SECTION ECK

ENGINE CONTROL SYSTEM (K9K)

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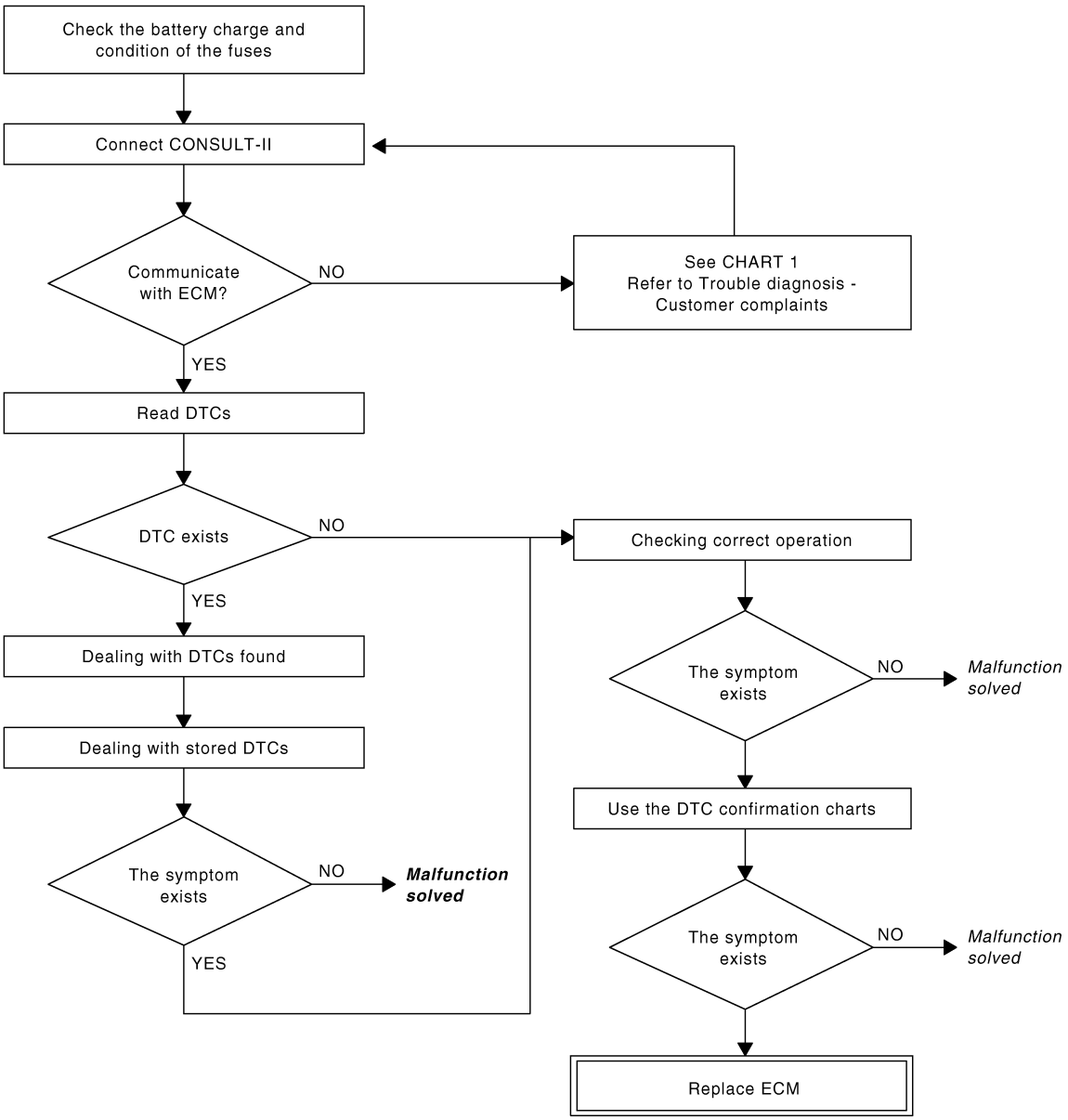
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000001180513

OVERALL SEQUENCE



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Diagnostics Malfunctions

- Malfunctions are declared as either present or stored (depending on whether they appeared in a certain context 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 following 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 tool 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 customer 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 corresponding 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 processed 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 measurements 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 “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:

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:0000000001180514

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.

KEY POINTS

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

SEF907L

WORKSHEET SAMPLE

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Fuel and fuel filler cap		☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
	☐ 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 conditions		☐ Not affected	
	Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions		☐ In town ☐ In suburbs ☐ Highway ☐ 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 30 40 50 60 MPH	
Malfunction indicator lamp		☐ Turned on ☐ Not turned on	

MTBL0017

INSPECTION AND ADJUSTMENT
BASIC INSPECTION

BASIC INSPECTION : Description

INFOID:0000000001180515

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 INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)"
Internal fuel transfer pump check	TEST 2	ECK-11, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)"
High pressure supply pump (Pressure control valve) check	TEST 3	ECK-11, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]"
High pressure supply pump (Volumetric control valve) check	TEST 4	ECK-12, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]"
Rail high pressure regulation check	TEST 5	ECK-15, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)"
Major leak in fuel injectors/fuel injectors open	TEST 6	ECK-19, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)"
Incorrect fuel injection quantity	TEST 7	ECK-20, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)"

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

INFOID:0000000001180516

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).

Is the inspection result normal?

Yes >> GO TO 2.
No >> Bleed the fuel supply system with the manual priming pump.

2.CHECK FUEL CIRCUIT

Does the fuel circulate correctly when pumped manually?

Yes or No

Yes >> GO TO 5.
No >> GO TO 3.

3.CHECK FOR LEAK

Look for leaks on the unions.

Are there leaks in the hoses 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)

INFOID:0000000001180517

NOTE:

- **CONDITIONS PRIOR TO TEST**
- Test 1 Low pressure fuel supply system check has been carried out previously and results are satisfactory.
- **CAUSE**
- 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.

- 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)
- 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

Pump (Pressure Control Valve) Check]

INFOID:0000000001180518

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/cm^2, 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

Pump (Volumetric Control Valve) Check]

INFOID:0000000001180519

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**
- Not enough or no rail pressure during starting.
- Rail reference pressure during starting, minimum 15 000 kPa (150 bar, 153 kg/cm^2, 2175 psi).

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

Refer to ECK-69, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2
NO >> Replace high pressure supply pump.

2. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)-I

- Reconnect all harness connectors disconnected.
- Turn ignition switch ON.
- Select “DATA MONITOR” mode with CONSULT-III.
- Check that the “FUEL_FLOW_S/V_CU” indication when the cranking engine.

Is the excitation current between 0.6 - 1.0A?

YES >> GO TO 6.
NO >> GO TO 3.

3. 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 5.
NO >> GO TO 4.

4. 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.

5. 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 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/cm^2, 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.

>> **INSPECTION END**

BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)

INFOID:0000000001180520

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**
  - Engine coolant temperature between 80 - 90°C (176 - 194°F).
  - All the electrical load are switched off.
  - Air conditioning is switched off.
  - The tank is at least half-full.
  - The pipe connections and unions have been checked.
  - Check the sealing of the high pressure pipes and unions.
- **CAUSE**
  - Rail pressure variations around the setpoint.
  - The rail reference pressure is not reached.
  - Rough idle.
  - Possibly noisy combustion.

1.CHECK AIR BUBBLES

1. Start engine
2. Are there large air bubbles in the transparent supply pipe going to the pump?

Is the inspection result normal?

YES >> Check low pressure system.
NO >> GO TO 2.

2.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)-I

Disconnect high pressure supply pump (volumetric control valve) harness connector.

Does the engine stop?

YES >> GO TO 3.
NO >> Replace high pressure supply pump (the high pressure supply pump [volumetric control valve] remains open mechanically).

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

1. Reconnect high pressure supply pump (volumetric control valve) harness connector.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Start engine.
4. Disconnect high pressure supply pump (pressure control valve) harness connector.

Does the engine stop?

YES >> GO TO 4.
NO >> Replace high pressure supply pump (the high pressure supply pump [pressure control valve] remains open mechanically).

4.CHECK FUEL INJECTOR

1. Reconnect high pressure supply pump (pressure control valve) harness connector.
2. Wait at least 30 seconds.
3. Start engine and let it idle speed.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check that the “F/FLOW_CORR_CYL1”, “F/FLOW_CORR_CYL2”, “F/FLOW_CORR_CYL3”, “F/FLOW_CORR_CYL4” indication.

Are the reference value 0.3 - 1.9?

YES >> GO TO 6.
NO >> GO TO 5.

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

Carry out TEST 6.

>> 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 ECK-96, "Component Inspection") or engine coolant temperature sensor (Refer to ECK-92, "Component Inspection").

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.

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

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 >> 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. 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 14.
NO >> GO TO 13.

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 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 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 pressure sensor		Ground	Voltage (V)
Connector	Terminal		
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 pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
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 pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
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.

2. Start engine and let it idle speed.
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Check that the “RAIL PRESSURE” indication under the following conditions.
NOTE:
An unusual combustion noise may be heard.

CONDITION (ENGINE SPEED)	INDICATION
At idle speed	190 - 210 bar
2000 rpm	400 - 500 bar
3000 rpm	500 - 700 bar
4000 rpm	700 - 900 bar

Is the inspection result normal?

YES >> GO TO 22.
NO >> GO TO 21.

21. CHECK FUEL RAIL PRESSURE-II

1. Turn ignition switch OFF.
2. Replace fuel rail. Refer to EM-278, "Removal and Installation"
3. Start engine and let it idle speed.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check that the “RAIL PRESSURE” indication under the following conditions.
NOTE:
An unusual combustion noise may be heard.

CONDITION (ENGINE SPEED)	INDICATION
At idle speed	190 - 210 bar
2000 rpm	400 - 500 bar
3000 rpm	500 - 700 bar
4000 rpm	700 - 900 bar

Is the inspection result normal?

YES >> GO TO 22.
NO >> Replace high pressure supply pump.

22. INSPECTION END

High pressure supply pump (volumetric control valve) OK.

>> **INSPECTION END**

BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)

INFOID:0000000001180521

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.
- **CAUSE**
- Not enough or no rail pressure during starting.
- The engine does not start.

1. CHECK FUEL INJECTOR-I

Refer to ECK-100, "Component Inspection".

Is the inspection result normal?

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)

INFOID:0000000001180522

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.

- All the electrical loads are switched off.
- Air conditioning is switched off.

• **CAUSE**

- The engine runs poorly at idle speed, possibly emits white smoke.

1.CHECK FUEL INJECTOR

Refer to ECK-100, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning fuel injector.

2.CHECK ENGINE COOLANT TEMPERATURE AND FUEL TEMPERATURE

1. Start engine let it idle speed.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Check “FUEL TEMP” indication is above 60°C (140°F)
4. Check “F/FLOW CORR CYL1“, “F/FLOW CORR CYL2”, “F/FLOW CORR CYL3”, “F/FLOW CORR CYL4” indication.

Are the reference value 0.3 - 1.9?

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

3.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. While the engine is idling, check the return flow rate at the fuel injector. After 5 minutes the return volume must be between 16 - 24 ml per fuel injector.

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".

>> INSPECTION END

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description

INFOID:0000000001180523

When replacing ECM, this procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement

INFOID:0000000001180524

1.PRECONDITIONING

- 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 (122°F)].

NOTE:
While the ECM is being programmed the cooling fan motors are triggered automatically.

>> GO TO 2.

2.SAVE ECM DATA

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

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

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.
3. Perform “WRITE VIN” in WORK SUPPORT mode with CONSULT-III.
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:0000000001180526

1.START

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

5. Select “DATA MONITOR” mode with CONSULT-III.
6. Check that the “NEW EGR/V OFFSET” and “LAST EGR/V OFSET” indication.

0.75V < NEW EGR/V OFFSET = LAST EGR/V OFSET < 1.5V

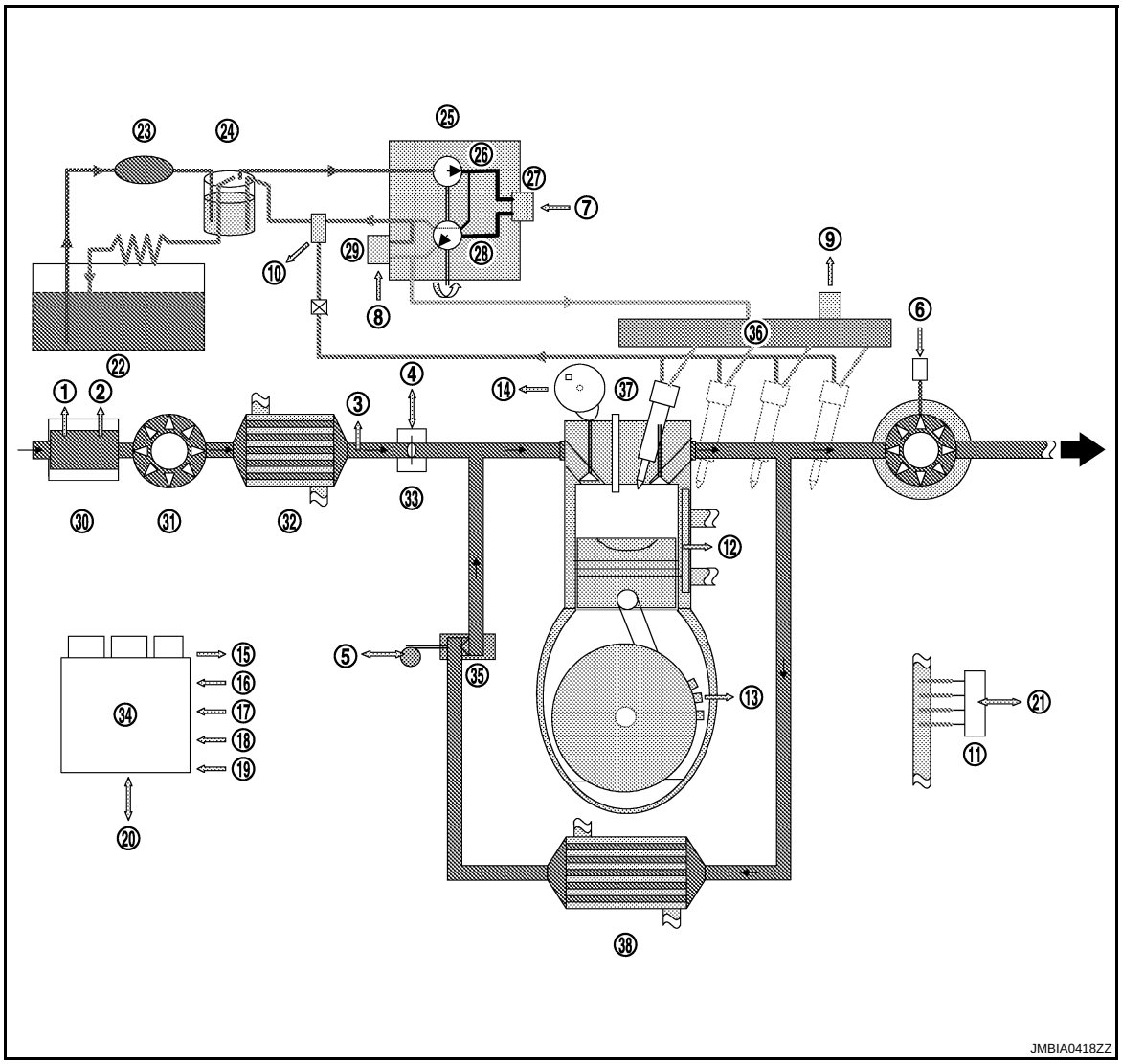
>> END

FUNCTION DIAGNOSIS

ENGINE CONTROL SYSTEM

System Diagram

INFOID:0000000001180527



1. Mass air flow sensor signal
2. Intake air temperature sensor signal
3. Turbocharger boost sensor signal
4. Throttle position sensor signal
5. EGR Volume Control Valve Control Position Sensor signal
6. Turbocharger boost control solenoid valve signal
7. High Pressure Supply Pump (volumetric Control Valve) signal
8. High Pressure Supply Pump (pressure Control Valve) signal
9. Fuel rail pressure sensor signal
10. Fuel Pump Temperature Sensor
11. Glow plug
12. Engine coolant temperature sensor signal
13. Crankshaft Position Sensor signal
14. Camshaft Position Sensor signal
15. Barometric pressure sensor signal
16. Refrigerant pressure sensor signal
17. Accelerator pedal position sensor signal
18. Clutch switch signal
19. Brake switch signal
20. CAN communication
21. Glow plug signal
22. Fuel tank
23. Fuel pump
24. Fuel filter
25. High Pressure Supply Pump
26. High Pressure Supply Pump (internal transfer pump)
27. High Pressure Supply Pump (volumetric Control Valve)
28. High Pressure Supply Pump (high pressure pump)
29. High Pressure Supply Pump (pressure Control Valve)
30. Mass air flow sensor (with intake air temperature sensor)

31. Compressor
32. Charge air cooler
33. Electric throttle control actuator
34. ECM
35. EGR volume control valve
36. Fuel rail
37. Fuel injector
38. EGR cooler

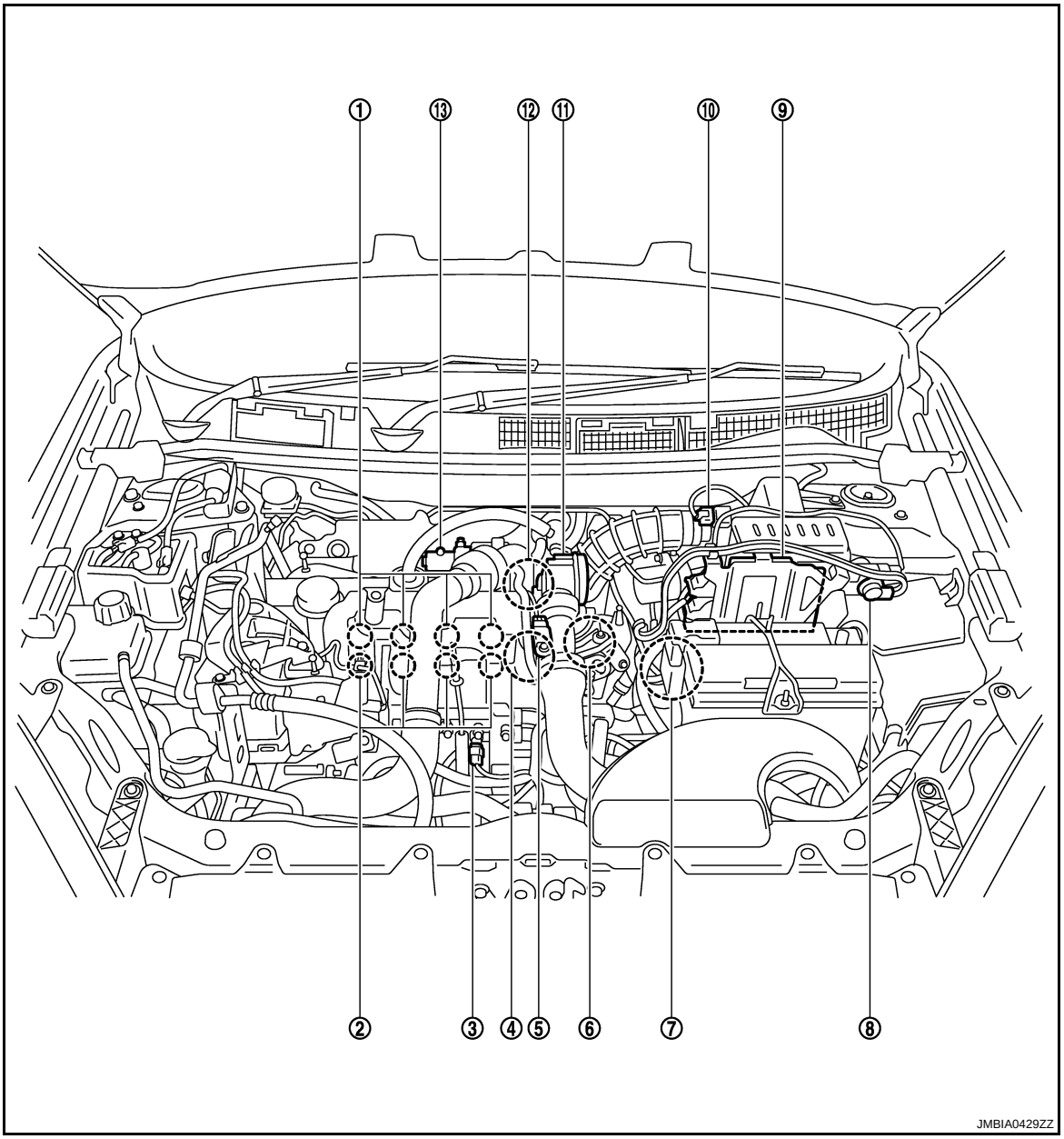
System Description

INFOID:0000000001180528

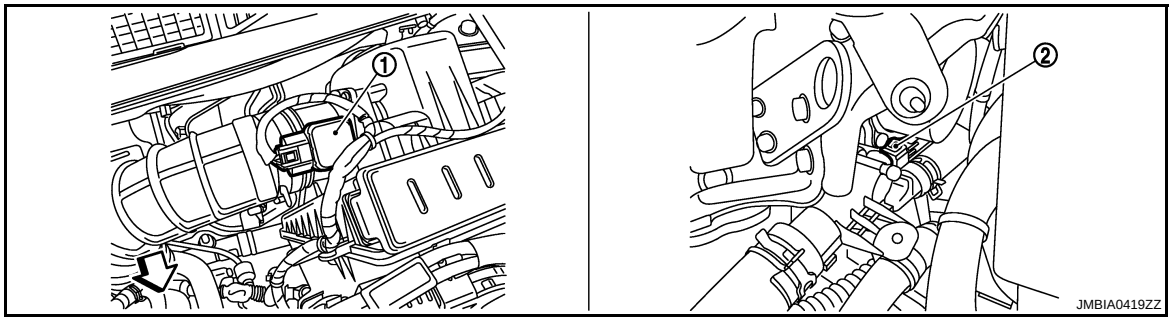
ECM performs various controls such as fuel injection control and furl pressure control.

Component Parts Location

INFOID:0000000001180529

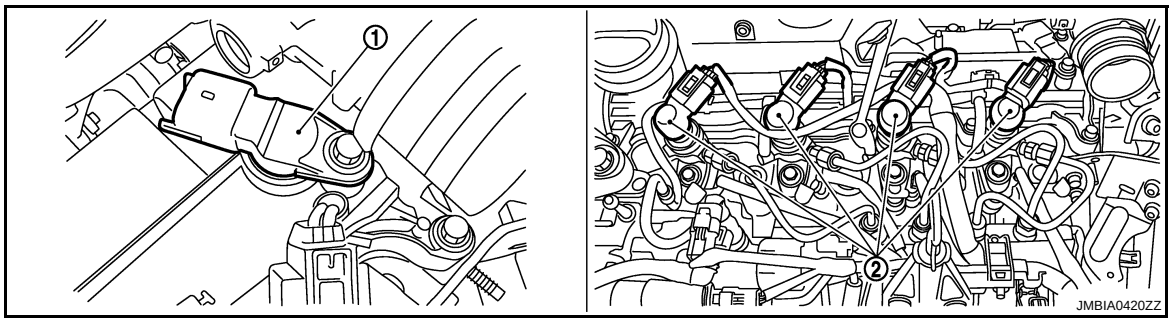


1. Fuel injector
2. Glow plug
3. Fuel rail pressure sensor
4. Crankshaft position sensor
5. Turbocharger boost sensor
6. Engine coolant temperature sensor
7. Glow relay
8. Turbocharger boost control solenoid valve
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)
11. Electric throttle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

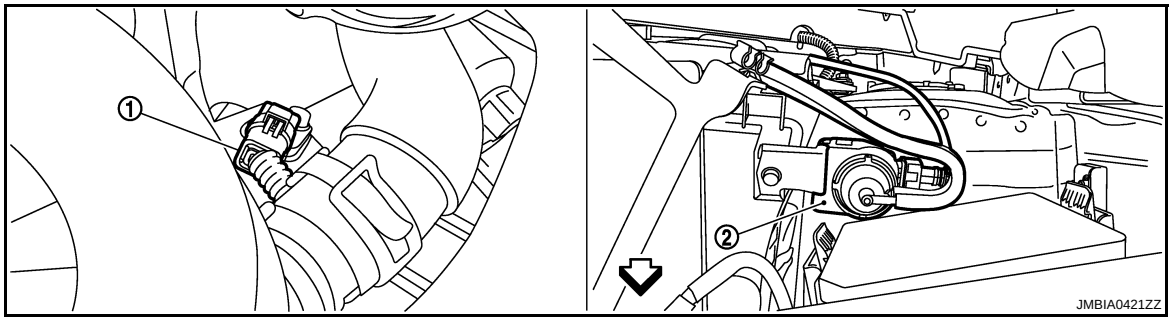


⇦ : Vehicle front

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

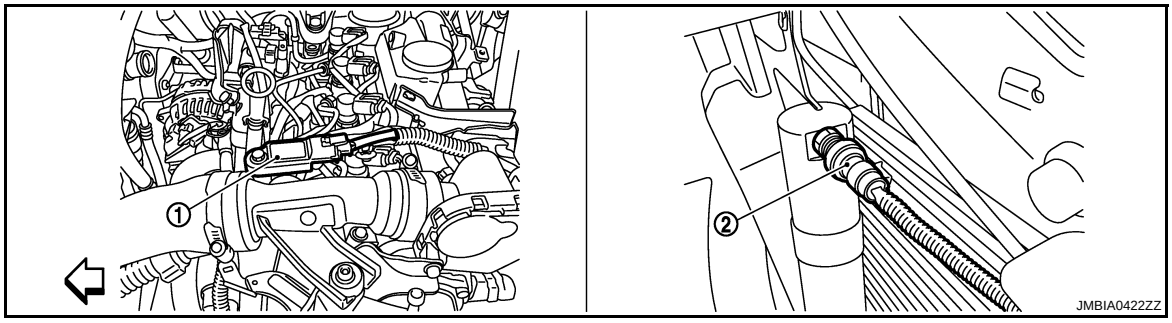


1. Camshaft Position Sensor
2. Fuel injector



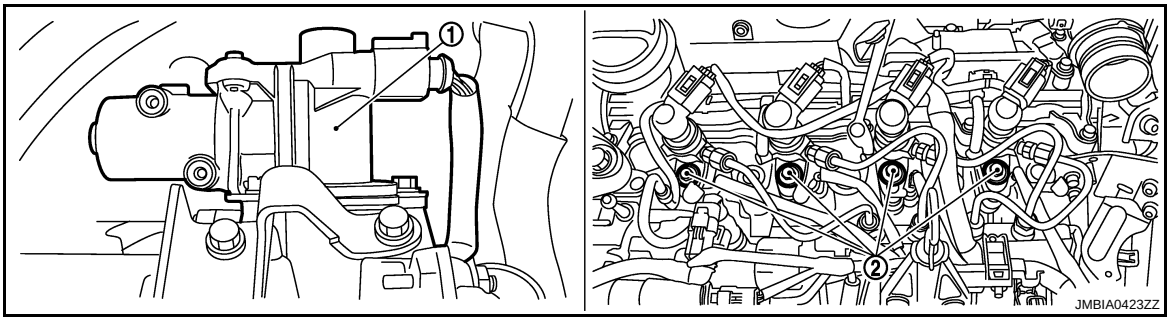
⇦ : Vehicle front

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

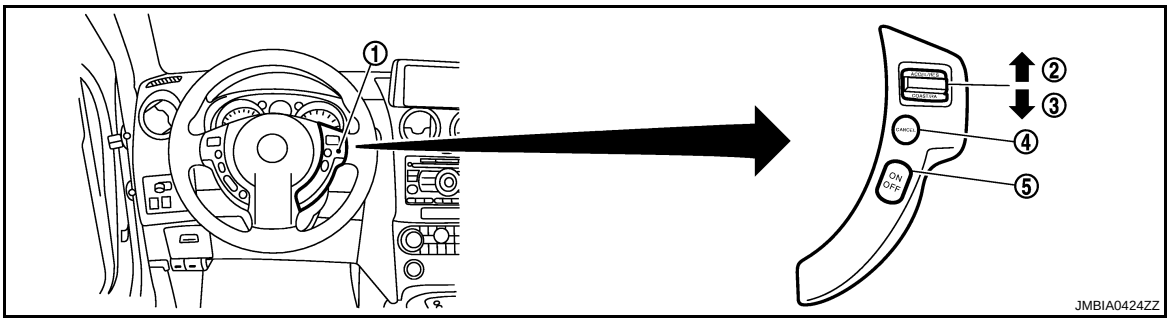


⇦ : Vehicle front

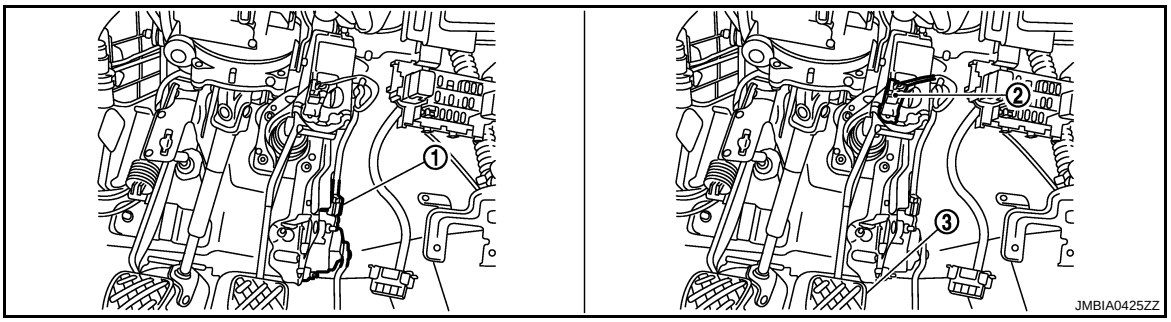
1. Turbocharger boost sensor
2. Refrigerant pressure sensor



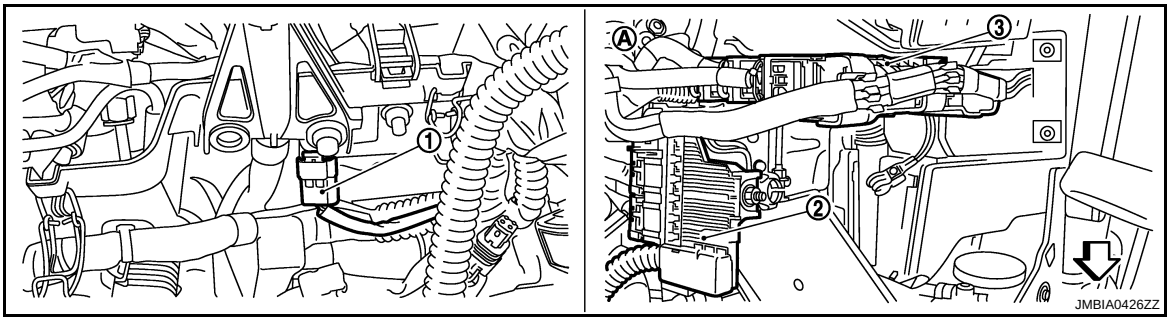
1. EGR volume control valve 2. Glow plug



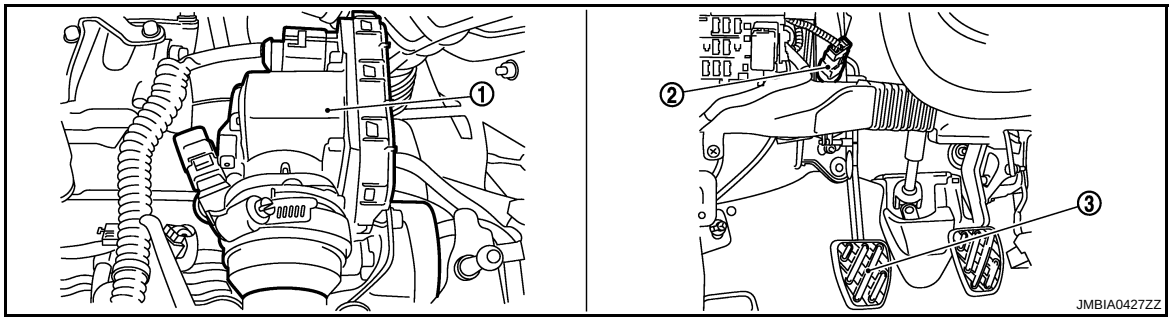
1. ASCD steering switch 2. RESUME/ACCELERATE switch 3. SET/COAST switch
4. CANCEL switch 5. MAIN switch



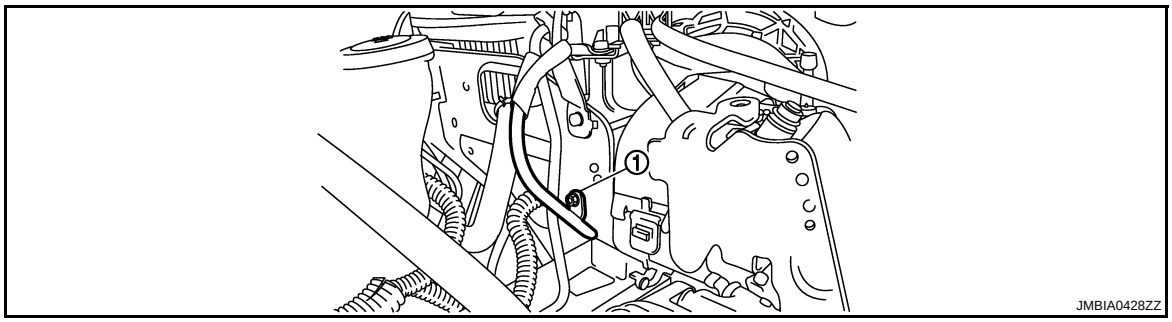
1. Accelerator pedal position sensor 2. Stop lamp switch 3. Brake pedal



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

Component Description

INFOID:0000000001180530

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"

FUEL INJECTION CONTROL

System Description

INFOID:0000000001180531

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.

- The system comprises:
  - Priming bulb
  - Fuel filter
  - High pressure supply pump
  - Fuel rail
  - Fuel rail pressure sensor
  - Fuel injector
  - Fuel pump temperature sensor
  - Engine coolant temperature sensor
  - 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 radial pump, it generates the required pressure in the rail.
- 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

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

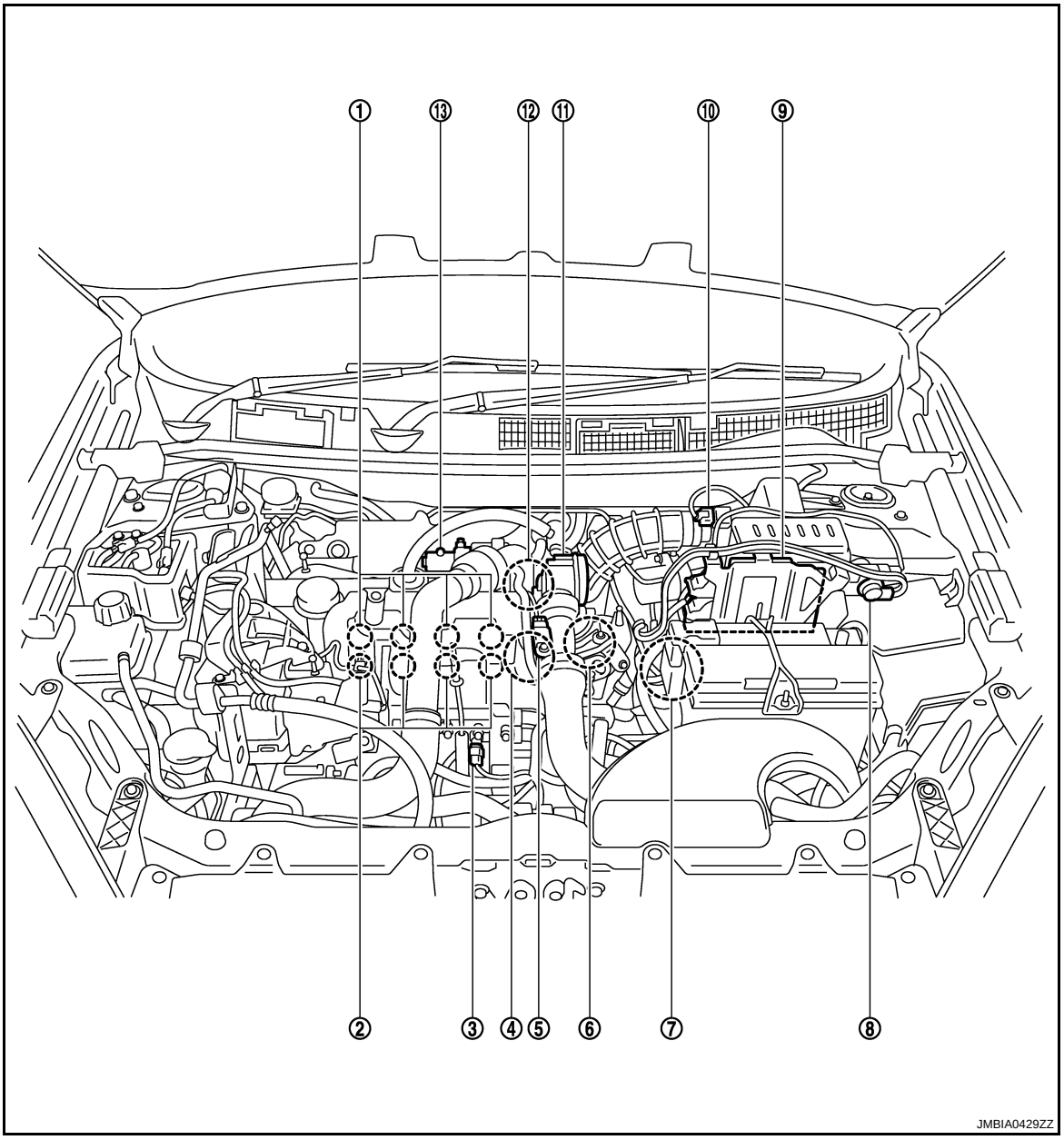
The aim of this regulation process is to facilitate smooth engine operation by compensating for the system variations (fuel injectors, compression rate, etc.) which affect the torque generated by each cylinder during combustion.
The regulation process is only active at idle speed, with a warm engine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

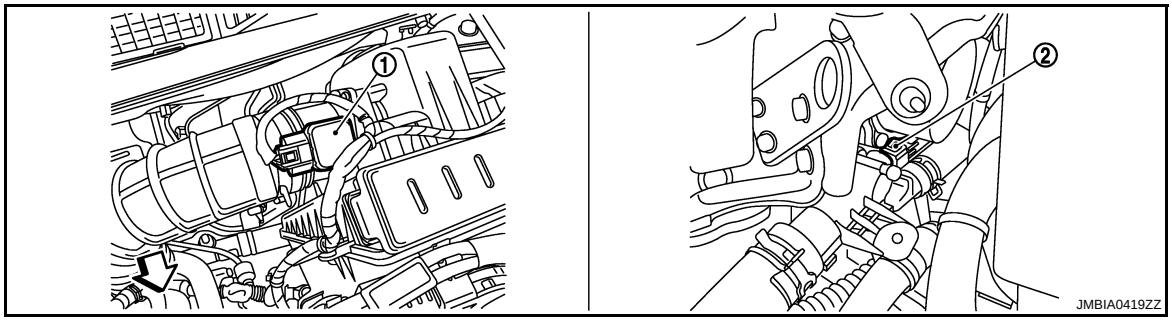
This controller allows smooth behavior of running engine, reduction of noise and oscillations in the drivetrain by compensating for system dispersions (fuel injectors, compression ratio, manufacturing tolerances of cylinders or valves...) having an influence on the torque generated by each cylinder during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

Component Parts Location

INFOID:0000000001180532

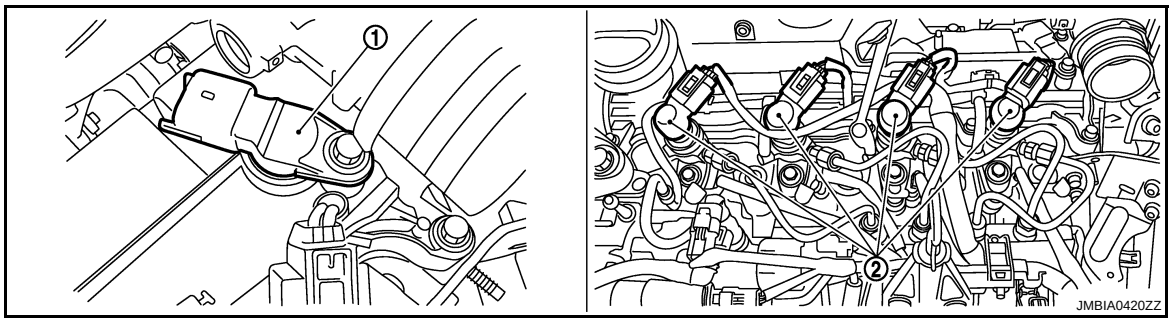


1. Fuel injector
2. Glow plug
3. Fuel rail pressure sensor
4. Crankshaft position sensor
5. Turbocharger boost sensor
6. Engine coolant temperature sensor
7. Glow relay
8. Turbocharger boost control solenoid valve
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)
11. Electric throttle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

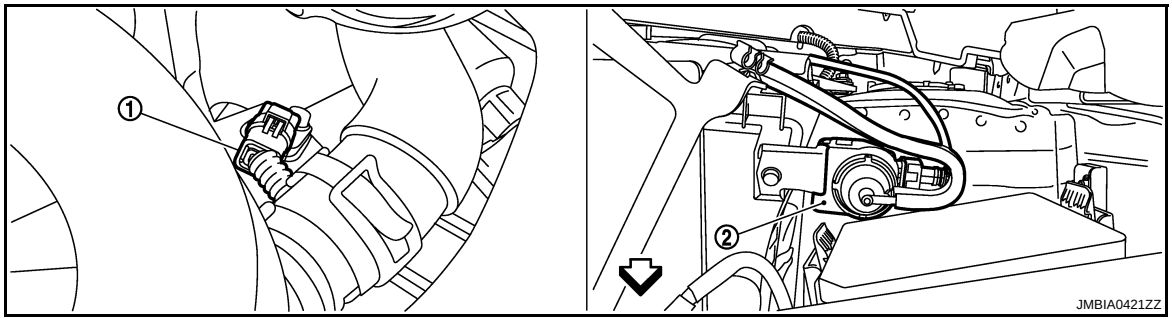


⇦ : Vehicle front

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

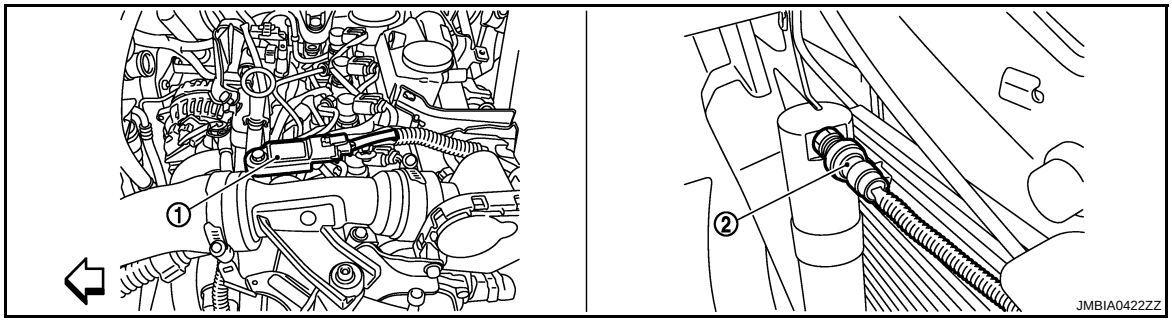


1. Camshaft Position Sensor
2. Fuel injector



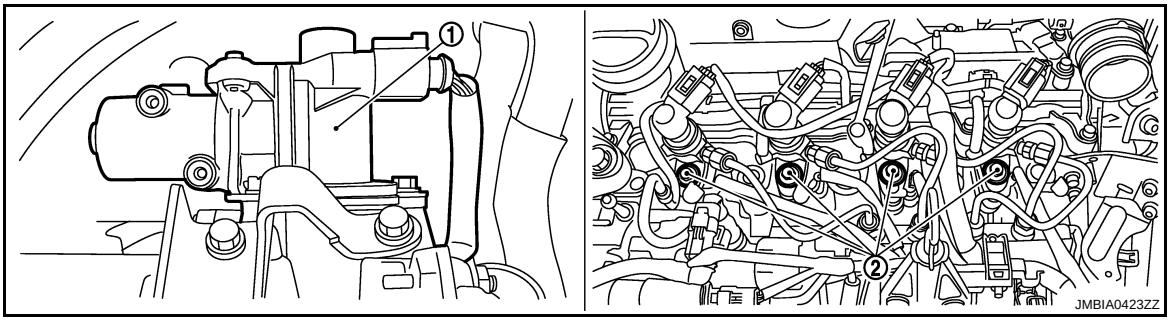
⇦ : Vehicle front

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

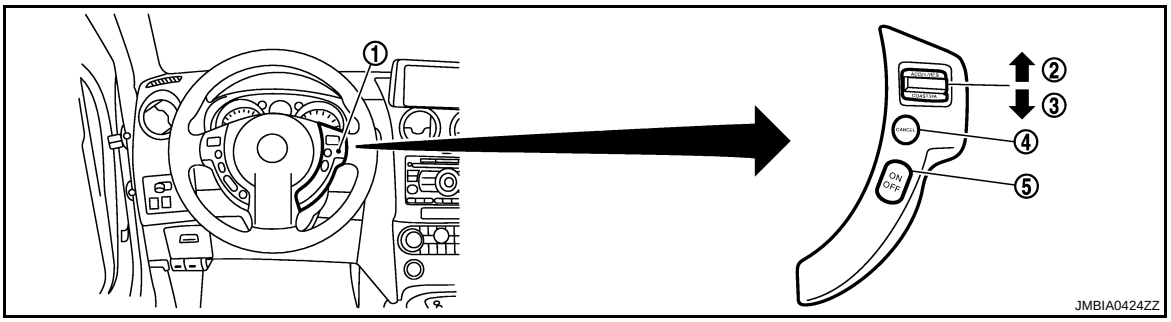


⇦ : Vehicle front

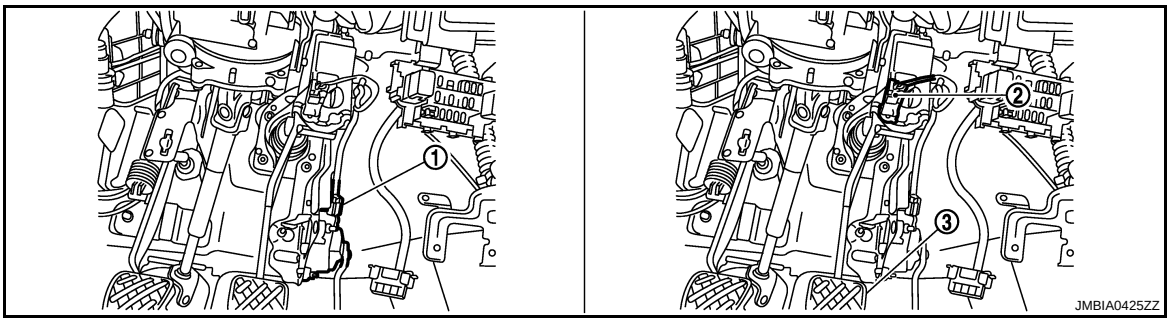
1. Turbocharger boost sensor
2. Refrigerant pressure sensor



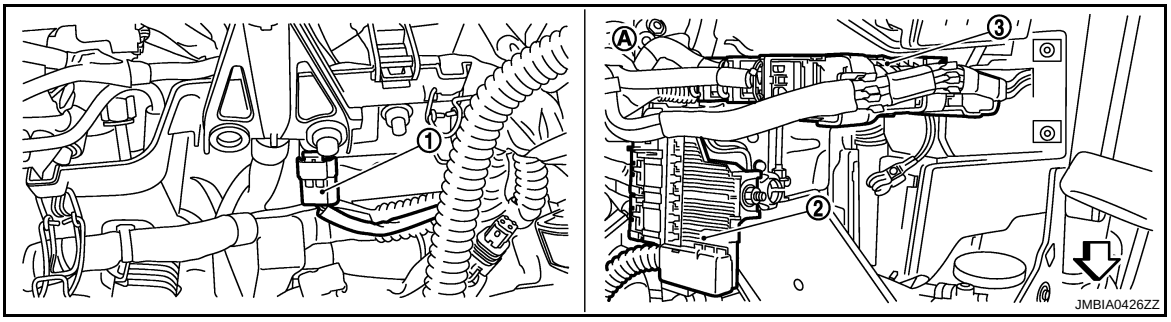
1. EGR volume control valve
2. Glow plug



1. ASCD steering switch
2. RESUME/ACCELERATE switch
3. SET/COAST switch
4. CANCEL switch
5. MAIN switch

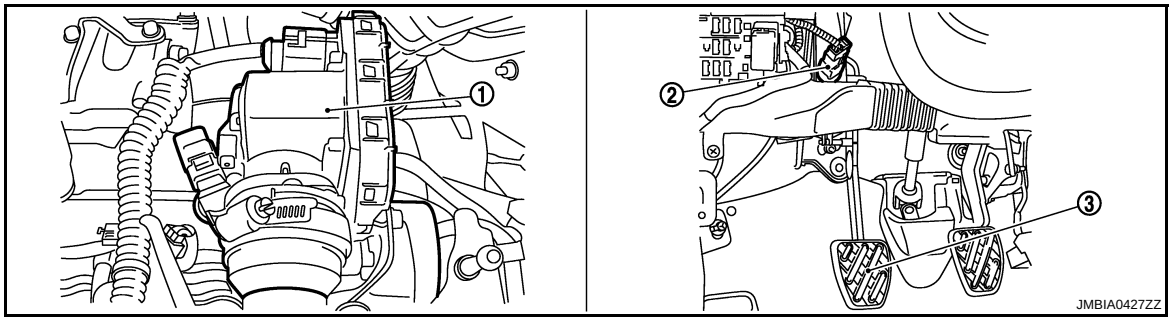


1. Accelerator pedal position sensor
2. Stop lamp switch
3. Brake pedal

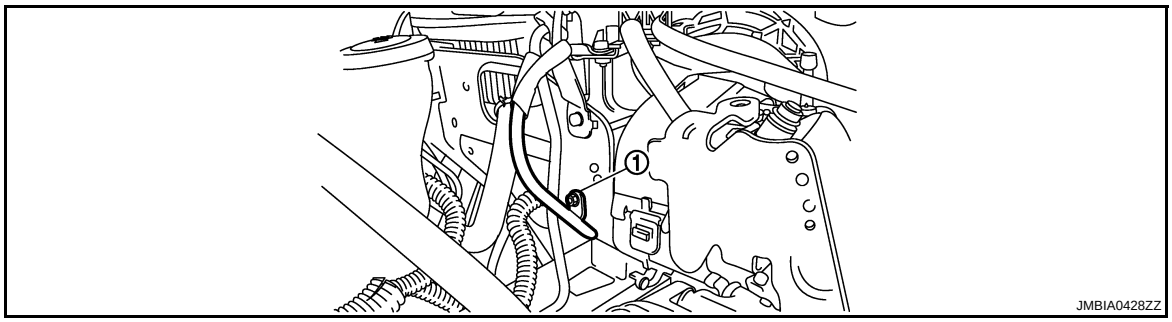


1. Fuel rail pressure sensor
2. Glow relay
3. ECM

A. View with battery removed



1. Electric throttle control actuator 2. Clutch switch 3. Clutch pedal

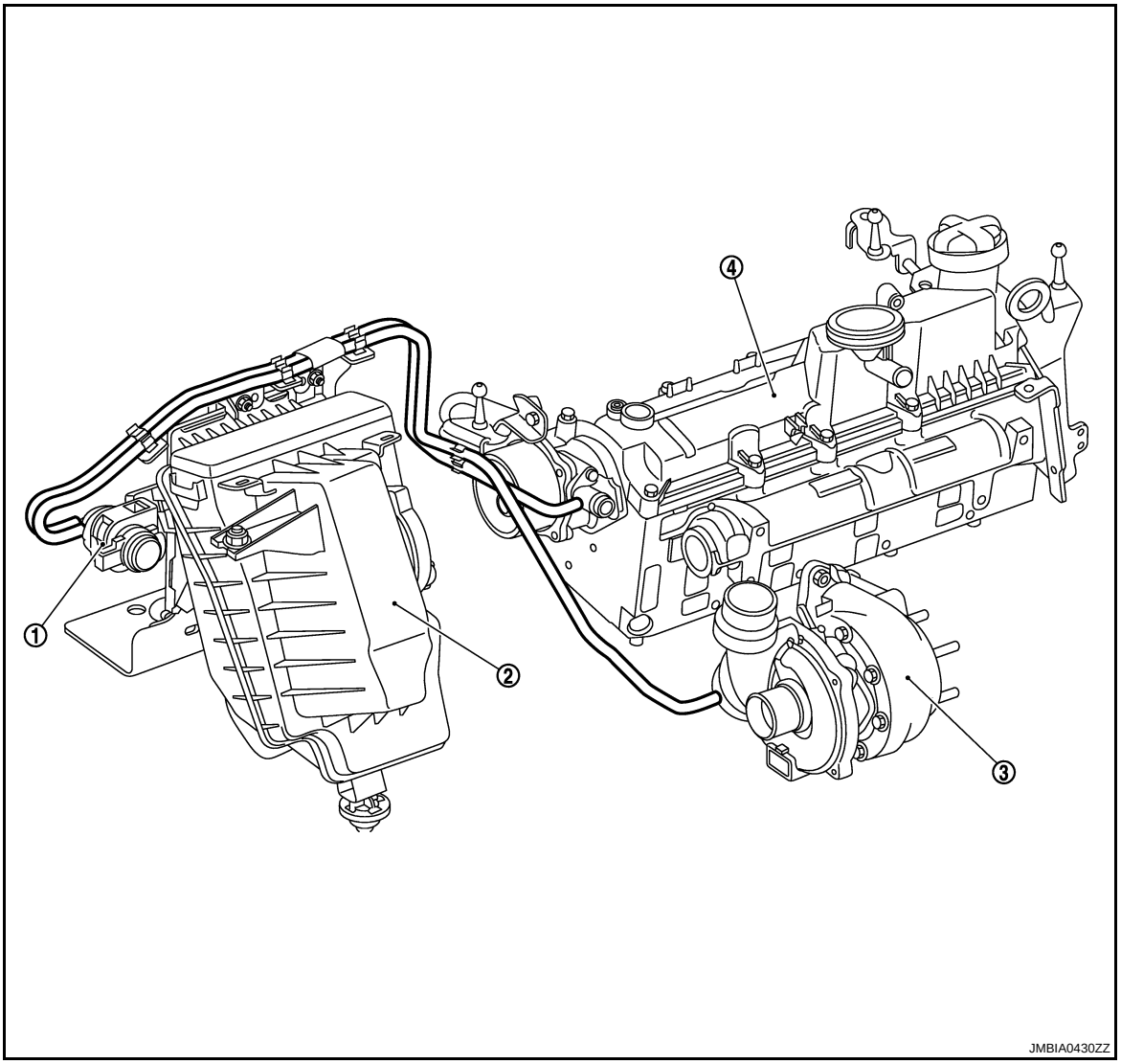


1. Body ground E17

TURBOCHARGER BOOST CONTROL

Vacuum Hose Drawing

INFOID:0000000001180533



1. Turbocharger boost control solenoid valve
2. Air cleaner
3. Turbocharger
4. Rocker cover
5. Vacuum pump

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

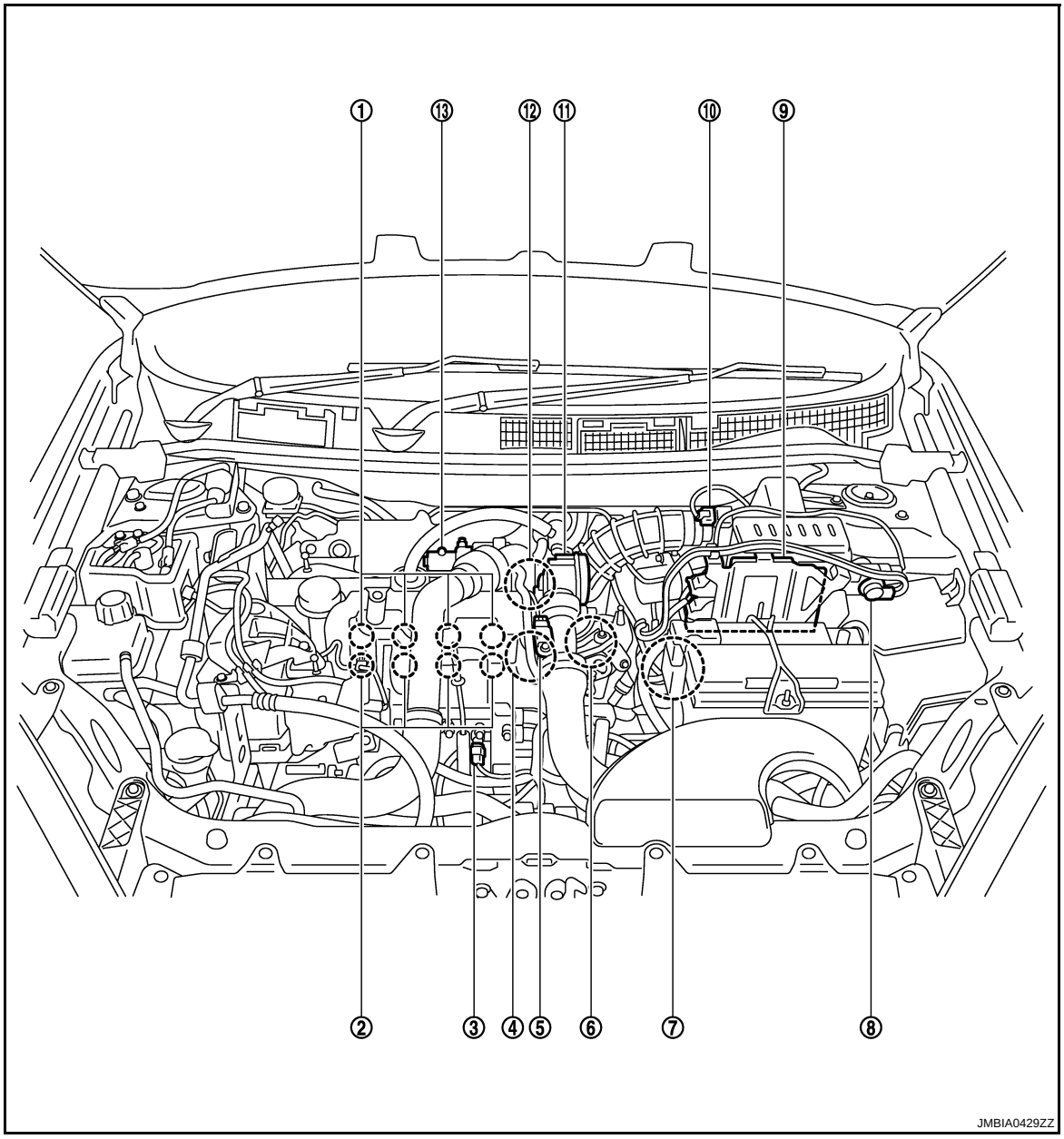
System Description

INFOID:0000000001180534

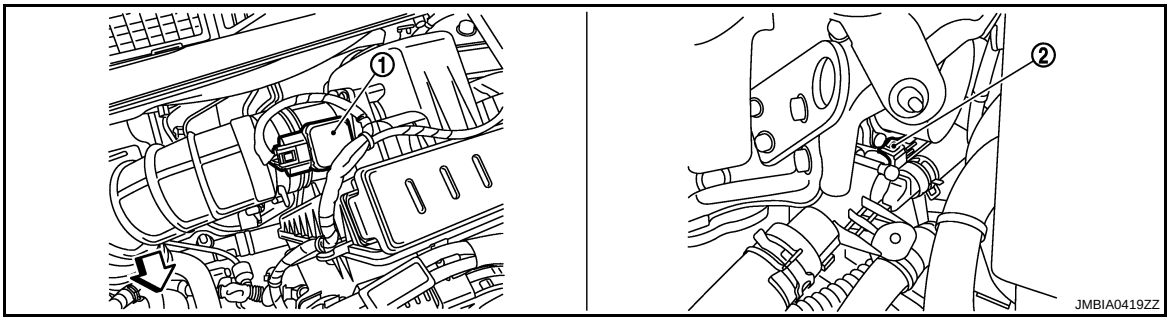
The turbocharger system consists of a solenoid valve connected to the vacuum pump circuit; this enables the vanes to be controlled by means of a diaphragm so as to create either an overpressure or a vacuum in the fresh air inlet circuit.

Component Parts Location

INFOID:0000000001180535

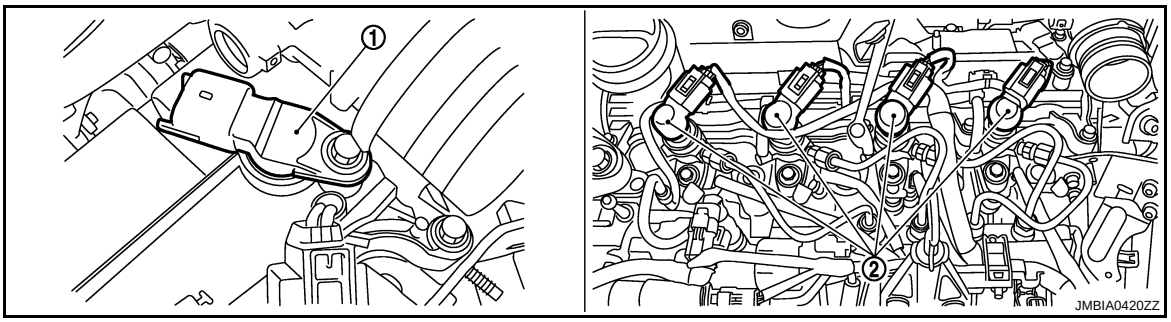


1. Fuel injector
2. Glow plug
3. Fuel rail pressure sensor
4. Crankshaft position sensor
5. Turbocharger boost sensor
6. Engine coolant temperature sensor
7. Glow relay
8. Turbocharger boost control solenoid valve
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)
11. Electric throttle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

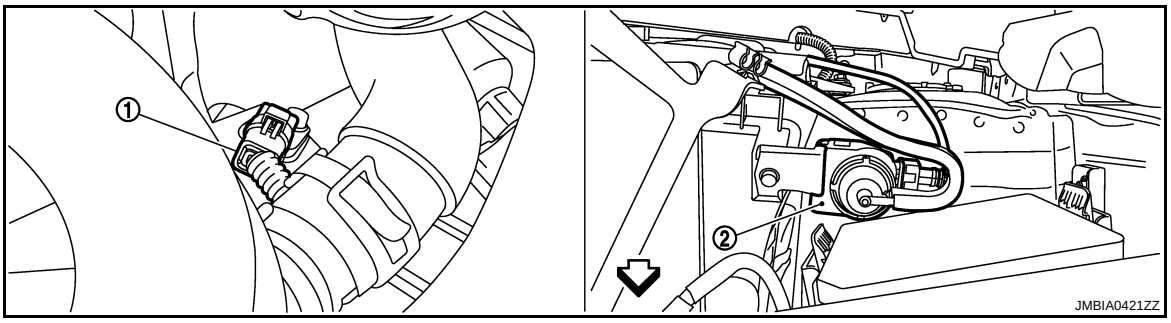


⇦ : Vehicle front

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

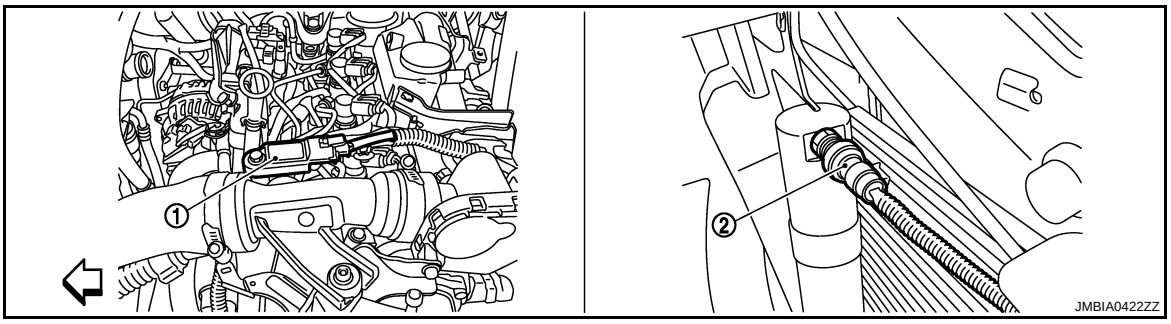


1. Camshaft Position Sensor
2. Fuel injector



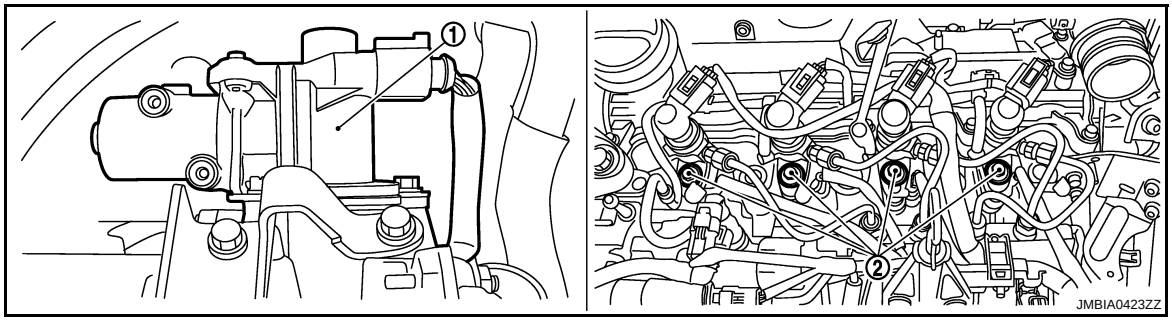
⇦ : Vehicle front

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

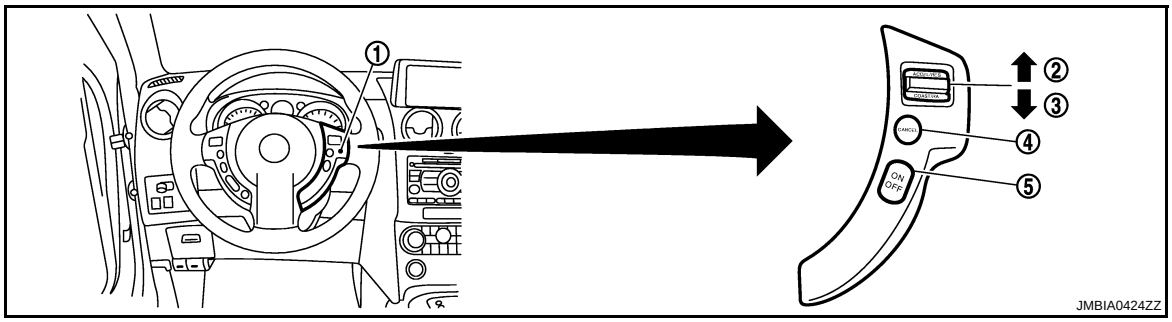


⇦ : Vehicle front

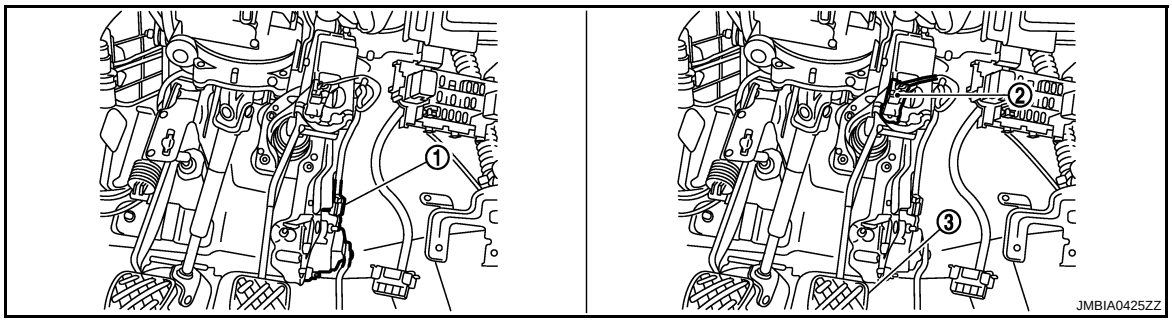
1. Turbocharger boost sensor
2. Refrigerant pressure sensor



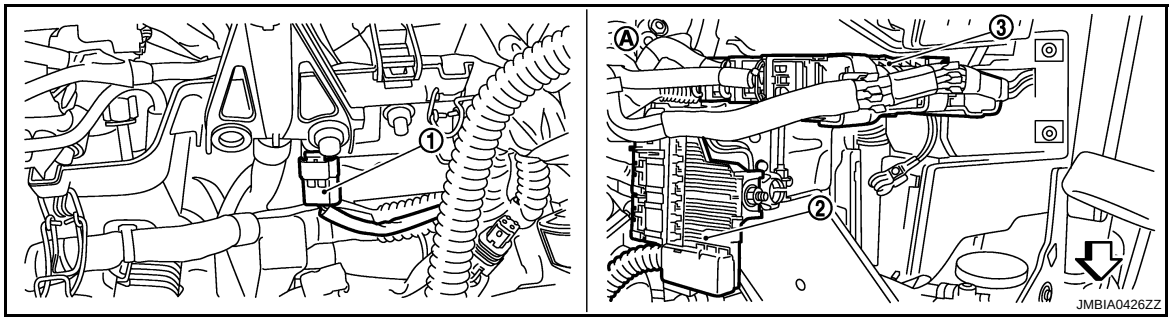
1. EGR volume control valve
2. Glow plug



1. ASCD steering switch
2. RESUME/ACCELERATE switch
3. SET/COAST switch
4. CANCEL switch
5. MAIN switch

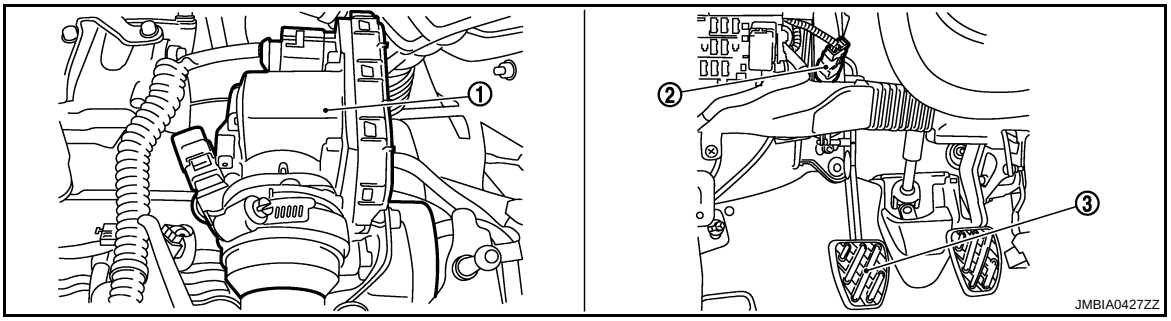


1. Accelerator pedal position sensor
2. Stop lamp switch
3. Brake pedal

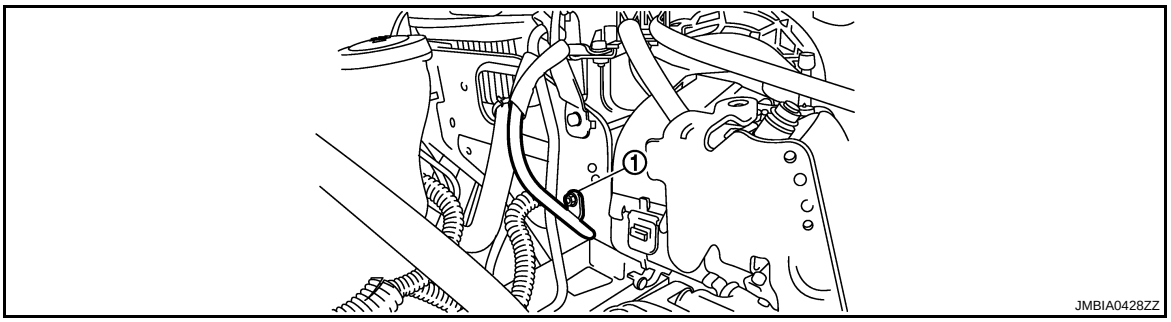


1. Fuel rail pressure sensor
2. Glow relay
3. ECM

A. View with battery removed



1. Electric throttle control actuator 2. Clutch switch 3. Clutch pedal



1. Body ground E17

EGR SYSTEM

System Description

INFOID:0000000001180536

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.

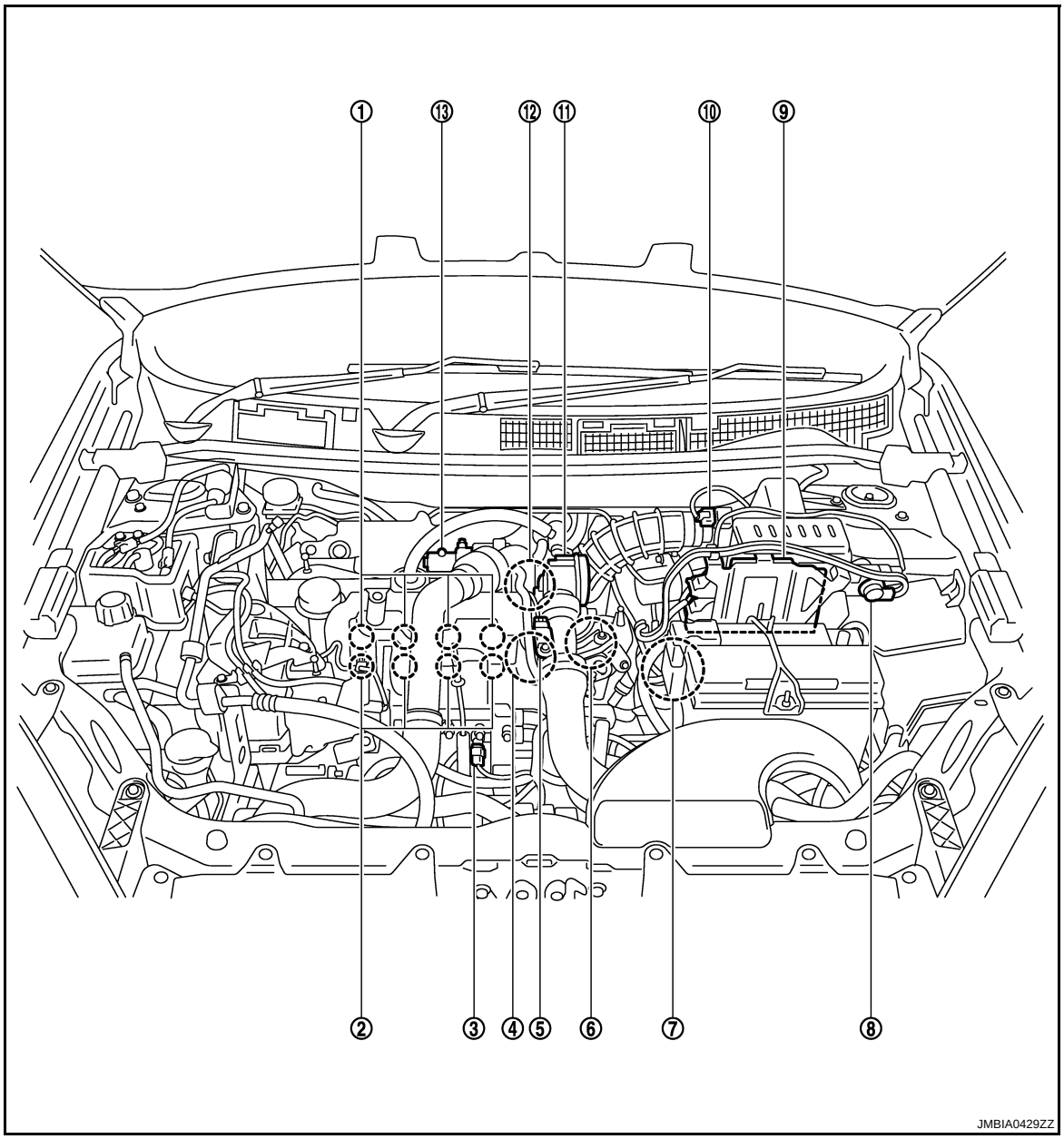
Measurement of the Fresh Air Flow

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.

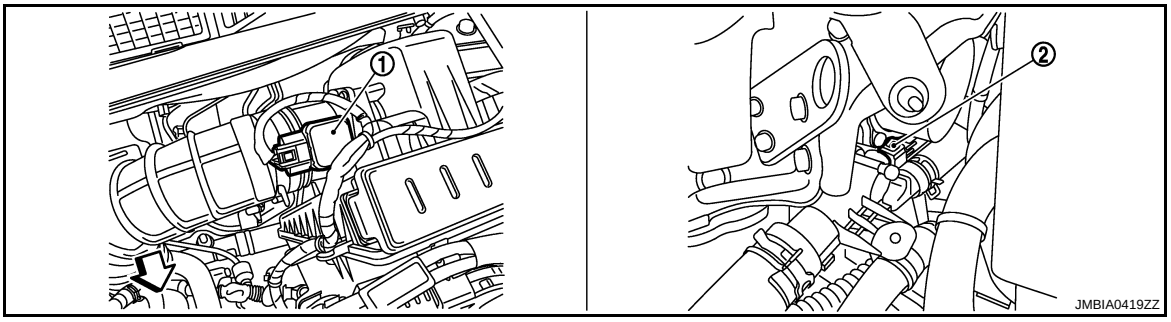
The mass air flow sensor facilitates control of the quantity of exhaust gas sent for recirculation, thus ensuring the best possible recirculation rates. Air flow measurement allows closed-loop control via the EGR valve.

Component Parts Location

INFOID:0000000001180537

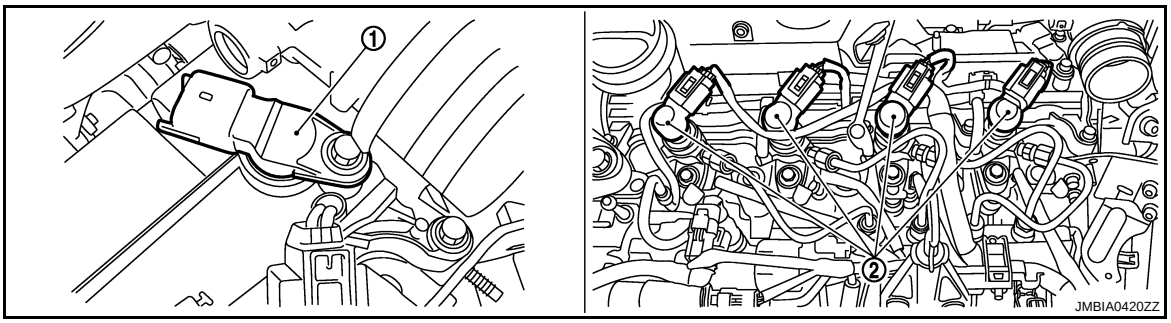


1. Fuel injector
2. Glow plug
3. Fuel rail pressure sensor
4. Crankshaft position sensor
5. Turbocharger boost sensor
6. Engine coolant temperature sensor
7. Glow relay
8. Turbocharger boost control solenoid valve
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)
11. Electric throttle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

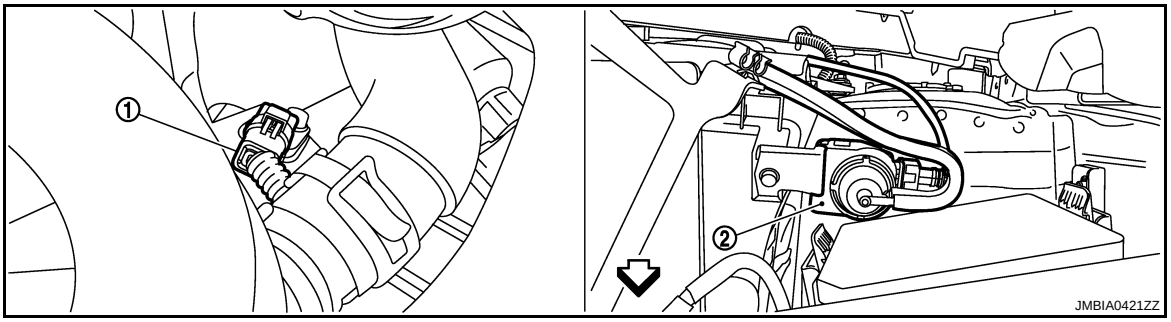


⇦ : Vehicle front

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

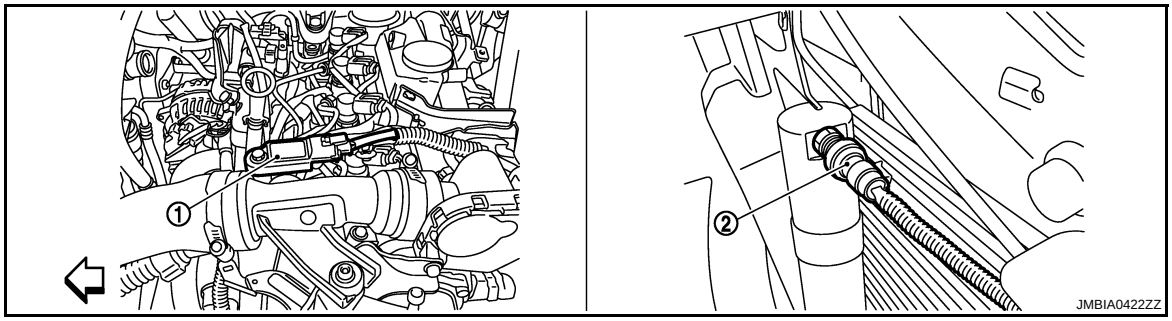


1. Camshaft Position Sensor
2. Fuel injector



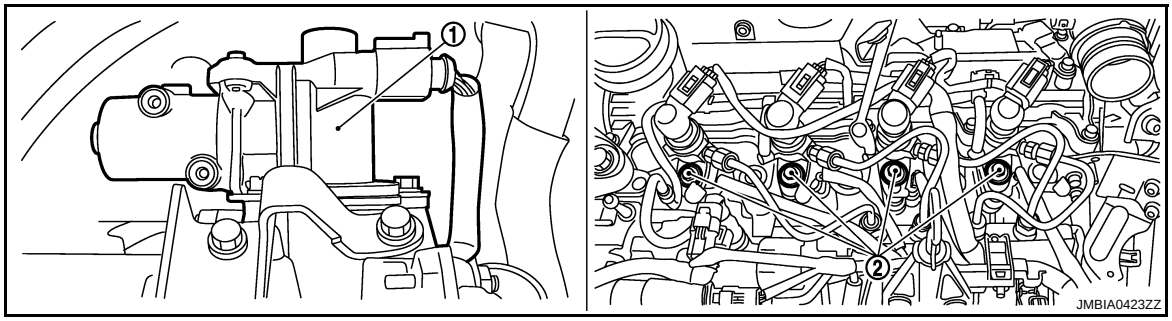
⇦ : Vehicle front

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

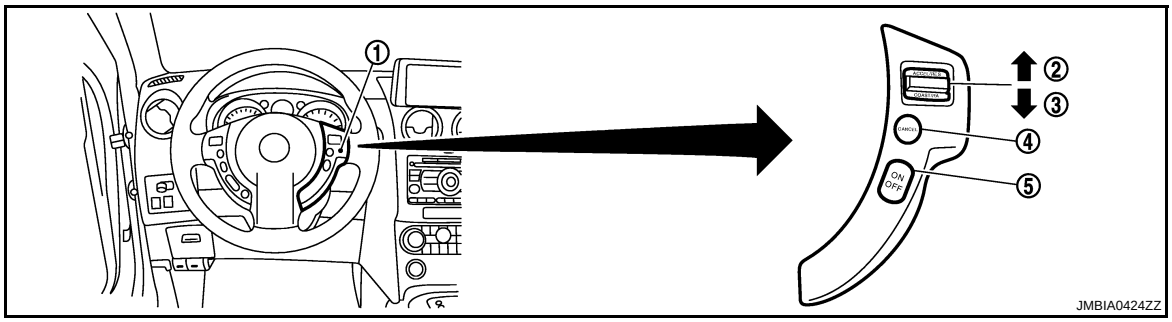


⇦ : Vehicle front

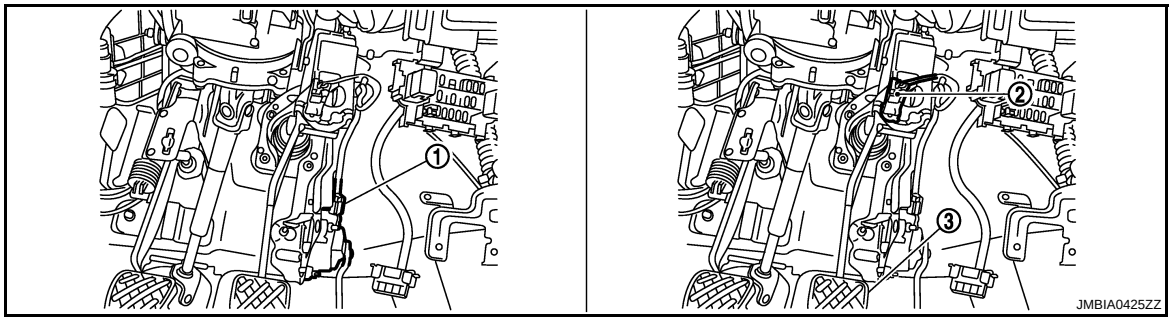
1. Turbocharger boost sensor 2. Refrigerant pressure sensor



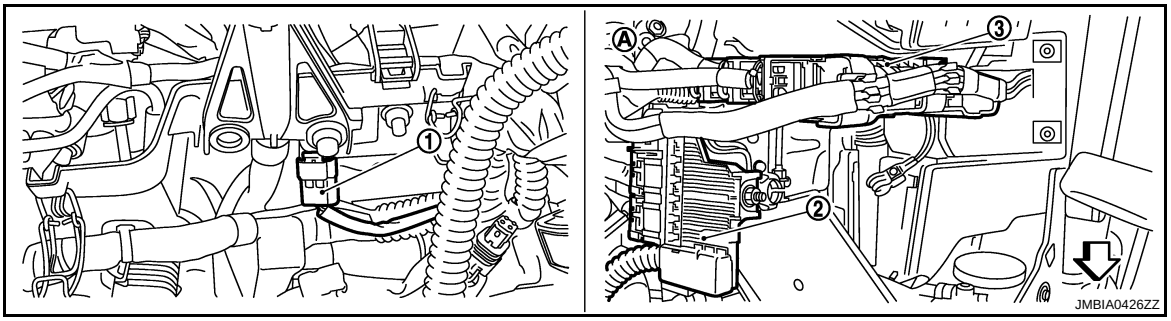
1. EGR volume control valve 2. Glow plug



1. ASCD steering switch 2. RESUME/ACCELERATE switch 3. SET/COAST switch
4. CANCEL switch 5. MAIN switch

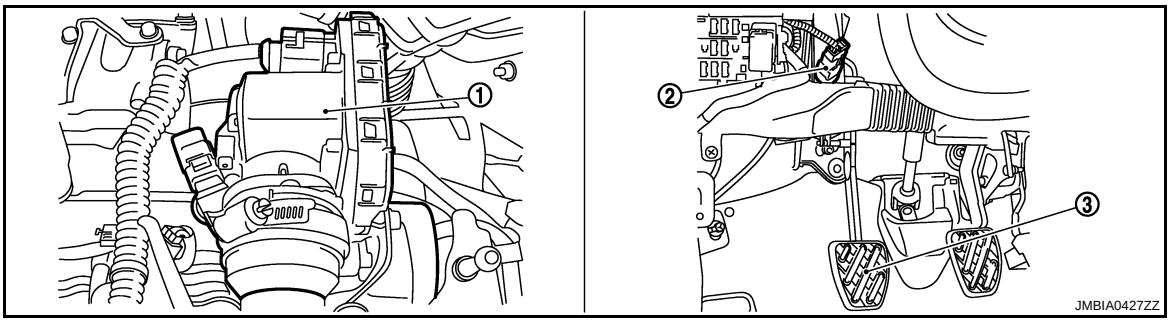


1. Accelerator pedal position sensor 2. Stop lamp switch 3. Brake pedal

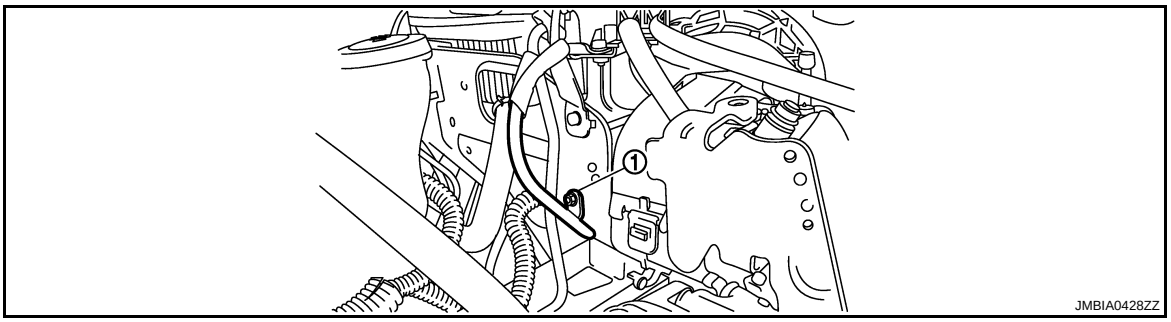


1. Fuel rail pressure sensor 2. Glow relay 3. ECM

A. View with battery removed



1. Electric throttle control actuator 2. Clutch switch 3. Clutch pedal

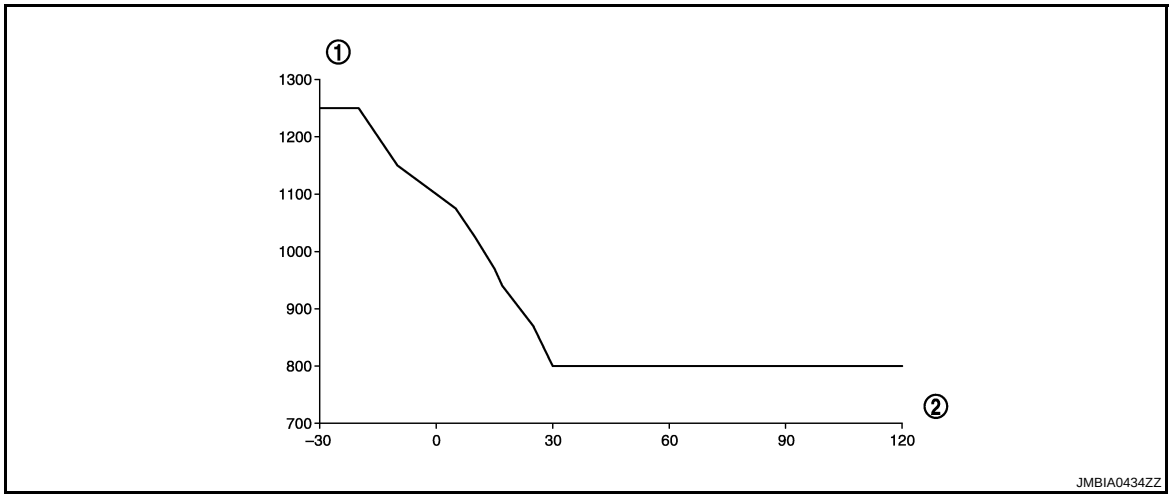


1. Body ground E17

IDLE SPEED CONTROL

System Diagram

INFOID:0000000001180538



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

System Description

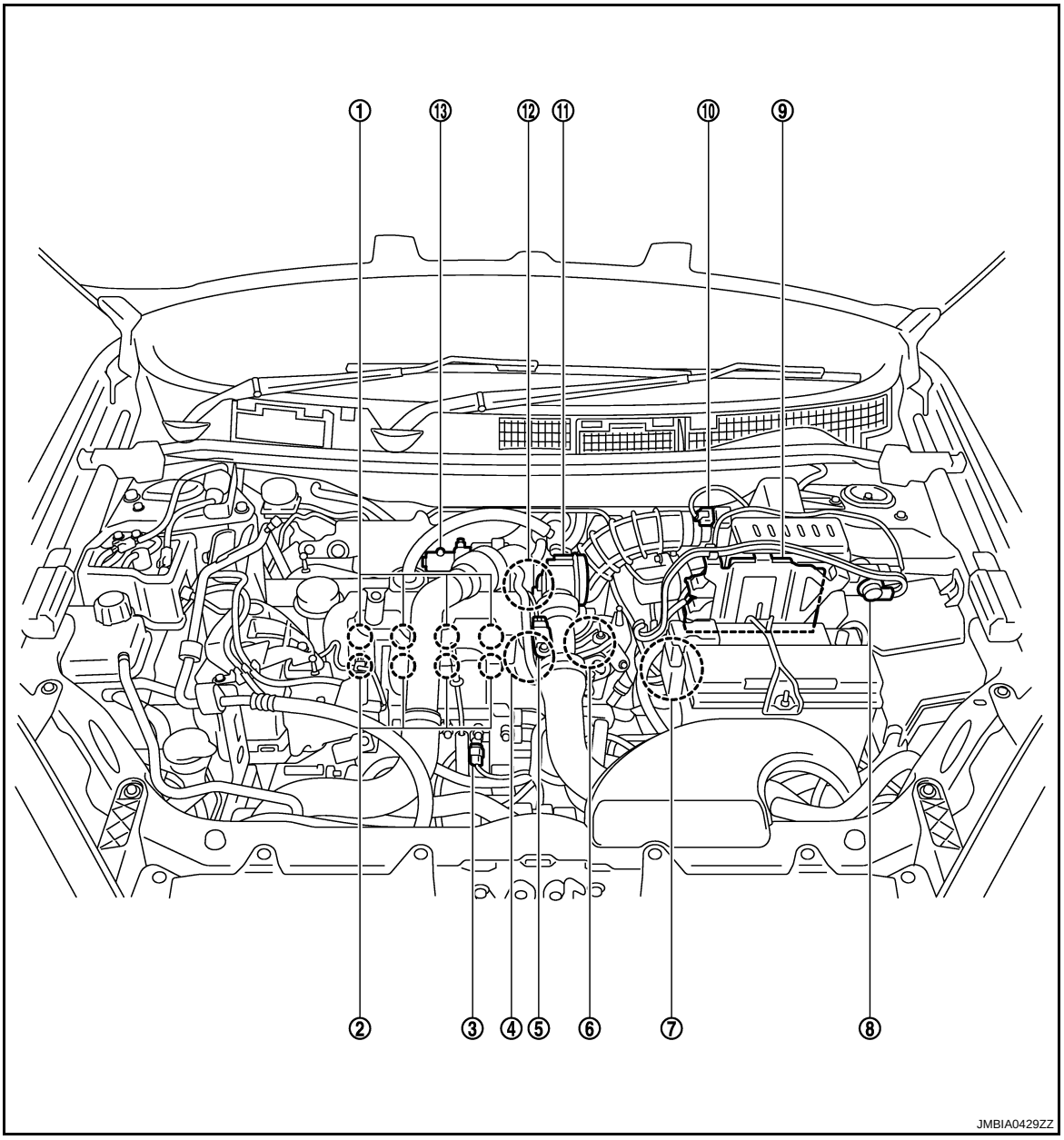
INFOID:0000000001180539

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

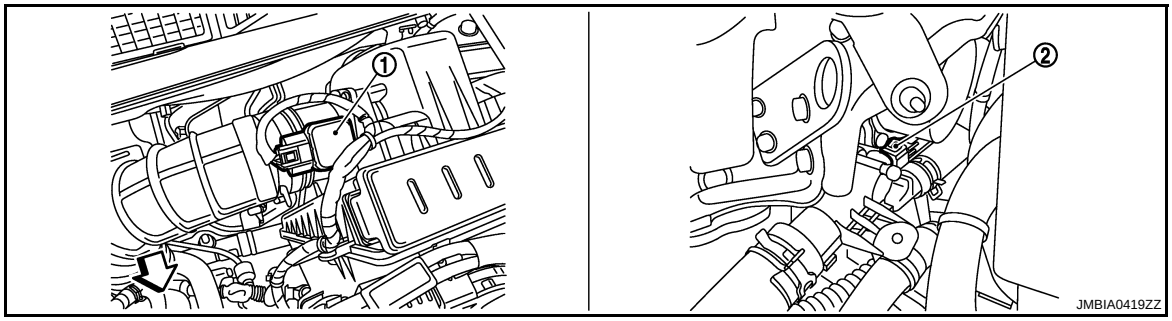
- The idle speed setpoint is dependent on:
- Engine coolant temperature
- Emission control program
- Air conditioning requirement
- Gear engaged
- Electrical load
- Battery voltage

Component Parts Location

INFOID:0000000001180540

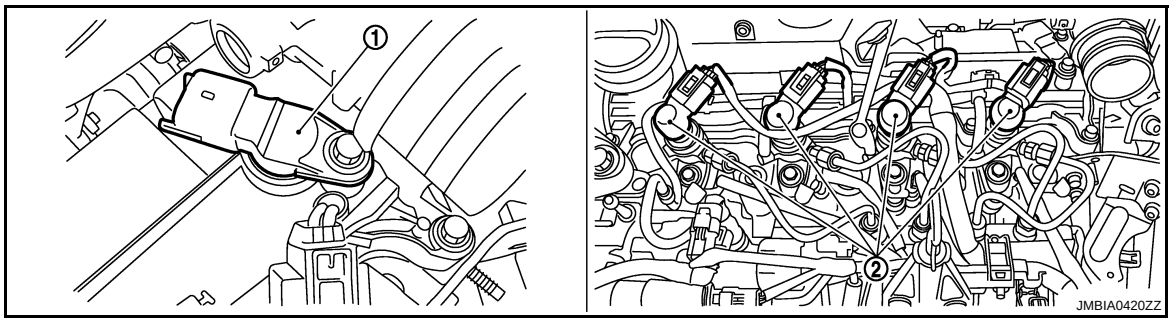


1. Fuel injector
2. Glow plug
3. Fuel rail pressure sensor
4. Crankshaft position sensor
5. Turbocharger boost sensor
6. Engine coolant temperature sensor
7. Glow relay
8. Turbocharger boost control solenoid valve
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)
11. Electric throttle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

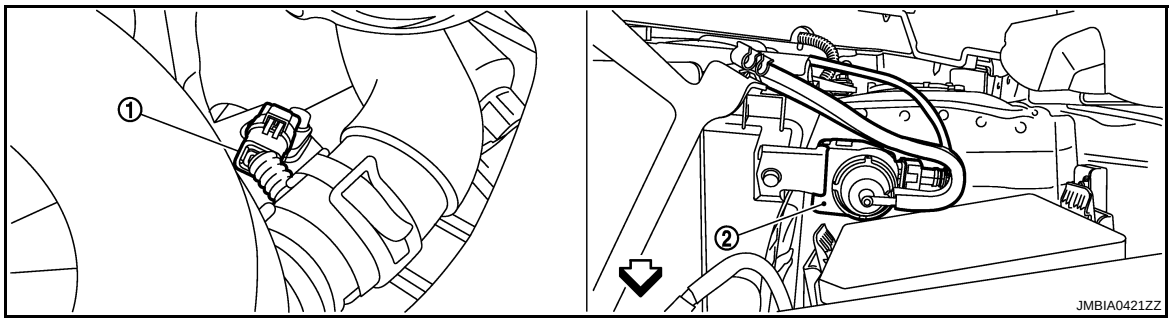


⇦ : Vehicle front

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

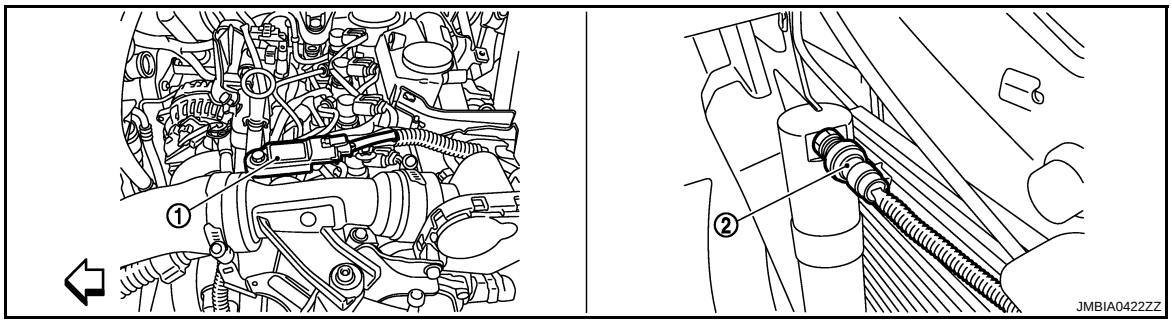


1. Camshaft Position Sensor
2. Fuel injector



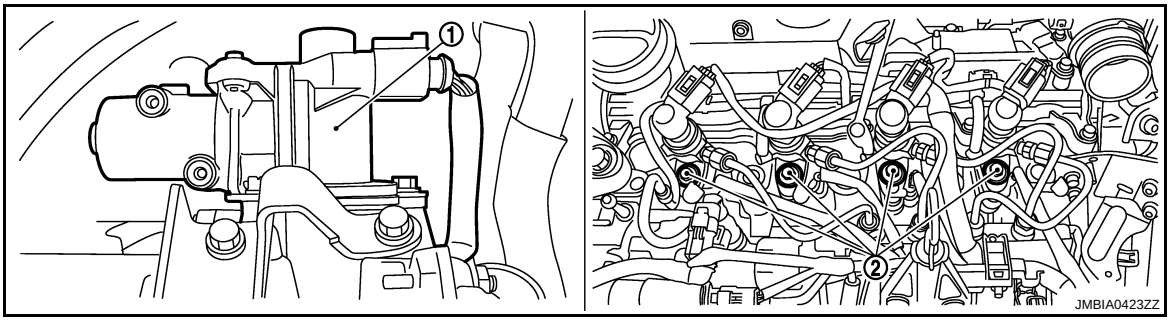
⇦ : Vehicle front

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

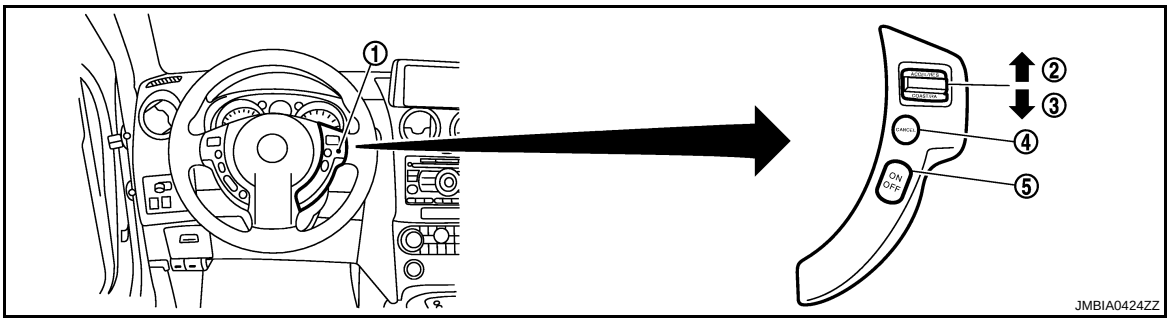


⇦ : Vehicle front

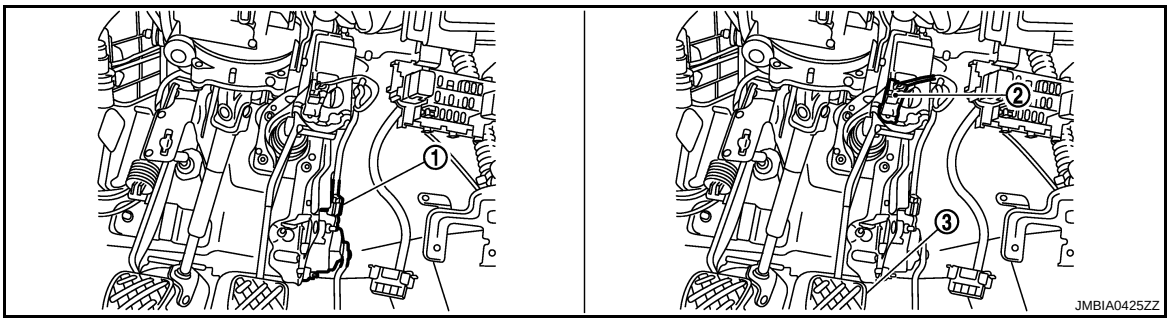
1. Turbocharger boost sensor
2. Refrigerant pressure sensor



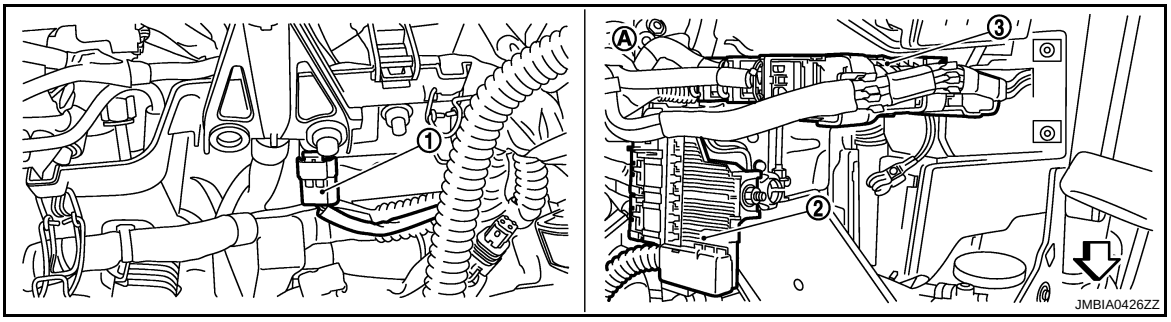
1. EGR volume control valve 2. Glow plug



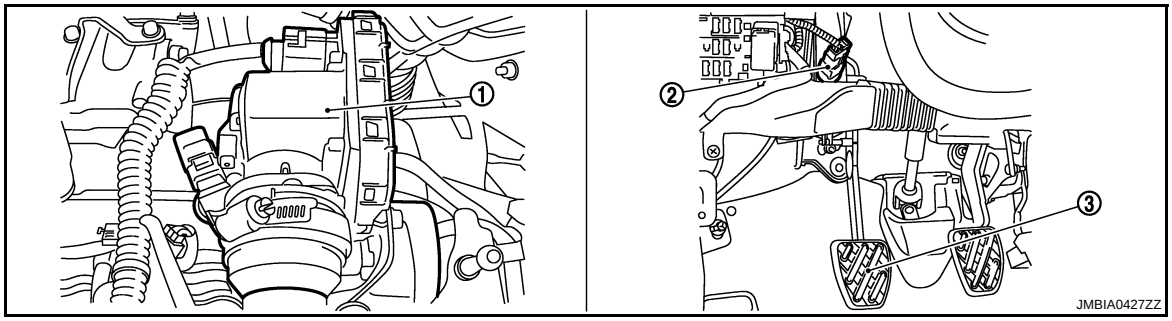
1. ASCD steering switch 2. RESUME/ACCELERATE switch 3. SET/COAST switch
4. CANCEL switch 5. MAIN switch



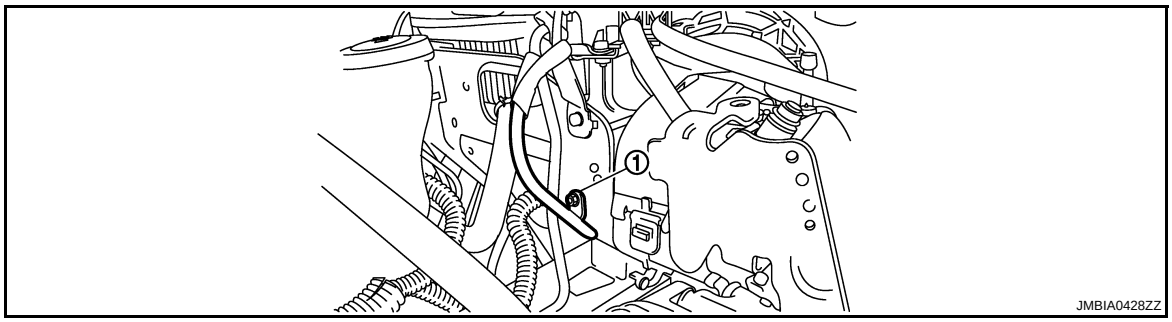
1. Accelerator pedal position sensor 2. Stop lamp switch 3. Brake pedal



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

ENGINE TORQUE CONTROL

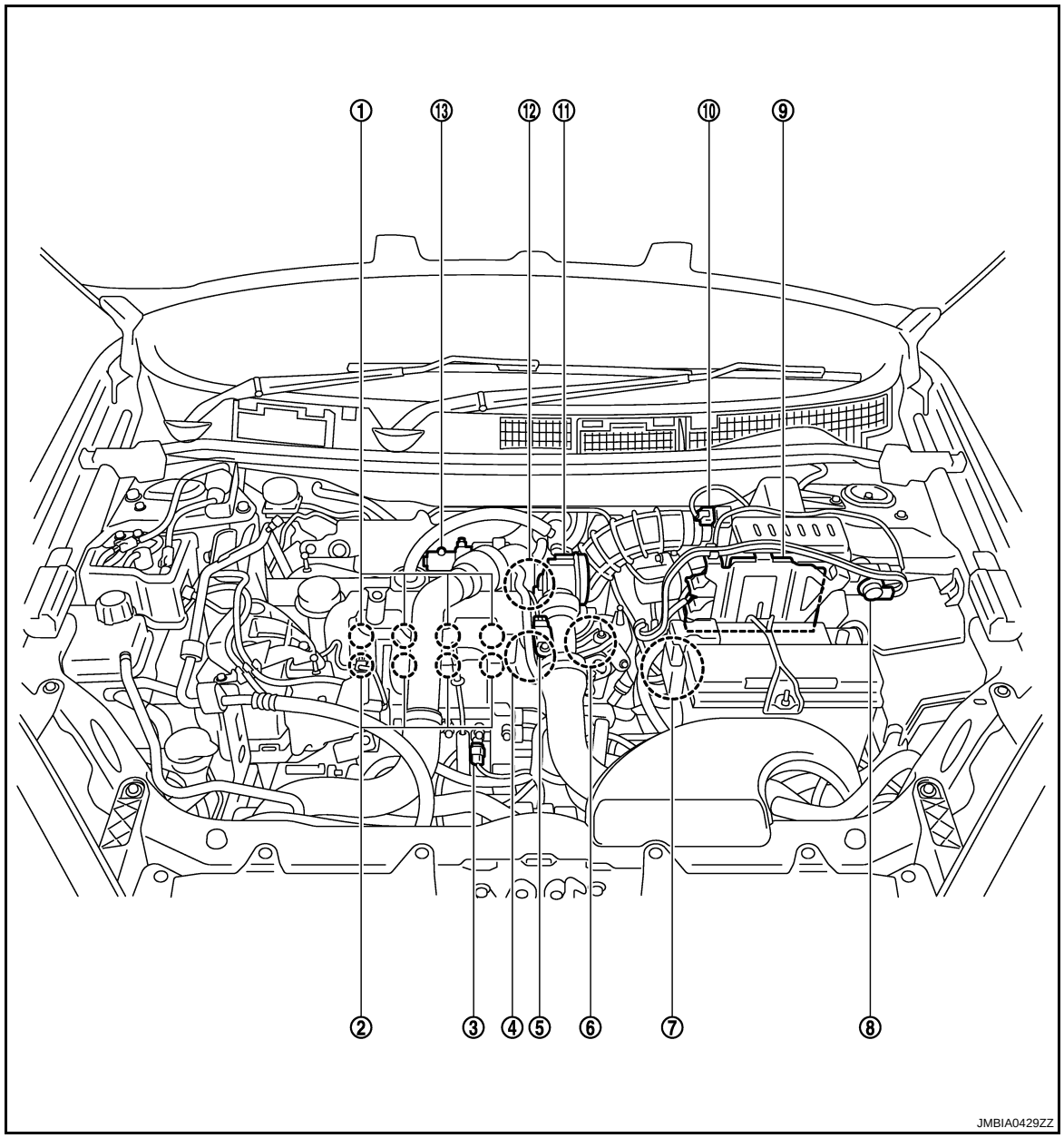
System Description

INFOID:0000000001180541

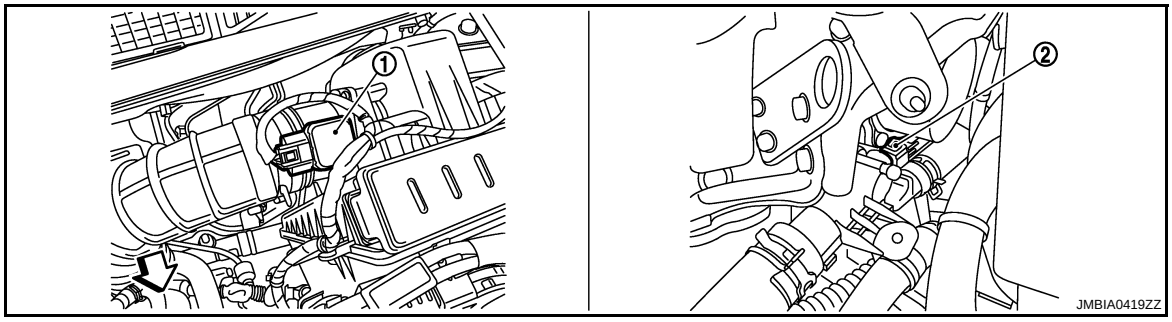
The torque structure is the system which translates the driver's request into a torque supplied by the engine. It is required for certain functions such as the electronic stability program (ESP), the automatic gearbox or the sequentialgearbox if fitted).
Each inter-system (ESP, automatic gearbox, sequential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

INFOID:0000000001180542

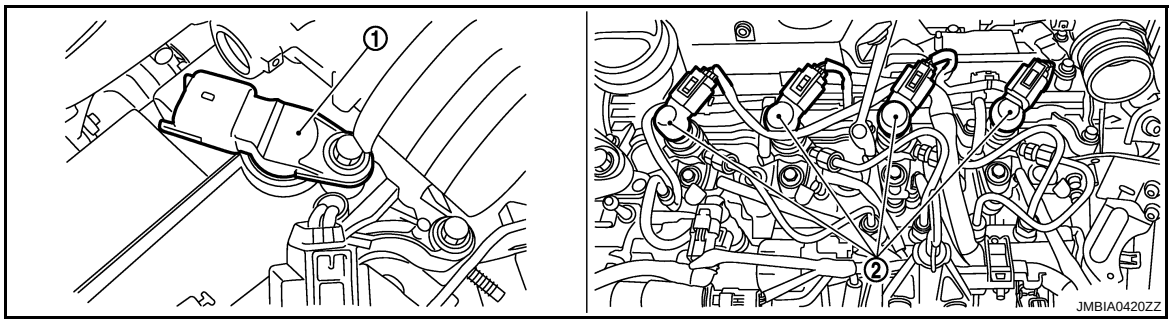


1. Fuel injector
2. Glow plug
3. Fuel rail pressure sensor
4. Crankshaft position sensor
5. Turbocharger boost sensor
6. Engine coolant temperature sensor
7. Glow relay
8. Turbocharger boost control solenoid valve
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)
11. Electric throttle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

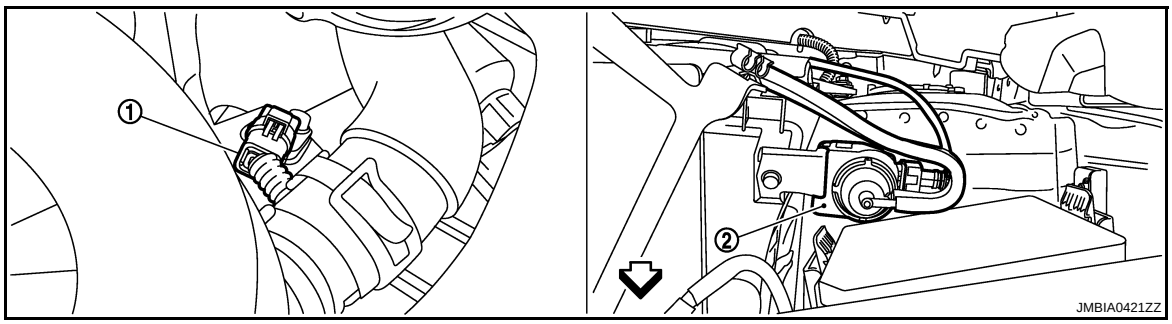


⇦ : Vehicle front

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

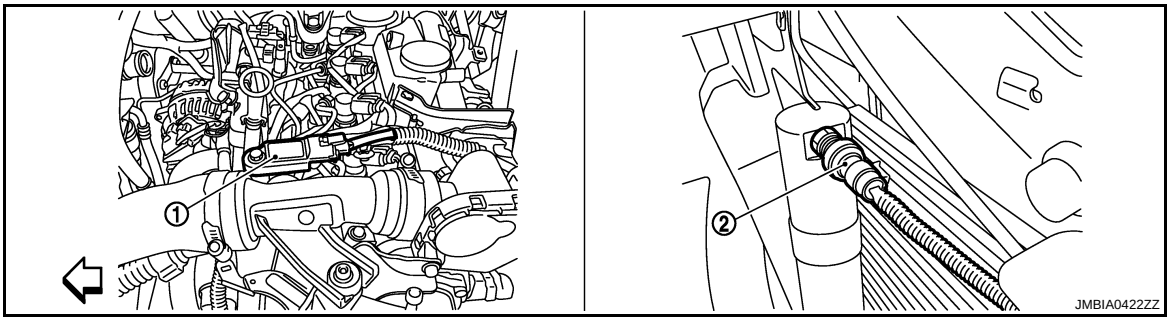


1. Camshaft Position Sensor
2. Fuel injector



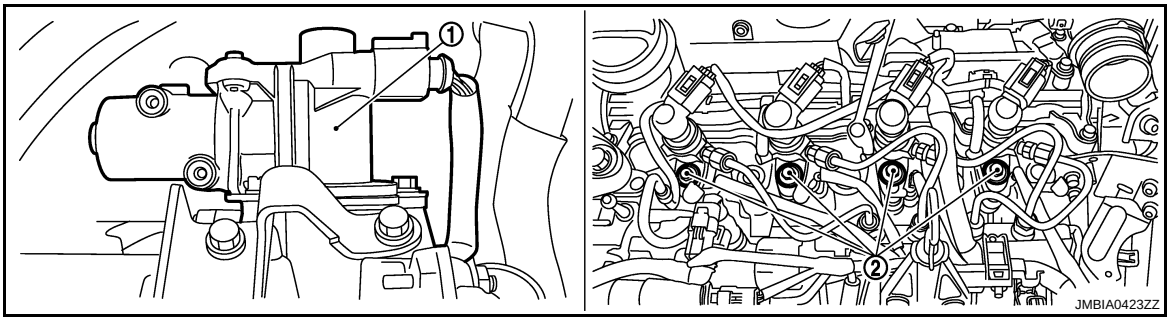
⇦ : Vehicle front

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

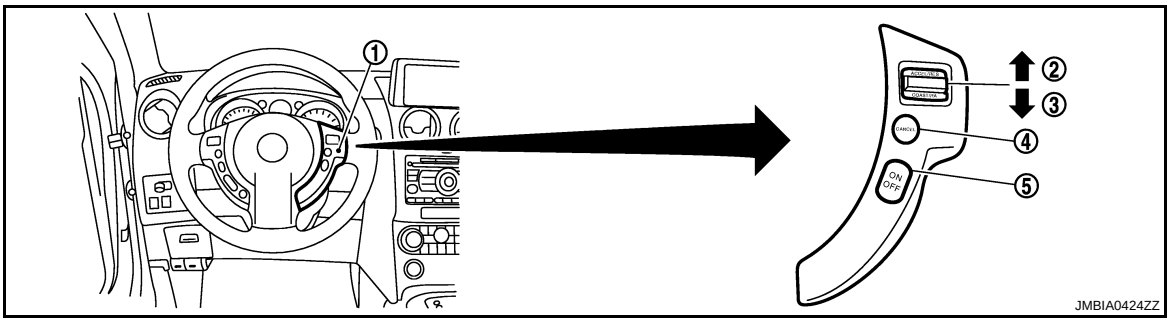


⇦ : Vehicle front

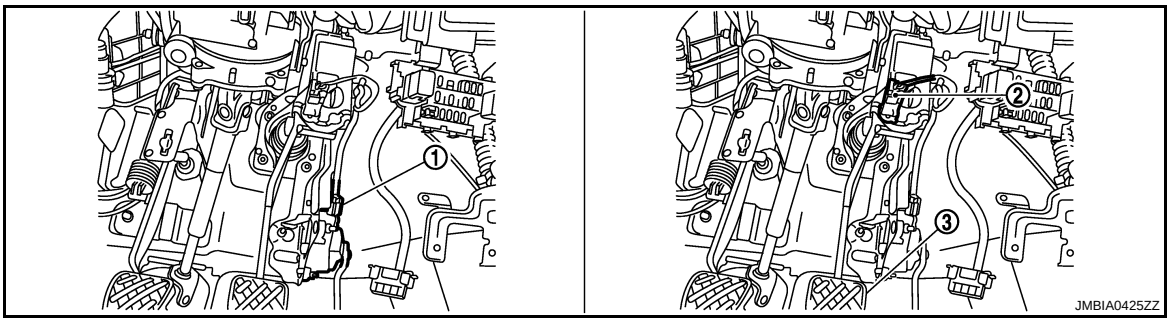
1. Turbocharger boost sensor
2. Refrigerant pressure sensor



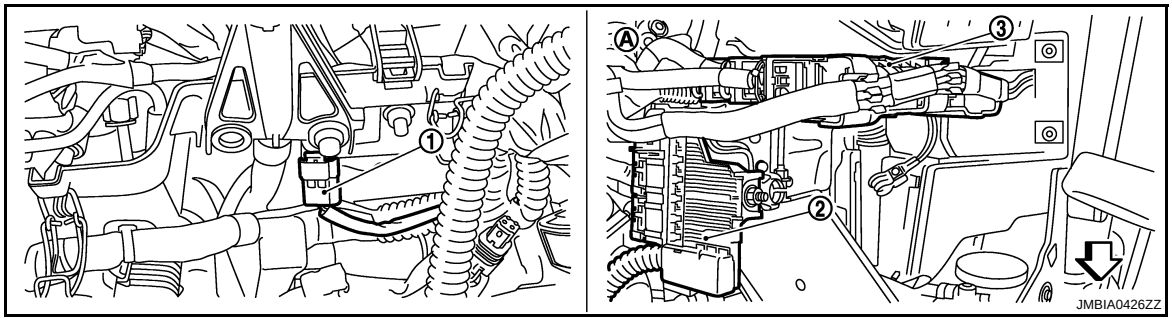
1. EGR volume control valve
2. Glow plug



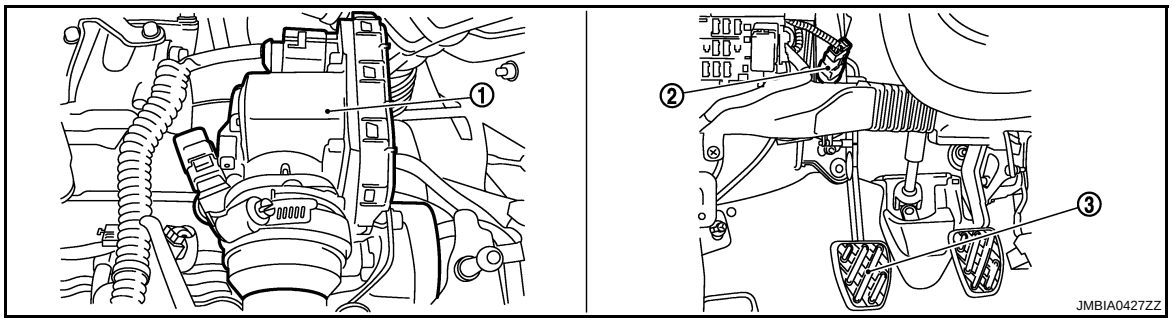
1. ASCD steering switch
2. RESUME/ACCELERATE switch
3. SET/COAST switch
4. CANCEL switch
5. MAIN switch



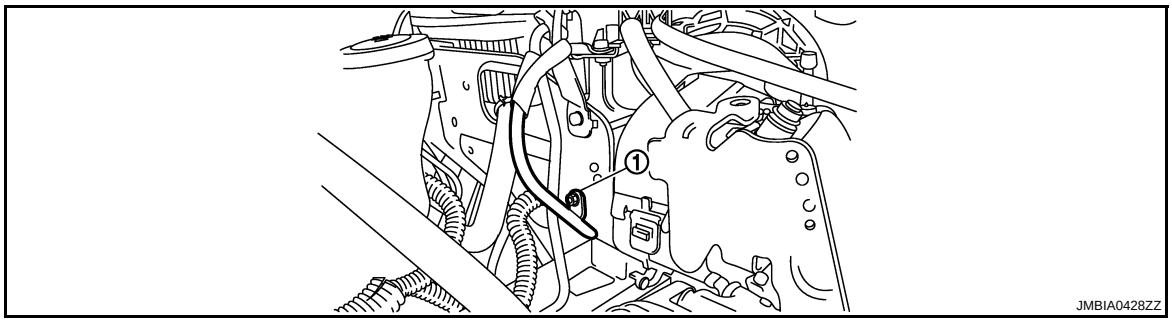
1. Accelerator pedal position sensor
2. Stop lamp switch
3. Brake pedal



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

GLOW CONTROL

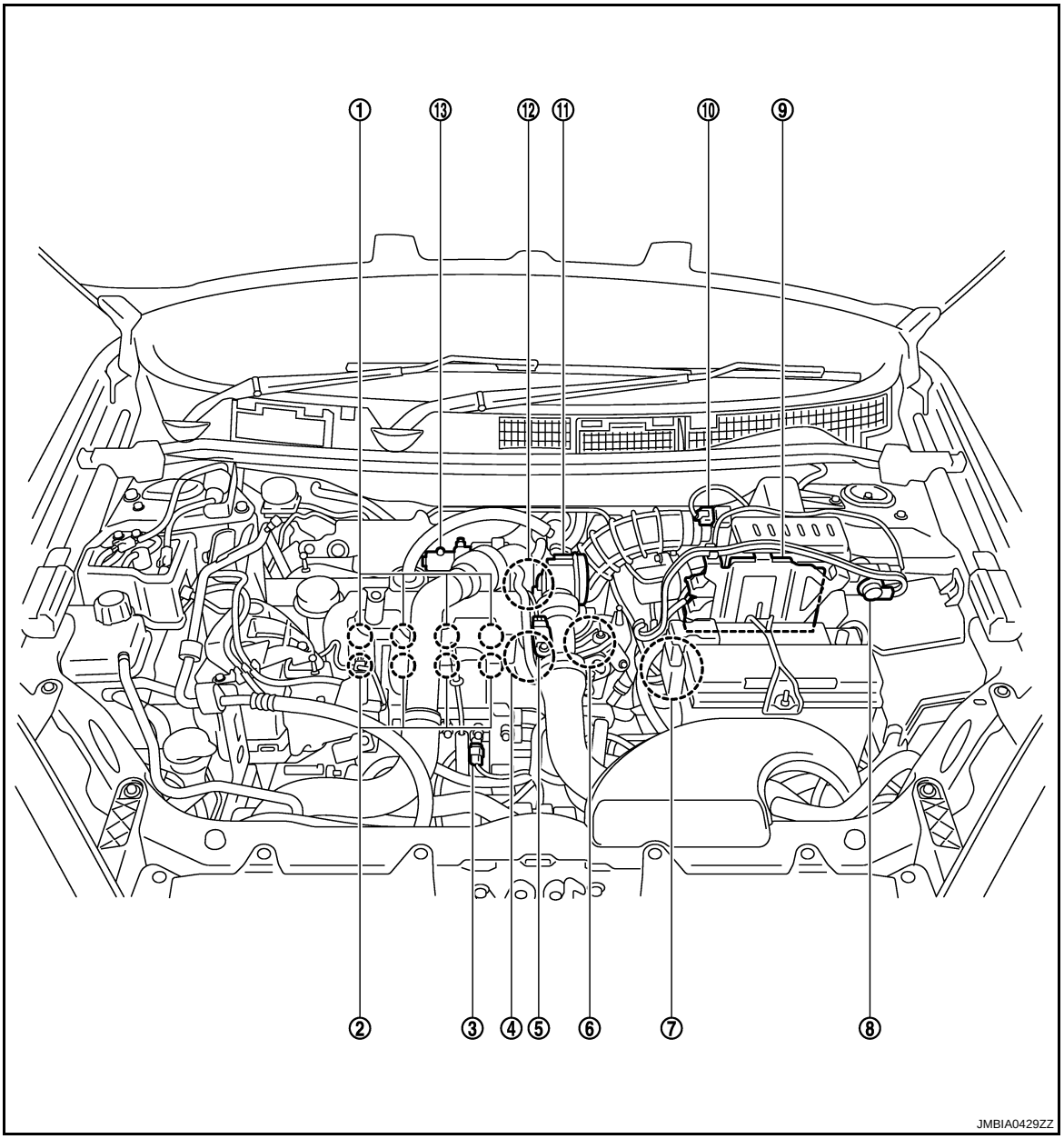
System Description

INFOID:0000000001180543

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).

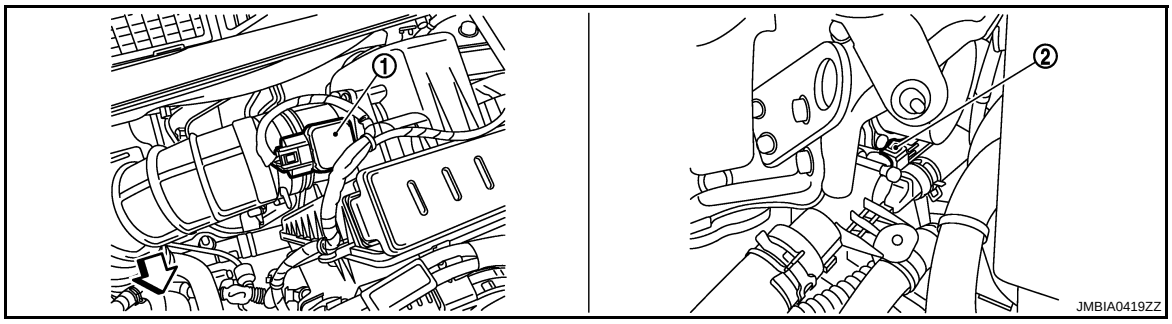
Component Parts Location

INFOID:0000000001180544



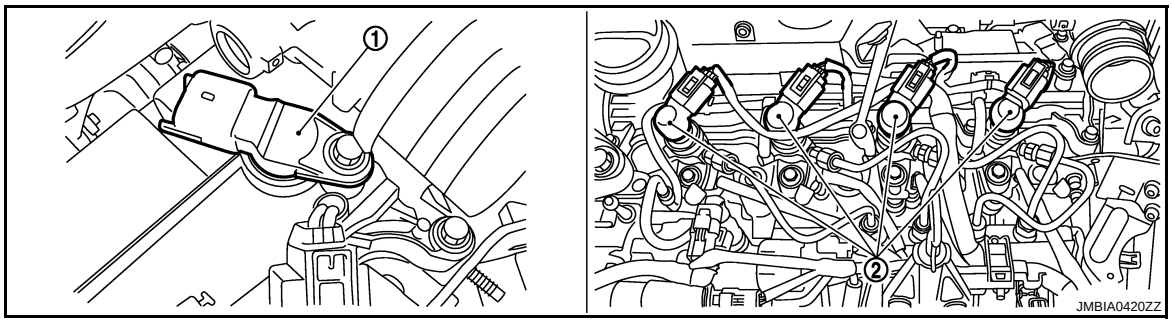
1. Fuel injector
2. Glow plug
3. Fuel rail pressure sensor
4. Crankshaft position sensor
5. Turbocharger boost sensor
6. Engine coolant temperature sensor

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

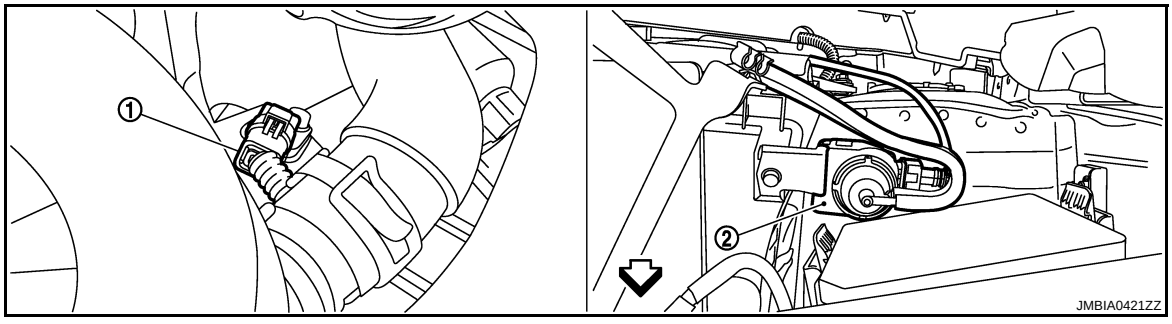


⇦ : Vehicle front

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

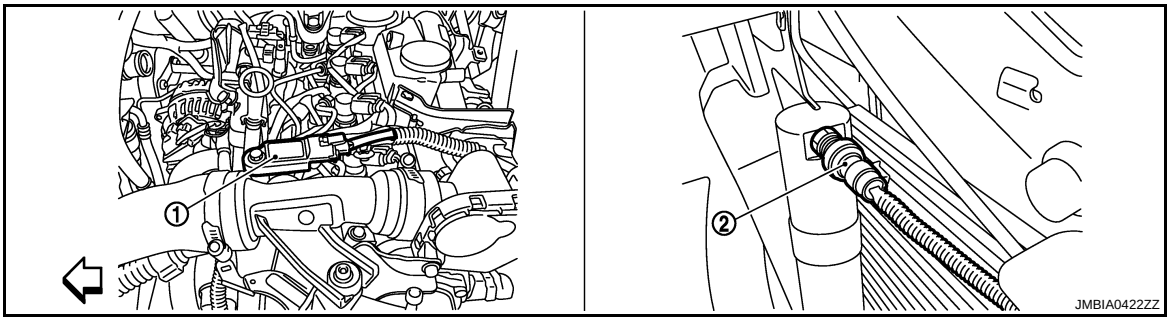


1. Camshaft Position Sensor
2. Fuel injector



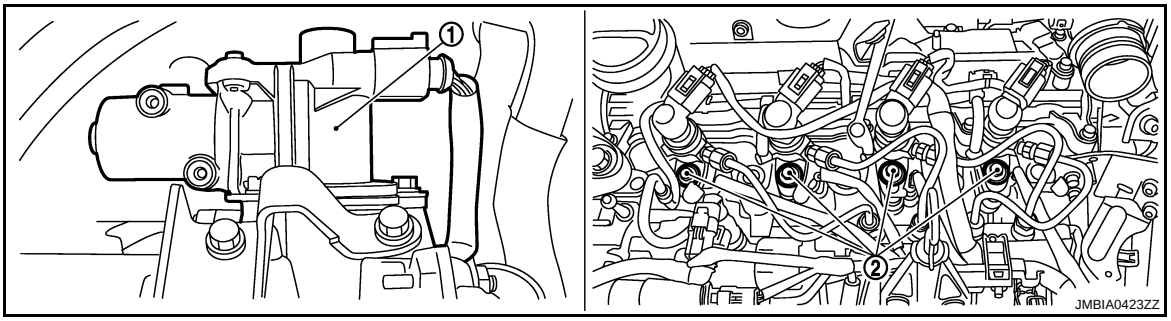
⇦ : Vehicle front

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

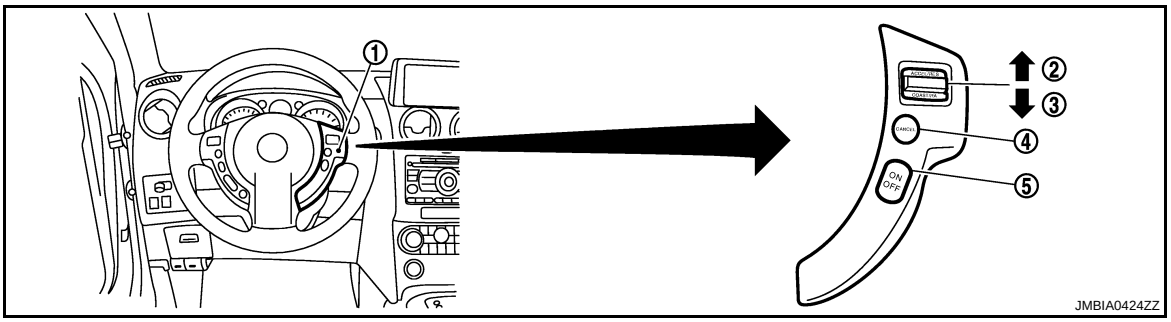


⇦ : Vehicle front

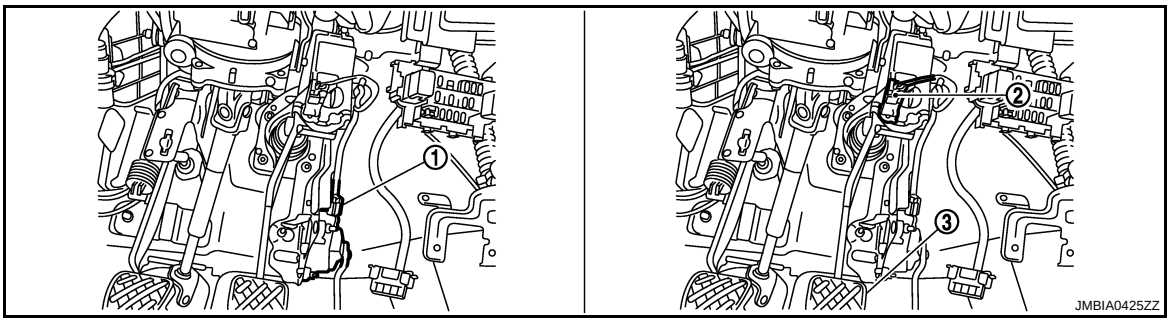
1. Turbocharger boost sensor
2. Refrigerant pressure sensor



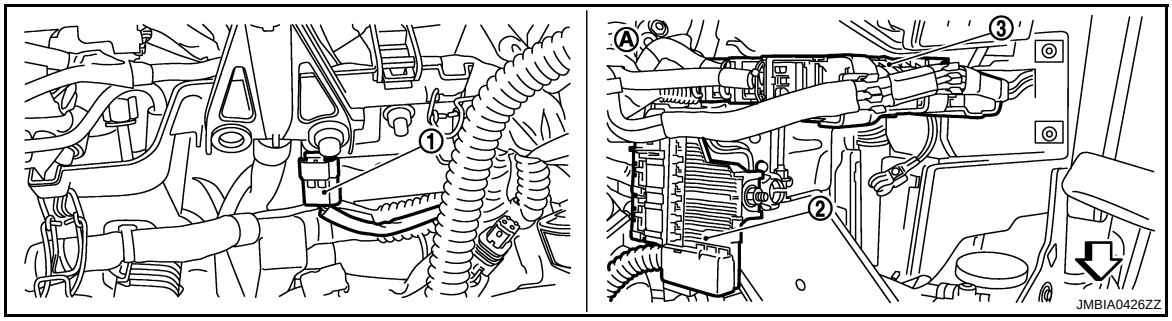
1. EGR volume control valve
2. Glow plug



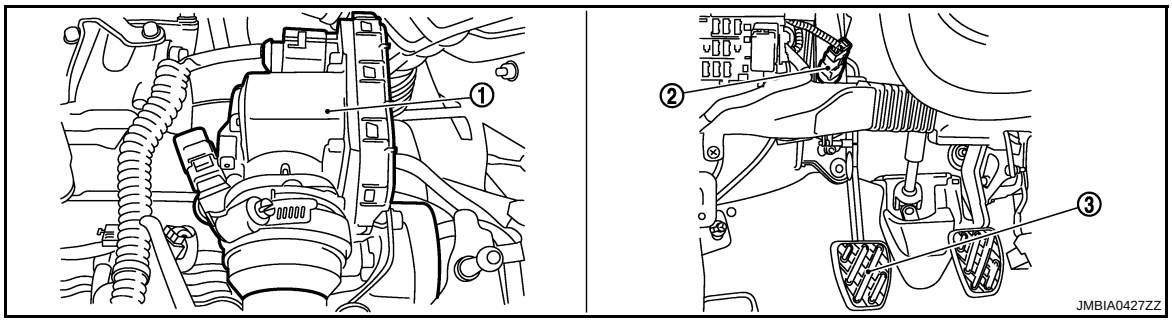
1. ASCD steering switch
2. RESUME/ACCELERATE switch
3. SET/COAST switch
4. CANCEL switch
5. MAIN switch



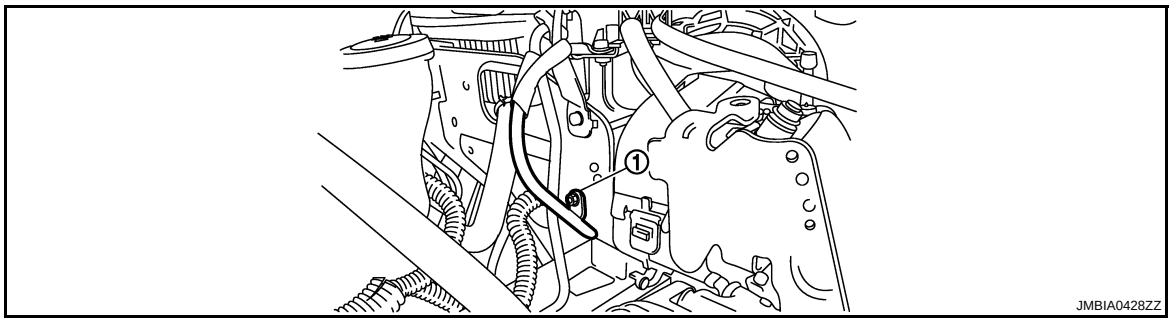
1. Accelerator pedal position sensor
2. Stop lamp switch
3. Brake pedal



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

COOLING FAN CONTROL

System Description

INFOID:0000000001180545

The cooling fan motor is controlled by the ECM.

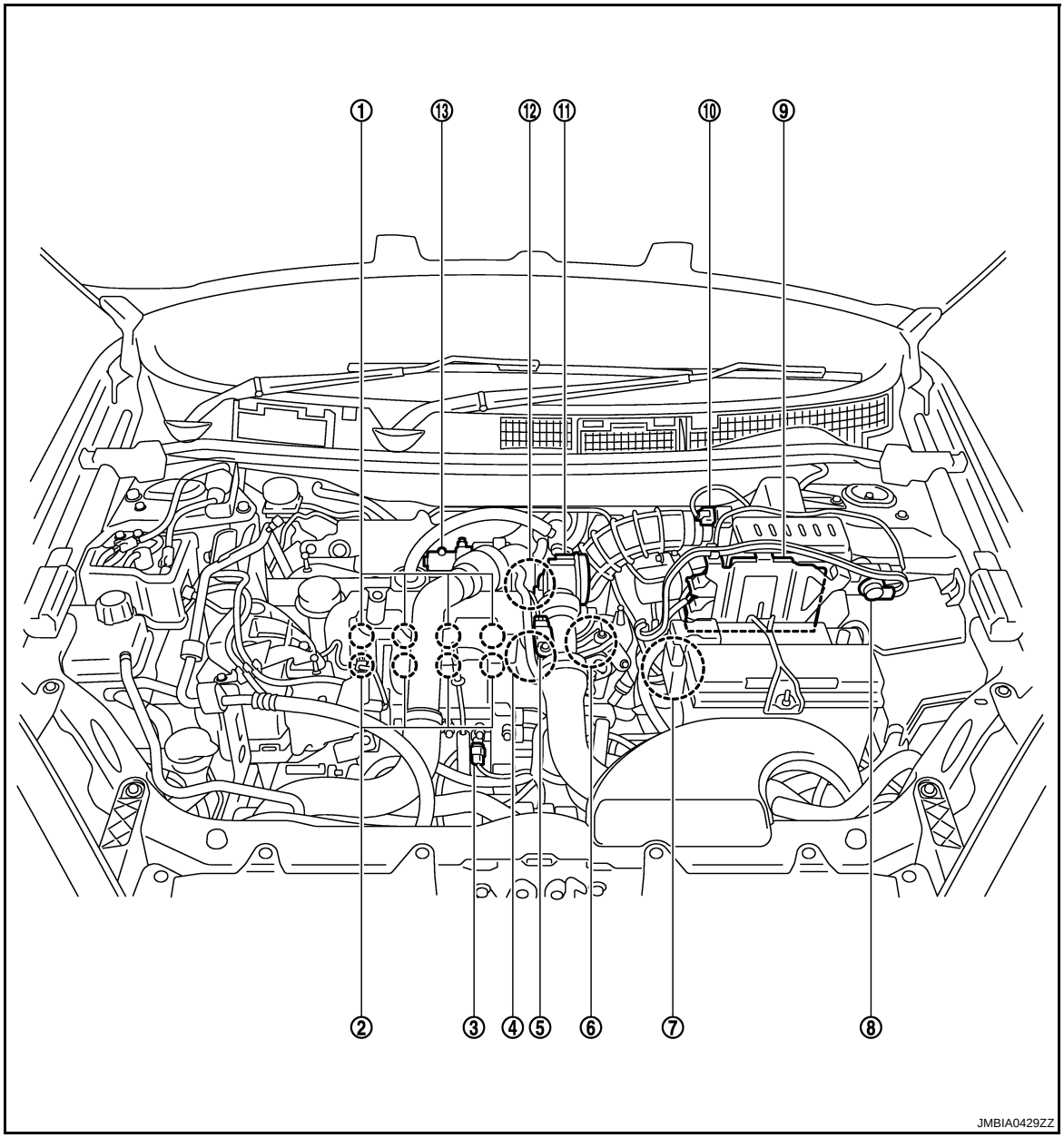
COOLING FAN OPERATION WITH THE ENGINE RUNNING

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:

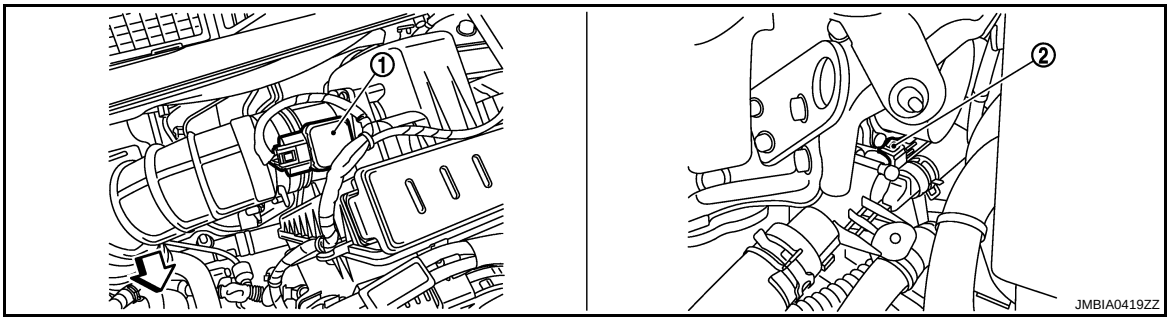
- Engine running
  - LOW speed is actuated when the engine coolant temperature exceeds 96 °C (205°F) and is deactivated when it drops below 94 °C (201°F).
  - HIGH speed is actuated when the engine coolant temperature exceeds 104 °C (219°F) and is deactivated when it drops below 102 °C (216°F).
- If 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 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).

Component Parts Location

INFOID:0000000001180546

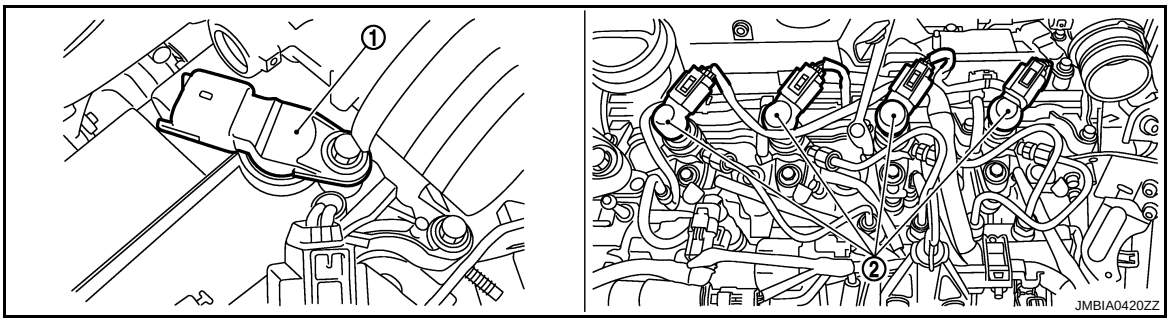


1. Fuel injector
2. Glow plug
3. Fuel rail pressure sensor
4. Crankshaft position sensor
5. Turbocharger boost sensor
6. Engine coolant temperature sensor
7. Glow relay
8. Turbocharger boost control solenoid valve
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)
11. Electric throttle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

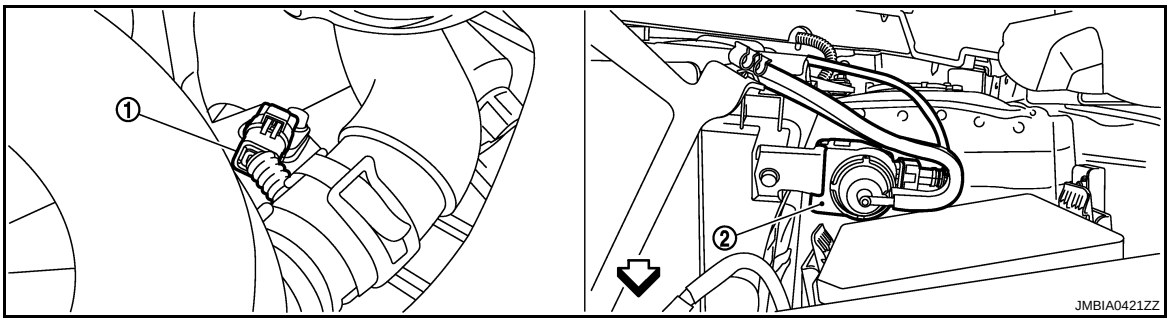


⇦ : Vehicle front

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

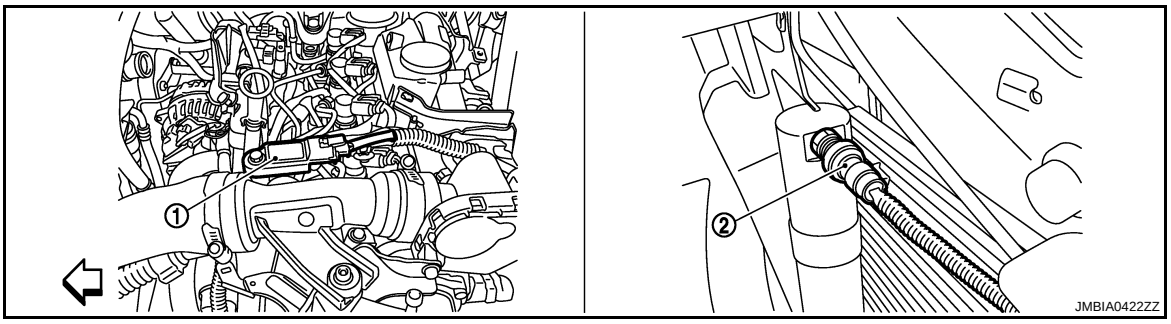


1. Camshaft Position Sensor
2. Fuel injector



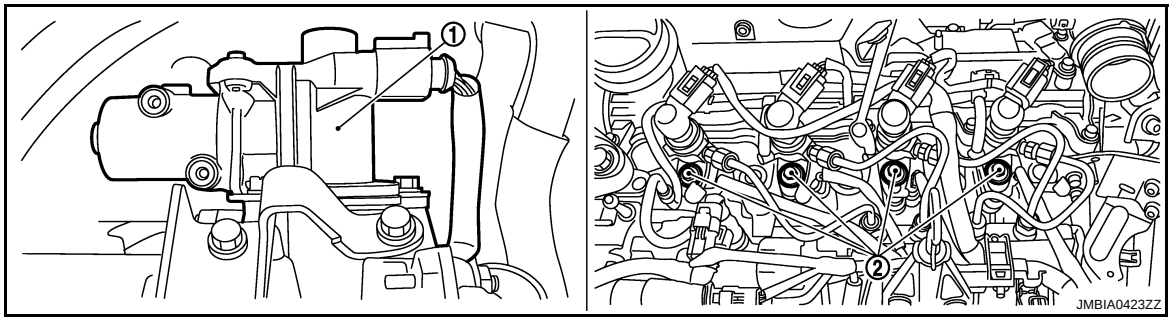
⇦ : Vehicle front

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

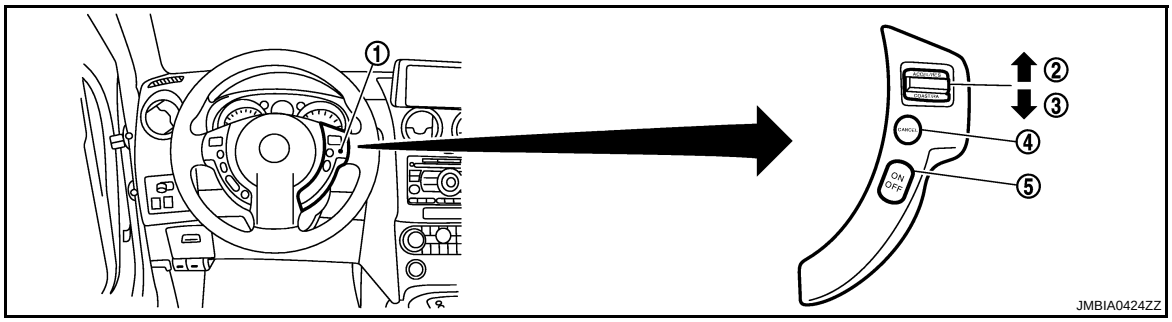


⇦ : Vehicle front

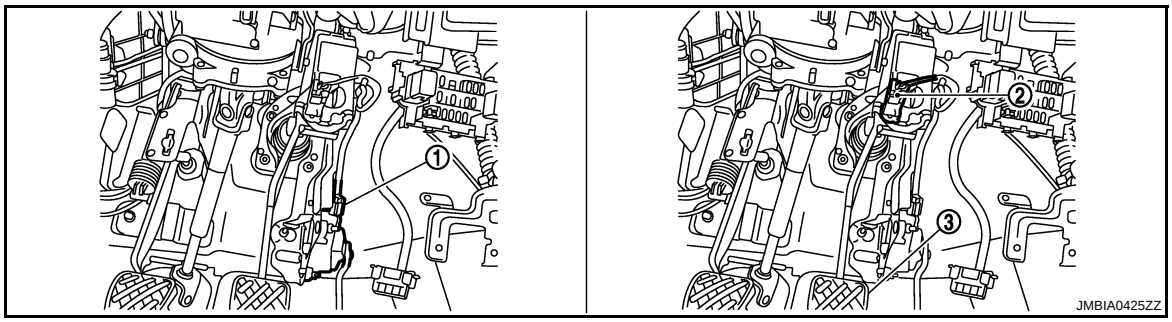
1. Turbocharger boost sensor
2. Refrigerant pressure sensor



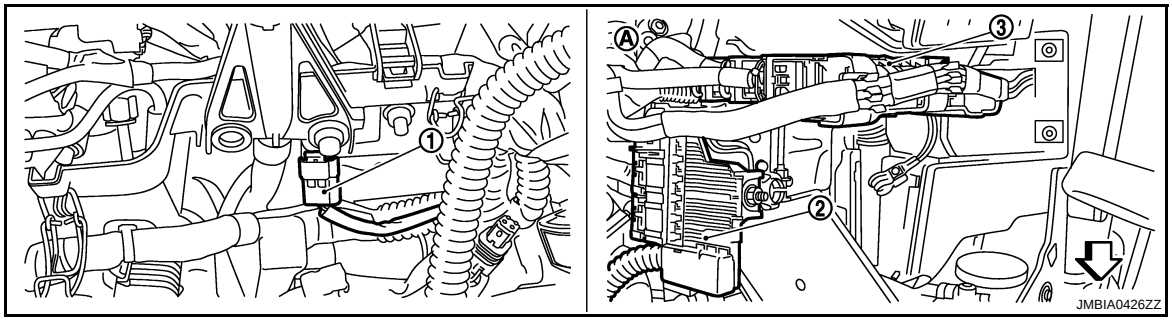
1. EGR volume control valve
2. Glow plug



1. ASCD steering switch
2. RESUME/ACCELERATE switch
3. SET/COAST switch
4. CANCEL switch
5. MAIN switch

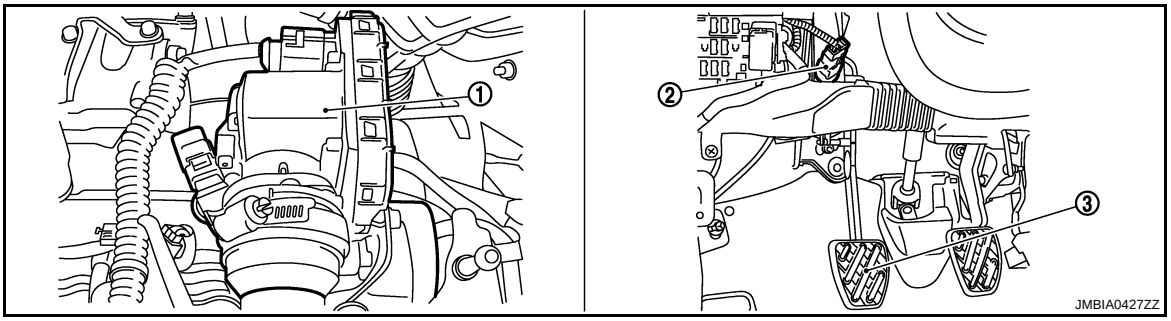


1. Accelerator pedal position sensor
2. Stop lamp switch
3. Brake pedal

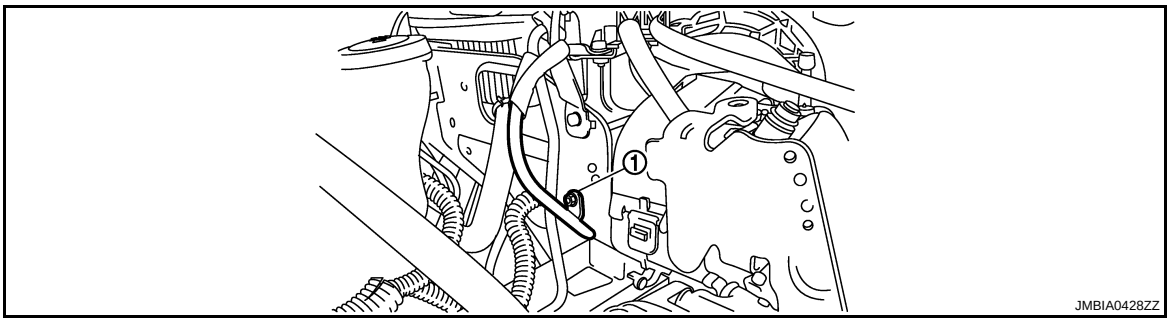


1. Fuel rail pressure sensor
2. Glow relay
3. ECM

A. View with battery removed



1. Electric throttle control actuator 2. Clutch switch 3. Clutch pedal



1. Body ground E17

CAN COMMUNICATION

System Description

INFOID:0000000001180547

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.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000001180548

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.

DTCs Causing MI to Light

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
P0204	Cylinder 4 fuel injector control circuit	ECK-101
P0409	EGR Volume control valve control position sensor circuit	ECK-120
P0606	ECM	ECK-139
P2413	EGR volume control valve	ECK-163

ENGINE WARNING LIGHT

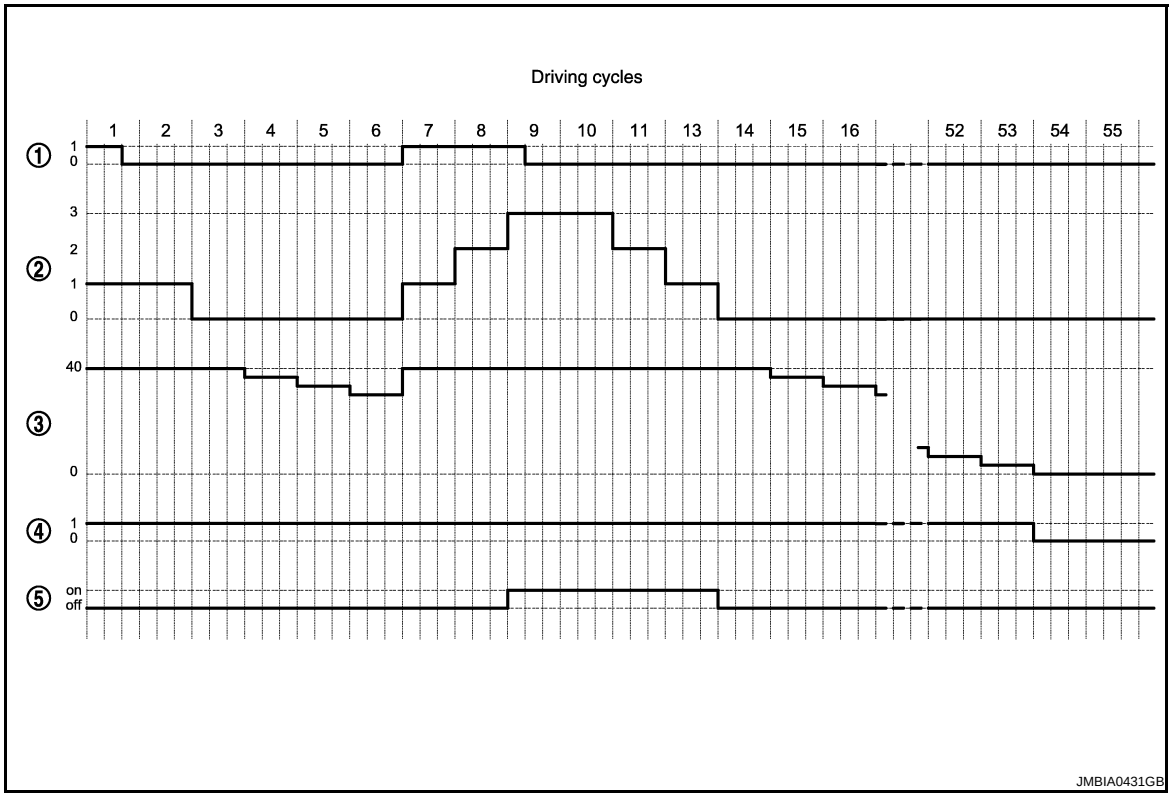
In the event of an engine malfunction, the ECM may request the display of an engine warning light [MI (Red)].

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

With CONSULT-II
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 → 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.



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.

COMPONENT DIAGNOSIS

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000001180549

1.INSPECTION START

Start engine.

Is engine running?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK ECM POWER SUPPLY CIRCUIT-I

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

ECM		Ground	Voltage
Connector	Terminal		
F68	69	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse (No. 5)
- Harness for open or short between ECM and fuse

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

4.CHECK GROUND CONNECTION-I

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 5.
NO >> Repair or replace ground connection.

5.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Disconnect ECM harness connectors.
2. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
E60	123	Ground	Existed
	124		
	125		
	128		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to power in harness or connectors.

6.CHECK ECM POWER SUPPLY CIRCUIT-III

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

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

ECM		Ground	Voltage
Connector	Terminal		
F68	53	Ground	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.
	54		

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.

ECM		Ground	Voltage
Connector	Terminal		
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		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E68	53	E11	9	Existed
	54			

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.

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.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
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 11.
NO >> Repair open circuit or short to ground or short power in harness or connectors.

11. 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 14.
NO >> Replace 20A fuse.

12. CHECK GROUND CONNECTION-II

1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair or replace ground connection.

13. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

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

ECM		Ground	Continuity
Connector	Terminal		
E60	123	Ground	Existed
	124		
	125		
	128		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair open circuit or short power in harness or connectors.

14. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair open circuit or short to power in harness or connectors.

P0001 FUEL PUMP

DTC Logic

INFOID:0000000001180550

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:0000000001180551

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 supply pump (volumetric 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.

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 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 >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

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

Refer to ECK-69, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace high pressure supply pump.

5. CHECK FUEL LINE

Check fuel line cleanliness.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Fuel line cleanliness.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001180552

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

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (volumetric control valve) harness connector.
3. Check resistance between high pressure supply pump (volumetric control valve) terminals as follows.

Terminals	Resistance
1 and 2	1.5 - 15Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure supply pump.

P0002 FUEL PUMP

DTC Logic

INFOID:0000000001180553

DTC DETECTION LOGIC

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:0000000001180554

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

Refer to ECK-19, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/ Fuel Injectors Open)".

Is the inspection result normal?

OK >> GO TO 7.
NG >> Replace or replace. Then GO TO 9.

7.CHECK INCORRECT FUEL INJECTION QUANTITY

Refer to ECK-20, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

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".

Is the inspection result normal?

YES >> INSPECTIO END.
NO >> Repair or replace. Then GO TO 9.

9.CLEAR PRESSURE REGULATION

Perform “PRESS_REG_ADAPTIVE” in WORK SUPPORT mode with CONSULT-III.

>> **INSPECTION END**.

Component Inspection

INFOID:0000000001180555

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

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (volumetric control valve) harness connector.
3. Check resistance between high pressure supply pump (volumetric control valve) terminals as follows.

Terminals	Resistance
1 and 2	1.5 - 15Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure supply pump.

P0016 CKP - CMP CORRELATION

DTC Logic

INFOID:0000000001180556

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0016	CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION	• 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:0000000001180557

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		
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	
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.

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 sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
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-73, "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, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace timing belt.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

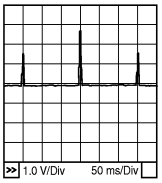
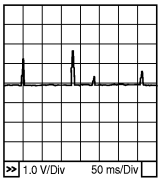
>> **INSPECTION END**

Component Inspection

INFOID:0000000001180558

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.

ECM		Condition	Voltage
Connector	Terminal		
F68	75 (CMP sensor signal)	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 1V ★  MBIB1510E
		[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	0 - 1V ★  MBIB1511E

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace CMP sensor.

P0045 TC BOOST CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000001180559

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0045	TURBOCHARGER BOOST CONTROL SOLENOID VALVE CIRCUIT • CO: Open circuit • CO.0: Open circuit or short circuit to ground • CC.1: Short circuit to +12V	• Harness or connectors (The solenoid valve circuit is open or shorted.) • Turbocharger boost control solenoid valve

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

Diagnosis Procedure

INFOID:0000000001180560

1.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost control solenoid valve harness connector.
3. Turn ignition switch ON.
4. 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

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 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	
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 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E7, F121

- 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:0000000001180561

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

DTC Logic

INFOID:0000000001180562

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0069	TURBOCHARGER BOOST SENSOR - BAROMETRIC PRESSURE SENSOR CORRELATION • 1.DEF: Signal outside lower level • 2.DED: Signal outside upper level	• Harness or connectors (Turbocharger boost sensor) • Turbocharger boost sensor • Barometric pressure sensor

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:0000000001180563

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 TUBOCHARGER BOOST SENSOR SUPPLY CIRCUIT

1. Disconnect turbocharger boost sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger boost sensor connector and ground.

Turbocharger boost sensor		Ground	Voltage
Connector	Terminal		
F91	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.

3.CHECK TUBOCHARGER BOOST SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F91	2	F85	43	Existed

2. 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 TUBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
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 ECK-21, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".
2. Perform EGR volume control valve closed position learning. Refer to ECK-22, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001180564

1.CHECK TURBOCHARGER BOOST SENSOR-I

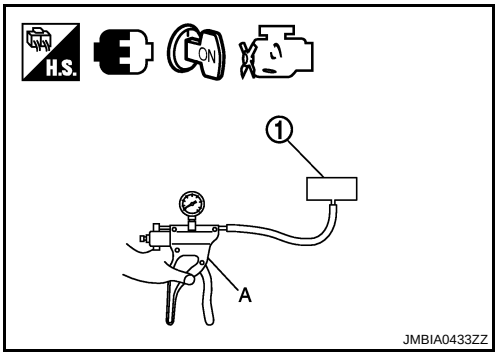
1. Turn ignition switch OFF.
2. Remove turbocharger boost sensor with its harness connected.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check “BOOST_PRESS” and “ATOMOS_PRESS” indication.

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) = ± 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.
2. Apply a pressure of between 10kPa(0.100 bar, 0.102 kg/cm^2, 1.5 psi) - 13kPa(0.130 bar, 0.133 kg/cm^2, 1.9 psi) [maximum pressure to be applied: 13kPa(0.130 bar, 0.133 kg/cm^2, 1.9 psi)].
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Check “BOOST_PRESS” indication with that given by the vacuum pump.



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If there is no discrepancy?

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

P0087 FUEL PUMP

DTC Logic

INFOID:0000000001180565

DTC DETECTION LOGIC

DTC No.	Trouble 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:

- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC becomes present during the first 30 seconds after the engine starts.
- In low ambient temperature conditions, diagnostic can.t make difference between a normal long engine start and abnormal long engine start. So, DTC must be take in account only if customer complains about too long or impossible engine start not only in cold conditions but also and especially in warm conditions. If customer complains only in cold conditions, root cause of the problem could elsewhere like low battery level, bad fuel specification (too viscous fuel). This DTC could appear after fuel filter too.
- **Special notes:**
  Starting and engine operation difficult or impossible.

Diagnosis Procedure

INFOID:0000000001180566

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 7.

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 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 (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.

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

DTC Logic

INFOID:0000000001180567

DTC DETECTION 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)

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:0000000001180568

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 >> 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:0000000001180569

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?

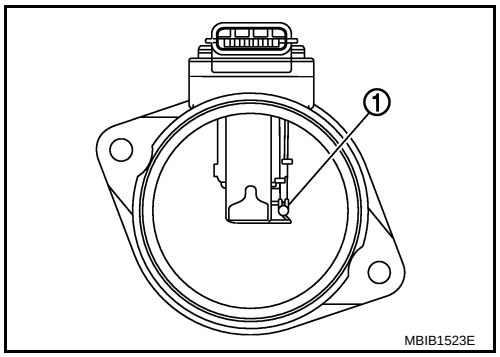
YES >> INSPECTION END
NO >> Replace high pressure supply pump.

P0100 MAF SENSOR

Description

INFOID:0000000001180570

The mass air flow sensor is placed in the stream of intake air.
- Intake air temperature sensor (1)



DTC Logic

INFOID:0000000001180571

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0100	MASS AIR FLOW SENSOR CIRCUIT • CC.0: Short circuit to ground • CO.1: Open circuit or short circuit to +12V	• Harness or connectors (Mass air flow sensor circuit is open or shorted.) • Mass air flow sensor

NOTE:
- **If DTC P0100 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 the ignition has been switched on.

Diagnosis Procedure

INFOID:0000000001180572

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 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.

Mass air flow sensor		Ground	Voltage
Connector	Terminal		
E15	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 for open or short between IPDM E/R and mass air flow sensor

• 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 flow sensor		Ground	Voltage
Connector	Terminal		
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.

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		ECM		Continuity
Connector	Terminal	Connector	Terminal	
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.

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		ECM		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 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

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

10. CHECK MASS AIR FLOW SENSOR

Refer to ECK-112, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace mass air flow sensor.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001180573

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 sensor			Voltage
Connector	Terminal		
E15	2 (Mass air flow sensor ground)	6 (Mass air flow sensor signal)	0.3 - 0.7V

Is the inspection result normal?

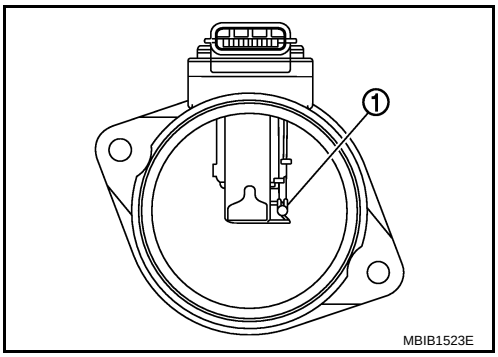
YES >> **INSPECTION END**
NO >> Replace mass air flow sensor.

P0101 MAF SENSOR

Description

INFOID:0000000001180574

The mass air flow sensor is placed in the stream of intake air.
- Intake air temperature sensor (1)



DTC Logic

INFOID:0000000001180575

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 ECK-141, "DTC Logic".**

Diagnosis Procedure

INFOID:0000000001180576

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.

Mass air flow sensor		Ground	Voltage
Connector	Terminal		
E15	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between IPDM E/R and mass air flow sensor
- 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 MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT-II

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

Mass air flow sensor		Ground	Voltage
Connector	Terminal		
E15	5	Ground	Approx. 5V

Is the inspection result normal?

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

7. 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.

8. 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		ECM		Continuity
Connector	Terminal	Connector	Terminal	
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 10.
NO >> GO TO 9.

9. 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.

10. CHECK MASS AIR FLOW SENSOR INPUT 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		ECM		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

INFOID:0000000001180577

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 sensor			Voltage
Connector	Terminal		
E15	2 (Mass air flow sensor ground)	6 (Mass air flow sensor signal)	0.3 - 0.7V

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace mass air flow sensor.

P0110 IAT SENSOR

Description

INFOID:0000000001180578

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:0000000001180579

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0110	INTAKE AIR TEMPERATURE SENSOR CIRCUIT • CC.0: Short circuit to ground • CO.1: Open circuit or short circuit to +12V • 1.DEF: Micro-breaks	• Harness or connectors (Intake air temperature sensor circuit is open or shorted.) • Intake air temperature sensor

NOTE:
- **If DTC P0110 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 the ignition has been switched on for at least 10 seconds.

Diagnosis Procedure

INFOID:0000000001180580

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 INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT-II

1. Disconnect mass air flow sensor (with intake air temperature sensor) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between mass air flow sensor harness connector and ground.

Mass air flow sensor		Ground	Voltage
Connector	Terminal		
E15	1	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 mass air flow sensor

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

4.CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

Mass air flow sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
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:0000000001180581

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

INFOID:0000000001180582

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:0000000001180583

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0115	ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT • CC.0: Short circuit to ground • CO.1: Open circuit or short circuit to +12V • 1.DEF: Micro-breaks • 2.DEF: Signal incoherence	• Harness or connectors (Engine coolant temperature sensor circuit is open or shorted.) • Engine coolant temperature sensor

NOTE:

- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the ignition has been switched on for at least 10 seconds.
- **If the DTC is present:**
- Cooling fan motor is always operate.
- Air conditioner is not operate.

Diagnosis Procedure

INFOID:0000000001180584

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 ENGINE COOLANT TEMPERATURE SENSOR SUPPLY CIRCUIT

1. Disconnect engine coolant temperature sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between engine coolant temperature sensor connector and ground.

Engine coolant temperature sensor		Ground	Voltage
Connector	Terminal		
F79	3	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.

3.CHECK ENGINE COOLANT TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine coolant temperature sensor harness connector and ECM harness connector.

Engine coolant temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F79	2	F85	33	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 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:0000000001180585

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)
2 and 3	25°C (77°F)	2,252 ± 112.16
	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

Description

INFOID:0000000001180586

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:0000000001180587

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0120	ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT • CC.0: Short circuit to ground • CC.1: Short circuit to +12V • CO: Open circuit	• Harness or connectors (Electric throttle control actuator circuit is open or shorted.) • Throttle position sensor • Throttle control motor

NOTE:
- The electric throttle control actuator function is no longer ensured when the engine is stopped or the valve is closed, then the engine stalls or starting is impossible.

Diagnosis Procedure

INFOID:0000000001180588

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 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 control actuator		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

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

3. 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
	2		94	
	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

Description

INFOID:0000000001180589

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:0000000001180590

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0180	FUEL PUMP TEMPERATURE SENSOR CIRCUIT • CC.0: Short circuit to ground • CO.1: Open circuit or short circuit to +12V • 1.DEF: Micro-breaks • 2.DEF: Signal incoherence	• Harness or connectors (Fuel pump temperature sensor circuit is open or shorted.) • Fuel pump temperature sensor

NOTE:

- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the ignition has been switched on for at least 10 seconds.

Diagnosis Procedure

INFOID:0000000001180591

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 FUEL PUMP TEMPERATURE SENSOR SUPPLY CIRCUIT

1. Disconnect fuel pump temperature sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between fuel pump temperature sensor connector and ground.

Fuel pump temperature sensor		Ground	Voltage
Connector	Terminal		
F100	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.

3.CHECK FUEL PUMP TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel pump temperature sensor harness connector and ECM harness connector.

Fuel pump temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F100	2	F85	29	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 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:0000000001180592

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

INFOID:0000000001180593

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:0000000001180594

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0190	FUEL RAIL PRESSURE SENSOR CIRCUIT • CO.0: Short circuit to ground • CO.1: Open circuit or short circuit to +12V • 1.DEF: malfunctioning sensor • 2.DEF: Signal outside upper level • 3.DEF: Micro-breaks	• Harness or connectors (Fuel rail pressure sensor circuit is open or shorted.) • Fuel rail pressure sensor

NOTE:

- **If DTC P0190 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 the ignition is switched on when the engine is running outside idle speed.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001180595

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 FUEL RAIL PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect fuel rail pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between fuel rail pressure sensor connector and ground.

Fuel rail pressure sensor		Ground	Voltage
Connector	Terminal		
F102	3	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.

3.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 pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
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 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 pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
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

INFOID:0000000001180596

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.

P0200 FUEL INJECTOR

DTC Logic

INFOID:0000000001180597

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0200	FUEL INJECTOR CONTROL • 1.DEF: Voltage outside permitted range of values • 2.DEF: Configuration/ Initialisation • 3.DEF: Signal incoherence	• Harness or connectors (The fuel injector circuit is open or shorted.) • Fuel injector

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the engine has been started.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001180598

1.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.
4. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F70	1	F85	8	Existed
2	F71	1	F85	7	
3	F72	1	F85	6	
4	F73	1	F85	5	

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

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 FUEL INJECTOR OUTPUT CIRCUIT FOR OPEN AND SHORT

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

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F70	2	F85	4	Existed
2	F71	2	F85	3	
3	F72	2	F85	2	
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-100, "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

INFOID:0000000001180599

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.

P0201, P0202, P0203, P0204 FUEL INJECTOR

DTC Logic

INFOID:0000000001180600

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0201	NO. 1 CYLINDER FUEL INJECTOR CIRCUIT • CO: Open circuit • CC: Short circuit • 1.DEF: Line in open circuit • 2.DEF: Open circuit or internal electronic malfunction	• Harness or connectors (The fuel injector circuit is open or shorted.) • Fuel injector
P0202	NO. 2 CYLINDER FUEL INJECTOR CIRCUIT • CO: Open circuit • CC: Short circuit • 1.DEF: Line in open circuit • 2.DEF: Open circuit or internal electronic malfunction	
P0203	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	
P0204	NO. 4 CYLINDER FUEL INJECTOR CIRCUIT • CO: Open circuit • CC: Short circuit • 1.DEF: Line in open circuit • 2.DEF: Open circuit or internal electronic malfunction	

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the engine has been started.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**
- **Malfunction indicator (Yellow) lights up.**

Diagnosis Procedure

INFOID:0000000001180601

1.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.
4. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F70	1	F85	8	Existed
2	F71	1	F85	7	
3	F72	1	F85	6	
4	F73	1	F85	5	

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

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 FUEL INJECTOR OUTPUT CIRCUIT FOR OPEN AND SHORT

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

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F70	2	F85	4	Existed
2	F71	2	F85	3	
3	F72	2	F85	2	
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

INFOID:0000000001180602

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.

P0217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000001180603

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 indicated.

DTC No.	Trouble diagnosis name	Possible cause
P0217	Engine over temperature (Overheat)	• Harness or connectors (The cooling fan circuit is open or shorted.) • IPDM E/R (Cooling fan relay-1) • Cooling fan relay-3 • Cooling fan motor • Radiator hose • Radiator • Radiator cap • Water pump • Thermostat

Diagnosis Procedure

INFOID:0000000001180604

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 >> GO TO 3.
NO >> Refer to ECK-170, "Diagnosis Procedure".

3.CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-52, "Inspection".

Is leakage detected?

YES >> GO TO 4.
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

Check radiator cap. Refer to CO-55, "RADIATOR CAP : Inspection".

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 reservoir tank	• Visual	No overflow during driving and idling	CO-52, "Inspection"
OFF*4	10	• Coolant return from reservoir 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) Maximum distortion (warping)	EM-297, "Inspection"
	12	• Cylinder block and pistons	• 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".

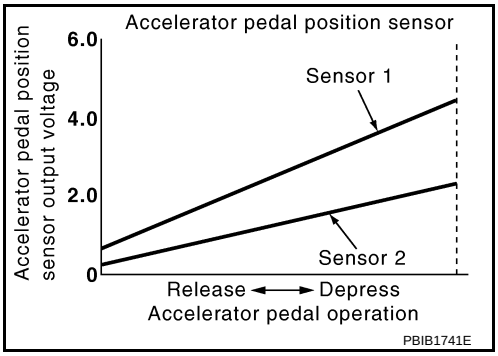
>> INSPECTION END

P0225 APP SENSOR

Description

INFOID:0000000001180605

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

INFOID:0000000001180606

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
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.)

NOTE:
- **If DTC P0225 is displayed with DTC P0641, first perform trouble diagnosis for DTC P0641. Refer to ECK-141, "DTC Logic".**
- **If DTC P0225 is displayed with DTC P0651, first perform trouble diagnosis for DTC P0651. Refer to ECK-143, "DTC Logic".**
- **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.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001180607

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 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.

Accelerator pedal position sensor			Ground	Voltage
Sensor	Connector	Terminal		
1	E110	4	Ground	Approx. 5V
2		5		

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 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.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E110	2	E60	127	Existed
2		1		120	

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			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E110	3	E60	126	Existed
2		6		119	

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:0000000001180608

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 ± 0.9 KΩ
2	1 and 5	2.85 ± 2.05 KΩ

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace accelerator pedal position sensor.

P0235 TC BOOST SENSOR

Description

INFOID:0000000001180609

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:0000000001180610

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0235	• CC.1: short circuit to +12V • CO.0: Open circuit or Short circuit to ground • 1.DEF: Micro-breaks • 2.DEF: Signal outside lower level • 3.DEF: Signal outside upper level	• Harness or connectors (Turbocharger boost sensor) • Turbocharger boost sensor

NOTE:

- **If DTC P0235 is displayed with DTC P0651, first perform trouble diagnosis for DTC P0651. Refer to ECK-143, "DTC Logic".**
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the ignition has been switched on for 1 second, with a warm engine when the vehicle is stationary.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001180611

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 TUBOCHARGER BOOST SENSOR SUPPLY CIRCUIT

1. Disconnect turbocharger boost sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger boost sensor connector and ground.

Turbocharger boost sensor		Ground	Voltage
Connector	Terminal		
F91	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.

3. CHECK TUBOCHARGER BOOST SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F91	2	F85	43	Existed

2. 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 TUBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
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

INFOID:0000000001180612

1.CHECK TURBOCHARGER BOOST SENSOR-I

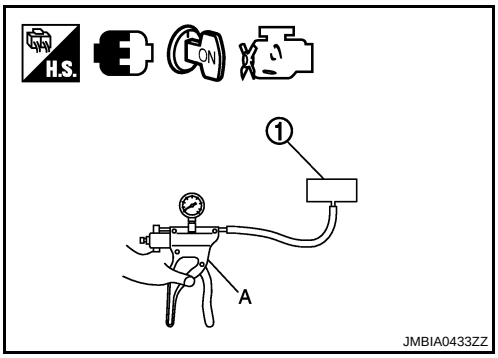
1. Turn ignition switch OFF.
2. Remove turbocharger boost sensor with its harness connected.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check “BOOST_PRESS” and “ATOMOS_PRESS” indication.

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) = ± 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.
2. Apply a pressure of between 10kPa(0.100 bar, 0.102 kg/cm^2, 1.5 psi) - 13kPa(0.130 bar, 0.133 kg/cm^2, 1.9 psi) [maximum pressure to be applied: 13kPa(0.130 bar, 0.133 kg/cm^2, 1.9 psi)].
3. Select “DATA MONITOR” mode with CONSULT-III.
4. 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

DTC Logic

INFOID:0000000001180613

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0335	CRANKSHAFT POSITION SENSOR CIRCUIT • 1.DEF: Signal incoherence • 2.DEF: No signal • 3.DEF: Signal out side level • 4.DEF: Value out side level • 5.DEF: Configuration/ initialisation	• Harness or connectors (The sensor circuit is open or shorted.) • Crankshaft position sensor • Signal plate

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present with the engine cranking or idling.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001180614

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 CKP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect crankshaft position (CKP) sensor (1) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F89	2	F68	88	Existed

5. 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 CKP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F89	1	F68	84	Existed

2. 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 CKP SENSOR

Refer to ECK-112, "Component Inspection".

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

INFOID:0000000001180615

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.

P0340 CMP SENSOR

DTC Logic

INFOID:0000000001180616

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0340	CAMSHAFT POSITION SENSOR CIRCUIT • 1.DEF: Signal incoherence • 2.DEF: No signal • 3.DEF: Value out side level • 4.DEF: Configuration/ initialisation	• Harness or connectors (The 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 after the engine is started or following a load test.
- **Special note:**
  Longer starting time, requires several attempts to start the vehicle.

Diagnosis Procedure

INFOID:0000000001180617

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 POWER SUPPLY CIRCUIT

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		
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
- Harness for open or short between IPDM E/R 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	
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.

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 sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
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".

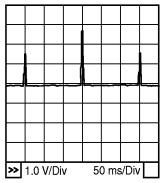
>> **INSPECTION END**

Component Inspection

INFOID:0000000001180618

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.

ECM		Condition	Voltage
Connector	Terminal		
F68	75 (CMP sensor signal)	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 1V ★  MBIB1510E
		[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	0 - 1V ★  MBIB1511E

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace CMP sensor.

P0380 GLOW RELAY

DTC Logic

INFOID:0000000001180619

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:0000000001180620

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 relay		Ground	Voltage
Connector	Terminal		
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		ECM		Continuity
Connector	Terminal	Connector	Terminal	
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.

Glow relay		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F94	8	F68	76	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 INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace glow relay.
NO >> Repair or replace.

P0381 GLOW CONTROL SYSTEM

DTC Logic

INFOID:0000000001180621

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0381	GLOW CONTROL UNIT CIRCUIT • CC.0: Short circuit to ground • CO.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:0000000001180622

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 relay		Ground	Voltage
Connector	Terminal		
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		ECM		Continuity
Connector	Terminal	Connector	Terminal	
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.

Glow relay		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F94	8	F68	76	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 GLOW RELAY OUTPUT CIRCUIT FOR OPEN AND SHORT

1. Disconnect glow plug harness connector.
2. Check the continuity between glow plug harness connector and ECM harness connector.

Glow relay			Glow plug		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F94	2	F95	1	Existed
2		7	F96	1	
3		1	F97	1	
4		6	F98	1	

3. 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 GLOW PLUG

Refer to ECK-119, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace malfunctioning glow plug.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace glow relay.
NO >> Repair or replace.

Component Inspection

INFOID:0000000001180623

1.CHECK GLOW PLUG

1. Turn ignition switch OFF.
2. Disconnect glow plug harness connector.
3. Check resistance between glow plug terminals as follows.

Terminal	Resistance
1 and engine ground	Not less than 2Ω [at 20°C (68°F)]

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace malfunctioning glow plug.

P0409 EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR

DTC Logic

INFOID:0000000001180624

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible Cause
P0409	EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR 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 ECK-143, "DTC Logic".**
- **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

INFOID:0000000001180625

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 valve control position sensor		Ground	Voltage
Connector	Terminal		
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.

3.CHECK EGR VOLUME CONTROL VALVE 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 position 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 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 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 position 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 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 >> GO TO 6.
NO >> Repair or replace.

6.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**

P0487 EGR VOLUME CONTROL VALVE

DTC Logic

INFOID:0000000001180626

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:0000000001180627

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		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F99	2	F68	95	Existed
			96	Not existed
	6		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"

>> **INSPECTIO END**

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001180628

1.CHECK EGR VOLUME CONTROL VALVE CONTROL 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.

P0488 EGR SYSTEM

DTC Logic

INFOID:0000000001180629

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 position sensor circuit is open or shorted.) • EGR volume control valve • EGR volume control valve control position sensor • Incorrect EGR volume control valve installation • 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:0000000001180630

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.

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 control position sensor		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

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 position 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 position 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.

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	
F99	2	F68	95	Existed
			96	Not existed
	6		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

- 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.CHECK EGR VOLUME CONTROL VALVE CONTROL 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.

P0500 VSS

Description

INFOID:0000000001180632

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:0000000001180633

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)

Diagnosis Procedure

INFOID:0000000001180634

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**

P0530 REFRIGERANT PRESSURE SENSOR

Description

INFOID:0000000001180635

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:0000000001180636

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 ECK-141, "DTC Logic".**

Diagnosis Procedure

INFOID:0000000001180637

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 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 pressure sensor		Ground	Voltage
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.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E50	1	F68	74	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 refrigerant pressure sensor

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

6. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E50	2	F68	78	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 refrigerant pressure sensor

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

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.
NO >> Repair or replace.

P0560 BATTERY VOLTAGE

DTC Logic

INFOID:0000000001180638

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

INFOID:0000000001180639

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, STR-8, "System Diagram" and CHG-8, "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.

ECM		Ground	Voltage
Connector	Terminal		
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.

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

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E68	53	E11	9	Existed
	54			

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 6.

6. 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.

7. CHECK ECM POWER SUPPLY CIRCUIT-III

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		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
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 8.
NO >> Repair open circuit or short to ground or short power in harness or connectors.

8. 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 9.
NO >> Replace 20A fuse.

9. CHECK GROUND CONNECTION

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

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace ground connection.

10. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

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

ECM		Ground	Continuity
Connector	Terminal		
E60	123	Ground	Existed
	124		
	125		
	128		

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.

P0571 ASCD BRAKE SWITCH

DTC Logic

INFOID:0000000001180640

DTC DETECTION LOGIC

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 shorted) • 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

INFOID:0000000001180641

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				
E60	116 (ASCD brake switch)	Ground	Brake pedal	Fully released	Battery voltage
				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 lamp switch		Ground	Voltage
Connector	Terminal		
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

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 lamp switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
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

INFOID:0000000001180642

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 (Stop lamp switch)	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed
3 and 4 (ASCD brake switch)	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

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

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-8, "Inspection and Adjustment" (LHD models) or BR-55, "Inspection and Adjustment" (RHD models).
2. Check the continuity between stop lamp switch terminals under the following conditions.

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

P0575 ASCD STEERING SWITCH

Description

INFOID:0000000001180643

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:0000000001180644

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

INFOID:0000000001180645

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	Voltage
Connector	Terminal			
E60	110 (ASCD steering switch signal)	Ground	MAIN switch: Pressed	Approx. 0V
			CANSEL switch: Pressed	Approx. 1V
			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.

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.

Combination switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M352	15	E60	111	Existed

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

Is the inspection result normal?

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

4. DETECT MALFUNCTIONING PART

- Combination switch (spiral cable)
- Harness for open or short between ECM and combination switch

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

5. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Combination switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M352	14	E60	110	Existed

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

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

- Combination switch (spiral cable)
- Harness for open or short between ECM and combination switch

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

7. CHECK ASCD STEERING SWITCH

Refer to ECK-98, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001180646

1. CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector M352.
2. Check the continuity between combination switch harness connector terminals under following conditions.

Combination meter		Condition	Resistance
Connector	Terminals		
M352	14 and 15 (Combination switch)	MAIN switch: Pressed	Approx. 0 Ω
		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

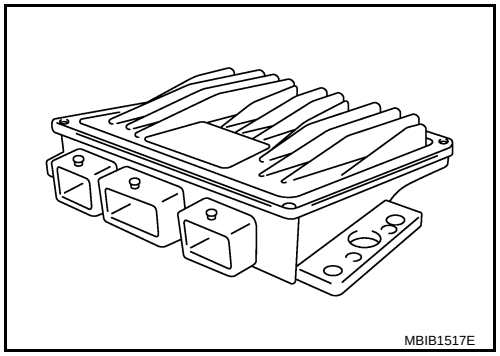
NO >> Replace ASCD steering switch

P0606 ECM

Description

INFOID:0000000001180647

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


MBIB1517E

DTC Logic

INFOID:0000000001180648

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0606	ECM • 1.DEF to 20.DEF: Internal electric malfunction	• ECM

NOTE:
- **If DTC P0606 is displayed with other DTC, first perform the trouble diagnosis for other DTC.**
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after an attempted start, or with the engine running.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**
- **Malfunction indicator (Yellow) lights up.**

Diagnosis Procedure

INFOID:0000000001180649

1.CHECK DTC

Make sure that which malfunction (DTC second line indication) is displayed.

A	Except 9.DEFF
B	9.DEF

A or B

A >> GO TO 2.
B >> GO TO 3.

2.REPLACE ECM

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

>> **INSPECTION END**

3.CHECK CAN COMMUNICATION LINE

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

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

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

OK or NG

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

5. REPLACE ECM

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

>> **INSPECTION END**

P0641 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000001180650

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0641	SENSOR POWER SUPPLY CIRCUIT • 1.DEF: Signal outside lower level • 2.DEF: Signal outside upper level	• Harness or connectors (The APP sensor 2 power supply circuit is shorted.) (Fuel rail pressure sensor circuit is shorted.) (EGR volume control valve control position sensor circuit is shorted.) (Mass air flow sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 2) • Fuel rail pressure sensor • EGR volume control valve control position sensor • Mass air flow sensor • Refrigerant pressure sensor

NOTE:
- **If DTC P0641 is displayed with DTC P0100, P0101, P0110, P0190, P0225, P0409, P0530, P2120, first perform trouble diagnosis for DTC P0641.**
- **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:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001180651

1.CHECK GROUND CONNECTION

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 ACCELERATOR PEDAL POSITION SENSOR 2 POWER SUPPLY CIRCUIT

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

APP sensor		Ground	Voltage
Connector	Terminal		
E110	5	Ground	Approx. 5V

Is the inspection result normal?

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

3.CHECK SENSOR POWER SUPPLY CIRCUITS

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

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F68	89	Refrigerant pressure sensor	E50	3
	85	EGR volume control valve (EGR volume control valve control position 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
F68	74	Refrigerant pressure sensor	E50	1
	82	EGR volume control valve (EGR volume control valve control position 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 ECK-120, "Diagnosis Procedure".)
- Fuel rail pressure sensor (Refer to ECK-98, "Component Inspection".)
- 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

DTC Logic

INFOID:0000000001180652

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0651	SENSOR POWER SUPPLY CIRCUIT • 1.DEF: Parameter at minimum level • 2.DEF: Parameter at maximum level	• Harness or connectors (The APP sensor 1 power supply circuit is shorted.) (Turbocharger boost sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1) • Turbocharger boost sensor

NOTE:
- **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:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001180653

1.CHECK GROUND CONNECTION

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 ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

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

APP sensor		Ground	Voltage
Connector	Terminal		
E110	4	Ground	Approx. 5V

Is the inspection result normal?

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

3.CHECK SENSOR POWER SUPPLY CIRCUITS

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E60	122	APP sensor	E110	4
F85	36	Turbocharger boost sensor	F91	1

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	127	APP sensor	E110	2
F85	43	Turbocharger boost sensor	F91	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 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:0000000001180654

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 shorted.) • IPDM E/R (ECM relay)

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

Diagnosis Procedure

INFOID:0000000001180655

1.CHECK ECM POWER SUPPLY CIRCUIT

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

ECM		Ground	Voltage
Connector	Terminal		
F68	60	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 4.

2.CHECK ECM POWER SUPPLY CIRCUIT-II

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		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E68	53	E11	9	Existed
	54			

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.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.

4.CHECK ECM POWER SUPPLY CIRCUIT-III

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		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
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.

ECM		Ground	Continuity
Connector	Terminal		
E60	123	Ground	Existed
	124		
	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

DTC Logic

INFOID:0000000001180656

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis 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 light will not work.**

Diagnosis Procedure

INFOID:0000000001180657

1.CHECK CAN COMMUNICATION LINE

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

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK PNP SWITCH

Refer to TM-57, "PARK/NEUTRAL POSITION (PNP) SWITCH : Component Inspection".

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

P0830 ASCD CLUTCH SWITCH

Description

INFOID:0000000001180658

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

DTC Logic

INFOID:0000000001180659

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:0000000001180660

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 clutch switch		Ground	Voltage
Connector	Terminal		
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		
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".

>> INSPECTION END

Component Inspection

INFOID:0000000001180661

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 pedal	Fully released	Existed
		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 CL-6, "Inspection and Adjustment".
2. Check the continuity between ASCD clutch switch terminals under the following conditions.

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD clutch switch.

P1089 FUEL PUMP

DTC Logic

INFOID:0000000001180662

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 injector • 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 ECK-95, "DTC Logic".**
- **If DTC P1089 is displayed with DTC P0190, first perform trouble diagnosis for DTC P0190. Refer to ECK-97, "DTC Logic".**
- **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:0000000001180663

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

Refer to ECK-19, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

Is the inspection result normal?

OK >> GO TO 7.
NG >> Replace or replace. Then GO TO 9.

7. CHECK INCORRECT FUEL INJECTION QUANTITY

Refer to ECK-20, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

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".

Is the inspection result normal?

YES >> INSPECTIO END.
NO >> Repair or replace. Then GO TO 9.

9. CLEAR PRESSURE REGULATION

Perform “PRESS_REG_ADAPTIVE” in WORK SUPPORT mode with CONSULT-III.

>> **INSPECTION END**.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:0000000001180664

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:0000000001180665

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:**
  If DTC P2101 2.DEF is displayed, first perform trouble diagnosis for DTC P0120. Refer to ECK-93, "DTC Logic".

Diagnosis Procedure

INFOID:0000000001180666

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 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 control actuator		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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. 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

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 ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT-II

1. 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	2	F68	94	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 ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT-III

1. 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	4	F68	90	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 INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace electric throttle control actuator.
NO >> Repair or replace.

Component Inspection

INFOID:0000000001180667

1.CHECK THROTTLE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Check resistance between electric throttle control actuator terminals as follows.

Terminals	Resistance
1 and 2	21 ± 2.1Ω [23°C (73°F)]

Is the inspection result normal?

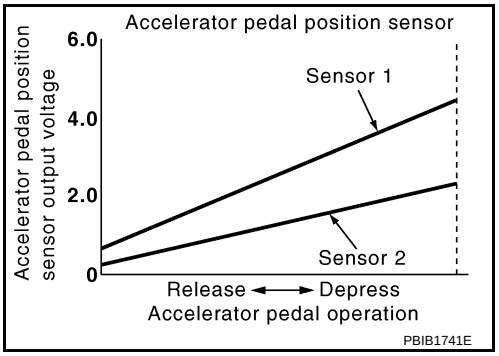
YES >> INSPECTION END
NO >> Replace electric throttle control actuator.

P2120 APP SENSOR

Description

INFOID:0000000001180668

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

INFOID:0000000001180669

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2120	ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT • CC.1: Short circuit to +12V • CO.0: Open circuit or short circuit to ground	• Harness or connectors (APP sensor 2 circuit is open or shorted.) • Accelerator pedal position sensor (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:0000000001180670

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 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.

Accelerator pedal position sensor			Ground	Voltage
Sensor	Connector	Terminal		
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.

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

1. Turn ignition switch OFF.

2. Disconnect accelerator pedal position sensor.
3. 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	
2	E110	1	E60	120	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 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	
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:0000000001180671

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 ± 0.9 KΩ
2	1 and 5	2.85 ± 2.05 KΩ

Is the inspection result normal?

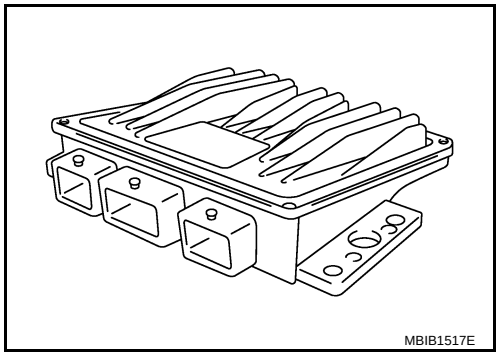
YES >> **INSPECTION END**
NO >> Replace accelerator pedal position sensor.

P2226 BARO SENSOR

Description

INFOID:0000000001180672

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



DTC Logic

INFOID:0000000001180673

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:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the ignition has been switched on for at least 10 seconds.
- **Special note:**
  The barometric pressure sensor is integrated into the ECM, and cannot be separated.

Diagnosis Procedure

INFOID:0000000001180674

1. REPLACE ECM

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

>> **INSPECTION END**

P2263 TC SYSTEM

DTC Logic

INFOID:0000000001180675

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

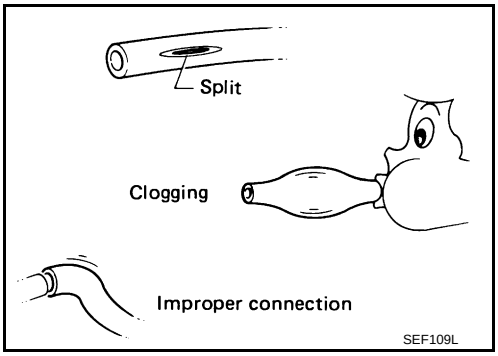
NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC becomes present after the engine is started.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001180676

1.CECHECK VACUUM HOSES AND VACUUM GALLERY

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



Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 2.

2.CHECK AIR FILTER

Check that air filter is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 3.

3.CHECK INTAKE AIR DUCT

Check that intake air duct is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 4.

4.CHECK VACUUM PUMP

Check vacuum pump.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 5.

5.CHECK TURBOCHARGER

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 control solenoid valve		Ground	Voltage
Connector	Terminal		
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.

7. 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	
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".

Is the inspection result normal?

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".

>> **INSPECTION END**

P2299 ACCELERATOR/BRAKE PEDAL POSITION INCONSISTENCY

DTC Logic

INFOID:0000000001180677

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 shorted.) • 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

INFOID:0000000001180678

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 BRAKE SWITCH CIRCUIT

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

ECM		Ground	Condition		Voltage
Connector	Terminal				
E60	115 (Brake switch signal)	Ground	Brake pedal	Fully released	0V
				Slightly depressed	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 7.

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.

Accelerator pedal position sensor			Ground	Voltage
Sensor	Connector	Terminal		
1	E110	4	Ground	Approx. 5V
2		5		

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 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.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E110	2	E60	127	Existed
2		1		120	

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	E110	3	E60	126	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, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace accelerator pedal position sensor.

7. CHECK BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E118	1	Ground	Battery voltage

Is the inspection result normal?

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

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

9. CHECK 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 lamp switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
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

DTC Logic

INFOID:0000000001180679

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 position sensor circuit is open or shorted.) • EGR volume control valve • EGR volume control valve control position sensor • Incorrect EGR volume control valve installation • EGR volume control valve stuck closed • EGR passage clogged

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC becomes 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.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001180680

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.

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 control position sensor		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

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 position 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 position 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.

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	
F99	2	F68	95	Existed
			96	Not existed
	6		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

- 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**

P2502 BATTERY VOLTAGE

DTC Logic

INFOID:0000000001180681

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

INFOID:0000000001180682

1.CHECK CAN COMMUNICATION LINE

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

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK ALTERNATOR

Refer to CHG-8, "System Diagram".

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

DTC Logic

INFOID:0000000001180683

DTC DETECTION LOGIC

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:
- **Priorities when dealing with a number of DTCs:**
  If DTC P2610 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.
- **Special notes:**
- The engine only stops after the ignition is switched off.

Diagnosis Procedure

INFOID:0000000001180684

1.CHECK INTAKE AIR DUCT

Check that intake air duct is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 2.

2.CHECK VACUUM PUMP

Check vacuum pump.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 3.

3.CHECK TURBOCHARGER

Check turbocharger.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 4.

4.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Refer to ECK-75, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace turbocharger boost control solenoid valve.

5.CHECK THROTTLE CONTROL MOTOR

Refer to ECK-152, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace turbocharger boost sensor.

6.CHECK FUEL INJECTOR

Refer to ECK-101, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace fuel injector.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> **INSPECTION END**

ASCD INDICATOR

Description

INFOID:0000000001180685

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

INFOID:0000000001180686

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 → Not illuminated
• MAIN switch: ON • When vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	• ASCD: Operating	Illuminated
	• ASCD: Not operating	Not illuminated

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Go to ECK-169, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001180687

1.CHECK CAN COMMUNICATION LINE

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

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK COMBINATION METER OPERATION

Refer to MWI-27, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check combination meter circuit. Refer to MWI-7, "METER SYSTEM : System Diagram".

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

COOLING FAN

Description

INFOID:0000000001180688

Cooling fan operates at each speed when the current flows in the cooling fan motor as follows.
Refer to ECK-57, "System Description" for cooling fan operation.

Component Function Check

INFOID:0000000001180689

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

INFOID:0000000001180690

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 fan motor-1		Ground	Voltage
Connector	Terminal		
E59	1	Ground	Battery voltage
	3		

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

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 fan motor		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E3	1	E14	52	Existed

4. Check the continuity between cooling fan motor harness connector and cooling fan relay-3 harness connector.

Cooling fan motor		Cooling fan relay-3		Continuity
Connector	Terminal	Connector	Terminal	
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 fan relay-3		Continuity
Connector	Terminal	Connector	Terminal	
E13	48	E59	4	Existed

6. Check the continuity between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Continuity
Connector	Terminal		
E10	5	Ground	Existed
	6		

7. Check the continuity between cooling fan relay-3 and ground harness connector.

Cooling fan motor		Ground	Continuity
Connector	Terminal		
E3	2	Ground	Existed

8. 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 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.

7.CHECK COOLING FAN MOTOR

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)

INFOID:0000000001180691

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.

Terminals		Operation
(+)	(–)	
1	2	Cooling fans operate

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace cooling fan motor.

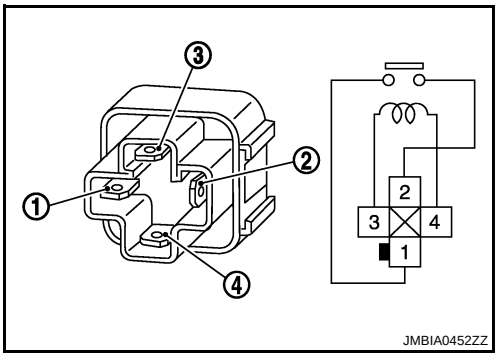
Component Inspection (Cooling Fan Relay)

INFOID:0000000001180692

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



JMBIA0452ZZ

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace cooling fan relay.

STOP LAMP SWITCH

Description

INFOID:0000000001180693

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

INFOID:0000000001180694

1.CHECK BRAKE SWITCH CIRCUIT

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

ECM		Ground	Condition		Voltage
Connector	Terminal				
E60	115 (Brake switch signal)	Ground	Brake pedal	Fully released	0V
				Slightly depressed	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to ECK-173, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001180695

1.CHECK BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E118	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 E105, M77
- 10A fuse (No. 11)
- 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.

3.CHECK 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 lamp switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
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 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:0000000001180696

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 (Stop lamp switch)	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed
3 and 4 (ASCD brake switch)	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

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

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-8, "Inspection and Adjustment" (LHD models) or BR-55, "Inspection and Adjustment" (RHD models).
2. Check the continuity between stop lamp switch terminals under the following conditions.

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

Is the inspection result normal?

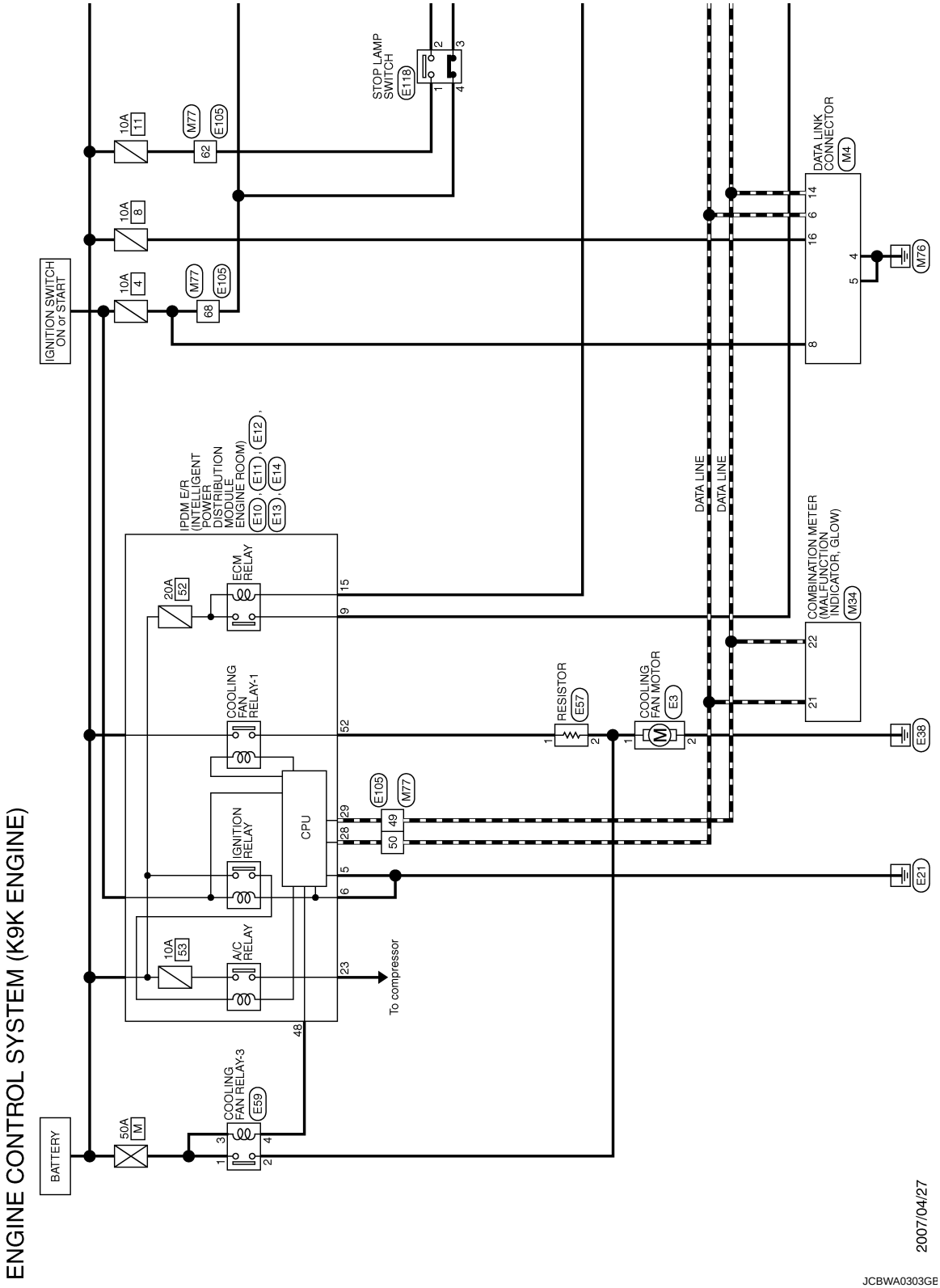
YES >> INSPECTION END
NO >> Replace stop lamp switch.

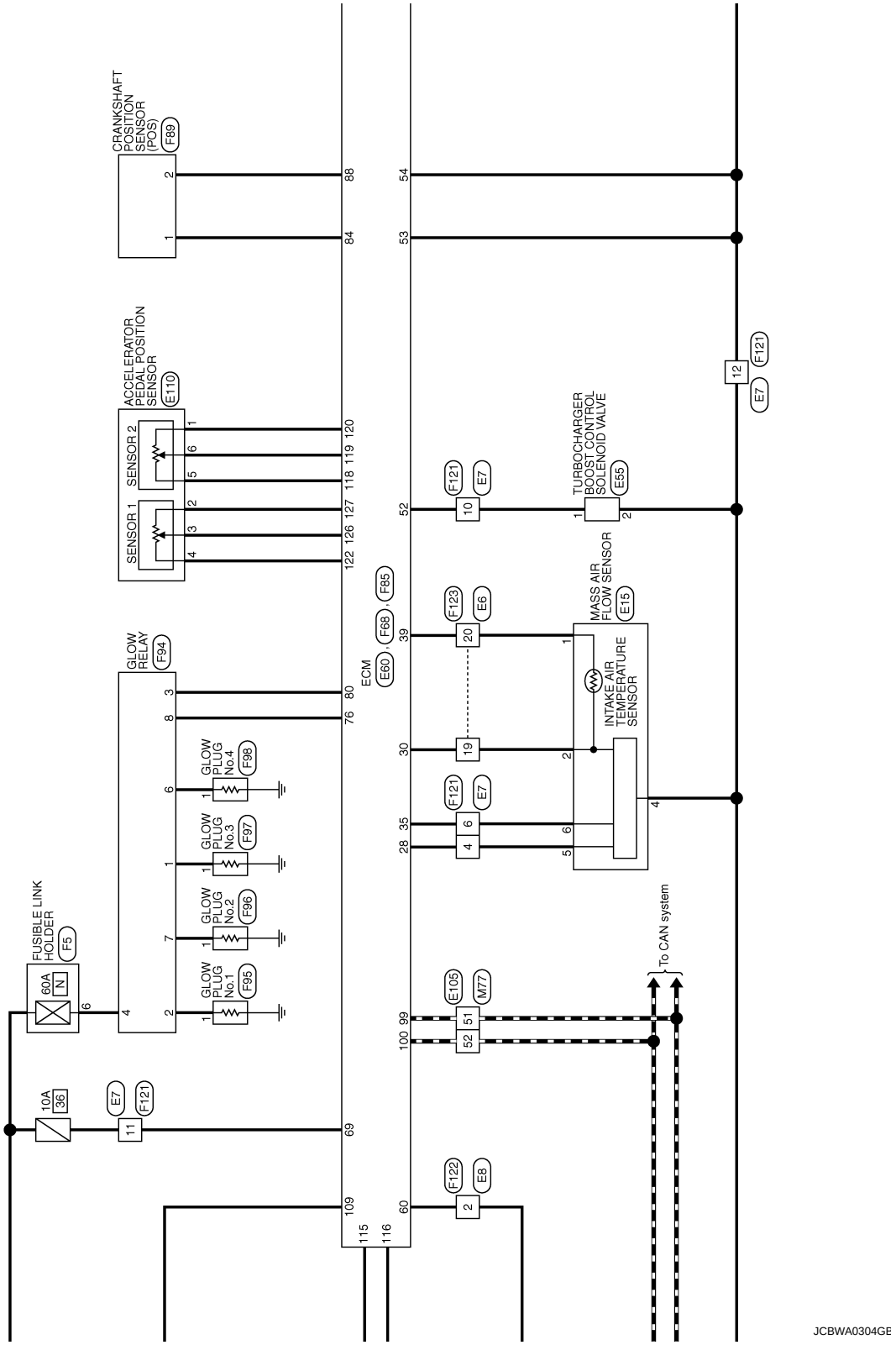
ECU DIAGNOSIS

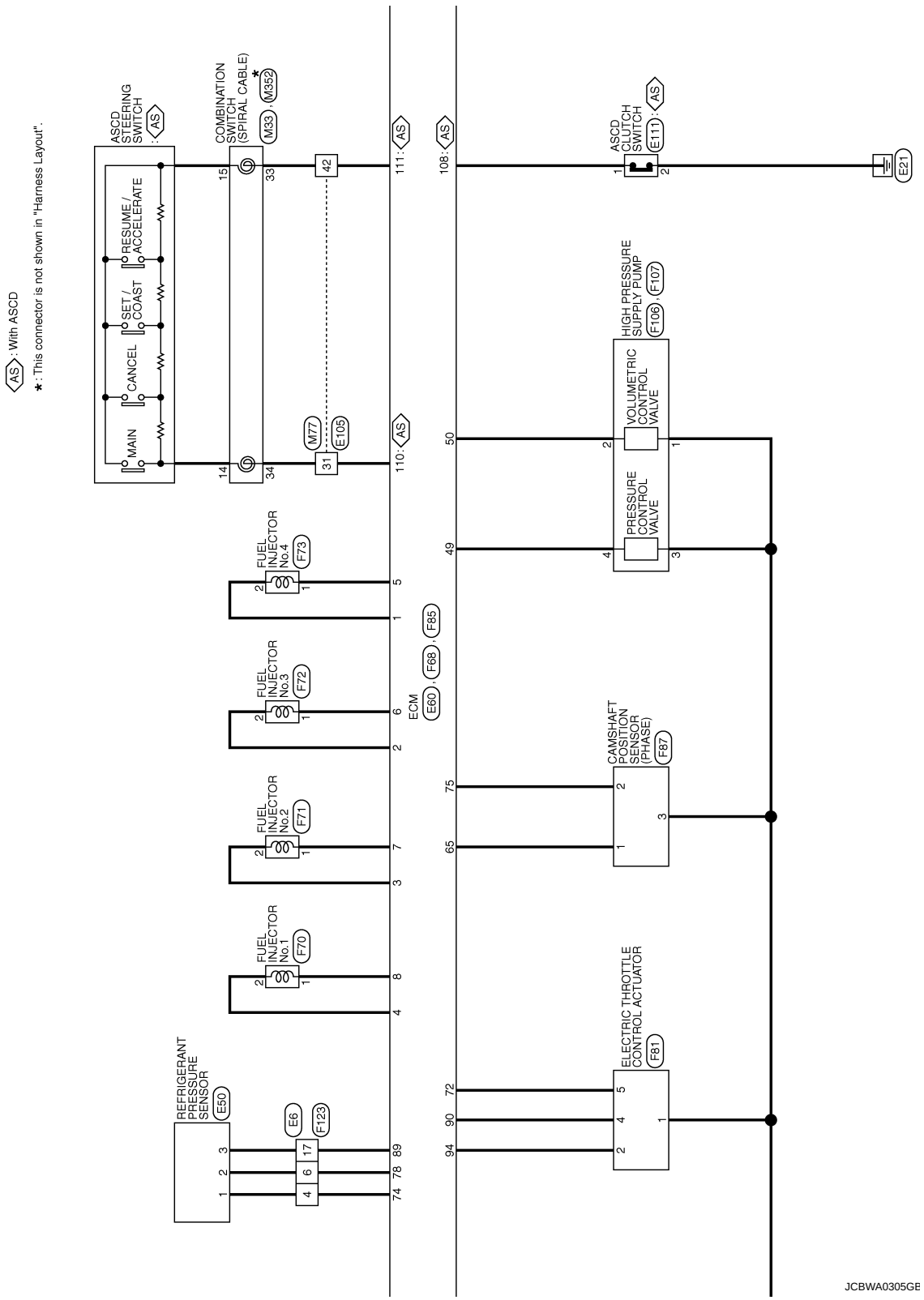
ECM

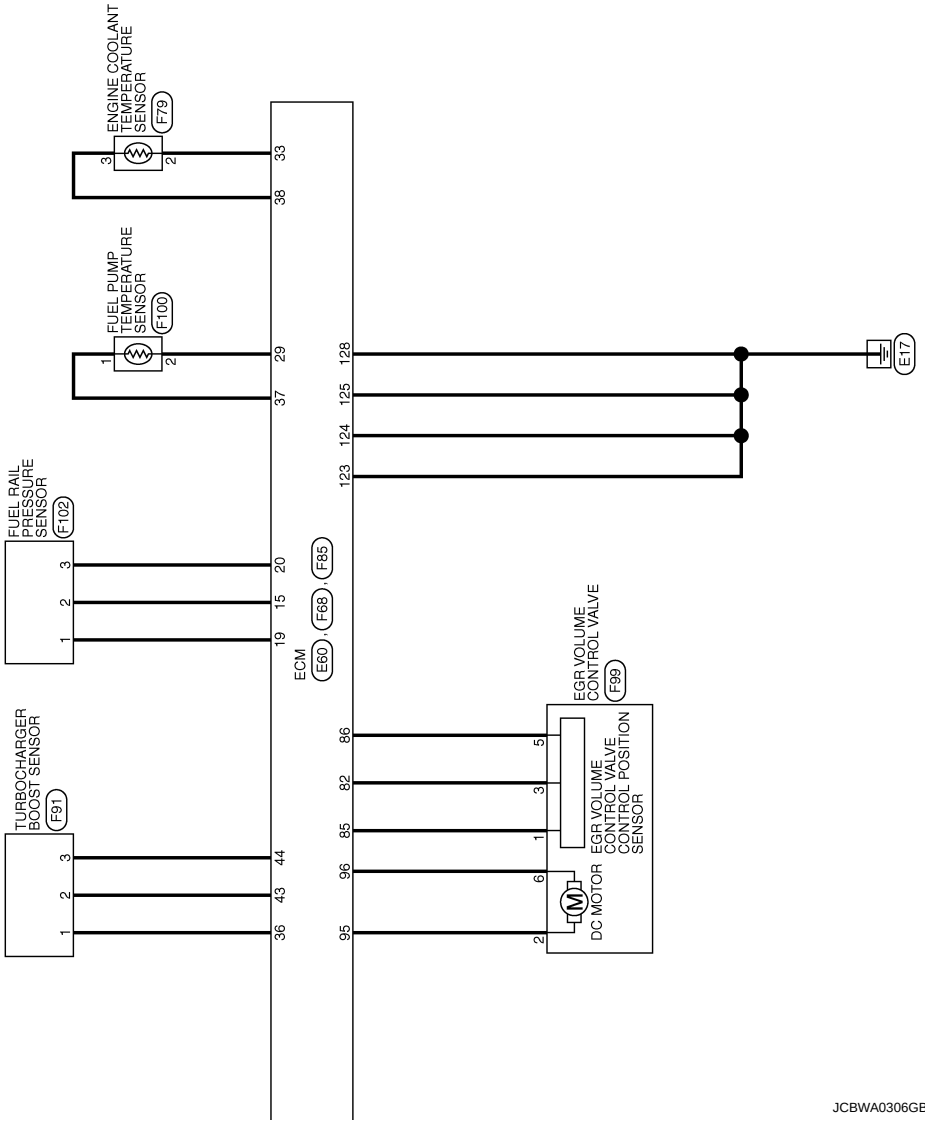
Wiring Diagram - ENGINE CONTROL SYSTEM -

INFOID:0000000001180697




CRANKSHAFT POSITION SENSOR (POS) F89
ACCELERATOR PEDAL POSITION SENSOR E110
SENSOR 1
SENSOR 2
GLOW RELAY F94
GLOW PLUG No.1 F95
GLOW PLUG No.2 F96
GLOW PLUG No.3 F97
GLOW PLUG No.4 F98
FUSIBLE LINK HOLDER F5
60A N
10A 36
ECM E60 F68 F85
TURBOCHARGER BOOST CONTROL SOLENOID VALVE E55
MASS AIR FLOW SENSOR E15
INTAKE AIR TEMPERATURE SENSOR
To CAN system
JCBWA0304GE


AS : With ASCD
* : This connector is not shown in "Harness Layout".
ASCD STEERING SWITCH
AS
MAIN
CANCEL
SET / COAST
RESUME / ACCELERATE
COMBINATION SWITCH (SPIRAL CABLE)
M352
M33
15
33
14
34
42
M77
E105
31
111: AS
110: AS
108: AS
ASCD CLUTCH SWITCH
E111
E21
HIGH PRESSURE SUPPLY PUMP
F106
F107
VOLUMETRIC CONTROL VALVE
PRESSURE CONTROL VALVE
FUEL INJECTOR No.4
F73
FUEL INJECTOR No.3
F72
FUEL INJECTOR No.2
F71
FUEL INJECTOR No.1
F70
ECM
E60
F68
F85
CAMSHAFT POSITION SENSOR (PHASE)
F87
ELECTRIC THROTTLE CONTROL ACTUATOR
F81
REFRIGERANT PRESSURE SENSOR
E50
E6
F123
JCBWA0305GE


ENGINE COOLANT TEMPERATURE SENSOR
F79
FUEL PUMP TEMPERATURE SENSOR
F100
FUEL RAIL PRESSURE SENSOR
F102
TURBOCHARGER BOOST SENSOR
F91
ECM
E60, F68, F85
EGR VOLUME CONTROL VALVE
F99
EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR
DC MOTOR
E17
JCBWA0306GE

ENGINE CONTROL SYSTEM (K9K ENGINE)

Connector No.	E3
Connector Name	COOLING FAN MOTOR
Connector Type	P801038951602

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	R	–
2	B	–

Connector No.	E6
Connector Name	WIRE TO WIRE
Connector Type	TK24MW-1V

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
4	R/L	–
6	G/P	–
17	Y/W	–
19	GR/R	–[With K9K engine]
20	LG	–[With K9K engine]

Connector No.	E7
Connector Name	WIRE TO WIRE
Connector Type	NS16MW-CS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
4	R	–[With diesel engine]
6	B/Y	–[With diesel engine]
10	G/R	–[With diesel engine]
11	L/B	–[With diesel engine]
12	G	–

Connector No.	E8
Connector Name	WIRE TO WIRE
Connector Type	M02MW-LC

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
2	B/R	–

Connector No.	E10
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	M06FB-LC

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
5	B	–
6	B	–

Connector No.	E11
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS12FBR-CS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
9	G	–
15	B/R	–[With diesel engine]

Connector No.	E12
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS12FW-CS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
23	Y/B	–
28	L	–
29	P	–

Connector No.	E13
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS16FW-CS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
48	Y	–[Except M9R engine]

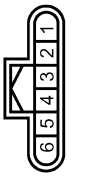
JCBWA0307GE

ENGINE CONTROL SYSTEM (K9K ENGINE)

Connector No.	E14
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	YZK 7283-5591-40-F

Terminal No.	Color of Wire	Signal Name [Specification]
52	W	–

Connector No.	E15
Connector Name	MASS AIR FLOW SENSOR
Connector Type	RH06FB



Terminal No.	Color of Wire	Signal Name [Specification]
1	LG	–
2	GR/R	–
4	G	–
5	R	–
6	B/Y	–

Connector No.	E50
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Type	D400997F

Terminal No.	Color of Wire	Signal Name [Specification]
1	R/L	GND
2	G/P	PD
3	Y/W	AVSS

Connector No.	E55
Connector Name	TURBOCHARGER BOOST CONTROL SOLENOID VALVE
Connector Type	SUPPLIRE REF 282788-1

Terminal No.	Color of Wire	Signal Name [Specification]
1	G/R	–
2	G	–

Connector No.	E57
Connector Name	RESISTOR
Connector Type	P8010389516O2

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–
2	R	–

Connector No.	E59
Connector Name	COOLING FAN RELAY-3
Connector Type	24347 9F900

Terminal No.	Color of Wire	Signal Name [Specification]
1	W/B	–
2	R	–
3	W/B	–
4	W	–

Connector No.	E60
Connector Name	ECM
Connector Type	MAA24FB-MEA8-LH

Terminal No.	Color of Wire	Signal Name [Specification]
99	P	MAIN CAN-L (BODY)
100	L	MAIN CAN-H (BODY)
108	G	CLUTCH PED SWITCH
109	W/L	IGN
110	V	ASCD STRG SW(+)
111	B	ASCD STRG SW(–)
115	O	BRAKE SWITCH MAIN
116	R/W	BNC SW
118	R	ACCEL PED SENS-2 +V
119	W	ACCEL PED SENS-2
120	B	ACCEL PED SENS-2 GND
122	R	ACCEL PED SENS-1 +V
123	B	GND
124	B	GND
125	B	GND
126	W	ACCEL PED SENS-1
127	B	ACCEL PED SENS-1 GND
128	B	GND

JCBWA0308GE

ENGINE CONTROL SYSTEM (K9K ENGINE)

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Type	TH60MW-NS16-TM4

Terminal No.	Color of Wire	Signal Name [Specification]
31	V	–
42	B	–
49	P	–
50	L	–
51	P	–
52	L	–
62	V	–
68	W/L	–[Except M9R engine]

Connector No.	E110
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Type	RH06FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	B	–[With MR engine or K9K engine]
2	B	–[With K9K engine]
3	W	–[With MR engine or K9K engine]
4	R	–[With diesel engine]
5	R	–[With K9K engine]
6	W	–[With K9K engine]

Connector No.	E111
Connector Name	ASCD CLUTCH SWITCH
Connector Type	M02FBR-LC

Terminal No.	Color of Wire	Signal Name [Specification]
1	G	–[With K9K engine]
2	B	–[With K9K engine]

Connector No.	E118
Connector Name	STOP LAMP SWITCH
Connector Type	M04FW-LC

Terminal No.	Color of Wire	Signal Name [Specification]
1	V	–
2	R/W	–
3	O	–
4	W/L	–

Connector No.	F5
Connector Name	FUSIBLE LINK HOLDER
Connector Type	L01FB-MC

Terminal No.	Color of Wire	Signal Name [Specification]
6	W	–

Connector No.	F68
Connector Name	ECM
Connector Type	MAA40FBR-MEA8-LH

Terminal No.	Color of Wire	Signal Name [Specification]
49	SB	HP PRES VALVE DRIVE
50	LG/B	HP REG VALVE DRIVE
52	G/R	VNT CONTROL VALVE
53	G	VBATT
54	G	VBATT
60	B/R	CU RELAY DRIVE
65	O	CAMSHAFT GND
69	L/B	VBD (DIRECTVBATT)
72	L	PWM SIGNAL
74	R/L	FREON PRESS GND
75	W	CAMSHAFT SENS
76	L/Y	GLOW-PLUG COMMOND
78	G/P	FREON PRESS SENS
80	R/G	GLOW PLUG DIAGNOSTICS
82	GR	EGR POSS GND
84	R/O	CRANKSHAFT SENS +
85	SB	EGR POSS +V
86	Y/G	EGR POSS SENS
88	L/O	CRANKSHAFT SENS –
89	Y/W	FREON PRESURE +V
90	R/Y	INLET THROTTLE FBACK
94	O	INLET THROTTLE GND
95	R	EGR DC MOTOR+
96	L/W	EGR DC MOTOR–

Connector No.	F70
Connector Name	FUEL INJECTOR NO.1
Connector Type	KOSTAL 09441231

Terminal No.	Color of Wire	Signal Name [Specification]
1	R	–
2	R/Y	–

JCBWA0309GB

ENGINE CONTROL SYSTEM (K9K ENGINE)

Connector No.	F71
Connector Name	FUEL INJECTOR NO.2
Connector Type	KOSTAL 09441231

Terminal No.	Color of Wire	Signal Name [Specification]
1	L	–
2	L/W	–

Connector No.	F72
Connector Name	FUEL INJECTOR NO.3
Connector Type	KOSTAL 09441231

Terminal No.	Color of Wire	Signal Name [Specification]
1	G	–
2	G/Y	–

Connector No.	F73
Connector Name	FUEL INJECTOR NO.4
Connector Type	KOSTAL 09441231

Terminal No.	Color of Wire	Signal Name [Specification]
1	B	–
2	B/R	–

Connector No.	F79
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Type	GHW 17843000000-F

Terminal No.	Color of Wire	Signal Name [Specification]
2	Y/B	–
3	GR/L	–

28	R	AIR MASS FLOW SENS -V
29	L/G	FUEL TEMP GND
30	GR/R	AIR MASS-FLOW SENS GND
33	Y/B	WATER TEMP GND
35	B/Y	AIR MASS FLOW
36	V	BOOST PRES +V
37	P	FUEL TEMP SENS
38	GR/L	WATER TEMP SENS
39	LG	INTAKE AIR TEMP SENS
43	G	BOOST PRES GND
44	O	BOOST PRES SENS

Connector No.	F87
Connector Name	CAMSHAFT POSITION SENSOR (PHASE)
Connector Type	FEA03FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	O	–
2	W	–
3	G	–

Connector No.	F81
Connector Name	ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Type	FEP 4212200

Terminal No.	Color of Wire	Signal Name [Specification]
1	G	–
2	O	–
4	R/Y	–
5	L	–

Connector No.	F85
Connector Name	ECM
Connector Type	MAA40FGY-MEA8-RH

1	5	9	13	17	21	25	29	33	37	41	45
2	6	10	14	18	22	26	30	34	38	42	46
3	7	11	15	19	23	27	31	35	39	43	47
4	8	12	16	20	24	28	32	36	40	44	48

Terminal No.	Color of Wire	Signal Name [Specification]
1	B/R	PIEZO INJECTOR 4 LSD
2	G/Y	PIEZO INJECTOR 3 LSD
3	L/W	PIEZO INJECTOR 2 LSD
4	R/Y	PIEZO INJECTOR 1 LSD
5	B	PIEZO INJECTOR 4 HSD
6	G	PIEZO INJECTOR 3 HSD
7	L	PIEZO INJECTOR 2 HSD
8	R	PIEZO INJECTOR 1 HSD
15	GR	RAIL PRESS GND
19	LG	RAIL PRESS SENS
20	L	RAIL PRESS +V

JCBWA0310GE

ENGINE CONTROL SYSTEM (K9K ENGINE)

Connector No.	F89
Connector Name	CRANKSHAFT POSITION SENSOR (POS)
Connector Type	FEA02FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	R/O	–
2	L/O	–

Connector No.	F91
Connector Name	TURBOCHARGER BOOST SENSOR
Connector Type	BOSCH 1928404073

Terminal No.	Color of Wire	Signal Name [Specification]
1	V	5V
2	G	GND
3	O	VS

Connector No.	F94
Connector Name	GLOW RELAY
Connector Type	FCI 240PC089S0015

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	GLOW PLUG 3
2	L	GLOW PLUG 1
3	R/G	DIAG
4	W	+BATT
6	Y	GLOW PLUG 4
7	LG	GLOW PLUG 2
8	L/Y	CONTROL [Except M9R engine]

Connector No.	F95
Connector Name	GLOW PLUG NO.1
Connector Type	TYCO-AMP 953631-1

Terminal No.	Color of Wire	Signal Name [Specification]
1	L	–

Connector No.	F96
Connector Name	GLOW PLUG NO.2
Connector Type	TYCO-AMP 953631-1

Terminal No.	Color of Wire	Signal Name [Specification]
1	LG	–

Connector No.	F97
Connector Name	GLOW PLUG NO.3
Connector Type	TYCO-AMP 953631-1

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–

Connector No.	F98
Connector Name	GLOW PLUG NO.4
Connector Type	TYCO-AMP 953631-1

Terminal No.	Color of Wire	Signal Name [Specification]
1	Y	–

Connector No.	F99
Connector Name	EGR VOLUME CONTROL VALVE
Connector Type	FEP-42121200

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	– [Except M9R engine]
2	R	– [Except M9R engine]
3	GR	–
5	Y/G	– [Except M9R engine]
6	L/W	– [Except M9R engine]

JCBWA0311GB

ENGINE CONTROL SYSTEM (K9K ENGINE)

Connector No.	F100
Connector Name	FUEL PUMP TEMPERATURE SENSOR
Connector Type	FEA02FGY

Terminal No.	Color of Wire	Signal Name [Specification]
1	P	–
2	L/G	–

Connector No.	F102
Connector Name	FUEL RAIL PRESSURE SENSOR
Connector Type	FCI-211PC032S2049

Terminal No.	Color of Wire	Signal Name [Specification]
1	LG	–
2	GR	–
3	L	–

Connector No.	F106
Connector Name	HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)
Connector Type	FEA02FO

Terminal No.	Color of Wire	Signal Name [Specification]
1	G	–
2	LG/B	–

Connector No.	F107
Connector Name	HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)
Connector Type	FEA02FW

Terminal No.	Color of Wire	Signal Name [Specification]
3	G	–
4	SB	–

Connector No.	F121
Connector Name	WIRE TO WIRE
Connector Type	NS16FW-CS

Terminal No.	Color of Wire	Signal Name [Specification]
4	R	–[With diesel engine]
6	B/Y	–[With diesel engine]
10	G/R	–[With diesel engine]
11	L/B	–[With diesel engine]
12	G	–

Connector No.	F122
Connector Name	WIRE TO WIRE
Connector Type	M02FW-LC

Terminal No.	Color of Wire	Signal Name [Specification]
2	B/R	–

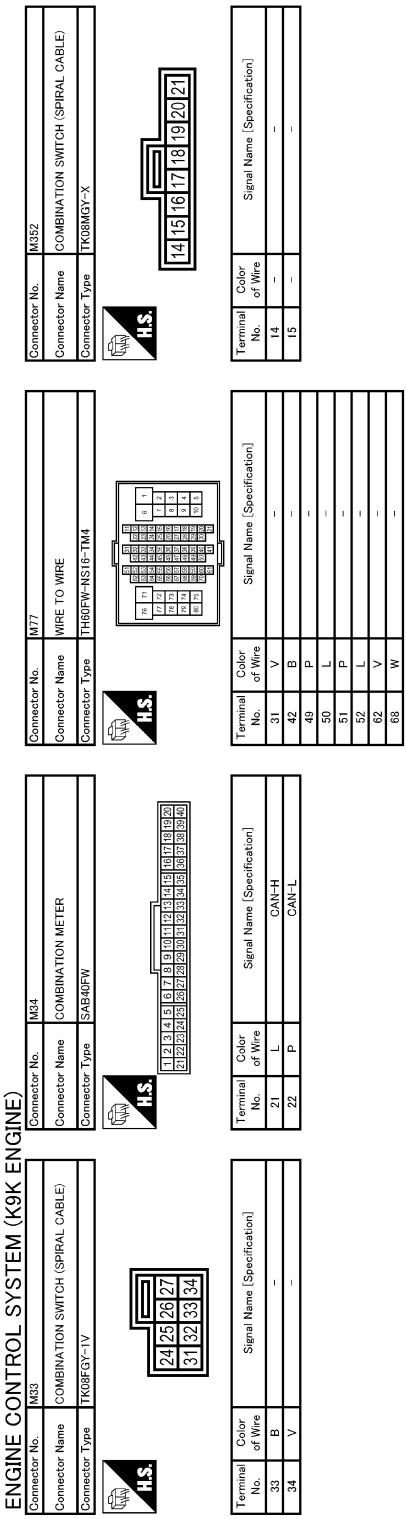
Connector No.	F123
Connector Name	WIRE TO WIRE
Connector Type	TK24FW-1Y

Terminal No.	Color of Wire	Signal Name [Specification]
4	R/L	–
6	G/P	–
17	Y/W	–
19	GR/R	–[With K9K engine]
20	LG	–[With K9K engine]

Connector No.	M4
Connector Name	DATA LINK CONNECTOR
Connector Type	BD16FW

Terminal No.	Color of Wire	Signal Name [Specification]
4	B	–
5	B	–
6	L	–
8	W	–
14	P	–
16	Y	–

JCBWA0312GE



JCBWA0313GE

DTC Index

INFOID:0000000001180698

X: Applicable —: Not applicable

DTC*	Items (CONSULT-III screen item)	Trip	MI lighting up		Reference page
			Yellow	Red	
P0001	FUEL SYSTEM	3	–	×	ECK-68
P0002	FUEL SYSTEM	3	–	–	ECK-68

DTC*	Items (CONSULT-III screen item)	Trip	MI lighting up		Reference page
			Yellow	Red	
P0016	COHERENCE CMSFT/SN	3	–	–	ECK-68
P0045	TURBO ACT CIRC	3	–	×	ECK-75
P0069	PRESSURE COHERENCE	3	–	×	ECK-77
P0087	LOW FUEL PRESS	3	–	–	ECK-79
P0090	FUEL SYSTEM	3	–	×	ECK-81
P0100	AIR FLOW SEN CIRC	3	–	–	ECK-83
P0101	AIR FLOW SEN CIRC	3	–	–	ECK-86
P0110	IN-AIR TMP SEN CIR	3	–	–	ECK-89
P0115	WATER TMP SEN	1 or 3	–	–	ECK-91
P0120	TP SEN CIRC	3	–	–	ECK-93
P0180	FUEL TEMP SEN CIRC	1 or 3	–	–	ECK-95
P0190	RAIL/PRESS SEN CIR	3	–	×	ECK-97
P0200	INJECTOR CTRL CIRC	3	–	×	ECK-99
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	×	×	ECK-101
P0217	ENG OVER TEMP	1	–	–	ECK-103
P0225	PDL POTEN CIRC TK1	3	–	×	ECK-106
P0235	IN-MANI PRES CIRC	3	–	×	ECK-109
P0335	ENGNE SPD SEN CIRC	1	–	×	ECK-111
P0340	CAMSHAFT SEN CIRC	3	–	–	ECK-113
P0380	PRHT UNIT CTRL CIR	3	–	–	ECK-116
P0381	PRHT DGNSTC CNECT	3	–	–	ECK-118
P0409	EGR POSITN OFFSET	3	×	–	ECK-120
P0487	EGR COMMAND CIRC	3	–	–	ECK-122
P0488	EGR/V POSITN CTRL	3	–	× or –	ECK-124
P0500	VEHL/SPD INF CIRC	1	–	–	ECK-127
P0530	REFRIGERNT SEN CIR	1	–	–	ECK-128
P0560	CPU SUPPLY VOLTAGE	1	–	–	ECK-130
P0571	BRAKE SWITCH CIRC	1	–	–	ECK-133
P0575	SPD LIM/CRS CTRL	1	–	–	ECK-136
P0606	COMPUTER(C/U)	1 or 3	× or –	× or –	ECK-139
P0641	SEN SUPPLY N-1 VOL	3	–	×	ECK-141
P0651	SEN SUPPLY N-2 VOL	3	–	×	ECK-143
P0685	MAIN RLY CTRL CIRC	3	–	×	ECK-145
P0812	REVERSE INFO	1	–	–	ECK-147
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

DTC*	Items (CONSULT-III screen item)	Trip	MI lighting up		Reference page
			Yellow	Red	
P2299	BRK/ACCEL PDL PSTN	3	–	×	ECK-160
P2413	EGR SYSTEM	3	×	×	ECK-163
P2502	ALT CHARGE INFO	1	–	–	ECK-166
P2610	ENGINE PROTECTION	1	–	–	ECK-167

*: This number is prescribed by ISO 15031-6.

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:0000000001180699

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, "Diagnosis Procedure"
Starting malfunction	Engine does not start or starts with difficulty	CHART 2	ECK-190, "Diagnosis Procedure"
	Starting difficult with cold engine	CHART 3	ECK-192, "Diagnosis Procedure"
	Impossible to shut off engine	CHART 4	ECK-194, "Diagnosis Procedure"
Idle speed malfunction	Engine Idle speed too high	CHART 5	ECK-195, "Diagnosis Procedure"
	Engine Idle speed too low or unstable	CHART 6	ECK-196, "Diagnosis Procedure"
Behavior while driving	Engine stalling	CHART 7	ECK-198, "Diagnosis Procedure"
	No or very little acceleration, increase in engine speed	CHART 8	ECK-200, "Diagnosis Procedure"
	Engine bucking	CHART 9	ECK-203, "Diagnosis Procedure"
	Erratic acceleration	CHART 10	ECK-205, "Diagnosis Procedure"
	No engine braking	CHART 11	ECK-207, "Diagnosis Procedure"
	Loss of power	CHART 12	ECK-208, "Diagnosis Procedure"
	Too much power	CHART 13	ECK-211, "Diagnosis Procedure"
	Overspeed at idle speed or on releasing brake	CHART 14	ECK-213, "Diagnosis Procedure"
	Excessive consumption	CHART 15	ECK-214, "Diagnosis Procedure"
	Engine knock	CHART 16	ECK-216, "Diagnosis Procedure"
	Engine overheating	CHART 17	ECK-218, "Diagnosis Procedure"
Noise, odors or smoke	Engine smokes when started	CHART 18	ECK-219, "Diagnosis Procedure"
	Engine emits blue smoke	CHART 19	ECK-220, "Diagnosis Procedure"
	Engine smokes when revved	CHART 20	ECK-222, "Diagnosis Procedure"
	Engine emits white smoke (especially when starting)	CHART 21	ECK-223, "Diagnosis Procedure"
	Emission control not satisfactory	CHART 22	ECK-224, "Diagnosis Procedure"

NOT COMMUNICATION WITH THE ECM

Description

INFOID:0000000001180700

CHART 1: NO COMMUNICATION WITH THE ECM

Diagnosis Procedure

INFOID:0000000001180701

1.INSPECTION START

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).

>> GO TO 2.

2.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-28, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK ECM GROUND

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

Check ECM power supply and ground circuit. Refer to ECK-65, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connector.

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.

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace harness or connector.

ENGINE DOES NOT START OR STARTS WITH DIFFICULTY

Description

INFOID:0000000001180702

CHART 2: ENGINE DOES NOT START OR STARTS WITH DIFFICULTY

Diagnosis Procedure

INFOID:0000000001180703

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"

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.
NO >> Repair or replace starter motor or starter relay. Refer to STR-23, "K9K MODELS : Removal and 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".

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.

7.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

Check air intake system. Refer to EM-266, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace air intake system. Refer to EM-266, "Removal and Installation"

10. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to ECK-93, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. CHECK LOW PRESSURE CIRCUIT

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 12.

12. 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)".

>> GO TO 13.

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

Perform the TEST 3: 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]".

>> GO TO 14.

14. 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 15.

15. 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 16.

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

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 Open)".

>> GO TO 17.

17. 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**

STARTING DIFFICULT WITH COLD ENGINE

Description

INFOID:0000000001180704

CHART 3: STARTING DIFFICULT WITH COLD ENGINE

Diagnosis Procedure

INFOID:0000000001180705

1.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 2.
No >> Top up the oil.

2.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-23, "Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace engine oil. Refer to LU-24, "Refilling"

3.CHECK BATTERY

Check the battery. Refer to PG-113, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace battery. Refer to PG-113, "Removal and Installation"

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 STR-23, "K9K MODELS : Removal and Installation"

5.CHECK COMPONENT PART

Check the following.
- Engine coolant temperature sensor. Refer to ECK-92, "Component Inspection".
- Fuel pump temperature sensor. Refer to ECK-96, "Component Inspection".
- Intake air temperature sensor. Refer to ECK-90, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK GLOW SYSTEM

Check the glow system. Refer to ECK-118, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace glow system. Refer to EM-276, "Removal and Installation"

7.CHECK LOW PRESSURE CIRCUIT

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 8.

8.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)".

>> GO TO 9.

9. CHECK COMPRESSION PRESSURE

Check the compression pressure. Refer to EM-264, "Inspection".

>> **INSPECTION END**

IMPOSSIBLE TO SHUT OFF ENGINE

Description

INFOID:0000000001180706

CHART 4: IMPOSSIBLE TO SHUT OFF ENGINE

Diagnosis Procedure

INFOID:0000000001180707

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.

ENGINE IDLE SPEED TOO HIGH

Description

INFOID:0000000001180708

CHART 5: ENGINE IDLE SPEED TOO HIGH

Diagnosis Procedure

INFOID:0000000001180709

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 >> GO TO 3.
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".

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace.

ENGINE IDLE SPEED TOO LOW OR UNSTABLE

Description

INFOID:0000000001180710

CHART 6: ENGINE IDLE SPEED TOO LOW OR UNSTABLE

Diagnosis Procedure

INFOID:0000000001180711

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. Refer to EM-266, "Removal and Installation".

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 REFRIGERANT PRESSURE SENSOR

Check refrigerant pressure sensor. Refer to ECK-128, "Diagnosis Procedure".

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?

YES >> GO TO 9.
NO >> Repair or replace.

9.CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

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 ECK-10, "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 ECK-11, "BASIC INSPECTION : 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 ECK-11, "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 ECK-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 ECK-15, "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 ECK-19, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 16.

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)".

>> **INSPECTION END**

ENGINE STALLING

Description

INFOID:0000000001180712

CHART 7: ENGINE STALLING

Diagnosis Procedure

INFOID:0000000001180713

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.

8.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

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-28, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace harness or connector.

10. CHECK LOW PRESSURE CIRCUIT

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 11.

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)".

>> 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 ECK-11, "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 ECK-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 ECK-15, "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 ECK-19, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 16.

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)".

>> **INSPECTION END**

NO OR VERY LITTLE ACCELERATION, INCREASE IN ENGINE SPEED

Description

INFOID:0000000001180714

CHART 8: NO OR VERY LITTLE ACCELERATION, INCREASE IN ENGINE SPEED

Diagnosis Procedure

INFOID:0000000001180715

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.

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

Check EGR system. Refer to ECK-163, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace.

10. CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-28, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 12.
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 Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 13.

13. 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)".

>> GO TO 14.

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

Perform the TEST 3: 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]".

>> GO TO 15.

15. 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 16.

16. 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 17.

17. 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, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 18.

18. 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**

ENGINE BUCKING

Description

INFOID:0000000001180716

CHART 9: ENGINE BUCKING

Diagnosis Procedure

INFOID:0000000001180717

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 >> GO TO 3.
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".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace.

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.

5.CHECK VEHICLE SPEED SIGNAL

Check the following component.

- “ABS actuator and electric unit (control unit)” [Refer to BRC-17, "CONSULT-III Function (ABS)" (without ESP) or BRC-95, "CONSULT-III Function (ABS)" (with ESP).]
- Combination meter (Refer to MWI-27, "CONSULT-III Function (METER/M&A)".)

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-28, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace harness or connector.

7.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-266, "Removal and Installation".

Is the inspection result normal?

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?

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 ECK-10, "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 ECK-11, "BASIC INSPECTION : 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 ECK-11, "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 ECK-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 ECK-15, "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 ECK-19, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 16.

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)".

>> **INSPECTION END**

ERRATIC ACCELERATION

Description

INFOID:0000000001180718

CHART 10: Erratic acceleration

Diagnosis Procedure

INFOID:0000000001180719

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 >> GO TO 3.
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".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace.

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.

5.CHECK VEHICLE SPEED SIGNAL

Check the following component.

- “ABS actuator and electric unit (control unit)” [Refer to BRC-17, "CONSULT-III Function (ABS)" (without ESP) or BRC-95, "CONSULT-III Function (ABS)" (with ESP).]
- Combination meter (Refer to MWI-27, "CONSULT-III Function (METER/M&A)".)

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-28, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace harness or connector.

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

Perform the TEST 3: 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]".

>> GO TO 8.

8.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 9.

9. 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 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 ECK-19, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 11.

11. 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**

NO ENGINE BRAKING

Description

INFOID:0000000001180720

CHART 11: NO ENGINE BRAKING

Diagnosis Procedure

INFOID:0000000001180721

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 >> GO TO 3.
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".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace.

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

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 Open)".

>> GO TO 6.

6.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**

LOSS OF POWER

Description

INFOID:0000000001180722

CHART 12: LOSS OF POWER

Diagnosis Procedure

INFOID:0000000001180723

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK FUEL FILTER

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.

3.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-23, "Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace engine oil. Refer to LU-24, "Refilling"

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.

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.

7.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-266, "Removal and Installation".

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".

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.
NO >> Repair or replace.

12. CHECK VEHICLE SPEED SIGNAL

Check the following component.

- "ABS actuator and electric unit (control unit)" [Refer to BRC-17, "CONSULT-III Function (ABS)" (without ESP) or BRC-95, "CONSULT-III Function (ABS)" (with ESP).]
- Combination meter (Refer to MWI-27, "CONSULT-III Function (METER/M&A)".)

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair or replace.

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, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair or replace harness or connector.

15. CHECK EGR SYSTEM

Check EGR system. Refer to ECK-163, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Repair or replace.

16. CHECK CATALYTIC CONVERTER

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

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. 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)".

>> 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 ECK-11, "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 ECK-12, "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 ECK-15, "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 ECK-19, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 23.

23. 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**

TOO MUCH POWER

Description

INFOID:0000000001180724

CHART 13: TOO MUCH POWER

Diagnosis Procedure

INFOID:0000000001180725

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 >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to ECK-92, "Component Inspection".

Is the turbocharger correct?

Yes >> GO TO 4.
No >> Repair or replace.

4.CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to ECK-158, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 5.
No >> Repair or replace.

5.CHECK CLUTCH SWITCH

Check clutch switch. Refer to ECK-149, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK VEHICLE SPEED SIGNAL

Check the following component.

- “ABS actuator and electric unit (control unit)” [Refer to BRC-17, "CONSULT-III Function (ABS)" (without ESP) or BRC-95, "CONSULT-III Function (ABS)" (with ESP).]
- Combination meter (Refer to MWI-27, "CONSULT-III Function (METER/M&A)".)

Is the inspection result normal?

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

7.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-28, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace harness or connector.

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

Perform the TEST 3: 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]".

>> 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 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 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 ECK-19, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> 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**

OVERSPEED AT IDLE SPEED OR ON RELEASING BRAKE

Description

INFOID:0000000001180726

CHART 14: OVERSPEED AT IDLE SPEED OR ON RELEASING BRAKE

Diagnosis Procedure

INFOID:0000000001180727

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"

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 3.
No >> Top up the oil.

3.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 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.
NO >> Repair or replace harness or connector.

5.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-28, "CAN Communication 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)”

Perform trouble diagnosis on the “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”. Refer to BRC-17, "CONSULT-III Function (ABS)" (without ESP) or BRC-95, "CONSULT-III Function (ABS)" (with ESP).

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Repair or replace.

EXCESSIVE CONSUMPTION

Description

INFOID:0000000001180728

CHART 15:EXCESSIVE CONSUMPTION

Diagnosis Procedure

INFOID:0000000001180729

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 >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-266, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 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.

6.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.

7.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.
No >> Repair or replace.

8.CHECK LOW PRESSURE CIRCUIT

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 9.

9.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)".

>> GO TO 10.

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

Perform the TEST 3: 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]".

>> GO TO 11.

11. 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 12.

12. 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 13.

13. 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, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 14.

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)".

>> **INSPECTION END**

ENGINE KNOCK

Description

INFOID:0000000001180730

CHART 16: ENGINE KNOCK

Diagnosis Procedure

INFOID:0000000001180731

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"

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 3.
No >> Top up the oil.

3.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 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.
NO >> Repair or replace harness or connector.

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 CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace.

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

Perform the TEST 3: 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]".

>> GO TO 10.

10. 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 11.

11. 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 12.

12. 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, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 13.

13. 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**

ENGINE OVERHEATING

Description

INFOID:0000000001180732

CHART 17: ENGINE OVERHEATING

Diagnosis Procedure

INFOID:0000000001180733

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

Description

INFOID:0000000001180734

CHART 18: ENGINE SMOKES WHEN STARTED

Diagnosis Procedure

INFOID:0000000001180735

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"

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 3.
No >> Top up the oil.

3.CHECK FUEL PUMP TEMPERATURE SENSOR

Check fuel pump temperature sensor. Refer to ECK-96, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 4.
No >> Repair or replace.

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 SYSTEM

Check the cooling system. Refer to CO-48, "Troubleshooting Chart".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

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

Perform the TEST 3: 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]".

>> GO TO 7.

7.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 8.

8.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)".

>> **INSPECTION END**

ENGINE EMITS BLUE SMOKE

Description

INFOID:0000000001180736

CHART 19: ENGINE EMITS BLUE SMOKE

Diagnosis Procedure

INFOID:0000000001180737

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"

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

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".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace.

10. CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

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

Perform the TEST 3: 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]".

>> GO TO 12.

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 Control Valve) Check]".

>> GO TO 13.

13. 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 14.

14. 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, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 15.

15. 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)".

>> GO TO 16.

16. 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 17.
NO >> Repair or replace harness or connector.

17. 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.

ENGINE SMOKES WHEN REVVED

Description

INFOID:0000000001180738

CHART 20: ENGINE SMOKES WHEN REVVED

Diagnosis Procedure

INFOID:0000000001180739

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"

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 3.
No >> Top 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 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.
NO >> Repair or replace harness or connector.

5.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to ECK-85, "Component Inspection".

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace.

ENGINE EMITS WHITE SMOKE (ESPECIALLY WHEN STARTING)

Description

INFOID:0000000001180740

CHART 21: ENGINE EMITS WHITE SMOKE (ESPECIALLY WHEN STARTING)

Diagnosis Procedure

INFOID:0000000001180741

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK COOLING SYSTEM

Check the cooling system. Refer to CO-48, "Troubleshooting Chart".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK GLOW SYSTEM

Check the glow system. Refer to ECK-118, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace glow system. Refer to EM-276, "Removal and Installation"

4.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, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 5.

5.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**

EMISSION CONTROL NOT SATISFACTORY

Description

INFOID:0000000001180742

CHART 22: EMISSION CONTROL NOT SATISFACTORY

Diagnosis Procedure

INFOID:0000000001180743

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 >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-266, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 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.

6.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.

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.

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

Perform the TEST 3: 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]".

>> 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 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 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 ECK-19, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> 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**

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000001180744

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.

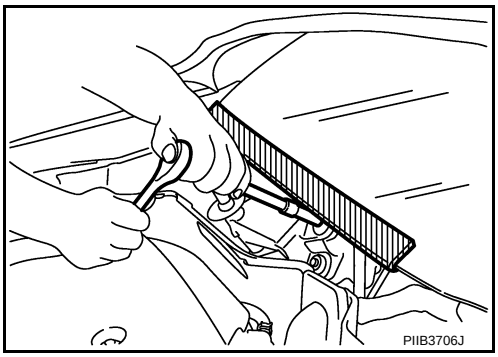
WARNING:

- **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

INFOID:0000000001180745

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

INFOID:0000000001180746

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.

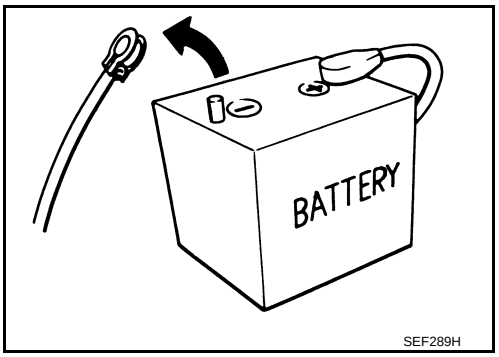
CAUTION:

- **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 PG-104, "Description".**
- **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.**

General Precautions

INFOID:0000000001180747

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **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.**



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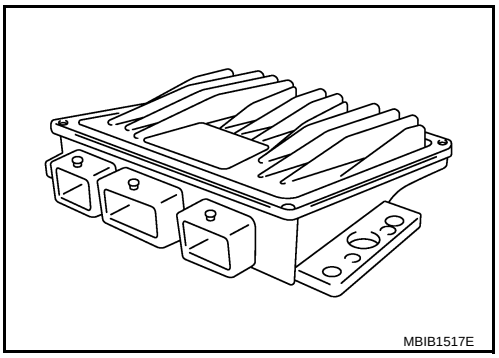
- **Do not disassemble ECM.**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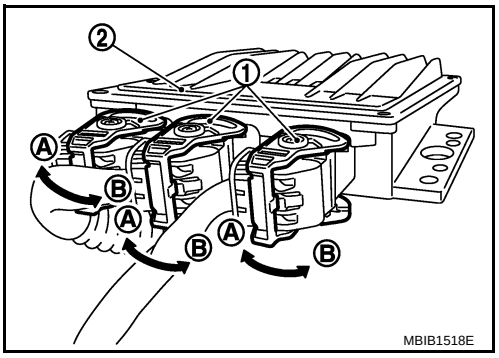
- **When connecting ECM harness connector, fasten (A) it securely with levers (1) as far as they will go as shown in the figure.**
- **ECM (2)**
- **Loosen (B)**



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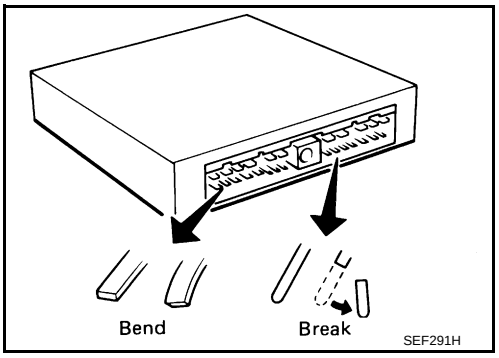
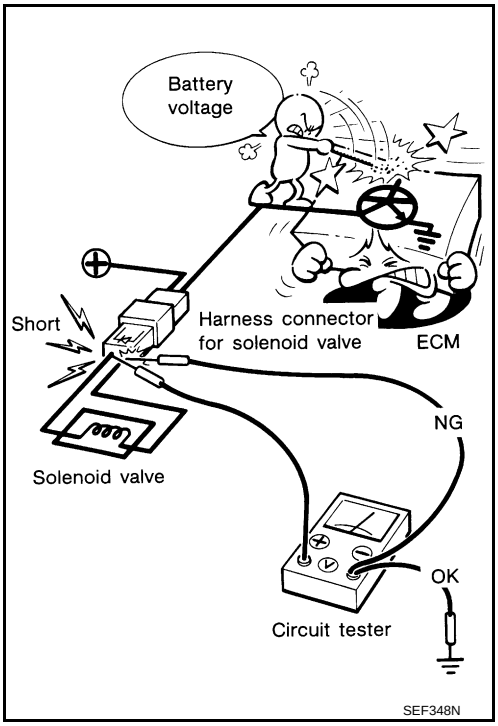
- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can 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.**

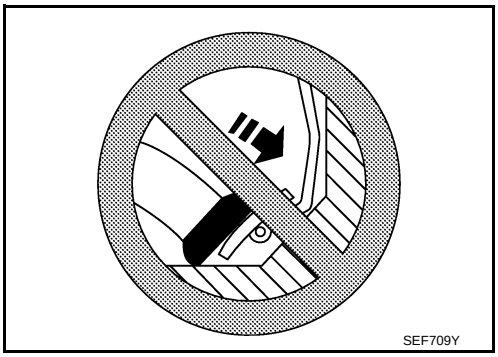


SEF291H

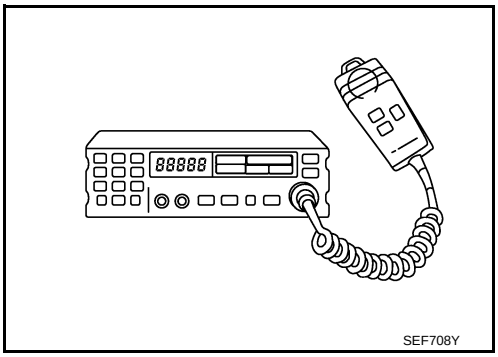
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to 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.



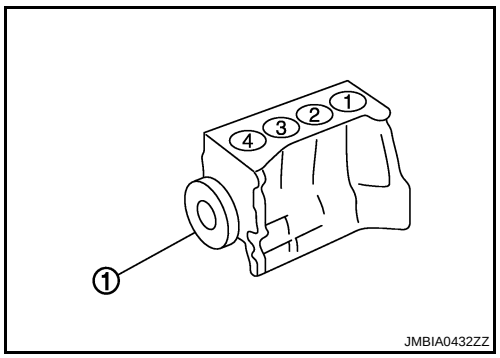
- **Do not depress accelerator pedal when staring.**
- **Immediately after staring, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**



- **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.**
- **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.
- **Adjust the antenna and feeder line so that the standingwave radio can be kept smaller.**
- **Be sure to ground the radio to vehicle body.**



- **Cylinder NO.1 is at the flywheel end.**
  -1: Crankshaft pulley



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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 ofelectro-static 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

INFOID:0000000001180748

Cleanliness

RISKS ASSOCIATED WITH CONTAMINATION

The high pressure direct injection system is highly sensitive to contamination. The risks associated withcontamination 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

NOTE:
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)

Idle Speed

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Condition	Specification
No load* (in Neutral position)	800 ± 50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, glow plug, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position