SECTION ECK ENGINE CONTROL SYSTEM (K9K) C

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< BASIC INSPECTION >

BASIC INSPECTION DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

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OVERALL SEQUENCE



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DIAGNUSIS AND REPAIR WURRFLUW
< BASIC INSPECTION > [K9K]
 Malfunctions are declared as either present or stored (depending on whether they appeared in a certain con text and have disappeared since, or whether they remain present but have not been diagnosed within the current context).
 The present or stored status of faults should be taken into consideration when the diagnostic tool is used fol lowing the + after ignition supply being switched on (without acting on the system components). For a present fault, apply the procedure described in the Interpretation of faults section.
 For a stored fault, note the faults displayed and apply the instructions in the Notes section. If the malfunction is confirmed when the instructions in the Notes section are applied, the malfunction is present. Deal with the malfunction
 If the malfunction is not confirmed, check: the electrical lines which correspond to the fault,
 the connectors for these lines (for oxidation, bent pins, etc), the condition of the wires (insulation has melted or been cut, abrasions). the resistance of the component detected as faulty,
 Conformity Check The aim of the conformity check is to check data that does not produce a fault on the diagnostic too because the data is inconsistent. Therefore, this phase is used to: carry out fault finding on faults that do not have a fault display, and which may correspond to a custome complaint
 check that the system is operating correctly and that there is no risk of a fault recurring after repairs. This section gives the fault finding procedures for statuses and parameters and the conditions for checking them.
 If a status is not behaving normally or a parameter is outside the permitted tolerance values, consult the cor responding malfunction finding page.
Customer Complaints - Malfunction finding chart If the test with the diagnostic tool is OK but the customer complaint is still present, the fault should be pro cessed by customer complaint. NOTE:
A synopsis of the general procedure to follow is provided on the preceding page in the form of a flow chart.
Malfunction Finding Procedure (Wiring Check)

Diagnostics malfunctions

Removing the connectors and/or handling the wirings may temporarily remove the origin of a DTC. The mea-
surements of the electrical voltages, resistance and insulation are generally correct, especially when the DTC
is not present at the time of the analysis (stored DTC).

Visual Check

Look for impacts under the bonnet and in the passenger compartment.

Perform a careful check of the protections, insulation and correct running of wirings.

Look for traces of oxidation.

Tactile Check

While manipulating the wirings, use the diagnostic tool to detect a change in DTC status from "stored" to Μ "present".

Ensure that the connectors are correctly engaged.

Apply light stresses to the connectors.

Gently manipulate the wiring harness.

If a change of status occurs, try to isolate the origin of the incident.

Inspection of each component

Disconnect the connectors and check the appearance of the clips and blades and their crimping (no crimping on the insulating part).

Check that the clips and blades are properly engaged in the receptacles.

Ensure that there is no rebounding of clips or blades at the time of connection.

Check the contact pressure of the clips using a suitable model blade.

Resistance Control

Test the continuity of the lines in their entirety, then section by section.

Try to create a short-circuit to earth, on the + 12 V or with another wire.

If a DTC is detected, repair or replace the wiring.

REMINDERS

Trouble Diagnosis:

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

There are present DTCs and stored DTCs (which appeared in a certain context and have since disappeared or which are still present but have not had trouble diagnosis performed on them in the current context).

The "present" or "stored" status of DTCs must be considered when activating the diagnostic tool after power is supplied to the ECM (without activating the system components).

Deal with present DTCs according to the procedure specified in the corresponding DTC trouble diagnosis. For stored DTCs, note the DTCs displayed and follow the instructions in the Notes section.

If the DTC is confirmed when the instructions in the Notes section are applied, the malfunction is present. Deal with the DTC.

If the DTC is not confirmed, check:

- Electrical lines which correspond to the malfunction
- Connectors for these lines (for oxidation, bent pins, etc.)
- Resistance of the malfunction component
- · Condition of the wires (melted or cut insulation, wear)

Conformity Check

The conformity check is designed to check the states and data monitor items which do not display any DTCs on the diagnostic tool when inconsistent. This phase therefore allows:

• Diagnoses malfunctions that do not have a DTC display, and which may correspond to a customer complaint.

• Checks that the system is operating correctly and that there is no risk of a DTC reappearing after repairs.

This section gives the trouble diagnosis procedures for states and parameters and the conditions for checking them.

If a state is not operating normally or a data monitor value is outside permitted tolerance values, you should consult the corresponding trouble diagnosis page.

Customer Complaints - Trouble Diagnosis

If the test with the CONSULT-III is OK, but the customer complaint still present, the malfunction should be treated by customer complaints.

A synopsis of the general procedure to follow is provided on the previous page in the form of a flow chart.

SAFETY ADVICE

- The safety instructions must be followed at all times when working on components, to avoid damage or injury:
- make sure that the battery is properly charged to avoid damaging the computers with a low load,
- use the appropriate tools,
- do not touch the xenon bulbs.

Diagnostic Work Sheet

INFOID:000000001180514

SEF907L

DESCRIPTION

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.

In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

Some conditions may cause the MI to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.



- WHAT Vehicle & engine model
- WHEN Date, Frequencies
- WHERE..... Road conditions
- HOW Operating conditions, Weather conditions, Symptoms

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

WORKSHEET SAMPLE

Customer na	ime MR/MS	Model & Year	VIN		
Engine #		Trans.	Mileage		
Incident Date	e	Manuf. Date	In Service Date		
Fuel and fue	l filler cap	 Vehicle ran out of fuel causing misfire Fuel filler cap was left off or incorrectly screwed on. 			
	Startability	 Impossible to start No combustion affected by the partial combustion NOT affected in the partial combustion NOT affected in the possible but hard to start 	tion Partial combustion hrottle position d by throttle position ers []		
Symptoms	Idling	No fast idle Unstable H Others [High idle 🔲 Low idle]		
- , , , , , , , , , , , , , , , , , , ,	Driveability	Stumble Surge Knock Intake backfire Exhaust backfi Others [Lack of power ire]		
	Engine stall	At the time of start While idling While accelerating While decelerating Just after stopping While loading			
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime			
Frequency		All the time Under certain conditions Sometimes			
Weather con	ditions	Not affected			
	Weather	Fine Raining Snowing	Others []		
	Temperature	🗌 Hot 🗌 Warm 🗌 Cool 🗌] Cold 🔲 Humid °F		
		Cold During warm-up	After warm-up		
Engine conditions		Engine speed			
Road conditi	ons	🗌 In town 🗌 In suburbs 🗌 Hig	nhway 🗌 Off road (up/down)		
Driving conditions		 Not affected At starting While idling At racing While accelerating While cruising While decelerating While turning (RH/LH) 			
		Vehicle speed 0 10 20			
Malfunction i	ndicator lamp	Turned on Not turned on			

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< BASIC INSPECTION >

INSPECTION AND ADJUSTMENT BASIC INSPECTION

BASIC INSPECTION : Description

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NOTE:

Only consult the tests after following the diagnostic procedure chart.

Some specific checks are grouped under the "tests" heading and are used as required in different diagnostic charts.

Basic test	Trouble diagnosis	Reference page
Low pressure fuel supply system check	TEST 1	ECK-10, "BASIC INSPEC- TION : Special Repair Re- quirement (TEST 1: Low Pressure Fuel Supply System Check)"
Internal fuel transfer pump check	TEST 2	ECK-11, "BASIC INSPEC- TION : Special Repair Re- quirement (TEST 2: Internal Fuel Transfer Pump Check)"
High pressure supply pump (Pressure control valve) check	TEST 3	ECK-11, "BASIC INSPEC- <u>TION : Special Repair Re-</u> <u>quirement [TEST 3: High</u> <u>Pressure Supply Pump (Pres-</u> <u>sure Control Valve) Check]"</u>
High pressure supply pump (Volumetric control valve) check	TEST 4	ECK-12, "BASIC INSPEC- <u>TION : Special Repair Re-</u> <u>quirement [TEST 4: High</u> <u>Pressure Supply Pump (Volu-</u> <u>metric Control Valve) Check]</u> "
Rail high pressure regulation check	TEST 5	ECK-15, "BASIC INSPEC- <u>TION : Special Repair Re-</u> <u>quirement (TEST 5: Rail High</u> <u>Pressure Regulation Check)"</u>
Major leak in fuel injectors/fuel injectors open	TEST 6	ECK-19. "BASIC INSPEC- TION : Special Repair Re- quirement (TEST 6: Major Leak in Fuel Injectors/Fuel In- jectors Open)"
Incorrect fuel injection quantity	TEST 7	ECK-20. "BASIC INSPEC- TION : Special Repair Re- quirement (TEST 7: Incorrect Fuel Injection Quantity)"

BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)

NOTE:

CAUSE

- No fuel can be seen in the transparent supply pipe leading to the pump or large air bubbles can be seen (small air bubbles are permitted).
- engine does not start.

1. CHECK CONFORMITY

Check the conformity and presence of the fuel (gasoline instead of diesel, contaminated fuel). <u>Is the inspection result normal?</u>

Yes >> GO TO 2.

No >> Bleed the fuel supply system with the manual priming pump.

< BASIC INSPECTION > [K9K]
2.CHECK FUEL CIRCUIT
Does the fuel circulate correctly when pumped manually?
Yes or No
Yes >> GO TO 5.
3 CHECK FOR LEAK
Are there leaks in the bases and unions?
Yes >> Carry out the required repairs.
No >> GO TO 4.
4.CHECK FUEL FILTER
Check the correctness of the fuel filter.
Is the fuel filter correct?
Yes >> GO TO 5. No >> Replace the fuel filter with a genuine part
5. INSPECTION END
Low pressure circuit OK.
>> INSPECTION END
BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer
Pump Check)
NOTE
CONDITIONS PRIOR TO TEST
- Test 1 Low pressure fuel supply system check has been carried out previously and results are satisfactory.
- Fuel can be seen in the transparent supply pipe leading to the pump.
- However, fuel does not move during starting.
1.CHECK INTERNAL FUEL TRANSFER PUMP
1. Disconnect high pressure supply pump (volumetric control valve) harness connector
2. Remove fuel return pipe from the pump and block it so that it is sealed. Connect a pipe to the pump to measure the flow of diesel
3. To authorise a 15 second cranking engine and carry out this test it is essential to carry out the following
procedure: measure the flow of diesel.
 Perform "SAVE DATA FOR CPU REPLC" in WORK SUPPORT mode with CONSULT-III.
- Perform "PRGRM_REINITIALIZE" in WORK SUPPORT mode with CONSULT-III.
 Cranking engine for at least 15 seconds (starting speed 250 rpm) Check the flow rate of the fuel being collected in a graduated measuring cylinder (500 ml minimum). The
 minimum flow rate must be 25 ml every 15 sec. Perform "WRT DATA AFTR REPLC CPU" in WORK SUPPORT mode with CONSULT-III.
Does the flow measure less than 25ml?
Yes >> Replace high pressure supply pump. No >> GO TO 2.
2.INSPECTION END
Low pressure system OK.

>> INSPECTION END

BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply

< BASIC INSPECTION >

Pump (Pressure Control Valve) Check]

NOTE:

CONDITIONS PRIOR TO TEST

- The entire low pressure system must be in good condition.
- Check the sealing of the high pressure pipes and unions.
- CAUSE
- Rail pressure approximately 5000 kPa(50 bar, 51 kg/cm², 725 psi) during starting.

1.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect high pressure supply pump (pressure control valve) harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between high pressure supply pump (pressure control valve) harness connector and ground.

High pressure supply pump (Pressure control valve)		Ground	Voltage	
Connector	Terminal			
F107	3	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R
- Harness connector E7, F121
- Harness for open or short between IPDM E/R and high pressure supply pump (pressure control valve)
- Harness for open or short between ECM and high pressure supply pump (pressure control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between high pressure supply pump (pressure control valve) harness connector and ECM harness connector.

High pressure supply pump (Pressure control valve)		ECM		Continuity
Connector	Terminal	Connector Terminal		
F107	4	F68	49	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) CHECK

Refer to ECK-82, "Component Inspection".

Is the inspection result normal?

Yes >> INSPECTION END

No >> Replace high pressure supply pump.

BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply

< BASIC INSP	ECTION >				[K9K]
Pump (Volu	metric Co	ontrol Valv	ve) Check]		INFOID:000000001180519
NOTE: • CONDITION	S PRIOR TO	DTEST		n	r
 The entire lov Check the se CAUSE Not enough c 	w pressure s aling of the	system must high pressu	be in good cond re pipes and unions starting	lition. ons.	
 Rail reference 	e pressure o	during startir	a. minimum 15 (000 kPa (150 bar. 153 kg/cm ² . 2175 j	psi).
1. СНЕСК НІС	GH PRESSU		Y PUMP (VOLUI	METRIC CONTROL VALVE)-II	
Refer to ECK-6	39, "Compor	nent Inspecti	on"		
Is the inspectio	on result nor	mal?			
YES >> GC	D TO 2				
	piace nigh p 20 ppcssi		ургуриттр. Ургуриттр		
		DRL SUFFL			
 Turn ignition : 	switch ON.		sconnecteu.		
Select "DATA	MONITOR	" mode with	CONSULT-III.		
 Check that the excitation 	n current be	LOVV_S/V_C	U ^m Indication wh	en the cranking engine.	
YES >> GC	D TO 6.		1.04:		
NO >> GC	D TO 3.				
3.снеск ню	GH PRESSL	JRE SUPPL	Y PUMP (VOLU	METRIC CONTROL VALVE) POWER	R SUPPLY
 Turn ignitic Disconnec Turn ignitic 	on switch OF t high press	F. ure supply p	ump (volumetric	control valve) harness connector.	
 Check the ground. 	voltage bet	ween high p	ressure supply p	ump (volumetric control valve) harne	ess connector and
High pressure s (volumetric co	supply pump ntrol valve)	Ground	Voltage		
Connector	Terminal		C C		
F106	1	Ground	Battery voltage		
Is the inspectio	on result nor	mal?			
YES >> GO	D TO 5.				
			г		
Check the follo					
• IPDM E/R					
 Harness conr Harness for c Harness for c 	nector E7, F open or shor open or shor	121 t between E t between IF	CM and high pre PDM E/R and hig	essure supply pump (volumetric contr h pressure supply pump (volumetric	ol valve) control valve)
-					
>> Re	epair open ci		t to ground or sh		
	TH PRESSU	OPT	T PUMP (VOLU	WETRIC CONTROL VALVE) OUTP	UT SIGNAL CIR-
i. iuniyinuc					

 Disconnect ECM harness connector.
 Check the continuity between high pressure supply pump (volumetric control valve) harness connector and ECM harness connector.

< BASIC INSPECTION >

High pressure supply pump (volumetric control valve)		ECM		Continuity
Connector	Terminal	Connector Terminal		
F106	2	F68	50	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK ENGINE CONDITION

Start engine.

Is the engine start?

YES >> GO TO 7.

NO >> GO TO 9.

7.CHECK ENGINE CONDITION

 Check that the oil level is correct and that the engine coolant temperature is normal operation temperature 60°C (140°F)

• Engine running at idle speed.

- Select "HIGH PRES CIRCUIT LEAK TEST" in "ACTIVE TEST" mode with CONSULT-III.
- Engine will perform 4 acceleration cycles.
- Select "DATA MONITOR" mode with CONSULT-III.
- Check that the "RAIL PRES SET" and "RAIL PRESSURE" indication.
- Does "RAIL PRESSURER" follow "RAIL PRES SET" at ± 5000 kPa(50 bar, 51 kg/cm², 725 psi) during the phase of the 4 acceleration cycles?

NOTE:

If the rail pressure does not reach the setpoint there is an fuel injector leak that is too great or the pressure signal is incorrect.

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 8.

8. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Carry out TEST 5.

>> GO TO 11.

9.CHECK ENGINE CONDITION

• Check that the oil level is correct.

Select "DATA MONITOR" mode with CONSULT-III.

• Check that the "RAIL PRES SET" and "RAIL PRESSURE" indication.

• Does "RAIL PRESSURER" follow "RAIL PRES_SET" when the cranking engine.

NOTE:

If the rail pressure does not reach the setpoint there is an fuel injector leak that is too great or the pressure signal is incorrect.

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 10.

10.CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Carry out TEST 6.

>> GO TO 11.

11.INSPECTION END

High pressure supply pump (volumetric control valve) OK.

А

>> INSPECTION END

BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Reg-	
ulation Check)	ECI
 NOTE: If contaminants (swarf) can be seen in the transparent return pipe, the entire fuel injection system (fuel injectors, pump, rail, high pressure pipes and all return pipes) must be replaced. CONDITIONS PRIOR TO TEST 	С
 Engine coolant temperature between 80 - 90°C (176 - 194°F). All the electrical load are switched off. Air conditioning is switched off. 	D
 The pipe connections and unions have been checked. Check the sealing of the high pressure pipes and unions. CAUSE 	Ε
 Rail pressure variations around the setpoint. The rail reference pressure is not reached. Rough idle. Possibly noisy combustion. 	F
1.CHECK AIR BUBBLES	G
 Start engine Are there large air bubbles in the transparent supply pipe going to the pump? Is the inspection result normal? YES >> Check low pressure system. 	Н
NO >> GO TO 2. 2.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)-I	
Disconnect high pressure supply pump (volumetric control valve) harness connector.	
YES >> GO TO 3. NO >> Replace high pressure supply pump (the high pressure supply pump [volumetric control valve] remains open mechanically).	J
3.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)-I	
 Reconnect high pressure supply pump (volumetric control valve) harness connector. Turn ignition switch OFF and wait at least 30 seconds. Start engine. 	L
 Disconnect high pressure supply pump (pressure control valve) harness connector. <u>Does the engine stop?</u> YES >> GO TO 4. NO >> Replace high pressure supply pump (the high pressure supply pump [pressure control valve] 	M
4.CHECK FUEL INJECTOR	Ν
 Reconnect high pressure supply pump (pressure control valve) harness connector. Wait at least 30 seconds. Start engine and let it idle speed. Select "DATA MONITOR" mode with CONSULT-III. Check that the "F/FLOW_CORR_CYL1", "F/FLOW_CORR_CYL2", "F/FLOW_CORR_CYL3", "F/FLOW_CORR_CYL4" indication. 	0 P
Are the reference value $0.3 - 1.9$? YES >> GO TO 6.	

 ${\bf 5.} {\bf CHECK} \text{ major leak in fuel injector/fuel injectors open}$

Carry out TEST 6.

< BASIC INSPECTION >

>> INSPECTION END

6.CHECK ENGINE CONDITION

- Check that the oil level is correct and that the engine coolant temperature is normal operation temperature.60°C (140°F)
- Engine running at idle speed.
- Select "HIGH PRES CIRCUIT LEAK TEST" in "ACTIVE TEST" mode with CONSULT-III.
- Engine will perform 4 acceleration cycles.
- Select DATA MONITOR mode with CONSULT-III.
- Check that the "RAIL PRES SET" and "RAIL PRESSURE" indication.
- Does "RAIL PRESSURE" follow "RAIL PRES SET" at during the phase of 4 acceleration cycles?

Is the inspection result normal?

YES >> GO TO 22.

NO >> GO TO 7.

7. CHECK ENGINE COOLANT TEMPERATURE AND FUEL TEMPERATURE

- 1. Select "DATA MONITOR" mode with CONSULT-III.
- 2. Check that the "FUEL TEMP" indication when operating at idle speed is between 60 80°C (140 176°F)
- 3. Check that the "WATER TEM" indication is between 80 90°C (176 194°F)

NOTE:

- When the fuel temperature is above 136°C (277°F), the maximum rail pressure is reduced to protect the plastic pipes.
- When the coolant temperature is above 100°C (212°F), the maximum rail pressure is reduced to protect the engine.

Are the "FUEL TEMP" and "WATER TEMP" within the reference value range?

- YES >> GO TO 8.
- NO >> Check the fuel pump temperature sensor (Refer to <u>ECK-96, "Component Inspection"</u>) or engine coolant temperature sensor (Refer to <u>ECK-92, "Component Inspection"</u>).

$\mathbf{8}$. Check high pressure supply pump (volumetric control valve) power supply

- 1. Turn ignition switch OFF.
- 2. Disconnect high pressure supply pump (volumetric control valve) harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between high pressure supply pump (volumetric control valve) harness connector and ground.

High pressure supply pump (volumetric control valve)		Ground	Voltage	
Connector	Terminal			
F106	1	Ground	Battery voltage	

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R
- Harness connector E7, F121
- Harness for open or short between ECM and high pressure supply pump (volumetric control valve)
- Harness for open or short between IPDM E/R and high pressure supply pump (volumetric control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. Check high pressure supply pump (volumetric control valve) output signal circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.

< BASIC INSPECTION >

 Check the continuity between high pressure supply pump (volumetric control valve) harness connector and ECM harness connector.

High pressur (volumetric	e supply pump control valve)	EC	Continuity	
Connector	Terminal	Connector Terminal		
F106	2	F68	50	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair open circuit or short to ground or short to power in harness or connectors. 11.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)-II

Refer to ECK-69, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace high pressure supply pump.

$12. {\sf check high pressure supply pump (pressure control valve) power supply}$

- 1. Turn ignition switch OFF.
- 2. Disconnect high pressure supply pump (pressure control valve) harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between high pressure supply pump (pressure control valve) harness connector and ground.

High pressure (Pressure c	e supply pump ontrol valve)	Ground	Voltage
Connector	Terminal		
F107	3	Ground	Battery voltage

Is the inspection result normal?

13. DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R
- Harness connector E7, F121
- Harness for open or short between IPDM E/R and high pressure supply pump (pressure control valve)
- Harness for open or short between ECM and high pressure supply pump (pressure control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) OUTPUT SIGNAL CIR-	N
CUIT FOR OPEN AND SHORT	_

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between high pressure supply pump (pressure control valve) harness connector and ECM harness connector.

High pressure supply pump (Pressure control valve)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F107	4	F68	49	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

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< BASIC INSPECTION >

YES >> GO TO 15.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)-II

Refer to ECK-82. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace high pressure supply pump.

16.CHECK FUEL RAIL PRESSURE SENSOR POWER SUUPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect fuel rail pressure sensor harness connector.

3. Turn ignition switch ON.

4. Check the voltage between fuel rail pressure sensor harness connector and ground.

Fuel rail pres	ssure sensor	Ground	Voltage (V)	
Connector	Terminal	Oround		
F102	3	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 17.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

17. CHECK FUEL RAIL PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

Fuel rail pre	essure sensor	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F102	2	F85	15	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 18.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

18.CHECK FUEL RAIL PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

Fuel rail pre	essure sensor	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F102	1	F85	19	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 19.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

19.CHECK FUEL RAIL PRESSURE SENSOR

Refer to ECK-98, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 20.

NO >> Replace fuel rail.

20. CHECK FUEL RAIL PRESSURE-I

1. Reconnect all harness connectors disconnected.

< BASIC INSPECTION >	[K9K]	
 Start engine and let it idle s Select "DATA MONITOR" r Check that the "RAIL PRES NOTE: 	speed. node with CONSULT-III. SSURE" indication under the following conditions.	A
An unusual combustion no	ise may be heard.	EC
CONDITION (ENGINE SPEED)	INDICATION	
At idle speed	190 - 210 bar	С
2000 rpm	400 - 500 bar	
3000 rpm	500 - 700 bar	
4000 rpm	700 - 900 bar	D
Is the inspection result normal? YES >> GO TO 22. NO >> GO TO 21. 21.CHECK FUEL RAIL PRES	SSURE-II	E
 Turn ignition switch OFF. Replace fuel rail. Refer to 1 Start engine and let it idles Select "DATA MONITOR" r Check that the "RAIL PRES 	EM-278, "Removal and Installation" speed. node with CONSULT-III. SSURE" indication under the following conditions.	F
NOTE: An unusual combustion no	ise may be heard.	Н
CONDITION (ENGINE SPEED)	INDICATION	
At idle speed	190 - 210 bar	I
2000 rpm	400 - 500 bar	
3000 rpm	500 - 700 bar	
4000 rpm	700 - 900 bar	0
YES >> GO TO 22. NO >> Replace high press 22.INSPECTION END	sure supply pump.	K
High pressure supply pump (vo	lumetric control valve) OK.	L
>> INSPECTION END BASIC INSPECTION : S tors/Fuel Injectors Open	pecial Repair Requirement (TEST 6: Major Leak in Fuel Injec-)	M
NOTE: • CONDITIONS PRIOR TO TE - The entire low pressure syste - Check the sealing of the high - Test 3 High pressure supply p - Test 4 High pressure supply p	ST em must be in good condition. pressure pipes and unions. pump (pressure control valve) check is OK pump (volumetric control valve) check is OK	N 0
 Test 5 Rail high pressure regies CAUSE Not enough or no rail pressure The engine does not start. 1.CHECK FUEL INJECTOR-I 	e during starting.	Ρ

Is the inspection result normal?

< BASIC INSPECTION >

YES >> GO TO 2.

NO >> Replace malfunctioning fuel injector.

2. CHECK INTERNAL FUEL TRANSFER PUMP

- 1. Turn ignition switch OFF.
- 2. Disconnect the return system connections at the fuel injectors and close off the return pipes so they are leak-tight.
- 3. To authorise a 15 second cranking engine and carry out this test it is essential to carry out the following procedure:
- Disconnect high pressure supply pump (volumetric control valve) harness connector
- Turn ignition switch ON.
- Perform "SAVE DATA FOR CPU REPLC" in WORK SUPPORT mode with CONSULT-III.
- Perform "PRGRM_REINITIALIZE" in WORK SUPPORT mode with CONSULT-III.
- Cranking engine for at least 15 seconds (starting speed 250 rpm)
- Perform "WRT DATA AFTR REPLC CPU" in WORK SUPPORT mode with CONSULT-III.
- Is the return volume at the fuel injectors more than 20 ml per fuel injector for the starting phase? **NOTE:**
- Do not repeat this procedure more than 3 times and wait 30 seconds between each 15 second cranking engine.
- Then wait 30 minutes before cranking the engine for 3 15 second cycles.
- Follow this instruction so that the starter does not get damaged.

Does the flow measure more than 20ml?

Yes >> Replace malfunctioning fuel injector.

No >> GO TO 3.

3.CHECK FUEL INJECTOR-II

- 1. Turn ignition switch OFF.
- 2. Reconnect return pipes.
- 3. Start Engine.
- 4. Select "DATA MONITOR" mode with CONSULT-III.
- 5. Check "RAIL PRESSURE" and "RAIL PRES SET" indication.
- 6. Does "RAIL PRESSURE" follow "RAIL PRES SET" during the 3 second cranking engine?

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> GO TO 4.

4.CHECK GLOW PLUG

- 1. Turn ignition switch OFF.
- 2. Remove the glow plugs and check for moisture.
- 3. If the glow plugs are wet with fuel, it is possible that the fuel injector is leaking.

Are the glow plugs wet with fuel?

- Yes >> Replace malfunction fuel injector.
- No >> Replace high pressure supply pump.

5.INSPECTION END

Fuel injector system OK.

>> INSPECTION END

BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)

NOTE:

CONDITIONS PRIOR TO TEST

- The entire low pressure system must be in good condition.
- Check the sealing of the high pressure pipes and unions.
- Test 3 High pressure supply pump (pressure control valve) check is OK
- Test 4 High pressure supply pump (volumetric control valve) check is OK
- Test 5 Rail high pressure regulation circuit check is OK.

< BASIC INSPECTION >	K9K]
 All the electrical loads are switched off. Air conditioning is switched off. CAUSE 	A
- The engine runs poorly at idle speed, possibly emits white smoke.	
1.CHECK FUEL INJECTOR	ECk
Refer to ECK-100, "Component Inspection".	
Is the inspection result normal?	C
YES >> GO TO 2. NO >> Replace malfunctioning fuel injector.	C
Z .CHECK ENGINE COOLANT TEMPERATURE AND FUEL TEMPERATURE	D
 Start engine let it idle speed. Select "DATA MONITOR" mode with CONSULT-III. Check "FUEL TEMP" indication is above 60°C (140°F) Check "F/FLOW CORR CYL1", "F/FLOW CORR CYL2", "F/FLOW CORR CYL3", "F/FLOW CORR (indication. 	CYL4" E
Are the reference value 0.3 - 1.9? YES >> GO TO 3. NO >> GO TO 4	F
3. CHECK INTERNAL FUEL TRANSFER PUMP	
	G
 Disconnect the return system connections at the fuel injectors and close off the return pipes so the leak-tight. While the engine is idling, check the return flow rate at the fuel injector. After 5 minute return volume must be between 16 - 24 ml per fuel injector. 	ey are es the H
Is there more than 24 ml or less than 16 ml of return for each fuel injector?	
Yes >> Replace malfunctioning fuel injector. No >> INSPECTION END	
4.CHECK COMPRESSION PRESSURE	
Check compression pressure. Refer to EM-264, "Inspection".	J
>> INSPECTION END ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT	K
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description	10001180523
When replacing ECM, this procedure must be performed.	
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair F	₹e- M
quirement	0001180524
1.PRECONDITIONING	N
 Connect a CONSULT-III Connect a battery charger Electric load switch is OFF Wait for the engine to cool [engine coolant temperature < 60°C (140°F and air temperature < 50°C (12 NOTE: 	0 2°F)].
While the ECM is being programmed the cooling fan motors are triggered automatically.	Р
>> GO TO 2. 2.SAVE ECM DATA	

Turn ignition switch ON. Perform "SAVE DATA FOR CPU REPLC" in WORK SUPPORT mode with CONSULT-III.

< BASIC INSPECTION >

>> GO TO 3. 3.replace ecm

Replace ECM.

>> GO TO 4.

4.WRITE ECM DATA

- 1. Turn ignition switch OFF, wait at least 30 seconds and then turn ON.
- Perform "PRGRM_REINITIALIZE" in WORK SUPPORT mode with CONSULT-III. 2.
- 3. Perform "WRT DATA AFTR REPLC CPU" in WORK SUPPORT mode with CONSULT-III.
- Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-9, "ECM 4 **RE-COMMUNICATING FUNCTION : Description**".
- Turn ignition switch OFF, wait at least 30 seconds and then turn ON. 5.
- Select "DATA MONITOR" mode in ECM with CONSULT-III. 6.
- 7. Check that the "CODE PROGRAM" indication.

Which is displayed on CONSULT-III?

YES >> GO TO 6.

NO >> GO TO 5.

5.WRITE ECM DATA

- 1. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-9, "ECM **RE-COMMUNICATING FUNCTION : Description".**
- Turn ignition switch OFF, wait at least 30 seconds and then turn ON. 2.
- 3. Select "DATA MONITOR" mode in ECM with CONSULT-III.
- Check that the "CODE PROGRAM" indication. 4

Which is displayed on CONSULT-III?

YES >> GO TO 6.

NO >> Repeat above steps.

6.PERFORM VIN REGISTRATION

- 1. Start engine and warm it up to normal operating temperature. NOTE:
 - The start-up phase may last up to 30 seconds.
- 2. Turn ignition switch OFF, wait at least 30 seconds and then turn ON.
- Perform "WRITE VIN" in WORK SUPPORT mode with CONSULT-III. 3.
- 4. Follow the instruction of CONSULT-III display.

NOTE:

After replace ECM, stored DTC may appear on other control unit. Clear the malfunction memory of these control unit.

>> END

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Description

INFOID:0000000001180525

EGR Volume Control Valve Closed Position Learning is an operation to learn the fully closed position of the EGR volume control valve by monitoring the EGR volume control valve control position sensor output signal.

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement

INFOID:000000001180526

1.START

- 1. Turn ignition switch ON.
- Perform "EGR ADAPTIVES" in WORK SUPPORT mode with CONSULT-III. 2.
- Turn ignition switch OFF.and wait at least 30 seconds. 3.
- 4. Start engine and let it idle.

			INSF	PECTION	AND	ADJUSTME	NT				
< E	BASIC INSPE		1>							[K9K]	
5. 6.	Select "DATA Check that th	MON e "NE	ITOR" mode w W EGR/V OFF	vith CONSUL SET" and "L	_T-III. _AST E	GR/V OFSET" in	dication.				А
	0.75V	<	NEW EGR/	V OFFSET	=	LAST EGR/V (OFSET	<	1.5V		FOK
	>> END										ECK
											С
											D
											Е
											F
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< FUNCTION DIAGNOSIS >

FUNCTION DIAGNOSIS ENGINE CONTROL SYSTEM

System Diagram

INFOID:000000001180527



- 1. Mass air flow sensor signal
- 4. Throttle position sensor signal
- 7. High Pressure Supply Pump (volumetric Control Valve) signal
- 10. Fuel Pump Temperature Sensor
- 13. Crankshaft Position Sensor signal
- 16. Refrigerant pressure sensor signal
- 19. Brake switch signal
- 22. Fuel tank
- 25. High Pressure Supply Pump
- 28. High Pressure Supply Pump (high pressure pump)

- 2. Intake air temperature sensor signal 3.
- 5. EGR Volume Control Valve Control Position Sensor signal
- 8. High Pressure Supply Pump (pressure Control Valve) signal
- 11. Glow plug
- 14. Camshaft Position Sensor signal
- 17. Accelerator pedal position sensor signal
- 20. CAN communication
- 23. Fuel pump
- 26. High Pressure Supply Pump (internal transfer pump)
- 29. High Pressure Supply Pump (pressure Control Valve)

- Turbocharger boost sensor signal
- Turbocharger boost control solenoid valve signal
- Fuel rail pressure sensor signal
- 12. Engine coolant temperature sensor signal
- 15. Barometric pressure sensor signal
- 18. Clutch switch signal
- 21. Glow plug signal
- 24. Fuel filter

6.

9.

- 27. High Pressure Supply Pump (volumetric Control Valve)
- Mass air flow sensor (with intake air temperature sensor)



< FUNCTION DIAGNOSIS >

- 31. Compressor
- 34. ECM
- 37. Fuel injector

32. Charge air cooler 35. EGR volume control valve

38. EGR cooler

- 33. Electric throttle control actuator
- 36. Fuel rail

INFOID:000000001180528

INFOID:000000001180529

System Description

ECM performs various controls such as fuel injection control and furl pressure control.

Component Parts Location



- Fuel injector 1.
- 4. Crankshaft position sensor
- 7. Glow relay
- 10. Mass air flow sensor (with intake air 11. Electric throttle control actuator temperature sensor)
- 13. EGR volume control valve
- 2. Glow plug
- 5. Turbocharger boost sensor
- 8. Turbocharger boost control solenoid valve
- 3. Fuel rail pressure sensor
- 6. Engine coolant temperature sensor
- ECM 9.
- 12. Camshaft position sensor
- **ECK-25**

[K9K]

А

ECK

ENGINE CONTROL SYSTEM

< FUNCTION DIAGNOSIS >



 \triangleleft : Vehicle front

1. Mass air flow sensor (with intake air 2. Engine coolant temperature sensor temperature sensor)



- 1. Camshaft Position Sensor
- 2. Fuel injector



<□: Vehicle front

- 1. Crankshaft position sensor
- 2. Turbocharger boost control solenoid valve



 \triangleleft : Vehicle front

1. Turbocharger boost sensor

2. Refrigerant pressure sensor

ENGINE CONTROL SYSTEM

< FUNCTION DIAGNOSIS >



1. EGR volume control valve

2. Glow plug



- 1. ASCD steering switch
- 4. CANCEL switch
- 2. RESUME/ACCELERATE switch
- 5. MAIN switch



- 1. Accelerator pedal position sensor 2.
- 2. Stop lamp switch
- 3. Brake pedal

3.

SET/COAST switch



- 1. Fuel rail pressure sensor
- A. View with battery removed
- 2. Glow relay

ECM 3.

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ECK

[K9K]

ENGINE CONTROL SYSTEM

< FUNCTION DIAGNOSIS >



- 1. Electric throttle control actuator 2. Clutch s
 - Clutch switch

3. Clutch pedal



1. Body ground E17

Component Description

INFOID:000000001180530

Component	Reference
Accelerator pedal position sensor	ECK-155, "Description"
ASCD steering switch	ECK-136, "Description"
Clutch switch	ECK-148, "Description"
Cooling fan motor	ECK-170, "Description"
Electric throttle control actuator	ECK-93, "Description"
Engine coolant temperature sensor	ECK-91, "Description"
Fuel pump temperature sensor	ECK-95, "Description"
Fuel rail pressure sensor	ECK-97, "Description"
Intake air temperature sensor	ECK-89, "Description"
Mass air flow sensor	ECK-86, "Description"
Refrigerant pressure sensor	ECK-128, "Description"
Stop lamp switch	ECK-173, "Description"
Throttle control motor	ECK-93, "Description"
Throttle position sensor	ECK-93, "Description"
Turbocharger boost sensor	ECK-109, "Description"
Vehicle speed sensor	ECK-127, "Description"

System Description

SYSTEM DESCRIPTION

The high pressure injection system is designed to deliver a precise quantity of diesel fuel to the engine at a set moment. The Siemens VDO piezo Common Rail system used on the K9K Step 2 engine is a second generation Common Rail injection system. Fuel pressure in the rail can reach a maximum of 1,600 bar. It uses fuel injectors controlled by piezoelectric actuators. The fuel is pressurised by means of a high pressure pump then sent to a rail which supplies the four fuel injectors.

- The circuit comprises two subsystems, which are distinguished by the fuel pressure level:
- the low pressure circuit comprises the tank, the diesel fuel filter, the transfer pump and the fuel injector return lines,
- the high-pressure circuit comprises the high-pressure (HP) pump, the rail, the fuel injectors and the high-pressure (HP) pipes.

Finally, there are a number of control sensors and actuators which enable the entire system to be controlled and monitored.

I he system comprises:	_
- Priming bulb	F
- Fuel filter	
- High pressure supply pump	
- Fuel rail	G
- Fuel rail pressure sensor	
- Fuel injector	
- Fuel pump temperature sensor	Ц
- Engine coolant temperature sensor	П
- Camshaft position sensor	
- Crankshaft position sensor	
- Turbocharger boost sensor	
 EGR volume control valve control position sensor 	

- EGR volume control valve
- Barometric pressure sensor (built in ECM)
- Mass air flow sensor
- Intake air temperature sensor
- Electric throttle control actuator

High Pressure Supply Pump

The high pressure supply pump consists of the following components:

- Internal fuel transfer pump:
- This pump is a vane-type rotary pump. It draws in fuel from the fuel tank through a fuel filter and supplies the high pressure pump with fuel.
- Volumetric control valve:
- This solenoid valve regulates the flow of fuel entering the high pressure pump and enables an optimum quantity of fuel to be pressurised according to operating phase; this improves the output of the high pressure supply pump and thereby the output of the engine as well.
- High pressure pump:

-	This	pump is a 3-piston	adial pump, it generates the required pressure in the rail.	N
•	Droc	source control values		

- Pressure control valve:
- This solenoid valve regulates the output pressure of the high pressure pump.

Fuel Injector (Piezo Type)

CAUTION:

The fuel injector voltage is very high (much higher than that of conventional fuel injectors). This voltage can be as much as 150 V.

The piezo fuel injectors enable rapid, precise metering of the quantity of fuel injected, with excellent injection process repetitivity.

The piezo actuator operates like a capacitor. To control the fuel injector, the computer sends, at the correct time, a quantity of energy which is sufficient to enable the actuator to deform and the fuel injector to open. During the injection period, the piezo actuator stores this energy.

At the end of the injection period, the computer recovers the energy sent at the start of the control operation. The piezo actuator discharges and returns to its original shape. The fuel injector closes. To improve output, the

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< FUNCTION DIAGNOSIS >

energy returned by the piezo actuator is reused, which keeps down the amount of energy that has to be supplied for the next injection process.

Engine Synchronisation

One of the determining factors for fuel injection control is knowing the position of each of the pistons in their respective cylinders at all times.

The angular position is measured by means of a magneto-inductive sensor which is excited by the teeth machined onto the flywheel; this is known as the crankshaft position sensor. The flywheel has 60 teeth, each 6 degrees apart; 2 of these teeth are missing to form a notch.

A second sensor (Hall-effect sensor), stimulated by a tooth machined onto the camshaft, which turns at half the engine speed, provides a signal relating to the progress of the injection cycle. Indeed, when the piston of cylinder 1 is at top dead centre (TDC), either at the end of the compression stroke or at the end of the exhaust stroke, the camshaft position sensor enables a distinction to be made between these two states.

By comparing the signals from these two sensors, the computer is able to provide all its systems with synchronisation parameters, namely: the angular position of the flywheel, engine speed, the number of the active fuel injector and the progress of the injection cycle.

This module also supplies the system with the rotation speed signal.

The camshaft position sensor is only used when starting the engine. As soon as the engine is running by itself (not being cranked by the starter), the signal provided by the crankshaft position sensor is sufficient. If the camshaft position sensor should fail while the engine is running, this will not affect the operation of the engine.

Quantity of Fuel Injected and Control of Start of Injection

- The parameters for controlling injection are, for each cylinder, the quantity to be injected and the start of injection. These are calculated by the ECM from the following information:
- Engine speed.
- Accelerator pedal position.
- Turbocharge air pressure.
- Engine coolant temperature.
- Intake air temperature.
- Fuel pump temperature.
- Mass air flow.
- Pressure of fuel in the rail.

Station to Station Flow Regulation

The aim of this regulation process is to facilitate smooth engine operation by compensating for the system variations (fuel injectors, compression rate, etc.) which affect the torque generated by each cylinder during combustion.

The regulation process is only active at idle speed, with a warm engine and on condition that the engine speed is sufficiently stable. An injection timing correction coefficient is assigned to each cylinder; this is "learning" all the time the regulation process is active and remains fixed at the last value that was learned when the regulation is inactive.

At each new cycle, the coefficients are initialised to 1.

Cylinder Balancing Control

This controller allows smooth behavior of running engine, reduction of noise and oscillations in the drivetrain by compensating for system dispersions (fuel injectors, compression ratio, manufacturing tolerances of cylinders or valves...) having an influence on the torque generated by each cylinder during combustion.

The controller is only activated if engine is in idle, warm and not too rough. Corrective coefficient on the injection time is associated with each cylinder that is learnt as soon as the regulation is active. Otherwise it remains with its last memorized value.

At each new driving cycle, coefficients are initialized to 1.

< FUNCTION DIAGNOSIS >

Component Parts Location

[K9K]



- 10. Mass air flow sensor (with intake air 11. Electric throttle control actuator temperature sensor)
- 13. EGR volume control valve

1.

4.

7.

- Turbocharger boost control solenoid 9. valve
- ECM
- 12. Camshaft position sensor

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< FUNCTION DIAGNOSIS >



 \triangleleft : Vehicle front

1. Mass air flow sensor (with intake air 2. Engine coolant temperature sensor temperature sensor)



- 1. Camshaft Position Sensor
- 2. Fuel injector



<□: Vehicle front

- 1. Crankshaft position sensor
- 2. Turbocharger boost control solenoid valve



C: Vehicle front

- 1. Turbocharger boost sensor
- 2. Refrigerant pressure sensor

< FUNCTION DIAGNOSIS >



1. EGR volume control valve

2. Glow plug



- 1. ASCD steering switch
- 4. CANCEL switch
- 2. RESUME/ACCELERATE switch
- 5. MAIN switch



- 1. Accelerator pedal position sensor 2.
- 2. Stop lamp switch
- 3. Brake pedal

3.

SET/COAST switch



- 1. Fuel rail pressure sensor
- A. View with battery removed
- 2. Glow relay

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< FUNCTION DIAGNOSIS >



1. Electric throttle control actuator 2. Clutch switch

3. Clutch pedal



1. Body ground E17

TURBOCHARGER BOOST CONTROL

< FUNCTION DIAGNOSIS >

TURBOCHARGER BOOST CONTROL

Vacuum Hose Drawing

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4. Rocker cover 5. Vacuum pump

NOTE: Do not use soapy water or any type of solvent while installing vacuum hose.

System Description

1.

The turbocharger system consists of a solenoid valve connected to the vacuum pump circuit; this enables the vanes to be controlled by means of a diaphragm so as to create either an overpressure or a vacuum in the fresh air inlet circuit.

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TURBOCHARGER BOOST CONTROL

< FUNCTION DIAGNOSIS >

Component Parts Location

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[K9K]



- Fuel injector 1.
- 4. Crankshaft position sensor
- 7. Glow relay
- 10. Mass air flow sensor (with intake air 11. Electric throttle control actuator temperature sensor)
- 13. EGR volume control valve
- 2. Glow plug
- 5. Turbocharger boost sensor
- 8. Turbocharger boost control solenoid 9. valve
- Fuel rail pressure sensor 3.
- 6. Engine coolant temperature sensor
 - ECM
- 12. Camshaft position sensor
TURBOCHARGER BOOST CONTROL

< FUNCTION DIAGNOSIS >

[K9K]



C: Vehicle front

1. Mass air flow sensor (with intake air 2. Engine coolant temperature sensor temperature sensor)



- 1. Camshaft Position Sensor
- 2. Fuel injector



C : Vehicle front

- 1. Crankshaft position sensor
- 2. Turbocharger boost control solenoid valve



C: Vehicle front

1. Turbocharger boost sensor

2. Refrigerant pressure sensor

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TURBOCHARGER BOOST CONTROL

< FUNCTION DIAGNOSIS >



1. EGR volume control valve

2. Glow plug



- 1. ASCD steering switch
- 2. RESUME/ACCELERATE switch
- SET/COAST switch

3.

- 4. CANCEL switch
- 5. MAIN switch



- 1. Accelerator pedal position sensor
- 2. Stop lamp switch
- 3. Brake pedal



1. Fuel rail pressure sensor

Α.

View with battery removed

2. Glow relay

3. ECM

TURBOCHARGER BOOST CONTROL

< FUNCTION DIAGNOSIS >



1. Electric throttle control actuator 2. Clutch switch



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< FUNCTION DIAGNOSIS >

EGR SYSTEM

System Description

EGR SYSTEM

EGR Valve Control

The EGR (exhaust gas recirculation) system consists of a direct current EGR volume control valve fitted with a EGR volume control valve control position sensor. The EGR volume control valve is controlled in a closed-loop via the EGR volume control valve control position sensor. Up to a certain rate, exhaust gas recirculation enables nitrogen oxide (NOx) emissions to be reduced significantly.

Measurement of the Fresh Air Flow

The flow of fresh air entering the engine is calculated by a mass air flow sensor (ratiometric hot-wire sensor). An intake air temperature sensor is integrated into the mass air flow sensor.

The mass air flow sensor facilitates control of the quantity of exhaust gas sent for recirculation, thus ensuring the best possible recirculation rates. Air flow measurement allows closed-loop control via the EGR valve.

Component Parts Location



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[K9K]

EGR SYSTEM

< FUNCTION DIAGNOSIS >

- 1. Fuel injector
- Crankshaft position sensor 4.
- 7. Glow relay
- 10. Mass air flow sensor (with intake air 11. Electric throttle control actuator temperature sensor)
- 13. EGR volume control valve
- 2. Glow plug
- 5. Turbocharger boost sensor
- 8. Turbocharger boost control solenoid 9. valve
- 3. Fuel rail pressure sensor
- 6. Engine coolant temperature sensor
- ECM
- 12. Camshaft position sensor



C: Vehicle front

1. Mass air flow sensor (with intake air 2. Engine coolant temperature sensor temperature sensor)



- 1. Camshaft Position Sensor
- 2. Fuel injector



C: Vehicle front

- Crankshaft position sensor 1.
- 2. Turbocharger boost control solenoid valve

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EGR SYSTEM

< FUNCTION DIAGNOSIS >



- C : Vehicle front
- 1. Turbocharger boost sensor
- 2. Refrigerant pressure sensor



1. EGR volume control valve 2. Glow plug



- 1. ASCD steering switch
- 2. RESUME/ACCELERATE switch
- 3. SET/COAST switch

3.

Brake pedal

4. CANCEL switch

Accelerator pedal position sensor

1.

5. MAIN switch

2.



Stop lamp switch

ECK-42

EGR SYSTEM

< FUNCTION DIAGNOSIS >



- 1. Fuel rail pressure sensor
- 2. Glow relay

3. ECM

A. View with battery removed



1. Electric throttle control actuator 2. Clutch switch

3. Clutch pedal



1. Body ground E17

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< FUNCTION DIAGNOSIS >

IDLE SPEED CONTROL

System Diagram

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- 1. Engine speed in rpm
- 2. Engine coolant temperature °C

System Description

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The ECM is responsible for regulating the idle speed as a function of the idle speed setpoint which it calculates.

- The idle speed setpoint is dependent on:
- Engine coolant temperature
- Emission control program
- Air conditioning requirement
- Gear engaged
- Electrical load
- Battery voltage

< FUNCTION DIAGNOSIS >

Component Parts Location



Glow relay 7.

1.

4.

- 10. Mass air flow sensor (with intake air 11. Electric throttle control actuator temperature sensor)
- 13. EGR volume control valve
- 8. Turbocharger boost control solenoid 9. valve
- ECM
- 12. Camshaft position sensor

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< FUNCTION DIAGNOSIS >



 \triangleleft : Vehicle front

1. Mass air flow sensor (with intake air 2. Engine coolant temperature sensor temperature sensor)



- 1. Camshaft Position Sensor
- 2. Fuel injector



: Vehicle front

- 1. Crankshaft position sensor
- 2. Turbocharger boost control solenoid valve



C: Vehicle front

1. Turbocharger boost sensor

2. Refrigerant pressure sensor



< FUNCTION DIAGNOSIS >



- 1. EGR volume control valve
- 2. Glow plug



- 1. ASCD steering switch
- 4. CANCEL switch
- 2. RESUME/ACCELERATE switch
- 5. MAIN switch



- 1. Accelerator pedal position sensor 2.
- 2. Stop lamp switch
- 3. Brake pedal

3.

SET/COAST switch



- 1. Fuel rail pressure sensor
- A. View with battery removed
- 2. Glow relay

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< FUNCTION DIAGNOSIS >



1. Electric throttle control actuator 2. Clutch switch

3. Clutch pedal



1. Body ground E17

< FUNCTION DIAGNOSIS >

ENGINE TORQUE CONTROL

System Description

The torque structure is the system which translates the driver's request into a torque supplied by the engine. It is required for certain functions such as the electronic stability program (ESP), the automatic gearbox or the sequentialgearbox if fitted).

Each inter-system (ESP, automatic gearbox, sequential gearbox) sends the ECM a torque request viathe CAN communication. The computer arbitrates between the inter-system torque requests and the driver's request (comprised of the accelerator pedal or the cruise control/speed limiter function). The result of the arbitration gives thetorque setpoint.

From this torque setpoint, the computer determines the quantity of fuel to be injected (injection duration and numberof injections) and the amount of air required (turbocharging pressure and EGR rate) so that the engine is able toprovide the torque required in the best possible conditions (in terms of smooth running performance, pollutantemissions, etc.).

Component Parts Location



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< FUNCTION DIAGNOSIS >

- 1. Fuel injector
- 4. Crankshaft position sensor

temperature sensor) 13. EGR volume control valve

7. Glow relay

- 2. Glow plug
- 5. Turbocharger boost sensor
- 8. Turbocharger boost control solenoid 9. valve
- 10. Mass air flow sensor (with intake air 11. Electric throttle control actuator
- 3. Fuel rail pressure sensor
 - Engine coolant temperature sensor
- 9. ECM

6.

12. Camshaft position sensor



C: Vehicle front

1. Mass air flow sensor (with intake air 2. Engine coolant temperature sensor temperature sensor)



1. Camshaft Position Sensor

2. Fuel injector



C: Vehicle front

- 1. Crankshaft position sensor
- 2. Turbocharger boost control solenoid valve

< FUNCTION DIAGNOSIS >

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- C: Vehicle front
- 1. Turbocharger boost sensor
- 2. Refrigerant pressure sensor



EGR volume control valve Glow plug 1. 2.



- ASCD steering switch 1.
- 2. **RESUME/ACCELERATE** switch
- 3. SET/COAST switch

- 4. CANCEL switch
- 5. MAIN switch



- Accelerator pedal position sensor 2. 1.
- Stop lamp switch
- 3. Brake pedal
- **ECK-51**

< FUNCTION DIAGNOSIS >



- 1. Fuel rail pressure sensor
- 2. Glow relay

3. ECM

A. View with battery removed



1. Electric throttle control actuator 2. Clutch switch

3. Clutch pedal



1. Body ground E17

< FUNCTION DIAGNOSIS >

GLOW CONTROL

System Description

Glow control involves controlling the glow plugs and the glow plugs "on" indicator light on the instrument panel (via the can communication). The glow plugs are activated by a relay box and the power is provided by the battery.

After the ignition is switched on. Preheating is activated for a period of time. The indicator light comes on for the activation period which is dependent on the battery voltage, barometric pressure and engine coolant temperature. When the engine coolant temperature is below a certain threshold, a postheating function enables combustion stability, and thereby engine operation, to be improved (reduction in unburnt fuel and pollutant emissions).

Component Parts Location



- 1. Fuel injector
- 4. Crankshaft position sensor
- 2. Glow plug
- 5. Turbocharger boost sensor
- 3. Fuel rail pressure sensor
- 6. Engine coolant temperature sensor

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< FUNCTION DIAGNOSIS >

13. EGR volume control valve

7. Glow relay

- 8. Turbocharger boost control solenoid 9. ECM valve
- 10. Mass air flow sensor (with intake air 11. Electric throttle control actuator temperature sensor)
- 12. Camshaft position sensor
- C: Vehicle front
- 1. Mass air flow sensor (with intake air 2. Engine coolant temperature sensor temperature sensor)



- 1. Camshaft Position Sensor
- 2. Fuel injector



C: Vehicle front

- 1. Crankshaft position sensor
- 2. Turbocharger boost control solenoid valve

< FUNCTION DIAGNOSIS >

[K9K]



- \triangleleft : Vehicle front
- 1. Turbocharger boost sensor
- 2. Refrigerant pressure sensor



1. EGR volume control valve 2. Glow plug



- 1. ASCD steering switch
- 2. RESUME/ACCELERATE switch
- 3. SET/COAST switch

- 4. CANCEL switch
- 5. MAIN switch



- 1. Accelerator pedal position sensor 2.
- Stop lamp switch
- 3. Brake pedal
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< FUNCTION DIAGNOSIS >

[K9K]



- 1. Fuel rail pressure sensor
- 2. Glow relay

3. ECM

A. View with battery removed



1. Electric throttle control actuator 2. Clutch switch

3. Clutch pedal



1. Body ground E17

< FUNCTION DIAGNOSIS >

COOLING FAN CONTROL

System Description

The cooling fan motor is controlled by the ECM.

COOLING FAN OPERATION WITH THE ENGINE RUNNING

Cooling fan operate is guaranteed by a 2-speed fan assembly (LOW speed and HIGH speed). The ECM requests the IPDM E/R to actuate them via the can communication. To provide cooling:

- Engine running
- LOW speed is actuated when the engine coolant temperature exceeds 96 °C (205°F) and is deactivated when it drops below 94 °C (201°F).
- HIGH speed is actuated when the engine coolant temperature exceeds 104 °C (219°F) and is deactivated when it drops below 102 °C (216°F).
- If the engine coolant temperature exceeds the threshold of 115°C (239°F), the ECM requests the IPDM E/R, via the CAN communication, to switch off the air conditioning compressor so as to reduce the load on the Ε engine and attempt to limit the rise in temperature. The cut-off request is cancelled if the engine coolant temperature drops below 110°C (230°F).
- If a malfunction in the engine coolant temperature sensor circuit is detected, the ECM requests that HIGH speed operation.
- In addition to engine management, the ECM centralises the cooling requirements for the climate control and automatic transmission/sequential gearbox functions (where fitted).

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< FUNCTION DIAGNOSIS >

Component Parts Location

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- Fuel injector 1.
- 4. Crankshaft position sensor
- 7. Glow relay
- 10. Mass air flow sensor (with intake air 11. Electric throttle control actuator temperature sensor)
- 13. EGR volume control valve
- 2. Glow plug
- 5. Turbocharger boost sensor
- 8. Turbocharger boost control solenoid 9. valve
- Fuel rail pressure sensor 3.
- 6. Engine coolant temperature sensor
 - ECM
- 12. Camshaft position sensor

< FUNCTION DIAGNOSIS >

[K9K]



C: Vehicle front

1. Mass air flow sensor (with intake air 2. Engine coolant temperature sensor temperature sensor)



- 1. Camshaft Position Sensor
- 2. Fuel injector



└□: Vehicle front

- 1. Crankshaft position sensor
- 2. Turbocharger boost control solenoid valve



C: Vehicle front

1. Turbocharger boost sensor

2. Refrigerant pressure sensor

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< FUNCTION DIAGNOSIS >



1. EGR volume control valve

2. Glow plug



- 1. ASCD steering switch
- 2. RESUME/ACCELERATE switch
- SET/COAST switch

3.

- 4. CANCEL switch
- 5. MAIN switch



- 1. Accelerator pedal position sensor
- 2. Stop lamp switch
- 3. Brake pedal



1. Fuel rail pressure sensor

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View with battery removed

2. Glow relay

3. ECM

< FUNCTION DIAGNOSIS >

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CAN COMMUNICATION

System Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

Refer to LAN-28, "CAN Communication Signal Chart", about CAN communication for detail.

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ON BOARD DIAGNOSTIC (OBD) SYSTEM

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

The ECM controls the display on the instrument panel of certain information relating to the operation of the engine.

Four functions are involved here: The OBD malfunction indicator [MI (Yellow)] for the EOBD (European On Board Diagnostics), the pre/post heating, the engine coolant temperature and engine malfunction [MI (Red)]. These four functions are represented by four lights given out by the ECM

GLOW LAMP

This lamp indicates that the glow control system has been activated.

ENGINE COOLANT TEMPERATURE LIGHT

This light is used as an indicator of engine overheating.

• In the event of overheating, it is up to the driver whether to stop the vehicle or not.

MALFUNCTION INDICATOR

The OBD malfunction indicator [MI (Yellow)] is used to alert the driver to the existence of engine control system malfunctions involving excessive pollution or if the EOBD system is deactivated.

The ECM makes a request for lighting of the MI (Yellow) only where there is a malfunction present at the end of three consecutive cycles.

The 3-second visual check upon powering up (automatic test procedure controlled by the IPDM E/R) is performed by the ECM.

In the event of a confirmed OBD malfunction by lighting of the MI, no flashing of the light must be observed following the lighting test.

DTC	Description	Reference page	
P0201	Cylinder 1 fuel injector control circuit	ECK-101	
P0202	Cylinder 2 fuel injector control circuit	ECK-101	
P0203	Cylinder 3 fuel injector control circuit	ECK-101	J
P0204	Cylinder 4 fuel injector control circuit	ECK-101	
P0409	EGR Volume control valve control position sensor circuit	ECK-120	
P0606	ECM	ECK-139	K
P2413	EGR volume control valve	ECK-163	

DTCs Causing MI to Light

ENGINE WARNING LIGHT

In the event of an engine malfunction, the ECM may request the display of an engine warning light [MI (Red)].

HOW TO ERASE DTC, 1ST TRIP DTC AND 2ND TRIP DTC

With CONSULT-III

The emission related diagnostic information in the ECM can be erased by selecting "ALL ERASE" in the "Description" of "FINAL CHECK" mode with CONSULT-III.

MI OPERATION CHART

Some malfunction must switch on MI to warn driver, that his engine emissions exceed OBD thresholds (Euro 3 x 2.5).

The rule is to switch on MI after 3 consecutive driving cycles (engine start + engine stop + power latch) with a present OBD malfunction.

To switch off the MI (without CONSULT-III), vehicle has to drive 3 consecutive cycles without present OBD malfunction.

Ignition switch OFF \rightarrow ON transition, MI remains switched on in pre-drive check mode until engine start. If MI does not switch off whereas engine is running, there is at least one present OBD malfunction.

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ON BOARD DIAGNOSTIC (OBD) SYSTEM

< FUNCTION DIAGNOSIS >



- 1. Present malfunction
- 2. Driving cycle counter
- 3. Warm up cycle counter

- 4. Memorised malfunction
- 5. MI state

NOTE: Driving cycle and warm up cycle are both detected in the same cycle.

	NT DIAGNO	POWER S		ID GROUND CIRCUIT	[K9K]
			IOSIS		<u> </u>
POWER	SUPPLY	AND GR		RCUIT	A
Diagnosis	Procedure	9			INFOID:000000001180549
1.INSPECT	ION START				EO
Start engine.					С
Is engine run	ning?				
NO >> (GO TO 8. GO TO 2.				D
2.снеск е	CM POWER	SUPPLY CIR	CUIT-I		
 Turn igni Check th 	tion switch OI e voltage betv	FF and then C ween ECM ha	DN. arness connec	tor and ground.	E
E	СМ	Cround	Valtaga	-	F
Connector	Terminal	Ground	voltage	_	
F68	69	Ground	Battery voltage	_	G
YES >> (<u>tion result nor</u> GO TO 4.	<u>mai?</u>			0
NO >> (GO TO 3.				н
3.DETECT	MALFUNCTIO	ONING PART			
 Check the fol 10A fuse (N 	lowing. Jo. 5)				
 Harness for 	r open or sho	rt between EC	CM and fuse		I
>> F	Renair open c	ircuit or short	to around or s	bort to power in barness or connectors	
4.CHECK G		NECTION-I	to ground or t		J
1. Turn igni	tion switch OI	FF.			
2. Check gr	ound connection result nor	tion E17. Refe mal?	er to Ground I	nspection in <u>GI-41, "Circuit Inspection"</u> .	K
YES >> (GO TO 5.	<u>Indi.</u>			
NO >> F	Repair or repla	ace ground co	onnection.		L
				J SHORT-I	<u> </u>
2. Check th	e continuity b	etween ECM	harness conn	ector and ground.	IVI
	014				
Connector	Terminal	Ground	Continuity		N
	123			-	
F60	124	Ground	Existed		0
200	125		Existed		
	128	r chart to pou			Р
Is the inspect	tion result nor	mal?	юI.		
YES >> (GO TO 6.	ine di second	·		
	Kepair open c		to power in ha	arness or connectors.	
		JUFFLI CIK			

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1. Turn ignition switch OFF and wait at least 10 seconds.

POWER SUPPLY AND GROUND CIRCUIT

< COMPONENT DIAGNOSIS >

2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltago	
Connector	Terminal		voltage	
500	53	<u> </u>	After turning ignition switch OFF, battery volt-	
F68	54	Ground	age will exist for a few seconds, then drop ap- proximately 0V.	

Is the inspection result normal?

YES >> GO TO 12.

NO-1 >> Battery voltage does not exist: GO TO 7.

NO-2 >> Battery voltage exists for more than a few seconds: GO TO 10.

7.CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Check the voltage between ECM harness connector and ground.

EC	CM	Ground	Voltage
Connector	Terminal	Cround	voltage
F68	60	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 10.

8.CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.

2. Disconnect IPDM E/R harness connector E11.

3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDN	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E68	53	F11	٩	Evistod
LUO	54		9	LAISIEU

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 9.

9.DETECT MALFUNCTIONING PART

Check the following.

Harness or connectors E7, E121

Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

ECK-66

10.CHECK ECM POWER SUPPLY CIRCUIT-VI

- 1. Disconnect ECM harness connector.
- 2. Disconnect IPDM E/R harness connector E11.

3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

E	СМ	IPDN	II E/R	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F68	60	E11	15	Existed

4. Also check harness for short to ground and short to power.

POWER SUPPLY AND GROUND CIRCUIT

0010001					IKOKI
< COMPON)SIS >			[พงพ]
YES >> (NO >> I 11.CHECK	tion result nor GO TO 11. Repair open c 20A FUSE	<u>mal?</u> ircuit or short	to ground or s	short power in harness or connectors.	A
1. Disconn	ect 20A fuse (No. 52) from	IPDM E/R.		EC
2. Check 2	0A fuse.	10			
VES >> (<u>mal?</u>			С
NO >> I	Replace 20A f	use.			
12.снеск	GROUND C	ONNECTION	-		D
1. Turn ign	ition switch OI	FF.			
2. Check g	round connec	tion E9. Refe	r to Ground In	spection in <u>GI-41, "Circuit Inspection"</u> .	F
VES	tion result nor	mal?			
NO >> I	Repair or repla	ace ground c	onnection.		
13.снеск	ECM GROU	ND CIRCUIT	FOR OPEN A	ND SHORT-II	F
1. Disconn 2. Check th	ect ECM harn ne continuity b	ess connecto etween ECN	or. I harness conn	ector and ground.	G
Connector	Terminal	Ground	Continuity		н
	123			-	11
500	124				
E60	125	Ground	Existed		
	128				
3. Also che	ck harness fo	r short to pov	ver.		J
Is the inspec	tion result nor	mal?			
YES >>0 NO >>1	GO TO 14. Repair open c	ircuit or short	power in harn	ess or connectors.	K
			NI		
Refer to GI-3	tion result nor	<u>nt Incident"</u> . mal2			L
YES >> 1	Replace IPDM	<u>IIE/R</u> .			
NO >>	Repair open c	ircuit or short	to power in ha	arness or connectors.	М
					1 1 1
					Ν
					0

< COMPONENT DIAGNOSIS >

P0001 FUEL PUMP

DTC Logic

[K9K]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0001	 HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) CIRCUIT CO: Open circuit CO.0: Short circuit to ground CC.1: Short circuit to +12V 1.DEF: Parameter at maximum level 	 Harness or connectors [High pressure supply pump (volumetric control valve) circuit is open or shorted.] High pressure supply pump (volumetric control valve) Fuel line

NOTE:

Conditions for applying the diagnostic procedure to the stored DTCs:

- The DTC becomes present after the engine is started.
- If the DTC is present:
- Malfunction indicator (Red) lights up.

Diagnosis Procedure

INFOID:000000001180551

1. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect high pressure supply pump (volumetric control valve) harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between high pressure supply pump (volumetric control valve) harness connector and ground.

High pressure (volumetric o	e supply pump control valve)	Ground	Voltage
Connector	Terminal		
F106	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector E7, F121
- Harness for open or short between ECM and high pressure supply pump (volumetric control valve)
- Harness for open or short between IPDM E/R and high pressure supply pump (volumetric control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

$\mathbf{3.}$ check high pressure supply pump (volumetric control valve) output signal circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between high pressure supply pump (volumetric control valve) harness connector and ECM harness connector.

High pressur (volumetric	High pressure supply pump (volumetric control valve)		ECM	
Connector	Terminal	Connector	Terminal	
F106	2	F68	50	Existed

4. Also check harness for short to ground and short to power.



P0001 FUEL PUMP

< COMPONENT	DIAGNOSIS >	[K9K]
Is the inspection r	esult normal?	
YES >> GO T	04.	A
NO >> Repai	r open circuit or short to ground or short to power in harness or conner	ctors.
4. CHECK HIGH	PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)	
Refer to ECK-69,	"Component Inspection"	
Is the inspection re	esult normal?	
YES >> GO T	O 5.	(
NO >> Repla	ce high pressure supply pump.	
5. CHECK FUEL	LINE	
Check fuel line cle	anliness.	
Is the inspection re	esult normal?	
YES >> GO T	O 6.	г
NO >> Fuel li	ine cleanliness.	
6. CHECK INTER	MITTENT INCIDENT	
Refer to GI-39, "In	itermittent Incident".	F
>> INSPI	ECTION END	
Component In	spection	INEO/D-00000001180553
,		INFOID.000000001160352
1.CHECK HIGH	PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)	L
1. Turn ignition s	switch OFF.	F
2. Disconnect hi	gh pressure supply pump (volumetric control valve) harness connector	r.
3. Check resista	nce between high pressure supply pump (volumetric control valve) ter	minals as follows.
Terminals	Resistance	
1 and 2	1.5 - 15Ω	
Is the inspection re	esult normal?	
YES >> INSPI		L
NO >> Repla	ce nign pressure supply pump.	ŕ
		1
		for
		Ν
		Ν
		C
		r
		F

< COMPONENT DIAGNOSIS >

P0002 FUEL PUMP

DTC Logic

1		
DTC No.	Trouble diagnosis name	Possible cause
P0002	HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) ADAPTIVE • 1.DEF: Parameter at maximum stop • 2.DEF: Parameter at maximum level	 Harness or connectors [High pressure supply pump (volumetric control valve) circuit is open or shorted.] (Fuel rail pressure sensor circuit is open or shorted.) High pressure supply pump (volumetric control valve) Fuel rail pressure sensor

NOTE:

• Conditions for applying the diagnostic procedure to the stored DTCs:

The DTC is declared present when after the engine is started or following a load test.

Diagnosis Procedure

INFOID:000000001180554

1.CHECK LOW PRESSURE FUEL SUPPLY SYSTEM

Refer to ECK-10, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

Is the inspection result normal?

OK >> GO TO 2.

NG >> Replace or replace. Then GO TO 9.

2. CHECK INTERNAL FUEL TRANSFER PUMP

Refer to ECK-11. "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

Is the inspection result normal?

OK >> GO TO 3.

NG >> Replace or replace. Then GO TO 9.

3.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Refer to ECK-11, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 4.

NG >> Replace or replace. Then GO TO 9.

4.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Refer to ECK-12, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 5.

NG >> Replace or replace. Then GO TO 9.

5. CHECK RAIL HIGH PRESSURE REGULATION

Refer to ECK-15. "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

Is the inspection result normal?

OK >> GO TO 6.

NG >> Replace or replace. Then GO TO 9.

6.CHECK MAJOR LEAK IN FUEL INJECTORS/FUEL INJECTORS OPEN

ECK-70

INFOID:000000001180553

P0002 FUEL PUMP

< COMPONENT	DIAGNOSIS >	[K9K]
Refer to ECK-19.	"BASIC INSPECTION : Special Repair Requirement (TEST	6: Major Leak in Fuel Injectors/
Fuel Injectors Op	<u>en)"</u> .	
Is the inspection r	esult normal?	
OK >> GO T	0.7	
I .CHECK INCO	RRECT FUEL INJECTION QUANTITY	
Refer to ECK-20.	BASIC INSPECTION : Special Repair Requirement (TEST 7	7: Incorrect Fuel Injection Quan-
<u>tity)"</u>		
Is the inspection r	esult normal?	
OK >> GO T		
NG >> Repla	ace or replace. Then GO TO 9.	
O. CHECK INTER	RITTENT INCIDENT	
Refer to GI-39, "In	ntermittent Incident".	
Is the inspection r	esult normal?	
YES >> INSP	ECTIO END.	
NO >> Repa	ir or replace. Then GO TO 9.	
9.CLEAR PRES	SURE REGULATION	
Perform "PRESS	REG ADAPTIVE" in WORK SUPPORT mode with CONSU	I T-III
>> INSP	ECTION END	
Component in	ispection	INFOID:000000001180555
1. СНЕСК НІСН	PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VA	LVE)
1. Turn ignition	switch OFF.	
2. Disconnect h	igh pressure supply pump (volumetric control valve) harness	connector.
3. Check resista	ince between high pressure supply pump (volumetric control	valve) terminals as follows.
		
Terminais	Resistance	
1 and 2	1.5 - 15Ω	
Is the inspection r	esult normal?	
YES >> INSP	ECTION END	
NO >> Repla	ace high pressure supply pump.	

< COMPONENT DIAGNOSIS >

P0016 CKP - CMP CORRELATION

DTC Logic

INFOID:000000001180556

[K9K]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0016	CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELA- TION	 Harness or connectors (CMP sensor circuit is open or shorted.) Camshaft position sensor Timing belt Signal plate

NOTE:

• Conditions for applying the diagnostic procedure to the stored DTCs:

The DTC is declared present when cranking the engine or at idle speed.

• If the DTC is present:

Longer starting time, requires several attempts to start the vehicle.

Diagnosis Procedure

INFOID:000000001180557

1.CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK CMP SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect camshaft position (CMP) sensor harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between CMP sensor harness connector and ground.

CMP	sensor	Ground	Voltage	
Connector	Terminal	Cround		
F87	3	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

Harness connector E7, F121

Harness for open or short between ECM and CMP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CMP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between CMP sensor harness connector and ECM harness connector.

CMP sensor		ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
F87	1	F68	65	Existed	

ECK-72
		P0016	CKP - CM	P CORRE	LATION	
< COMPON	ENT DIAGNO)SIS >				[K9K]
4. Also che	ck harness for	r short to grou	nd and short	to power.		
Is the inspect	tion result nor	mal?				A
YES >> 0	GO TO 5.					
_NO >> F	Repair open ci	rcuit or short t	o ground or s	short to power	r in harness or connectors.	
5.CHECK C	MP SENSOR	INPUT SIGN	AL CIRCUIT	FOR OPEN A	AND SHORT	ECK
1. Check th	e continuity b	etween CMP :	sensor harne	ss connector	and ECM harness connector.	
CMD	00000r	EC	NA		-	С
		Commenter		Continuity		
Connector	Terminai	Connector	Terminal	F 566 F	_	D
F87	2	F68	75	Existed	_	D
2. Also che	ck harness for	r short to grou	nd and short	to power.		
Is the inspec	tion result nor	<u>mal?</u>				E
YES >> (GO TO 6.	rouit or chort t		hart to pouro	r in hornood or connectors	
	Repair open ci	rcuit or short t	o ground or s	short to power	In namess of connectors.	
O.CHECK C	MP SENSOR					F
Refer to ECK	(-73, "Compor	nent Inspection	<u>ı"</u> .			
Is the inspec	tion result nor	mal?				
YES >> (GO TO 7.					G
NO >> F	Replace cams	haft position s	ensor.			
I.CHECK S	PROCKET					Н
Visually chec	k for chipping	signal plate g	ear tooth.			
Is the inspect	tion result nor	mal?				
YES >> 0	GO TO 8.					I.
NO >> F	Repair or repla	ace sprocket.				
8. CHECK T	IMING BELT					
Refer to EM-	288, "Remova	al and Installat	ion".			J
Is the inspec	tion result nor	mal?				
YES >> (GO TO 9.					
NO >> F	Replace timing	g belt.				ĸ
9.CHECK IN	NTERMITTEN	T INCIDENT				
Refer to GI-3	9. "Intermitter	nt Incident".				L
<u> </u>	<u>, , , , , , , , , , , , , , , , , , , </u>					
>> I	NSPECTION	END				
Componei	nt Inspectio	n			INFO	ID:000000001180558
1.снеск с	MP SENSOR					K I
1 Record	et all barnoss	connectors di	sconnected			N
2 Start end	vine and warm	it up to norm	al operating to	emperature		

Start engine and warm it up to normal operating temperature.
 Measure the voltage signal between ECM harness connector and ground under the following conditions.

P0016 CKP - CMP CORRELATION

< COMPONENT DIAGNOSIS >

[K9K]

E	CM	Condition	Voltago	
Connector	Terminal	Condition	Voltage	
F68	75	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle. 	0 - 1V ★	
	(CMP sensor signal)	 [Engine is running] Warm-up condition Engine speed: 2,000 rpm 	0 - 1V ★	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CMP sensor.

P0045 TC BOOST CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

P0045 TC BOOST CONTROL SOLENOID VALVE

DTC Logic

[K9K]

INFOID:000000001180559

TURBOCHARGER BOOST CONTROL SOLENDID VALVE CIRCUIT Harmess or connectors CO: Open circuit CO: Open circuit or short circuit to ground CO: Short circuit to +12V Turbocharger boost control solenoid valve Turbocharger boost control solenoid valve Turbocharger boost control solenoid valve Check the voltage between turbocharger boost control solenoid valve harness connector and ground. Turbocharger boost control solenoid valve Check the voltage between turbocharger boost control solenoid valve harness connector. Turbocharger boost control solenoid valve Connector Terminal Ground Voltage S > GO TO 3. NO >> GO TO 2. Dieter MALFUNCTIONING PART Check the following. Harness for open or short between IPDM E/R and turbocharger boost control solenoid valve Harness for open or short between ECM and turbocharger boost control solenoid valve Harness for open or short between ECM and turbocharger boost control solenoid valve Scheck TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR PEN AND SHORT Turbocharger boost control solenotor. Check the continuity between turbocharger boost control solenoid valve Scheck the continuity between turbocharger boost control solenoid valve Harness for open or short between ECM and turbocharger boost control solenoid valve Harness for open or short between ECM and turbocharger boost control solenoid valve Scheck the continuity between turbocharger boost control solenoid valve harness connectors. Check the continuity between tur	DTC No.		Trouble diagnosis i	name		Possible cause
NOTE: If the DTC is present: Malfunction indicator (Red) lights up. Diagnosis Procedure 1.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT 1. Turn ignition switch OFF. Disconnect turbocharger boost control solenoid valve harness connector. 3. Turn ignition switch ON. 6. Check the voltage between turbocharger boost control solenoid valve harness connector and ground. Turbocharger boost control solenoid valve E55 2 Ground Voltage E55 2 Ground Battery voltage s.the inspection result normal? YES > GO TO 3. NO > GO TO 2. 2.DETECT MALFUNCTIONING PART Check the following. Harness for open or short between IPDM E/R and turbocharger boost control solenoid valve >> Repair open circuit or short to ground or short to power in harness or connectors. 3.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOOPPEN AND SHORT 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between turbocharger boost control solenoid valve harness connector and ECM h ness connector. 3. Check the continuity between turbocharger boost co	P0045	TURBOCHAR • CO: Open ci • CO.0: Open • CC.1: Short	GER BOOST CONTROL SC rcuit circuit or short circuit to grou circuit to +12V	CUIT (The ed.) • Turbo	ess or connectors solenoid valve circuit is open or short ocharger boost control solenoid valve	
Diagnosis Procedure	NOTE: If the DT Malfunc	C is present: ion indicator	[·] (Red) lights up.			
.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT I. Turn ignition switch OFF. Disconnect turbocharger boost control solenoid valve harness connector. Turn ignition switch ON. Check the voltage between turbocharger boost control solenoid valve harness connector and ground. Turbocharger boost control solenoid valve Ground Voltage Connector Terminal E55 2 Ground Battery voltage sthe inspection result normal? YES > GO TO 3. NO >> GO TO 2. 2.DETECT MALFUNCTIONING PART Check the following. • Harness for open or short between IPDM E/R and turbocharger boost control solenoid valve • Harness for open or short between ECM and turbocharger boost control solenoid valve >> Repair open circuit or short to ground or short to power in harness or connectors. 3.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOOPPEN AND SHORT 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between turbocharger boost control solenoid valve harness connector and ECM h ness connector. Turbocharger boost control solenoid valve Effented Terminal <td>Diagnos</td> <td>s Procedu</td> <td>re</td> <td></td> <td></td> <td>INFOID:000000001180</td>	Diagnos	s Procedu	re			INFOID:000000001180
Turn ignition switch OFF. Disconnect turbocharger boost control solenoid valve harness connector. Turn ignition switch ON. Check the voltage between turbocharger boost control solenoid valve harness connector and ground. Turbocharger boost control solenoid valve Ground Voltage Connector Terminal Ground Voltage State inspection result normal? YES >> GO TO 3. NO >> GO TO 2. Z.DETECT MALFUNCTIONING PART Check the following. Harness for open or short between IPDM E/R and turbocharger boost control solenoid valve + Harness for open or short between ECM and turbocharger boost control solenoid valve >> Repair open circuit or short to ground or short to power in harness or connectors. C.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FO DPEN AND SHORT Turn ignition switch OFF. Disconnect ECM harness connector. Turbocharger boost control solenoid valve ECM Connector Terminal Con	1.снеск	TURBOCHA	RGER BOOST CONTE	ROL SOLENOID	VALVE POWE	R SUPPLY CIRCUIT
Inductrial ger boost control solenoid valve Ground Voltage Connector Terminal Ground Battery voltage E55 2 Ground Battery voltage s the inspection result normal? YES > GO TO 3. NO >> GO TO 2. Operation of the solenoid valve DETECT MALFUNCTIONING PART Check the following. Detect the following. Harness for open or short between IPDM E/R and turbocharger boost control solenoid valve >> Repair open or short between ECM and turbocharger boost control solenoid valve >> Repair open circuit or short to ground or short to power in harness or connectors. Scheck TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOOPEN AND SHORT . Turn ignition switch OFF. Disconnect ECM harness connector. . Check the continuity between turbocharger boost control solenoid valve harness connector and ECM h ness connector. . Check the continuity between turbocharger boost control solenoid valve harness connector and ECM h ness connector. . Turbocharger boost control solenoid valve ECM	2. Discor 3. Turn iq 4. Check	inect turbocha inition switch the voltage b	arger boost control sole ON. etween turbocharger b	enoid valve harne oost control soler	ss connector. noid valve harn	ess connector and ground.
E55 2 Ground Battery voltage is the inspection result normal? YES >> GO TO 3. YES >> GO TO 2. 2. 2.DETECT MALFUNCTIONING PART 2. Check the following. • • Harness for open or short between IPDM E/R and turbocharger boost control solenoid valve • Harness for open or short between ECM and turbocharger boost control solenoid valve • Harness for open circuit or short to ground or short to power in harness or connectors. 3. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR DEVENAND SHORT 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between turbocharger boost control solenoid valve harness connector and ECM h ness connector. 3. Check the continuity between turbocharger boost control solenoid valve harness connector and ECM h ness connector. Turbocharger boost control solenoid valve ECM Connector Terminal Connector Terminal Connector Terminal	Co	nnector	Terminal	Ground	Voltage	
Is the inspection result normal? YES >> GO TO 3. NO >> GO TO 2. 2.DETECT MALFUNCTIONING PART Check the following. • Harness for open or short between IPDM E/R and turbocharger boost control solenoid valve • Harness for open or short between ECM and turbocharger boost control solenoid valve >> Repair open circuit or short to ground or short to power in harness or connectors. 3.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOOPEN AND SHORT 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between turbocharger boost control solenoid valve harness connector and ECM h ness connector. Turbocharger boost control solenoid valve ECM Continuity		E55	2	Ground	Battery volta	ge
>> Repair open circuit or short to ground or short to power in harness or connectors. 3. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between turbocharger boost control solenoid valve harness connector and ECM harness connector. Turbocharger boost control solenoid valve ECM Continuity Connector Terminal Connector Terminal	2.DETEC Check the Harness Harness	T MALFUNCT following. for open or sh for open or sh	TIONING PART nort between IPDM E/R nort between ECM and	and turbocharge turbocharger boo	er boost contro ost control sole	l solenoid valve noid valve
2. Disconnect ECM harness connector. 3. Check the continuity between turbocharger boost control solenoid valve harness connector and ECM h ness connector. <u>Turbocharger boost control solenoid valve ECM Connector Terminal Connector Terminal E55 1 </u>		> Repair open	circuit or short to grou	nd or short to po	wer in harness D VALVE OU ⁻	or connectors. TPUT SIGNAL CIRCUIT FO
Turbocharger boost control solenoid valve ECM Continuity Connector Terminal Connector Terminal	S.CHECK	TURBOCHA SHORT	RGER BOOST CON	IROL SOLENOI		
Connector Ierminal Connector Terminal	S.CHECK DPEN ANI DPEN ANI Discor Check ness c	TURBOCHA O SHORT Inition switch Inect ECM ha the continuity onnector.	RGER BOOST CONT OFF. rness connector. between turbocharger	boost control so	enoid valve ha	rness connector and ECM ha
	3. CHECK DPEN ANI 1. Turn iq 2. Discor 3. Check ness c	TURBOCHA D SHORT Inition switch Inect ECM ha the continuity onnector.	RGER BOOST CONT OFF. rness connector. between turbocharger	boost control so	enoid valve ha	rness connector and ECM ha

YES >> GO TO 5. NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

ECK-75

А

P0045 TC BOOST CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

• Harness for open or short between ECM and turbocharger boost control solenoid valve

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Refer to ECK-76. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace turbocharger boost control solenoid valve.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000001180561

[K9K]

1.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

1. Turn ignition switch OFF.

2. Disconnect turbocharger boost control solenoid valve harness connector.

3. Check resistance between turbocharger boost control solenoid valve terminals as follows.

Terminals	Resistance
1 and 2	18.9 - 23.1Ω [at 23°C (73°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace high pressure supply pump.

P0069 TC BOOST SENSOR, BARO SENSOR CORRELATION

< COMPONENT DIAGNOSIS >

P0069 TC BOOST SENSOR, BARO SENSOR CORRELATION

DTC Logic

INFOID:000000001180562

		Trouble dia	ignosis name		Possible cause
P0069	TURBOCHARC CORRELATION • 1.DEF: Signa • 2.DED: Signa	GER BOOST SENSOR N al outside lower level al outside upper level	- BAROMETRIC PRE	ESSURE SENSOR	 Harness or connectors (Turbocharger boost sensor) Turbocharger boost sensor Barometric pressure sensor
IOTE:					
Condition	ons for apply C becomes pre	ing the diagnosti esent after the end	c procedure to the ine is started	he stored DTCs	
If the D	C is present	: 			
Malfund	tion indicato	r (Red) lights up.			
Diagnos	sis Procedu	Ire			INFOID:000000001180563
.CHEC	(GROUND C	ONNECTIONS			
. Turn i	anition switch	OFF.			
. Chec	k ground conr	nection E17. Refer	to Ground inspec	ction in <u>GI-41, "C</u>	Circuit Inspection".
<u>s the insp</u>	ection result r	ormal?			
YES >	> GO TO 2. > Repair or re	place around conr	vection		
		GER BOOST SEN	ISOR SUPPLY C	IRCUIT	
Disco	nnect turboch	arger boost sensor		tor	
. Turn i	gnition switch	ON.	namess connect		
. Check	the voltage b	etween turbochar	ger boost sensor (connector and g	round.
	Turbochargor	hoost sonsor			
C		Terminal	Ground	Voltage	
	onnector Terminal				
	F91	1	Ground	Approx, 5V	
the insp	F91 ection result r	normal?	Ground	Approx. 5V	
the insp YES >	F91 ection result r > GO TO 3.	normal?	Ground	Approx. 5V	
<u>s the insp</u> YES > NO >	F91 ection result r > GO TO 3. > Repair oper	normal?	Ground ground or short to	Approx. 5V o power in harne	ess or connectors.
the insp YES > NO >	F91 ection result r > GO TO 3. > Repair oper < TUBOCHAR	normal? normal? no circuit or short to CGER BOOST SEN	Ground ground or short to ISOR GROUND (Approx. 5V o power in harne CIRCUIT FOR C	ess or connectors. DPEN AND SHORT
s the insp YES > NO > CHECH	F91 ection result r GO TO 3. Repair oper TUBOCHAR the continuity	normal? n circuit or short to GER BOOST SEN between turboch	Ground ground or short to ISOR GROUND (arger boost senso	Approx. 5V o power in harne CIRCUIT FOR C or harness conne	ess or connectors. OPEN AND SHORT ector and ECM harness connector.
s the insp YES > NO > 3.CHECH . Chech	F91 ection result r > GO TO 3. > Repair oper < TUBOCHAR	n circuit or short to GER BOOST SEN between turboch	Ground ground or short to ISOR GROUND (arger boost senso	Approx. 5V o power in harne CIRCUIT FOR C or harness conne	ess or connectors. DPEN AND SHORT ector and ECM harness connector.
s the insp YES > NO > 3.CHECH . Chech	F91 ection result r GO TO 3. Repair oper TUBOCHAR the continuity ocharger boost se	normal? normal? GER BOOST SEN between turbocha	Ground ground or short to ISOR GROUND (arger boost senso ECM	Approx. 5V o power in harne CIRCUIT FOR C or harness conne	ess or connectors. OPEN AND SHORT ector and ECM harness connector.
s the insp YES > NO > CHECH . Chech Turbo	F91 ection result r GO TO 3. Repair oper CTUBOCHAR	normal? normal? GER BOOST SEN between turbocha	Ground ground or short to ISOR GROUND (arger boost senso ECM ector Term	Approx. 5V	ess or connectors. OPEN AND SHORT ector and ECM harness connector.
s the insp YES > NO > CHECH . Chech Turbo Connect F91	F91 ection result r GO TO 3. Repair oper TUBOCHAR the continuity charger boost sector Ter	normal? normal? circuit or short to GER BOOST SEN between turbocha ensor minal Conn 2 F8 for short to groups	Ground ground or short to ISOR GROUND (arger boost senso ECM Ector Term 5 43	Approx. 5V o power in harne CIRCUIT FOR C or harness conne inal Cont Ner	ess or connectors. DPEN AND SHORT ector and ECM harness connector.
s the insp YES > NO > CHECH . Chech Turbo Connect F91 . Also const	F91 Pection result r F91 F91 FOULTION FOULT	n circuit or short to GER BOOST SEN between turbocha ensor minal Conn 2 F8 for short to ground pormal?	Ground ground or short to ISOR GROUND (arger boost senso ECM Ector Term 5 43 J and short to pov	Approx. 5V o power in harne CIRCUIT FOR C or harness conne inal Cont inal Exi ver.	ess or connectors. OPEN AND SHORT ector and ECM harness connector. inuity
s the insp YES > NO > CHECH Connect Connect F91 Connect F91 Connect Sthe insp YES >	F91 ection result r GO TO 3. Repair oper TUBOCHAR the continuity charger boost se ctor Ter check harness ection result r S GO TO 4.	normal? normal? CGER BOOST SEN between turbocha minal Conn 2 F8 for short to ground normal?	Ground ground or short to ISOR GROUND (arger boost senso ECM ector Term 15 43 d and short to pov	Approx. 5V o power in harne CIRCUIT FOR C or harness conne inal 3 Exi ver.	ess or connectors. DPEN AND SHORT ector and ECM harness connector. inuity
s the insp YES > NO > CHECH Connect Connect F91 Also c s the insp YES > NO >	F91 Pection result r GO TO 3. Control of the continuity Cocharger boost sector Cocharger boost secton result r Cocharger control of the continuity Cocharger boost secton result r Cocharger control of the control of t	normal? normal? CGER BOOST SEN between turbocha ensor minal Conn 2 F8 for short to ground normal?	Ground ground or short to ISOR GROUND (arger boost senso ECM Ector Term 5 43 J and short to pov ground or short to	Approx. 5V o power in harne CIRCUIT FOR C or harness conne inal Cont 3 Exi ver.	ess or connectors. OPEN AND SHORT ector and ECM harness connector. inuity sted

ECK-77

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P0069 TC BOOST SENSOR, BARO SENSOR CORRELATION

< COMPONENT DIAGNOSIS >

[K9K]

Turbocharge	er boost sensor	E	Continuity		
Connector	Terminal	Connector	Terminal	Continuity	
F91	3	F85	44	Existed	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK TUBOCHARGER BOOST SENSOR

Refer to ECK-112, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace turbocharger boost sensor.

6.REPLACE ECM

- 1. Perform <u>ECK-21, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair</u> Requirement".
- Perform EGR volume control valve closed position learning. Refer to <u>ECK-22, "EGR VOLUME CONTROL</u> VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:000000001180564

1.CHECK TURBOCHARGER BOOST SENSOR-I

- 1. Turn ignition switch OFF.
- 2. Remove turbocharger boost sensor with its harness connected.
- 3. Turn ignition switch ON.
- 4. Select "DATA MONITOR" mode with CONSULT-III.
- 5. Check "BOOST_PRESS" and "ATOMOS_PRESS" indication.

<u>If the value is not very close to "ATOMOS PRESS", maximum pressure difference between</u> <u>"ATOMOS PRESS" and "BOOST PRESS" with the ignition switch ON (engine stop) = \pm 50 mbar?</u>

YES >> GO TO 2.

NO >> Replace turbocharger boost sensor.

2.CHECK TURBOCHARGER BOOST SENSOR-II

- 1. Use pump to apply turbocharger boost sensor as shown in the figure.
- Apply a pressure of between 10kPa(0.100 bar, 0.102 kg/cm², 1.5 psi) 13kPa(0.130 bar, 0.133 kg/cm², 1.9 psi) [maximum pressure to be applied: 13kPa(0.130 bar, 0.133 kg/cm², 1.9 psi)].
- 3. Select "DATA MONITOR" mode with CONSULT-III.
- Check "BOOST_PRESS" indication with that given by the vacuum pump.

If there is no discrepancy?

- YES >> INSPECTION END
- NO >> Replace turbocharger boost sensor.



P0087 FUEL PUMP

DTC Logic

INFOID:000000001180565

[K9K]

DTC DETECTION LOGIC

	l rouble diagnosis name	Possible cause
P0087	RAIL PRESSURE 1.DEF: Rail pressure too low on starting	 High pressure supply pump High pressure supply pump (Pressure control valve) High pressure supply pump (Volumetric control valve) Fuel injector Fuel rail pressure sensor Air mixed with fuel Lack of fuel Fuel rail pressure relief valve Fuel line Harness or connector
NOTE: • Conditio	ns for applying the diagnostic procedure to the sto	ared DTCs.
The DTC In low an and abno or impose complain specificat Special r Starting	C becomes present during the first 30 seconds after the nbient temperature conditions, diagnostic can.t make d ormal long engine start. So, DTC must be take in accou sible engine start not only in cold conditions but also ar s only in cold conditions, root cause of the problem con tion (too viscous fuel). This DTC could appear after fue notes: and engine operation difficult or impossible.	e engine starts. ifference between a normal long engine star nt only if customer complains about too long nd especially in warm conditions. If custome uld elsewhere like low battery level, bad fue I filter too.
The DTC In low and and abno or impose complain specificat Special n Starting	C becomes present during the first 30 seconds after the nbient temperature conditions, diagnostic can.t make d ormal long engine start. So, DTC must be take in accou sible engine start not only in cold conditions but also ar s only in cold conditions, root cause of the problem con tion (too viscous fuel). This DTC could appear after fue notes: and engine operation difficult or impossible.	e engine starts. ifference between a normal long engine star nt only if customer complains about too long ad especially in warm conditions. If custome uld elsewhere like low battery level, bad fue I filter too.
The DTC In low and and abno or imposs complain specificat Special n Starting Diagnosi 1.CHECK	C becomes present during the first 30 seconds after the nbient temperature conditions, diagnostic can.t make d ormal long engine start. So, DTC must be take in accou sible engine start not only in cold conditions but also ar s only in cold conditions, root cause of the problem con tion (too viscous fuel). This DTC could appear after fue notes: and engine operation difficult or impossible. S Procedure	e engine starts. ifference between a normal long engine star nt only if customer complains about too long ad especially in warm conditions. If custome uld elsewhere like low battery level, bad fue I filter too.

NG >> Replace or replace. Then GO TO 7.

2.CHECK INTERNAL FUEL TRANSFER PUMP

Refer to ECK-11, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump	
<u>Check)"</u> .	N
le the inspection result normal?	

Is the inspection result normal?

OK >> GO TO 3.

NG >> Replace or replace. Then GO TO 7.

3. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Refer to ECK-11, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump	0
(Pressure Control Valve) Check]".	

Is the inspection result normal?

OK >> GO TO 4.

NG >> Replace or replace. Then GO TO 7.

4.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Refer to ECK-12, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]". Is the inspection result normal?

OK >> GO TO 5.

ECK-79

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ECK

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NG >> Replace or replace. Then GO TO 7.

5. CHECK RAIL HIGH PRESSURE REGULATION

Refer to ECK-15, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

Is the inspection result normal?

OK >> GO TO 6.

NG >> Replace or replace. Then GO TO 7.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTIO END.

NO >> Repair or replace. Then GO TO 7.

7.CLEAR PRESSURE REGULATION

Perform "PRESS_REG_ADAPTIVE" in WORK SUPPORT mode with CONSULT-III.

>> INSPECTION END.

P0090 FUEL PUMP

< COMPONENT DIAGNOSIS >

P0090 FUEL PUMP

DTC Logic

DTC No.		Trouble	diagnosis name	Possible cause
P0090	 HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) CIRCUIT CO: Open circuit CO.0: Short circuit to ground CC.1: Short circuit to +12V 1.DEF: Parameter at maximum level 			 Harness or connectors [High pressure supply pump (pressure control valve) circuit is open or shorted.] High pressure supply pump (pressure control valve)
IOTE: Conditio The DTC If the DT Malfunct	ns for applying becomes pres C is present: ion indicator (I	the diagn ent after the Red) lights	ostic procedure to the stor engine is started. up.	red DTCs:
Jiagnosi	s Procedure			INFOID:000000001180566
.CHECK	HIGH PRESSU	IRE SUPPL	Y PUMP (PRESSURE CON	TROL VALVE) POWER SUPPLY
. Turn ig . Discon . Turn ig . Check ground	nition switch OF nect high press nition switch Of the voltage bet	F. ure supply p l. ween high p	oump (pressure control valve pressure supply pump (pres	e) harness connector. soure control valve) harness connector and
High press (Pressure	ure supply pump e control valve)	Ground	Voltage	
Connector	Terminal	0	Deffect of the set	
the inspense YES >> NO >>	GO TO 3. GO TO 3. GO TO 2. MALFUNCTIC	<u>mal?</u> DNING PAR	т	
heck the f IPDM E/F Harness Harness Harness	following. R connector E7, F for open or shor for open or shor	121 t between II t between E	PDM E/R and high pressure CM and high pressure supp	supply pump (pressure control valve) ly pump (pressure control valve)
>>	• Repair open ci	rcuit or sho	rt to ground or short to powe	r in harness or connectors.
CHECK		IRE SUPPL	Y PUMP (PRESSURE CON	TROL VALVE) OUTPUT SIGNAL CIRCUIT
		F		
Discon Check ECM h	nect ECM harne the continuity b arness connect	ess connect etween high or.	or. I pressure supply pump (pre	ssure control valve) harness connector and

High pressur (Pressure o	e supply pump control valve)	E	Continuity	
Connector Terminal		Connector	Terminal	
F107	4	F68	49	Existed

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ECK

INFOID:000000001180567

P0090 FUEL PUMP

< COMPONENT DIAGNOSIS >

[K9K]

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) CHECK

Refer to ECK-82, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 5.

No >> Replace high pressure supply pump.

5.INSPECTION END

High pressure supply pump (pressure control valve) OK.

>> INSPECTION END

Component Inspection

INFOID:000000001180569

1. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

1. Turn ignition switch OFF.

- 2. Disconnect high pressure supply pump (pressure control valve) harness connector.
- 3. Check resistance between high pressure supply pump (pressure control valve) terminals as follows.

Terminals	Resistance
3 and 4	1.5 - 15Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace high pressure supply pump.

P0100 MAF SENSOR

Description

• Intake air temperature sensor (1)



DTC Logic

INFOID:000000001180571

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DTC DETECTION LOGIC

DTC No.		Trouble	diagnosis name		Possible cause
P0100	MASS AIR FLOW • CC.0: Short cire • CO.1: Open cir	/ SENSOR CIF cuit to ground cuit or short cir	CUIT cuit to +12V		 Harness or connectors (Mass air flow sensor circuit is open or shorted.) Mass air flow sensor
NOTE: If DTC P ECK-141 Conditio	0100 is display , <u>"DTC Logic"</u> . ns for applying is declared pre	yed with Di g the diagno	TC P0641, first p ostic procedure	erform trouble to the stored D	diagnosis for DTC P0641. Refer to TCs:
Diagnosi	s Procedure)			INFOID:000000001180572
Снеск	GROUND CON		3		
Turn io	nition switch OI	======================================	-		
. Check	ground connec	tion E17. R	efer to Ground ins	spection in <u>GI-41</u>	, "Circuit Inspection".
s the inspe	ection result nor	mal?			
YES >>	GO TO 2.	ace around (connection		
	MASS AIR FL	OW SENSO	R POWER SUPP	I Y CIRCUIT-I	
	nition switch O	=F			
. Discon	nect mass air fl	ow sensor h	arness connector		
. Turn ig	nition switch OI	N.	oir flow concor bo	rpace connector	and around
. Check	the voltage bet	ween mass	all now sensor na		and ground.
Mass a	ir flow sensor				
Connector	Terminal	Ground	Voltage		
E15	4	Ground	Battery voltage		
s the inspe	ection result nor	mal?	·		
YES >>	GO TO 4.				
NO >>	• GO TO 3.				

ECK-83

3.DETECT MALFUNCTIONING PART

Check the following.

• Harness for open or short between IPDM E/R and mass air flow sensor

INFOID:000000001180570

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P0100 MAF SENSOR

< COMPONENT DIAGNOSIS >

[K9K]

· Harness for open or short between ECM and mass air flow sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT-II

Check the voltage between mass air flow sensor harness connector and ground.

Mass air f	low sensor	Ground	Voltage
Connector Terminal		Cround	voltage
E15	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

• Harness connector E7, F121

Harness for open or short between ECM and mass air flow sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

$\mathbf{6}.$ CHECK MASS AIR FLOW SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

Mass air	flow sensor	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E15	2	F85	30	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.

• Harness connector E6, F123

Harness for open or short between ECM and mass air flow sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

f 8.CHECK MASS AIR FLOW SENSOR NPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

Mass air	flow sensor	E	Continuity		
Connector	Terminal	Connector Terminal		Continuity	
E15	6	F85	35	Existed	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

• Harness connector E7, F121

• Harness for open or short between ECM and mass air flow sensor

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P0100 MAF SENSOR

< COMPONENT DIAGN	OSIS >
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>> Repair open circuit or short to ground or short to power in harness or connectors. 10.CHECK MASS AIR FLOW SENSOR							
Refer to E	CK-112, "Component Insp	pection".			ECK		
Is the insp	ection result normal?				LON		
YES >	> GO TO 11.						
NO >	> Replace mass air flow s	sensor.			С		
Refer to <u>G</u>	1-39, "Intermittent Inciden	<u>t"</u> .			D		
>	> INSPECTION END						
Component Inspection							
1.CHECK	MASS AIR FLOW SENS	SOR					
1. Turn iç 2 Recor	gnition switch OFF.	ors disconnected			F		
3. Turn i	gnition switch ON.						
4. Check	the voltage between mas	ss air flow sensor harne	ss connector.		G		
	Mass air flow sen	sor					
Connector	Connector Terminal Voltage						
E15	2 (Mass air flow sensor ground)	6 (Mass air flow sensor sig- nal)	0.3 - 0.7V		I		
Is the insp	ection result normal?	,					
YES >	> INSPECTION END						
NO >	> Replace mass air flow s	sensor.			J		
					Κ		
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					IVI		
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P0101 MAF SENSOR

Description

The mass air flow sensor is placed in the stream of intake air.

• Intake air temperature sensor (1)



INFOID:000000001180575

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0101	REQUESTED AIR FLOW • 1.DEF: Signal outside lower level • 2.DEF: Signal outside upper level	 Harness or connectors (The sensor circuit is open or shorted.) Mass air flow sensor Intake air leaks Intake air duct obstructed Air filter obstructed

NOTE:

• If DTC P0101 is displayed with DTC P0641, first perform trouble diagnosis for DTC P0641. Refer to <u>ECK-141, "DTC Logic"</u>.

Diagnosis Procedure

1.CHECK AIR FILTER

Check that air filter is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace.

No >> GO TO 2.

2. CHECK INTAKE AIR DUCT

Check that intake air duct is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace.

No >> GO TO 3.

3.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.

2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace ground connection.

4.CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.

2. Disconnect mass air flow sensor harness connector.

3. Turn ignition switch ON.

4. Check the voltage between mass air flow sensor harness connector and ground.

INFOID:000000001180574

INFOID:000000001180576

P0101 MAF SENSOR

< COMPONENT DIAGNOSIS >

Mass air fl	ow sensor	Ground	Voltago			
Connector	Terminal	Giouna	voltage			_
E15	4	Ground	Battery voltag	Э		-
Is the inspect	ion result nor	mal?				
YES >> G	GO TO 6.					
NO >>G	SO TO 5.					
O. DETECT N	MALFUNCTIO	ONING PAR	Г			
Check the foll • Harness for • Harness for	lowing. open or sho open or sho	rt between IF rt between E	PDM E/R and CM and mass	mass air flow s air flow senso	sensor or	
>> R	lepair open c	ircuit or shor	t to ground or	short to powe	in harness or con	nectors.
6. CHECK M	ASS AIR FLO	OW SENSO	R POWER SL	PPLY CIRCUI	T-II	
Check the vol	tage betwee	n mass air fle	ow sensor hai	ness connecto	r and ground.	
Mass air fl	ow sensor	Ground	Voltage			
Connector	Terminal	Cround	Voltage			
E15	5	Ground	Approx. 5V			
Is the inspecti	ion result nor	mal?				
YES >> G	GO TO 8.					
NO >>G 7	GO TO 7.					
I.DETECT N	MALFUNCTIO	ONING PAR	Г			
Check the foll	lowing.					
 Harness col Harness for 	nnector E7, F	-121 rt between F	CM and mass	air flow sense)r	
>> R	lepair open c	ircuit or shor	t to ground or	short to power	in harness or con	nectors.
8.снеск м	ASS AIR FLO	OW SENSO		IRCUIT FOR	OPEN AND SHOR	т
1 Check the	e continuity h	etween mas	s air flow sen	or harness co	nnector and ECM	
Mass	air flow sensor		ECM			
Connector	Termi	nal C	Connector	Terminal	Continuity	
E15	2		F85	30	Existed	
2. Also chec	ck harness fo	r short to are	ound and sho	t to power.		
Is the inspecti	ion result nor	mal?				
YES >> G	GO TO 10.					
			-			
9.DETECT N	MALFUNCTIO	JNING PAR	Γ			
Check the foll Harness cor Harness for 	lowing. nnector E6, F open or sho	- 123 rt between E	CM and mass	air flow senso	pr	
_		, .		1 4 4		
>> R	lepair open c	ircuit or shor	t to ground or	short to powe	in harness or con	nectors.
1U. CHECK	MASS AIR F	LOW SENS	OR INPUT SI	GNAL CIRCUI	T FOR OPEN AND) SHORT
1. Check the	e continuity b	etween mas	s air flow sen	or harness co	nnector and ECM	narness connector.

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P0101 MAF SENSOR

< COMPONENT DIAGNOSIS >

INFOID:0000000001180577

Mass air	flow sensor	E	Continuity	
Connector	Terminal	Connector Terminal		
E15	6	F85	35	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

• Harness connector E7, F121

• Harness for open or short between ECM and mass air flow sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK MASS AIR FLOW SENSOR

Refer to ECK-112, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace mass air flow sensor.

13. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK MASS AIR FLOW SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Turn ignition switch ON.
- 4. Check the voltage between mass air flow sensor harness connector.

	Mass air flow ser	Voltage	
Connector	Term	voltage	
E15	2 (Mass air flow sensor ground)	6 (Mass air flow sensor sig- nal)	0.3 - 0.7V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor.

P0110 IAT SENSOR

< COMPONENT DIAGNOSIS >

P0110 IAT SENSOR

Description

The intake air temperature sensor is built into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

DTC Logic

INFOID:000000001180579

INFOID:000000001180578

DTC DETECTION LOGIC

DTC No.		Trouble d	iagnosis name	Possible cause
P0110	INTAKE AIR TEM • CC.0: Short cir • CO.1: Open cir • 1.DEF: Micro-b	IPERATURE SI cuit to ground cuit or short cir oreaks	ENSOR CIRCUIT	 Harness or connectors (Intake air temperature sensor circuit is open or shorted.) Intake air temperature sensor
NOTE: If DTC P <u>ECK-141</u> Conditio	0110 is display , "DTC Logic" ns for applying	yed with DT	C P0641, first perfor	m trouble diagnosis for DTC P0641. Refer to e stored DTCs:
Diagnosi	s Procedure	esent alter tr	le ignition has been st	INFOLD:00000000118055
1 .снеск	GROUND COI	NECTIONS		
1. Turn ig 2. Check <u> s the inspe</u> YES >> NO >> 2. CHECK	nition switch O ground conner ction result nor GO TO 2. Repair or repla INTAKE AIR T	FF. ction E17. Re <u>mal?</u> ace ground c EMPERATU	efer to Ground inspect connection. RE SENSOR POWER	ion in <u>GI-41, "Circuit Inspection"</u> . SUPPLY CIRCUIT-II
1. Discon 2. Turn ig 3. Check	nect mass air fl nition switch O the voltage bet	ow sensor (v N. ween mass a	vith intake air tempera air flow sensor harnes	ture sensor) harness connector. s connector and ground.
Mass a Connector	ir flow sensor Terminal	Ground	Voltage	
E15	1	Ground	Approx. 5V	
Is the inspe YES >> NO >> 3. DETEC	Ction result nor GO TO 4. GO TO 3. MALFUNCTIO	mal? DNING PAR		
Check the f • Harness • Harness	ollowing. connector E6, F or open or sho	⁻ 123 rt between E	CM and mass air flow	sensor
>> 4. снеск	Repair open c INTAKE AIR T	ircuit or shor EMPERATU	t to ground or short to RE SENSOR GROUN	power in harness or connectors. D CIRCUIT FOR OPEN AND SHORT
1. Turn ig 2. Discon	nition switch O nect ECM harn	FF. ess connect	Dr.	

3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

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P0110 IAT SENSOR

< COMPONENT DIAGNOSIS >

Mass air	flow sensor	E	Continuity	
Connector	Connector Terminal		Terminal	Continuity
E15	2	F85	30	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

Harness connector E6, F123

• Harness for open or short between ECM and mass air flow sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to ECK-112, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace mass air flow sensor (with intake air temperature sensor).

7. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000001180581

1. CHECK INTAKE AIR TEMPERATURE SENSOR

Check resistance between mass air flow sensor terminals 1 and 2 under the following conditions.

Condition	Resistance (Ω)
10°C (50°F)	3,714 ± 161
20°C (68°F)	2,448 ± 95
30°C (86°F)	1,671 ± 58

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor (with intake air temperature sensor).

P0115 ECT SENSOR

Description

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

DTC Logic

INFOID:000000001180583

INFOID:000000001180582

DTC DETECTION LOGIC

DTC No.		Trouble diagnosis	name		Possible cause	
P0115	ENGINE COOL • CC.0: Short of • CO.1: Open of • 1.DEF: Micro	ANT TEMPERATURE SENS sircuit to ground sircuit or short circuit to +12V -breaks	OR CIRCUIT		 Harness or connectors (Engine coolant temperature sensor cir- cuit is open or shorted.) Engine coolant temperature sensor 	E
	 2.DEF: Signa 	I incoherence				F
NOTE: • Condition The DT • If the DT • Cooling	ons for apply C is declared FC is present fan motor is a	ing the diagnostic propresent after the ignition: ways operate.	ocedure to tl n has been s	he stored DT(switched on for	≿s: ∙at least 10 seconds.	G
- Air cond		operate.				Н
Diagnos	sis Procedu	ire			INFOID:000000001180584	
1. CHECK	K GROUND C	ONNECTIONS				
1. Turn i 2. Check Is the insp YES >	gnition switch c ground conn <u>ection result r</u> -> GO TO 2.	OFF. ection E17. Refer to Gr normal?	ound inspec	tion in <u>GI-41, "</u>	Circuit Inspection".	J
NO >	> Repair or re	eplace ground connection	on.			K
	K ENGINE CC	OLANT TEMPERATUR	RE SENSOR	SUPPLY CIR	CUIT	1.
 Disco Turn i Check 	nnect engine gnition switch < the voltage b	coolant temperature ser ON. between engine coolant	nsor harness temperature	s connector. sensor conne	ector and ground.	L
	Engine coolant te	mperature sensor	Ground	\/alta aa	_	M
Co	onnector	Terminal	Ground	voitage		
	F79	3	Ground	Approx. 5V		
Is the insp YES > NO > 3. CHECH	ection result r > GO TO 3. > Repair oper < ENGINE CC	normal? n circuit or short to grou OOLANT TEMPERATUF	nd or short to	o power in har GROUND CII	ness or connectors. RCUIT FOR OPEN AND SHORT	N
 Turn i Disco Check conne 	gnition switch nnect ECM ha < the continuit ector.	OFF. arness connector. y between engine cool	ant temperat	ture sensor ha	irness connector and ECM harness	Ρ

Engine coolant t	emperature sensor	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F79	2	F85	33	Existed

ECK-91

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P0115 ECT SENSOR

< COMPONENT DIAGNOSIS >

[K9K]

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to ECK-92, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000001180585

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance between engine coolant temperature sensor terminals 2 and 3 under the following conditions.

Terminal	Condition	Resistance (Ω)
	25°C (77°F)	$2,252 \pm 112.16$
2 and 3	50°C (112°F)	810 ± 39
	80°C (176°F)	283 ± 8

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Engine coolant temperature sensor.

P0120 ELECTRIC THROTTLE CONTROL ACTUATOR

< COMPONENT DIAGNOSIS >

P0120 ELECTRIC THROTTLE CONTROL ACTUATOR

Description

By default the valve is open when in the rest position and is actuated only when the engine is stopped; this has a damping effect and helps to stop the engine.

DTC Logic

INFOID:000000001180587

INFOID:000000001180586

DTC DETECTION LOGIC

DTC No.		Trouble	diagnosis name		Possible cause
P0120	ELECTRIC THRC • CC.0: Short cire • CC.1: Short cire • CO: Open circe	DTTLE CONTR cuit to ground cuit to +12V it	OL ACTUATOR CIRC	UIT	 Harness or connectors (Electric throttle control actuator circuit is open or shorted.) Throttle position sensor Throttle control motor
• The electr closed, the	ic throttle contr en the engine s	ol actuator f	unction is no long ing is impossible.	er ensured wher	n the engine is stopped or the valve is
Diagnosis	s Procedure	•			INFOID:000000001180588
1.снеск	GROUND CON	NECTIONS	;		
Is the insperive of the second	ction result nor GO TO 2. Repair or repla ELECTRIC TH nition switch OI nect electric thr nition switch OI the voltage betw	mal? ace ground of ROTTLE CO FF. ottle control N. ween electric	connection. ONTROL ACTUAT actuator harness	OR POWER SL connector.	JPPLY CIRCUIT
Electric throt	tle control actua- tor	Ground	Voltage		
Connector	Terminal				
F81	1	Ground	Battery voltage		
YES >> NO >> 3. DETECT	GO TO 4. GO TO 4. GO TO 3. MALFUNCTIO	DNING PAR	г		
Check the fr • IPDM E/R • Harness c • Harness fr • Harness fr	ollowing. connector E7, F or open or sho or open or sho	121 t between IF t between E	PDM E/R and elec CM and electric th	ctric throttle cont hrottle control ac	rol actuator tuator
>> 4. снеск	Repair open c ELECTRIC TH	ircuit or shor ROTTLE CC	t to ground or sho NTROL ACTUAT	ort to power in ha OR CIRCUIT	arness or connectors.

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

ECK-93

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P0120 ELECTRIC THROTTLE CONTROL ACTUATOR

< COMPONENT DIAGNOSIS >

3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle	e control actuator	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
	5		72	
F81	2	F68	94	Existed
	4		90	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace electric throttle control actuator.

NO >> Repair or replace.

P0180 FPT SENSOR

< COMPONENT DIAGNOSIS >

P0180 FPT SENSOR

Description

Fuel pump temperature sensor is built in the fuel pump. The sensor detects the fuel temperature in the fuel pump and calibrates the fuel injection amount change by fuel temperature.

DTC Logic

INFOID:000000001180590

INFOID:000000001180589

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name				Possible cause		
P0180	FUEL PUMP T • CC.0: Short c • CO.1: Open c • 1.DEF: Micro • 2.DEF: Signa	EMPERATURE SENSOR C circuit to ground circuit or short circuit to +12 -breaks Il incoherence	URCUIT V		 Harness (Fuel pur open or s Fuel pur 	or connectors np temperature shorted.) ip temperature	e sensor circuit is sensor
NOTE: Conditio The DTC	ns for applyi is declared p	ng the diagnostic pro	ocedure to th n has been sy	e stored DI witched on fo	Cs: or at least	10 seconds	
Diagnosi	s Procedui	re					INFOID:00000000011805
1.снеск	GROUND CO	ONNECTIONS					
I. Turn ig 2. Check	nition switch (ground conne	OFF. ection E17. Refer to Gr	ound inspecti	ion in <u>GI-41,</u>	"Circuit In	spection".	
<u>s the inspe</u> YES >>	• GO TO 2. • Repair or rep	ormal? place ground connection	on.				
NU >>							
	FUEL PUMP	TEMPERATURE SEN	ISOR SUPPL				
2.CHECK Discon Turn ig Check	FUEL PUMP nect fuel pum nition switch (the voltage be	TEMPERATURE SEN p temperature sensor ON. etween fuel pump temp	ISOR SUPPL harness conn perature sens	Y CIRCUIT nector. or connecto	r and grou	nd.	
2.CHECK 1. Discon 2. Turn ig 3. Check	FUEL PUMP nect fuel pum nition switch (the voltage be Fuel pump temp	TEMPERATURE SEN p temperature sensor ON. etween fuel pump temp erature sensor	ISOR SUPPL harness conn perature sens	Y CIRCUIT nector. sor connecto	r and grou	nd.	
2.CHECK . Discon 2. Turn ig 3. Check	FUEL PUMP nect fuel pum nition switch (the voltage be Fuel pump temponector	TEMPERATURE SEN p temperature sensor ON. etween fuel pump temp erature sensor Terminal	ISOR SUPPL harness conn perature sens Ground	Y CIRCUIT nector. sor connecto Voltage	r and grou	nd.	
2.CHECK 1. Discon 2. Turn ig 3. Check Cor F	FUEL PUMP nect fuel pum nition switch (the voltage be Fuel pump temponector	TEMPERATURE SEN p temperature sensor ON. etween fuel pump temp erature sensor Terminal 1	ISOR SUPPL harness conn perature sens Ground Ground	Y CIRCUIT nector. sor connecto Voltage Approx. 5V	r and grou	nd.	
2.CHECK 1. Discon 2. Turn ig 3. Check Corr F s the inspective YES >> NO >> 3.CHECK 1. Turn ig 2.Discon	FUEL PUMP nect fuel pum nition switch (the voltage be Fuel pump temponector 100 ection result no GO TO 3. Repair open FUEL PUMP nition switch (pect ECM bar	TEMPERATURE SEN p temperature sensor ON. etween fuel pump temp erature sensor Terminal 1 ormal? circuit or short to grou TEMPERATURE SEN OFF.	ISOR SUPPL harness conn perature sens Ground Ground ISOR GROUI	Y CIRCUIT nector. sor connecto Voltage Approx. 5V	r and grou	nd. connectors. EN AND SH	ORT
2.CHECK 1. Discon 2. Turn ig 3. Check Con F s the inspe YES >> NO >> 3. CHECK 1. Turn ig 2. Discon 3. Check nector.	FUEL PUMP nect fuel pum nition switch (the voltage be ruel pump temponector 100 ection result no GO TO 3. Repair open FUEL PUMP nition switch (nect ECM har the continuity	TEMPERATURE SEN p temperature sensor ON. etween fuel pump temp erature sensor Terminal 1 ormal? circuit or short to grou TEMPERATURE SEN OFF. ness connector.	ISOR SUPPL harness conn perature sens Ground Ground ISOR GROUI	Y CIRCUIT hector. sor connecto Voltage Approx. 5V o power in ha ND CIRCUIT ensor harne	r and grou	onnectors. EN AND SH	IORT M harness cor
2.CHECK 1. Discon 2. Turn ig 3. Check Cor F s the inspective YES >> NO >> 3.CHECK 1. Turn ig 2. Discon 3. Check nector.	FUEL PUMP nect fuel pum nition switch (the voltage be Fuel pump temp nector 100 ection result no GO TO 3. Repair open FUEL PUMP nition switch (nect ECM har the continuity Fuel pump temp	TEMPERATURE SEN p temperature sensor ON. etween fuel pump temp erature sensor Terminal 1 circuit or short to grou TEMPERATURE SEN OFF. rness connector. between fuel pump temp perature sensor	ISOR SUPPL harness conn perature sens Ground Ground ISOR GROUI	Y CIRCUIT hector. sor connecto Voltage Approx. 5V o power in ha ND CIRCUIT ensor harne ECM	r and grou	nd. connectors. EN AND SH tor and ECI	IORT M harness cor
2.CHECK 1. Discon 2. Turn ig 3. Check Con F s the inspe YES >> NO >> 3. CHECK 1. Turn ig 2. Discon 3. Check nector. Con	FUEL PUMP nect fuel pum nition switch (the voltage be Fuel pump temp nector 100 ection result no GO TO 3. Repair open FUEL PUMP nition switch (nect ECM har the continuity Fuel pump temp nector	TEMPERATURE SEN p temperature sensor ON. etween fuel pump temp erature sensor Terminal 1 ormal? circuit or short to grou TEMPERATURE SEN OFF. rness connector. between fuel pump temp perature sensor Terminal	ISOR SUPPL harness conn perature sens Ground Ground ISOR GROUI emperature se	Y CIRCUIT hector. sor connecto Voltage Approx. 5V o power in ha ND CIRCUIT ensor harne ECM	r and grou	nd. connectors. EN AND SH tor and ECI	IORT M harness cor

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

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P0180 FPT SENSOR

< COMPONENT DIAGNOSIS >

4. CHECK FUEL PUMP TEMPERATURE SENSOR

Refer to ECK-96, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel pump temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000001180592

1.CHECK FUEL PUMP TEMPERATURE SENSOR

Check resistance between fuel pump temperature sensor terminals 1 and 2 under the following conditions.

Condition	Resistance (Ω)
25°C (77°F)	2,051 ± 123
50°C (112°F)	811 ± 47
80°C (176°F)	309 ± 17

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Engine coolant temperature sensor.

P0190 FRP SENSOR

Description

The fuel rail pressure (FRP) sensor is placed to the fuel rail. It measures the fuel pressure in the fuel rail. The sensor sends voltage signal to the ECM. As the pressure increases, the voltage rises. The ECM controls the fuel pressure in the fuel rail. The ECM uses the signal from fuel rail pressure sensor as a feedback signal.

DTC Logic

INFOID:000000001180594

INFOID:000000001180593

DTC DETECTION LOGIC

DTC No.		Trouble diagno	osis name		Possible cause
P0190	FUEL RAIL PRES • CO.0: Short circ • CO.1: Open circ • 1.DEF: malfunc • 2.DEF: Signal o • 3.DEF: Micro-br	SURE SENSOR CIRC cuit to ground cuit or short circuit to + tioning sensor utside upper level reaks	CUIT 12V		 Harness or connectors (Fuel rail pressure sensor circuit is open or shorted.) Fuel rail pressure sensor
NOTE: • If DTC P <u>ECK-141</u> • Conditio - The DTC • If the DT - Malfunct	0190 is display <u>, "DTC Logic"</u> . ns for applying is declared pre C is present: ion indicator (I	yed with DTC P0 g the diagnostic p sent after the ignit Red) lights up.	641, first perfo procedure to the ion is switched	orm trouble di he stored DTC on when the e	agnosis for DTC P0641. Refer to
Diagnosi	s Procedure	1			INFOID:000000001180595
1.снеск	GROUND CON	INECTIONS			
1. Turn ig 2. Check <u>Is the inspe</u> YES >: NO >: 2. CHECK	nition switch OF ground connect action result norn GO TO 2. Repair or repla FUEL RAIL PR	FF. tion E17. Refer to <u>mal?</u> ace ground connect ESSURE SENSO	Ground inspection. R POWER SU	ction in <u>GI-41, "</u> PPLY CIRCUIT	<u>Circuit Inspection"</u> .
 Discor Turn ig Check 	nect fuel rail pre nition switch Of the voltage bety	essure sensor harı N. ween fuel rail pres	ness connector sure sensor co	nnector and gr	ound.
	Fuel rail pressur	e sensor	Ground	Voltage	-
Cor	nector	Terminal			_
F	102	3	Ground	Approx. 5V	_
YES >> NO >> 3. CHECK	 GO TO 3. Repair open ci FUEL RAIL PR 	mar? rcuit or short to gr ESSURE SENSO	ound or short to R GROUND C	o power in harr IRCUIT FOR C	ness or connectors. PEN AND SHORT
1. Turn ig	nition switch OF	FF.			

2. Disconnect ECM harness connector.

3. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

ECK-97

Fuel rail pre	essure sensor	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F102	2	F85	15	Existed

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P0190 FRP SENSOR

< COMPONENT DIAGNOSIS >

[K9K]

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL RAIL PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

Fuel rail pre	essure sensor	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F102	1	F85	19	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK FUEL RAIL PRESSURE SENSOR

Refer to ECK-98, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace fuel rail pressure sensor.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK FUEL RAIL PRESSURE SENSOR

- 1. Turn ignition switch OFF and wait at least 1 minutes.
- 2. Reconnect harness connector disconnected.
- 3. Turn ignition switch ON.
- 4. Select "DATA MONITOR" mode with CONSULT-III.
- 5. Check that the "RAIL PRESSURE" indication.

If the value is lower than 30 bar?

YES >> INSPECTION END.

NO >> Replace fuel rail pressure sensor.

INFOID:000000001180596

P0200 FUEL INJECTOR

DTC Logic

INFOID:000000001180597

DTC No.		Trou	ole diagnosis name		Pos	sible cause
P0200	FUEL INJECT • 1.DEF: Volta • 2.DEF: Con • 3.DEF: Sign	OR CONTROL age outside perm figuration/ Initialis nal incoherence	 Harness or co (The fuel inje shorted.) Fuel injector 	onnectors ctor circuit is open or		
DTE: Conditio The DTC f the DT Malfunct	ns for apply is declared p C is present tion indicato	ing the diagn present after the c r (Red) lights	ostic procedure ne engine has be up.	to the stored DT en started.	Cs:	
lagnos	IS Proceau					INFOID:000000000118059
Discor Discor Discor Check	nnect ECM hannect fuel inje the continuit	OFF. arness connect ctor harness of y between fue	tor. connector. I injector harness	connector and EC	CM harness coni	nector.
	F	uel injector		EC	M	Orațianite
Cylind	ler (Connector	Terminal	Connector	Terminal	Continuity
1		F70	1	F85	8	
2		F71	1	F85	7	Fxisted
3		F72	1	F85	6	Linotou
4		F73	1	F85	5	
<u>the inspe</u> ES >:	ection result r > GO TO 2. > Repair oper CFUEL INJEC the continuit	<u>ormal?</u> circuit or sho TOR OUTPU y between fue	ort to ground or sh T CIRCUIT FOR I injector harness	ort to power in ha OPEN AND SHO connector and EC	rness or connec RT CM harness coni	tors. nector.
IO >: CHECK Check				EC	M	Continuity
NO >: CHECK Check	F	uel injector				Continuity
IO >: CHECK Check	F ler (Fuel injector Connector	Terminal	Connector	Ierminal	
IO >: CHECK Check Cylinc 1	F ler (Fuel injector Connector F70	Terminal 2	Connector F85	Ierminal 4	
NO >: CHECK Check Cylinc 1 2	F ler (Tuel injector Connector F70 F71	Terminal 2 2	Connector F85 F85	Ierminal 4 3	Existed
NO >: CHECK Check Cylinc 1 2 3	F ler (Tuel injector Connector F70 F71 F72	Terminal 2 2 2 2	Connector F85 F85 F85	Ierminal 4 3 2	Existed

YES >> GO TO 3.

>> Repair open circuit or short to ground or short to power in harness or connectors. NO

3.CHECK FUEL INJECTOR

Refer to ECK-100, "Component Inspection". Is the inspection result normal?

ECK-99

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P0200 FUEL INJECTOR

< COMPONENT DIAGNOSIS >

NO >> Replace engine coolant temperature sensor.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.

- 2. Disconnect fuel injector harness connector.
- 3. Check resistance between fuel injector terminals as follows.

Terminals	Resistance		
1 and 2	150 - 250Ω [at 20°C (68°F)]		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning fuel injector.

INFOID:000000001180599

P0201, P0202, P0203, P0204 FUEL INJECTOR

< COMPONENT DIAGNOSIS >

P0201, P0202, P0203, P0204 FUEL INJECTOR

DTC Logic

DTC DETECTION LOGIC

	Trouble diagnosis name Possible cause				
P0201	 NO. 1 CYLINDER FUEL INJE CO: Open circuit CC: Short circuit 1.DEF: Line in open circuit 2.DEF: Open circuit or inter 	ECTOR CIRCUIT	ion		
20202	 NO. 2 CYLINDER FUEL INJE CO: Open circuit CC: Short circuit 1.DEF: Line in open circuit 2.DEF: Open circuit or intel 	Harness or connectors (The fuel injector circuit is open or			
90203	• 2.DEF: Open circuit or internal electronic malfunction NO. 3 CYLINDER FUEL INJECTOR CIRCUIT • CO: Open circuit • CC: Short circuit • 1.DEF: Line in open circuit • 2.DEF: Open circuit or internal electronic malfunction				
0204	 NO. 4 CYLINDER FUEL INJE CO: Open circuit CC: Short circuit 1.DEF: Line in open circuit 2.DEF: Open circuit or interview 	ECTOR CIRCUIT	ion		
TE: conditio he DTC the DT lalfunct lalfunct	ns for applying the diag is declared present after C is present: ion indicator (Red) light ion indicator (Yellow) light	nostic procedure the engine has be ts up. ghts up.	e to the stored DT en started.	īCs:	
TE: Conditio The DTC the DT Malfunct Malfunct agnosi	ns for applying the diag is declared present after C is present: ion indicator (Red) light ion indicator (Yellow) light is Procedure FUEL INJECTOR POWE	nostic procedure the engine has be ts up. ghts up.	e to the stored DT en started. JIT FOR OPEN A	T Cs: ND SHORT	INFOID:000000001180601
DTE: Conditio The DTC f the DT Malfunct Malfunct agnosi .CHECK Turn ig Discon Discon	ns for applying the diag is declared present after C is present: tion indicator (Red) light ion indicator (Yellow) light is Procedure FUEL INJECTOR POWE philion switch OFF. anect ECM harness connect fuel injector harness the continuity between fue	Inostic procedure the engine has be ts up. ghts up. ER SUPPLY CIRCI	e to the stored DT en started. JIT FOR OPEN A	ND SHORT	INFOID:000000001180601
DTE: Conditio The DTC f the DT Malfunct Malfunct agnosi .CHECK Turn ig Discon Discon Check	ns for applying the diag is declared present after C is present: tion indicator (Red) light tion indicator (Yellow) light is Procedure FUEL INJECTOR POWE phition switch OFF. Inect ECM harness connect the continuity between fu	Inostic procedure the engine has be ts up. ghts up. ER SUPPLY CIRCI ector. connector. el injector harness	e to the stored DT en started. JIT FOR OPEN A	T Cs: ND SHORT CM harness con	INFOID:000000001180601
TE: conditio he DTC the DT lalfunct lalfunct agnosi CHECK Turn ig Discon Discon Check	ns for applying the diag is declared present after C is present: tion indicator (Red) light tion indicator (Yellow) light s Procedure FUEL INJECTOR POWE phition switch OFF. the continuity between ful Fuel injector	Inostic procedure the engine has be ts up. ghts up. ER SUPPLY CIRCI ector. connector. lel injector harness	e to the stored D en started. JIT FOR OPEN A connector and E	T Cs: ND SHORT CM harness con	INFOID:000000001180601 nector.
DTE: Conditio The DTC The DTC Ithe DTC	ns for applying the diag is declared present after C is present: tion indicator (Red) light tion indicator (Yellow) light is Procedure FUEL INJECTOR POWE philion switch OFF. Innect ECM harness connect the continuity between fu Fuel injector Fuel injector	Inostic procedure the engine has be ts up. ghts up. ER SUPPLY CIRCI ector. connector. lel injector harness Terminal	e to the stored DT en started. JIT FOR OPEN A connector and EC Connector	T Cs: ND SHORT CM harness con CM Terminal	INFOID:000000001180601 nector.
DTE: Conditio The DTC I the DT Malfunct Malfunct Agnosi CHECK Turn ig Discon Discon Check	is declared present after C is present: tion indicator (Red) light tion indicator (Yellow) light is Procedure FUEL INJECTOR POWE philion switch OFF. the continuity between ful Fuel injector Fuel injector Fuel injector Fuel injector Fuel injector	Inostic procedure the engine has be ts up. ghts up. ER SUPPLY CIRCI ector. connector. lel injector harness Terminal	e to the stored DT en started. JIT FOR OPEN A connector and E0 Connector F85	TCs: ND SHORT CM harness con CM Terminal 8	INFOID:000000001180601 nector.

5. Also check harness for short to ground and short to power.

F73

Is the inspection result normal?

YES >> GO TO 2.

4

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

1

2.CHECK FUEL INJECTOR OUTPUT CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between fuel injector harness connector and ECM harness connector.

ECK-101

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INFOID:000000001180600

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P0201, P0202, P0203, P0204 FUEL INJECTOR

< COMPONENT DIAGNOSIS >

Fuel injector				CM	Continuity
Cylinder	Connector	Terminal	Connector	Terminal	Continuity
1	F70	2	F85	4	
2	F71	2	F85	3	Evisted
3	F72	2	F85	2	Existed
4	F73	2	F85	1	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL INJECTOR

Refer to ECK-102, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace engine coolant temperature sensor.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.

2. Disconnect fuel injector harness connector.

3. Check resistance between fuel injector terminals as follows.

Terminals	Resistance
1 and 2	150 - 250Ω [at 20°C (68°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning fuel injector.

INFOID:000000001180602

P0217 ENGINE OVER TEMPERATURE

< COMPONENT DIAGNOSIS >

P0217 ENGINE OVER TEMPERATURE

DTC Logic

DTC DETECTION LOGIC

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is $_{\rm C}$ indicated.

DTC No.	Trouble diagnosis name	Possible cause
P0217	Engine over temperature (Overheat)	 Harness or connectors (The cooling fan circuit is open or short- ed.) IPDM E/R (Cooling fan relay-1) Cooling fan relay-3 Cooling fan motor Radiator hose Radiator Radiator cap Water pump Thermostat
Diagnosi	is Procedure	INFOID:000000001180604
1. снеск	COOLING FAN LOW SPEED FUNCTION	
1. Start e 2. Turn a 3. Make s Is the inspe	ngine and let it idle. ir conditioner switch and blower fan switch ON. sure that cooling fan operates at low speed. ection result normal?	
YES >> NO >> 2. CHECK	> GO TO 2. > Refer to <u>ECK-170, "Diagnosis Procedure"</u> . COOLING FAN HIGH SPEED FUNCTION	
1. Turn ig 2. Turn a 3. Discon	gnition switch OFF. ir conditioner switch and blower fan switch OFF. nnect engine coolant temperature sensor harness co	nnector.
4. Conne 5. Restar Is the inspe	ect 150Ω resistor to engine coolant temperature sens t engine and make sure that cooling fan operates at ection result normal?	or harness connector. higher speed than low speed.
YES >> NO >>	> GO TO 3. > Refer to <u>ECK-170, "Diagnosis Procedure"</u> .	
Check cool	ling system for leak. Refer to <u>CO-52, "Inspection"</u> .	
<u>Is leakage</u>	detected?	

NO >> GO TO 5.

4. CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak. Refer to CO-52, "Inspection".

- Hose
- Radiator
- Water pump

>> Repair or replace malfunctioning part.

5.CHECK RADIATOR CAP

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P0217 ENGINE OVER TEMPERATURE

< COMPONENT DIAGNOSIS >

Check radiator cap. Refer to <u>CO-55, "RADIATOR CAP : Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace radiator cap.

6.CHECK THERMOSTAT

Check thermostat. Refer to CO-62, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace thermostat.

7.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to ECK-92, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace engine coolant temperature sensor.

8. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, check the following.

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	 Blocked radiator Blocked condenser Blocked radiator grille Blocked bumper 	• Visual	No blocking	_
	2	Coolant mixture	Coolant tester	50 - 50% coolant mixture	MA-28, "SAE Viscosity Number"
	3	Coolant level	Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-52. "Inspection"
	4	Radiator cap	Pressure tester	CO-55, "RADIATOR CAP : Inspection"	CO-55, "RADIATOR CAP : Inspection"
ON* ²	5	Coolant leaks	Visual	No leaks	CO-52, "Inspection"
ON* ²	6	Thermostat	 Touch the upper and lower radiator hoses 	Both hoses should be hot	CO-62, "Exploded View"
ON* ¹	7	Cooling fan motor	 IPDM E/R (auto active test) 	Operating	ECK-172, "Component Inspection (Cooling Fan Motor)"
OFF	8	Combustion gas leak	Color checker chemical tester 4 Gas analyzer	Negative	_
ON* ³	9	Coolant temperature gauge	Visual	Gauge less than 3/4 when driving	_
		Coolant overflow to res- ervoir tank	Visual	No overflow during driving and idling	CO-52, "Inspection"
OFF* ⁴	10	Coolant return from res- ervoir tank to radiator	Visual	Should be initial level in reservoir tank	CO-52, "Inspection"
OFF	11	Cylinder head	Straight gauge feeler gauge	0.1 mm (0.004 in) Maxi- mum distortion (warping)	EM-297, "Inspection"
	12	Cylinder block and pis- tons	• Visual	No scuffing on cylinder walls or piston	_

*1: Engine running at idle speed.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to CO-48, "Troubleshooting Chart".

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<pre>P0217 ENGINE OVER TEMPERATURE < COMPONENT DIAGNOSIS ></pre>	[K9K]	
>> INSPECTION END	A	ŝ.
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P0225 APP SENSOR

Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.

DTC Logic

DTC No.

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DTC DETECTION LOGIC

P0225	ACCELERATOR PEDAL POSITION SENSOR 1 AND ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT • CC.1: Short circuit to +12V • 1.DEF: Signal incoherence • 2.DEF: No signal • CO.0: Open circuit or short circuit to ground	 Harness or connectors (APP sensor 1 and 2 circuit is open or shorted.) Accelerator pedal position sensor (APP sensor 1 and 2.) 				
IOTE: If DTC P0225 is displayed with DTC P0641, first perform trouble diagnosis for DTC P0641, Refer						

- If DTC P0225 is displayed with DTC P0641, first perform trouble diagnosis for DTC P0641. Refer to <u>ECK-141, "DTC Logic"</u>.
- If DTC P0225 is displayed with DTC P0651, first perform trouble diagnosis for DTC P0651. Refer to <u>ECK-143, "DTC Logic"</u>.
- If DTC P2120 is present at the same time, check that the APP sensor connector is connected correctly.
- Conditions for applying the diagnostic procedure to the stored DTCs:
- The DTC is declared present after a series of full load/no load action on the accelerator.

Trouble diagnosis name

- If the DTC is present:
- Malfunction indicator (Red) lights up.

Diagnosis Procedure

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.

Check ground connection E17. Refer to Ground inspection in <u>GI-41, "Circuit Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect accelerator pedal position sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between accelerator pedal position sensor connector and ground.

A	Ground	Voltago		
Sensor	Giouna	voltage		
1	E110	4	Ground	
2		5	Giounu	Αρρισχ. 5 ν

Accelerator pedal operation

Possible cause

INFOID:000000001180606

INFOID:000000001180607

PBIB17411

INFOID:000000001180605

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

 $\mathbf{3.}$ Check accelerator pedal position sensor ground circuit for open and short

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Acce	Accelerator pedal position sensor			ECM		
Sensor	Connector	Terminal	Connector Terminal		Continuity	
1	E110	2	EGO	127	Evictod	
2	EIIU	1	E00	120	EXISIED	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ACCELERATOR PEDAL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accel	erator pedal position	sensor	ECM		Continuity
Sensor	Connector	Terminal	Connector Terminal		Continuity
1	E110	3	EGO	126	Evistod
2	EIIU	6	200	119	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to ECK-107, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace accelerator pedal position sensor.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect accelerator pedal position sensor harness connector.
- 3. Check resistance between accelerator pedal position sensor as follows.

Sensor	Terminals	Resistance
1	2 and 4	$1.7\pm0.9~{ m K\Omega}$
2 1 and 5		$2.85\pm2.05~{ m K\Omega}$

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<u>Is the inspection result normal?</u> YES >> **INSPECTION END**

NO >> Replace accelerator pedal position sensor.
P0235 TC BOOST SENSOR

< COMPONENT DIAGNOSIS >

P0235 TC BOOST SENSOR

Description

The turbocharger boost sensor detects pressure in the exit side of the charge air cooler. The sensor output voltage to the ECM increases as pressure increases.

DTC Logic

INFOID:000000001180610

DTC DETECTION LOGIC

DTC No.		Trouble diagno	osis name		Possible cause	D
P0235	 CC.1: short ci CO.0: Open ci 1.DEF: Micro 2.DEF: Signa 	ircuit to +12V sircuit or Short circuit to gr -breaks Loutside lower level	bund		 Harness or connectors (Turbocharger boost sensor) Turbocharger boost sensor 	E
	 3.DEF: Signa 	l outside upper level				
NOTE: • If DTC F ECK-14	P0235 is disp 3. "DTC Logic	layed with DTC P06	51, first perfo	orm trouble dia	agnosis for DTC P0651. Refer to	F
 Condition The DTC the vehice If the DT Malfunct 	ons for applyi is declared p cle is stationar CC is present: tion indicator	ng the diagnostic p resent after the ignitio y. (Red) lights up.	rocedure to tl on has been sv	ne stored DTC: witched on for 1	s: second, with a warm engine when	G
Diagnag	io Drocodu	ro				H
Diagnos	is Procedu	le			INFOID:000000001180611	
1.снеси		ONNECTIONS				
1. Turn i 2. Chec <u>Is the insp</u>	gnition switch k ground conn <u>ection result n</u>	OFF. ection E17. Refer to ormal?	Ground inspec	tion in <u>GI-41, "(</u>	<u>Circuit Inspection"</u> .	J
YES > NO > 2.CHECH	> GO TO 2. > Repair or re (TUBOCHAR	place ground connec GER BOOST SENS0	tion. DR SUPPLY C	IRCUIT		K
 Discort Turn i Check 	nnect turbocha gnition switch the voltage b	arger boost sensor ha ON. etween turbocharger	rness connect	or. connector and g	ground.	L
	Turbocharger	boost sensor			-	N/
Co	nnector	Terminal	Ground	Voltage		IV
	F91	1	Ground	Approx. 5V	-	
Is the insp YES > NO >	ection result n > GO TO 3. > Repair open	ormal? circuit or short to gro	ound or short to	power in harn	ess or connectors.	N
J.CHECK	TUBOCHAR	GER BOOST SENSO			OPEN AND SHORT	
1. Check	the continuity	between turbocharg	er boost sensc	or harness conn	ector and ECM harness connector.	E

Turbocharge	er boost sensor	EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F91	2	F85	43	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

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P0235 TC BOOST SENSOR

< COMPONENT DIAGNOSIS >

INFOID:000000001180612

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK TUBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

Turbocharge	er boost sensor	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F91	3	F85	44	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK TUBOCHARGER BOOST SENSOR

Refer to ECK-112, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace turbocharger boost sensor.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK TURBOCHARGER BOOST SENSOR-I

1. Turn ignition switch OFF.

- 2. Remove turbocharger boost sensor with its harness connected.
- 3. Turn ignition switch ON.
- 4. Select "DATA MONITOR" mode with CONSULT-III.
- 5. Check "BOOST_PRESS" and "ATOMOS_PRESS" indication.

If the value is not very close to "ATOMOS PRESS", maximum pressure difference between "ATOMOS PRESS" and "BOOST PRESS" with the ignition switch ON (engine stop) = \pm 50 mbar?

- YES >> GO TO 2.
- NO >> Replace turbocharger boost sensor.

2.CHECK TURBOCHARGER BOOST SENSOR-II

- 1. Use pump to apply turbocharger boost sensor as shown in the figure.
- Apply a pressure of between 10kPa(0.100 bar, 0.102 kg/cm², 1.5 psi) - 13kPa(0.130 bar, 0.133 kg/cm², 1.9 psi) [maximum pressure to be applied: 13kPa(0.130 bar, 0.133 kg/cm², 1.9 psi)].
- 3. Select "DATA MONITOR" mode with CONSULT-III.
- Check "BOOST_PRESS" indication with that given by the vacuum pump.

If there is no discrepancy?

- YES >> INSPECTION END
- NO >> Replace turbocharger boost sensor.



P0335 CKP SENSOR

< COMPONENT DIAGNOSIS >

P0335 CKP SENSOR

DTC Logic

DTC DETECTION LOGIC

DTC No.		Trouble dia	gnosis name		Possible cause	
D 0225	CRANKSHAFT PC • 1.DEF: Signal in • 2.DEF: No signal	DSITION SENSO coherence	R CIRCUIT		 Harness or connectors (The sensor circuit is open or shorted.) 	С
F 0333	 3.DEF: Signal or 4.DEF: Value ou 5.DEF: Configur 	ut side level It side level ation/ initialisatior	ı		Crankshaft position sensorSignal plate	D
NOTE: • Condition The DTC • If the DT	ons for applying is declared present:	J the diagnos sent with the e	tic procedur engine cranki	re to the stored ng or idling.	DTCs:	E
- Malfunc	tion indicator (F	Red) lights up).			F
Diagnos	is Procedure				INFOID:000000001180614	
1.снеск	GROUND CON	INECTIONS				G
1. Turn iç 2. Checl Is the insp	nition switch OF ground connec	F. tion E17. Refe <u>mal?</u>	er to Ground	inspection in <u>GI-</u>	41, "Circuit Inspection".	Н
YES >: NO >: 2.CHECK	> GO TO 2. > Repair or repla CCKP SENSOR	ace ground co GROUND CIF	nnection. RCUIT FOR (OPEN AND SHO	DRT	I
 Turn iç Discor Discor Check 	nition switch OF nect crankshaft nect ECM harne the continuity b	F. position (CKP ess connector. etween CKP s) sensor (1) sensor harnes	harness connect ss connector and	or. d ECM harness connector.	J
	(P.consor	EC	NA			K
Connecto	r Terminal	Connector	Terminal	Continuity		
	2	F68	88	Existed		L
5. Also c	heck harness for	r short to grou	nd and short	to power.		
Is the insp	ection result nor	mal?				M
YES >:	> GO TO 3. > Repair open ci	rcuit or short t	o around or s	short to power in	harness or connectors	
3.CHECK	CKP SENSOR	INPUT SIGNA		FOR OPEN AND) SHORT	
1. Check	the continuity b	etween CKP s	ensor harnes	s connector and	ECM harness connector.	IN
Cł	KP sensor	EC	M	Continuity		0
Connecto	r Terminal	Connector	Terminal	Containdity		
F89	1	F68	84	Existed		Ρ
Connecto F89 2. Also c Is the insp	r Terminal 1 heck harness for	Connector F68 r short to grou mal?	Terminal 84 nd and short	Continuity Existed to power.		

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CKP SENSOR

Refer to ECK-112, "Component Inspection".

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INFOID:000000001180613

< COMPONENT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Replace crankshaft position sensor.

5. CHECK GEAR TOOTH

Visually check for chipping flywheel gear tooth.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace signal plate.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK CKP SENSOR

1. Turn ignition switch OFF.

2. Disconnect CKP sensor harness connector.

3. Check resistance between CKP sensor terminals as follows.

Terminals	Resistance
1 and 2	612 - 748Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace CKP sensor.

INFOID:000000001180615

P0340 CMP SENSOR

< COMPONENT DIAGNOSIS >

P0340 CMP SENSOR

DTC DETECTION LOGIC

DTC Logic

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INFOID:000000001180616

DTC No.		Trouble of	liagnosis name		Possible cause	
P0340	CAMSHAFT POSITION SENSOR CIRCUIT • Harness or connectors • 1.DEF: Signal incoherence (The sensor circuit is open 40 • 2.DEF: No signal • Camshaft position sensor			 Harness or connectors (The sensor circuit is open or shorted.) Camshaft position sensor 	(
	 3.DEF: Value or 4.DEF: Configu 	ut side level ration/ initialisa	tion		Timing belt Signal plate	I
NOTE:						
Condition The DTC	ons for applying is declared pre	g the diagnormalised the sent after	ostic procedure to e engine is started (the stored I or following a	DTCs: a load test.	
Special	note:		· · · · · · · · ·			
Longer s	tarting time, req	uires severa	attempts to start tr	ne venicie.		
Diagnos	is Procedure	;			INFOID:000000001180617	
1.СНЕСК	GROUND COM	NECTIONS	8			
1. Turn iç	gnition switch O	FF.				
2. Check	<pre>< ground connection result nor</pre>	ction E17. R	efer to Ground insp	ection in <u>GI-4</u>	1, "Circuit Inspection".	
YES >:	> GO TO 2.	<u>mai:</u>				
NO >:	> Repair or replace	ace ground (connection.			
2. CHECK	CMP SENSOR	R POWER S	UPPLY CIRCUIT			
1. Turn iç	gnition switch O	FF.	D)			
 Discor Turn id 	nect camshaft nition switch O	Dosition (CM N.	P) sensor harness	connector.		
4. Check	the voltage bet	ween CMP s	sensor harness con	nector and g	round.	
	AD concor					
Connecto	r Terminal	Ground	Voltage			
	3	Ground	Battery voltage			
Is the insp	ection result nor	mal?				
YES >	> GO TO 4.					
NO >:	> GO TO 3.					
J.DETEC	T MALFUNCTIO	DNING PAR	Γ			
Check theHarness	following.	121				
Harness	for open or sho	rt between E	CM and CMP sens	or		
 Harness 	for open or sho	rt between I	PDM E/R and CMP	sensor		
	- Penair onon o	ircuit or sho	t to around or short	to nower in l	harness or connectors	
A						

4. CHECK CMP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1.

Turn ignition switch OFF. Disconnect ECM harness connector. 2.

3. Check the continuity between CMP sensor harness connector and ECM harness connector.

ECK-113

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P0340 CMP SENSOR

< COMPONENT DIAGNOSIS >

CMP	sensor	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F87	1	F68	65	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

 ${f 5.}$ CHECK CMP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between CMP sensor harness connector and ECM harness connector.

CMP	CMP sensor		ECM		
Connector	Terminal	Connector	Terminal	Continuity	
F87	2	F68	75	Existed	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK CMP SENSOR

Refer to ECK-112, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace camshaft position sensor.

7.CHECK SPROCKET

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace sprocket.

8. CHECK TIMING BELT

Refer to EM-288, "Exploded View".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace timing belt.

9.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000001180618

1.CHECK CMP SENSOR

1. Reconnect all harness connectors disconnected.

- 2. Start engine and warm it up to normal operating temperature.
- 3. Measure the voltage signal between ECM harness connector and ground under the following conditions.

P0340 CMP SENSOR

< COMPONENT DIAGNOSIS >

[K9K]

ECM		Condition	Voltage	A
Connector	Terminal	Condition	voltage	
E62	75	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle. 	0 - 1V ★	C D
FOO	(CMP sensor signal)	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 - 1V ★	E
Is the inspection re	sult normal?			

YES

>> INSPECTION END >> Replace CMP sensor. NO

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P0380 GLOW RELAY

< COMPONENT DIAGNOSIS >

P0380 GLOW RELAY

DTC Logic

INFOID:000000001180619

[K9K]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0380	GLOW PLUG DIAGNOSTIC CONNECTION • CO: Open circuit • CC.0: Short circuit to ground • CC.1: Short circuit to +12V	 Harness or connectors (The glow relay circuit is open or shorted.) Glow relay

NOTE:

• Conditions for applying the diagnostic procedure to the stored DTCs:

The DTC is declared present after attempts have been made to start the engine.

Special notes:

If the DTC is present, it will be difficult to start the vehicle, or even impossible when cold, or preheating will be continuous and the heater plugs will deteriorate.

Diagnosis Procedure

INFOID:000000001180620

1.CHECK GLOW RELAY POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect glow relay harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between glow relay connector and ground.

Glow	Ground	Voltago	
Connector	Terminal	Giouna	vollage
F94	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

• 80A fusible link (letter N)

· Harness for open and short between glow relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK GLOW RELAY INPUT CIRCUIT FOR OPEN AND SHORT-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between glow relay harness connector and ECM harness connector.

Glov	w relay	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F94	3	F68	80	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK GLOW RELAY INPUT CIRCUIT FOR OPEN AND SHORT-II

1. Check the continuity between glow relay harness connector and ECM harness connector.

P0380 GLOW RELAY

< COMPONENT DIAGNOSIS >

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Glov	w relay	EC	М		A
Connector	Terminal	Connector	Terminal	- Continuity	
F94	8	F68	76	Existed	EC
2. Also check	harness for short	to ground and sho	ort to power.		LOF
Is the inspection YES >> GO NO >> Rep 5.CHECK INTE	<u>n result normal?</u> TO 5. pair open circuit o ERMITTENT INC	r short to ground c DENT	or short to powe	er in harness or connec	ctors.
	"Intermittent Incid	opt"			D
Refer to <u>GI-39.</u> Is the inspection	result normal?	<u>ent</u> .			
YES >> Rec	place glow relay.				-
NO >> Rep	pair or replace.				E
					F
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P0381 GLOW CONTROL SYSTEM

DTC Logic

INFOID:000000001180621

[K9K]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0381	GLOW CONTROL UNIT CIRCUITCC.0: Short circuit to groundCO.1: Open circuit or short circuit to +12V	 Harness or connectors (The glow relay circuit is open or shorted.) Glow relay Glow plug

NOTE:

• Conditions for applying the diagnostic procedure to the stored DTCs:

The DTC is declared present after several attempts have been made to start the engine.

Special notes:

If the DTC is present, it will be difficult to start the vehicle, or even impossible when cold, or preheating will be continuous and the heater plugs will deteriorate.

Diagnosis Procedure

INFOID:000000001180622

1.CHECK GLOW RELAY POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect glow relay harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between glow relay connector and ground.

Glow	Ground	Voltago	
Connector	Connector Terminal		voltage
F94	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

• 80A fusible link (letter N)

· Harness for open and short between glow relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK GLOW RELAY INPUT CIRCUIT FOR OPEN AND SHORT-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between glow relay harness connector and ECM harness connector.

Glow relay		E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F94	3	F68	80	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK GLOW RELAY INPUT CIRCUIT FOR OPEN AND SHORT-II

1. Check the continuity between glow relay harness connector and ECM harness connector.

P0381 GLOW CONTROL SYSTEM

< COMPONENT DIAGNOSIS >

[K9K]

Glow r	elay	EC	СМ		
Connector	Terminal	Connector	Terminal	Continuity	
F94	8	F68	76	Existed	
2. Also check ha Is the inspection re YES >> GO To NO >> Repai 5. CHECK GLOW	Irness for short esult normal? O 5. r open circuit or / RELAY OUTP	to ground and sh short to ground UT CIRCUIT FOI	ort to power. or short to power R OPEN AND SH	r in harness or connector	ctors.
 Disconnect global Check the cor 	ow plug harnes ntinuity betweer	s connector. I glow plug harne	ess connector and	d ECM harness conne	ector.
	Glow relay			Glow plug	Continuity
Cylinder	Connector	Terminal	Connect	or Terminal	Continuity
1		2	F95	1	
2	FOA	7	F96	1	Frietod
3	1 34	1	F97	1	LAISIEU
4		6	F98	1	
Is the inspection re YES >> GO Te NO >> Repla 7 CHECK INTERPORT	o 7. ce malfunctioni	ng glow plug.			
Refer to <u>GI-39, "In</u> Is the inspection re YES >> Repla NO >> Repai	<u>termittent inclue</u> esult normal? ce glow relay. r or replace.	<u>ent"</u> .			
Component In	spection				INFOID:000000001180623
1 .CHECK GLOW	PLUG				
 Turn ignition s Disconnect gli Check resista 	witch OFF. ow plug harnes: nce between glo	s connector. ow plug terminals	s as follows.		
Terminal		Resistance			
1 and engine gro	ound Not le	ss than 2 Ω [at 20°C ((68°F)]		
Is the inspection re	esult normal?				
YES >> INSPI	ECTION END				

NO >> Replace malfunctioning glow plug.

P0409 EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR < COMPONENT DIAGNOSIS > [K9K]

P0409 EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR

DTC Logic

INFOID:000000001180624

INFOID:000000001180625

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible Cause
P0409	EGR VOLUME CONTROL VALVE CONTROL POSITION SEN- SOR CIRCUIT • CO.0: Open circuit or short circuit to ground • CC.1: Short circuit to +12V	 Harness or connectors (The EGR volume control valve control position sensor circuit is open or shorted.) EGR volume control valve control position sensor

NOTE:

- If DTC P0409 is displayed with DTC P0651, first perform trouble diagnosis for DTC P0651. Refer to <u>ECK-143, "DTC Logic"</u>.
- Conditions for applying the diagnostic procedure to the stored DTCs: The DTC is declared present after the engine started.
- If the DTC is present:
- Malfunction indicator (Yellow) lights up.

Diagnosis Procedure

1.CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".
- Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.

- 2. Turn ignition switch ON.
- 3. Check the voltage between EGR volume control valve control position sensor connector and ground.

EGR volume control valv	Ground	Voltage	
Connector	nnector Terminal		voltage
F99	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

 $\mathbf{3}.$ Check EGR volume control value control position sensor ground circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between EGR volume control valve control position sensor harness connector and ECM harness connector.

EGR volume control valve control posi- tion sensor		E	Continuity	
Connector	Terminal	Connector	Terminal	
F99	3	F85	82	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

P0409 EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR

< COMPONENT DIAGNOSIS >

4.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR INPUT CIRCUIT FOR OPEN AND SHORT

 Check the continuity between EGR volume control valve control position sensor harness connector and ECM harness connector.

EGR volume control valve control posi- tion sensor ECM		Ж	Continuity		C	
Connector	Terminal	Connector	Terminal			0
F99	5	F85	86	Existed		
2. Also check	harness for short t	o ground and sh	ort to power.			D
Is the inspection	<u>result normal?</u>					
YES >> GO NO >> Rep	TO 5. bair open circuit or	short to ground	or short to powe	r in harness or co	nnectors.	Е
Refer to <u>GI-39, "Intermittent Incident"</u> .						F
Is the inspection	<u>result normal?</u>					
NO >> Rec	air or replace.					G
6.REPLACE E	GR VOLUME CON	NTROL VALVE				G
 Replace the Perform EC Requirement 	EGR volume con K-22, "EGR VOLI ht"	trol valve. UME CONTROL	VALVE CLOSE	D POSITION LE	ARNING : Special Repair	Н
>> INS	PECTIO END					I
						J

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P0487 EGR VOLUME CONTROL VALVE

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0487	EGR VOLUME CONTROL VALVE CIRCUIT • CO: Open circuit • CC.0: Short circuit to ground • CC.1: Short circuit to +12V • 1.DEF: Values outside the level • CC: Short circuit	 Harness or connectors (The EGR volume control valve control motor circuit is open or shorted.) EGR volume control motor valve

NOTE:

• Conditions for applying the diagnostic procedure to the stored DTCs:

The DTC is declared present with the engine idle speed.

Diagnosis Procedure

INFOID:000000001180627

1. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.check egr volume control valve control motor circuit

1. Disconnect EGR volume control valve harness connector.

- 2. Disconnect ECM harness connector.
- 3. Check harness continuity between the following terminals.

EGR volume control valve		EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F99	2	F68	95	Existed
	6		96	Not existed
			95	Not existed
			96	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK EGR VOLUME CONTROL VALVE

Refer to ECK-123, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.

2. Perform ECK-22, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

[K9K]

INFOID:000000001180626

P0487 EGR VOLUME CONTROL VALVE

F0467 EGR VOLUME CONTROL VALVE		
< COMPONENT DIAGNOSIS >	[K9K]	
5. CHECK INTERMITTENT INCIDENT		Δ
Refer to GI-39, "Intermittent Incident".		/ \
>> INSPECTION END		EC
Component Inspection	INFOID:000000001180628	
1. CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR		С
 Turn ignition switch OFF. Disconnect EGR volume control valve harness connector. Check resistance between EGR volume control valve terminals as follows. 		D
Terminals Resistance		
2 and 6 2.3 Ω		
Is the inspection result normal?		
YES >> INSPECTION END NO >> Replace EGR volume control valve.		F
		G
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< COMPONENT DIAGNOSIS >

P0488 EGR SYSTEM

DTC Logic

[K9K]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0488	EGR VOLUME CONTROL • 1.DEF: Signal incoherence • 2.DEF: Signal outside lower level • 3.DEF: Signal outside upper level • 4.DEF: Valve outside level • 5.DEF: Defective sensor	 Harness or connectors (The EGR volume control valve circuit is open or shorted.) (The EGR volume control valve control posi- tion sensor circuit is open or shorted.) EGR volume control valve EGR volume control valve control position sensor Incorrect EGR volume control valve installa- tion EGR volume control valve stuck closed EGR passage clogged

NOTE:

• **Conditions for applying the diagnostic procedure to the stored DTCs:** The DTC is declared present after the engine is started.

Special notes:

- Engine instability, possibly even stalling.
- Difficult to start engine or even impossible when cold.
- Loss of performance.
- Possible smoke emissions.
- Malfunction indicator (Red) lights up.

Diagnosis Procedure

INFOID:000000001180630

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.

2. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK EGR VOLUME CONTROL VALVE INSTALLATION

Check that EGR volume control valve is installed properly.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Install EGR volume control valve properly.

 $\mathbf{3}$.check egr volume control valve control position sensor power supply circuit

1. Disconnect EGR volume control valve harness connector.

2. Turn ignition switch ON.

3. Check the voltage between EGR volume control valve control position sensor connector and ground.

GR volume control valve	Ground	Voltage		
Connector	Terminal	Cround	vollage	
F99	1	Ground	Approx. 5V	

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR GROUND CIRCUIT FOR

P0488 EGR SYSTEM

< COMPONENT DIAGNOSIS >

OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- Check the continuity between EGR volume control valve control position sensor harness connector and ECM harness connector.

EGR volume contr tion	ol valve control posi- sensor	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F99	3	F85	82	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK EGR VOLUME CONTROL	VALVE CONTROL	POSITION SENSOR	INPUT CIRCUIT FOR OPEN
AND SHORT			

1. Check the continuity between EGR volume control valve control position sensor harness connector and ECM harness connector.

EGR volume control valve control posi- tion sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F99	5	F85	86	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

${f 6}.$ CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR CIRCUIT

1. Check harness continuity between the following terminals.

EGR volume control valve		ECM		Continuity	
Connector	Terminal	Connector Terminal		Continuity	
	2 6		95	Existed	
FOO		F68	96	Not existed	
F99			95	Not existed	
			96	Existed	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK EGR VOLUME CONTROL VALVE VISUALLY

1. Remove the EGR volume control valve

2. Check if foreign matter is caught between the EGR volume control valve and the housing.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Remove the foreign matter and clean the EGR volume control valve.

8.CHECK EGR PASSAGE

Check the following for clogging and cracks.

EGR tube

ECK-125

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< COMPONENT DIAGNOSIS >

EGR hose

EGR cooler

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace EGR passage.

9. CHECK EGR VOLUME CONTROL VALVE

Refer to ECK-126, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 11.

10. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair or replace.

11.REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.

2. Perform ECK-22, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> INSPECTIO END

Component Inspection

INFOID:0000000001180631

$1. {\sf CHECK} \ {\sf EGR} \ {\sf VOLUME} \ {\sf CONTROL} \ {\sf VALVE} \ {\sf CONTROL} \ {\sf MOTOR}$

- 1. Turn ignition switch OFF.
- 2. Disconnect EGR volume control valve harness connector.
- 3. Check resistance between EGR volume control valve terminals as follows.

Terminals	Resistance
2 and 6	2.3 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EGR volume control valve.

< COMPONENT DIAGNOSIS >

P0500 VSS

Description

The vehicle speed signal is sent to the combination meter from the "ABS actuator and electric unit (control unit)" by CAN communication line. The combination meter then sends a signal to the ECM by CAN communication line.

DTC Logic

INFOID:000000001180633

INFOID:000000001180634

INFOID:000000001180632

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause	
P0500	VEHICLE SPEED SIGNAL • 1.DEF: Value outside level	 Harness or connectors (The CAN communication line is open or shorted) Harness or connectors (The vehicle speed signal circuit is open or shorted) Wheel sensor Combination meter ABS actuator and electric unit (control unit) 	F

Diagnosis Procedure

1.CHECK CAN COMMUNICATION LINE Refer to LAN-28, "CAN Communication Signal Chart". Is the inspection result normal? YES >> GO TO 2. NO >> Repair or replace 2.check dtc with "abs actuator and electric unit (control unit)" Refer to BRC-17, "CONSULT-III Function (ABS)" (with out ESP) or BRC-95, "CONSULT-III Function (ABS)" (with ESP). Is the inspection result normal? YES >> GO TO 3. NO >> Repair or replace. 3.CHECK COMBINATION METER Refer to MWI-27, "CONSULT-III Function (METER/M&A)". >> INSPECTION END

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P0530 REFRIGERANT PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

P0530 REFRIGERANT PRESSURE SENSOR

Description

INFOID:000000001180635

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.

DTC Logic

INFOID:000000001180636

INFOID:000000001180637

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0530	REFRIGERANT PRESSURE SENSOR CIRCUIT • CO.0: Short circuit to +12V or open circuit • CC.1: Short circuit to ground	 Harness or connectors (Refrigerant pressure sensor circuit is open or shorted.) Refrigerant pressure sensor

NOTE:

• If DTC P0530 is displayed with DTC P0641, first perform the trouble diagnosis for DTC P0641 Refer to <u>ECK-141, "DTC Logic"</u>.

Diagnosis Procedure

1. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- Check ground connection E17. Refer to Ground inspection in <u>GI-41, "Circuit Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.check refrigerant pressure sensor power supply circuit

1. Disconnect refrigerant pressure sensor harness connector.

2. Turn ignition switch ON.

3. Check the voltage between refrigerant pressure sensor connector and ground.

Refrigerant pr	Ground	Voltage	
Connector	Connector Terminal		
E50	3	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

Harness connector E6, F123

• Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

P0530 REFRIGERANT PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

[K9K]

Refrigerant pr	Refrigerant pressure sensor ECM		Oractionsite	А	
Connector	Terminal	Connector	Terminal	- Continuity	
E50	1	F68	74	Existed	E
4. Also check h	arness for short	to ground and sh	ort to power.	<u>.</u>	EC
Is the inspection	result normal?				
YES >> GO	TO 6.				С
5 DETECT MAL					
		PARI			C
 Harness conne 	ing. ector E6_E123				
Harness for ope	en or short betw	een ECM and refr	igerant pressure	e sensor	
					E
>> Repa	air open circuit o	r short to ground o	or short to powe	r in harness or connectors	3.
O. CHECK REFF	RIGERANT PRE	SSURE SENSOR	NPUT SIGNA	L CIRCUIT FOR OPEN A	ND SHORT
1. Check the co	ontinuity betwee	n refrigerant pres	sure sensor har	ness connector and ECM	harness connec-
tor.					
Refrigerant pr	essure sensor	FC	M		G
Connector	Terminal	Connector	Terminal	Continuity	
E50	2	F68	78	Existed	H
2. Also check h	arness for short	to ground and sh	ort to power.		
Is the inspection	result normal?				1
YES >> GO T	TO 8.				I
NO >> GO]	TO 7.				
1 .DETECT MAL	FUNCTIONING	PART			J
Check the followi	ing.				
 Harness conne Harness for operation 	en or short betw	een ECM and refr	igerant pressure	esensor	k
			.g		
>> Repa	air open circuit o	r short to ground	or short to powe	r in harness or connectors	S.
8.CHECK INTE	RMITTENT INC	IDENT			L
Refer to GI-39, "I	Intermittent Incid	lent".			
Is the inspection	result normal?				N
YES >> Repl	ace refrigerant p	pressure sensor.			
NO >> Repa	air or replace.				
					N
					С

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P0560 BATTERY VOLTAGE

DTC Logic

INFOID:000000001180638

INFOID:000000001180639

[K9K]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0560	BATTERY VOLTAGE • 1.DEF: Signal outside lower level • 2.DEF: Signal outside upper level	 Harness connectors (ECM power supply circuit is open or shorted.) Battery Battery terminal Alternator IPDM E/R

NOTE:

• Conditions for applying the diagnostic procedure to the stored DTCs:

The DTC is declared present when the engine is running.

Diagnosis Procedure

1.CHECK BATTERY VOLTAGE

- 1. Turn ignition switch ON.
- 2. Check battery voltage.

Voltage: Above 11V

Is the inspection result normal?

YES >> GO TO 2.

NO >> Recharge the battery.

2. CHECK BATTERY TERMINALS

- 1. Turn ignition switch OFF.
- 2. Check battery terminals condition.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair the battery terminals.

3.CHECK BATTERY AND ALTERNATOR

Check that the proper type of battery and type of alternator are installed. Refer to, <u>STR-8</u>, "System Diagram" and <u>CHG-8</u>, "System Diagram".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace with a proper one.

4.CHECK ECM POWER SUPPLY CIRCUIT-I

Check the voltage between ECM harness connector and ground.

EC	CM	Ground	Voltage
Connector	Terminal	Cround	voltage
F68	60	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5. NO >> GO TO 7.

5. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.

2. Disconnect IPDM E/R harness connector E11.

P0560 BATTERY VOLTAGE

< COMPONENT DIAGNOSIS >

[K9K]

3.	Check the continuity	between	ECM harness	connector a	and IPDM E/R	harness connector.
----	----------------------	---------	-------------	-------------	--------------	--------------------

E	CM	IPDN	IE/R	Querti i		
Connector	Terminal	Connector	Terminal	Continuity		FOI
E68	53	E11	9	Existed		EC
	54					
4. Also cheo	ck harness fo	r short to grou	nd and short	to power.		С
Is the inspect	ion result nor	mal?				
YES >> 0 NO >> 0	GO TO 9. GO TO 6.					D
O .DETECT N	MALFUNCTIO	ONING PART				
Check the fol	lowing.	7 5404				Е
 Harness or Harness for 	connectors E	17, E121 t between FC	M and IPDM	F/R		
				2/13		
>> F	Repair open ci	ircuit or short t	o ground or s	short to power	in harness or connectors.	F
7. CHECK E		SUPPLY CIRC	CUIT-III	·		
1 Disconne	ect ECM harn	ess connector				G
2. Disconne	ect IPDM E/R	harness conn	ector E11.			
3. Check th	e continuity b	etween ECM	narness conr	ector and IPD	M E/R harness connector.	
				1		Н
EC	CM	IPDN	1 E/R	Continuity		
Connector	Terminal	Connector	Terminal			I
F68	60	E11	15	Existed		1
4. Also cheo	ck harness fo	r short to grou	nd and short	to power.		
Is the inspect	ion result nor	<u>mal?</u>				J
YES >> G NO >> R	50 TO 8. Repair open ci	ircuit or short f	o around or s	short power in	harness or connectors.	
						k
		No. 52) from I				
2. Check 20)A fuse.	NO. 52) HOIH I				
Is the inspect	ion result nor	mal?				L
YES >> 0	GO TO 9.					
NO >> R	Replace 20A f	use.				в. Л
9. CHECK G	ROUND CON	NECTION				IVI
Check ground	d connection	E9. Refer to G	round Inspec	ction in <u>GI-41,</u>	'Circuit Inspection".	
Is the inspect	ion result nor	mal?				Ν
YES >> 0	O TO 10					
NO >> R	Repair or repla	ace ground co	nnection.	_		_
IU.CHECK	ECM GROUI	ND CIRCUIT I	OR OPEN A	ND SHORT		0
1. Check th	e continuity b	etween ECM	narness conr	ector and gro	und.	
						D

E	СМ	Ground	Continuity
Connector	Terminal	Cround	Continuity
	123		
Feo	124	Ground	Existed
LUU	125	Glound	LAISted
	128		

P0560 BATTERY VOLTAGE

< COMPONENT DIAGNOSIS >

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair open circuit or short power in harness or connectors.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace.

< COMPONENT DIAGNOSIS >

P0571 ASCD BRAKE SWITCH

DTC Logic

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INFOID:000000001180640

INFOID:000000001180641

[K9K]

DTC DETECTION LOGIC

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DTC No.	Trouble diagnosis name	Possible cause
P0571	ASCD BRAKE SWITCH CIRCUIT • 1.DEF: Values outside the levels • 2.DEF: Signal incoherence • 3.DEF: Signal outside upper level	 Harness or connectors (Stop lamp switch circuit is open or shorted) (The CAN communication line is open or short- ed) Stop lamp switch BCM

NOTE:

Conditions for applying the diagnostic procedure to the stored DTCs:

The DTC is declared present after a series of actions on the brake pedal.

Diagnosis Procedure

1. CHECK ASCD BRAKE SWITCH CIRCUIT

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector and ground.

	ECM	Ground		Condition	Voltage
Connector	Terminal	Ground		Condition	voltage
E60	116	Ground	Brake pedal	Fully released	Battery voltage
LOU	(ASCD brake switch)	Ground	Blake pedal	Slightly depressed	0V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 2.

2. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch (with ASCD brake switch) harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between stop lamp switch harness connector and ground.

Stop lan	np switch	Ground	Voltago
Connector	Terminal	Ground	voltage
E118	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

Harness connector E105, M77

• 10A fuse (No. 4)

Harness for open or short between fuse and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT

2. Disconnect ECM harness connector.

P0571 ASCD BRAKE SWITCH

< COMPONENT DIAGNOSIS >

[K9K]

INFOID:000000001180642

3. Check the continuity between stop lamp switch harness connector and ECM harness connector.

Stop lar	np switch	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E118	3	E60	116	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK ASCD BRAKE SWITCH

Refer to ECK-134, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace stop lamp switch.

6.CHECK BCM

Refer to BCS-18, "BCM : CONSULT-III Function (BCM - BCM)".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace

7. CHECK CAN COMMUNICATION LINE

Refer to LAN-28, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.

2. Disconnect stop lamp switch harness connector.

3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	C	Condition	Continuity
1 and 2	Brako podal	Fully released	Not existed
(Stop lamp switch)	Diake pedai	Slightly depressed	Existed
3 and 4	Brako podal	Fully released	Existed
(ASCD brake switch)	Diake pedai	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

 Adjust stop lamp switch installation. Refer to <u>BR-8</u>, "Inspection and Adjustment" (LHD models) or <u>BR-55</u>, "Inspection and Adjustment" (RHD models).

2. Check the continuity between stop lamp switch terminals under the following conditions.

P0571 ASCD BRAKE SWITCH

< COMPONENT DIAGNOSIS >

Terminals	C	Condition	Continuity
1 and 2	Brako podal	Fully released	Not existed
(Stop lamp switch)	Diake pedai	Slightly depressed	Existed
3 and 4	Brake nedal	Fully released	Existed
(ASCD brake switch)	Diake pedal	Slightly depressed	Not existed

Is the inspection result

YES >> INSPECTION >> Replace store

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	T ully Teleased	NOT CRISTOU
ake pedal	Slightly depressed	Existed
raka padal	Fully released	Existed
ake peuai	Slightly depressed	Not existed
normal?		
ON END		
op lamp	switch.	

P0575 ASCD STEERING SWITCH

Description

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.

DTC Logic

INFOID:000000001180644

INFOID:000000001180645

INFOID:000000001180643

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0575	 CRUISE CONTROL/SPEED LIMITER FUNCTION 1.DEF: Values outside the levels CC.1: Short circuit to +12V 2.DEF: Signal outside upper level 	 Harness or connectors (ASCD steering switch circuit is open or shorted) ASCD steering switch Combination switch

NOTE:

• Special note:

If the DTC is present, the cruise control/speed limiter function will be inhibited.

Diagnosis Procedure

1.CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Check ground connection E17. Refer to Ground inspection in GI-41. "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK ASCD STEERING SWITCH CIRCUIT

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltago	
Connector	Terminal	Ground	Condition	vollage	
	110 (ASCD steering switch signal)	Ground	MAIN switch: Pressed	Approx. 0V	
			CANSEL switch: Pressed	Approx. 1V	
E60			SET/COAST switch: Pressed	Approx. 2V	
			RESUME/ACCELERATE switch: Pressed	Approx. 3V	
			All ASCD steering switches: Released	Approx. 4V	

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

$\mathbf{3}$. CHECK ASCD STEERING SWITCH CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect combination switch harness connector.

3. Disconnect ECM harness connector.

4. Check the continuity between combination switch harness connector and ECM harness connector.

Combina	ation switch	E	Continuity	
Connector Terminal		Connector	Terminal	Continuity
M352	15	E60	111	Existed

5. Also check harness for short to ground and short to power.

	P	0575 ASCD S	STEERING S	SWITCH	
< COMPONENT	DIAGNOSIS >				[K9K]
Is the inspection r	esult normal?				٨
NO >> GO T	05. 04.				A
4.DETECT MAL	FUNCTIONING	PART			
Combination sw	itch (spiral cable	e) son FCM and som	hination awitah		EC
 Hamess for ope 		een ECIVI and con	IDINATION SWITCH		
>> Repa	ir open circuit oi	r short to ground o	or short to powe	r in harness or conn	ectors.
5.CHECK ASCD	STEERING SV	VITCH INPUT SIG	NAL CIRCUIT	FOR OPEN AND SH	IORT
1. Check the co	ntinuity betweer	n combination swit	ch harness con	nector and ECM ha	ness connector.
Combinatio	on switch	FC	M		
Connector	Terminal	Connector	Terminal	Continuity	E
M352	14	E60	110	Existed	
2. Also check ha	arness for short	to ground and sho	ort to power.	<u> </u>	F
Is the inspection r	esult normal?	0	·		
YES >> GO T	07.				
NO >> GO T	O 6.				G
O. DETECT MAL	FUNCTIONING	PART			
 Combination sw Harness for one 	itch (spiral cable	e) een ECM and com	hination switch		Н
- Hamess for ope	in or short betwe				
>> Repa	ir open circuit oi	r short to ground o	or short to powe	r in harness or conn	ectors.
7.CHECK ASCD	STEERING SV	VITCH			
Refer to ECK-98.	Component Ins	spection".			
Is the inspection r	esult normal?				0
YES >> GO T	08. ASCD steer	ing switch			
					K
Refer to GI-39		ent"			
		<u>onc</u> .			L
>> INSP	ECTION END				
Component In	spection				INFOID:000000001180646
1.CHECK ASCD	STEERING SV	VITCH			
1. Disconnect co	ombination swite	ch (spiral cable) ha	arness connecto	or M352.	N
2. Check the co	ntinuity between	combination swite	ch harness coni	nector terminals und	er following conditions.

Combination meter		Condition	Resistance	
Connector	Terminals	Condition	Resistance	
M352		MAIN switch: Pressed	Approx. 0 Ω	
	14 and 15 (Combination switch)	CANCEL switch: Pressed	Approx. 250 Ω	
		SET/COAST switch: Pressed	Approx. 660 Ω	
		RESUME/ACCELERATE switch: Pressed	Approx. 1,480 Ω	
		All ASCD steering switches: Released	Approx. 4,000 Ω	

Is the inspection result normal?

YES >> INSPECTION END

ECK-137

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< COMPONENT DIAGNOSIS >

NO >> Replace ASCD steering switch

< COMPONENT DIAGNOSIS >

P0606 ECM

Description

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble di	agnosis name	Possible cause
P0606	ECM • 1.DEF to 20.DEF: Internal electr	ic malfunction	• ECM
NOTE: • If DTC P • Condition The DT(• If the DT • Malfunc • Malfunc	0606 is displayed with othe ons for applying the diagnos C is declared present after an C is present: tion indicator (Red) lights u tion indicator (Yellow) lights	r DTC, first perform the tr stic procedure to the stor attempted start, or with the p. s up.	rouble diagnosis for other DTC. ed DTCs: e engine running.
Diagnos	is Procedure		INFOID:000000001180649
1. CHECK	CDTC		
Make sure	that which malfunction (DTC	second line indication) is d	lisplayed.
A E	xcept 9.DEFF		
B 9	DEF		
<u>A or B</u> A >: B >:	> GO TO 2. > GO TO 3.		
2.repla	CE ECM		
1. Perfor <u>Requir</u>	m <u>ECK-21, "ADDITIONAL \$</u> rement".	SERVICE WHEN REPLAC	CING CONTROL UNIT : Special Repair
2. Perfor <u>Requir</u>	m <u>ECK-22, "EGR VOLUME (</u> rement".	CONTROL VALVE CLOSE	D POSITION LEARNING : Special Repair
>	> INSPECTION END		
3. снеск	CAN COMMUNICATION LIN	IE	
Refer to L/	AN-28, "CAN Communication	Signal Chart".	
OK or NG			
OK >	> GO TO 4.		
T.CHECK	CDIC WITH ABS ACTUATOR	AND ELECTRIC UNIT (C	

INFOID:000000001180647

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INFOID:000000001180648

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P0606 ECM

< COMPONENT DIAGNOSIS >

Refer to <u>BRC-17, "CONSULT-III Function (ABS)"</u> (without ESP) or <u>BRC-95, "CONSULT-III Function (ABS)"</u> (with ESP).

<u>OK or NG</u>

OK >> GO TO 5. NG >> Repair or replace.

5.REPLACE ECM

- 1. Perform <u>ECK-21, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair</u> <u>Requirement"</u>.
- 2. Perform ECK-22, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> INSPECTION END

P0641 SENSOR POWER SUPPLY

< COMPONENT DIAGNOSIS >

P0641 SENSOR POWER SUPPLY

DTC Logic

INFOID:000000001180650

[K9K]

DTC DETECTION LOGIC

DIC NO.	Trou	ole diagnosis nar	ne	Possible cause
P0641	SENSOR POWER SU • 1.DEF: Signal outsic • 2.DEF: Signal outsic	PPLY CIRCUIT e lower level e upper level	 Harnes (The A (Fuel r (EGR) is shor (Mass (Refrig Accele (APP s Fuel ra EGR v Mass a Refrige 	ss or connectors PP sensor 2 power supply circuit is shorted.) ail pressure sensor circuit is shorted.) volume control valve control position sensor circuit ted.) air flow sensor circuit is shorted.) lerant pressure sensor circuit is shorted.) vator pedal position sensor sensor 2) ail pressure sensor olume control valve control position sensor air flow sensor erant pressure sensor
NOTE: • If DTC perform - Conditi The DT - If the D	P0641 is displayed trouble diagnosis ons for applying th C is declared prese IC is present:	with DTC Po for DTC P06 e diagnostic nt after the ign	0100, P0101, P0110, P0 41. procedure to the stored ition has been switched o	190, P0225, P0409, P0530, P2120, firs d DTCs: on.
- Malfund Diagnos	is Procedure	i) lights up.		INFOID:0000000011806
1. снесі	K GROUND CONNE	CTION		
1. Turn i 2. Chec Is the insp	gnition switch OFF. c ground connection <u>section result norma</u> -> GO TO 2. -> Repair or replace	E17. Refer to <u>?</u> ground conne PEDAL POSIT	Ground Inspection in <u>GI</u> ection. ION SENSOR 2 POWER	-41, "Circuit Inspection".
$\frac{1}{2}$ NO > $\frac{1}{2}$ CHECI	CACCELERATOR 			
NO > 2.CHECI 1. Disco 2. Turn i 3. Chec	ACCELERATOR F nnect accelerator pe gnition switch ON. < the voltage betwee	edal position (en APP senso	APP) sensor harness cor r harness connector and	nector. ground.
NO > 2.CHECI 1. Disco 2. Turn i 3. Checi	ACCELERATOR F nnect accelerator pe gnition switch ON. the voltage betwee APP sensor tor Terminal	edal position (en APP senso Ground	APP) sensor harness cor r harness connector and Voltage	nector. ground.
NO > 2.CHECI 1. Disco 2. Turn i 3. Checi Connec	ACCELERATOR F nnect accelerator pe gnition switch ON. the voltage betwee APP sensor tor Terminal 5	Ground	APP) sensor harness cor r harness connector and Voltage Approx. 5V	nector. ground.
NO > 2.CHECI 1. Disco 2. Turn i 3. Checi Connec E110 Is the insp	ACCELERATOR F nnect accelerator pe gnition switch ON. the voltage betwee APP sensor tor Terminal 5 pection result norma	edal position (en APP senso Ground Ground	APP) sensor harness cor r harness connector and Voltage Approx. 5V	nector. ground.
NO > 2.CHECI 1. Disco 2. Turn i 3. Checi Connect E110 Is the insp YES > NO > 2	ACCELERATOR F nnect accelerator pe gnition switch ON. the voltage betwee APP sensor tor Terminal 5 ection result norma > GO TO 4. > GO TO 3.	edal position (en APP senso Ground Ground ?	APP) sensor harness cor r harness connector and Voltage Approx. 5V	nector. ground.

ECM		Sensor			
Connector	Terminal	Name	Connector	Terminal	
E60	118	APP sensor	E110	5	

ECK-141

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P0641 SENSOR POWER SUPPLY

< COMPONENT DIAGNOSIS >

E	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
F68	89	Refrigerant pressure sensor	E50	3
	85	EGR volume control valve (EGR volume control valve control posi- tion sensor)	F99	1
F85	20	Fuel rail pressure sensor	F102	3
	28	Mass air flow sensor	E15	5

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair short to ground or short to power in harness or connectors.

4.CHECK SENSOR GROUND CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor				
Connector	Terminal	Name	Connector	Terminal		
E60	120	APP sensor	E110	1		
	74	Refrigerant pressure sensor	E50	1		
F68	82	EGR volume control valve (EGR volume control valve control posi- tion sensor)	F99	3		
F85	15	Fuel rail pressure sensor	F102	2		
	30	Mass air flow sensor	E15	2		

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair short to ground or short to power in harness or connectors.

5. CHECK COMPONENTS

Check the following.

- Refrigerant pressure sensor (Refer to ECK-128, "Diagnosis Procedure".)
- EGR volume control valve (EGR volume control valve control position sensor) (Refer to <u>ECK-120, "Diagno-</u> <u>sis Procedure"</u>.)
- Fuel rail pressure sensor (Refer to <u>ECK-98, "Component Inspection"</u>.)
- Mass air flow sensor (Refer to ECK-85. "Component Inspection".)
- Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning component.

6.CHECK APP SENSOR

Refer to ECK-107, "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Replace APP sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

P0651 SENSOR POWER SUPPLY

< COMPONENT DIAGNOSIS >

P0651 SENSOR POWER SUPPLY

DTC Logic

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INFOID:000000001180652

[K9K]

DTC DETECTION LOGIC ECK DTC No. Possible cause Trouble diagnosis name · Harness or connectors (The APP sensor 1 power supply circuit is shorted.) SENSOR POWER SUPPLY CIRCUIT (Turbocharger boost sensor circuit is shorted.) P0651 1.DEF: Parameter at minimum level Accelerator pedal position sensor 2.DEF: Parameter at maximum level D (APP sensor 1) Turbocharger boost sensor NOTE: Ε If DTC P0651 is displayed with DTC P0225, P0235, first perform trouble diagnosis for DTC P0651. Conditions for applying the diagnostic procedure to the stored DTCs: The DTC is declared present after the ignition has been switched on. • If the DTC is present: F Malfunction indicator (Red) lights up. **Diagnosis** Procedure INFOID:000000001180653 1. CHECK GROUND CONNECTION 1. Turn ignition switch OFF. Н Check ground connection E17. Refer to Ground Inspection in GI-41, "Circuit Inspection". 2. Is the inspection result normal? YES >> GO TO 2. NO >> Repair or replace ground connection. 2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT Disconnect accelerator pedal position (APP) sensor harness connector. 1. 2. Turn ignition switch ON. Check the voltage between APP sensor harness connector and ground. 3. Κ APP sensor Ground Voltage Connector Terminal E110 4 Ground Approx. 5V Is the inspection result normal? YES >> GO TO 4. Μ NO >> GO TO 3. ${ m 3.}$ CHECK SENSOR POWER SUPPLY CIRCUITS Check harness for short to power and short to ground, between the following terminals. Ν FCM Sensor

L.	0111	Consor			
Connector	Terminal	Name	Connector	Terminal	0
E60	122	APP sensor	E110	4	
F85	36	Turbocharger boost sensor	F91	1	Р

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair short to ground or short to power in harness or connectors.

4.CHECK SENSOR GROUND CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

P0651 SENSOR POWER SUPPLY

< COMPONENT DIAGNOSIS >

ECM Sensor Connector Terminal Name Connector Terminal E60 127 E110 2 APP sensor F85 Turbocharger boost sensor F91 2 43

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair short to ground or short to power in harness or connectors.

5.CHECK TURBOCHARGER BOOST SENSOR

• Turbocharger boost sensor (Refer to ECK-78, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace Turbocharger boost sensor.

6.CHECK APP SENSOR

Refer to ECK-107, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace APP sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END
P0685 ECM RELAY

DTC Logic

INFOID:000000001180654

[K9K]

DTC DETECTION LOGIC

DTC No.		Trouble	diagnosis name		Possible cause
P0685	ECM RELAY CIRCUIT • CO: Open circuit • CC.0: Short circuit to ground • CC.1: Short circuit to +12V			 Harness or connectors (The ECM relay circuit is open or short- ed.) IPDM E/R (ECM relay) 	
NOTE: • If the DT - Malfunct	C is present: ion indicator (l	Red) lights (лр.		
Diagnosi	s Procedure	;			INFOID:000000001180655
1.снеск	ECM POWER	SUPPLY CIF	RCUIT		
1. Turn ig 2. Check	nition switch OF the voltage bety	FF. ween ECM h	arness connec	tor and ground.	
Connector	ECM Terminal	Ground	Voltage	_	
F68	60	Ground	Battery voltage	_	
2.CHECK 1. Discon 2. Discon 3. Check	ECM POWER nect ECM harn nect IPDM E/R the continuity b	SUPPLY CIF ess connecto harness con etween ECM	RCUIT-II or. nector E11. 1 harness conn	ector and IPDM E	E/R harness connector.
	ECM	IP[DM E/R		
Connector	Terminal	Connector	Terminal	Continuity	
E68	53 54	E11	9	Existed	
4. Also ch Is the inspe YES >> NO >> 3. DETEC	eck harness fo ection result nor GO TO 6. GO TO 3. MALFUNCTIC	r short to gro <u>mal?</u> DNING PART	und and short	to power.	
Check the • Harness • Harness	following. or connectors E for open or shoi	7, E121 rt between E	CM and IPDM	E/R	
>> 4. снеск	Repair open c ECM POWER	ircuit or shor SUPPLY CIF	t to ground or s RCUIT-III	short to power in h	narness or connectors.

- 1. Disconnect ECM harness connector.
- 2. Disconnect IPDM E/R harness connector E11.

3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECK-145

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P0685 ECM RELAY

< COMPONENT DIAGNOSIS >

[K9K]

ECM		IPD	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F68	60	E11	15	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5

NO >> Repair open circuit or short to ground or short power in harness or connectors.

5.CHECK 20A FUSE

1. Disconnect 20A fuse (No. 52) from IPDM E/R.

2. Check 20A fuse.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace 20A fuse.

6. CHECK GROUND CONNECTION

Check ground connection E9. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace ground connection.

7.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

E	СМ	Ground	Continuity	
Connector Terminal		Oround	Continuity	
	123		Existed	
E60	124	Ground		
LUU	125			
	128			

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace.

P0812 PNP SWITCH

< COMPONENT DIAGNOSIS >

P0812 PNP SWITCH

DTC Logic

INFOID:000000001180656

[K9K]

DTC DETECTION LOGIC

DIC NO. I rouble diagnosi	is name	Possible cause
P0812 REVERSE GEAR SIGNAL • 1.DEF: Values outside the levels		 Harness or connectors (CAN communication line is open or shorted.) Park/neutral position switch
NOTE: • If DTC P0812 is displayed, the reversing	g light will not work.	
Diagnosis Procedure		INFO/D:000000001180655
1.CHECK CAN COMMUNICATION LINE		
Refer to <u>LAN-28, "CAN Communication Sig</u> OK or NG	nal Chart".	
OK >> GO TO 2. NG >> Repair or replace.		
Refer to TM-57, "PARK/NEUTRAL POSITIC	N (PNP) SWITCH : C	component Inspection".
OK or NG		
OK >> GO TO 3. NG >> Repair or replace.		
Refer to <u>GI-39, "Intermittent Incident"</u> .		
>> INSPECTION END		

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P0830 ASCD CLUTCH SWITCH

Description

ASCD clutch switch signal is applied to the ECM through the ASCD clutch switch when the clutch pedal is depressed.

DTC Logic

INFOID:000000001180659

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DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0830	ASCD CLUTCH SWITCH CIRCUIT • 1.DEF: No possible classification	 Harness or connectors (ASCD clutch switch circuit is open or shorted.) ASCD clutch switch

NOTE:

• Conditions for applying the diagnostic procedure to the stored DTCs:

The DTC is declared present after a series of actions on the clutch pedal during a road test [speed greater than 90 km/h (54 mph)].

Diagnosis Procedure

INFOID:000000001180660

1. CHECK ASCD CLUTCH SWITCH SIGNAL CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD clutch switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ASCD clutch switch harness connector and ground.

ASCD clu	tch switch	Ground	Voltago	
Connector Terminal		Cround	voltage	
E111	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2.check ascd clutch switch input signal circuit

1. Check the continuity between ASCD clutch switch harness connector and ground.

ASCD clutch switch		Ground	Continuity	
Connector Terminal			Continuity	
E111	2	E60	Existed	

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to power in harness or connectors.

3.CHECK ASCD CLUTCH SWITCH

Refer to ECK-149, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace ASCD clutch switch.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

P0830 ASCD CLUTCH SWITCH

< COMPONENT DIAGNOSIS >

>> INSPECTION END

Component Inspection

1.CHECK ASCD CLUTCH SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD clutch switch harness connector.
- 3. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch podal	Fully released	Existed
i anu z	Clutch pedal	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END NO >> GO TO 2.

2. CHECK ASCD CLUTCH SWITCH-II

- 1. Adjust ASCD clutch switch installation. Refer to <u>CL-6. "Inspection and Adjustment"</u>.
- 2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch podal	Fully released	Existed
	Clutch pedal	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD clutch switch.

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P1089 FUEL PUMP

DTC Logic

[K9K]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P1089	 FUEL RAIL PRESSURE REGULATION FUNCTION 1.DEF: High pressure supply pump (Pressure control valve) closed 2.DEF: High pressure supply pump (Pressure control valve) open 3.DEF: High pressure supply pump (Volumetric control valve) open 4.DEF: High pressure supply pump (Volumetric control valve) closed 5.DEF: Component malfunction: High pressure supply pump (Pressure control valve or Volumetric control valve) 6.DEF: High pressure supply pump (Pressure control valve) oscillation 7.DEF: High pressure supply pump (Volumetric control valve)) oscillation 	 Harness or connectors [High pressure supply pump (volumetric control valve) circuit is open or shorted.] [High pressure supply pump (Pressure control valve) circuit is open or shorted.] (Fuel rail pressure sensor circuit is open or shorted.) High pressure supply pump High pressure supply pump (Pressure control valve) High pressure supply pump (Volumetric control valve) Fuel line Fuel rail Fuel rail pressure sensor Fuel rail pressure sensor Fuel rail pressure relief valve Air mixture with fuel Lack of fuel

NOTE:

• NOTE:

- If DTC P1089 is displayed with DTC P0180, first perform trouble diagnosis for DTC P0180. Refer to <u>ECK-95, "DTC Logic"</u>.
- If DTC P1089 is displayed with DTC P0190, first perform trouble diagnosis for DTC P0190. Refer to <u>ECK-97, "DTC Logic"</u>.
- Conditions for applying the diagnostic procedure to the stored DTCs: The DTC appears when the engine is running.
- If the DTC is present:
- Malfunction indicator (Red) lights up.

Diagnosis Procedure

INFOID:000000001180663

1.CHECK LOW PRESSURE FUEL SUPPLY SYSTEM

Refer to ECK-10, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

Is the inspection result normal?

OK >> GO TO 2.

NG >> Replace or replace. Then GO TO 9.

2.CHECK INTERNAL FUEL TRANSFER PUMP

Refer to ECK-11, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

Is the inspection result normal?

OK >> GO TO 3.

NG >> Replace or replace. Then GO TO 9.

3.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Refer to <u>ECK-11</u>, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 4.

NG >> Replace or replace. Then GO TO 9.

ECK-150

P1089 FUEL PUMP

P1089 FUEL PUMP	
< COMPONENT DIAGNOSIS > [K9K]	
4. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)	Λ
Refer to ECK-12. "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]". Is the inspection result normal?	ECK
NG >> Replace or replace. Then GO TO 9.	
5. CHECK RAIL HIGH PRESSURE REGULATION	С
Refer to ECK-15, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regula- tion Check)".	D
OK >> GO TO 6.	
NG >> Replace or replace. Then GO TO 9.	F
O.CHECK MAJOR LEAK IN FUEL INJECTORS/FUEL INJECTORS OPEN	
Refer to <u>ECK-19</u> , "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/ Fuel Injectors Open)".	_
Is the inspection result normal?	F
OK >> GO TO 7.	
7 CHECK INCORPECT FUEL IN JECTION OF ANTITY	G
Peter to ECK-20 "BASIC INSPECTION: Special Repair Requirement (TEST 7: Incorrect Euclidiation Quan-	
tity)".	Н
Is the inspection result normal?	
OK >> GO TO 8. NG >> Replace or replace. Then GO TO 9	
8. CHECK INTERMITTENT INCIDENT	
Refer to GI-39, "Intermittent Incident".	J
Is the inspection result normal?	
YES >> INSPECTIO END.	IZ.
9 CLEAR PRESSURE REGULATION	K
Perform "PRESS REG ADAPTIVE" in WORK SUPPORT mode with CONSULT-III	
	L
>> INSPECTION END.	
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P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< COMPONENT DIAGNOSIS >

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description

By default the valve is open when in the rest position and is actuated only when the engine is switched off; this has a damping effect and helps to stop the engine.

DTC Logic

INFOID:000000001180665

INFOID:000000001180664

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2101	 THROTTLECONTROL MOTOR CIRCUIT 1.DEF: No signal 2.DEF: 3.DEF: Values out of range 4.DEF: Signal incoherence 	 Harness or connectors (Throttle control motor circuit is open or shorted.) Throttle control motor

NOTE:

Conditions for applying the diagnostic procedure to the stored DTCs:

The DTC is declared present after the engine is started or following a load test.

• Special note:

Diagnosis Procedure

INFOID:000000001180666

1.CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- Check ground connection E17. Refer to Ground inspection in <u>GI-41, "Circuit Inspection"</u>.
- Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect electric throttle control actuator harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle	e control actua- or	Ground	Voltage	
Connector	Terminal			
F81	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R
- Harness connector E7, F121
- Harness for open or short between IPDM E/R and electric throttle control actuator
- Harness for open or short between ECM and electric throttle control actuator

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT-I

ECK-152

If DTC P2101 2.DEF is displayed, first perform trouble diagnosis for DTC P0120. Refer to <u>ECK-93,</u> <u>"DTC Logic"</u>.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< COMPONENT DIAGNOSIS >

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle	control actuator	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F81	5	F68	72	Existed
Also check h the inspection YES >> GO NO >> Repa	arness for short result normal? TO 5. air open circuit of CTRIC THROTTL	to ground and sho r short to ground o .E CONTROL AC	ort to power. or short to powe TUATOR CIRC	r in harness or connectors. UIT-II
nector.	Drunuity between			
Electric throttle	control actuator	EC	M	Continuity
Connector	Terminal	Connector	Terminal	
F81	2	F68	94	Existed
<u>s the inspection</u> YES >> GO ⁻ NO >> Repa	result normal? TO 6. air open circuit o	r short to ground o	or short to powe	r in harness or connectors.
Electric throttle	control actuator	EC	см	Continuity
Connector	Terminal	Connector	Terminal	
F81	4	F68	90	Existed
2. Also check h <u>s the inspection</u> YES >> GO ⁻ NO >> Repa 7.CHECK INTE	arness for short <u>result normal?</u> TO 7. air open circuit o RMITTENT INCI	to ground and sho r short to ground o DENT	ort to power. or short to powe	r in harness or connectors.
Refer to <u>GI-39, "I</u>	ntermittent Incid	ent".		
s the inspection YES >> Repl NO >> Repa	result normal? ace electric throt air or replace.	ttle control actuato	or.	
Component li	nspection			INFOID:0000000118066
1.CHECK THRO		DL MOTOR		
 Turn ignition Disconnect e Check resistant 	switch OFF. electric throttle co ance between el	ontrol actuator har ectric throttle cont	ness connector trol actuator terr	ninals as follows.

Terminals	Resistance
1 and 2	$21 \pm 2.1\Omega$ [23°C (73°F)]

Is the inspection result normal?

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P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< COMPONENT DIAGNOSIS >

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- YES >> INSPECTION END
- NO >> Replace electric throttle control actuator.

P2120 APP SENSOR

Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.

DTC Logic

DTC DETECTION LOGIC

DTC No. Trouble diagnosis name Possible cause Harness or connectors ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT (APP sensor 2 circuit is open or shorted.) P2120 CC.1: Short circuit to +12V Accelerator pedal position sensor CO.0: Open circuit or short circuit to ground (APP sensor 2) NOTE: If DTC P2120 is displayed with DTC P0641, first perform trouble diagnosis for DTC P0641. Refer to ECK-141, "DTC Logic". Conditions for applying the diagnostic procedure to the stored DTCs: The DTC is declared present after a series of full load-no load accelerator pedal actions have been carried out (engine stopped, ignition on). If the DTC is present: - Malfunction indicator (Red) lights up. **Diagnosis** Procedure INFOID:000000001180670 1. CHECK GROUND CONNECTIONS Turn ignition switch OFF. 1. Check ground connection E17. Refer to Ground inspection in GI-41, "Circuit Inspection". 2. Is the inspection result normal? YES >> GO TO 2. NO >> Repair or replace ground connection. 2.check accelerator pedal position sensor power supply circuit 1. Disconnect accelerator pedal position sensor harness connector. 2. Turn ignition switch ON. 3. Check the voltage between accelerator pedal position sensor connector and ground.

Ad	Accelerator pedal position sensor			Voltago
Sensor	Connector	Terminal	Ground	voltage
2	E110	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

 $\mathbf{3.}$ CHECK ACCELERATOR PEDAL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

ECK-155

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INFOID:000000001180668



INFOID:0000000001180669

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P2120 APP SENSOR

< COMPONENT DIAGNOSIS >

- 2. Disconnect accelerator pedal position sensor.
- 3. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Continuity	CM	E	Accelerator pedal position sensor		
Continuity	Terminal	Connector	Terminal	Connector	Sensor
Existed	120	E60	1	E110	2

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ACCELERATOR PEDAL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			E	Continuity		
Sensor	Connector	Terminal	Connector Terminal		Continuity	
2	E110	6	E60	119	Existed	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to ECK-107, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace accelerator pedal position sensor.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000001180671

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.

2. Disconnect accelerator pedal position sensor harness connector.

3. Check resistance between accelerator pedal position sensor as follows.

Sensor	Terminals	Resistance
1	2 and 4	$1.7\pm0.9~{ m K\Omega}$
2	1 and 5	$2.85\pm2.05~{ m K\Omega}$

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal position sensor.

P2226 BARO SENSOR

Description

The barometric pressure sensor is built into ECM. The sensor detects ambient barometric pressure and sends the voltage signal to the microcomputer.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2226	 BAROMETRIC PRESSURE SENSOR CIRCUIT CC.1: Short circuit to +12V CO.0: Short circuit to ground or open circuit CO.0: Micro -breaks 	• ECM
NOTE: • Condition The DTC • Special The barc	ons for applying the diagnostic procedure to the stored DTCs C is declared present after the ignition has been switched on for a note: ometric pressure sensor is integrated into the ECM, and cannot be	: least 10 seconds. e separated.
Diagnos	is Procedure	INFOID:000000001180674
1. REPLA	CE ECM	
1. Perfor	m ECK-21, "ADDITIONAL SERVICE WHEN REPLACING CO	<u> ONTROL UNIT : Special Repair</u>
2. Perfor <u>Requi</u>	m <u>ECK-22, "EGR VOLUME CONTROL VALVE CLOSED POSIT</u> rement".	TION LEARNING : Special Repair
>	> INSPECTION END	

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INFOID:000000001180673

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P2263 TC SYSTEM

DTC Logic

INFOID:000000001180675

INFOID:000000001180676

[K9K]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2263	AIR INLET CIRCUIT • 1.DEF: Permanent at minimum limit • 2.DEF: Permanent at maximum limit	 Harness or connectors (Turbocharger boost control solenoid valve circuit is open or shorted.) Air inlet circuit Vacuum pump Vacuum hose Turbocharger Turbocharger boost control solenoid valve Turbocharger boost sensor Electric throttle control actuator

NOTE:

• Conditions for applying the diagnostic procedure to the stored DTCs: The DTC becomes present after the engine is started.

• If the DTC is present:

• Malfunction indicator (Red) lights up.

Diagnosis Procedure

1. cecheck vacuum hoses and vacuum gallery

1. Turn ignition switch OFF.

Check vacuum hoses and vacuum gallery for clogging, cracks 2. or improper connection. Refer to ECK-35, "Vacuum Hose Drawing".

Is the inspection result normal?

Yes >> Repair or replace.

>> GO TO 2. No



2.CHECK AIR FILTER

Check that air filter is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace. >> GO TO 3.

No

3.CHECK INTAKE AIR DUCT

Check that intake air duct is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace.

>> GO TO 4. No

4.CHECK VACUUM PUMP

Check vacuum pump.

Is the inspection result normal?

Yes >> Repair or replace.

>> GO TO 5. No

5. CHECK TURBOCHARGER

P2263 TC SYSTEM

< COMPONENT DIAGNOSIS >

Check turbocharger.

Is the inspection result normal?

Yes >> Repair or replace.

No >> GO TO 6.

6.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Disconnect turbocharger boost control solenoid valve harness connector.

2. Turn ignition switch ON.

3. Check the voltage between turbocharger boost control solenoid valve harness connector and ground.

Turbocharger boost o	control solenoid valve	Ground	Voltage	
Connector	Terminal	Ground	voltage	
E55	2	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

1	.CHECK	TURBOCHARGER	BOOST	CONTROL	SOLENOID	VALVE	OUTPUT	SIGNAL	CIRCUIT	FOR	ŀ
0	PEN AND	SHORT									

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between turbocharger boost control solenoid valve harness connector and ECM harness connector.

Turbocharger boost	control solenoid valve	E	Continuity	
Connector	Terminal	Connector Terminal		
E55	1	F68	52	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Refer to ECK-76, "Component Inspection".

<u>Is the inspection result normal?</u> YES >> GO TO 9.

NO >> Replace turbocharger boost control solenoid valve.

9.CHECK TURBOCHARGER BOOST SENSOR

Refer to ECK-78, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace turbocharger boost sensor.

10. CHECK THROTTLE CONTROL MOTOR

Refer to ECK-153, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace turbocharger boost sensor.

11.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

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P2299 ACCELERATOR/BRAKE PEDAL POSITION INCONSISTENCY

< COMPONENT DIAGNOSIS >

P2299 ACCELERATOR/BRAKE PEDAL POSITION INCONSISTENCY

DTC Logic

INFOID:000000001180677

INFOID:000000001180678

[K9K]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2299	ACCELERATOR PEDAL/BRAKE PEDAL INCONSISTENCY • 1.DEF: Inconsistency	 Harness or connectors (APP sensor 1 and 2 circuit is open or shorted.) (Stop lamp switch circuit is open or short- ed.) Accelerator pedal position sensor (APP sensor 1 and 2.) Stop lamp switch Accelerator pedal

NOTE:

Special note:

- The brake and accelerator pedals were detected as depressed simultaneously for 30 seconds.
- If the DTC is present:
- Malfunction indicator (Red) lights up.

Diagnosis Procedure

1.CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- Check ground connection E17. Refer to Ground inspection in <u>GI-41, "Circuit Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK BRAKE SWITCH CIRCUIT

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltago	
Connector	Terminal	Giouna	Condition		voltage	
E60	115 (Brake switch signal)	Ground	Brako podal	Fully released	0V	
			Diake pedai	Slightly depressed	Battery voltage	

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 7.

 $\mathbf{3}.$ Check accelerator pedal position sensor power supply circuit

1. Turn ignition switch OFF.

2. Disconnect accelerator pedal position sensor harness connector.

3. Turn ignition switch ON.

4. Check the voltage between accelerator pedal position sensor connector and ground.

A	Ground	Voltago		
Sensor	Sensor Connector			vollage
1	E110	4	Ground	
2		5	Giouna	Αρριύχ. 5 ν

Is the inspection result normal?

YES >> GO TO 4.

P2299 ACCELERATOR/BRAKE PEDAL POSITION INCONSISTENCY

< COMPONENT DIAGNOSIS >

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ACCELERATOR PEDAL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accel	erator pedal position	sensor	ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	Continuity
1	E110	2	E60	127	Existed
2	EIIO	1	200	120	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK ACCELERATOR PEDAL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor ECM Continuity Sensor Connector Terminal Connector Terminal 1 3 126 E110 E60 Existed 2 6 119

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to ECK	-107, "Compo	onent Inspec	tion".		Κ
Is the inspect	ion result nor	mal?			
YES >> G NO >> R	O TO 11. Replace accel	erator pedal	position sensor.		L
7. СНЕСК ВІ	RAKE SWITC	CH POWER	SUPPLY CIRCU	IT	
 Turn ignit Disconne Turn ignit 	ion switch Ol ct stop lamp	FF. switch harne	ess connector.		Μ
4. Check the	e voltage bet	ween stop la	imp switch harne	ess connector and ground.	Ν
Stop larr	np switch	Ground	Voltago		
Connector	Terminal	Ground	voltage		0
E118	1	Ground	Battery voltage		
Is the inspect	ion result nor	mal?			_

YES >> GO TO 9. NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector E105, M77
- 10A fuse (No. 11)
- Harness for open or short between fuse and stop lamp switch

ECK-161

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P2299 ACCELERATOR/BRAKE PEDAL POSITION INCONSISTENCY

< COMPONENT DIAGNOSIS >

[K9K]

>> Repair open circuit or short to ground or short to power in harness or connectors.

$9. {\sf CHECK} \text{ brake switch input signal circuit}$

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.

3. Check the continuity between stop lamp switch harness connector and ECM harness connector.

Stop lar	Stop lamp switch Connector Terminal		ECM		
Connector			Terminal	Continuity	
E118	2	E60	115	Existed	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK STOP LAMP SWITCH

Refer to ECK-107, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace stop lamp switch.

11.CHECK ACCELERATOR PEDAL

Refer to ACC-3, "Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace accelerator pedal position sensor.

12. CHECK INTERMITTENT INCIDENT

Refer to GI-39. "Intermittent Incident".

>> INSPECTION END

P2413 EGR SYSTEM

< COMPONENT DIAGNOSIS >

P2413 EGR SYSTEM

DTC Logic

INFOID:000000001180679

[K9K]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name		Possible cause
P2413	EGR VOLUME CONTROL • 1.DEF: Jammed component		 Harness or connectors (The EGR volume control valve circuit is open or shorted.) (The EGR volume control valve control posi- tion sensor circuit is open or shorted.) EGR volume control valve EGR volume control valve control position sensor Incorrect EGR volume control valve installa- tion EGR volume control valve stuck closed EGR passage clogged
NOTE:			
 Conditions The DTC be 	cor applying the diagnostic procedu	ire to the store ted.	ea DICS:
Special not Engine inst:	es: ability possibly even stalling		
- Difficult to s	tart engine or even impossible when co	old.	
 Loss of perf Possible sm 	ormance. Joke emissions		
• If the DTC i	is present:		
- Malfunction	n indicator (Red) lights up.		
Diagnosis	Procedure		INFOID:000000001180
1. снеск G	ROUND CONNECTIONS		
1. Turn ignit	ion switch OFF.	increation in C	
Is the inspect	ion result normal?		<u>s-41, Circuit inspection</u> .
YES >> 0	60 TO 2.		
NO >> R ? ou = ov = i	epair or replace ground connection.		
	GR VOLUME CONTROL VALVE INSTA		
Uneck that E	ion result normal?	репу.	
YES >> 0	60 TO 3.		
NO >> Ir	nstall EGR volume control valve proper	ly.	
3. CHECK E	GR VOLUME CONTROL VALVE CONT	FROL POSITIC	N SENSOR POWER SUPPLY CIRCUIT
1. Disconne	ct EGR volume control valve harness c	connector.	
3. Check the	e voltage between EGR volume control	valve control p	position sensor connector and ground.
GR vol	ume control valve control position sensor		
		 Ground 	Voltage

GR volume control valve	Ground	Voltage	
Connector Terminal			
F99	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR GROUND CIRCUIT FOR

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between EGR volume control valve control position sensor harness connector and ECM harness connector.

EGR volume contr tion	EGR volume control valve control posi- tion sensor		ECM	
Connector	Terminal	Connector	Terminal	*
F99	3	F85	82	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR INPUT CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EGR volume control valve control position sensor harness connector and ECM harness connector.

EGR volume control valve control posi- tion sensor		E	Continuity		
Connector	Terminal	Connector Terminal			
F99	5	F85	86	Existed	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR CIRCUIT

1. Check harness continuity between the following terminals.

EGR volume control valve		E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F99	2	- F68	95	Existed
			96	Not existed
			95	Not existed
			96	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK EGR VOLUME CONTROL VALVE VISUALLY

1. Remove the EGR volume control valve

2. Check if foreign matter is caught between the EGR volume control valve and the housing.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Remove the foreign matter and clean the EGR volume control valve.

8.CHECK EGR PASSAGE

Check the following for clogging and cracks.

EGR tube

ECK-164

P2413 EGR SYSTEM

< COMPONENT DIAGNOSIS > [K9K]	
EGR hose EGR cooler	А
Is the inspection result normal?	
YES >> GO TO 9. NO >> Repair or replace EGR passage.	EC
9. CHECK EGR VOLUME CONTROL VALVE	
Refer to ECK-126, "Component Inspection".	C
Is the inspection result normal?	C
YES >> GO TO 10.	
10 = 0.000000000000000000000000000000000	D
Refer to <u>GI-39, "Intermittent Incident"</u> .	Е
Is the inspection result hormal?	_
NO >> Repair or replace.	
11. REPLACE EGR VOLUME CONTROL VALVE	F
 Replace the EGR volume control valve. Perform ECK-22, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair 	G
Requirement"	G
>> INSPECTIO END	Н
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P2502 BATTERY VOLTAGE

DTC Logic

INFOID:000000001180681

INFOID:000000001180682

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2502	ALTERNATOR CHARGE SIGNAL • 1.DEF: Values outside level	 Harness or connectors (The CAN communication line is open or shorted) Alternator

NOTE:

• Conditions for applying the diagnostic procedure to the stored DTCs: The DTC becomes present after the engine is started.

Diagnosis Procedure

1. CHECK CAN COMMUNICATION LINE

Refer to LAN-28, "CAN Communication Signal Chart".

<u>OK or NG</u>

OK >> GO TO 2. NG >> Repair or replace. **2.**CHECK ALTERNATOR

Refer to <u>CHG-8, "System Diagram"</u>.

OK or NG

OK >> GO TO 3.

NG >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

P2610 ENGINE SAFETY STOP

< COMPONENT DIAGNOSIS >

P2610 ENGINE SAFETY STOP

DTC Logic

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INFOID:000000001180683

[K9K]

DTC No.	Trouble diagnosis name	Possible cause
P2610	ENGINE SAFETY STOP • 1.DEF: Electric • 2.DEF: Hydraulic	 Harness or connectors (Fuel injector circuit is shorted) Turbocharger Fuel injector Intake air leas Electric throttle control actuator
NOTE:		
Prioritie If DTC F	s when dealing with a number of DTCs: 2610 is displayed with other DTC, first perform	n the trouble diagnosis for the other DTC.
Special	notes:	j
- The engi	ne only stops after the ignition is switched off.	
Diagnos	is Procedure	INFOID:00000000118066
1.CHECK	INTAKE AIR DUCT	
Check that	intake air duct is not obstructed.	
Is the insp	ection result normal?	
Yes >	> Repair or replace.	
Check vac	uum pump. action rosult normal?	
Yes >	> Repair or replace	
No >	> GO TO 3.	
3.CHECK	TURBOCHARGER	
Check turk	ocharger.	
Is the insp	ection result normal?	
Yes >	> Repair or replace.	
4.CHECK	TURBOCHARGER BOOST CONTROL SOLEN	
Refer to F		
Is the insp	ection result normal?	
YES >	> GO TO 5.	
NO >	> Replace turbocharger boost control solenoid va	lve.
D. CHECK	THROTTLE CONTROL MOTOR	
Refer to E	CK-152, "Diagnosis Procedure".	
Is the insp	ection result normal?	
YES > NO >	> GO TO 6. > Replace turbocharger boost sensor.	
6.CHECK		
Refer to F	CK-101, "Diagnosis Procedure"	
Is the insp	ection result normal?	

[K9K]

7. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

ASCD INDICATOR

< COMPONENT DIAGNOSIS >

ASCD INDICATOR

Description

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.

CRUISE lamp illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.

SET lamp illuminates when following conditions are met.

- CRUISE lamp is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET lamp remains lit during ASCD control.

Component Function Check

1.ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

CONDITION	INDICATOR	
Ignition switch: ON	MAIN switch: Pressed at the 1st time →at the 2nd time	Illuminated \rightarrow Not illuminated
MAIN switch: ON	ASCD: Operating	Illuminated
 When vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH) 	ASCD: Not operating	Not illuminated
Is the inspection result normal?		
YES >> INSPECTION END NO >> Go to ECK-169, "Diagnosis F	rocedure".	
Diagnosis Procedure		INFOID:000000001180687
1.CHECK CAN COMMUNICATION LINE	E	
Refer to LAN-28, "CAN Communication S	ignal Chart".	
<u>OK or NG</u>		
OK >> GO TO 2.		
NG >> Repair or replace.		
2. CHECK COMBINATION METER OPE	RATION	
Refer to MWI-27, "CONSULT-III Function	(METER/M&A)".	
Is the inspection result normal?		
YES >> GO TO 3.		
NO >> Check combination meter circ	cuit. Refer to <u>MWI-7, "METER</u> :	SYSTEM : System Diagram".
3. CHECK INTERMITTENT INCIDENT		
Refer to GI-39. "Intermittent Incident".		
>> INSPECTION END		

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COOLING FAN

Description

Cooling fan operates at each speed when the current flows in the cooling fan motor as follows. Refer to <u>ECK-57, "System Description"</u> for cooling fan operation.

Component Function Check

1. CHECK COOLING FAN LOW SPEED FUNCTION

- 1. Start engine and let it idle.
- 2. Turn air conditioner switch and blower fan switch ON.
- 3. Make sure that cooling fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 2. NO >> Refer to ECK-170, "Diagnosis Procedure".

2. CHECK COOLING FAN HIGH SPEED FUNCTION

- 1. Turn ignition switch OFF.
- 2. Turn air conditioner switch and blower fan switch OFF.
- 3. Disconnect engine coolant temperature sensor harness connector.
- 4. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
- 5. Restart engine and make sure that cooling fan operates at higher speed than low speed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Refer to ECK-170, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK CAN COMMUNICATION LINE

Refer to ECK-69, "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace

2. CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect cooling fan relay-3 harness connector.
- 3. Check the voltage between cooling fan relay-3 harness connectors and ground.

Cooling fai	n motor-1	Ground	Voltage	
Connector	Terminal	Ground		
E50	1	Ground	Battery voltage	
L33	3	Ground	Dattery voltage	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- 50A fusible link (letter M)
- Harness for open or short between cooling fan motor-3 and battery

>> Repair or replace malfunctioning part.

4.CHECK COOLING FAN CIRCUIT FOR OPEN AND SHORT

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COOLING FAN

< COMPONENT DIAGNOSIS >

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- 1. Disconnect cooling fan motor harness connector.
- 2. Disconnect IPDM E/R harness connectors E13 and E14.
- 3. Check the continuity between cooling fan motor harness connector and IPDM E/R harness connector.

Cooling fa	in motor	IPDM	E/R	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E3	1	E14	52	Existed

4. Check the continuity between cooling fan motor harness connector and cooling fan relay-3 harness connector.

Cooling fa	an motor	Cooling fa	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E3	1	E59	2	Existed

5. Check the continuity between IPDM E/R harness connector and cooling fan relay-3 harness connector.

IPDM E/R		Cooling fa	n relay-3	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E13	48	E59	4	Existed

6. Check the continuity between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Continuity
Connector	Terminal	Orbana	Continuity
E10	5	Ground	Existed
LIU	6	Ground	LAISted

7. Check the continuity between cooling fan relay-3 and ground harness connector.

Cooling	fan motor	Ground	Continuity
Connector	Terminal	Giouna	Continuity
E3	2	Ground	Existed
8. Also che	ck harness fo	or short to ar	ound and short to

Is the inspection result normal?

YES	>> GO TO 6.
NO	>> GO TO 5.
F	

5.DETECT MALFUNCTIONING PART

Check the following.

Harness for open or short between cooling fan motor and IPDM E/R

- Harness for open or short between cooling fan motor and cooling fan relay-3
- Harness for open or short between IPDM E/R and cooling fan relay-3
- Harness for open or short between IPDM E/R and ground
- Harness for open or short between cooling fan relay-3 anf ground
- Resitor E57
 - >> Repair or replace malfunctioning part.

6.CHECK COOLING FAN RELAY

Refer to ECK-172, "Component Inspection (Cooling Fan Relay)".

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Replace malfunctioning cooling fan relay.

ECK-171

Refer to ECK-172. "Component Inspection (Cooling Fan Motor)".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace cooling fan motor.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace IPDM E/R.
- NO >> Repair or replace harness or connector.

Component Inspection (Cooling Fan Motor)

- 1. CHECK COOLING FAN MOTOR
- 1. Turn ignition switch OFF.
- 2. Disconnect cooling fan motor harness connector E3.
- 3. Supply cooling fan motor terminal with battery voltage and check operation.

Tern	ninals	Operation	
(+)	(-)	Operation	
1	2	Cooling fans operate	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace cooling fan motor.

Component Inspection (Cooling Fan Relay)

1.CHECK COOLING FAN RELAYS

- 1. Turn ignition switch OFF.
- 2. Remove cooling fan relay.
- 3. Check the continuity between cooling fan relay terminals under the following conditions.

Terminals	Conditions	Continuity
3 and 4	12V direct current supply between terminals 1 and 2	Existed
	No current supply	Not existed
Is the insp	pection result normal?	

YES >> INSPECTION END

NO >> Replace cooling fan relay.



INFOID:0000000001180691

INFOID:000000001180692

[K9K]

STOP LAMP SWITCH

< COMPONENT DIAGNOSIS >

STOP LAMP SWITCH

Description

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

Component Function Check

1.CHECK BRAKE SWITCH CIRCUIT

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector and ground.

	ECM						
Connector	Termi	nal	Ground	Condition		Voltage	l
E60	115 (Brake swite)	5 ch signal)	Ground	Brake pedal	Fully released Slightly depressed	0V Battery voltage	
<u>s the inspect</u> YES >> II NO >> G	ion result nori NSPECTION So to <u>ECK-17</u> 3	<u>mal?</u> END. 3, "Diagnosi	s Procedu	<u>'e"</u> .			(
Diagnosis	Procedure					INFOI	D:0000000001180695
1.снеск в	RAKE SWITC	H POWER	SUPPLY C	CIRCUIT			ł
I. Turn ignit 2. Disconne 3. Turn ignit 4. Check th	tion switch OF ect stop lamp s tion switch ON e voltage betw	F. switch harne N. veen stop la	ess connec amp switch	ctor. harness con	nector and ground.		
		•			Ū.		
Stop lan	np switch	Ground	Voltag	е			
E118	1	Ground	Battery vo	oltage			ļ
s the inspect	ion result nor	mal?					
YES >> 0 NO >> 0 2 DETECT N	GO TO 3. GO TO 2.		т				ļ
Check the fol	lowing.		1				
 Harness co 10A fuse (N 	nnector E105	, M77					
 Harness for 	open or shor	t between fu	use and sto	op lamp swite	h		1
_							
א << 2 בעבכיג פו	Repair open ci	rcuit or shoi	rt to ground	d or short to p	ower in harness or	connectors.	
2. Disconne 3. Check th	ect ECM harne e continuity be	ess connect etween stop	or. amp swite	ch harness c	onnector and ECM	harness connecto	r.

Stop lar	np switch	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E118	2	E60	115	Existed

4. Also check harness for short to ground and short to power.

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Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK STOP LAMP SWITCH

Refer to ECK-107, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace stop lamp switch.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000001180696

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.

2. Disconnect stop lamp switch harness connector.

3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
(Stop lamp switch)	Diake pedai	Slightly depressed	Existed
3 and 4	Brako podal	Fully released	Existed
(ASCD brake switch)	Diake peuai	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

- Adjust stop lamp switch installation. Refer to <u>BR-8</u>, "Inspection and Adjustment" (LHD models) or <u>BR-55</u>, "Inspection and Adjustment" (RHD models).
- 2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brako podal	Fully released	Not existed
(Stop lamp switch)	Diake pedai	Slightly depressed	Existed
3 and 4	Brake pedal	Fully released	Existed
(ASCD brake switch)	Diake pedai	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch.







< ECU DIAGNOSIS >

ECK-177



Connector No. EB Connector Name WIRE TO WIFE Connector Type MC2WW-LC	Taminal Color No. of Wire 2 B/R	Connector Name E13 Damactor Name ENALE R. RUTELLGENT POWER Damactor Type ENALER Damactor Type ISI FIRM-CS Mane ISI FIRM-CS	A ECK C D
Connector No. E7 Connector Name WRE TO WIFE Connector Type INSTERM-G5 Connector Type ISTERM-G5 Connector TYPE ISTERM-G5 C	Terminal Color. Signal Name (Specification) No. of Wre Signal Name (Specification) 4 R /Wth discel engine) 10 C.R -/Wth discel engine) 11 L.B -/Wth discel engine) 12 G -/Wth discel engine)	Connector Na E12 Connector Name PDM. E. R. NITELICENT POWER Connector Type Signal Name [Specification] 28 L 28 L 28 L	E F G H
GINE) Connector Nu. E6 Connector Name WRE TO WIFE Connector Type Tr2:3MW-TV Connector Type T2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	Terminal Color Signal Name (Speerfication) Ao of Wre Signal Name (Speerfication) 4 R.L - 6 G.P - 19 Y.W - 20 LG -(Wth Kilk engine)	Connector No. E11 Connector Name PDM. E.R. (HITELLOENT POWER Dometor Name PDM. E.R. (HITELLOENT POWER Dometor Type ISISTBBLOD Connector Type ISISTBBLOD Dometor Type ISISTBBLOD	l J K
ENGINE CONTROL SYSTEM (K9K ENC Connector Name Connector Name	Terminal Color Signal Name [Specification] No. of Wire T 1 T - 2 B -		L M N
		JUBWAUJU/GE	Р

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Connector No. E5 Connector Name Connector Name Connector Name Connector Type Connector Ty	Terminal Color Signal Name [Specification] No. of Wire - 1 0,R - 2 0 -	12 R AOCEL PED SENS-1 +V 123 B MD 124 B GND 125 B ADCEL PED SENS-1 126 B ADCEL PED SENS-1 127 B ADCEL PED SENS-1 128 B ADCEL PED SENS-1 129 B ACCEL PED SENS-1
Dometor No. E90 Dometor Name REFIRIGERANT PRESSURE SENSOR Dometor Type D40093/F	Terminal Color Signal Name [Seedification] No. of Wire Color I R/L GMD 2 V/M AVSS	Connector No. E00 Connector Name E CM Connector Name E CM Connector Type MAA24FB-MEA8-LH Connector Type Signal Mane (Specification) No. Colur Connector Name (Specification) No. Colur Connector Name (Specification) No. No. BAAC8 SMICH MAIN 110 V ACOEL PED SMICH N ACOEL PED SMICH ACOEL PED SMICH 120 B ACOEL PED SENS-2 VN
AGINE) Connector Name Connector Name Connector Type AFLOW SENSOR Connector Type AFLOW SENSOR Connector Type AFLOW SENSOR Connector Name Connector Na	Terminal Color Signal Name [Specification] No. of Wire - 1 LG - 2 GR/R - 4 G - 5 R - 6 B/Y -	Connector Nu. E30 Connector Name COOLING FAN RELAY-3 Connector Type 24347 9F900 Terminal Color Instrument Color<
ENGINE CONTROL SYSTEM (K9K EN Connector Na. Et al Connector Name DFDME R (INTELLIGENT POWER Connector Type VIX 7383-5591-40-F Connector Type VIX 7383-5591-40-F 5415312	Terminal Color Signal Name [Specification] Na. of Wire -	

ECK-180

< ECU DIAGNOSIS >

[K9K]
Connector No. E118 Connector Name STOP LAMP SWITCH Connector Type MO4FW-LC	Terminal Color Signal Name (Specification) 1 V V 2 R.W - 3 0 - 4 W.L -	Connector Name F70 Connector Name FULEL INJECTOR NO.1 Connector Type KOSTAL 0941231 Mini Color Inamial Color Namial Color Namial Color Name Signal Name (Speofif cation)	A ECP C D
Connector No. E111 Connector Name ASD CLUTCH SWITCH Connector Type MO2FBR-LC	Terminal Color Signal Name (Specification) No. of Wich Signal Name (Specification) 1 0 -[With KBK engine] 2 B -[With KBK engine]	76 L/Y GLOW-PLIG COMMOND 78 G.P FFECIN PRESS SENS 80 R/G GLOW-PLIG DIAMONTICS 81 R/G GLOW PRESS SENS 82 R/G GLOMSHAFT SENS + 83 K/G CRAMISSHAFT SENS + 86 L/G CRAMISSHAFT SENS + 91 V/G CRAMISSHAFT SENS + 93 K/G CRAMISSHAFT SENS + 94 C CRAMISSHAFT SENS + 95 K/M MLET THROTTLE FIAA/C 95 L/W NLET THROTTLE GND 96 L/W BCR DOMOTOR+	E F G
GINE) Connector Na. El10 Connector Name ACCEL ERATOR PEDAL POSITION SENSOR Connector Type Redoff Connector Type Redoff	Terminal Color Signal Mane [Specification] No. of Wree Signal Mane [Specification] 1 1 B -(Wrh MR engine or KBK engine] 2 B -(Wrh MR engine or KBK engine] 3 W -[Wrh MR engine or KBK engine] 4 R -(Wrh MR engine or KBK engine] 5 R -(Wrh MR engine or KBK engine] 6 W -(Wrh KBK engine]	Connector Nu. F88 Connector Name ECM Connector Name ECM Connector Name ECM Connector Yan MARDFBR-MEAS-LH MARDFBR-MEAS-LH MARDF	I J K
ENGINE CONTROL SYSTEM (K9K EN Connector Nun. EI Connector Name WRE TO WRE Connector Type H90MV-HSI 6-TH4	Terminal No. Color Nuc. Signal Name [Sneufication] 11 V - 42 B - 43 P - 50 L - 51 P - 52 L - 62 V - 62 V - 63 N/L -	Gomeeter No. Fa Connector Name FUSIBLE LINK HOLDER Connector Type LOIFB-MC Connector Type LOIFB-MC Image: Signal Name [Secrification] -	L M N O

[K9K]

Connector No. F/3 Connector Name ENGINE COOLANT TEMPERATURE SENSOR Connector Type GHW 17843000000-F Connector Type GHW 17843000000-F	Domector No. F87 Connector Name CAMSHAFT POSITION SENSOR (PHASE) Connector Name CAMSHAFT POSITION SENSOR (PHASE) Connector Type FEAD3FB Total E
Connector Name F13 Connector Name FUEL INJECTOR NO.4 Connector Type KOSTAL 09441231 Connector Type Signal Name (Specification) I Connector Type I Connector Type	28 R AIR MASS FLOW SENS +V 29 L/G FUEL TEMP OID 30 GR-R AIR MASS-FLOW SENS OID 35 L/Y WATES FLOW SENS OID 36 L/Y MARASS FLOW 37 L/Y MARASS FLOW 38 GR-I MARASS FLOW 39 LG MARASS FLOW 43 0 BOOST PRES OID 44 0 BOOST PRES SENS
GINE) Gomeotor Nuo. 572 Connector Name FUEL INJECTOR NO.3 Connector Nuo.3 Connector Yane Kill Colspan="2">Color Terminal Color 2 G.Y.	Connector No. F85 Connector Name ECM Connector Name ECM Connector Type MAA0FGY-MEA8-RH Connector Type Signal Mane Specification No. of Wire Signal Name Specification <tr< td=""></tr<>
BNGINE CONTROL SYSTEM (K9K ENU Commetor Nu. Connector Num FUL INJECTOR NO.2 Connector Type KOSTAL 09441231 Connector Type KOSTAL 09411231 Connector Type KOST	Ormester No. Fil Connector Name ELECTRIC THROTTLE CONTROL Connector Type ACTUATOR Connector Type F9 2121200

CBWA0310GE

Connector No. F35 Connector Name QLOW PLUG NO.1 Connector Type TYCO-AMP 958631-1	Termmal Color Signal Name [Specification] No. of Wre	Onmeter Na. F99 Connector Name EGR VOLUME CONTROL VALVE Connector Type FEP-42121200 Connector Type FEP-42121200	Termmal Color Signal Mame [Specification] No. of Wrre Signal Mame [Specification] 1 SB -[Except MGR engine] 2 R -[Except MGR engine] 3 GR -[Except MGR engine] 6 L/W -[Except MGR engine]	A ECK C D
Connector No. F14 Connector Name GLOW RELAY Connector Type FCI 240PC0085015	Terminal No. Color of Wire of Wire Signal Name [Specification] No. of Wire of Wire a Store PLUG 3 2 L clow PLUG 1 3 R.G DMG 4 W 4 W -BAT 6 V 7 LG GLOW PLUG 2 8 L/Y CONTROL[Evcept MBR engine]	Gomettor No. F18 Connector Name GLOW PLUG NO.4 Connector Type TYCO-AMP 553831-1	Terminal Color Signal Name [Specification] No. of Wire	E F G H
Connector No. F1 Connector No. F1 Connector Name TURBOCH 1928404073 Connector Type BOSCH 1928404073	Terminal No. Color of Wire Signal Name [Specification] 1 V Signal Name [specification] 2 G GNO 3 0 VS	Connector No. F97 Connector Name GLOW FLUG NO 3 Connector Type TYCO-AMP 553331-1	Terminal Color Signal Name [Specification] No. of Wire 1 W	l J K
ENGINE CONTROL SYSTEM (K9K EN Connector Na. F83 Connector Name Connector Name Connector Type F80 Connector Type F80 F80 Connector Name Connector Nam	Terminal Color No. of Ware I R/U 2 L/O	Connector No. F96 Connector Name GLOW PLUG NO.2 Connector Type TYCO-AMP 953831-1	Terminal No. Color of Wise Signal Name [Specification] 1 LG -	L M N O

Commetor No. F107 Commetor Name Commetor Name Commetor Type FEA02FW FEA02FW	Terminal Color Signal Name [Specification] No. or Whe - 3 G - 4 SB -	Connector No. M4 Connector Name DATA LINK CONNECTOR Connector Type BD16FW Connector Type BD16FW Connector Type BD16FW	Terminal Color Signal Name [Speoification] No. of Whe - 4 B - 6 L - 16 P - 16 Y -
Connector No. F106 Connector No. F106 Connector Name HIGH PRESSURE SUPPLY PLANP Connector Name KOLLIMETRIC CONTROL VALVE) Connector Type FEA03FD	Terminal Color Signal Name [Specification] No. of Wire - 1 G - 2 LG/B -	Connector No. F 123 Connector Name WRE TO WIRE Connector Type TIX24FW-1V Connector Type TIX24FW-1V M.S. TIX24FW-1V Laboratoria TIX24FW-1V Laboratoria TIX24FW-1V Laboratoria TIX24FW-1V Laboratoria TIX24FW-1V Laboratoria TIX24FW-1V	Terminal No. Color of Wire 6 Signal Name [Specification] 1 A R/J - 6 G/P - - 17 Y/W - - 19 G/R -[With K9K engine] 20 LG -[With K9K engine]
GINE) Cometer No. F102 Connector Name Dometer Type CI-21IFC00252049 CI-21IFC00252049 CI-21IFC00252049 CI-221	Territial Color Signal Name [Specification] No. of Wre - 1 LG - 2 GR - 3 L -	Connector No. F122 Connector Name WITE TO WITE Connector Type M02FW-LC	Territical Color Signal Name [Specification] Mo. of Wee -
ENGINE CONTROL SYSTEM (K9K EN Commeter Name Commeter Name Commeter Type FEAU2FEI Commeter Type FEAU2FEI FEAU FEAU2FEI FEAU	Terminal No. Color of Wer Signal Name [Specification] 1 P - 2 L/G -	Connector No. F121 Connector Name MRE TO WIRE Connector Type NS10FW-CS Connector Type NS10FW-CS MAX T H 3 16 15 16 15	Terminal No. Color of Wer B. Signal Name [Specification] No. of Wer B. Color 1 D. CVRh diseal engine] 11 U.B. -[With diseal engine] 12 G. -[With diseal engine] 12 G. -[With diseal engine]

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ECM

DTC Index

X: Applicable —: Not applicable

INFOID:000000001180698

DTC*	Items (CONSULT-III screen item)	Trip	MI lighting up		Poforonco pago
			Yellow	Red	Treference page
P0001	FUEL SYSTEM	3	_	×	<u>ECK-68</u>
P0002	FUEL SYSTEM	3	_	_	<u>ECK-68</u>

< ECU DIAGNOSIS >

DTC*	Items (CONSULT-III screen item)	Trip	MI lighting up		Reference nage
DIC		Πp	Yellow	Red	Reference page
P0016	COHERENCE CMSFT/SN	3	-	-	<u>ECK-68</u>
P0045	TURBO ACT CIRC	3	-	×	ECK-75
P0069	PRESSURE COHERENCE	3	-	×	<u>ECK-77</u>
P0087	LOW FUEL PRESS	3	-	-	<u>ECK-79</u>
P0090	FUEL SYSTEM	3	-	×	<u>ECK-81</u>
P0100	AIR FLOW SEN CIRC	3	-	-	<u>ECK-83</u>
P0101	AIR FLOW SEN CIRC	3	-	-	<u>ECK-86</u>
P0110	IN-AIR TMP SEN CIR	3	_	_	<u>ECK-89</u>
P0115	WATER TMP SEN	1 or 3	-	-	<u>ECK-91</u>
P0120	TP SEN CIRC	3	-	-	<u>ECK-93</u>
P0180	FUEL TEMP SEN CIRC	1 or 3	-	-	<u>ECK-95</u>
P0190	RAIL/PRESS SEN CIR	3	-	×	<u>ECK-97</u>
P0200	INJECTOR CTRL CIRC	3	-	×	<u>ECK-99</u>
P0201	CYL 1 INJ CTRL CIR	3	×	×	ECK-101
P0202	CYL 2 INJ CTRL CIR	3	×	×	ECK-101
P0203	CYL 3 INJ CTRL CIR	3	×	×	ECK-101
P0204	CYL 4 INJ CTRL CIR	3	×	×	<u>ECK-101</u>
P0217	ENG OVER TEMP	1	-	-	ECK-103
P0225	PDL POTEN CIRC TK1	3	-	×	ECK-106
P0235	IN-MANI PRES CIRC	3	-	×	<u>ECK-109</u>
P0335	ENGNE SPD SEN CIRC	1	-	×	ECK-111
P0340	CAMSHAFT SEN CIRC	3	-	-	ECK-113
P0380	PRHT UNIT CTRL CIR	3	-	-	<u>ECK-116</u>
P0381	PRHT DGNSTC CNECT	3	-	-	ECK-118
P0409	EGR POSITN OFFSET	3	×	-	<u>ECK-120</u>
P0487	EGR COMMAND CIRC	3	-	-	ECK-122
P0488	EGR/V POSITN CTRL	3	-	× or –	<u>ECK-124</u>
P0500	VEHL/SPD INF CIRC	1	-	-	<u>ECK-127</u>
P0530	REFRIGERNT SEN CIR	1	_	_	ECK-128
P0560	CPU SUPPLY VOLTAGE	1	-	-	<u>ECK-130</u>
P0571	BRAKE SWITCH CIRC	1	-	-	ECK-133
P0575	SPD LIM/CRS CTRL	1	-	-	<u>ECK-136</u>
P0606	COMPUTER(C/U)	1 or 3	\times or –	× or –	<u>ECK-139</u>
P0641	SEN SUPPLY N-1 VOL	3	-	×	<u>ECK-141</u>
P0651	SEN SUPPLY N-2 VOL	3	_	×	<u>ECK-143</u>
P0685	MAIN RLY CTRL CIRC	3	_	×	<u>ECK-145</u>
P0812	REVERSE INFO	1	-	-	<u>ECK-147</u>
P0830	CLUTCH SWITCH CIRC	1	-	-	ECK-148
P1089	RAIL PRESS REGULTN	3	-	× or –	ECK-150
P2101	ETC FUNCTION/CIRC	3	-	_	ECK-152
P2120	PDL POTEN CIRC TK2	3	_	×	ECK-155
P2226	ATMOS PRES SE CIR	3	-	_	ECK-157
P2263	T/C SYSTEM	3	_	×	ECK-158

ECK-186

< ECU DIAGNOSIS >

	Items (CONSULT-III screen item)	Trip	MI ligh	nting up	Defenses	
DIC			Yellow	Red	Reference page	А
P2299	BRK/ACCEL PDL PSTN	3	-	×	ECK-160	
P2413	EGR SYSTEM	3	×	×	ECK-163	ECK
P2502	ALT CHARGE INFO	1	-	-	ECK-166	
P2610	ENGINE PROTECTION	1	-	-	ECK-167	
*: This number is prese	cribed by ISO 15031-6.	·		·		С
						D
						E
						F
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ENGINE CONTROL SYSTEM SYMPTOMS

[K9K]

SYMPTOM DIAGNOSIS ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:000000001180699

NOTE:

Only consult this customer complaint after a complete check using the CONSULT-III.

Symptom		Trouble diagnosis	Reference page
No communication with the ECM		CHART 1	ECK-189, "Diag- nosis Procedure"
	Engine does not start or starts with difficulty	CHART 2	ECK-190, "Diag- nosis Procedure"
Starting malfunction	Starting difficult with cold engine	CHART 3	ECK-192, "Diag- nosis Procedure"
	Impossible to shut off engine	CHART 4	ECK-194, "Diag- nosis Procedure"
Idle speed malfunction	Engine Idle speed too high	CHART 5	ECK-195, "Diag- nosis Procedure"
	Engine Idle speed too low or unstable	CHART 6	ECK-196, "Diag- nosis Procedure"
	Engine stalling	CHART 7	ECK-198, "Diag- nosis Procedure"
	No or very little acceleration, increase in engine speed	CHART 8	ECK-200, "Diag- nosis Procedure"
Robaviar while driving	Engine bucking	CHART 9	ECK-203, "Diag- nosis Procedure"
Behavior while driving	Erratic acceleration	CHART 10	ECK-205, "Diag- nosis Procedure"
	No engine braking	CHART 11	ECK-207, "Diag- nosis Procedure"
	Loss of power	CHART 12	ECK-208, "Diag- nosis Procedure"
	Too much power	CHART 13	ECK-211, "Diag- nosis Procedure"
	Overspeed at idle speed or on releasing brake	CHART 14	ECK-213, "Diag- nosis Procedure"
	Excessive consumption	CHART 15	ECK-214, "Diag- nosis Procedure"
	Engine knock	CHART 16	ECK-216, "Diag- nosis Procedure"
	Engine overheating	CHART 17	ECK-218, "Diag- nosis Procedure"
	Engine smokes when started	CHART 18	ECK-219, "Diag- nosis Procedure"
Noise, odors or smoke	Engine emits blue smoke	CHART 19	ECK-220, "Diag- nosis Procedure"
	Engine smokes when revved	CHART 20	ECK-222, "Diag- nosis Procedure"
	Engine emits white smoke (especially when starting)	CHART 21	ECK-223, "Diag- nosis Procedure"
	Emission control not satisfactory	CHART 22	ECK-224, "Diag- nosis Procedure"

ECK-188

NOT COMMUNICATION WITH THE ECM

< SYMPTOM DIAGNOSIS > [K9K]	
NOT COMMUNICATION WITH THE ECM	
Description	A
CHART 1: NO COMMUNICATION WITH THE ECM	FCK
Diagnosis Procedure	
1.INSPECTION START	С
Ensure that CONSULT-III is not causing the malfunction by trying to establish dialogue with an ECM on another vehicle. If the CONSULT-III is not at malfunction, and dialogue cannot be established with any other ECM on the same vehicle, the cause could be a suspected ECM interfering on the CAN communication line. Check the voltage of the battery and carry out the operations necessary to obtain a voltage which is to specification (9.5 V < U battery < 17.5 V).	D
>> GO TO 2.	E
2. CHECK CAN COMMUNICATION	
Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to <u>LAN-28</u> , "CAN Com- munication Signal Chart".	F
<u>Is the inspection result normal?</u> YES >> GO TO 3. NO >> Repair or replace harness or connector.	G
3. CHECK ECM GROUND	Н
Check the ECM earth (ground) point on the side strut tower.	
Is the inspection result normal? YES >> GO TO 4. NO >> Repair or replace ground connection.	
4. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT	J
Check ECM power supply and ground circuit. Refer to <u>ECK-65, "Diagnosis Procedure"</u> . Is the inspection result normal?	
YES >> GO TO 5.	Κ
5. CHECK DATA LINK CONNECTOR CIRCUIT	
Check for the presence of 12 V on terminal 16 with ignition switch OFF, 12 V on terminal 8 with ignition switch ON and an earth (ground) on terminals 4 and 5 of the data link connector. Repair if necessary.	L
Is the inspection result normal?	M
YES >> INSPECTION END NO >> Repair or replace harness or connector.	Ν
	0

ENGINE DOES NOT START OR STARTS WITH DIFFICULTY [K9K] < SYMPTOM DIAGNOSIS > ENGINE DOES NOT START OR STARTS WITH DIFFICULTY Description INFOID:000000001180702 CHART 2: ENGINE DOES NOT START OR STARTS WITH DIFFICULTY **Diagnosis** Procedure INFOID:000000001180703 1.CHECK FUEL Check that the fuel reservoir is correctly filled and with the right fuel. >> GO TO 2. 2. CHECK BATTERY Check the battery. Refer to PG-113, "Removal and Installation". Is the inspection result normal? YES >> GO TO 3. NO >> Repair or replace battery. Refer to PG-113, "Removal and Installation" ${f 3.}$ CHECK STARTER MOTOR Check the starter and starter motor relay. Refer to STR-8, "System Diagram". Is the inspection result normal? YES >> GO TO 4. >> Repair or replace starter motor or starter relay. Refer to STR-23, "K9K MODELS : Removal and NO Installation" **4.**CHECK ECM RELAY Check the ECM relay. Refer to ECK-145, "Diagnosis Procedure". Is the inspection result normal? YES >> GO TO 5. NO >> Replace IPDM E/R. Refer to PCS-33, "Removal and Installation". ${f 5}.$ CHECK ECM POWER SUPPLY AND GROUND CIRCUIT Check ECM power supply and ground circuit. Refer to ECK-65, "Diagnosis Procedure". Is the inspection result normal? YES >> GO TO 6. NO >> Repair or replace harness or connector. **6**.CHECK WIRING HARNESS Visually check the condition of the engine wiring harness. Is the inspection result normal? YES >> GO TO 7. NO >> Repair or replace harness or connector. **I**.CHECK CAMSHAFT POSITION SENSOR Check the camshaft position sensor. Refer to ECK-114, "Component Inspection". Is the inspection result normal? YES >> GO TO 8. NO >> Repair or replace. 8.CHECK CAMSHAFT Check the camshaft. Refer to EM-297, "Inspection". Is the inspection result normal? YES >> GO TO 9. NO >> Replace camshaft. Refer to EM-295, "Removal and Installation".

9.CHECK AIR INTAKE SYSTEM

ENGINE DOES NOT START OR STARTS WITH DIFFICULTY	
< SYMPTOM DIAGNOSIS > [K9K]	
Check air intake system. Refer to EM-266, "Removal and Installation".	٨
Is the inspection result normal?	A
NO >> Repair or replace air intake system. Refer to EM-266, "Removal and Installation"	
10. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR	ECK
Check electric throttle control actuator. Refer to ECK-93, "Diagnosis Procedure".	
Is the inspection result normal?	С
YES >> GO TO 11.	
11 CHECK LOW DRESSURE CIRCUIT	D
Defer the TEST 1: LOW DECOURT OFFICE Defer to EOK 10, IDAGIC INCRECTION - Created	D
Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".	
	E
>> GO TO 12.	
12.CHECK INTERNAL FUEL TRANSFER PUMP	F
Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to <u>ECK-11, "BASIC INSPECTION :</u>	
<u>Special Repair Requirement (TEST 2. Internal Fuel Transfer Fump Check)</u> .	G
>> GO TO 13.	0
13. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)	
Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to ECK-11.	Н
"BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check!"	
>> GO TO 14.	
14. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)	J
Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to ECK-	
12. "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]"	1Z
	N
>> GO TO 15.	
15. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT	L
Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to ECK-15, "BASIC	
INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".	M
>> GO TO 16	
16. CHECK MAJOR I FAK IN FUEL INJECTORS/FUEL INJECTORS OPEN	Ν
Perform the TEST 6: MA IOR LEAK IN FLIEL IN IECTOR/FLIEL IN IECTORS OPEN Refer to ECK-19	1.4
"BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors	
<u>Open)"</u> .	0
>> GO TO 17	
17. CHECK INCORRECT FUEL INJECTION QUANTITY	Ρ
Perform the TEST 7: INCORRECT FUEL INJECTION OUANTITY Refer to ECK-20. "BASIC INSPECTION -	
Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".	

>> INSPECTION END

STARTING	DIFFICULT	WITH COLD	DENGINE
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STARTING DIFFICULT WITH COLD ENGINE

Description INFOID:000000011807
CHART 3: STARTING DIFFICULT WITH COLD ENGINE
Diagnosis Procedure
1.CHECK ENGINE OIL LEVEL
Is the engine oil level correct?
<u>Yes or No</u>
Yes >> GO TO 2.
No >> lop up the oil.
Check the grade of engine oil. Refer to <u>LU-23, "Inspection"</u> .
Is the inspection result normal?
YES >> GO TO 3.
CHECK BATTERY
Check the battery. Refer to <u>PG-113, "Removal and Installation"</u> .
$VES \rightarrow GOTO A$
NO >> Repair or replace battery. Refer to <u>PG-113, "Removal and Installation"</u>
4.CHECK STARTER MOTOR
Check the starter motor. Refer to STR-23, "K9K MODELS : Removal and Installation".
Is the inspection result normal?
YES >> GO TO 5.
NO >> Repair or replace starter motor. Refer to <u>STR-23, "K9K MODELS : Removal and Installation"</u>
D. CHECK COMPONENT PART
Check the following.
 Engine coolant temperature sensor. Refer to <u>ECK-92, "Component Inspection"</u>. Euclipump temperature sensor. Refer to ECK-96, "Component Inspection".
 Intake air temperature sensor. Refer to <u>ECK-90. "Component Inspection"</u>.
Is the inspection result normal?
YES >> GO TO 6.
NO >> Repair or replace.
O.CHECK GLOW SYSTEM
Check the glow system. Refer to ECK-118, "Diagnosis Procedure".
Is the inspection result normal?
YES >> GO TO 7.
7. CHECK LOW PRESSURE CIRCUIT
Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to ECK-10. "BASIC INSPECTION : Specia
Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 8.

 $8. {\sf CHECK INTERNAL FUEL TRANSFER PUMP}$

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to <u>ECK-11, "BASIC INSPECTION :</u> Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

STARTING DIFFICULT WITH COLD ENGINE

< SYMPTOM DIAGNOSIS >	[K9K]
>> GO TO 9.	
9. CHECK COMPRESSION PRESSURE	A
Check the compression pressure. Refer to <u>EM-264, "Inspection"</u> .	
	ECK
>> INSPECTION END	
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IMPOSSIBLE TO SHUT OFF ENGINE

< SYMPTOM DIAGNOSIS >

IMPOSSIBLE TO SHUT OFF ENGINE

Description

CHART 4: IMPOSSIBLE TO SHUT OFF ENGINE

Diagnosis Procedure

1. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to ECK-65, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace harness or connector.

2. CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness. Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace harness or connector.

INFOID:000000001180706

[K9K]

INFOID:000000001180707

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ENGINE IDLE SPEED TOO HIGH	
< SYMPTOM DIAGNOSIS >	[K9K]
ENGINE IDLE SPEED TOO HIGH	Δ
Description	INFOID:000000001180708
CHART 5: ENGINE IDLE SPEED TOO HIGH	ECł
Diagnosis Procedure	INFOID:000000001180709
1. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT	С
Check ECM power supply and ground circuit. Refer to ECK-65, "Diagnosis Procedure".	
Is the inspection result normal?	D
YES >> GO TO 2. NO >> Repair or replace harness or connector	
2.check wiring harness	F
Visually check the condition of the engine wiring harness.	
Is the inspection result normal?	
YES >> GO TO 3.	F
3 CHECK ACCELERATOR PEDAL POSITION SENSOR	
Check the accelerator pedal position sensor. Befor to ECK 156. "Companent Inspection"	G
Is the inspection result normal?	
YES >> INSPECTION END	Н
NO >> Repair or replace.	
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< SYMPTOM DIAGNOSIS >	[K9K]
ENGINE IDLE SPEED TOO LOW OR UNSTABLE	
Description	INFOID:000000001180710
CHART 6: ENGINE IDLE SPEED TOO LOW OR UNSTABLE	
Diagnosis Procedure	INFOID:000000001180711
Check that the fuel reservoir is correctly filled and with the right fuel	
>> GO TO 2.	
2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT	
Check ECM power supply and ground circuit. Refer to <u>ECK-65, "Diagnosis Procedure"</u> .	
Is the inspection result normal?	
NO >> Repair or replace harness or connector.	
3. CHECK WIRING HARNESS	
Visually check the condition of the engine wiring harness.	
Is the inspection result normal?	
YES >> GO TO 4.	
Δ CHECK AID INITAKE SYSTEM	
Check air intake system. Refer to EM-266. "Removal and Installation"	
Is the inspection result normal?	
YES >> GO TO 5.	
NO >> Repair or replace air intake system. Refer to <u>EM-266, "Removal and Installation"</u> .	
5. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR	
Check electric throttle control actuator. Refer to ECK-93, "Diagnosis Procedure".	
Is the inspection result normal?	
NO >> Repair or replace.	
6. CHECK MASS AIR FLOW SENSOR	
Check mass air flow sensor. Refer to ECK-85. "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 7.	
7 CHECK DEEDICEDANT DESSLIDE SENSOD	
Check refrigerant pressure sensor. Befer to ECK 128. "Diagnosis Presedure"	
Is the inspection result normal?	
YES >> GO TO 8.	
NO >> Repair or replace.	
8.CHECK EGR SYSTEM	
Check EGR system. Refer to ECK-163. "Diagnosis Procedure".	
Is the inspection result normal?	
NO >> Repair or replace.	

ENGINE IDLE SPEED TOO LOW OR UNSTABLE

9.CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

OW OD UNOTADLE **~** _ --

ENGINE IDLE SPEED TOO LOW OR UNSTABLE	
< SYMPTOM DIAGNOSIS > [K9K]	
Is the inspection result normal?	٥
YES >> GO TO 10.	A
10 CHECK LOW DRESSURE CIRCUIT	
	ECK
Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to <u>ECK-10. "BASIC INSPECTION : Special</u> Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".	
	0
>> GO TO 11.	C
11. CHECK INTERNAL FUEL TRANSFER PUMP	
Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to ECK-11, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".	D
	F
IZ.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)	
Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to <u>ECK-11.</u> "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control	F
Valve) Check]".	
	G
13 CHECK HIGH PRESSURE SUPPLY DUMP (VOLUMETRIC CONTROL VALVE)	
	Н
12 "BASIC INSPECTION : Special Repair Requirement ITEST 4: High Pressure Supply Pump (Volumetric	
Control Valve) Check]".	
>> GO TO 14.	
14.CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT	J
Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to ECK-15, "BASIC	
INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)"	
	К
TO.CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN	L
Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to <u>ECK-19.</u>	
Open)".	
	M
>> GO TO 16.	
16. CHECK INCORRECT FUEL INJECTION QUANTITY	Ν
Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to ECK-20. "BASIC INSPECTION :	
Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)"	
	0
>> INSPECTION END	

ENGINE STALLING

< SYMPTOM DIAGNOSIS >

ENGINE STALLING

Description

CHART 7: ENGINE STALLING

Diagnosis Procedure

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to ECK-65, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness or connector.

3.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace harness or connector.

4.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-266, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace air intake system.

5.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to ECK-93, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace.

6.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to ECK-85. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace.

7.CHECK EGR SYSTEM

Check EGR system. Refer to ECK-163, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace.

Ö.CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace.

9.CHECK CAN COMMUNICATION

INFOID:000000001180712

INFOID:000000001180713

ENGINE STALLING

< SYMPTOM DIAGNOSIS > [K9K]	
Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to <u>LAN-28, "CAN Com-</u> munication Signal Chart".	А
Is the inspection result normal?	
YES >> GO TO 10.	
NO >> Repair or replace harness or connector.	ECk
Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to <u>ECK-10. "BASIC INSPECTION : Special</u> Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".	С
>> GO TO 11.	
11.CHECK INTERNAL FUEL TRANSFER PUMP	D
Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to <u>ECK-11, "BASIC INSPECTION :</u> Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".	E
>> GO TO 12	
12. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)	F
Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to <u>ECK-11,</u> "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".	G
>> GO TO 13.	Н
13. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)	
Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to <u>ECK-12. "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check!"</u>	
	I
>> GO TO 14.	0
Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to <u>ECK-15. "BASIC</u> INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".	K
>> GO TO 15.	L
15. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN	
Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to ECK-19,	M
<u>"BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors</u> <u>Open)"</u> .	
>> GO TO 16.	Ν
16. CHECK INCORRECT FUEL INJECTION QUANTITY	
Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to ECK-20, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".	0
>> INSPECTION END	Ρ

NO OR VERY LITTLE ACCELERATION, INCREASE IN ENGINE SPEED < SYMPTOM DIAGNOSIS > [K9K]

NO OR VERY LITTLE ACCELERATION, INCREASE IN ENGINE SPEED

Description

CHART 8: NO OR VERY LITTLE ACCELERATION, INCREASE IN ENGINE SPEED

Diagnosis Procedure

INFOID:000000001180715

INFOID:000000001180714

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to ECK-65, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness or connector.

3.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace harness or connector.

4.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-266, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace air intake system.

5.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to ECK-93, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace.

6.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to ECK-85, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace.

7.CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to ECK-158, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 8.

No >> Repair or replace.

 $\mathbf{8}$. CHECK ACCELERATOR PEDAL POSITION SENSOR

Check the accelerator pedal position sensor. Refer to ECK-156. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9. NO >> Repair or replace. 9.CHECK EGR SYSTEM

J.CHECK EGR SYSTEM

Check EGR system. Refer to ECK-163, "Diagnosis Procedure".

NO OR VERY LITTLE ACCELERATION, INCREASE IN ENGINE SPEED

NO OK VERT EITTEE ACCELERATION, INCREASE IN ENGINE ST EED	
< SYMPTOM DIAGNOSIS > [K9K]	
Is the inspection result normal?	
YES >> GO TO 10.	А
10 CHECK CATALYTIC CONVERTER	
	ECK
Is the inspection result normal?	
NO >> Repair or replace.	С
11. CHECK CAN COMMUNICATION	
Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-28, "CAN Com-	D
munication Signal Chart".	
<u>Is the inspection result normal?</u>	Е
NO >> Repair or replace harness or connector.	
12 CHECK LOW PRESSURE CIRCUIT	
Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK, Refer to ECK-10, "BASIC INSPECTION : Special	F
Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".	
	G
>> GO TO 13.	
13. CHECK INTERNAL FUEL TRANSFER PUMP	
Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to ECK-11, "BASIC INSPECTION :	Η
Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".	
>> GO TO 14	Ι
	I
"BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control	J
Valve) Check]".	
	Κ
>> GO TO 15.	
I J.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)	L
Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to ECK-	
Control Valve) Check]".	
	Μ
>> GO TO 16.	
16. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT	Ν
Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to ECK-15, "BASIC	
INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".	
	0
>> GO TO 17.	
1 / CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN	Р
Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to ECK-19.	
"BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors	

>> GO TO 18.

18. CHECK INCORRECT FUEL INJECTION QUANTITY

ECK-201

NO OR VERY LITTLE ACCELERATION, INCREASE IN ENGINE SPEED

[K9K]

< SYMPTOM DIAGNOSIS >

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to <u>ECK-20, "BASIC INSPECTION :</u> <u>Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)</u>".

>> INSPECTION END

ENGINE BUCKING

< SYMPTOM DIAGNOSIS >	[K9K]	
ENGINE BUCKING		Λ
Description	INFOID:000000001180716	А
CHART 9: ENGINE BUCKING		FC
Diagnosis Procedure	INFOID:000000001180717	
1. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT		С
Check ECM power supply and ground circuit. Refer to ECK-65. "Diagnosis Procedure".		
Is the inspection result normal?		_
YES >> GO TO 2.		D
NO >> Repair or replace harness or connector.		
2.CHECK WIRING HARNESS		E
Visually check the condition of the engine wiring harness.		
Is the inspection result normal?		_
YES >> GO TO 3.		
3 CHECK ACCELEDATOR DEDAL DOSITION SENSOR		
OLE HILL ACCELERATOR FEDAL FOSTION SENSOR		G
Check the accelerator pedal position sensor. Refer to <u>ECK-156, "Component Inspection"</u> .		
NO >> Repair or replace.		Г
4. CHECK ASCD CLUTCH SWITCH		
Check ASCD clutch switch. Refer to ECK-149. "Component Inspection"		
Is the inspection result normal?		
YES >> GO TO 5.		
NO >> Repair or replace.		J
5. CHECK VEHICLE SPEED SIGNAL		
Check the following component.		k
• "ABS actuator and electric unit (control unit)" [Refer to <u>BRC-17, "CONSULT-III Function (A</u>	<u>ABS)"</u> (without	
ESP) or <u>BRC-95, "CONSULT-III Function (ABS)"</u> (with ESP).]		
Is the inspection result normal?		L
YES >> GO TO 6		
NO >> Repair or replace.		N
6. CHECK CAN COMMUNICATION		IV
Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-2	8, "CAN Com-	N
munication Signal Chart".		IN
NO >> Repair or replace harness or connector.		C
7. CHECK AIR INTAKE SYSTEM		
Check air intake system Refer to EM-266 "Removal and Installation"		_
Is the inspection result normal?		P
YES $>>$ GO TO 8.		
NO >> Repair or replace air intake system.		
8. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR		
Check electric throttle control actuator. Refer to ECK-93. "Diagnosis Procedure"		
Is the inspection result normal?		

ECK-203

< SYMPTOM DIAGNOSIS >

YES >> GO TO 9.

NO >> Repair or replace.

9.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to ECK-85, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace.

10.CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to <u>ECK-10</u>, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 11.

11.CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to <u>ECK-11, "BASIC INSPECTION :</u> Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 12.

12.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to <u>ECK-11</u>, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 13.

13.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to <u>ECK-</u> 12. "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 14.

14. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to <u>ECK-15</u>, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 15.

15.CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to <u>ECK-19</u>, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors <u>Open</u>)".

>> GO TO 16.

16.CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to <u>ECK-20, "BASIC INSPECTION :</u> <u>Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)"</u>.

>> INSPECTION END

ERRATIC ACCELERATION

< SYMPTOM DIAGNOSIS > [K9K]	
ERRATIC ACCELERATION	Λ
Description	A
CHART 10: Erratic acceleration	EC
Diagnosis Procedure	
1. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT	С
Check ECM power supply and ground circuit. Refer to ECK-65, "Diagnosis Procedure".	
Is the inspection result normal?	
YES >> GO TO 2.	
2 OUTOK MUDINO HADNEGO	
	E
Visually check the condition of the engine wiring harness.	
Is the inspection result normal?	F
NO >> Repair or replace harness or connector.	
3. CHECK ACCELERATOR PEDAL POSITION SENSOR	
Check the accelerator pedal position sensor. Refer to ECK-156. "Component Inspection".	G
Is the inspection result normal?	
YES >> GO TO 4.	Н
NO >> Repair or replace.	
4.CHECK ASCD CLUTCH SWITCH	
Check ASCD clutch switch. Refer to ECK-149, "Component Inspection".	I
Is the inspection result normal?	
YES >> GO TO 5.	J
5 CHECK VEHICLE SPEED SIGNAL	
 "ABS actuator and electric unit (control unit)" [Refer to <u>BRC-17, "CONSULT-III Function (ABS)"</u> (without 	K
 Combination meter (Refer to <u>MWI-27, "CONSULT-III Function (METER/M&A)"</u>.) 	L
Is the inspection result normal?	
YES >> GO TO 6.	
6 OUTOK OAN COMMUNICATION	N
Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to <u>LAN-28</u> , "CAN Com- munication Signal Chart".	Ν
Is the inspection result normal?	
YES >> GO TO 7.	С
7 CHECK HICH DRESSING STIDDI V DI IMD (DRESSINGE CONTROL VALVE)	
Professione SUPPLY PUMP (PRESSURE CONTROL VALVE)	
Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to <u>ECK-11</u> , " <u>BASIC INSPECTION</u> : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".	Ρ

>> GO TO 8.

8. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

ERRATIC ACCELERATION

< SYMPTOM DIAGNOSIS >

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to <u>ECK-</u> 12, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric <u>Control Valve) Check]</u>".

>> GO TO 9.

9. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to <u>ECK-15</u>, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 10.

10. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to <u>ECK-19</u>, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors <u>Open</u>)".

>> GO TO 11.

11.CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to <u>ECK-20, "BASIC INSPECTION :</u> Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> INSPECTION END

NO ENGINE BRAKING

< SYMPTOM DIAGNOSIS > [K9K]	
NO ENGINE BRAKING	Δ
Description	A
CHART 11: NO ENGINE BRAKING	FCI
Diagnosis Procedure	LUI
1. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT	С
Check ECM power supply and ground circuit. Refer to ECK-65, "Diagnosis Procedure".	
Is the inspection result normal?	D
YES >> GO TO 2.	
2. CHECK WIRING HARNESS	
Visually check the condition of the engine wiring harness.	
Is the inspection result normal?	_
YES >> GO TO 3.	F
3. CHECK ACCELERATOR PEDAL POSITION SENSOR	
Check the accelerator pedal position sensor. Refer to ECK-156, "Component Inspection".	G
Is the inspection result normal?	
YES >> GO TO 4.	Н
4. CHECK IDLE SPEED	
Check idle speed. Refer to ECK-231, "Idle Speed".	
>> GO TO 5.	
5. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN	J
Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to <u>ECK-19</u> , <u>"BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors</u> Open)".	K
>> GO TO 6. 6 CHECK INCORRECT FLIEL IN JECTION OLIANTITY	L
Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY Refer to ECK-20. "BASIC INSPECTION :	
Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".	M
>> INSPECTION END	Ν
	0

LOSS OF POWER

< SYMPTOM DIAGNOSIS >	[K9K]
LOSS OF POWER	
Description	INFOID:00000000118072
CHART 12: LOSS OF POWER	
Diagnosis Procedure	INFOID:00000000118072
1.CHECK FUEL	
Check that the fuel reservoir is correctly filled and with the right fuel.	
>> GO TO 2.	
Check the correctness of the fuel filter.	
Is the fuel filter correct?	
Yes >> GO TO 3. No >> Replace the fuel filter with an genuine part	
Check the grade of engine oil. Defer to 111.22. "Inequestion"	
Is the inspection result normal?	
VES \sim GO TO 4	
NO >> Replace engine oil. Refer to <u>LU-24, "Refilling"</u>	
4. CHECK ENGINE OIL LEVEL	
Is the engine oil level correct?	
Yes or No	
Yes >> GO TO 5.	
No >> Top up the oil.	
5. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT	
Check ECM power supply and ground circuit. Refer to ECK-65, "Diagnosis Procedure".	
Is the inspection result normal?	
YES >> GO TO 6.	
NO >> Repair or replace harness or connector.	
O. CHECK WIRING HARNESS	
Visually check the condition of the engine wiring harness.	
Is the inspection result normal?	
YES >> GO TO 7.	
$NO >> Repair or replace namess or connector. 7_{\text{OUTEON}}$	
Check air intake system. Refer to <u>EM-266, "Removal and Installation"</u> .	
Is the inspection result normal?	
YES >> GO TO 8. NO >> Repair or replace	
8 CHECK ELECTRIC THROTTLE CONTROL ACTUATOR	
Check electric throttle control actuator. Refer to ECK-93. "Diagnosis Procedure"	
Is the inspection result normal?	
YES $>>$ GO TO 9.	
NO >> Repair or replace.	
9. CHECK MASS AIR FLOW SENSOR	

Check mass air flow sensor. Refer to ECK-85, "Component Inspection".

LOSS OF POWER

< SYMPTOM DIAGNOSIS >	[K9K]
Is the inspection result normal?	
YES >> GO TO 10.	/
NO >> Repair or replace.	
10. CHECK ACCELERATOR PEDAL POSITION SENSOR	
Check the accelerator pedal position sensor. Refer to ECK-156, "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 11.	(
NO >> Repair or replace.	
11.CHECK ASCD CLUTCH SWITCH	
Check ASCD clutch switch. Refer to ECK-149, "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 12.	1
NO >> Repair or replace.	-
IZ.CHECK VEHICLE SPEED SIGNAL	
Check the following component.	(without
• ABS actuator and electric unit (control unit) [Refer to <u>BRC-17, CONSOLT-III Function (ABS)</u> ESP) or BRC-95, "CONSULT-III Function (ABS)" (with ESP).1	without
Combination meter (Refer to <u>MWI-27, "CONSULT-III Function (METER/M&A)"</u> .)	
Is the inspection result normal?	(
YES >> GO TO 13.	
NO >> Repair or replace.	ŀ
13.CHECK TURBOCHARGER	
Check that the turbocharger is working properly. Refer to ECK-158, "Diagnosis Procedure".	
Is the turbocharger correct?	
Yes >> GO TO 14.	
NO >> Repair or replace.	
14.CHECK CAN COMMUNICATION	
Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-28, "CA	<u>N Com-</u>
munication Signal Chart.	1
NO >> Repair or replace harness or connector.	1
15. CHECK EGR SYSTEM	
Check EGR system Refer to ECK-163 "Diagnosis Procedure"	
Is the inspection result normal?	ľ
YES >> GO TO 16	
NO >> Repair or replace.	
16. CHECK CATALYTIC CONVERTER	ľ
Is the catalytic converter clogged or deteriorated?	
Is the inspection result normal?	(
YES >> GO TO 17.	
NO >> Repair or replace.	
17. CHECK LOW PRESSURE CIRCUIT	F
Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to ECK-10. "BASIC INSPECTION :	Special
Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".	

>> GO TO 18.

 $18. {\sf CHECK} \text{ internal fuel transfer pump}$

LOSS OF POWER

< SYMPTOM DIAGNOSIS >

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to <u>ECK-11, "BASIC INSPECTION :</u> Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 19.

19.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to <u>ECK-11</u>, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 20.

20. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to <u>ECK-12</u>, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 21.

21. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to <u>ECK-15</u>, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 22.

22. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to <u>ECK-19</u>, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors <u>Open</u>)".

>> GO TO 23.

23. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to <u>ECK-20, "BASIC INSPECTION :</u> <u>Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)"</u>.

>> INSPECTION END

TOO MUCH POWER

< SYMPTOM DIAGNOSIS >	[K9K]	
TOO MUCH POWER		
Description	INFOID:000000001180724	A
CHART 13: TOO MUCH POWER		FCK
Diagnosis Procedure	INFOID:000000001180725	LOIN
1. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT		С
Check ECM power supply and ground circuit. Refer to ECK-65, "Diagnosis Procedure".		
Is the inspection result normal?		D
YES >> GO TO 2.		
2 CHECK WIDING HADNESS		
		E
Visually check the condition of the engine wiring harness.		
$\frac{15 \text{ the inspection result normal?}}{\text{YES}} > 60 \text{ TO } 3$		F
NO >> Repair or replace harness or connector.		
3. CHECK ENGINE COOLANT TEMPERATURE SENSOR		
Check engine coolant temperature sensor. Refer to ECK-92, "Component Inspection".		G
Is the turbocharger correct?		
Yes >> GO TO 4.		Н
No >> Repair or replace.		
4.CHECK TURBOCHARGER		I
Check that the turbocharger is working properly. Refer to <u>ECK-158, "Diagnosis Procedure"</u> .		I
Is the turbocharger correct?		
No >> Repair or replace.		J
5. CHECK CLUTCH SWITCH		
Check clutch switch. Refer to ECK-149. "Component Inspection".		К
Is the inspection result normal?		
YES >> GO TO 6.		
NO >> Repair or replace.		L
O. CHECK VEHICLE SPEED SIGNAL		
Check the following component.		M
• ABS actuator and electric unit (control unit) [Refer to <u>BRC-17, CONSULT-III Function (</u> ESP) or BRC-95, "CONSULT-III Function (ABS)" (with ESP).]	<u>ABS)</u> (without	
 Combination meter (Refer to <u>MWI-27, "CONSULT-III Function (METER/M&A)"</u>.) 		NI
Is the inspection result normal?		IN
YES >> GO TO 7.		
7 CHECK CAN COMMUNICATION		0
Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-2		
munication Signal Chart".		Р
Is the inspection result normal?		-
YES >> GO TO 8.		
NO >> Repair or replace namess of connector.		

8. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

TOO MUCH POWER

< SYMPTOM DIAGNOSIS >

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to <u>ECK-11</u>. "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 9.

9. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to <u>ECK-</u> 12, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric <u>Control Valve) Check]</u>".

>> GO TO 10.

10. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to ECK-15, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 11.

11. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to <u>ECK-19</u>, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors <u>Open</u>)".

>> GO TO 12.

12. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to <u>ECK-20, "BASIC INSPECTION :</u> Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> INSPECTION END

OVERSPEED AT IDLE SPEED OR ON RELEASING BRAKE < SYMPTOM DIAGNOSIS > [K9K] OVERSPEED AT IDLE SPEED OR ON RELEASING BRAKE	
Description	А
CHART 14: OVERSPEED AT IDLE SPEED OR ON RELEASING BRAKE Diagnosis Procedure	EC
1.CHECK ENGINE OIL Check the grade of engine oil. Refer to LU-23, "Inspection". Is the inspection result normal? YES >> GO TO 2. NO >> Replace engine oil. Refer to LU-24, "Refilling"	C
2.CHECK ENGINE OIL LEVEL	Е
Is the engine oil level correct? <u>Yes or No</u> Yes >> GO TO 3. No >> Top up the oil.	F
3. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT	G
Check ECM power supply and ground circuit. Refer to <u>ECK-65, "Diagnosis Procedure"</u> . <u>Is the inspection result normal?</u> YES >> GO TO 4. NO >> Repair or replace harness or connector.	Н
4.CHECK WIRING HARNESS	
Is the inspection result normal? YES >> GO TO 5. NO >> Repair or replace harness or connector. 5. CHECK CAN COMMUNICATION	J
Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-28, "CAN Com-	Κ
munication Signal Chart". Is the inspection result normal? YES >> GO TO 6. NO >> Repair or replace harness or connector. 6.CHECK "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"	L
Perform trouble diagnosis on the "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)". Refer to <u>BRC-17. "CONSULT-III Function (ABS)"</u> (without ESP) or <u>BRC-95. "CONSULT-III Function (ABS)"</u> (with ESP). <u>Is the inspection result normal?</u> YES >> INSPECTION END.	M
NO >> Repair or replace.	\bigcirc

EXCESSIVE CONSUMPTION
< SYMPTOM DIAGNOSIS > [K9K]
EXCESSIVE CONSUMPTION
Description INFOID:000000001180728
CHART 15:EXCESSIVE CONSUMPTION
Diagnosis Procedure
1. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT
Check ECM power supply and ground circuit. Refer to <u>ECK-65, "Diagnosis Procedure"</u> .
Is the inspection result normal?
YES >> GO TO 2.
2 outpok within a harmonic of connector.
Visually check the condition of the engine wiring harness.
Is the inspection result normal?
YES >> GO TO 3.
3 OLEOKALD INTAKE OVOTEM
Check air intake system. Refer to EM-266, "Removal and Installation".
Is the inspection result normal?
YES >> GO IO 4. NO >> Repair or replace air intake system
4. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR
Check electric throttle control actuator. Refer to ECK-93 "Diagnosis Procedure"
Is the inspection result normal?
YES >> GO TO 5.
NO >> Repair or replace.
5. CHECK MASS AIR FLOW SENSOR
Check mass air flow sensor. Refer to ECK-85, "Component Inspection".
Is the inspection result normal?
YES >> GO TO 6.
NO >> Repair or replace.
O. CHECK TURBOCHARGER
Check that the turbocharger is working properly. Refer to ECK-158, "Diagnosis Procedure".
Is the turbocharger correct?
Yes >> GO TO 7.
No >> Repair or replace.
CHECK ENGINE COOLANT TEMPERATURE SENSOR
Check engine coolant temperature sensor. Refer to ECK-92. "Component Inspection".
Is the inspection result normal?
Yes >> GO TO 8.
8 out of the owned of the
Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to <u>ECK-10, "BASIC INSPECTION : Special</u> <u>Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)"</u> .

>> GO TO 9.

 $9. {\sf CHECK} \text{ internal fuel transfer pump}$

EXCESSIVE CONSUMPTION	
< SYMPTOM DIAGNOSIS > [K9K]	
Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to <u>ECK-11, "BASIC INSPECTION :</u> Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".	А
	7.
>> GO TO 10. 10.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)	ECK
Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to <u>ECK-11</u> , "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control	0
Valve) Check]".	C
>> GO TO 11.	D
11.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)	
Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to <u>ECK-12</u> , "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".	E
>> GO TO 12.	F
12. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT	
Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to <u>ECK-15</u> , " <u>BASIC</u> <u>INSPECTION</u> : <u>Special Repair Requirement</u> (<u>TEST 5</u> : <u>Rail High Pressure Regulation Check</u>)".	G
>> GO TO 13.	Н
13. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN	
Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to <u>ECK-19</u> , " <u>BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors</u> <u>Open)</u> ".	
>> GO TO 14.	J
14. CHECK INCORRECT FUEL INJECTION QUANTITY	
Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to ECK-20. "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".	К
>> INSPECTION END	L
	M
	Ν
	0
)
	Р

ENGINE KNOCK

< SYMPTOM DIAGNOSIS >	[K9K]
ENGINE KNOCK	
Description	INFOID:00000000118073
CHART 16: ENGINE KNOCK	
Diagnosis Procedure	INFOID:00000000118073
1.CHECK ENGINE OIL	
Check the grade of engine oil. Refer to LU-23, "Inspection".	
Is the inspection result normal?	
YES >> GO TO 2.	
2 CHECK ENGINE OIL LEVEL	
Is the engine oil level correct?	
Yes or No	
Yes >> GO TO 3.	
No >> Top up the oil.	
J. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT	
Check ECM power supply and ground circuit. Refer to <u>ECK-65, "Diagnosis Procedure"</u> .	
<u>Is the inspection result normal?</u> YES >> GO TO 4	
NO >> Repair or replace harness or connector.	
4.CHECK WIRING HARNESS	
Visually check the condition of the engine wiring harness.	
Is the inspection result normal?	
YES >> GO TO 5.	
5. CHECK AIR INTAKE SYSTEM	
Check air intake system Refer to FM-266 "Removal and Installation"	
Is the inspection result normal?	
YES >> GO TO 6.	
NO >> Repair or replace air intake system.	
O.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR	
Check electric throttle control actuator. Refer to <u>ECK-93, "Diagnosis Procedure"</u> .	
YES $>>$ GO TO 7.	
NO >> Repair or replace.	
7.CHECK MASS AIR FLOW SENSOR	
Check mass air flow sensor. Refer to ECK-85, "Component Inspection".	
Is the inspection result normal?	
YES >> GOTO8. NO >> Repair or replace.	
8. CHECK CATALYTIC CONVERTER	
Is the catalytic converter clogged or deteriorated?	
Is the inspection result normal?	
YES >> GO TO 9.	
CICILON HIGHT RESSORE SUFFLI FUMIF (FRESSURE CONTROL VALVE)	
ENGINE KNOCK

< SYMPTOM DIAGNOSIS >

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to <u>ECK-11</u>, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 10.	ECK
10.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)	
Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to <u>ECK-12</u> , "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".	С
>> GO TO 11.	D
11. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT	
Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to <u>ECK-15, "BASIC</u> INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".	E
>> GO TO 12.	F
12. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN	
Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to <u>ECK-19</u> , "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors	G
<u>Open)"</u> .	
>> GO TO 13.	Н
13. CHECK INCORRECT FUEL INJECTION QUANTITY	
Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to <u>ECK-20, "BASIC INSPECTION :</u> Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".	I
>> INSPECTION END	J
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ENGINE OVERHEATING		
< SYMPTOM DIAGNOSIS >	[K9K]	
ENGINE OVERHEATING		
Description	INFOID:000000001180732	
CHART 17: ENGINE OVERHEATING		
Diagnosis Procedure	INFOID:000000001180733	
1.CHECK COOLING SYSTEM		
Check the cooling system. Refer to CO-48, "Troubleshooting Chart".		
Is the inspection result normal?		
YES >> GO TO 2. NO >> Repair or replace.		
2. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT		
Check ECM power supply and ground circuit. Refer to ECK-65, "Diagnosis Procedure".		
Is the inspection result normal?		
YES >> GO TO 3.		
NO >> Repair or replace harness or connector.		
3.CHECK WIRING HARNESS		
Visually check the condition of the engine wiring harness.		
Is the inspection result normal?		
YES >> GO TO 4.		
NO >> Repair or replace harness or connector.		
4. CHECK ENGINE COOLANT TEMPERATURE SENSOR		
Check engine coolant temperature sensor. Refer to ECK-92. "Component Inspection".		
Is the inspection result normal?		
Yes >> GO TO 5.		
No >> Repair or replace.		
5. CHECK COOLING FAN OPERATION		
Check cooling fan operation. Refer to ECK-170, "Component Function Check".		
Is the inspection result normal?		
YES >> INSPECTION END		

NO >> Repair or replace.

ENGINE SMOKES WHEN STARTED

ENGINE SMOKES WHEN STARTED	
< SYMPTOM DIAGNOSIS >	[K9K]
ENGINE SMOKES WHEN STARTED	
Description	INFOID:000000001180734
CHART 18: ENGINE SMOKES WHEN STARTED	EC
Diagnosis Procedure	INFOID:000000001180735
1.CHECK ENGINE OIL	С
Check the grade of engine oil. Refer to LU-23, "Inspection".	
Is the inspection result normal?	Γ
YES >> GO TO 2. NO >> Replace engine oil. Refer to LU-24, "Refilling"	
2.CHECK ENGINE OIL LEVEL	F
Is the engine oil level correct?	
Yes or No	
Yes >> GO TO 3. No >> Top up the oil.	F
3. CHECK FUEL PUMP TEMPERATURE SENSOR	
Check fuel pump temperature sensor. Refer to ECK-96. "Component Inspection".	G
Is the inspection result normal?	
Yes >> GO TO 4. No >> Repair or replace.	Н
4. CHECK ENGINE COOLANT TEMPERATURE SENSOR	
Check engine coolant temperature sensor. Refer to ECK-92, "Component Inspection".	
Is the inspection result normal?	
Yes >> GO TO 5.	J
NO >> Repair or replace. $5 \text{ current cooling system}$	
Check COOLING STSTEM	
Is the inspection result normal?	Γ.
YES >> GO TO 6.	
NO >> Repair or replace.	L
6. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)	
Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Re "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure) Check]".	efer to <u>ECK-11,</u> ressure Control
>> GO TO 7.	Ν
7. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)	
Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). 12. "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pur Control Valve) Check]".	Refer to <u>ECK-</u> O mp (Volumetric
>> GO TO 8	P
8. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT	

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to <u>ECK-15</u>, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

< SYMPTOM DIAGNOSIS >

ENGINE EMITS BLUE SMOKE

Description

CHART 19: ENGINE EMITS BLUE SMOKE

Diagnosis Procedure

1.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-23, "Inspection".

Is the inspection result normal?

YES >> GO TO 2. NO >> Replace engine oil. Refer to <u>LU-24, "Refilling"</u>

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct? <u>Yes or No</u> Yes >> GO TO 3.

No >> Top up the oil. **3.**CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 4.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to ECK-92, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 5.

No >> Repair or replace.

5.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-266, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace air intake system.

6.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to ECK-93, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace.

7.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to ECK-85. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace.

8.CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to ECK-158, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 9. No >> Repair or replace. 9.CHECK EGR SYSTEM

Check EGR system. Refer to ECK-163, "Diagnosis Procedure".

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INFOID:000000001180737

ENGINE EMITS BLUE SMOKE		
< SYMPTOM DIAGNOSIS > [K9K]	_	
Is the inspection result normal?		
YES >> GO TO 10. NO >> Repair or replace	A	
10. CHECK CATALYTIC CONVERTER		
Is the catalytic converter cloqued or deteriorated?	ECK	
Is the inspection result normal?		
YES >> GO TO 11.	С	
NO >> Repair or replace.		
TT.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)	D	
Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to <u>ECK-11</u> , <u>"BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]"</u> .		
>> GO TO 12	E	
12. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)		
Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to ECK- 12, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric	F	
<u>Control Valve) Check]"</u> .	G	
>> GO TO 13.		
13. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT	Н	
Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to <u>ECK-15. "BASIC</u> INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".	I	
>> GO TO 14.		
14. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN	J	
Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to ECK-19, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors		
<u>Open)"</u> .	Κ	
>> GO TO 15.		
15. CHECK INCORRECT FUEL INJECTION QUANTITY	L	
Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to ECK-20, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".	Ъ.Л	
	IVI	
>> GO TO 16. 16 CHECK FCM POWER SUPPLY AND GROUND CIRCUIT		
Check ECM power supply and ground circuit. Refer to ECK-65. "Diagnosis Procedure"	N	
Is the inspection result normal?		
YES >> GO TO 17.	0	
NO >> Repair or replace harness or connector.		
I / .CHECK WIRING HARNESS	Ρ	
Visually check the condition of the engine wiring harness.		

YES >> **INSPECTION END** NO >> Repair or replace harness or connector.

ENGINE SMOKES WHEN REVVED	
< SYMPTOM DIAGNOSIS >	[K9K]
ENGINE SMOKES WHEN REVVED	
Description	INFOID:000000001180738
CHART 20: ENGINE SMOKES WHEN REVVED	
Diagnosis Procedure	INFOID:000000001180739
1.CHECK ENGINE OIL	
Check the grade of engine oil. Refer to LU-23, "Inspection".	
Is the inspection result normal?	
YES >> GO TO 2.	
NO >> Replace engine oil. Refer to <u>LU-24, "Refilling"</u>	
Z.CHECK ENGINE OIL LEVEL	
Is the engine oil level correct?	
<u>Yes or No</u>	
Yes >> GO TO 3.	
No $>>$ lop up the oil.	
3. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT	
Check ECM power supply and ground circuit. Refer to ECK-92, "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 4.	
NO >> Repair or replace narness or connector.	
4.CHECK WIRING HARNESS	
Visually check the condition of the engine wiring harness.	
Is the inspection result normal?	
YES >> GO TO 5.	
$\mathbf{S} = \mathbf{S} = \mathbf{S} + $	
O.CHECK MASS AIR FLOW SENSOR	
Check mass air flow sensor. Refer to ECK-85. "Component Inspection".	

Is the inspection result normal?

>> **INSPECTION END** >> Repair or replace. YES

NO

ENGINE EMITS WHITE SMOKE (ESPECIALLY WHEN STARTING) < SYMPTOM DIAGNOSIS > [K9K]	
ENGINE EMITS WHITE SMOKE (ESPECIALLY WHEN STARTING)	Λ
Description	A
CHART 21: ENGINE EMITS WHITE SMOKE (ESPECIALLY WHEN STARTING)	EC
Diagnosis Procedure	
1.CHECK FUEL	С
Check that the fuel reservoir is correctly filled and with the right fuel.	
>> GO TO 2.	D
2. CHECK COOLING SYSTEM	
Check the cooling system. Refer to CO-48, "Troubleshooting Chart".	Ε
Is the inspection result normal? YES >> GO TO 3	
NO >> Repair or replace.	F
3.CHECK GLOW SYSTEM	
Check the glow system. Refer to <u>ECK-118. "Diagnosis Procedure"</u> .	G
YES >> GO TO 4.	
NO >> Repair or replace glow system. Refer to <u>EM-276, "Removal and Installation"</u>	Н
4. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN	
"BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".	I
>> GO TO 5.	J
5. CHECK INCORRECT FUEL INJECTION QUANTITY	
Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to <u>ECK-20, "BASIC INSPECTION :</u> Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".	Κ
>> INSPECTION END	L
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EMISSION CONTROL NOT SATISFACTORY	
< SYMPTOM DIAGNOSIS >	[K9K]
EMISSION CONTROL NOT SATISFACTORY	
Description	INFOID:000000001180742
CHART 22: EMISSION CONTROL NOT SATISFACTORY	
Diagnosis Procedure	INFOID:000000001180743
1. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT	
Check ECM power supply and ground circuit. Refer to <u>ECK-65, "Diagnosis Procedure"</u> . <u>Is the inspection result normal?</u>	
NO >> Repair or replace harness or connector.	
Visually check the condition of the engine wiring harness.	
Is the inspection result normal?	
YES >> GO TO 3.	
3 CHECK AD INTAKE SYSTEM	
Check air intake system. Refer to <u>EM-266, "Removal and Installation"</u> .	
NO >> Repair or replace air intake system.	
4. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR	
Check electric throttle control actuator Refer to ECK-93 "Diagnosis Procedure"	
Is the inspection result normal?	
YES >> GO TO 5.	
NO >> Repair or replace.	
5. CHECK MASS AIR FLOW SENSOR	
Check mass air flow sensor. Refer to ECK-85, "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 6.	
NO >> Repair or replace.	
O.CHECK TURBOCHARGER	
Check that the turbocharger is working properly. Refer to <u>ECK-158, "Diagnosis Procedure"</u> .	
Is the turbocharger correct?	
Yes >> GO IO 7. No >> Renair or replace	
7 CHECK FOR SYSTEM	
Check ECP avistom Defer to ECK 162 "Diagnosis Dresedure"	
Is the inspection result normal?	
YES >> GO TO 8	
NO >> Repair or replace.	
${f 8.}$ CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)	
Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). R "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (P	efer to <u>ECK-11,</u> ressure Control

Valve) Check]".

EMISSION CONTROL NOT SATISFACTORY

< SYMPTOM DIAGNOSIS >

9. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)
Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to ECK-

12, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 10.

10. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to <u>ECK-15</u>, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 11.

11. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to <u>ECK-19</u>, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors <u>Open</u>)".

>> GO TO 12.

12. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to ECK-20. "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> INSPECTION END

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PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the "SRS AIRBAG" and "SEAT BELT" of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the "SRS AIRBAG".
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

Precaution for Procedure without Cowl Top Cover

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When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.

On Board Diagnostic (OBD) System of Engine

The ECM has an on board diagnostic system. It will light up the malfunction indicator (MI) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

- Be sure to turn the ignition switch OFF and disconnect the battery negative cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MI to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MI to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to <u>PG-104, "Description"</u>.
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MI to light up due to the short circuit.
- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MI to light up due to the malfunction of the fuel system, etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.



PRECAUTIONS

< PRECAUTION >

General Precautions

- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is runnina.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF, wait 3 minutes and disconnect battery negative cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- Before removing parts, turn ignition switch OFF and then disconnect battery negative cable.
- Do not disassemble ECM.

- When connecting ECM harness connector, fasten (A) it securely with levers (1) as far as they will go as shown in the figure.
- ECM (2)
- Loosen (B)

• When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).

Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.

- Securely connect ECM harness connectors. A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to IC's.
- Keep engine control system harness at least 10cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of IC's, etc.
- Keep engine control system parts and harness dry.
- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Even a slight leak in the air intake system can cause serious incidents.
- Do not shock or jar the camshaft position sensor, crankshaft position sensor.





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PRECAUTIONS

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- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.
- Do not disassemble fuel pump. If NG, take proper action.
- Do not disassemble fuel injector. If NG, replace fuel injector.

• When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.

· Immediately after staring, do not rev up engine unnecessarily.

- Keep the antenna as far as possible from the electronic control units.
- Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.
- Do not let them run parallel for a long distance.

• Do not depress accelerator pedal when staring.

Do not rev up engine just prior to shutdown.

- Adjust the antenna and feeder line so that the standingwave radio can be kept smaller.
- Be sure to ground the radio to vehicle body.







< PRECAUTION >

Cylinder NO.1 is at the flywheel end.

-1: Crankshaft pulley



ENGINE RUNNING

- No work should be carried out on the hydraulic system while engine is running.
- Remember that fuel pressure values in hydraulic circuit can reach up to 1,600 bar.
- Keep hands or face (particularly eyes) out of any high pressure leak.
- Recall that fuel is dangerous for health.

FUEL RAIL PRESSURE SENSOR

- Under warranty, do not remove the fuel rail pressure sensor from the rail.
- Do not try to measure the resistance of the fuel rail pressure sensor. This test is destructive for the internal components.

FUEL INJECTOR

- Fuel injectors are driven by over 100V.
- FUEL injector electronics are polarised. In case of intervention on wiring harness, do not invertwires. It is destructive for the piezo components.
- Do not drive the fuel injectors if their body is not connected to the battery ground (risk ofelectrostatic discharge). For instance, fuel injector body have to be in contact with cylinder.
- Piezo fuel injector connector must not be unplugged while engine is running. Risk of majordamage to the engine (fuel injector could stay opened).

Cleanliness

Cleanliness

RISKS ASSOCIATED WITH CONTAMINATION

The high pressure direct injection system is highly sensitive to contamination. The risks associated withcon-	ľ
tamination are:	

- damage to or destruction of the high pressure injection system,
- components jamming,
- components losing seal integrity.

All After-Sales operations must be performed under very clean conditions. This means that no impurities (particles a few microns in size) should have entered the system during dismantling.

The cleanliness principle must be applied from the filter to the fuel injectors.

What are the sources of contamination?

- metal or plastic chips,
- paint,
- fibres:
- from cardboard,
- from brushes,
- from paper,
- from clothing,
- from cloths,
- foreign bodies such as hair,
- ambient air

• etc.

NOTE:

Cleaning the engine using a high pressure washer is prohibited because of the risk of damaging connections. In addition, moisture may collect in the connectors and create electrical connection malfunction.

INSTRUCTIONS TO BE FOLLOWED BEFORE CARRYING OUT ANY WORK

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< PRECAUTION >

Before any work is carried out on the high pressure injection system, protect:

- the accessories and timing belts,
- the electrical accessories, (starter, alternator, electric power assisted steering pump),
- the flywheel surface, to prevent any diesel from running onto the clutch friction plate.
- Check that you have plugs for the unions to be opened (set of plugs available from the Parts Department). The plugs are single-use only. After use, they must be discarded (once used they are soiled and cleaning is not sufficient to make them reusable). Unused plugs must be discarded.
- Check that you have hermetically resealable plastic bags for storing removed parts. Stored parts will therefore be less subject to the risk of impurities. The bags are to be used once only, and discarded after use.
- Use lint-free cleaning cloths. Using normal cloth or paper is prohibited. They are not lint-free and could contaminate the fuel circuit. Each cloth should only be used once.
- Use fresh cleaning agent for each operation (used cleaning agent is contaminated). Pour it into an uncontaminated container.
- For each operation, use a clean brush in good condition (the brush must not shed its bristles).
- Use a brush and cleaning agent to clean the unions to be opened.
- Blast compressed air over the cleaned parts (tools, workbench, the parts, unions and injection system zones). Check that no bristles remain.
- Wash your hands before and during the operation if necessary.

• When wearing leather protective gloves cover them with latex gloves to prevent contamination.

INSTRUCTIONS TO BE FOLLOWED WHEN CARRYING OUT ANY WORK

- As soon as the circuit is open, all openings must be plugged to prevent impurities from entering the system. The plugs to be used are available from the Parts Department. The plugs must not be reused under any circumstances.
- Seal the pouch shut, even if it has to be opened shortly afterwards. Ambient air carries contamination.
- All components removed from the injection system must be stored in a hermetically sealed plastic bag once they have been plugged.
- Using a brush, cleaning agent, air gun, sponge or normal cloth is strictly prohibited once the circuit has been opened. These items could allow contamination to enter the system.
- A new component replacing an old one must not be removed from its packaging until it is to be fitted to the vehicle.

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS) SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

Condition	Specification	
No load* (in Neutral position)	800 ± 50 rpm	С
*: Under the following conditions		
A/C switch: OFF		D
Electric load: OFF (Lights, glow plug, heater fan & rear window d	efogger)	_

· Steering wheel: Kept in straight-ahead position

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