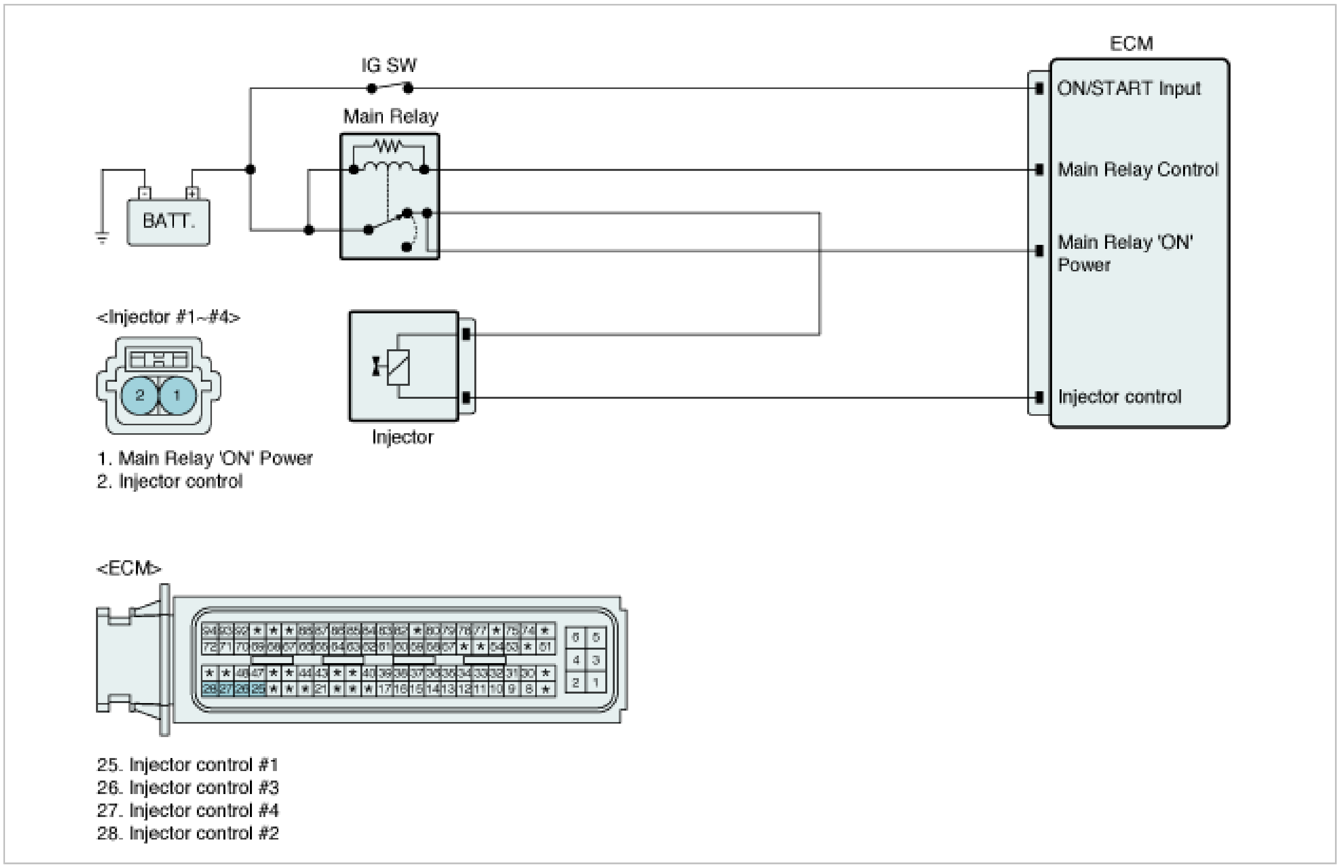
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical check	• Open in power supply harness • Short to ground in control harness • Poor connection or damaged harness • Faulty injector
Enable Conditions	• 10V < Battery voltage < 16V • Engine speed(rpm) >320	
Threshold Value	• Open or short to Ground in control circuit	
Diagnostic Time	• 1.5sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

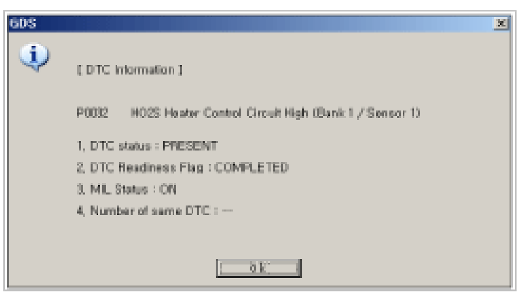
Temp.(°C)	Temp.(°F)	Resistance (Ω)
20	68	13.8~15.2

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Component Inspection

1. Ignition "OFF"
2. Disconnect injector connector.
3. Measure resistance between control terminal and power terminal of the injector connector. (Component side)
   Specification

Temp.(°C)	Temp.(°F)	Resistance (Ω)
20	68	13.8~15.2

4. Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Check injector for contamination, deterioration, or damage. Substitute with a known-good injector and check for proper operation. If the problem is corrected, replace injector and then go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

1. Ignition "ON" & Engine "OFF".
2. Measure voltage between power terminal of the injector harness connector and chassis ground.

Specification : Approx. B+

3. Is voltage within the specification?

YES	▸ Go to "Control Circuit Inspection" procedure
NO	▸ Check for a open in the power supply circuit between the main relay and the Injector. Check for open or blown 15A injector fuse. ▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure

Control Circuit Inspection

1. Check for short to ground in control circuit
   (1) Ignition "OFF".
   (2) Disconnect injector connector and ECM connector.
   (3) Measure resistance between control terminal of the injector harness connector and chassis ground.

   Specification : Infinite

   (4) Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Repair open or short to ground in control harness and go to "Verification of Vehicle Repair" procedure

Terminal and Connector Inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

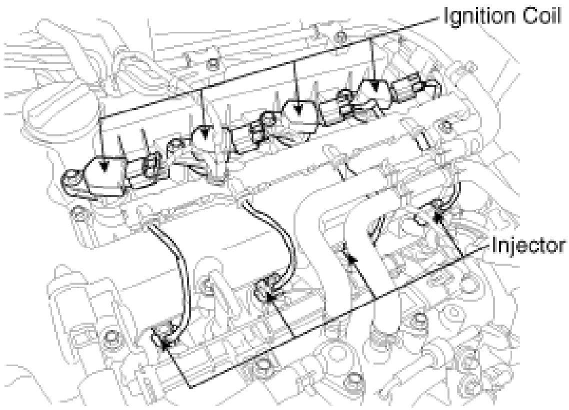
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

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

DTC Description

ECM sets DTC P0262 if the ECM detects that injector (Cylinder #1) control circuit is open or shorted to battery voltage.

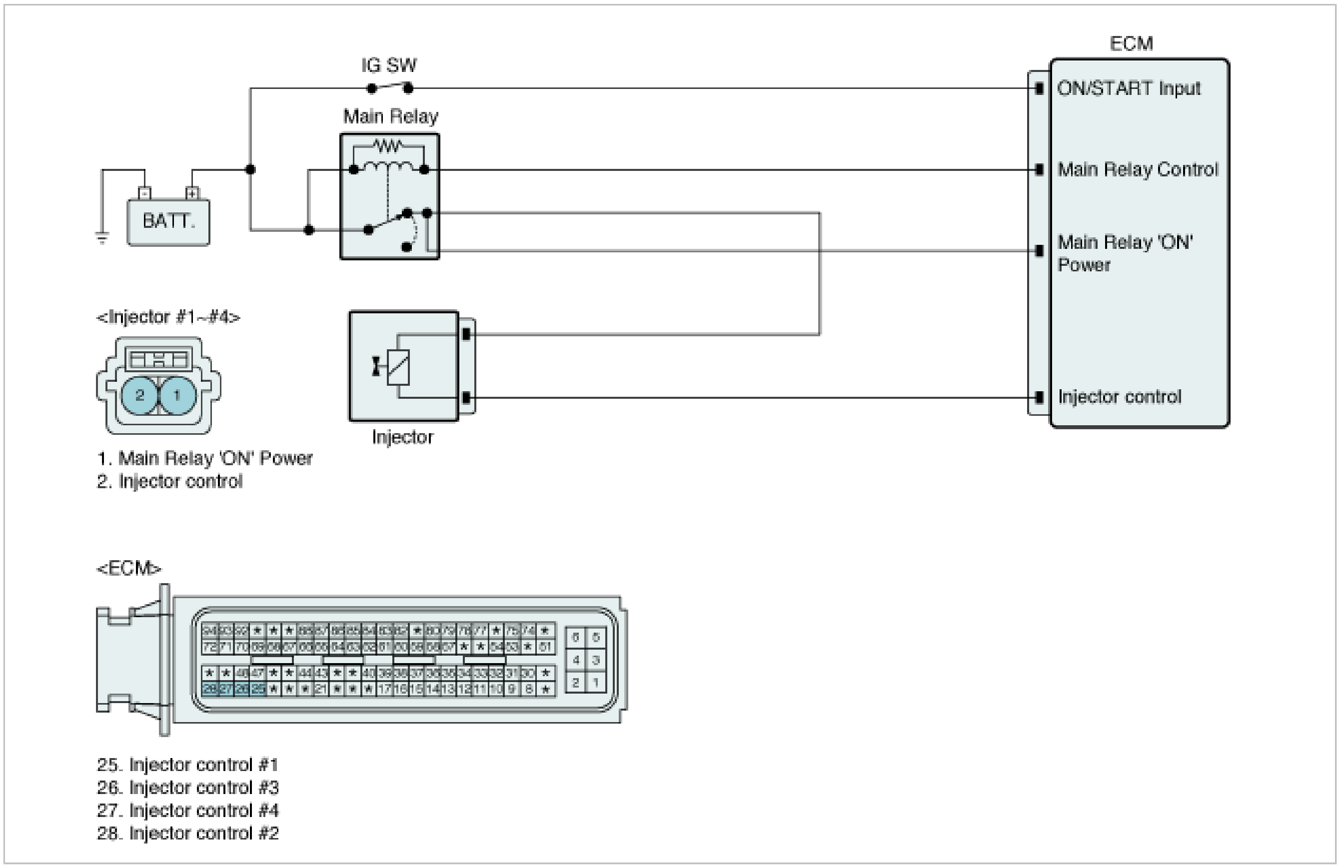
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical check	• Open or short to battery in control harness. • Poor connection or damaged harness • Faulty injector
Enable Conditions	• 10V < Battery voltage < 16V • Engine speed(rpm) >320	
Threshold Value	• Short to battery in control circuit	
Diagnostic Time	• 1.5sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

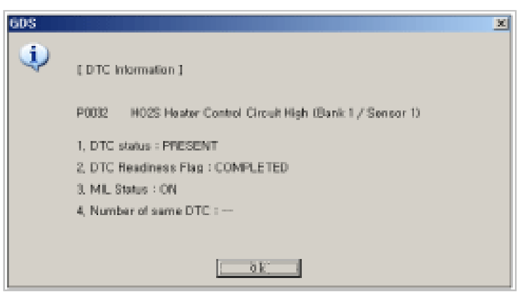
Temp.(°C)	Temp.(°F)	Resistance (Ω)
20	68	13.8~15.2

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Component Inspection

1. Ignition "OFF"
2. Disconnect injector connector.
3. Measure resistance between control terminal and power terminal of the injector connector. (Component side)
   Specification

Temp.(°C)	Temp.(°F)	Resistance (Ω)
20	68	13.8~15.2

4. Is resistance within the specification?

YES	▶ Go to next step as below
NO	▶ Check injector for contamination, deterioration, or damage. Substitute with a known-good injector and check for proper operation. If the problem is corrected, replace injector and then go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

1. Ignition "ON" & Engine "OFF"
2. Measure voltage between power terminal of the injector harness connector and chassis ground.

Specification : Approx. B+

3. Is voltage within the specification?

YES	▶ Go to "Control Circuit Inspection" procedure
NO	▶ Check for a open in the power supply circuit between the main relay and the Injector. Check for open or blown 15A injector fuse. ▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure

Control Circuit Inspection

1. Measure voltage between control terminal of the injector harness connector and chassis ground.

Specification : Approx. 4~5V

2. Is voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Check control circuit for open or short. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Terminal and Connector Inspection

1. 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.
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	▶ Check for poor connection between ECM and component: backed out terminal, improper mating,

	broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

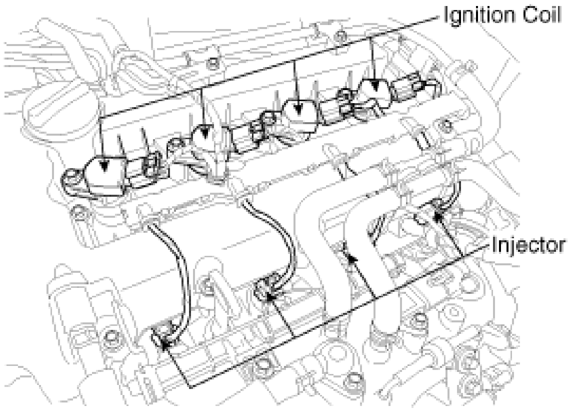
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

Based on information from various sensors, the ECM measures the fuel injection amount. The fuel injector is a solenoid-operated valve and the fuel injection amount is controlled by length of time the fuel injector is held open. The ECM controls each injector by grounding the control circuit. When the ECM energizes the injector by grounding the control circuit, the circuit voltage should be low (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 momentarily peak.

DTC Description

ECM sets DTC P0264 if the ECM detects that injector (Cylinder #2) control circuit is shorted to ground.

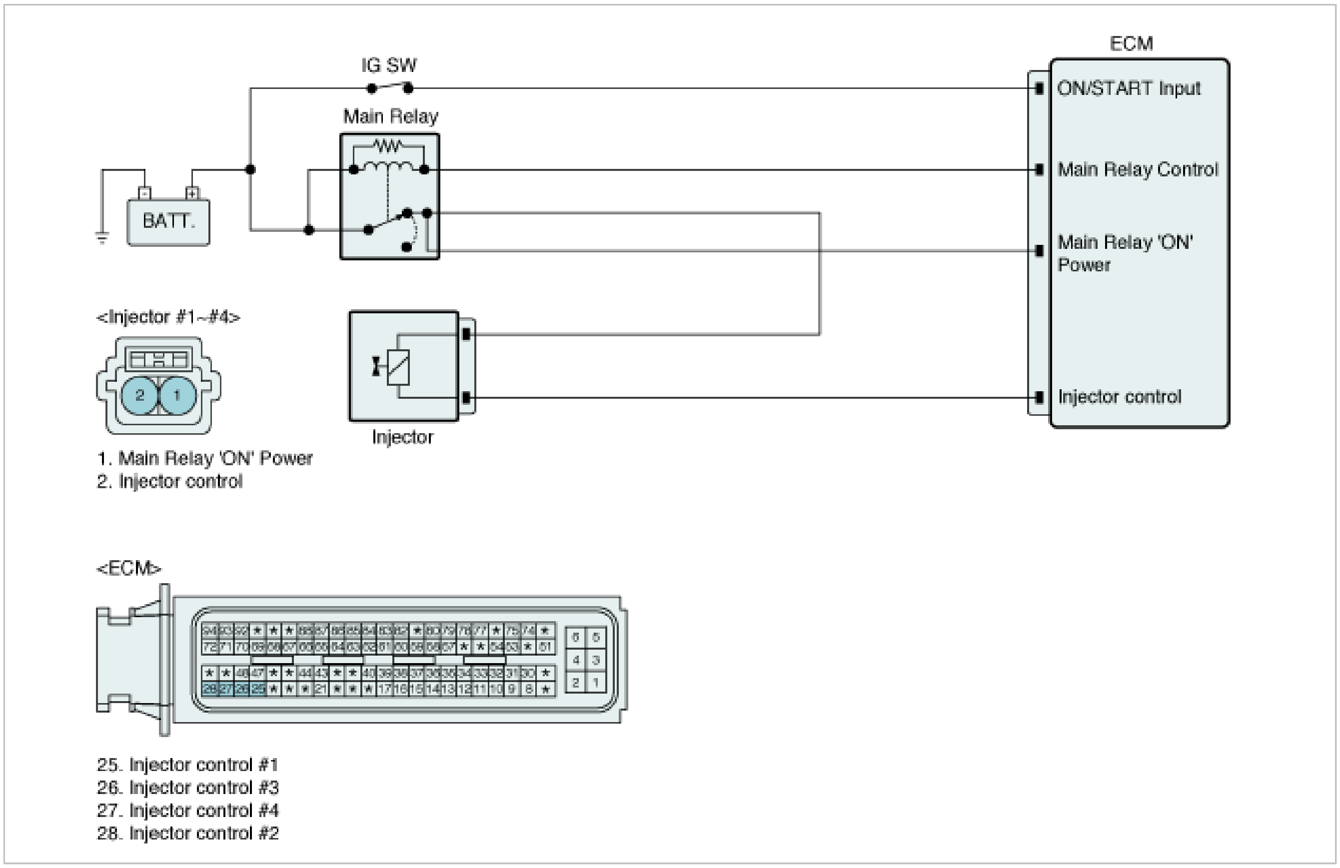
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical check	• Open in power supply harness • Short to ground in control harness • Poor connection or damaged harness • Faulty injector
Enable Conditions	• 10V < Battery voltage < 16V • Engine speed(rpm) >320	
Threshold Value	• Open or short to Ground in control circuit	
Diagnostic Time	• 1.5sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

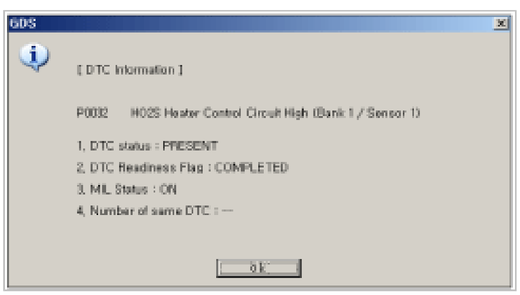
Temp.(°C)	Temp.(°F)	Resistance (Ω)
20	68	13.8~15.2

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Component Inspection

1. Ignition "OFF"
2. Disconnect injector connector.
3. Measure resistance between control terminal and power terminal of the injector connector. (Component side)
   Specification

Temp.(°C)	Temp.(°F)	Resistance (Ω)
20	68	13.8~15.2

4. Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Check injector for contamination, deterioration, or damage. Substitute with a known-good injector and check for proper operation. If the problem is corrected, replace injector and then go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

1. Ignition "ON" & Engine "OFF"
2. Measure voltage between power terminal of the injector harness connector and chassis ground.

Specification : Approx. B+

3. Is voltage within the specification?

YES	▸ Go to "Control Circuit Inspection" procedure
NO	▸ Check for a open in the power supply circuit between the main relay and the Injector. Check for open or blown 15A injector fuse. ▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure

Control Circuit Inspection

1. Check for short to ground in control circuit
   (1) Ignition "OFF".
   (2) Disconnect injector connector and ECM connector.
   (3) Measure resistance between control terminal of the injector harness connector and chassis ground.

   Specification : Infinite

   (4) Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Repair open or short to ground in control harness and go to "Verification of Vehicle Repair" procedure

Terminal and Connector Inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

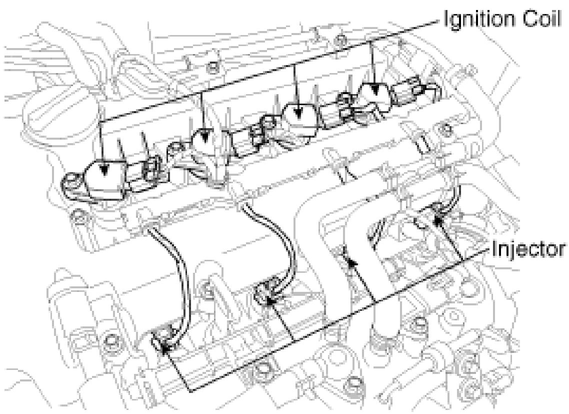
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

Based on information from various sensors, the ECM measures the fuel injection amount. The fuel injector is a solenoid-operated valve and the fuel injection amount is controlled by length of time the fuel injector is held open. The ECM controls each injector by grounding the control circuit. When the ECM energizes the injector by grounding the control circuit, the circuit voltage should be low (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 momentarily peak.

DTC Description

ECM sets DTC P0265 if the ECM detects that injector (Cylinder #2) control circuit is open or shorted to battery voltage.

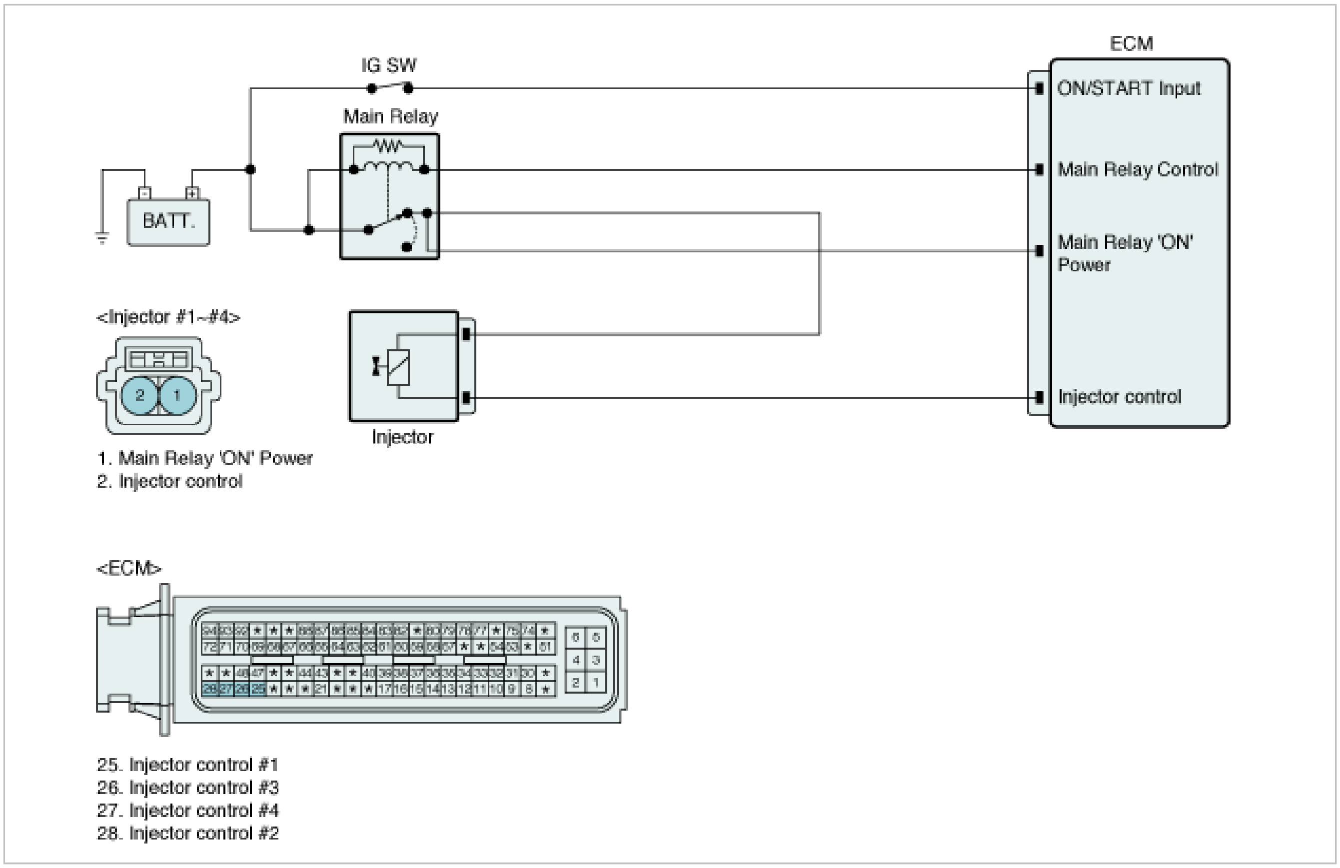
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical check	• Open or short to battery in control harness. • Poor connection or damaged harness • Faulty injector
Enable Conditions	• 10V < Battery voltage < 16V • Engine speed(rpm) >320	
Threshold Value	• Short to battery in control circuit	
Diagnostic Time	• 1.5sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

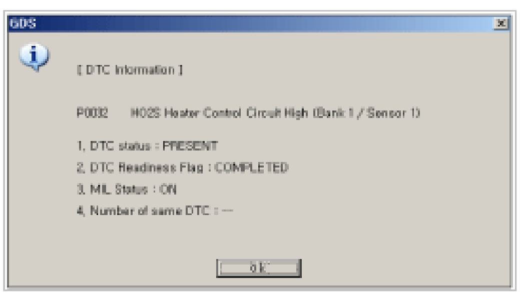
Temp.(°C)	Temp.(°F)	Resistance (Ω)
20	68	13.8~15.2

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Component Inspection

1. Ignition "OFF"
2. Disconnect injector connector.
3. Measure resistance between control terminal and power terminal of the injector connector. (Component side)
   Specification

Temp.(°C)	Temp.(°F)	Resistance (Ω)
20	68	13.8~15.2

4. Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Check injector for contamination, deterioration, or damage. Substitute with a known-good injector and check for proper operation. If the problem is corrected, replace injector and then go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

1. Ignition "ON" & Engine "OFF"
2. Measure voltage between power terminal of the injector harness connector and chassis ground.

Specification : Approx. B+

3. Is voltage within the specification?

YES	▸ Go to "Control Circuit Inspection" procedure
NO	▸ Check for a open in the power supply circuit between the main relay and the Injector. Check for open or blown 15A injector fuse. ▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure

Control Circuit Inspection

1. Measure voltage between control terminal of the injector harness connector and chassis ground.

Specification : Approx. 4~5V

2. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Check control circuit for open or short. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Terminal and Connector Inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating,

	broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

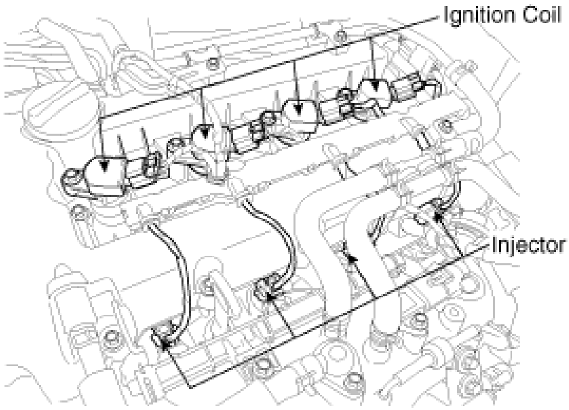
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

Based on information from various sensors, the ECM measures the fuel injection amount. The fuel injector is a solenoid-operated valve and the fuel injection amount is controlled by length of time the fuel injector is held open. The ECM controls each injector by grounding the control circuit. When the ECM energizes the injector by grounding the control circuit, the circuit voltage should be low (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 momentarily peak.

DTC Description

ECM sets DTC P0267 if the ECM detects that injector (Cylinder #3) control circuit is shorted to ground.

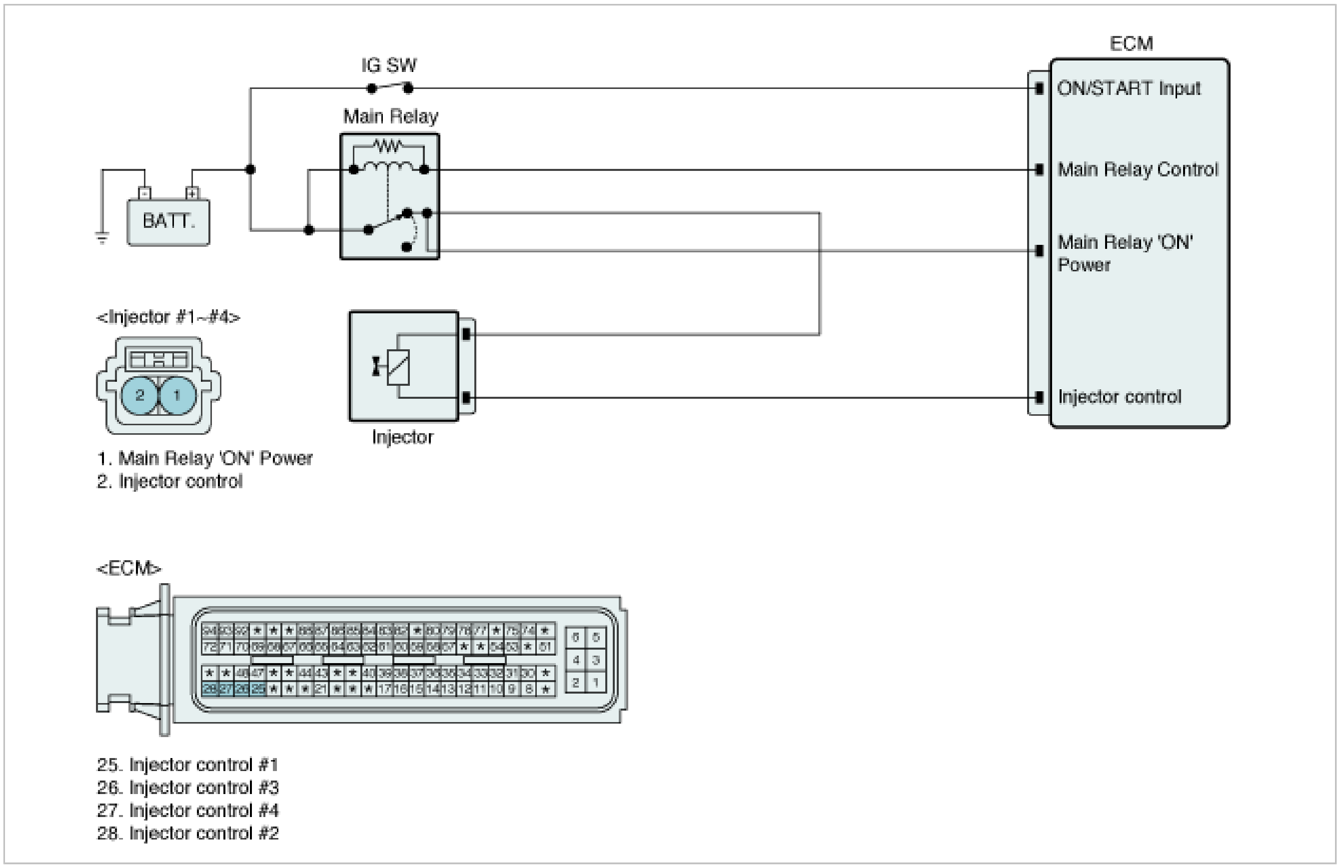
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical check	• Open in power supply harness • Short to ground in control harness • Poor connection or damaged harness • Faulty injector
Enable Conditions	• 10V < Battery voltage < 16V • Engine speed(rpm) >320	
Threshold Value	• Open or short to Ground in control circuit	
Diagnostic Time	• 1.5sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

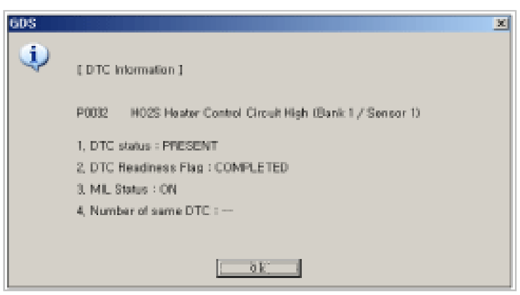
Temp.(°C)	Temp.(°F)	Resistance (Ω)
20	68	13.8~15.2

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Component Inspection

1. Ignition "OFF"
2. Disconnect injector connector.
3. Measure resistance between control terminal and power terminal of the injector connector. (Component side)
Specification

Temp.(°C)	Temp.(°F)	Resistance (Ω)
20	68	13.8~15.2

4. Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Check injector for contamination, deterioration, or damage. Substitute with a known-good injector and check for proper operation. If the problem is corrected, replace injector and then go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

1. Ignition "ON" & Engine "OFF"
2. Measure voltage between power terminal of the injector harness connector and chassis ground.

Specification : Approx. B+

3. Is voltage within the specification?

YES	▸ Go to "Control Circuit Inspection" procedure
NO	▸ Check for a open in the power supply circuit between the main relay and the Injector. Check for open or blown 15A injector fuse. ▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure

Control Circuit Inspection

1. Check for short to ground in control circuit
   (1) Ignition "OFF".
   (2) Disconnect injector connector and ECM connector.
   (3) Measure resistance between control terminal of the injector harness connector and chassis ground.

   Specification : Infinite

   (4) Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Repair open or short to ground in control harness and go to "Verification of Vehicle Repair" procedure

Terminal and Connector Inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

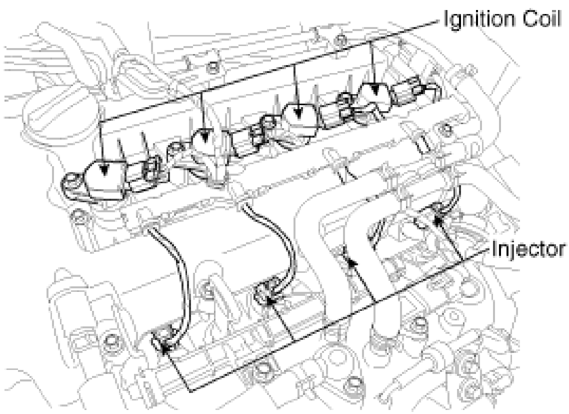
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

Based on information from various sensors, the ECM measures the fuel injection amount. The fuel injector is a solenoid-operated valve and the fuel injection amount is controlled by length of time the fuel injector is held open. The ECM controls each injector by grounding the control circuit. When the ECM energizes the injector by grounding the control circuit, the circuit voltage should be low (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 momentarily peak.

DTC Description

ECM sets DTC P0268 if the ECM detects that injector (Cylinder #3) control circuit is open or shorted to battery voltage.

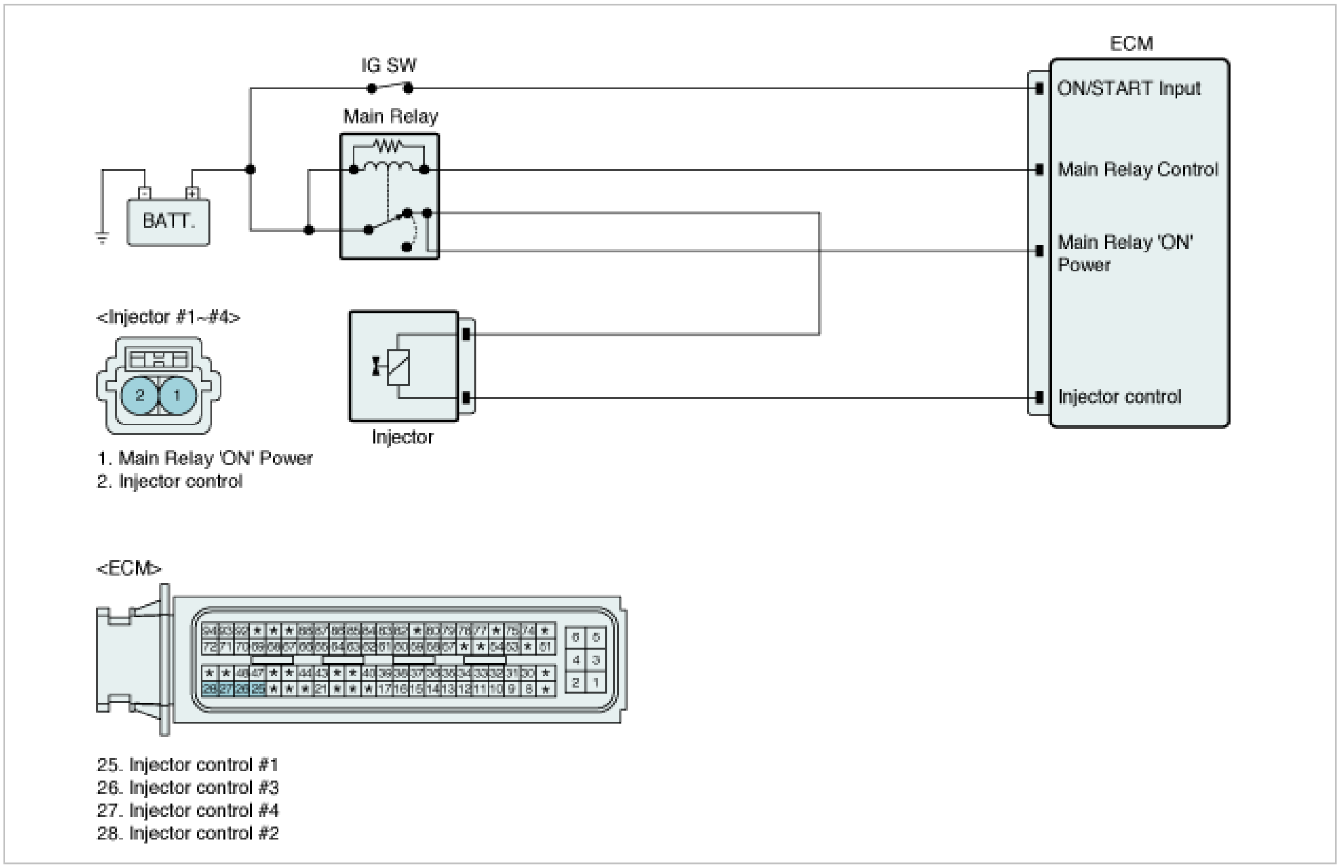
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical check	• Open or short to battery in control harness. • Poor connection or damaged harness • Faulty injector
Enable Conditions	• 10V < Battery voltage < 16V • Engine speed(rpm) >320	
Threshold Value	• Short to battery in control circuit	
Diagnostic Time	• 1.5sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

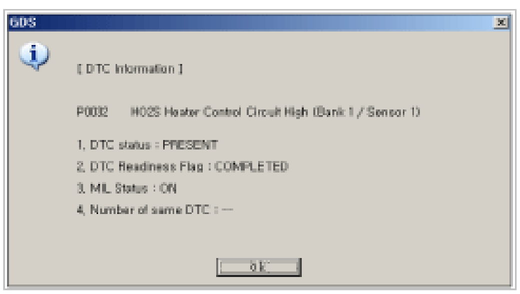
Temp.(°C)	Temp.(°F)	Resistance (Ω)
20	68	13.8~15.2

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Component Inspection

1. Ignition "OFF"
2. Disconnect injector connector.
3. Measure resistance between control terminal and power terminal of the injector connector. (Component side)
   Specification

Temp.(°C)	Temp.(°F)	Resistance (Ω)
20	68	13.8~15.2

4. Is resistance within the specification?

YES	▶ Go to next step as below
NO	▶ Check injector for contamination, deterioration, or damage. Substitute with a known-good injector and check for proper operation. If the problem is corrected, replace injector and then go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

1. Ignition "ON" & Engine "OFF"
2. Measure voltage between power terminal of the injector harness connector and chassis ground.

Specification : Approx. B+

3. Is voltage within the specification?

YES	▶ Go to "Control Circuit Inspection" procedure
NO	▶ Check for a open in the power supply circuit between the main relay and the Injector. Check for open or blown 15A injector fuse. ▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure

Control Circuit Inspection

1. Measure voltage between control terminal of the injector harness connector and chassis ground.

Specification : Approx. 4~5V

2. Is voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Check control circuit for open or short. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Terminal and Connector Inspection

1. 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.
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	▶ Check for poor connection between ECM and component: backed out terminal, improper mating,

	broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

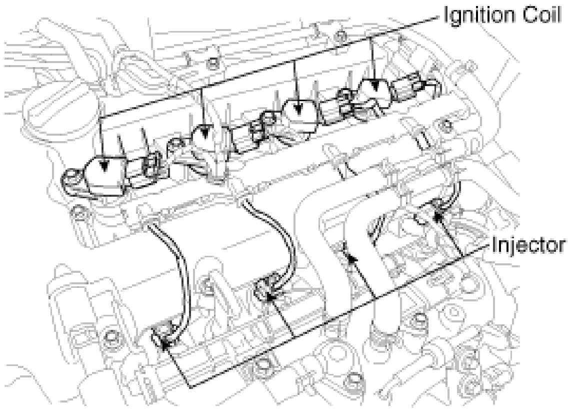
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

Based on information from various sensors, the ECM measures the fuel injection amount. The fuel injector is a solenoid-operated valve and the fuel injection amount is controlled by length of time the fuel injector is held open. The ECM controls each injector by grounding the control circuit. When the ECM energizes the injector by grounding the control circuit, the circuit voltage should be low (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 momentarily peak.

DTC Description

ECM sets DTC P0270 if the ECM detects that injector (Cylinder #4) control circuit is shorted to ground.

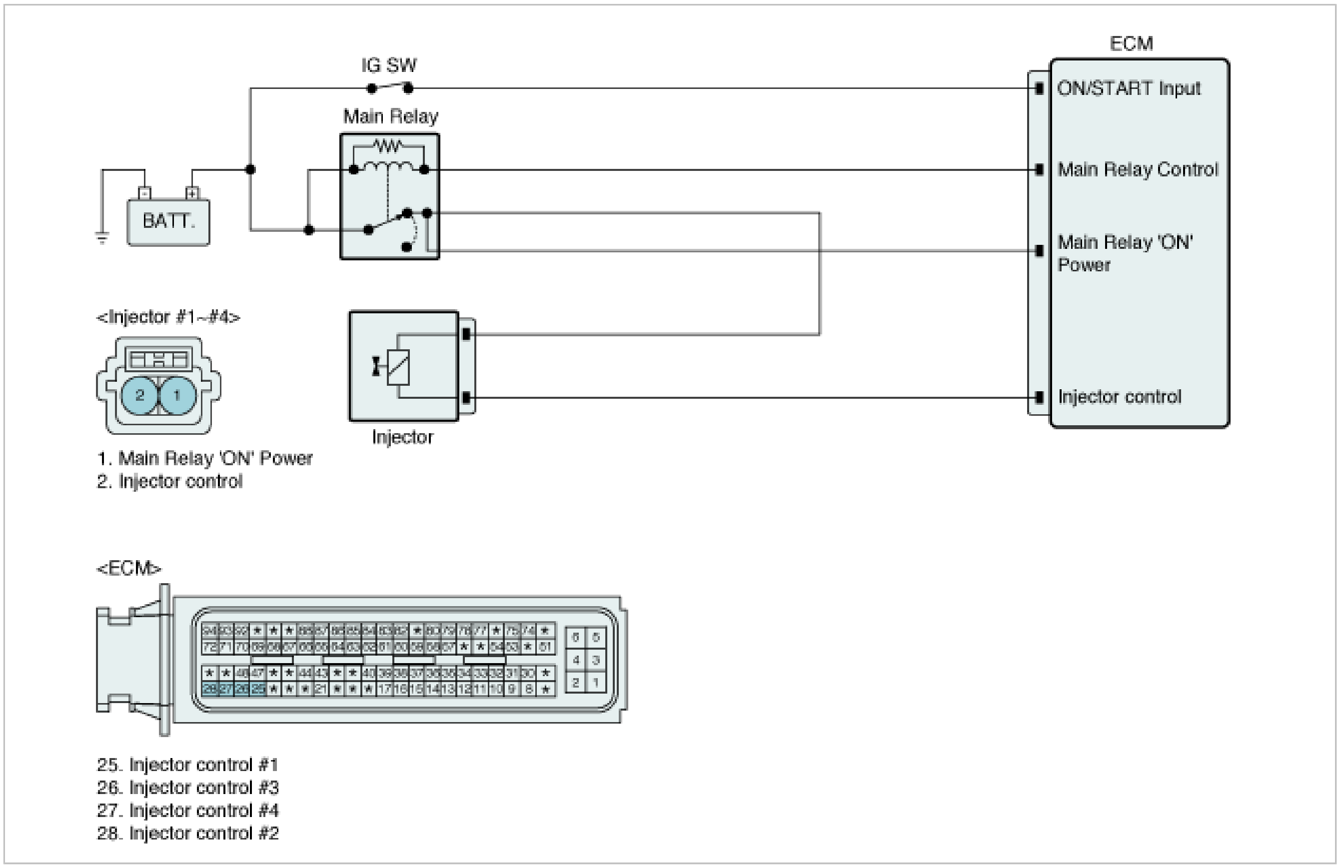
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical check	• Open in power supply harness • Short to ground in control harness • Poor connection or damaged harness • Faulty injector
Enable Conditions	• 10V < Battery voltage < 16V • Engine speed(rpm) >320	
Threshold Value	• Open or short to Ground in control circuit	
Diagnostic Time	• 1.5sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

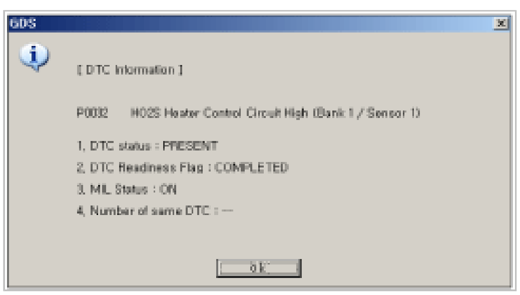
Temp.(°C)	Temp.(°F)	Resistance (Ω)
20	68	13.8~15.2

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Component Inspection

1. Ignition "OFF"
2. Disconnect injector connector.
3. Measure resistance between control terminal and power terminal of the injector connector. (Component side)
   Specification

Temp.(°C)	Temp.(°F)	Resistance (Ω)
20	68	13.8~15.2

4. Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Check injector for contamination, deterioration, or damage. Substitute with a known-good injector and check for proper operation. If the problem is corrected, replace injector and then go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

1. Ignition "ON" & Engine "OFF"
2. Measure voltage between power terminal of the injector harness connector and chassis ground.

Specification : Approx. B+

3. Is voltage within the specification?

YES	▸ Go to "Control Circuit Inspection" procedure
NO	▸ Check for a open in the power supply circuit between the main relay and the Injector. Check for open or blown 15A injector fuse. ▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure

Control Circuit Inspection

1. Check for short to ground in control circuit
   (1) Ignition "OFF".
   (2) Disconnect injector connector and ECM connector.
   (3) Measure resistance between control terminal of the injector harness connector and chassis ground.

   Specification : Infinite

   (4) Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Repair open or short to ground in control harness and go to "Verification of Vehicle Repair" procedure

Terminal and Connector Inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

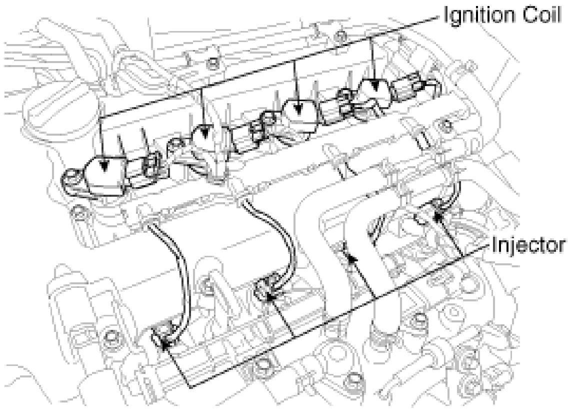
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

Based on information from various sensors, the ECM measures the fuel injection amount. The fuel injector is a solenoid-operated valve and the fuel injection amount is controlled by length of time the fuel injector is held open. The ECM controls each injector by grounding the control circuit. When the ECM energizes the injector by grounding the control circuit, the circuit voltage should be low (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 momentarily peak.

DTC Description

ECM sets DTC P0271 if the ECM detects that injector (Cylinder #4) control circuit is open or shorted to battery voltage.

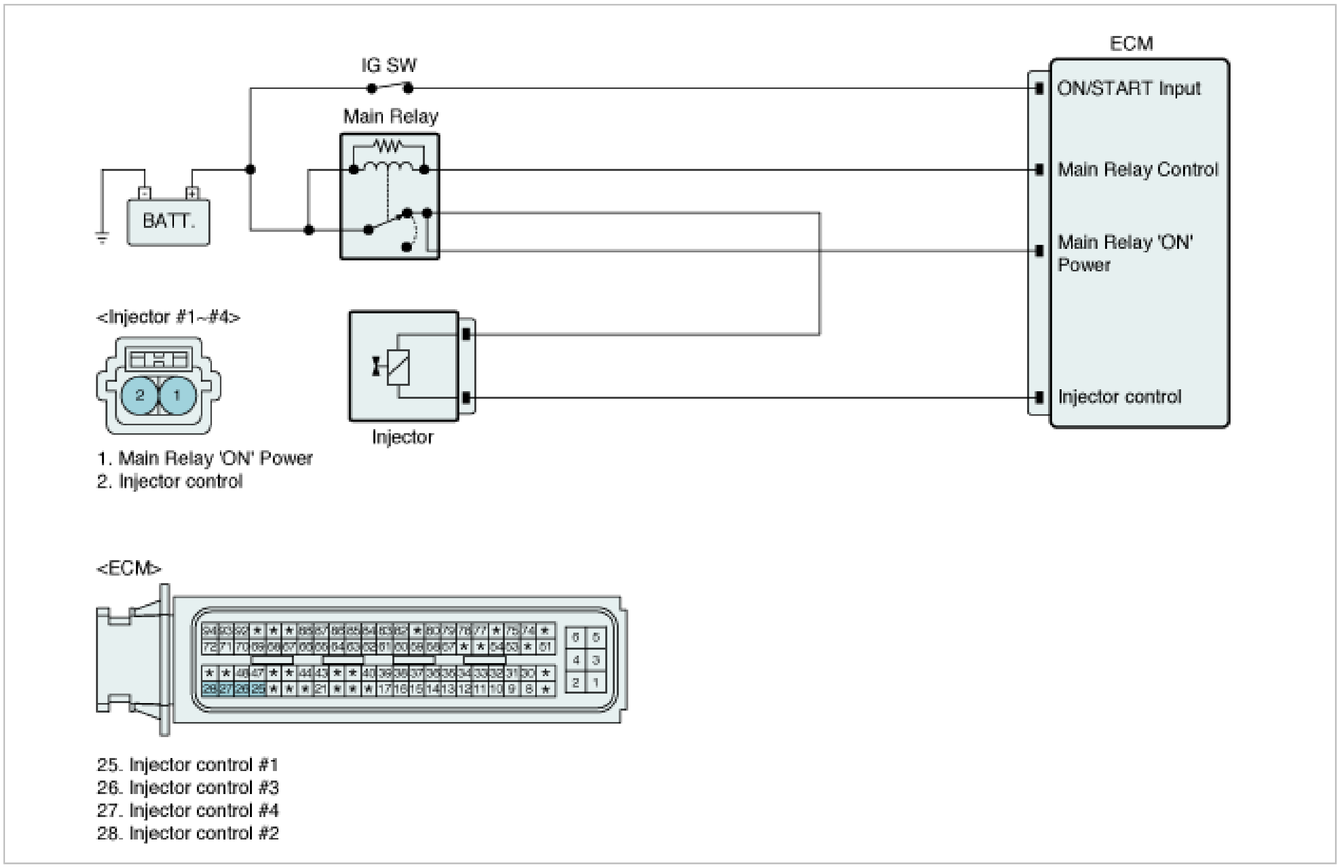
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical check	• Open or short to battery in control harness. • Poor connection or damaged harness • Faulty injector
Enable Conditions	• 10V < Battery voltage < 16V • Engine speed(rpm) >320	
Threshold Value	• Short to battery in control circuit	
Diagnostic Time	• 1.5sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

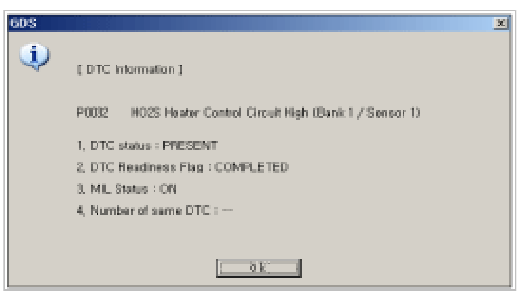
Temp.(°C)	Temp.(°F)	Resistance (Ω)
20	68	13.8~15.2

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Component Inspection

1. Ignition "OFF"
2. Disconnect injector connector.
3. Measure resistance between control terminal and power terminal of the injector connector. (Component side)
   Specification

Temp.(°C)	Temp.(°F)	Resistance (Ω)
20	68	13.8~15.2

4. Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Check injector for contamination, deterioration, or damage. Substitute with a known-good injector and check for proper operation. If the problem is corrected, replace injector and then go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

1. Ignition "ON" & Engine "OFF"
2. Measure voltage between power terminal of the injector harness connector and chassis ground.

Specification : Approx. B+

3. Is voltage within the specification?

YES	▸ Go to "Control Circuit Inspection" procedure
NO	▸ Check for a open in the power supply circuit between the main relay and the Injector. Check for open or blown 15A injector fuse. ▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure

Control Circuit Inspection

1. Check for short to ground in control circuit
   (1) Ignition "OFF".
   (2) Disconnect injector connector and ECM connector.
   (3) Measure resistance between control terminal of the injector harness connector and chassis ground.

   Specification : Infinite

   (4) Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Repair open or short to ground in control harness and go to "Verification of Vehicle Repair" procedure

Terminal and Connector Inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0299 Turbocharger/Supercharger Underboost

General Description

It has a function where it measures air that is flown into the intake manifold and serves this signal to the ECM. The inputted signal is computes the intake air amount, which is further used to determine the ignition timing and suitable amount of fuel to the relevant load. The MAP sensor is divided into the sensor installed the intake manifold and the sensor installed in between the intercooler and throttle body. The reason for using 2 sensors is to determine the ignition timing and suitable amount of fuel when the change of negative pressure for the intake manifold at the time where there is sudden increase or decrease in speed in after and before the throttle body.

DTC Description

ECM sets DTC P0299 if the ECM detects that booster pressure of turbo charger is lower than threshold value.

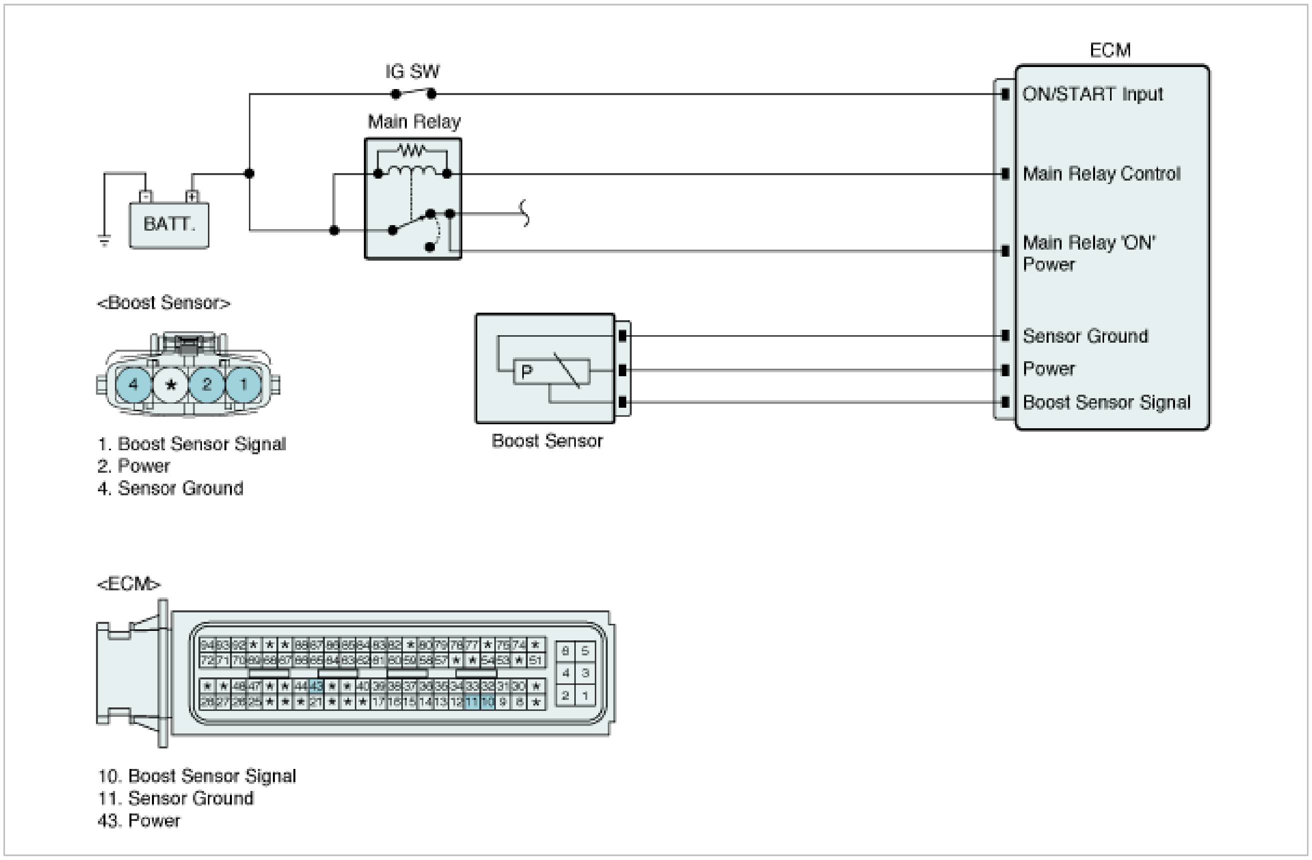
DTC Detectiong Condition

Item		Detecting Condition	Possible Cause
DTC Strategy		• Plausibility check	• Inspect Air cleaner • Inspect intake air line • Inspect vacuum hose • Faulty RCV • Faulty Wastegate
Enable Conditions	Case1	• engine speed > 2016 ~ 3008 rpm • ambient pressurre > 600 hpa • Fuel tank level> 8.6 % • ECT Temp. > -9.75 °C • Pressure quotient(Manifold pressure/Ambient Pressure) > 1.2 • Failure not detected for DTCs	
	Case2	• Wastegate PWM < 20.31 % • mass air flow > 70 kg/h • engine speed > 2016 ~ 3008 rpm • ambient pressure > 600 hpa • Fuel tank level > 8.6 % • ECT Temp.> -9.75 °C • Pressure quotient(Manifold pressure/Ambient Pressure) > 1.2 • Failure not detected for DTCs	
Threshold Value	Case1	• measured pressure up throttle< 600 ~ 1700 hpa(charge air pressure too low) • pressure up throttle deviation > 100 hpa	
	Case2	• pressure up throttle-ambient pressure < 40 ~151.41 hpa (basic charge air pressure too low)	
Diagnostic Time		• 2.2 sec	

Specification

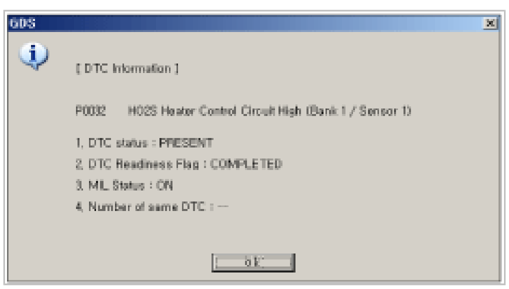
Item	Specification
Coil Resistance (Ω)	28.3 ~ 31.1 (20°C)

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

System Inspection

■ **Inspect Intake system**

1. Visually/physically inspect
   Intake system blocked or leakage inspection (First, Inspect contamination, gasket)
   ▸ Air cleaner blocked
   ▸ Inspect intake hose between turbo charger and ETS.(Blocked or leakage)
   ▸ Inspect waste gate valve and Recirculation valve (RCV) control hose blocked /leak /assemble improperly.
2. Was a problem found?

YES	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

3. Was a problem found?

YES	▸ Go to next step as below
NO	▸ Substitute with a known-good Solenoid Valve and check for proper operation. If the problem is corrected, replace Solenoid Valve and then go to "Verification of Vehicle Repair" procedure

Terminal and Connector Inspection

1. 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.
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	▸ Check valve timing. Refer to "P0016: Crankshaft Position-Camshaft Position Correlation(Bank1)" procedure. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Component Inspection

■ **Inspect Resistance**

1. Ignition "OFF".
2. Disconnect waste gate valve connector and RCV connector.
3. Measure resistance between control terminal and power terminal of the WGT connector. (Component side)
4. Measure resistance between control terminal and power terminal of the RCV connector. (Component side)
   Specification :

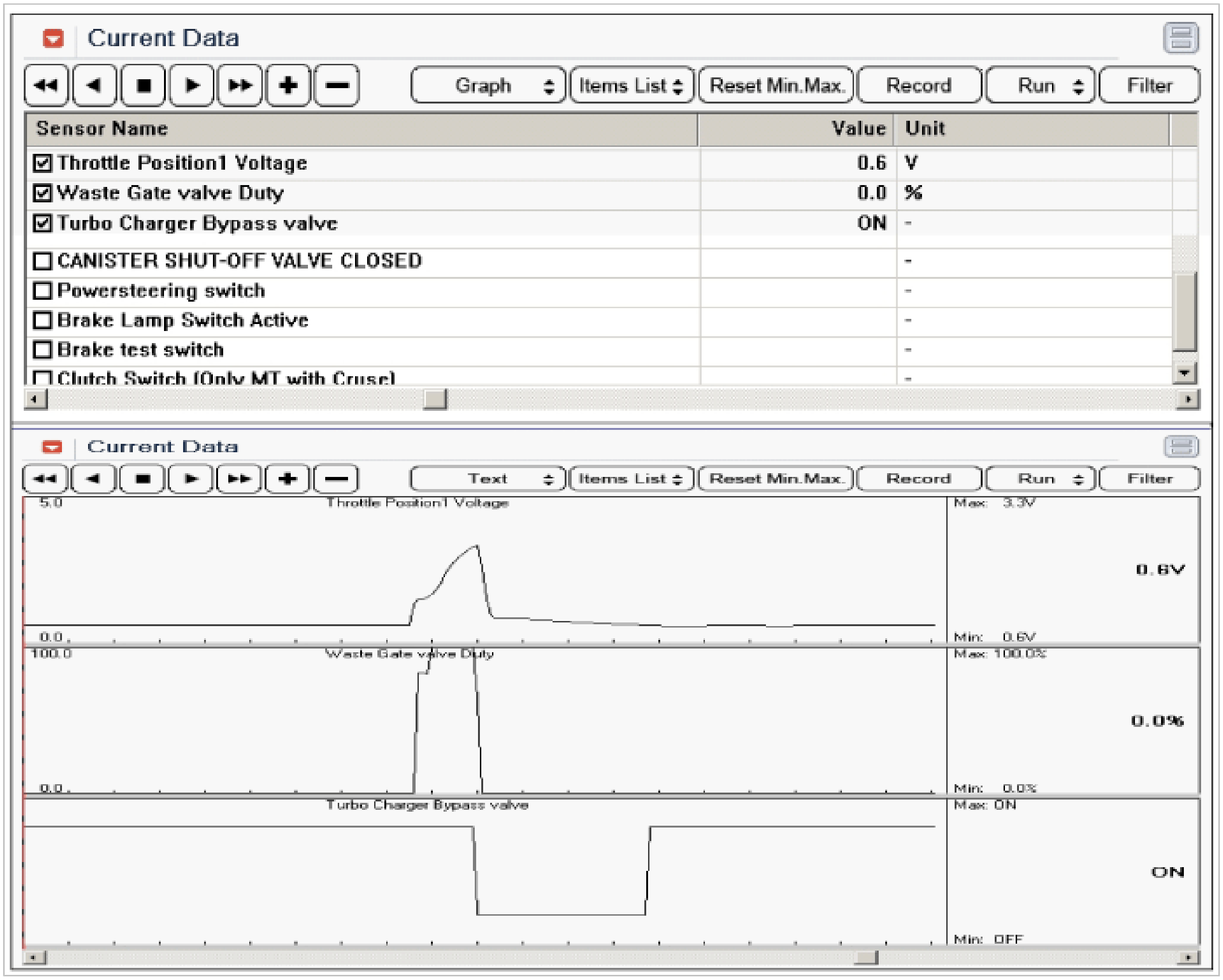
Waste gate valve / RCV	
Item	**Specification**
coil resistance	28.3 ~ 31.1 (20°C)

5. Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Check RCV for contamination, deterioration, or damage. Substitute with a known-good injector and check for proper operation. If the problem is corrected, replace RCV and then go to "Verification of Vehicle Repair" procedure

■ **Inspect Signal Waveform**

1. Monitor sensor data and signal waveform at accelerating.



2. Is the waveform normal?

YES	▶ Go to next step as below
NO	▶ Check injector for contamination, deterioration, or damage. Substitute with a known-good BPS and check for proper operation. If the problem is corrected, replace injector and then go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0300 Random/Multiple Cylinder Misfire Detected

General Description

The Misfire monitor diagnostic is based on crankshaft rotation velocity variation. The ECM determines crankshaft rotational velocity using the crankshaft position sensor and camshaft position sensor. When a cylinder misfires the crankshaft slows down momentarily. By monitoring the crankshaft and camshaft position sensor signals, the ECM can calculate when a misfire occurs. For a non-catalyst damaging misfire, the diagnostic will be required to report a misfire present within 1000-3200 engine revolutions. For catalyst damaging misfire, the diagnostic will respond to monitor 200 engine revolutions. Rough roads may cause false misfire detection. The rough road(acceleration)sensor consists of a piezoelectric vibration pick up which detects vertical acceleration of the vehicle. The sensor signal is used by the ECM to determine the degree of vertical movement of the car, for example, on a bumpy road. Since this may also cause uneven engine running, the ECM uses the signal to distinguish the phenomenon from actual misfiring.

DTC Description

If the ECM detects that engine speed variation indicates a misfire sufficient to cause three-way catalyst converter damage or emissions level to exceed standard value, the ECM sets misfire DTC. If the misfire rate is high enough to damage the catalyst, the MIL will flash to alert the vehicle operator. With a more than two cylinder misfire detection, the ECM sets P0300

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Calculation of engine roughness	• Faulty spark plugs or Ignition coil • Incorrect valve timing • Uneven compression • Air leakage • Improper Fuel pressure or dirty fuel. • Blocked/Leaking injectors • Leakage between cooling system and cylinder
Enable Conditions	• Engine load ratio :14~64% • 500< Engine speed(rpm) <6700 • Mass air flow gradient/sec. :12~60% • Throttle gradient/sec. :0.5~10.5% • Coolant temperature >20°C(68°F) if start temp. <-7°C(19°F) • No relevant failure • Fuel cut-off not active • 11V< Battery voltage <16V	
Threshold Value	• Misfire detected on 2 or more cylinders	
Diagnostic Time	• Continuous	
Mil On Condition	• Immediate (Misfire enough to damage the catalyst) • 2 Driving Cycles (Misfire breaking the emission regulation)	

Specification

Temp.(°C)	Temp.(°F)	Primary ignition coil (Ω)	Secondary ignition coil(kΩ)
20	68	0.56~0.68	6~8

Monitor DTC Status

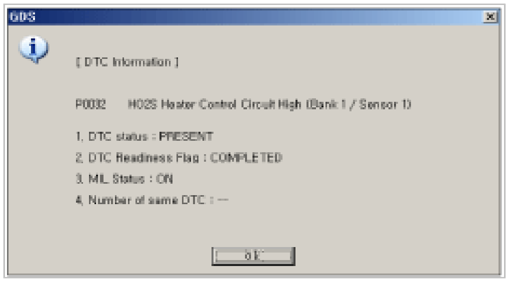
NOTE

If any DTCs related to injectors, HO2S, ECT(Engine Coolant Temperature)Sensor, Throttle Position sensor or Mass Air Flow Sensor are stored, do ALL REPAIRS associated with those codes before proceeding with this troubleshooting procedure.
If the misfire rate is high enough to cause possible catalyst damage(if the MIL was blinking), ensure that the monitoring for DTC P0420 is completed and passed after verifying the misfire repair.

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze

frame data or enable conditions.

4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

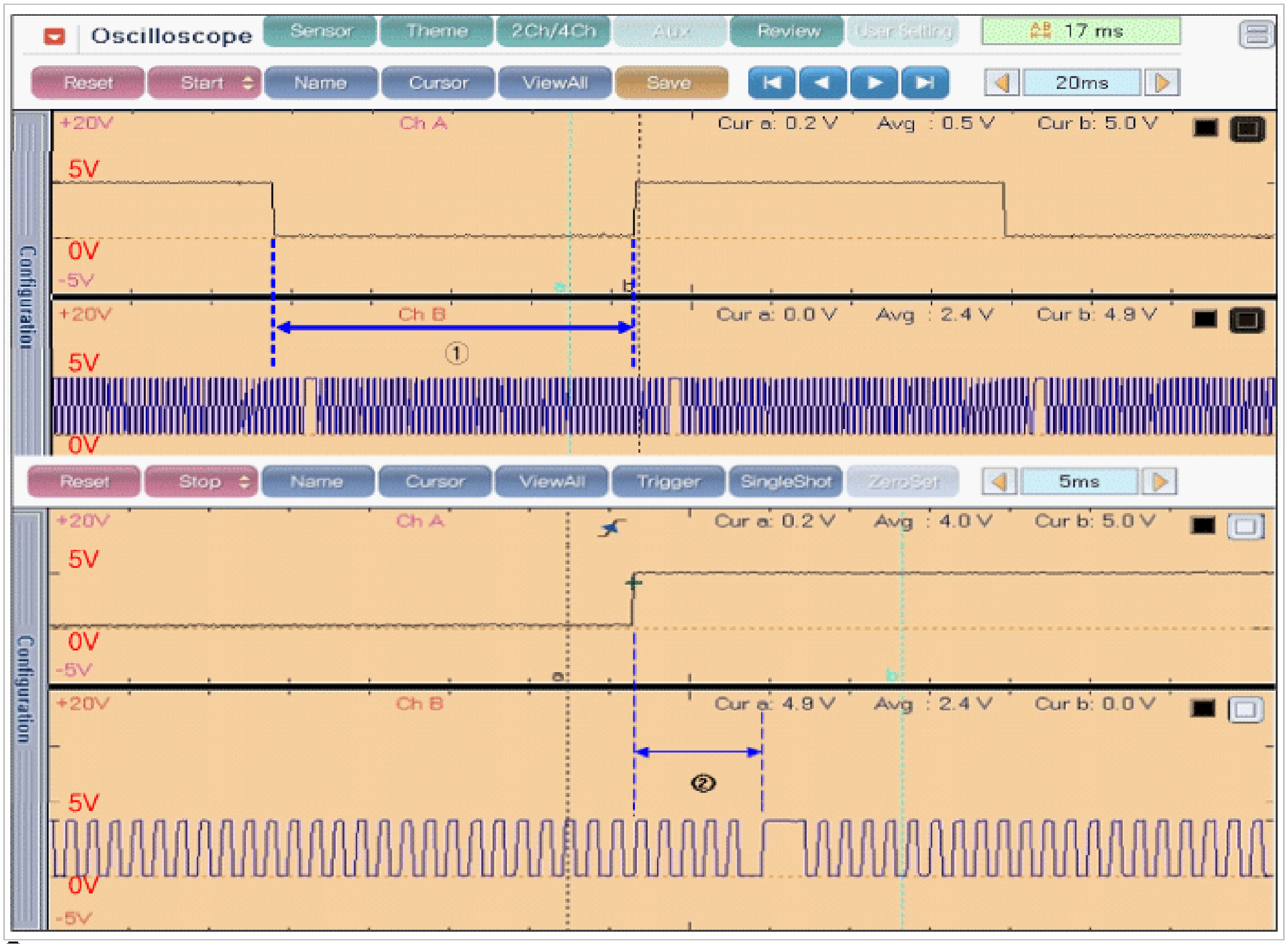
Visual Inspection

1. Visually/physically inspect for the following conditions
   - Vacuum hoses in engine room for splits, kinks and improper installation
   - Positive crankcase ventilation valve for improper installation, damaged o-rings and malfunctioning .
   - Verify that the ECM ground connections are clean and properly tightened.
2. Check MAFS and ECTS for the following conditions:
   - Contamination, deterioration, poor connection or damaged harness
   - The MAF signal displayed on the scantool should increase as engine speed increases
   - The engine coolant temperature displayed on the scantool should close to the actual coolant temperature.
3. Was a problem found in any of the above areas?

YES	▶ Replace or repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Go to next step as below

Timing Inspection

1. Set up an oscilloscope as follows :
   Channel A (+): Signal terminal of the CMPS #1(back probe), (-): ground
   Channel B (+): Signal terminal of the CKPS(back probe), (-): ground
2. Start the engine and check for signal waveform compared with reference waveform as below.



① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS #1.
② There are 3~5 signals of CKPS between the switching point of CMPS #1 and the missing tooth of CKPS.

3. Is the signal waveform normal?

YES	▸ Go to next step as below
NO	▸ Repair or readjust as necessary, if air gap of the CKPS is exceeds specification[0.3~1.7 mm (0.012~0.067 in)]. If OK, check that the crankshaft and camshaft are correctly aligned the matching marks of the pulleys. Repair or readjust as necessary and go to "Verification of Vehicle Repair" procedure

Ignition System Inspection

1. Spark Plug Cable & Ignition Coil Inspection
   (1) Visually/physically inspect the spark plug cable and ignition coil related to the misfiring cylinder(s) for the following conditions
   - Damage, cracks, carbon and flashover
   - Poor connection or damaged harness
   - Connected to the incorrect cylinders at the ignition coil and spark plug

   (2) Measure the resistance of the spark plug cable related to the misfiring cylinder(s)

   Specification : 5.6kΩ/m ±20%

   (3) Measure the resistance of the primary and secondary ignition coil related to the misfiring cylinder(s)

   Specification :
   Primary Ignition Coil Resistance : 0.56~0.68Ω at 20°C(68°F)
   Secondary Ignition Coil Resistance : 6~8kΩ at 20°C(68°F)

(4) Was a problem found in any of the above areas?

YES	▸ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

2. Spark Plug Inspection
   (1) Visually/physically inspect the spark plug related to the misfiring cylinder(s) for the following conditions
   - Damaged insulation, Worn electrodes, Oil or fuel fouled, Loose terminals and cracks
   - Check for electrode 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.

   (2) Was a problem found in any of the above areas?

YES	▸ Replace or adjust as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

Fuel System Inspection

1. Fuel Line Pressure Inspection
   (1) Check the fuel for excessive water, alcohol, or other contaminants. Replace contaminated fuel as necessary.

   (2) Install a fuel pressure gage

   (3) Inspect fuel pressure with normal idle status

Specification : 338~348kPa(3.45~3.55kg/cm²)

(4) Is fuel pressure within the specified value?

YES	▸ Go to next step as below
NO	▸ Inspect the suspected area. Refer to table as below. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

Condition	Possible 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	Fuel Pump(Fuel Pressure Regulator)
Fuel Pressure too High	Sticking fuel pressure regulator	Fuel Pump(Fuel Pressure Regulator)

2. Fuel Pressure Hold Inspection
   (1) Stop the engine and check for a change in the fuel pressure gauge reading.

Specification : After engine stops, the gauge reading should hold for minimum 5 minutes

(2) Is fuel pressure within the specified value?

YES	▸ Go to next step as below
NO	▸ Inspect the suspected area. Refer to table as below. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

Condition	Possible Cause	Suspected Area
Fuel pressure drops slowly	Injector leak	Injector
Fuel pressure drops immediately	tuck open in check valve of the fuel	Fuel pump

	pump	

Engine Compression Test

1. Warm up the engine to normal operating temperature. Verify the battery must be at or near full charge.
2. With ignition "OFF", disconnect the ignition coil connectors and the spark plug cables
3. Install compression pressure gauge to the spark plug hole.
4. With wide open throttle by hand, cranking the engine and record the compression readings from all of the cylinders

Specification :
Compression pressure : 1,283kPa (13.0kgf/cm², 185psi)
Minimum pressure : 1,135kPa (11.5kgf/cm², 164psi)
Difference between each cylinder : 100kPa (1.0kgf/cm², 15psi) or less

5. Is compression pressure within the specified value?

YES	▶ Verify if the engine has excessive coolant consumption. If yes, check for damaged inlet water passage, engine block, cylinder head or head gasket. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ If the cylinder compression in 1 or more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat compression test for cylinders with low compression pressure. - If adding oil helps the compression, it is likely that the piston rings and/or cylinder bore are worn or damaged. - If pressure stays low, a valve may be sticking or seating is improper, or there may be leakage past the gasket. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0301 Cylinder 1-Misfire detected

General Description

The Misfire monitor diagnostic is based on crankshaft rotation velocity variation. The ECM determines crankshaft rotational velocity using the crankshaft position sensor and camshaft position sensor. When a cylinder misfires the crankshaft slows down momentarily. By monitoring the crankshaft and camshaft position sensor signals, the ECM can calculate when a misfire occurs. For a non-catalyst damaging misfire, the diagnostic will be required to report a misfire present within 1000-3200 engine revolutions. For catalyst damaging misfire, the diagnostic will respond to monitor 200 engine revolutions. Rough roads may cause false misfire detection. The rough road(acceleration)sensor consists of a piezoelectric vibration pick up which detects vertical acceleration of the vehicle. The sensor signal is used by the ECM to determine the degree of vertical movement of the car, for example, on a bumpy road. Since this may also cause uneven engine running, the ECM uses the signal to distinguish the phenomenon from actual misfiring.

DTC Description

If the ECM detects that engine speed variation indicates a misfire sufficient to cause three-way catalyst converter damage or emissions level to exceed standard value, the ECM sets DTC P0301. If the misfire rate is high enough to damage the catalyst, the MIL will flash to alert the vehicle operator.

DTC Detecting Condition

Item		Detecting Condition	Possible Cause
DTC Strategy		• Calculation of engine roughness	• Faulty spark plugs or Ignition coil • Incorrect valve timing • Uneven compression • Air leakage • Improper Fuel pressure or dirty fuel. • Blocked/Leaking injectors • Leakage between cooling system and cylinder
Enable Conditions		• Engine load ratio :14~64% • 500< Engine speed(rpm) <6700 • Mass air flow gradient/sec. :12~60% • Throttle gradient/sec. :0.5~10.5% • Coolant temperature >20°C(68°F) if start temp. <-7°C(19°F) • No relevant failure • Fuel cut-off not active • 11V< Battery voltage <16V	
Threshold Value	Case1	• Misfire ratio :9.1 % - 50 % within 200 rev.	
	Case2	• Misfire ratio :2.3% within 1,000 rev.	
Diagnosis Time	Case1	• 200 rev. or 3*200 rev.	
	Case2	• 1000 rev. or 4*1000 rev.	
MIL On Condition	Case1	• Immediate	
	Case2	• 2 Driving Cycles	

Specification

Temp.(°C)	Temp.(°F)	Primary ignition coil (Ω)	Secondary ignition coil(kΩ)
20	68	0.56~0.68	6~8

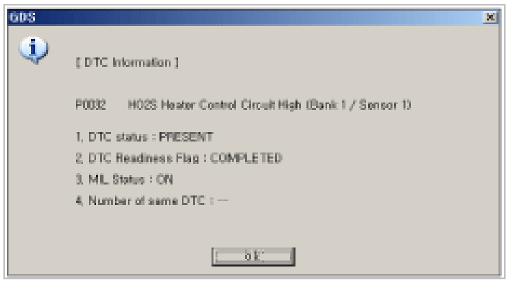
Monitor DTC Status

NOTE

If any DTCs related to injectors, HO2S, ECT(Engine Coolant Temperature)Sensor, Throttle Position sensor or Mass Air Flow Sensor are stored, do ALL REPAIRS associated with those codes before proceeding with this troubleshooting procedure.
If the misfire rate is high enough to cause possible catalyst damage(if the MIL was blinking), ensure that the monitoring for DTC P0420 is completed and passed after verifying the misfire repair.

1. Connect GDS and select "DTC Analysis" mode

2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

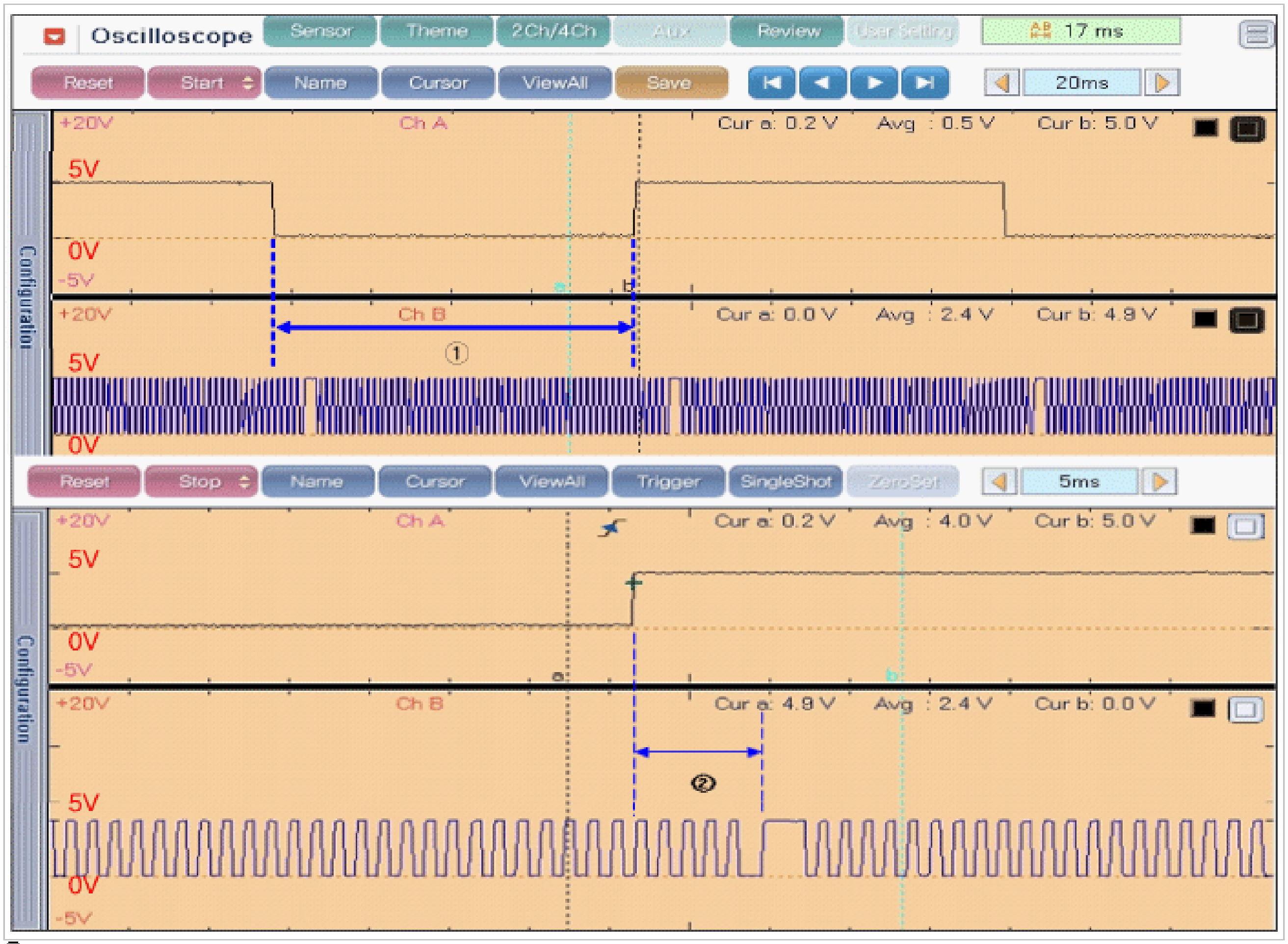
Visual Inspection

1. Visually/physically inspect for the following conditions
   - Vacuum hoses in engine room for splits, kinks and improper installation
   - Positive crankcase ventilation valve for improper installation, damaged o-rings and malfunctioning .
   - Verify that the ECM ground connections are clean and properly tightened.
2. Check MAFS and ECTS for the following conditions:
   - Contamination, deterioration, poor connection or damaged harness
   - The MAF signal displayed on the scantool should increase as engine speed increases
   - The engine coolant temperature displayed on the GDS should close to the actual coolant temperature.
3. Was a problem found in any of the above areas?

YES	▶ Replace or repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Go to next step as below

Timing Inspection

1. Set up an oscilloscope as follows :
   Channel A (+): Signal terminal of the CMPS #1(back probe), (-): ground
   Channel B (+): Signal terminal of the CKPS(back probe), (-): ground
2. Start the engine and check for signal waveform compared with reference waveform as below.



① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS #1.
② There are 3~5 signals of CKPS between the switching point of CMPS #1 and the missing tooth of CKPS.

3. Is the signal waveform normal?

YES	▶ Go to next step as below
NO	▶ Repair or readjust as necessary, if air gap of the CKPS is exceeds specification[0.3~1.7 mm (0.012~0.067 in)]. If OK, check that the crankshaft and camshaft are correctly aligned the matching marks of the pulleys. Repair or readjust as necessary and go to "Verification of Vehicle Repair" procedure

Ignition System Inspection

1. Spark Plug Cable & Ignition Coil Inspection
   (1) Visually/physically inspect the spark plug cable and ignition coil related to the misfiring cylinder(s) for the following conditions
   - Damage, cracks, carbon and flashover
   - Poor connection or damaged harness
   - Connected to the incorrect cylinders at the ignition coil and spark plug

   (2) Measure the resistance of the spark plug cable related to the misfiring cylinder(s)

   Specification : 5.6kΩ/m ±20%

   (3) Measure the resistance of the primary and secondary ignition coil related to the misfiring cylinder(s)

   Specification : Primary Ignition Coil Resistance : 0.56~0.68Ω at 20°C(68°F)
   Secondary Ignition Coil Resistance : 6~8kΩ at 20°C(68°F)

(4) Was a problem found in any of the above areas?

YES	▶ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Go to next step as below

2. Spark Plug Inspection
   (1) Visually/physically inspect the spark plug related to the misfiring cylinder(s) for the following conditions
      - Damaged insulation, Worn electrodes, Oil or fuel fouled, Loose terminals and cracks
      - Check for electrode 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.

   (2) Was a problem found in any of the above areas?

YES	▶ Replace or adjust as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Go to next step as below

Fuel System Inspection

1. Fuel Line Pressure Inspection
   (1) Check the fuel for excessive water, alcohol, or other contaminants. Replace contaminated fuel as necessary.

   (2) Install a fuel pressure gage

   (3) Inspect fuel pressure with normal idle status

Specification : 338~348kPa(3.45~3.55kg/cm²)

   (4) Is fuel pressure within the specified value?

YES	▶ Go to next step as below
NO	▶ Inspect the suspected area. Refer to table as below. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

Condition	Possible 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	Fuel Pump(Fuel Pressure Regulator)
Fuel Pressure too High	Sticking fuel pressure regulator	Fuel Pump(Fuel Pressure Regulator)

2. Fuel Pressure Hold Inspection
   (1) Stop the engine and check for a change in the fuel pressure gauge reading.

Specification : After engine stops, the gauge reading should hold for minimum 5 minutes

   (2) Is fuel pressure within the specified value?

YES	▶ Go to next step as below
NO	▶ Inspect the suspected area. Refer to table as below. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

Condition	Possible Cause	Suspected Area
Fuel pressure drops slowly	Injector leak	Injector
Fuel pressure drops immediately	tuck open in check valve of the fuel	Fuel pump

	pump	

Engine Compression Test

1. Warm up the engine to normal operating temperature. Verify the battery must be at or near full charge.
2. With ignition "OFF", disconnect the ignition coil connectors and the spark plug cables
3. Install compression pressure gauge to the spark plug hole.
4. With wide open throttle by hand, cranking the engine and record the compression readings from all of the cylinders

Specification :
Compression pressure : 1,283kPa (13.0kgf/cm², 185psi)
Minimum pressure : 1,135kPa (11.5kgf/cm², 164psi)
Difference between each cylinder : 100kPa (1.0kgf/cm², 15psi) or less

5. Is compression pressure within the specified value?

YES	▸ Verify if the engine has excessive coolant consumption. If yes, check for damaged inlet water passage, engine block, cylinder head or head gasket. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ If the cylinder compression in 1 or more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat compression test for cylinders with low compression pressure. - If adding oil helps the compression, it is likely that the piston rings and/or cylinder bore are worn or damaged. - If pressure stays low, a valve may be sticking or seating is improper, or there may be leakage past the gasket. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0302 Cylinder 2-Misfire detected

General Description

The Misfire monitor diagnostic is based on crankshaft rotation velocity variation. The ECM determines crankshaft rotational velocity using the crankshaft position sensor and camshaft position sensor. When a cylinder misfires the crankshaft slows down momentarily. By monitoring the crankshaft and camshaft position sensor signals, the ECM can calculate when a misfire occurs. For a non-catalyst damaging misfire, the diagnostic will be required to report a misfire present within 1000-3200 engine revolutions. For catalyst damaging misfire, the diagnostic will respond to monitor 200 engine revolutions. Rough roads may cause false misfire detection. The rough road(acceleration)sensor consists of a piezoelectric vibration pick up which detects vertical acceleration of the vehicle. The sensor signal is used by the ECM to determine the degree of vertical movement of the car, for example, on a bumpy road. Since this may also cause uneven engine running, the ECM uses the signal to distinguish the phenomenon from actual misfiring.

DTC Description

If the ECM detects that engine speed variation indicates a misfire sufficient to cause three-way catalyst converter damage or emissions level to exceed standard value, the ECM sets DTC P0302. If the misfire rate is high enough to damage the catalyst, the MIL will flash to alert the vehicle operator.

DTC Detecting Condition

<table>
<tr><th colspan="2">Item</th><th>Detecting Condition</th><th>Possible Cause</th></tr>
<tr><td colspan="2">DTC Strategy</td><td>• Calculation of engine roughness</td><td rowspan="8">• Faulty spark plugs or Ignition coil
• Incorrect valve timing
• Uneven compression
• Air leakage
• Improper Fuel pressure or dirty fuel.
• Blocked/Leaking injectors
• Leakage between cooling system and cylinder</td></tr>
<tr><td colspan="2">Enable Conditions</td><td>• Engine load ratio :14~64%
• 500< Engine speed(rpm) <6700
• Mass air flow gradient/sec. :12~60%
• Throttle gradient/sec. :0.5~10.5%
• Coolant temperature >20°C(68°F) if start temp. <-7°C(19°F)
• No relevant failure
• Fuel cut-off not active
• 11V< Battery voltage <16V</td></tr>
<tr><td rowspan="2">Threshold Value</td><td>Case1</td><td>• Misfire ratio :9.1 % - 50 % within 200 rev.</td></tr>
<tr><td>Case2</td><td>• Misfire ratio :2.3% within 1,000 rev.</td></tr>
<tr><td rowspan="2">Diagnosis Time</td><td>Case1</td><td>• 200 rev. or 3*200 rev.</td></tr>
<tr><td>Case2</td><td>• 1000 rev. or 4*1000 rev.</td></tr>
<tr><td rowspan="2">MIL On Condition</td><td>Case1</td><td>• Immediate</td></tr>
<tr><td>Case2</td><td>• 2 Driving Cycles</td></tr>
</table>

Specification

Temp.(°C)	Temp.(°F)	Primary ignition coil (Ω)	Secondary ignition coil(kΩ)
20	68	0.56~0.68	6~8

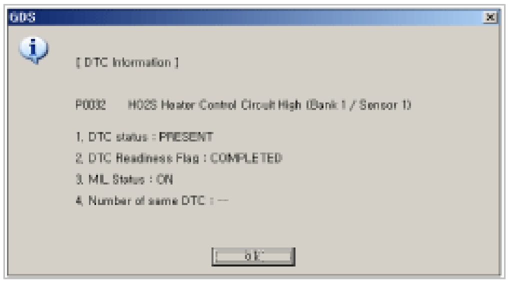
Monitor DTC Status

NOTE

If any DTCs related to injectors, HO2S, ECT(Engine Coolant Temperature)Sensor, Throttle Position sensor or Mass Air Flow Sensor are stored, do ALL REPAIRS associated with those codes before proceeding with this troubleshooting procedure.
If the misfire rate is high enough to cause possible catalyst damage(if the MIL was blinking), ensure that the monitoring for DTC P0420 is completed and passed after verifying the misfire repair.

1. Connect GDS and select "DTC Analysis" mode

2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

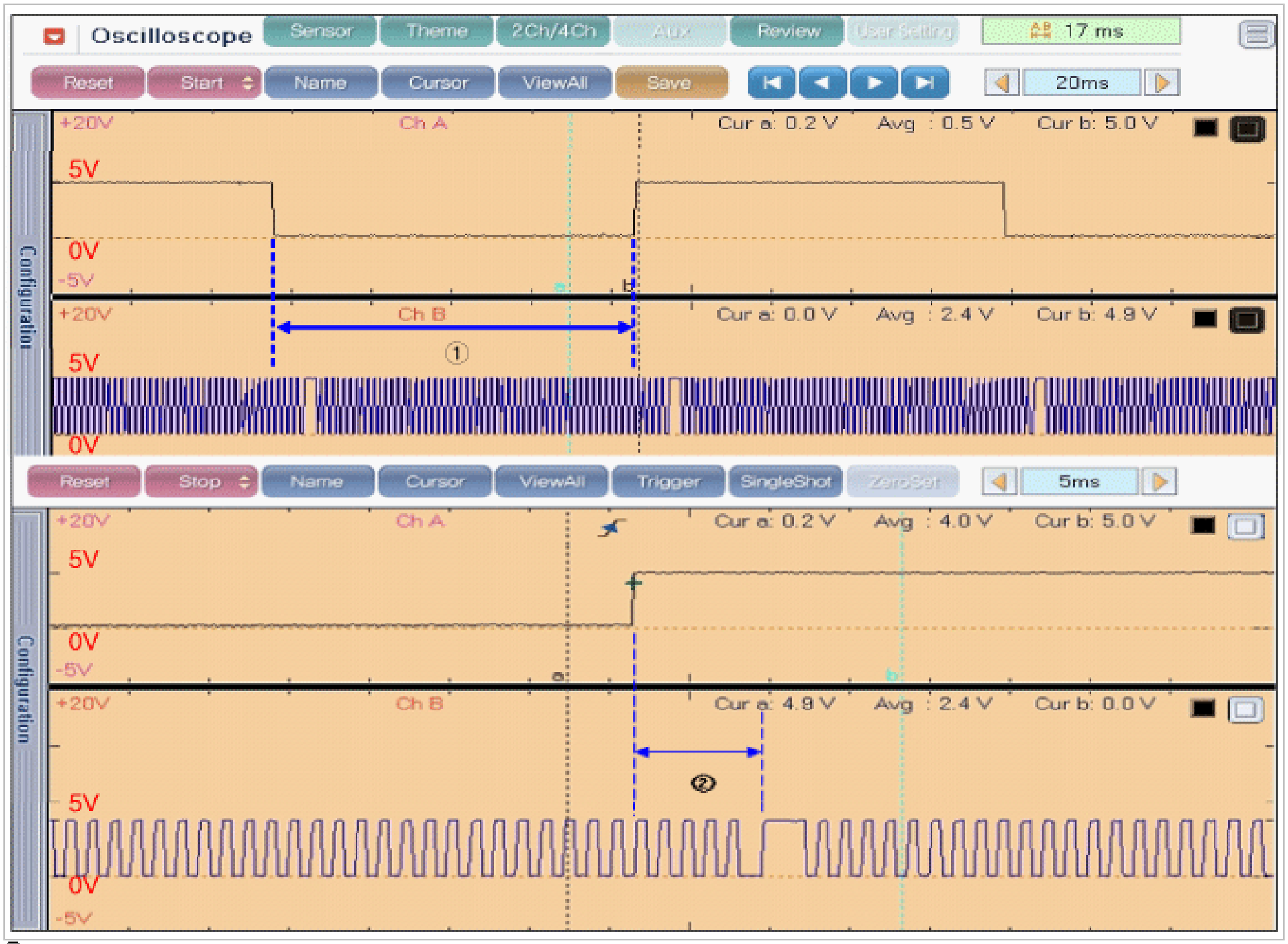
Visual Inspection

1. Visually/physically inspect for the following conditions
   - Vacuum hoses in engine room for splits, kinks and improper installation
   - Positive crankcase ventilation valve for improper installation, damaged o-rings and malfunctioning .
   - Verify that the ECM ground connections are clean and properly tightened.
2. Check MAFS and ECTS for the following conditions:
   - Contamination, deterioration, poor connection or damaged harness
   - The MAF signal displayed on the GDS should increase as engine speed increases
   - The engine coolant temperature displayed on the scantool should close to the actual coolant temperature.
3. Was a problem found in any of the above areas?

YES	▶ Replace or repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Go to next step as below

Timing Inspection

1. Set up an oscilloscope as follows :
   Channel A (+): Signal terminal of the CMPS #1(back probe), (-): ground
   Channel B (+): Signal terminal of the CKPS(back probe), (-): ground
2. Start the engine and check for signal waveform compared with reference waveform as below.



① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS #1.
② There are 3~5 signals of CKPS between the switching point of CMPS #1 and the missing tooth of CKPS.

3. Is the signal waveform normal?

YES	▶ Go to next step as below
NO	▶ Repair or readjust as necessary, if air gap of the CKPS is exceeds specification[0.3~1.7 mm (0.012~0.067 in)]. If OK, check that the crankshaft and camshaft are correctly aligned the matching marks of the pulleys. Repair or readjust as necessary and go to "Verification of Vehicle Repair" procedure

Ignition System Inspection

1. Spark Plug Cable & Ignition Coil Inspection
   (1) Visually/physically inspect the spark plug cable and ignition coil related to the misfiring cylinder(s) for the following conditions
   - Damage, cracks, carbon and flashover
   - Poor connection or damaged harness
   - Connected to the incorrect cylinders at the ignition coil and spark plug

   (2) Measure the resistance of the spark plug cable related to the misfiring cylinder(s)

   Specification : 5.6kΩ/m ±20%

   (3) Measure the resistance of the primary and secondary ignition coil related to the misfiring cylinder(s)

   Specification : Primary Ignition Coil Resistance : 0.56~0.68Ω at 20°C(68°F)
   Secondary Ignition Coil Resistance : 6~8kΩ at 20°C(68°F)

(4) Was a problem found in any of the above areas?

YES	▸ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

2. Spark Plug Inspection
   (1) Visually/physically inspect the spark plug related to the misfiring cylinder(s) for the following conditions
   - Damaged insulation, Worn electrodes, Oil or fuel fouled, Loose terminals and cracks
   - Check for electrode 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.

   (2) Was a problem found in any of the above areas?

YES	▸ Replace or adjust as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

Fuel System Inspection

1. Fuel Line Pressure Inspection
   (1) Check the fuel for excessive water, alcohol, or other contaminants. Replace contaminated fuel as necessary.

   (2) Install a fuel pressure gage

   (3) Inspect fuel pressure with normal idle status

Specification : 338~348kPa(3.45~3.55kg/cm²)

(4) Is fuel pressure within the specified value?

YES	▸ Go to next step as below
NO	▸ Inspect the suspected area. Refer to table as below. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

Condition	Possible 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	Fuel Pump(Fuel Pressure Regulator)
Fuel Pressure too High	Sticking fuel pressure regulator	Fuel Pump(Fuel Pressure Regulator)

2. Fuel Pressure Hold Inspection
   (1) Stop the engine and check for a change in the fuel pressure gauge reading.

Specification : After engine stops, the gauge reading should hold for minimum 5 minutes

(2) Is fuel pressure within the specified value?

YES	▸ Go to next step as below
NO	▸ Inspect the suspected area. Refer to table as below. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

Condition	Possible Cause	Suspected Area
Fuel pressure drops slowly	Injector leak	Injector
Fuel pressure drops immediately	tuck open in check valve of the fuel	Fuel pump

	pump	

Engine Compression Test

1. Warm up the engine to normal operating temperature. Verify the battery must be at or near full charge.
2. With ignition "OFF", disconnect the ignition coil connectors and the spark plug cables
3. Install compression pressure gauge to the spark plug hole.
4. With wide open throttle by hand, cranking the engine and record the compression readings from all of the cylinders

Specification :
Compression pressure : 1,283kPa (13.0kgf/cm², 185psi)
Minimum pressure : 1,135kPa (11.5kgf/cm², 164psi)
Difference between each cylinder : 100kPa (1.0kgf/cm², 15psi) or less

5. Is compression pressure within the specified value?

YES	▸ Verify if the engine has excessive coolant consumption. If yes, check for damaged inlet water passage, engine block, cylinder head or head gasket. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ If the cylinder compression in 1 or more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat compression test for cylinders with low compression pressure. - If adding oil helps the compression, it is likely that the piston rings and/or cylinder bore are worn or damaged. - If pressure stays low, a valve may be sticking or seating is improper, or there may be leakage past the gasket. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0303 Cylinder 3-Misfire detected

General Description

The Misfire monitor diagnostic is based on crankshaft rotation velocity variation. The ECM determines crankshaft rotational velocity using the crankshaft position sensor and camshaft position sensor. When a cylinder misfires the crankshaft slows down momentarily. By monitoring the crankshaft and camshaft position sensor signals, the ECM can calculate when a misfire occurs. For a non-catalyst damaging misfire, the diagnostic will be required to report a misfire present within 1000-3200 engine revolutions. For catalyst damaging misfire, the diagnostic will respond to monitor 200 engine revolutions. Rough roads may cause false misfire detection. The rough road(acceleration)sensor consists of a piezoelectric vibration pick up which detects vertical acceleration of the vehicle. The sensor signal is used by the ECM to determine the degree of vertical movement of the car, for example, on a bumpy road. Since this may also cause uneven engine running, the ECM uses the signal to distinguish the phenomenon from actual misfiring.

DTC Description

If the ECM detects that engine speed variation indicates a misfire sufficient to cause three-way catalyst converter damage or emissions level to exceed standard value, the ECM sets DTC P0303. If the misfire rate is high enough to damage the catalyst, the MIL will flash to alert the vehicle operator.

DTC Detecting Condition

<table>
<tr><th colspan="2">Item</th><th>Detecting Condition</th><th>Possible Cause</th></tr>
<tr><td colspan="2">DTC Strategy</td><td>• Calculation of engine roughness</td><td rowspan="8">• Faulty spark plugs or Ignition coil
• Incorrect valve timing
• Uneven compression
• Air leakage
• Improper Fuel pressure or dirty fuel.
• Blocked/Leaking injectors
• Leakage between cooling system and cylinder</td></tr>
<tr><td colspan="2">Enable Conditions</td><td>• Engine load ratio :14~64%
• 500< Engine speed(rpm) <6700
• Mass air flow gradient/sec. :12~60%
• Throttle gradient/sec. :0.5~10.5%
• Coolant temperature >20°C(68°F) if start temp. <-7°C(19°F)
• No relevant failure
• Fuel cut-off not active
• 11V< Battery voltage <16V</td></tr>
<tr><td rowspan="2">Threshold Value</td><td>Case1</td><td>• Misfire ratio :9.1 % - 50 % within 200 rev.</td></tr>
<tr><td>Case2</td><td>• Misfire ratio :2.3% within 1,000 rev.</td></tr>
<tr><td rowspan="2">Diagnosis Time</td><td>Case1</td><td>• 200 rev. or 3*200 rev.</td></tr>
<tr><td>Case2</td><td>• 1000 rev. or 4*1000 rev.</td></tr>
<tr><td rowspan="2">MIL On Condition</td><td>Case1</td><td>• Immediate</td></tr>
<tr><td>Case2</td><td>• 2 Driving Cycles</td></tr>
</table>

Specification

Temp.(°C)	Temp.(°F)	Primary ignition coil (Ω)	Secondary ignition coil(kΩ)
20	68	0.56~0.68	6~8

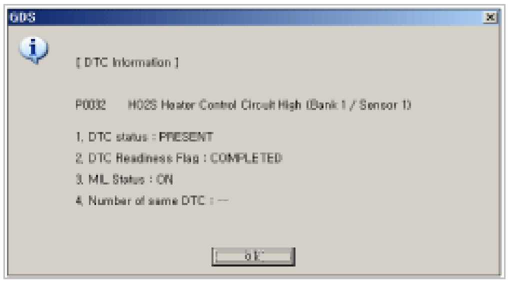
Monitor DTC Status

NOTE

If any DTCs related to injectors, HO2S, ECT(Engine Coolant Temperature)Sensor, Throttle Position sensor or Mass Air Flow Sensor are stored, do ALL REPAIRS associated with those codes before proceeding with this troubleshooting procedure.
If the misfire rate is high enough to cause possible catalyst damage(if the MIL was blinking), ensure that the monitoring for DTC P0420 is completed and passed after verifying the misfire repair.

1. Connect GDS and select "DTC Analysis" mode

2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

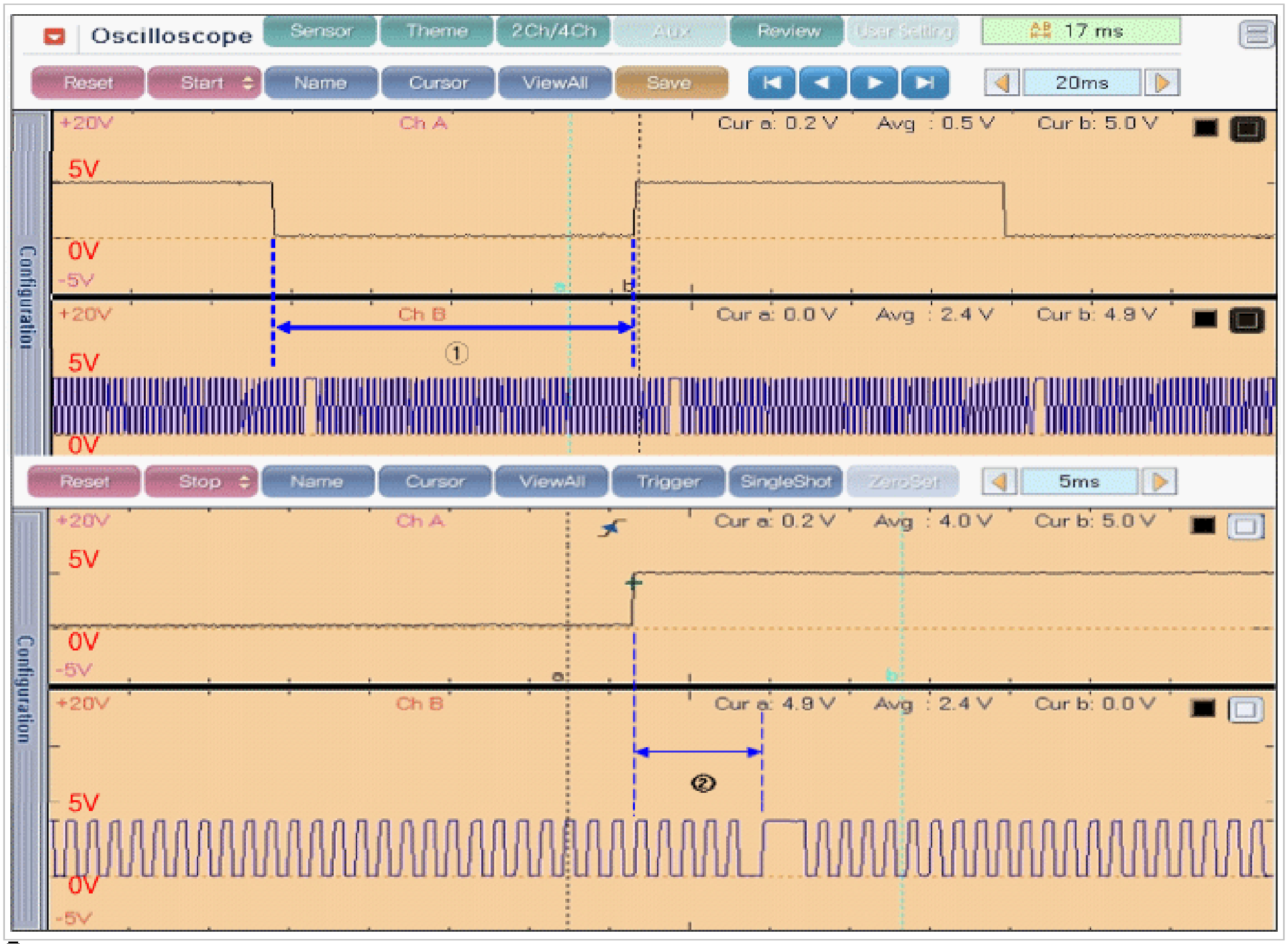
Visual Inspection

1. Visually/physically inspect for the following conditions
   - Vacuum hoses in engine room for splits, kinks and improper installation
   - Positive crankcase ventilation valve for improper installation, damaged o-rings and malfunctioning .
   - Verify that the ECM ground connections are clean and properly tightened.
2. Check MAFS and ECTS for the following conditions:
   - Contamination, deterioration, poor connection or damaged harness
   - The MAF signal displayed on the GDS should increase as engine speed increases
   - The engine coolant temperature displayed on the scantool should close to the actual coolant temperature.
3. Was a problem found in any of the above areas?

YES	▸ Replace or repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

Timing Inspection

1. Set up an oscilloscope as follows :
   Channel A (+): Signal terminal of the CMPS #1(back probe), (-): ground
   Channel B (+): Signal terminal of the CKPS(back probe), (-): ground
2. Start the engine and check for signal waveform compared with reference waveform as below.



① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS #1.
② There are 3~5 signals of CKPS between the switching point of CMPS #1 and the missing tooth of CKPS.

3. Is the signal waveform normal?

YES	▸ Go to next step as below
NO	▸ Repair or readjust as necessary, if air gap of the CKPS is exceeds specification[0.3~1.7 mm (0.012~0.067 in)]. If OK, check that the crankshaft and camshaft are correctly aligned the matching marks of the pulleys. Repair or readjust as necessary and go to "Verification of Vehicle Repair" procedure

Ignition System Inspection

1. Spark Plug Cable & Ignition Coil Inspection
   (1) Visually/physically inspect the spark plug cable and ignition coil related to the misfiring cylinder(s) for the following conditions
   - Damage, cracks, carbon and flashover
   - Poor connection or damaged harness
   - Connected to the incorrect cylinders at the ignition coil and spark plug

   (2) Measure the resistance of the spark plug cable related to the misfiring cylinder(s)

   Specification : 5.6kΩ/m ±20%

   (3) Measure the resistance of the primary and secondary ignition coil related to the misfiring cylinder(s)

   Specification : Primary Ignition Coil Resistance : 0.56~0.68Ω at 20°C(68°F)
   Secondary Ignition Coil Resistance : 6~8kΩ at 20°C(68°F)

(4) Was a problem found in any of the above areas?

YES	▸ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

2. Spark Plug Inspection
   (1) Visually/physically inspect the spark plug related to the misfiring cylinder(s) for the following conditions
   - Damaged insulation, Worn electrodes, Oil or fuel fouled, Loose terminals and cracks
   - Check for electrode 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.

   (2) Was a problem found in any of the above areas?

YES	▸ Replace or adjust as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

Fuel System Inspection

1. Fuel Line Pressure Inspection
   (1) Check the fuel for excessive water, alcohol, or other contaminants. Replace contaminated fuel as necessary.

   (2) Install a fuel pressure gage

   (3) Inspect fuel pressure with normal idle status

Specification : 338~348kPa(3.45~3.55kg/cm²)

   (4) Is fuel pressure within the specified value?

YES	▸ Go to next step as below
NO	▸ Inspect the suspected area. Refer to table as below. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

Condition	Possible 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	Fuel Pump(Fuel Pressure Regulator)
Fuel Pressure too High	Sticking fuel pressure regulator	Fuel Pump(Fuel Pressure Regulator)

2. Fuel Pressure Hold Inspection
   (1) Stop the engine and check for a change in the fuel pressure gauge reading.

Specification : After engine stops, the gauge reading should hold for minimum 5 minutes

   (2) Is fuel pressure within the specified value?

YES	▸ Go to next step as below
NO	▸ Inspect the suspected area. Refer to table as below. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

Condition	Possible Cause	Suspected Area
Fuel pressure drops slowly	Injector leak	Injector
Fuel pressure drops immediately	tuck open in check valve of the fuel	Fuel pump

	pump	

Engine Compression Test

1. Warm up the engine to normal operating temperature. Verify the battery must be at or near full charge.
2. With ignition "OFF", disconnect the ignition coil connectors and the spark plug cables
3. Install compression pressure gauge to the spark plug hole.
4. With wide open throttle by hand, cranking the engine and record the compression readings from all of the cylinders

Specification : Compression pressure : 1,283kPa (13.0kgf/cm², 185psi)
Minimum pressure : 1,135kPa (11.5kgf/cm², 164psi)
Difference between each cylinder : 100kPa (1.0kgf/cm², 15psi) or less

5. Is compression pressure within the specified value?

YES	▶ Verify if the engine has excessive coolant consumption. If yes, check for damaged inlet water passage, engine block, cylinder head or head gasket. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ If the cylinder compression in 1 or more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat compression test for cylinders with low compression pressure. - If adding oil helps the compression, it is likely that the piston rings and/or cylinder bore are worn or damaged. - If pressure stays low, a valve may be sticking or seating is improper, or there may be leakage past the gasket. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0304 Cylinder 4-Misfire detected

General Description

The Misfire monitor diagnostic is based on crankshaft rotation velocity variation. The ECM determines crankshaft rotational velocity using the crankshaft position sensor and camshaft position sensor. When a cylinder misfires the crankshaft slows down momentarily. By monitoring the crankshaft and camshaft position sensor signals, the ECM can calculate when a misfire occurs. For a non-catalyst damaging misfire, the diagnostic will be required to report a misfire present within 1000-3200 engine revolutions. For catalyst damaging misfire, the diagnostic will respond to monitor 200 engine revolutions. Rough roads may cause false misfire detection. The rough road(acceleration)sensor consists of a piezoelectric vibration pick up which detects vertical acceleration of the vehicle. The sensor signal is used by the ECM to determine the degree of vertical movement of the car, for example, on a bumpy road. Since this may also cause uneven engine running, the ECM uses the signal to distinguish the phenomenon from actual misfiring.

DTC Description

If the ECM detects that engine speed variation indicates a misfire sufficient to cause three-way catalyst converter damage or emissions level to exceed standard value, the ECM sets DTC P0304. If the misfire rate is high enough to damage the catalyst, the MIL will flash to alert the vehicle operator.

DTC Detecting Condition

<table>
<tr><th colspan="2">Item</th><th>Detecting Condition</th><th>Possible Cause</th></tr>
<tr><td colspan="2">DTC Strategy</td><td>• Calculation of engine roughness</td><td rowspan="8">• Faulty spark plugs or Ignition coil
• Incorrect valve timing
• Uneven compression
• Air leakage
• Improper Fuel pressure or dirty fuel.
• Blocked/Leaking injectors
• Leakage between cooling system and cylinder</td></tr>
<tr><td colspan="2">Enable Conditions</td><td>• Engine load ratio :14~64%
• 500< Engine speed(rpm) <6700
• Mass air flow gradient/sec. :12~60%
• Throttle gradient/sec. :0.5~10.5%
• Coolant temperature >20°C(68°F) if start temp. <-7°C(19°F)
• No relevant failure
• Fuel cut-off not active
• 11V< Battery voltage <16V</td></tr>
<tr><td rowspan="2">Threshold Value</td><td>Case1</td><td>• Misfire ratio :9.1 % - 50 % within 200 rev.</td></tr>
<tr><td>Case2</td><td>• Misfire ratio :2.3% within 1,000 rev.</td></tr>
<tr><td rowspan="2">Diagnosis Time</td><td>Case1</td><td>• 200 rev. or 3*200 rev.</td></tr>
<tr><td>Case2</td><td>• 1000 rev. or 4*1000 rev.</td></tr>
<tr><td rowspan="2">MIL On Condition</td><td>Case1</td><td>• Immediate</td></tr>
<tr><td>Case2</td><td>• 2 Driving Cycles</td></tr>
</table>

Specification

Temp.(°C)	Temp.(°F)	Primary ignition coil (Ω)	Secondary ignition coil(kΩ)
20	68	0.56~0.68	6~8

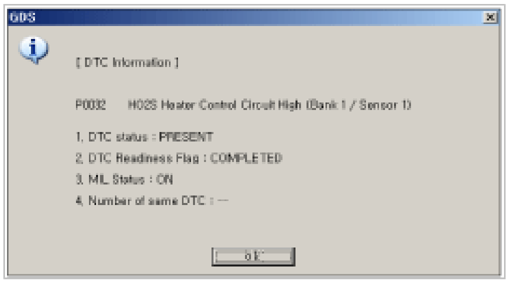
Monitor DTC Status

NOTE

If any DTCs related to injectors, HO2S, ECT(Engine Coolant Temperature)Sensor, Throttle Position sensor or Mass Air Flow Sensor are stored, do ALL REPAIRS associated with those codes before proceeding with this troubleshooting procedure.
If the misfire rate is high enough to cause possible catalyst damage(if the MIL was blinking), ensure that the monitoring for DTC P0420 is completed and passed after verifying the misfire repair.

1. Connect GDS and select "DTC Analysis" mode

2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

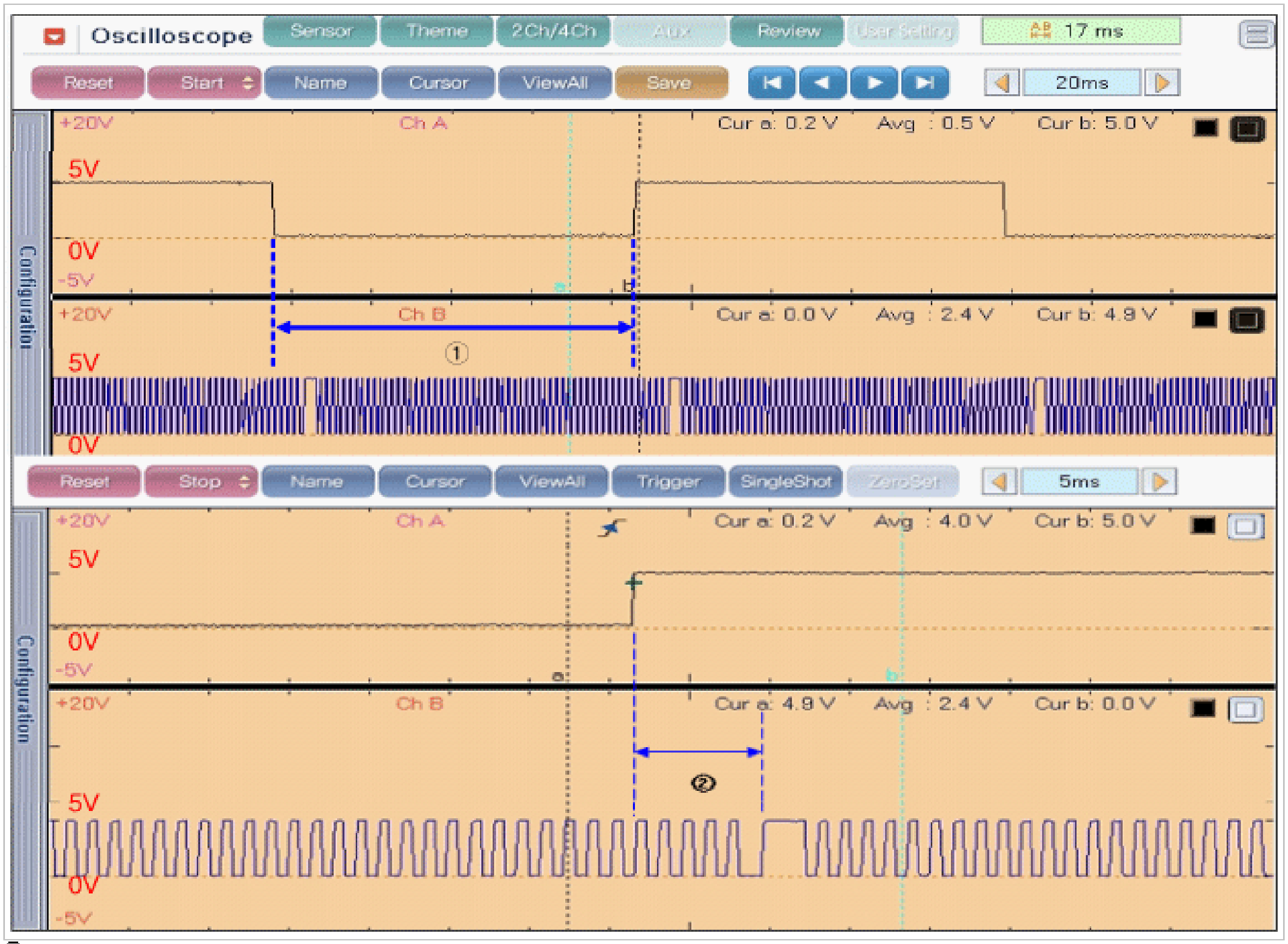
Visual Inspection

1. Visually/physically inspect for the following conditions
   - Vacuum hoses in engine room for splits, kinks and improper installation
   - Positive crankcase ventilation valve for improper installation, damaged o-rings and malfunctioning .
   - Verify that the ECM ground connections are clean and properly tightened.
2. Check MAFS and ECTS for the following conditions:
   - Contamination, deterioration, poor connection or damaged harness
   - The MAF signal displayed on the GDS should increase as engine speed increases
   - The engine coolant temperature displayed on the scantool should close to the actual coolant temperature.
3. Was a problem found in any of the above areas?

YES	▶ Replace or repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Go to next step as below

Timing Inspection

1. Set up an oscilloscope as follows :
   Channel A (+): Signal terminal of the CMPS #1(back probe), (-): ground
   Channel B (+): Signal terminal of the CKPS(back probe), (-): ground
2. Start the engine and check for signal waveform compared with reference waveform as below.



① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS #1.
② There are 3~5 signals of CKPS between the switching point of CMPS #1 and the missing tooth of CKPS.

3. Is the signal waveform normal?

YES	▸ Go to next step as below
NO	▸ Repair or readjust as necessary, if air gap of the CKPS is exceeds specification[0.3~1.7 mm (0.012~0.067 in)]. If OK, check that the crankshaft and camshaft are correctly aligned the matching marks of the pulleys. Repair or readjust as necessary and go to "Verification of Vehicle Repair" procedure

Ignition System Inspection

1. Spark Plug Cable & Ignition Coil Inspection
   (1) Visually/physically inspect the spark plug cable and ignition coil related to the misfiring cylinder(s) for the following conditions
   - Damage, cracks, carbon and flashover
   - Poor connection or damaged harness
   - Connected to the incorrect cylinders at the ignition coil and spark plug

   (2) Measure the resistance of the spark plug cable related to the misfiring cylinder(s)

   Specification : 5.6kΩ/m ±20%

   (3) Measure the resistance of the primary and secondary ignition coil related to the misfiring cylinder(s)

   Specification : Primary Ignition Coil Resistance : 0.56~0.68Ω at 20°C(68°F)
   Secondary Ignition Coil Resistance : 6~8kΩ at 20°C(68°F)

(4) Was a problem found in any of the above areas?

YES	▸ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

2. Spark Plug Inspection
   (1) Visually/physically inspect the spark plug related to the misfiring cylinder(s) for the following conditions
   - Damaged insulation, Worn electrodes, Oil or fuel fouled, Loose terminals and cracks
   - Check for electrode 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.

   (2) Was a problem found in any of the above areas?

YES	▸ Replace or adjust as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

Fuel System Inspection

1. Fuel Line Pressure Inspection
   (1) Check the fuel for excessive water, alcohol, or other contaminants. Replace contaminated fuel as necessary.

   (2) Install a fuel pressure gage

   (3) Inspect fuel pressure with normal idle status

Specification : 338~348kPa(3.45~3.55kg/cm²)

(4) Is fuel pressure within the specified value?

YES	▸ Go to next step as below
NO	▸ Inspect the suspected area. Refer to table as below. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

Condition	Possible 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	Fuel Pump(Fuel Pressure Regulator)
Fuel Pressure too High	Sticking fuel pressure regulator	Fuel Pump(Fuel Pressure Regulator)

2. Fuel Pressure Hold Inspection
   (1) Stop the engine and check for a change in the fuel pressure gauge reading.

Specification : After engine stops, the gauge reading should hold for minimum 5 minutes

(2) Is fuel pressure within the specified value?

YES	▸ Go to next step as below
NO	▸ Inspect the suspected area. Refer to table as below. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

Condition	Possible Cause	Suspected Area
Fuel pressure drops slowly	Injector leak	Injector
Fuel pressure drops immediately	tuck open in check valve of the fuel	Fuel pump

	pump	

Engine Compression Test

1. Warm up the engine to normal operating temperature. Verify the battery must be at or near full charge.
2. With ignition "OFF", disconnect the ignition coil connectors and the spark plug cables
3. Install compression pressure gauge to the spark plug hole.
4. With wide open throttle by hand, cranking the engine and record the compression readings from all of the cylinders

Specification :
Compression pressure : 1,283kPa (13.0kgf/cm², 185psi)
Minimum pressure : 1,135kPa (11.5kgf/cm², 164psi)
Difference between each cylinder : 100kPa (1.0kgf/cm², 15psi) or less

5. Is compression pressure within the specified value?

YES	▸ Verify if the engine has excessive coolant consumption. If yes, check for damaged inlet water passage, engine block, cylinder head or head gasket. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ If the cylinder compression in 1 or more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat compression test for cylinders with low compression pressure. - If adding oil helps the compression, it is likely that the piston rings and/or cylinder bore are worn or damaged. - If pressure stays low, a valve may be sticking or seating is improper, or there may be leakage past the gasket. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

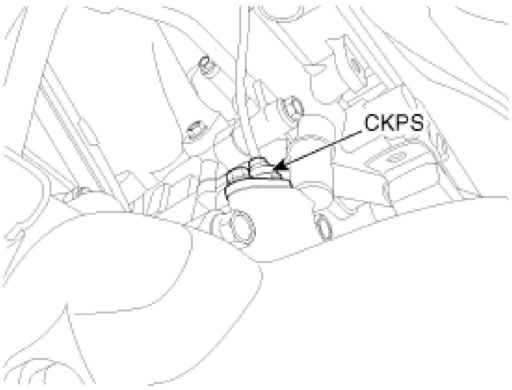
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0315 Crankshaft Position System Not Learned

Component Location



General Description

The Crankshaft Position Sensor (CKPS) is a hall effect 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 ECM 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 ECM identifies which cylinder is at top dead center.

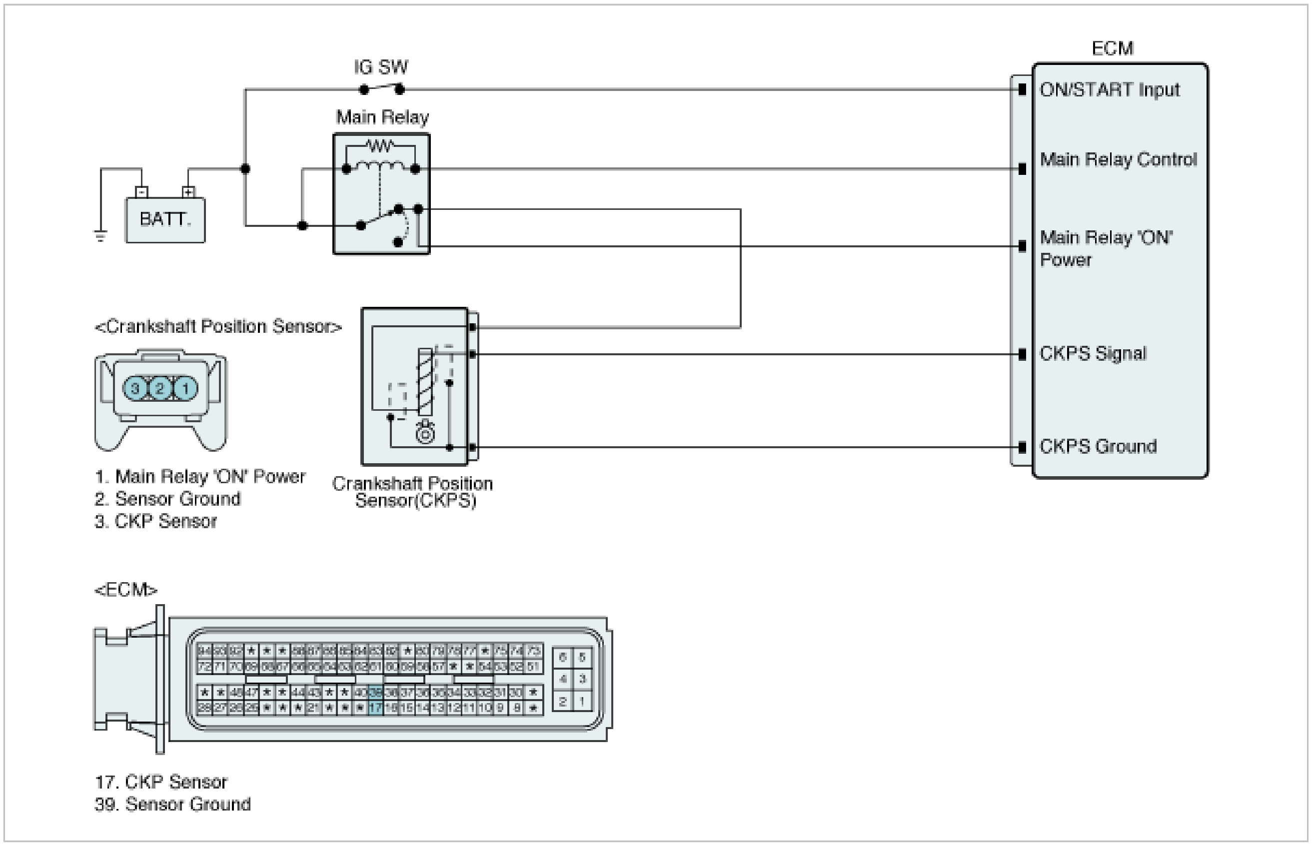
DTC Description

The ECM sets DTC P0315 when the number of crankshaft teeth during one revolution is incorrect or crankshaft signal is missing while camshaft signal is detected.

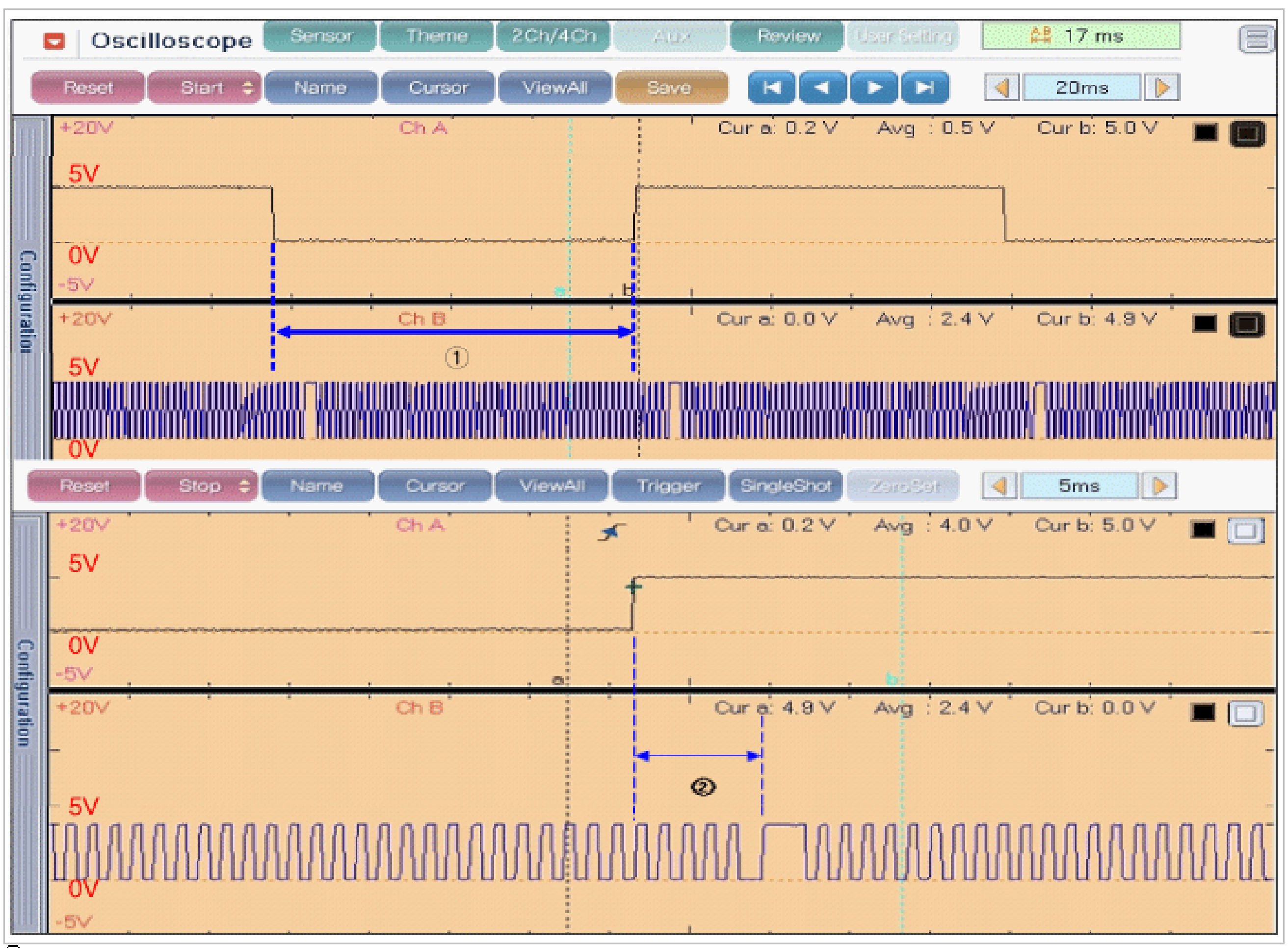
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Monitor segment time adaptation	• Misadjust crankshaft and camshaft pulley position • Poor connection or damaged harness
Enable Conditions	• Engine speed(rpm) : 1500~3500(A/T), 2500~3500(M/T) • No crankshaft position sensor error	
Threshold Value	• Segment adaptation value exceeds threshold value	
Diagnostic Time	• 3 rev.	
Mil On Condition	• -	

Diagnostic Circuit Diagram



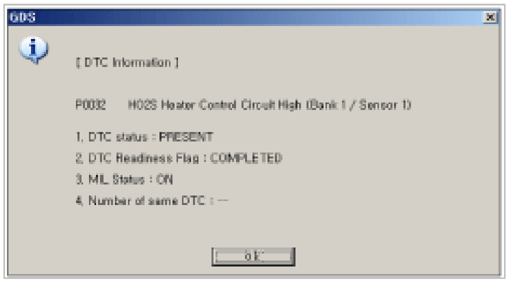
Signal Waveform & Data



① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS #1.
② There are 3~5 signals of CKPS between the switching point of CMPS #1 and the missing tooth of CKPS.

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

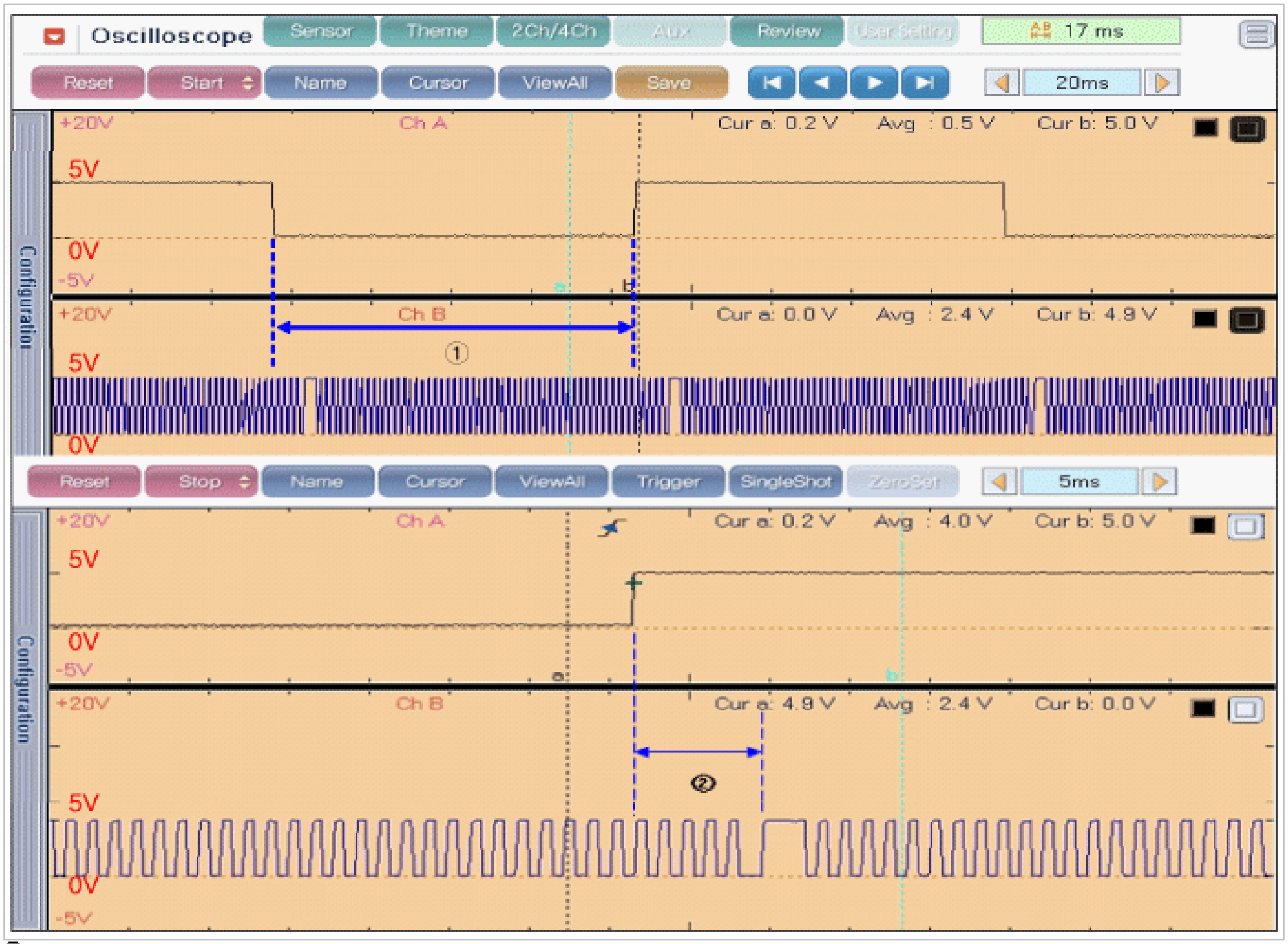
NOTE

- History (Not Present) 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 next step as below

Component Inspection

1. Set up an oscilloscope as follows :
   Channel A (+): Signal terminal of the CMPS #1(back probe), (-): ground
   Channel B (+): Signal terminal of the CKPS(back probe), (-): ground
2. Start the engine and check for signal waveform compared with reference waveform as below.



① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS #1.
② There are 3~5 signals of CKPS between the switching point of CMPS #1 and the missing tooth of CKPS.

3. Is the signal waveform normal?

YES	▸ Go to next step as below
NO	▸ Remove CKP and calculate air gap between sensor and flywheel/torque converter. Readjust as necessary and go to "Verification of Vehicle Repair" procedure. NOTE Air gap [0.3~1.7 mm [0.012~0.067 in] = measure distance from housing to teeth on flywheel/torque converter (measurement "A") and from mounting surface on sensor to sensor tip (measurement "B") subtract "B" from "A" - If fail to synchronize with CMP sensor, check that the crankshaft and camshaft are correctly aligned the matching marks of the pulleys. Repair or readjust as necessary and go to "Verification of Vehicle Repair" procedure - Check CKPS for contamination, deterioration, or damage. Substitute with a known-good CKPS and check for proper operation. If the problem is corrected, replace CKPS and then go to "Verification of Vehicle Repair" procedure

Terminal and Connector Inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

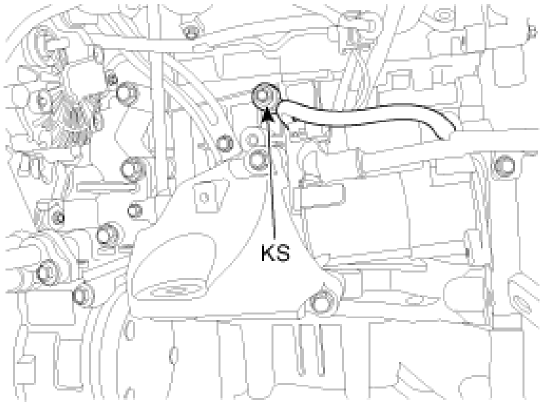
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The knock sensor is attached to the cylinder block and senses engine knocking. The sensor contains a piezoelectric element that converts vibration (or noise) into voltage signal and sends this signal to ECM. With input signals from camshaft position and crankshaft position sensor, ECM can identify which cylinder is knocking. ECM filters vibrations and determines if the vibrations are knocking signal. The Engine Control Module (ECM) uses this signal to suppress knocking by retarding ignition timing. The ECM will set a code (Malfunction Indicator Lamp will Not turn on) if during two driving cycles the Knock sensor's output voltage falls below minimum threshold. This code indicates an unexpected vibration is being read by the Knock sensor or ECM under normal engine operation.

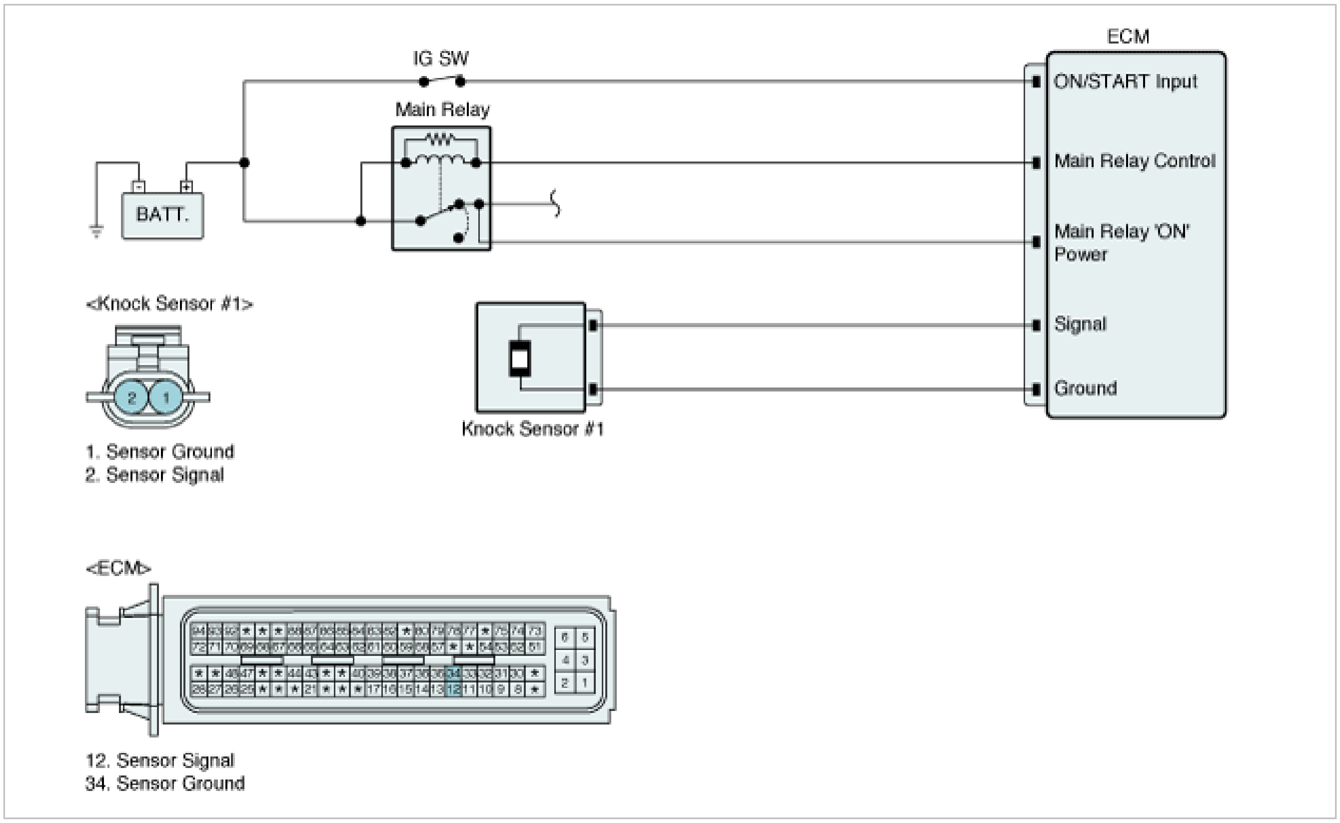
DTC Description

The ECM monitors the range of the analog input signal from knock sensor to check sensor failure that is short circuit or open circuit. If the difference between knock signal and noise level is smaller than the threshold during defined time period, the DTC P0326 is set. In case the noise level is higher than the upper threshold or lower than the lower threshold, the DTC P0326 is set too.

DTC Detecting Condition

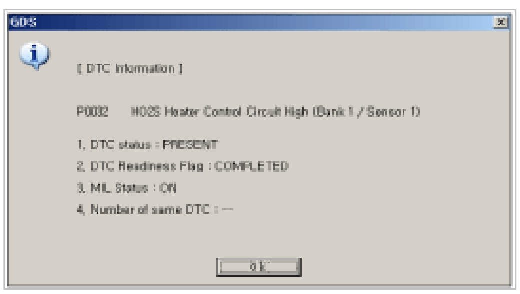
Item	Detecting Condition	Possible Cause
DTC Strategy	• Plausibility check	• Open/short in signal or ground circuit • Poor connection or damaged harness • Faulty knock sensor
Enable Conditions	• Knock detection function active • Engine rpm >2700 rpm • Air mass >0.5g/rev(250mg/tdc.) • No relevant failure	
Threshold Value	• Difference between the processed knock sensor signal and its mean does not exceed a threshold(0.08V) & the integral of the processed knock sensor signal does not reach the threshold(3V) for cylinders 2 and 3 • If the mean processed knock sensor signal of any one cylinder leaves the valid range(0.1V~4.5V).	
Diagnostic Time	• 100 rev.	
Mil On Condition	• -	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Ground circuit inspection

1. Ignition "OFF"
2. Disconnect Knock sensor and ECM connectors
3. Measure resistance between ground terminal of the sensor harness connector and Knock signal of the ECM harness connector.

Specification : Approx. 0Ω

4. Is resistance within the specification?

YES	▸ Go to "Signal Circuit Inspection" procedure.
NO	▸ Check for an open in ground circuit. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Signal Circuit Inspection

1. Check for short to ground in signal circuit
   (1) Measure resistance between signal terminal of the sensor harness connector and chassis ground.

   Specification : Infinite

   (2) Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Check signal circuit for short to ground. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

2. Check for short to power in signal circuit
   (1) Disconnect ECM connector
   (2) Ignition "ON" & Engine "OFF"
   (3) Measure voltage between signal terminal of sensor harness connector and chassis ground.

   Specification : Approx. 0V

   (4) Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

3. Check for open in signal harness
   (1) Ignition "OFF"
   (2) Measure resistance between signal terminal of sensor harness connector and Knock signal terminal of the ECM harness connector.

   Specification : Approx. 0Ω

   (3) Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Terminal and Connector Inspection

1. 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.
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 next step as below

Component Inspection

1. Component resistance inspection
   (1) Measure resistance between signal terminal and ground terminal of the sensor connector(Component side).

   Specification : Approx. 5MΩ at 20°C(68°F)

2. Output signal inspection
   (1) Remove knock sensor from vehicle and secure (across mounting boss) in a shop vise.
   (2) Set up an oscilloscope as follows :
   Channel A (+): Signal terminal, (-): Ground terminal
   (3) Rap on vise with a ball peen hammer while monitoring oscilloscope screen (there should be a spike of less than 1 volt with each hammer strike).

   Specification : knock sensor send a voltage spike with hammer strikes

3. Installation torque inspection
   (1) Check the installation torque of the knock sensor.

   Specification : Approx. 16 ~ 28N·m(160~250 kg·cm,11.8~18.4 lb·ft)

4. Has a problem been found?

YES	▸ Check knock sensor for contamination, deterioration, or damage. Substitute with a known-good sensor and check for proper operation. If the problem is corrected, replace sensor and then go to "Verification of Vehicle Repair" procedure
NO	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

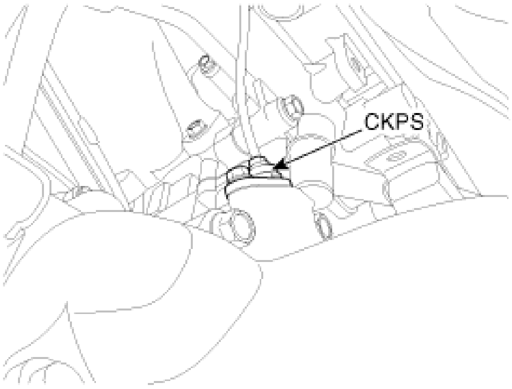
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Crankshaft Position Sensor (CKPS) is a hall effect 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 ECM 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 ECM identifies which cylinder is at top dead center.

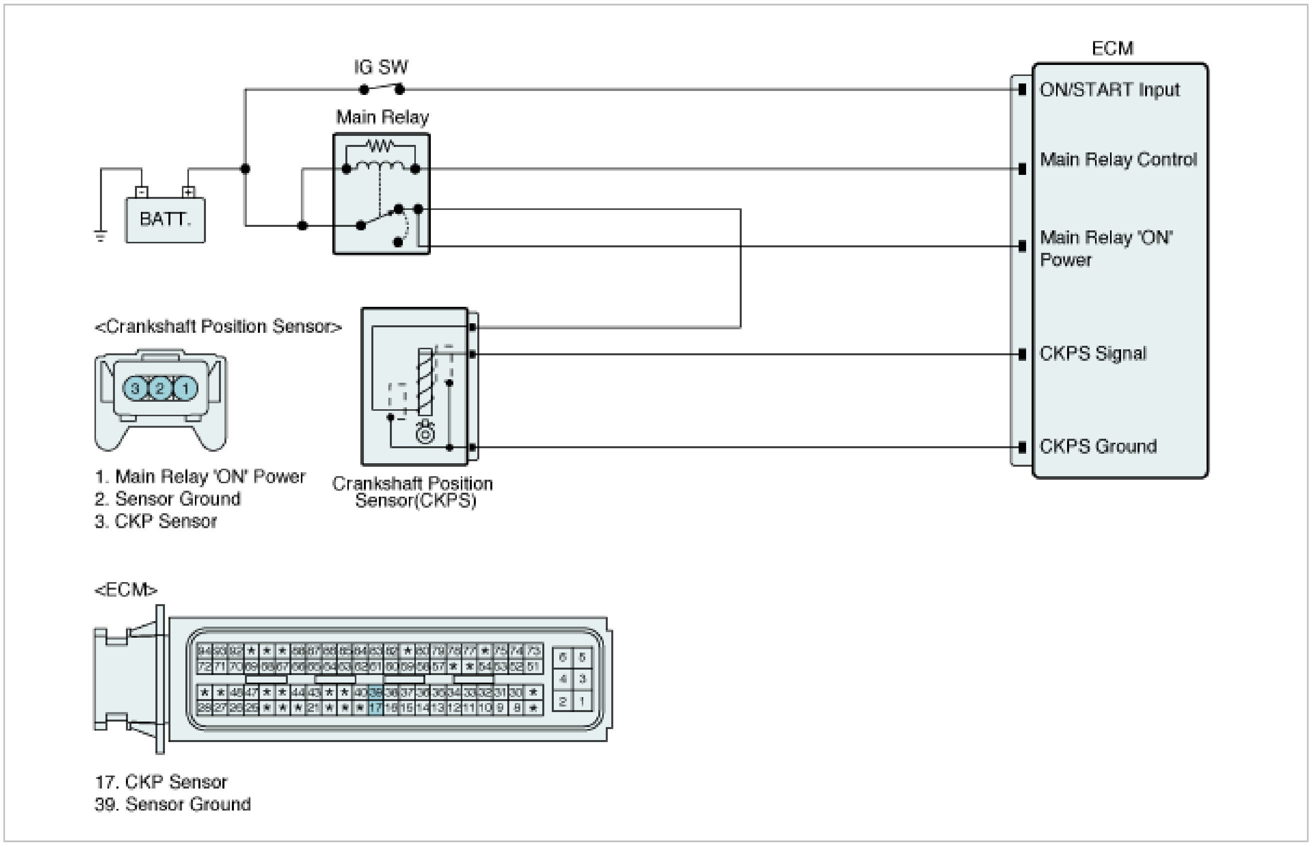
DTC Description

The ECM sets DTC P0335 when the number of crankshaft teeth during one revolution is incorrect or crankshaft signal is missing while camshaft signal is detected.

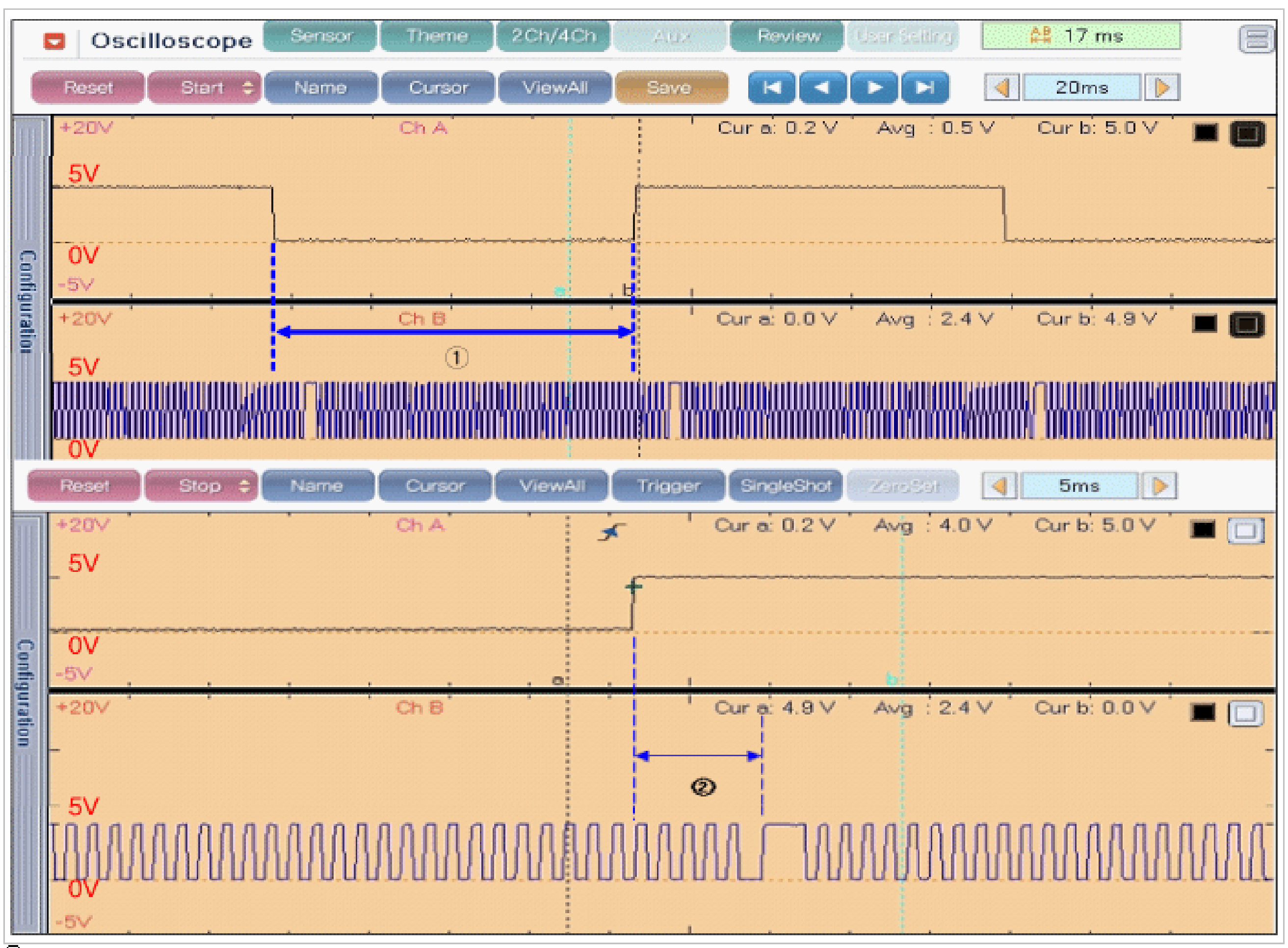
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Signal plausibility check	• Open or short in signal, ground or power supply circuit • Poor connection or damaged harness • Damage to the connecting flange/flywheel • Misadjust crankshaft and camshaft pulley position • Faulty CKP sensor
Enable Conditions	• Camshaft signal valid	
Threshold Value	• No crankshaft teeth detected after 3 camshaft edge transitions.	
Diagnostic Time	• 3 rev.	
MIL On Condition	• 2 Driving Cycles	

Diagnostic Circuit Diagram



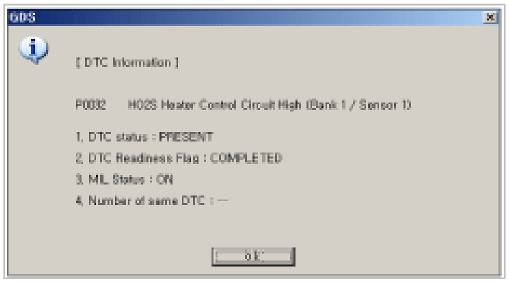
Signal Waveform



① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS #1.
② There are 3~5 signals of CKPS between the switching point of CMPS #1 and the missing tooth of CKPS.

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Power Circuit Inspection

1. Ignition "OFF"
2. Disconnect CKP sensor connector
3. Ignition "ON" & Engine "OFF"
4. Measure voltage between power terminal of CKPS harness connector and chassis ground.

Specification : Approx. B+

5. Is voltage within the specification?

YES	▸ Go to "Ground Circuit Inspection" procedure
NO	▸ Check for a open in the power supply circuit between the main relay and the CKPS. ▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Ground Circuit Inspection

1. Ignition "OFF"
2. Measure resistance between ground terminal of CKPS harness connector and chassis ground

Specification : Approx. 0Ω

3. Is resistance within the specification?

YES	▸ Go to "Signal Circuit Inspection" procedure
NO	▸ Check for an open or short to battery in the ground circuit.

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

Signal Circuit Inspection

1. Check for open or short to ground in signal circuit
   (1) Ignition "ON" & Engine "OFF"
   (2) Measure voltage between signal terminal of CKPS harness connector and chassis ground

   Specification : Approx. 5V

   (3) Is voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

2. Check for short to power in signal circuit
   (1) Ignition "OFF"
   (2) Disconnect ECM connector
   (3) Ignition "ON" & Engine "OFF"
   (4) Measure voltage between signal terminal of CKPS harness connector and chassis ground.

   Specification : Approx. 0V

   (5) Is voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

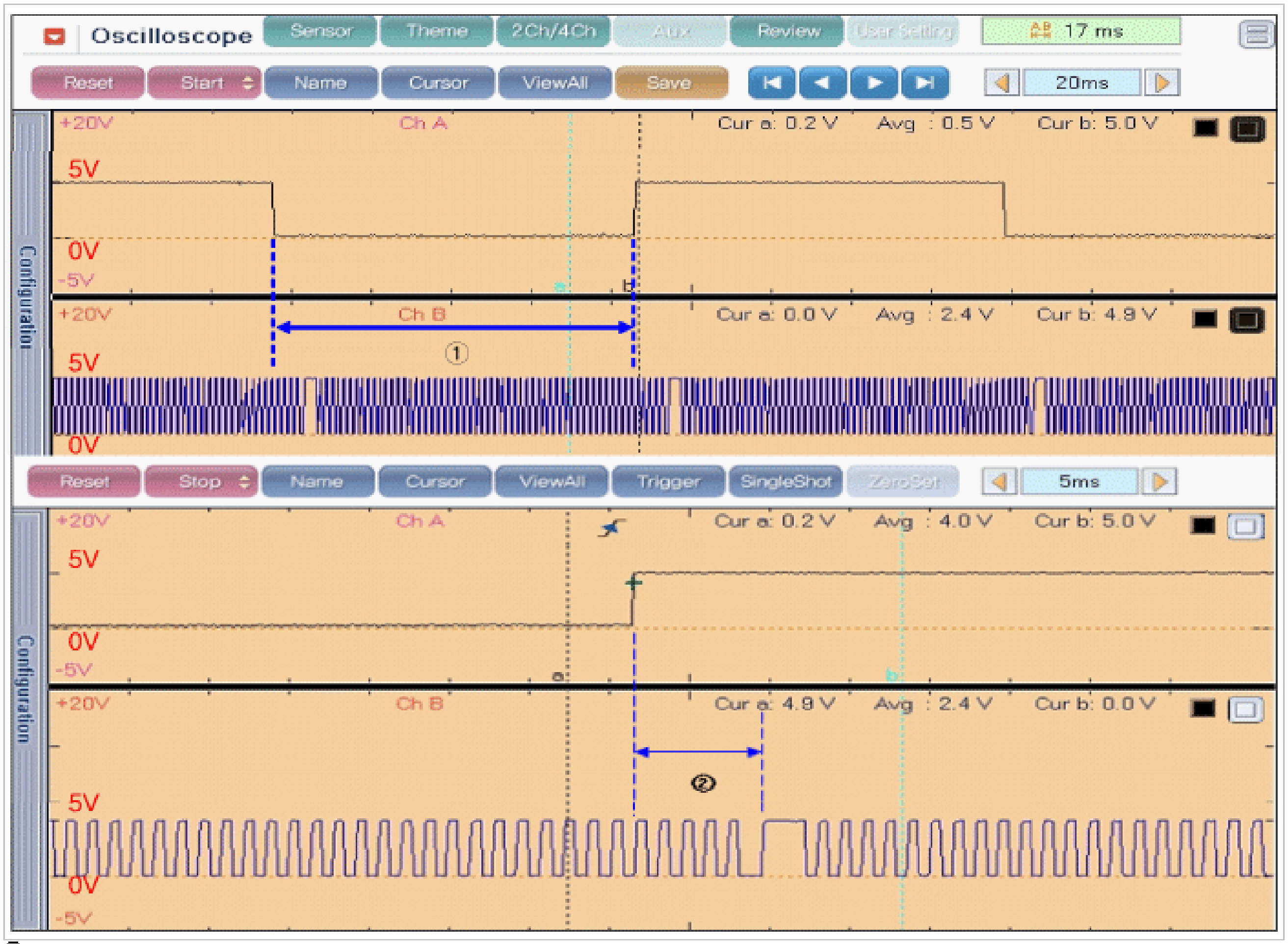
Terminal and connection inspection

1. 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.
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 next step as below

Component Inspection

1. Set up an oscilloscope as follows :
   (1) Channel A (+): Signal terminal of the CMPS #1(back probe), (-): ground
   (2) Channel B (+): Signal terminal of the CKPS(back probe), (-): ground
2. Start the engine and check for signal waveform compared with reference waveform as below.



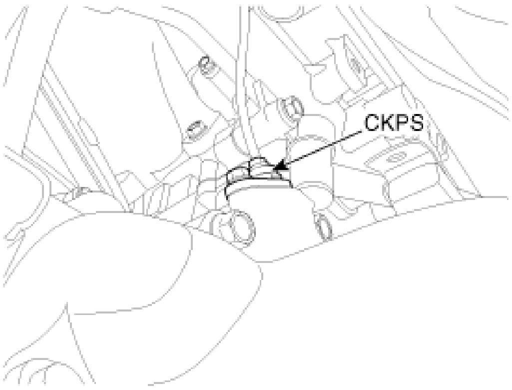
① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS #1.
② There are 3~5 signals of CKPS between the switching point of CMPS #1 and the missing tooth of CKPS.

3. Is the signal waveform normal?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ Remove CKP and calculate air gap between sensor and flywheel/torque converter. Readjust as necessary and go to "Verification of Vehicle Repair" procedure **NOTE** Air gap [0.3~1.7 mm [0.012~0.067 in] = measure distance from housing to teeth on flywheel/torque converter (measurement "A") and from mounting surface on sensor to sensor tip (measurement "B") subtract "B" from "A" - If air gap is OK, check CKPS for contamination, deterioration, or damage. Substitute with a known-good CKPS and check for proper operation. If the problem is corrected, replace CKPS and then go to "Verification of Vehicle Repair" procedure

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0336 Crankshaft Position Sensor \'A\' Circuit Range/Performance

Component Location



General Description

The Crankshaft Position Sensor (CKPS) is a hall effect 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 ECM 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 ECM identifies which cylinder is at top dead center.

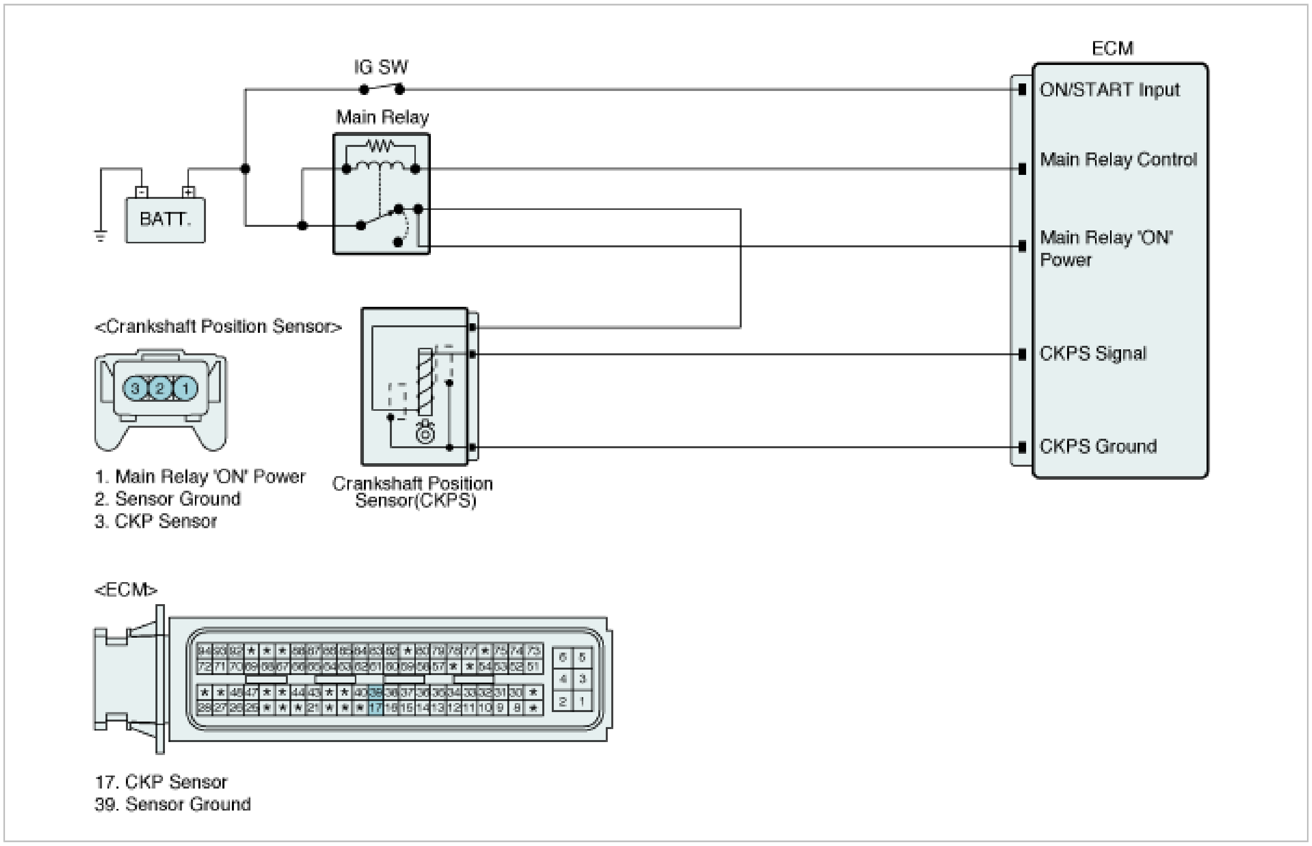
DTC Description

The ECM sets DTC P0336 when the crankshaft signal is missing while camshaft signal is detected.

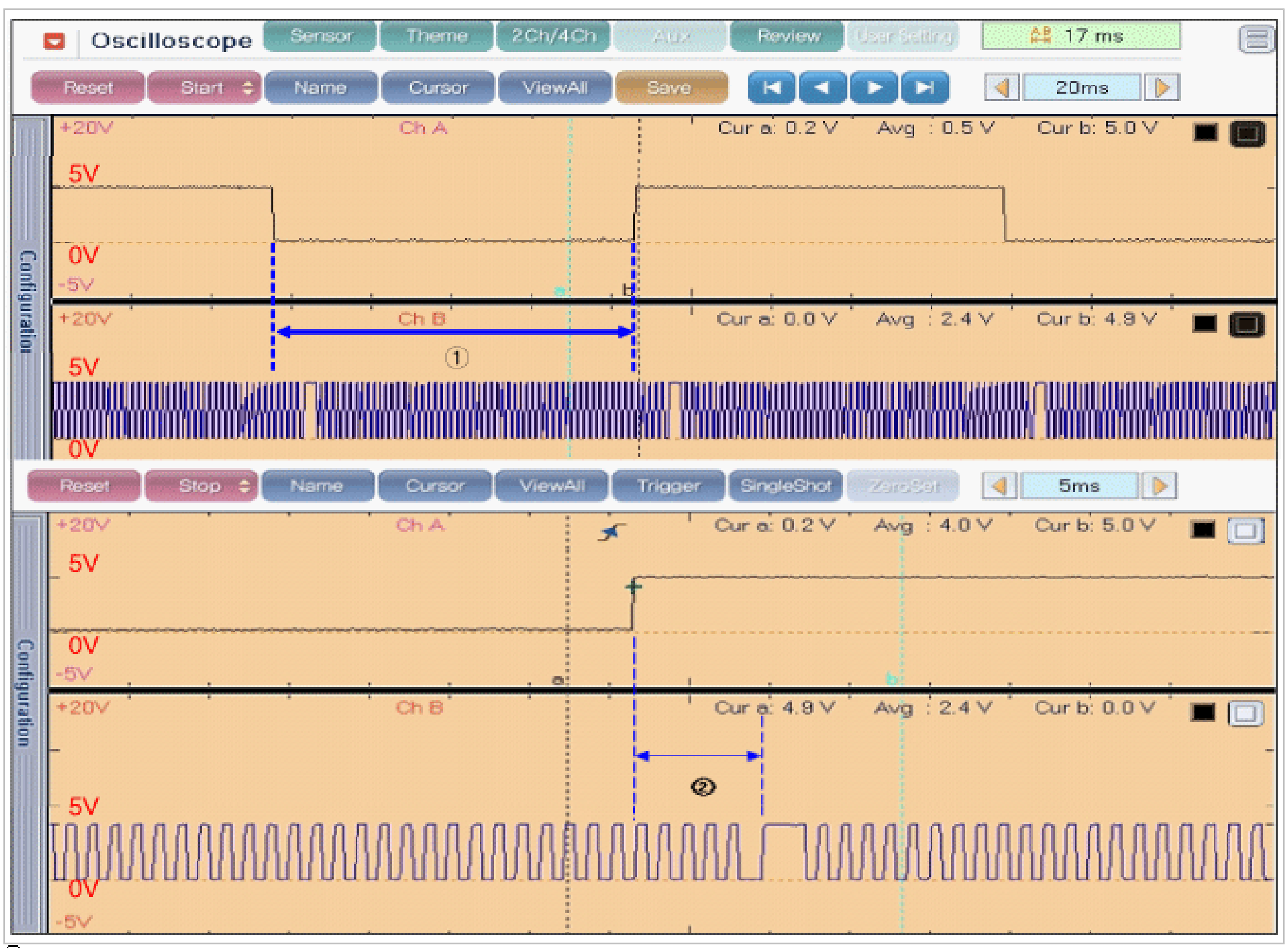
DTC Detecting Condition

Item		Detecting Condition	Possible Cause
DTC Strategy		• Signal plausibility check	• Open or short in signal, ground or power supply circuit • Poor connection or damaged harness • Damage to the connecting flange/flywheel • Misadjust crankshaft and camshaft pulley position • Faulty CKP sensor
Enable Conditions		• Engine synchronized • Engine speed > 512rpm	
Threshold Value	Case 1)	• Tooth number check(Number of missing/additional teeth > 1)	
	Case 2)	• Tooth number check(Number of missing/additional teeth > 2)	
Diagnostic Time	Case 1)	• 5 rev.	
	Case 2)	• 3 rev.	
MIL On Condition		• 2 Driving Cycles	

Diagnostic Circuit Diagram



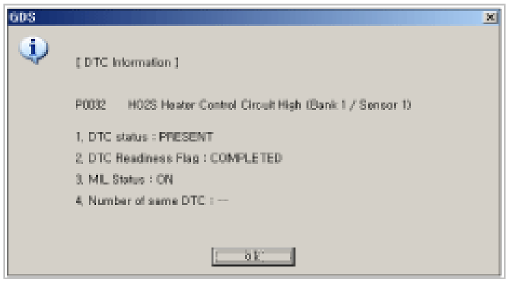
Signal Waveform



① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS #1.
② There are 3~5 signals of CKPS between the switching point of CMPS #1 and the missing tooth of CKPS.

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

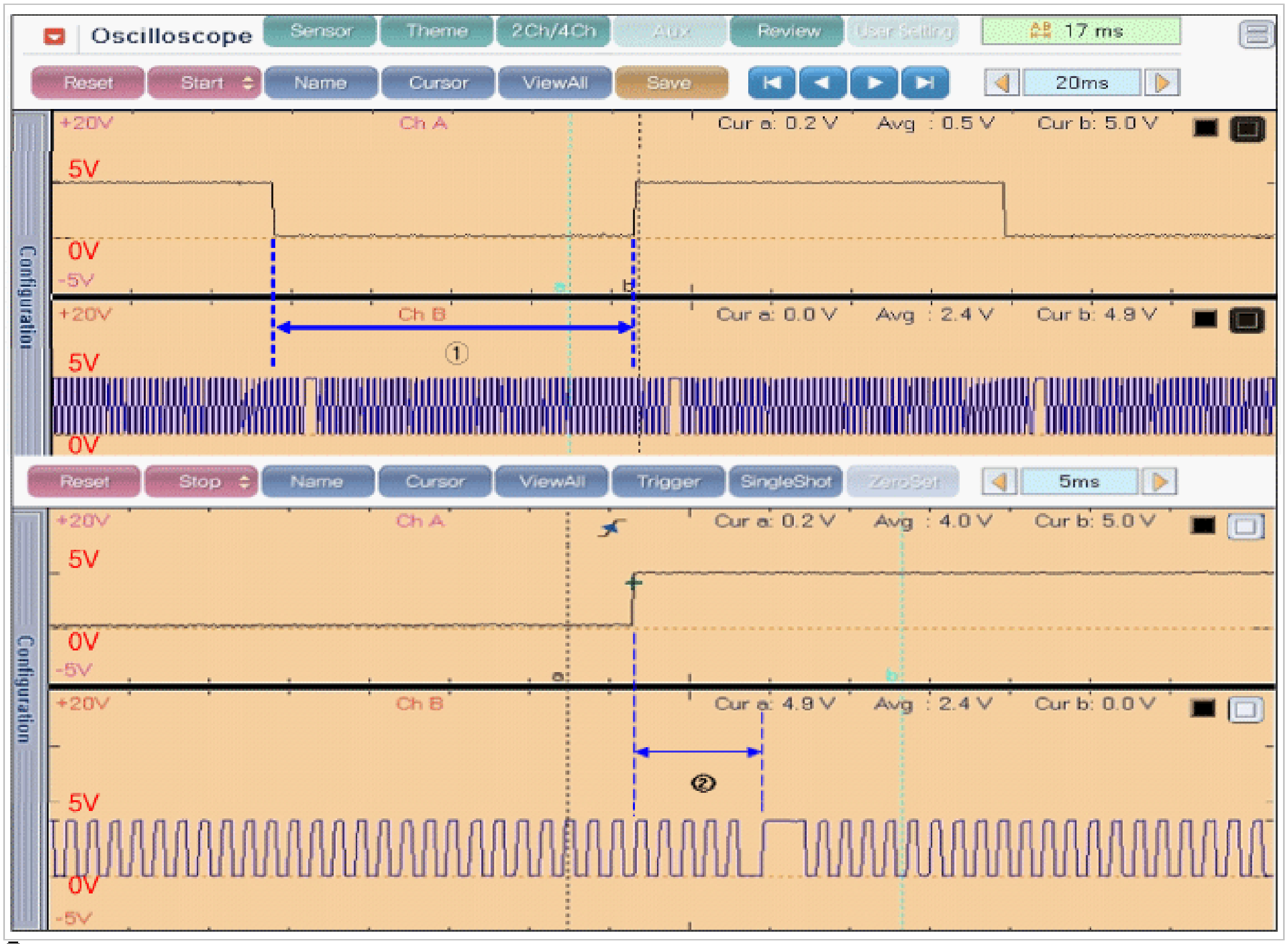
Terminal and connection inspection

1. 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.
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 next step as below

Component Inspection

1. Set up an oscilloscope as follows :
   (1) Channel A (+): Signal terminal of the CMPS #1(back probe), (-): ground
   (2) Channel B (+): Signal terminal of the CKPS(back probe), (-): ground
2. Start the engine and check for signal waveform compared with reference waveform as below.



① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS #1.
② There are 3~5 signals of CKPS between the switching point of CMPS #1 and the missing tooth of CKPS.

3. Is the signal waveform normal?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ - Remove CKP and calculate air gap between sensor and flywheel/torque converter. Readjust as necessary and go to "Verification of Vehicle Repair" procedure **NOTE** Air gap [0.3~1.7 mm [0.012~0.067 in] = measure distance from housing to teeth on flywheel/torque converter (measurement "A") and from mounting surface on sensor to sensor tip (measurement "B") subtract "B" from "A" - If air gap is OK, check CKPS for contamination, deterioration, or damage. Substitute with a known-good CKPS and check for proper operation. If the problem is corrected, replace CKPS and then go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

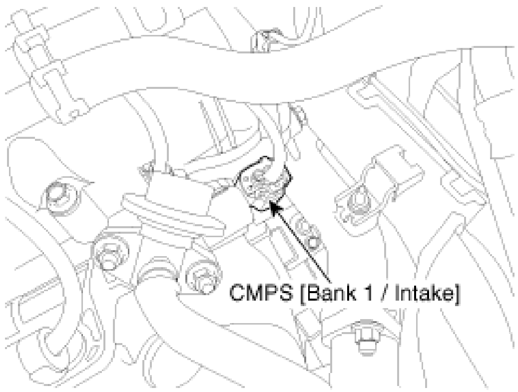
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0340 Camshaft Position Sensor \'A\' Circuit (Single Sensor)

Component Location



General Description

The Camshaft Position Sensor (CMPS) is a sensor that detects the compression TDC of the NO. 1 cylinder. The CMPS consists of a hall type sensor and a target on the end of the intake camshaft. When the target triggers the sensor, the sensor voltage is 5V. If not, the sensor voltage is 0V. These CMPS signal is sent to the ECM and the ECM uses the CMPS signal for synchronizing the firing of sequential fuel injectors.

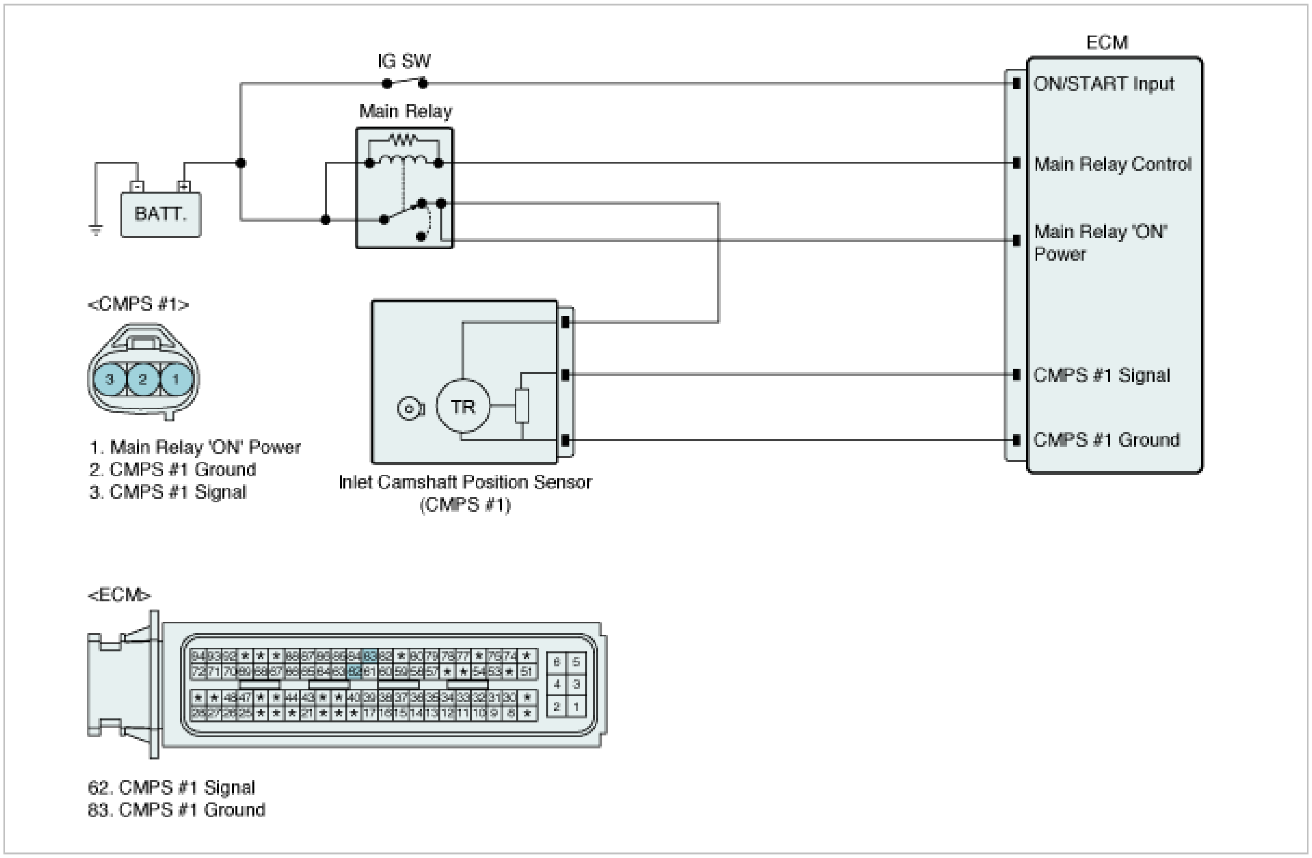
DTC Description

The ECM monitors the inlet camshaft sensor signal transition position which must change only once per crankshaft revolution. If no camshaft signal is detected while crankshaft signal is detected, the ECM sets DTC P0340.

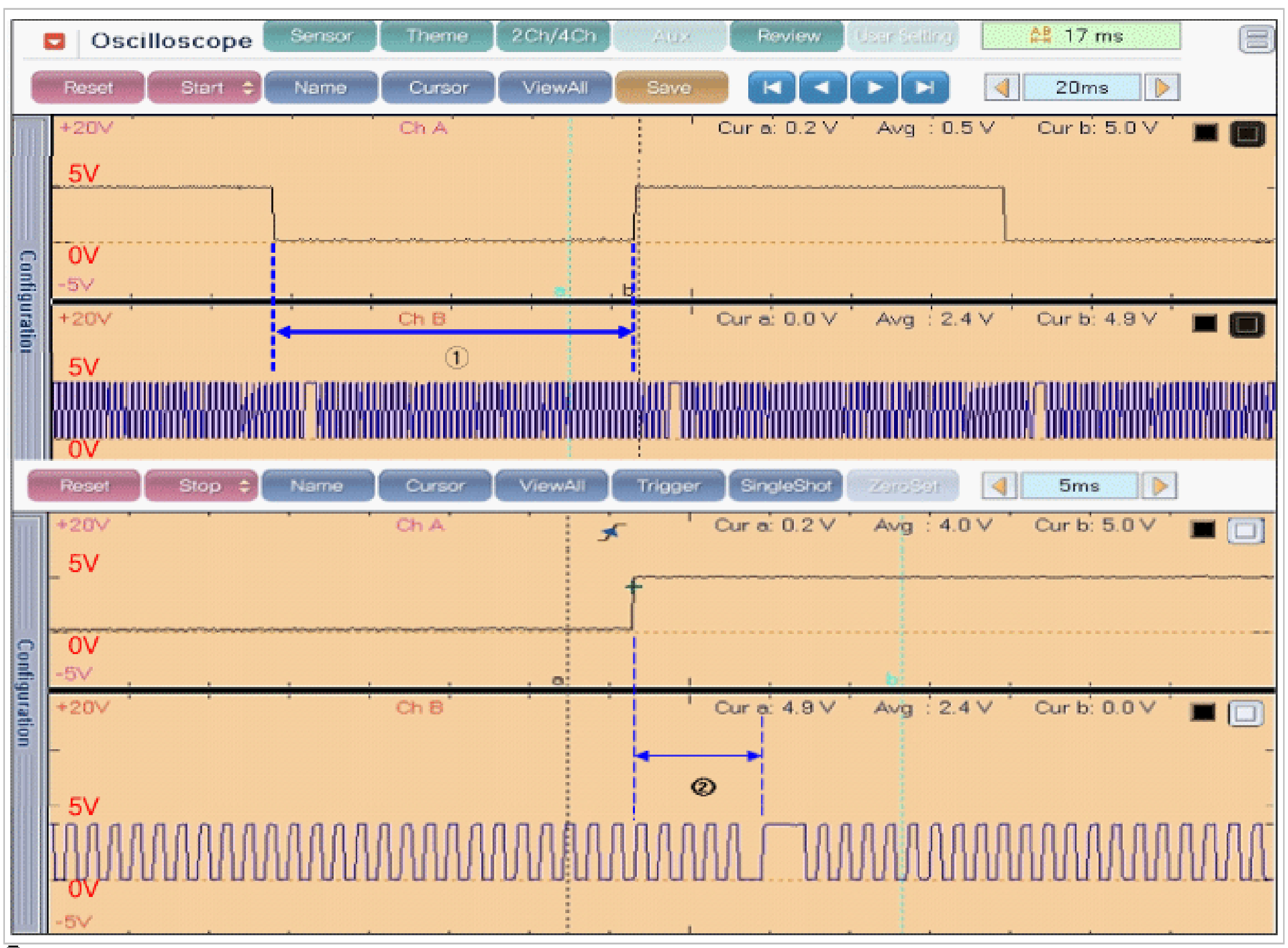
DTC Detecting Condition

Item		Detecting Condition	Possible Cause
DTC Strategy	Case1	• Missing signal check	• Open or short in signal, ground or power supply circuit • Poor connection or damaged harness • Misadjust crankshaft and camshaft pulley position • Faulty CMPS #1
	Case2	• Noisy signal check	
Enable Conditions		• Engine synchronized	
Threshold Value	Case1	• No camshaft edge detected within one revolution	
	Case2	• Camshaft segment duration < 7.3ms • Camshaft segment duration gradient not valid	
Diagnostic Time	Case1	• 8 rev.	
	Case2	• 5 rev.	
MIL On Condition		• 2 Driving Cycles	

Diagnostic Circuit Diagram



Signal Waveform

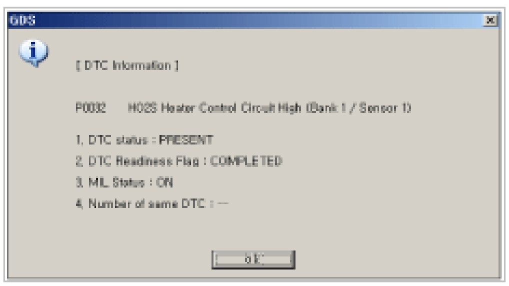


① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS #1.

② There are 3~5 signals of CKPS between the switching point of CMPS #1 and the missing tooth of CKPS.

Monitor DTC Status

1. Clear the DTC with GDS.
2. Operate the vehicle within the following conditions:
   - Engine run time at idle over 10 minutes
   - Engine Oil Temp. is between 20°C(68°F) and 110°C(230°F)
3. Ignition"ON" & Engine"OFF"
4. Using a GDS, monitor DTC
5. Go to applicable troubleshooting procedure for the following conditions
   - If any DTCs related to OCV(P0011) are stored, do ALL REPAIRS associated with those codes before proceeding with this troubleshooting procedure.
   - If DTC P0340 is set again, go to next step as below
   - If other DTCs are stored, go to the applicable troubleshooting procedure.
   - If no DTC output, go to "Verification of Vehicle Repair" procedure.
6. Click "DTC Status" on the menu bar to see DTC's information.
7. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions
8. Read "DTC Status" parameter



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Power Circuit Inspection

1. Ignition "OFF"
2. Disconnect CMPS #1 sensor connector
3. Ignition "ON" & Engine "OFF"
4. Measure voltage between power terminal of CMPS #1 harness connector and chassis ground.

Specification : Approx. B+

5. Is voltage within the specification?

YES	▸ Go to "Ground Circuit Inspection" procedure
NO	▸ Check for a open in the power supply circuit between the main relay and the CMPS Especially check for open or blown 10A sensor fuse

	Repair as necessary and go to "Verification of Vehicle Repair" procedure

Ground Circuit Inspection

1. Ignition "OFF"
2. Measure resistance between ground terminal of CMPS #1 harness connector and chassis ground.

Specification : Approx. 0Ω

3. Is resistance within the specification?

YES	▶ Go to "Signal Circuit Inspection" procedure
NO	▶ Check for an open or short to battery in the ground circuit. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Signal Circuit Inspection

1. Check for short to ground in signal harness
   (1) Measure resistance between signal terminal of CMPS #1 harness connector and chassis ground.

   Specification : Infinite

   (2) Is resistance within the specification?

YES	▶ Go to next step as below
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

2. Check for short to battery in signal harness
   (1) Disconnect ECM connector
   (2) Ignition "ON" & Engine "OFF"
   (3) Measure voltage between signal terminal of CMPS #1 harness connector and chassis ground

   Specification : Approx. 0V

   (4) Is voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

3. Check for open in signal harness
   (1) Ignition "OFF"
   (2) Measure resistance between signal terminal of CMPS #1 harness connector and CMPS #1 signal terminal of the ECM connector.

   Specification : Approx. 0Ω

   (3) Is resistance within the specification?

YES	▶ Go to next step as below
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

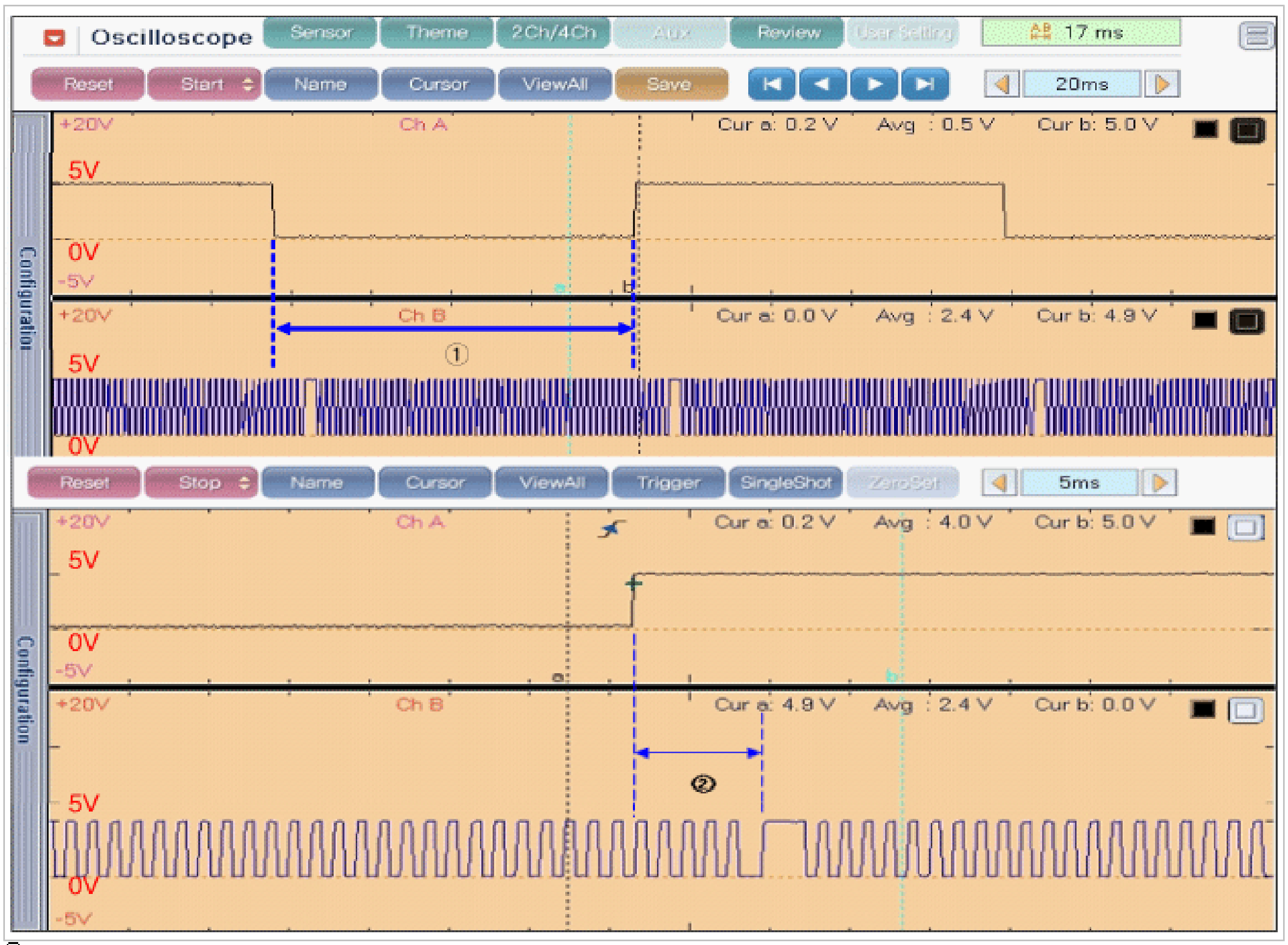
Terminal and connection inspection

1. 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.
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 next step as below

Component Inspection

1. Set up an oscilloscope as follows :
   (1) Channel A (+): Signal terminal of the CMPS #1(back probe), (-): ground
   (2) Channel B (+): Signal terminal of the CKPS(back probe), (-): ground
2. Start the engine and check for signal waveform compared with reference waveform as below.



① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS #1.
② There are 3~5 signals of CKPS between the switching point of CMPS #1 and the missing tooth of CKPS.

3. Is the signal waveform normal?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ - Remove CMPS and check for air gap. Readjust as necessary and go to "Verification of Vehicle Repair" procedure. - If fail to synchronize with CKP sensor, check that the crankshaft and camshaft are correctly aligned the matching marks of the pulleys. Repair or readjust as necessary and go to "Verification of Vehicle

	Repair" procedure. - Check CMPS for contamination, deterioration, or damage. 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.

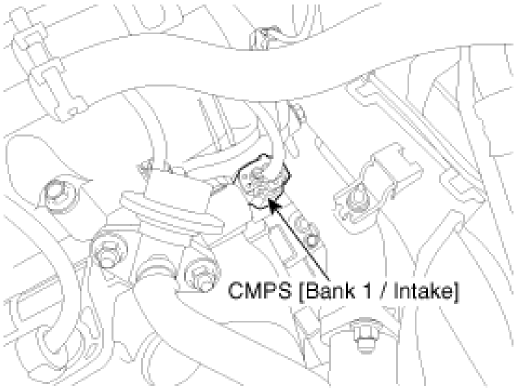
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Camshaft Position Sensor (CMPS) is a sensor that detects the compression TDC of the NO. 1 cylinder. The CMPS consists of a hall type sensor and a target on the end of the intake camshaft. When the target triggers the sensor, the sensor voltage is 5V. If not, the sensor voltage is 0V. These CMPS signal is sent to the ECM and the ECM uses the CMPS signal for synchronizing the firing of sequential fuel injectors.

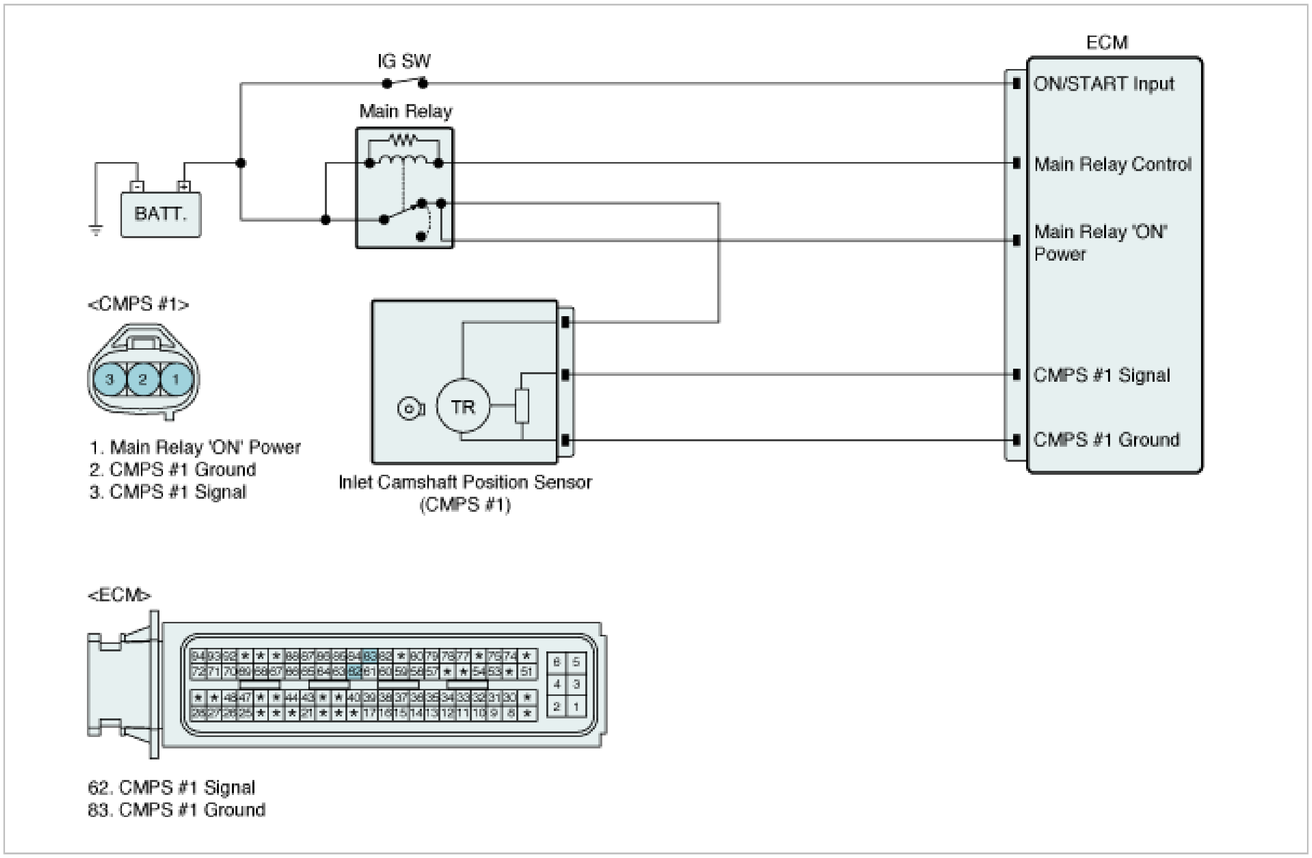
DTC Description

If the ECM receives an incorrect number of pulses on the inlet camshaft position sensor, DTC P0341 will set.

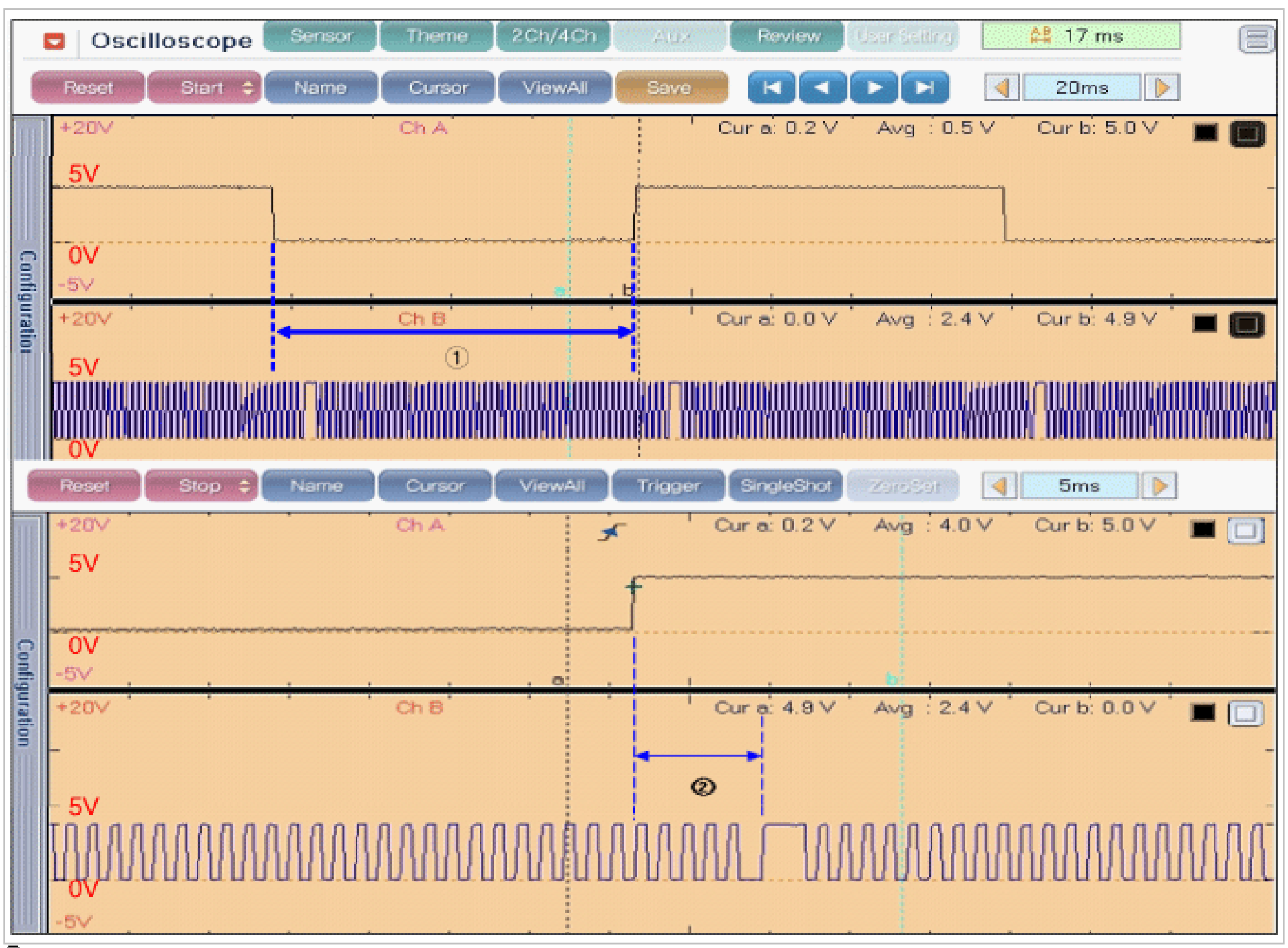
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Signal plausibility check	• Poor connection or damaged harness • Misadjust crankshaft and camshaft pulley position • Faulty CMPS #1
Enable Conditions	• Engine synchronized	
Threshold Value	• Camshaft edge out of normal range	
Diagnostic Time	• 8 sec.	
MIL On Condition	• 2 Driving Cycles	

Diagnostic Circuit Diagram



Signal Waveform & Data

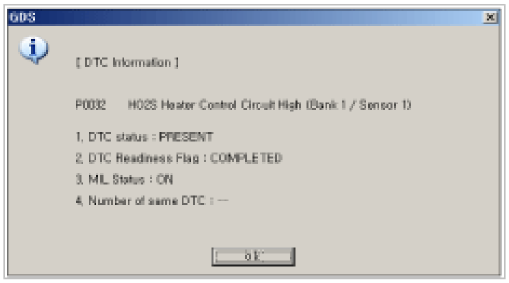


① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS #1.

② There are 3~5 signals of CKPS between the switching point of CMPS #1 and the missing tooth of CKPS.

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and connection inspection

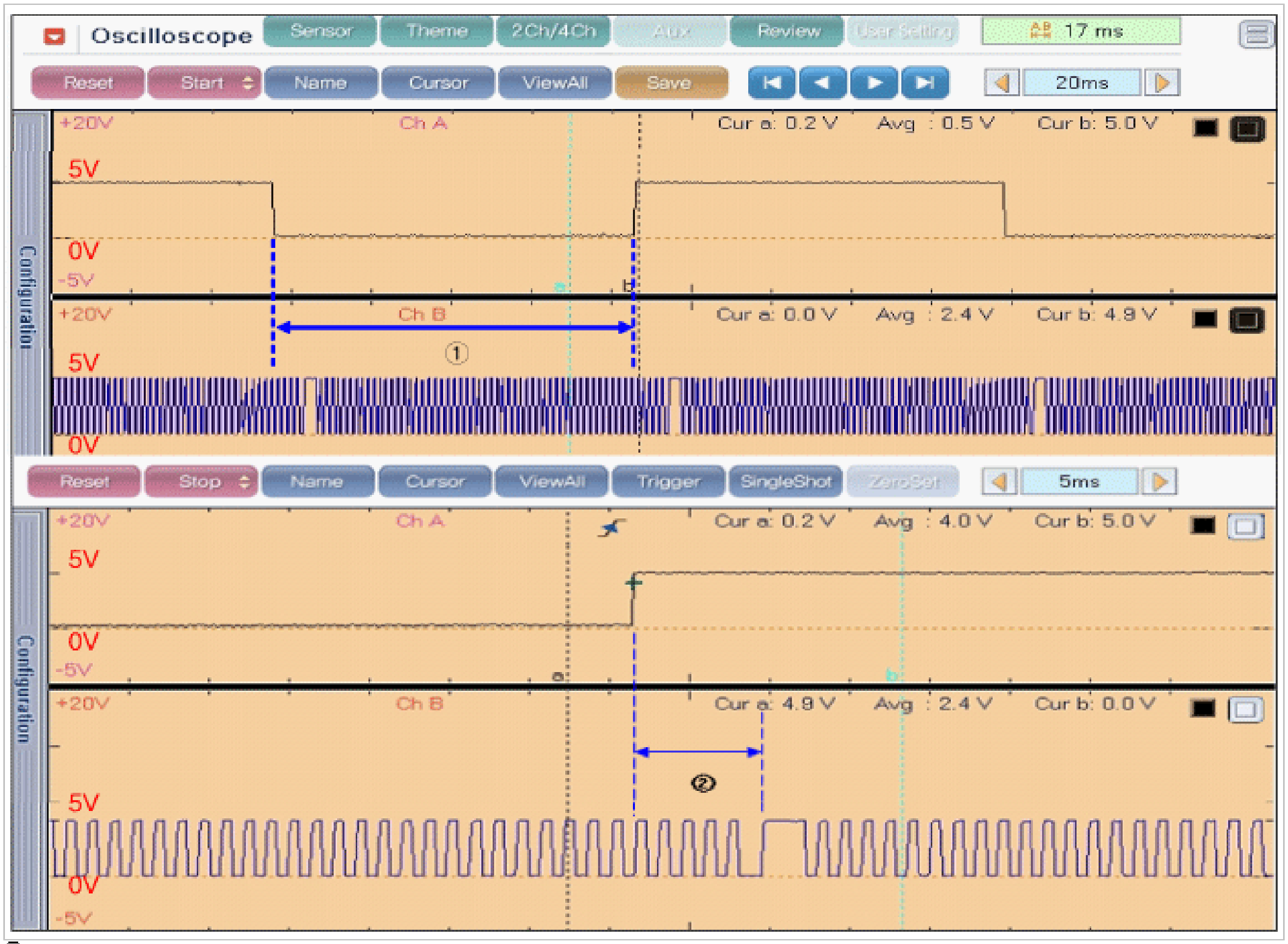
1. Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration,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

YES	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

Component Inspection

1. Set up an oscilloscope as follows :
   (1) Channel A (+): Signal terminal of the CMPS #1(back probe), (-): ground

   (2) Channel B (+): Signal terminal of the CKPS(back probe), (-): ground
2. Start the engine and check for signal waveform compared with reference waveform as below.



① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS #1.
② There are 3~5 signals of CKPS between the switching point of CMPS #1 and the missing tooth of CKPS.

3. Is the signal waveform normal?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ - Remove CMPS and check for air gap. Readjust as necessary and go to "Verification of Vehicle Repair" procedure. - If fail to synchronize with CKP sensor, check that the crankshaft and camshaft are correctly aligned the matching marks of the pulleys. Repair or readjust as necessary and go to "Verification of Vehicle Repair" procedure. - Check CMPS for contamination, deterioration, or damage. 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

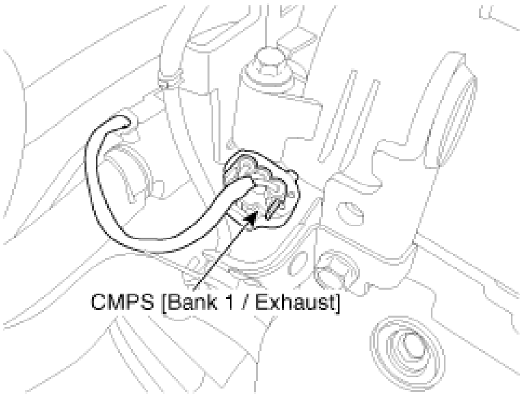
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0365 Camshaft Position Sensor \'B\' Circuit Malfunction (Bank 1)

Component Location



General Description

The Camshaft Position Sensor (CMPS) is a sensor that detects the compression TDC of the NO. 1 cylinder. The CMPS consists of a hall type sensor and a target on the end of the intake camshaft. When the target triggers the sensor, the sensor voltage is 5V. If not, the sensor voltage is 0V. These CMPS signal is sent to the ECM and the ECM uses the CMPS signal for synchronizing the firing of sequential fuel injectors.

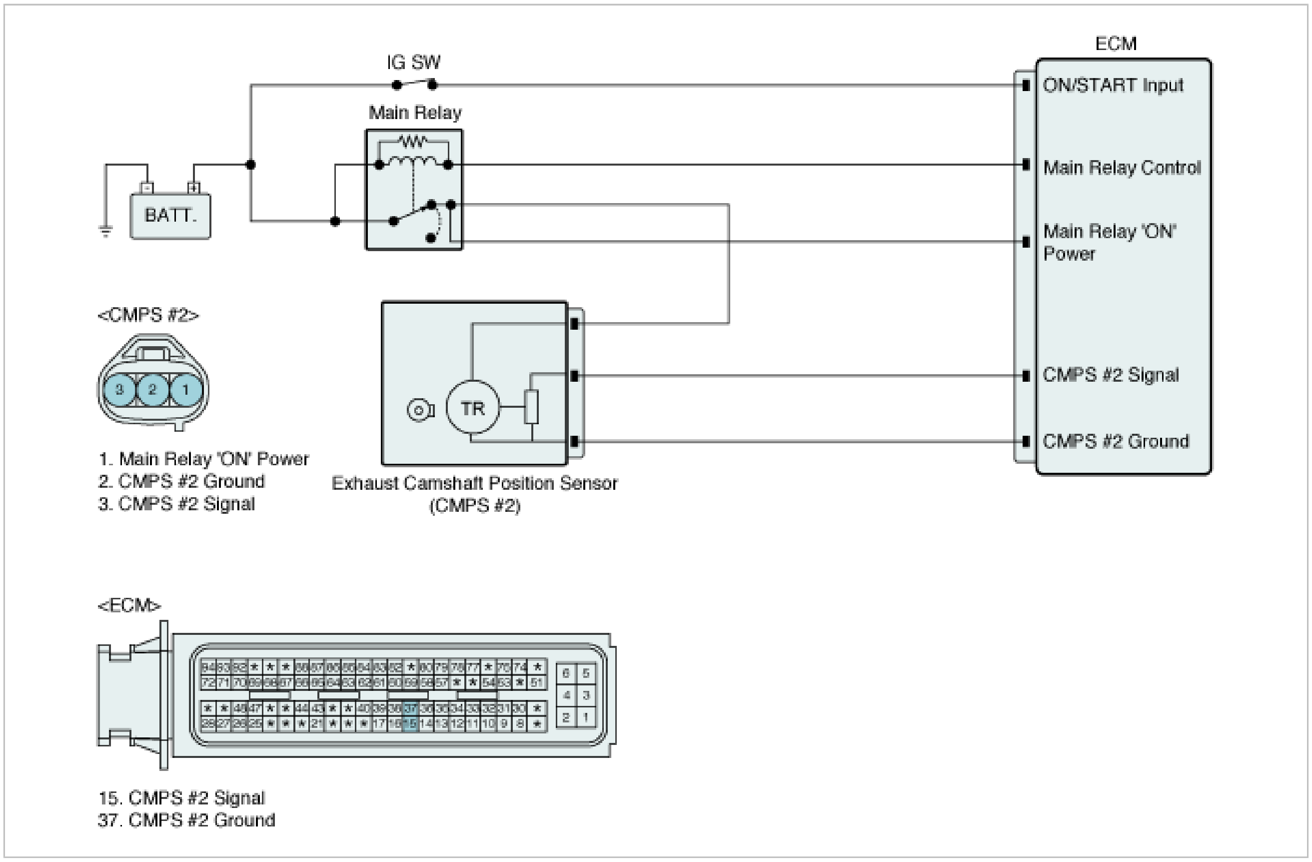
DTC Description

The ECM monitors the exhaust camshaft sensor signal transition position which must change only once per crankshaft revolution. If no camshaft signal is detected while crankshaft signal is detected, the ECM sets DTC P0365.

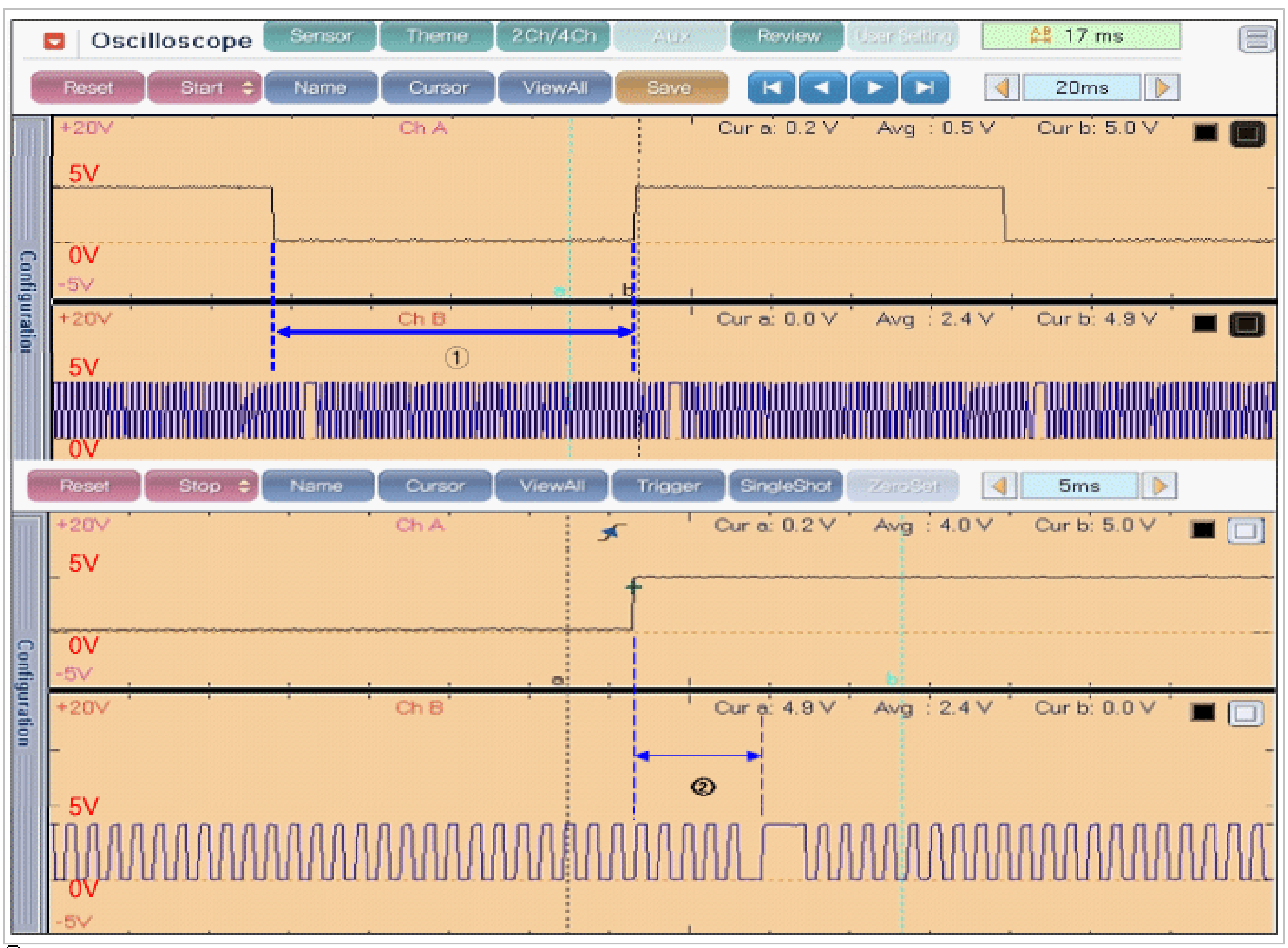
DTC Detecting Condition

Item		Detecting Condition	Possible Cause
DTC Strategy	Case1	• Missing signal check	• Open or short in signal, ground or power supply circuit • Poor connection or damaged harness • Misadjust crankshaft and camshaft pulley position • Faulty CMPS #2
	Case2	• Noisy signal check	
Enable Conditions		• Engine synchronized	
Threshold Value	Case1	• No camshaft edge detected within one revolution	
	Case2	• Camshaft segment duration < 7.3ms • Camshaft segment duration gradient not valid	
Diagnostic Time	Case1	• 8 rev.	
	Case2	• 5 rev.	
MIL On Condition		• 2 Driving Cycles	

Diagnostic Circuit Diagram



Signal Waveform & Data

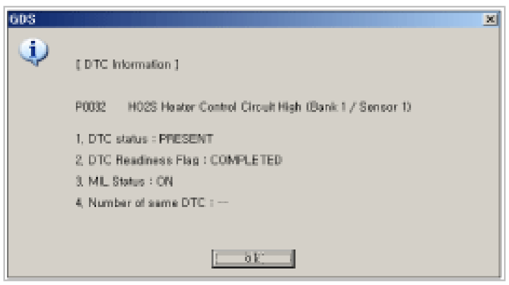


① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS #2.

② There are 3~5 signals of CKPS between the switching point of CMPS #2 and the missing tooth of CKPS.

Monitor DTC Status

1. Clear the DTC with GDS.
2. Operate the vehicle within the following conditions:
   - Engine run time at idle over 10 minutes
   - Engine Oil Temp. is between 20°C(68°F) and 110°C(230°F)
3. Ignition"ON" & Engine"OFF"
4. Using a GDS, monitor DTC
5. Go to applicable troubleshooting procedure for the following conditions
   - If any DTCs related to OCV(P0011) are stored, do ALL REPAIRS associated with those codes before proceeding with this troubleshooting procedure.
   - If DTC P0340 is set again, go to next step as below
   - If other DTCs are stored, go to the applicable troubleshooting procedure.
   - If no DTC output, go to "Verification of Vehicle Repair" procedure.
6. Click "DTC Status" on the menu bar to see DTC's information.
7. Confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions
8. Read "DTC Status" parameter



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Power Circuit Inspection

1. Ignition "OFF"
2. Disconnect CMPS #2 sensor connector
3. Ignition "ON" & Engine "OFF"
4. Measure voltage between power terminal of CMPS #2 harness connector and chassis ground.

Specification : Approx. B+

5. Is voltage within the specification?

YES	▸ Go to "Ground Circuit Inspection" procedure
NO	▸ Check for a open in the power supply circuit between the main relay and the CMPS Especially check for open or blown 10A sensor fuse

	Repair as necessary and go to "Verification of Vehicle Repair" procedure

Ground Circuit Inspection

1. Ignition "OFF"
2. Measure resistance between ground terminal of CMPS #2 harness connector and chassis ground.

Specification : Approx. 0Ω

3. Is resistance within the specification?

YES	▸ Go to "Signal Circuit Inspection" procedure
NO	▸ Check for an open or short to battery in the ground circuit. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Signal Circuit Inspection

1. Check for short to ground in signal harness
   (1) Measure resistance between signal terminal of CMPS #2 harness connector and chassis ground.

   Specification : Infinite

   (2) Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

2. Check for short to battery in signal harness
   (1) Disconnect ECM connector

   (2) Ignition "ON" & Engine "OFF"

   (3) Measure voltage between signal terminal of CMPS #2 harness connector and chassis ground

   Specification : Approx. 0V

   (4) Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

3. Check for open in signal harness
   (1) Ignition "OFF"

   (2) Measure resistance between signal terminal of CMPS #2 harness connector and CMPS #2 signal terminal of the ECM connector.

   Specification : Approx. 0Ω

   (3) Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

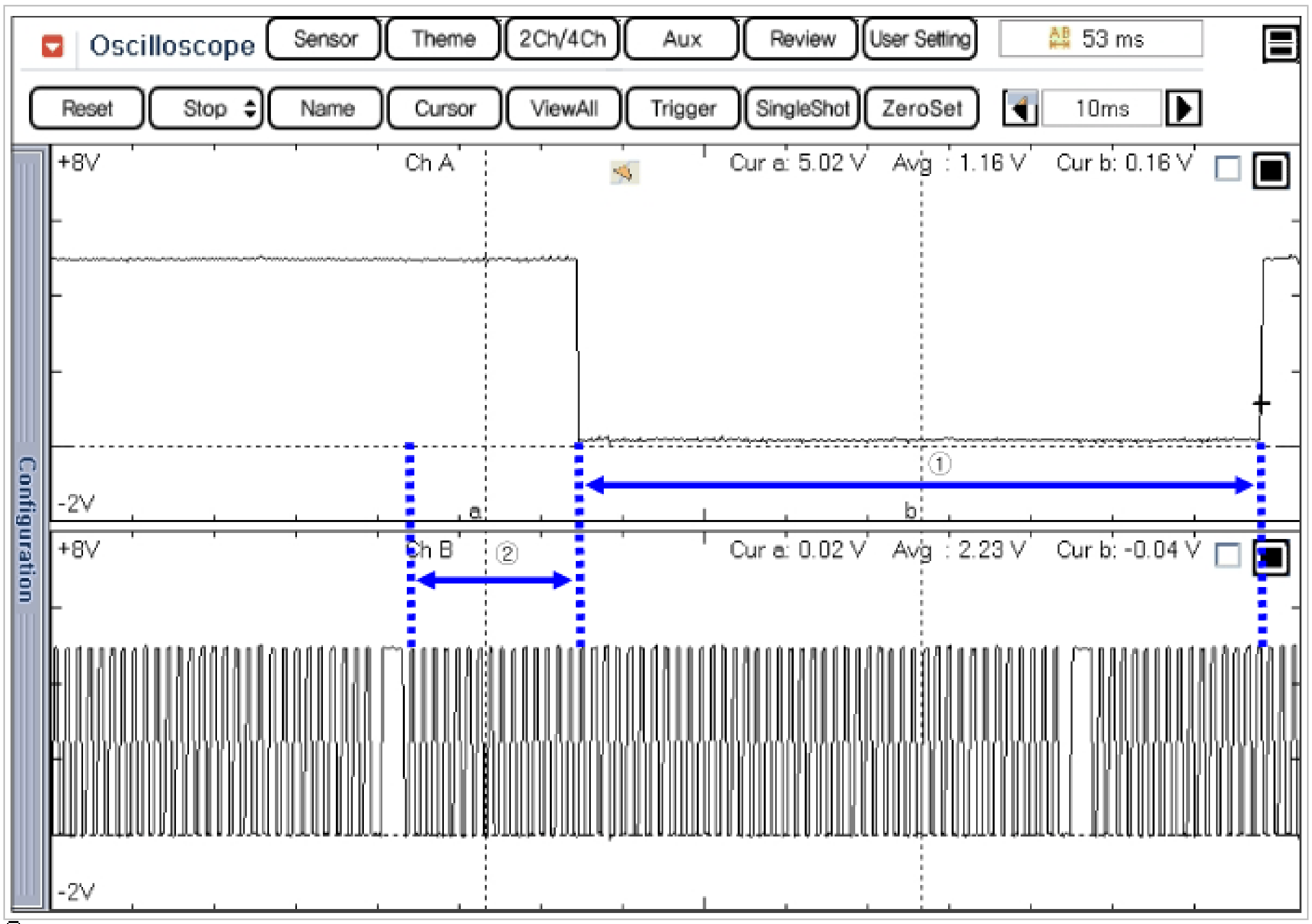
Terminal and connection inspection

1. 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.
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 next step as below

Component Inspection

1. Set up an oscilloscope as follows :
   (1) Channel A (+): Signal terminal of the CMPS #2(back probe), (-): ground
   (2) Channel B (+): Signal terminal of the CKPS(back probe), (-): ground
2. Start the engine and check for signal waveform compared with reference waveform as below.



① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS #2.
② There are 3~5 signals of CKPS between the switching point of CMPS #2 and the missing tooth of CKPS.

3. Is the signal waveform normal?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ - Remove CMPS and check for air gap. Readjust as necessary and go to "Verification of Vehicle Repair" procedure. - If fail to synchronize with CKP sensor, check that the crankshaft and camshaft are correctly aligned the matching marks of the pulleys. Repair or readjust as necessary and go to "Verification of Vehicle Repair" procedure.

	- Check CMPS for contamination, deterioration, or damage. 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.

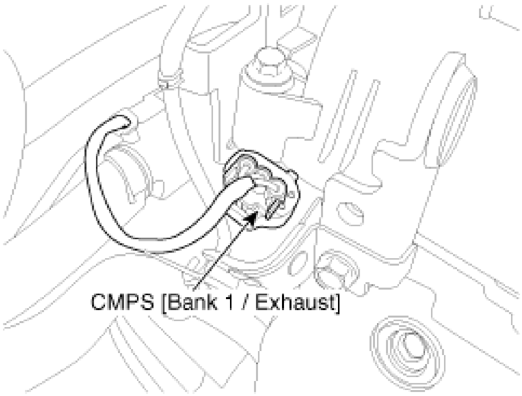
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Camshaft Position Sensor (CMPS) is a sensor that detects the compression TDC of the NO. 1 cylinder. The CMPS consists of a hall type sensor and a target on the end of the intake camshaft. When the target triggers the sensor, the sensor voltage is 5V. If not, the sensor voltage is 0V. These CMPS signal is sent to the ECM and the ECM uses the CMPS signal for synchronizing the firing of sequential fuel injectors.

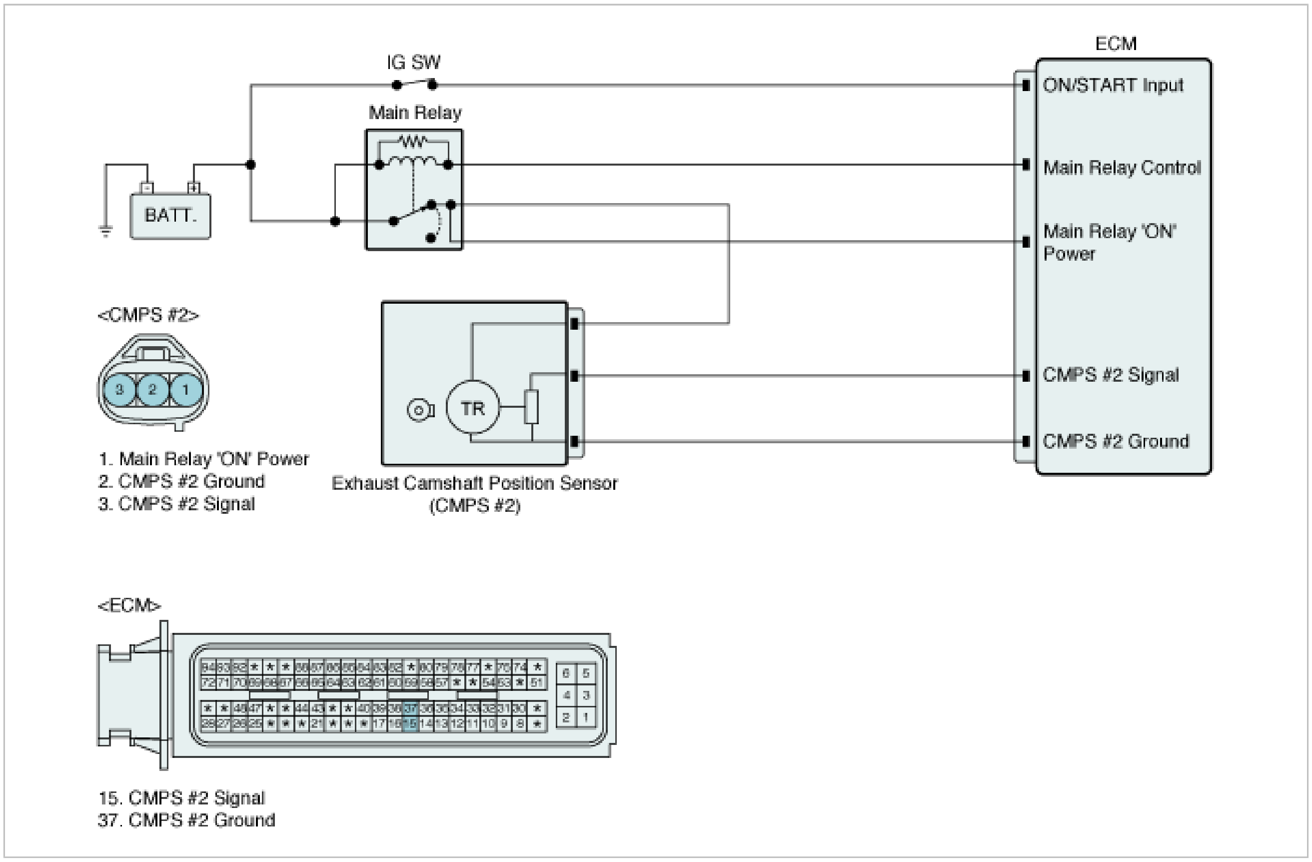
DTC Description

If the ECM receives an incorrect number of pulses on the exhaust camshaft position sensor, DTC P0366 will set.

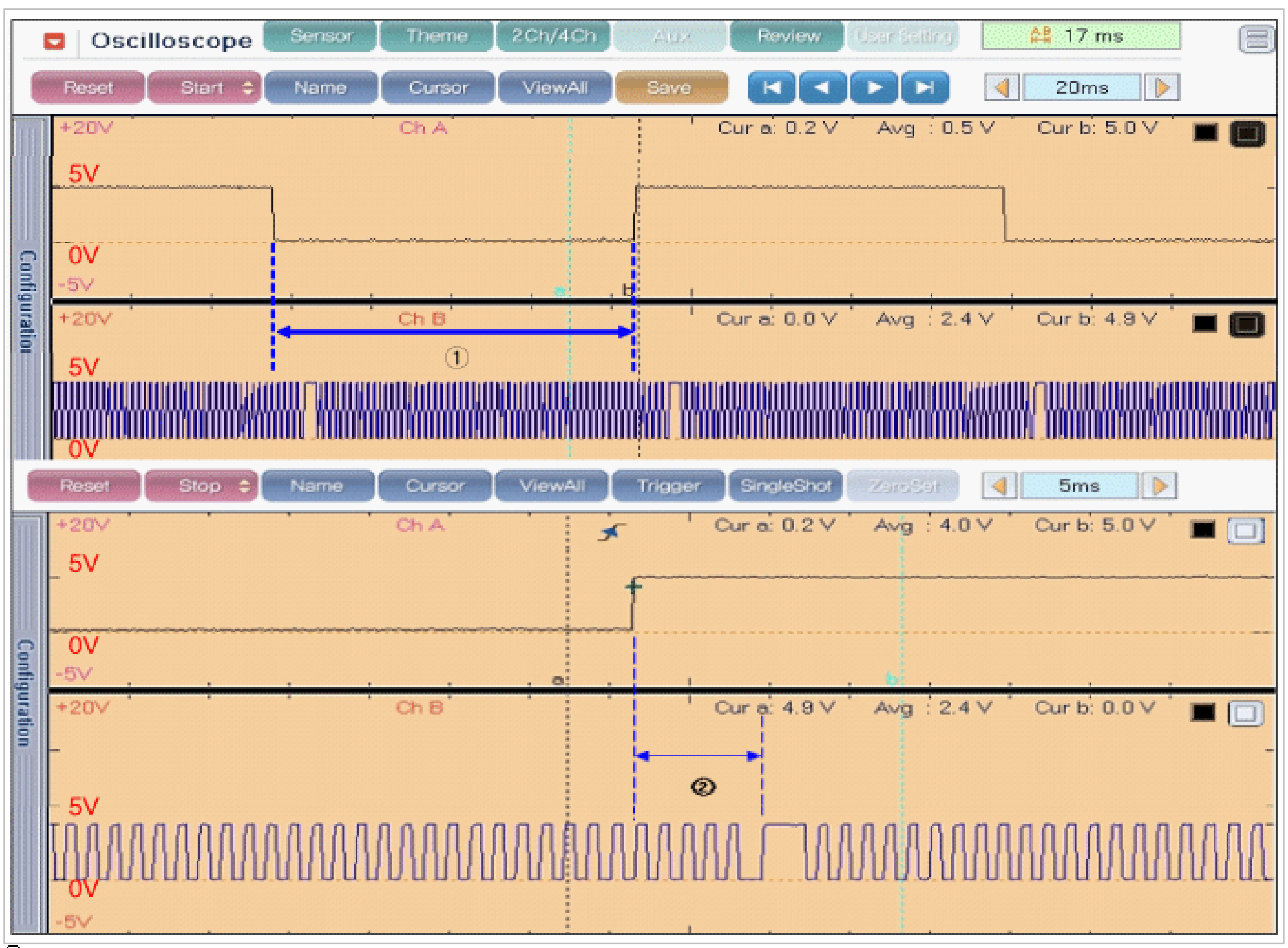
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Signal plausibility check	• Poor connection or damaged harness • Misadjust crankshaft and camshaft pulley position • Faulty CMPS #2
Enable Conditions	• Engine synchronized	
Threshold Value	• Camshaft edge out of normal range	
Diagnostic Time	• 8 sec.	
MIL On Condition	• 2 Driving Cycles	

Diagnostic Circuit Diagram



Signal Waveform & Data

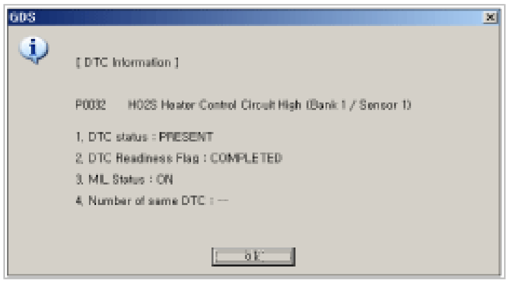


① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS #2.

② There are 3~5 signals of CKPS between the switching point of CMPS #2 and the missing tooth of CKPS.

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and connection inspection

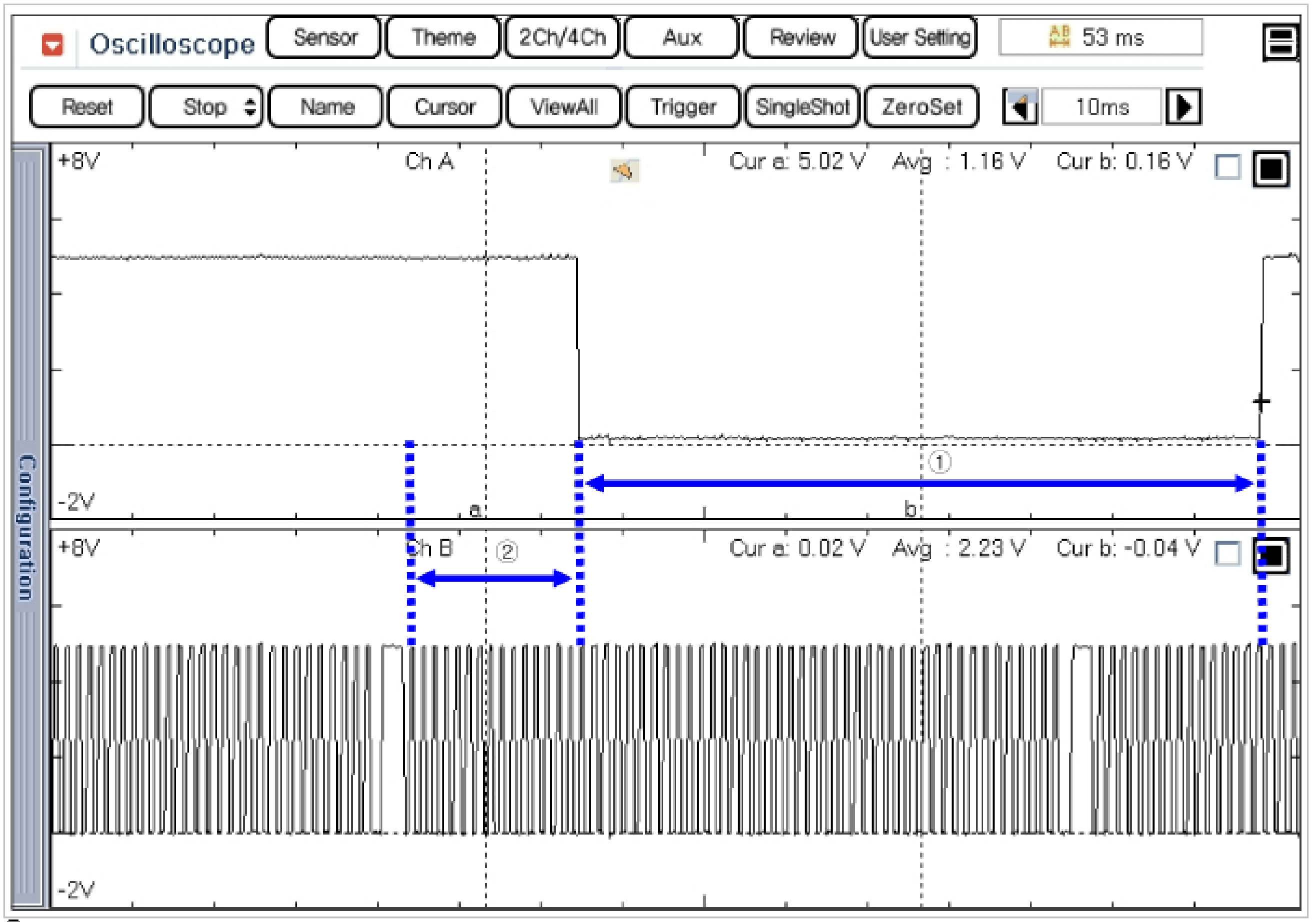
1. Many malfunctions in the electrical system are caused by poor harness(es) and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration,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

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Go to next step as below

Component Inspection

1. Set up an oscilloscope as follows :
   (1) Channel A (+): Signal terminal of the CMPS #2(back probe), (-): ground

   (2) Channel B (+): Signal terminal of the CKPS(back probe), (-): ground
2. Start the engine and check for signal waveform compared with reference waveform as below.



① There are 60 signals of CKPS(Including missing tooth) during the semi-cycle of CMPS #2.
② There are 3~5 signals of CKPS between the switching point of CMPS #2 and the missing tooth of CKPS.

3. Is the signal waveform normal?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ - Remove CMPS and check for air gap. Readjust as necessary and go to "Verification of Vehicle Repair" procedure. - If fail to synchronize with CKP sensor, check that the crankshaft and camshaft are correctly aligned the matching marks of the pulleys. Repair or readjust as necessary and go to "Verification of Vehicle Repair" procedure. - Check CMPS for contamination, deterioration, or damage. 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

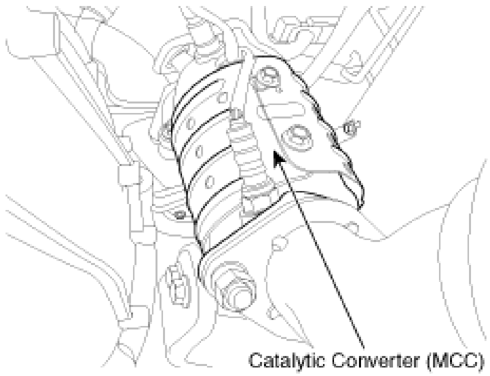
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0420 Catalyst System Efficiency below Threshold (Bank 1)

Component Location



General Description

The ECM uses dual oxygen sensors to monitor the efficiency of the manifold catalytic converter (warm-up catalytic converter). By monitoring the oxygen storage capacity of a catalyst, its efficiency can be indirectly calculated. The upstream (front) HO2S is used to detect the amount of oxygen in the exhaust gas before it enters the catalytic converter. A low voltage indicates high oxygen contents (lean air mixture). A high voltage indicates low oxygen contents (rich air mixture). When the catalyst efficiency drops, no chemical reaction takes place. This means the concentration of oxygen will be the same at the rear as it is at the front. The output voltage of the rear HO2S copies the voltage of the front HO2S.To monitor the system, the lean-to-rich switches of the front HO2S to the rear HO2S is counted. The ratio of rear switches to front switches is used to determine whether the catalyst is operating properly. An effective catalyst will have fewer rear switches than front switches, that is, a ratio closer to zero.

DTC Description

The ECM calculates oscillation size of rear HO2S signal which represents catalyst conversion properties. This oscillation size will determine if catalyst conversion is low due to aging or poisoning from leaded fuel or misfiring. The ECM sets P0420 if the average of calculated oscillation size of rear HO2S signal during predetermined duration is higher than the predetermined threshold.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Check catalyst oxygen storage capacity by evaluating downstream O2 sensor fluctuations	
Enable Conditions	• Coolant temperature >73°C(163°F) • 550°C(1022°F)< Modeled catalyst temp <850°C(1562°F) • Vehicle speed >3mph • 1300< Engine speed <3200 • 0.3g/rev.< MAF < 0.8g/rev. • Ambient pressure > 70kPa(700hPa) • Canister load < 0.5 • Lambda control active & Stable driving condition • Downstream O2 sensor operative readiness • No opening / closing of Canister Purge Valve • No relevant failure • 11V < Battery voltage < 16V	• Exhaust gas leaks • Faulty rear HO2S • Faulty three way catalyst converter
Threshold Value	• Average malfunction index > 1	
Diagnostic Time	• 50 Lambda Controller Cycles	

MIL On Condition	• 2 Driving Cycles	

Signal Waveform & Data

GDS Display for HO2S

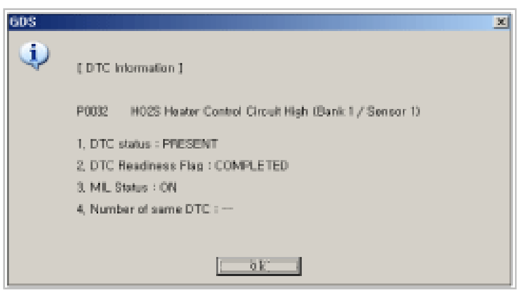
Test Condition		Scan Tool Parameter	
		O2 SNSR VOL.-B1/S1	**O2 SNSR VOL.-B1/S2**
Normal Value when circuit is normal	Idle after warm up	Signal is switching from rich (above 0.45V) to lean(below 0.45V) a minimum of 3 times in 10 seconds.	above 0.7V
HO2S(B1S1) signal circuit open		Approx. 0.43~0.45V	-
HO2S(B1S2) signal circuit open		-	Approx. 0.43~0.45V

Monitor DTC Status

NOTE

If any codes relating to injectors, HO2S, ECT(Engine Coolant Temperature)Sensor, Throttle Position sensor or Mass Air Flow Sensor are stored, do ALL REPAIRS associated with those codes before proceeding with this troubleshooting tree.

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Exhaust system Inspection

1. Visually/physically inspect the following conditions:
   - Exhaust system between HO2S and Three way catalyst for air leakage, restriction and damage.
   - Damage, and for loose or missing hardware:

2. Was a problem found in any of the above areas?

YES	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to "Rear HO2S Inspection " procedure

Rear HO2S Inspection

1. Visually/physically inspect the rear HO2S for the following conditions:
   - Ensure that the HO2S is securely installed.(Pigtail and wiring harness not making contact with the exhaust pipe)
   - Check for corrosion on terminals
   - Check for terminal tension (at the HO2S and at the ECM)
   - Any road damage
2. Was a problem found in any of the above areas?

YES	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to "TWC Inspection " procedure

TWC Inspection

1. Visually/physically inspect the three-way catalyst(TWC) converter for the following damage:
   - Severe discoloration caused by excessive temperature
   - Dents and holes
   - Internal rattle caused by a damaged catalyst
2. Also, ensure that the TWC is a proper original equipment manufacturer part.
3. Was a problem found?

YES	▸ Replace TWC and go to "Verification of Vehicle Repair" procedure
NO	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

General Description

The evaporative emission control system prevents hydrocarbon (HC) vapors from the fuel tank from escaping into the atmosphere where they could form photochemical smog. Gasoline vapors are collected in the charcoal canister. The ECM controls the Purge Control Solenoid Valve (PCSV) to purge any collected vapors from the canister back to the engine for combustlon. This valve is actuated by the purge control signal from the PCM and controls fuel vapor from the canister to the intake manifold.

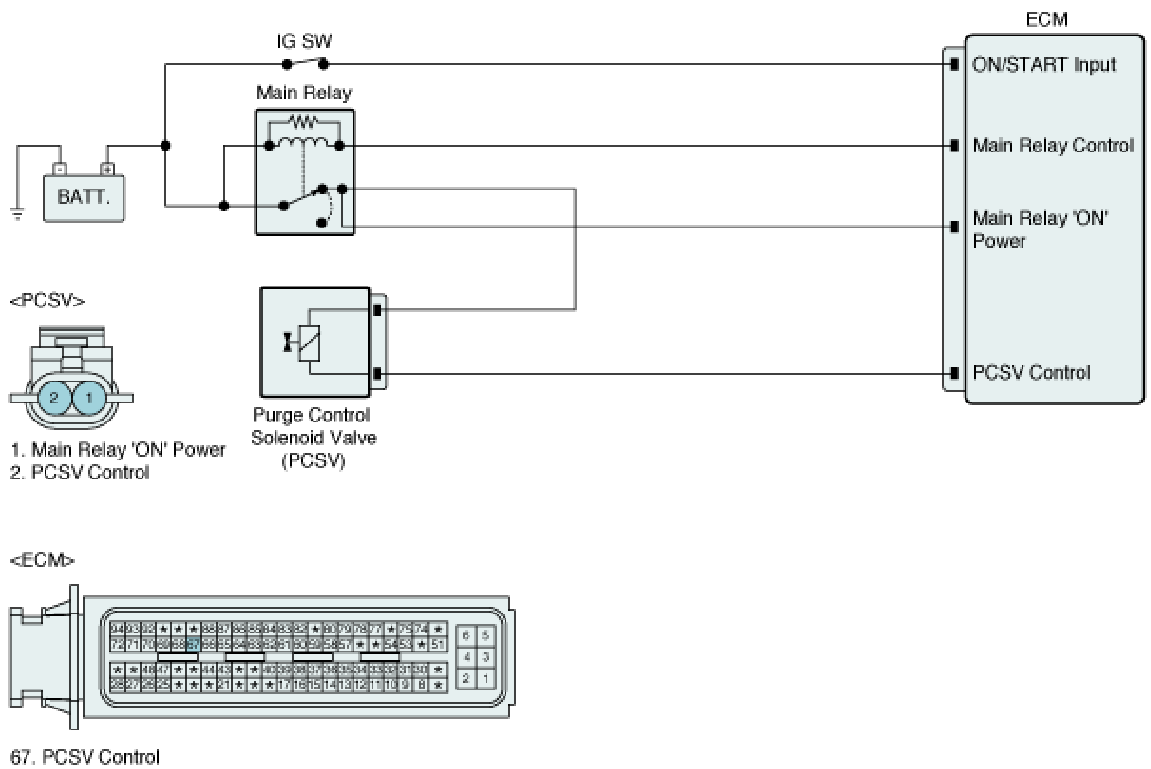
DTC Description

The ECM sets DTC P0441 if the pressure signal decrease occurs and the difference is below the predetermined threshold. If same error code is set in the next driving cycle, the ECM illuminates the MIL.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Canister Purge Valve Stuck open	• Leaking in fuel vapor lines • Faulty PCSV
Enable Conditions	• See conditions for very small Leak Detection (0.5 mm)	
Threshold Value	• Differential Fuel Tank Pressure < -200 Pa(-2 hPa)	
Diagnostic Time	• 5 sec.	
MIL On Condition	• 2 Driving Cycles	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Start engine to normal operating temperature

> **NOTE**
>
> Evaporative Emissions Systems (EVAP) Leak Tests can be run by the GDS. The tests are automated and provide

either a pass-fail result or directions to check for DTCs.

2. Install scan tool and clear DTC
3. Perform "EVAP. LEAKAGE TEST" mode referring to enable conditions as below

> NOTE
>
> EVAP. Leakage Test enable conditions
> - Following conditions must be fulfilled to start the test.
> 1) Engine warm up at Idle Status
> 2) No relevant DTC
> 3) Fuel level is below 80%

4. Is DTC P0441 set again?

YES	▸ Go to next step as below.
NO	▸ 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.

PCSV Inspection

1. Ignition "OFF"
2. Disconnect the hose leading from the PCSV to intake manifold at intake manifold.
3. Using a vacuum pump, apply vacuum to the manifold side of the vacuum hose and verify PCSV holds vacuum.
4. Ignition "ON" & Engine "OFF"
5. Install GDS and select "Canister Purge Valve" on the Actuation Test mode
6. Activates "Canister Purge Valve" by clicking "Start" icon.
7. Verify PCSV release vacuum while valve is activating(should hear a faint click from PCSV)
8. Repeat this procedure 4 or 5 times to ensure PCSV reliability.
   Specification:

Test Condition	Specification
PCSV is ON(should hear a faint click from PCSV)	Holds vacuum
PCSV is OFF	Release vacuum

9. Is PCSV working properly?

YES	▸ Go to next step as below
NO	▸ Verify arrow on PCSV is pointing towards intake manifold. If it is not, reverse installation. Reinstall as necessary and go to "Verification of Vehicle Repair" procedure. ▸ If OK, thoroughly check fuel vapor hoses and hose clamps between PCSV and intake manifold. Repair as necessary. If OK, test with a new PCSV and check for proper operation. If problem is corrected, replace PCSV and go to "Verification of Vehicle Repair" procedure.

Terminal and Connector inspection

1. 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.
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	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

1. Start engine to normal operating temperature

> NOTE
>
> Evaporative Emissions Systems (EVAP) Leak Tests can be run by the GDS. The tests are automated and provide either a pass-fail result or directions to check for DTCs.

2. Install GDS and clear DTC
3. Perform "EVAP. LEAKAGE TEST" mode referring to enable conditions as below

> NOTE
>
> EVAP. Leakage Test enable conditions
> - Following conditions must be fulfilled to start the test.
> 1) Engine warm up at Idle Status
> 2) No relevant DTC
> 3) Fuel level is below 80%

4. Monitoring for (pending) DTC.Is the same DTC set?

YES	▶ Go to the applicable troubleshooting procedure.
NO	▶ System performing to specification at this time.

General Description

Due to the increasing ambient temperature of the fuel and the return of unused hot fuel from the engine, fuel vapors are generated in the tank. In order to control the release of these vapors to the atmosphere, the evaporative emissions control system is used. The evaporative emission control system reduces hydrocarbon (HC) emissions by trapping fuel tank vapors until they can be burned in the combustion process. Evaporating fuel is stored in a charcoal canister until it can be flushed into the intake manifold. The evaporative emission control system is made up of a fuel tank that can be completely sealed from outside air, a Fuel Tank Pressure Sensor (FTPS), a Canister Close Valve (CCV) that seals the canister from the outside air, a canister filled with activated charcoal granules, a Purge Control Solenoid Valve (PCSV). The evaporative emission system can be checked for leaks by sealing the system off from the outside air, creating a vacuum, and monitoring if the system can hold that vacuum sufficiently for a set amount of time. If it cannot, a leak exists somewhere in the system.

DTC Description

The ECM closes the Canister Close Valve (CCV) at the charcoal canister to seal off the evaporative emission system and then opens purge control valve (PCSV) to generate a vacuum in the fuel tank. After vacuum generation, the ECM measures pressure differential curve in the fuel tank and sets DTC P0442 or P0456 if the vacuum generated within a monitoring period increases above a defined threshold.If same error code is set in the next driving cycle, the ECM illuminates the MIL.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Monitoring Fuel Tank Pressure Trend after generating underpressure in Tank	• Fuel filler cap damage or missing • Faulty or damaged fuel filler pipe • Leaking, disconnected or plugged fuel vapor lines • Faulty CCV • Faulty PCSV • Faulty Canister • Faulty Fuel Tank Pressure Sensor (FTPS)
Enable Conditions	• See conditions for very small Leak Detection (0.5 mm)	
Threshold Value	• Leak diameter > 0.80 mm	
Diagnostic Time	• 30 sec. in Idle when all Enable Conditions fulfilled	
Mil On Condition	• 2 Driving Cycles	

Monitor DTC Status

1. Start engine to normal operating temperature

> NOTE
>
> Evaporative Emissions Systems (EVAP) Leak Tests can be run by the GDS. The tests are automated and provide either a pass-fail result or directions to check for DTCs.

2. Install scan tool and clear DTC
3. Perform "EVAP. LEAKAGE TEST" mode referring to enable conditions as below

> NOTE
>
> EVAP. Leakage Test enable conditions
> - Following conditions must be fulfilled to start the test.
> 1) Engine warm up at Idle Status

2) No relevant DTC 3) Fuel level is below 80%

4. Is DTC P0442 set again?

YES	▶ Go to next step as below.
NO	▶ 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.

Fuel Filler Cap Inspection

1. Check fuel filler cap for being tightly installed, has o-ring seal installed and is in good condition.
2. Verify cap releases pressure / vacuum at specified values

Specification : Approx. 2 psi pressure and approximately 1.5 inches of mercury vacuum).

3. Are cap, o-ring and release pressures okay?

YES	▶ Thoroughly check fuel filler pipe for cracks, damage and o-ring seat for deformation and replace as necessary. Go to next step as below.
NO	▶ Replace fuel filler cap and go to "Verification of Vehicle Repair" procedure.

PCSV to Intake manifold Line Inspection

1. Ignition "OFF"
2. Disconnect the hose leading from the PCSV to intake manifold at intake manifold.
3. Using a vacuum pump, apply vacuum to the manifold side of the vacuum hose and verify PCSV holds vacuum.
4. Ignition "ON" & Engine "OFF"
5. Install GDS and select "Canister Purge Valve" on the Actuation Test mode
6. Activates "Canister Purge Valve" by clicking "Start" icon.
7. Verify PCSV release vacuum while valve is activating(should hear a faint click from PCSV)
8. Repeat this procedure 4 or 5 times to ensure PCSV reliability.
   Specification:

Test Condition	Specification
PCSV is ON(should hear a faint click from PCSV)	Holds vacuum
PCSV is OFF	Release vacuum

9. Is PCSV working properly?

YES	▶ Go to next step as below
NO	▶ Verify arrow on PCSV is pointing towards intake manifold. If it is not, reverse installation. Reinstall as necessary and go to "Verification of Vehicle Repair" procedure. ▶ If OK, thoroughly check fuel vapor hoses and hose clamps between PCSV and intake manifold. Repair as necessary. If OK, test with a new PCSV and check for proper operation. If problem is corrected, replace PCSV and go to "Verification of Vehicle Repair" procedure.

Canister Close Valve(CCV) Line Inspection

1. Reconnect all EVAP hardware that was previously disconnected.
2. Disconnect hose connecting Canister Closing Valve(CCV) to canister.
3. Ignition "ON" & Engine "OFF"
4. Blow air to the canister side of the valve and verify air escapes to the air filter side.
5. Install GDS and select "CANISTER CLOSE VALVE" on the Actuation Test mode.
6. Activates "CANISTER CLOSE VALVE" by clicking "START" icon.
7. Blow air into hose and verify air does not escape.
8. Repeat this procedure 4 or 5 times to ensure CCV reliability.
9. Is CCV working properly?

YES	▶ Go to next step as below
NO	▶ Check for cracks or damage in hose connecting CCV and canister. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure. ▶ If OK, replace CCV. If CCV was stuck closed, inspect all lines and canister for liquid fuel. Replace any contaminated components and blow out lines and go to "Verification of Vehicle Repair" procedure.

Fuel Tank Pressure Sensor Inspection

1. Ignition "ON" & Engine "OFF" .
2. Disconnect hose connecting FTPS to the Fuel Tank.
3. Using a vacuum pump, apply vacuum to the hose connecting to FTPS.
4. Measure FTPS output voltage between signal terminal of the FTPS harness connector and chassis ground.

Specification : Voltage increases proportionally with increasing pressure.

Pressure(kPa) [mmHG Guage]	Voltage(V)
6.666[50]	4.5
0[0]	2.5
-6.666[-50]	0.5

5. Is voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Check for cracks or damage in hose connecting canister and fuel pump. Repair or replace as necessary. ▶ Check for open or short in FTPS harness. Repair as necessary.If OK, test with a new FTPS and check for proper operation. If problem is corrected, replace FTPS and go to "Verification of Vehicle Repair" procedure

PCSV to Canister Line Inspection

1. Check for leakage in hose
   (1) Reconnect all EVAP hardware that was previously disconnected

(2) Disconnect the hose leading from the canister to the PCSV at canister

(3) Using a vacuum pump, apply specified vacuum[Approx. 4 inHg(14 kPa)] to the manifold side of the valve for 1 minute and verify PCSV holds vacuum.

(4) Is pressure within specification?

YES	▶ Go to next step as below
NO	▶ Check for cracks or damage in hose connecting PCSV and canister. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

2. Check for leakage in canister

(1) Disconnect hose clamps and remove canister assembly

(2) Block the hose of between:

A. Canister and fuel filler neck

A. Canister and CCV

A. Canister and PCSV

(3) Apply maximum of 4 inHg(14 kPa) pressure through fuel tank port from canister

(4) With system sealed and pressurized, check for leaks

(5) Were any leak(s) found?

YES	▶ Repair or replace leaking system component(s) and go to "Verification of Vehicle Repair" procedure.
NO	▶ Go to next step as below

Fuel Tank Line Inspection

1. Relieve the fuel system pressure and remove the fuel tank

CAUTION

Before removing the fuel tank, make sure the fuel hoses are not leaking.

2. Block all of the following outlets:

(1) Fuel lines

(2) Fuel filler neck

3. Apply maximum of 10cmHg(4 inHg) pressure to the EVAP. hose at the fuel tank. Then, pinch the EVAP. hose to retain the pressure
4. Check the suspect area for leaks with a soap solution.
5. Were any leak(s) found?

YES	▶ Repair or replace leaking system component(s) and go to "Verification of Vehicle Repair" procedure.
NO	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

1. Start engine to normal operating temperature

NOTE

Evaporative Emissions Systems (EVAP) Leak Tests can be run by the GDS. The tests are automated and provide either a pass-fail result or directions to check for DTCs.

2. Install GDS and clear DTC
3. Perform "EVAP. LEAKAGE TEST" mode referring to enable conditions as below

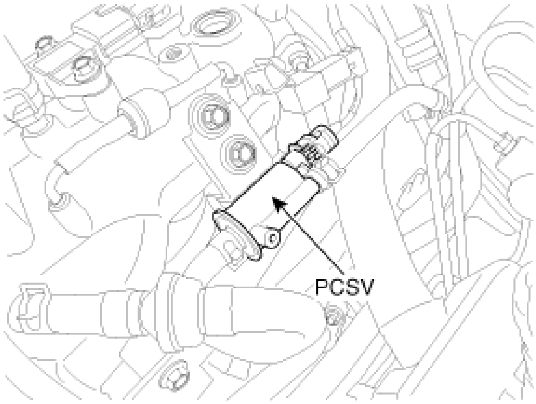
NOTE

EVAP. Leakage Test enable conditions
- Following conditions must be fulfilled to start the test.
1) Engine warm up at Idle Status
2) No relevant DTC
3) Fuel level is below 80%

4. Monitoring for (pending) DTC.Is the same DTC set?

YES	▸ Go to the applicable troubleshooting procedure.
NO	▸ System performing to specification at this time.

Component Location



General Description

The evaporative emission control system prevents hydrocarbon (HC) vapors from the fuel tank from escaping into the atmosphere where they could form photochemical smog. Gasoline vapors are collected in the charcoal canister. The ECM controls the Purge Control Solenoid Valve (PCSV) to purge any collected vapors from the canister back to the engine for combustion. This valve is actuated by the purge control signal from the ECM and controls fuel vapor flow from the canister to the intake manifold.

DTC Description

ECM sets DTC P0444 if the ECM detects that the PCSV control circuit is open.

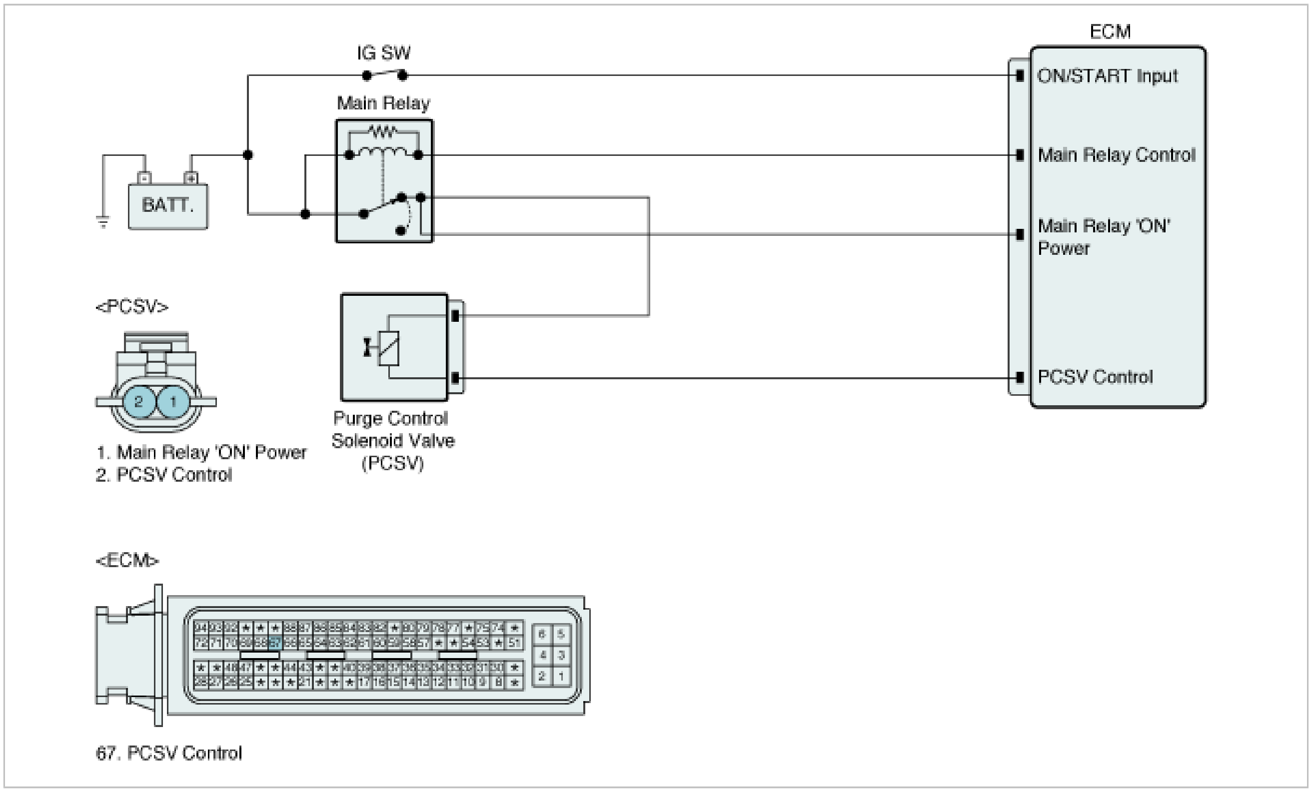
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Open in PCSV harness • Poor connection or damaged harness • Faulty PCSV
Enable Conditions	• 10V < Battery voltage < 16V • 2% < Canister purge duty < 98%	
Threshold Value	• Open in control circuit	
Diagnostic Time	• 3 sec.	
MIL On Condition	• 2 Driving Cycles	

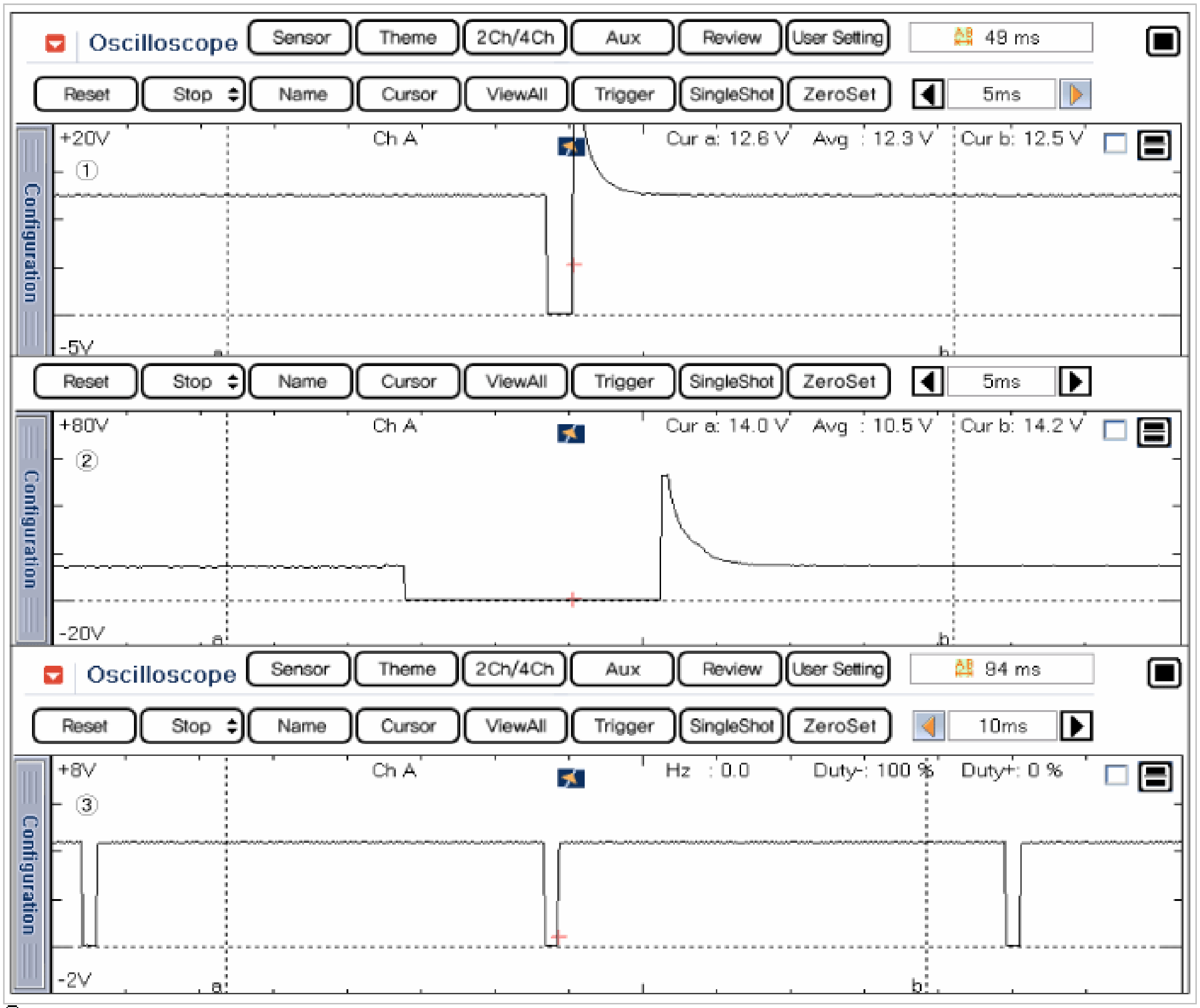
Specification

Temp.(°C)	Temp.(°C)	PCSV Resistance(Ω)
20	68	19 ~ 22

Diagnostic Circuit Diagram



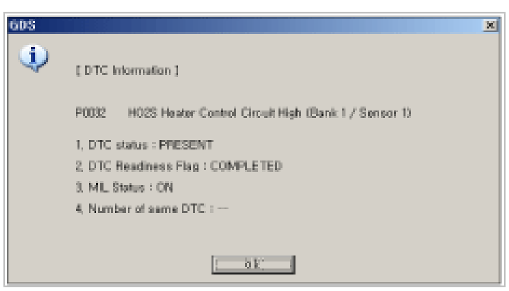
Signal Waveform & Data



① PCSV Control Waveform (Key-On)
② PCSV Control Waveform (Idle)
③ PCSV Control Waveform (Control Circuit Open / Key-On / ECM Side)

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Component Inspection

1. Ignition "OFF"
2. Disconnect PCSV connector
3. Measure resistance between power terminal and signal terminal of PCSV connector(Component side).

Temp.(°C)	Temp.(°C)	PCSV Resistance(Ω)
20	68	19 ~ 22

4. Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Check PCSV for contamination, deterioration, or damage. 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

Power Circuit Inspection

1. Ignition "ON" & Engine "OFF"
2. Measure voltage between power terminal of PCSV harness connector and chassis ground.

Specification : Approx. B+

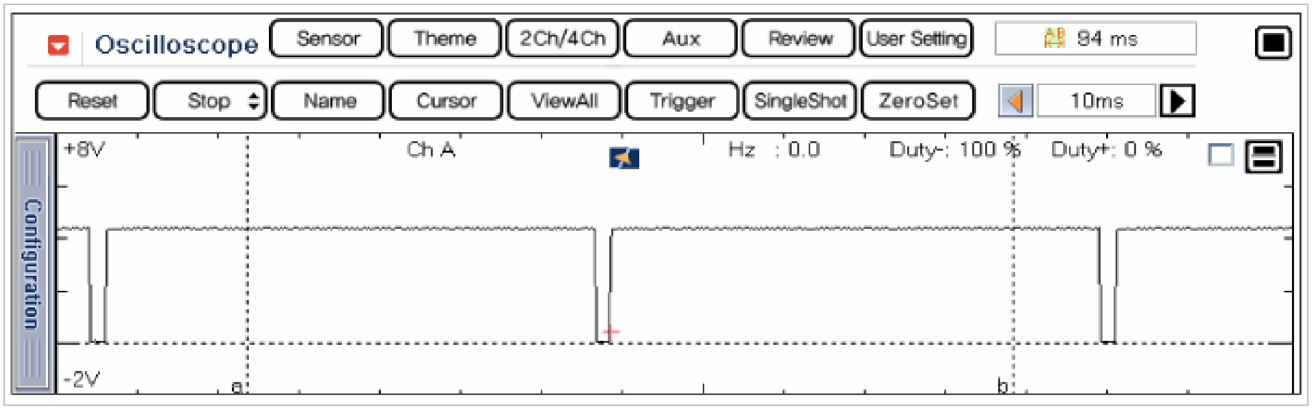
3. Is voltage within the specification?

YES	▸ Go to "Control Circuit Inspection" procedure
NO	▸ Check for a open in the power supply circuit. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Control Circuit Inspection

1. Measure voltage between power terminal of the PCSV harness connector and chassis ground.

Specification : Approx. 4~5V



2. Is voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Check control circuit for open or short. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Terminal and connection inspection

1. 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.
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	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

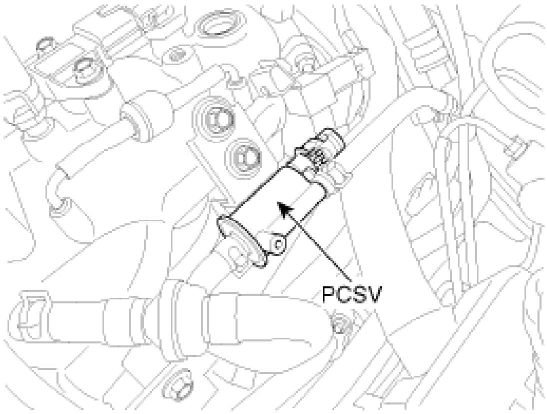
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The evaporative emission control system prevents hydrocarbon (HC) vapors from the fuel tank from escaping into the atmosphere where they could form photochemical smog. Gasoline vapors are collected in the charcoal canister. The ECM controls the Purge Control Solenoid Valve (PCSV) to purge any collected vapors from the canister back to the engine for combustion. This valve is actuated by the purge control signal from the ECM and controls fuel vapor flow from the canister to the intake manifold.

DTC Description

ECM sets DTC P0445 if the ECM detects that the PCSV control circuit is shorted to ground or shorted to battery voltage.

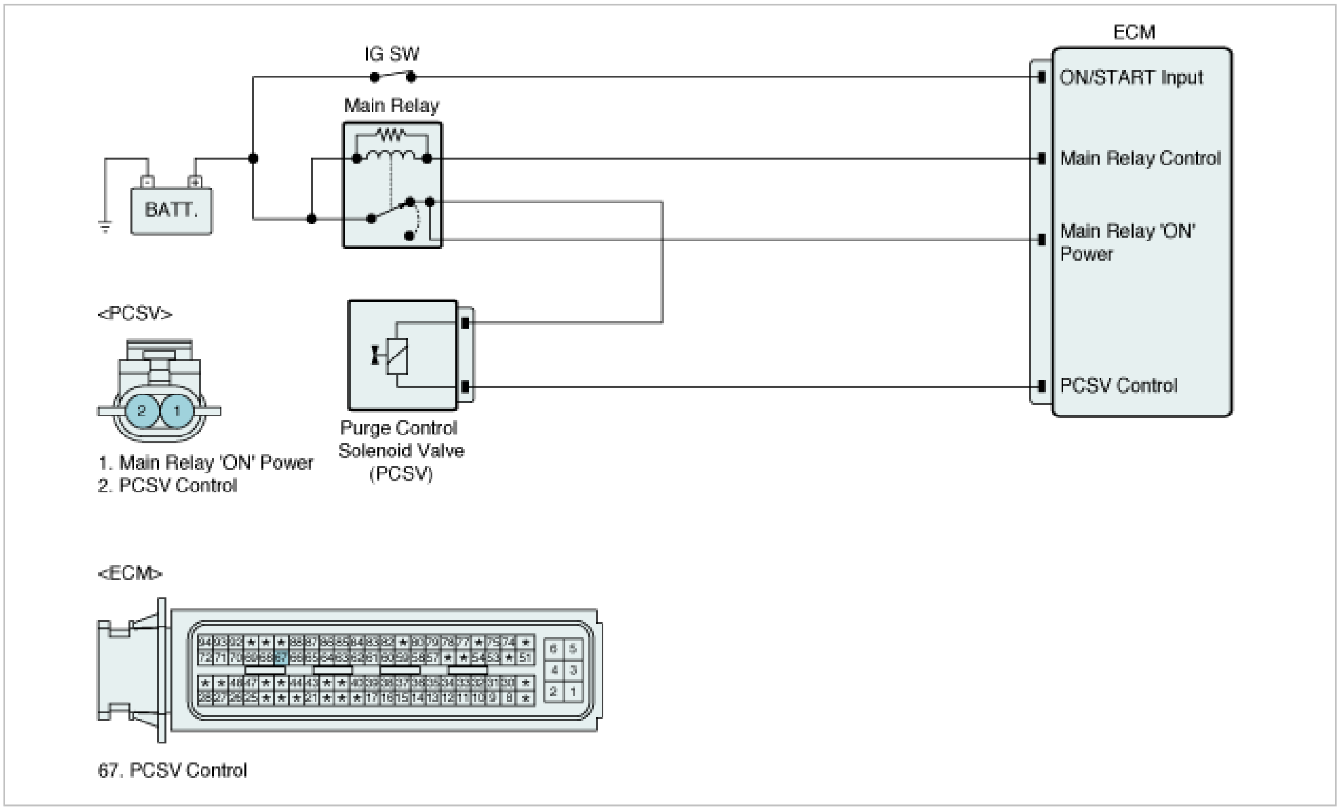
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Short in PCSV harness • Poor connection or damaged harness • Faulty PCSV
Enable Conditions	• 10V < Battery voltage < 16V • 2% < Canister purge duty < 98%	
Threshold Value	• Short to ground or battery in control circuit	
Diagnostic Time	• 3 sec.	
MIL On Condition	• 2 Driving Cycles	

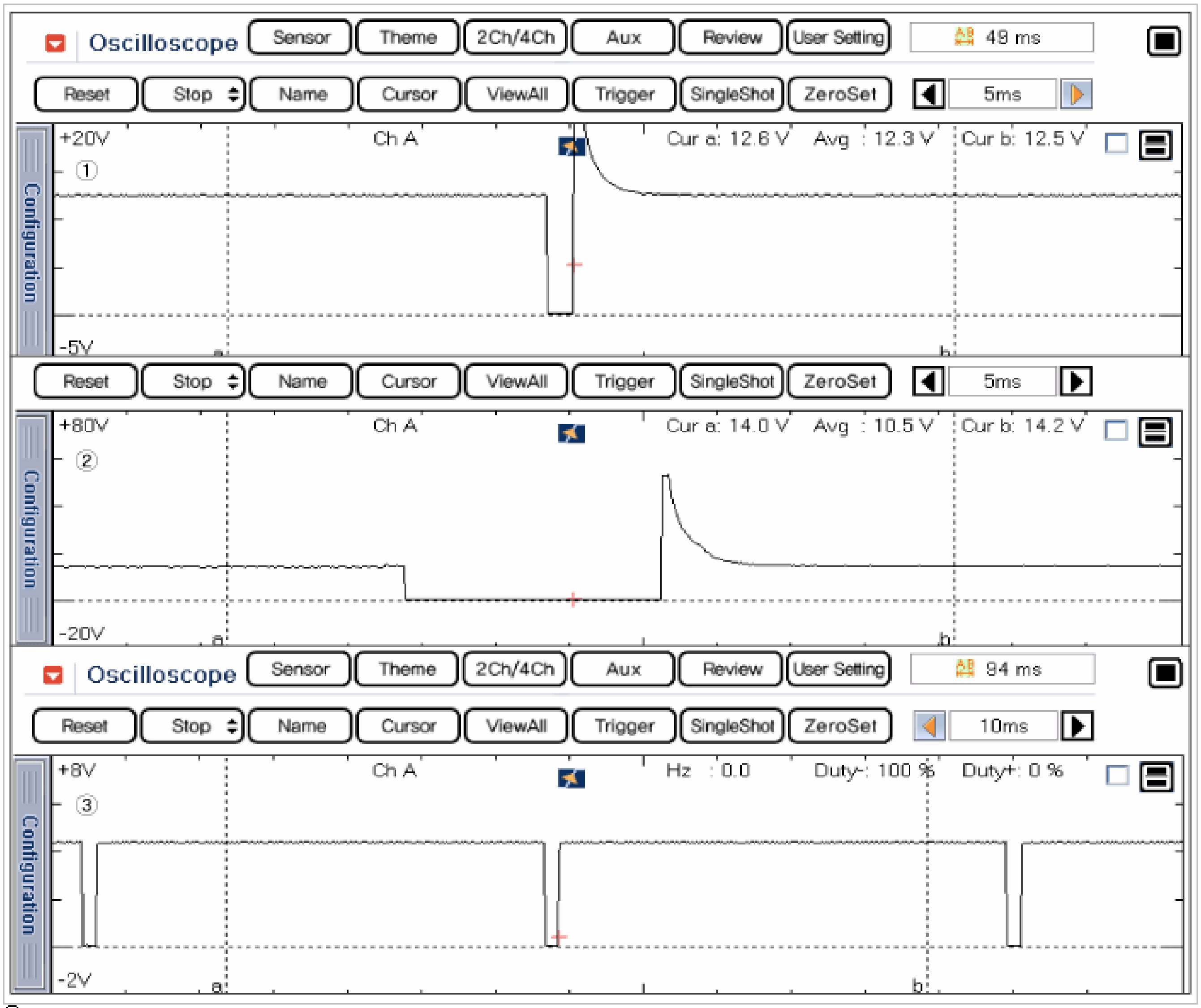
Specification

Temp.(°C)	Temp.(°C)	PCSV Resistance(Ω)
20	68	19 ~ 22

Diagnostic Circuit Diagram



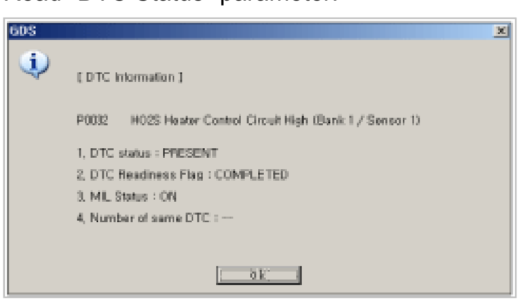
Signal Waveform & Data



① PCSV Control Waveform (Key-On)
② PCSV Control Waveform (Idle)
③ PCSV Control Waveform (Control Circuit Open / Key-On / ECM Side)

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Component Inspection

1. Ignition "OFF"
2. Disconnect PCSV connector
3. Measure resistance between power terminal and signal terminal of PCSV connector(Component side).

Temp.(°C)	Temp.(°C)	PCSV Resistance(Ω)
20	68	19 ~ 22

4. Is resistance within the specification?

YES	▶ Go to next step as below
NO	▶ Check PCSV for contamination, deterioration, or damage. 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

Power Circuit Inspection

1. Ignition "ON" & Engine "OFF"
2. Measure voltage between power terminal of PCSV harness connector and chassis ground.

Specification : Approx. B+

3. Is voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Check for a open in the power supply circuit. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Control Circuit Inspection

1. Measure voltage between power terminal of the PCSV harness connector and chassis ground.

Specification : Approx. 4~5V

2. Is voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Check control circuit for open or short. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Terminal and connection inspection

1. 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.

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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

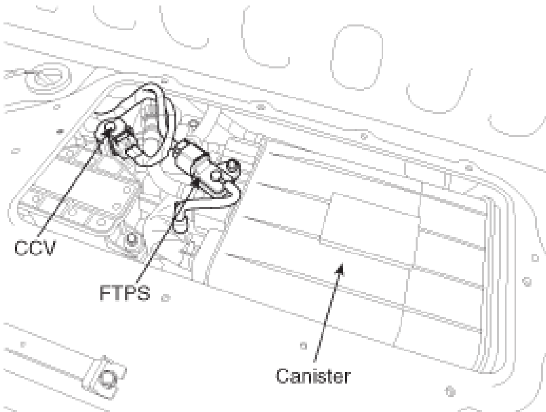
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The evaporative emissions system prevents hydrocarbon (HC) vapors from the fuel tank from escaping into the atmosphere where they could form photochemical smog. Gasoline vapors are collected in the charcoal canister. The Canister Closing Valve (CCV) closes off the air inlet into the canister for leak detection of the evaporative emission system. The CCV also prevents fuel vapors from escaping from the canister. When the engine purges the HC vapors from the canister, the clean air comes into the canister through the canister air-filter and the CCV.

DTC Description

ECM sets DTC P0447 if the ECM detects that the CCV control line is open.

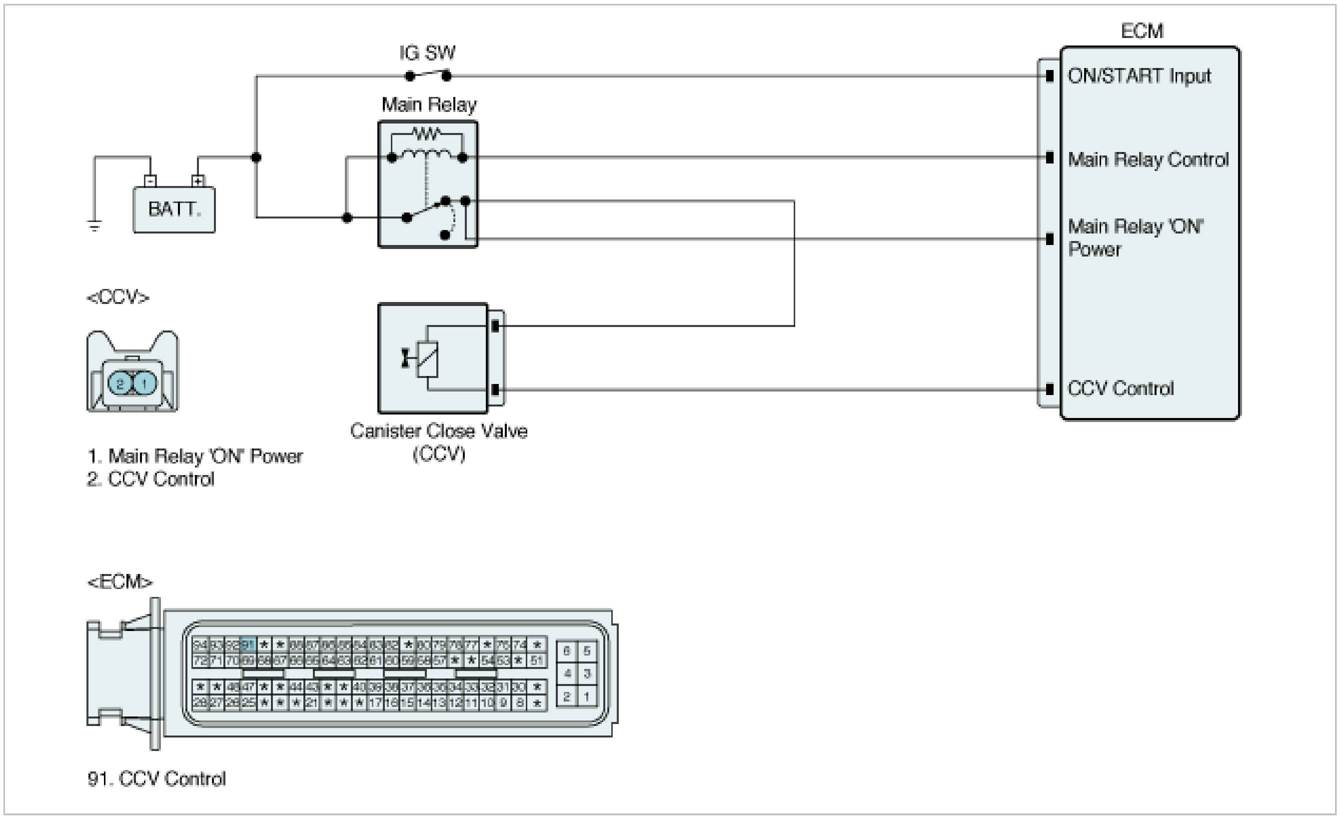
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical check	• Open in CCV harness • Poor connection or damaged harness • Faulty CCV
Enable Conditions	• 10V < Battery voltage < 16V	
Threshold Value	• Open in control circuit	
Diagnostic Time	• 3 sec	
Mil On Condition	• 2 Driving Cycles	

Specification

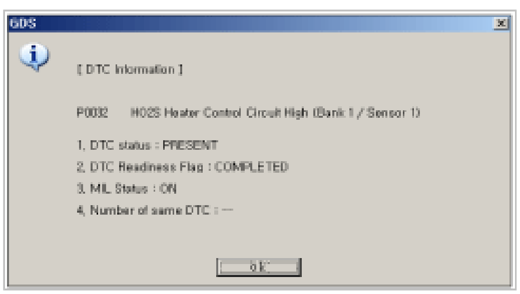
Canister Close Valve	Normal Parameter At 20°C (68°F)
Resistance	23 ~ 26Ω

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and Connector inspection

1. 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.
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	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Power Circuit Inspection

■ Check for Short to Ground in Power Circuit

1. IG KEY 'OFF'.
2. Disconnect CCV harness connector.
3. Measure resistance between power terminal of CCV harness connector and chassis ground.

Specification : Infinite

4. Is resistance within the specification?

YES	▶ Go to next procedure.
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ Check for Open in Power Circuit

1. IG KEY 'OFF'.
2. Disconnect CCV harness connector.
3. IG KEY 'ON'.
4. Measure voltage between power terminal of CCV harness connector and chassis ground.

Specification : Approx. 12V

5. Is voltage within the specification?

YES	▶ Go to next procedure.
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Control Circuit Inspection

■ Check for Open in Control Circuit

1. IG KEY 'OFF'.
2. Disconnect CCV harness connector.
3. IG KEY 'ON'.
4. Measure voltage between control terminal of CCV harness connector and chassis ground.

Specification : Approx. 4V

5. Is voltage within the specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. IG KEY 'OFF'.
2. Disconnect CCV harness connector.
3. Measure resistance between control terminal and power terminal of CCV connector. (Component side)
   Specification

Canister Close Valve	Normal Parameter At 20°C (68°F)
Resistance	23 ~ 26Ω

4. Is resistance within the specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Substitute with a known-good component and check for proper operation. If the problem is corrected, replace it and then go to "Verification of Vehicle Repair" procedure.

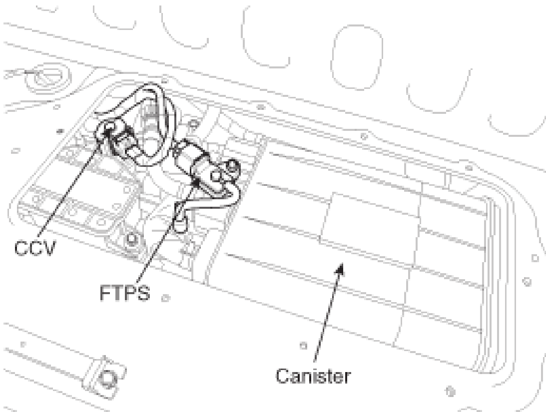
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The evaporative emissions system prevents hydrocarbon (HC) vapors from the fuel tank from escaping into the atmosphere where they could form photochemical smog. Gasoline vapors are collected in the charcoal canister. The Canister Closing Valve (CCV) closes off the air inlet into the canister for leak detection of the evaporative emission system. The CCV also prevents fuel vapors from escaping from the canister. When the engine purges the HC vapors from the canister, the clean air comes into the canister through the canister air-filter and the CCV.

DTC Description

ECM sets DTC P0448 if the ECM detects that the CCV control line is short to ground or short to battery line.

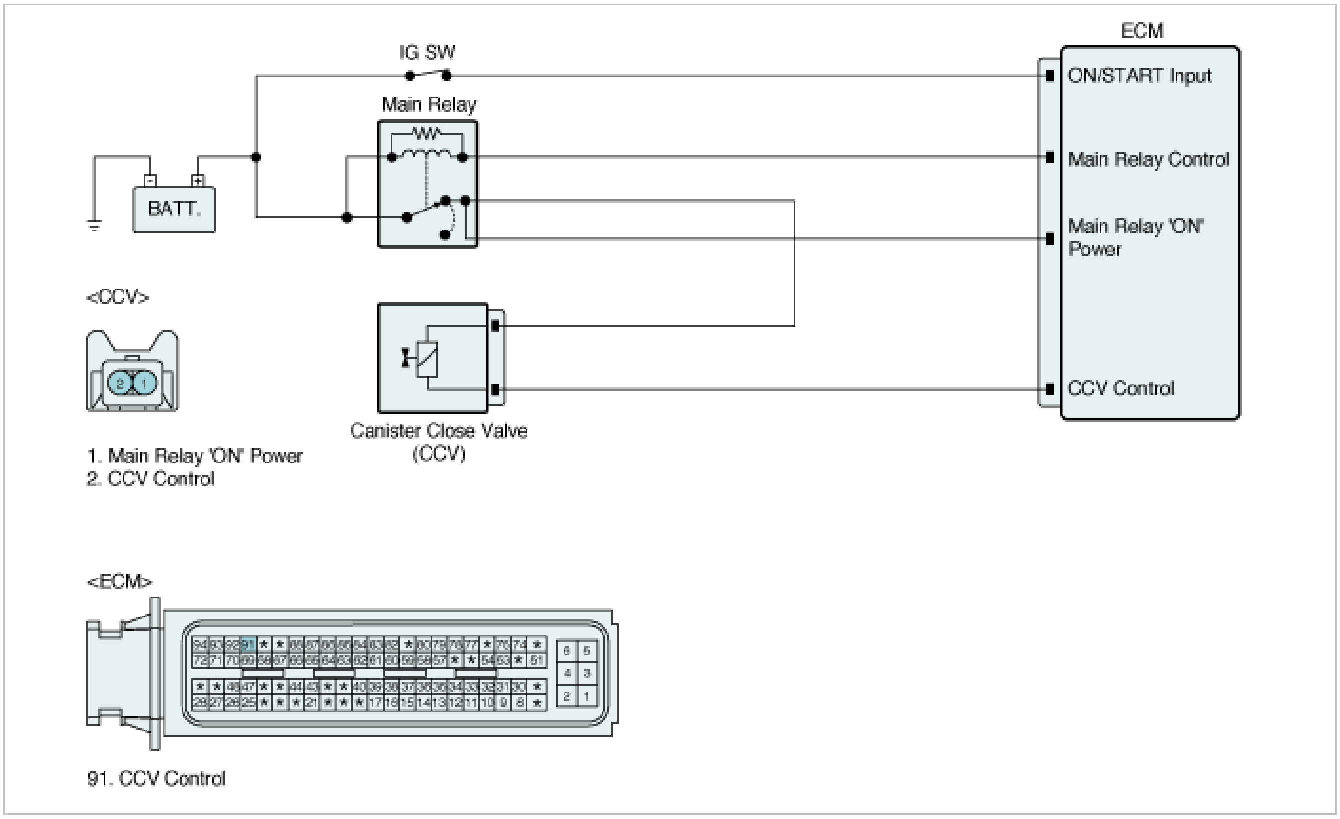
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical check	• Short in CCV harness • Poor connection or damaged harness • Faulty CCV
Enable Conditions	• 10V < Battery voltage < 16V	
Threshold Value	• Short to Ground or Short to Power in control circuit	
Diagnostic Time	• 3 sec	
Mil On Condition	• 2 Driving Cycles	

Specification

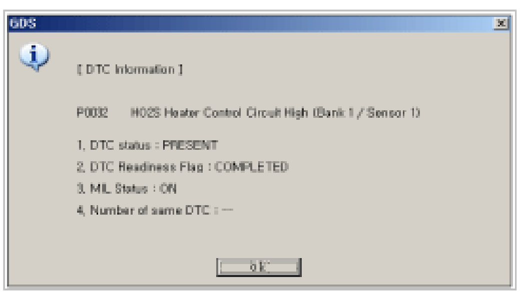
Canister Close Valve	Normal Parameter At 20°C (68°F)
Resistance	23 ~ 26Ω

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and Connector inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Control Circuit Inspection

■ **Check for Short to Ground or Power in Control Circuit**

1. IG KEY 'OFF'.
2. Disconnect CCV harness connector.
3. IG KEY 'ON'.
4. Measure voltage between control terminal of CCV harness connector and chassis ground.

Specification : Approx. 4V

5. Is voltage within the specification?

YES	▸ Go to next procedure.
NO	▸ Case 0V : Repair short to ground in control circuit and go to "Verification of Vehicle Repair" procedure. ▸ Case 12V : Repair short to power in control circuit and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. IG KEY 'OFF'.
2. Disconnect CCV harness connector.
3. Measure resistance between control terminal and power terminal of CCV connector. (Component side)
   Specification

Canister Close Valve	Normal Parameter At 20°C (68°F)
Resistance	23 ~ 26Ω

4. Is resistance within the specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Substitute with a known-good component and check for proper operation. If the problem is corrected, replace it and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

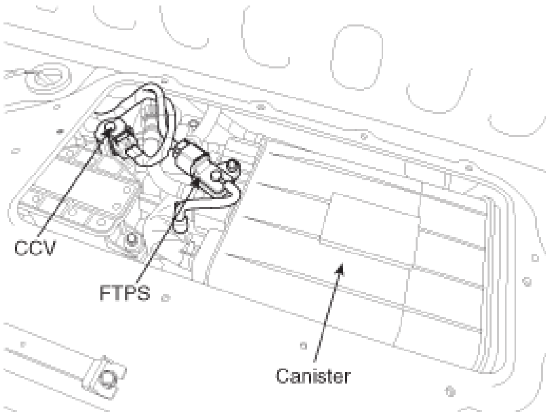
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The evaporative emissions system prevents hydrocarbon (HC) vapors from the fuel tank from escaping into the atmosphere where they could form photochemical smog. Gasoline vapors are collected in the charcoal canister. The Canister Closing Valve (CCV) closes off the air inlet into the canister for leak detection of the evaporative emission system. The CCV also prevents fuel vapors from escaping from the canister. When the engine purges the HC vapors from the canister, the clean air comes into the canister through the canister air-filter and the CCV.

DTC Description

The ECM measures pressure in the fuel tank by means of tank pressure sensor during all engine operating states except engine stop and start. ECM sets DTC P0449 if the ECM detects that the fuel tank pressure is too low as a result of the stuck closed CCV.

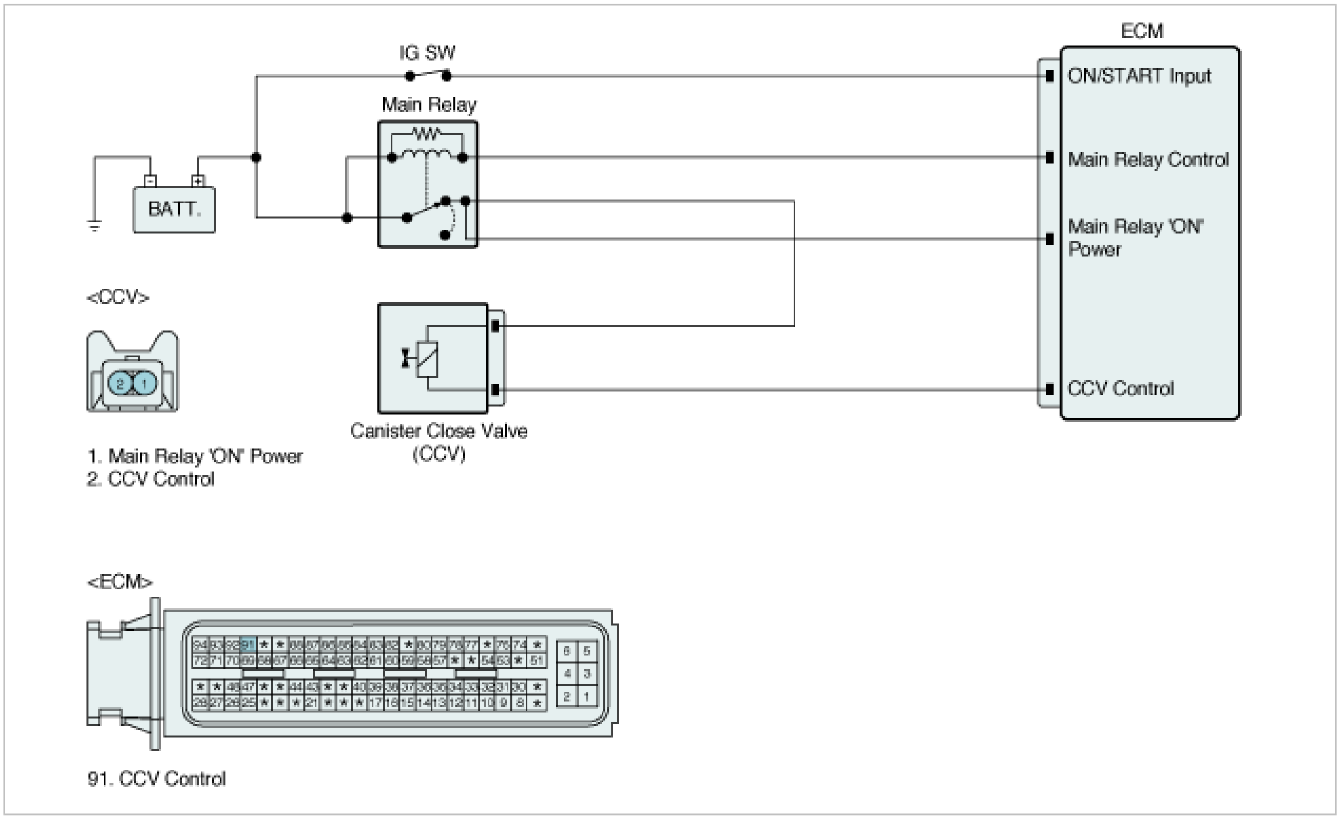
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Ventilation control valve stuck closed	• Canister air filter contamination • Faulty CCV
Enable Conditions	• Leak detection test not active • 11V < Battery voltage < 16V	
Threshold Value	• Differential Fuel Tank Pressure < -3500 Pa(-35 hPa)	
Diagnostic Time	• 10 sec	
Mil On Condition	• 2 Driving Cycles	

Specification

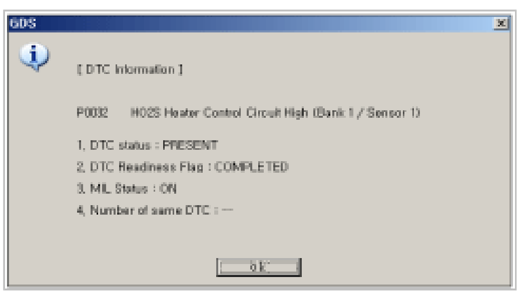
Canister Close Valve	Normal Parameter At 20°C (68°F)
Resistance	23 ~ 26Ω

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and Connector inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Canister Air-Filter inspection

1. Disassemble the Canister Air-Filter and hose from their respective positions.
2. Check the Canister air-filter for contamination.
3. Is Canister Air-Filter contaminated with dust?

YES	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Go to "Canister Close Valve(CCV) inspection" procedure

Canister Close Valve(CCV) Line Inspection

1. Reconnect all EVAP hardware that was previously disconnected.
2. Disconnect hose connecting Canister Closing Valve(CCV) to canister.
3. Ignition "ON" & Engine "OFF"
4. Blow air to the canister side of the valve and verify air escapes to the air filter side.
5. Install GDS and select "CANISTER CLOSE VALVE" on the Actuation Test mode.
6. Activates "CANISTER CLOSE VALVE" by clicking "START" icon.
7. Blow air into hose and verify air does not escape.
8. Repeat this procedure 4 or 5 times to ensure CCV reliability.
9. Is CCV working properly?

YES	▸ Check for poor connection between PCM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ If CCV was stuck closed, inspect all lines and canister for liquid fuel. Replace any contaminated components and blow out lines. Check CCV for contamination, deterioration, or damage. Substitute with a known-good CCV and check for proper operation. If the problem is corrected, replace CCV and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

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

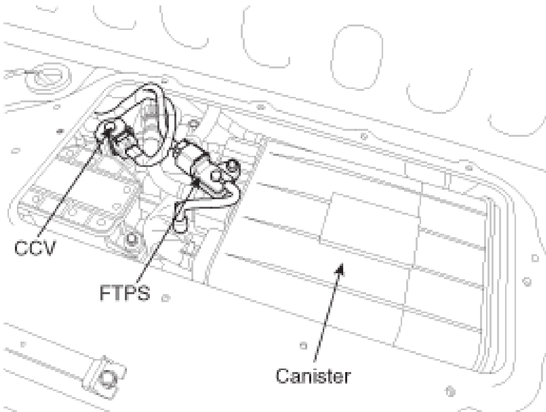
1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" and confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

YES	▸ System performing to specification at this time. Clear the DTC.
	▸ Go to the applicable troubleshooting procedure.

NO	

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0451 Evaporative Emission System-Pressure Sensor Range / Performance

Component Location



General Description

The evaporative emission control system prevents hydrocarbon vapors from escaping from the fuel tank into the atmosphere where they could form photochemical smog. Gasoline vapors are collected in the charcoal canister. The Fuel Tank Pressure Sensor (FTPS) is an integral part of the evaporative monitoring system. The ECM monitors the FTPS signal to detect vacuum decay and excess vacuum. The FTPS measures the difference between the air pressure inside the fuel tank and outside air pressure to check the purge control solenoid valve operation and for leak detection in the evaporative emission control system by monitoring pressure and vacuum levels in the fuel tank during the purge control solenoid valve operating cycles.

DTC Description

The ECM monitors pressure in the fuel tank by means of Fuel Tank Pressure Sensor (FTPS) during purge control valve opening or closing phase. This monitoring will determine if pressure sensor signal is stuck. The ECM sets DTC P0451 if pressure variation is smaller than the predetermined threshold.

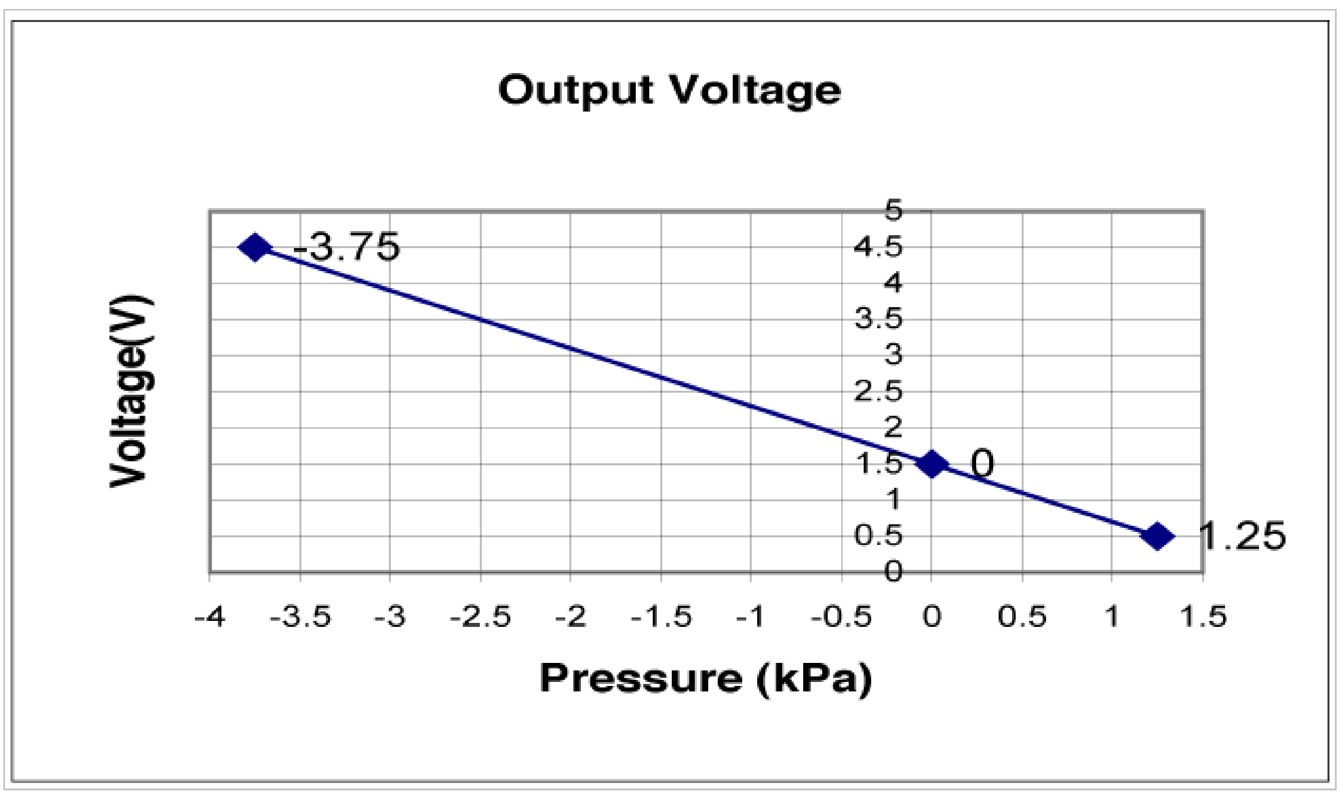
DTC Detecting Condition

<table>
<tr><th colspan="2">Item</th><th>Detecting Condition</th><th>Possible Cause</th></tr>
<tr><td rowspan="4">Case 1</td><td>DTC Strategy</td><td>• Signal Stuck in range</td><td rowspan="6">• Poor connection or damaged harness
• Faulty FTPS
• Faulty PCSV</td></tr>
<tr><td>Enable Conditions</td><td>• Vehicle Speed > 31mph at least one time during driving cycle
• Canister Purge Flow > 0.42g/sec (1.5kg/h) (Uninterupted 15 sec.)
• Fuel level < 85%
• Modeled Ambient Temperature > -10°C (14°F)
• Canister Load < 0.5
• No relevant DTCs</td></tr>
<tr><td>Threshold Value</td><td>• Signal Variation < 40 mV</td></tr>
<tr><td>Diagnostic Time</td><td>• 15 sec</td></tr>
<tr><td rowspan="2">Case 2</td><td>DTC Strategy</td><td>• Signal Stuck High</td></tr>
<tr><td>Enable Conditions</td><td>• Canister Purge Flow > 0.42g/sec (1.5kg/h)
• Fuel level < 85%
• Modeled Ambient Temperature > -10°C (14°F)
• Canister Load < 0.5</td></tr>
</table>

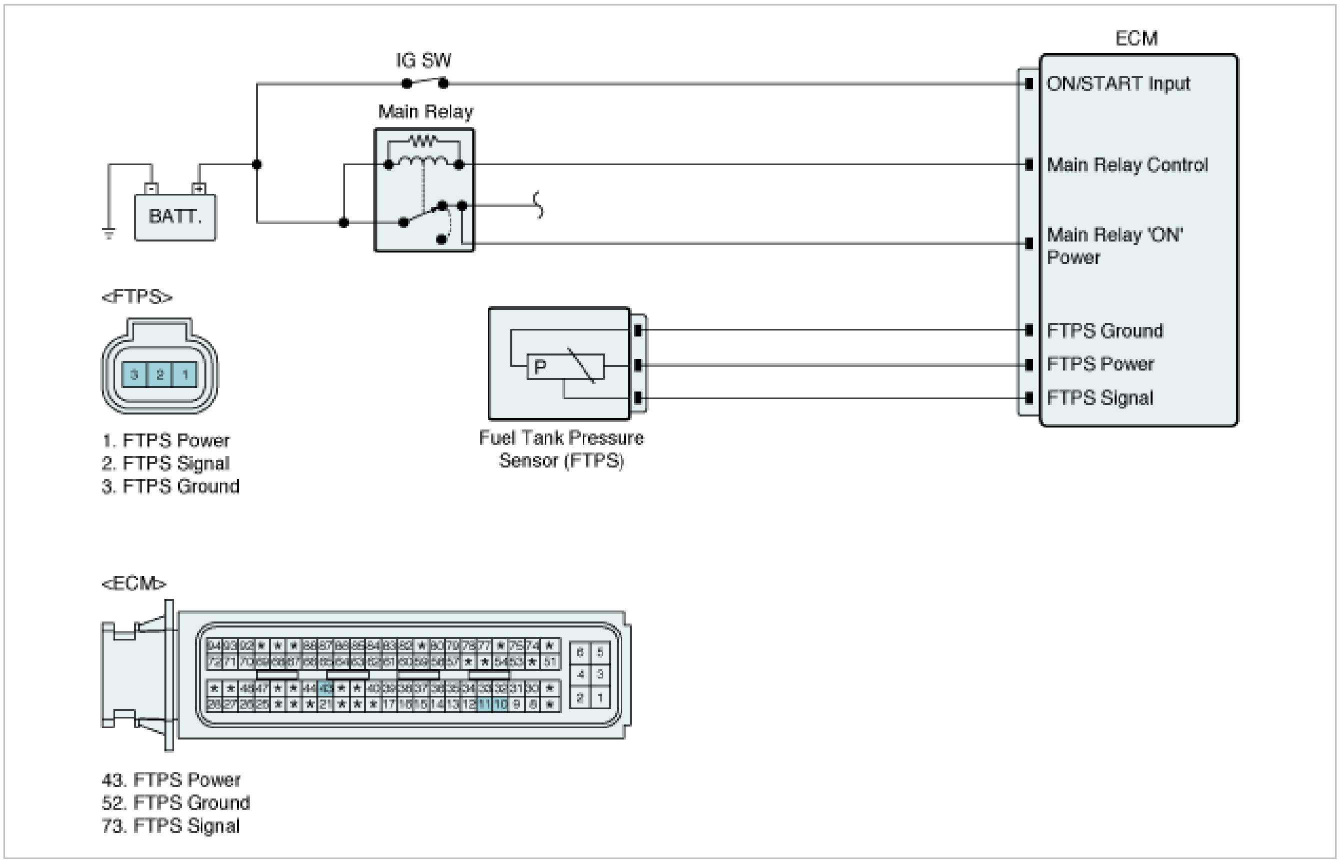
		• Coolant Temp. > 50°C (122°F) • No relevant DTCs	• Fuel Cap missing
	Threshold Value	• Fuel Tank Pressure > 400 Pa	
	Diagnostic Time	• 30 sec	
Case 3	DTC Strategy	• Signal Stuck Low	
	Enable Conditions	• Canister Purge Valve closed • Fuel level < 85% • Modeled Ambient Temperature > -10°C (14°F) • Coolant Temp. > -10°C (14°F) • No relevant DTCs	
	Threshold Value	• -3500 Pa < Fuel Tank Pressure < -1100 Pa	
	Diagnostic Time	• 40 sec	
Mil On Condition		• 2 driving cycle	

Specification

Pressure (kPa)	-3.75	0	1.25
Output voltage (V)	4.5 V	1.5 V	0.5 V

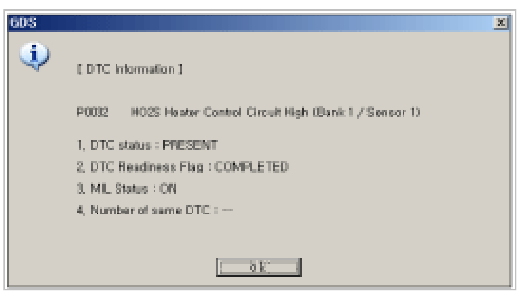


Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Terminal and Connector inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Fuel Filler Cap Inspection

1. Check fuel filler cap for being tightly installed, has o-ring seal installed and is in good condition.
2. Verify cap releases pressure / vacuum at specified values

Specification : Approx. 2 psi pressure and approximately 1.5 inches of mercury vacuum).

3. Are cap, o-ring and release pressures okay?

YES	▸ Thoroughly check fuel filler pipe for cracks, damage and o-ring seat for deformation and replace as necessary. Go to next step as below.
NO	▸ Replace fuel filler cap and go to "Verification of Vehicle Repair" procedure.

Fuel Tank Pressure Sensor Inspection

1. Ignition "ON" & Engine "OFF" .
2. Disconnect hose connecting FTPS to the Fuel Tank.
3. Using a vacuum pump, apply vacuum to the hose connecting to FTPS.
4. Measure FTPS output voltage between signal terminal of the FTPS harness connector and chassis ground.

Specification : Voltage increases proportionally with decreasing pressure.

Pressure(kPa)	Voltage(V)
-3.75	4.5
0	1.5
1.25	0.5

5. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Check for cracks or damage in hose connecting canister and fuel pump. Repair or replace as necessary. ▸ Check for open or short in FTPS harness. Repair as necessary. If OK, test with a new FTPS and check for proper operation. If problem is corrected, replace FTPS and go to "Verification of Vehicle Repair" procedure

PCSV Inspection

1. Ignition "OFF"
2. Disconnect the hose leading from the PCSV to intake manifold at intake manifold.

3. Using a vacuum pump, apply vacuum to the manifold side of the vacuum hose and verify PCSV holds vacuum.
4. Ignition "ON" & Engine "OFF"
5. Install GDS and select "Canister Purge Valve" on the Actuation Test mode
6. Activates "Canister Purge Valve" by clicking "Start" icon.
7. Verify PCSV release vacuum while valve is activating(should hear a faint click from PCSV)
8. Repeat this procedure 4 or 5 times to ensure PCSV reliability.
   Specification:

Test Condition	Specification
PCSV is ON(should hear a faint click from PCSV)	Holds vacuum
PCSV is OFF	Release vacuum

9. Is PCSV working properly?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Verify arrow on PCSV is pointing towards intake manifold. If it is not, reverse installation. Reinstall as necessary and go to "Verification of Vehicle Repair" procedure. ▸ If OK, thoroughly check fuel vapor hoses and hose clamps between PCSV and intake manifold. Repair as necessary. If OK, test with a new PCSV and check for proper operation. If problem is corrected, replace PCSV and go to "Verification of Vehicle Repair" procedure.

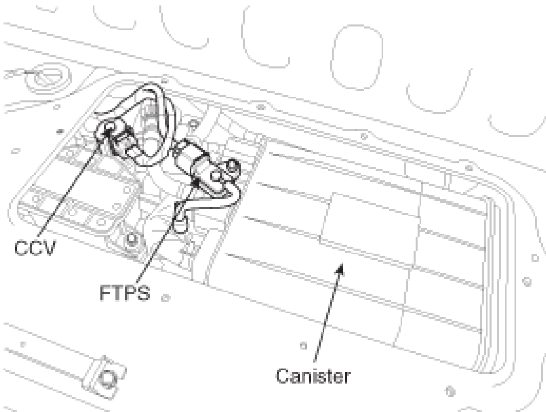
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The evaporative emission control system prevents hydrocarbon vapors from escaping from the fuel tank into the atmosphere where they could form photochemical smog. Gasoline vapors are collected in the charcoal canister. The Fuel Tank Pressure Sensor (FTPS) is an integral part of the evaporative monitoring system. The ECM monitors the FTPS signal to detect vacuum decay and excess vacuum. The FTPS measures the difference between the air pressure inside the fuel tank and outside air pressure to check the purge control solenoid valve operation and for leak detection in the evaporative emission control system by monitoring pressure and vacuum levels in the fuel tank during the purge control solenoid valve operating cycles.

DTC Description

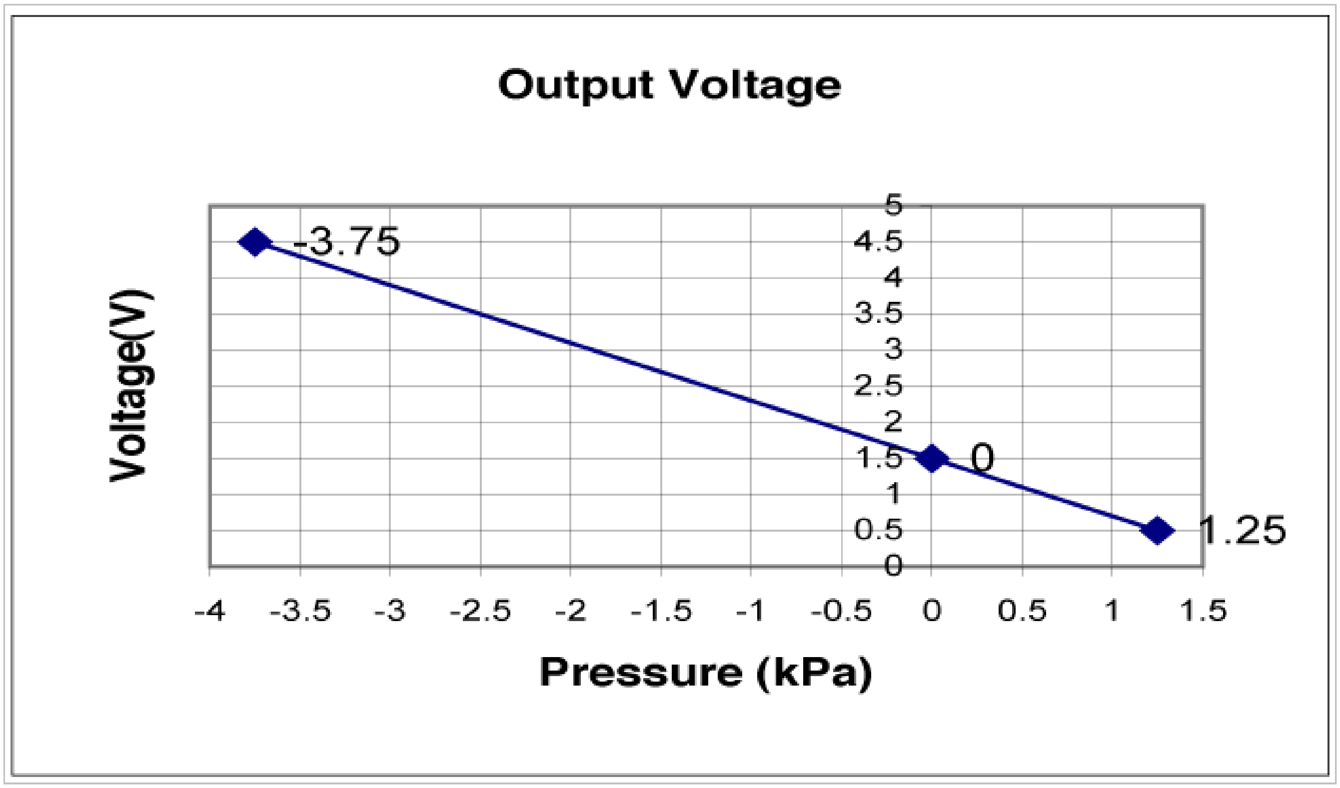
ECM sets DTC P0452 if the ECM detects signal voltage lower than the possible range of a properly operating FTPS.

DTC Detecting Condition

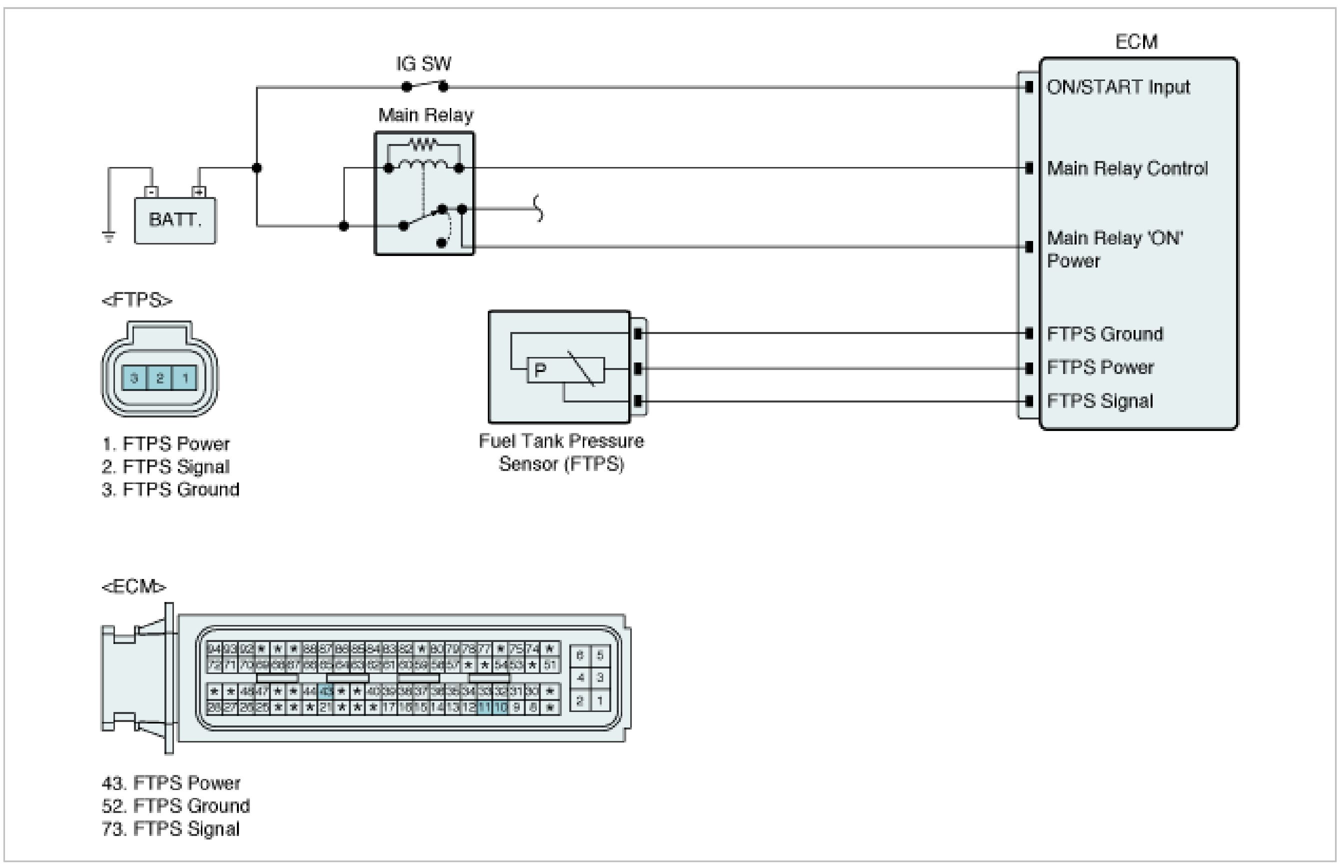
Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical check	• Short to ground in FTPS harness • Poor connection or damaged harness • Faulty FTPS
Enable Conditions	• 11V < Battery voltage < 16V	
Threshold Value	• Tank pressure signal < 0.1V	
Diagnostic Time	• 0.5 sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

Pressure (kPa)	-3.75	0	1.25
Output voltage (V)	4.5 V	1.5 V	0.5 V



Diagnostic Circuit Diagram

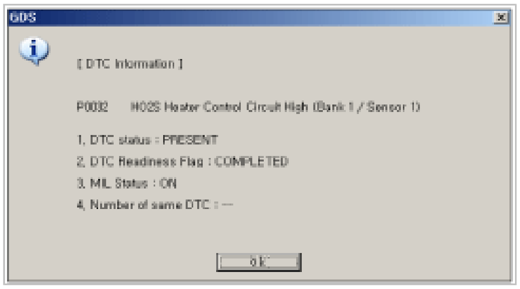


Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the

freeze frame data or enable conditions.

4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and Connector inspection

1. 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.
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	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Power Circuit Inspection

1. IG KEY 'OFF'.
2. Disconnect FTPS harness connector.
3. IG KEY 'ON'.
4. Measure voltage between power terminal of FTPS harness connector and chassis ground.

Specification : Approx. 5V

5. Is voltage within specification?

YES	▶ Go to next procedure.
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Signal Circuit Inspection

■ **Check for Short to Ground in Signal Circutil**

1. IG KEY 'OFF'.
2. Disconnect FTPS harness connector.
3. IG KEY 'ON'.
4. Measure voltage between signal terminal of FTPS harness connector and chassis ground.

Specification : Approx. 5V

5. Is voltage within specification?

YES	▶ Go to next procedure.
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Ignition "ON" & Engine "OFF" .
2. Disconnect hose connecting FTPS to the Fuel Tank.
3. Using a vacuum pump, apply vacuum to the hose connecting to FTPS.
4. Measure FTPS output voltage between signal terminal of the FTPS harness connector and chassis ground.

Specification : Voltage increases proportionally with decreasing pressure.

Pressure(kPa)	Voltage(V)
-3.75	4.5
0	1.5
1.25	0.5

5. Is voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Check for cracks or damage in hose connecting canister and fuel pump. Repair or replace as necessary. ▶ Check for open or short in FTPS harness. Repair as necessary. If OK, test with a new FTPS and check for proper operation. If problem is corrected, replace FTPS and go to "Verification of Vehicle Repair" procedure

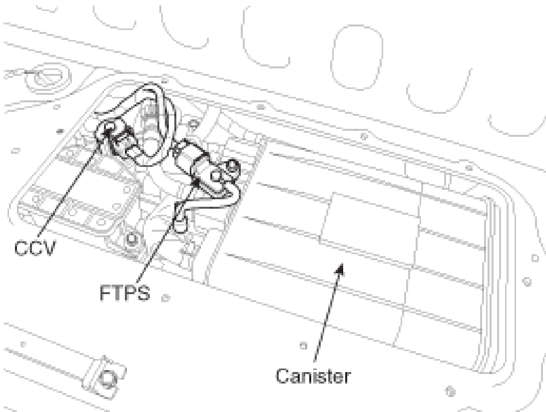
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The evaporative emission control system prevents hydrocarbon vapors from escaping from the fuel tank into the atmosphere where they could form photochemical smog. Gasoline vapors are collected in the charcoal canister. The Fuel Tank Pressure Sensor (FTPS) is an integral part of the evaporative monitoring system. The ECM monitors the FTPS signal to detect vacuum decay and excess vacuum. The FTPS measures the difference between the air pressure inside the fuel tank and outside air pressure to check the purge control solenoid valve operation and for leak detection in the evaporative emission control system by monitoring pressure and vacuum levels in the fuel tank during the purge control solenoid valve operating cycles.

DTC Description

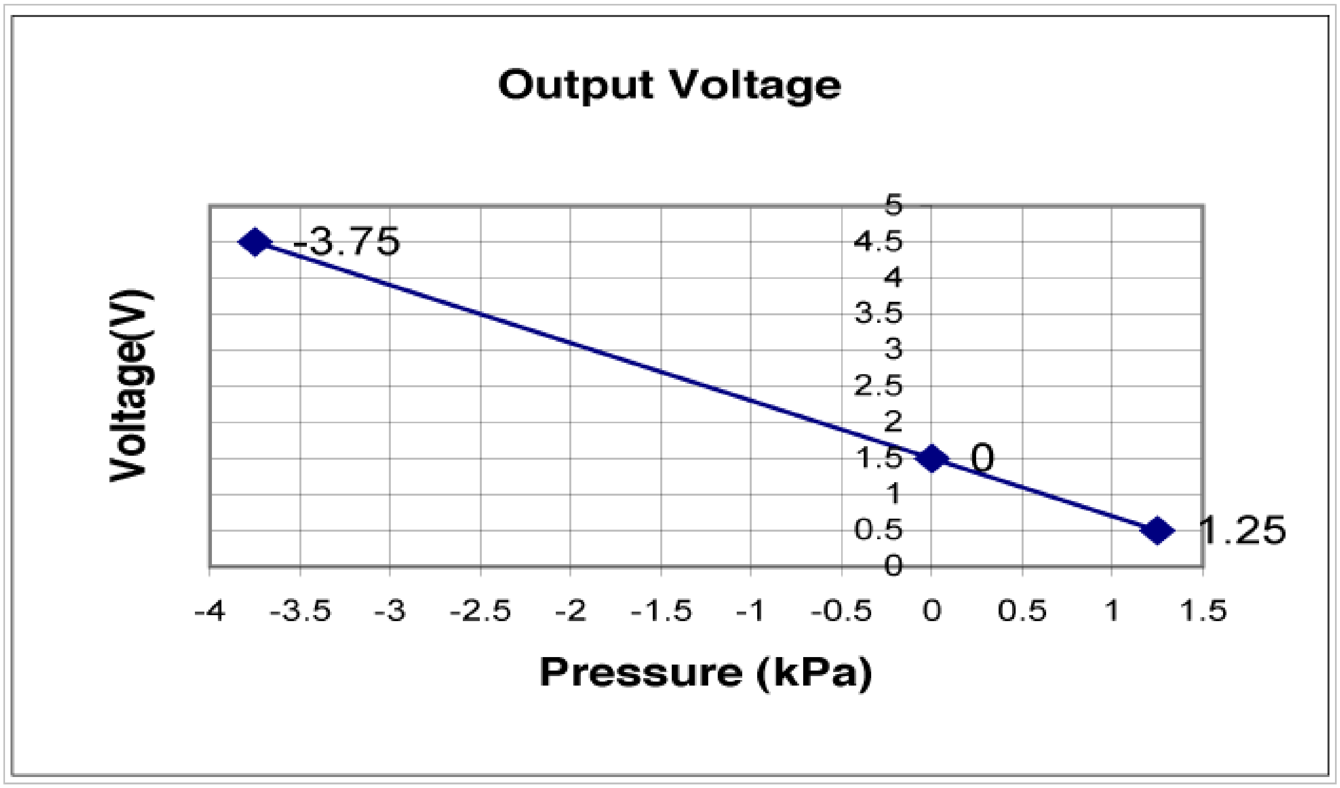
ECM sets DTC P0453 if the ECM detects signal voltage higher than the possible range of a properly operating FTPS.

DTC Detecting Condition

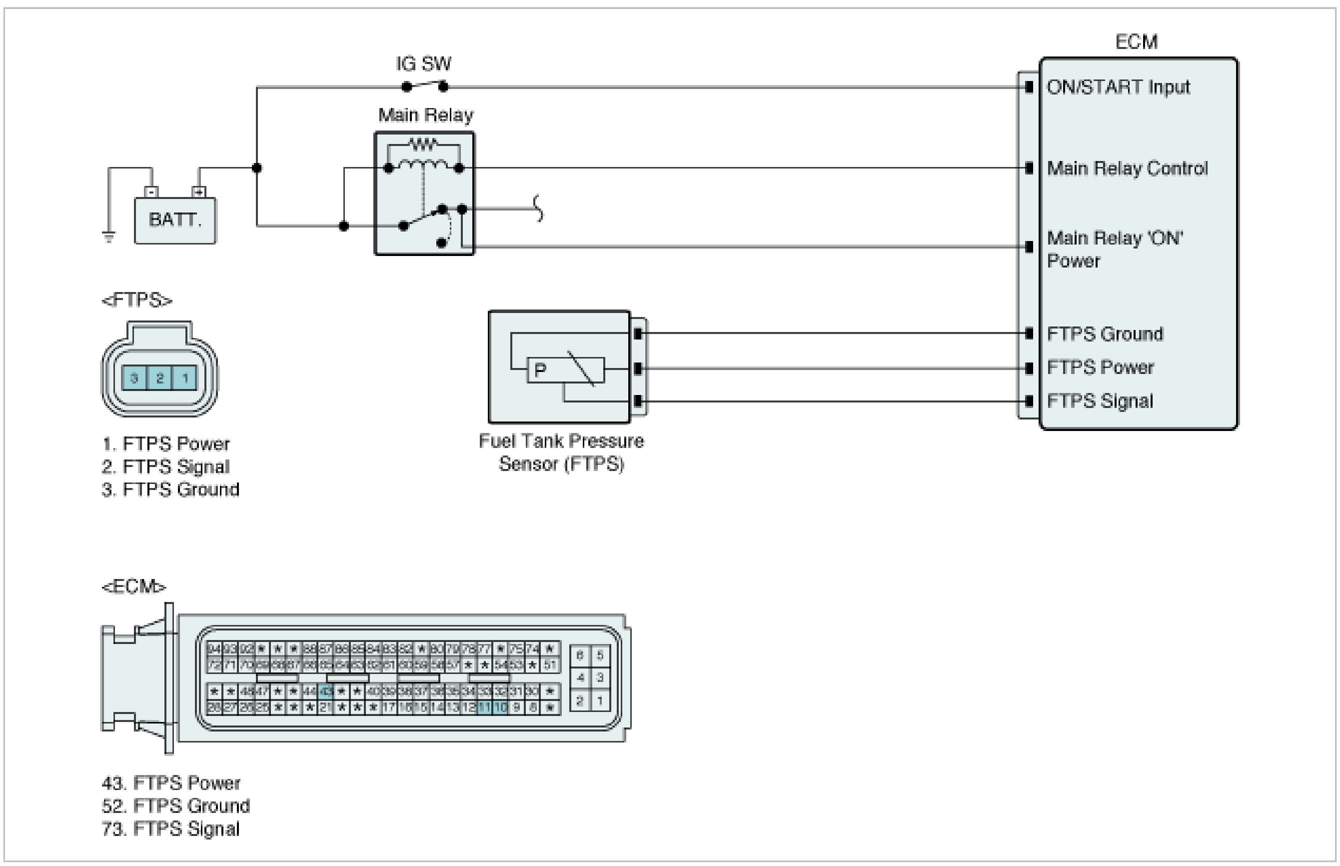
Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical check	• Short to battery in FTPS harness • Open in FTPS harness • Poor connection or damaged harness • Faulty FTPS
Enable Conditions	• 11V< Battery voltage < 16V	
Threshold Value	• Tank pressure signal > 4.9V	
Diagnostic Time	• 0.5 sec.	
Mil On Condition	• 2 Driving Cycles	

Specification

Pressure (kPa)	-3.75	0	1.25
Output voltage (V)	4.5 V	1.5 V	0.5 V



Diagnostic Circuit Diagram

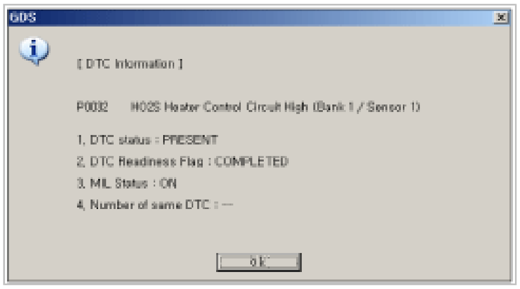


Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the

freeze frame data or enable conditions.

4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and Connector inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Ground Circuit Inspection

■ **Check for Open in Ground Circuit**

1. IG KEY 'OFF'.
2. Disconnect FTPS harness connector and ECM harness connector.
3. Measure resistance between both ends of ground line.

Specification : Below 1Ω

4. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Signal Circuit Inspection

■ **Check for Open in Signal Circuit**

1. IG KEY 'OFF'.
2. Disconnect FTPS harness connector.
3. IG KEY 'ON'.
4. Measure voltage between signal terminal of FTPS harness connector and chassis ground.

Specification : Approx. 5V

5. Is voltage within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ **Check for Short to Power in Signal Circuit**

1. IG KEY 'OFF'.
2. Disconnect FTPS harness connector and ECM harness connector.
3. IG KEY 'ON'.
4. Measure voltage between signal terminal of FTPS harness connector and chassis ground.

Specification : Approx. 0V

5. Is voltage within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Ignition "ON" & Engine "OFF" .
2. Disconnect hose connecting FTPS to the Fuel Tank.
3. Using a vacuum pump, apply vacuum to the hose connecting to FTPS.
4. Measure FTPS output voltage between signal terminal of the FTPS harness connector and chassis ground.

Specification : Voltage increases proportionally with decreasing pressure.

Pressure(kPa)	Voltage(V)
-3.75	4.5
0	1.5
1.25	0.5

5. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Check for cracks or damage in hose connecting canister and fuel pump. Repair or replace as necessary. ▸ Check for open or short in FTPS harness. Repair as necessary. If OK, test with a new FTPS and check for proper operation. If problem is corrected, replace FTPS and go to "Verification of Vehicle Repair" procedure

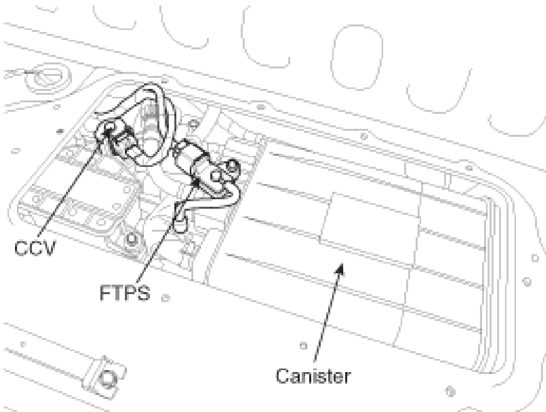
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The evaporative emission control system prevents hydrocarbon vapors from escaping from the fuel tank into the atmosphere where they could form photochemical smog. Gasoline vapors are collected in the charcoal canister. The Fuel Tank Pressure Sensor (FTPS) is an integral part of the evaporative monitoring system. The ECM monitors the FTPS signal to detect vacuum decay and excess vacuum. The FTPS measures the difference between the air pressure inside the fuel tank and outside air pressure to check the purge control solenoid valve operation and for leak detection in the evaporative emission control system by monitoring pressure and vacuum levels in the fuel tank during the purge control solenoid valve operating cycles.

DTC Description

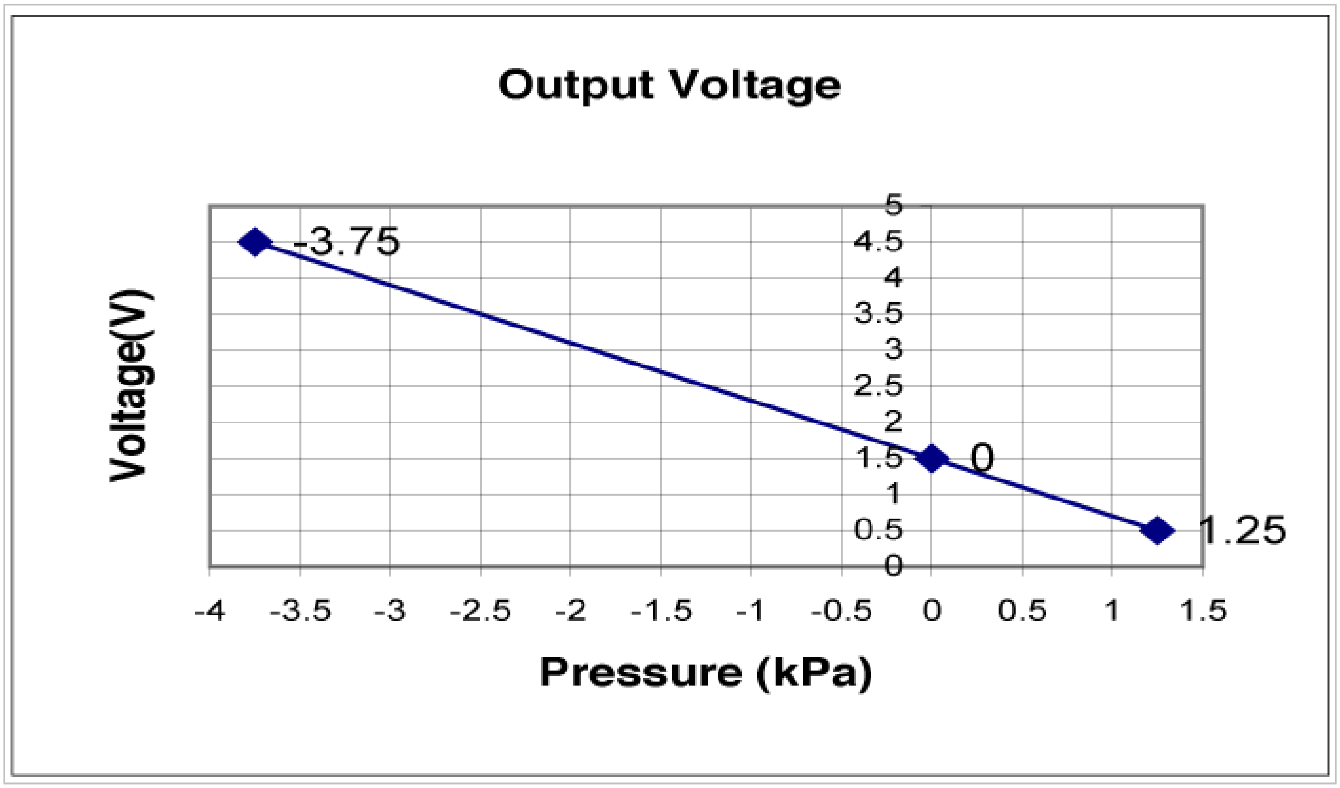
The ECM monitors pressure stability in the fuel tank by means of Fuel Tank Pressure Sensor (FTPS) for predetermined duration just before start the leakage monitoring to detect noise signal of pressure sensor. The ECM sets DTC P0454 if the pressure fluctuation is bigger than predetermined threshold.

DTC Detecting Condition

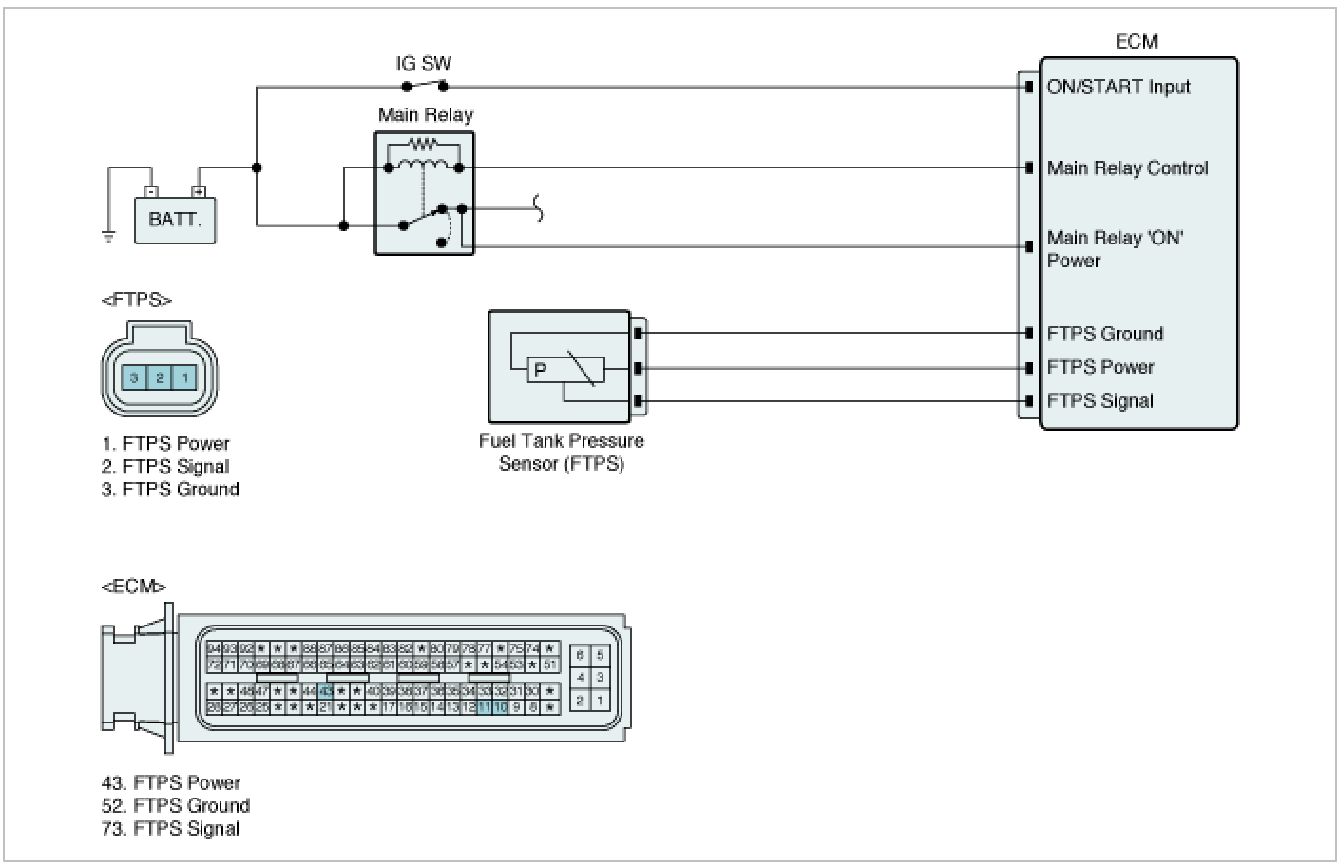
Item	Detecting Condition	Possible Cause
DTC Strategy	• Noisy signal check	• Poor connection or damaged harness • Faulty FTPS
Enable Conditions	• See conditions for very small Leak Detection (0.5 mm)	
Threshold Value	• Leak detection test inhibited more than 3 times due to noise in tank pressure signal	
Diagnostic Time	• 0.12 sec	
Mil On Condition	• 2 Driving Cycles	

Specification

Pressure (kPa)	-3.75	0	1.25
Output voltage (V)	4.5 V	1.5 V	0.5 V



Diagnostic Circuit Diagram

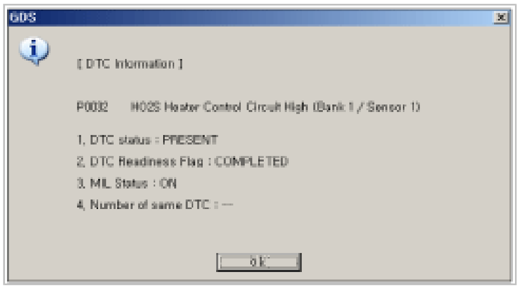


Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the

freeze frame data or enable conditions.

4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and Connector inspection

1. 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.
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	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Ignition "ON" & Engine "OFF" .
2. Disconnect hose connecting FTPS to the Fuel Tank.
3. Using a vacuum pump, apply vacuum to the hose connecting to FTPS.
4. Measure FTPS output voltage between signal terminal of the FTPS harness connector and chassis ground.

Specification : Voltage increases proportionally with decreasing pressure.

Pressure(kPa)	Voltage(V)
-3.75	4.5
0	1.5
1.25	0.5

5. Is voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Check for cracks or damage in hose connecting canister and fuel pump. Repair or replace as necessary. ▶ Check for open or short in FTPS harness. Repair as necessary.If OK, test with a new FTPS and check for proper operation. If problem is corrected, replace FTPS and go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0455 Evaporative Emission System-Leak detected(Large leak)

General Description

Due to the increasing ambient temperature of the fuel and the return of unused hot fuel from the engine, fuel vapors are generated in the tank. In order to control the release of these vapors to the atmosphere, the evaporative emissions control system is used. The evaporative emission control system reduces hydrocarbon (HC) emissions by trapping fuel tank vapors until they can be burned in the combustion process. Evaporating fuel is stored in a charcoal canister until it can be flushed into the intake manifold. The evaporative emission control system is made up of a fuel tank that can be completely sealed from outside air, a Fuel Tank Pressure Sensor (FTPS), a Canister Close Valve (CCV) that seals the canister from the outside air, a canister filled with activated charcoal granules, a Purge Control Solenoid Valve (PCSV). The evaporative emission system can be checked for leaks by sealing the system off from the outside air, creating a vacuum, and monitoring if the system can hold that vacuum sufficiently for a set amount of time. If it cannot, a leak exists somewhere in the system.

DTC Description

The ECM closes the Canister Close Valve (CCV) at the charcoal canister to seal off the evaporative emission system and then opens purge control valve (PCSV) to generate a vacuum in the fuel tank. This vacumm generation phase will determine if there is a large leak like tank cap open or canister shut off valve (CCV) stuck open. The ECM sets DTC P0455 if the pressure in the fuel tank does not drop as low as predetermined threshold during predetermined maximum vacuum generation period.

DTC Detecting Condition

<table>
<tr><th colspan="2">Item</th><th>Detecting Condition & Fail Safe</th><th>Possible Cause</th></tr>
<tr><td colspan="2">DTC Strategy</td><td>• Check fuel tank underpressure during evacuation</td><td rowspan="8">• Fuel filler cap damage or missing
• Faulty or damaged fuel filler pipe
• Leaking, disconnected or plugged fuel vapor lines
• Faulty CCV
• Faulty PCSV
• Faulty Canister
• Faulty Fuel Tank Pressure Sensor (FTPS)</td></tr>
<tr><td colspan="2">Enable Conditions</td><td>• See conditions for very small Leak Detection (0.5 mm)</td></tr>
<tr><td rowspan="2">Threshold Value</td><td>case 1</td><td>• Time to generate underpressure > 20 sec.</td></tr>
<tr><td>case 2</td><td>• Time for DTP to decrease from -300 Pa(-3 hPa) to -700 Pa(-7 hPa) during Evacuation > 10 sec.</td></tr>
<tr><td rowspan="2">Diagnostic Time</td><td>case 1</td><td>• 25 sec. in Idle when all Enable Conditions fulfilled</td></tr>
<tr><td>case 2</td><td>• 15 sec. in Idle when all Enable Conditions fulfilled</td></tr>
<tr><td colspan="2">Mil On Condition</td><td>• 2 Driving Cycles</td></tr>
</table>

Monitor DTC Status

1. Start engine to normal operating temperature

> NOTE
>
> Evaporative Emissions Systems (EVAP) Leak Tests can be run by the GDS. The tests are automated and provide either a pass-fail result or directions to check for DTCs.

2. Install scan tool and clear DTC
3. Perform "EVAP. LEAKAGE TEST" mode referring to enable conditions as below

> NOTE
>
> EVAP. Leakage Test enable conditions
> - Following conditions must be fulfilled to start the test.
> 1) Engine warm up at Idle Status

2) No relevant DTC 3) Fuel level is below 80%

4. Is DTC P0442 set again?

YES	▶ Go to next step as below
NO	▶ 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.

Fuel Filler Cap Inspection

1. Check fuel filler cap for being tightly installed, has o-ring seal installed and is in good condition.
2. Verify cap releases pressure / vacuum at specified values

Specification : Approx. 2 psi pressure and approximately 1.5 inches of mercury vacuum).

3. Are cap, o-ring and release pressures okay?

YES	▶ Thoroughly check fuel filler pipe for cracks, damage and o-ring seat for deformation and replace as necessary. Go to next step as below.
NO	▶ Replace fuel filler cap and go to "Verification of Vehicle Repair" procedure.

PCSV to Intake manifold Line Inspection

1. Ignition "OFF"
2. Disconnect the hose leading from the PCSV to intake manifold at intake manifold.
3. Using a vacuum pump, apply vacuum to the manifold side of the vacuum hose and verify PCSV holds vacuum.
4. Ignition "ON" & Engine "OFF"
5. Install GDS and select "Canister Purge Valve" on the Actuation Test mode
6. Activates "Canister Purge Valve" by clicking "Start" icon.
7. Verify PCSV release vacuum while valve is activating(should hear a faint click from PCSV)
8. Repeat this procedure 4 or 5 times to ensure PCSV reliability.
Specification:

Test Condition	Specification
PCSV is ON(should hear a faint click from PCSV)	Holds vacuum
PCSV is OFF	Release vacuum

9. Is PCSV working properly?

YES	▶ Go to next step as below
NO	▶ Verify arrow on PCSV is pointing towards intake manifold. If it is not, reverse installation. Reinstall as necessary and go to "Verification of Vehicle Repair" procedure. ▶ If OK, thoroughly check fuel vapor hoses and hose clamps between PCSV and intake manifold. Repair as necessary. If OK, test with a new PCSV and check for proper operation. If problem is corrected, replace PCSV and go to "Verification of Vehicle Repair" procedure.

Canister Close Valve(CCV) Line Inspection

1. Reconnect all EVAP hardware that was previously disconnected.
2. Disconnect hose connecting Canister Closing Valve(CCV) to canister.
3. Ignition "ON" & Engine "OFF"
4. Blow air to the canister side of the valve and verify air escapes to the air filter side.
5. Install GDS and select "CANISTER CLOSE VALVE" on the Actuation Test mode.
6. Activates "CANISTER CLOSE VALVE" by clicking "START" icon.
7. Blow air into hose and verify air does not escape.
8. Repeat this procedure 4 or 5 times to ensure CCV reliability.
9. Is CCV working properly?

YES	▶ Go to next step as below
NO	▶ Check for cracks or damage in hose connecting CCV and canister. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure. ▶ If OK, replace CCV. If CCV was stuck closed, inspect all lines and canister for liquid fuel. Replace any contaminated components and blow out lines and go to "Verification of Vehicle Repair" procedure.

Fuel Tank Pressure Sensor Inspection

1. Ignition "ON" & Engine "OFF" .
2. Disconnect hose connecting FTPS to the Fuel Tank.
3. Using a vacuum pump, apply vacuum to the hose connecting to FTPS.
4. Measure FTPS output voltage between signal terminal of the FTPS harness connector and chassis ground.
   Specification : Voltage increases proportionally with decreasing pressure.

Pressure(kPa)	Voltage(V)
-3.75	4.5
0	1.5
1.25	0.5

5. Is voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Check for cracks or damage in hose connecting canister and fuel pump. Repair or replace as necessary. ▶ Check for open or short in FTPS harness. Repair as necessary.If OK, test with a new FTPS and check for proper operation. If problem is corrected, replace FTPS and go to "Verification of Vehicle Repair" procedure

PCSV to Canister Line Inspection

1. Check for leakage in hose
   (1) Reconnect all EVAP hardware that was previously disconnected
   (2) Disconnect the hose leading from the canister to the PCSV at canister
   (3) Using a vacuum pump, apply specified vacuum[Approx. 4 inHg(14 kPa)] to the manifold side of the valve for 1 minute and verify PCSV holds vacuum.

(4) Is pressure within specification?

YES	▶ Go to next step as below
NO	▶ Check for cracks or damage in hose connecting PCSV and canister. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

2. Check for leakage in canister
   (1) Disconnect hose clamps and remove canister assembly
   (2) Block the hose of between:
      A. Canister and fuel filler neck
      A. Canister and CCV
      A. Canister and PCSV
   (3) Apply maximum of 4 inHg(14 kPa) pressure through fuel tank port from canister
   (4) With system sealed and pressurized, check for leaks
   (5) Were any leak(s) found?
3. Apply maximum of 4 inHg(14 kPa) pressure through fuel tank port from canister
4. With system sealed and pressurized, check for leaks
5. Were any leak(s) found?

YES	▶ Repair or replace leaking system component(s) and go to "Verification of Vehicle Repair" procedure.
NO	▶ Go to next step as below

Fuel Tank Line Inspection

1. Relieve the fuel system pressure and remove the fuel tank

> **CAUTION**
>
> Before removing the fuel tank, make sure the fuel hoses are not leaking.

2. Block all of the following outlets:
   (1) Fuel lines
   (2) Fuel filler neck
3. Apply maximum of 10cmHg(4 inHg) pressure to the EVAP. hose at the fuel tank. Then, pinch the EVAP. hose to retain the pressure
4. Check the suspect area for leaks with a soap solution.
5. Were any leak(s) found?

YES	▶ Repair or replace leaking system component(s) and go to "Verification of Vehicle Repair" procedure.
NO	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

1. Start engine to normal operating temperature

NOTE

Evaporative Emissions Systems (EVAP) Leak Tests can be run by the GDS. The tests are automated and provide either a pass-fail result or directions to check for DTCs.

2. Install GDS and clear DTC
3. Perform "EVAP. LEAKAGE TEST" mode referring to enable conditions as below

NOTE

EVAP. Leakage Test enable conditions
- Following conditions must be fulfilled to start the test.
1) Engine warm up at Idle Status
2) No relevant DTC
3) Fuel level is below 80%

4. Monitoring for (pending) DTC.Is the same DTC set?

YES	▸ Go to the applicable troubleshooting procedure.
NO	▸ System performing to specification at this time.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0456 Evaporative Emission System-Leak detected (very small leak)

General Description

Due to the increasing ambient temperature of the fuel and the return of unused hot fuel from the ECM engine, fuel vapors are generated in the tank. In order to control the release of these vapors to the atmosphere, the evaporative emissions control system is used. The evaporative emission control system reduces hydrocarbon (HC) emissions by trapping fuel tank vapors until they can be burned in the combustion process. Evaporating fuel is stored in a charcoal canister until it can be flushed into the intake manifold. The evaporative emission control system is made up of a fuel tank that can be completely sealed from outside air, a Fuel Tank Pressure Sensor (FTPS), a Canister Close Valve (CCV) that seals the canister from the outside air, a canister filled with activated charcoal granules, a Purge Control Solenoid Valve (PCSV). The evaporative emission system can be checked for leaks by sealing the system off from the outside air, creating a vacuum, and monitoring if the system can hold that vacuum sufficiently for a set amount of time. If it cannot, a leak exists somewhere in the system.

DTC Description

The ECM closes the Canister Close Valve (CCV) at the charcoal canister to seal off the evaporative emission system and then opens purge control valve (PCSV) to generate a vacuum in the fuel tank. After vacuum generation, the ECM measures pressure differential curve in the fuel tank and sets DTC P0442 or P0456 if the vacuum generated within a monitoring period increases above a defined threshold.
If same error code is set in the next driving cycle, the ECM illuminates the MIL.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Monitoring Fuel Tank Pressure Trend after generating underpressure in Tank	• Fuel filler cap damage or missing • Faulty or damaged fuel filler pipe • Leaking, disconnected or plugged fuel vapor lines • Faulty CCV • Faulty PCSV • Faulty Canister • Faulty Fuel Tank Pressure Sensor (FTPS)
Enable Conditions	• Coolant temperature > 50°C(122°F) • Ambient air temperature model > -10°C(14°F) • Vehicle speed< 7.5mph • Fuel level < 85% • Time after start > 100 sec. • Estimated altitude< 2.4km(8000ft) • Canister load < 0.25 • Minimum canister purge time: 3~25sec. depending on canister load • -1100 Pa < Differential fuel tank Pressure < 400 Pa • Time since last EVAP monitoring test abortion > 60 sec. • Ambient Temperature learning done one time since engine start: Vehicle speed > thd. during pre-defined time : VS > 15mph during 150 sec. (time counter reseted only if VS < 15 mph for more than 20 sec.) • Ambient pressure gradient during uphill driving (AMP variation > 75hPa within 15 minuntes) • Idle speed engine operating state • No relevant failure • Battery voltage > 10V	
Threshold Value	• 0.81 mm > Leak diameter > 0.42 mm	
Diagnostic Time	• 30 sec. In idle when all enable conditions fulfilled	
Mil On Condition	• 2 Driving Cycles	

Monitor DTC Status

1. Start engine to normal operating temperature

> NOTE
>
> Evaporative Emissions Systems (EVAP) Leak Tests can be run by the GDS. The tests are automated and provide either a pass-fail result or directions to check for DTCs.

2. Install scan tool and clear DTC
3. Perform "EVAP. LEAKAGE TEST" mode referring to enable conditions as below

> NOTE
>
> EVAP. Leakage Test enable conditions
> - Following conditions must be fulfilled to start the test.
> 1) Engine warm up at Idle Status
> 2) No relevant DTC ECM
> 3) Fuel level is below 80%

4. Is DTC P0446 set again?

YES	▸ Go to next step as below
NO	▸ 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.

Fuel Filler Cap Inspection

1. Check fuel filler cap for being tightly installed, has o-ring seal installed and is in good condition.
2. Verify cap releases pressure / vacuum at specified values

Specification : Approx. 2 psi pressure and approximately 1.5 inches of mercury vacuum).

3. Are cap, o-ring and release pressures okay?

YES	▸ Thoroughly check fuel filler pipe for cracks, damage and o-ring seat for deformation and replace as necessary. Go to next step as below.
NO	▸ Replace fuel filler cap and go to "Verification of Vehicle Repair" procedure.

PCSV to Intake manifold Line Inspection

1. Ignition "OFF"
2. Disconnect the hose leading from the PCSV to intake manifold at intake manifold.
3. Using a vacuum pump, apply vacuum to the manifold side of the vacuum hose and verify PCSV holds vacuum.
4. Ignition "ON" & Engine "OFF"
5. Install GDS and select "Canister Purge Valve" on the Actuation Test mode
6. Activates "Canister Purge Valve" by clicking "Start" icon.
7. Verify PCSV release vacuum while valve is activating(should hear a faint click from PCSV)
8. Repeat this procedure 4 or 5 times to ensure PCSV reliability.
   Specification:

Test Condition	Specification
PCSV is ON(should hear a faint click from PCSV)	Holds vacuum
PCSV is OFF	Release vacuum

9. Is PCSV working properly?

YES	▸ Go to next step as below
NO	▸ Verify arrow on PCSV is pointing towards intake manifold. If it is not, reverse installation. Reinstall as necessary and go to "Verification of Vehicle Repair" procedure. ▸ If OK, thoroughly check fuel vapor hoses and hose clamps between PCSV and intake manifold. Repair as necessary. If OK, test with a new PCSV and check for proper operation. If problem is corrected, replace PCSV and go to "Verification of Vehicle Repair" procedure.

Canister Close Valve(CCV) Line Inspection

1. Reconnect all EVAP hardware that was previously disconnected.
2. Disconnect hose connecting Canister Closing Valve(CCV) to canister.
3. Ignition "ON" & Engine "OFF"
4. Blow air to the canister side of the valve and verify air escapes to the air filter side.
5. Install GDS and select "CANISTER CLOSE VALVE" on the Actuation Test mode.
6. Activates "CANISTER CLOSE VALVE" by clicking "START" icon.
7. Blow air into hose and verify air does not escape.
8. Repeat this procedure 4 or 5 times to ensure CCV reliability.
9. Is CCV working properly?

YES	▸ Go to next step as below
NO	▸ Check for cracks or damage in hose connecting CCV and canister. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure. ▸ If OK, replace CCV. If CCV was stuck closed, inspect all lines and canister for liquid fuel. Replace any contaminated components and blow out lines and go to "Verification of Vehicle Repair" procedure.

Fuel Tank Pressure Sensor Inspection

1. Ignition "ON" & Engine "OFF" .
2. Disconnect hose connecting FTPS to the Fuel Tank.
3. Using a vacuum pump, apply vacuum to the hose connecting to FTPS.
4. Measure FTPS output voltage between signal terminal of the FTPS harness connector and chassis ground.

Specification : Voltage increases proportionally with decreasing pressure.

Specification : Voltage increases proportionally with decreasing pressure.

Pressure(kPa)	Voltage(V)
-3.75	4.5
0	1.5
1.25	0.5

5. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Check for cracks or damage in hose connecting canister and fuel pump. Repair or replace as necessary. ▸ Check for open or short in FTPS harness. Repair as necessary.If OK, test with a new FTPS and check for proper operation. If problem is corrected, replace FTPS and go to "Verification of Vehicle Repair" procedure

PCSV to Canister Line Inspection

1. Check for leakage in hose
   (1) Reconnect all EVAP hardware that was previously disconnected
   (2) Disconnect the hose leading from the canister to the PCSV at canister
   (3) Using a vacuum pump, apply specified vacuum[Approx. 4 inHg(14 kPa)] to the manifold side of the valve for 1 minute and verify PCSV holds vacuum.
   (4) Is pressure within specification?

YES	▸ Go to next step as below
NO	▸ Check for cracks or damage in hose connecting PCSV and canister. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

2. Check for leakage in canister
   (1) Disconnect hose clamps and remove canister assembly
   (2) Block the hose of between:
      A. Canister and fuel filler neck
      A. Canister and CCV
      A. Canister and PCSV
   (3) Apply maximum of 4 inHg(14 kPa) pressure through fuel tank port from canister
   (4) With system sealed and pressurized, check for leaks
   (5) Were any leak(s) found?
3. Apply maximum of 4 inHg(14 kPa) pressure through fuel tank port from canister
4. With system sealed and pressurized, check for leaks
5. Were any leak(s) found?

YES	▸ Repair or replace leaking system component(s) and go to "Verification of Vehicle Repair" procedure.
NO	▸ Go to next step as below

Fuel Tank Line Inspection

1. Relieve the fuel system pressure and remove the fuel tank

> CAUTION
>
> Before removing the fuel tank, make sure the fuel hoses are not leaking.

2. Block all of the following outlets:

(1) Fuel lines

(2) Fuel filler neck

3. Apply maximum of 10cmHg(4 inHg) pressure to the EVAP. hose at the fuel tank. Then, pinch the EVAP. hose to retain the pressure
4. Check the suspect area for leaks with a soap solution.
5. Were any leak(s) found?

YES	▶ Repair or replace leaking system component(s) and go to "Verification of Vehicle Repair" procedure.
NO	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

1. Start engine to normal operating temperature

> NOTE
>
> Evaporative Emissions Systems (EVAP) Leak Tests can be run by the GDS. The tests are automated and provide either a pass-fail result or directions to check for DTCs.

2. Install GDS and clear DTC
3. Perform "EVAP. LEAKAGE TEST" mode referring to enable conditions as below

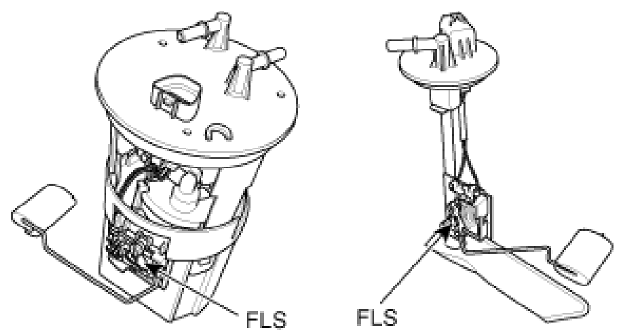
> NOTE
>
> EVAP. Leakage Test enable conditions
> - Following conditions must be fulfilled to start the test.
> 1) Engine warm up at Idle Status
> 2) No relevant DTC
> 3) Fuel level is below 80%

4. Monitoring for (pending) DTC.Is the same DTC set?

YES	▶ Go to the applicable troubleshooting procedure.
NO	▶ System performing to specification at this time.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0461 Fuel Level Sensor \'A\' Circuit Range/Performance

Component Location



General Description

The Fuel Level Sensor(FLS) measures the fuel level in fuel tank and its information is used to supply the ECM with information regarding the monitoring condition of the EVAP canister purge system for leak detection. If the fuel level sensor is monitored for high or low stuck or difference between voltage of fuel level sensor and voltage deviation of fuel level sensor is exceeds limited value while driving, this is interpreted by the ECM as a fault.

DTC Description

ECM sets DTC P0461 if the calculated fuel consumption is more than 30% or the feul level signal variation from fuel level sensor is less than 5%

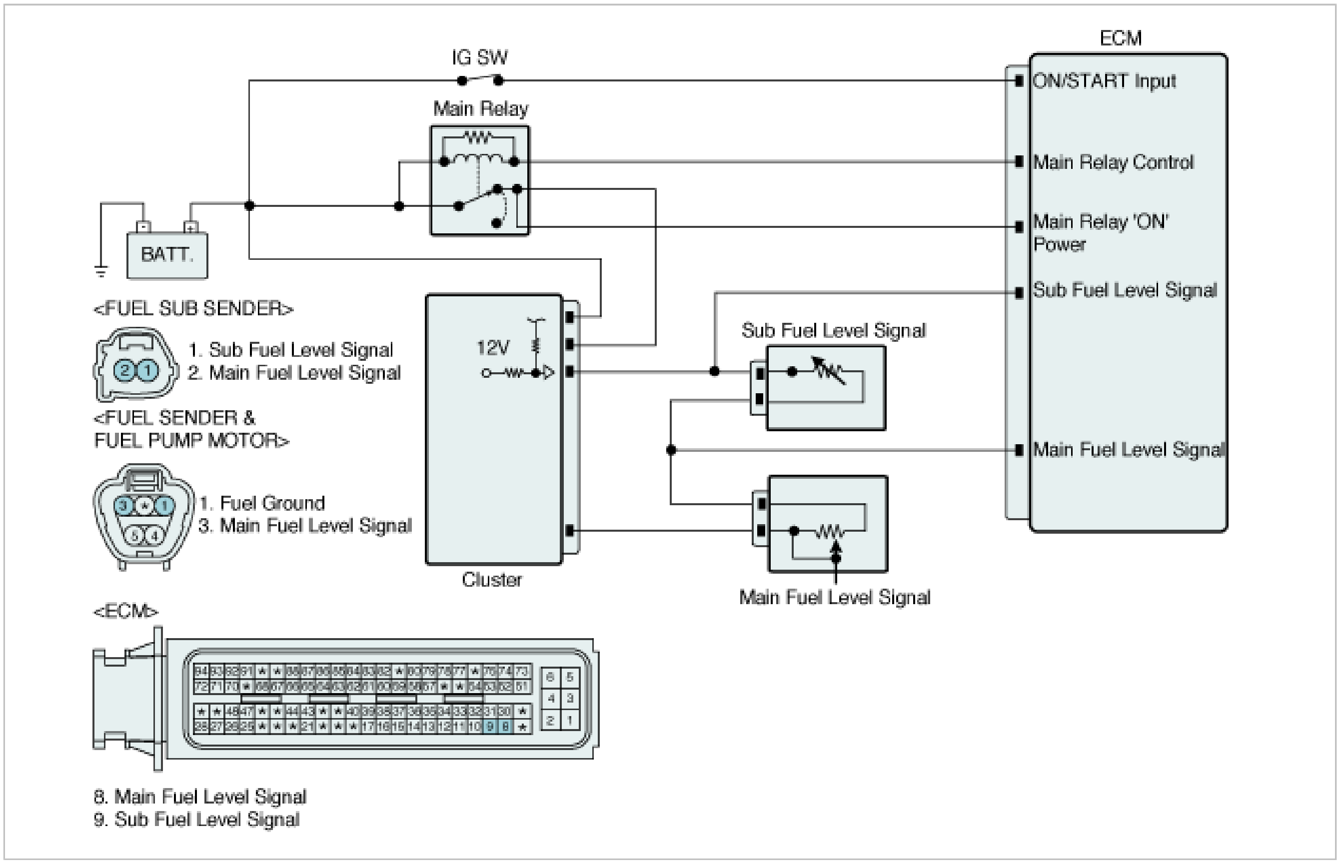
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Signal Stuck	• Poor connection or damaged harness • Faulty Fuel Level Sender "A"
Enable Conditions	• Cumulated Fuel Consumption > 30% (~ 20 liter of Tank capacity) -> can be cumulated over more than 1 Driving Cycles • No MIL illuminated for relevant DTCs • 11 < Battery voltage < 16	
Threshold Value	• Filtered FL signal change < 5 % after 30% calculated fuel consumption	
Diagnostic Time	• 20 liters fuel consumption	
Mil On Condition	• 2 * 30% Fuel Consumption	

Specification

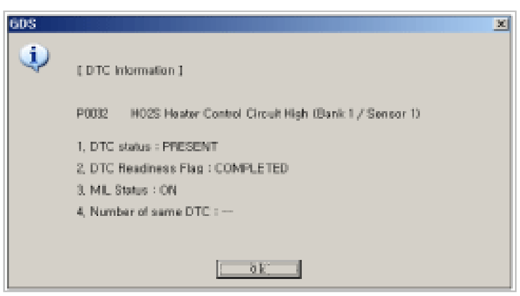
FLOAT Position	S/F	G/F	7/8	6/8	5/8	4/8	3/8	2/8	1/8	W/G	G/E	S/E
Sender Resist(Ω)	3.6±1	6.4±1	9.3±1	9.3±1	9.3±1	9.3±1	16.4±1	38.6±1	61.6±1	76.8±1	83.4±1	90.0±1
Fuel height at tank bottom(main tank)(mm)	177.8±2	174.9±2	170.8±2	170.8±2	170.8±2	170.8±2	160.2±2	127.0±2	92.1±2	66.0±2	54.5±2	42.6±2
F/TANK Vol. (L)	63.0	61.5	54.25	47.5	40.75	34	27.25	20.5	13.75	9.0	7.0	5.0

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and Connector inspection

1. 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.
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 the "Component inspection" procedure.

Component Inspection

■ **Fuel level sender reistance check**

1. IG key "OFF"
2. Disconnect main and sub fuel level sender connector.
3. Measure the resistance of each fuel level sender moving the float.

Specification :
Main fuel level sender resistance : 4~90 Ω
Sub fuel level sender resistance : 4.5 ~ 110.5 Ω

4. Is the resistance within the specification?

YES	▸ It seem to beintermittent fault. Check if the float is stuck by any particles. Erase DTCs and test again. And go to "Verification of Vehicle Repair" procedure.
NO	▸ Substitute with a known-good component and check for proper operation. If the problem is corrected, replace it and then go to "Verification of Vehicle Repair" procedure.

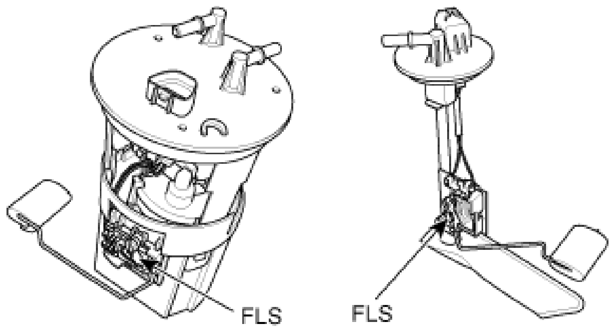
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Fuel Level Sensor(FLS) measures the fuel level in fuel tank and its information is used to supply the ECM with information regarding the monitoring condition of the EVAP canister purge system for leak detection. If the fuel level sensor is monitored for high or low stuck or difference between voltage of fuel level sensor and voltage deviation of fuel level sensor is exceeds limited value while driving, this is interpreted by the ECM as a fault.

DTC Description

ECM sets DTC P0463 if the ECM detects that the control line is short to ground.

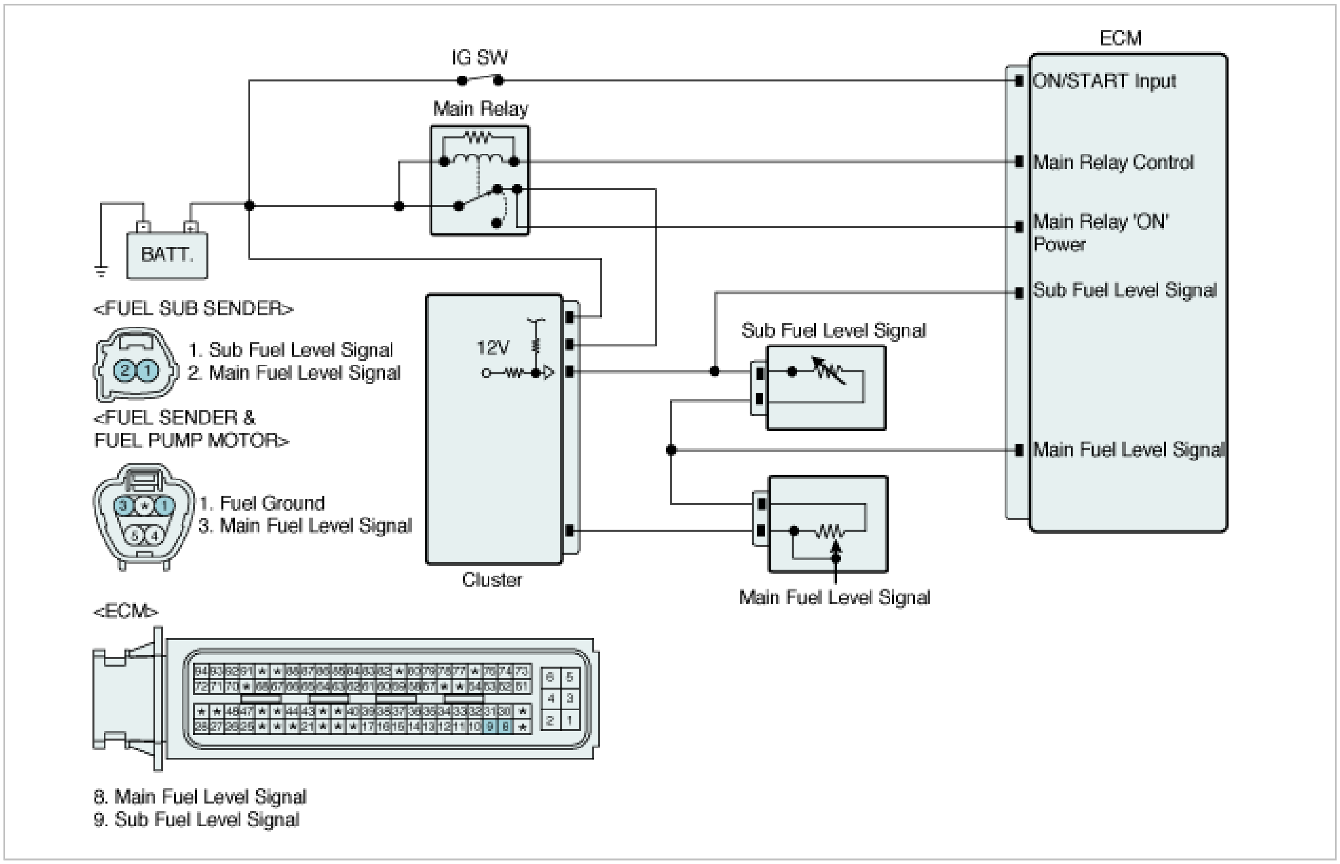
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical check	• Short to ground in signal circuit • Poor connection or damaged harness • Faulty Fuel Level Sender "A"
Enable Conditions	• 6V < Battery voltage < 16V • Delay time when failure present : 200 s	
Threshold Value	• Fuel Level Signal < 0.04V	
Diagnostic Time	• 220 sec.	
Mil On Condition	• 2 driving cycle	

Specification

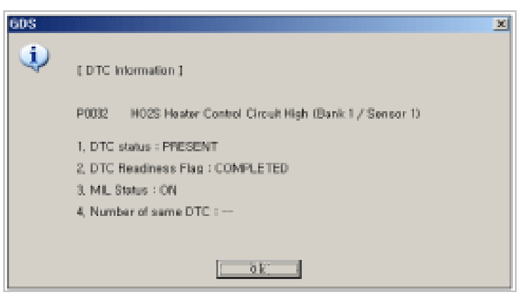
FLOAT Position	S/F	G/F	7/8	6/8	5/8	4/8	3/8	2/8	1/8	W/G	G/E	S/E
Sender Resist(Ω)	3.6±1	6.4±1	9.3±1	9.3±1	9.3±1	9.3±1	16.4±1	38.6±1	61.6±1	76.8±1	83.4±1	90.0±1
Fuel height at tank bottom(main tank)(mm)	177.8±2	174.9±2	170.8±2	170.8±2	170.8±2	170.8±2	160.2±2	127.0±2	92.1±2	66.0±2	54.5±2	42.6±2
F/TANK Vol. (L)	63.0	61.5	54.25	47.5	40.75	34	27.25	20.5	13.75	9.0	7.0	5.0

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and Connector inspection

1. 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.
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 the "Signal Circuit Inspection" procedure

Signal Circuit Inspection

■ **Check for Short to Ground in Signal Circuit**

1. IG key 'OFF'.
2. Disconnect ECM and sub fuel level sender connector.
3. IG key "ON"
4. Measure the resistance between the signal terminal of sub fuel level sender harness connector and chassis ground.

Specification : about 11 ~ 12V

5. Is resistance within specification?

YES	▶ Go to "Component Inspection".
NO	▶ Repair the open or short to ground the circuit of of sub fuel level sender signal circuit. And then go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ **Fuel level sender reistance check**

1. IG key "OFF"
2. Disconnect main and sub fuel level sender connector.
3. Measure the resistance of each fuel level sender moving the float.

Specification :
Main fuel level sender resistance : 4~90 Ω
Sub fuel level sender resistance : 4.5 ~ 110.5 Ω

4. Is the resistance within the specification?

YES	▶ It seem to beintermittent fault. Check if the float is stuck by any particles. Erase DTCs and test again. And go to "Verification of Vehicle Repair" procedure.
NO	▶ Substitute with a known-good component and check for proper operation. If the problem is corrected, replace it and then go to "Verification of Vehicle Repair" procedure.

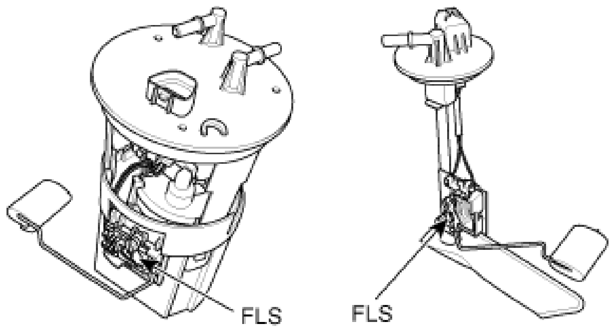
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Fuel Level Sensor(FLS) measures the fuel level in fuel tank and its information is used to supply the ECM with information regarding the monitoring condition of the EVAP canister purge system for leak detection. If the fuel level sensor is monitored for high or low stuck or difference between voltage of fuel level sensor and voltage deviation of fuel level sensor is exceeds limited value while driving, this is interpreted by the ECM as a fault.

DTC Description

ECM sets DTC P0463 if the ECM detects that the control line is short to battery or open.

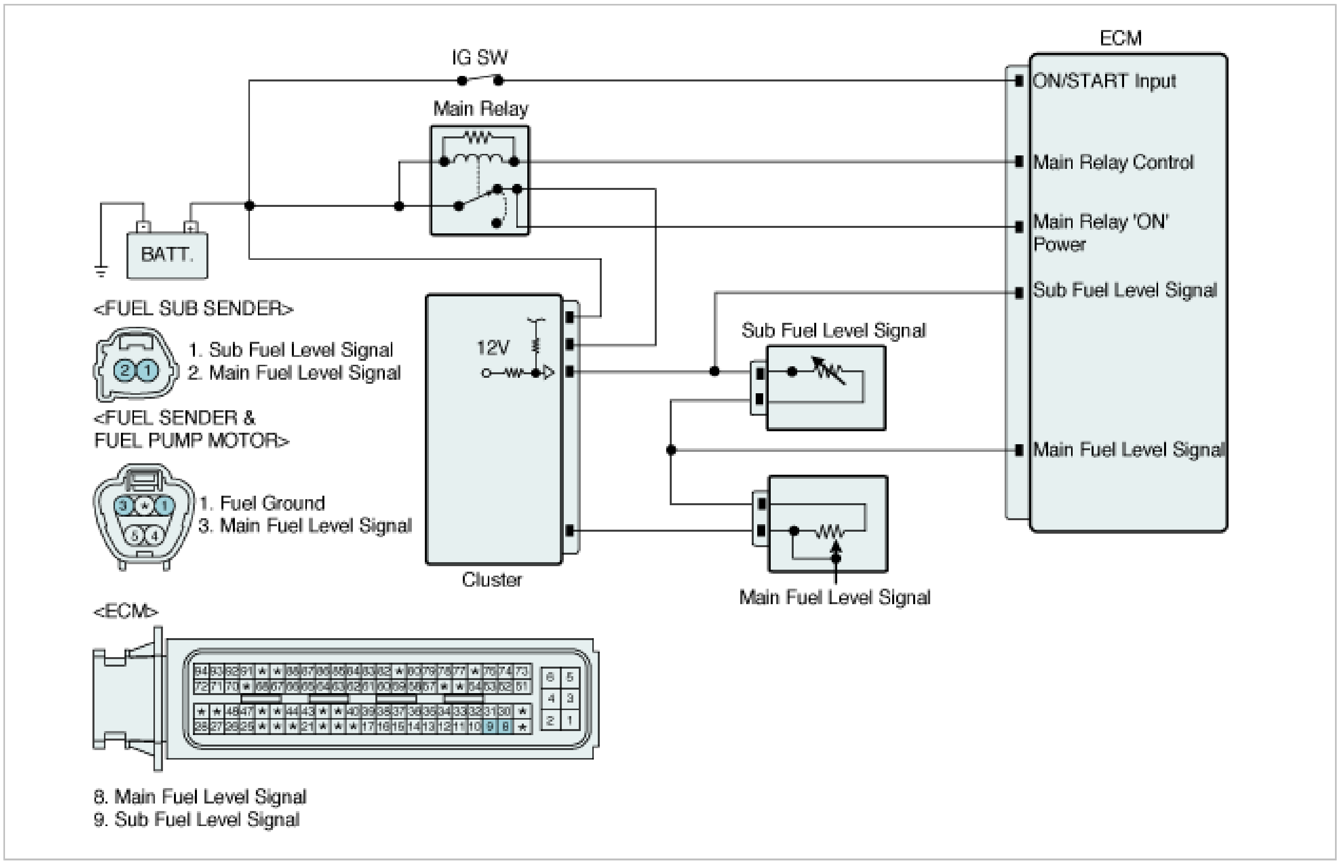
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical check (Short to Battery / Open)	• Short to battery or Open in signal circuit • Poor connection or damaged harness • Faulty Fuel Level Sender "A"
Enable Conditions	• 6V < Battery voltage < 16V • Delay time when failure present : 200 s	
Threshold Value	• Fuel Level Signal > 4.95V	
Diagnostic Time	• 220 sec.	
Mil On Condition	• 2 driving cycle	

Specification

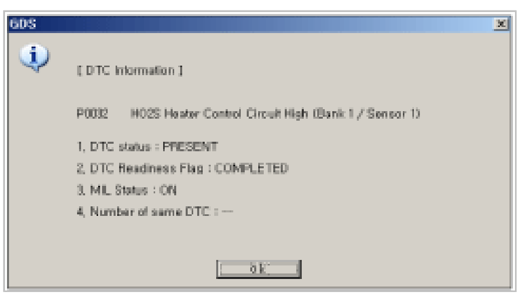
FLOAT Position	S/F	G/F	7/8	6/8	5/8	4/8	3/8	2/8	1/8	W/G	G/E	S/E
Sender Resist(Ω)	3.6±1	6.4±1	9.3±1	9.3±1	9.3±1	9.3±1	16.4±1	38.6±1	61.6±1	76.8±1	83.4±1	90.0±1
Fuel height at tank bottom(main tank)(mm)	177.8±2	174.9±2	170.8±2	170.8±2	170.8±2	170.8±2	160.2±2	127.0±2	92.1±2	66.0±2	54.5±2	42.6±2
F/TANK Vol. (L)	63.0	61.5	54.25	47.5	40.75	34	27.25	20.5	13.75	9.0	7.0	5.0

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and Connector inspection

1. 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.
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".

Signal Circuit Inspection

■ **Voltage Check**

1. IG KEY 'OFF'.
2. Disconnect the sub fuel level sender and the cluster connector.
3. IG KEY 'ON'.
4. Measure the voltage between signal terminal of Fuel Level Sender 'A' connector and chassis ground.

Specification : 0V

5. Is voltage within specification?

YES	▸ Go to"Component Inspection" procedure.
NO	▸ Repair open in signal circuit of sub fuel level sender and go to "Verification of Vehicle Repair" procedure.

■ **Check for Open in Ground Circuit**

1. IG KEY 'OFF'.
2. Disconnect sub fuel level sender harness connector.
3. Measure the resistance of both terminal of sub fuel level sender harness.

Specification : below 1Ω

4. Is the resistance within specification?

YES	▸ Go to "Ground Circuit Inspection"
NO	▸ Repair the open circuit of sub fuel level sender and go to "Verification of Vehicle Repair" procedure.

Ground Circuit Inspection

■ **Check open in harness**

1. IG key "OFF"
2. Disconnect Instrument cluster connector and main fuel level sender connector.
3. Measure the resistance of both terminal of main fuel level sender harness.

Specification : Below 1Ω

4. Is the resistance within specification?

YES	▸ Go to "Component Inspection"

NO	▸ Repair the open circuit of main fuel level sender and go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ **Fuel level sender reistance check**

1. IG key "OFF"
2. Disconnect main and sub fuel level sender connector.
3. Measure the resistance of each fuel level sender moving the float.

Specification :
Main fuel level sender resistance : 4~90 Ω
Sub fuel level sender resistance : 4.5 ~ 110.5 Ω

4. Is the resistance within the specification?

YES	▸ It seem to beintermittent fault. Check if the float is stuck by any particles. Erase DTCs and test again. And go to "Verification of Vehicle Repair" procedure.
NO	▸ Substitute with a known-good component and check for proper operation. If the problem is corrected, replace it and then go to "Verification of Vehicle Repair" procedure.

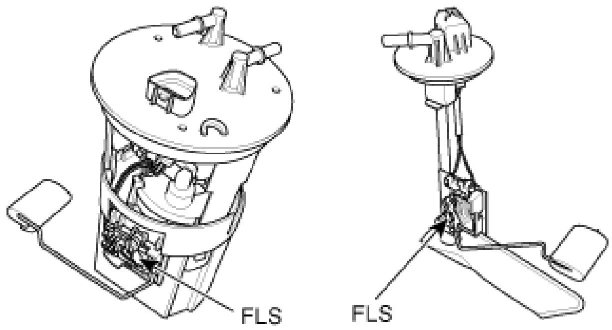
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Fuel Level Sensor(FLS) measures the fuel level in fuel tank and its information is used to supply the ECM with information regarding the monitoring condition of the EVAP canister purge system for leak detection. If the fuel level sensor is monitored for high or low stuck or difference between voltage of fuel level sensor and voltage deviation of fuel level sensor is exceeds limited value while driving, this is interpreted by the ECM as a fault.

DTC Description

ECM compares fuel level measured with filtered value. If there is difference over 50% between each other, ECM sets P0464.

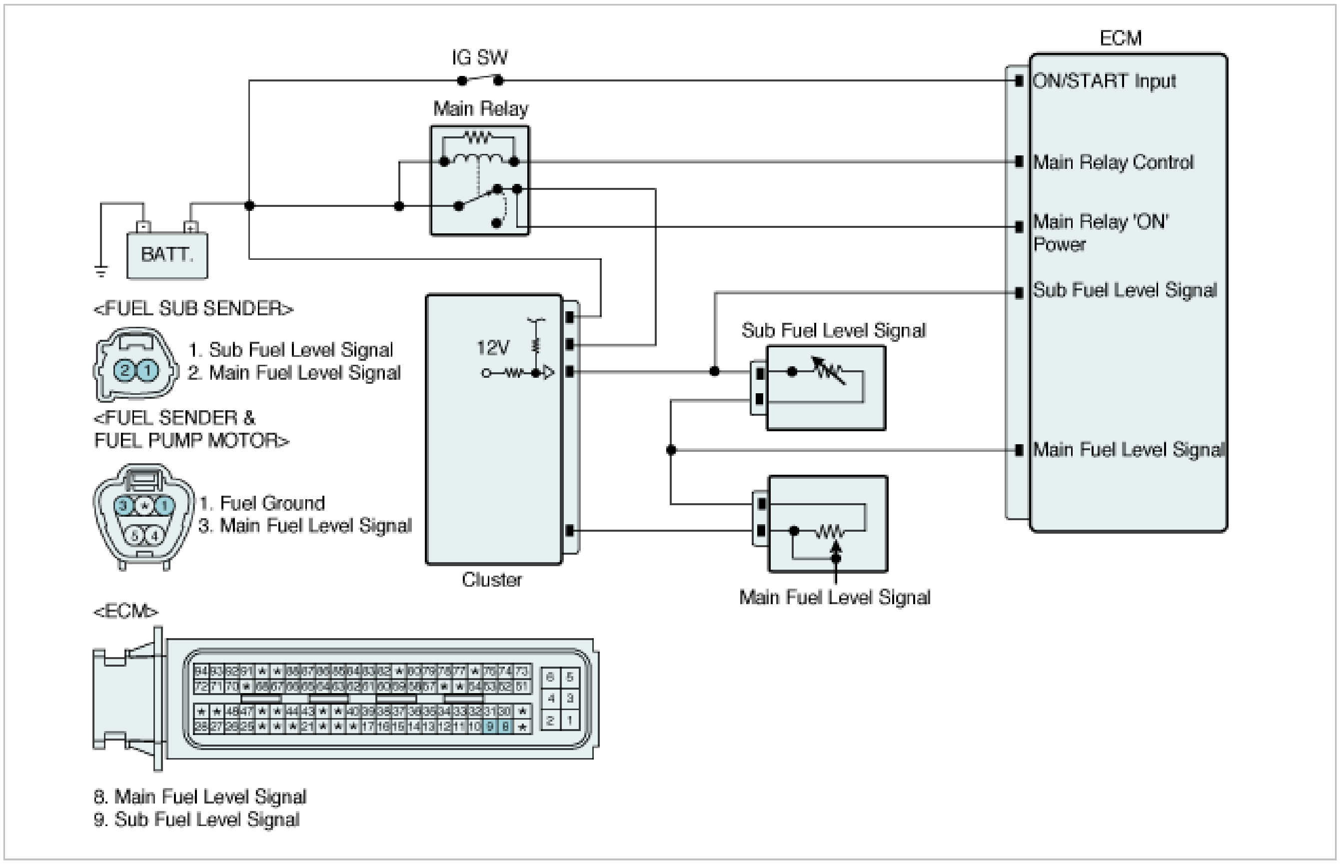
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Noisy signal	• Poor connection or damaged harness • Faulty Fuel Level Sender "A"
Enable Conditions	• Vehicle Speed > 22 mph during 20 sec. • Wheel speed gradient < 1.8 /1000 during 20 sec. • No relevant DTCs. • 11< Battery voltage <16	
Threshold Value	• FL measured - FL filtered value > 45 %	
Diagnostic Time	• 10 sec	
Mil On Condition	• 2 driving cycle	

Specification

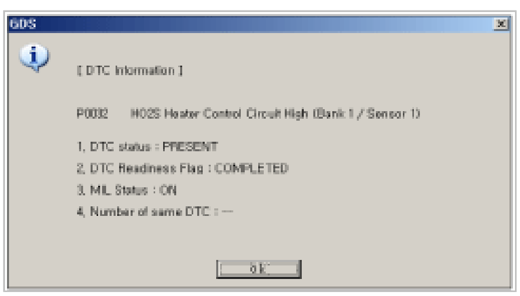
FLOAT Position	S/F	G/F	7/8	6/8	5/8	4/8	3/8	2/8	1/8	W/G	G/E	S/E
Sender Resist(Ω)	3.6±1	6.4±1	9.3±1	9.3±1	9.3±1	9.3±1	16.4±1	38.6±1	61.6±1	76.8±1	83.4±1	90.0±1
Fuel height at tank bottom(main tank)(mm)	177.8±2	174.9±2	170.8±2	170.8±2	170.8±2	170.8±2	160.2±2	127.0±2	92.1±2	66.0±2	54.5±2	42.6±2
F/TANK Vol. (L)	63.0	61.5	54.25	47.5	40.75	34	27.25	20.5	13.75	9.0	7.0	5.0

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and Connector inspection

1. 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.
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"

Component Inspection

■ **Fuel level sender reistance check**

1. IG key "OFF"
2. Disconnect main and sub fuel level sender connector.
3. Measure the resistance of each fuel level sender moving the float.

Specification :
Main fuel level sender resistance : 4~90 Ω
Sub fuel level sender resistance : 4.5 ~ 110.5 Ω

4. Is the resistance within the specification?

YES	▸ It seems as a problem of fuel level sender resistance. If the problem is corrected, go to "Verification of Vehicle Repair" procedure.
NO	▸ Substitute with a known-good main or sub fuel level sender and check for proper operation. If the problem is corrected, replace it and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0504 Brake Switch \'A\' / \'B\' Correlation

General Description

The Stop lamp switch is used to judge whether the acceleration system is abnormal or not. The stop lamp switch has a duplex system(signals brake test or brake light) to memorize the abnormality when the signals of depressing and releasing the brake pedal are detected simultaneously.

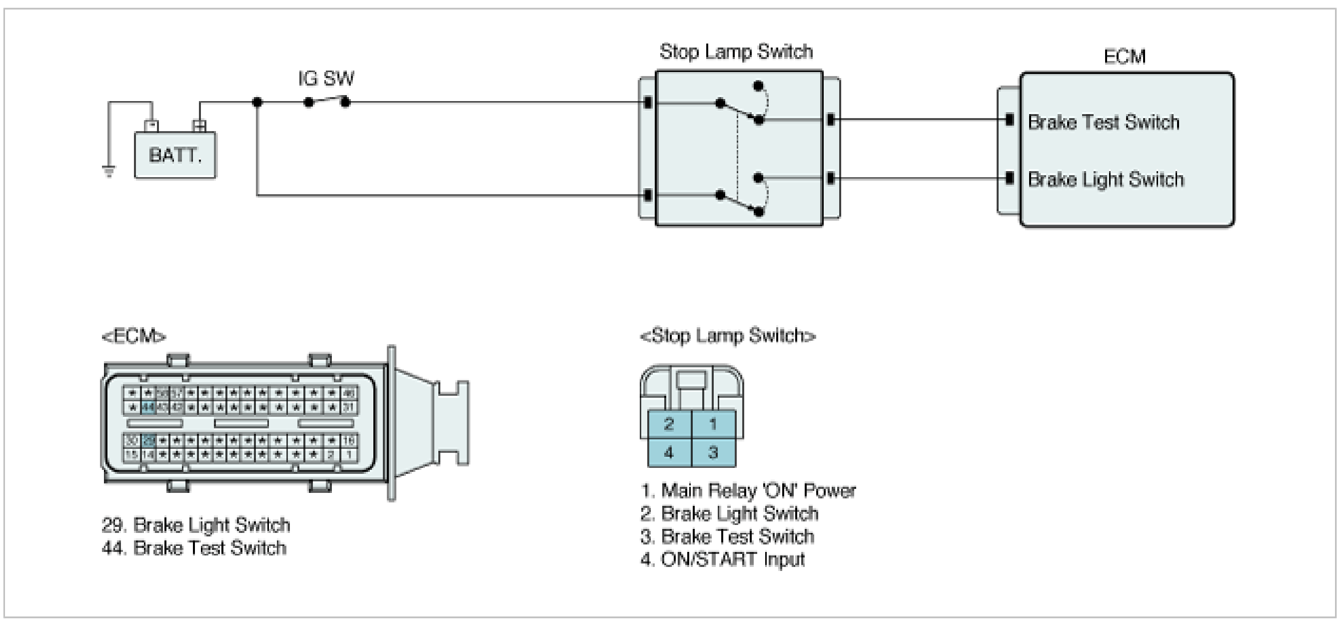
DTC Description

ECM sets DTC P0504 if the ECM detects signal of the brake warning lamp and brake switch are not correlate within the predetermined time.

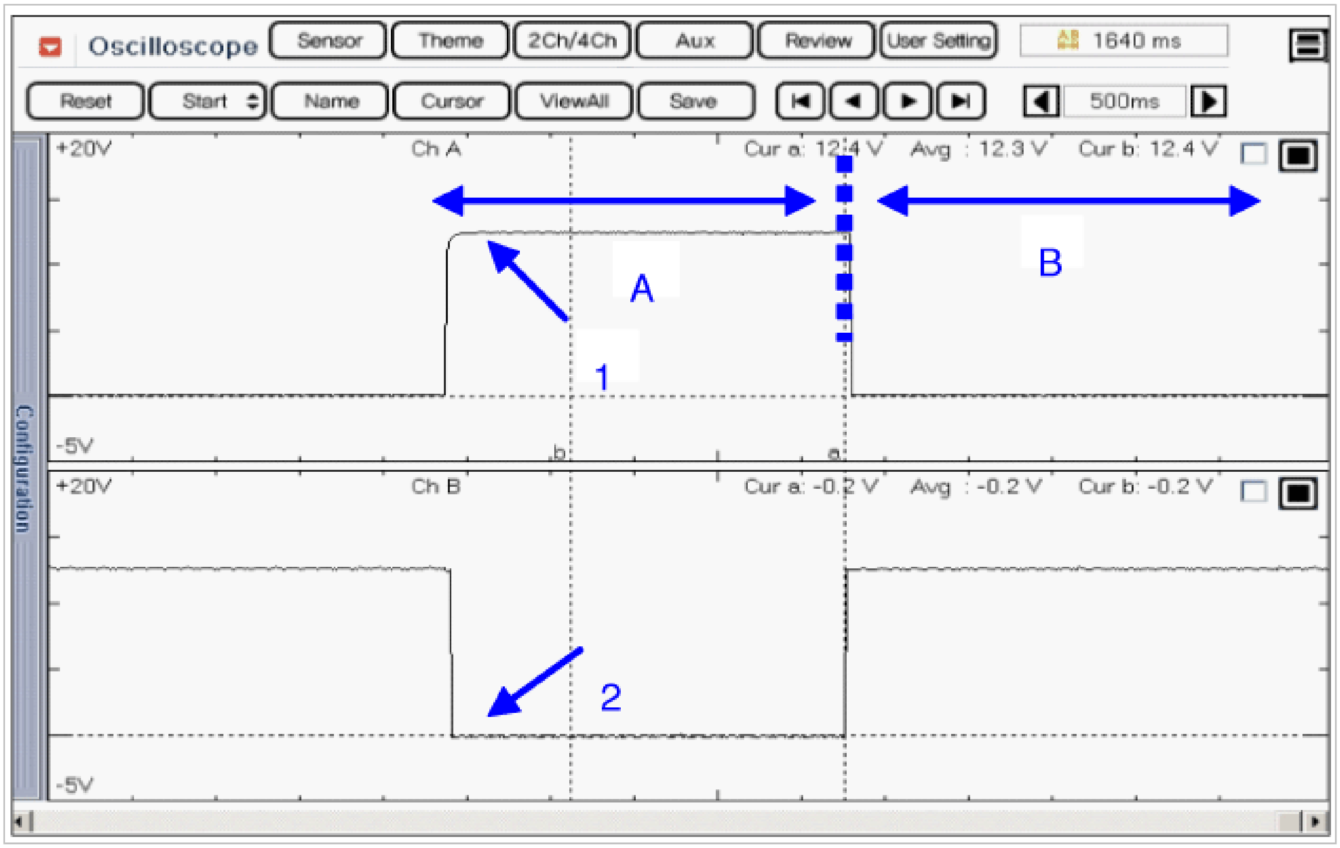
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Plausibility check between Brake Light Switch(BLS) and Brake Test Switch(BTS)	• Open or short circuit in harness • Poor connection or damaged harness • Faulty brake warning lamp or brake test switch
Enable Conditions	• Engine running	
Threshold Value	• Time between brake light switch and brake test switch do not correlate longer than > 10 sec	
Diagnostic Time	• 12 times brake pedal activation	
MIL On Condition	• -	

Diagnostic Circuit Diagram



Signal Waveform & Data

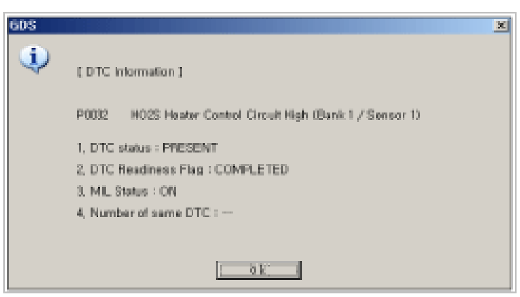


1. Brake Test Switch
2. Brake Light Switch

Test Condition	Brake Test Switch	Brake Light Switch
Step on brake pedal	Battery Voltage	Approx. 0V
Release brake pedal	Approx. 0V	Battery Voltage

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

■ **Check for Open/Short on Power Circuit**

1. Ignition "OFF".
2. Disconnect Stop Lamp Switch.
3. Measure voltage between Brake Light Switch terminal and chassis ground.
4. Measure voltage between Brake Test Switch terminal and chassis ground.
5. Ignition "ON".
6. Measure voltage between Brake Light Switch terminal and chassis ground.
7. Measure voltage between Brake Test Switch terminal and chassis ground.
   Specification

Test Condition	IG "OFF"	IG "ON"
Brake Light Switch	Battery Voltage	Battery Voltage
Brake Test Switch	0V	Battery Voltage

8. Is voltage within the specifiation?

YES	▸ Go to next procedure.
NO	▸ Check fuse between battery and Stop Lamp Switch. Check for Open or Short in power circuit. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Signal Circuit Inspection

1. Ignition "OFF".
2. Disconnect Stop Lamp Switch and ECM harness connector.
3. Measure resistance between both ends of Brake Lamp Switch line.
   Measure resistance between both ends of Brake Test Switch line.
4. Measure resistance between Brake Light Switch terminal of Switch harness connector and chassis ground.
   Measure resistance between Brake Test Switch terminal of Switch harness connector and chassis ground.

Specification : Below 1Ω (Only for No.3)
Infinite (Only for No.4)

5. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ In case of No.3 : Repair Open in signal circuit and go to "Verification of Vehicle Repair" procedure. ▸ In case of No.4 : Repair Short in signal circuit and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Ignition "OFF".
2. Disconnect ECM harness connector.
3. Ignition "ON".
4. Measure voltage between Brake Light Switch terminal of ECM harness connector and chassis ground.
5. Measure voltage between Brake Test Switch terminal of ECM harness connector and chassis ground.
6. Step on the brake pedal.
7. Measure voltage between Brake Light Switch terminal of ECM harness connector and chassis ground.
8. Measure voltage between Brake Test Switch terminal of ECM harness connector and chassis ground.
   Specification

Test Condition	With releasing pedal	With stepping on pedal
Brake Light Switch	0V	Battery Voltage
Brake Test Switch	Battery Voltage	0V

9. Is voltage within specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Check Stop Lamp Switch for contamination, deterioration, or damage. Substitute with a known-good switch and check for proper operation. If the problem is corrected, replace switch and then go to "Verification of Vehicle Repair" procedure.

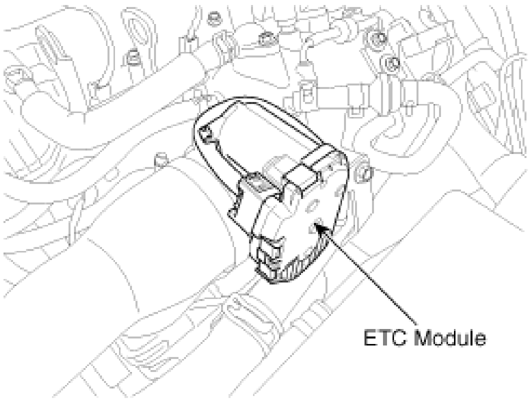
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

When engine is idling, the ECM adjusts the throttle valve so that the engine runs at the correct idling speed, regardless of coolant temperature, load and etc. When the additional load applied in the engine, the air flow through the idle speed control actuator is increased momentarily to raise the idling speed.

DTC Description

The ECM monitors engine speed deviation from the target idle engine speed when the vehicle is stopped and the throttle valve opening is stable. The ECM sets DTC P0506 if the difference to the target idle engine speed is higher than the predetermined threshold.

DTC Detecting Condition

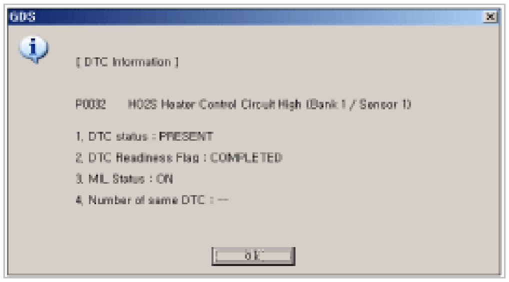
Item	Detecting Condition	Possible Cause
DTC Strategy	• Monitoring deviation between target idle speed and actual engine speed	• Restriction in intake or exhaust system • Contact resistance in connectors • Faulty ETC
Enable Conditions	• Coolant temp. > 73°C(163°F) • Engine idle status(closed throttle valve & vehicle speed=0) • Idle speed controller active(idle status) • 11 < Battery voltage < 16 • After engine start > 20 sec. • No relevant failure	
Threshold Value	• Nominal Idle Speed - Engine Speed < 100rpm	
Diagnostic Time	• 21 sec.	
MIL On Condition	• -	

Monitor DTC Status

NOTE

If any MAPS or ETC codes are present, do ALL REPAIRS associated with them before proceeding with this troubleshooting tree.

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Check for restricted intake or exhaust system

1. Visually/physically inspect the following items:
   - Air cleaner filter element for excessive dirt or for any foreign objects
   - Throttle body inlet for damage or for any foreign objects
   - Restricted exhaust system
2. Was a problem found in any of the above areas?

YES	▶ 'Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Go to next step as below

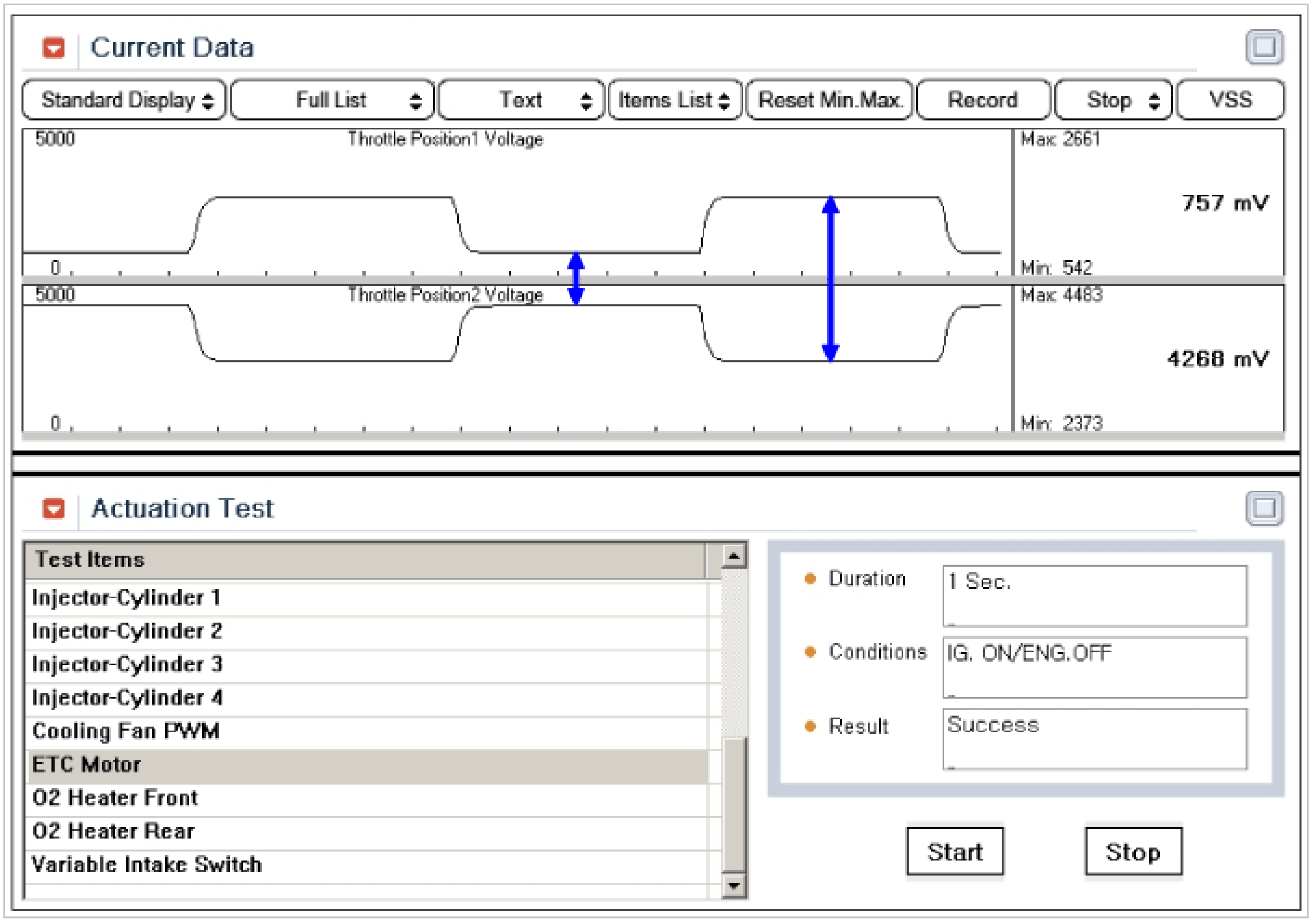
Terminal and connection inspection

1. 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.
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 next step as below

Component Inspection

1. Select 'Actuation Test' mode and execute 'ETC motor' item.



▶ During 'ETC Motor' test, TPS1 and TPS2 show symmetrical movements.

2. Is the waveform normal?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Check ETC for contamination, deterioration, or damage. Substitute with a known-good ETC and check for proper operation. If the problem is corrected, replace TPS and then go to "Verification of Vehicle Repair" procedure.

NOTE

It is necessary to perform the TPS adaptation procedure after the ETC assembly or ECM replacing.
■ TPS adaptation procedure
Ignition "OFF" and then "ON" without cranking. Wait for 10 seconds under enable conditions.
→ Enable conditions : Battery >10V & Intake Air Temp. >5.3°C(41.5°F) & 5.3°C(41.5°F) < Engine CoolantTemp. < 99.8°C(211.6°F)

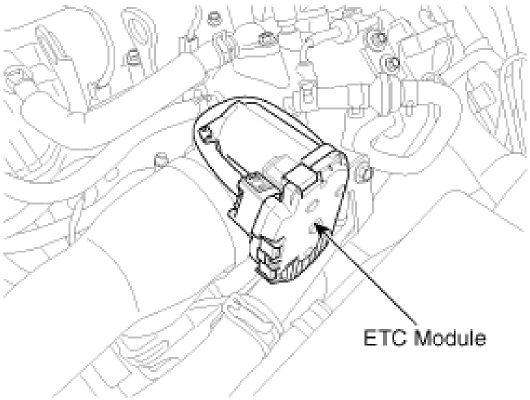
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

When engine is idling, the ECM adjusts the throttle valve so that the engine runs at the correct idling speed, regardless of coolant temperature, load and etc. When the additional load applied in the engine, the air flow through the idle speed control actuator is increased momentarily to raise the idling speed.

DTC Description

The ECM monitors engine speed deviation from the target idle engine speed when the vehicle is stopped and the throttle valve opening is stable. The ECM sets DTC P0507 if the difference to the target idle engine speed is higher than the predetermined threshold.

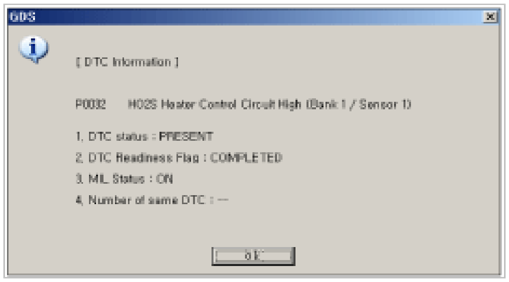
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Monitoring deviation between target idle speed and actual engine speed	• A stuck or binding throttle body • Air leakage • Poor connection or damaged harness • Faulty ETC
Enable Conditions	• Coolant temp. > 73°C(163°F) • Engine idle status(closed throttle valve & vehicle speed=0) • Idle speed controller active(idle status) • 11 < Battery voltage < 16 • After engine start > 20 sec. • No relevant failure	
Threshold Value	• Engine Speed - Nominal Idle Speed > 200rpm	
Diagnostic Time	• 21 sec.	
MIL On Condition	• -	

Monitor DTC Status

> NOTE
>
> If any MAPS or ETC codes are present, do ALL REPAIRS associated with them before proceeding with this troubleshooting tree.

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Air Leakage Inspection

1. Visually/physically inspect the air leakage in intake/exhaust system as following items,
   - Check for throttle Plate being held open with excessive carbon deposits.
   - Vacuum hoses for splits, kinks and improper connections.
   - Throttle body gasket.
   - Positive crankcase ventilation valve for improper installation, damaged o-rings and malfunctioning .
   - 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. Was a problem found in any of the above areas?

YES	▶ Replace or repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Go to next step as below

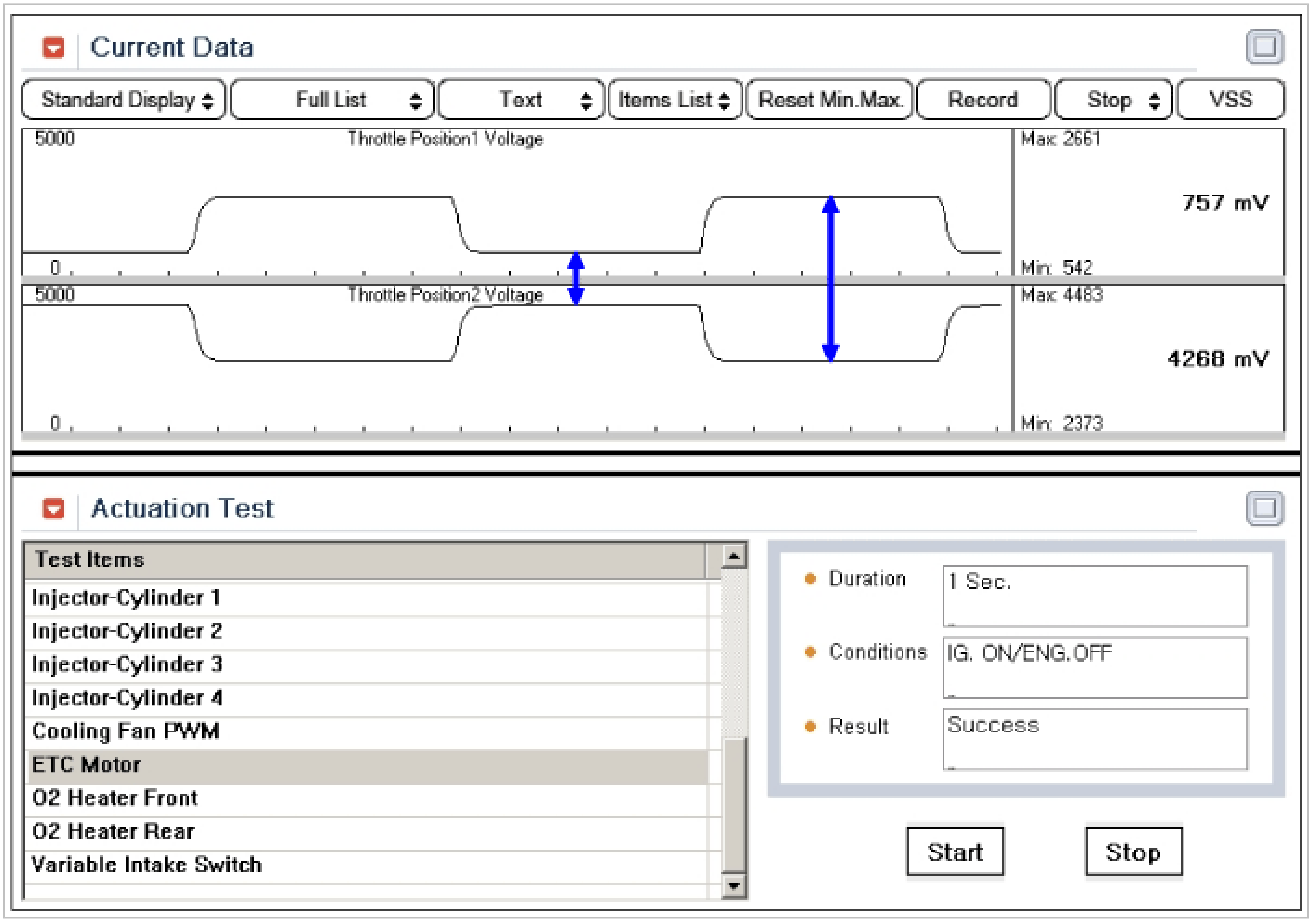
Terminal and connection inspection

1. 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.
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 next step as below

Component Inspection

1. Select 'Actuation Test' mode and execute 'ETC motor' item.



▸ During 'ETC Motor' test, TPS1 and TPS2 show symmetrical movements.

2. Is the waveform normal?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check ETC for contamination, deterioration, or damage. Substitute with a known-good ETC and check for proper operation. If the problem is corrected, replace TPS and then go to "Verification of Vehicle Repair" procedure.

NOTE

It is necessary to perform the TPS adaptation procedure after the ETC assembly or ECM replacing.
■ TPS adaptation procedure
Ignition "OFF" and then "ON" without cranking. Wait for 10 seconds under enable conditions.
→ Enable conditions : Battery >10V & Intake Air Temp. >5.3°C(41.5°F) & 5.3°C(41.5°F) < Engine CoolantTemp. < 99.8°C(211.6°F)

Verification of Vehicle Repair

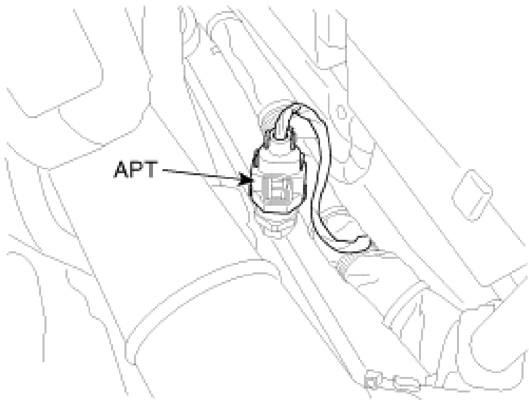
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0532 A/C Refrigerant Pressure Sensor \'A\' Circuit Low Input

Component Location



General Description

The ECM(Engine Control Module) receives pressure signal in the A/C refrigerant high pressure side from the A/C refrigerant pressure sensor. This input indicates how much load the A/C compressor is putting on the engine and is one of the factors used by the ECM in order to determine the idle air control position for the idle speed. The circuits consist of a 5V reference and a ground, both provided by the ECM, and a signal from the sensor. The signal is a voltage which is proportional to the A/C pressure from 0 to 5V. Low pressure produces a low voltage signal and high pressure a high-voltage signal.

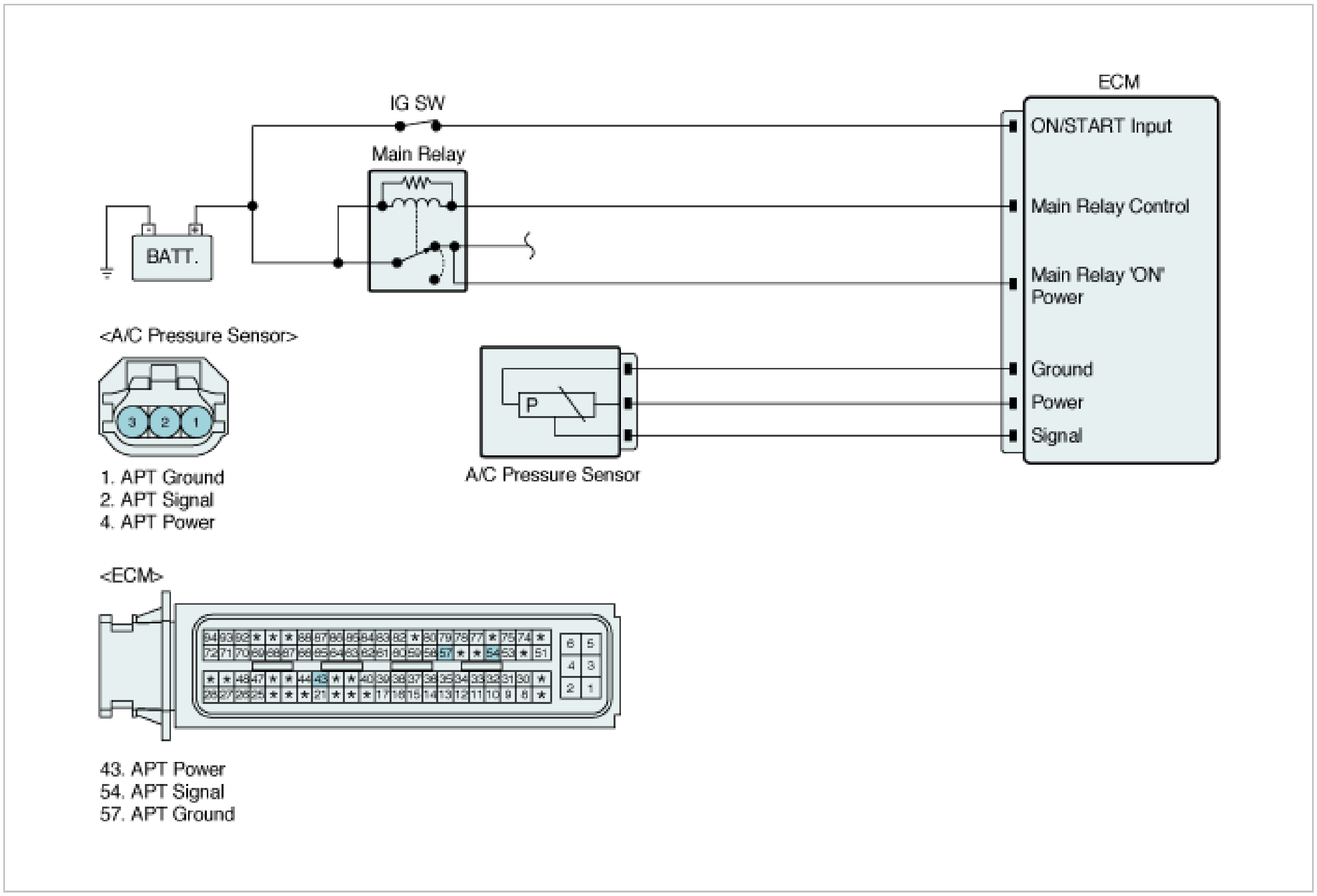
DTC Description

ECM sets DTC P0532 if the ECM detects signal lower than the possible range of a properly operating sensor.

DTC Detecting Condition

Item	Detecting Condition	Possible cause
DTC Strategy	• Electrical Check	• Open or short to ground in power circuit • Open or short to ground in signal circuit • Poor connection or damaged harness • Faulty A/C Pressure Sensor
Enable Conditions	• Failure not detected for DTCs : P06A4, P06A5	
Threshold value	• Signal voltage < 0.2V	
Diagnosis Time	• 25.5 sec.	
MIL On Condition	• -	

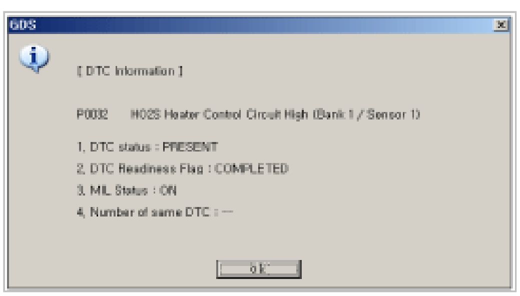
Diagnostic Circuit Diagram



Monitor DTC Status

> **NOTE**
>
> If there are DTCs of A/C Pressure Sensor, Power Steering Pressure Sensor, Variable Charge Motion Actuator and Tank Pressure Sensor together, check power line first. Those sensors own power line jointly.

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and Connector inspection

1. 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.
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 next procedure.

Power Circuit Inspection

■ Check for Short to Ground in Power Circuit

1. Ignition 'OFF'.
2. Disconnect A/C pressure sensor harness connector.
3. Measure resistance between power terminal of A/C pressure. harness connector and chassis ground.

Specification : Infinite

4. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ Check for Open in Power Circuit

1. IG KEY OFF.
2. Disconnect A/C pressure sensor harness connector.
3. IG KEY ON.
4. Measure voltage between power terminal of A/C pressure. harness connector and chassis ground.

Specification : Approx. 5V

5. Is voltage within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Signal Circuit Inspection

■ Check for Short to Ground in Signal Circuit

1. IG KEY OFF.
2. Disconnect ECM and A/C pressure sensor harness connector.
3. Measure resistance between signal terminal of A/C pressure. harness connector and chassis ground.

Specification : Infinite

4. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ **Check for Open in Signal Circuit**

1. IG KEY OFF.
2. Disconnect A/C pressure sensor harness connector.
3. Measure resistance between both ends of signal line.

Specification : Below 1Ω

4. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. IG 'OFF'.
2. Connect prove to signal terminal as below and select 'Ocilloscope' menu on GDS.
   Channel A (+): Signal terminal of A/C pressure sensor, (-): Ground
3. Engine start and check the signal with operation.
4. Is waveform within specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Check A/C pressure sensor for contamination, deterioration, or damage. Substitute with a known-good A/C pressure sensor and check for proper operation. If the problem is corrected, replace A/C pressure sensor and then go to "Verification of Vehicle Repair" procedure.

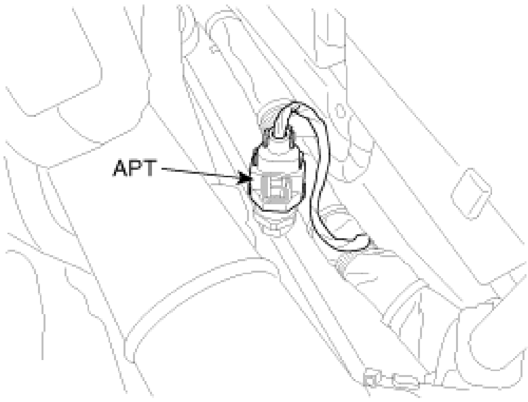
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The ECM(Engine Control Module) receives pressure signal in the A/C refrigerant high pressure side from the A/C refrigerant pressure sensor. This input indicates how much load the A/C compressor is putting on the engine and is one of the factors used by the ECM in order to determine the idle air control position for the idle speed. The circuits consist of a 5V reference and a ground, both provided by the ECM, and a signal from the sensor. The signal is a voltage which is proportional to the A/C pressure from 0 to 5V. Low pressure produces a low voltage signal and high pressure a high-voltage signal.

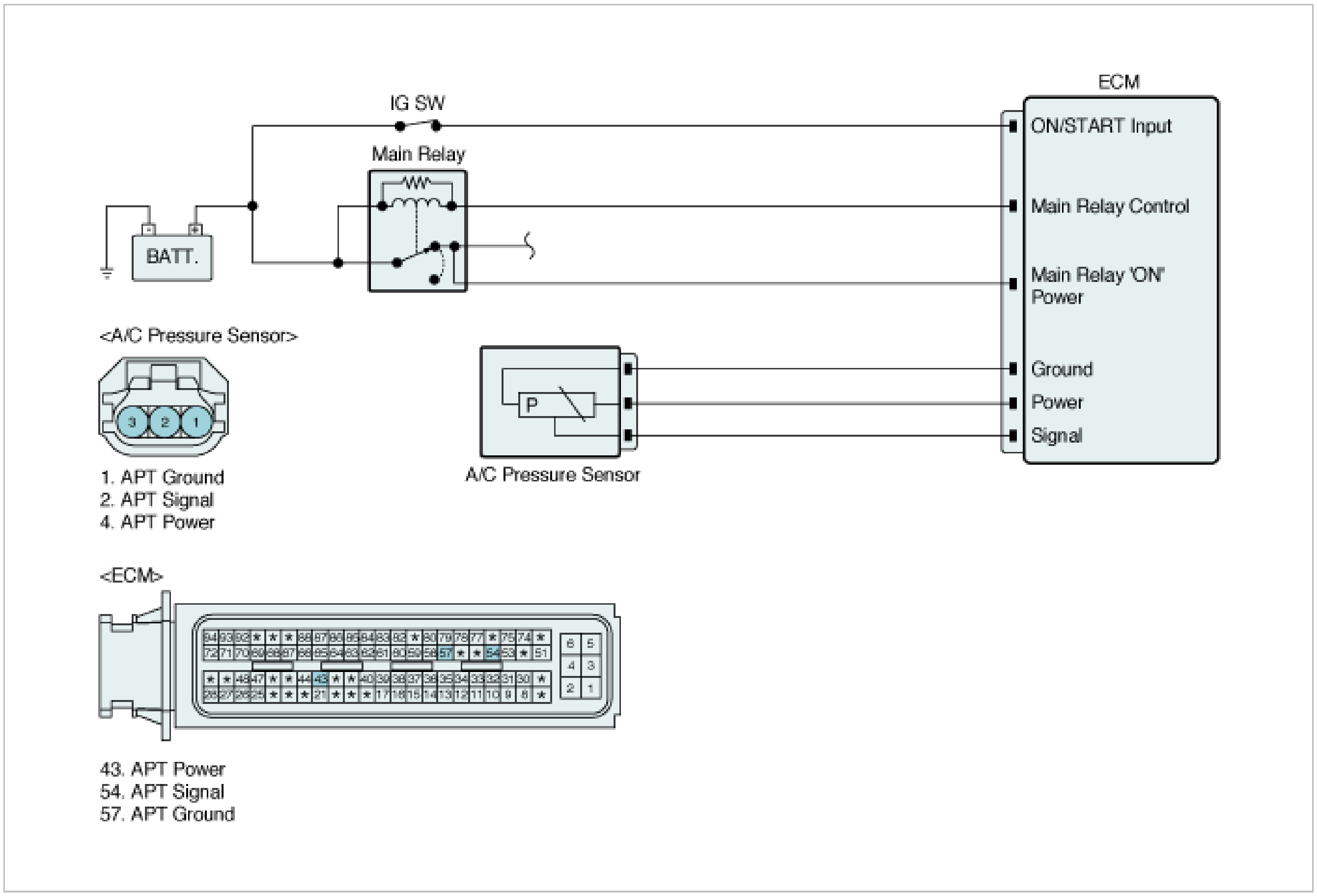
DTC Description

ECM sets DTC P0553 if the ECM detects signal higher than the possible range of a properly operating sensor.

DTC Detecting Condition

Item	Detecting Condition	Possible cause
DTC Strategy	• Electrical Check	• Short to power in signal circuit • Open in ground circuit • Poor connection or damaged harness • Faulty A/C pressure sensor
Enable Conditions	• Failure not detected for DTCs : P06A4, P06A5	
Threshold value	• Signal voltage > 4.7V	
Diagnosis Time	• 25.5 sec.	
MIL On Condition	• -	

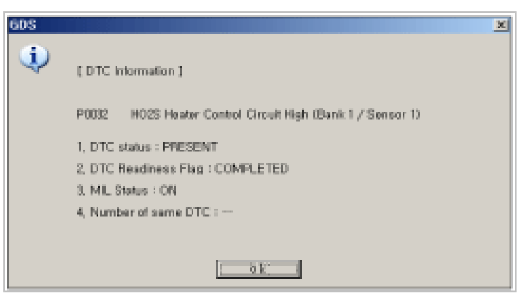
Diagnostic Circuit Diagram



Monitor DTC Status

> **NOTE**
>
> If there are DTCs of A/C Pressure Sensor, Power Steering Pressure Sensor, Variable Charge Motion Actuator and Tank Pressure Sensor together, check power line first. Those sensors own power line jointly.

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and Connector inspection

1. 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.
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 next procedure.

Signal Circuit Inspection

■ **Check for Short to Power in Signal Circuit**

1. IG KEY OFF.
2. Disconnect A/C pressure sensor harness connector.
3. IG KEY ON.
4. Measure voltage between signal terminal of A/C pressure. harness connector and chassis ground.

Specification : Approx. 0 V

5. Is voltage within specification?

YES	▶ Go to next procedure.
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Ground Circuit Inspection

■ **Check for Open in Ground Circuit**

1. IG KEY OFF.
2. Disconnect A/C pressure. harness connector and ECM harness connector.
3. Measure resistance between both ends of ground line.

Specification : Below 1Ω

4. Is resistance within specification?

YES	▶ Go to next procedure.
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. IG 'OFF'.
2. Connect prove to signal terminal as below and select 'Ocilloscope' menu on GDS.
   Channel A (+): Signal terminal of A/C pressure sensor, (-): Ground

3. Engine start and check the signal with operation.
4. Is waveform within specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Check A/C pressure sensor for contamination, deterioration, or damage. Substitute with a known-good A/C pressure sensor and check for proper operation. If the problem is corrected, replace A/C pressure sensor and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

General Description

To reduce the required power to manipulate steering wheel, hydraulic pressure is used in power steering system. A load is sensed at steering oil pressure sensor then inputted to ECM as a wheel position signal. Controlling idle speed valve, ECM performs appropriate electric load correction With this signal.

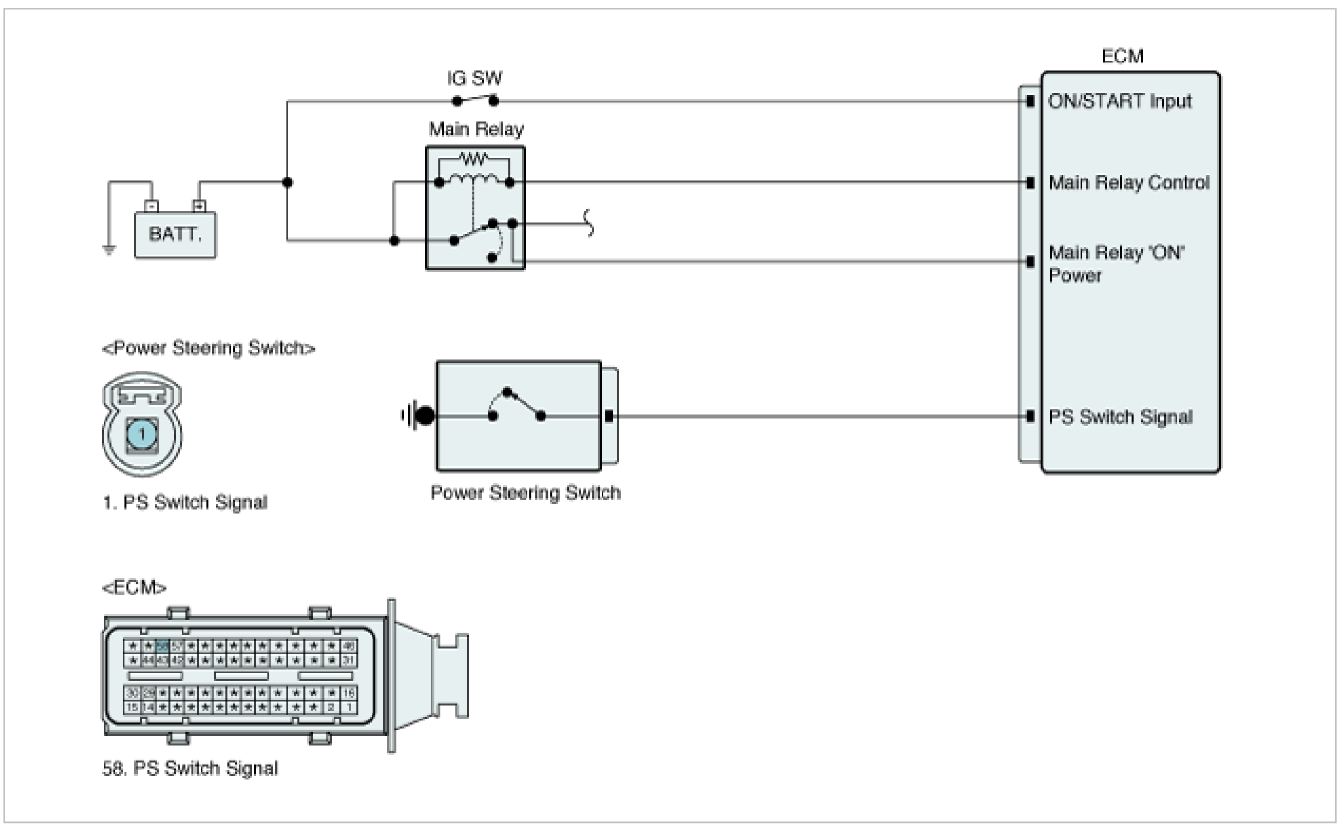
DTC Description

ECM sets DTC P0551 if the ECM detects signal exceeds the possible range of a properly operating sensor

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Plausibility check (Signal Stuck)	• Poor connection or damaged harness • Faulty power steering pressure sensor
Enable Conditions	• Vehicle speed > 60Km/h (37mph) • Coolant temp. > 60°C(140°F) • No relevant failure	
Threshold Value	• Signal > 3.2V	
Diagnostic Time	• 200 sec.	
MIL On Condition	• -	

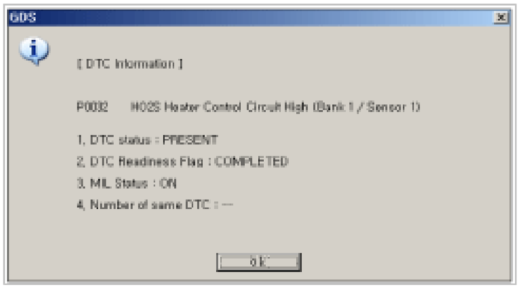
Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.

4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Signal Circuit Inspection

1. Check for short to ground in signal circuit
   (1) IG "OFF".
   (2) Disconnect the Power Steering Switch.
   (3) IG "ON" & Engine "OFF"
   (4) Measure voltage between signal terminal of the Power Steering Switch harness connector and chassis ground.

   Specification : Approx. B+

   (5) Is voltage within the specification?

YES	▶ Go to next step as below.
NO	▶ Check for short to battery in signal circuit. Repair as necessary and go to "Verification of Vehicle Repair" procedure

2. Check for open or short to battery in signal circuit
   (1) IG "OFF".
   (2) Disconnect the Power Steering Switch and ECM connector.
   (3) IG "ON" & Engine "OFF".
   (4) Measure voltage between signal terminal of the power steering switch harness connector and chassis ground.

   Specification : Approx. 0V

   (5) Is voltage within the specification?

YES	▶ Go to next step as below.
NO	▶ Check for short to battery in signal circuit. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Terminal and connection inspection

1. 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.
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 next procedure.

Component Inspection

1. IG "ON" & Engine "ON".
2. Measure voltage between signal terminal (back probe) of the switch harness connector and chassis ground.

Specification : Approx. B+
- Signal "OFF"(Steering wheel=Straight ahead) : Approx. B+
- Signal "ON"(Steering wheel=Turned) : Approx. 0V

3. Is voltage within the specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Substitute with a known-good sensor and check for proper operation. If the problem is corrected, replace sensor and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

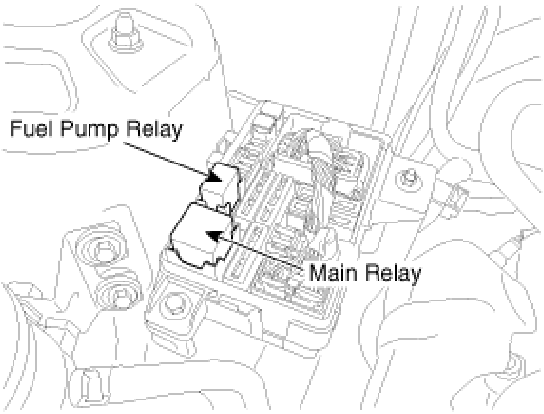
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0560 System Voltage

Component Location



General Description

The ECM provides ground to one side of the coil of the main relay and the other side is connected to the battery. The ECM monitors battery voltage and the voltage after the main relay.

DTC Description

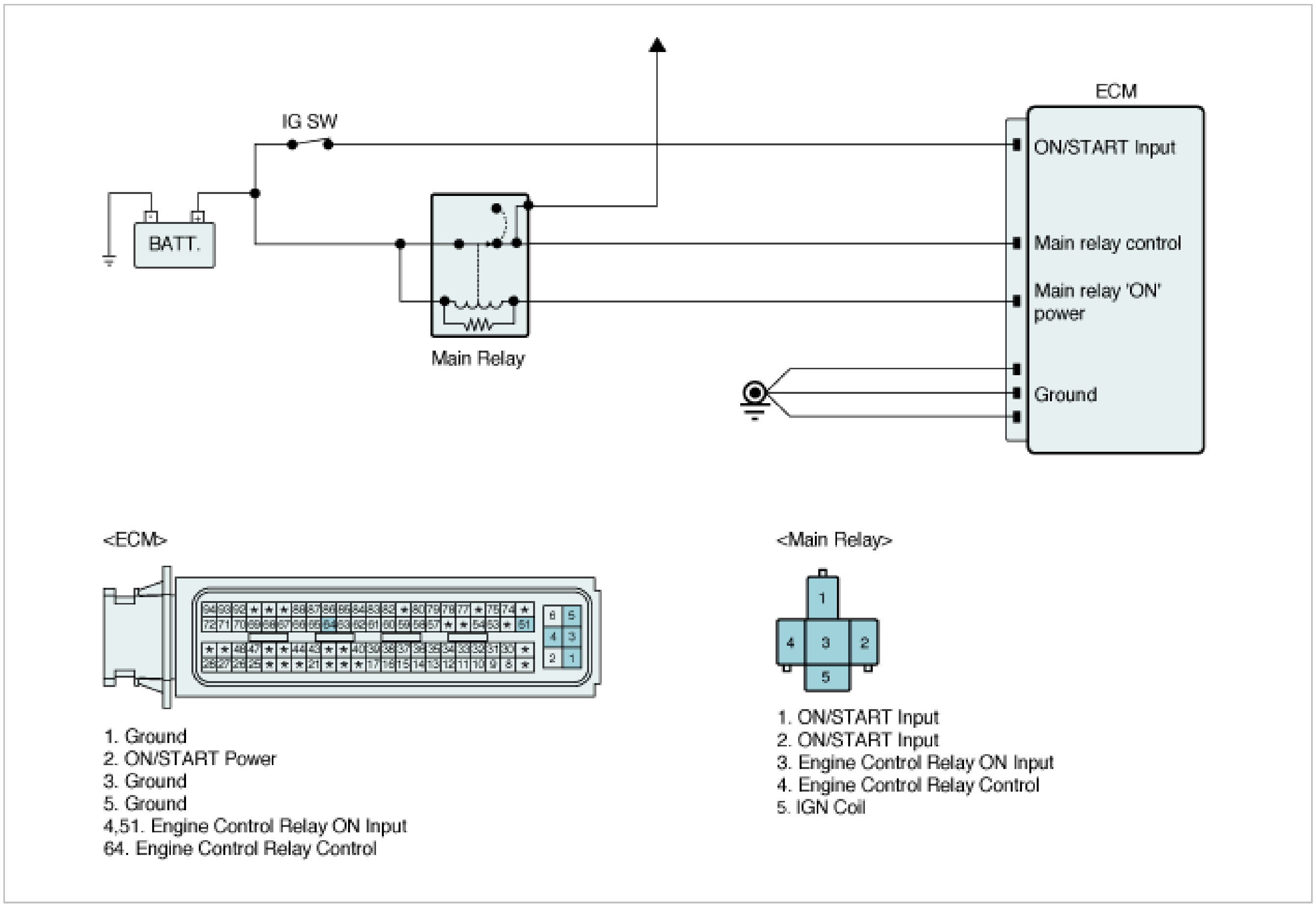
The ECM measures the voltage from ignition key and from main relay respectively and compares two voltages. This comparison will watch if the Main Relay has switched and remains on after ignition Key-On and if it has switched off after the ignition Key-Off. The ECM sets DTC P0560 if the voltage after Main Relay is lower than a predetermined threshold after ignition key-on or higher than a predetermined threshold after ignition key-off.

DTC Detecting Condition

Item		Detecting Condition	Possible Cause
DTC Strategy	Case1	• Comparison of battery voltage and voltage after main relay(Voltage low)	• Open or short circuit • Poor connection or damaged harness
	Case2	• Comparison of battery voltage and voltage after main relay(Voltage high)	
	Case3	• Monitor voltage supply after main relay(open circuit check)	
Enable Conditions	Case1	• Ignition "ON" • Battery voltage > 10V • Delay time after main relay ON > 0.05sec.	
	Case2	• Ignition "OFF" • Delay time after main relay ON > 0.05sec.	
	Case3	• Voltage after main relay > 8.5V • Voltage after ignition switch > 5V • Delay time after main relay ON > 0.05sec.	
Threshold Value	Case1	• Voltage after Main Relay < 6 V	
	Case2	• Voltage after Main Relay < 6 V	
	Case3	• Voltage after main relay - Voltage after ignition switch > 3.8~8.5V	
Diagnostic Time	Case1	• 0.2 sec.	
	Case2	• 0.2 sec.	
	Case3	• 0.1 sec.	

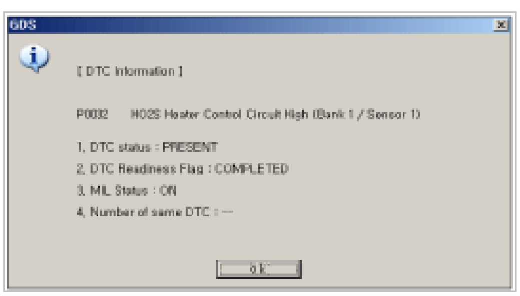
MIL On Condition	• -	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE
- History (Not Present) 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 next step as below

Component Inspection

1. With Ignition OFF, remove the main relay
2. Measure resistance between power terminal and control terminal of the main relay(Component side).

Specification : Approx. 70~120Ω at 20°C(68°F)

3. Apply 12V and a ground to power and control terminals of the main relay(Components side).
4. Check if the main relay works well when it is energized. (If the main relay works normally, a clicking sound can be heard.)
5. Does the main relay operate normally?

YES	▸ Go to next step as below.
NO	▸ Check main relay for contamination, deterioration, or damage. Substitute with a known-good main relay and check for proper operation. If the problem is corrected, replace main relay and then go to "Verification of Vehicle Repair" procedure.

Power Circuit Inspection

1. Ignition "ON" & Engine "OFF".
2. Measure the voltage between power terminals of the main relay harness connector and chassis ground.

Specification : Approx. B+

3. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

4. Measure the voltage between 'power to sensor' terminal of the main relay harness connector and chassis ground.

Specification : Approx. 0V & 4.5V

5. Is value within the specification?

YES	▸ Go to next step as below
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Control Circuit Inspection

1. Ignition "OFF"
2. With ECM connector disconnected, measure voltage between main relay control terminal of the ECM harness connector and chassis ground.

Specification : Approx. B+

3. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Check control circuit for open or short circuit between main relay and ECM. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Ignition Switch Circuit Inspection

1. Ignition "ON" & Engine "OFF".
2. Measure the voltage between 'ON/START Input' terminal of the ECM harness connector and chassis ground.

Specification : Approx. B+

3. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Terminal and connection inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

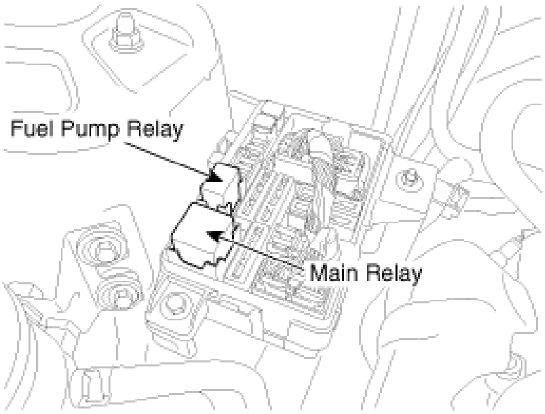
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The ECM provides ground to one side of the coil of the main relay and the other side is connected to the battery. The ECM monitors battery voltage and the voltage after the main relay.

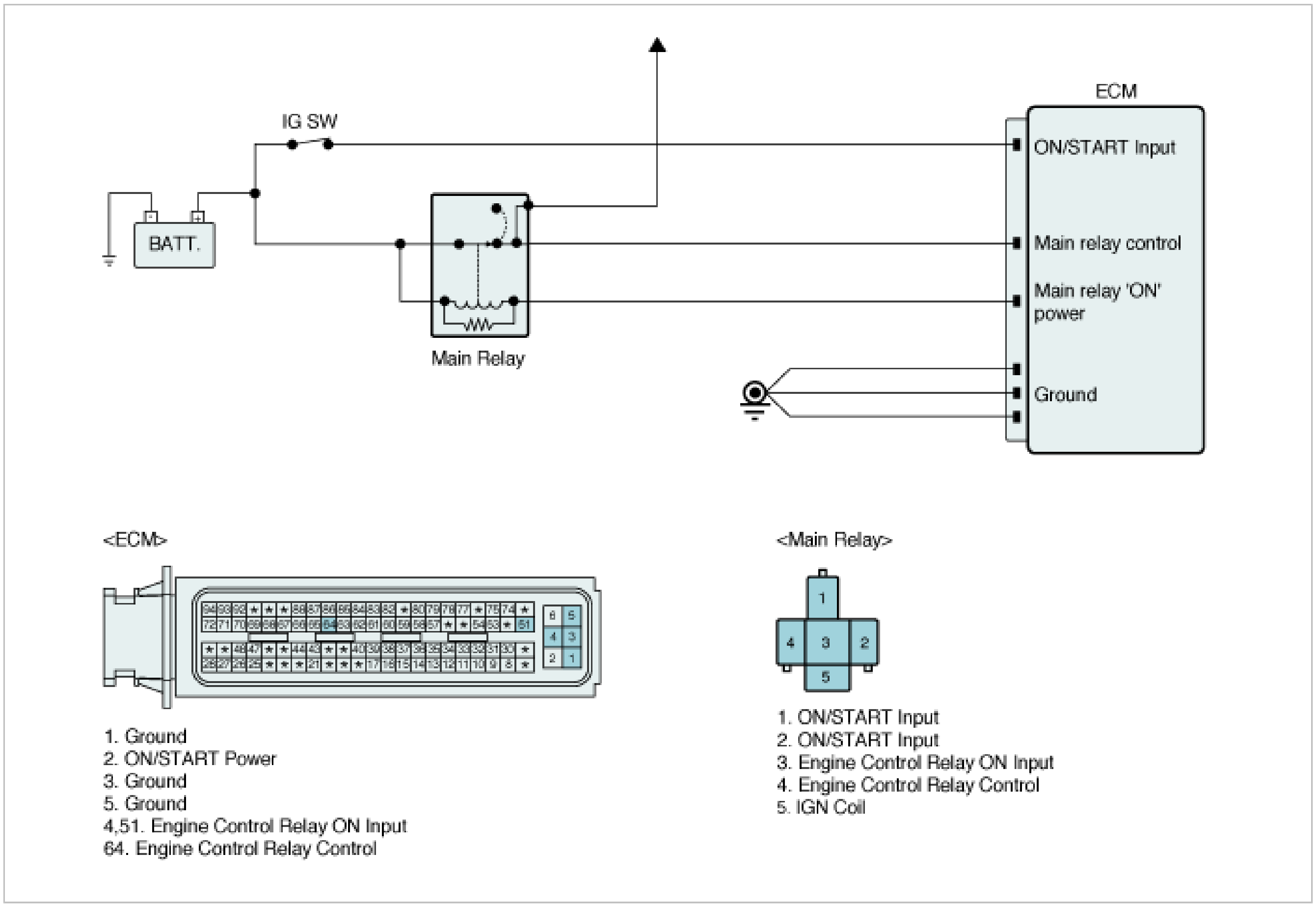
DTC Description

ECM sets DTC P0562 if the ECM detects system voltage lower than the possible range of battery voltage.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Battery voltage check	• Poor connection or damaged harness • Faulty charging system
Enable Conditions	• No relevant error • Vehicle speed > 10km/h (6.2MPH)	
Threshold Value	• Battery voltage < 10V	
Diagnostic Time	• 30 sec.	
MIL On Condition	• 2 Driving Cycles	

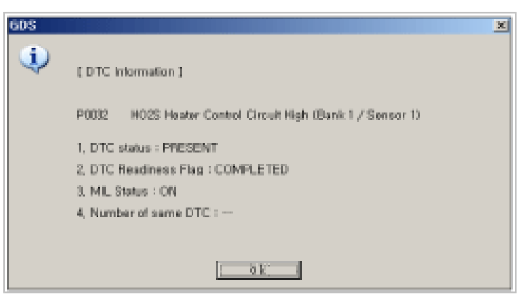
Diagnostic Circuit Diagram



Monitor DTC Status

> **NOTE**
>
> If any codes relating to system voltage(P0562) is stored, do ALL REPAIRS associated with those codes before proceeding with troubleshooting.

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

System Inspection

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 °C(°F)	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.

Terminal and connection inspection

1. 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.
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	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

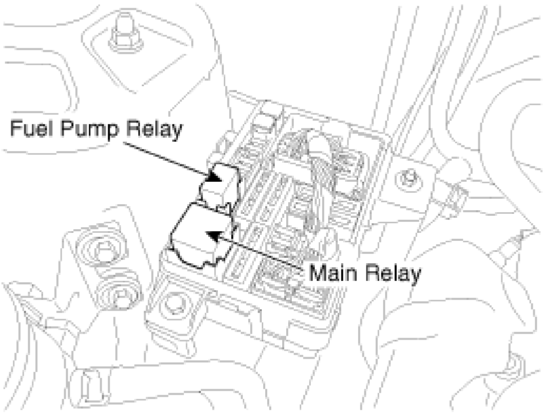
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The ECM provides ground to one side of the coil of the main relay and the other side is connected to the battery. The ECM monitors battery voltage and the voltage after the main relay.

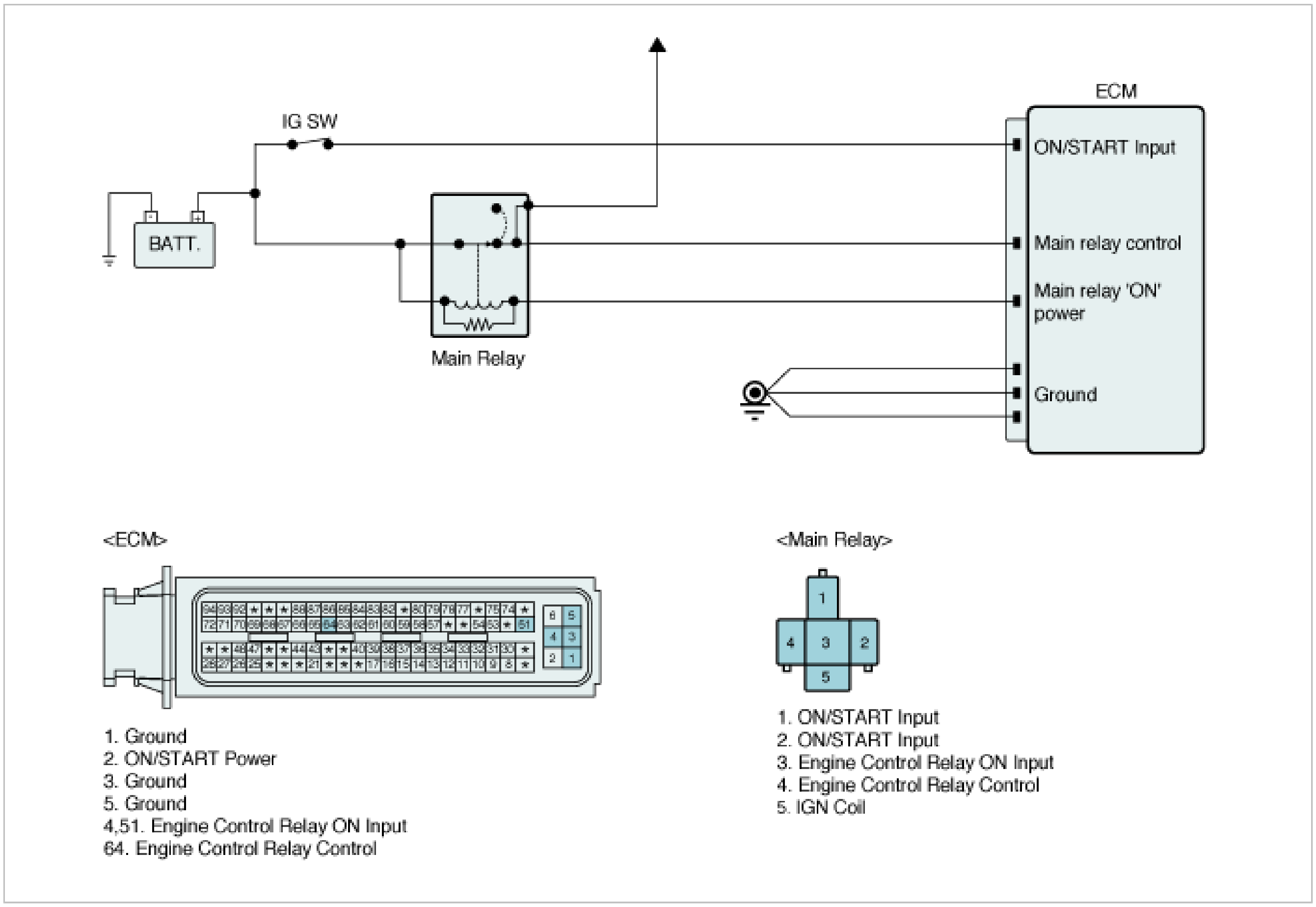
DTC Description

ECM sets DTC P0563 if the ECM detects system voltage higher than the possible range of battery voltage.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Battery voltage check	• Poor connection or damaged harness • Faulty charging system
Enable Conditions	• No relevant error • Vehicle speed > 10km/h (6.2MPH)	
Threshold Value	• Battery voltage > 16V	
Diagnostic Time	• 30 sec.	
MIL On Condition	• 2 Driving Cycles	

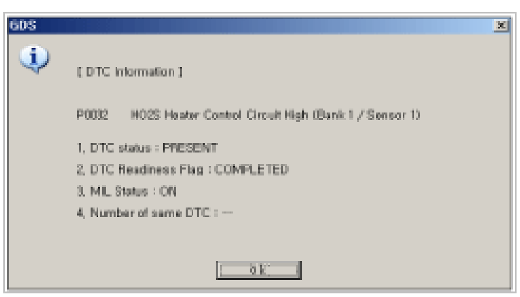
Diagnostic Circuit Diagram



Monitor DTC Status

> **NOTE**
>
> If any codes relating to system voltage(P0563) is stored, do ALL REPAIRS associated with those codes before proceeding with troubleshooting

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

System Inspection

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 °C(°F)	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.

Terminal and connection inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0564 Cruise Control Multi-Function Input A Circuit

General Description

The cruise control system keeps the vehicle running at a fixed speed until a signal canceling this fixed speed is received. When the main switch is turned on with vehicle in the running mode, the battery voltage is applied to the ECM. When a signal from the control switch is input to the ECM while the vehicle is in state, the ECM controls fuel injection to make a car go at a steady speed you want. Also, while the system is operating, "CRUISE" indicator lamp in the meter assembly lights up.

DTC Description

If the switch signal's voltage is not within the calibrated ranges when ECM checks the switch signal under detecting condition, ECM sets P0564.

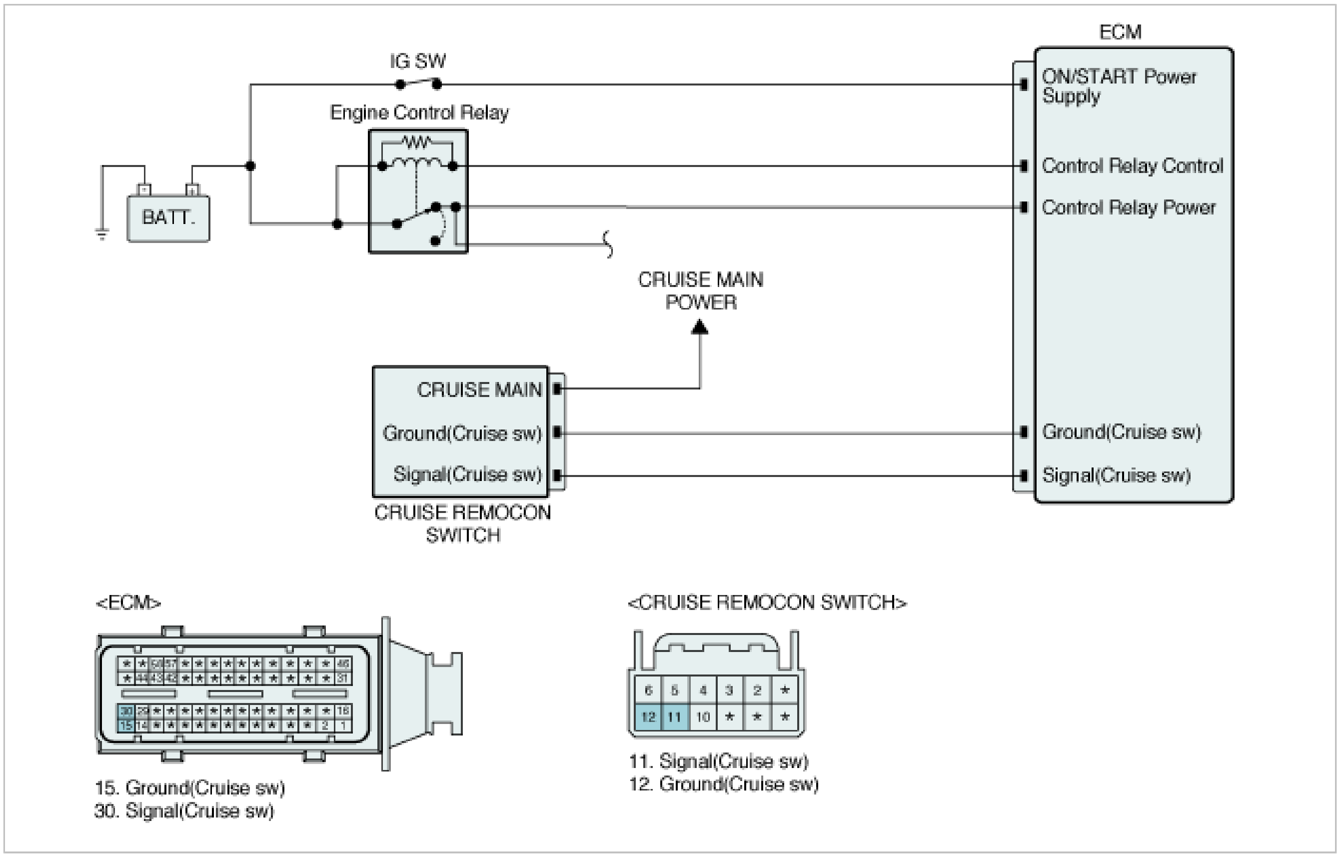
DTC Detecting Condition

Item		Detecting Condition	Possible Cause
DTC Strategy	Case1	• Invalid voltage range check	• Open or short in harness • Poor connection or damaged harness • Faulty cruise remote control switch
	Case2	• Check SET/COAST switch stuck	
	Case3	• Check RES/ACC switch stuck	
Enable Conditions	Case1	• 10V < Battery voltage <16V	
	Case2 & 3	• 10V < Battery voltage <16V • Cruise control not active	
Threshold Value	Case1	• 0.05 V < Switch voltage(SW) < 0.72 V or 0.85V < SW <2 V or 2.2 V < SW < 4.4 V or 4.8 V < SW	
	Case2	• 0.72 V < Switch voltage < 0.85V	
	Case3	• 2.0V < Switch voltage < 2.2V	
Diagnostic Time	Case1	• 31sec.	
	Case2	• 61sec.	
	Case3	• 61sec.	
MIL On Condition		• -	

Specification

Item	Resistance(Ω)	Item	Resistance(Ω)
CRUISE MAIN switch	3.9 kΩ ± 5%	COAST SET switch	220 Ω ± 5%
CANCEL switch	0 Ω ± 5%	RESUME/ACCEL switch	910 Ω ± 5%

Diagnostic Circuit Diagram



Terminal and connection inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

■ **Check power circuit voltage**

1. IG key OFF.
2. Disconnect 'CRUISE REMOCON SWITCH' connector.
3. IG key ON.
4. Measure voltage between 'CRUISE MAIN' terminal of 'CRUISE REMOCON SWITCH' harness connector and chassis ground.

Specification : 11.5V~13.0V

5. Is the measured value within specification?

YES	▸ Go to "Signal Circuit Inspection".
NO	▸ Repair short to ground / open between 'CRUISE MAIN' terminal of 'CRUISE REMOCON SWITCH'

	harness connector and 'Cruise supply' terminal of ECM harness connector, and go to "Verification of Vehicle Repair" procedure.

Signal Circuit Inspection

■ **Check signal circuit voltage**

1. IG key OFF.
2. Disconnect 'CRUISE REMOCON SWITCH' connector.
3. IG key ON.
4. Measure voltage between 'Signal(Cruise sw)' terminal of 'CRUISE REMOCON SWITCH' harness connector and chassis ground.

Specification : 4.8V~5.1V

5. Is the measured value within specification?

YES	▸ Go to "Component Inspection" procedure.
NO	▸ Go to "Check short in signal circuit" as follows.

■ **Check short in signal circuit**

1. IG key OFF.
2. Disconnect 'CRUISE REMOCON SWITCH' connector and ECM connector.
3. Check resistance between 'Signal(Cruise sw)' terminal and 'CRUISE MAIN' terminal of 'CRUISE REMOCON SWITCH' harness connector.
4. Check resistance between 'Signal(Cruise sw)' terminal and 'Ground(Cruise sw)' terminal of 'CRUISE REMOCON SWITCH' harness connector.

Specification : Infinite

5. Is the measured value within specification?

YES	▸ Go to "Check open in signal circuit" as follows.
NO	▸ Repair short in signal circuit, and go to "Verification of Vehicle Repair" procedure.

■ **Check open in signal circuit**

1. IG key OFF.
2. Disconnect 'CRUISE REMOCON SWITCH' connector and ECM connector.
3. Measure resistance between 'Signal(Cruise sw)' terminal of 'CRUISE REMOCON SWITCH' harness connector and 'Signal(Cruise sw)' terminal of ECM connector.

Specification : Below 1.0Ω

4. Is the measured value within specification?

YES	▸ Go to "Component Inspection" procedure.
NO	▸ Repair open between 'Signal(Cruise sw)' terminal of 'CRUISE REMOCON SWITCH' harness connector and 'Signal(Cruise sw)' terminal of ECM connector, and go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ **Check auto cruise switch**

1. IG key OFF.
2. Disconnect 'CRUISE REMOCON SWITCH' connector.
3. Measure resistance between 'Signal(Cruise sw)' terminal and 'CRUISE MAIN' terminal of 'CRUISE REMOCON SWITCH' harness connector with each switch depressed.(Component side)
4. Measure resistance between 'Signal(Cruise sw)' terminal and 'Ground(Cruise sw)' terminals of 'CRUISE REMOCON SWITCH' harness connector.(Component side)
   Specification :

Item	Resistance(Ω)
CRUISE MAIN switch	3.9 kΩ ± 5%
CANCEL switch	0 Ω ± 5%
COAST SET switch	220 Ω ± 5%
RESUME/ACCEL switch	910 Ω ± 5%

5. Is the measured value within specification?

YES	▸ Go to "Verification of Vehicle Repair" procedure.
NO	▸ Replace 'CRUISE REMOCON SWITCH' and go to "Verification of Vehicle Repair " procedure.

> NOTE
>
> There is a memory reset function on scan tool that can erase optional parts automatically detected and memorized by ECM. After testing ECM on the vehicle, use this function to reuse the ECM on the others.

Verification of Vehicle Repair

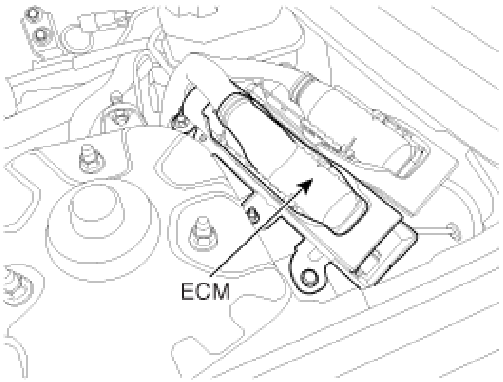
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0605 Internal Control Module Read Only Memory(ROM) Error

Component Location



General Description

A malfunction is detected by using a checksum technique for verifying data. The digital data is composed of zeros and ones. A checksum is the total of all ones in a string of data. By comparing the checksum value with a stored value, a malfunction can be detected.

DTC Description

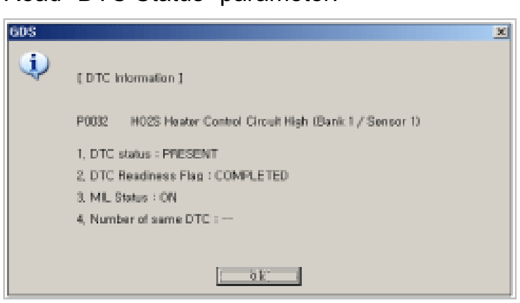
The ECM monitors RAM areas and communication connections between microcontroller and output drivers and sets DTC P0605 if failure is detected.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Check RAM Area / Communication connections	• Contact resistance in connectors • Faulty ECM
Enable Conditions	• Ignition ON	
Threshold Value	• RAM test / Checksum / SPI communication : failure	
Diagnostic Time	• 0.1 second	
MIL On Condition	• Immediate	

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Back Up Voltage Inspection

1. Ignition "OFF"
2. Disconnect ECM connector.
3. Ignition "ON"
4. Measure voltage between terminal 6 of the ECM harness connector and chassis ground.

Specification : Remain stable at battery voltage

5. Are circuits remaining stable at battery voltage?

YES	▸ Using a scan tool, check ECM software version and upgrade as necessary. If version is the newest one, check ECM for contamination, deterioration, or damage. 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. **NOTE** It is necessary to perform the TPS adaptation procedure with Scan tool when the throttle body assembly or ECM is replaced. ■ TPS adaptation procedure 1. Erase previous TPS adaptation value using Scan tool. 2. Ignition "OFF" and then "ON" without cranking. Wait for 10 seconds under enable conditions - Enable conditions : Battery >10V & Intake Air Temp. >5.3°C(41.5°F) & 5.3°C(41.5°F) < Engine Coolant Temp.< 99.8°C(211.6°F) 3. After TPS adaptation, the system normality should be confirmed by reading out "FMY" on the Scan Tool.
NO	▸ If voltage fluctuates, check circuit for loose, bent or corroded terminals, Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

General Description

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.

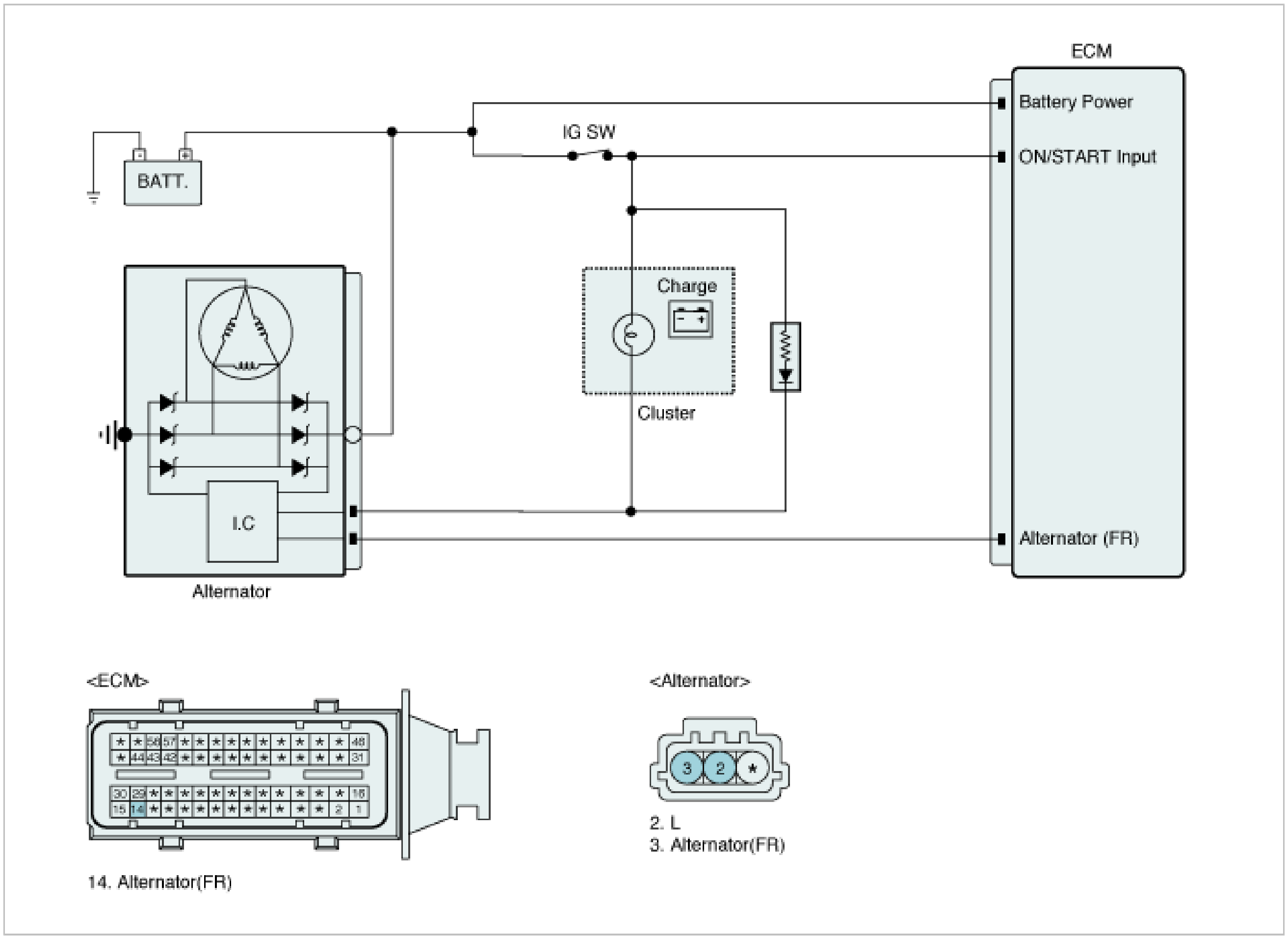
DTC Description

ECM sets DTC P0625 if the ECM detects output duty signal lower than the possible range of a properly operating alternator.

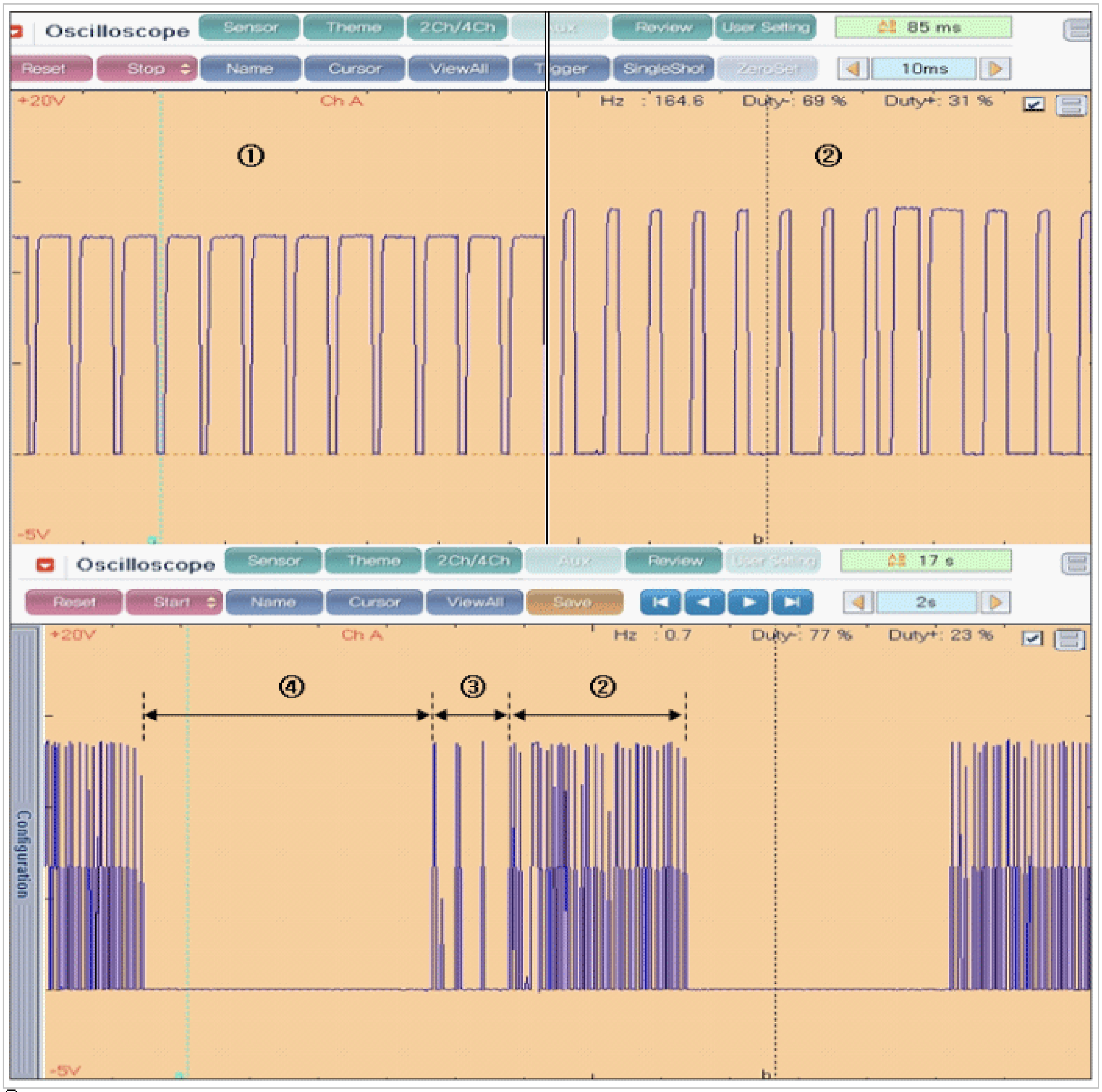
DTC Detecting Condition

<table>
<tr><th colspan="2">Item</th><th>Detecting Condition</th><th>Possible Cause</th></tr>
<tr><td colspan="2">DTC Strategy</td><td>• Electrical Check</td><td rowspan="9">• Short to battery in harness
• Poor connection or damaged harness</td></tr>
<tr><td rowspan="2">Enable Conditions</td><td>Case1</td><td>• Time after ignition ON > 0.1sec.
• Engine speed=0
• No main relay error</td></tr>
<tr><td>Case2</td><td>• Engine speed > 0rpm
• No relevant failure
• Battery voltage < 16V
• 600< Engine speed(rpm) < 4000
• Coolant temp. > 73°C(140°F)</td></tr>
<tr><td rowspan="2">Threshold Value</td><td>Case1</td><td>• Alternator load < 15%</td></tr>
<tr><td>Case2</td><td>• Alternator load < 2%</td></tr>
<tr><td rowspan="2">Diagnostic Time</td><td>Case1</td><td>• 1sec.</td></tr>
<tr><td>Case2</td><td>• 20sec.</td></tr>
<tr><td colspan="2">MIL On Condition</td><td>• -</td></tr>
</table>

Diagnostic Circuit Diagram



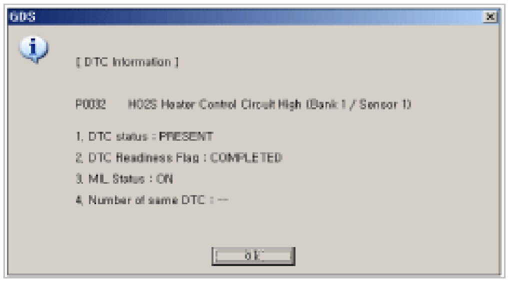
Signal Waveform & Data



① Normal waveform with IG ON
② Normal waveform with Idle and no electrical load
③ Normal waveform with Idle and part electrical load
④ Normal waveform with Idle and full electrical load(A/C, Defrost, Head Lamp, Repeater, Audio, etc)

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

System Inspection

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
   SpeRange/Performancecification :

Ambient temperature °C(°F)	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?

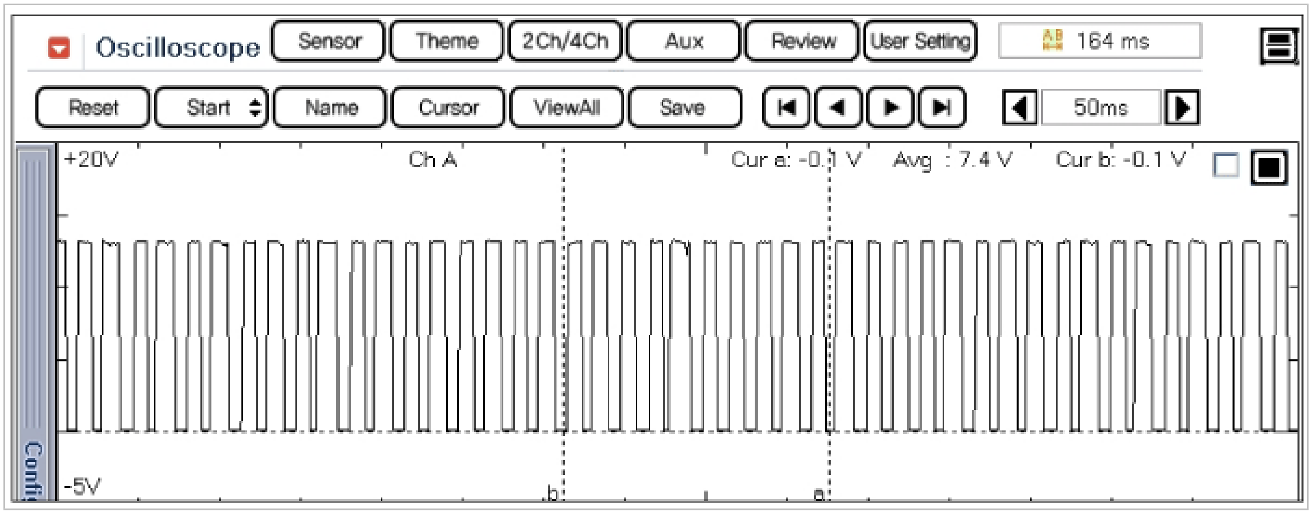
YES	▸ Go to next step as below
NO	▸ Possibility of charging system malfunction. Repair or replace alternator and battery. Refer to Charging System group in Workshop manual. And then go to "Verification of Vehicle Repair" procedure.

Control Circuit Inspection

1. With ignition OFF, disconnect alternator connector
2. Ignition "ON" & Engine "OFF"
3. Measure voltage between FR terminal of the alternator harness connector and chassis ground.

Specification : Approx. 9~10V

> **NOTE**
>
> Normal waveform with ignition "ON"



4. Is voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure

Terminal and connection inspection

1. 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.
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	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0626 Generator Field/F Terminal Circuit High

General Description

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.

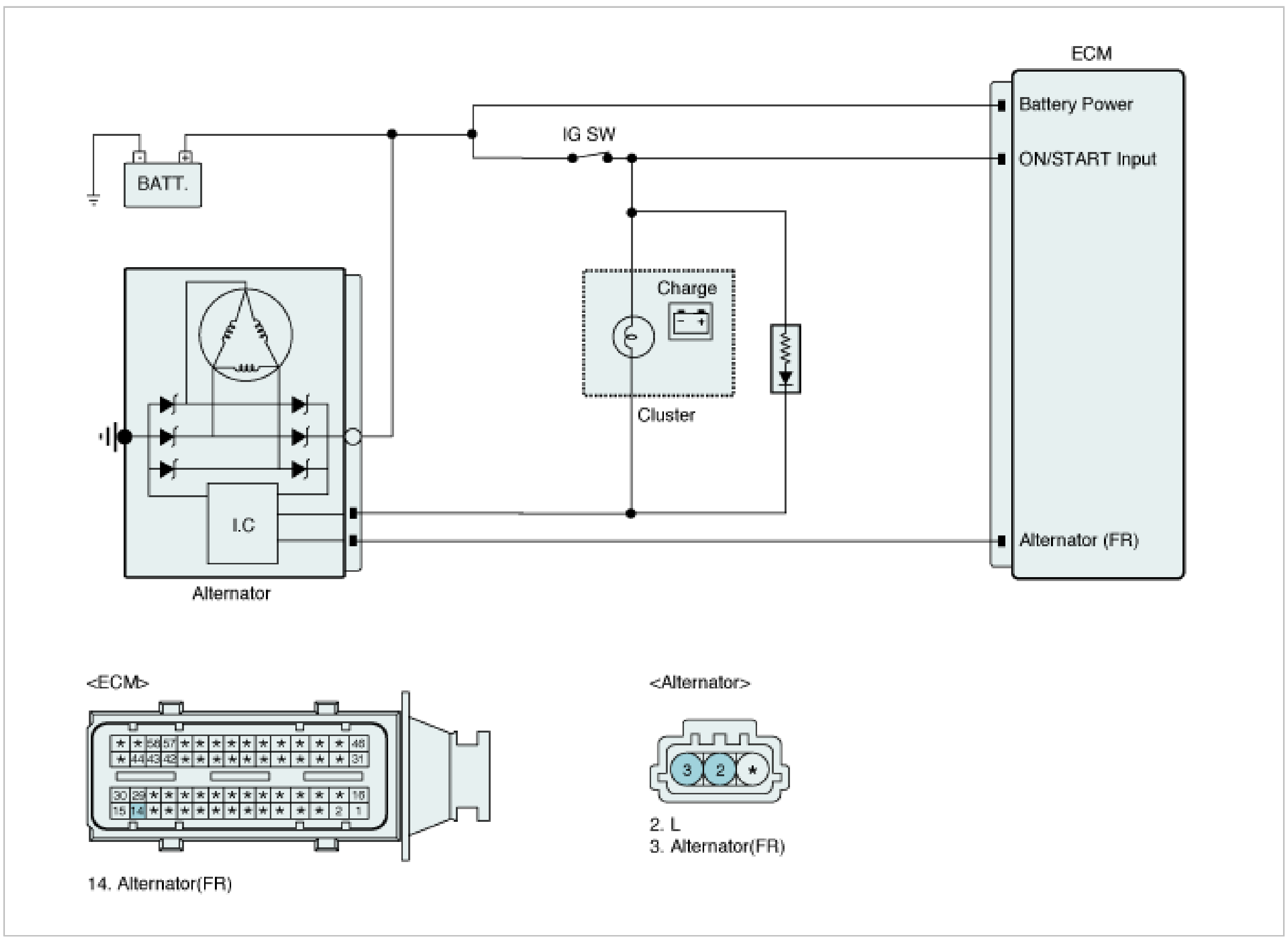
DTC Description

ECM sets DTC P0626 if the ECM detects output duty signal higher than the possible range of a properly operating alternator.

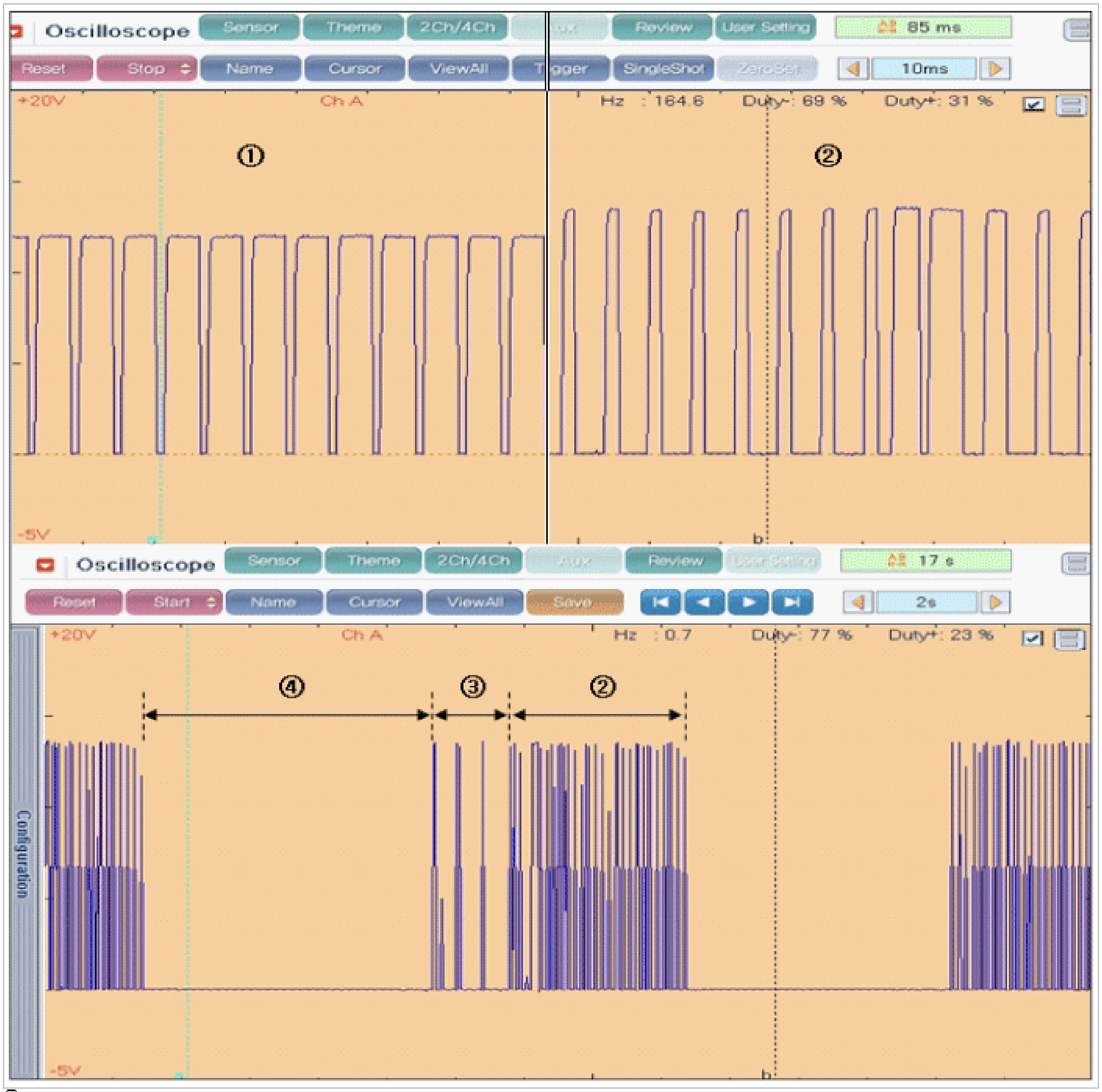
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Open or short to ground in harness • Faulty charging system
Enable Conditions	• Time after ignition ON > 0.1sec. • Engine speed=0 • No main relay error	
Threshold Value	• Alternator load > 35%	
Diagnostic Time	• 1sec.	
MIL On Condition	• -	

Diagnostic Circuit Diagram



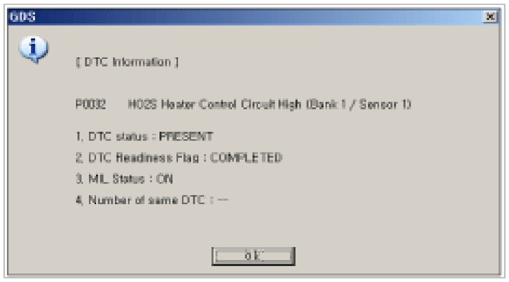
Signal Waveform & Data



① Normal waveform with IG ON
② Normal waveform with Idle and no electrical load
③ Normal waveform with Idle and part electrical load
④ Normal waveform with Idle and full electrical load(A/C, Defrost, Head Lamp, Repeater, Audio, etc)

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

System Inspection

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 °C(°F)	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?

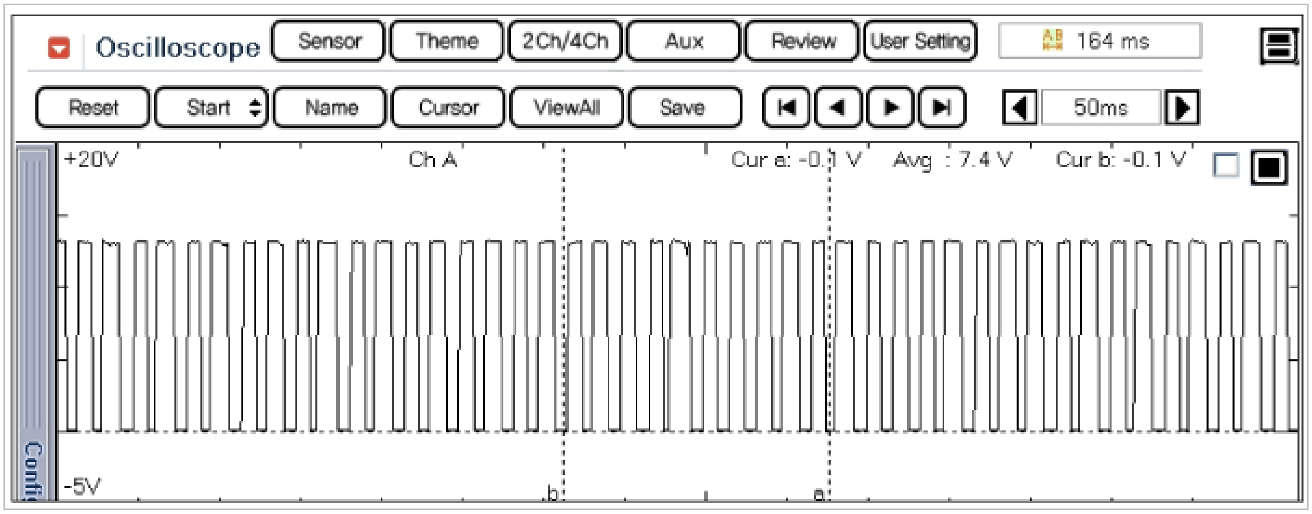
YES	▶ Go to next step as below
NO	▶ Possibility of charging system malfunction. Repair or replace alternator and battery. Refer to Charging System group in Workshop manual. And then go to "Verification of Vehicle Repair" procedure.

Control Circuit Inspection

1. With ignition OFF, disconnect alternator connector
2. Ignition "ON" & Engine "OFF"
3. Measure voltage between FR terminal of the alternator harness connector and chassis ground.

Specification : Approx. 9~10V

> NOTE
>
> Normal waveform with ignition "ON"



4. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure

Terminal and connection inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

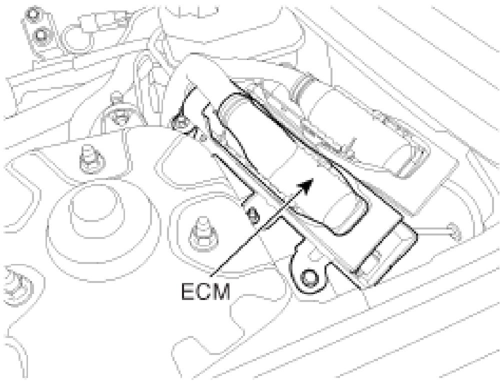
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0630 VIN Not Programmed or Incompatible-ECM/PCM

Component Location



General Description

Regulations require that all 2005 and subsequent model year vehicles shall have the Vehicle Identification Number(VIN) available in a standardized format through the standardized data link connector in accordance with SAE J1979 specifications. Using a scan tool, PERFORM "VIN WRITING" procedure after replacing or reflashing a PCM.

DTC Description

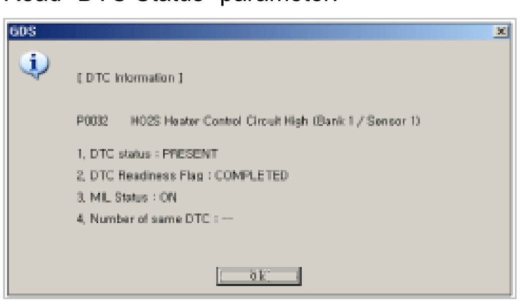
The PCM monitors ROM areas and sets DTC P0630 if there is no Vehicle Identification Number(VIN) information.

DTC Detecting Condition

Item	Detecting Condition	Possible cause
DTC Strategy	• VIN Check	• PCM is Virgin(not programmed) status
Enable Conditions	• -	
Threshold value	• VIN not programmed in PCM	
Diagnosis Time	• 1sec.	
MIL On Condition	• 1 driving cycle	

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 PCM's connector or was repaired and PCM 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 next step as below

System Inspection

1. Was the PCM just replaced or reflashed?

YES	▶ Using a scan tool, perform "VIN WRITING" procedure. Refer to the latest Reference manual for scan tool and go to "Verification of Vehicle Repair" procedure
NO	▶ Using a scan tool, read VIN information. If there is no proper VIN information, perform "VIN WRITING" procedure. If VIN information exists, substitute with a known-good PCM and check for proper operation. If the problem is corrected, replace PCM. And go to "Verification of Vehicle Repair" procedure.

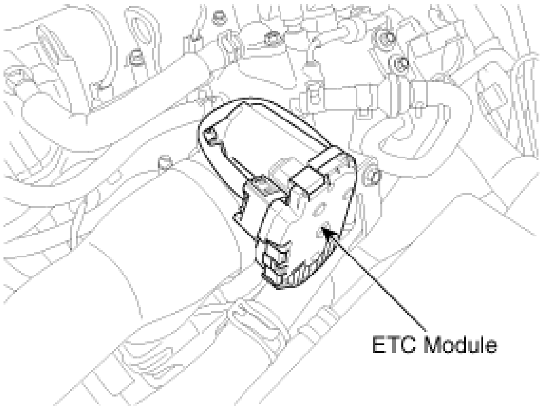
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Electronic Throttle Control(ETC) system is made of the components throttle body, Throttle Position Sensor(TPS)1&2 and Accelerator Position Sensor(APS) 1&2. The throttle body contains the actuator, the throttle plate and the throttle position sensor (potentiometer), which are integrated in one housing. The actuator consists of a DC motor with a two-stage gear. The opening angle of the throttle valve is detected by the throttle position sensor which is mounted on the throttle body. And it provides feedback to the ECM to control the throttle motor in order to control the throttle valve opening angle properly in response to the driving condition.

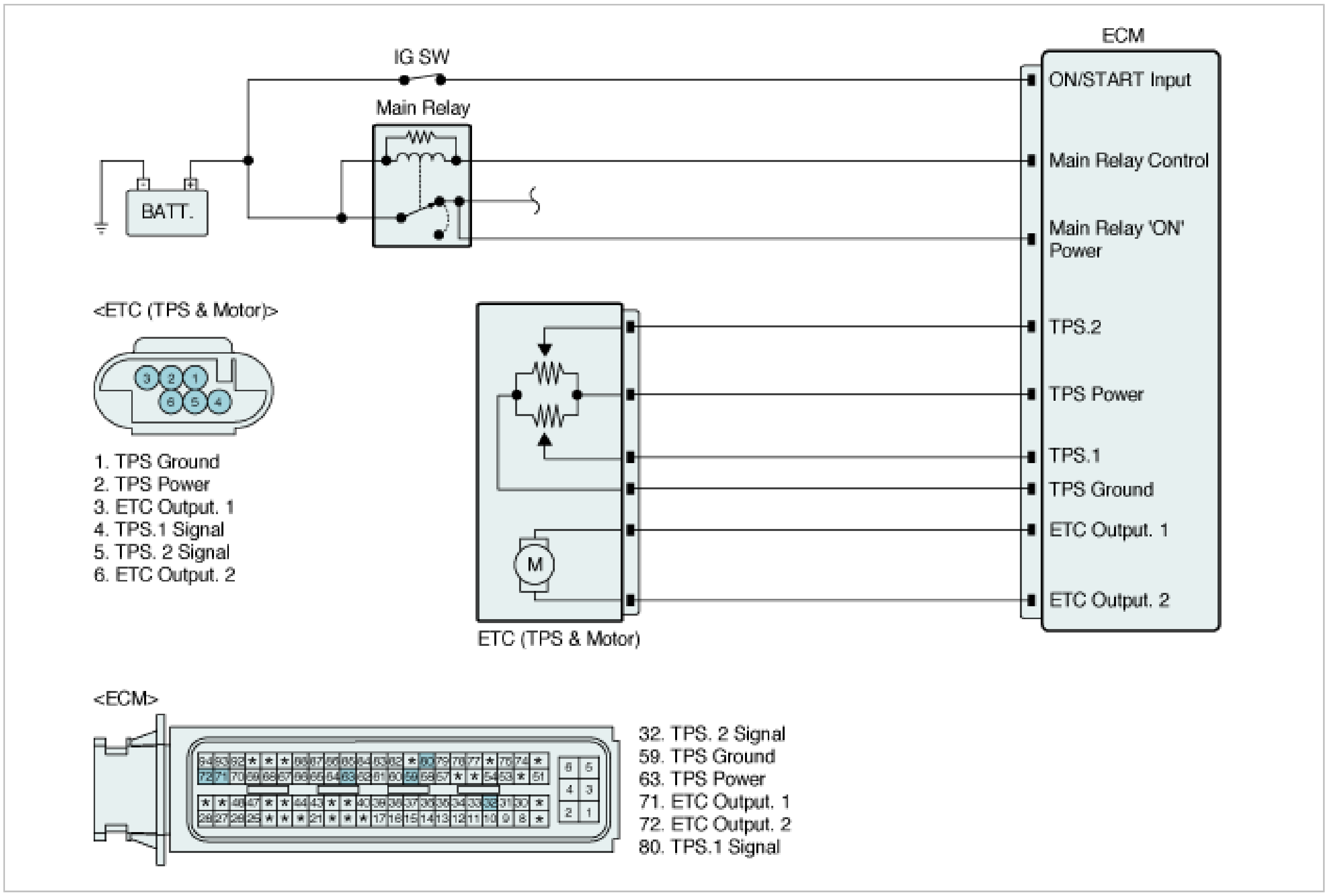
DTC Description

ECM sets DTC P0638 if the ECM detects TPS adaptation value exceeds threshold value.

DTC Detecting Condition

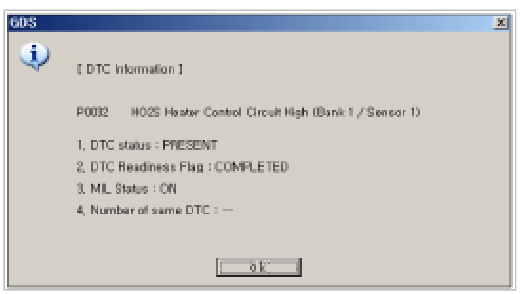
Item		Detecting Condition	Possible Cause
DTC Strategy	Case1	• TPS adaptation condition check	• Poor connection or damaged harness • Faulty ETC Motor • Faulty TPS
	Case2	• ETC Limp Home position check	
	Case3	• Lower mechanical stop adaptation voltage range check	
Enable Conditions		• During TPS adaptation	
Threshold Value	Case1	• TPS adaptation is requested but not possible	
	Case2	• Difference between Throttle sensor voltage in limphome and limphome setpoint > 0.3V	
	Case3	• Difference between Throttle sensor voltage in lower mechanical stop position and lower mechanical stop position setpoint > 0.3V	
Diagnostic Time		• 1.2 sec.	
Limp-Home		• Forced limited RPM mode : The ECM limits engine speed to 1500rpm • Electrical check of the ETC system is prohibited	
MIL On Condition		• Immediate	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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	▶ Check for poor connection between ECM and component : backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Control Circuit Inspection

1. Disconnect ECM harness connector.
2. Measure resistance between 'ETC output 1' terminal and 'ETC output 2' terminal of ECM harness connector.

Specification : Approx. 1.2 ~ 1.8 Ω (20°C / 68°F)

3. Is resistance within specification?

YES	▶ Go to next procedure.
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ **TPS Inspection**

1. Start engine and install scan tool.
2. Monitor the "TPS VOLTAGE1" and "TPS VOLTAGE2" parameters on the Scantool data list

Specification : Refer to "Signal Waveform & Data" in the "General Information" procedure
- Output of TPS1 increases smoothly in proportion with the throttle valve opening angle.
- Output of TPS2 decreases smoothly in inverse proportion with the throttle valve opening angle.

3. Are the TPS VOLTAGE1&2 within the specification?

YES	▶ Go to next procedure.
NO	▶ Check TPS1&2, referring troubleshooting guide for DTC P0121/P0221. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

■ **ETC Motor Inspection**

1. Visually/physically inspect the restriction or any foreign objects in throttle body.
2. Clean or replace as necessary and go to "Verification of Vehicle Repair" procedure.
   If OK, go to next step as below.
3. Ignition "OFF".
4. Disconnect the ETC motor harness connector.
5. Measure resistance between 'ETC output 1' terminal and 'ETC output 2' terminal of ETC motor harness connector. (Component side)

Specification : 1.2~1.8Ω at 20°C(68°F)

6. Is resistance within specification?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ Substitute with a known-good switch and check for proper operation. If the problem is corrected, replace component and then go to "Verification of Vehicle Repair" procedure.

NOTE

It is necessary to perform the TPS adaptation procedure after the ETC assembly or ECM replacing.
■ TPS adaptation procedure
Ignition "OFF" and then "ON" without cranking. Wait for 10 seconds under enable conditions.
→ Enable conditions : Battery >10V & Intake Air Temp. >5.3°C(41.5°F) & 5.3°C(41.5°F)< Engine CoolantTemp. < 99.8°C(211.6°F)

Verification of Vehicle Repair

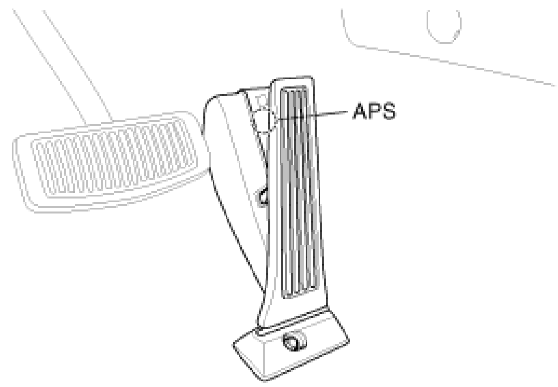
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0642 Sensor Reference Voltage \'A\' Circuit Low

Component Location



General Description

The ECM provides a 5volt reference voltage to the Acceleration Position Sensor1(APS2). The ECM monitors reference voltage deviation from the power supply circuit of the APS2.

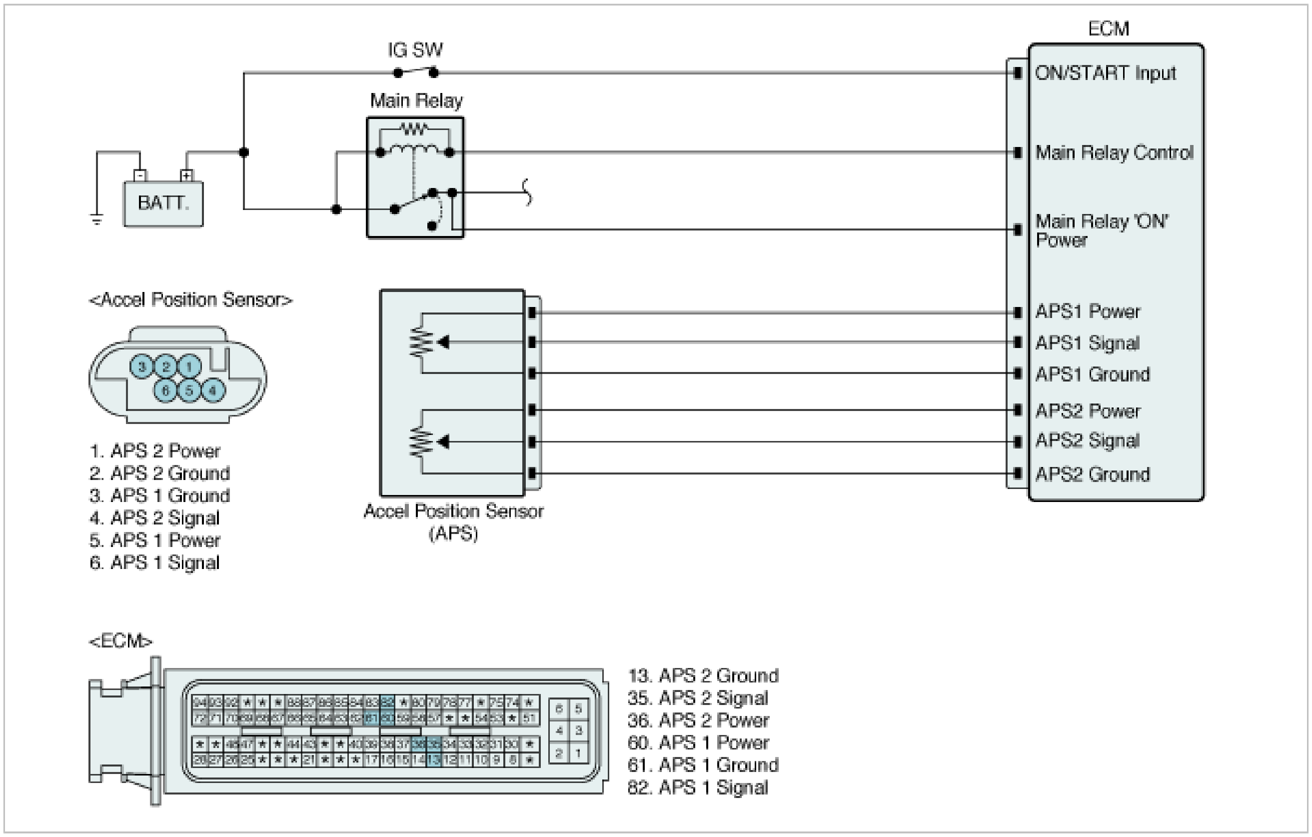
DTC Description

ECM sets DTC P0642 if the ECM detects reference voltage is lower than threshold value.

DTC Detecting Condition

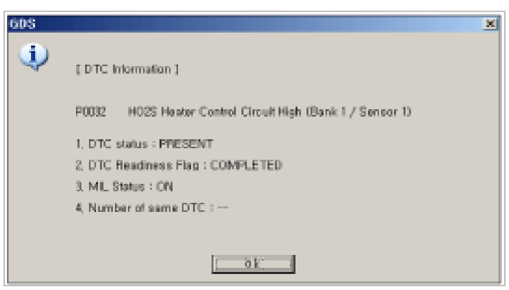
<table>
<tr><th colspan="2">Item</th><th>Detecting Condition</th><th>Possible Cause</th></tr>
<tr><td rowspan="3">Case 1</td><td>DTC Strategy</td><td>• Short to ground</td><td rowspan="11">• Short to ground in power circuit
• Poor connection or damaged harness
• Faulty APS</td></tr>
<tr><td>Enable Conditions</td><td>• IG "ON"</td></tr>
<tr><td>Threshold Value</td><td>• APS power supply voltage_2 < 0.7 V</td></tr>
<tr><td rowspan="3">Case 2</td><td>DTC Strategy</td><td>• Electrical check</td></tr>
<tr><td>Enable Conditions</td><td>• IG "ON"</td></tr>
<tr><td>Threshold Value</td><td>• 0.7 V ≤ APS power supply voltage_2 < 4.5 V</td></tr>
<tr><td colspan="2">Diagnostic Time</td><td>• 0.1 sec</td></tr>
<tr><td colspan="2">Mil On Condition</td><td>• 1 driving cycle</td></tr>
<tr><td colspan="2">Fail Safe</td><td>• Forced limited power mode : The ECM limits opening angle of the throttle valve to max. 50% and engine torque to a certain pre-determined value.
• After idle recognition, the ECM uses APS1 signal to calculate the current opening angle of the throttle valve.</td></tr>
</table>

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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	▸ Check for poor connection between ECM and component : backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

■ **Check for Short to Ground in Power circuit**

1. IG KEY OFF.
2. Disconnect APS harness connector.
3. IG KEY ON.
4. Measure voltage between APS2 power terminal of APS harness connector and chassis ground.

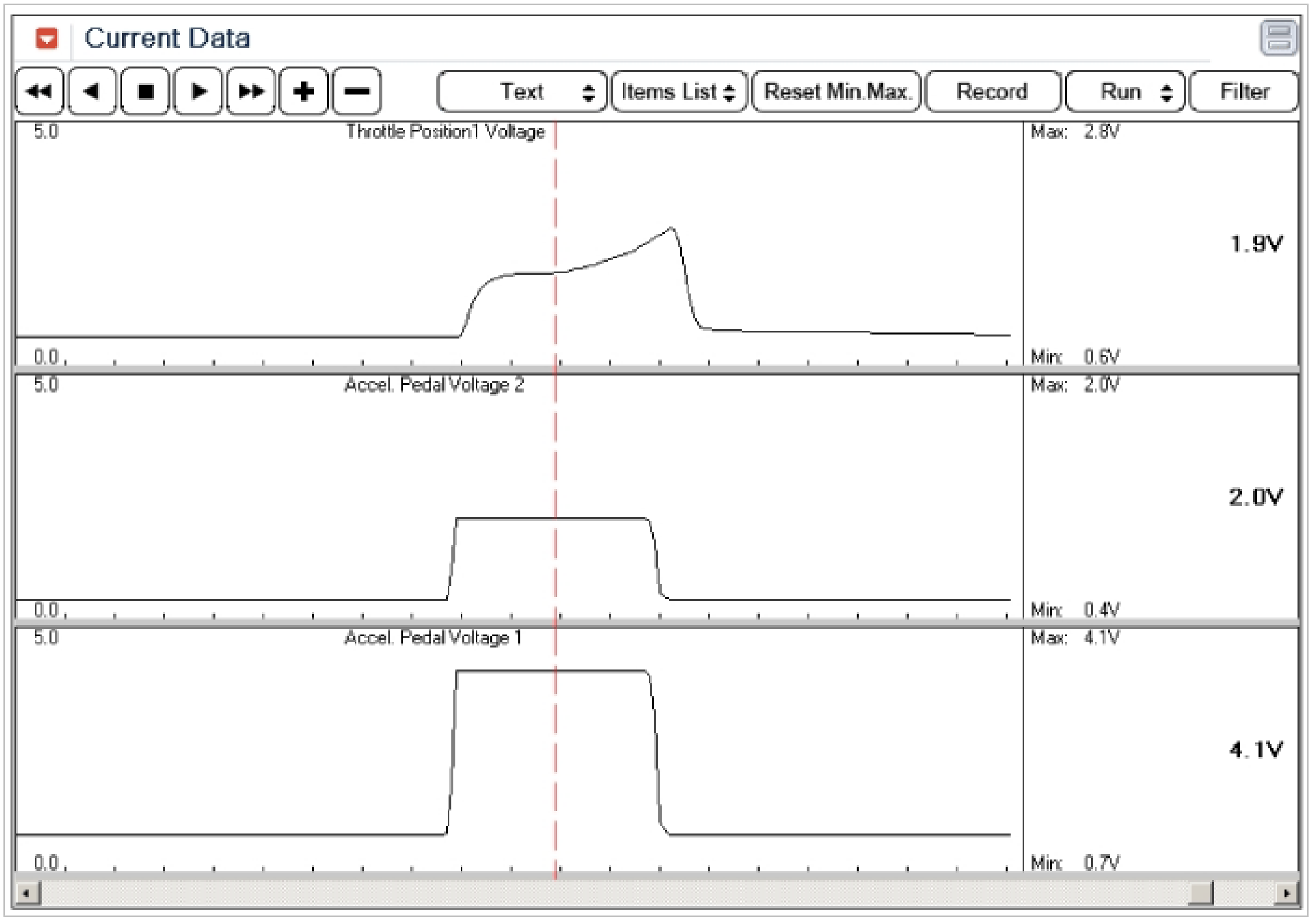
Specification : Approx. 5V

5. Is voltage within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. IG key ON.
2. Check sensor data as below.



3. Data Analysis

Condition		GDS Sensor Data	
		APS 1	APS 2
IG Key "ON & Engine "OFF"	Output voltages of APS1 and APS2 are in propotion to accelerating. APS2 output voltage is half of APS1 output voltage.		
	Release a pedal fully	0.58~0.93V	0.29~0.38
	Depress a pedal fully	3.85~4.35V	1.93~2.18V

4. Is data in accordance with "Data Anaysis"?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Substitute with a known-good component and check for proper operation. If the problem is corrected, replace component and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

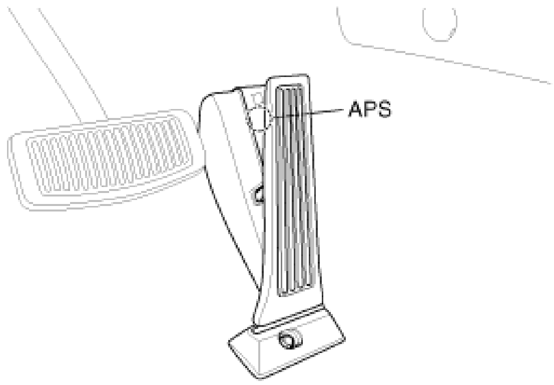
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The ECM provides a 5volt reference voltage to the Acceleration Position Sensor1(APS2). The ECM monitors reference voltage deviation from the power supply circuit of the APS2.

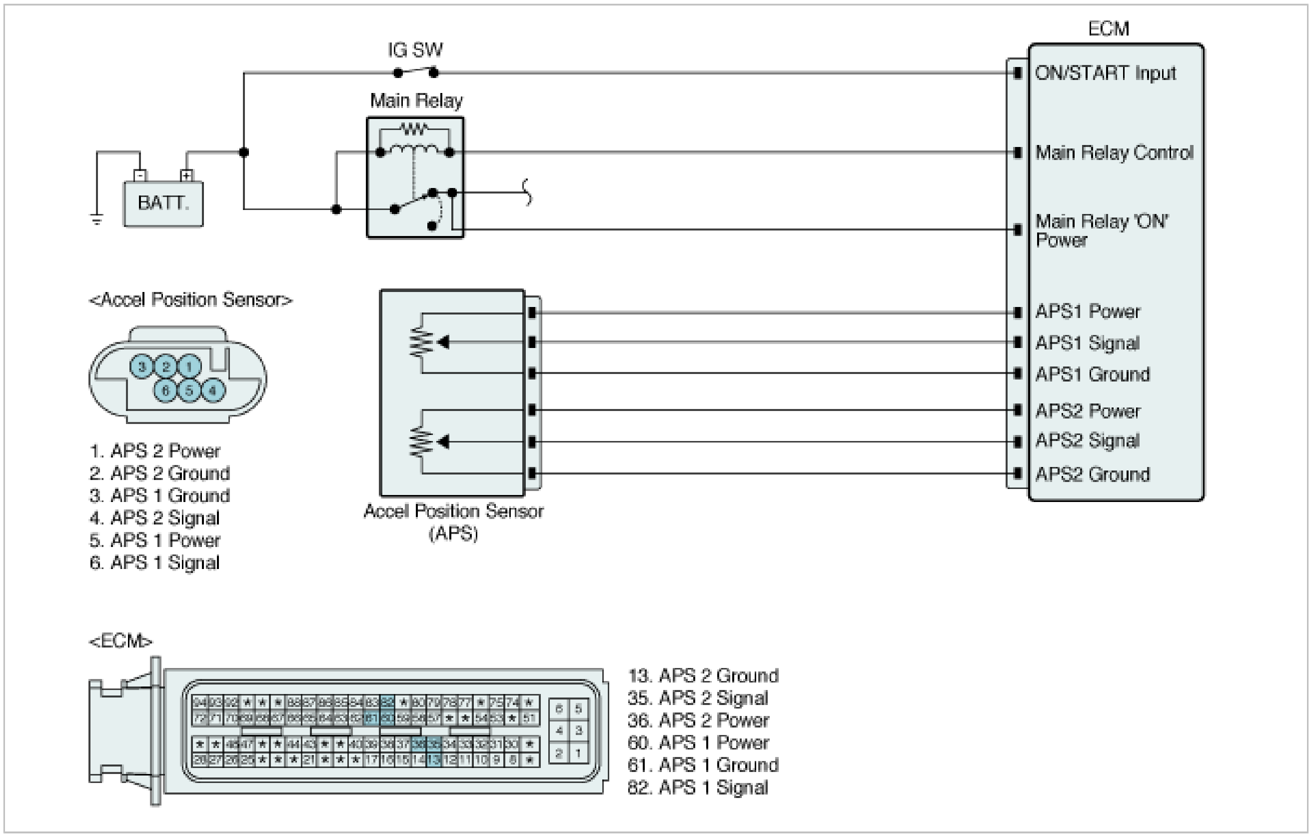
DTC Description

ECM sets DTC P0643 if the ECM detects reference voltage higher than threshold value.

DTC Detecting Condition

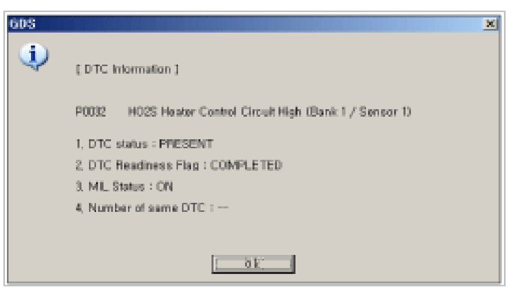
Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Short to battery in power circuit • Poor connection or damaged harness • Faulty APS
Enable Conditions	• IG "ON"	
Threshold Value	• APS2 > 5.5V	
Diagnostic Time	• 0.1sec.	
MIL On Condition	• 1 driving cycle	
Fail Safe	• Forced limited power mode : The ECM limits opening angle of the throttle valve to max. 50% and engine torque to a certain pre-determined value. • After idle recognition, the ECM uses APS1 signal to calculate the current opening angle of the throttle valve.	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

■ **Check for Short to battery in Power circuit**

1. IG KEY OFF.
2. Disconnect APS harness connector.
3. IG KEY ON.
4. Measure voltage between APS2 power terminal of APS harness connector and chassis ground.

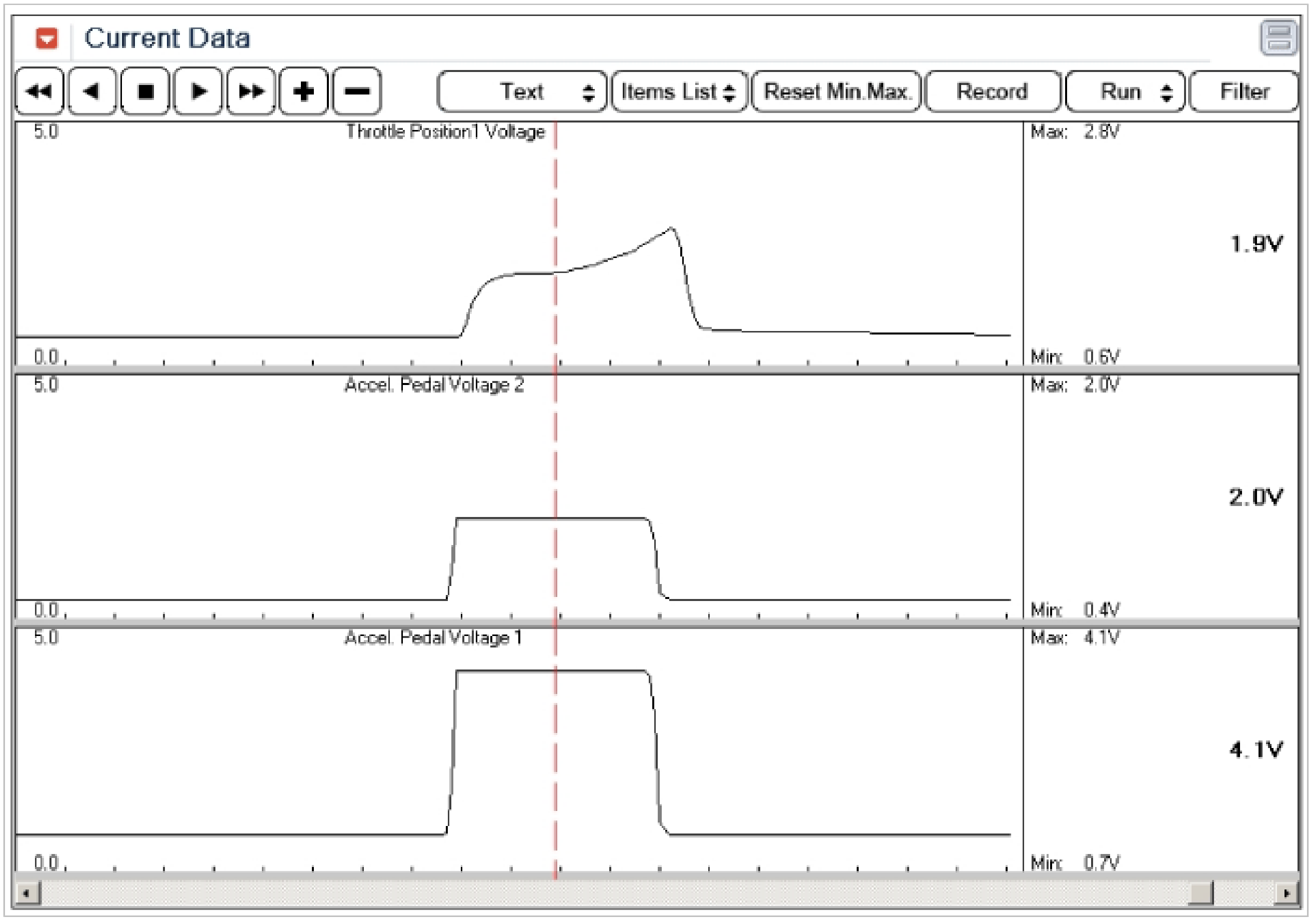
Specification : Approx. 5V

5. Is voltage within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. IG key ON.
2. Check sensor data as below.



3. Data Analysis

Condition		GDS Sensor Data	
		APS 1	APS 2
IG Key "ON & Engine "OFF"	Output voltages of APS1 and APS2 are in propotion to accelerating. APS2 output voltage is half of APS1 output voltage.		
	Release a pedal fully	0.58~0.93V	0.29~0.38
	Depress a pedal fully	3.85~4.35V	1.93~2.18V

4. Is data in accordance with "Data Anaysis"?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Substitute with a known-good component and check for proper operation. If the problem is corrected, replace component and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

General Description

The A/C clutch relay is activated if the A/C switch is operated while the blower is running and system operation is enabled by the ECM. When A/C is requested, the Engine Control Module(ECM) provides a ground path to the A/C clutch relay control circuit. When the relay circuit is grounded, the A/C clutch relay is energized. The ECM delays grounding the relay circuit for a short time, so the ECM can adjust the engine idle speed for the additional load. The ECM will temporarily de-energized the A/C clutch relay for one or more of the following conditions:
-Full acceleration when the throttle is at WOT.(Wide Open Throttle)
-Risk of overheating: Engine coolant temp. exceeds threshold value
-A/C system pressure exceeds threshold value
-Engine starting

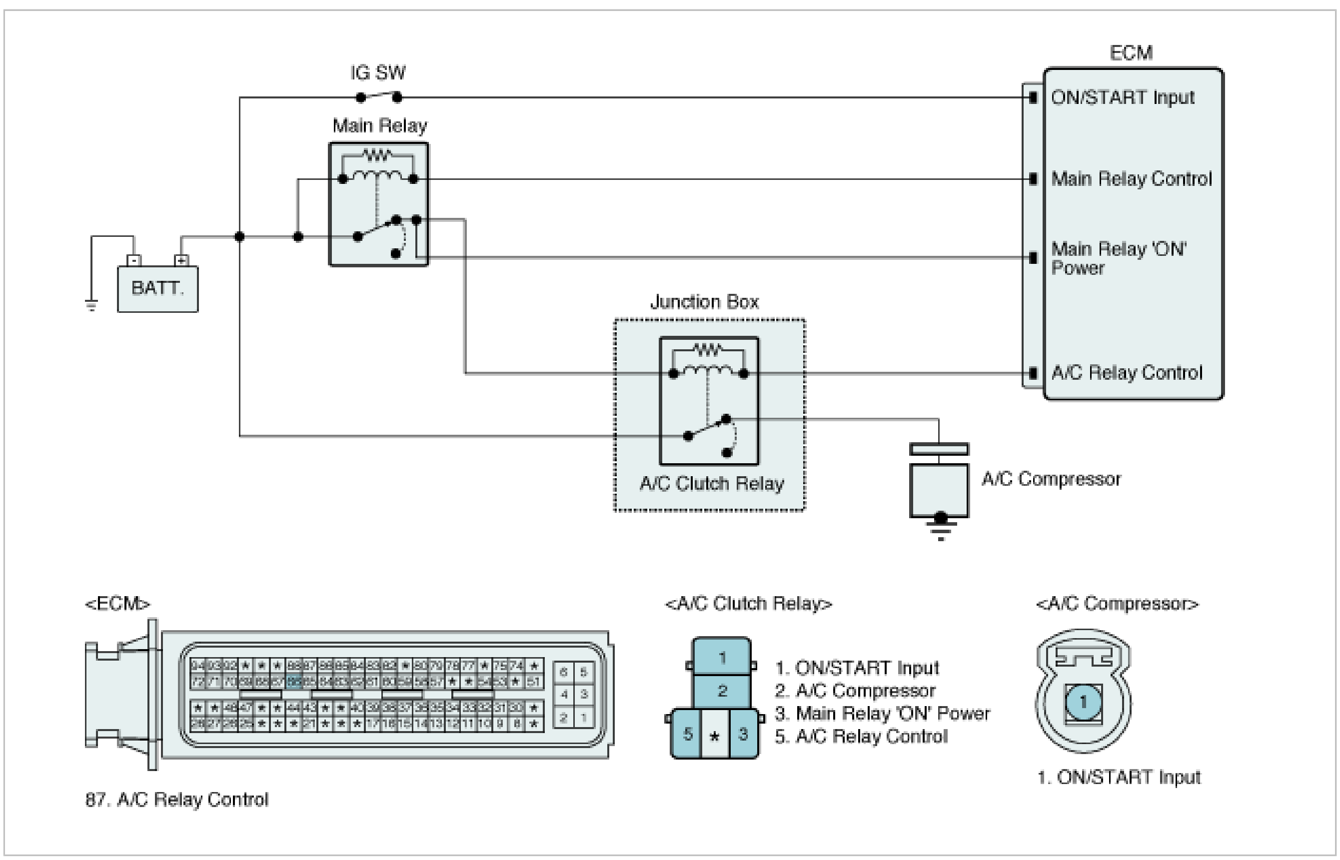
DTC Description

ECM sets DTC P0646 if the ECM detects signal lower than the possible range of a properly operating sensor.

DTC Detecting Condition

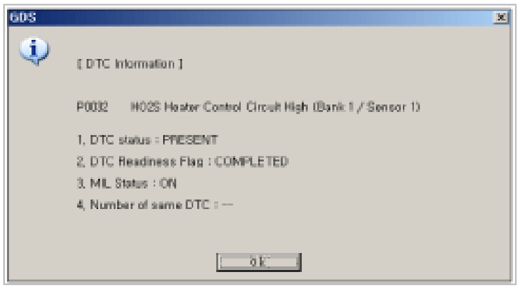
Item	Detecting Condition	Possible cause
DTC Strategy	• Electrical Check	• Open or short to ground in power circuit • Open or short to ground in Control circuit • Poor connection or damaged harness • Faulty A/C Compressor Relay
Enable Conditions	• 10V < Battery voltage < 16V	
Threshold value	• Short to Ground or Line Break	
Diagnosis Time	• 50 sec.	
MIL On Condition	• -	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 PCM's connector or was repaired and PCM 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 next step as below

Terminal and Connector inspection

1. 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.
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 next procedure.

Power Circuit Inspection

■ **Check for Short to Ground in Power Circuit**

1. IG KEY 'OFF'.
2. Disassemble A/C Relay.
3. Measure resistance between power terminal of A/C Relay harness side and chassis ground.

Specification : Infinite

4. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ **Check for Open in Power Circuit**

1. IG KEY 'OFF'.
2. Disassemble A/C Relay.
3. IG KEY 'ON'.
4. Measure voltage between power terminal of A/C Relay harness side and chassis ground.

Specification : Approx. 12V

5. Is voltage within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Control Circuit Inspection

■ **Check for Short to Ground in Control Circuit**

1. IG KEY 'OFF'.
2. Disassemble A/C Relay.
3. Measure resistance between control terminal of A/C Relay harness side and chassis ground.

Specification : Infinite

4. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ **Check for Open in Control Circuit**

1. IG KEY 'OFF'.
2. Disassemble A/C Relay.
3. IG KEY 'ON'.
4. Measure voltage between control terminal of A/C Relay harness side and chassis ground.

Specification : Approx. 4.5 V

5. Is voltage within specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Execute Actuation test of A/C Relay.
2. Check the sound of A/C Relay operation. (Clicking repeatedly)
3. Does A/C Relay operate normally?

YES	▸ Go to next procedure.

NO	▶ Substitute with a known-good A/C Relay and check for proper operation. If the problem is corrected, replace A/C Relay and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0647 A/C Clutch Relay Control Circuit High

General Description

The A/C clutch relay is activated if the A/C switch is operated while the blower is running and system operation is enabled by the ECM. When A/C is requested, the Engine Control Module(ECM) provides a ground path to the A/C clutch relay control circuit. When the relay circuit is grounded, the A/C clutch relay is energized. The ECM delays grounding the relay circuit for a short time, so the ECM can adjust the engine idle speed for the additional load. The ECM will temporarily de-energized the A/C clutch relay for one or more of the following conditions:
-Full acceleration when the throttle is at WOT.(Wide Open Throttle)
-Risk of overheating: Engine coolant temp. exceeds threshold value
-A/C system pressure exceeds threshold value
-Engine starting

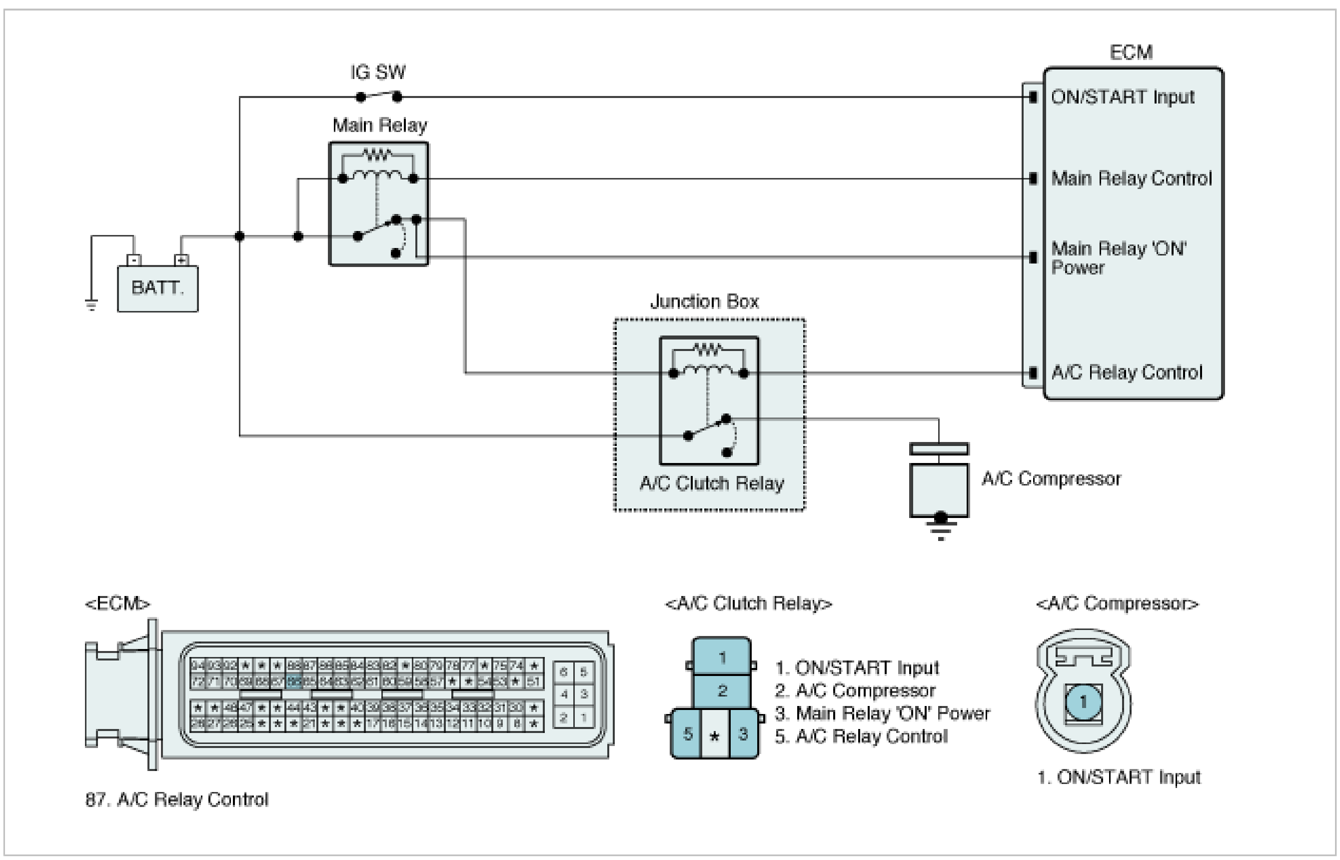
DTC Description

ECM sets DTC P0647 if the ECM detects signal lower than the possible range of a properly operating sensor.

DTC Detecting Condition

Item	Detecting Condition	Possible cause
DTC Strategy	• Electrical Check	• Short to power in Control circuit • Poor connection or damaged harness • Faulty A/C Compressor Relay
Enable Conditions	• 10V < Battery voltage < 16V	
Threshold value	• Short to battery	
Diagnosis Time	• 50 sec.	
MIL On Condition	• -	

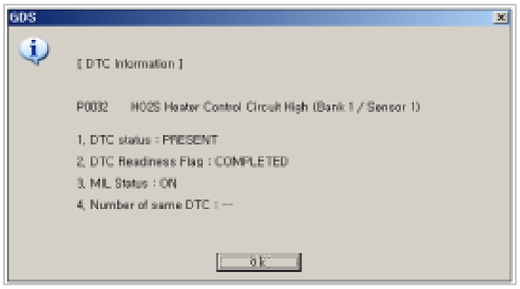
Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode

2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below.

Terminal and Connector inspection

1. 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.
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 next procedure.

Control Circuit Inspection

■ **Check for Short to Power in Control Circuit**

1. IG KEY 'OFF'.
2. Disassemble A/C Relay.
3. IG KEY 'ON'.
4. Measure voltage between control terminal of A/C Relay harness side and chassis ground.

Specification : Approx. 4.5 V

5. Is voltage within specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Execute Actuation test of A/C Relay.
2. Check the sound of A/C Relay operation. (Clicking repeatedly)
3. Does A/C Relay operate normally?

YES	▶ Go to next procedure.
NO	▶ Substitute with a known-good A/C Relay and check for proper operation. If the problem is corrected, replace A/C Relay and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

General Description

The Malfunction Indicator Lamp (MIL), which is located in the instrument cluster, comes on to notify the driver that there may be a problem with the vehicle and that service is needed. Immediately after the ignition switch turns on, the malfunction indicator lamp is lit to indicate that the MIL operates normally and goes off after starting

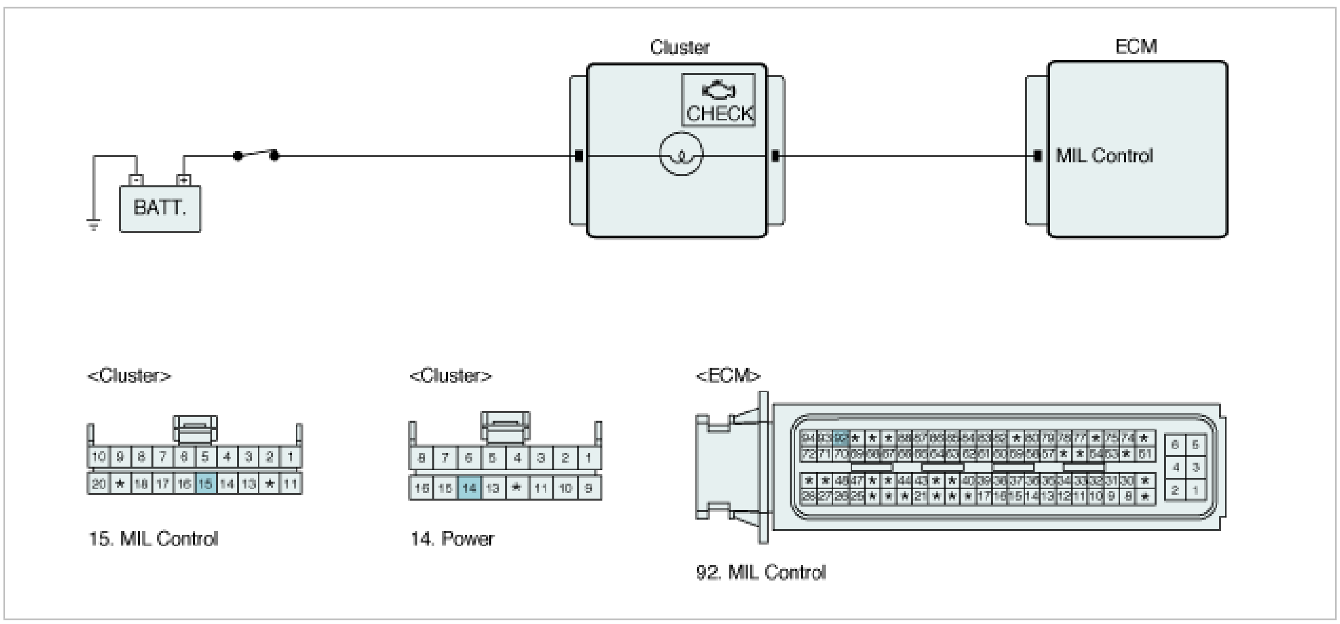
DTC Description

ECM sets DTC P0650 if the ECM detects that the MIL control line is open or short circuit to ground or battery line.

DTC Detecting Condition

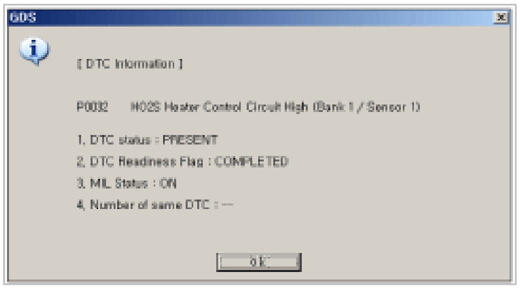
Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Open or short between MIL and ECM • Poor connection or damaged harness • Burned out MIL bulb
Enable Conditions	• 6V < Battery voltage < 16V	
Threshold Value	• Open circuit,short circuit to ground or battery	
Diagnostic Time	• 0.1sec.	
MIL On Condition	• -	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Control Circuit Inspection

1. Ignition "OFF"
2. Disconnect ECM connector
3. Ignition "ON" & Engine "OFF"
4. Using a suitable wire, jumper the terminal 92 of the ECM harness connector to chassis ground.
5. Is MIL bulb illuminated?

YES	▶ Go to next step as below
NO	▶ Remove instrument cluster and inspect MIL bulb. If it is burned out, replace bulb. If bulb is okay, locate source of open between bulb and Meter Fuse. Repair as necessary and go to "Verification of Vehicle Repair" procedure

6. Remove wire from ECM harness connector
7. Does MIL bulb go out?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Check for source of short to GND between bulb and ECM. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Verification of Vehicle Repair

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

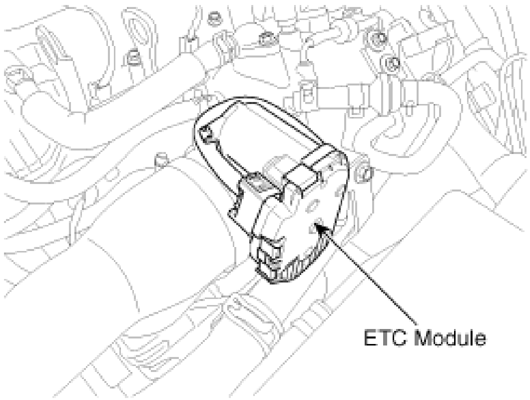
1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" and confirm that "DTC Readiness Flag" indicates "Complete". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
3. Read "DTC Status" parameter.
4. Is parameter displayed "History(Not Present) fault"?

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

YES	
NO	▸ Go to the applicable troubleshooting procedure.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0652 Sensor Reference Voltage \'B\' Circuit Low

Component Location



General Description

The ECM provides a 5 volt reference voltage to the Throttle Position Sensor(TPS). The ECM monitors reference voltage deviation from the power supply circuit of the TPS.

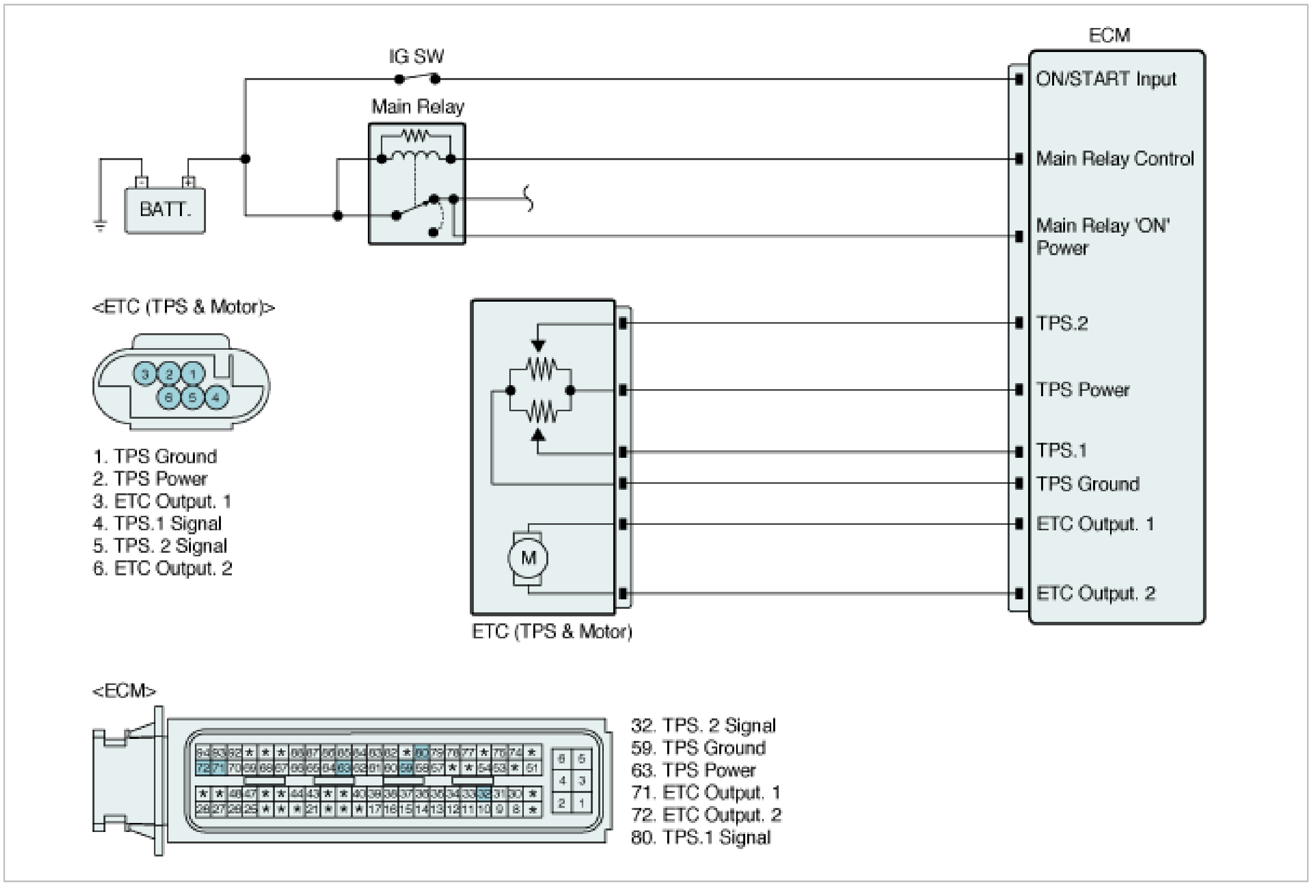
DTC Description

ECM sets P0652 when detects a reference voltage is out of normal range.

DTC Detecting Condition

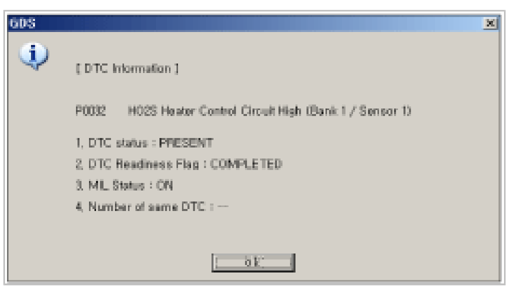
Item		Detecting Condition	Possible Cause
Case 1	DTC Strategy	• Short to Ground	• Short to ground in Power circuit • Poor connection or damaged harness • Faulty ETC
	Enable Conditions	• IG ON	
	Threshold Value	• TPS power supply voltage < 0.7 V	
Case 2	DTC Strategy	• Sensor or circuit error	
	Enable Conditions	• IG ON	
	Threshold Value	• 0.7 V ≤ TPS power supply voltage < 4.5 V	
Diagnostic Time		• 0.04 sec.	
Mil On Condition		• 1 driving cycle	
Fail Safe		• Forced limited RPM mode : The ECM limits engine speed to 1500rpm • Electrical check of the ETC system is prohibited	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

■ **Check for Short to Ground in Power circuit**

1. IG KEY OFF.
2. Disconnect ETC connector.
3. IG KEY ON.
4. Measure voltage between TPS power terminal of ETC harness connector and chassis ground.

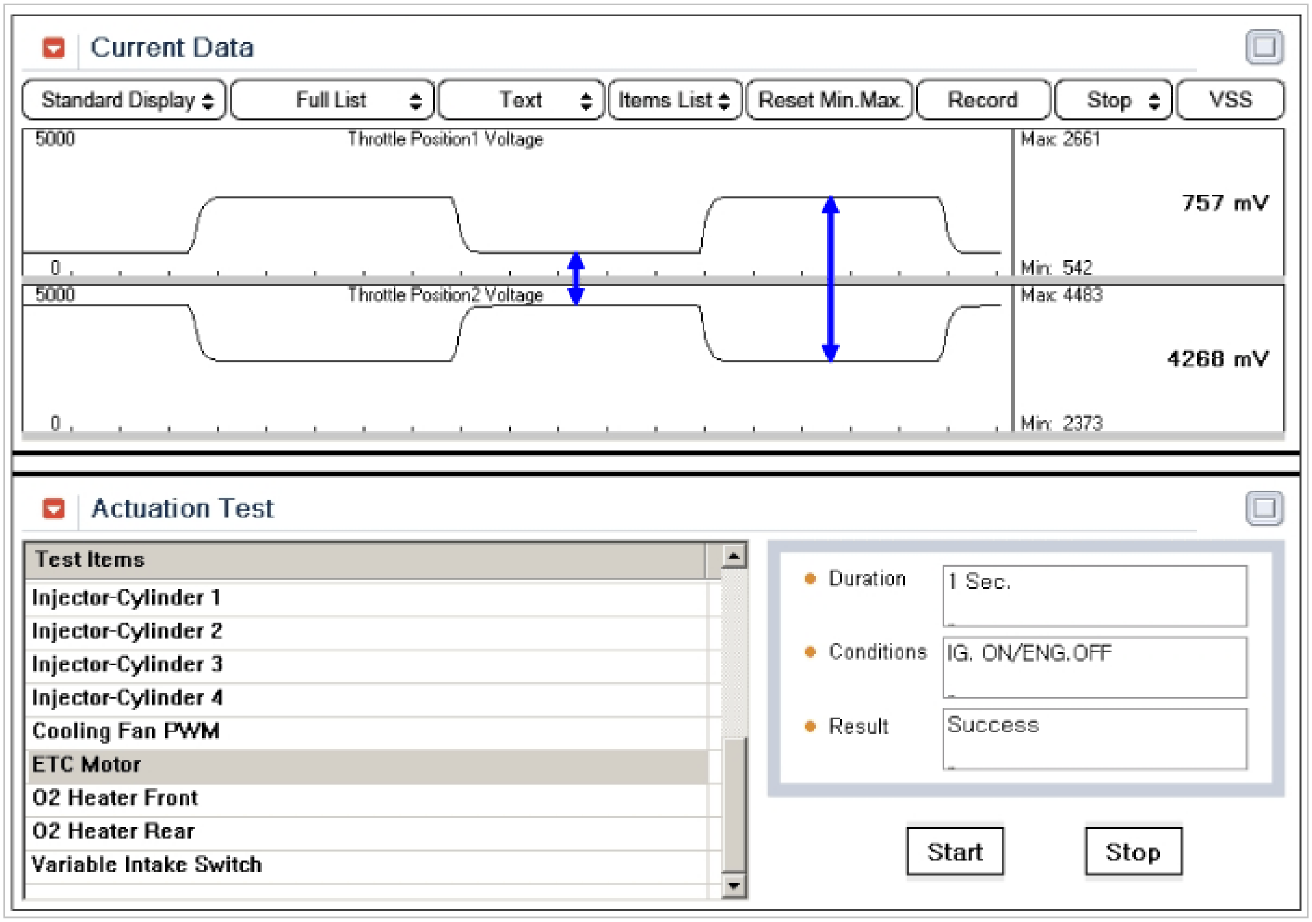
Specification : Approx. 5V

5. Is voltage within specification?

YES	▶ Go to next procedure.
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Select 'Actuation Test' mode and execute 'ETC motor' item.



▸ During 'ETC Motor' test, TPS1 and TPS2 show symmetrical movements.

2. Is the waveform normal?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check ETC for contamination, deterioration, or damage. Substitute with a known-good ETC and check for proper operation. If the problem is corrected, replace TPS and then go to "Verification of Vehicle Repair" procedure.

NOTE

It is necessary to perform the TPS adaptation procedure after the ETC assembly or ECM replacing.
■ TPS adaptation procedure
Ignition "OFF" and then "ON" without cranking. Wait for 10 seconds under enable conditions.
→ Enable conditions : Battery >10V & Intake Air Temp. >5.3°C(41.5°F) & 5.3°C(41.5°F) < Engine CoolantTemp. < 99.8°C(211.6°F)

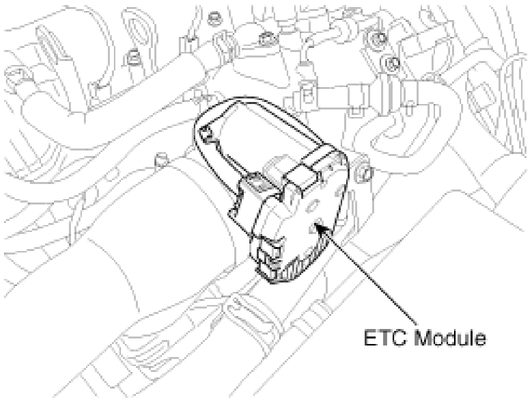
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The ECM provides a 5 volt reference voltage to the Throttle Position Sensor(TPS). The ECM monitors reference voltage deviation from the power supply circuit of the TPS.

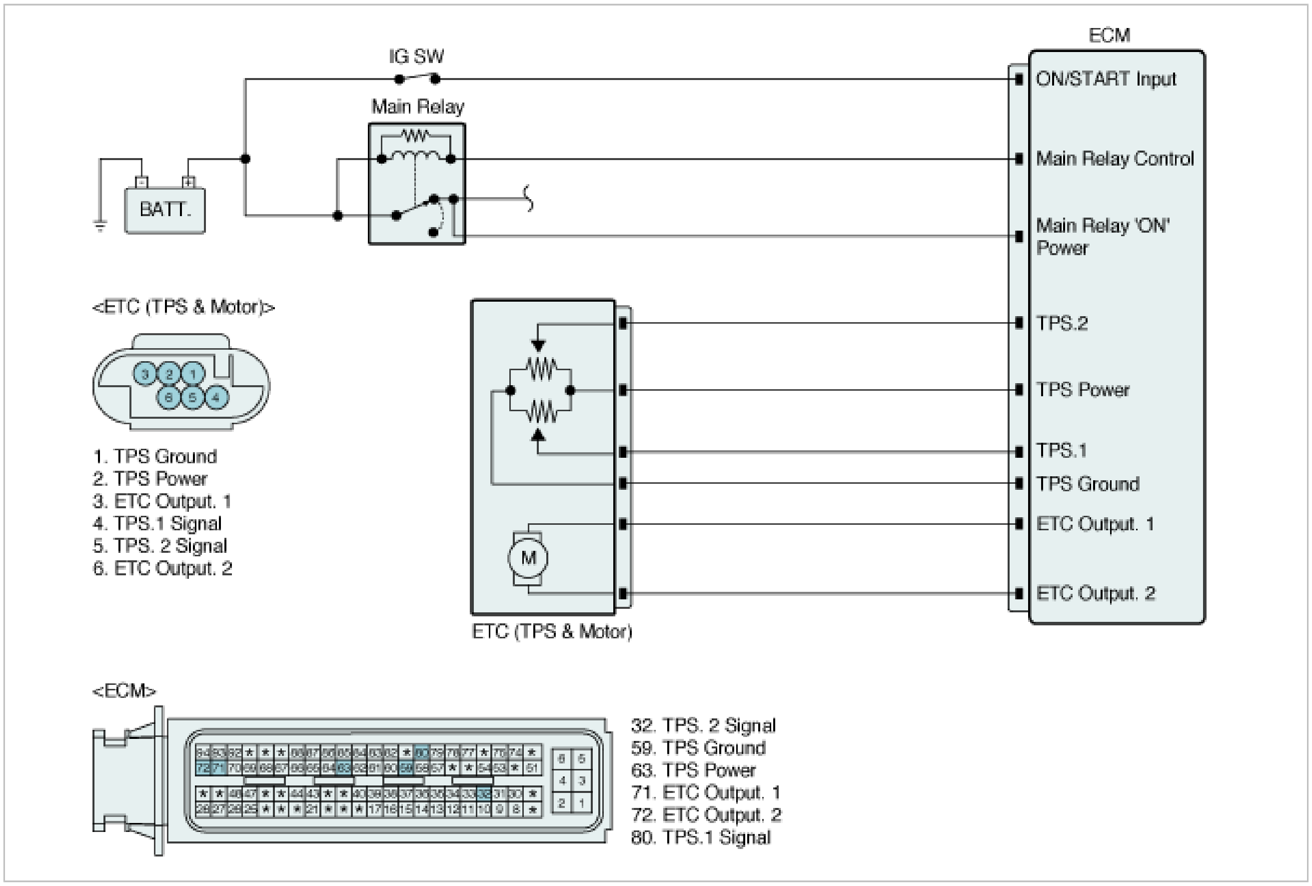
DTC Description

ECM sets DTC P0653 if the ECM detects reference voltage higher than threshold value.

DTC Detecting Condition

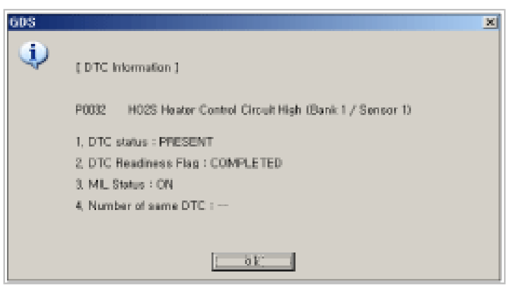
Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Short to battery in Power circuit • Poor connection or damaged harness • Faulty ETC
Enable Conditions	• IG "ON"	
Threshold Value	• TPS power supply voltage > 5.5V	
Diagnostic Time	• 0.04 sec.	
MIL On Condition	• 1 driving cycle	
Fail Safe	• Forced limited RPM mode : The ECM limits engine speed to 1500rpm • Electrical check of the ETC system is prohibited	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

■ **Check for Short to Battery in Power circuit**

1. IG KEY OFF.
2. Disconnect ETC connector.
3. IG KEY ON.
4. Measure voltage between TPS power terminal of ETC harness connector and chassis ground.

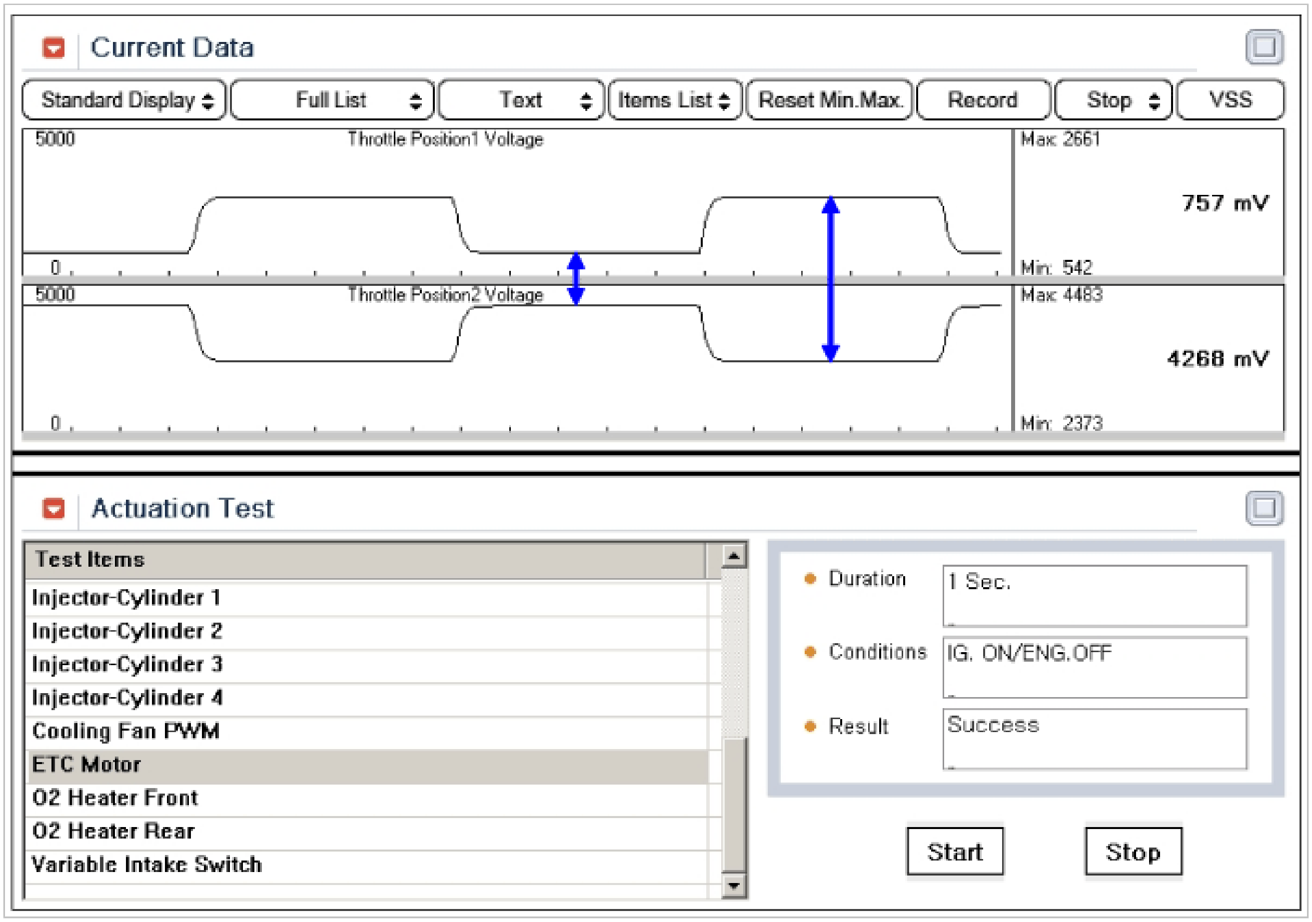
Specification : Approx. 5V

5. Is voltage within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Select 'Actuation Test' mode and execute 'ETC motor' item.



▸ During 'ETC Motor' test, TPS1 and TPS2 show symmetrical movements.

2. Is the waveform normal?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check ETC for contamination, deterioration, or damage. Substitute with a known-good ETC and check for proper operation. If the problem is corrected, replace TPS and then go to "Verification of Vehicle Repair" procedure.

NOTE

It is necessary to perform the TPS adaptation procedure after the ETC assembly or ECM replacing.
■ TPS adaptation procedure
Ignition "OFF" and then "ON" without cranking. Wait for 10 seconds under enable conditions.
→ Enable conditions : Battery >10V & Intake Air Temp. >5.3°C(41.5°F) & 5.3°C(41.5°F) < Engine CoolantTemp. < 99.8°C(211.6°F)

Verification of Vehicle Repair

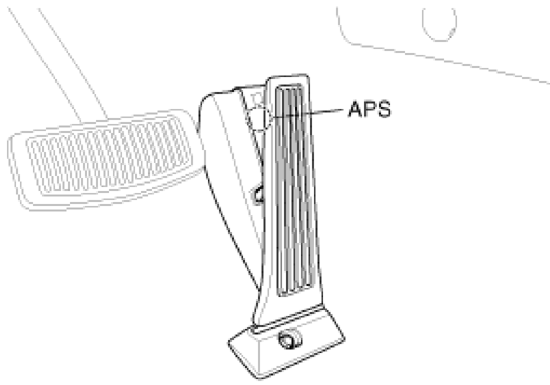
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0698 Sensor Reference Voltage \'C\' Circuit Low

Component Location



General Description

The ECM provides a 5volt reference voltage to the Acceleration Position Sensor1(APS1). The ECM monitors reference voltage deviation from the power supply circuit of the APS1.

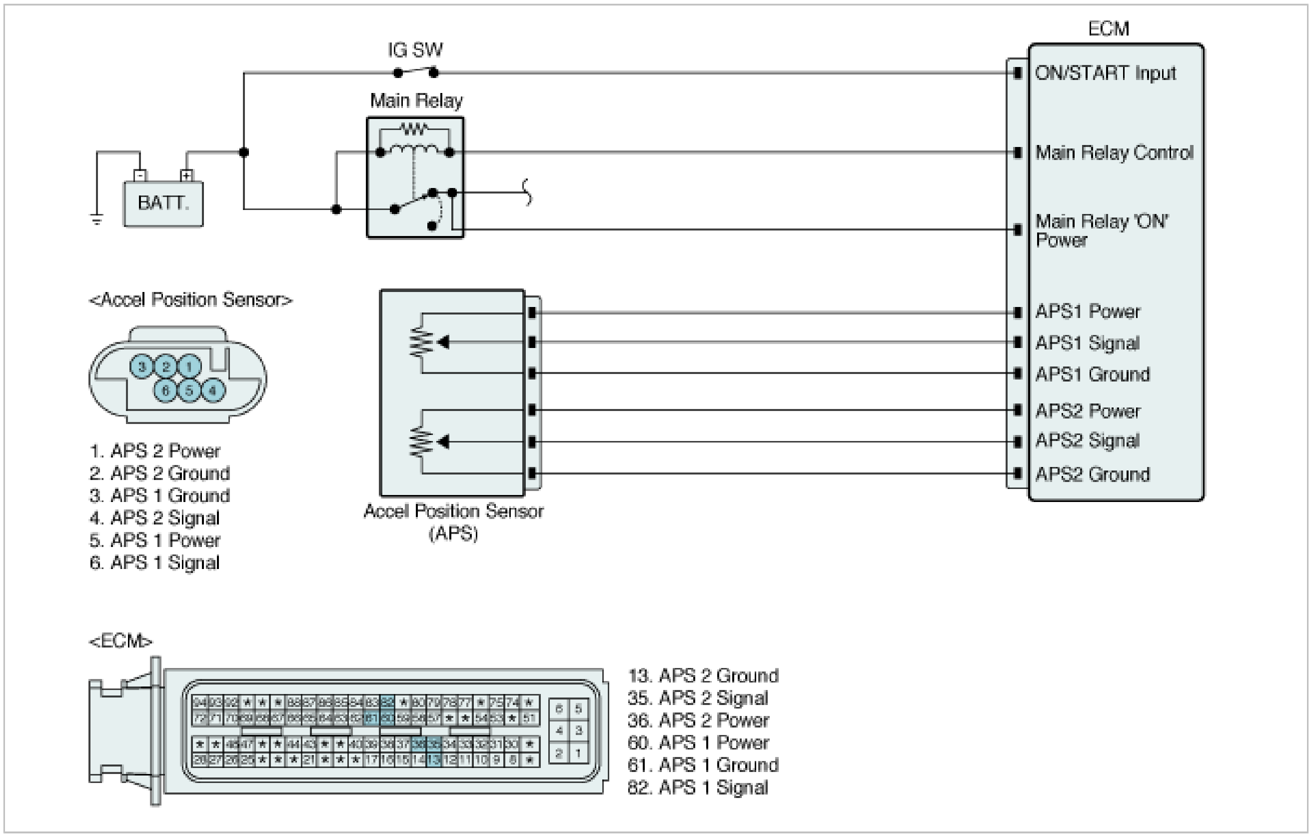
DTC Description

ECM sets DTC P0698 if the ECM detects reference voltage is lower than threshold value.

DTC Detecting Condition

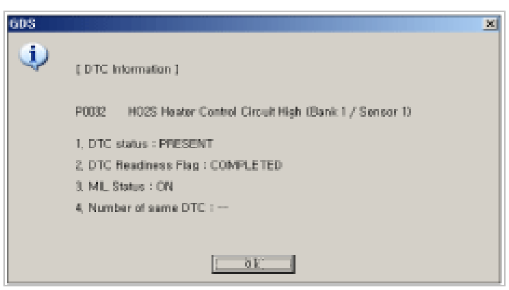
Item		Detecting Condition	Possible Cause
Case 1	DTC Strategy	• Short to ground	• Short to ground in power circuit • Poor connection or damaged harness • Faulty APS
	Enable Conditions	• IG "ON"	
	Threshold Value	• APS power supply voltage_1 < 0.7 V	
Case 2	DTC Strategy	• Electrical check	
	Enable Conditions	• IG "ON"	
	Threshold Value	• 0.7 V ≤ APS power supply voltage_1 < 4.5 V	
Diagnostic Time		• 0.1 sec	
Mil On Condition		• 1 driving cycle	
Fail Safe		• Forced limited power mode : The ECM limits opening angle of the throttle valve to max. 50% and engine torque to a certain pre-determined value. • After idle recognition, the ECM uses APS2 signal to calculate the current opening angle of the throttle valve..	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

■ **Check for Short to Ground in Power circuit**

1. IG KEY OFF.
2. Disconnect APS harness connector.
3. IG KEY ON.
4. Measure voltage between APS1 power terminal of APS harness connector and chassis ground.

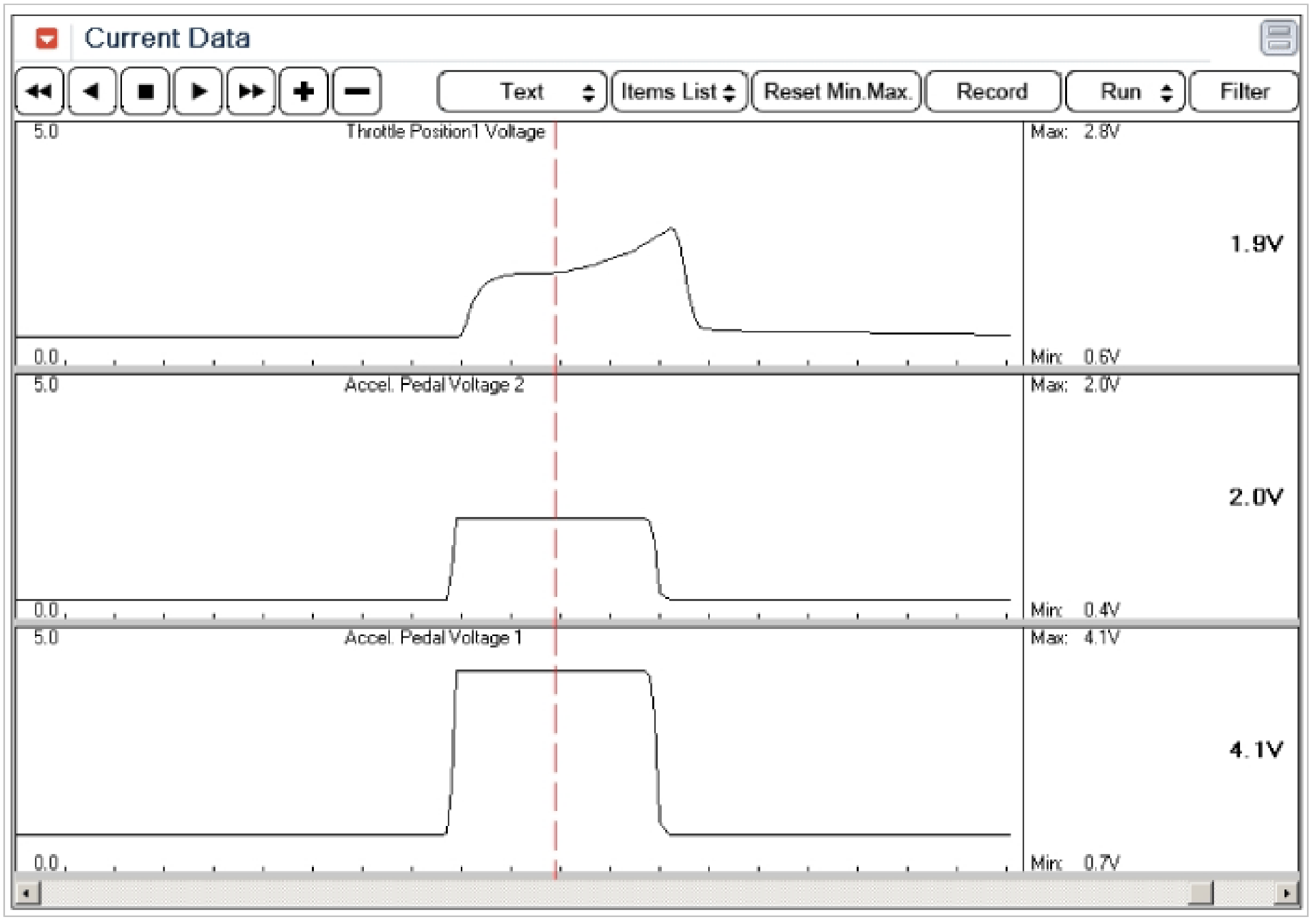
Specification : Approx. 5V

5. Is voltage within specification?

YES	▶ Go to next procedure.
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. IG key ON.
2. Check sensor data as below.



3. Data Analysis

Condition		GDS Sensor Data	
		APS 1	APS 2
IG Key "ON & Engine "OFF"	Output voltages of APS1 and APS2 are in propotion to accelerating. APS2 output voltage is half of APS1 output voltage.		
	Release a pedal fully	0.58~0.93V	0.29~0.38
	Depress a pedal fully	3.85~4.35V	1.93~2.18V

4. Is data in accordance with "Data Anaysis"?

YES	▸ Check for poor connection between PCM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Substitute with a known-good component and check for proper operation. If the problem is corrected, replace component and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

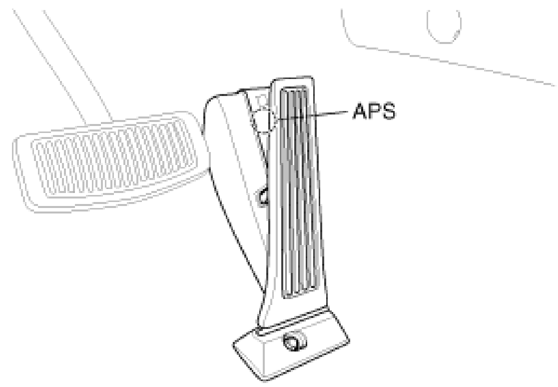
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The ECM provides a 5volt reference voltage to the Acceleration Position Sensor1(APS1). The ECM monitors reference voltage deviation from the power supply circuit of the APS1.

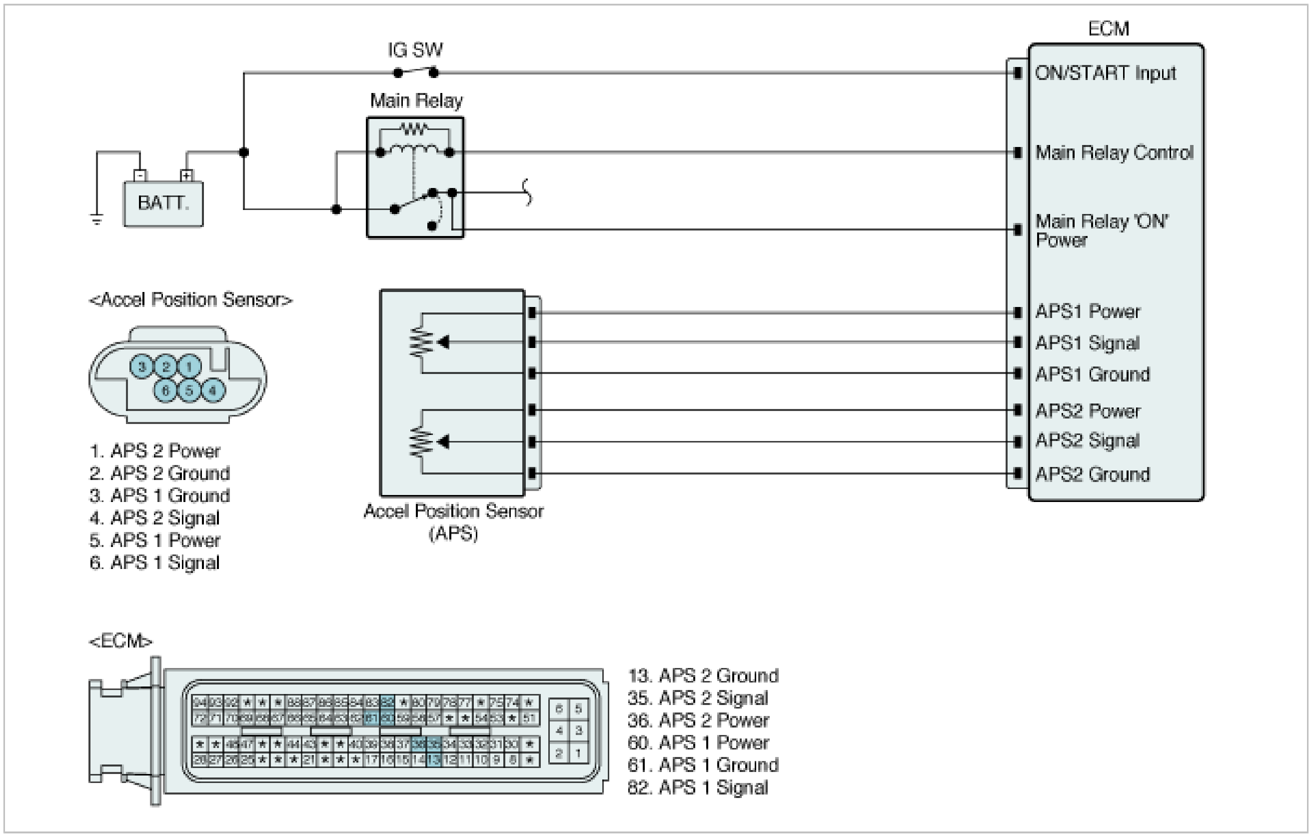
DTC Description

ECM sets DTC P0699 if the ECM detects reference voltage higher than threshold value.

DTC Detecting Condition

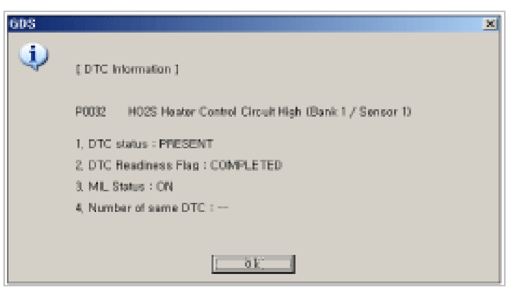
Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Short to battery in Power circuit • Poor connection or damaged harness • Faulty APS
Enable Conditions	• IG "ON"	
Threshold Value	• APS1 > 5.5V	
Diagnostic Time	• 0.1sec.	
MIL On Condition	• 1 driving cycle	
Fail Safe	• Forced limited power mode : The ECM limits opening angle of the throttle valve to max. 50% and engine torque to a certain pre-determined value. • After idle recognition, the ECM uses APS2 signal to calculate the current opening angle of the throttle valve.	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

■ **Check for Short to battery in Power circuit**

1. IG KEY OFF.
2. Disconnect APS harness connector.
3. IG KEY ON.
4. Measure voltage between APS1 power terminal of APS harness connector and chassis ground.

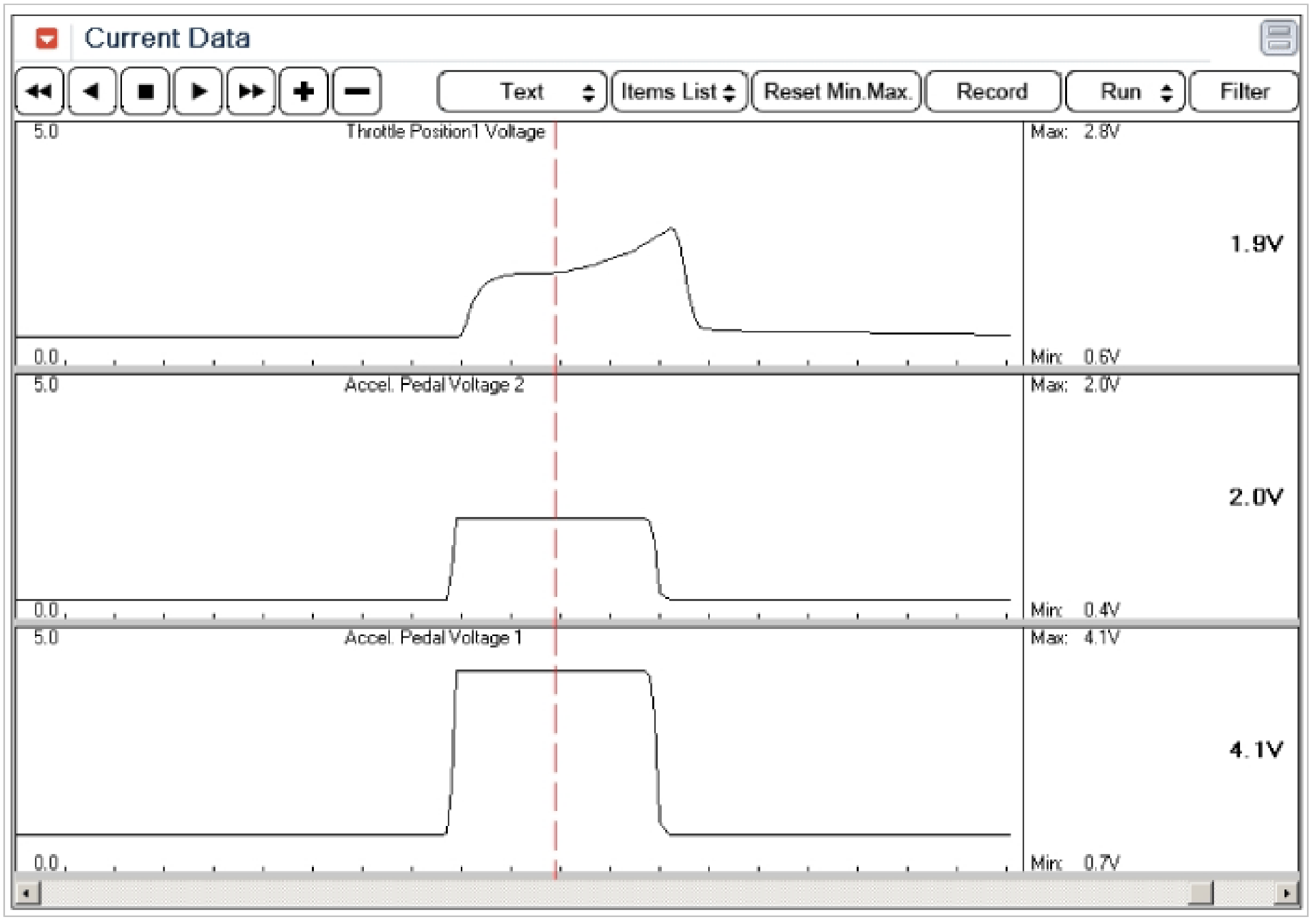
Specification : Approx. 5V

5. Is voltage within specification?

YES	▶ Go to next procedure.
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. IG key ON.
2. Check sensor data as below.



3. Data Analysis

Condition		GDS Sensor Data	
		APS 1	**APS 2**
IG Key "ON & Engine "OFF"	Output voltages of APS1 and APS2 are in propotion to accelerating. APS2 output voltage is half of APS1 output voltage.		
	Release a pedal fully	0.58~0.93V	0.29~0.38
	Depress a pedal fully	3.85~4.35V	1.93~2.18V

4. Is data in accordance with "Data Anaysis"?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Substitute with a known-good component and check for proper operation. If the problem is corrected, replace component and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

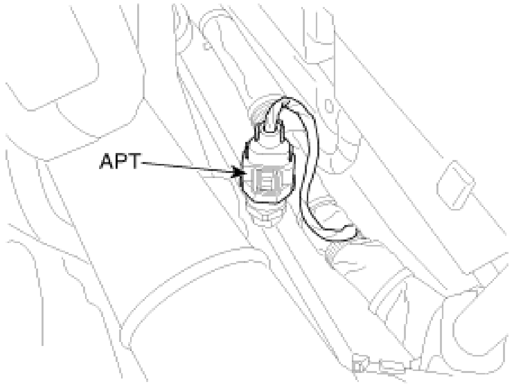
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The ECM provides a 5volt reference voltage to the Air-con Pressure Transducer(APT) and Boost Pressure Sensor(PUT). The ECM monitors reference voltage deviation from the power supply circuit of the APT and DTP.

DTC Description

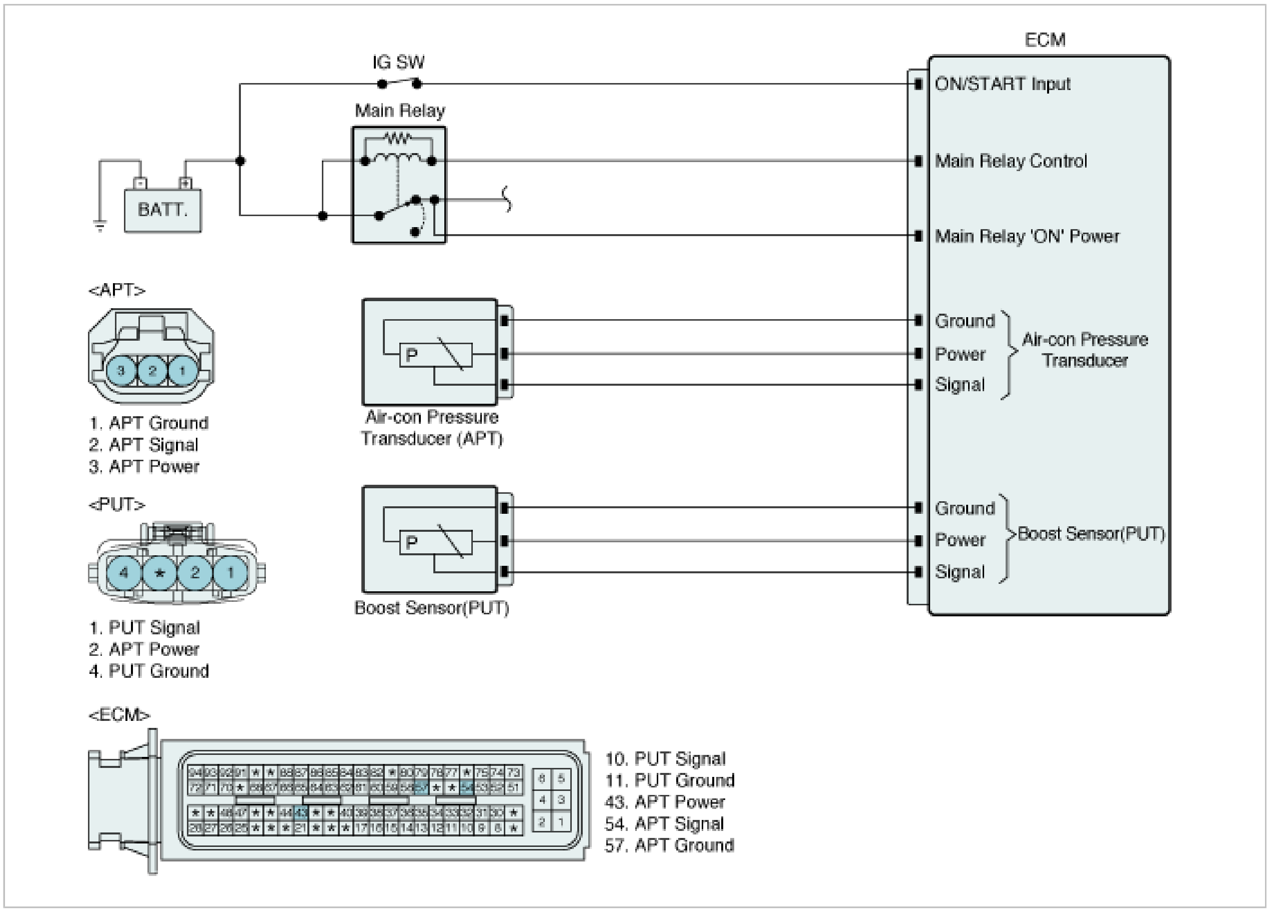
ECM sets DTC P06A4 if the ECM detects reference voltage of APT and PUT are lower than threshold value.

DTC Detecting Condition

Item		Detecting Condition	Possible Cause
Case 1	DTC Strategy	• Short to Ground	• Short to ground in Power circuit • Poor connection or damaged harness • Faulty APT/DTP
	Enable Conditions	• IG "ON"	
	Threshold Value	• APT/PSPS power supply voltage < 0.7 V	
Case 2	DTC Strategy	• Electrical check	
	Enable Conditions	• IG "ON"	
	Threshold Value	• 0.7 V ≤ APT/DTP power supply voltage < 4.5 V	
Diagnostic Time		• 0.1 sec.	
Mil On Condition		• 1 driving cycle	

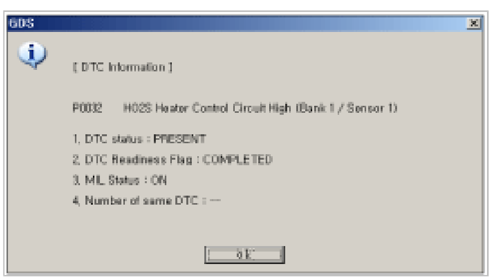
(※ APT : Air-Con Pressure Transducer, DTP : Differential Tank Pressure)

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Power Circuit Inspection

■ Check for Short to Ground in Power circuit

1. IG KEY OFF.
2. Disconnect APT/PSPS connectors.
3. IG KEY ON.
4. Measure voltage between power terminal of APT harness connector and chassis ground.
   Measure voltage between power terminal of PSPS harness connector and chassis ground.

Specification : Approx. 5V

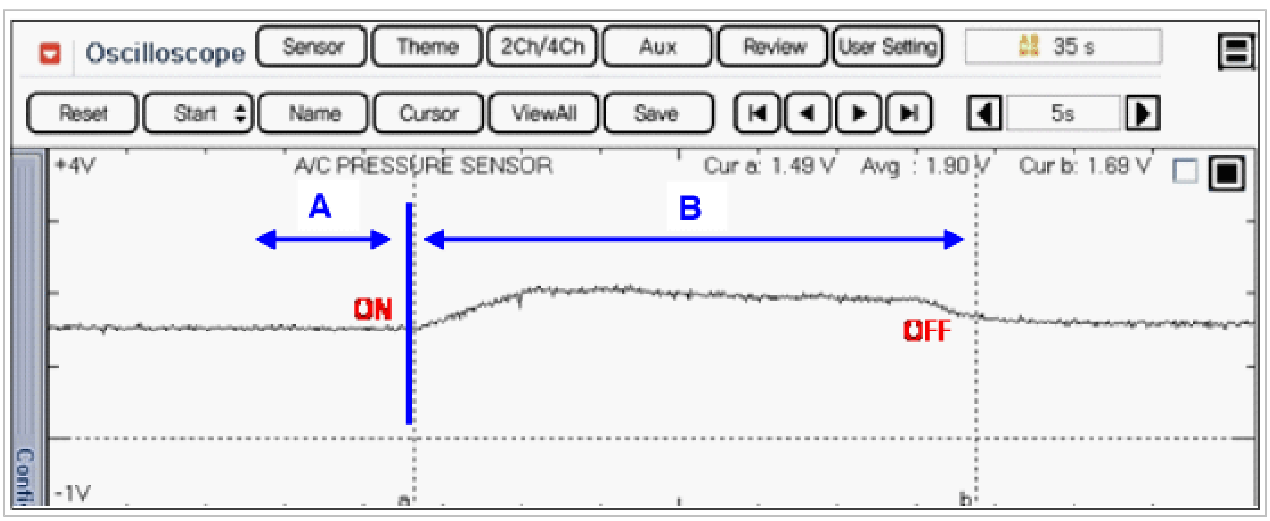
5. Is voltage within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Air-Con Pressure Transducer
   (1) Connect GDS and select Oscilloscope menu.
   (2) Connect probe to signal line as below :
   Channel A (+): Air-Con Pressure Transducer Signal line, (-): Ground
   (3) After warming up, Check signal with Air-Con working.

   Specification :
   A : Approx. 1.3~1.5V (Idle & Air-Con OFF)
   B : Above 1.5V (Idle & Air-Con ON)



   (4) Is data in accordance with specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Go to next procedure.

(5) Return vehicle to original condition

(6) Ignition "ON" & Engine "OFF"

(7) Is the A/C compressor clutch engaged?

YES	▸ Disconnect A/C clutch relay and check the A/C compressor clutch status. - If engaged, repair open/short circuit in the A/C compressor clutch harness or replace faulty compressor clutch assembly. And go to "Verification of Vehicle Repair" procedure - If disengaged, repair open/short circuit in the A/C clutch relay harness or replace faulty clutch relay. And go to "Verification of Vehicle Repair" procedure.
NO	▸ Go to next procedure.

(8) Start the engine to normal operating temperature.

(9) Turn the A/C ON and OFF

(10) Does the A/C compressor clutch cycle ON and OFF with the selector switch?

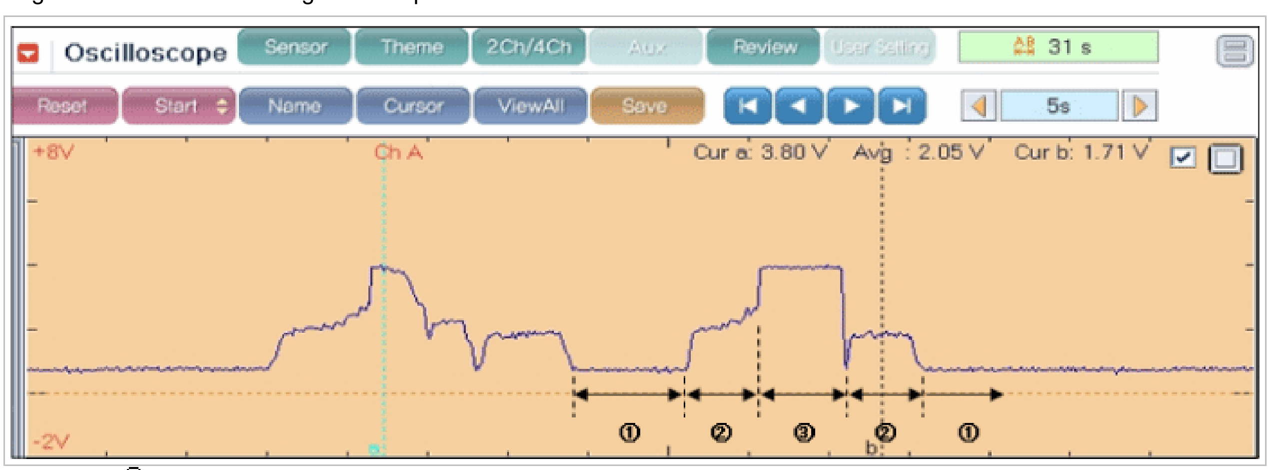
YES	▸ Check A/C pressure sensor for contamination, deterioration, or damage. Substitute with a known-good A/C pressure sensor and check for proper operation. If the problem is corrected, replace A/C pressure sensor and then go to "Verification of Vehicle Repair" procedure.
NO	▸ - Monitor the " A/C SWITCH & A/C COMPRESSOR" parameters on the Scantool data list. Refer to "Signal Waveform & Data" in the "General Information" procedure. - Turn the A/C ON and OFF - Check the scantool indicate when the A/C is ON and OFF correctly. If OK, check the A/C pressure. Refer to A/C group in Workshop Manual. Repair as necessary and go to "Verification of Vehicle Repair" procedure. If NG, repair the signal from the A/C selector switch and compressor switch. Go to "Verification of Vehicle Repair" procedure.

2. Power Steering Pressure Sensor

(1) IG 'OFF'.

(2) Connect prove to signal terminal as below and select 'Ocilloscope' menu on GDS.
Channel A (+): Signal terminal of P/S pressure sensor, (-): Ground

(3) Engine start and check the signal with operation.



INTERVAL ① : The signal at the Power Steering halt
INTERVAL ② : The normal perfomance signal including Most of the range
INTERVAL ③ : The signal at the maximum steering angle.

(4) Is waveform within specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Check P/S pressure sensor for contamination, deterioration, or damage. Substitute with a known-good P/S pressure sensor and check for proper operation. If the problem is corrected, replace P/S pressure sensor and then go to "Verification of Vehicle Repair" procedure.

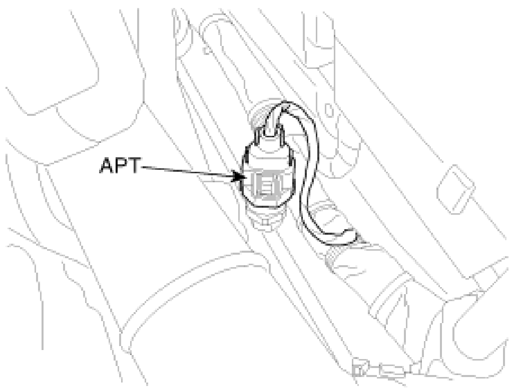
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The ECM provides a 5volt reference voltage to the Air-con Pressure Transducer(APT) and Power Steering Pressure Sensor (PSPS). The ECM monitors reference voltage deviation from the power supply circuit of the APT and PSPS.

DTC Description

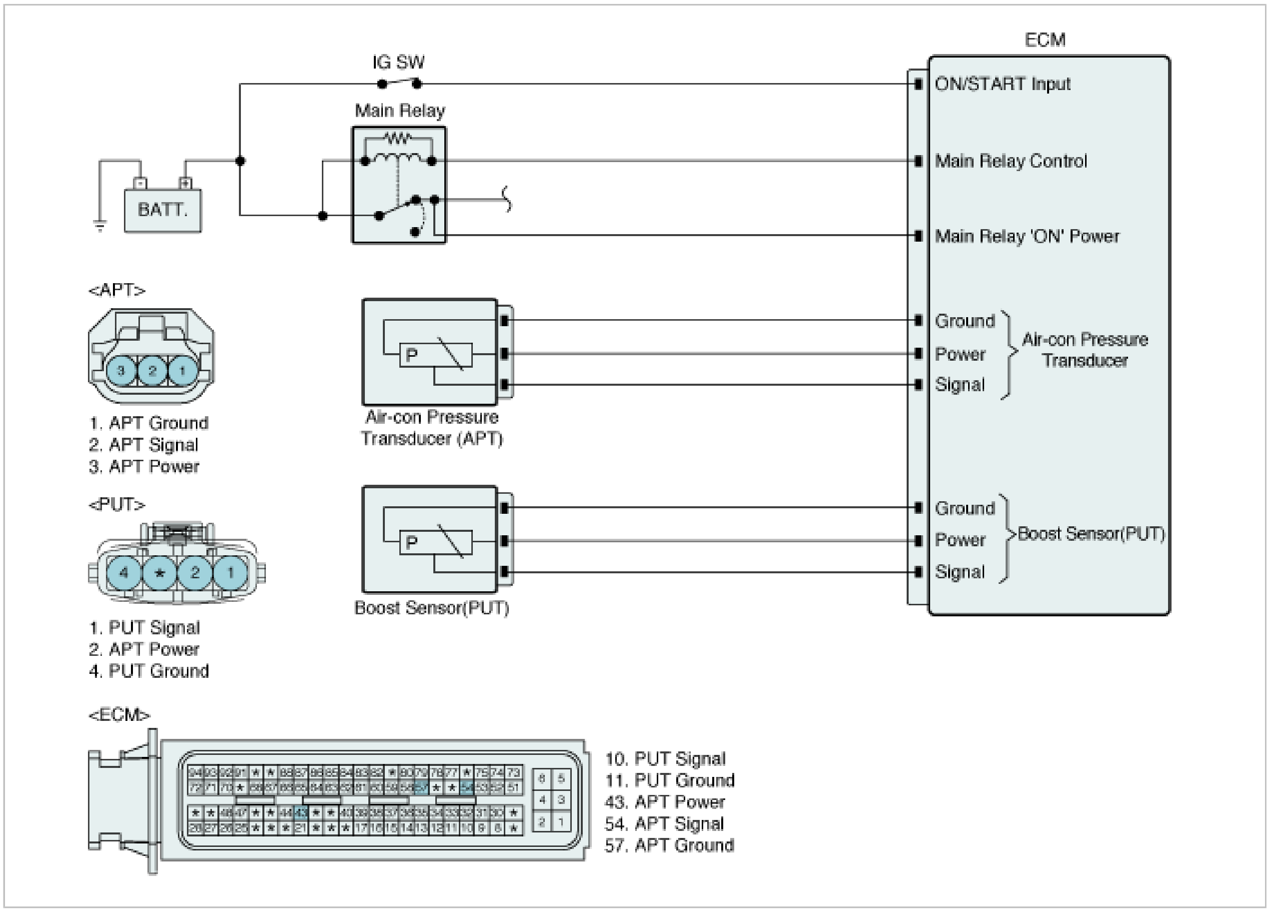
The ECM provides a 5volt reference voltage to the Air-con Pressure Transducer(APT) and PUT. The ECM monitors reference voltage deviation from the power supply circuit of the APT and PUT.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Short to battery in Power circuit • Poor connection or damaged harness • Faulty APT/PSPS
Enable Conditions	• IG "ON"	
Threshold Value	• APT/PSPS > 5.5V	
Diagnostic Time	• 0.1sec.	
MIL On Condition	• 1 driving cycle	

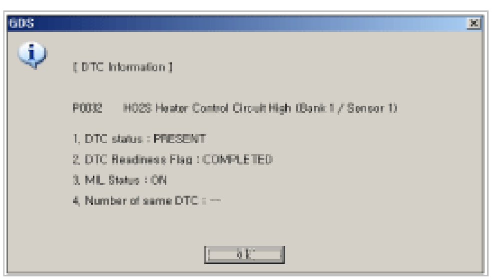
(※ APT : Air-Con Pressure Transducer, PSPS : Power Steering Pressure Sensor)

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Power Circuit Inspection

■ Check for Short to Battery in Power circuit

1. IG KEY OFF.
2. Disconnect APT/PSPS connectors.
3. IG KEY ON.
4. Measure voltage between power terminal of APT harness connector and chassis ground.
   Measure voltage between power terminal of PSPS harness connector and chassis ground.

Specification : Approx. 5V

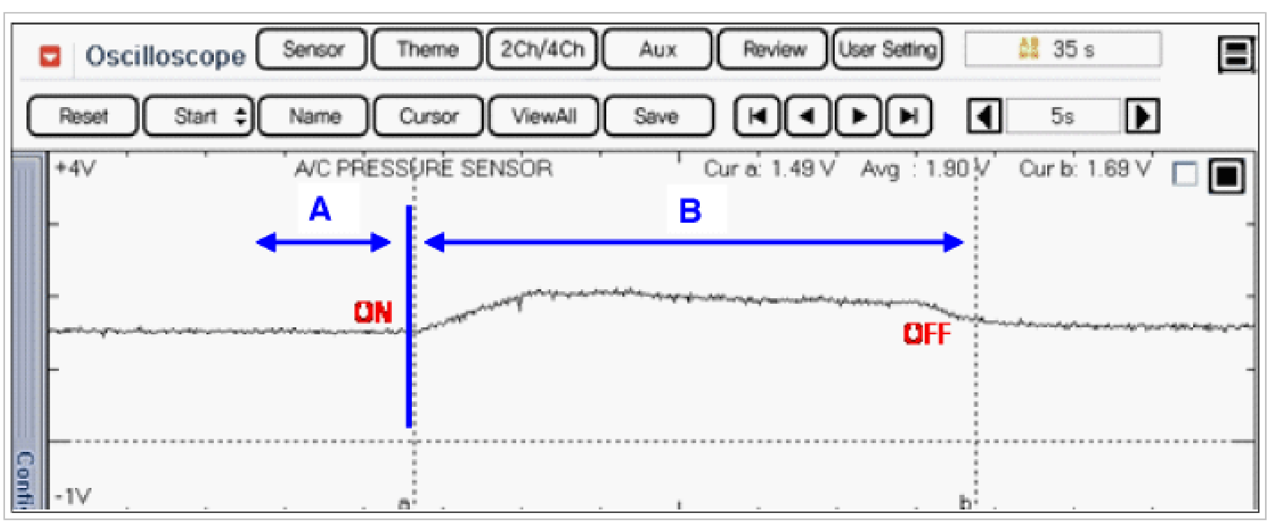
5. Is voltage within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Air-Con Pressure Transducer
   (1) Connect GDS and select Oscilloscope menu.
   (2) Connect probe to signal line as below :
   Channel A (+): Air-Con Pressure Transducer Signal line, (-): Ground
   (3) After warming up, Check signal with Air-Con working.

Specification :
A : Approx. 1.3~1.5V (Idle & Air-Con OFF)
B : Above 1.5V (Idle & Air-Con ON)



(4) Is data in accordance with specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Go to next procedure.

(5) Return vehicle to original condition

(6) Ignition "ON" & Engine "OFF"

(7) Is the A/C compressor clutch engaged?

YES	▸ Disconnect A/C clutch relay and check the A/C compressor clutch status. - If engaged, repair open/short circuit in the A/C compressor clutch harness or replace faulty compressor clutch assembly. And go to "Verification of Vehicle Repair" procedure - If disengaged, repair open/short circuit in the A/C clutch relay harness or replace faulty clutch relay. And go to "Verification of Vehicle Repair" procedure.
NO	▸ Go to next procedure.

(8) Start the engine to normal operating temperature.

(9) Turn the A/C ON and OFF

(10) Does the A/C compressor clutch cycle ON and OFF with the selector switch?

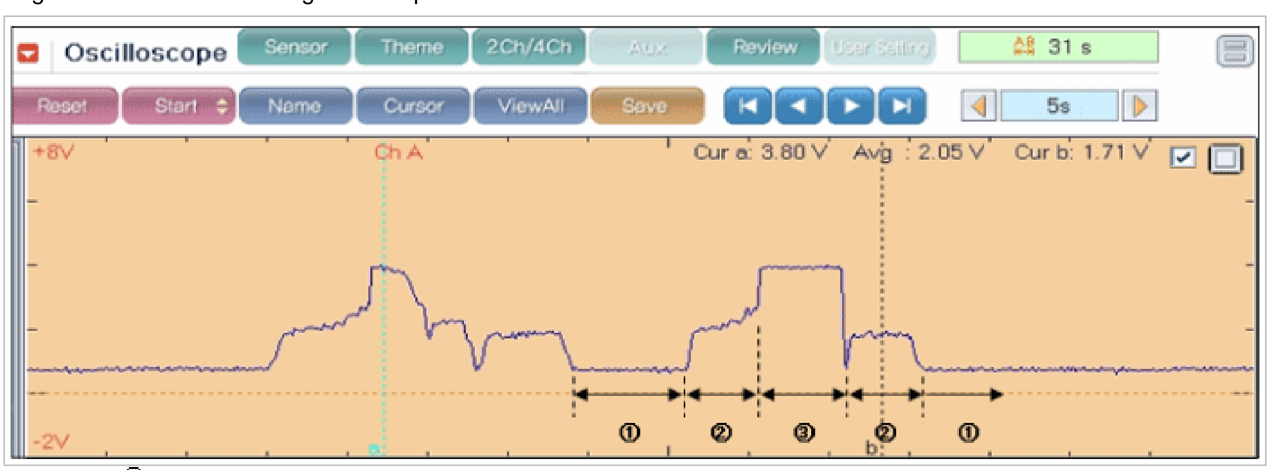
YES	▸ Check A/C pressure sensor for contamination, deterioration, or damage. Substitute with a known-good A/C pressure sensor and check for proper operation. If the problem is corrected, replace A/C pressure sensor and then go to "Verification of Vehicle Repair" procedure.
NO	▸ - Monitor the " A/C SWITCH & A/C COMPRESSOR" parameters on the Scantool data list. Refer to "Signal Waveform & Data" in the "General Information" procedure. - Turn the A/C ON and OFF - Check the scantool indicate when the A/C is ON and OFF correctly. If OK, check the A/C pressure. Refer to A/C group in Workshop Manual. Repair as necessary and go to "Verification of Vehicle Repair" procedure. If NG, repair the signal from the A/C selector switch and compressor switch. Go to "Verification of Vehicle Repair" procedure.

2. Power Steering Pressure Sensor

(1) IG 'OFF'.

(2) Connect prove to signal terminal as below and select 'Ocilloscope' menu on GDS.
Channel A (+): Signal terminal of P/S pressure sensor, (-): Ground

(3) Engine start and check the signal with operation.



INTERVAL ① : The signal at the Power Steering halt
INTERVAL ② : The normal perfomance signal including Most of the range
INTERVAL ③ : The signal at the maximum steering angle.

(4) Is waveform within specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Check P/S pressure sensor for contamination, deterioration, or damage. Substitute with a known-good P/S pressure sensor and check for proper operation. If the problem is corrected, replace P/S pressure sensor and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P0704 Clutch Switch Input Circuit Malfunction

General Description

Clutch switch senses the operation of clutch at a M/T vehicle. And the signal is displayed by ON/OFF.

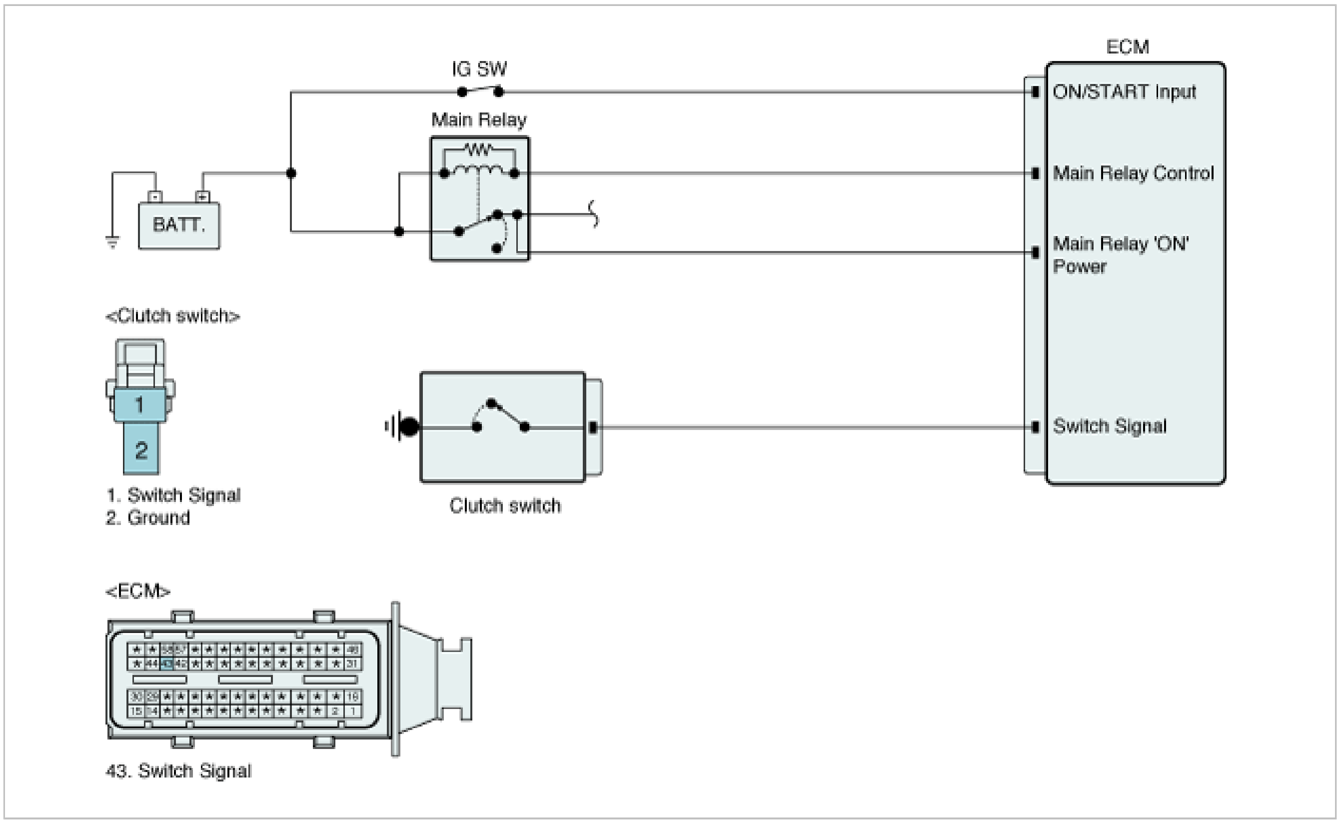
DTC Description

ECM sets P0704 when detects Open or Short in signal circuit.

DTC Detecting Condition

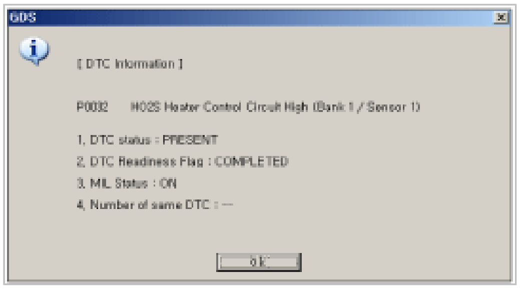
Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Open or Short in signal circuit • Poor connection or damaged harness • Faulty clutch switch
Enable Conditions	• -	
Threshold Value	• Open / Short	
Diagnostic Time	• -	
MIL On Condition	• -	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Signal Circuit Inspection

■ Check for Short to ground in Signal circuit

1. IG KEY OFF.
2. Disconnect clutch switch harness connector.
3. IG KEY ON.
4. Measure voltage between signal terminal of clutch switch harness connector and chassis ground.

Specification : 12 V

5. Is voltage within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ Check for Open in Signal circuit

1. IG KEY OFF.
2. Disconnect clutch switch harness connector and ECM harness connector.

3. Measure resistance between both ends of signal line.

Specification : Approx. 0 Ω

4. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. IG KEY "ON" and select 'Oscilloscope' menu in GDS.
2. Connect probe to signal line of clutch switch.
3. Measure voltage with stepping on and off the clutch pedal.
Specification :

Test Condition	With releasing pedal	With stepping on pedal
Voltage	12 V	0 V

4. Is voltage within specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check the component for contamination, deterioration, or damage. Substitute with a known-good component and check for proper operation. If the problem is corrected, replace the component and then go to "Verification of Vehicle Repair" procedure.

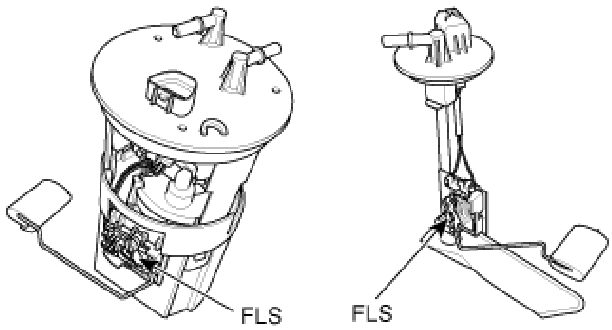
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Fuel Level Sensor(FLS) measures the fuel level in fuel tank and its information is used to supply the ECM with information regarding the monitoring condition of the EVAP canister purge system for leak detection. If the fuel level sensor is monitored for high or low stuck or difference between voltage of fuel level sensor and voltage deviation of fuel level sensor is exceeds limited value while driving, this is interpreted by the ECM as a fault.

DTC Description

ECM sets DTC P2006 if the calculated fuel consumption is more than 30% or the feul level signal variation from fuel level sensor is less than 5%

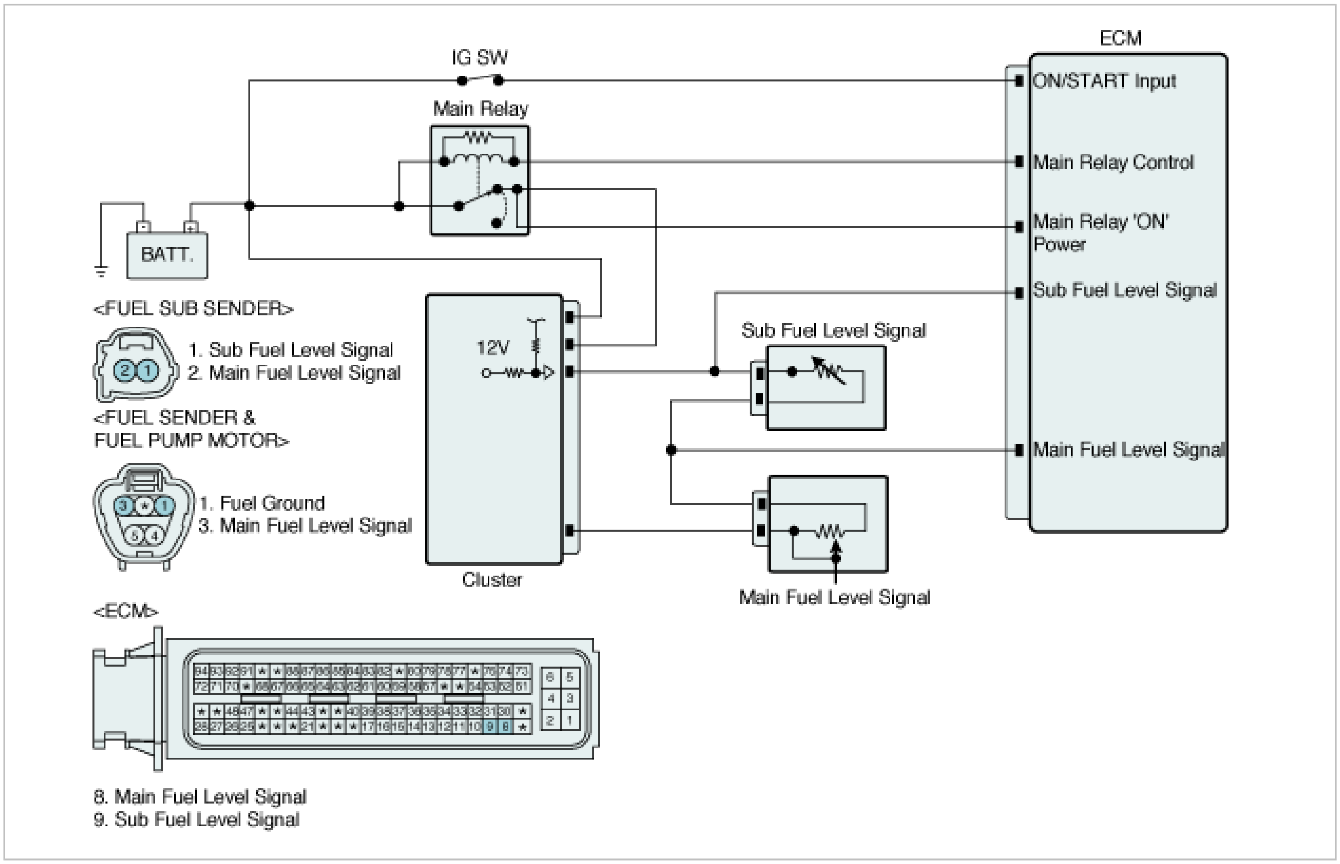
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Signal Stuck	• Poor connection or damaged harness • Faulty Fuel Level Sender "B"
Enable Conditions	• Cumulated Fuel Consumption > 30% (~ 20 liter of Tank capacity) -> can be cumulated over more than 1 Driving Cycles • No MIL illuminated for relevant DTCs • 11V < Battery voltage <16V	
Threshold Value	• Filtered FTL signal change < 5 % after 30% calculated fuel consumption	
Diagnostic Time	• 20 liters fuel consumption	
MIL On Condition	• 2 * 30% Fuel Consumption	

Specification

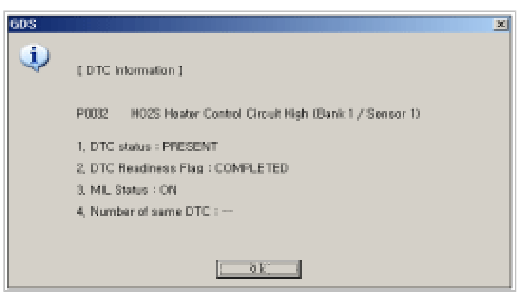
FLOAT Position	S/F	G/F	7/8	6/8	5/8	4/8	E/LOCK
Sender Resist(Ω)	4±1	4±1	4±1	4±1	4±1	4±1	4±1
Fuel height at tank bottom (sub tank)(mm)	4±1	4±1	4±1	4±1	4±1	4±1	4±1
F/TANK Vol.(L)	63.0	61.5	54.25	47.5	4.75	34	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE
- History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. IG KEY 'OFF'.
2. Disassemble Fuel Level Sender 'A'.
3. Measure resistance between signal terminal and ground terminal of Fuel Level Senser 'A' with moving the float. (Component side)

Specification :
Main fuel level sender resistance : 4~90 Ω
Sub fuel level sender resistance : 4.5 ~ 110.5 Ω

4. Is resistance within the specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Substitute with a known-good component and check for proper operation. If the problem is corrected, replace it and then go to "Verification of Vehicle Repair" procedure.

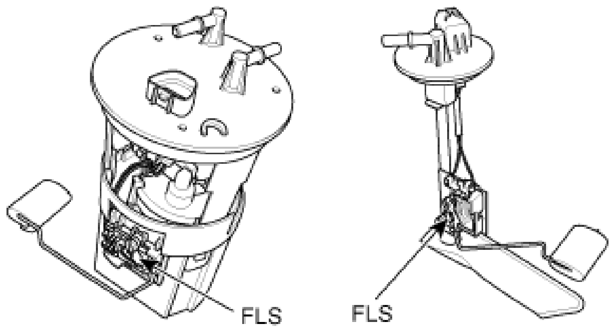
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Fuel Level Sensor(FLS) measures the fuel level in fuel tank and its information is used to supply the ECM with information regarding the monitoring condition of the EVAP canister purge system for leak detection. If the fuel level sensor is monitored for high or low stuck or difference between voltage of fuel level sensor and voltage deviation of fuel level sensor is exceeds limited value while driving, this is interpreted by the ECM as a fault.

DTC Description

ECM sets DTC P2067 if the ECM detects that the control line is short to ground.

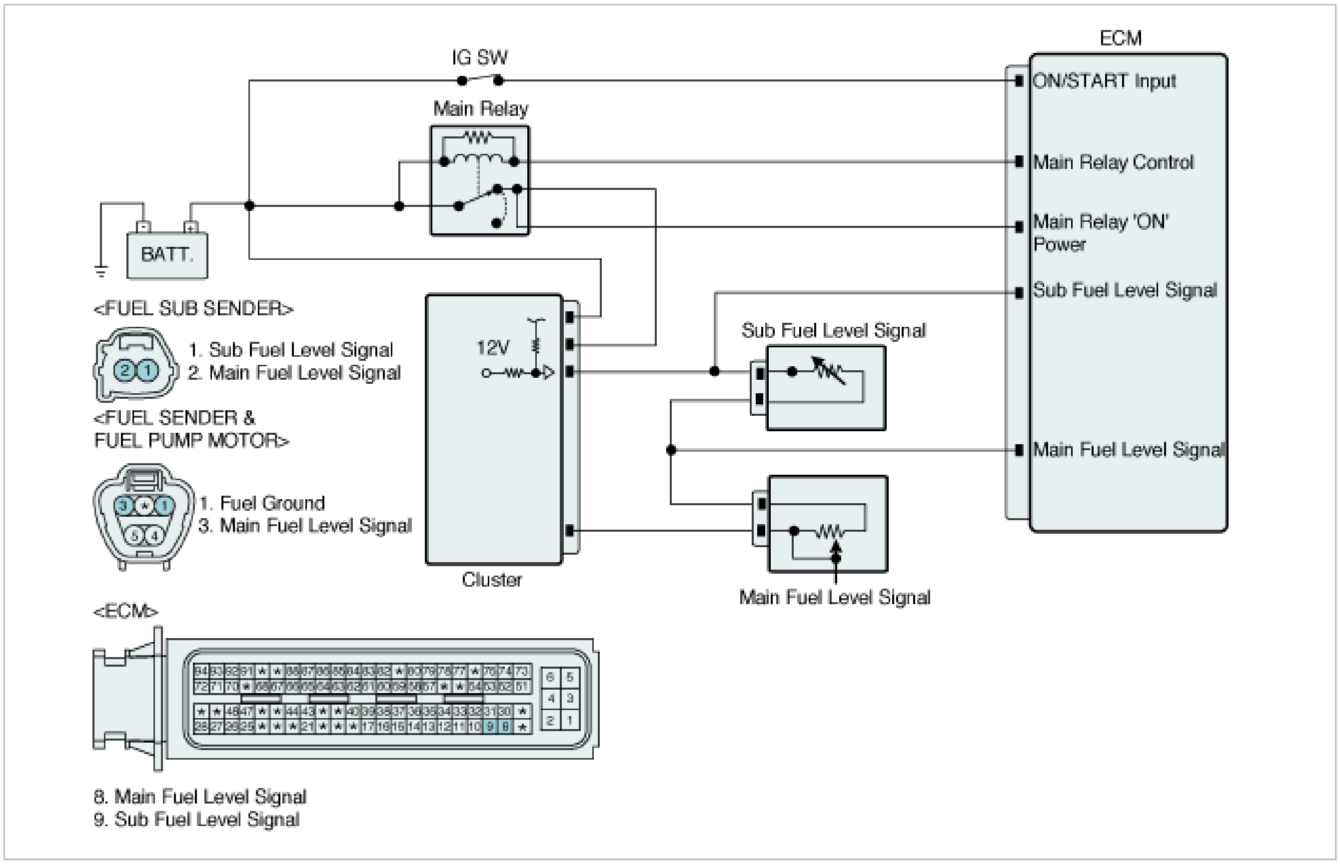
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical check	• Poor connection or damaged harness • Faulty Fuel Level Sender "A"
Enable Conditions	• Vehicle Speed > 22 mph during 20 sec. • Wheel speed gradient < 1.8 /1000 during 20 sec. • No relevant DTCs. • 11< Battery voltage <16	
Threshold Value	• FL measured - FL filtered value > 50 %	
Diagnostic Time	• 10 sec	
Mil On Condition	• 2 driving cycle	

Specification

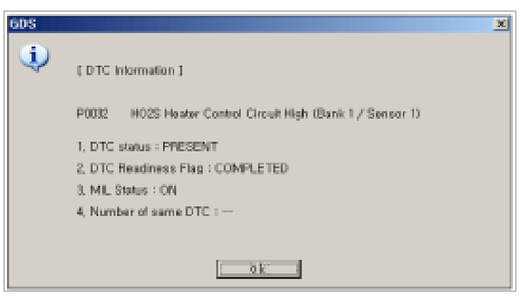
FLOAT Position	S/F	G/F	7/8	6/8	5/8	4/8	E/LOCK
Sender Resist(Ω)	4±1	4±1	4±1	4±1	4±1	4±1	4±1
Fuel height at tank bottom (sub tank)(mm)	4±1	4±1	4±1	4±1	4±1	4±1	4±1
F/TANK Vol.(L)	63.0	61.5	54.25	47.5	4.75	34	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and Connector inspection

1. 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.
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

■ **Check voltage**

1. IG "OFF" and disconnect Fuel Sender B connector.
2. IG "ON".
3. Measure voltage between total signal terminal of Fuel Sub Sender harness connector and chassis ground.

Specification : Approx. 11 ~ 12V

4. Is the measured voltage within specification ?

YES	▶ Go to "Check short to ground in harness" procedure.
NO	▶ Repair open in harness and go to "Verification of Vehicle Repair" procedure.

■ **Check shorted in harness**

1. IG "OFF" and disconnect Fuel Sender A & Fuel Pump Motor connector, Fuel Sub Sender B connector and ECM connector.
2. Measure resistance between middle signal terminal of ECM harness connector and chassis ground.

Specification : Infinite

3. 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.

■ **Check open in harness**

1. IG "OFF" and disconnect Fuel Sender A & Fuel Pump Motor connector and ECM connector.
2. Measure resistance between total signal terminal of Fuel Sender and middle signal terminal of ECM harness connector.

Specification : Below 1Ω

3. Is the measured resistance within specification ?

YES	▶ Go to "Component Inspection" procedure.
NO	▶ Repair open in harness, and go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ **Check FLS resistance**

1. IG "OFF" and Disconnect Fuel Sender & Fuel Pump Motor connector and Fuel Sub Sender connector.

2. Remove these senders from fuel tank and measure the reistance of Fuel sender while lifting up and down the fuel level float.
3. Does the resistance of FLS change as lifting up and down the fuel level float ?

YES	▸ 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. NOTE There is a memory reset function on scantool that can erase optional parts automaticallydetected and memorized by ECM.Before or after testing ECM on the vehicle, use this function to reuse the ECM on the others
NO	▸ Substitute with a known - good Fuel Sub Sender and check for proper operation. If the problem is corrected, replace Fuel Sub Sender and go to "Verification of Vehicle Repair" procedure.

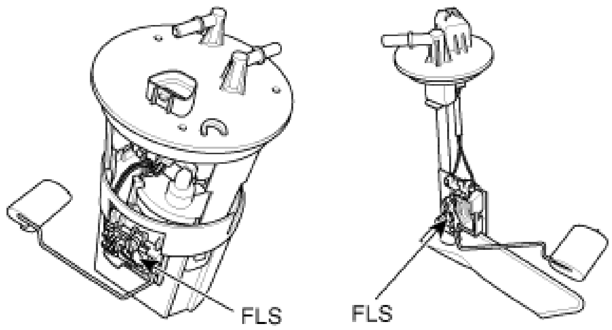
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Fuel Level Sensor(FLS) measures the fuel level in fuel tank and its information is used to supply the ECM with information regarding the monitoring condition of the EVAP canister purge system for leak detection. If the fuel level sensor is monitored for high or low stuck or difference between voltage of fuel level sensor and voltage deviation of fuel level sensor is exceeds limited value while driving, this is interpreted by the ECM as a fault.

DTC Description

ECM sets DTC P0463 if the ECM detects that the control line is short to battery or open.

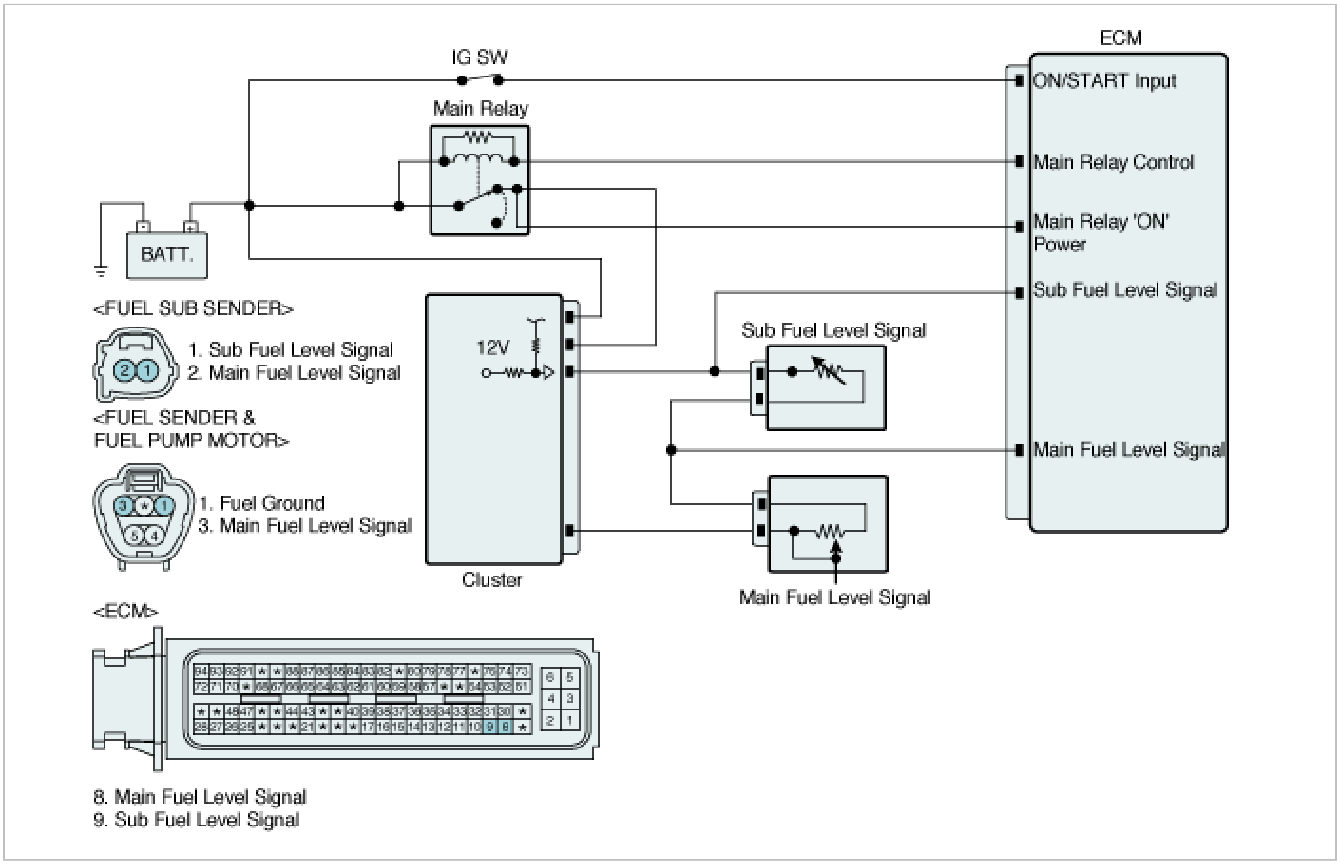
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical check	• Poor connection or damaged harness • Faulty Fuel Level Sender "A"
Enable Conditions	• Vehicle Speed > 22 mph during 20 sec. • Wheel speed gradient < 1.8 /1000 during 20 sec. • No relevant DTCs. • 11< Battery voltage <16	
Threshold Value	• FL measured - FL filtered value > 50 %	
Diagnostic Time	• 10 sec	
Mil On Condition	• 2 driving cycle	

Specification

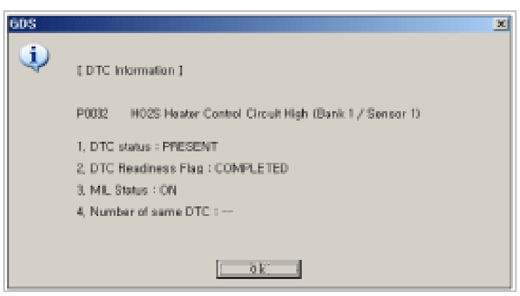
FLOAT Position	S/F	G/F	7/8	6/8	5/8	4/8	E/LOCK
Sender Resist(Ω)	4±1	4±1	4±1	4±1	4±1	4±1	4±1
Fuel height at tank bottom (sub tank)(mm)	4±1	4±1	4±1	4±1	4±1	4±1	4±1
F/TANK Vol.(L)	63.0	61.5	54.25	47.5	4.75	34	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and Connector Inspection

1. 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.
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".

Signal Circuit Inspection

■ **Check short to battery in harness**

1. IG "OFF" and disconnect Instrument cluster connector, Fuel Sender A & Fuel Pump Motor connector, and Fuel Sub Sender connector.
2. IG "ON".
3. Measure voltage between total signal terminal of Fuel Sub Sender harness connector and chassis ground.

Specification : Approx. 0V

4. Is the measured voltage within specification ?

YES	▸ Go to "Ground Circuit Inspection" procedure.
NO	▸ Repair short to battery in harness and go to "Verification of Vehicle Repair" procedure.

Ground Circuit Inspection

■ **Check open in harness**

1. IG "OFF" and disconnect Instrument cluster connector and Fuel Sender A & Fuel Pump Motor connector.
2. Measure resistance between ground terminal of Fuel Sender harness connector and Fuel ground terminal of Instrument cluster harness connector.

Specification : Below 1Ω

3. Is the measured resistance within specification ?

YES	▸ Go to "Component Inspection" procedure.
NO	▸ Repair open in harness, and go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ **Check FLS resistance**

1. IG "OFF" and Disconnect Fuel Sender & Fuel Pump Motor connector and Fuel Sub Sender connector.
2. Remove these senders from fuel tank and measure the reistance of Fuel sender while lifting up and down the fuel level float.
3. Does the resistance of FLS change as lifting up and down the fuel level float ?

YES	▸ 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. NOTE There is a memory reset function on GDS that can erase optional parts automaticallydetected

	and memorized by ECM.Before or after testing ECM on the vehicle, use this function to reuse the ECM on the others
NO	▸ Substitute with a known-good component and check for proper operation. If the problem is corrected, replace it and then go to "Verification of Vehicle Repair" procedure.

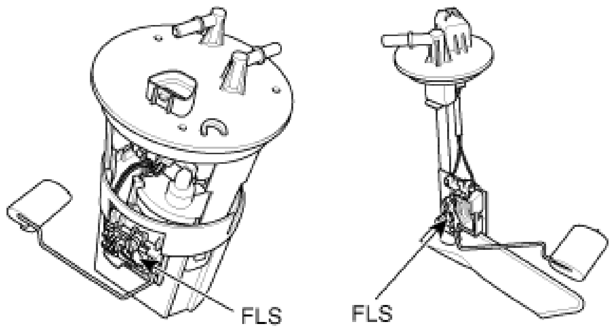
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Fuel Level Sensor(FLS) measures the fuel level in fuel tank and its information is used to supply the ECM with information regarding the monitoring condition of the EVAP canister purge system for leak detection. If the fuel level sensor is monitored for high or low stuck or difference between voltage of fuel level sensor and voltage deviation of fuel level sensor is exceeds limited value while driving, this is interpreted by the ECM as a fault.

DTC Description

ECM compares fuel level measured with filtered value. If there is difference over 50% between each other, ECM sets P2069

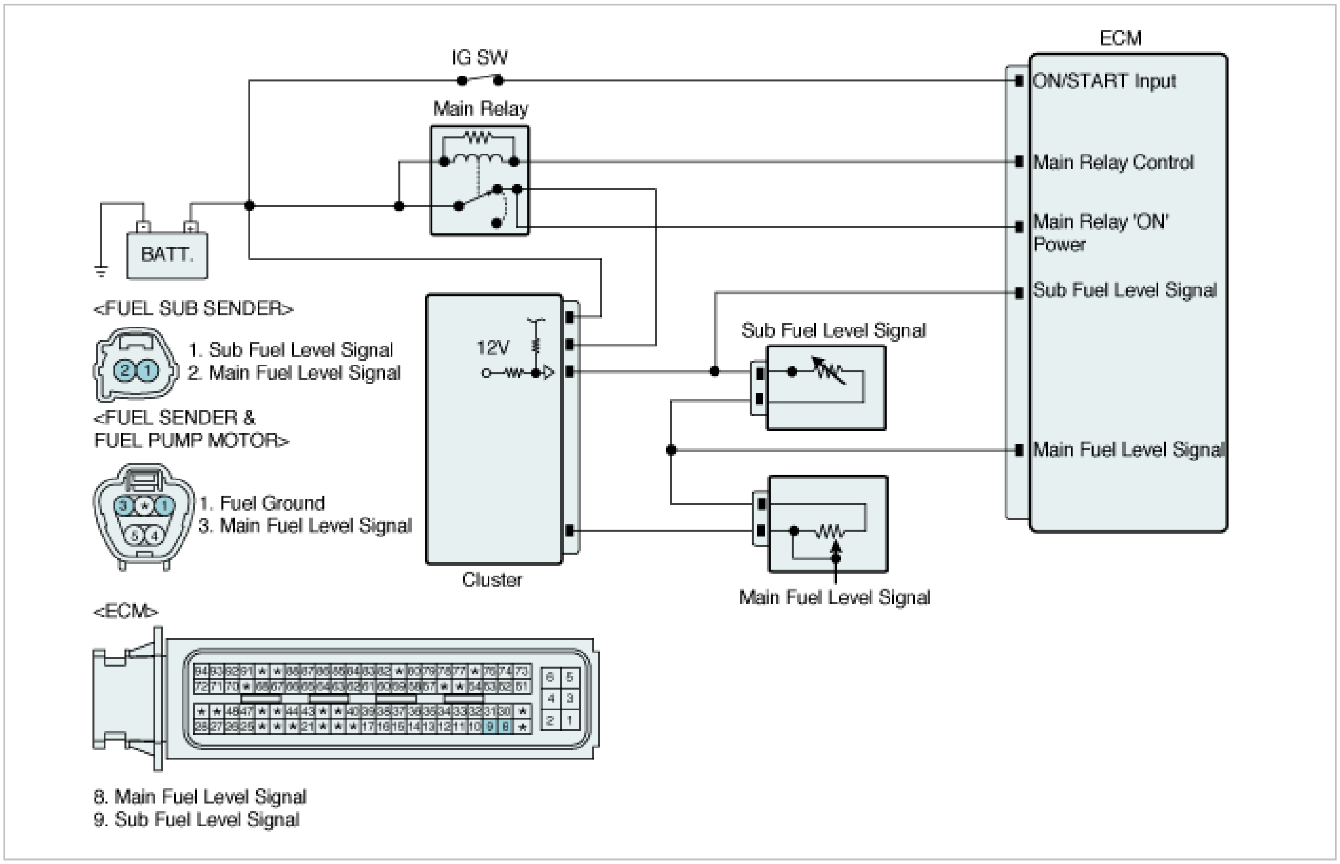
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Noisy signal	• Poor connection or damaged harness • Faulty Fuel Level Sender "A"
Enable Conditions	• Vehicle Speed > 22 mph during 20 sec. • Wheel speed gradient < 1.8 /1000 during 20 sec. • No relevant DTCs. • 11< Battery voltage <16	
Threshold Value	• FL measured - FL filtered value > 50 %	
Diagnostic Time	• 10 sec	
Mil On Condition	• 2 driving cycle	

Specification

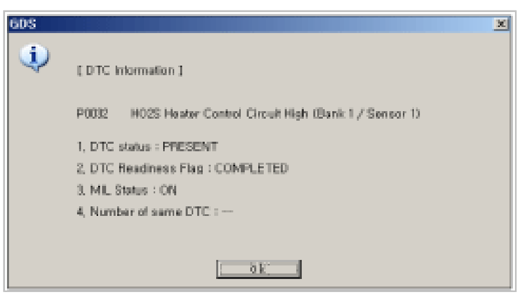
FLOAT Position	S/F	G/F	7/8	6/8	5/8	4/8	E/LOCK
Sender Resist(Ω)	4±1	4±1	4±1	4±1	4±1	4±1	4±1
Fuel height at tank bottom (sub tank)(mm)	4±1	4±1	4±1	4±1	4±1	4±1	4±1
F/TANK Vol.(L)	63.0	61.5	54.25	47.5	4.75	34	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below.

Terminal and Connector Inspection

1. 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.
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"

Component Inspection

■ **Fuel level sender reistance check**

1. IG key "OFF"
2. Disconnect main and sub fuel level sender connector.
3. Measure the resistance of each fuel level sender moving the float.

Specification :
Main fuel level sender resistance : 4~90 Ω
Sub fuel level sender resistance : 4.5 ~ 110.5 Ω

4. Is the resistance within the specification?

YES	▸ It seem to beintermittent fault. Check if the float is stuck by any particles. Erase DTCs and test again. And go to "Verification of Vehicle Repair" procedure.
NO	▸ Substitute with a known-good component and check for proper operation. If the problem is corrected, replace it and then go to "Verification of Vehicle Repair" procedure.

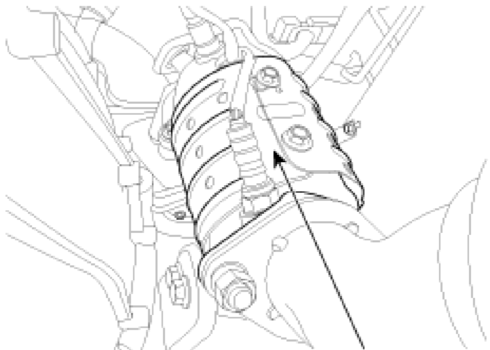
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

In order to provide the best possible combination of drivability, fuel economy and emission control, the ECM uses a closed loop air/fuel metering system. The ECM monitors the HO2S signal voltage and adjusts fuel delivery based it in closed loop fuel control. Changes in fuel delivery will be indicated by the long-term and the short-term fuel trim values. The ideal fuel trim value is around 0%. The ECM will add fuel when the HO2S signal is indicating a lean condition. Additional fuel is indicated by fuel trim values that are above 0%. The ECM will reduce fuel when the HO2S signal is indicating a rich condition. Reduction in fuel is indicated by fuel trim values that are below 0%. The DTC relevant to fuel trim will be set when the amount reaches excessive levels because of a lean or rich condition.

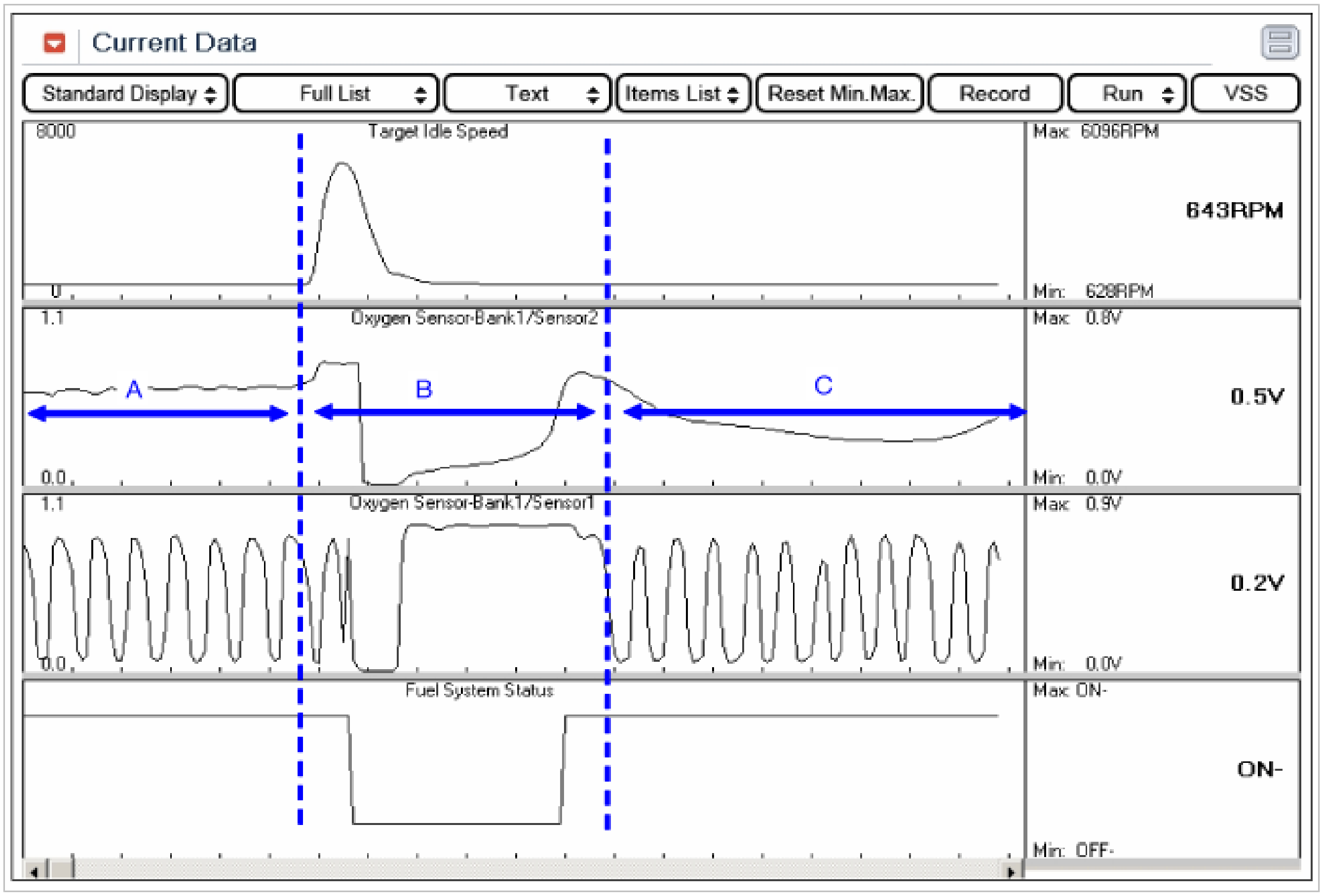
DTC Description

If the lambda controller reaches the maximum or minimum threshold, then feedback control is no longer possible and emissions will be increased. The ECM sets DTC P2096 if no proportional post catalyst fuel trim adaptation occurs for a defined time after the lambda controller has reached its maximum threshold.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Monitoring deviation of down HO2S feedback control	• Air leakage in exhaust System • HO2S • TWC
Enable Conditions	• Lambda control active • No relevant failure • Dynamic fuel trim is active • Canister purge valve not opening or closing	
Threshold Value	• Adaptation value > 630 msec.	
Diagnostic Time	• 60 sec.	
MIL On Condition	• 2 Driving Cycles	

Signal Waveform & Data

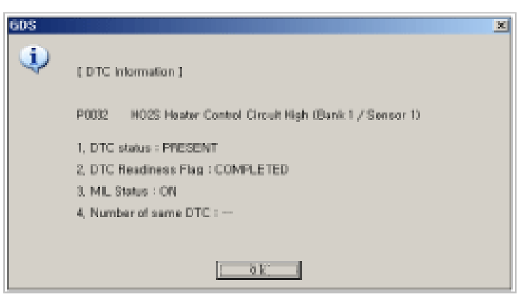


- Sector A : Signal Normal
- Sector B : Signal Fluctuation by rapid acceleration
- Sector C : Signal Recovery

Monitor DTC Status

> **NOTE**
>
> If any codes relating to Rear HO2S or TWC(ThreeWay Catalyst Converter) are stored, do ALL REPAIRS associated with those codes before proceeding with this troubleshooting tree.

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Component Inspection

■ Exhaust system Inspection

1. Visually/physically inspect the following conditions:
   - Exhaust system between HO2S and Three way catalyst for air leakage, restriction and damage.
   - Damage, and for loose or missing hardware
2. Was a problem found in any of the above areas?

YES	▶ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Go to next step as below

■ TWC Inspection

1. Visually/physically inspect the three-way catalyst(TWC) converter for the following damage:
   - Severe discoloration caused by excessive temperature
   - Dents and holes
   - Internal rattle caused by a damaged catalyst
2. Also, ensure that the TWC is a proper original equipment manufacturer part.
3. Was a problem found?

YES	▶ Replace TWC and go to "Verification of Vehicle Repair" procedure
NO	▶ Go to next step as below

■ HO2S Inspection

1. Visually/physically inspect the HO2S for the following conditions:
   - Ensure that the HO2S is securely installed.(Pigtail and wiring harness not making contact with the exhaust pipe)
   - Check for corrosion on terminals and terminal tension (at the HO2S and at the ECM)
   - Front HO2S for silicon contamination. This contamination will be indicated by a white powdery coating on the portion of the sensor exposed to the exhaust stream and this will result in a but false(high) voltage signal
   - Fuel, engine coolant or oil contamination
   - Use of improper sealant
   - If contamination is evident on the HO2S, Fix the source of the sensor contamination before replacing the sensor to prevent future contamination. Go to "Verification of Vehicle Repair" procedure.
2. Warm up the engine to normal operating temperature and let it idle.
3. Connect GDS and monitor the "O2 SNSR VOL.-B1/S1" and "O2 SNSR VOL.-B1/S2" parameters on the GDS data list.

Specification : Refer to "Signal Waveform & Data" in the "General Information" procedure
- Front HO2S(O2 SNSR VOL.-B1/S1) : Verify signal is switching from rich(above 0.45V) to lean(below 0.45V) a minimum of 3 times in 10 seconds (voltage will vary between 0.1 and 0.9V) at idle.
- Rear HO2S(O2 SNSR VOL.-B1/S2) : Above 0.6V at idle

4. Was a problem found in any of the above areas?

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

NO	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

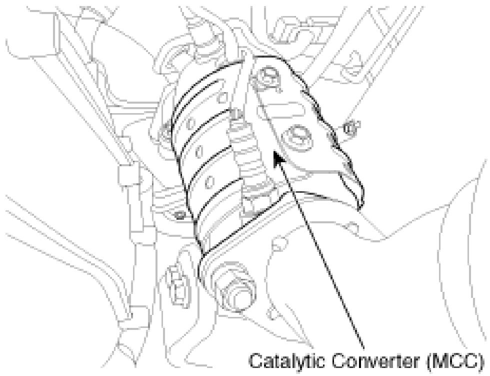
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

In order to provide the best possible combination of drivability, fuel economy and emission control, the ECM uses a closed loop air/fuel metering system. The ECM monitors the HO2S signal voltage and adjusts fuel delivery based it in closed loop fuel control. Changes in fuel delivery will be indicated by the long-term and the short-term fuel trim values. The ideal fuel trim value is around 0%. The ECM will add fuel when the HO2S signal is indicating a lean condition. Additional fuel is indicated by fuel trim values that are above 0%. The ECM will reduce fuel when the HO2S signal is indicating a rich condition. Reduction in fuel is indicated by fuel trim values that are below 0%. The DTC relevant to fuel trim will be set when the amount reaches excessive levels because of a lean or rich condition.

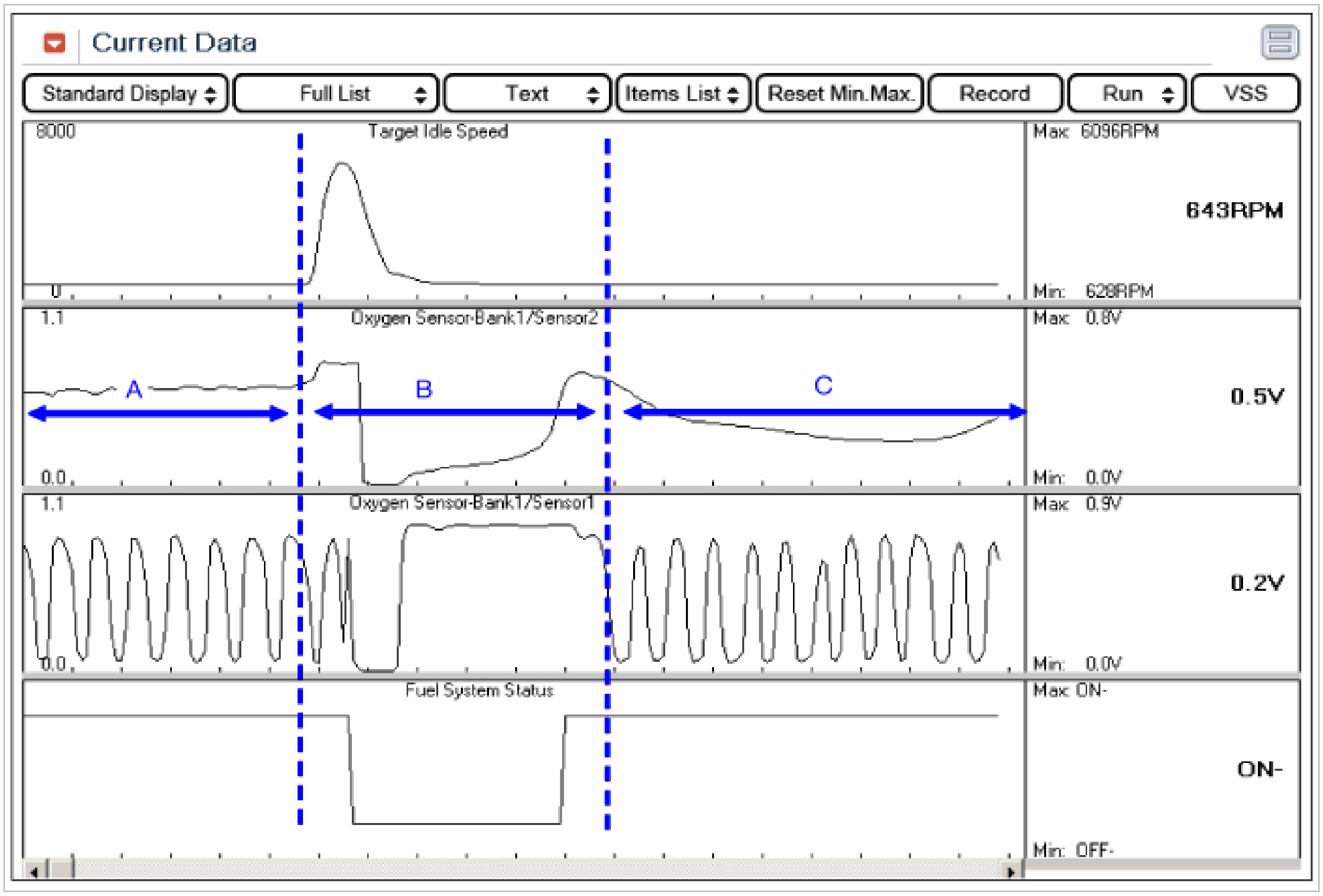
DTC Description

f the lambda controller reaches the maximum or minimum threshold, then feedback control is no longer possible and emissions will be increased. The ECM sets DTC P2097 if no proportional post catalyst fuel trim adaptation occurs for a defined time after the lambda controller has reached its minimum threshold.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Monitoring deviation of down HO2S feedback control	• Exhaust System • HO2S • TWC
Enable Conditions	• Lambda control active • No relevant failure • Dynamic fuel trim is active • Canister purge valve not opening or closing	
Threshold Value	• Adaptation value < -500 msec.	
Diagnostic Time	• 60 sec.	
MIL On Condition	• 2 Driving Cycles	

Signal Waveform & Data

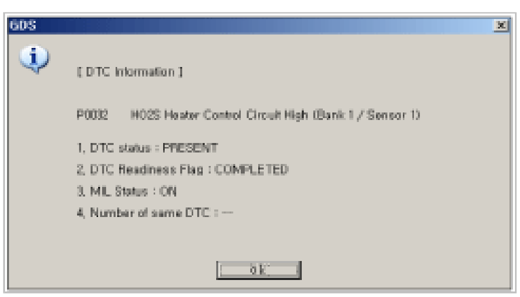


- Sector A : Signal Normal
- Sector B : Signal Fluctuation by rapid acceleration
- Sector C : Signal Recovery

Monitor DTC Status

> NOTE
>
> If any codes relating to Rear HO2S or TWC(ThreeWay Catalyst Converter) are stored, do ALL REPAIRS associated with those codes before proceeding with this troubleshooting tree.

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Component Inspection

■ **Exhaust system Inspection**

1. Visually/physically inspect the following conditions:
   - Exhaust system between HO2S and Three way catalyst for air leakage, restriction and damage.
   - Damage, and for loose or missing hardware
2. Was a problem found in any of the above areas?

YES	▸ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

■ **TWC Inspection**

1. Visually/physically inspect the three-way catalyst(TWC) converter for the following damage:
   - Severe discoloration caused by excessive temperature
   - Dents and holes
   - Internal rattle caused by a damaged catalyst
2. Also, ensure that the TWC is a proper original equipment manufacturer part.
3. Was a problem found?

YES	▸ Replace TWC and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

■ **HO2S Inspection**

1. Visually/physically inspect the HO2S for the following conditions:
   - Ensure that the HO2S is securely installed.(Pigtail and wiring harness not making contact with the exhaust pipe)
   - Check for corrosion on terminals and terminal tension (at the HO2S and at the ECM)
   - Front HO2S for silicon contamination. This contamination will be indicated by a white powdery coating on the portion of the sensor exposed to the exhaust stream and this will result in a but false(high) voltage signal
   - Fuel, engine coolant or oil contamination
   - Use of improper sealant
   - If contamination is evident on the HO2S, Fix the source of the sensor contamination before replacing the sensor to prevent future contamination. Go to "Verification of Vehicle Repair" procedure.
2. Warm up the engine to normal operating temperature and let it idle.
3. Connect GDS and monitor the "O2 SNSR VOL.-B1/S1" and "O2 SNSR VOL.-B1/S2" parameters on the GDS data list.

Specification : Refer to "Signal Waveform & Data" in the "General Information" procedure
- Front HO2S(O2 SNSR VOL.-B1/S1) : Verify signal is switching from rich(above 0.45V) to lean(below 0.45V) a minimum of 3 times in 10 seconds (voltage will vary between 0.1 and 0.9V) at idle.
- Rear HO2S(O2 SNSR VOL.-B1/S2) : Above 0.6V at idle

4. Was a problem found in any of the above areas?

YES	▸ Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure

NO	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

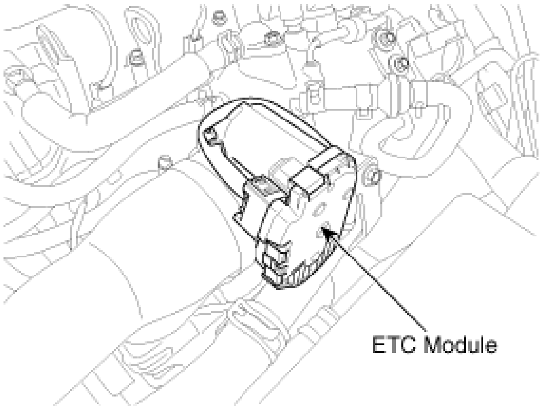
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Electronic Throttle Control(ETC) system is made of the components throttle body, Throttle Position Sensor(TPS)1&2 and Accelerator Position Sensor(APS) 1&2. The throttle body contains the actuator, the throttle plate and the throttle position sensor (potentiometer), which are integrated in one housing. The actuator consists of a DC motor with a two-stage gear. The opening angle of the throttle valve is detected by the throttle position sensor which is mounted on the throttle body. And it provides feedback to the ECM to control the throttle motor in order to control the throttle valve opening angle properly in response to the driving condition.

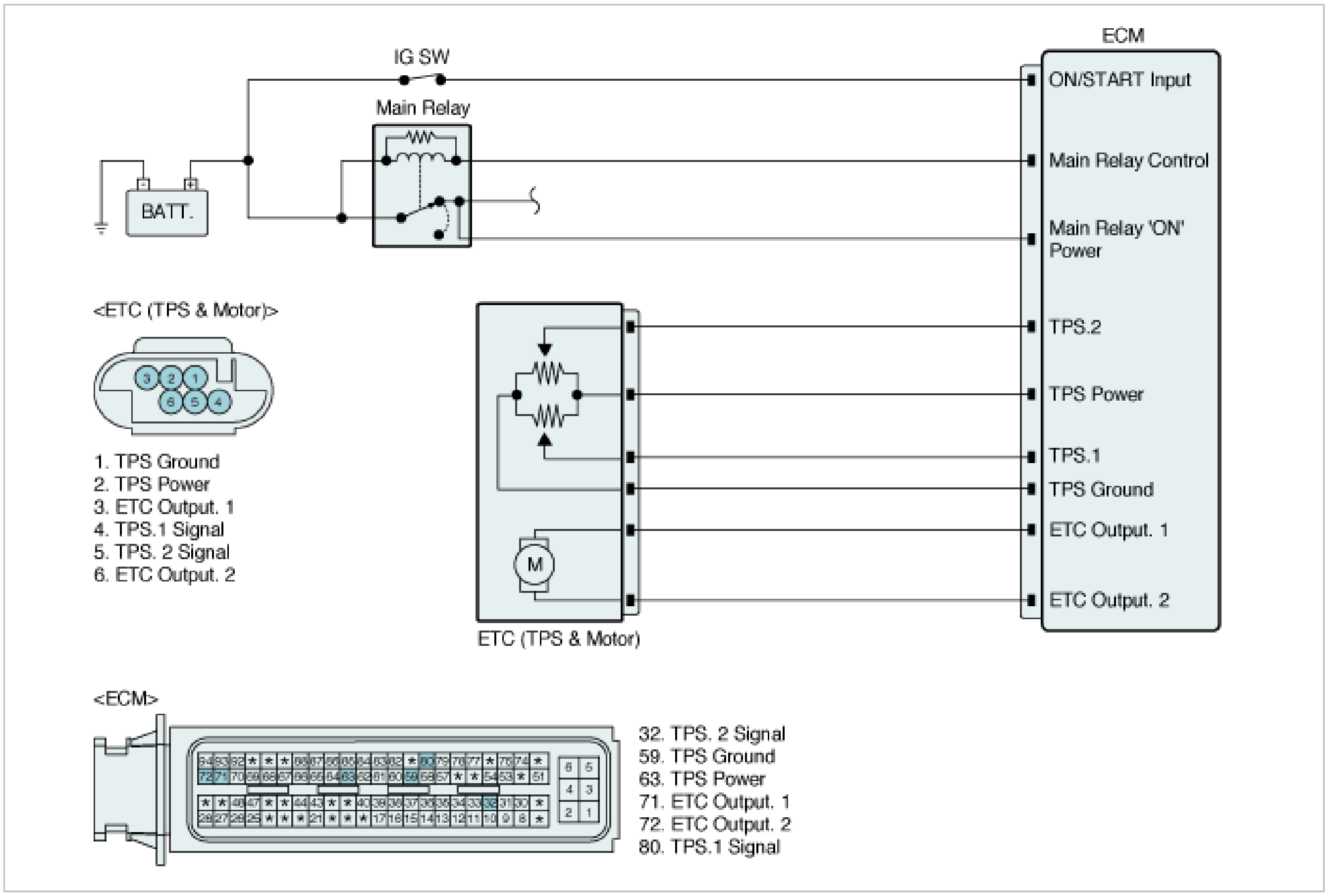
DTC Description

ECM sets P2101 when detects error in ETC motor circuit.

DTC Detecting Condition

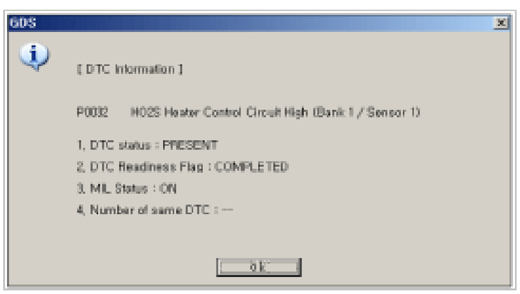
Item	Detecting Condition	Possible Cause
DTC Strategy	• Hardware error	• Open or Short in Control circuit • Poor connection or damaged harness • Faulty ETC Motor
Enable Conditions	• Battery voltage > 9V	
Threshold Value	• Low voltage, Over current, Over heat, or H-Bridge (Control circuit) error	
Diagnostic Time	• 0.1 sec.	
MIL On Condition	• Immediately	
Fail Safe	• Forced limited RPM mode : The ECM limits engine speed to 1500rpm • Electrical check of the ETC system is prohibited	

Diagnostic Circuit Diagram



Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

ETC Output 1 Circuit Inspection

■ Check for Short to Ground in ETC Output 1 Circuit

1. IG KEY OFF.
2. Disconnect ETC Connector.
3. Measure resistance between ETC Output 1 terminal of ETC harness connector and chassis ground.

Specification : Infinite

4. Is resistance within specification?

YES	▶ Go to next procedure.
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ Check for Short to Power in ETC Output 1 Circuit

1. IG KEY OFF.
2. Disconnect ETC connector.
3. IG KEY ON.
4. Measure voltage between ETC Output 1 terminal of ETC harness connector and chassis ground.

Specification : Approx. 0 V

5. Is voltage within specification?

YES	▶ Go to next procedure.
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ Check for Open in ETC Output 1 Circuit

1. IG KEY OFF.
2. Disconnect ETC harness connector and ECM harness connector.
3. Measure resistance between both ends of ETC Output 1 line.

Specification : Below 1Ω.

4. Is resistance within specification?

YES	▶ Go to next procedure.

NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

ETC Output 2 Circuit Inspection

■ **Check for Short to Ground in ETC Output 2 Circuit**

1. IG KEY OFF.
2. Disconnect ETC Connector.
3. Measure resistance between ETC Output 2 terminal of ETC harness connector and chassis ground.

Specification : Infinite

4. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ **Check for Short to Power in ETC Output 2 Circuit**

1. IG KEY OFF.
2. Disconnect ETC connector.
3. IG KEY ON.
4. Measure voltage between ETC Output 2 terminal of ETC harness connector and chassis ground.

Specification : Approx. 4.5 V

5. Is voltage within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ **Check for Open in ETC Output 2 Circuit**

1. IG KEY OFF.
2. Disconnect ETC harness connector and ECM harness connector.
3. Measure resistance between both ends of ETC Output 2 line.

Specification : Below 1Ω.

4. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ **TPS Inspection**

1. Start engine and install scan tool.
2. Monitor the "TPS VOLTAGE1" and "TPS VOLTAGE2" parameters on the Scantool data list.

Specification : Refer to "Signal Waveform & Data" in the "General Information" procedure
- Output of TPS1 increases smoothly in proportion with the throttle valve opening angle.

- Output of TPS2 decreases smoothly in inverse proportion with the throttle valve opening angle.

3. Are the TPS VOLTAGE1&2 within the specification?

YES	▸ Go to next step as below
NO	▸ Check TPS1&2, referring troubleshooting guide for DTC P0121/P0221. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure

■ **ETC Motor Inspection**

1. Visually/physically inspect the restriction or any foreign objects in throttle body.
2. Clean or replace as necessary and go to "Verification of Vehicle Repair" procedure.
   If OK, go to next step as below.
3. Ignition "OFF".
4. Disconnect the ETC motor harness connector.
5. Measure resistance between 'ETC output 1' terminal and 'ETC output 2' terminal of ETC motor harness connector. (Component side)

Specification : 1.2~1.8Ω at 20°C(68°F)

6. Is resistance within specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Substitute with a known-good switch and check for proper operation. If the problem is corrected, replace component and then go to "Verification of Vehicle Repair" procedure.

NOTE

It is necessary to perform the TPS adaptation procedure after the ETC assembly or ECM replacing.
■ TPS adaptation procedure
Ignition "OFF" and then "ON" without cranking. Wait for 10 seconds under enable conditions.
→ Enable conditions : Battery >10V & Intake Air Temp. >5.3°C(41.5°F) & 5.3°C(41.5°F) < Engine CoolantTemp. < 99.8°C(211.6°F)

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

General Description

If a malfunction occurs in the Electronic Throttle Control(ETC) system, the ECM will control the engine from predetermined data stored in its memory or stop the engine if a safety problem is anticipated,as an Emergency Operation(Limp-Home)mode. The purpose of Limp-Home mode is to control the engine as close as possible to normal engine operation if a malfunction occurs. When the DTC related to ETC system is recorded by the ECM, then this DTC will be set. This DTC only indicates malfunction related to ETC system has occurred and engine is in Limp-Home mode. DO ALL REPAIRS associated malfunction with ETC system.

DTC Description

ECM sets DTC P2104 to indicate ETC system malfunction has occurred and engine is in Limp-Home mode. The ECM limited opening angle of the throttle valve to max. 50% and engine torque to a certain predetermined value after setting the DTC, as an Emergency Operation(Limp-Home)mode.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Additional DTC when both electrical error of pedal value sensor 1 and pedal value sensor 2 are detected.	• ETC system malfunction (P2138)
Enable Conditions		
Threshold Value		
Diagnostic Time	• 1 Driving Cycle	

Monitor DTC Status

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

NOTE

- History (Not Present) 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 go to "Verification of Vehicle Repair" procedure
NO	▶ Monitor specific DTC for P2138. Do ALL REPAIRS associated with that code. Go to troubleshooting procedure for DTC P2138.

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P2105 Throttle Actuator Control System-Force Engine Shutdown

General Description

If a malfunction occurs in the Electronic Throttle Control(ETC) system, the ECM will control the engine from predetermined data stored in its memory or stop the engine if a safety problem is anticipated,as an Emergency Operation(Limp-Home)mode. The purpose of Limp-Home mode is to control the engine as close as possible to normal engine operation if a malfunction occurs. When the DTC related to ETC system is recorded by the ECM, then this DTC will be set. This DTC only indicates malfunction related to ETC system has occurred and engine is in Limp-Home mode. DO ALL REPAIRS associated malfunction with ETC system.

DTC Description

ECM sets DTC P2105 to indicate ETC system malfunction has occurred and engine is in Limp-Home mode. The ECM shuts down the engine after setting the DTC, as an Emergency Operation(Limp-Home)mode.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Additional DTC when P0605 level 3 monitoring related error detected.	• ETC system malfunction(P0605)
Enable Conditions		
Threshold Value		
Diagnostic Time	• 1 Driving Cycle	

Monitor DTC Status

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

> NOTE
>
> - History (Not Present) 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 go to "Verification of Vehicle Repair" procedure
NO	▸ Monitor specific DTC for P0605. Do ALL REPAIRS associated with that code. Go to troubleshooting procedure for DTC P0605.

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P2106 Throttle Actuator Control System-Force Limited Power

General Description

If a malfunction occurs in the Electronic Throttle Control(ETC) system, the ECM will control the engine from predetermined data stored in its memory or stop the engine if a safety problem is anticipated,as an Emergency Operation(Limp-Home)mode. The purpose of Limp-Home mode is to control the engine as close as possible to normal engine operation if a malfunction occurs. When the DTC related to ETC system is recorded by the ECM, then this DTC will be set. This DTC only indicates malfunction related to ETC system has occurred and engine is in Limp-Home mode. DO ALL REPAIRS associated malfunction with ETC system.

DTC Description

ECM sets DTC P2106 to indicate ETC system malfunction has occurred and engine is in Limp-Home mode. The ECM reduces engine torque by 25% of normal value after setting the DTC, as an Emergency Operation(Limp-Home)mode.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Additional DTC when TPS sensor electrical error or plausibility of TPS_1 and TPS_2 error detected	• ETC system malfunction (P0121,P0122,P0123,P0221,P0222,P0223,P0642,P0643,P0698,P0699,P2122,P2123,P2127,P2128 or P2138)
Enable Conditions		
Threshold Value		
Diagnostic Time	• 1 Driving Cycle	

Monitor DTC Status

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

> **NOTE**
>
> - History (Not Present) 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 go to "Verification of Vehicle Repair" procedure
NO	▸ Monitor specific DTCs for P0121,P0122,P0123,P0221,P0222,P0223,P0642,P0643,P0698,P0699,P2122,P2123,P2127,P2128 or P2138. Do ALL REPAIRS associated with those codes. Go to proper troubleshooting procedures for setting the DTCs.

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P2110 Throttle Actuator Control System-Forced Limited RPM

General Description

If a malfunction occurs in the Electronic Throttle Control(ETC) system, the ECM will control the engine from predetermined data stored in its memory or stop the engine if a safety problem is anticipated,as an Emergency Operation(Limp-Home)mode. The purpose of Limp-Home mode is to control the engine as close as possible to normal engine operation if a malfunction occurs. When the DTC related to ETC system is recorded by the ECM, then this DTC will be set. This DTC only indicates malfunction related to ETC system has occurred and engine is in Limp-Home mode. DO ALL REPAIRS associated malfunction with ETC system.

DTC Description

ECM sets DTC P2110 to indicate ETC system malfunction has occurred and engine is in Limp-Home mode. The ECM limits engine speed to 1500rpm after setting the DTC, as an Emergency Operation(Limp-Home)mode.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Additional DTC when PVS single error or ETC hardware check error(P2101, 2118) or TPS start check adaptation(P2119, P0638) or TPS reference voltage(P0652, P0653) or PVS reference voltage(P0642, P0643,P0698,P0699) or PVS ratio error(P2138) or both TPS_1 and TPS_2 error or Level 2 monitoring error detected	• ETC system malfunction
Enable Conditions		
Threshold Value		
Diagnostic Time	• 1 Driving Cycle	

Monitor DTC Status

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

NOTE

- History (Not Present) 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 go to "Verification of Vehicle Repair" procedure
NO	▸ Monitor specific DTCs for P0605,P0652,P0653,P0638,P2101,P2118 or P2119. Do ALL REPAIRS associated with those codes. Go to proper troubleshooting procedures for setting the DTCs.

Verification of Vehicle Repair

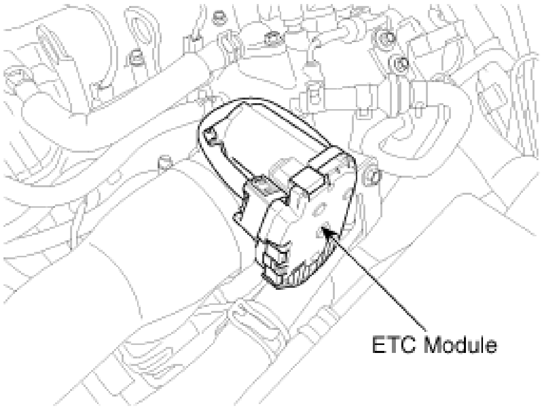
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P2118 Throttle Actuator Control Motor Current Range/Performance

Component Location



General Description

The Electronic Throttle Control(ETC) system is made of the components throttle body, Throttle Position Sensor(TPS)1&2 and Accelerator Position Sensor(APS) 1&2. The throttle body contains the actuator, the throttle plate and the throttle position sensor (potentiometer), which are integrated in one housing. The actuator consists of a DC motor with a two-stage gear. The opening angle of the throttle valve is detected by the throttle position sensor which is mounted on the throttle body. And it provides feedback to the ECM to control the throttle motor in order to control the throttle valve opening angle properly in response to the driving condition.

DTC Description

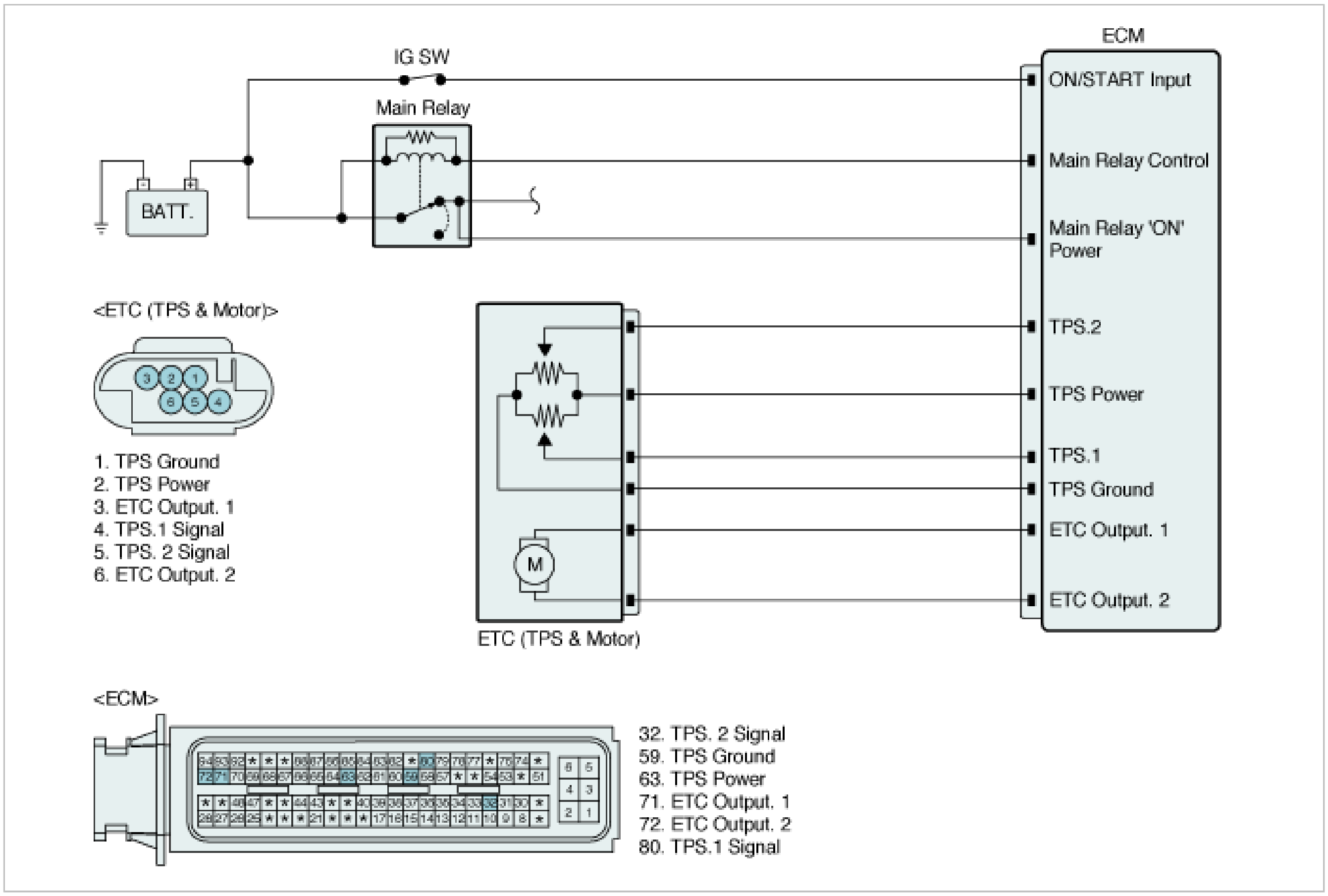
ECM sets DTC P2118 if the ECM detects motor's PWM signal exceeds threshold value.

DTC Detecting Condition

Item		Detecting Condition	Possible Cause
DTC Strategy	Case1	• PWM range check	• Open in Control circuit • Poor connection or damaged harness • Faulty ETC Motor
	Case2	• Deviation between throttle position and constant setpoint check	
	Case3	• Deviation between throttle position and moving setpoint check	
Enable Conditions	Case1	• TPS adaptation finished • Battery voltage >10V • No relevant error	
	Case2	• TPS adaptation finished • Constant TPS setpoint • No relevant error	
	Case3	• TPS adaptation finished • No relevant error	
Threshold Value	Case1	• Moving mean value of the controller output > 95%	
	Case2	• Throttle position - Throttle position setpoint >2.4%	
	Case3	• Throttle position - Throttle position setpoint >9.5%	
Diagnostic Time		• 0.5 sec.	
Fail Safe		• Forced limited RPM mode : The ECM limits engine speed to 1500rpm • Electrical check of the ETC system is prohibited	

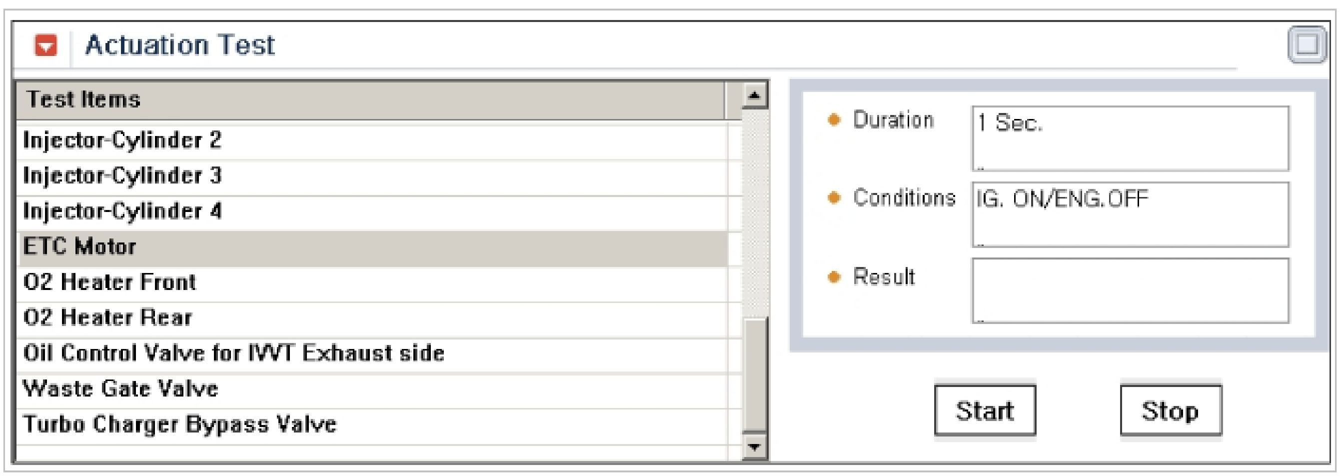
MIL On Condition	• Immediate	

Diagnostic Circuit Diagram



Signal Waveform & Data

1. Select 'Actuation Test' mode and execute 'ETC motor' item.

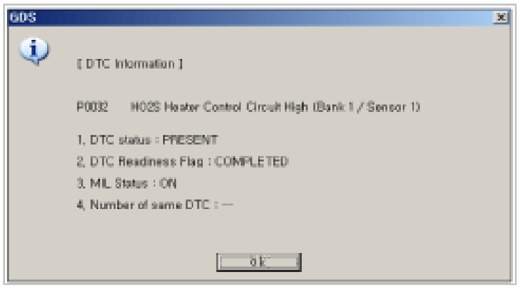


▸ During 'ETC Motor' test, TPS1 and TPS2 show symmetrical movements.

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.

4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Control Circuit Inspection

1. Disconnect ECM harness connector.
2. Measure resistance between 'ETC output 1' terminal and 'ETC output 2' terminal of ECM harness connector.

Specification : Approx. 1.2 ~ 1.8 Ω (20°C / 68°F)

3. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ **ETC Motor Inspection**

1. Visually/physically inspect the restriction or any foreign objects in throttle body.
2. Clean or replace as necessary and go to "Verification of Vehicle Repair" procedure.
   If OK, go to next step as below.

3. Ignition "OFF".
4. Disconnect the ETC motor harness connector.
5. Measure resistance between 'ETC output 1' terminal and 'ETC output 2' terminal of ETC motor harness connector. (Component side)

Specification : 1.2~1.8Ω at 20°C(68°F)

6. Is resistance within specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Substitute with a known-good switch and check for proper operation. If the problem is corrected, replace component and then go to "Verification of Vehicle Repair" procedure.

NOTE

It is necessary to perform the TPS adaptation procedure after the ETC assembly or ECM replacing.
■ TPS adaptation procedure
Ignition "OFF" and then "ON" without cranking. Wait for 10 seconds under enable conditions.
→ Enable conditions : Battery >10V & Intake Air Temp. >5.3°C(41.5°F) & 5.3°C(41.5°F) < Engine CoolantTemp. < 99.8°C(211.6°F)

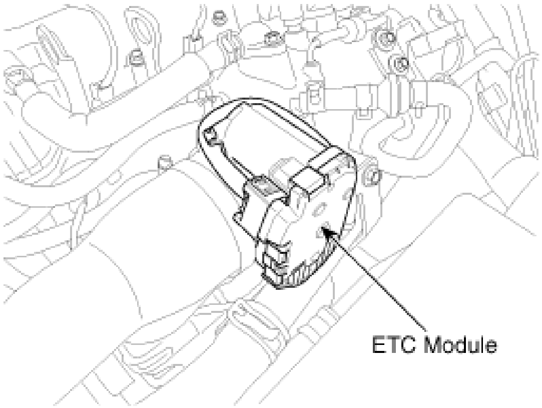
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Electronic Throttle Control(ETC) system is made of the components throttle body, Throttle Position Sensor(TPS)1&2 and Accelerator Position Sensor(APS) 1&2. The throttle body contains the actuator, the throttle plate and the throttle position sensor (potentiometer), which are integrated in one housing. The actuator consists of a DC motor with a two-stage gear. The opening angle of the throttle valve is detected by the throttle position sensor which is mounted on the throttle body. And it provides feedback to the ECM to control the throttle motor in order to control the throttle valve opening angle properly in response to the driving condition.

DTC Description

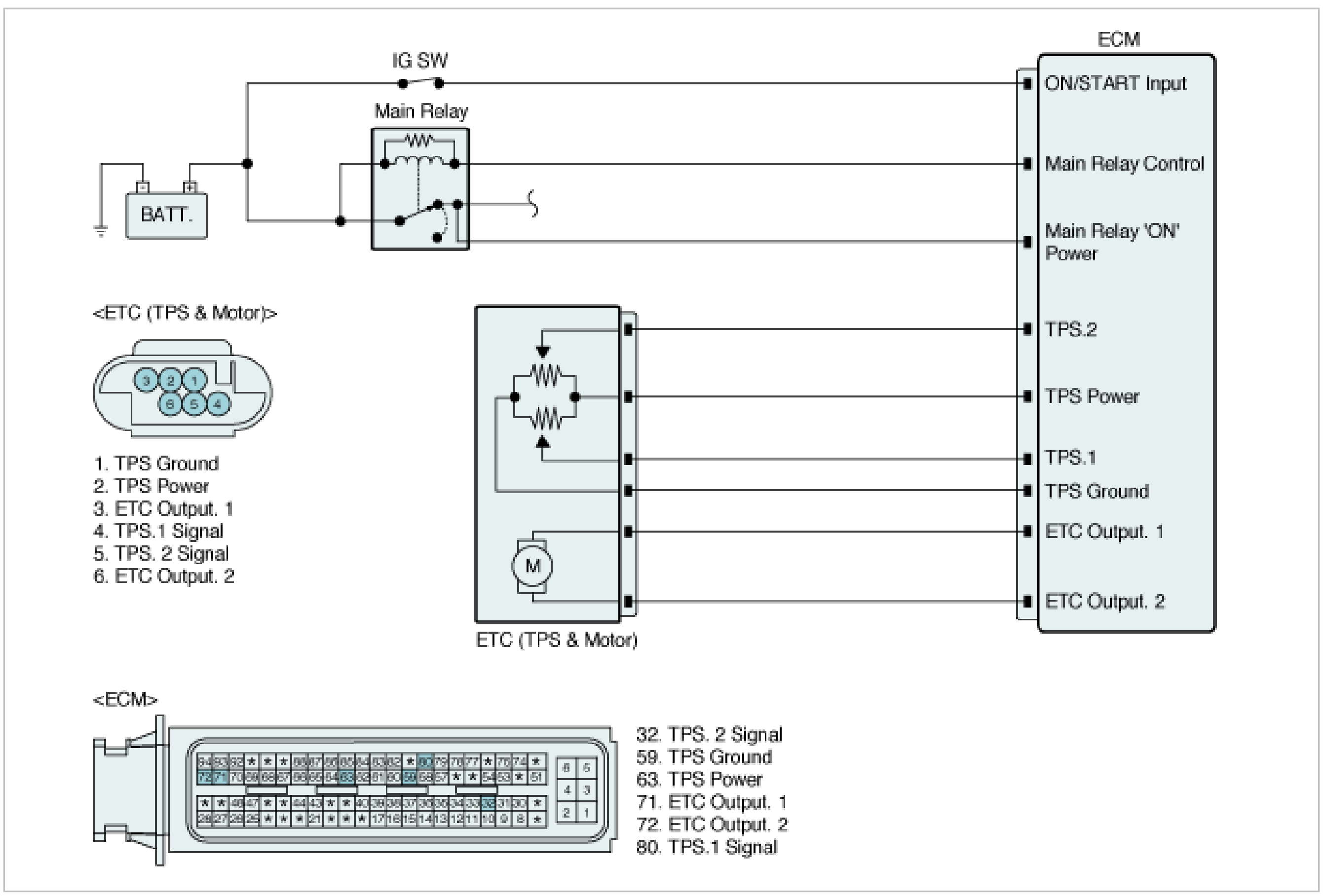
ECM sets DTC P2119 if the ECM detects TPS adaptation procedure is abnormal.

DTC Detecting Condition

Item		Detecting Condition	Possible Cause
DTC Strategy	Case1	• TPS adaptation Lower position check	
	Case2	• TPS adaptation error low return spring check	
	Case3	• TPS adaptation upper position check	
	Case4	• TPS adaptation error upper return spring check	
	Case5	• TPS start check error in spring check	
	Case6	• TPS start check error in limp-home-check	
Enable Conditions	Case1	• During TPS adaptation • TPS setpoint = 11.9%	
	Case2,4	• During TPS adaptation	
	Case3	• During TPS adaptation • TPS setpoint = 29%	
	Case5	• During TPS start check • TPS setpoint = 24.2%	
	Case6	• During TPS start check • No engine start condition	
	Case1	• Throttle position for the lower return spring check is not reached within a limit maximum time(Difference between throttle position and setpoint > 0.48%°)	
		• When ETC power stage is off, Throttle can not return by spring power in the limp-home position within a limit	• Poor connection or damaged harness

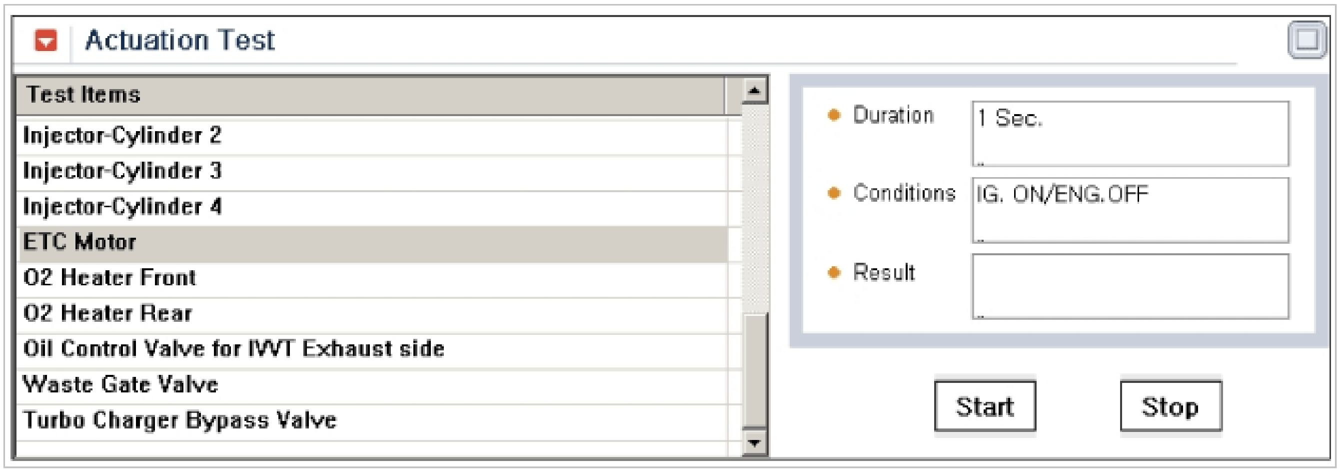
Threshold Value	Case2	maximum time(Difference between Throttle position and adapted voltage in limphome position > 0.18 V)	• Faulty ETC Motor
	Case3	• Throttle position for the upper return spring check is not reached within a limit maximum time(Difference between throttle position and setpoint > 0.48%)	
	Case4	• When ETC power stage is off, Throttle cannot return by spring power in the limp-home position within a limit maximum time(Difference between Throttle position and adapted voltage in limphome position > 0.18 V)	
	Case5	• Throttle flap cannot reach the setpoint within the hysteresis within a limit maximum time(Difference between throttle position and requested position > 0.48%)	
	Case6	• When ETC power stage is off, Throttle cannot return by spring power in the limp-home position within a limit maximum time(Difference between Throttle position and adapted voltage in limphome position > 0.18V)	
Diagnostic Time		• 0.8~1.2 sec.	
Fail Safe		• Forced limited RPM mode : The ECM limits engine speed to 1500rpm • Electrical check of the ETC system is prohibited	
MIL On Condition		• Immediate	

Diagnostic Circuit Diagram



Signal Waveform & Data

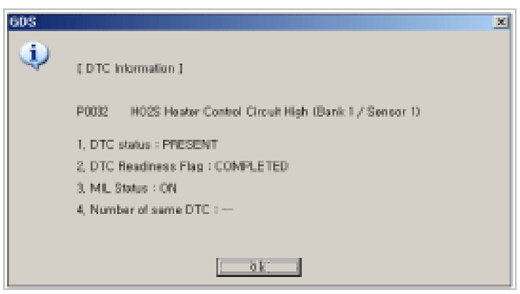
1. Select 'Actuation Test' mode and execute 'ETC motor' item.



▸ During 'ETC Motor' test, TPS1 and TPS2 show symmetrical movements.

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Control Circuit Inspection

1. Disconnect ECM harness connector.
2. Measure resistance between 'ETC output 1' terminal and 'ETC output 2' terminal of ECM harness connector.

Specification : Approx. 1.2 ~ 1.8 Ω (20°C / 68°F)

3. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ **ETC Motor Inspection**

1. Visually/physically inspect the restriction or any foreign objects in throttle body.
2. Clean or replace as necessary and go to "Verification of Vehicle Repair" procedure.
   If OK, go to next step as below.
3. Ignition "OFF".
4. Disconnect the ETC motor harness connector.
5. Measure resistance between 'ETC output 1' terminal and 'ETC output 2' terminal of ETC motor harness connector. (Component side)

Specification : 1.2~1.8Ω at 20°C(68°F)

6. Is resistance within specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Substitute with a known-good switch and check for proper operation. If the problem is corrected, replace component and then go to "Verification of Vehicle Repair" procedure.

NOTE

It is necessary to perform the TPS adaptation procedure after the ETC assembly or ECM replacing.
■ TPS adaptation procedure
Ignition "OFF" and then "ON" without cranking. Wait for 10 seconds under enable conditions.
→ Enable conditions : Battery >10V & Intake Air Temp. >5.3°C(41.5°F) & 5.3°C(41.5°F)< Engine CoolantTemp. < 99.8°C(211.6°F)

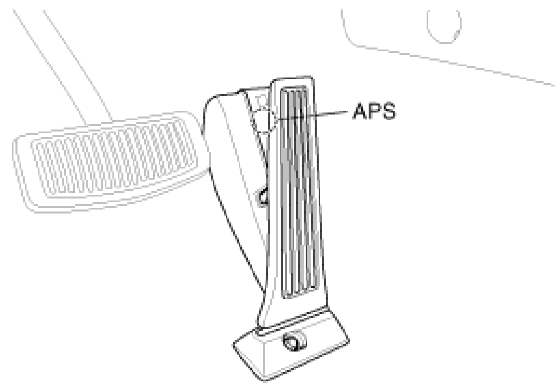
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Electronic Throttle Control(ETC) system is made of the components throttle body, Throttle Position Sensor(TPS) 1&2 and Accelerator Position Sensor(APS)1&2.The APS is mounted in the accelerator pedal to detect the opening angle of the accelerator pedal. It has 2 sensors to detect the accelerator position and a malfunction of the accelerator position sensor. The ECM judges the current opening angle of the accelerator pedal from APS1&2, and the ECM controls the throttle motor based on these signals.

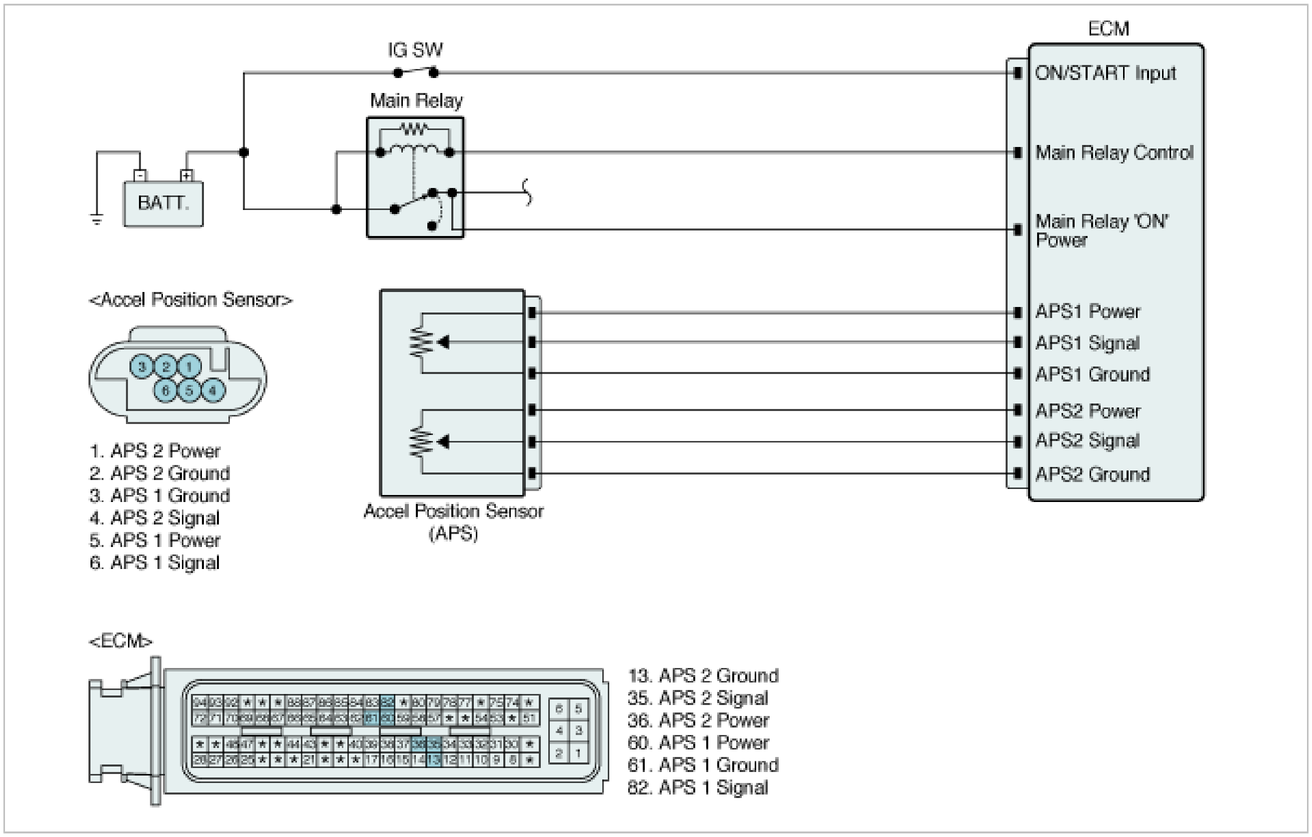
DTC Description

ECM sets DTC P2122 if the ECM detects output voltage lower than the possible range of a properly operating APS1.

DTC Detecting Condition

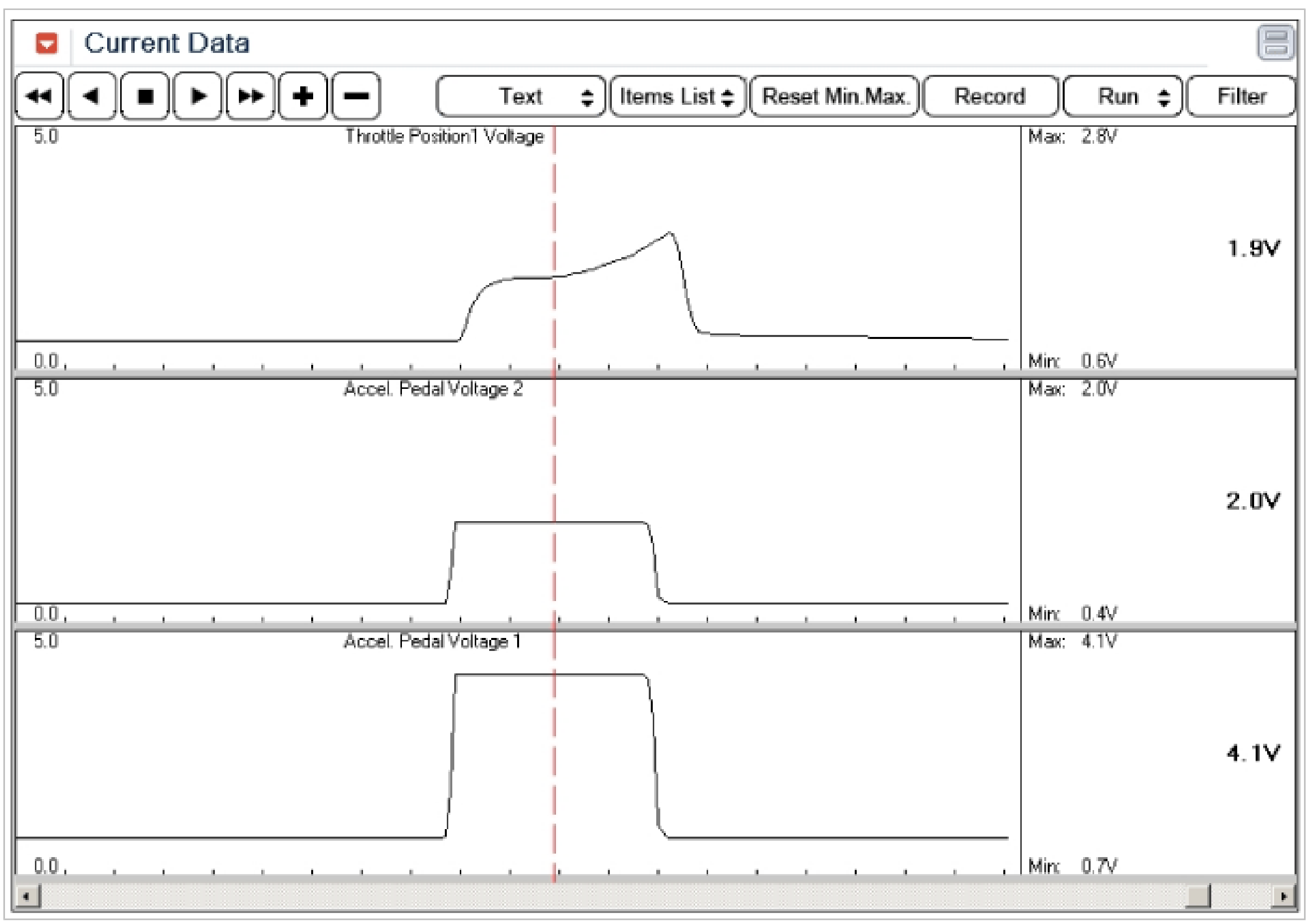
Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Open or Short to ground in power circuit • Open or short to ground in signal circuit • Poor connection or damaged harness • Faulty APS1
Enable Conditions	• No error for power supply circuit in APS1 • APS2 > 0.55V	
Threshold Value	• APS1 < 0.23V	
Diagnostic Time	• 0.3 sec.	
MIL On Condition	• 1 Driving Cycle	
Fail Safe	• Forced limited power mode : The ECM limits opening angle of the throttle valve to max. 50% and engine torque to a certain pre-determined value. • After idle recognition, the ECM uses APS2 signal to calculate the current opening angle of the throttle valve.	

Diagnostic Circuit Diagram



Signal Waveform & Data

1. IG key ON.
2. Check sensor data as below.

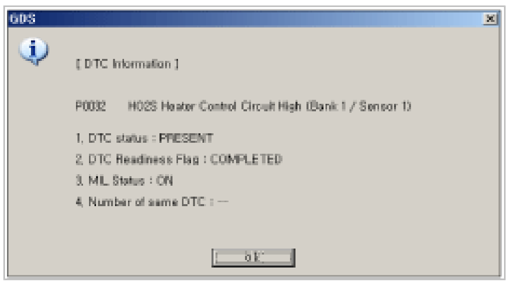


3. Data Analysis

<table>
<tr><th colspan="2" rowspan="2">Condition</th><th colspan="2">GDS Sensor Data</th></tr>
<tr><th>APS 1</th><th>APS 2</th></tr>
<tr><td rowspan="3">IG Key "ON & Engine "OFF"</td><td colspan="3">Output voltages of APS1 and APS2 are in propotion to accelerating.
APS2 output voltage is half of APS1 output voltage.</td></tr>
<tr><td>Release a pedal fully</td><td>0.58~0.93V</td><td>0.29~0.38</td></tr>
<tr><td>Depress a pedal fully</td><td>3.85~4.35V</td><td>1.93~2.18V</td></tr>
</table>

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Power Circuit Inspection

■ **Check for Short to Ground in Power Circuit**

1. IG KEY OFF.

2. Disconnect APS harness connector.
3. IG KEY ON.
4. Measure resistance between APS1 power terminal of APS harness connector and chassis ground.

Specification : Infinite

5. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ **Check for Open in Power circuit**

1. IG KEY OFF.
2. Disconnect APS harness connector.
3. IG KEY ON.
4. Measure voltage between APS1 power terminal of APS harness connector and chassis ground.

Specification : Approx. 5V

5. Is voltage within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Signal Circuit Inspection

■ **Check for Short to Ground in Signal Circuit**

1. IG KEY OFF.
2. Disconnect APS harness connector.
3. IG KEY ON.
4. Measure resistance between APS1 signal terminal of APS harness connector and chassis ground.

Specification : Infinite

5. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ **Check for Open in Signal circuit**

1. IG KEY OFF.
2. Disconnect APS harness connector and ECM harness connector.
3. Measure resistance between both ends of APS1 signal line.

Specification : Below 1Ω.

4. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Accelerator Pedal Rod Inspection
   (1) Verify that the accelerator pedal operate freely without binding between full closed and wide open position by operating the accelerator pedal.
   (2) Check for poor carpet fit under the accelerator controls pedal.
   (3) Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure. If OK, go to next step as below.
2. APS1 Inspection
   (1) IG KEY 'ON'.
   (2) Connect GDS and monitor the "APS1" parameter on the data list.
   Specification : Refer to "Signal Waveform & Data" in the "General Information".

Test Condition	APS1
Release a pedal fully	Approx. 0.58~0.93V
Depress a pedal fully	Approx. 3.85~4.35V

   (3) Is data in accordance with "Data Anaysis"?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Substitute with a known-good component and check for proper operation. If the problem is corrected, replace component and then go to "Verification of Vehicle Repair" procedure.

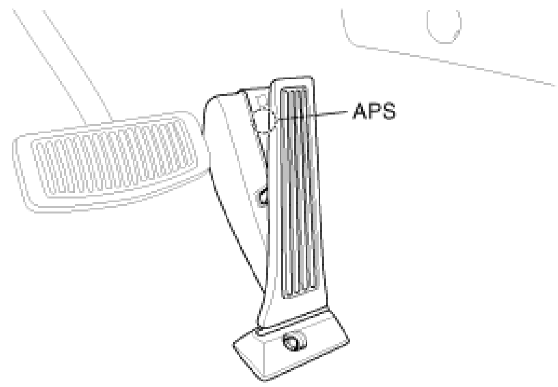
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Electronic Throttle Control(ETC) system is made of the components throttle body, Throttle Position Sensor(TPS) 1&2 and Accelerator Position Sensor(APS)1&2.The APS is mounted in the accelerator pedal to detect the opening angle of the accelerator pedal. It has 2 sensors to detect the accelerator position and a malfunction of the accelerator position sensor. The ECM judges the current opening angle of the accelerator pedal from APS1&2, and the ECM controls the throttle motor based on these signals.

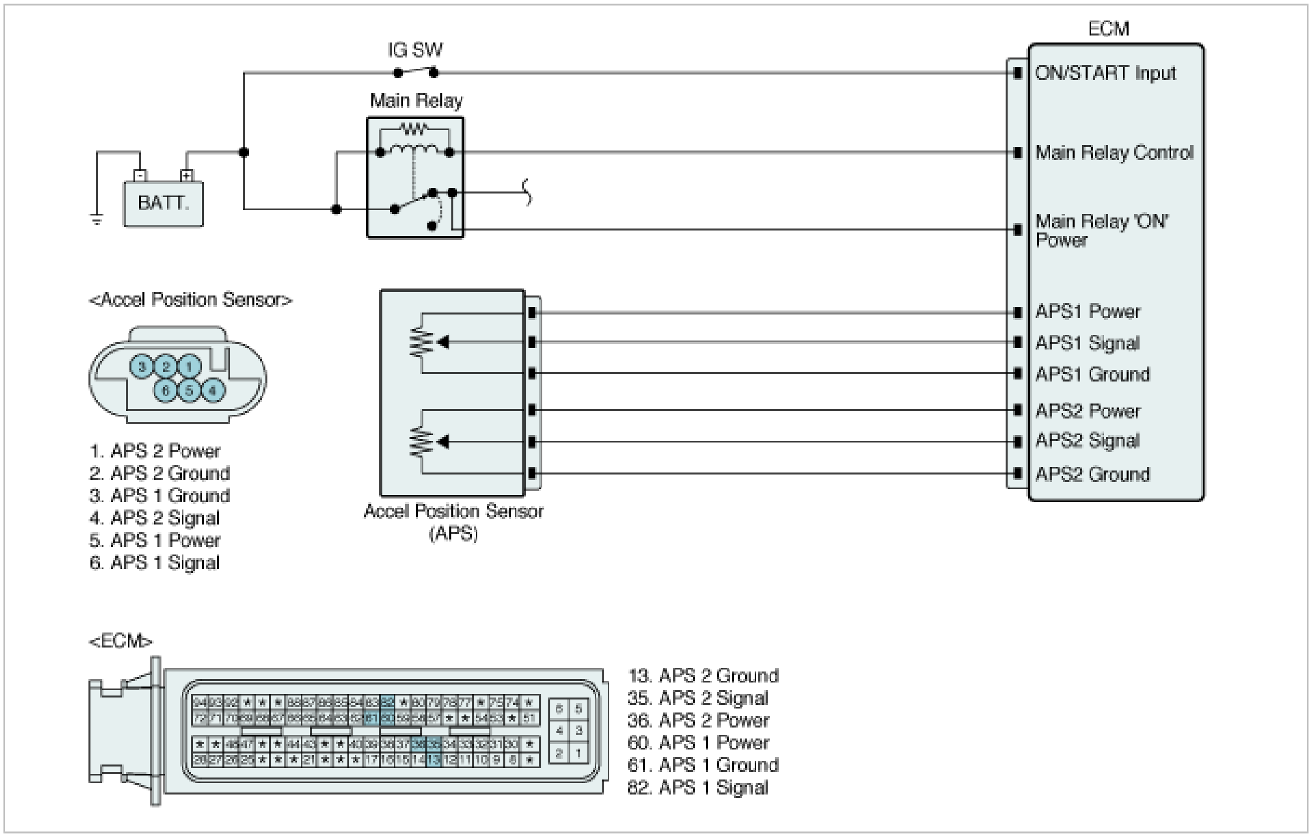
DTC Description

ECM sets DTC P2123 if the ECM detects output voltage higher than the possible range of a properly operating APS1.

DTC Detecting Condition

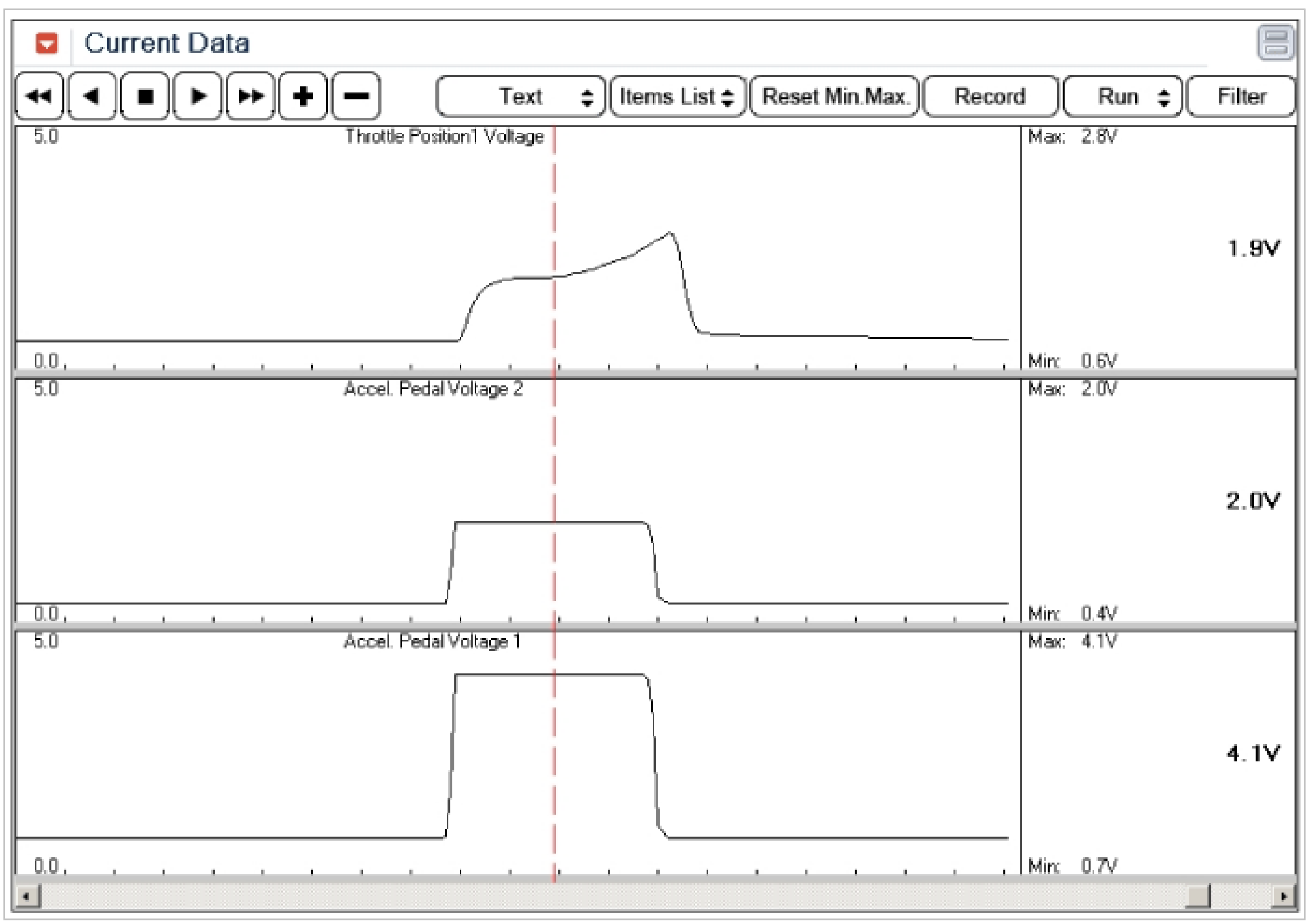
Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Open or Short to ground in power circuit • Open or short to ground in signal circuit • Poor connection or damaged harness • Faulty APS1
Enable Conditions	• No error for power supply circuit in APS1	
Threshold Value	• APS1 > 4.7V	
Diagnostic Time	• 0.3 sec.	
MIL On Condition	• 1 Driving Cycle	
Fail Safe	• Forced limited power mode : The ECM limits opening angle of the throttle valve to max. 50% and engine torque to a certain pre-determined value. • After idle recognition, the ECM uses APS2 signal to calculate the current opening angle of the throttle valve.	

Diagnostic Circuit Diagram



Signal Waveform & Data

1. IG key ON.
2. Check sensor data as below.

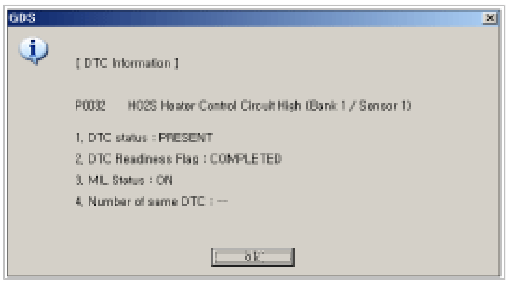


3. Data Analysis

Condition		GDS Sensor Data	
		APS 1	APS 2
IG Key "ON & Engine "OFF"	Output voltages of APS1 and APS2 are in propotion to accelerating. APS2 output voltage is half of APS1 output voltage.		
	Release a pedal fully	0.58~0.93V	0.29~0.38
	Depress a pedal fully	3.85~4.35V	1.93~2.18V

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Signal Circuit Inspection

■ **Check for Shrot to Power in Signal circuit**

1. IG KEY OFF.

2. Disconnect APS harness connector.
3. IG KEY ON.
4. Measure voltage between APS1 signal terminal of APS harness connector and chassis ground.

Specification : Approx. 0V

5. Is voltage within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Ground Circuit Inspection

■ **Check for Open in Ground circuit**

1. IG KEY OFF.
2. Disconnect APS harness connector and ECM harness connector.
3. Measure resistance between both ends of APS1 ground line.

Specification : Below 1Ω

4. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Accelerator Pedal Rod Inspection
   (1) Verify that the accelerator pedal operate freely without binding between full closed and wide open position by operating the accelerator pedal.
   (2) Check for poor carpet fit under the accelerator controls pedal.
   (3) Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure. If OK, go to next step as below.

2. APS1 Inspection
   (1) IG KEY 'ON'.
   (2) Connect GDS and monitor the "APS1" parameter on the data list.
   Specification : Refer to "Signal Waveform & Data" in the "General Information".

Test Condition	APS1
Release a pedal fully	Approx. 0.58~0.93V
Depress a pedal fully	Approx. 3.85~4.35V

   (3) Is data in accordance with "Data Anaysis"?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Substitute with a known-good component and check for proper operation. If the problem is corrected, replace component and then go to "Verification of Vehicle Repair" procedure.

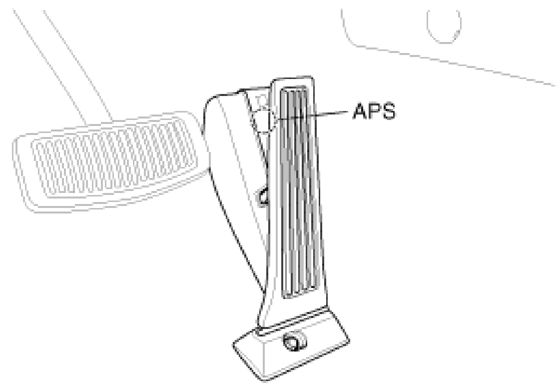
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Electronic Throttle Control(ETC) system is made of the components throttle body, Throttle Position Sensor(TPS) 1&2 and Accelerator Position Sensor(APS)1&2.The APS is mounted in the accelerator pedal to detect the opening angle of the accelerator pedal. It has 2 sensors to detect the accelerator position and a malfunction of the accelerator position sensor. The ECM judges the current opening angle of the accelerator pedal from APS1&2, and the ECM controls the throttle motor based on these signals.

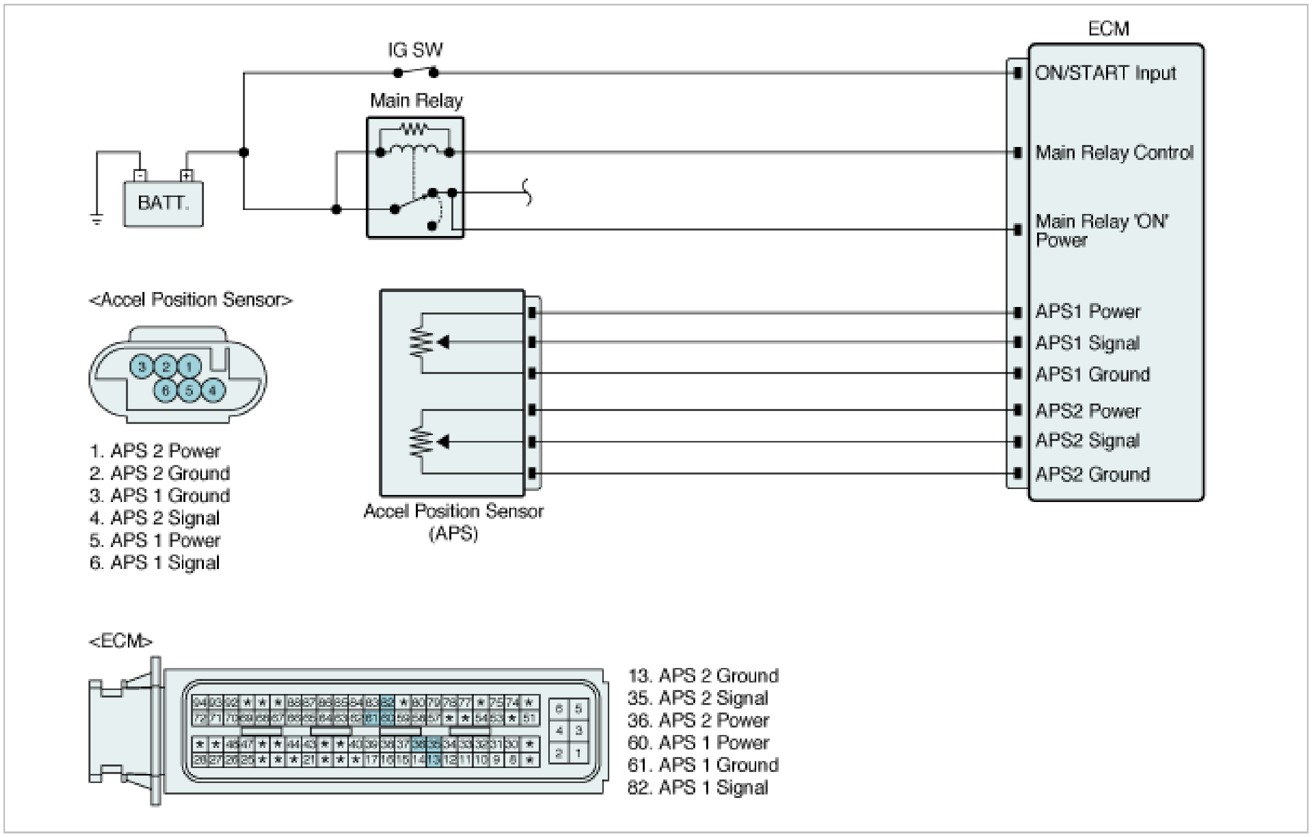
DTC Description

ECM sets DTC P2127 if the ECM detects output voltage lower than the possible range of a properly operating APS2.

DTC Detecting Condition

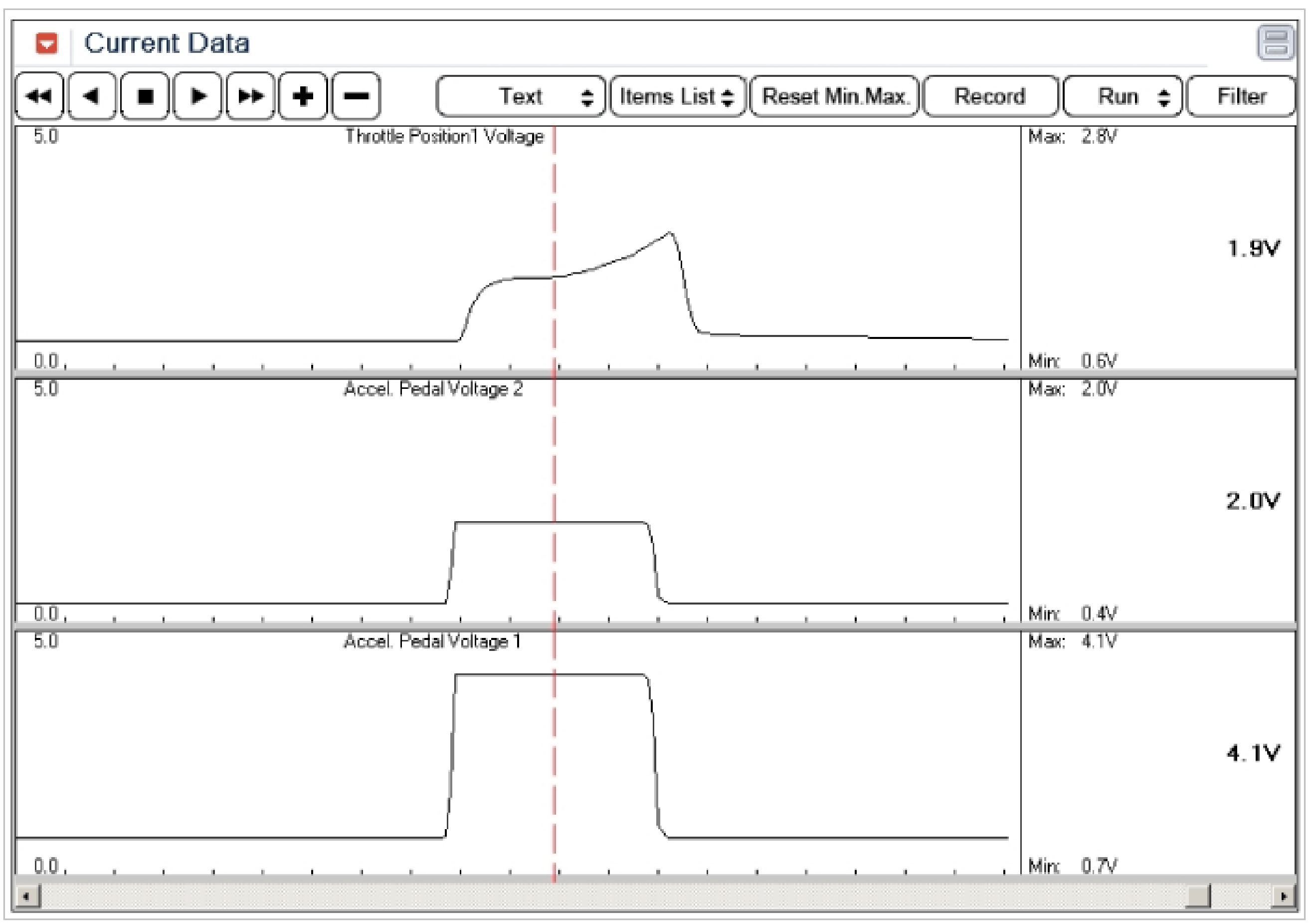
Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Open or Short to ground in power circuit • Open or short to ground in signal circuit • Poor connection or damaged harness • Faulty APS2
Enable Conditions	• No error for power supply circuit in APS2 • APS1 > 1V	
Threshold Value	• APS1 < 0.13V	
Diagnostic Time	• 0.3 sec.	
MIL On Condition	• 1 Driving Cycle	
Fail Safe	• Forced limited power mode : The ECM limits opening angle of the throttle valve to max. 50% and engine torque to a certain pre-determined value. • After idle recognition, the ECM uses APS1 signal to calculate the current opening angle of the throttle valve.	

Diagnostic Circuit Diagram



Signal Waveform & Data

1. IG key ON.
2. Check sensor data as below.

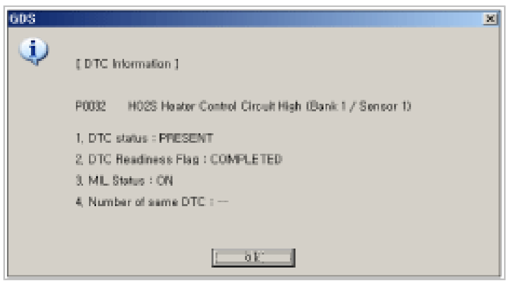


3. Data Analysis

Condition		GDS Sensor Data	
		APS 1	**APS 2**
IG Key "ON & Engine "OFF"	Output voltages of APS1 and APS2 are in propotion to accelerating. APS2 output voltage is half of APS1 output voltage.		
	Release a pedal fully	0.58~0.93V	0.29~0.38
	Depress a pedal fully	3.85~4.35V	1.93~2.18V

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Power Circuit Inspection

■ **Check for Short to Ground in Power Circuit**

1. IG KEY OFF.

2. Disconnect APS harness connector.
3. IG KEY ON.
4. Measure resistance between APS2 power terminal of APS harness connector and chassis ground.

Specification : Infinite

5. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ Check for Open in Power circuit

1. IG KEY OFF.
2. Disconnect APS harness connector.
3. IG KEY ON.
4. Measure voltage between APS2 power terminal of APS harness connector and chassis ground.

Specification : Approx. 5V

5. Is voltage within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Signal Circuit Inspection

■ Check for Short to Ground in Signal Circuit

1. IG KEY OFF.
2. Disconnect APS harness connector.
3. IG KEY ON.
4. Measure resistance between APS2 signal terminal of APS harness connector and chassis ground.

Specification : Infinite

5. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

■ Check for Open in Signal circuit

1. IG KEY OFF.
2. Disconnect APS harness connector and ECM harness connector.
3. Measure resistance between both ends of APS2 signal line.

Specification : Below 1Ω.

4. Is resistance within specification?

YES	▸ Go to next procedure.
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Accelerator Pedal Rod Inspection
   (1) Verify that the accelerator pedal operate freely without binding between full closed and wide open position by operating the accelerator pedal.

   (2) Check for poor carpet fit under the accelerator controls pedal.

   (3) Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure. If OK, go to next step as below.

2. APS1 Inspection
   (1) IG KEY 'ON'.

   (2) Connect GDS and monitor the "APS2" parameter on the data list.
   Specification : Refer to "Signal Waveform & Data" in the "General Information".

Test Condition	APS2
Release a pedal fully	Approx. 0.29~0.38
Depress a pedal fully	Approx. 1.93~2.18V

   (3) Is data in accordance with "Data Anaysis"?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Substitute with a known-good component and check for proper operation. If the problem is corrected, replace component and then go to "Verification of Vehicle Repair" procedure.

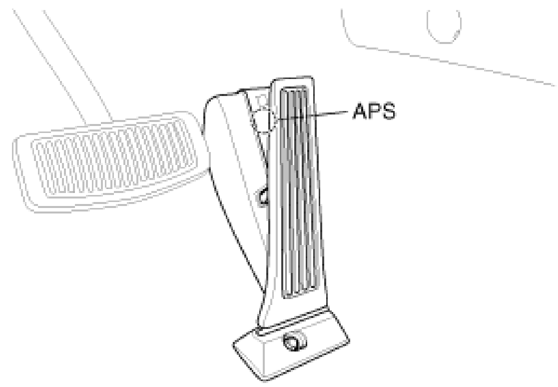
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

The Electronic Throttle Control(ETC) system is made of the components throttle body, Throttle Position Sensor(TPS) 1&2 and Accelerator Position Sensor(APS)1&2.The APS is mounted in the accelerator pedal to detect the opening angle of the accelerator pedal. It has 2 sensors to detect the accelerator position and a malfunction of the accelerator position sensor. The ECM judges the current opening angle of the accelerator pedal from APS1&2, and the ECM controls the throttle motor based on these signals.

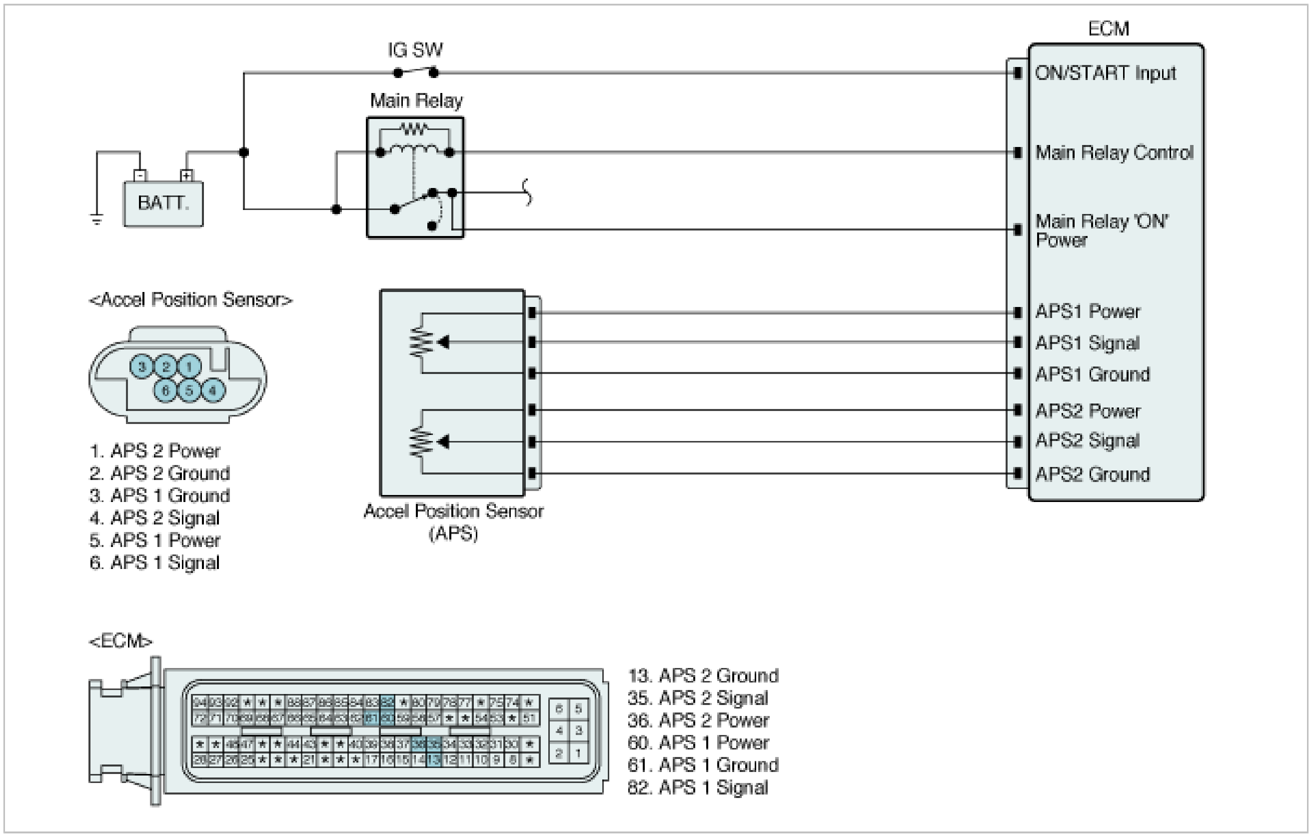
DTC Description

ECM sets DTC P2128 if the ECM detects output voltage higher than the possible range of a properly operating APS2.

DTC Detecting Condition

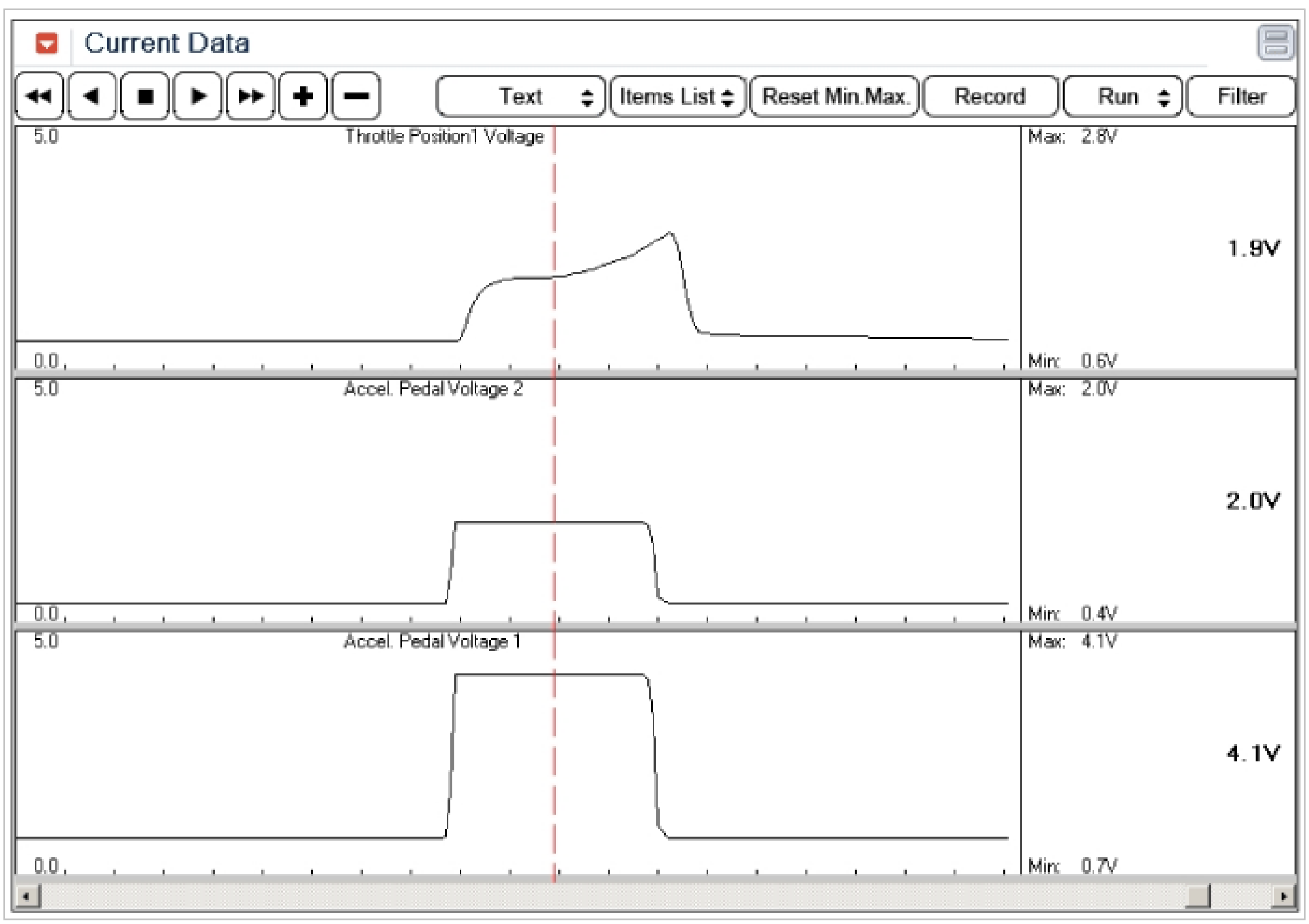
Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• Open in ground circuit • Short to battery in signal circuit • Poor connection or damaged harness • Faulty APS2
Enable Conditions	• No error for power supply circuit in APS2	
Threshold Value	• APS2 > 2.5V	
Diagnostic Time	• 0.3 sec.	
MIL On Condition	• 1 Driving Cycle	
Fail Safe	• Forced limited power mode : The ECM limits opening angle of the throttle valve to max. 50% and engine torque to a certain pre-determined value. • After idle recognition, the ECM uses APS2 signal to calculate the current opening angle of the throttle valve.	

Diagnostic Circuit Diagram



Signal Waveform & Data

1. IG key ON.
2. Check sensor data as below.

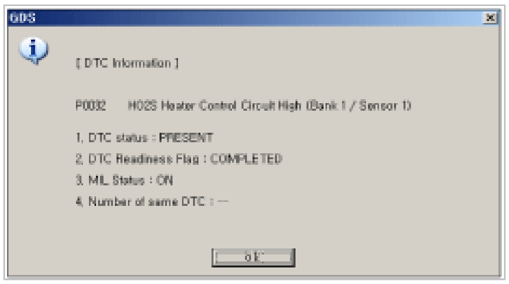


3. Data Analysis

Condition		GDS Sensor Data	
		APS 1	**APS 2**
IG Key "ON & Engine "OFF"	Output voltages of APS1 and APS2 are in propotion to accelerating. APS2 output voltage is half of APS1 output voltage.		
	Release a pedal fully	0.58~0.93V	0.29~0.38
	Depress a pedal fully	3.85~4.35V	1.93~2.18V

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Signal Circuit Inspection

■ **Check for Shrot to Power in Signal circuit**

1. IG KEY OFF.

2. Disconnect APS harness connector.
3. IG KEY ON.
4. Measure voltage between APS2 signal terminal of APS harness connector and chassis ground.

Specification : Approx. 0V

5. Is voltage within specification?

YES	▶ Go to next procedure.
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Ground Circuit Inspection

■ **Check for Open in Ground circuit**

1. IG KEY OFF.
2. Disconnect APS harness connector and ECM harness connector.
3. Measure resistance between both ends of APS2 ground line.

Specification : Below 1Ω

4. Is resistance within specification?

YES	▶ Go to next procedure.
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Accelerator Pedal Rod Inspection
   (1) Verify that the accelerator pedal operate freely without binding between full closed and wide open position by operating the accelerator pedal.
   (2) Check for poor carpet fit under the accelerator controls pedal.
   (3) Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure. If OK, go to next step as below.
2. APS1 Inspection
   (1) IG KEY 'ON'.
   (2) CConnect GDS and monitor the "APS2" parameter on the data list.
   Specification : Refer to "Signal Waveform & Data" in the "General Information".

Test Condition	APS2
Release a pedal fully	Approx. 0.29~0.38
Depress a pedal fully	Approx. 1.93~2.18V

   (3) Is data in accordance with "Data Anaysis"?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ Substitute with a known-good component and check for proper operation. If the problem is corrected, replace component and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P2138 Throttle/Pedal Position Sensor/Switch D/E Voltage Correlation

Component Location

General Description

The Electronic Throttle Control(ETC) system is made of the components throttle body, Throttle Position Sensor(TPS) 1&2 and Accelerator Position Sensor(APS)1&2.The APS is mounted in the accelerator pedal to detect the opening angle of the accelerator pedal. It has 2 sensors to detect the accelerator position and a malfunction of the accelerator position sensor. The ECM judges the current opening angle of the accelerator pedal from APS1&2, and the ECM controls the throttle motor based on these signals.

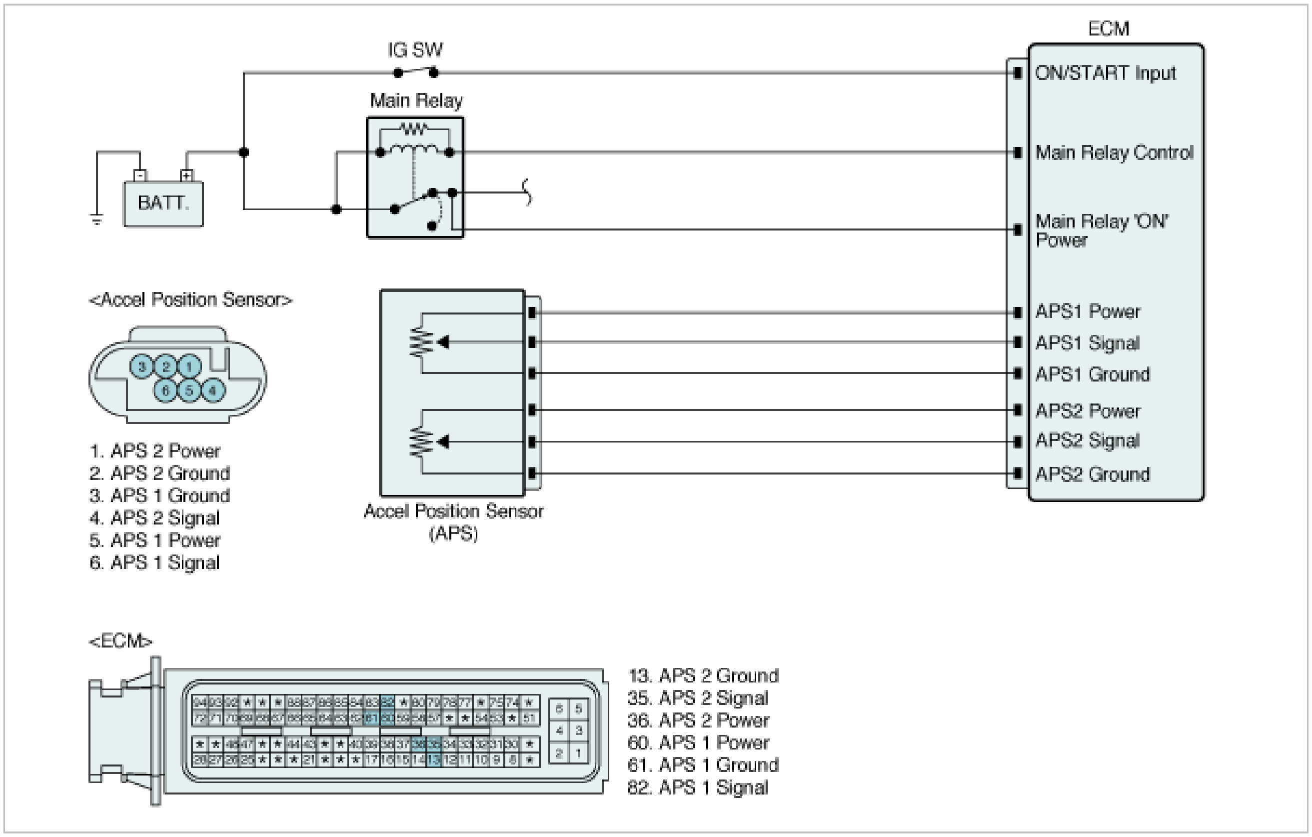
DTC Description

ECM sets DTC P2138 if the ECM detects output voltage of the APS1 is not proportion to APS2.

DTC Detecting Condition

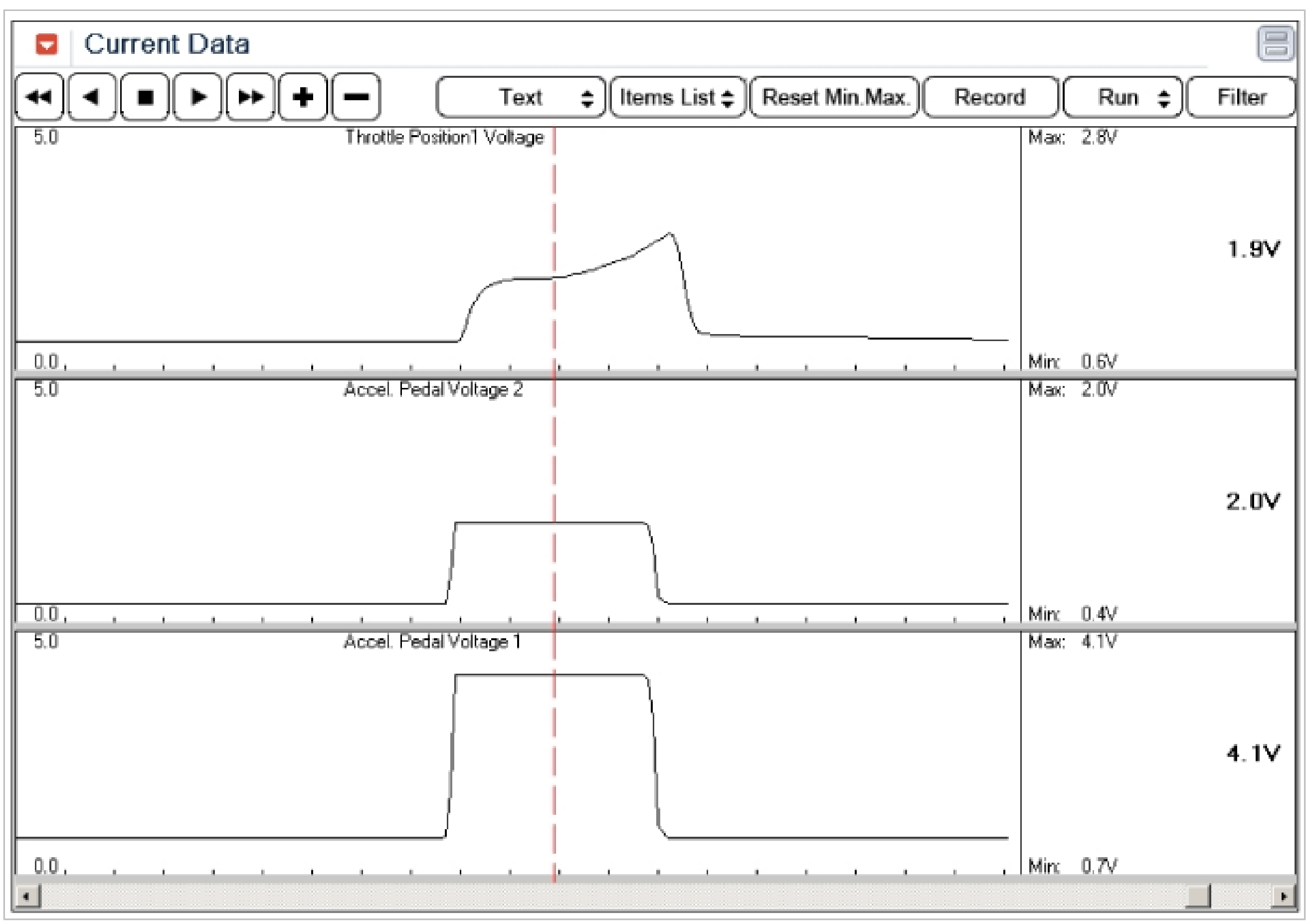
Item		Detecting Condition	Possible Cause
DTC Strategy		• Plausibility check	• Poor connection or damaged harness • APS1 • APS2
Enable Conditions	Case1	• No relevant failure	
	Case2	• No relevant failure • APS1 >1.0V or APS2 >0.55V	
Threshold Value	Case1	• One channel of APS is moving and other channel is not reaching threshold	
	Case2	• Ratio error between APS1 & APS2	
Diagnostic Time	Case1	• 0.10sec.	
	Case2	• 0.35sec.	
Mil On Condition		• Immediate	
Fail Safe		• Forced limited power mode : The ECM limits opening angle of the throttle valve to max. 50% and engine torque to a certain pre-determined value. • The ECM selects the current opening angle of the throttle valve from minimum value of APS1 and APS2.	

Diagnostic Circuit Diagram



Signal Waveform & Data

1. IG key ON.
2. Check sensor data as below.

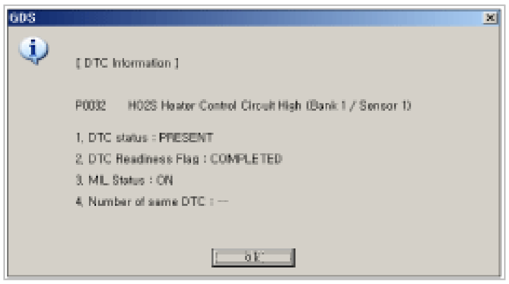


3. Data Analysis

Condition		GDS Sensor Data	
		APS 1	APS 2
IG Key "ON & Engine "OFF"	Output voltages of APS1 and APS2 are in propotion to accelerating. APS2 output voltage is half of APS1 output voltage.		
	Release a pedal fully	0.58~0.93V	0.29~0.38
	Depress a pedal fully	3.85~4.35V	1.93~2.18V

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Terminal and connection inspection

1. 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.
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	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Component Inspection

1. Accelerator Pedal Rod Inspection
   (1) Verify that the accelerator pedal operate freely without binding between full closed and wide open position by operating

the accelerator pedal.

(2) Check for poor carpet fit under the accelerator controls pedal.

(3) Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure. If OK, go to next step as below.

2. APS1 Inspection

(1) IG KEY 'ON'.

(2) Connect GDS and monitor the "APS1" & "APS2" parameter on the data list.

Specification : Refer to "Signal Waveform & Data" in the "General Information".

Test Condition	APS1	APS2
Release a pedal fully	Approx. 0.58~0.93V	Approx. 0.29~0.38
Depress a pedal fully	Approx. 0.58~0.93V	Approx. 1.93~2.18V

(3) Is data in accordance with "Data Anaysis"?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Substitute with a known-good component and check for proper operation. If the problem is corrected, replace component and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

General Description

The Wheel Speed Sensor (WSS) generates a waveform with a frequency proportional to the speed of the vehicle. The signal generated by the WSS informs the ABS/ESP Module not only if the vehicle speed is low or high but also if the vehicle is or is not moving. Then, ABS/ESP Module informs ECM of these information. The ECM uses these information to control the fuel injection, ignition timing, transaxle shift scheduling and torque converter clutch scheduling. The WSS signal is also used to detect rough road conditions.

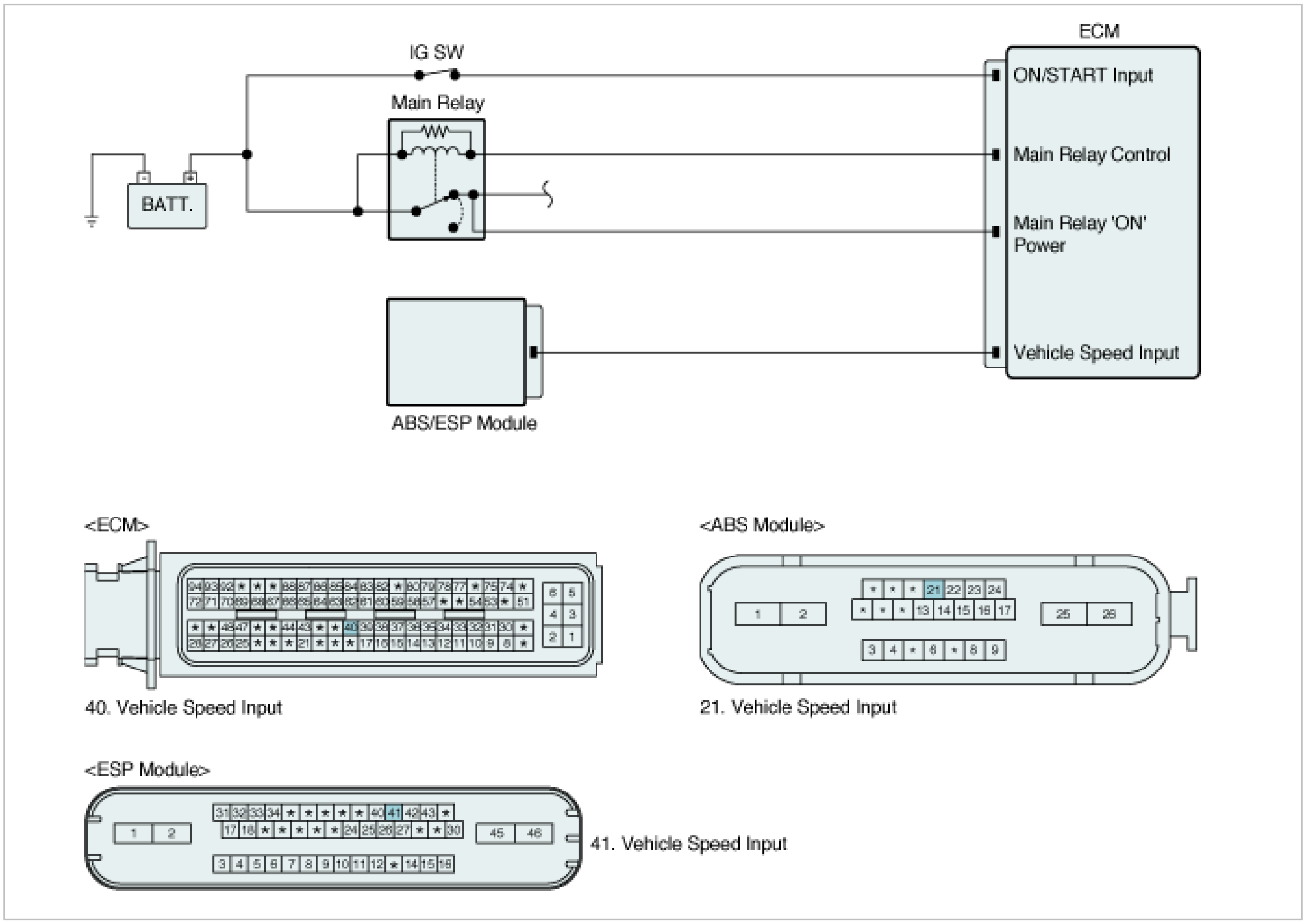
DTC Description

The ECM evaluates engine speed and mass air flow if there is no vehicle speed signal. This evaluation of both values will detect open circuit or short circuit errors on the wheel speed sensor. The ECM sets DTC P2159 if there is no vehicle speed signal from wheel speed sensor while both engine speed and mass air flow are higher than predetermined threshold during the predetermined time

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Plausibility Check	• Open or short in harness • Poor connection or damaged harness • VSS
Enable Conditions	• Engine speed > 2100rpm • Air mass flow > 0.44g/rev. • No fuel injection shut off • Coolant Temp. > 60°C(140°F)	
Threshold Value	• VSS = 0 with high engine speed and load	
Diagnostic Time	• 60sec.	
MIL On Condition	• 2 Driving Cycles	

Diagnostic Circuit Diagram



Monitor DTC Status

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

> **NOTE**
>
> - History (Not Present) 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 the ECM's connector, which was repaired but 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 "Monitor GDS Data" procedure

Monitor GDS Data

1. With vehicle raised on a lift , start the engine and place transaxle in Drive. Let vehicle idle and verify speedometer indicates approx. 10km/h or more(6mph or more) on the instrument cluster.
2. Connect GDS and select ABS/ESP system.
3. Monitor the "WHEEL SPD SENSOR-FR" parameter on the current data list.

Specification : 10km/h or more(6mph or more)

4. Is value within the specification?

YES	▶ Wheel speed sensor is OK. Go to Go to "Signal Circuit Inspection[With ABS]" procedure
NO	▶ Check for open or short circuit between wheel speed sensor(FR) and ABS/ESP control module If problems are found, repair as necessary and go to "Verification of Vehicle Repair" procedure If OK, Check wheel speed sensor(FR) as follow: - Gap between wheel speed sensor and trigger wheel (Air gap : 0.3~1.1 mm(0.011 ~ 0.043 in)) - Trigger wheel condition - Sensor resistance : Approx. 1,300~1,500Ω at 20°C(68°F)Replace wheel speed sensor as necessary and go to "Verification of Vehicle Repair" procedure.

Signal Circuit Inspection

■ **With ABS System**

1. Check for short to ground in signal circuit
   (1) Ignition "OFF"
   (2) Disconnect ECM and ABS Control Module connectors
   (3) Measure resistance between Vehicle speed input terminal of ECM harness connector and chassis ground.

   Specification : Infinite

   (4) Is resistance within the specification?

YES	▶ Go to next step as below
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

2. Check for short to battery in signal circuit
   (1) Ignition "ON" & Engine"OFF"
   (2) Measure voltage between Vehicle speed input terminal of ECM harness connector and chassis ground

   Specification : Approx. 0V

   (3) Is voltage within the specification?

YES	▶ Go to next step as below
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

3. Check for open in signal circuit
   (1) Ignition "OFF"
   (2) Measure resistance between Vehicle speed input terminal of ECM harness connector and Vehicle speed output terminal of ABS/ESP Control Module harness connector.

   Specification : Approx. 0Ω

   (3) Is resistance within the specification?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO	

■ **Without ABS system**

1. Check for short to ground in Signal circuit
   (1) Ignition "OFF"
   (2) Disconnect ECM and wheel speed sensor(front right) harness connector.
   (3) Measure resistance between signal '+' terminal of ECM harness connector and chassis ground.
   (4) Measure resistance between signal '-' terminal of ECM harness connector and chassis ground.

   Specification : Infinite

   (5) Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

2. Check for short to battery in signal circuit
   (1) Ignition "ON" & Engine"OFF"
   (2) Measure voltage between signal '+' terminal of ECM harness connector and chassis ground.
   (3) Measure voltage between signal '-' terminal of ECM harness connector and chassis ground.

   Specification : Approx. 0V

   (4) Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

3. Check for open in signal circuit
   (1) Ignition "OFF"
   (2) Measure resistance between signal '+' terminal of WSS harness connector and signal '+' terminal of ECM harness connector.
   (3) Measure resistance between signal '-' terminal of WSS harness connector and signal '-' terminal of ECM harness connector.

   Specification : Approx. 0Ω

   (4) Is resistance within the specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. 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

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

General Description

In order to provide the best possible combination of drivability, fuel economy and emission control, the ECM uses a closed loop air/fuel metering system. The ECM monitors the HO2S signal voltage and adjusts fuel delivery based it in closed loop fuel control. Changes in fuel delivery will be indicated by the long-term and the short-term fuel trim values. The ideal fuel trim value is around 0%. The ECM will add fuel when the HO2S signal is indicating a lean condition. Additional fuel is indicated by fuel trim values that are above 0%. The ECM will reduce fuel when the HO2S signal is indicating a rich condition. Reduction in fuel is indicated by fuel trim values that are below 0%. The DTC relevant to fuel trim will be set when the amount reaches excessive levels because of a lean or rich condition.

DTC Description

If the lambda controller reaches the maximum or minimum threshold, then feedback control is no longer possible and emissions will be increased. The ECM sets DTC P2187 if no proportional post catalyst fuel trim adaptation occurs for a defined time after the lambda controller has reached its maximum threshold at idle.

DTC Detecting Condition

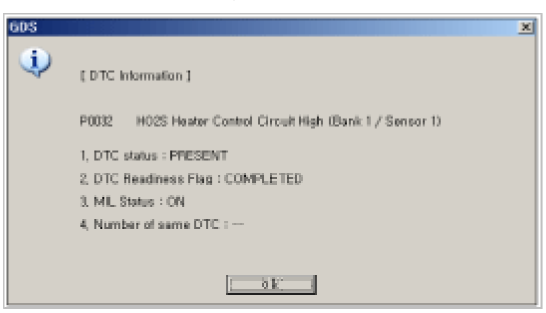
Item	Detecting Condition	Possible Cause
DTC Strategy	• Monitoring deviation of long term fuel trim control in Idle	• Air leakage in intake,exhaust or EVAP system • Faulty PCV system • Faulty sensor signals • Fuel system
Enable Conditions	• No relevant failure • Lambda adaptation active • Coolant Temp. > 73°C(163°F)	
Threshold Value	• Idle long term fuel trim > +0.008 g/rev(+4mg/stk)	
Diagnostic Time	• 90 sec.	
MIL On Condition	• 2 Driving Cycles	

Monitor DTC Status

NOTE

If any codes relating to injectors, HO2S, ECT(Engine Coolant Temperature)Sensor, Throttle Position sensor, Injectors or Mass Air Flow Sensor are stored, do ALL REPAIRS associated with those codes before proceeding with this troubleshooting tree.

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Monitor Actuation Test

NOTE

The main purpose of this test is to identify potential engine mechanical condition problems and fuel and ignition systems problems that are not common to all cylinders. For best results, perform this test while maintaining as steady an rpm reading as possible.

CAUTION

Before beginning tests; set the parking brake, place gear selector in P or N and block drive wheels for safety.

1. Warm up the engine to normal operating temperature and let it idle.
2. Install GDS and select "INJECTOR #1" parameter on the Actuation Test mode shown in the figure.
3. Monitor engine rpm and shut off the injector #1 by pressing "STRT(F1)" key
4. Repeat procedure on all injectors and record the engine rpm.

Specification : All cylinders should show an even RPM drop.

5. Was each cylinder's rpm drop within the same value?

YES	▸ Go to next step as below
NO	▸ Cylinders with the least amount of RPM drop are not contributing their share of power. Go to "Fuel System Inspection" procedure. NOTE If the RPM loss between cylinders is quite large(200RPM or more) and engine has high mileage, there is possibility of engine wear. Perform compression test with pressure gauge to check the engine wear

Check intake/exhaust system for leakage

1. Visually/physically inspect the air leakage in intake/exhaust system for the following areas:
   - 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. Was a problem found in any of the above areas?

YES	▶ Replace or repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Go to next step as below

3. Inspect the leakage in EVAP. system for the following conditions:
   (1) Remove the manifold side vacuum hose from the EVAP canister purge valve.
   (2) Using a hand vacuum pump apply specified vacuum(Approx. 15 in, Hg) to the manifold side of the valve
   (3) Does the valve hold vacuum?

YES	▶ Go to next step as below
NO	▶ Repair air leakage and go to "Verification of Vehicle Repair" procedure

Sensor Inspection

NOTE

Refer to "Signal Waveform & Data" in the "General Information" procedure

1. Visually/physically inspect the front HO2S for the following conditions:
   - Ensure that the HO2S is securely installed.
   - Silicon contamination. This contamination will be indicated by a white powdery coating on the portion of the sensor exposed to the exhaust stream and this will result in a but false(high) voltage signal
   - Fuel, engine coolant or oil contamination
   - Use of improper sealant
   - If contamination is evident on the HO2S, Fix the source of the sensor contamination before replacing the sensor to prevent future contamination. Go to "Verification of Vehicle Repair" procedure.
2. Visually/physically inspect the MAFS for the following conditions:
   - Contamination or deterioration
   - Poor connection or damaged harness
3. Check for an intermittent TPS1 false signal. TPS1 signal displayed on a scantool should increase steadily when depressing accelerator pedal after starting.
4. Verify that the ECM ground connections are clean and properly tightened.
5. If test result is NG, repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.
   If OK, go to next step as below.

NOTE

If the contamination is evident on the HO2S or MAFS. Fix the source of the sensor contamination before replacing the sensor to prevent future contamination.

Positive Crankcase Ventilation System Inspection

1. Check the engine oil level. The oil level should be between the min. and max. marking. Fill to the correct oil level.
2. Check crankcase ventilation valve for improper installation, damaged o-rings and malfunctioning .
3. Warm up the engine to normal operating temperature.
4. Connect Scantool and note the "SHORT TERM FUEL-B1" parameter on the Scantool data list.
5. Disconnect and plug the positive crankcase ventilation at the intake manifold side.
6. Monitor the "SHORT TERM FUEL-B1" parameter on the Scantool data list once again.

Specification : The value should remain more or less unchanged

7. Is the displayed value within the specified value?

YES	▶ Go to next step as below
NO	▶ Check the PCV(Positive Crankcase Ventilation) valve for operation properly. Refer to "EM" group in Workshop Manual. If OK, check that engine oil is diluted with fuel. Change the oil or filter as necessary and go to "Verification of Vehicle Repair" procedure.

Fuel System Inspection

1. Fuel Line Pressure Inspection
   (1) Check the fuel for excessive water, alcohol, or other contaminants. Replace contaminated fuel as necessary.
   (2) Install a fuel pressure gage
   (3) Inspect fuel pressure with normal idle status

   Specification : 338~348kPa(3.45~3.55kg/cm²)

   (4) Is fuel pressure within the specified value?

YES	▶ Go to next step as below
NO	▶ Inspect the suspected area. Refer to table as below. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

Condition	Possible 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	Fuel Pump(Fuel Pressure Regulator)
Fuel Pressure too High	Sticking fuel pressure regulator	Fuel Pump(Fuel Pressure Regulator)

2. Fuel Pressure Hold Inspection
   (1) Stop the engine and check for a change in the fuel pressure gauge reading.

   Specification : After engine stops, the gauge reading should hold for minimum 5 minutes

   (2) Is fuel pressure within the specified value?

YES	▶ Visually/physically inspect the engine mechanical problem. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ Inspect the leakage or malfunctioning of suspected area. Refer to table as below. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

Condition	Possible Cause	Suspected Area
Fuel pressure drops slowly	Injector leak	Injector
Fuel pressure drops immediately	Stuck open in check valve of the fuel pump	Fuel Pump

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P2188 System too Rich at Idle (Bank 1)

General Description

In order to provide the best possible combination of drivability, fuel economy and emission control, the ECM uses a closed loop air/fuel metering system. The ECM monitors the HO2S signal voltage and adjusts fuel delivery based it in closed loop fuel control. Changes in fuel delivery will be indicated by the long-term and the short-term fuel trim values. The ideal fuel trim value is around 0%. The ECM will add fuel when the HO2S signal is indicating a lean condition. Additional fuel is indicated by fuel trim values that are above 0%. The ECM will reduce fuel when the HO2S signal is indicating a rich condition. Reduction in fuel is indicated by fuel trim values that are below 0%. The DTC relevant to fuel trim will be set when the amount reaches excessive levels because of a lean or rich condition.

DTC Description

If the lambda controller reaches the maximum or minimum threshold, then feedback control is no longer possible and emissions will be increased. The ECM sets DTC P2188 if no proportional post catalyst fuel trim adaptation occurs for a defined time after the lambda controller has reached its minimum threshold at idle.

DTC Detecting Condition

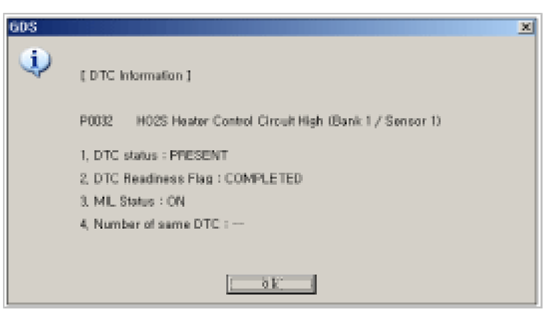
Item	Detecting Condition	Possible Cause
DTC Strategy	• Monitoring deviation of long term fuel trim control in Idle	• Air restriction in intake or exhaust system • Front HO2S or MAFS contamination • Faulty sensor signals • EVAP system • Fuel system
Enable Conditions	• No relevant failure • Lambda adaptation active • Coolant Temp. > 73°C(163°F) • Low estimated fuel dilution in oil	
Threshold Value	• Idle long term fuel trim < -0.005 g/rev(-2.5mg/stk)	
Diagnostic Time	• 90 sec.	
MIL On Condition	• 2 Driving Cycles	

Monitor DTC Status

NOTE

If any codes relating to injectors, HO2S, ECT(Engine Coolant Temperature)Sensor, Throttle Position sensor, Injectors or Mass Air Flow Sensor are stored, do ALL REPAIRS associated with those codes before proceeding with this troubleshooting tree.

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Monitor Actuation Test

> NOTE
>
> The main purpose of this test is to identify potential engine mechanical condition problems and fuel and ignition systems problems that are not common to all cylinders. For best results, perform this test while maintaining as steady an rpm reading as possible.

> CAUTION
>
> Before beginning tests; set the parking brake, place gear selector in P or N and block drive wheels for safety.

1. Warm up the engine to normal operating temperature and let it idle.
2. Install Scan Tool and select "INJECTOR #1" parameter on the Actuation Test mode shown in the figure.
3. Monitor engine rpm and shut off the injector #1 by pressing "STRT(F1)" key
4. Repeat procedure on all injectors and record the engine rpm.

Specification : All cylinders should show an even RPM drop.

5. Was each cylinder's rpm drop within the same value?

YES	▶ Go to next step as below
NO	▶ Cylinders with the least amount of RPM drop are not contributing their share of power. Go to "Fuel System Inspection" procedure. NOTE If the RPM loss between cylinders is quite large(200RPM or more) and engine has high mileage, there is possibility of engine wear. Perform compression test with pressure gauge to check the engine wear

Check intake/exhaust system for restriction

1. Visually/physically inspect the restriction in intake/exhaust system for the following areas:
   - Air cleaner filter element for excessive dirt or for any foreign objects
   - Throttle body inlet for damage or for any foreign objects
   - Throttle bore and throttle plate for chocking and for any foreign objects
   - Restricted exhaust system
2. Inspect the leakage in EVAP. system for the following conditions:
   - Check the EVAP canister for fuel saturation. If the EVAP canister is full of fuel, visually and physically inspect the

EVAP and fuel system.

3. Was a problem found in any of the above areas?

YES	▸ Replace or repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

Sensor Inspection

NOTE

Refer to "Signal Waveform & Data" in the "General Information" procedure

1. Visually/physically inspect the front HO2S for the following conditions:
   - Ensure that the HO2S is securely installed.
   - Silicon contamination. This contamination will be indicated by a white powdery coating on the portion of the sensor exposed to the exhaust stream and this will result in a but false(high) voltage signal
   - Fuel, engine coolant or oil contamination
   - Use of improper sealant
   - If contamination is evident on the HO2S, Fix the source of the sensor contamination before replacing the sensor to prevent future contamination. Go to "Verification of Vehicle Repair" procedure.
2. Visually/physically inspect the MAFS for the following conditions:
   - Contamination or deterioration
   - Poor connection or damaged harness
3. Check for an intermittent TPS1 false signal. TPS1 signal displayed on a scantool should increase steadily when depressing accelerator pedal after starting.
4. Verify that the ECM ground connections are clean and properly tightened.
5. If test result is NG, repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.
   If OK, go to next step as below.

   NOTE

   If the contamination is evident on the HO2S or MAFS. Fix the source of the sensor contamination before replacing the sensor to prevent future contamination.

Positive Crankcase Ventilation System Inspection

1. Check the engine oil level. The oil level should be between the min. and max. marking. Fill to the correct oil level.
2. Check crankcase ventilation valve for improper installation, damaged o-rings and malfunctioning .
3. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure. If OK, go to next step.

Fuel System Inspection

1. Fuel Line Pressure Inspection
   (1) Check the fuel for excessive water, alcohol, or other contaminants. Replace contaminated fuel as necessary.

   (2) Install a fuel pressure gage

   (3) Inspect fuel pressure with normal idle status

   Specification : 338~348kPa(3.45~3.55kg/cm²)

   (4) Is fuel pressure within the specified value?

YES	▸ Go to next step as below

NO	▸ Inspect the suspected area. Refer to table as below. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

Condition	Possible 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	Fuel Pump(Fuel Pressure Regulator)
Fuel Pressure too High	Sticking fuel pressure regulator	Fuel Pump(Fuel Pressure Regulator)

2. Fuel Pressure Hold Inspection
   (1) Stop the engine and check for a change in the fuel pressure gauge reading.

Specification : After engine stops, the gauge reading should hold for minimum 5 minutes

   (2) Is fuel pressure within the specified value?

YES	▸ Visually/physically inspect the engine mechanical problem. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Inspect the leakage or malfunctioning of suspected area. Refer to table as below. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

Condition	Possible Cause	Suspected Area
Fuel pressure drops slowly	Injector leak	Injector
Fuel pressure drops immediately	Stuck open in check valve of the fuel pump	Fuel Pump

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P2191 System too Lean at Higher Load (←Multiple) (Bank 1)

General Description

In order to provide the best possible combination of drivability, fuel economy and emission control, the ECM uses a closed loop air/fuel metering system. The ECM monitors the HO2S signal voltage and adjusts fuel delivery based it in closed loop fuel control. Changes in fuel delivery will be indicated by the long-term and the short-term fuel trim values. The ideal fuel trim value is around 0%. The ECM will add fuel when the HO2S signal is indicating a lean condition. Additional fuel is indicated by fuel trim values that are above 0%. The ECM will reduce fuel when the HO2S signal is indicating a rich condition. Reduction in fuel is indicated by fuel trim values that are below 0%. The DTC relevant to fuel trim will be set when the amount reaches excessive levels because of a lean or rich condition.

DTC Description

If the lambda controller reaches the maximum or minimum threshold, then feedback control is no longer possible and emissions will be increased. The ECM sets DTC P2191 if no proportional post catalyst fuel trim adaptation occurs for a defined time after the lambda controller has reached its maximum threshold at part load.

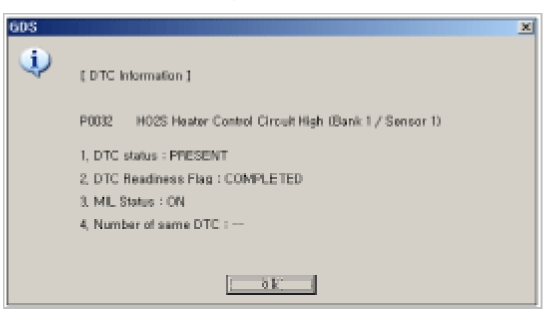
DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Monitoring deviation of long term fuel trim control in part load	• Air leakage in intake,exhaust or EVAP system • Faulty PCV system • Faulty sensor signals • Fuel system
Enable Conditions	• No relevant failure • Lambda adaptation active • Coolant Temp. > 73°C(163°F)	
Threshold Value	• Part load long term fuel trim > +25%	
Diagnostic Time	• 90 sec.	
MIL On Condition	• 2 Driving Cycles	

Monitor DTC Status

> NOTE
>
> If any codes relating to injectors, HO2S, ECT(Engine Coolant Temperature)Sensor, Throttle Position sensor, Injectors or Mass Air Flow Sensor are stored, do ALL REPAIRS associated with those codes before proceeding with this troubleshooting tree.

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Monitor Actuation Test

NOTE

The main purpose of this test is to identify potential engine mechanical condition problems and fuel and ignition systems problems that are not common to all cylinders. For best results, perform this test while maintaining as steady an rpm reading as possible.

CAUTION

Before beginning tests; set the parking brake, place gear selector in P or N and block drive wheels for safety.

1. Warm up the engine to normal operating temperature and let it idle.
2. Install Scan Tool and select "INJECTOR #1" parameter on the Actuation Test mode shown in the figure.
3. Monitor engine rpm and shut off the injector #1 by pressing "STRT(F1)" key
4. Repeat procedure on all injectors and record the engine rpm.

Specification : All cylinders should show an even RPM drop.

5. Was each cylinder's rpm drop within the same value?

YES	▸ Go to next step as below
NO	▸ Cylinders with the least amount of RPM drop are not contributing their share of power. Go to "Fuel System Inspection" procedure. NOTE If the RPM loss between cylinders is quite large(200RPM or more) and engine has high mileage, there is possibility of engine wear. Perform compression test with pressure gauge to check the engine wear

Check intake/exhaust system for leakage

1. Visually/physically inspect the air leakage in intake/exhaust system for the following areas:
   - 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. Was a problem found in any of the above areas?

YES	▶ Replace or repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Go to next step as below

3. Inspect the leakage in EVAP. system for the following conditions:
   (1) Remove the manifold side vacuum hose from the EVAP canister purge valve.
   (2) Using a hand vacuum pump apply specified vacuum(Approx. 15 in, Hg) to the manifold side of the valve
   (3) Does the valve hold vacuum?

YES	▶ Go to next step as below
NO	▶ Repair air leakage and go to "Verification of Vehicle Repair" procedure

Sensor Inspection

NOTE

Refer to "Signal Waveform & Data" in the "General Information" procedure

1. Visually/physically inspect the front HO2S for the following conditions:
   - Ensure that the HO2S is securely installed.
   - Silicon contamination. This contamination will be indicated by a white powdery coating on the portion of the sensor exposed to the exhaust stream and this will result in a but false(high) voltage signal
   - Fuel, engine coolant or oil contamination
   - Use of improper sealant
   - If contamination is evident on the HO2S, Fix the source of the sensor contamination before replacing the sensor to prevent future contamination. Go to "Verification of Vehicle Repair" procedure.
2. Visually/physically inspect the MAFS for the following conditions:
   - Contamination or deterioration
   - Poor connection or damaged harness
3. Check for an intermittent TPS1 false signal. TPS1 signal displayed on a scantool should increase steadily when depressing accelerator pedal after starting.
4. Verify that the ECM ground connections are clean and properly tightened.
5. If test result is NG, repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.
   If OK, go to next step as below.

NOTE

If the contamination is evident on the HO2S or MAFS. Fix the source of the sensor contamination before replacing the sensor to prevent future contamination.

Positive Crankcase Ventilation System Inspection

1. Check the engine oil level. The oil level should be between the min. and max. marking. Fill to the correct oil level.
2. Check crankcase ventilation valve for improper installation, damaged o-rings and malfunctioning .
3. Warm up the engine to normal operating temperature.
4. Connect Scantool and note the "SHORT TERM FUEL-B1" parameter on the Scantool data list.
5. Disconnect and plug the positive crankcase ventilation at the intake manifold side.
6. Monitor the "SHORT TERM FUEL-B1" parameter on the Scantool data list once again.

Specification : The value should remain more or less unchanged

7. Is the displayed value within the specified value?

YES	▸ Go to next step as below
NO	▸ Check the PCV(Positive Crankcase Ventilation) valve for operation properly. Refer to "EM" group in Workshop Manual. If OK, check that engine oil is diluted with fuel. Change the oil or filter as necessary and go to "Verification of Vehicle Repair" procedure.

Fuel System Inspection

1. Fuel Line Pressure Inspection
   (1) Check the fuel for excessive water, alcohol, or other contaminants. Replace contaminated fuel as necessary.
   (2) Install a fuel pressure gage
   (3) Inspect fuel pressure with normal idle status

Specification : 338~348kPa(3.45~3.55kg/cm²)

   (4) Is fuel pressure within the specified value?

YES	▸ Go to next step as below
NO	▸ Inspect the suspected area. Refer to table as below. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

Condition	Possible 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	Fuel Pump(Fuel Pressure Regulator)
Fuel Pressure too High	Sticking fuel pressure regulator	Fuel Pump(Fuel Pressure Regulator)

2. Fuel Pressure Hold Inspection
   (1) Stop the engine and check for a change in the fuel pressure gauge reading.

Specification : After engine stops, the gauge reading should hold for minimum 5 minutes

   (2) Is fuel pressure within the specified value?

YES	▸ Visually/physically inspect the engine mechanical problem. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Inspect the leakage or malfunctioning of suspected area. Refer to table as below. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

Condition	Possible Cause	Suspected Area
Fuel pressure drops slowly	Injector leak	Injector
Fuel pressure drops immediately	Stuck open in check valve of the fuel pump	Fuel Pump

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P2192 System too Rich at Higher Load (Bank 1)

General Description

In order to provide the best possible combination of drivability, fuel economy and emission control, the ECM uses a closed loop air/fuel metering system. The ECM monitors the HO2S signal voltage and adjusts fuel delivery based it in closed loop fuel control. Changes in fuel delivery will be indicated by the long-term and the short-term fuel trim values. The ideal fuel trim value is around 0%. The ECM will add fuel when the HO2S signal is indicating a lean condition. Additional fuel is indicated by fuel trim values that are above 0%. The ECM will reduce fuel when the HO2S signal is indicating a rich condition. Reduction in fuel is indicated by fuel trim values that are below 0%. The DTC relevant to fuel trim will be set when the amount reaches excessive levels because of a lean or rich condition.

DTC Description

If the lambda controller reaches the maximum or minimum threshold, then feedback control is no longer possible and emissions will be increased. The ECM sets DTC P2192 if no proportional post catalyst fuel trim adaptation occurs for a defined time after the lambda controller has reached its minimum threshold at part load.

DTC Detecting Condition

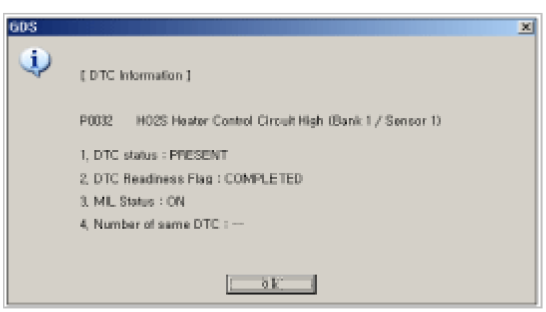
Item	Detecting Condition	Possible Cause
DTC Strategy	• Monitoring deviation of long term fuel trim control in part load	• Air restriction in intake or exhaust system • Front HO2S or MAFS contamination • Faulty sensor signals • EVAP system • Fuel system
Enable Conditions	• No relevant failure • Lambda adaptation active • Coolant Temp. > 73°C(163°F) • Low estimated fuel dilution in oil	
Threshold Value	• Part load long term fuel trim < -25%	
Diagnostic Time	• 90 sec.	
MIL On Condition	• 2 Driving Cycles	

Monitor DTC Status

NOTE

If any codes relating to injectors, HO2S, ECT(Engine Coolant Temperature)Sensor, Throttle Position sensor, Injectors or Mass Air Flow Sensor are stored, do ALL REPAIRS associated with those codes before proceeding with this troubleshooting tree.

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Monitor Actuation Test

> NOTE
>
> The main purpose of this test is to identify potential engine mechanical condition problems and fuel and ignition systems problems that are not common to all cylinders. For best results, perform this test while maintaining as steady an rpm reading as possible.

> CAUTION
>
> Before beginning tests; set the parking brake, place gear selector in P or N and block drive wheels for safety.

1. Warm up the engine to normal operating temperature and let it idle.
2. Install Scan Tool and select "INJECTOR #1" parameter on the Actuation Test mode shown in the figure.
3. Monitor engine rpm and shut off the injector #1 by pressing "STRT(F1)" key
4. Repeat procedure on all injectors and record the engine rpm.

Specification : All cylinders should show an even RPM drop.

5. Was each cylinder's rpm drop within the same value?

YES	▸ Go to next step as below
NO	▸ Cylinders with the least amount of RPM drop are not contributing their share of power. Go to "Fuel System Inspection" procedure. NOTE If the RPM loss between cylinders is quite large(200RPM or more) and engine has high mileage, there is possibility of engine wear. Perform compression test with pressure gauge to check the engine wear

Check intake/exhaust system for restriction

1. Visually/physically inspect the restriction in intake/exhaust system for the following areas:
   - Air cleaner filter element for excessive dirt or for any foreign objects
   - Throttle body inlet for damage or for any foreign objects
   - Throttle bore and throttle plate for chocking and for any foreign objects
   - Restricted exhaust system
2. Inspect the leakage in EVAP. system for the following conditions:
   - Check the EVAP canister for fuel saturation. If the EVAP canister is full of fuel, visually and physically inspect the

EVAP and fuel system.

3. Was a problem found in any of the above areas?

YES	▸ Replace or repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Go to next step as below

Sensor Inspection

> NOTE
>
> Refer to "Signal Waveform & Data" in the "General Information" procedure

1. Visually/physically inspect the front HO2S for the following conditions:
   - Ensure that the HO2S is securely installed.
   - Silicon contamination. This contamination will be indicated by a white powdery coating on the portion of the sensor exposed to the exhaust stream and this will result in a but false(high) voltage signal
   - Fuel, engine coolant or oil contamination
   - Use of improper sealant
   - If contamination is evident on the HO2S, Fix the source of the sensor contamination before replacing the sensor to prevent future contamination. Go to "Verification of Vehicle Repair" procedure.
2. Visually/physically inspect the MAFS for the following conditions:
   - Contamination or deterioration
   - Poor connection or damaged harness
3. Check for an intermittent TPS1 false signal. TPS1 signal displayed on a scantool should increase steadily when depressing accelerator pedal after starting.
4. Verify that the ECM ground connections are clean and properly tightened.
5. If test result is NG, repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.
   If OK, go to next step as below.

> NOTE
>
> If the contamination is evident on the HO2S or MAFS. Fix the source of the sensor contamination before replacing the sensor to prevent future contamination.

Positive Crankcase Ventilation System Inspection

1. Check the engine oil level. The oil level should be between the min. and max. marking. Fill to the correct oil level.
2. Check crankcase ventilation valve for improper installation, damaged o-rings and malfunctioning .
3. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure. If OK, go to next step.

Fuel System Inspection

1. Fuel Line Pressure Inspection
   (1) Check the fuel for excessive water, alcohol, or other contaminants. Replace contaminated fuel as necessary.

   (2) Install a fuel pressure gage

   (3) Inspect fuel pressure with normal idle status

   Specification : 338~348kPa(3.45~3.55kg/cm²)

   (4) Is fuel pressure within the specified value?

YES	▸ Go to next step as below

NO	▸ Inspect the suspected area. Refer to table as below. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

Condition	Possible 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	Fuel Pump(Fuel Pressure Regulator)
Fuel Pressure too High	Sticking fuel pressure regulator	Fuel Pump(Fuel Pressure Regulator)

2. Fuel Pressure Hold Inspection
   (1) Stop the engine and check for a change in the fuel pressure gauge reading.

Specification : After engine stops, the gauge reading should hold for minimum 5 minutes

   (2) Is fuel pressure within the specified value?

YES	▸ Visually/physically inspect the engine mechanical problem. Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▸ Inspect the leakage or malfunctioning of suspected area. Refer to table as below. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

Condition	Possible Cause	Suspected Area
Fuel pressure drops slowly	Injector leak	Injector
Fuel pressure drops immediately	Stuck open in check valve of the fuel pump	Fuel Pump

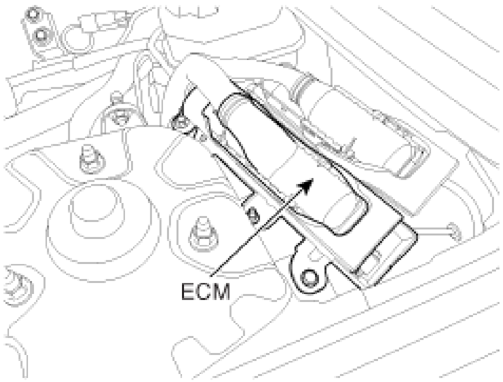
Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

Component Location



General Description

ECM has a barometric pressure sensor built-in its inner structure, where it detects the atmospheric pressure at the vehicle's current location. The barometric pressure sensor calculates the density of air(quantity of oxygen) and accurately detects the intake air amount along with intake air sensor and intake air temperature sensor. This does an important role in compensating the amount of fuel when driving in hillsides areas where difference in air density(oxygen) exists, and also in EGR control.

DTC Description

ECM sets DTC P2227 if the ECM detects that operation of barometic pressure sensor is abnormal.

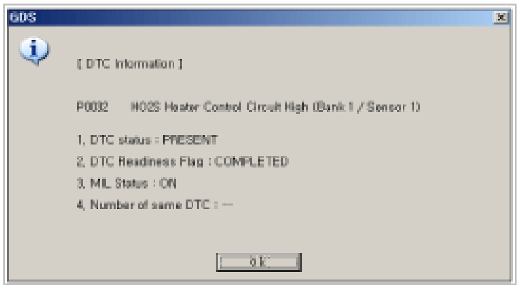
DTC Detectiong Condition

<table>
<tr><th colspan="2">Item</th><th>Detecting Condition</th><th>Possible Cause</th></tr>
<tr><td colspan="2">DTC Strategy</td><td>• Plausibility check</td><td rowspan="8">• BPS</td></tr>
<tr><td rowspan="2">Enable Conditions</td><td>Case1</td><td>• engine off time > 10 sec
• Vehicle speed < 0.6mph
• 0.8V < BPS voltage < 4.9V
• 0.1V < MAP voltsge < 4.85V
• 0.1V < PUT voltage < 4.7V
• engine operating state off
• Failure not detected for following DTCs</td></tr>
<tr><td>Case2</td><td>• Engine operating state out of start
• throttle position > -1°TPS
• 0.35 < Pressure quotient < 1
• Failure not detected for following DTCs</td></tr>
<tr><td rowspan="2">Threshold Value</td><td>Case1</td><td>• turbodharger boost pressure-manifold air pressure< 100hPa,
barometric pressure-turbocarger boost pressure > 100hPa
barometric pressure-manifold air pressure > 100hPa</td></tr>
<tr><td>Case2</td><td>• barometric pressure-pressure up throttle > 500hPa,
pressure up throttle-pressure up throttle(full load) > 0hPa
barometric pressure-pressure up throttle during full load > 2716hPa,</td></tr>
<tr><td colspan="2">Diagnostic Time</td><td>• immediately</td></tr>
<tr><td colspan="2"></td><td></td></tr>
</table>

MIL On Condition	• 2 Driving Cycles	

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Verification of Vehicle Repair

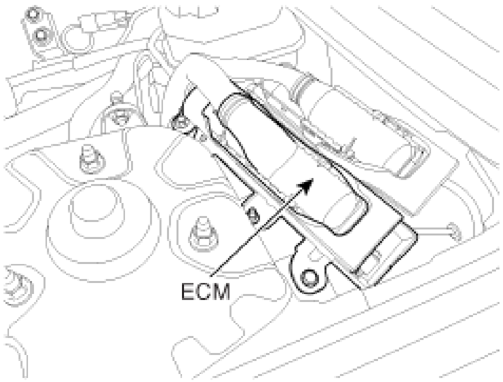
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P2228 Barometric Pressure Circuit Low Input

Component Location



General Description

ECM has a barometric pressure sensor built-in its inner structure, where it detects the atmospheric pressure at the vehicle's current location. The barometric pressure sensor calculates the density of air(quantity of oxygen) and accurately detects the intake air amount along with intake air sensor and intake air temperature sensor. This does an important role in compensating the amount of fuel when driving in hillsides areas where difference in air density(oxygen) exists, and also in EGR control.

DTC Description

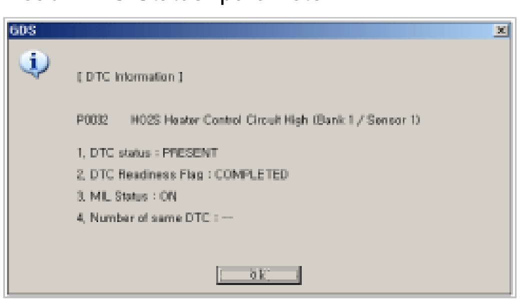
ECM sets DTC P2228 if the ECM detects that barometic pressure sensor circuit is short to ground.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	
Enable Conditions	• -	
Threshold Value	• BPS voltage < 0.7V	• BPS
Diagnostic Time	• 1.2 sec	
Mil On Condition	• 2 Driving Cycles	

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Verification of Vehicle Repair

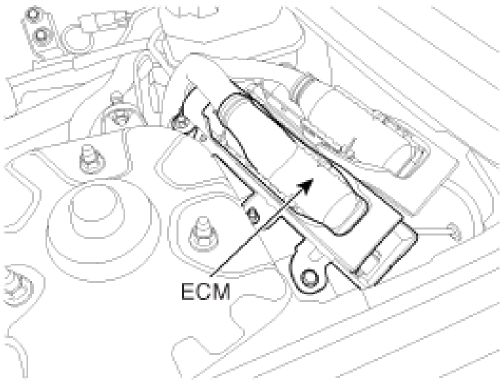
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P2229 Barometric Pressure Circuit High Input

Component Location



General Description

. ECM has a barometric pressure sensor built-in its inner structure, where it detects the atmospheric pressure at the vehicle's current location. The barometric pressure sensor calculates the density of air(quantity of oxygen) and accurately detects the intake air amount along with intake air sensor and intake air temperature sensor. This does an important role in compensating the amount of fuel when driving in hillsides areas where difference in air density(oxygen) exists, and also in EGR control.

DTC Description

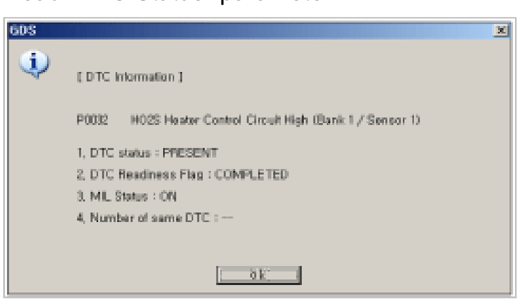
ECM sets DTC P2229 if the ECM detects that barometic pressure sensor circuit is short to battery.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Electrical Check	• BPS
Enable Conditions	• -	
Threshold Value	• BPS voltage < 0.7V	
Diagnostic Time	• 1.2 sec	
Mil On Condition	• 2 Driving Cycles	

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

Verification of Vehicle Repair

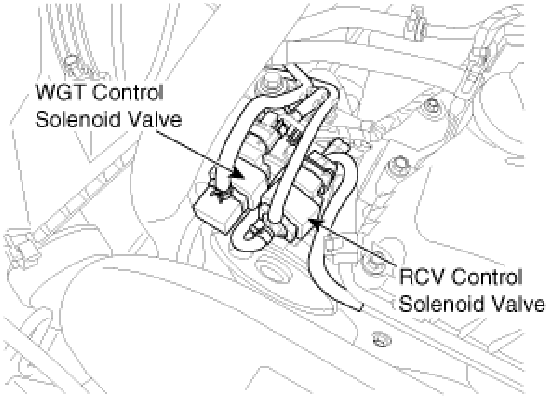
After a repair, it is essential to verify that the fault has been corrected.

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P2261 Turbocharger/Supercharger Bypass Valve - Mechanical

Component Location



General Description

If suddenly closing the throttle body during driving, the boost pressure within the pipes increase. This increased pressure does not flow into the intake but transfers in the opposite direction and creates a Tipout Surge1), caused by sudden increase in pressure at the impeller within the compressor. This may result in making collision sound. This device helps reduce the collision sound by discharging the highly increased pressure before the compressor rather than after the compressor. Usually positive pressure is connected to the actuator. The RCV is closed at this time. When decelerating after acceleration, the solenoid valve will operate. This act will create a vacuum state connecting the negative pressure to the actuator, which lets it overcome the spring force and pull the diaphragm. At this state, the air entering the combustor does not affect the compressor wheel and exerts action within the air cleaner.

DTC Description

ECM sets DTC P2261 if the ECM detects that bypass valve is abnormal open or close stuck.

DTC Detectiong Condition

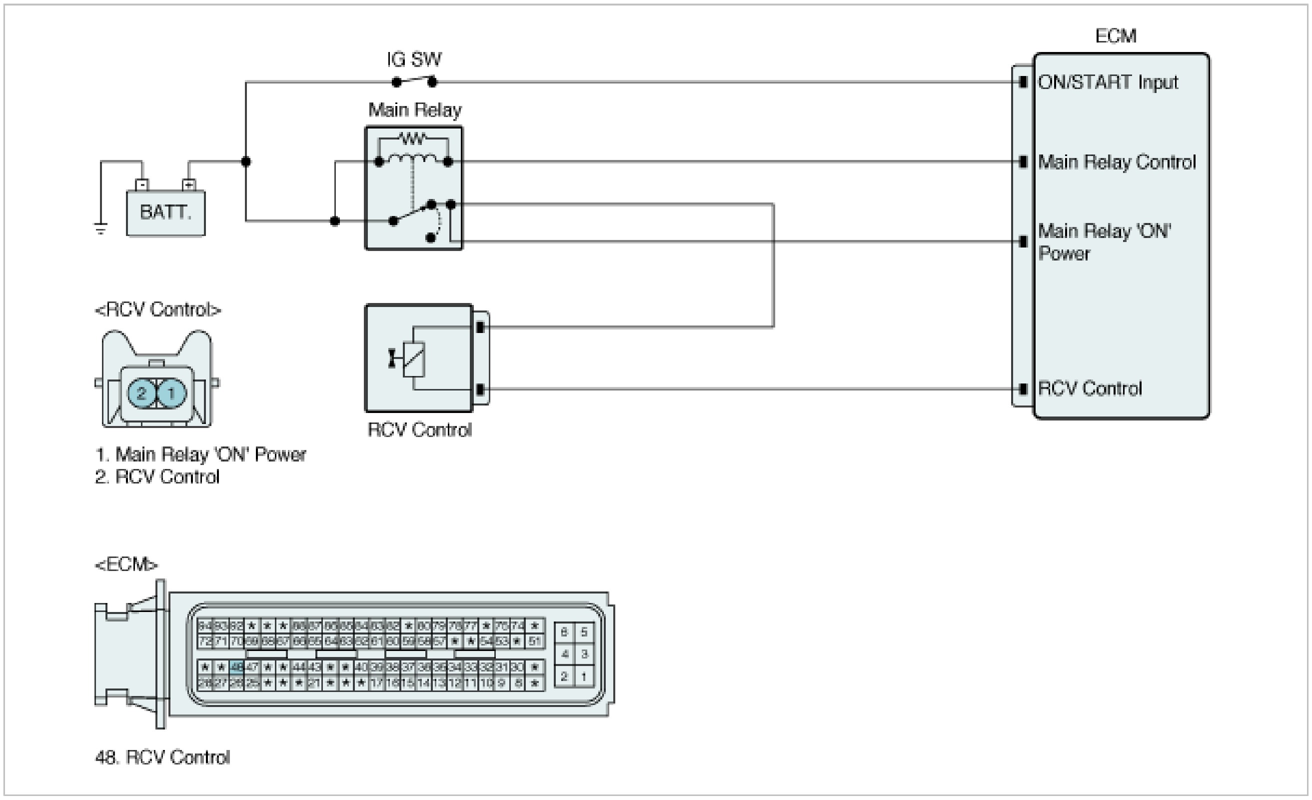
Item		Detecting Condition	Possible Cause
DTC Strategy		• Plausibility check	• RCV stuck
Enable Conditions	Case1	• time after valve close request > 500ms • Failure not detected for following DTCs • Stuck open	
	Case2	• time after valve close request > 500ms • pedal value gradient < -97.7%/s • maximum pressure up throttle deviation < 100hPa • Failure not detected for following DTCs • Stuck close	
Threshold Value	Case1	• pressure up throttle mean value > modeled pressure up throttle with closed • pressure up thottle mean value < modeled pressure up throttle with opened valve + 50hPa	
	Case2	• 6.5hPa*s > modeled pressure up throttle value > 6.5hPa*s	
Diagnostic Time		• immediately	
MIL On Condition		• 2 Driving cycles	

Specification

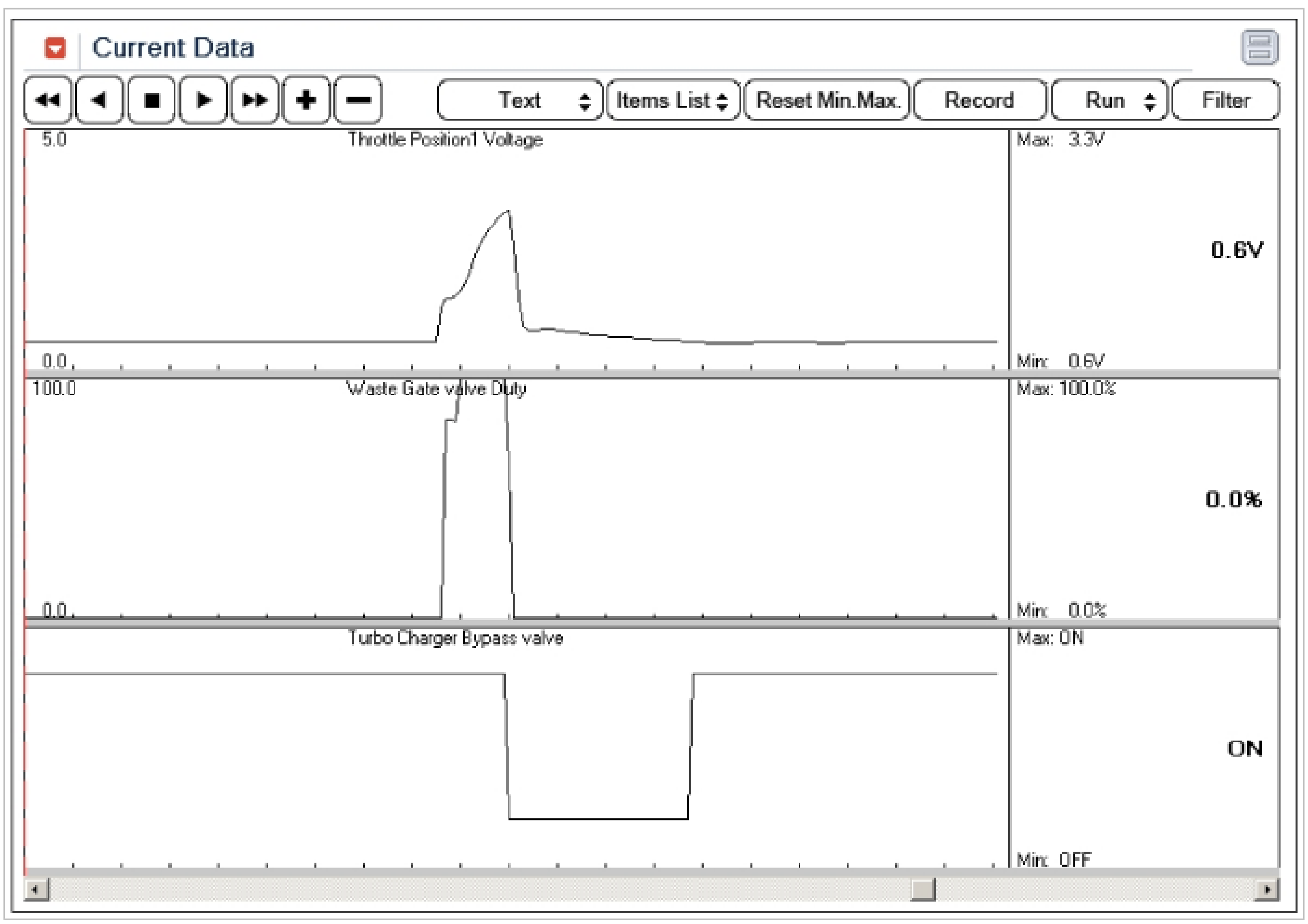
Temp.(°C)	Temp.(°F)	Resistance(Ω)

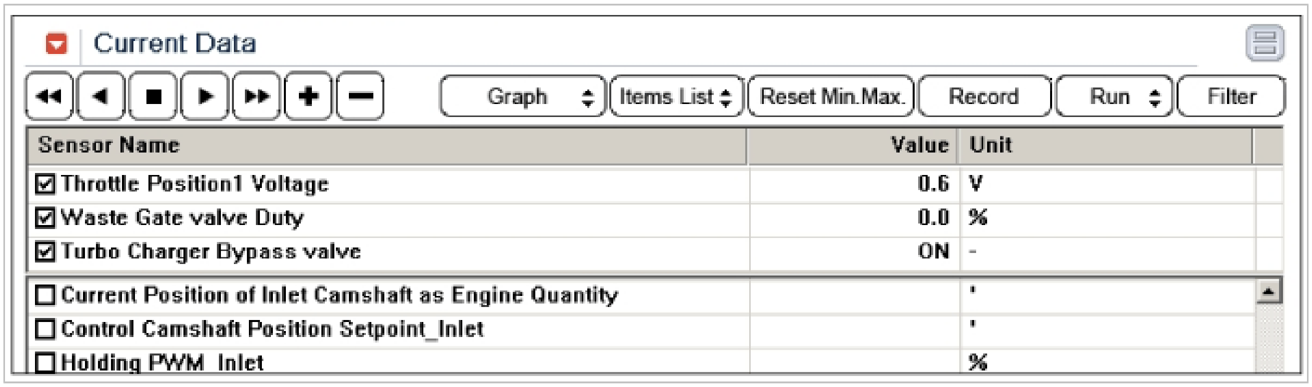
20	82	28.3 ~ 31.1

Diagnostic Circuit Diagram



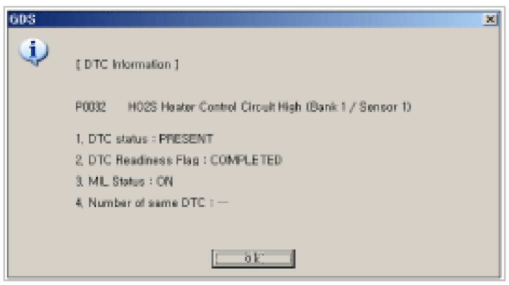
Signal Waveform & Data





Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

NOTE

- History (Not Present) 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 next step as below

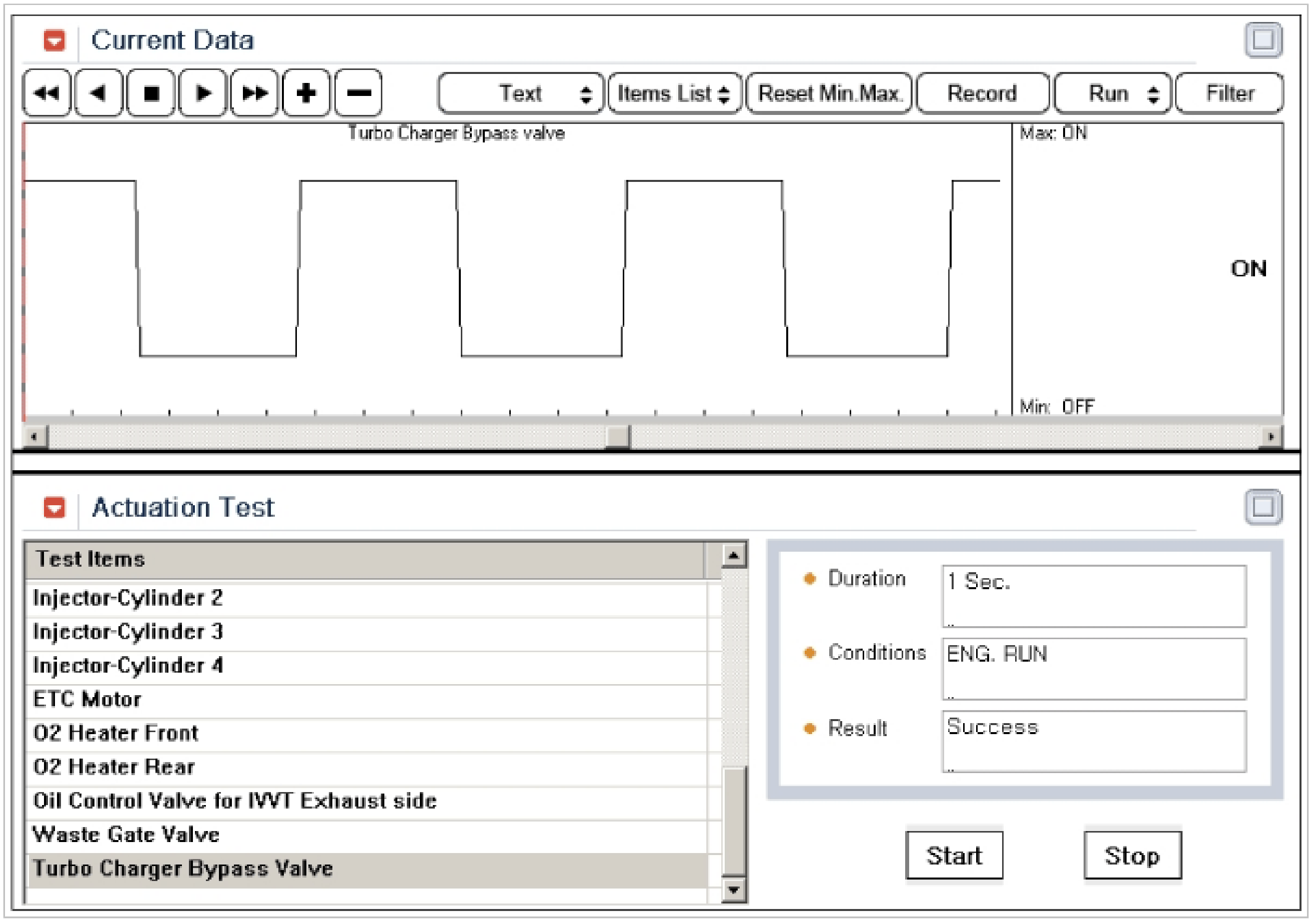
Terminal and Connector Inspection

1. 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.
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	▶ Check valve timing. Refer to "P0016: Crankshaft Position-Camshaft Position Correlation(Bank1)" procedure. Repair as necessary and go to "Verification of Vehicle Repair" procedure

Component Inspection

1. Select 'Actuation Test' mode and execute 'Turbo Charger Bypass Valve' item.



2. Is the waveform normal?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.

3. Resistance Inspection
   (1) Ignition "OFF"
   (2) Measure resistance between power terminal and control terminal of the sensor connector (Component side)

Specification

Temp.(°C)	Temp.(°F)	Resistance(Ω)
20	82	28.3 ~ 31.1

4. Is resistance within the specification?

YES	▶ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▶ Substitute with a known - good RCV and check for proper operation. If the problem is corrected, replace RCV and go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

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

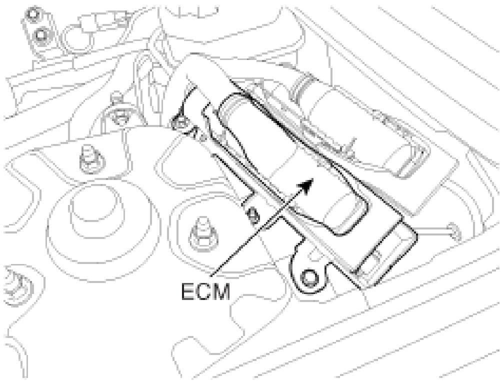
1. Connect GDS and select "DTC Analysis" mode.

2. Click "DTC Status" 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.

GENESIS COUPE(BK) >2010 > G 2.0 DOHC > Fuel System > Engine Control System > P2610 ECM/PCM Internal Engine Off Timer Performance

Component Location



DTC Description

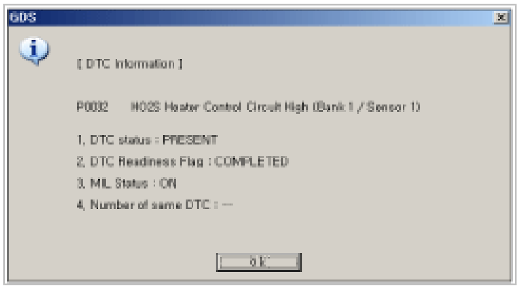
ECM sets P2610 when detects internal error.

DTC Detecting Condition

Item		Detecting Condition	Possible Cause
Case1	DTC Strategy	• During engine running check accuracy of time measurement by Engine-off timer micro-com.	
	Enable Conditions	• Time with IG KEY "ON" > 10 sec. • 11V < Battery voltage < 16V	
	Threshold Value	• Compare Engine-off timer time measurement with Engine running timer	
	Diagnostic Time	• Immediate	
Case2	DTC Strategy	• During Engine stop, check Engine-off timer start increment.	• ECM
	Enable Conditions	• After transition point (N > 32rpm → N <32rpm) • 11V < Battery voltage < 16V	
	Threshold Value	• Engine-off timer after 2 sec. engine stop < 1sec. or > 4sec.	
	Diagnostic Time	• 2 sec	
MIL On Condition		• 2 driving cycle	

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> NOTE
>
> - History (Not Present) 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 next step as below

Back Up Voltage Inspection

1. Ignition "OFF"
2. Disconnect ECM connector.
3. Ignition "ON"
4. Measure voltage between terminal 6 of the ECM harness connector and chassis ground.

Specification : Remain stable at battery voltage

5. Are circuits remaining stable at battery voltage?

YES	▶ Using a scan tool, check ECM software version and upgrade as necessary. If version is the newest one, check ECM for contamination, deterioration, or damage. 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. NOTE It is necessary to perform the TPS adaptation procedure after the ETC assembly or ECM replacing. ■ TPS adaptation procedure Ignition "OFF" and then "ON" without cranking. Wait for 10 seconds under enable conditions. → Enable conditions : Battery >10V & Intake Air Temp. >5.3°C(41.5°F) & 5.3°C(41.5°F) < Engine CoolantTemp. < 99.8°C(211.6°F)
NO	▶ If voltage fluctuates, check circuit for loose, bent or corroded terminals, Repair as necessary and go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

General Description

A communication line exists between the Engine Control Module(ECM) and the Transaxle Control Module(TCM). The communication is through a Control Area Network(CAN). Without CAN communication, an independent pin and wiring is needed to receive a sensor information from a ECM. The more information to be communicated, the more wirings is required. In case of CAN communication type, all the information need to be communicated among control modules such as ECM and ABS control module use CAN lines.

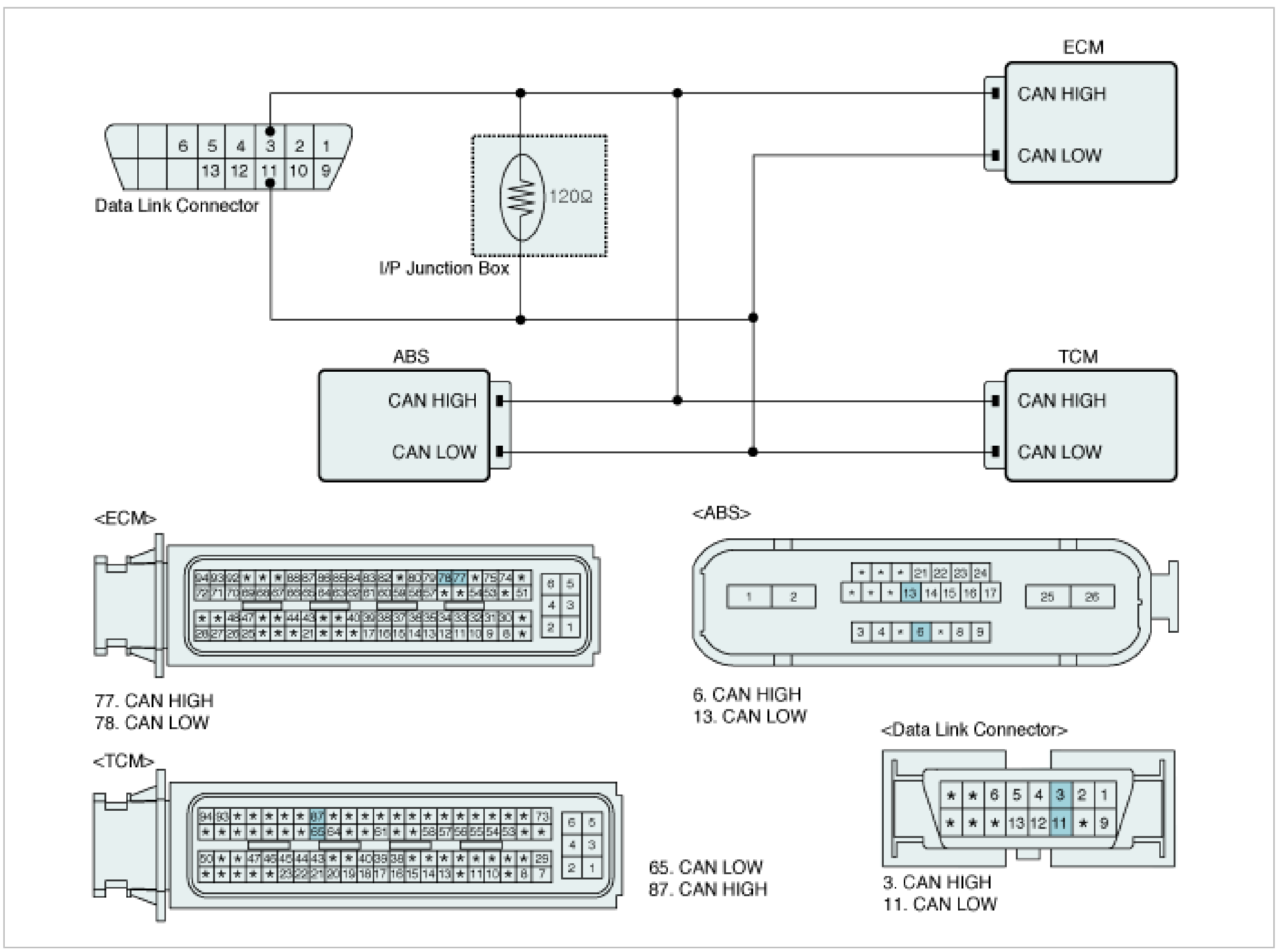
DTC Description

The ECM determines CAN communication error and sets DTC U0001 if communication with other control devices (e.g. ABS) via CAN is impossible or ECM detects that communication time via CAN exceeds threshold value.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Check CAN message transfer status	• Open or short in CAN line • Poor connection or damaged harness • Faulty ECM
Enable Conditions	• Battery voltage > 10V • Delay time > 0.5 sec.	
Threshold Value	• 20 wrong messages received by ECM	
Diagnostic Time	• 1 sec.	
MIL On Condition	• 2 Driving Cycles	

Diagnostic Circuit Diagram



Signal Waveform & Data

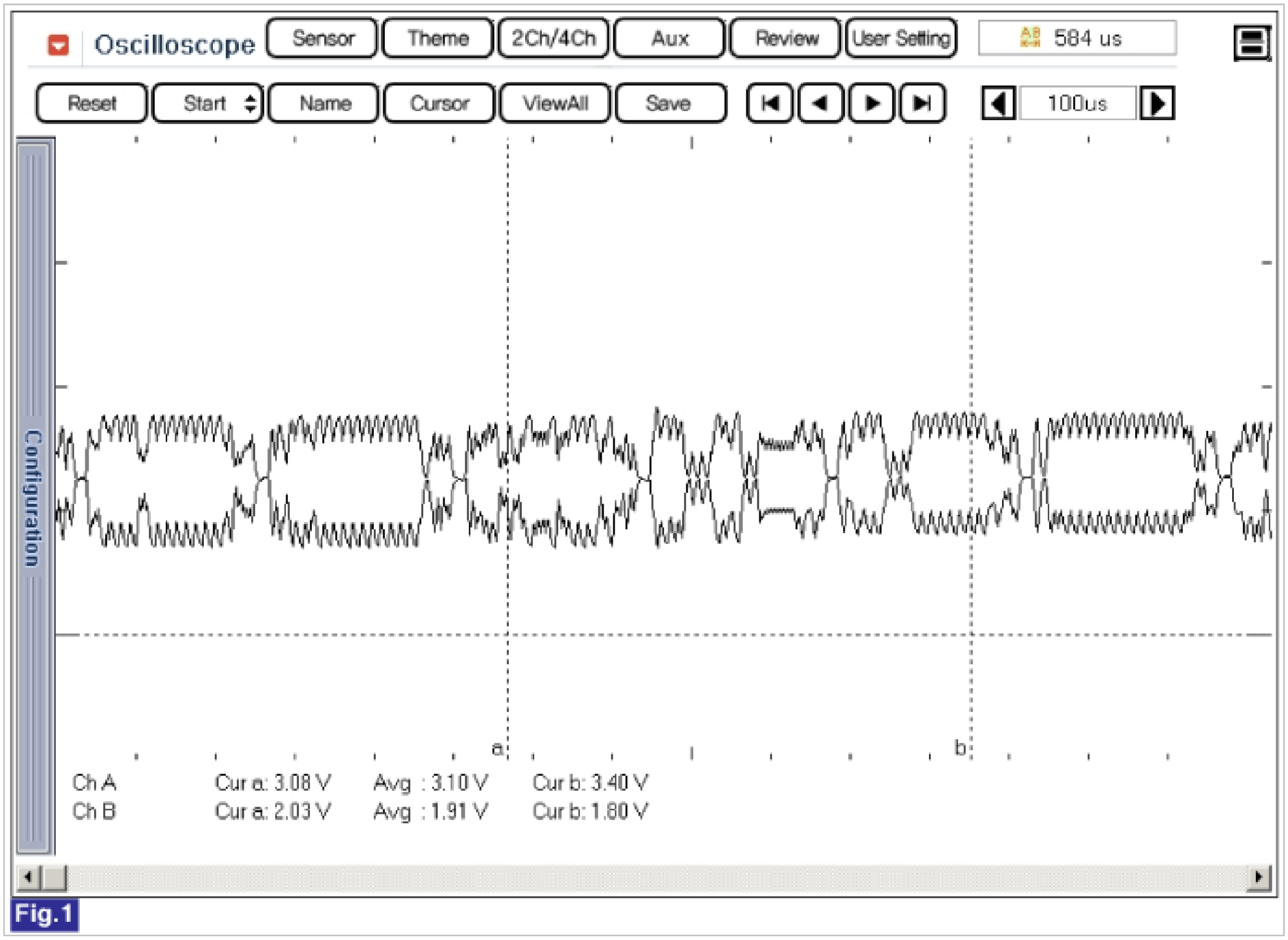
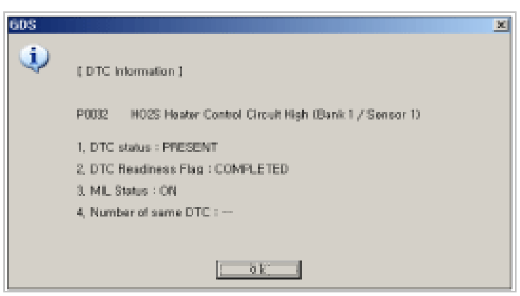


Fig.1) Normal waveform with ignition ON

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.


GDS

[DTC Information]

P0032 HO2S Heater Control Circuit High (Bank 1 / Sensor 1)

1. DTC status : PRESENT
2. DTC Readiness Flag : COMPLETED
3. MIL Status : ON
4. Number of same DTC : --

OK

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

NOTE
- History (Not Present) 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 next step as below

Check CAN communication line for open

1. Ignition "OFF"
2. Disconnect ECM harness connector.
3. Measure resistance between High signal terminal and Low signal terminal of ECM harness connector.

Specification : Approx. 110~130Ω

4. Is resistance within the specification?

YES	▸ Go to next step as below.
NO	▸ Check for open in wiring related to the CAN communication(ECM, EPS, MTS and vertical resistor at the junction box). Repair as necessary and then go to "Verification of Vehicle Repair" procedure. NOTE Vertical Resistor Resistance : Approx. 110~130Ω

Check CAN communication line for short to ground

1. Measure resistance between High signal terminal of ECM harness connector and chassis ground.
2. Measure resistance between Low signal terminal of ECM harness connector and chassis ground.

Specification : Infinite(above 10kΩ)

3. Is resistance within the specification?

YES	▸ Go to next step as below
NO	▸ Repair CAN communication line for a short to ground. And then go to "Verification of Vehicle Repair" procedure

Check CAN communication line for short to battery

1. Disconnect the connectors related to the CAN communication
2. Ignition "ON" & Engine "OFF"
3. Measure voltage between High signal terminal of ECM harness connector and chassis ground.
4. Measure voltage between Low signal terminal of ECM harness connector and chassis ground.

Specification : Approx. 0V

5. Is voltage within the specification?

YES	▸ Go to next step as below
NO	▸ Repair CAN communication line for a short to battery. And then go to "Verification of Vehicle Repair" procedure

Terminal and connection inspection

1. 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.
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 next step as below

Component Inspection

1. Ignition "OFF"
2. Measure resistance between High signal terminal and Low signal terminal of ECM connector(ECM side).

Specification : Approx. 110~130Ω

3. Is resistance within the specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check ECM for contamination, deterioration, or damage. 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.

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.

General Description

A communication line exists between the Engine Control Module(ECM) and the Transaxle Control Module(TCM). The communication is through a Control Area Network(CAN). Without CAN communication, an independent pin and wiring is needed to receive a sensor information from a ECM. The more information to be communicated, the more wirings is required. In case of CAN communication type, all the information need to be communicated among control modules such as ECM and ABS control module use CAN lines.

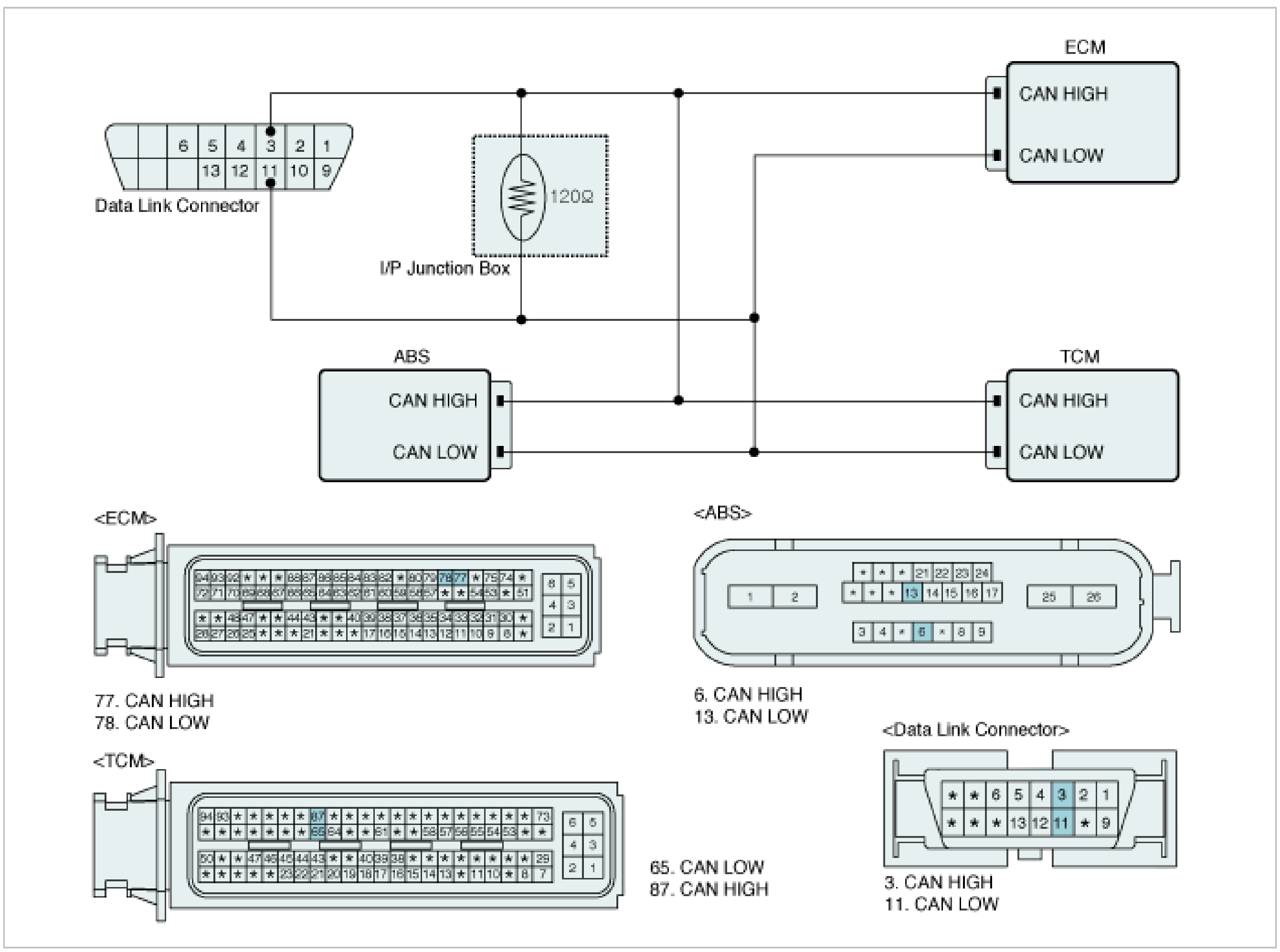
DTC Description

The ECM determines CAN communication error and sets DTC U0101 if no message received from TCM.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Check CAN message transfer status	• Poor connection or damaged harness • Faulty ECM • Faulty TCM
Enable Conditions	• Battery voltage > 10V • Engine speed > 32rpm • Delay time > 0.5 sec.	
Threshold Value	• No message from TCM for 0.1sec.	
Diagnostic Time	• 1.5 sec.	
MIL On Condition	• 2 Driving Cycles	

Diagnostic Circuit Diagram



Signal Waveform & Data

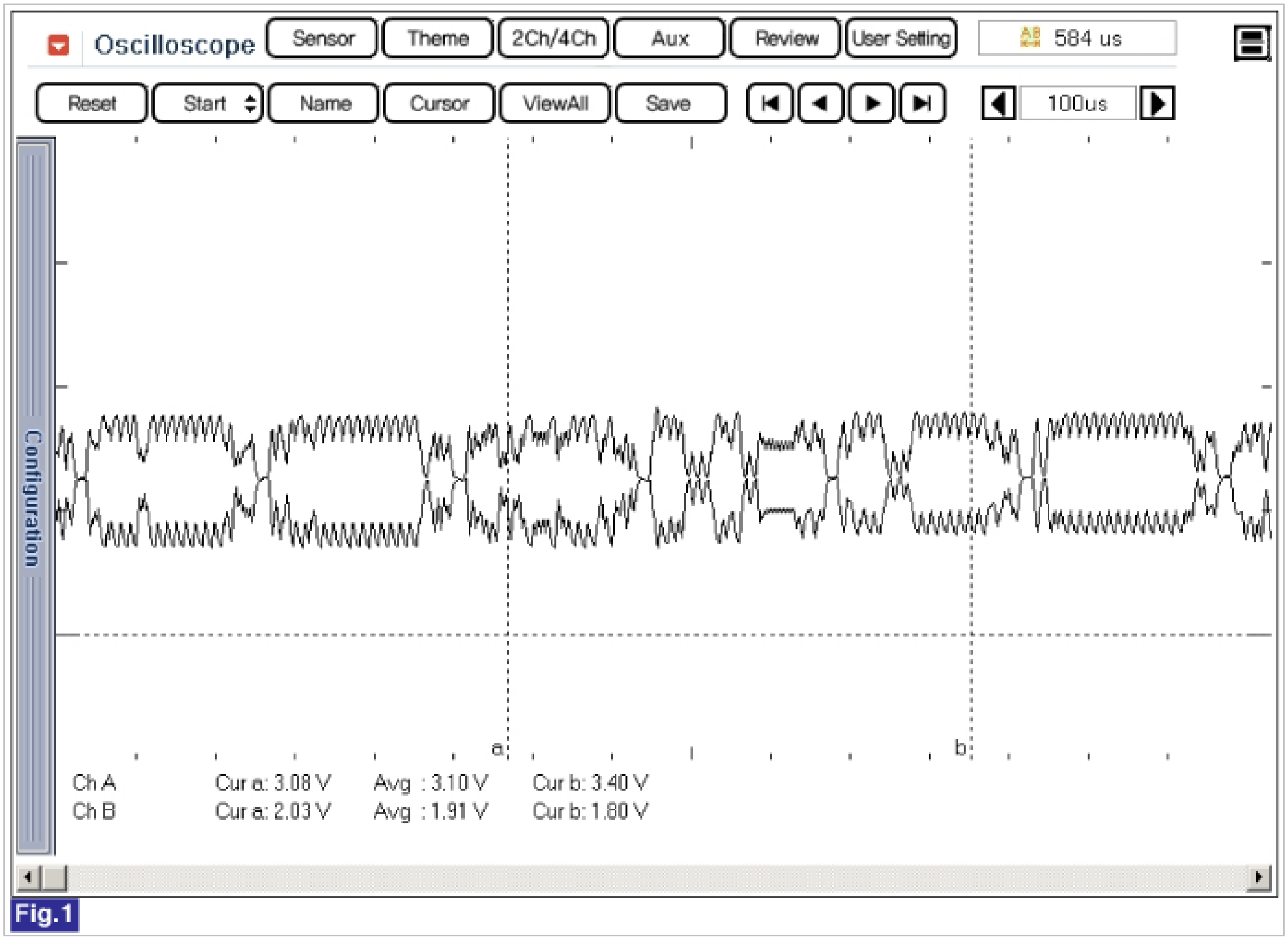
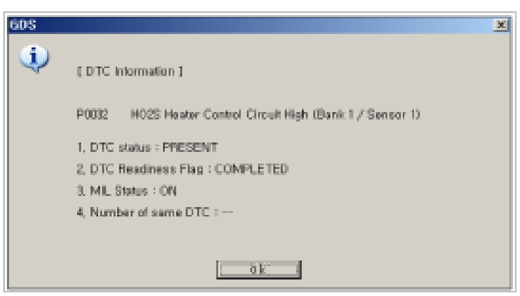


Fig.1) Normal waveform with ignition ON

Monitor DTC Status

1. Connect GDS and select "DTC Analysis" mode
2. Click "DTC Status" on the menu bar to see DTC's information.
3. Confirm that "DTC Readiness Flag" indicates "COMPLETED". If not, drive the vehicle within conditions noted in the freeze frame data or enable conditions.
4. Read "DTC Status" parameter.



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

> **NOTE**
>
> - History (Not Present) 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 next step as below

Signal Circuit Inspection

Check CAN communication line Open

1. Disconnect the connectors related to the CAN communication
2. Ignition "ON" & Engine "OFF"
3. Measure resistance between High signal terminal of ECM and TCM.
4. Measure resistance between Low signal terminal of ECM and TCM.

Specification : Approx. 0Ω

5. Is resistance within the specification?

YES	▸ Go to next step as below.
NO	▸ Repair CAN communication line for Open. And then go to "Verification of Vehicle Repair" procedure.

Terminal and connection inspection

1. 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.
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	▸ Check for continuity in wiring related to the CAN communication line(ECM, EPS, MTS and vertical resistor at the junction box.). Repair as necessary and then go to "Verification of Vehicle Repair" procedure

Component Inspection

1. Ignition "OFF"
2. Measure resistance between High signal terminal and Low signal terminal of ECM connector(ECM side).

Specification : Approx. 110~130Ω

3. Is resistance within the specification?

YES	▸ Check for poor connection between ECM and component: backed out terminal, improper mating, broken locks or poor terminal to wire connection. Repair as necessary and go to "Verification of Vehicle Repair" procedure
NO	▸ Check ECM for contamination, deterioration, or damage. 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.

Verification of Vehicle Repair

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

1. Connect GDS and select "DTC Analysis" mode.
2. Click "DTC Status" 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.