SECTION ENGINE CONTROL SYSTEM o

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CONTENTS

QR25DE

BASIC INSPECTION7
DIAGNOSIS AND REPAIR WORKFLOW
INSPECTION AND ADJUSTMENT11
BASIC INSPECTION
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT
IDLE SPEED 14 IDLE SPEED : Description 14 IDLE SPEED : Special Repair Requirement 14
IGNITION TIMING
VIN REGISTRATION
THROTTLE VALVE CLOSED POSITION LEARN- 15ING15THROTTLE VALVE CLOSED POSITION LEARNING : Description15THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement15
IDLE AIR VOLUME LEARNING

IDLE AIR VOLUME LEARNING : Special Repair Requirement16	F
MIXTURE RATIO SELF-LEARNING VALUE CLEAR	G
FUNCTION DIAGNOSIS19	
ENGINE CONTROL SYSTEM19System Diagram19System Description19Component Parts Location20Component Description25	J
MULTIPORT FUEL INJECTION SYSTEM27System Diagram27System Description27Component Parts Location30Component Description35	K
ELECTRIC IGNITION SYSTEM37System Diagram37System Description37Component Parts Location38Component Description43	M
AUTOMATIC SPEED CONTROL DEVICE (ASCD)	O P
CAN COMMUNICATION	
COOLING FAN CONTROL59	

System Diagram59

System Description	59
Component Parts Location	
Component Description	65
EVAPORATIVE EMISSION SYSTEM	67
System Diagram	
System Description	
Component Parts Location	
Component Description	
INTAKE VALVE TIMING CONTROL	
System Diagram	
System Description	
Component Parts Location Component Description	
ON BOARD DIAGNOSTIC (OBD) SYSTEM .	
Diagnosis Description	
CONSULT-III Function Diagnosis Tool Function	
-	
COMPONENT DIAGNOSIS	109
TROUBLE DIAGNOSIS - SPECIFICATION	
VALUE	. 109
Description	
Component Function Check	
Diagnosis Procedure	110
POWER SUPPLY AND GROUND CIRCUIT .	. 118
Diagnosis Procedure	
	400
U0129, U1022 CAN COMM CIRCUIT DTC Logic	
Diagnosis Procedure	
-	
U0293, U1020 CAN COMM CIRCUIT	
DTC Logic Diagnosis Procedure	
	123
U0400, U1021 CAN COMM DATA	
DTC Logic	124
Diagnosis Procedure	124
U0418, U1023 CAN COMM DATA	. 126
DTC Logic	126
Diagnosis Procedure	126
U1000, U1001 CAN COMM CIRCUIT	. 128
Description	
DTC Logic	
Diagnosis Procedure	128
P0011 IVT CONTROL	. 129
DTC Logic	
Diagnosis Procedure	
Component Inspection	131
P0031, P0032 A/F SENSOR 1 HEATER	122
Description	
DTC Logic	
Diagnosis Procedure	

Component Inspection 135
P0037, P0038 HO2S2 HEATER 136 Description 136 DTC Logic 136 Diagnosis Procedure 137 Component Inspection 138
P0043, P0044 HO2S3 HEATER 139 Description 139 DTC Logic 139 Diagnosis Procedure 140 Component Inspection 141
P0075 IVT CONTROL SOLENOID VALVE142Description142DTC Logic142Diagnosis Procedure142Component Inspection143
P0101 MAF SENSOR145Description145DTC Logic145Component Function Check146Diagnosis Procedure147Component Inspection148
P0102, P0103 MAF SENSOR153Description153DTC Logic153Diagnosis Procedure154Component Inspection155
P0112, P0113 IAT SENSOR160Description160DTC Logic160Diagnosis Procedure161Component Inspection161
P0116 ECT SENSOR163Description163DTC Logic163Diagnosis Procedure164Component Inspection164
P0117, P0118 ECT SENSOR166Description166DTC Logic166Diagnosis Procedure167Component Inspection167
P0122, P0123 TP SENSOR169Description169DTC Logic169Diagnosis Procedure169Component Inspection171Special Repair Requirement171
P0125 ECT SENSOR 172 Description 172 DTC Logic 172

Diagnosis Procedure Component Inspection	
P0127 IAT SENSOR	175
Description	175
DTC Logic	175
Diagnosis Procedure	
Component Inspection	
	170
P0128 THERMOSTAT FUNCTION	177
DTC Logic	
Diagnosis Procedure	
Component Inspection	178
P0130 A/F SENSOR 1	
Description	179
DTC Logic	179
Component Function Check	
Diagnosis Procedure	
	101
P0131 A/F SENSOR 1	183
Description	
DTC Logic	
Diagnosis Procedure	184
P0132 A/F SENSOR 1	
Description	186
DTC Logic	186
Diagnosis Procedure	
P0133 A/F SENSOR 1	189
Description	
DTC Logic	189
	189
DTC Logic Diagnosis Procedure	189 190
DTC Logic Diagnosis Procedure P0137 HO2S2	189 190 193
DTC Logic Diagnosis Procedure P0137 HO2S2 Description	189 190 193 193
DTC Logic Diagnosis Procedure P0137 HO2S2	189 190 193 193
DTC Logic Diagnosis Procedure P0137 HO2S2 Description	189 190 193 193 193
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check	189 190 193 193 193 194
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure	189 190 193 193 193 194 195
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check	189 190 193 193 193 194 195
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection	189 190 193 193 193 194 195 196
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0138 HO2S2	189 190 193 193 193 194 195 196 198
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0138 HO2S2 Description	189 190 193 193 193 194 195 196 198
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0138 HO2S2 Description DTC Logic	189 190 193 193 193 194 195 196 198 198
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0138 HO2S2 Description DTC Logic Component Function Check	189 190 193 193 193 194 195 196 198 198 198 200
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0138 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure	189 190 193 193 193 194 195 196 198 198 198 200 200
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0138 HO2S2 Description DTC Logic Component Function Check	189 190 193 193 193 194 195 196 198 198 198 200 200
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0138 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection	189 190 193 193 193 194 195 196 198 198 198 200 203
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0138 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0139 HO2S2	189 190 193 193 193 194 195 196 198 198 200 200 203
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0138 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0139 HO2S2	189 190 193 193 193 194 195 196 198 198 200 200 203
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0138 HO2S2 DESCRIPTION DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0139 HO2S2 Description	189 190 193 193 193 194 195 196 198 198 198 198 200 203 205
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0138 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0139 HO2S2 Description DTC Logic	189 190 193 193 193 194 195 196 198 198 198 200 200 203 205 205 205
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0138 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0139 HO2S2 Description DTC Logic Component Inspection	189 190 193 193 193 194 195 196 198 198 198 200 203 205 205 205 205
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0138 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0139 HO2S2 Description DTC Logic Component Function Check DTC Logic Component Function Check Diagnosis Procedure	189 190 193 193 193 194 195 196 198 198 198 200 200 203 205 205 206 207
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0138 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0139 HO2S2 Description DTC Logic Component Inspection	189 190 193 193 193 194 195 196 198 198 198 200 200 203 205 205 206 207
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0138 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0139 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Function Check Diagnosis Procedure Component Function Check Diagnosis Procedure Component Function Check Diagnosis Procedure Component Inspection	189 190 193 193 193 194 195 196 198 198 198 200 200 203 205 205 205 206 207 208
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0138 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0139 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Function Check Diagnosis Procedure Component Function Check Diagnosis Procedure Component Function Check Diagnosis Procedure Component Inspection P0143 HO2S3	189 190 193 193 194 195 196 198 198 198 200 200 203 205 205 205 205 206 207 208 210
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0138 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0139 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Function Check Diagnosis Procedure Component Function Check Diagnosis Procedure Component Function Check Diagnosis Procedure Component Inspection P0143 HO2S3 Description	189 190 193 193 193 194 195 196 198 198 198 198 200 200 203 205 205 205 205 205 207 208 210 210
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0138 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0139 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Function Check Diagnosis Procedure Component Function Check Diagnosis Procedure Component Function Check Diagnosis Procedure Component Inspection P0143 HO2S3 Description DTC Logic	189 190 193 193 193 194 195 196 198 198 198 198 200 200 200 203 205 205 205 205 205 207 208 210 210 210
DTC Logic Diagnosis Procedure P0137 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0138 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P0139 HO2S2 Description DTC Logic Component Function Check Diagnosis Procedure Component Function Check Diagnosis Procedure Component Function Check Diagnosis Procedure Component Function Check Diagnosis Procedure Component Inspection P0143 HO2S3 Description	189 190 193 193 193 194 195 196 198 198 198 198 200 200 200 203 205 205 205 205 205 207 208 210 210 210

P0144 HO2S3213	
Description213	А
DTC Logic	
Diagnosis Procedure214	
P0145 HO2S3216	EC
Description	
DTC Logic216	
Diagnosis Procedure217	С
P0146 HO2S3	
Description	
DTC Logic219	D
Diagnosis Procedure220	
P0171 FUEL INJECTION SYSTEM FUNC-	E
TION	
DTC Logic	
Diagnosis Procedure	F
P0172 FUEL INJECTION SYSTEM FUNC-	
TION	G
DTC Logic226 Diagnosis Procedure227	
-	
P0181 FTT SENSOR 230	Н
Description	
DTC Logic	
Diagnosis Procedure	
Component Inspection232	
P0182, P0183 FTT SENSOR 233	
Description233	J
DTC Logic	
Diagnosis Procedure233 Component Inspection235	
	Κ
P0201, P0202, P0203, P0204 FUEL INJEC-	
TOR	
Description	L
DTC Logic236 Diagnosis Procedure236	
Component Inspection	M
	IVI
P0222, P0223 TP SENSOR 239	
Description	Ν
DTC Logic	14
Diagnosis Procedure239 Component Inspection241	
Special Repair Requirement	0
P0300, P0301, P0302, P0303, P0304 MIS-	
FIRE	Ρ
DTC Logic242 Diagnosis Procedure243	
P0327, P0328 KS248	
Description	
DTC Logic	
Diagnosis Procedure	
Component Inspection249	

P0335 CKP SENSOR (POS) Description		C C
DTC Logic		P0
Diagnosis Procedure		SU
Component Inspection	.252	
P0340 CMP SENSOR (PHASE)	254	
Description		
DTC Logic	.254	C
Diagnosis Procedure		P0
Component Inspection	.256	
P0420 THREE WAY CATALYST FUNCTION.	258	Г
DTC Logic		C
Diagnosis Procedure	.259	P0
P0441 EVAP CONTROL SYSTEM	262	Ľ
DTC Logic		С С
Component Function Check		C
		L
Diagnosis Procedure	.204	P0
P0443 EVAP CANISTER PURGE VOLUME		C
CONTROL SOLENOID VALVE	267	Г
Description		Ċ
DTC Logic		
		L
Diagnosis Procedure		P0
Component Inspection	.270	C
P0444, P0445 EVAP CANISTER PURGE		- C
VOLUME CONTROL SOLENOID VALVE	272	
Description		_
DESCIPTION DTC Logic		P0
Diagnosis Procedure		Ľ
-		C
Component Inspection	.274	C
P0447 EVAP CANISTER VENT CONTROL		
VALVE	275	P0
Description		Ľ
DTC Logic		D
Diagnosis Procedure		Ľ
Component Inspection	.277	P0
P0448 EVAP CANISTER VENT CONTROL		D
VALVE	279	D
Description		Ľ
DTC Logic		P0
Diagnosis Procedure		_
Component Inspection		
	.201	
P0451 EVAP CONTROL SYSTEM PRES-		C
SURE SENSOR	283	P0
Description		
DTC Logic		
Diagnosis Procedure		
Component Inspection		Ĺ
	.200	P0
P0452 EVAP CONTROL SYSTEM PRES-		. U
SURE SENSOR	286	5
Description		C
		L
DTC Logic	.200	D 0

Diagnosis Procedure Component Inspection	
	209
P0453 EVAP CONTROL SYSTEM PRES- SURE SENSOR	200
Description	
DTC Logic	
Diagnosis Procedure	
Component Inspection	
P0456 EVAP CONTROL SYSTEM	.295
DTC Logic	
Diagnosis Procedure	296
Component Inspection	300
P0460 FUEL LEVEL SENSOR	.301
Description	
DTC Logic	
Diagnosis Procedure	301
P0461 FUEL LEVEL SENSOR	.302
Description	302
DTC Logic	302
Component Function Check	302
Diagnosis Procedure	303
P0462, P0463 FUEL LEVEL SENSOR	.304
Description	
DTC Logic	
Diagnosis Procedure	
P0500 VSS	306
Description	
DTC Logic	
Diagnosis Procedure	
P0506 ISC SYSTEM	.307
Description	
DTC Logic	
Diagnosis Procedure	
P0507 ISC SYSTEM	309
Description	
DTC Logic	
Diagnosis Procedure	
P0603 ECM POWER SUPPLY	211
Description	
DTC Logic	
Diagnosis Procedure	
P0605 ECM	
Description	
DTC Logic Diagnosis Procedure	
-	
P0607 ECM	
Description	
DTC Logic	
Diagnosis Procedure	315

DTC Logic	6
POAC4 HV MIL ON REQUEST	
P1148 CLOSED LOOP CONTROL	
P1195 ENGINE DOES NOT START	C
P1196 POOR ENGINE POWER	3
P1197 FUEL RUN OUT	
P1217 ENGINE OVER TEMPERATURE	7 7
P1225 TP SENSOR 331 Description 331 DTC Logic 331 Diagnosis Procedure 331 Special Repair Requirement 332	1 1 1
P1226 TP SENSOR333Description333DTC Logic333Diagnosis Procedure333Special Repair Requirement334	3 3 3
P1421 COLD START CONTROL	5 5
P1564 ASCD STEERING SWITCH	7 7 7
P1572 ASCD BRAKE SWITCH)) 1 4
P1574 ASCD VEHICLE SPEED SENSOR	6 6
P1805 BRAKE SWITCH	B

Description	A
P2100, P2103 THROTTLE CONTROL MO-TOR RELAY351Description351DTC Logic351Diagnosis Procedure351	EC C
P2101 ELECTRIC THROTTLE CONTROL FUNCTION	D
Diagnosis Procedure	F
Description	G
Special Repair Requirement	Η
Description	
P2135 TP SENSOR362Description362DTC Logic362Diagnosis Procedure362Component Inspection364Special Repair Requirement364	J K L
P2423 HC ADSORPTION CATALYST FUNC- TION	M
P2A00 A/F SENSOR 1 369 Description 369 DTC Logic 369 Diagnosis Procedure 370	N
ASCD BRAKE SWITCH	P
COOLING FAN	

Component Inspection (Cooling Fan Relay)379

FUEL PUMP	380
Description	
Component Function Check	
Diagnosis Procedure	
Component Inspection (Fuel Pump)	
Component Inspection (Condenser-1)	

IGNITION SIGNAL 38	84
Description	84
Component Function Check	84
Diagnosis Procedure	84
Component Inspection (Ignition Coil with Power	
Transistor)	87
Component Inspection (Condenser-2)38	88

MALFUNCTION INDICATOR LAMP .	389
Description	
Component Function Check	
Diagnosis Procedure	

ON BOARD REFUELING VAPOR RECOV-

ERY (ORVR)	390
Description	
Component Function Check	
Diagnosis Procedure	
Component Inspection	

POSITIVE CRANKCASE VENTILATION	395
Description	
Component Inspection	

REFRIGERANT PRESSURE SENSOR	396
Description	
Component Function Check	
Diagnosis Procedure	

ЕСМ	398
Reference Value	398
Wiring Diagram — ENGINE CONTROL SYSTE	M
—	409
Fail Safe	432
DTC Inspection Priority Chart	434
DTC Index	435
How to Set SRT Code	438
Test Value and Test Limit	440

SYMPTOM DIAGNOSIS443
ENGINE CONTROL SYSTEM SYMPTOMS443 Symptom Table
NORMAL OPERATING CONDITION447 Description
PRECAUTION448
PRECAUTIONS 448Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TEN- SIONER"448Precaution for Procedure without Cowl Top Cover. 448448Precautions For Xenon Headlamp Service448On Board Diagnostic (OBD) System of Engine449General Precautions449
PREPARATION452
PREPARATION452Special Service Tools452Commercial Service Tools452
ON-VEHICLE MAINTENANCE454
FUEL PRESSURE
EVAP LEAK CHECK
ON-VEHICLE REPAIR457
EVAP CANISTER457Exploded View457Removal and Installation457Inspection458
SERVICE DATA AND SPECIFICATIONS (SDS)459

SERVICE DATA AND SPECIFICATIONS

(SDS)	459
Idle Speed	
Ignition Timing	459
Calculated Load Value	
Mass Air Flow Sensor	459

BASIC INSPECTION DIAGNOSIS AND REPAIR WORKFLOW

Work Flow



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INFOID:000000003069075 EC **OVERALL SEQUENCE** Inspection start D 1. Get information for symptom Get the detailed information about symptom from the customer. 2. Check DTC*1 Check DTC*1. Print out DTC^{*1} and freeze frame data^{*2} (or, write it down). Check related service bulletins. Symptom is described. Symptom is not described. Symptom is described. DTC*1 is detected. DTC*1 is detected. DTC*1 is not detected. 3. Confirm the symptom 4. Confirm the symptom Try to confirm the symptom described by the Try to confirm the symptom described by the Н customer. customer. Also study the normal operation and fail safe Also study the normal operation and fail safe related to the symptom. related to the symptom. 5. Perform DTC CONFIRMATION PROCEDURE 6. Perform BASIC INSPECTION With CONSULT-III Without CONSULT-III 9. Detect malfunctioning 7. Perform "SPEC" in system by Symptom Within the "DATA MONITOR" mode SP value Table Out of the SP value 8. Detect malfunctioning part by **TROUBLE DIAGNOSIS** Malfunctioning part - SPECIFICATION VALUE is not detected. Malfunctioning part 10. Detect malfunctioning part by is detected. Μ **Diagnosis Procedure** Ν 11. Repair or replace the malfunctioning part 12. Final check DTC*1 is detected. Symptom remains. Make sure that the symptom is not detected. Perform DTC Confirmation Procedure again, and then make sure that the malfunction can be repaired securely. Ρ DTC*1 is not detected. Symptom does not remain. **INSPECTION END**

*1: Include 1st trip DTC.

*2: Include 1st trip freeze frame data.

DETAILED FLOW

EC-7

< BASIC INSPECTION >

1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the "Diagnostic Work Sheet". (Refer to <u>EC-9</u>, "<u>Diagnostic Work</u> <u>Sheet</u>".)

>> GO TO 2.

2.CHECK DTC

- 1. Check DTC.
- 2. Perform the following procedure if DTC is displayed.
- Record DTC and freeze frame data. (Print them out with CONSULT-III or GST.)
- Erase DTC. (Refer to EC-86, "Diagnosis Description".)
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to <u>EC-443</u>, "Symptom Table".)
- 3. Check related service bulletins for information.

Is any symptom described and is any DTC detected?

Symptom is described, DTC is detected>>GO TO 3. Symptom is described, DTC is not detected>>GO TO 4. Symptom is not described, DTC is detected>>GO TO 5.

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON). Also study the normal operation and fail safe related to the symptom. Refer to <u>EC-447, "Description"</u> and <u>EC-</u>432, "Fail Safe".

Diagnosis Work Sheet is useful to verify the incident.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.

Also study the normal operation and fail safe related to the symptom. Refer to <u>EC-447</u>, "<u>Description</u>" and <u>EC-432</u>, "Fail Safe".

Diagnosis Work Sheet is useful to verify the incident.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then make sure that DTC is detected again.

If two or more DTCs are detected, refer to <u>EC-434. "DTC Inspection Priority Chart"</u> and determine trouble diagnosis order.

NOTE:

- Freeze frame data is useful if the DTC is not detected.
- Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.

If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIR-MATION PROCEDURE.

Is DTC detected?

YES >> GO TO 10.

NO >> Check according to <u>EC-435, "DTC Index"</u>.

6.PERFORM BASIC INSPECTION

Perform EC-11, "BASIC INSPECTION : Special Repair Requirement".

Do you have CONSULT-III?

EC-8

DIAGNOSIS AND REPAIR WORKFLOW

DIAGNOSIS AND REPAIR WORKFLOW	
< BASIC INSPECTION >	[QR25DE]
YES >> GO TO 7. NO >> GO TO 9.	A
7. PERFORM SPEC IN DATA MONITOR MODE	
With CONSULT-III Make sure that "MAS A/F SE-B1", "B/FUEL SCHDL" and "A/F ALPHA-B1" are within the SP value SULT-III in "SPEC" of "DATA MONITOR" mode. Refer to EC-109, "Component Function Check".	using CON-
Is the measurement value within the SP value? YES >> GO TO 9.	С
NO >> GO TO 8.	
8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE	D
Detect malfunctioning part according to <u>EC-110, "Diagnosis Procedure"</u> .	
Is malfunctioning part detected? YES >> GO TO 11. NO >> GO TO 9.	E
9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE	
Detect malfunctioning system according to <u>EC-443</u> , " <u>Symptom Table</u> " based on the confirmed step 4, and determine the trouble diagnosis order based on possible causes and symptom.	symptom in
>> GO TO 10.	G
10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE	
Inspect according to Diagnosis Procedure of the system.	Н
NOTE: The Diagnosis Procedure in EC section described based on open circuit inspection. A short circu is also required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-45, "Cirtion"</u> .	
Is malfunctioning part detected?	
 YES >> GO TO 11. NO >> Monitor input data from related sensors or check the voltage of related ECM terminals SULT-III. Refer to <u>EC-398, "Reference Value"</u>. 	ل using CON-
11. REPAIR OR REPLACE THE MALFUNCTIONING PART	K
 Repair or replace the malfunctioning part. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair a ment. 	and replace-
 Check DTC. If DTC is displayed, erase it. Refer to <u>EC-86, "Diagnosis Description"</u>. 	
>> GO TO 12. 12. FINAL CHECK	Μ
When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Compone Check again, and then make sure that the malfunction have been repaired securely. When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and that the symptom is not detected.	14
Is DTC detected and does symptom remain? YES-1 >> DTC is detected: GO TO 10.	0
 YES-2 >> Symptom remains: GO TO 6. NO >> Before returning the vehicle to the customer, make sure to erase unnecessary D⁻ (Refer to <u>EC-86, "Diagnosis Description"</u>.) If the completion of SRT is needed, drive very the specific DRIVING PATTERN in <u>EC-438, "How to Set SRT Code"</u>. 	
Diagnostic Work Sheet	=OID:000000003069076

DESCRIPTION

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

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 MIL 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.

WORKSHEET SAMPLE

Customer nar	me 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.
	☐ Startability	Impossible to start No combust Partial combustion affected by th Partial combustion NOT affected Possible but hard to start Other	nrottle position I by throttle position
Symptoms	🗌 Idling	□ No fast idle □ Unstable □ H □ Others [High idle ☐ Low idle]
	Driveability	Stumble Surge Knock Intake backfire Exhaust backfi Others [Lack of power re]
	Engine stall	At the time of start While idling While accelerating While dece	lerating
Incident occur	Incident occurrence] In the daytime
Frequency		All the time Under certain cond	ditions 🗌 Sometimes
Weather conditions			
	Weather	🗌 Fine 🗌 Raining 🗌 Snowing	Others []
	Temperature	🗌 Hot 🗌 Warm 🗌 Cool 🗌] Cold 🗌 Humid °F
		Cold During warm-up	After warm-up
Engine conditions		Engine speed 0 2,000	
Road conditio	ins	🗌 In town 🗌 In suburbs 🗌 Hig	hway 🗌 Off road (up/down)
Driving conditions		Not affected At starting While idling While accelerating While decelerating While turning Vehicle speed	8
		0 10 20	30 40 50 60 MPH
Malfunction in	idicator lamp	☐ Turned on ☐ Not turned on	

KEY POINTS

WHAT Vehicle & engine model WHEN Date, Frequencies WHERE Road conditions **HOW** Operating conditions, Weather conditions, Symptoms SEF907L

MTBI 0017

[QR25DE]

INSPECTION AND ADJUSTMENT < BASIC INSPECTION > INSPECTION AND ADJUSTMENT BASIC INSPECTION BASIC INSPECTION : Special Repair Requirement

1.INSPECTION START

- 1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
- 2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket
- 3. Lift up the vehicle.
- Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine until engine coolant temperature indicator points the middle of gauge. Ensure engine stays below 1,500 rpm.
- 5. Run engine at about 2,500 rpm for about 2 minutes under no load.
- 6. Make sure that no DTC is displayed with CONSULT-III or GST.

Is any DTC detected?

YES >> GO TO 2.

NO >> GO TO 3.

2.REPAIR OR REPLACE

Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3	
	J
3.CHECK TARGET IDLE SPEED	
1. Run engine at about 2,500 rpm for about 2 minutes under no load.	
2. Rev engine two or three times under no load, then run engine at idle speed for about 1 minute.	Κ
 Shift the selector lever to N position with engine running. Chask idle encoder 	
 Check idle speed. For procedure, refer to <u>EC-14, "IDLE SPEED : Special Repair Requirement"</u>. 	
For specification, refer to <u>EC-459, "Idle Speed"</u> .	L
CAUTION:	
Never leave the selector lever in the N position for a long period of time. In the N position, the	
engine operates but electricity cannot be generated.	M
5. Shift the selector lever to P position.	
Is the inspection result normal?	
YES >> GO TO 9.	Ν
NO >> GO TO 4.	
4.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	-
1. Turn ignition switch OFF.	0
2. Perform EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".	
>> GO TO 5.	Ρ
5. PERFORM IDLE AIR VOLUME LEARNING	
Perform EC-16, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".	
Is Idle Air Volume Learning carried out successfully?	

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 6.

NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

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< BASIC INSPECTION >

6.CHECK TARGET IDLE SPEED AGAIN

- Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine until engine coolant temperature.
- 2. Shift the selector lever to N position with engine running.
- Check idle speed.
 For procedure, refer to <u>EC-14</u>, "IDLE SPEED : <u>Special Repair Requirement</u>".
 For specification, refer to <u>EC-459</u>, "Idle <u>Speed</u>".
 CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

4. Shift the selector lever to P position.

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the Following.

- Check camshaft position sensor (PHASE) and circuit. Refer to <u>EC-254, "DTC Logic"</u>.
- Check crankshaft position sensor (POS) and circuit. Refer to EC-250, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 8.

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

8. CHECK ECM FUNCTION

Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)

>> GO TO 4.

9.CHECK IGNITION TIMING

- 1. Run engine at idle.
- 2. Shift the selector lever to N position with engine running.
- Check ignition timing with a timing light. For procedure, refer to <u>EC-14. "IGNITION TIMING : Special Repair Requirement"</u>. For specification, refer to <u>EC-459, "Ignition Timing"</u>. CAUTION: Never lacks the selector lower in the N position for a long period of time.

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

4. Shift the selector lever to P position.

Is the inspection result normal?

YES >> GO TO 17. NO >> GO TO 10.

NO >> GO TO 10.

10. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

1. Turn ignition switch OFF.

2. Perform EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 11.

11.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-16, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 12.

NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

12.CHECK TARGET IDLE SPEED AGAIN

< BASIC INSPECTION > [QR]	25DEJ
 Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine until engine coola perature. Shift the collector layer to N position with engine running. 	nt tem-
 Shift the selector lever to N position with engine running. Check idle speed. 	
For procedure, refer to EC-14, "IDLE SPEED : Special Repair Requirement".	EC
For specification, refer to <u>EC-459, "Idle Speed"</u> .	EC
CAUTION: Never leave the selector lever in the N position for a long period of time. In the N position	on, the
 engine operates but electricity cannot be generated. Shift the selector lever to P position. 	C
Is the inspection result normal?	
YES >> GO TO 13.	D
NO >> GO TO 15.	
13. CHECK IGNITION TIMING AGAIN	Е
1. Run engine at idle.	
 Shift the selector lever to N position with engine running. Check ignition timing with a timing light. 	
For procedure, refer to <u>EC-14, "IGNITION TIMING : Special Repair Requirement"</u> .	F
For specification, refer to EC-459, "Ignition Timing".	
CAUTION:	on tha
Never leave the selector lever in the N position for a long period of time. In the N position engine operates but electricity cannot be generated.	Sh, the _G
4. Shift the selector lever to P position.	
Is the inspection result normal?	Н
YES >> GO TO 17.	
NO >> GO TO 14.	
14. CHECK TIMING CHAIN INSTALLATION	1
Check timing chain installation. Refer to EM-50, "Removal and Installation".	
Is the inspection result normal?	
YES >> GO TO 15.	J
NO >> Repair the timing chain installation. Then GO TO 4.	
15. DETECT MALFUNCTIONING PART	K
Check the following.	
 Check camshaft position sensor (PHASE) and circuit. Refer to <u>EC-254, "DTC Logic"</u>. Check crankshaft position sensor (POS) and circuit. Refer to <u>EC-250, "DTC Logic"</u>. 	
Is the inspection result normal?	L
YES >> GO TO 16.	
NO >> Repair or replace. Then GO TO 4.	M
16. CHECK ECM FUNCTION	IVI
Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, I is a rare case.)	but this N
>> GO TO 4.	
17.INSPECTION END	0
If ECM is replaced during this BASIC INSPECTION procedure, go to EC-14, "ADDITIONAL SERVICE	WHEN
REPLACING CONTROL UNIT : Special Repair Requirement".	P
	1

>> INSPECTION END ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT

< BASIC INSPECTION >

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description INFOID:000000003069078

When replacing ECM, this procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement INFOID:000000003069079

1.PERFORM VIN REGISTRATION

Refer to EC-14, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-14, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 3.

 ${f 3.}$ PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-14, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> END IDLE SPEED

IDLE SPEED : Description

This describes how to check the idle speed. For the actual procedure, follow the instructions in "BASIC INSPECTION".

IDLE SPEED : Special Repair Requirement

1.CHECK IDLE SPEED

(R)With CONSULT-III Check idle speed in "DATA MONITOR" mode with CONSULT-III. With GST Check idle speed with Service \$01 of GST.

>> INSPECTION END **IGNITION TIMING**

IGNITION TIMING : Description

This describes how to check the ignition timing. For the actual procedure, follow the instructions in "BASIC INSPECTION".

IGNITION TIMING : Special Repair Requirement

1.CHECK IGNITION TIMING

INFOID:000000003069080

INFOID:000000003069082

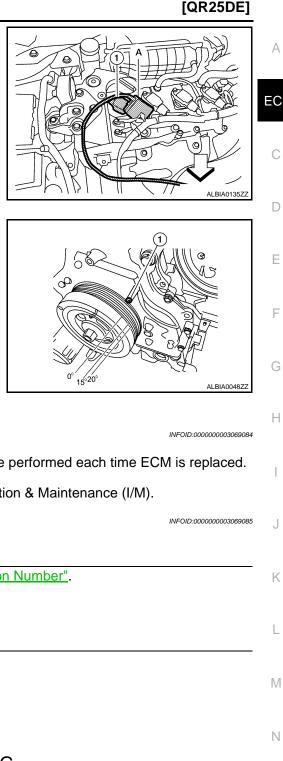
INFOID:000000003069083

[QR25DE]

INFOID:000000003069081

< BASIC INSPECTION >

- 1. Attach timing light to No. 1 igniton coil (1) wire as shown.
 - A : Timing light



- 2. Check ignition timing.
 - 1 : Timing indicator

>> INSPECTION END

VIN REGISTRATION : Description

VIN REGISTRATION

VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced. **NOTE:**

Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).

VIN REGISTRATION : Special Repair Requirement

1.CHECK VIN	
Check the VIN of the vehicle and note it. Refer to GI-21, "Identification Number".	K
>> GO TO 2.	
2. PERFORM VIN REGISTRATION	L
With CONSULT-III Turn ignition switch ON	

1. Turn ignition switch ON.

2. Select "VIN REGISTRATION" in "WORK SUPPORT" mode.

3. Follow the instruction of CONSULT-III display.

>> END THROTTLE VALVE CLOSED POSITION LEARNING

THROTTLE VALVE CLOSED POSITION LEARNING : Description

Throttle Valve Closed Position Learning is a function of ECM to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement

INFOID:000000003069087

INFOID:000000003069086

1.START

1. Make sure that accelerator pedal is fully released.

< BASIC INSPECTION >

- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds. Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

>> END IDLE AIR VOLUME LEARNING

IDLE AIR VOLUME LEARNING : Description

Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps each engine idle speed within the specific range. It must be performed under any of the following conditions:

- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

IDLE AIR VOLUME LEARNING : Special Repair Requirement

1.PRECONDITIONING

Make sure that all of the following conditions are satisfied.

Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 100°C (158 212°F)
- PNP switch: ON
- Vehicle speed: Stopped
- Transmission: Warmed-up (Drive vehicle for 10 minutes.)

Do you have CONSULT-III?

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

2. IDLE AIR VOLUME LEARNING

With CONSULT-III

- Perform Throttle Valve Closed Position Learning. Refer to <u>EC-15</u>, "<u>THROTTLE VALVE CLOSED POSI-</u> <u>TION LEARNING : Special Repair Requirement</u>".
- 2. Turn ignition switch ON (READY).
- 3. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
- 4. Touch "START" and wait 20 seconds.

Is "CMPLT" displayed on CONSULT-III screen?

YES >> GO TO 3.

NO >> GO TO 6.

 $\mathbf{3}$. CHECK IDLE SPEED AND IGNITION TIMING

1. Rev up the engine two or three times.

Check idle speed and ignition timing are within the specifications. Refer to <u>EC-459</u>, "Idle Speed" and <u>EC-459</u>, "Ignition Timing".

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

4. IDLE AIR VOLUME LEARNING

Without CONSULT-III

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- 1. Lift up the vehicle.
- 2. Perform Throttle Valve Closed Position Learning. Refer to <u>EC-15. "THROTTLE VALVE CLOSED POSI-</u> <u>TION LEARNING : Special Repair Requirement"</u>.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.

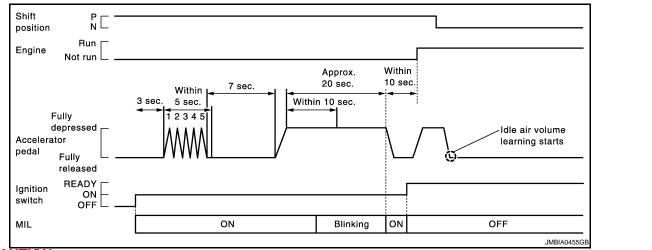
EC-16

INFOID:000000003069088

INFOID:000000003069089

< BASIC INSPECTION >

- 5. Repeat the following procedure quickly five times within 5 seconds.
- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.
- 6. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops blinking and turned ON.
- 7. Fully release the accelerator pedal and turn ignition switch ON (READY).
- 8. Depress the accelerator pedal and keep it to start engine within 10 seconds after the MIL turned ON.
- 9. Shift the selector lever to N position with engine running.
- 10. Fully release the accelerator pedal.
- 11. Wait 1 minute.



CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

- 12. Shift the selector lever to P position.
- 13. Depress the accelerator pedal and keep it.
- 14. Shift the selector lever to N position with engine running.
- Check idle speed and ignition timing are within the specifications. Refer to <u>EC-459, "Idle Speed"</u> and <u>EC-</u>
 <u>459, "Ignition Timing"</u>.
 CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated. ${\rm K}$

16. Shift the selector lever to P position.

>> GO TO 5.

5. CHECK IDLE SPEED AND IGNITION TIMING

1. Depress the accelerator pedal and keep it.

2. Shift the selector lever to N position with engine running.

Check idle speed and ignition timing are within the specifications. Refer to <u>EC-459</u>, "Idle Speed" and <u>EC-459</u>, "Ignition Timing".
 CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

4. Shift the selector lever to P position.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART-I

Check the following

- Check that throttle valve is fully closed.
- Check PCV valve operation.
- Check that downstream of throttle valve is free from air leakage.

Is the inspection result normal?

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< BASIC INSPECTION >

YES >> GO TO 7.

NO >> Repair or replace malfunctioning part.

7.DETECT MALFUNCTIONING PART-II

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.

It is useful to perform "TROUBLE DIAGNOSIS - SPECIFICATION VALUE". Refer to <u>EC-109</u>, "<u>Description</u>". If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:

- Engine stalls.
- Erroneous idle.

>> INSPECTION END MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description

INFOID:000000003069090

This describes how to erase the mixture ratio self-learning value. For the actual procedure, follow the instructions in "Diagnosis Procedure".

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement

INFOID:000000003069091

1.START

With CONSULT-III

- Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
- 3. Clear mixture ratio self-learning value by touching "CLEAR".

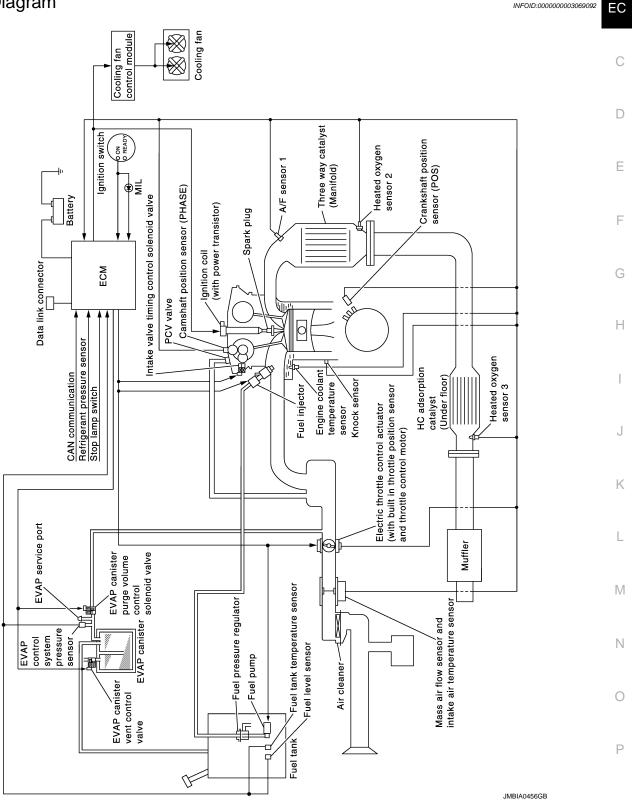
With GST

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF.
- 3. Disconnect mass air flow sensor harness connector.
- 4. Turn ignition switch ON (READY).
- 5. Depress the accelerator pedal to start engine, then keep engine running for at least 5 seconds.
- 6. Turn ignition switch OFF and reconnect mass air flow sensor harness connector.
- 7. Select Service \$03 with GST. Make sure DTC P0102 is detected.
- 8. Select Service \$04 with GST to erase the DTC P0102.

>> END

FUNCTION DIAGNOSIS ENGINE CONTROL SYSTEM

System Diagram



System Description

ECM performs various controls such as fuel injection control and ignition timing control.

[QR25DE]

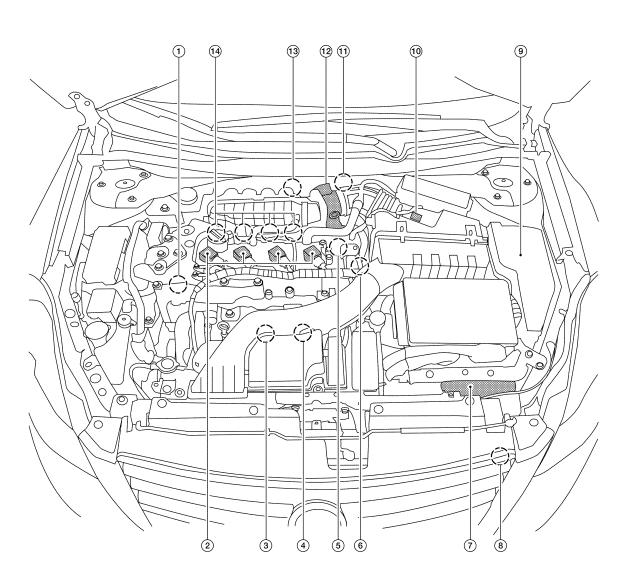
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< FUNCTION DIAGNOSIS >

Component Parts Location



- 1. Intake valve timing control solenoid 2. valve
- 4. Air fuel ratio (A/F) sensor 1
- 7. ECM
- 10. Mass air flow sensor (with intake temperature sensor)
- 13. EVAP canister purge volume control 14. Fuel injector solenoid valve
- Ignition coil (with power transistor) and spark plug
- 5. Camshaft position sensor (PHASE)
- 8. Refrigerant pressure sensor
- 11. EVAP service port
- 3. Knock sensor, Crankshaft position sensor (POS)
 - Engine coolant temperature sensor

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9. IPDM E/R

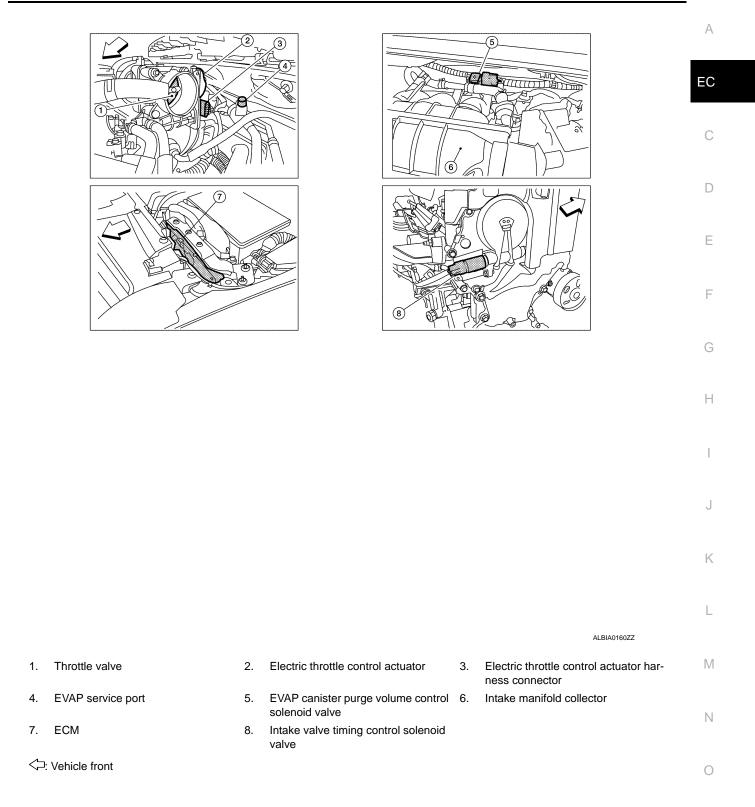
6.

12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)

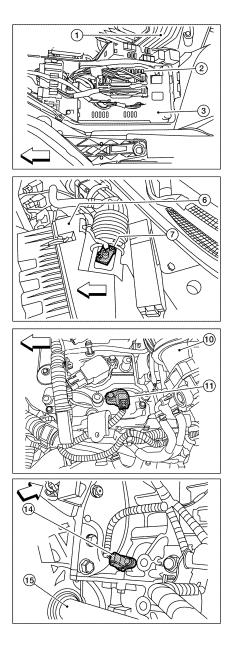
< FUNCTION DIAGNOSIS >

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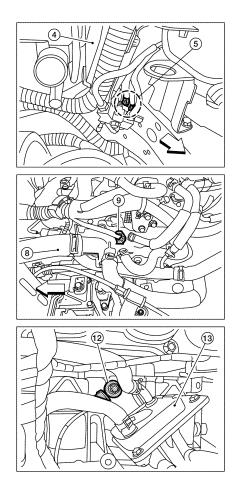


< FUNCTION DIAGNOSIS >



- 1. Air cleaner assembly
- EPS control unit (view with air cleaner assembly removed)
- 7. Mass air flow sensor (with intake temperature sensor)
- 10. Intake manifold collector
- 13. Engine oil cooler
- C: Vehicle front

- 2. Fuel pump fuse
- 5. Engine grounds
- 8. Upper radiator hose
- 11. Camshaft position sensor (PHASE)
- 14. Crankshaft position sensor (POS)

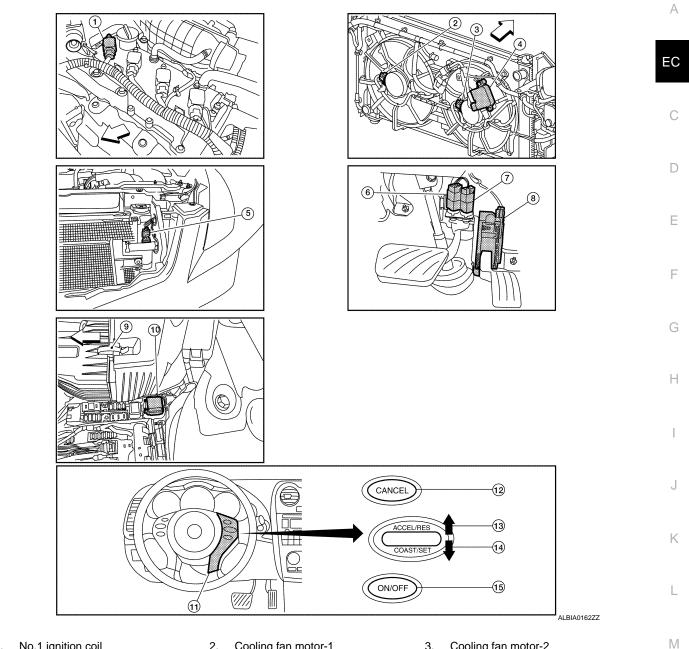


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- 3. IPDM E/R
- 6. Air cleaner assembly
- 9. Engine coolant temperature sensor
- 12. Knock sensor
- 15. Drive shaft RH

< FUNCTION DIAGNOSIS >

[QR25DE]

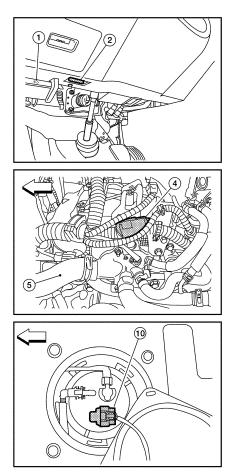


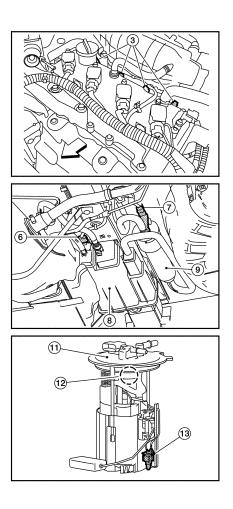
- No.1 ignition coil 1.
- Cooling fan control module 4.
- ASCD brake switch 7.
- 10. Cooling fan relay-1
- 13. RESUME/ACCELERATE switch
- C: Vehicle front

- 2. Cooling fan motor-1
- 5. Refrigerant pressure sensor
- 8. Accelerator pedal position sensor
- 11. ASCD steering switch
- 14. SET/COAST switch
- Cooling fan motor-2 3.
- 6. Stop lamp switch
- 9. Air cleaner assembly
- 12. CANSEC switch
- 15. MAIN switch

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- Hood opener handle 1.
- Condenser-2 4.
- 7. EVAP canister vent control valve
- 10. Fuel level sensor unit and fuel pump 11. Fuel pump assembly harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
- 13. Fuel tank temperature sensor
- : Vehicle front

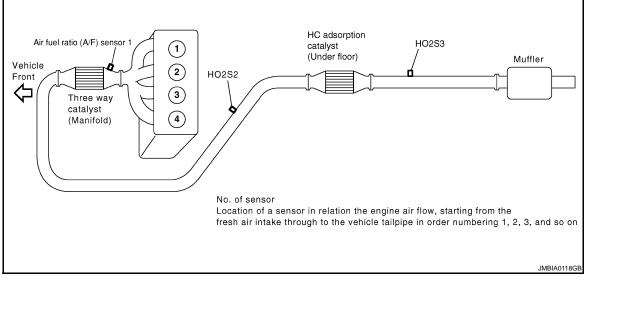
- Data link connector 2.
- 5. Upper radiator hose
- EVAP canister (MAIN) 8.

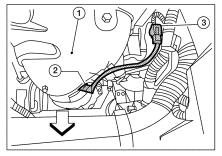


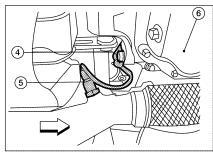
- Fuel injector harness connector 3.
- EVAP control system pressure sen-6. sor
- EVAP canister (SUB) 9.
- 12. Fuel pressure regulator

< FUNCTION DIAGNOSIS >

[QR25DE]





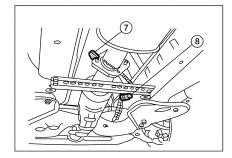


3.

6.

connector

Oil pan



- 1. Exhaust manifold cover
- 4. Heated oxygen sensor 2 harness connector
- 7. Heated oxygen sensor 3
- 2. Air fuel ratio (A/F) sensor 1
- 5. Heated oxygen sensor 2
- 8. Heated oxygen sensor 3 harness connector

C: Vehicle front

Component Description

INFOID:000000003069095

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Air fuel ratio (A/F) sensor 1 harness

Component	Reference
A/F sensor 1	EC-179, "Description"
A/F sensor 1 heater	EC-133, "Description"



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< FUNCTION DIAGNOSIS >

Component	Reference
ASCD brake switch	EC-340, "Description"
ASCD steering switch	EC-337, "Description"
ASCD vehicle speed sensor	EC-346, "Description"
Camshaft position sensor (PHASE)	EC-254, "Description"
Crankshaft position sensor (POS)	EC-250, "Description"
Cooling fan motor	EC-376, "Description"
Electric throttle control actuator	EC-360, "Description"
Engine coolant temperature sensor	EC-166, "Description"
EVAP canister purge volume control solenoid valve	EC-267, "Description"
EVAP canister vent control valve	EC-275. "Description"
EVAP control system pressure sensor	EC-283. "Description"
Fuel injector	EC-236, "Description"
Fuel level sensor	EC-301, "Description"
Fuel pump	EC-380, "Description"
Fuel tank temperature sensor	EC-230, "Description"
Heated oxygen sensor 2	EC-193, "Description"
Heated oxygen sensor 2 heater	EC-136. "Description"
Heated oxygen sensor 3	EC-210. "Description"
Heated oxygen sensor 3 heater	EC-139, "Description"
Ignition signal	EC-384, "Description"
Intake air temperature sensor	EC-160. "Description"
Intake valve timing control solenoid valve	EC-78, "System Description"
Knock sensor	EC-248, "Description"
Mass air flow sensor	EC-145. "Description"
PCV valve	EC-395, "Description"
Refrigerant pressure sensor	EC-396, "Description"
Stop lamp switch	EC-348, "Description"
Throttle control motor	EC-357. "Description"
Throttle control motor relay	EC-351, "Description"
Throttle position sensor	EC-169, "Description"
Vehicle speed sensor	EC-306. "Description"

< FUNCTION DIAGNOSIS >

MULTIPORT FUEL INJECTION SYSTEM

System Diagram

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INFOID:000000003069096

[QR25DE]

Crankshaft position sensor (POS)	Engine speed & Piston position	_			
Camshaft position sensor (PHASE)					
Mass air flow sensor	Amount of intake air	•			
Intake air temperature sensor	Intake air temperature	•			
Engine coolant temperature sensor	Engine coolant temperature	-			
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas	-			
Throttle position sensor	Throttle position	-			
Battery	Battery voltage	•	Fuel injection & mixture ratio		
Knock sensor	Engine knocking condition	- ECM	control	Fuel injector	
Heated oxygen sensor 2*	Density of oxygen in exhaust gas	-			
Brake ECU	Vehicle speed	•			
	┘ Vehicle speed Accelerator pedal position Shift position Engine operation command				
	/ Engine start request / Engine idle request Fuel cut request Engine power request Engine speed request				
Hybrid vehicle control ECU	etc.	▶			
* : This sensor is not used to control th	e engine system under normal conditions				

System Description

INFOID:000000003069097

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INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS)	Engine speed	Engine speed		
Camshaft position sensor (PHASE)	Piston position			
Mass air flow sensor	Amount of intake air			
Intake air temperature sensor	Intake air temperature			
Engine coolant temperature sensor	Engine coolant temperature			
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas			
Throttle position sensor	Throttle position			
Battery	Battery voltage	Fuel injection		
Knock sensor	Engine knocking condition	& mixture ratio	Fuel injector	
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas	control		(
Brake ECU	Vehicle speed*2			
	Vehicle speed*2			
	Accelerator pedal position*2			Ρ
Hybrid vehicle control ECU	Shift position*2			
	Engine operation command* ² (Engine start request, Engine idle re- quest, Fuel cut request, Engine power request, Engine speed request, etc.)			

*1: This sensor is not used to control the engine system under normal conditions.



< FUNCTION DIAGNOSIS >

[QR25DE]

*2: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from the crankshaft position sensor (POS), camshaft position sensor (PHASE) and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

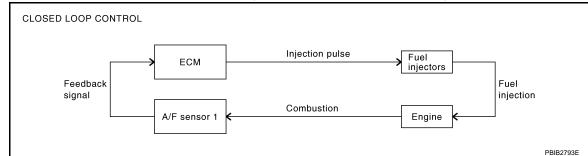
<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses A/F sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about A/F sensor 1, refer to <u>EC-179</u>, "<u>DTC Logic</u>". This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).

This stage is referred to as the closed loop control condition.

Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of A/F sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

Open Loop Control

The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of A/F sensor 1 or its circuit
- Insufficient activation of A/F sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from A/F sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally

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designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio.

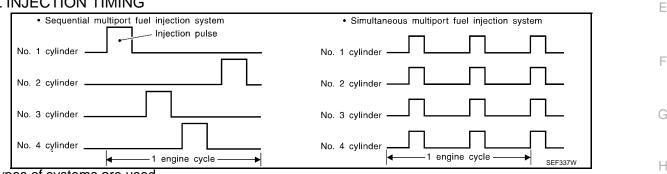
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.

"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from A/F sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

"Long term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



Two types of systems are used.

- Sequential Multiport Fuel Injection System Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.
- Simultaneous Multiport Fuel Injection System
 Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals
 of the same width are simultaneously transmitted from the ECM.
 The four injectors will then receive the signals two times for each engine cycle.
 This system is used if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or receiving the fuel cut request signal from hybrid vehicle control ECU.

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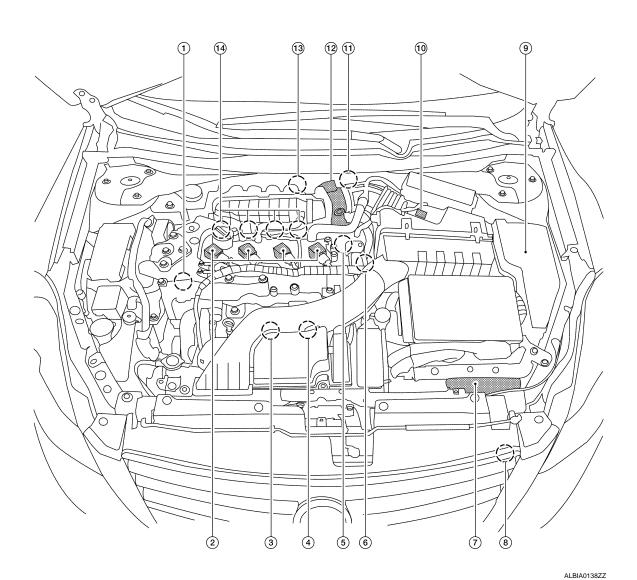
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Component Parts Location



- 1. Intake valve timing control solenoid 2. valve
- 4. Air fuel ratio (A/F) sensor 1
- 7. ECM
- 10. Mass air flow sensor (with intake temperature sensor)
- 13. EVAP canister purge volume control 14. Fuel injector solenoid valve
- Ignition coil (with power transistor) and spark plug
- 5. Camshaft position sensor (PHASE)
- 8. Refrigerant pressure sensor
- 11. EVAP service port
- 3. Knock sensor, Crankshaft position sensor (POS)
 - Engine coolant temperature sensor
- 9. IPDM E/R

6.

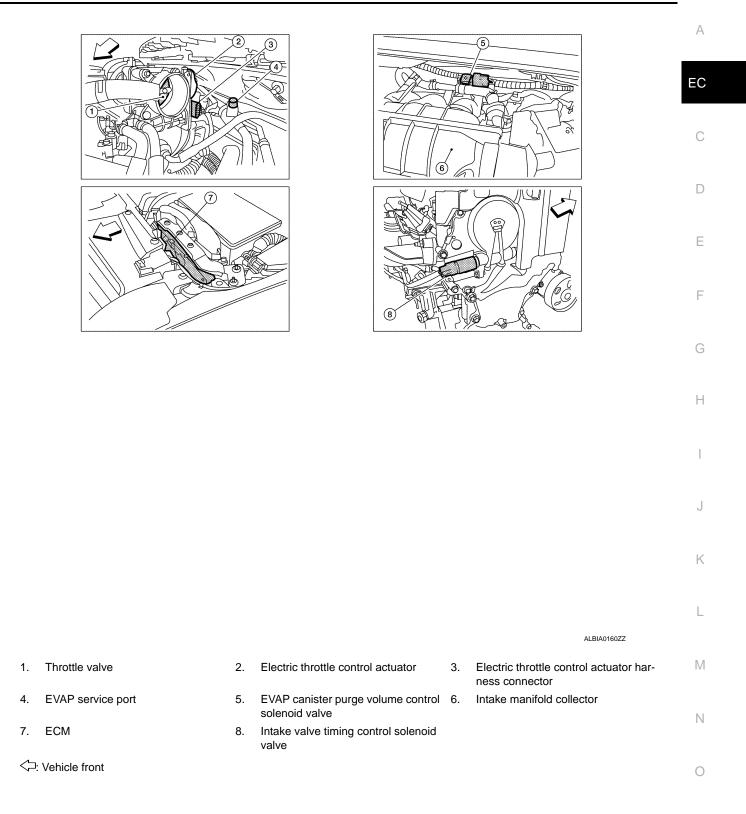
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)

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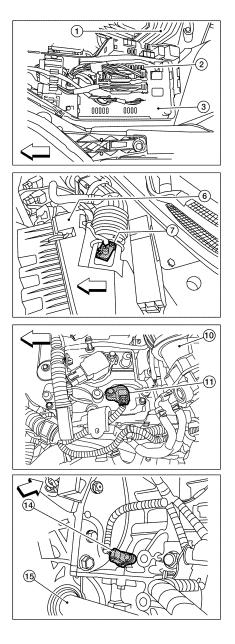
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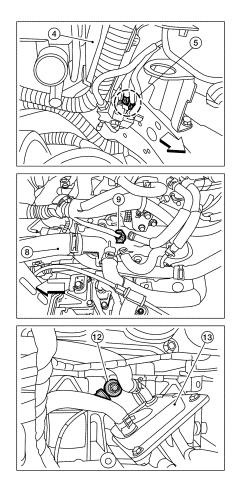
MULTIPORT FUEL INJECTION SYSTEM

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- 1. Air cleaner assembly
- EPS control unit (view with air cleaner assembly removed)
- 7. Mass air flow sensor (with intake temperature sensor)
- 10. Intake manifold collector
- 13. Engine oil cooler
- C: Vehicle front

- 2. Fuel pump fuse
- 5. Engine grounds
- 8. Upper radiator hose
- 11. Camshaft position sensor (PHASE)
- 14. Crankshaft position sensor (POS)

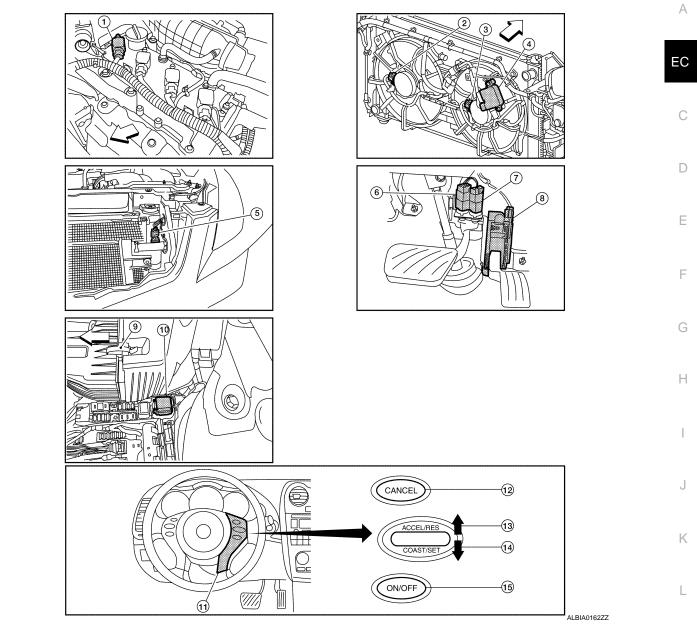


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- 3. IPDM E/R
- 6. Air cleaner assembly
- 9. Engine coolant temperature sensor
- 12. Knock sensor
- 15. Drive shaft RH

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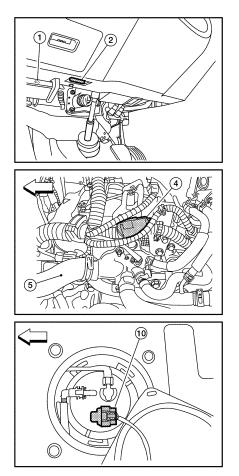
- 1. No.1 ignition coil
- 4. Cooling fan control module
- 7. ASCD brake switch
- 10. Cooling fan relay-1
- 13. RESUME/ACCELERATE switch
- C: Vehicle front

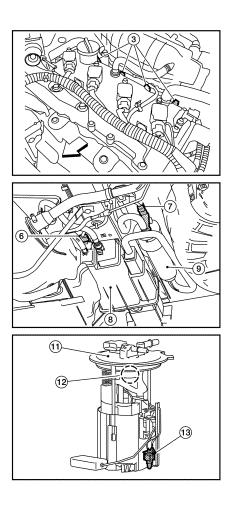
- 2. Cooling fan motor-1
- 5. Refrigerant pressure sensor
- 8. Accelerator pedal position sensor
- 11. ASCD steering switch
- 14. SET/COAST switch
- 3. Cooling fan motor-2
- 6. Stop lamp switch
- 9. Air cleaner assembly
- 12. CANSEC switch
- 15. MAIN switch

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- Hood opener handle 1.
- Condenser-2 4.
- 7. EVAP canister vent control valve
- 10. Fuel level sensor unit and fuel pump 11. Fuel pump assembly harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
- 13. Fuel tank temperature sensor
- : Vehicle front

- Data link connector 2.
- 5. Upper radiator hose
- EVAP canister (MAIN) 8.



- Fuel injector harness connector 3.
- EVAP control system pressure sen-6. sor
- EVAP canister (SUB) 9.
- 12. Fuel pressure regulator

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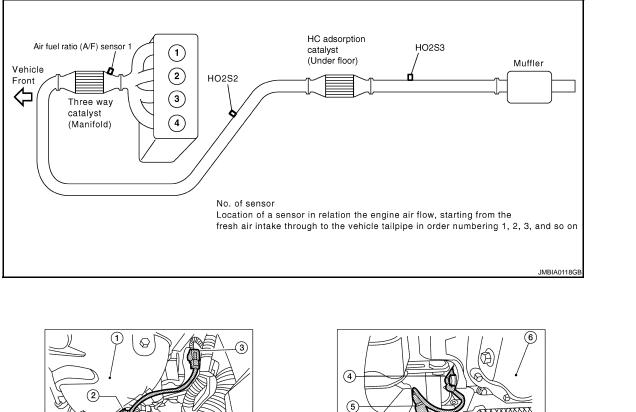
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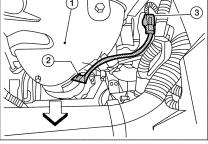
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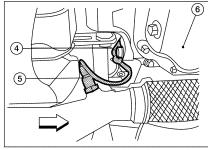
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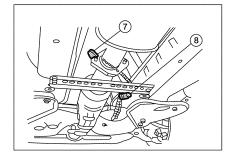


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connector

Oil pan



- 1. Exhaust manifold cover
- Heated oxygen sensor 2 harness 4. connector
- 7. Heated oxygen sensor 3
- 2. Air fuel ratio (A/F) sensor 1
- 5. Heated oxygen sensor 2
- 8. Heated oxygen sensor 3 harness connector

C: Vehicle front

Component Description

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Component	Reference
A/F sensor 1	EC-179, "Description"
Camshaft position sensor (PHASE)	EC-254, "Description"



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Air fuel ratio (A/F) sensor 1 harness

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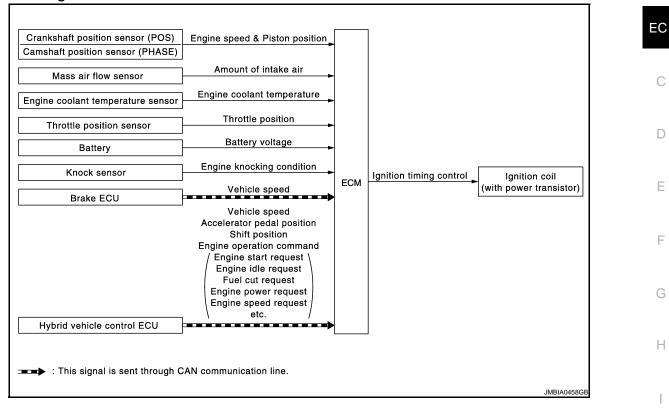
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Component	Reference
Crankshaft position sensor (POS)	EC-250, "Description"
Engine coolant temperature sensor	EC-166, "Description"
Fuel injector	EC-236, "Description"
Heated oxygen sensor 2	EC-136, "Description"
Intake air temperature sensor	EC-160, "Description"
Knock sensor	EC-248, "Description"
Mass air flow sensor	EC-145, "Description"
Throttle position sensor	EC-169, "Description"
Vehicle speed sensor	EC-306, "Description"

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ELECTRIC IGNITION SYSTEM

System Diagram



System Description

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INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed		
Camshaft position sensor (PHASE)	Piston position		
Mass air flow sensor	Amount of intake air	=	
Engine coolant temperature sensor	Engine coolant temperature	-	
Throttle position sensor	Throttle position	=	
Battery	Battery voltage	-	
Knock sensor	Engine knocking		Institut and with never transis
Brake ECU	Vehicle speed*	 Ignition timing control 	Ignition coil (with power transis- tor)
	Vehicle speed*	=	
	Accelerator pedal position*	=	
	Shift position*	-	
Hybrid vehicle control ECU	Engine operation command* (Engine start request, Engine idle request, Fuel cut request, Engine power request, Engine speed re- quest, etc.)		

*: This signal is sent to the ECM through CAN communication line.

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The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.

The ECM receives information such as the injection pulse width and camshaft position sensor (PHASE) signal. Computing this information, ignition signals are transmitted to the power transistor.

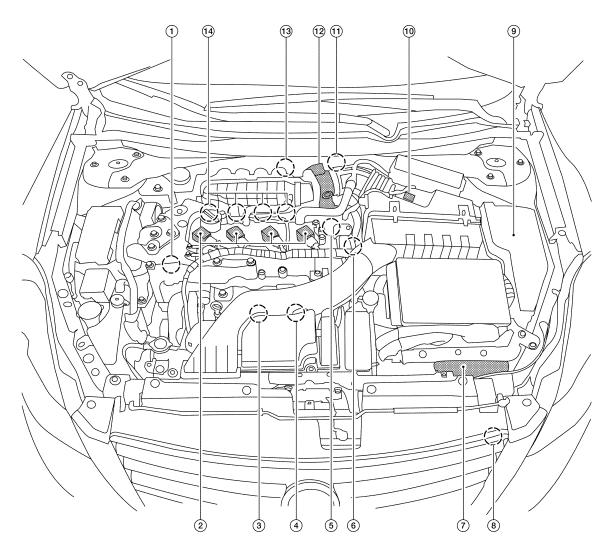
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Component Parts Location

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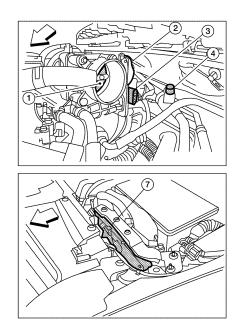
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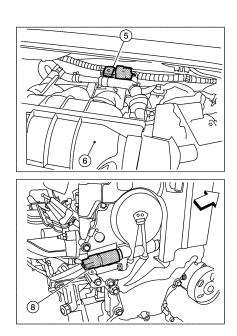
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- 1. Intake valve timing control solenoid valve
- Air fuel ratio (A/F) sensor 1 4.
- 7. ECM
- 10. Mass air flow sensor (with intake temperature sensor)
- 13. EVAP canister purge volume control 14. Fuel injector solenoid valve
- Ignition coil (with power transistor) and spark plug
- 5. Camshaft position sensor (PHASE) 8.
- Refrigerant pressure sensor 11.
 - EVAP service port
- 3. Knock sensor,

Crankshaft position sensor (POS) Engine coolant temperature sensor

- 6. IPDM E/R 9.
- Electric throttle control actuator (with 12. built in throttle position sensor and throttle control motor)





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- Throttle valve 1.
- EVAP service port 4.
- 7. ECM
- C: Vehicle front

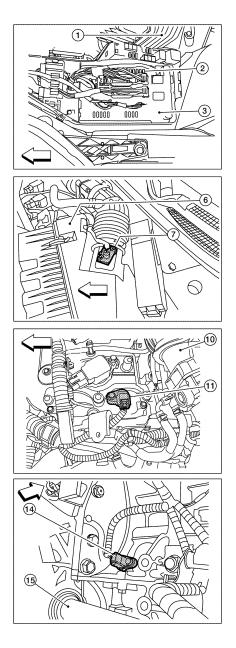
EC-39

- Electric throttle control actuator har-3. ness connector
 - Intake manifold collector
- Electric throttle control actuator

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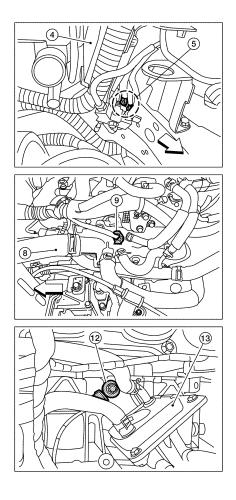
- EVAP canister purge volume control 6. 5. solenoid valve 8.
 - Intake valve timing control solenoid valve

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- 1. Air cleaner assembly
- EPS control unit (view with air cleaner assembly removed)
- 7. Mass air flow sensor (with intake temperature sensor)
- 10. Intake manifold collector
- 13. Engine oil cooler
- C: Vehicle front

- 2. Fuel pump fuse
- 5. Engine grounds
- 8. Upper radiator hose
- 11. Camshaft position sensor (PHASE)
- 14. Crankshaft position sensor (POS)

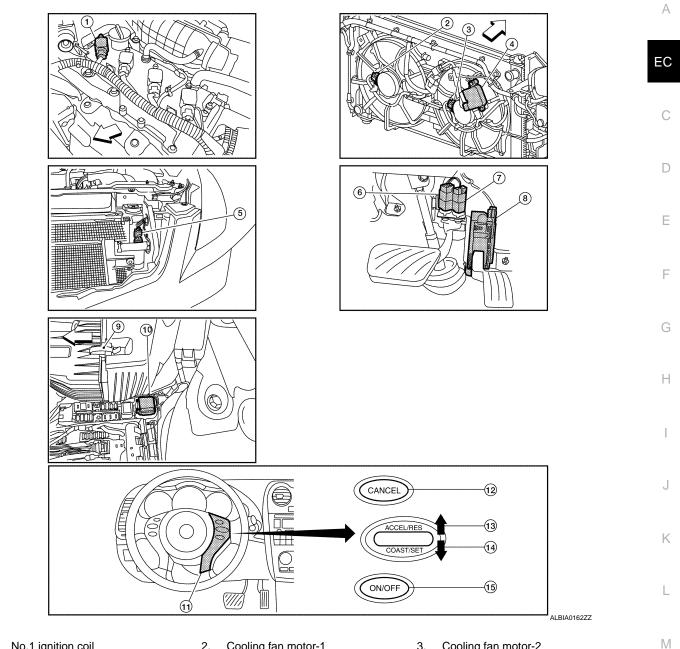


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- 3. IPDM E/R
- 6. Air cleaner assembly
- 9. Engine coolant temperature sensor
- 12. Knock sensor
- 15. Drive shaft RH

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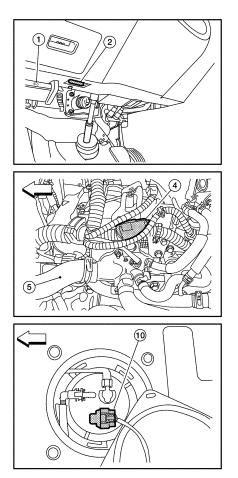


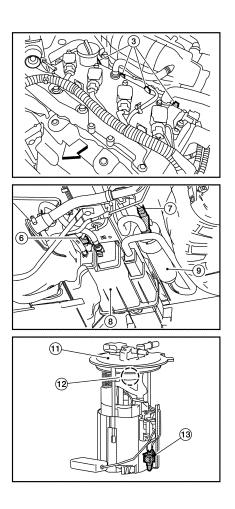
- No.1 ignition coil 1.
- Cooling fan control module 4.
- ASCD brake switch 7.
- 10. Cooling fan relay-1
- 13. RESUME/ACCELERATE switch
- C: Vehicle front

- 2. Cooling fan motor-1
- 5. Refrigerant pressure sensor
- 8. Accelerator pedal position sensor
- 11. ASCD steering switch
- 14. SET/COAST switch
- Cooling fan motor-2 3.
- 6. Stop lamp switch
- 9. Air cleaner assembly
- 12. CANSEC switch
- 15. MAIN switch

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- Hood opener handle 1.
- Condenser-2 4.
- 7. EVAP canister vent control valve
- 10. Fuel level sensor unit and fuel pump 11. Fuel pump assembly harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
- 13. Fuel tank temperature sensor
- : Vehicle front

- Data link connector 2.
- 5. Upper radiator hose
- EVAP canister (MAIN) 8.



- Fuel injector harness connector 3.
- EVAP control system pressure sen-6. sor
- EVAP canister (SUB) 9.
- 12. Fuel pressure regulator

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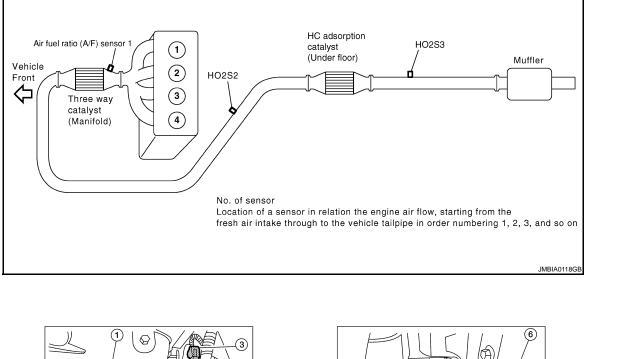
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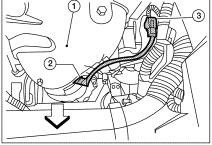
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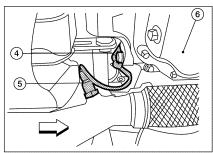
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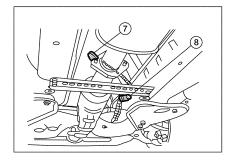


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connector

Oil pan



- 1. Exhaust manifold cover
- 4. Heated oxygen sensor 2 harness connector
- 7. Heated oxygen sensor 3
- 2. Air fuel ratio (A/F) sensor 1
- 5. Heated oxygen sensor 2
- 8. Heated oxygen sensor 3 harness connector

C: Vehicle front

Component Description

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Air fuel ratio (A/F) sensor 1 harness

Component	Reference
Camshaft position sensor (PHASE)	EC-254, "Description"
Crankshaft position sensor (POS)	EC-250, "Description"



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Component	Reference
Engine coolant temperature sensor	EC-166, "Description"
Ignition signal	EC-384. "Description"
Knock sensor	EC-248. "Description"
Mass air flow sensor	EC-145. "Description"
Throttle position sensor	EC-169, "Description"
Vehicle speed sensor	EC-306. "Description"

< FUNCTION DIAGNOSIS >

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Diagram

Stop lamp switch	Brake pedal operation		CRUISE/SET lamp operation	Combination meter
ASCD brake switch	Brake pedal operation			
Accelerator pedal Position sensor	Accelerator pedal operation	•	Torque request MG ECU Operation	MG1 MG2
PNP switch	Gear position	HV ECU		
MG ECU	MG2 speed	•		
Brake ECU	Brake pedal operation		ASCD request	
Stop lamp switch	Brake pedal operation	•		
ASCD brake switch	Brake pedal operation	•	Vehicle speed Engine power request Engine speed request	
	ASCD steering switch	ECM		
ASCD streering switch	Vehicle speed		Operation	
Brake ECU				control actuator

System Description

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INPUT/OUTPUT SIGNAL CHART

Input				ECU		Outp	out									
Sensor	Signal			ECU	Signal			Actuator								
Stop lamp switch	Brake pedal operation				CRUISE lamp operation*			Combina-								
ASCD brake switch	Brake pedal operation				SET lamp operati	on*		tion meter								
Accelerator pedal position sensor	Accelerator pedal opera	ation		-												
PNP switch	Gear position					Torque request	MG	Operation	MG1							
MG ECU	MG2 speed				Hybrid vehicle		ECU		MG2							
Brake ECU	Brake pedal operation*									control						
Stop lamp switch	Brake pedal operation	ECM ASC requ										ECU	Vahiele en eed*			
ASCD brake switch	Brake pedal operation		4000		Vehicle speed* Engine power	FOM		Electric								
ASCD steering switch	ASCD steering switch operation		ECM.	ASCD request*		request* Engine speed	ECM	Operation	throttle control actuator							
Brake ECU	Vehicle speed*				request*											

*: This signal is sent through CAN communication line.

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.

Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/ h (25 MPH) and 144 km/h (89 MPH).

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The hybrid vehicle control ECU receives signals from each switch, sensor, control unit, and maintains constant vehicle speed by optimizing the use of the engine and motor driving force.

Operation status of ASCD is indicated by CRUISE lamp and SET lamp in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.

NOTE:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press MAIN switch. (The CRUISE lamp in combination meter illuminates.)

When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH), press SET/COAST switch. (Then SET lamp in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system. And then ASCD will keep the new set speed.

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Selector lever is changed to N, P, R position
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- TCS system is operated

When any of the following conditions is detected, the hybrid vehicle control ECU will cancel the cruise operation and inform the driver by blinking indicator lamp.

• Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

If MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

RESUME OPERATION

When the RESUME/ACCELERATE switch is pressed after cancel operation other than pressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released
- Selector lever is in other than P and N positions
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (89 MPH)

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Component Parts Location

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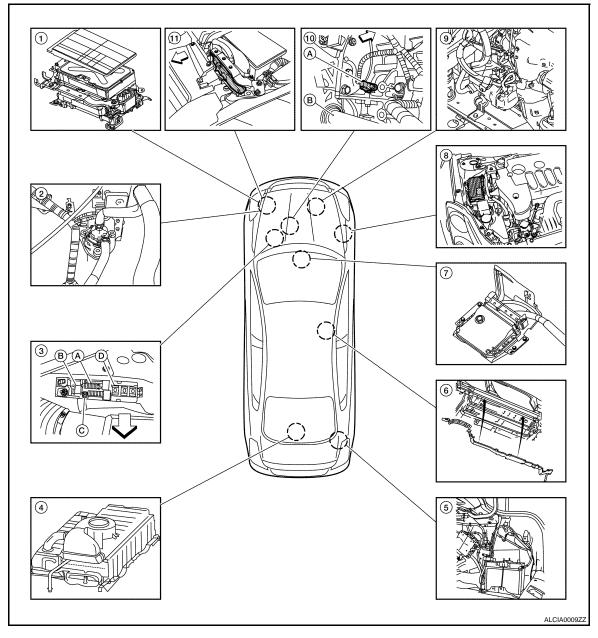
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- EC Э С 80 MPH 60 100 6 40 120 160 **120** 🔟 T T 150 ം PG office 140 D 160 12 Е 2 4 3 P 1 SHIFT 5 60 11 HHOHH DROFI O (Н 0:0:0 (5) (7 (8) (6 9 10 Κ Μ ALCIA0008ZZ Combination meter **READY** operation indicator light Malfunction indicator light 2. 3. Ν
- 1.
- 4. Master warning light
- Stop lamp switch 7.
- 10. Yaw rate/side G sensor
- 5. Data link connector
- 8. Accelerator pedal position sensor
- 11. Controller (A/C auto AMP.)
- 6. Steering angle sensor
- 9. ACU (Air bag diagnosis sensor unit)
- 12. Vehicle information display indicator
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1. Inverter with converter assembly

2. Water pump with motor & bracket as- 3. sembly

High voltage fuse and fusible link box A: HV CONT MAIN fuse 10A B: IGCT relay C: IGCT fusible link 50A D: DC/DC fusible link 120A

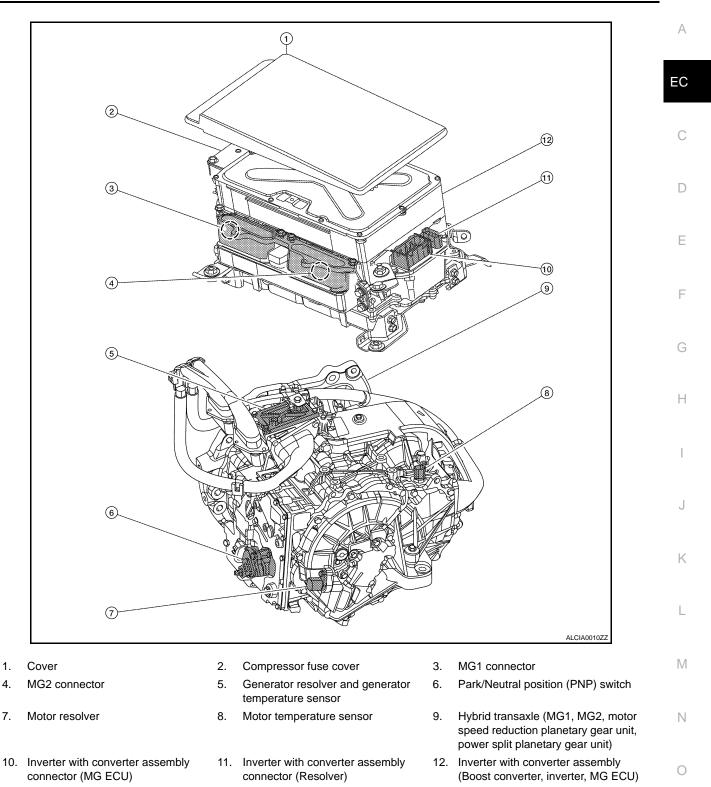
- 4. HV battery
- Hybrid vehicle control ECU (located under heater box assembly)
- 10. A: Crankshaft position sensor B: Axle
- √ Vehicle front

- 5. Auxiliary battery
- 8. Brake ECU
- 11. ECM

- 6. Frame wire
- 9. Electric compressor (For A/C)

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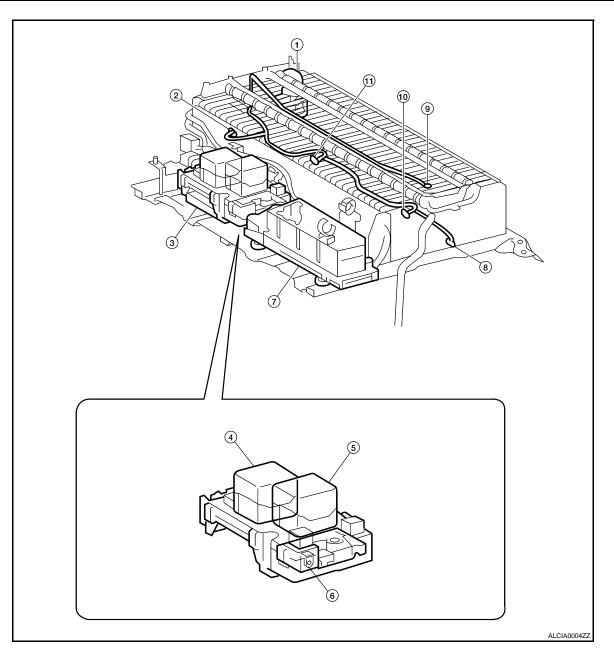
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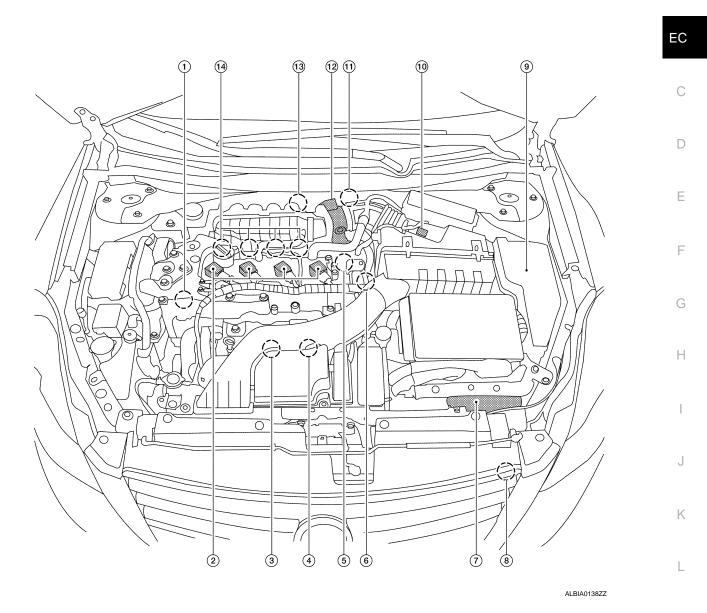


- 1. Service plug grip
- 4. SMRG
- 7. Hybrid vehicle converter
- 10. Battery temperature sensor 2
- 2. Battery temperature sensor 0
- 5. SMRB
- 8. Battery temperature sensor 3
- 11. Battery temperature sensor 1
- 3. Battery smart unit
- 6. Battery current sensor
- 9. Intake air temperature sensor

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- 1. Intake valve timing control solenoid 2. valve
- Air fuel ratio (A/F) sensor 1 4.
- ECM 7.
- Mass air flow sensor (with intake 10. temperature sensor)
- 13. EVAP canister purge volume control 14. Fuel injector solenoid valve
- Ignition coil (with power transistor) and spark plug
- 5. Camshaft position sensor (PHASE)

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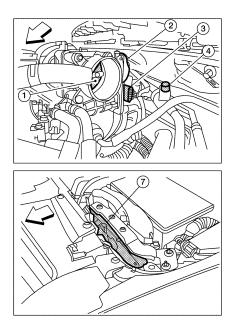
- 8. Refrigerant pressure sensor
- 11. EVAP service port
- Μ 3. Knock sensor, Crankshaft position sensor (POS) Engine coolant temperature sensor IPDM E/R Ν 12. Electric throttle control actuator (with
- built in throttle position sensor and throttle control motor)

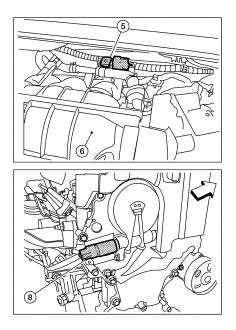
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- Throttle valve 1.
- EVAP service port 4.
- 7. ECM
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- Electric throttle control actuator 2.
- 5. EVAP canister purge volume control 6. Intake manifold collector solenoid valve
- 8. Intake valve timing control solenoid valve
- 3. Electric throttle control actuator harness connector

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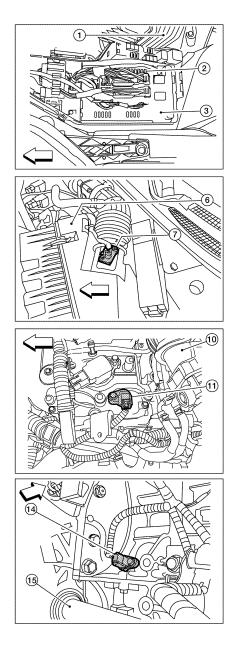
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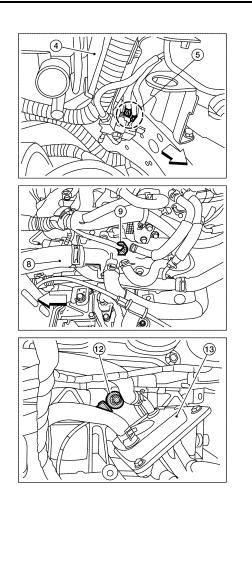
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- 1. Air cleaner assembly
- EPS control unit (view with air cleaner assembly removed)
- 7. Mass air flow sensor (with intake temperature sensor)
- 10. Intake manifold collector
- 13. Engine oil cooler

C: Vehicle front	

- 2. Fuel pump fuse
- 5. Engine grounds
- 8. Upper radiator hose
- 11. Camshaft position sensor (PHASE)
- 14. Crankshaft position sensor (POS)

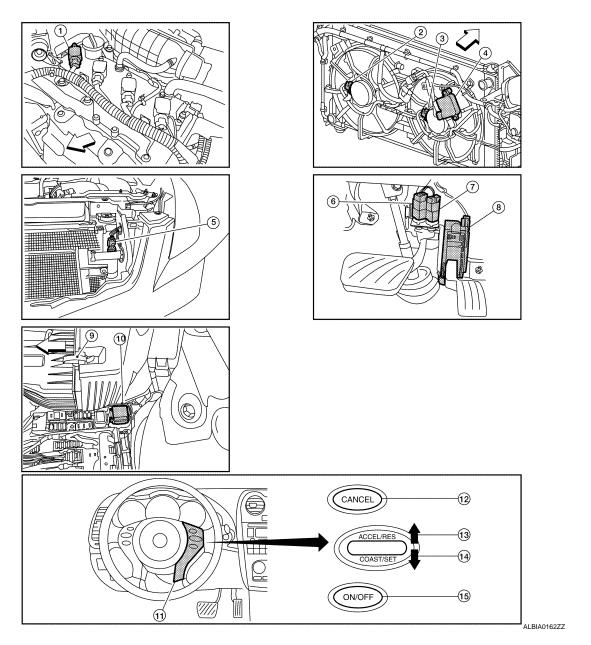


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3.	IPDM E/R	M
6.	Air cleaner assembly	
		NI
9.	Engine coolant temperature sensor	IN
12.	Knock sensor	\cap
15.	Drive shaft RH	0

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< FUNCTION DIAGNOSIS >



- 1. No.1 ignition coil
- 4. Cooling fan control module
- 7. ASCD brake switch
- 10. Cooling fan relay
- 13. RESUME/ACCELERATE switch
- 2. Cooling fan motor-1
- 5. Refrigerant pressure sensor
- 8. Accelerator pedal position sensor
- 11. ASCD steering switch
- 14. SET/COAST switch
- 3. Cooling fan motor-2
- 6. Stop lamp switch
- 9. Air cleaner assembly
- 12. CANSEC switch
- 15. MAIN switch

C: Vehicle front

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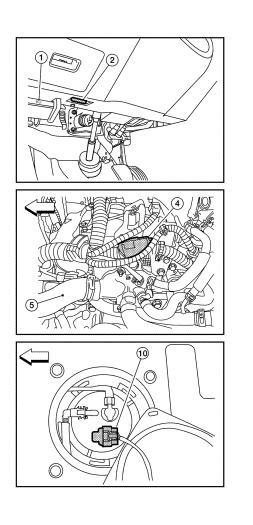
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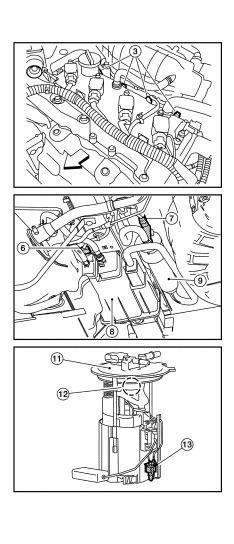
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- Μ Fuel injector harness connector 3.
- 6. EVAP control system pressure sensor
- 9. EVAP canister (SUB)
- 12. Fuel pressure regulator
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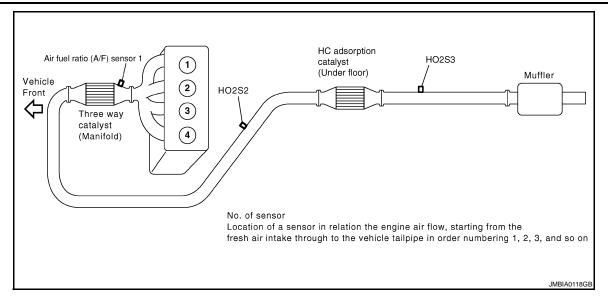
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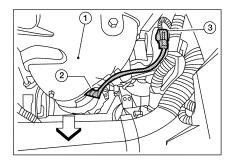
- Hood opener handle 1.
- Condenser-2 4.
- 7. EVAP canister vent control valve
- 10. Fuel level sensor unit and fuel pump 11. Fuel pump assembly harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
- 13. Fuel tank temperature sensor
- : Vehicle front

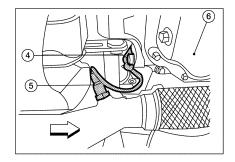
- Data link connector 2.
- 5. Upper radiator hose
- EVAP canister (MAIN) 8.

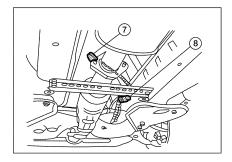
< FUNCTION DIAGNOSIS >











- 1. Exhaust manifold cover
- 4. Heated oxygen sensor 2 harness connector
- 7. Heated oxygen sensor 3

C: Vehicle front

- 2. Air fuel ratio (A/F) sensor 1
- 5. Heated oxygen sensor 2
- 8. Heated oxygen sensor 3 harness connector

ALBIA0272ZZ

- 3. Air fuel ratio (A/F) sensor 1 harness connector
- 6. Heated oxygen sensor 2 (This illustration is a view from under vehicle.)

< FUNCTION DIAGNOSIS >

Component Description

INFOID:000000003069107

[QR25DE]

Component	Reference	
ASCD steering switch	EC-337, "Description"	EC
ASCD brake switch	HBC-475, "Description", EC-340, "Description"	
Stop lamp switch	HBC-480, "Description", EC-348, "Description"	
Electric throttle control actuator	EC-360. "Description"	
MG1, MG2	HBC-39, "MG1 AND MG2 MAIN CONTROL : System Description"	
ASCD indicator	HBC-581, "Description"	D

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CAN COMMUNICATION

System Description

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

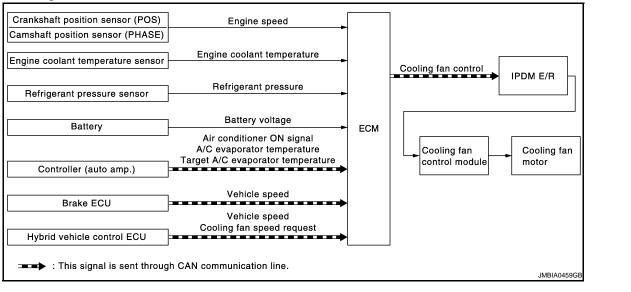
Refer to LAN-27. "CAN Communication Signal Chart", about CAN communication for detail.

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< FUNCTION DIAGNOSIS >

COOLING FAN CONTROL

System Diagram



System Description

INFOID:000000003069110

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INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		
Refrigerant pressure sensor	Refrigerant pressure		
Battery	Battery voltage		IPDM E/R
Controller (auto amp.)	Air conditioner ON signal*	Cooling fan	 ✓ Cooling fan control module ↓ Cooling fan motor
	A/C evaporator temperature*	control	
	Target A/C evaporator temperature*		Cooling fan motor
Brake ECU	Vehicle speed*	_	
Hybrid yobiolo control ECU	Vehicle speed*		
Hybrid vehicle control ECU	Cooling fan speed request*		

*: This signal is sent to ECM through CAN communication line.

SYSTEM DESCRIPTION

ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, air conditioner ON signal, refrigerant pressure, target A/C evaporator temperature, A/C evaporator temperature and cooling fan speed request from hybrid vehicle control ECU.

Cooling fan control signal is sent to IPDM E/R from ECM by CAN communication line. Then, IPDM E/R sends ON/OFF pulse duty signal to cooling fan control module. Corresponding to this ON/OFF pulse duty signal, cooling fan control module gives cooling fan motor operating voltage to cooling fan motors. Cooling fan speed is controlled by duty cycle of cooling fan motor operating voltage sent from cooling fan control module.

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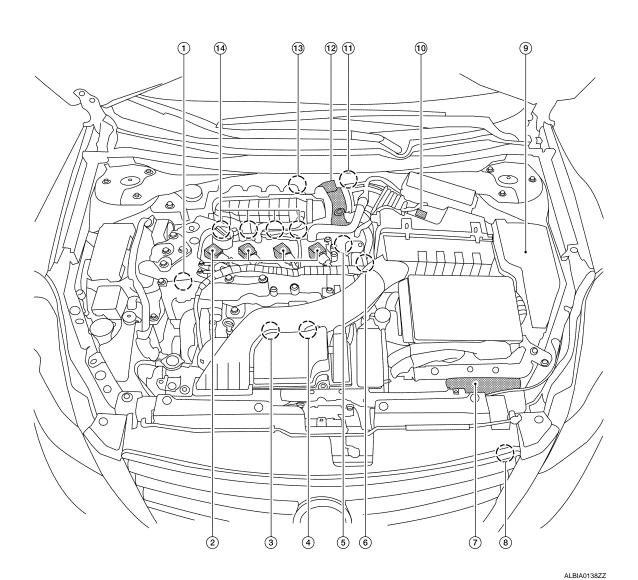
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Component Parts Location

INFOID:000000003069111

[QR25DE]



- 1. Intake valve timing control solenoid 2. valve
- 4. Air fuel ratio (A/F) sensor 1
- 7. ECM
- 10. Mass air flow sensor (with intake temperature sensor)
- 13. EVAP canister purge volume control 14. Fuel injector solenoid valve
- Ignition coil (with power transistor) and spark plug
- 5. Camshaft position sensor (PHASE)
- 8. Refrigerant pressure sensor
- 11. EVAP service port
- Knock sensor, Crankshaft position sensor (POS)
 - Engine coolant temperature sensor
- 9. IPDM E/R

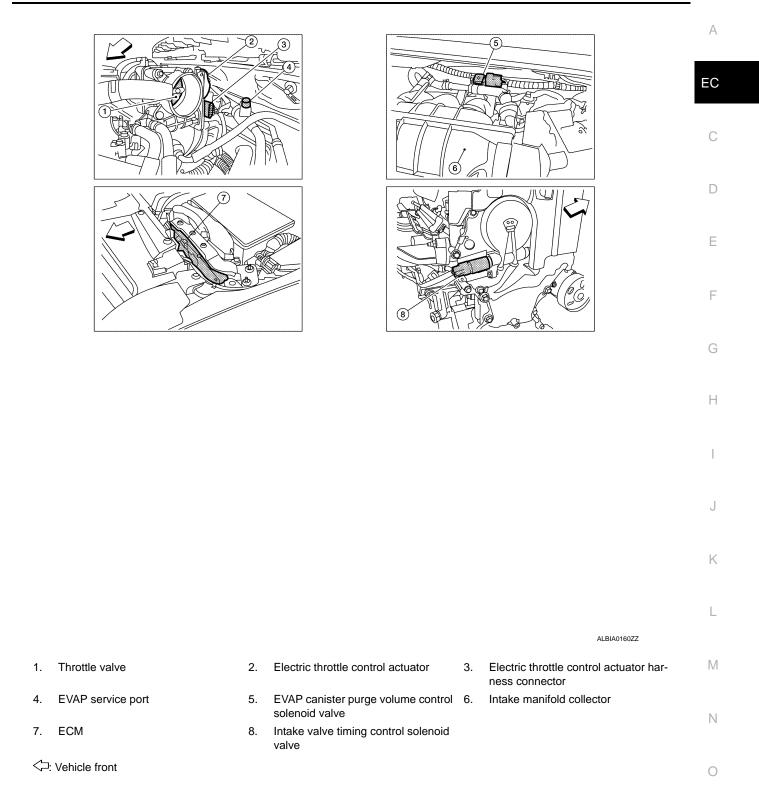
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12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)

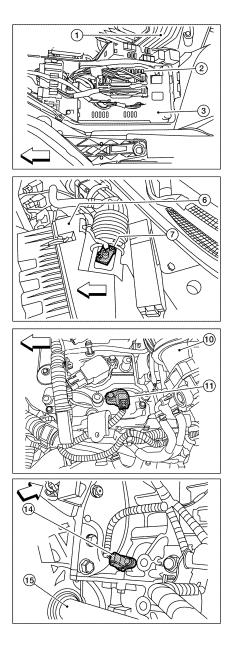
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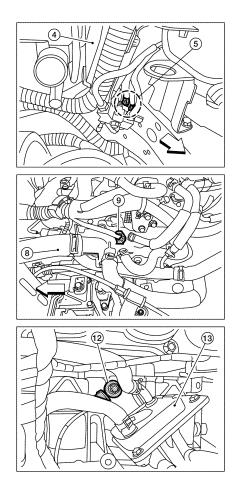


< FUNCTION DIAGNOSIS >



- 1. Air cleaner assembly
- EPS control unit (view with air cleaner assembly removed)
- 7. Mass air flow sensor (with intake temperature sensor)
- 10. Intake manifold collector
- 13. Engine oil cooler
- C: Vehicle front

- 2. Fuel pump fuse
- 5. Engine grounds
- 8. Upper radiator hose
- 11. Camshaft position sensor (PHASE)
- 14. Crankshaft position sensor (POS)

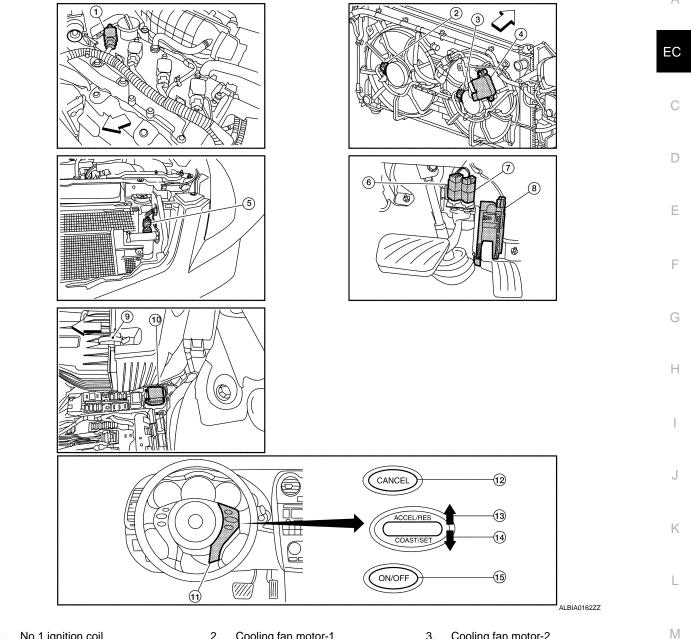


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- 3. IPDM E/R
- 6. Air cleaner assembly
- 9. Engine coolant temperature sensor
- 12. Knock sensor
- 15. Drive shaft RH

< FUNCTION DIAGNOSIS >

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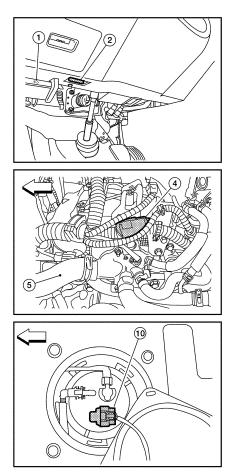
- No.1 ignition coil 1.
- Cooling fan control module 4.
- ASCD brake switch 7.
- 10. Cooling fan relay-1
- 13. RESUME/ACCELERATE switch
- C: Vehicle front

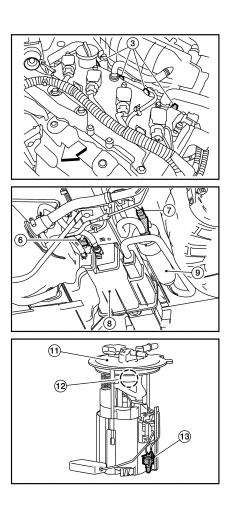
- 2. Cooling fan motor-1
- 5. Refrigerant pressure sensor
- 8. Accelerator pedal position sensor
- ASCD steering switch 11.
- 14. SET/COAST switch
- Cooling fan motor-2 3.
- 6. Stop lamp switch
- 9. Air cleaner assembly
- 12. CANSEC switch
- 15. MAIN switch

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- Hood opener handle 1.
- Condenser-2 4.
- 7. EVAP canister vent control valve
- 10. Fuel level sensor unit and fuel pump 11. Fuel pump assembly harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
- 13. Fuel tank temperature sensor
- : Vehicle front

- Data link connector 2.
- 5. Upper radiator hose
- EVAP canister (MAIN) 8.



- Fuel injector harness connector 3.
- EVAP control system pressure sen-6. sor
- EVAP canister (SUB) 9.
- 12. Fuel pressure regulator

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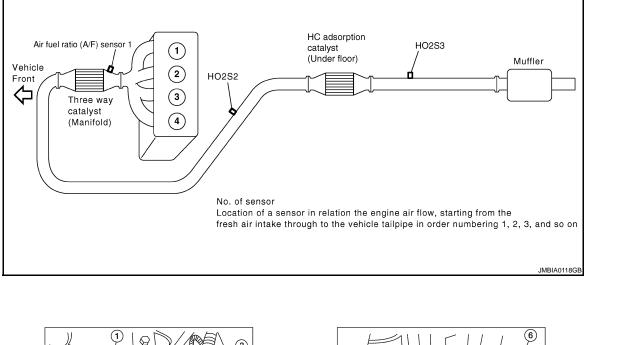
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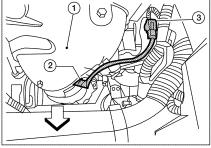
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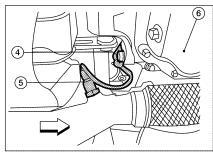
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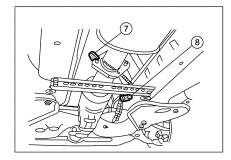
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- 1. Exhaust manifold cover
- 4. Heated oxygen sensor 2 harness connector
- 7. Heated oxygen sensor 3
- 2. Air fuel ratio (A/F) sensor 1
- 5. Heated oxygen sensor 2
- 8. Heated oxygen sensor 3 harness connector

C: Vehicle front

Component Description

INFOID:000000003069112

Component	Reference
Camshaft position sensor (PHASE)	EC-254, "Description"
Crankshaft position sensor (POS)	EC-250, "Description"



- ALBIA0272ZZ
- Air fuel ratio (A/F) sensor 1 harness connector
 Oil pan
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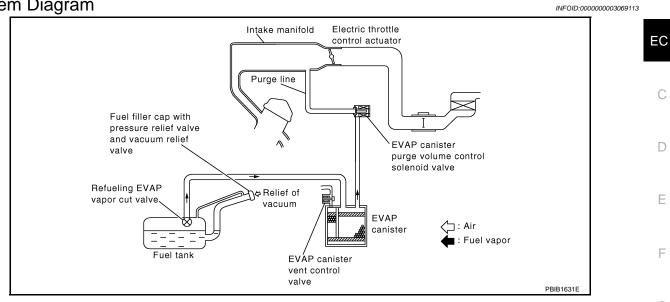
< FUNCTION DIAGNOSIS >

Component	Reference
Cooling fan control module	EC-376, "Description"
Cooling fan motor	EC-376. "Description"
Engine coolant temperature sensor	EC-166. "Description"
Refrigerant pressure sensor	EC-396, "Description"

< FUNCTION DIAGNOSIS >

EVAPORATIVE EMISSION SYSTEM

System Diagram



EVAPORATIVE EMISSION LINE DRAWING

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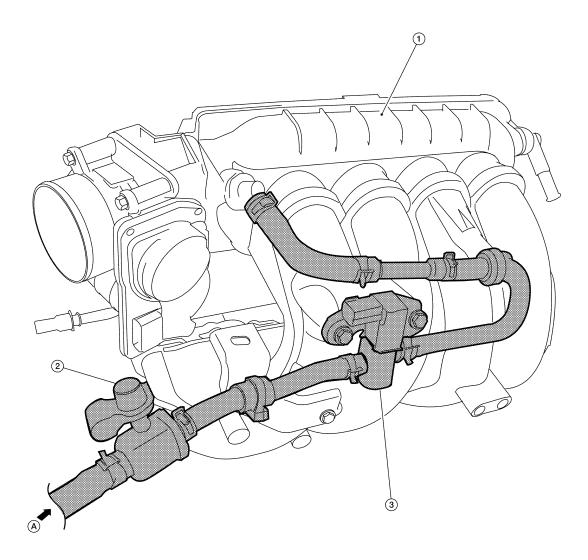
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1. Intake manifold collector

2. EVAP service port

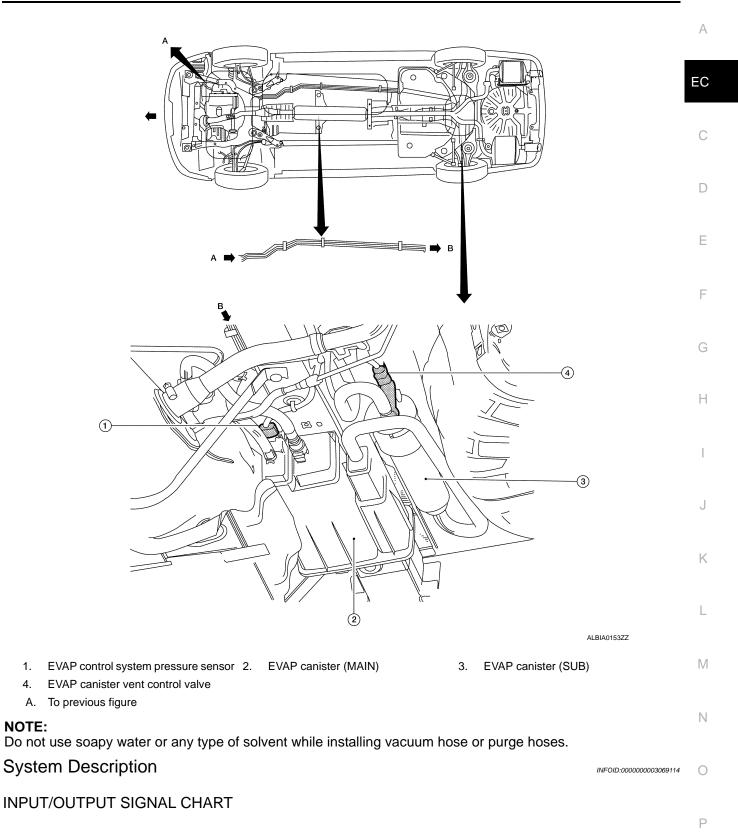
3. EVAP canister purge volume control solenoid valve

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- A. From next figure

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< FUNCTION DIAGNOSIS >

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed	EVAP canister purge flow control	EVAP canister purge vol- ume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage		
Throttle position sensor	Throttle position		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
EVAP control system pressure sensor	Pressure in purge line		
Brake ECU	Vehicle speed*		
Hybrid vehicle control ECU	Vehicle speed*		
	Accelerator pedal position*		

*: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.

The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.

EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.

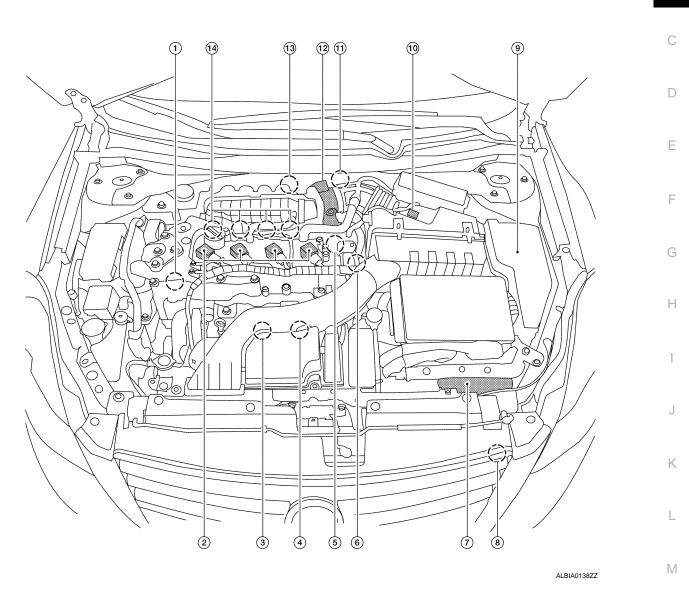
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Component Parts Location

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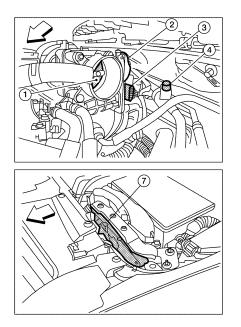
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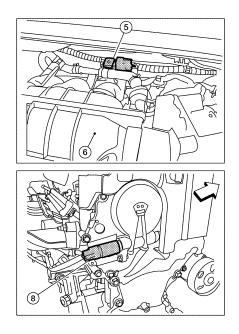
EC



- 1. Intake valve timing control solenoid 2. valve
- 4. Air fuel ratio (A/F) sensor 1
- 7. ECM
- 10. Mass air flow sensor (with intake temperature sensor)
- 13. EVAP canister purge volume control 14. Fuel injector solenoid valve
- Ignition coil (with power transistor) and spark plug
- 5. Camshaft position sensor (PHASE)
- 8. Refrigerant pressure sensor
- 11. EVAP service port
- Knock sensor, Crankshaft position sensor (POS)
 Engine coolant temperature sensor
 IPDM E/R
 Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
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< FUNCTION DIAGNOSIS >





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- Throttle valve 1.
- EVAP service port 4.
- 7. ECM
- Chicle front

- 2. Electric throttle control actuator
- 5. EVAP canister purge volume control 6. Intake manifold collector solenoid valve
- 8. Intake valve timing control solenoid valve
- 3. Electric throttle control actuator harness connector

< FUNCTION DIAGNOSIS >

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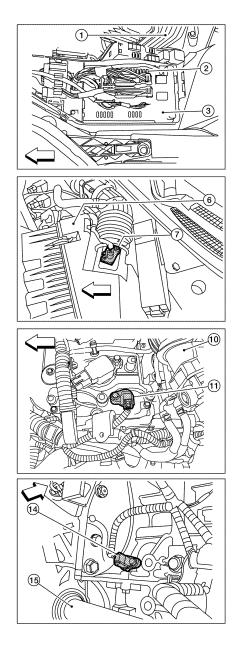
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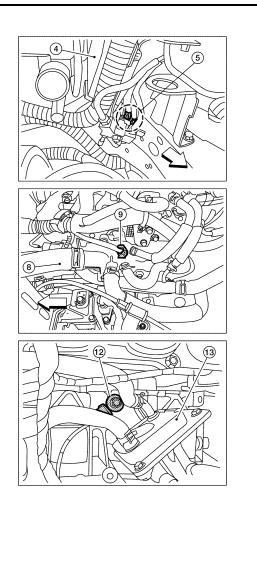
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- 1. Air cleaner assembly
- EPS control unit (view with air cleaner assembly removed)
- 7. Mass air flow sensor (with intake temperature sensor)
- 10. Intake manifold collector
- 13. Engine oil cooler

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- 2. Fuel pump fuse
- 5. Engine grounds
- 8. Upper radiator hose
- 11. Camshaft position sensor (PHASE)
- 14. Crankshaft position sensor (POS)



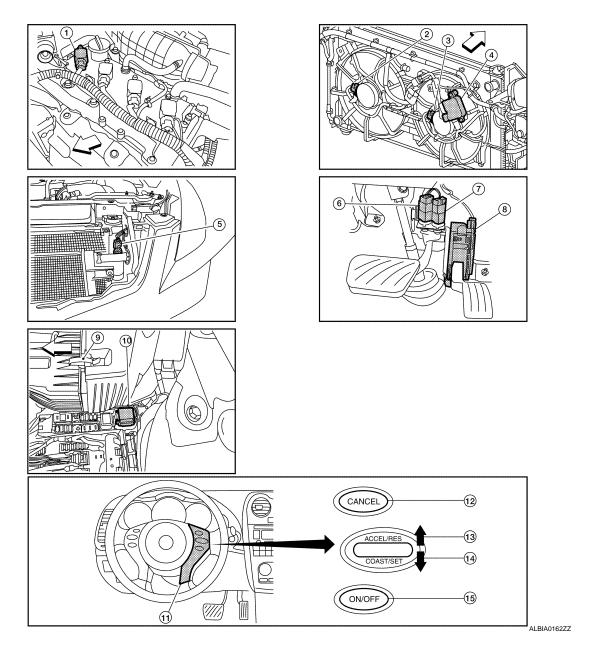
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3.	IPDM E/R	M
6.	Air cleaner assembly	
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9.	Engine coolant temperature sensor	IN
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12.	Knock sensor	\bigcirc
15.	Drive shaft RH	<u> </u>

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< FUNCTION DIAGNOSIS >

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- 1. No.1 ignition coil
- 4. Cooling fan control module
- 7. ASCD brake switch
- 10. Cooling fan relay-1
- 13. RESUME/ACCELERATE switch
- 2. Cooling fan motor-1
- 5. Refrigerant pressure sensor
- 8. Accelerator pedal position sensor
- 11. ASCD steering switch
- 14. SET/COAST switch
- 3. Cooling fan motor-2
- 6. Stop lamp switch
- 9. Air cleaner assembly
- 12. CANSEC switch
- 15. MAIN switch

C: Vehicle front

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harness connector

cover removed.)

: Vehicle front

13. Fuel tank temperature sensor

(This illustration is view with rear

seat cushion and inspection hole

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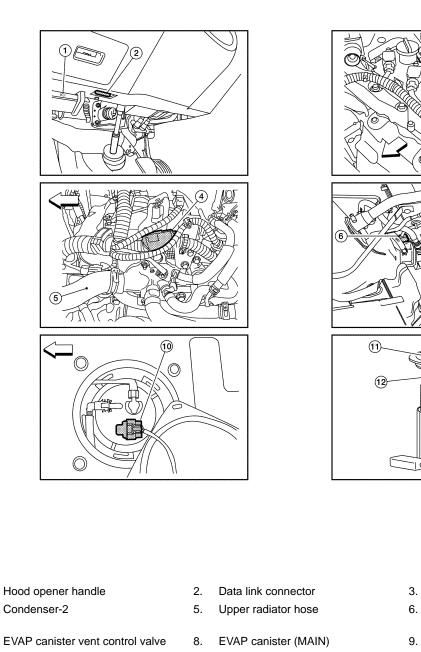
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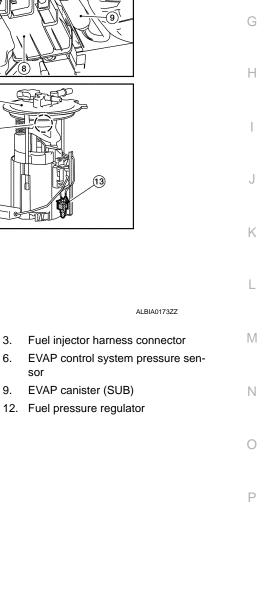
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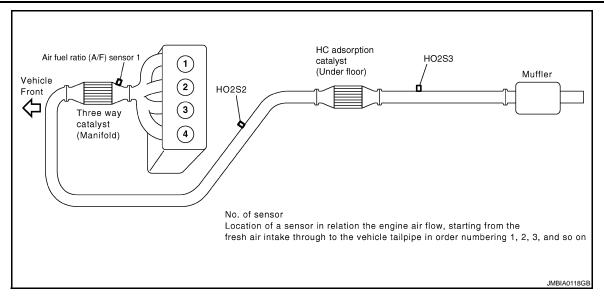
10. Fuel level sensor unit and fuel pump 11. Fuel pump assembly

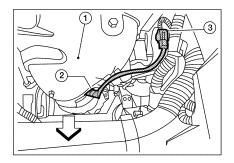


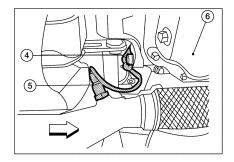
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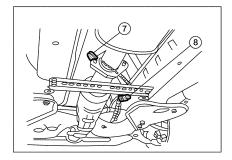
< FUNCTION DIAGNOSIS >











- 1. Exhaust manifold cover
- 4. Heated oxygen sensor 2 harness connector
- 7. Heated oxygen sensor 3
- 2. Air fuel ratio (A/F) sensor 1
- 5. Heated oxygen sensor 2
- 8. Heated oxygen sensor 3 harness connector

- ALBIA0272ZZ
- 3. Air fuel ratio (A/F) sensor 1 harness connector
- 6. Oil pan

C: Vehicle front

Component Description

INFOID:000000003069116

Component	Reference
A/F sensor 1	EC-179, "Description"
Camshaft position sensor (PHASE)	EC-254, "Description"



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Component	Reference	
Crankshaft position sensor (POS)	EC-250, "Description"	A
Engine coolant temperature sensor	EC-166. "Description"	
EVAP canister purge volume control solenoid valve	EC-267, "Description"	EC
EVAP control system pressure sensor	EC-283. "Description"	
Fuel tank temperature sensor	EC-230, "Description"	
Mass air flow sensor	EC-145, "Description"	С
Throttle position sensor	EC-169. "Description"	
Vehicle speed sensor	EC-306, "Description"	D

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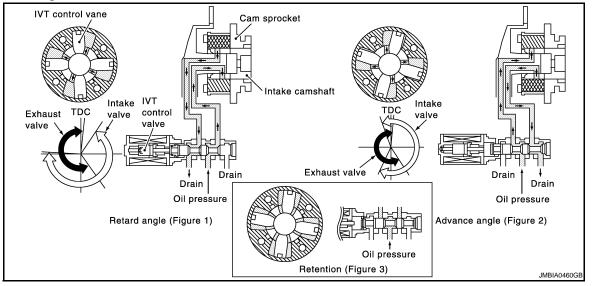
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INTAKE VALVE TIMING CONTROL

System Diagram



System Description

INFOID:000000003069118

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS)	 Engine speed and piston position 			
Camshaft position sensor (PHASE)				
Engine coolant temperature sensor	Engine coolant temperature		Intake valve timing control solenoid valve	
Brake ECU	Vehicle speed*			
Hybrid vehicle control ECU	Vehicle speed*			

*: This signal is sent to the ECM through CAN communication line

SYSTEM DESCRIPTION

This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing (IVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

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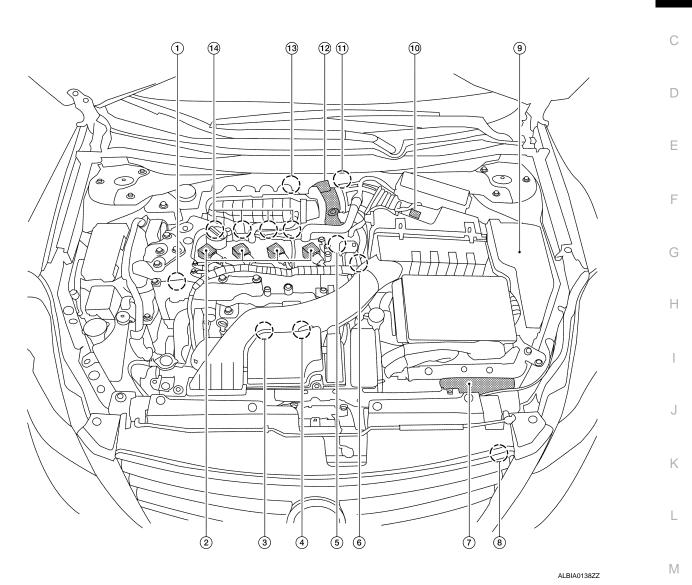
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Component Parts Location

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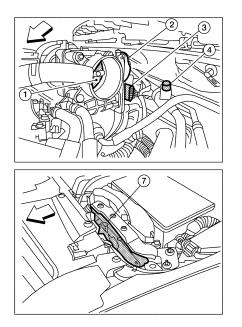
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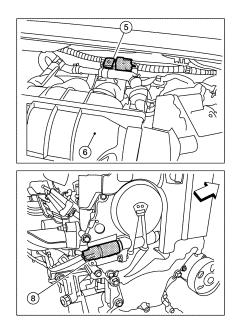
EC



- 1. Intake valve timing control solenoid 2. valve
- 4. Air fuel ratio (A/F) sensor 1
- 7. ECM
- 10. Mass air flow sensor (with intake temperature sensor)
- 13. EVAP canister purge volume control 14. Fuel injector solenoid valve
- Ignition coil (with power transistor) and spark plug
- 5. Camshaft position sensor (PHASE)
- 8. Refrigerant pressure sensor
- 11. EVAP service port
- Knock sensor, Crankshaft position sensor (POS)
 Engine coolant temperature sensor
 IPDM E/R
 Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
 - Ρ

< FUNCTION DIAGNOSIS >





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- Throttle valve 1.
- EVAP service port 4.
- 7. ECM
- Chicle front

- 2. Electric throttle control actuator
- 5. EVAP canister purge volume control 6. Intake manifold collector solenoid valve
- 8. Intake valve timing control solenoid valve
- 3. Electric throttle control actuator harness connector

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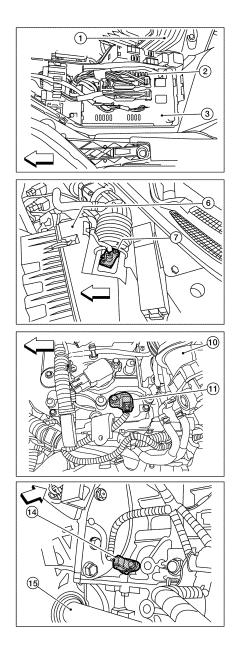
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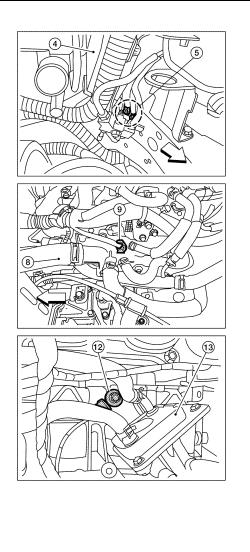
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- 1. Air cleaner assembly
- EPS control unit (view with air cleaner assembly removed)
- 7. Mass air flow sensor (with intake temperature sensor)
- 10. Intake manifold collector
- 13. Engine oil cooler

- 2. Fuel pump fuse
- 5. Engine grounds
- 8. Upper radiator hose
- 11. Camshaft position sensor (PHASE)
- 14. Crankshaft position sensor (POS)

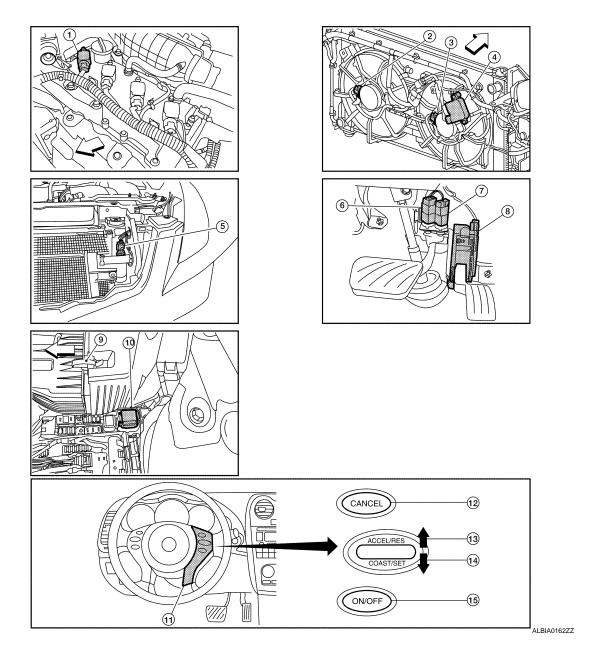


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3.	IPDM E/R	M
6.	Air cleaner assembly	
		NI
9.	Engine coolant temperature sensor	IN
12.	Knock sensor	\cap
15.	Drive shaft RH	0

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< FUNCTION DIAGNOSIS >



- 1. No.1 ignition coil
- 4. Cooling fan control module
- 7. ASCD brake switch
- 10. Cooling fan relay-1
- 13. RESUME/ACCELERATE switch
- 2. Cooling fan motor-1
- 5. Refrigerant pressure sensor
- 8. Accelerator pedal position sensor
- 11. ASCD steering switch
- 14. SET/COAST switch
- 3. Cooling fan motor-2
- 6. Stop lamp switch
- 9. Air cleaner assembly
- 12. CANSEC switch
- 15. MAIN switch

C: Vehicle front

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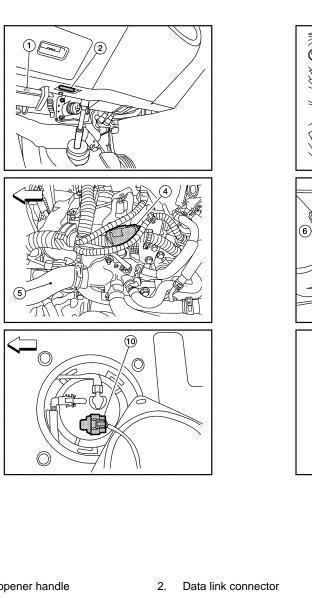
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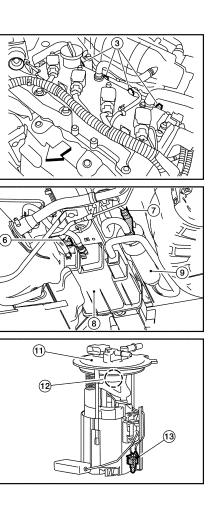
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- ALBIA0173ZZ
- Μ Fuel injector harness connector 3.
- 6. EVAP control system pressure sensor
- 9. EVAP canister (SUB)
- 12. Fuel pressure regulator
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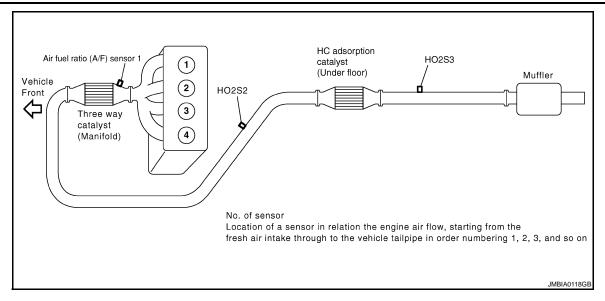
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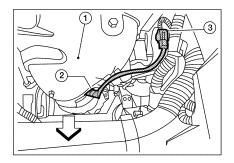
- Hood opener handle 1.
- Condenser-2 4.
- 7. EVAP canister vent control valve
- 10. Fuel level sensor unit and fuel pump 11. Fuel pump assembly harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
- 13. Fuel tank temperature sensor
- : Vehicle front

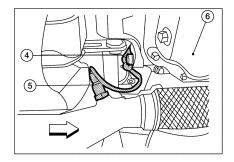
- 5. Upper radiator hose
- EVAP canister (MAIN) 8.

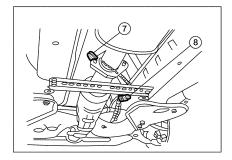
< FUNCTION DIAGNOSIS >











- 1. Exhaust manifold cover
- Heated oxygen sensor 2 harness 4. connector
- 7. Heated oxygen sensor 3
- 2. Air fuel ratio (A/F) sensor 1
- 5. Heated oxygen sensor 2
- 8. Heated oxygen sensor 3 harness connector

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- 3. Air fuel ratio (A/F) sensor 1 harness connector
- Oil pan 6.

C: Vehicle front

Component Description

INFOID:000000003069120

Component	Reference
Camshaft position sensor (PHASE)	EC-254, "Description"
Crankshaft position sensor (POS)	EC-250, "Description"



< FUNCTION DIAGNOSIS >

Component	Reference	
Engine coolant temperature sensor	EC-166, "Description"	A
Intake valve timing control solenoid valve	EC-78, "System Description"	
Vehicle speed sensor	EC-306. "Description"	EC

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ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:000000003069121

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INTRODUCTION

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	Diagnostic service
Diagnostic Trouble Code (DTC)	Service \$03 of SAE J1979
Freeze Frame data	Service \$02 of SAE J1979
System Readiness Test (SRT) code	Service \$01 of SAE J1979
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Service \$07 of SAE J1979
1st Trip Freeze Frame data	
Test values and Test limits	Service \$06 of SAE J1979
Calibration ID	Service \$09 of SAE J1979

The above information can be checked using procedures listed in the table below.

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	SRT status	Test value
CONSULT-III	×	×	×	×	×	×	_
GST	×	×	×		×	×	×
ECM	×	×*	_		_	×	_

*: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to <u>EC-432</u>, <u>"Fail Safe"</u>.)

TWO TRIP DETECTION LOGIC

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not light up at this stage. <1st trip>

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL lights up. The MIL lights up at the same time when the DTC is stored. <2nd trip> The "trip" in the "Two Trip Detection Logic" means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

 \times : Applicable —: Not applicable

		М	IL		DTC 1st trip DTC			DTC
Items	1s	t trip	2nc	l trip	1st trip 2nd trip 1st trip		2nd trip	
	Blinking	Lighting up	Blinking	Lighting up	displaying	displaying		display- ing
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	×	_	_	_	_	_	×	_
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	_	_	×	_	_	×	_	_
One trip detection diagnoses (Re- fer to <u>EC-435, "DTC Index"</u> .)	_	×	_	_	×	_	_	_
Except above	_		—	×	—	×	×	_

DTC AND FREEZE FRAME DATA

DTC and 1st Trip DTC

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The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.

If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".

For malfunctions in which 1st trip DTCs are displayed, refer to "EMISSION-RELATED DIAGNOSTIC INFOR-MATION ITEMS". These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-III.

1st trip DTC is specified in Service \$07 of SAE J1979. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a malfunction. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to <u>EC-7, "Work Flow"</u>. Then perform DTC CONFIRMA-TION PROCEDURE or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

Freeze Frame Data and 1st Trip Freeze Frame Data

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-III or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-III screen, not on the GST. Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM has the following priorities to update the data.

Priority		Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172	L
2		Except the above items	
3	1st trip freeze frame da	ata	M

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".

How to Read DTC and 1st Trip DTC

(B) With CONSULT-III

With GST

CONSULT-III or GST (Generic Scan Tool) Examples: P0340, P0850, P1148, etc. These DTCs are prescribed by SAE J2012.

< FUNCTION DIAGNOSIS >

(CONSULT-III also displays the malfunctioning component or system.)

The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0340, 0850, 1148, etc.

These DTCs are controlled by NISSAN.

- 1st trip DTC No. is the same as DTC No.
- Output of a DTC indicates a malfunction. However, GST or the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-III can identify malfunction status as shown below. Therefore, using CONSULT-III (if available) is recommended.

DTC or 1st trip DTC of a malfunction is displayed in "SELF-DIAGNOSTIC RESULTS" mode of CONSULT-III. Time data indicates how many times the vehicle was driven after the last detection of a DTC.

If the DTC is being detected currently, the time data will be [0].

If a 1st trip DTC is stored in the ECM, the time data will be [1t].

How to Erase DTC and 1st Trip DTC

With CONSULT-III

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

With GST

The emission related diagnostic information in the ECM can be erased by selecting Service \$04 with GST.

- 1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
- 2. Select Service \$04 with GST (Generic Scan Tool).

No Tools

- 1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
- 2. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal.
- If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.
- The following data are cleared when the ECM memory is erased.
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Service \$01 of SAE J1979.

As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.

If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating "INCMP", use the information in this Service Manual to set the SRT to "CMPLT".

In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate "CMPLT" for each application system. Once set as "CMPLT", the SRT status remains "CMPLT" until the self-diagnosis memory is erased.

Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate "INCMP" for these items.

NOTE:

The SRT will also indicate "INCMP" if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.

If, during the state emissions inspection, the SRT indicates "CMPLT" for all test items, the inspector will continue with the emissions test. However, if the SRT indicates "INCMP" for one or more of the SRT items the vehicle is returned to the customer untested.

NOTE:

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If MIL is ON during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates "CMPLT" for all test items. Therefore, it is important to check SRT ("CMPLT") and DTC (No DTCs) before the inspection.

SRT Item

The table below shows required self-diagnostic items to set the SRT to "CMPLT".

SRT item (CONSULT-III indication)	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	Three way catalyst function	P0420
	HC adsorption catalyst function	P2423
EVAP SYSTEM	EVAP control system purge flow monitoring	P0441
	EVAP control system	P0456
HO2S	Air fuel ratio sensor 1	P0133
	Heated oxygen sensor 2	P0137
	Heated oxygen sensor 2	P0138
	Heated oxygen sensor 2	P0139
	Heated oxygen sensor 3	P0143
	Heated oxygen sensor 3	P0144
	Heated oxygen sensor 3	P0145

SRT Set Timing

SRT is set as "CMPLT" after self-diagnosis has been performed one or more times. Completion of SRT is Н done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

		Example						
Self-diagnosis result		Diagnosis	Diagnosis $(\leftarrow ON \rightarrow OFF \leftarrow ON \rightarrow OFF \rightarrow $					
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)		
		P0402	OK (1)	— (1)	— (1)	OK (2)		
		P1402	OK (1)	OK (2)	— (2)	— (2)		
		SRT of EGR	"CMPLT"	"CMPLT"	"CMPLT"	"CMPLT"		
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)		
		P0402	— (0)	— (0)	OK (1)	— (1)		
		P1402	OK (1)	OK (2)	— (2)	— (2)		
		SRT of EGR	"INCMP"	"INCMP"	"CMPLT"	"CMPLT"		
NG exists	Case 3	P0400	OK	ОК	—	—		
		P0402	—	—	—	—		
		P1402	NG	_	NG	NG (Consecutive NG)		
		(1st trip) DTC	1st trip DTC	_	1st trip DTC	DTC (= MIL ON)		
		SRT of EGR	"INCMP"	"INCMP"	"INCMP"	"CMPLT"		

OK: Self-diagnosis is carried out and the result is OK.

NG: Self-diagnosis is carried out and the result is NG.

-: Self-diagnosis is not carried out.

When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate "CMPLT". \rightarrow Case 1 above

When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate "CMPLT" at the time the respective self-diagnoses have at least one OK result. \rightarrow Case 2 above

< FUNCTION DIAGNOSIS >

If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate "CMPLT". \rightarrow Case 3 above

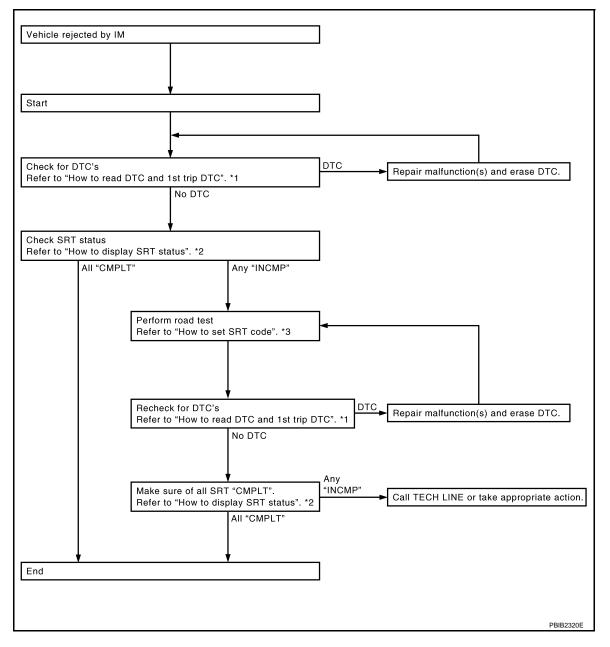
The table above shows that the minimum number of cycles for setting SRT as "INCMP" is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

- The SRT will indicate "CMPLT" at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires "CMPLT" of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to "CMPLT" of SRT, the self-diagnosis memory must be erased from ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate "INCMP". NOTE:

SRT can be set as "CMPLT" together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates "CMPLT".

SRT Service Procedure

If a vehicle has failed the state emissions inspection due to one or more SRT items indicating "INCMP", review the flowchart diagnostic sequence on the next page.



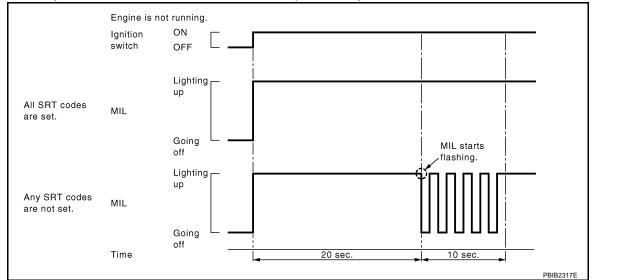
*1 "How to Read DTC and 1st Trip DTC" *2 "How to Display SRT Status" *3 "How to Set SRT Code"



< FUNCTION DIAGNOSIS >

How to Display SRT Status WITH CONSULT-III Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-III. For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT-III screen; for items whose SRT codes are not set, "INCMP" is displayed. NOTE: Though displayed on the CONSULT-III screen, "HO2S HTR" is not SRT item. WITH GST Selecting Service \$01 with GST (Generic Scan Tool) NO TOOLS A SRT code itself can not be displayed while only SRT status can be. 1. Turn ignition switch ON and wait 20 seconds. 2. SRT status is indicated as shown below.

- When all SRT codes are set, MIL lights up continuously.
- When any SRT codes are not set, MIL will flash periodically for 10 seconds.



MALFUNCTION INDICATOR LAMP (MIL)

Description

The MIL is located on the instrument panel.

- The MIL will light up when the ignition switch is turned ON. This is a bulb check.
 If the MIL does not light up, refer to <u>EC-389, "Component Func-</u>
 - tion Check".
- 2. When the ignition switch is turned ON (READY), the MIL should go off.

If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.

SERVICE ENGINE SOON

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On Board Diagnostic System Function

The on board diagnostic system has the following three functions.

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Diagnostic Test Mode	Ignition switch	Function	Explanation of Function
Mode I	ON	BULB CHECK	This function checks the MIL bulb for damage (blown, open cir- cuit, etc.). If the MIL does not come on, check MIL circuit. When any SRT codes are not set, MIL may flash. For the details, refer to "How to Display SRT Status".
	ON (READY)	MALFUNCTION WARNING	 This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. Misfire (Possible three way catalyst damage) One trip detection diagnoses
Mode II	ON	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.

Diagnostic Test Mode I — Bulb Check

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to <u>EC-</u><u>389, "Component Function Check"</u>.

Diagnostic Test Mode I — Malfunction Warning

MIL	Condition		
ON	When the malfunction is detected.		
OFF	No malfunction.		

This DTC number is clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

Diagnostic Test Mode II — Self-diagnostic Results

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MIL as shown below. The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These uniden-

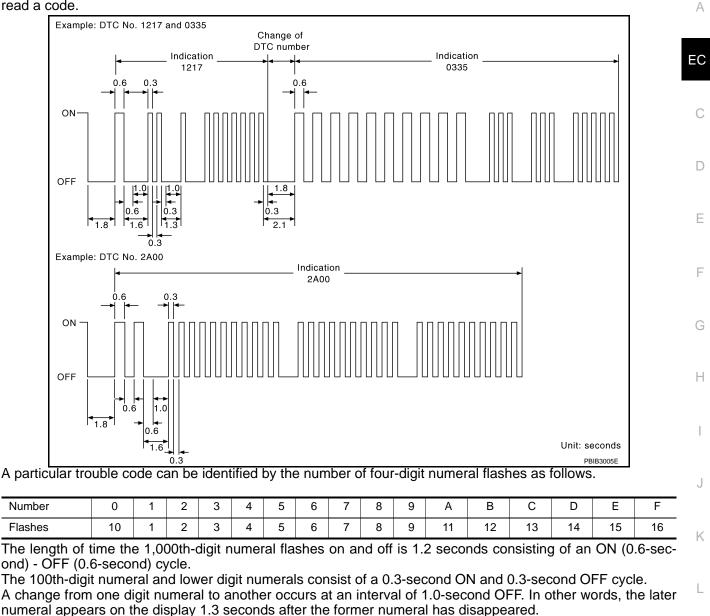
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tified codes can be identified by using the CONSULT-III or GST. A DTC will be used as an example for how to read a code.



A change from one trouble code to another occurs at an interval of 1.8-second OFF.

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See <u>EC-435, "DTC Index"</u>)

How to Switch Diagnostic Test Mode

NOTE:

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF. HOW TO SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)
- 1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
- 2. Repeat the following procedure quickly five times within 5 seconds.
- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.
- 3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MIL starts blinking.

NOTE:

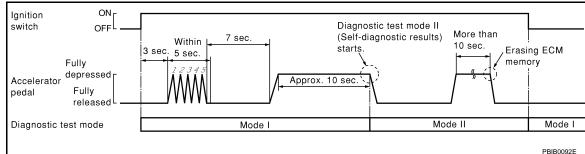
Do not release the accelerator pedal for 10 seconds if MIL may start blinking on the halfway of this 10 seconds. This blinking is displaying SRT status and is continued for another 10 seconds.

< FUNCTION DIAGNOSIS >

4. Fully release the accelerator pedal.

ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).

Wait until the same DTC (or 1st trip DTC) appears to confirm all DTCs certainly.



HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

- 1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to "How to Set Diagnostic Test Mode II (Self-diagnostic Results)".
- 2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
- The emission-related diagnostic information has been erased from the backup memory in the ECM.
- 3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to "How to Erase Diagnostic Test Mode II (Self-diagnostic Results)".

- If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.
- · Be careful not to erase the stored memory before starting trouble diagnoses.

OBD System Operation Chart

Relationship Between MIL, 1st Trip DTC, DTC and Detectable Items

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on.
- The MIL will go off after the vehicle is driven 3 times (driving pattern B) with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The "TIME" in "SELF-DIAGNOSTIC RESULTS" mode of CON-SULT-III will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

Summary Chart

Items	Fuel Injection System	Misfire	Other
MIL (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), * ¹	1 (pattern C), * ¹	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns B and C under "Fuel Injection System" and "Misfire", see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM".

For details about patterns A and B under Other, see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM".

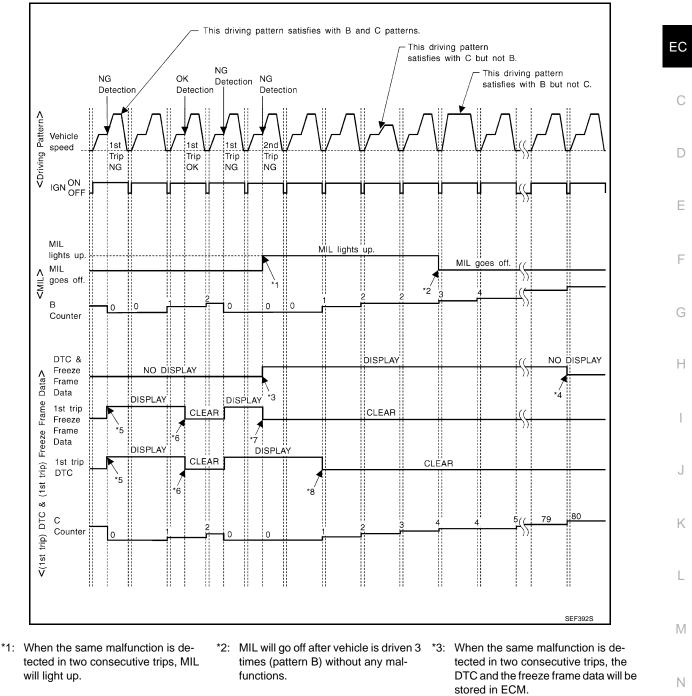
*1: Clear timing is at the moment OK is detected.

*2: Clear timing is when the same malfunction is detected in the 2nd trip.

Relationship Between MIL, DTC, 1st Trip DTC and Driving Patterns for "Misfire <Exhaust Quality Deterioration>",

< FUNCTION DIAGNOSIS >

"Fuel Injection System"



- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.
- *5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
- *8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.
- The 1st trip DTC and the 1st trip *6: freeze frame data will be cleared at the moment OK is detected.
- Ρ

Explanation for Driving Patterns for "Misfire < Exhaust Quality Deterioration>", "Fuel Injection System" <Driving Pattern B> Driving pattern B means the vehicle operation as follows:

[QR25DE]

А

< FUNCTION DIAGNOSIS >

[QR25DE]

- All components and systems should be monitored at least once by the OBD system.
- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunction.
- The MIL will go off when the B counter reaches 3. (*2 in "OBD SYSTEM OPERATION CHART") <Driving Pattern C>

Driving pattern C means the vehicle operation as follows:

The following conditions should be satisfied at the same time:

Engine speed: (Engine speed in the freeze frame data) \pm 375 rpm

Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]

Engine coolant temperature (T) condition:

- When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).

Example:

If the stored freeze frame data is as follows:

Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)

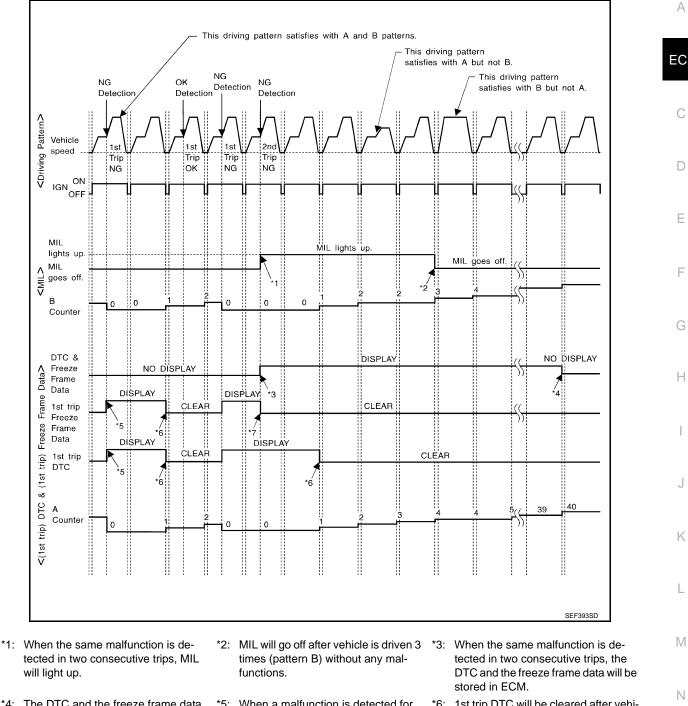
To be satisfied with driving pattern C, the vehicle should run under the following conditions:

Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

- The C counter will be cleared when the malfunction is detected regardless of vehicle conditions above.
- The C counter will be counted up when vehicle conditions above is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

Relationship Between MIL, DTC, 1st Trip DTC and Driving Patterns Except For "Misfire < Exhaust Quality Deterioration>", "Fuel Injection System"

< FUNCTION DIAGNOSIS >



- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction.
 (The DTC and the freeze frame data still remain in ECM.)
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.
- *5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
- *6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

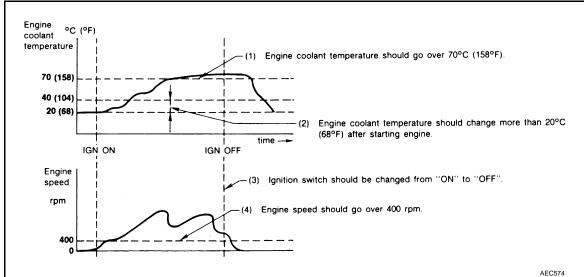
[QR25DE]

Ρ

Explanation for Driving Patterns Except for "Misfire < Exhaust Quality Deterioration>", "Fuel Injection System"

< FUNCTION DIAGNOSIS >

<Driving Pattern A>



- The A counter will be cleared when the malfunction is detected regardless of (1) (4).
- The A counter will be counted up when (1) (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:

All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will go off when the B counter reaches 3 (*2 in OBD SYSTEM OPERATION CHART).

CONSULT-III Function

INFOID:000000003069122

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the in- dications on the CONSULT-III unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data monitor	Input/Output data in the ECM can be read.
Active test	Diagnostic Test Mode in which CONSULT-III drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECU part number	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

• Diagnostic trouble codes

- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

< FUNCTION DIAGNOSIS >

[QR25DE]

			DIAGNOSTIC TEST MODE					A		
					AGNOSTIC SULTS	DATA		DTC 8 CONFIR		-
Item		WORK SUPPORT	DTC*1	FREEZE FRAME DATA*2	MONI- TOR	ACTIVE TEST	SRT STA- TUS	DTC WORK SUP- PORT	EC	
		Crankshaft position sensor (POS)		×	×	×				- C
		Camshaft position sensor (PHASE)		×	×	×				-
		Mass air flow sensor		×		×				D
		Engine coolant temperature sensor		×	×	×	×			-
		A/F sensor 1		×		×		×	×	-
S		Heated oxygen sensor 2		×		×		×	×	- E
ART:		Heated oxygen sensor 3		×		×		×		-
T P/		Vehicle speed sensor		×	×	×				- F
NEN		Accelerator pedal position sensor				×				-
PO		Throttle position sensor		×	×	×				-
NON I	UT	Fuel tank temperature sensor		×		×	×			G
	ENGINE CONTROL COMPONENT PARTS INPUT	EVAP control system pressure sensor		×		×				-
ITRO		Intake air temperature sensor		×	×	×				Н
CO		Knock sensor		×						
Ш.		Refrigerant pressure sensor				×				-
19 N GI		Air conditioner switch				×				-
ш		PNP switch				×				-
		Stop lamp switch		×		×				-
		Battery voltage				×				_ 0
		Fuel level sensor		×		×				-
		ASCD steering switch		×		×				K
		ASCD brake switch		×		×				-
		Fuel injector		×		×	×			-
		Power transistor (Ignition timing)				×	×			- L
R		Throttle control motor relay		×		×				-
PAF		Throttle control motor		×						N
ENGINE COTNROL COMPONENT PARTS		EVAP canister purge volume control solenoid valve		×		×	×		×	-
MPO	F	Fuel pump relay	×			×	×			N
CO CO		Cooling fan		×		×	×			-
SOL		A/F sensor 1 heater		×		×		×* ³		-
DTNF		Heated oxygen sensor 2 heater		х		×		×* ³		- 0
ы Ш		Heated oxygen sensor 3 heater		×		×		×* ³		-
GIN		EVAP canister vent control valve	×	×		×	×			P
EN		Intake valve timing control solenoid valve		×		×	×			-
		Calculated load value			×	×				-

X: Applicable

*1: This item includes 1st trip DTCs.

< FUNCTION DIAGNOSIS >

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-III screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to <u>EC-86, "Diagnosis Description"</u>.
*3: Always "CMPLT" is displayed.

INSPECTION PROCEDURE Refer to CONSULT-III Operators Manual.

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE* ¹	 SELECTOR LEVER IS N POSITION WITH ENGINE RUNNING. FUEL PUMP WILL STOP BY TOUCHING "START". 	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	 IGNITION SWITCH ON (READY) THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM. 	When learning the idle air volume
SELF-LEARNING CONT	THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEF- FICIENT.	When clearing mixture ratio self- learning value
EVAP SYSTEM CLOSE	CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. IGN SW ON ENGINE NOT RUNNING AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). NO VACUUM AND NO HIGH PRESSURE IN EVAP SYS- TEM FUEL TANK TEMP. IS MORE THAN 0°C (32°F). WITHIN 10 MINUTES AFTER STARTING "EVAP SYS- TEM CLOSE" WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITION EXCEPT ABOVE, CONSULT- III WILL DISCONTINUE IT AND DISPLAY APPROPRI- ATE INSTRUCTION. NOTE: WHEN STARTING ENGINE, CONSULT-III MAY DIS- PLAY "BATTERY VOLTAGE IS LOW. CHARGE BAT- TERY", EVEN IN USING CHARGED BATTERY.	When detecting EVAP vapor leak point of EVAP system
VIN REGISTRATION	IN THIS MODE, VIN IS REGISTERED IN ECM.	When registering VIN in ECM
TARGET IDLE RPM ADJ*2	INSPECTION MODE IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ* ²	INSPECTION MODE IDLE CONDITION	When adjusting target ignition tim- ing

*1: If this function is performed, a certain DTC may be detected.

*2: This function is not necessary in the usual service procedure.

SELF-DIAG RESULTS MODE

Self Diagnostic Item Regarding items of DTC and 1st trip DTC, refer to <u>EC-435, "DTC Index"</u>.)

Freeze Frame Data and 1st Trip Freeze Frame Data

< FUNCTION DIAGNOSIS >

[QR25DE]

Freeze frame data item*	Description	А
DIAG TROUBLE CODE [PXXXX]	The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to <u>EC-435, "DTC Index"</u> .)	EC
FUEL SYS-B1	 "Fuel injection system status" at the moment a malfunction is detected is displayed. One mode in the following is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop 	С
CAL/LD VALUE [%]	The calculated load value at the moment a malfunction is detected is displayed.	D
COOLANT TEMP [°C] or [°F]	The engine coolant temperature at the moment a malfunction is detected is displayed.	E
L-FUEL TRM-B1 [%]	 "Long-term fuel trim" at the moment a malfunction is detected is displayed. The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim. 	F
S-FUEL TRM-B1 [%]	 "Short-term fuel trim" at the moment a malfunction is detected is displayed. The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule. 	Γ
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed.	G
VEHICL SPEED [km/h] or [mph]	The vehicle speed at the moment a malfunction is detected is displayed.	Ц
ABSOL TH-P/S [%]	The throttle valve opening angle at the moment a malfunction is detected is displayed.	П
B/FUEL SCHDL [msec]	The base fuel schedule at the moment a malfunction is detected is displayed.	I
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed.	I
FUEL SYS-B2		J
L-FUEL TRM-B2 [%]		0
S-FUEL TRM-B2 [%]	 Always a certain value is displayed. These items are not efficient for L32 models. 	
INT MANI PRES [kPa]		Κ
FTFMCH1		

*: The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE

Monitored Item

 \times : Applicable M

L

Monitored item Unit		Description	Remarks
ENG SPEED	rpm	 Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE). 	 Accuracy becomes poor if engine speed drops below the idle rpm. If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1	V	The signal voltage of the mass air flow sensor is displayed.	 When the engine is stopped, a certain value is indicated. When engine is running specification range is indicated in "SPEC".
B/FUEL SCHDL	msec	"Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	When engine is running specification range is indicated in "SPEC".

< FUNCTION DIAGNOSIS >

[QR25DE]

Monitored item	Unit	Description	Remarks		
A/F ALPHA-B1	%	 The mean value of the air-fuel ratio feedback cor- rection factor per cycle is indicated. 	 When the engine is stopped, a certain value is indicated. When engine is running specification range is indicated in "SPEC". This data also includes the data for the air-fuel ratio learning control. 		
COOLAN TEMP/S	°C or °F	• The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	• When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.		
A/F SEN1 (B1)	V	 The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed. 			
HO2S2 (B1)	V	• The signal voltage of the heated oxygen sensor 2 is displayed.			
HO2S3 (B1)	V	• The signal voltage of the heated oxygen sensor 3 is displayed.			
HO2S2 MNTR(B1)	RICH/LEAN	 Display of heated oxygen sensor 2 signal: RICH: means the amount of oxygen after three way catalyst is relatively small. LEAN: means the amount of oxygen after three way catalyst is relatively large. 	• When the engine is stopped, a certain value is indicated.		
VHCL SPEED SE	km/h or mph	 The vehicle speed computed from the vehicle speed signal sent from brake ECU is displayed. 			
BATTERY VOLT	V	The power supply voltage of ECM is displayed.			
TP SEN 1-B1		The throttle position sensor signal voltage is dis-	• TP SEN 2-B1 signal is converted by		
TP SEN 2-B1	V	v played.	ECM internally. Thus, it differs from ECM terminal voltage signal.		
FUEL T/TMP SE	°C or °F	• The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.			
INT/A TEMP SE	°C or °F	• The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.			
EVAP SYS PRES	V	• The signal voltage of EVAP control system pres- sure sensor is displayed.			
FUEL LEVEL SE	V	• The signal voltage of the fuel level sensor is displayed.			
START SIGNAL	ON/OFF	 Indicates start signal status [ON/OFF] computed by the ECM according to the input signals. 	 After starting the engine, [OFF] is dis- played regardless of the starter sig- nal. 		
CLSD THL POS	ON/OFF	 Indicates idle position [ON/OFF] computed by ECM according to the engine power request sig- nal. 			
AIR COND SIG	ON/OFF	• Indicates [ON/OFF] condition of the air condition- er switch as determined by the air conditioner sig- nal.			
P/N POSI SW	ON/OFF	 Indicates [ON/OFF] condition from the park/neu- tral position (PNP) switch signal. 			
PW/ST SIGNAL	ON/OFF	Always OFF is displayed.This item is not efficient for L32 models.			
LOAD SIGNAL	ON/OFF	 Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and light- ing switch are OFF. 			

< FUNCTION DIAGNOSIS >

[QR25DE]

Monitored item	Unit	Description	Remarks
IGNITION SW	ON/OFF	Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW	ON/OFF	 Indicates [ON/OFF] condition from the blower fan switch signal. 	8
BRAKE SW	ON/OFF	 Indicates [ON/OFF] condition from the stop lamp switch signal. 	
INJ PULSE-B1	msec	 Indicates the actual fuel injection pulse width compensated by ECM according to the input sig- nals. 	• When the engine is stopped, a certain computed value is indicated.
IGN TIMING	BTDC	 Indicates the ignition timing computed by ECM according to the input signals. 	• When the engine is stopped, a certain value is indicated.
CAL/LD VALUE	%	"Calculated load value" indicates the value of the current air flow divided by peak air flow.	
MASS AIRFLOW	g⋅m/s	 Indicates the mass air flow computed by ECM ac- cording to the signal voltage of the mass air flow sensor. 	
PURG VOL C/V	%	 Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. The opening becomes larger as the value increases. 	
INT/V TIM (B1)	°CA	 Indicates [°CA] of intake camshaft advance an- gle. 	
INT/V SOL-B1	%	 The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. The advance angle becomes larger as the value increases. 	
FUEL PUMP RLY	ON/OFF	 Indicates the fuel pump relay control condition determined by ECM according to the input sig- nals. 	
VENT CONT/V	ON/OFF	The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. ON: Closed OFF: Open	
THRTL RELAY	ON/OFF	 Indicates the throttle control motor relay control condition determined by the ECM according to the input signals. 	
HO2S2 HTR (B1)	ON/OFF	 Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals. 	
HO2S3 HTR(B1)	ON/OFF	 Indicates [ON/OFF] condition of heated oxygen sensor 3 heater determined by ECM according to the input signals. 	
VEHICLE SPEED	km/h or mph	 The vehicle speed computed from the vehicle speed signal sent from HV ECU is displayed. 	
IDL A/V LEARN	YET/CMPLT	 Display the condition of Idle Air Volume Learning YET: Idle air volume learning has not been per- formed yet. CMPLT: Idle air volume learning has already been performed successfully. 	
TRVL AFTER MIL	km or mile	Distance traveled while MIL is activated.	
A/F S1 HTR(B1)	%	 Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals. The current flow to the heater becomes larger as the value increases. 	

< FUNCTION DIAGNOSIS >

[QR25DE]

Monitored item	Unit	Description	Remarks
AC PRESS SEN	V	• The signal voltage from the refrigerant pressure sensor is displayed.	
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from brake ECU is displayed.	
SET VHCL SPD	km/h or mph	The preset vehicle speed is displayed.	
MAIN SW	ON/OFF	 Indicates [ON/OFF] condition from MAIN switch signal. 	
CANCEL SW	ON/OFF	 Indicates [ON/OFF] condition from CANCEL switch signal. 	
RESUME/ACC SW	ON/OFF	Indicates [ON/OFF] condition from RESUME/AC- CELERATE switch signal.	
SET SW	ON/OFF	 Indicates [ON/OFF] condition from SET/COAST switch signal. 	
BRAKE SW1	ON/OFF	 Indicates [ON/OFF] condition from ASCD brake switch signal. 	
BRAKE SW2	ON/OFF	 Indicates [ON/OFF] condition of stop lamp switch signal. 	
VHCL SPD CUT	NON/CUT	 Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off. 	
LO SPEED CUT	NON/CUT	 Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low, and ASCD operation is cut off. 	
AT OD MONITOR	ON/OFF	Always OFF is displayed.This item is not efficient for L32 models.	
AT OD CANCEL	ON/OFF	 Always OFF is displayed. This item is not efficient for L32 models.	
CRUISE LAMP	ON/OFF	 Indicates request condition of CRUISE lamp de- termined by the ECM according to the input sig- nals. 	
SET LAMP	ON/OFF	 Always OFF is displayed. This item is not efficient for L32 models.	
A/F ADJ-B1	_	• Indicates the correction of factor stored in ECM. The factor is calculated from the difference be- tween the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 sig- nal.	
FAN DUTY	%	 Indicates a command value for cooling fan. The value is calculated by ECM based on input sig- nals. 	
ACCEL PEDAL POSI	%	 Indicates the accelerator pedal opening value sent from HV ECU. The opening becomes larger as the value in- creases 	
ENG POWER RQST	kW	 Indicates engine power request value sent from HV ECU. 	
ENG SPEED RQST	rpm	Indicates engine speed request signal sent from HV ECU.	
CATALYST TEMP-B1	°C or °F	• Indicates the catalyst temperature computed by ECM according to the input signals.	

< FUNCTION DIAGNOSIS >

[QR25DE]

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Monitored item	Unit	Description	Remarks	Δ
ENG START RQST	YES/NO	 Indicates [YES/NO] condition of engine start re- quest signal sent from HV ECU. 		A
ENG IDLE RQST	YES/NO	 Indicates [YES/NO] condition of engine idle re- quest signal sent from HV ECU. 		EC
ENG F/C RQST	YES/NO	 Indicates [YES/NO] condition of fuel cut request signal sent from HV ECU. 		
EVAP LEAK DIAG	YET/CMPLT	 Indicates the condition of EVAP leak diagnosis. YET: EVAP leak diagnosis has not been per- formed yet. CMPLT: EVAP leak diagnosis has been per- formed successfully. 		C
EVAP DIAG READY	ON/OFF	 Indicates the ready condition of EVAP leak diagnosis. ON: Diagnosis has been ready condition. OFF: Diagnosis has not been ready condition. 		E
ENG START DIAG	YET/CMPLT	 Indicates the condition of engine does not start diagnosis. YET: Diagnosis has not been performed yet. CMPLT: Diagnosis has been performed success- fully. 		F
ENG ST DIAG RSLT	NOTNG/NG	Indicates engine does not start diagnosis result.		G

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	 Ignition switch: ON (READY) Engine: Return to the original trouble condition Change the amount of fuel injection using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	 Harness and connectors Fuel injector Air fuel ratio (A/F) sensor 1
IGNITION TIMING	 Ignition switch: ON (READY) Engine: Return to the original trouble condition Timing light: Set Retard the ignition timing using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	Perform Idle Air Volume Learn- ing.
POWER BALANCE*1	 Ignition switch: ON (READY) Engine: After warming up Selector lever: P Cut off each fuel injector signal one at a time using CONSULT-III. 	Engine runs rough or dies.	 Harness and connectors Compression Fuel injector Power transistor Spark plug Ignition coil
ENG COOLANT TEMP	 Ignition switch: ON (READY) Engine: Return to the original trouble condition Change the engine coolant temperature using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	 Harness and connectors Engine coolant temperature sensor Fuel injector
FUEL PUMP RELAY* ²	 Ignition switch: ON Turn the fuel pump relay "ON" and "OFF" using CONSULT-III and listen to operating sound. 	Fuel pump relay makes the operat- ing sound.	Harness and connectorsFuel pump relay

< FUNCTION DIAGNOSIS >

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TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
PURG VOL CONT/V	 Ignition switch: ON (READY) Engine: After warming up, run engine at 1,500 rpm. Change the EVAP canister purge volume control solenoid valve opening percent using CON-SULT-III. 	Engine speed changes according to the opening percent.	Harness and connectorsSolenoid valve
FUEL/T TEMP SEN	Change the fuel tank temperature	using CONSULT-III.	
VENT CONTROL/V	 Ignition switch: ON (Engine stopped) Turn solenoid valve "ON" and "OFF" with the CONSULT-III and listen to operating sound. 	Solenoid valve makes an operat- ing sound.	Harness and connectorsSolenoid valve
V/T ASSIGN ANGLE	 Ignition switch: ON (READY) Engine: Return to the original trouble condition Change intake valve timing using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	 Harness and connectors Intake valve timing control solenoid valve
FAN DUTY CON- TROL ^{*3}	 Ignition switch: ON Change duty ratio using CON- SULT-III. 	Cooling fan speed changes.	 Harness and connectors Cooling fan motor Cooling fan relay Cooling fan control module IPDM E/R

*1: This item can be executed for 200 seconds after touch "Test Start". If 200 seconds passed, touch "End", and turn ignition switch OFF.

*2: Leaving fuel pump relay OFF with CONSULT-III while ignition switch is ON (READY) position, a certain DTC may be detected. *3: Leaving cooling fan OFF with CONSULT-III while engine is running may cause the engine to overheat.

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to EC-86, "Diagnosis Description".

SRT WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

DTC WORK SUPPORT Mode

Test mode	Test item	Corresponding DTC No.	Reference page
EVAPORATIVE SYSTEM	PURG VOL CN/V P1444	P0443	<u>EC-267</u>
EVAFORATIVE STSTEM	PURG FLOW P0441	P0441	<u>EC-262</u>
A/F SEN1	A/F SEN1(B1) P0133	P0133	<u>EC-189</u>
A/F SENT	A/F SEN1(B1) P1276	P0130	<u>EC-179</u>
	HO2S2(B1) P1146	P0138	<u>EC-198</u>
HO2S2	HO2S2(B1) P1147	P0137	<u>EC-193</u>
	HO2S2(B1) P0139	P0139	<u>EC-205</u>
ENGINE PERFORMANCE	POOR ENG PWR P1196	P1196	<u>EC-323</u>

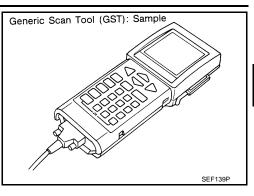
Diagnosis Tool Function

DESCRIPTION

< FUNCTION DIAGNOSIS >

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 different functions explained below. ISO15765-4 is used as the protocol.

The name "GST" or "Generic Scan Tool" is used in this service manual.

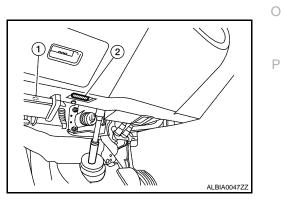


FUNCTION

Diagnostic Service		Function
Service \$01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including an- alog inputs and outputs, digital inputs and outputs, and system status information.
Service \$02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to <u>EC-435</u> , "DTC Index".
Service \$03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.
Service \$04	CLEAR DIAG INFO	 This diagnostic service can clear all emission-related diagnostic information. This includes: Clear number of diagnostic trouble codes (Service \$01) Clear diagnostic trouble codes (Service \$03) Clear trouble code for freeze frame data (Service \$01) Clear freeze frame data (Service \$02) Reset status of system monitoring test (Service \$01) Clear on board monitoring test results (Service \$06 and \$07)
Service \$06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
Service \$07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission- related powertrain components/systems that are continuously monitored during normal driving conditions.
Service \$08	_	 This diagnostic service can close EVAP system in ignition switch ON position (Engine stopped). When this diagnostic service is performed, EVAP canister vent control valve can be closed. In the following conditions, this diagnostic service cannot function. Low ambient temperature Low battery voltage Engine running Ignition switch OFF Low fuel temperature Too much pressure is applied to EVAP system
Service \$09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle infor- mation such as Vehicle Identification Number (VIN) and Calibration IDs.

INSPECTION PROCEDURE

- 1. Turn ignition switch OFF.
- 2. Connect "GST" to data link connector (2), which is located under LH dash panel near the hood opener handle (1).



EC-107

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EC

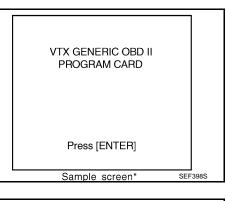
С

D

< FUNCTION DIAGNOSIS >

[QR25DE]

- 3. Turn ignition switch ON.
- Enter the program according to instruction on the screen or in the operation manual. (*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic mode according to each service procedure.

For further information, see the GST Operation Manual of the tool maker.

OBD II FUNCTIONS	
F0: DATA LIST	
F1: FREEZE DATA	
F2: DTCs	
F3: SNAPSHOT	
F4: CLEAR DIAG INFO	
F5: O2 TEST RESULTS	
F6: READINESS TESTS	
F7: ON BOARD TESTS	
F8: EXPAND DIAG PROT	
F9: UNIT CONVERSION	
Sample screen*	SEF416S

EC-109

< COMPONENT DIAGNOSIS >

COMPONENT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

The specification (SP) value indicates the tolerance of the value that is displayed in "SPEC" of "DATA MONI-TOR" mode of CONSULT-III during normal operation of the Engine Control System. When the value in "SPEC" of "DATA MONITOR" mode is within the SP value, the Engine Control System is confirmed OK. When the value in "SPEC" of "DATA MONITOR" mode is NOT within the SP value, the Engine Control System may have one or more malfunctions. The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL. The SP value will be displayed for the following three items: B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correc-Е tion) A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle) MAS A/F SE-B1 (The signal voltage of the mass air flow sensor) F Component Function Check INEOID:0000000003069125 1.START Make sure that all of the following conditions are satisfied. • Vehicle driven distance: More than 5,000 km (3,107 miles) Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm², 14.25 - 15.12 psi) Н Atmospheric temperature: 20 - 30°C (68 - 86°F) Engine coolant temperature: 75 - 95°C (167 - 203°F) Transmission: Warmed-up (After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.) Engine speed: Idle >> GO TO 2. 2.PERFORM "SPEC" OF "DATA MONITOR" MODE (P)With CONSULT-III Κ NOTE: Perform "SPEC" in "DATA MONITOR" mode in maximum scale display.

- 1. Lift up the vehicle.
- 2. Perform EC-11, "BASIC INSPECTION : Special Repair Requirement".
- 3. Turn ignition switch ON (READY).
- 4. Depressed the accelerator pedal and keep it.
- 5. Shift the selector lever to N position with engine running.
 - **CAUTION:**

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

- Select "B/FUEL SCHDL", "A/F ALPHA-B1" and "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode with CONSULT-III.
- 7. Make sure that monitor items are within the SP value.
- 8. Shift the selector lever to P position.

Is the inspection result normal?

- YES >> END
- NO >> Go to EC-110, "Diagnosis Procedure".

[QR25DE]

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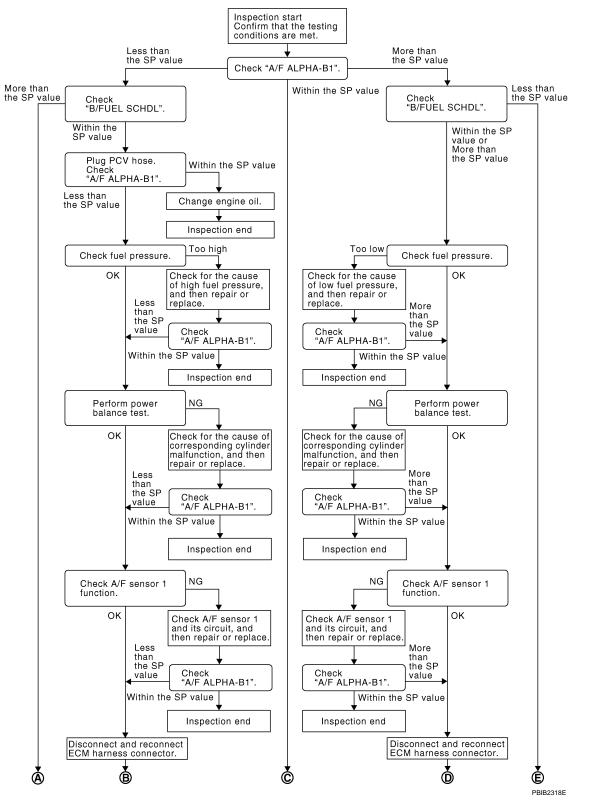
Ρ

< COMPONENT DIAGNOSIS >

Diagnosis Procedure

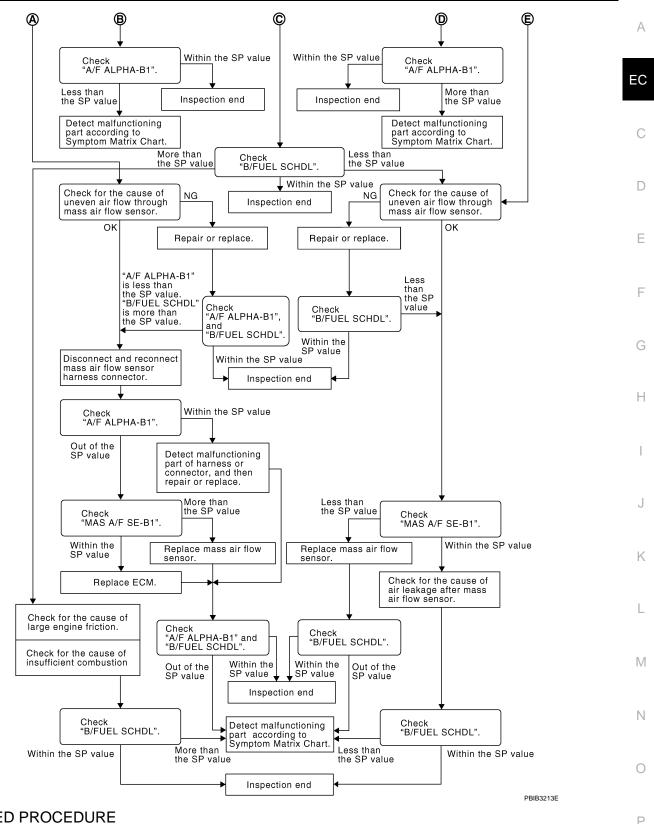
[QR25DE]

OVERALL SEQUENCE



< COMPONENT DIAGNOSIS >

[QR25DE]



DETAILED PROCEDURE

1.CHECK "A/F ALPHA-B1"

With CONSULT-III

- 1. Confirm that the testing conditions are met. Refer to EC-109. "Component Function Check".
- 2. Lift up the vehicle.
- 3. Turn ignition switch ON (READY).
- 4. Depressed the accelerator pedal and keep it.

EC-111

- [QR25DE] < COMPONENT DIAGNOSIS > 5. Shift the selector lever to N position with engine running. **CAUTION:** Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the each indication is 6. within the SP value. NOTE: Check "A/F ALPHA-B1" for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little. Is the measurement value within the SP value? YES >> GO TO 17. NO-1 >> Less than the SP value: GO TO 2. NO-2 >> More than the SP value: GO TO 3. 2.CHECK "B/FUEL SCHDL" Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is 1. within the SP value. 2. Shift the selector lever to P position. Is the measurement value within the SP value? >> GO TO 4. YES NO >> More than the SP value: GO TO 19. 3. CHECK "B/FUEL SCHDL" Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is 1. within the SP value. 2. Shift the selector lever to P position. Is the measurement value within the SP value? YES >> GO TO 6. NO-1 >> More than the SP value: GO TO 6. NO-2 >> Less than the SP value: GO TO 25. **4.**CHECK "A/F ALPHA-B1" 1. Turn ignition switch OFF. 2. Disconnect PCV hose, and then plug it. 3. Turn ignition switch ON (READY). 4. Depressed the accelerator pedal and keep it. 5. Shift the selector lever to N position with engine running. CAUTION: Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within 6 the SP value. Shift the selector lever to P position. 7.
- Is the measurement value within the SP value?
- >> GO TO 5. YES
- NO >> GO TO 6.
- 5. CHANGE ENGINE OIL
- 1. Turn ignition switch OFF.
- 2. Change engine oil.
 - NOTE:

This symptom may occur when a large amount of gasoline is mixed with engine oil because of driving conditions (such as when engine oil temperature does not rise enough since a journey distance is too short during winter). The symptom will not be detected after changing engine oil or changing driving condition.

>> INSPECTION END

6.CHECK FUEL PRESSURE

<pre>COMPONENT DIAGNOSIS - SPECIFICATION VALUE </pre>	[QR25DE]
Check fuel pressure. (Refer to <u>EC-454, "Inspection"</u> .)	
Is the inspection result normal?	A
YES >> GO TO 9.	
NO-1 >> Fuel pressure is too high: Replace "fuel filter and fuel pump assembly" and then GC NO-2 >> Fuel pressure is too low: GO TO 7.	TO 8.
7. DETECT MALFUNCTIONING PART	
Check fuel hoses and fuel tubes for clogging	С
Is the inspection result normal?	
 YES >> Replace "fuel filter and fuel pump assembly" and then GO TO 8. NO >> Repair or replace and then GO TO 8. 	D
8. CHECK "A/F ALPHA-B1"	
1. Turn ignition switch ON (READY).	
 Depressed the accelerator pedal and keep it. Shift the selector lever to N position with engine running. 	E
CAUTION:	
Never leave the selector lever in the N position for a long period of time. In the N	position, the _F
 engine operates but electricity cannot be generated. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indic 	ation is within
the SP value.	
5. Shift the selector lever to P position.	G
Is the measurement value within the SP value?	
YES >> INSPECTION END NO >> GO TO 9.	ŀ
9.PERFORM POWER BALANCE TEST	
 Perform "POWER BALANCE" in "ACTIVE TEST" mode. Make sure that the each cylinder produces a momentary engine speed drop. 	I
Is the inspection result normal?	
YES >> GO TO 12.	
NO $>>$ GO TO 10.	
10. DETECT MALFUNCTIONING PART	
Check the following.	k
1. Ignition coil and its circuit (Refer to <u>EC-384, "Component Function Check"</u> .)	
2. Fuel injector and its circuit (Refer to <u>EC-236, "Diagnosis Procedure"</u> .)	
 Intake air leakage Low compression pressure (Refer to EM-21, "Compression pressure".) 	l
Is the inspection result normal?	
YES >> Replace fuel injector and then GO TO 11.	Ν
NO >> Repair or replace malfunctioning part and then GO TO 11.	
11.снеск "А/F АLPHA-В1"	
1. Turn ignition switch ON (READY).	N
2. Depressed the accelerator pedal and keep it.	
3. Shift the selector lever to N position with engine running.	,
CAUTION: Never leave the selector lever in the N position for a long period of time. In the N	nosition the
engine operates but electricity cannot be generated.	
4. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indic	ation is within
the SP value.	
5. Shift the selector lever to P position.	
<u>Is the measurement value within the SP value?</u> YES >> INSPECTION END	
NO $>>$ GO TO 12.	
12.CHECK A/F SENSOR 1 FUNCTION	

< COMPONENT DIAGNOSIS >

[QR25DE]

- Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1.
- For DTC P0130, refer to EC-179, "DTC Logic".
- For DTC P0131, refer to EC-183, "DTC Logic".
- For DTC P0132, refer to <u>EC-186, "DTC Logic"</u>.
 For DTC P0133, refer to <u>EC-189, "DTC Logic"</u>.
- For DTC P2A00, refer to EC-369, "DTC Logic".

Is any DTC detected?

YES >> GO TO 15.

NO >> GO TO 13.

13. CHECK A/F SENSOR 1 CIRCUIT

Perform DIAGNOSTIC PROCEDURE according to corresponding DTC.

>> GO TO 14.

14.CHECK "A/F ALPHA-B1"

- 1. Lift up the vehicle.
- Turn ignition switch ON (READY). 2.
- Depressed the accelerator pedal and keep it. 3.
- 4. Shift the selector lever to N position with engine running.
- **CAUTION:**

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

- 5. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the each indication is within the SP value.
- 6. Shift the selector lever to P position.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> GO TO 15.

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 16.

16.CHECK "A/F ALPHA-B1"

- 1. Lift up the vehicle.
- 2. Turn ignition switch ON (READY).
- 3. Depressed the accelerator pedal and keep it.
- 4. Shift the selector lever to N position with engine running. **CAUTION:**

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

- 5. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.
- Shift the selector lever to P position. 6.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to EC-443, "Symptom Table".

17.CHECK "B/FUEL SCHDL"

- 1 Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.
- 2. Shift the selector lever to P position.

Is the measurement value within the SP value?

- YES >> INSPECTION END
- NO-1 >> More than the SP value: GO TO 18.

EC-114

	QR25DE]
NO-2 >> Less than the SP value: GO TO 25.	
8. DETECT MALFUNCTIONING PART	
 Check for the cause of large engine friction. Refer to the following. Engine oil level is too high Engine oil viscosity Belt tension of power steering, alternator, A/C compressor, etc. is excessive Noise from engine Noise from transmission, etc. Check for the cause of insufficient combustion. Refer to the following. 	
Valve clearance malfunction Intake valve timing control function malfunction Camshaft sprocket installation malfunction, etc.	
>> Repair or replace malfunctioning part, and then GO TO 30. $9.$ CHECK INTAKE SYSTEM	
neck for the cause of uneven air flow through mass air flow sensor. Refer to the following. Crushed air ducts Malfunctioning seal of air cleaner element Uneven dirt of air cleaner element	
mproper specification of intake air system the inspection result normal?	
 'ES >> GO TO 21. IO >> Repair or replace malfunctioning part, and then GO TO 20. O.CHECK "A/F ALPHA-B1", AND "B/FUEL SCHDL" 	
Lift up the vehicle. Turn ignition switch ON (READY). Depressed the accelerator pedal and keep it. Shift the selector lever to N position with engine running. CAUTION:	
Never leave the selector lever in the N position for a long period of time. In the N posengine operates but electricity cannot be generated. Select "A/F ALPHA-B1" and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make the each indication is within the SP value. Shift the selector lever to P position.	
the measurement value within the SP value?	
 'ES >> INSPECTION END 'B/FUEL SCHDL" is more, "A/F ALPHA-B1" is less than the SP value: GO TO 21. 	
1. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR	
Turn ignition switch OFF. Disconnect mass air flow sensor harness connector. Check pin terminal and connector for dar then reconnect it again.	mage and
>> GO TO 22.	
2.CHECK "A/F ALPHA-B1"	
Lift up the vehicle. Turn ignition switch ON (READY). Depressed the accelerator pedal and keep it. Shift the selector lever to N position with engine running. CAUTION:	
Never leave the selector lever in the N position for a long period of time. In the N posengine operates but electricity cannot be generated. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication	

- 5. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.
- 6. Shift the selector lever to P position.

< COMPONENT DIAGNOSIS >

[QR25DE]

Is the measurement value within the SP value?

- YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to <u>EC-145, "DTC</u> <u>Logic"</u>. Then GO TO 29.
- NO >> GO TO 23.

23.CHECK "MAS A/F SE-B1"

- 1. Depressed the accelerator pedal and keep it.
- 2. Shift the selector lever to N position with engine running.
 - CAUTION: Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.
- 3. Select "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.
- 4. Shift the selector lever to P position.
- Is the measurement value within the SP value?

YES >> GO TO 24.

NO >> More than the SP value: Replace mass air flow sensor, and then GO TO 29.

24.REPLACE ECM

1. Replace ECM.

2. Go to EC-14, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 29.

25. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

Is the inspection result normal?

- YES >> GO TO 27.
- NO >> Repair or replace malfunctioning part, and then GO TO 26.

26. CHECK "B/FUEL SCHDL"

- 1. Lift up the vehicle.
- 2. Turn ignition switch ON (READY).
- 3. Depressed the accelerator pedal and keep it.
- 4. Shift the selector lever to N position with engine running. CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

- 5. Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.
- 6. Shift the selector lever to P position.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Less than the SP value: GO TO 27.

27.CHECK "MAS A/F SE-B1"

- 1. Lift up the vehicle.
- 2. Turn ignition switch ON (READY).
- 3. Depressed the accelerator pedal and keep it.
- 4. Shift the selector lever to N position with engine running. CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

Incodel Diagnosis - of Edit Ration VALUE	
< COMPONENT DIAGNOSIS > [C	QR25DE]
 Select "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the ind within the SP value. Shift the selector lever to P position. 	dication is
Is the measurement value within the SP value?	
YES >> GO TO 28.	EC
NO >> Less than the SP value: Replace mass air flow sensor, and then GO TO 30.	EO
28. CHECK INTAKE SYSTEM	
Check for the cause of air leak after the mass air flow sensor. Refer to the following.	С
 Disconnection, looseness, and cracks in air duct 	
Looseness of oil filler cap	
 Disconnection of oil level gauge Open stuck, breakage, hose disconnection, or cracks of PCV valve 	D
 Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control 	l solenoid
valve	E
Malfunctioning seal of rocker cover gasket	
 Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system. Malfunctioning seal of intake air system, etc. 	em pans
	F
>> GO TO 30.	
29. CHECK "A/F ALPHA-B1" AND "B/FUEL SCHDL"	C
1. Lift up the vehicle.	G
2. Turn ignition switch ON (READY).	
3. Depressed the accelerator pedal and keep it.	Н
 Shift the selector lever to N position with engine running. CAUTION: 	
Never leave the selector lever in the N position for a long period of time. In the N pos	ition, the
engine operates but electricity cannot be generated.	I
 Select "A/F ALPHA-B1" and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make the indication is within the SP value. 	sure that
6. Shift the selector lever to P position.	J
Is the measurement value within the SP value?	0
YES >> INSPECTION END	
NO >> Detect malfunctioning part according to <u>EC-443, "Symptom Table"</u> .	K
30. CHECK "B/FUEL SCHDL"	
1. Lift up the vehicle.	
2. Turn ignition switch ON (READY).	L
 Depressed the accelerator pedal and keep it. Shift the selector lever to N position with engine running. 	
CAUTION:	M
Never leave the selector lever in the N position for a long period of time. In the N pos	ition, the
 engine operates but electricity cannot be generated. 5. Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and then make sure that the in- 	diaction in
 Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and then make sure that the in- within the SP value. 	dication is N
6. Shift the selector lever to P position.	
Is the measurement value within the SP value?	0
YES >> INSPECTION END	0
NO >> Detect malfunctioning part according to <u>EC-443, "Symptom Table"</u> .	
	Р

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

1.INSPECTION START

- 1. Turn ignition switch ON (READY).
- 2. Depress accelerator pedal.

Is engine running?

YES >> GO TO 8. 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	Cround	voltage
E10	93	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 E18
- 10A fuse (No. 35)
- 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 E9. Refer to Ground Inspection in GI-45, "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.

E	ECM Ground Continuity		Continuity	
Connector	Terminal	Cround	Continuity	
F14	12			
F 14	16			
	107	Ground	Existed	
E10	108	Ground	Existed	
EIU	111			
	112			

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6. INFOID:000000003069127

<pre>POWER SUPPLY AND GROUND CIRCUIT < COMPONENT DIAGNOSIS ></pre>	[QR25DE]
6.DETECT MALFUNCTIONING PART	
Check the following. • Harness connectors F80, E68	
 Harness for open or short between ECM and ground 	E
>> Repair open circuit or short to power in harness or connectors. 7. CHECK ECM POWER SUPPLY CIRCUIT-II	
 Reconnect ECM harness connectors. Turn ignition switch ON. Check the voltage between IPDM E/R harness connector and ground. 	
IPDM E/R Ground Voltage	
Connector Terminal	
F10 53 Ground Battery voltage	
<u>Is the inspection result normal?</u> YES >> Go to <u>EC-384, "Diagnosis Procedure"</u> . NO >> GO TO 8.	
8.CHECK ECM POWER SUPPLY CIRCUIT-III	
 Turn ignition switch OFF and wait at least 10 seconds. Check the voltage between ECM harness connector and ground. 	
Connector Terminal	
E10 105 After turning ignition switch OFF, battery volt- age will exist for a few seconds, then drop ap- proximately 0V.	
Is the inspection result normal?	
YES >> GO TO 14. NO-1 >> Battery voltage does not exist: GO TO 9. NO-2 >> Battery voltage exists for more than a few seconds: GO TO 12.	
9.CHECK ECM POWER SUPPLY CIRCUIT-IV	
 Turn ignition switch OFF and wait at least 10 seconds. Check the voltage between ECM harness connector and ground. 	
ECM	
Connector Terminal Ground Voltage	
F14 24 Ground Battery voltage	
Is the inspection result normal?	
YES >> GO TO 10. NO >> GO TO 12.	
10.CHECK ECM POWER SUPPLY CIRCUIT-V	
I O.CHECK ECM FOWER SUPPLY CIRCUIT-V	

Disconnect IPDM E/R harness connector E18.
 Check the continuity between ECM harness connector and IPDM E/R harness connector.

E	СМ	IPDN	M E/R	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E10	105	E18	10	Existed

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

Ρ

POWER SUPPLY AND GROUND CIRCUIT

< COMPONENT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 17. NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

Junction block connectors E44, E45

• 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.

12.CHECK ECM POWER SUPPLY CIRCUIT-VI

- 1. Disconnect ECM harness connector.
- 2. Disconnect IPDM E/R harness connector F10.
- 3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F14	24	F10	69	Existed

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

Is the inspection result normal?

YES >> GO TO 13.

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

13.CHECK 15A FUSE

- 1. Disconnect 15A fuse (No. 42) from IPDM E/R.
- 2. Check 15A fuse.

Is the inspection result normal?

YES >> GO TO 17.

NO >> Replace 15A fuse (No. 42).

14. CHECK GROUND CONNECTION-II

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Repair or replace ground connection.

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

1. Disconnect ECM harness connector.

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

E	СМ	Ground	Continuity
Connector	Terminal	Cround	Continuity
F14	12		
F 14	16		
	107	- Ground	Existed
E10	108		Existed
E10	111		
	112		

3. Also check harness for short to power. Is the inspection result normal?

YES >> GO TO 17.

POWER SUPPLY AND GROUND CIRCUIT

< COMPONENT DIAGNOSIS >	[QR25DE]
NO >> GO TO 16.	
16. DETECT MALFUNCTIONING PART	A
Check the following. • Harness or connectors F80, E68 • Harness for open or short between ECM and ground	EC
>> Repair open circuit or short to power in harness or connectors. 17.CHECK INTERMITTENT INCIDENT	С
Refer to GI-42, "Intermittent Incident".	
Is the inspection result normal?	D
 YES >> Replace IPDM E/R. NO >> Repair open circuit or short to power in harness or connectors. 	E
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U0129, U1022 CAN COMM CIRCUIT

DTC Logic

INFOID:000000003069128

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0129	Lost communication	CAN communication signal of OBD (emission related diagnosis) is not received between brake ECU and ECM for 1 second or more.	HEV SYSTEM CAN communication line between brake ECU and ECM
U1022	with brake ECU	CAN communication signal other than OBD (emis- sion related diagnosis) is not received between brake ECU and ECM for 1 second or more.	HEV SYSTEM CAN communication line short

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.

2. Check DTC.

Is DTC detected?

YES >> <u>EC-122, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

Go to LAN-4, "Description".

INFOID:000000003069129

U0293, U1020 CAN COMM CIRCUIT

DTC Logic

А

EC

INFOID:000000003069130

[QR25DE]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0293	Lost communication	CAN communication signal of OBD (emission related diagnosis) is not received between HV ECU and ECM for 1 second or more.	HEV SYSTEM CAN communication line between HV ECU and ECM
U1020	with HV ECU	CAN communication signal other than OBD (emission related diagnosis) is not received between HV ECU and ECM for 1 second or more.	HEV SYSTEM CAN communication line short
DTC CON	FIRMATION PRO	CEDURE	
1. PERFO	RM DTC CONFIRM	ATION PROCEDURE	
1. Turn ig 2. Check		d wait at least 3 seconds.	
Is DTC det			
	<u>EC-123, "Diagnosi</u> INSPECTION END		
-	s Procedure	·	INFOID:000000003069
C	-4, "Description".		
	<u>, Desemption</u> .		

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EC-123

U0400, U1021 CAN COMM DATA

DTC Logic

INFOID:000000003069132

INFOID:000000003069133

[QR25DE]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0400	Invalid data received from hybrid vehicle control ECU	SUM data on CAN signal of OBD (emission re- lated diagnosis) from HV ECU is different from SUM data calculated by ECM.	Harness or connectors (HEV SYSTEM CAN communication line is open or shorted)
U1021		SUM data on CAN signal other than OBD (emission related diagnosis) from HV ECU is different from SUM data calculated by ECM.	 ECM HV ECU

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.

2. Check DTC.

Is DTC detected?

- YES >> Go to EC-124. "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK HEV SYSTEM CAN COMMUNICATION CIRCUIT

Refer to LAN-53, "Trouble Diagnosis Procedure".

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace.

2. REPLACE ECM

- 1. Replace ECM.
- Go to <u>EC-14</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

BWith CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "SELF-DIAG RESULTS" mode with CONSULT-III.
- 3. Touch "ERASE".
- 4. Perform DTC CONFIRMATION PROCEDURE. See <u>EC-124</u>, "<u>DTC Logic</u>".
- 5. Check DTC.

With GST

- Turn ignition switch ON.
- 2. Select "Service \$04" with GST.
- 3. Perform DTC CONFIRMATION PROCEDURE.
- See <u>EC-124, "DTC Logic"</u>.
- 4. Check DTC.

Is the DTC U0400 or U1021 displayed again?

- YES >> GO TO 4.
- NO >> INSPECTION END
- **4.**REPLACE HV ECU

U0400, U1021 CAN COMM DATA

- (COMPONENT DIAGNOSIS > [QR25DE]	
		_
1. 2.	Replace HV ECU. Go to <u>HBC-12, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Require-</u> ment".	A
	>> INSPECTION END	EC
		С
		D
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U0418, U1023 CAN COMM DATA

DTC Logic

INFOID:000000003069134

INFOID:000000003069135

[QR25DE]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0418	Invalid data received from brake ECU	SUM data on CAN signal of OBD (emission re- lated diagnosis) from brake ECU is different from SUM data calculated by ECM.	Harness or connectors (HEV SYSTEM CAN communication line is open or shorted)
U1023		SUM data on CAN signal other than OBD (emission related diagnosis) from brake ECU is different from SUM data calculated by ECM.	• ECM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.

2. Check DTC.

Is DTC detected?

- YES >> Go to EC-126. "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK HEV SYSTEM CAN COMMUNICATION CIRCUIT

Refer to LAN-53, "Trouble Diagnosis Procedure".

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace.

2. REPLACE ECM

- 1. Replace ECM.
- Go to <u>EC-14</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

BWith CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "SELF-DIAG RESULTS" mode with CONSULT-III.
- 3. Touch "ERASE".
- 4. Perform DTC CONFIRMATION PROCEDURE. See <u>EC-126, "DTC Logic"</u>.
- 5. Check DTC.

With GST

- Turn ignition switch ON.
- 2. Select "Service \$04" with GST.
- 3. Perform DTC CONFIRMATION PROCEDURE.
- See <u>EC-126, "DTC Logic"</u>.
- 4. Check DTC.
- Is the DTC U0418 or U1023 displayed again?
- YES >> GO TO 4.
- NO >> INSPECTION END
- **4.**REPLACE BRAKE ECU

U0418, U1023 CAN COMM DATA

< COMPONENT DIAGNOSIS >		[QR25DE]
1. 2.	Replace brake ECU. Go to <u>BRC-190, "Exploded View"</u> .	A
	>> INSPECTION END	EC
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U1000, U1001 CAN COMM CIRCUIT

Description

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

DTC Logic

INFOID:000000003069137

INFOID:000000003069138

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000	CAN communication	When ECM is not transmitting or receiving CAN com- munication signal of OBD (emission related diagno- sis) for 2 seconds or more.	 Harness or connectors (CAN communication line is open or
U1001	line	When ECM is not transmitting or receiving CAN com- munication signal other than OBD (emission related diagnosis) for 2 seconds or more.	shorted)

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 3 seconds.
- 2. Check DTC.

Is DTC detected?

- YES >> EC-128, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

Go to LAN-16, "Trouble Diagnosis Flow Chart".

INFOID:000000003069136

P0011 IVT CONTROL

< COMPONENT DIAGNOSIS >

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for EC-142, "DTC Logic"
- If DTC P0011 is displayed with DTC P0340, first perform the trouble diagnosis for EC-254, "DTC Logic".

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause	D
P0011	Intake valve timing control performance	There is a gap between angle of target and phase-control angle degree.	 Crankshaft position sensor (POS) Camshaft position sensor (PHASE) Intake valve control solenoid valve Accumulation of debris to the signal pick-up portion of the camshaft Timing chain installation Foreign matter caught in the oil groove for intake valve timing control 	E

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Н If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10V and 16V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (HBC-97) to start engine, and warm up engine to normal operating tem-L perature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON (READY) and select "DATA MONITOR" mode with CONSULT-III.
- Μ 4. Maintain the following conditions for at least 10 consecutive seconds. Hold the accelerator pedal as steady as possible.

VHCL SPEED SE	70 km/h (43 mph) or more
ENG SPEED	800 - 2,000 rpm
COOLAN TEMP/S	80°C (176°F) or more
Shift lever	D position

CAUTION:

Always drive at a safe speed.

- 5. Stop vehicle.
- 6. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

YES >> Go to EC-130, "Diagnosis Procedure"

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3.PERFORM DTC CONFIRMATION PROCEDURE-II

(R)With CONSULT-III

Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	1,700 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 70°C (221°F)
Shift lever	D position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:

Always drive at a safe speed.

2. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

- YES >> Go to EC-130, "Diagnosis Procedure" NO
 - >> INSPECTION END

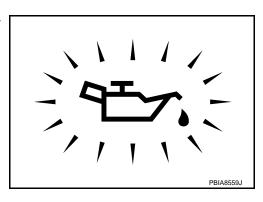
Diagnosis Procedure

1.CHECK OIL PRESSURE WARNING LAMP

- 1. Activate "INSPECTION MODE 1" (HBC-97) to start engine.
- Check oil pressure warning lamp and confirm it is not illumi-2. nated.

Is oil pressure warning lamp illuminated?

- >> Go to LU-8, "Inspection". YES
- >> GO TO 2. NO



2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-131, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace intake valve timing control solenoid valve.

3.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-252, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace crankshaft position sensor (POS).

4.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-256, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

>> Replace camshaft position sensor (PHASE). NO

5.CHECK CAMSHAFT (INTAKE)

INFOID:000000003069145

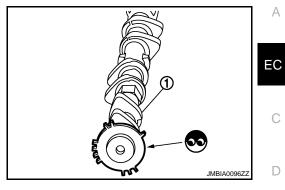
P0011 IVT CONTROL

< COMPONENT DIAGNOSIS >

- Check the following.Accumulation of debris to the signal plate of camshaft (1) rear endChipping signal plate of camshaft rear end

Is the inspection result normal?

YES	>> GO TO 6.
NO	>> Remove debris and clean the signal plate of camshaft
	rear end or replace camshaft.



6. Check timing chain installation

Check service reco	ords for any recent repairs th	at may cause timing chain misaligned.	E
Are there any serv	ice records that may cause t	ming chain misaligned?	
		er to EM-50, "Removal and Installation".	
<u>NO</u> >> GO TO	• • •		F
7.CHECK LUBRI	CATION CIRCUIT		
Refer to EM-46, "I	nspection After Installation".		-
Is the inspection re	esult normal?		G
YES >> GO TO			
•	lubrication line.		Н
8. CHECK INTER	MITTENT INCIDENT		
Refer to GI-42, "In	termittent Incident".		-
>> INSPE	ECTION END		
Component In:	spection	INFOID:00000000306914	³ J
1.CHECK INTAK	E VALVE TIMING CONTROL	SOLENOID VALVE-I	
 Turn ignition s Disconnect int 		noid valve harness connector.	K
		ing control solenoid valve terminals as follows.	
			1
Terminals	Resistance		
1 and 2	6.7 - 7.7Ω		
1 or 2 and ground	${}^{\infty\Omega}$ (Continuity should not exist)		Μ
Is the inspection re	esult normal?		
YES >> GO TO	-		Ν
-	ce intake valve timing control		
2.CHECK INTAK	E VALVE TIMING CONTROL	SOLENOID VALVE-II	~
1. Remove intak	e valve timing control solenoi	d valve.	0

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P0011 IVT CONTROL

< COMPONENT DIAGNOSIS >

 Provide 12V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.
 CAUTION:

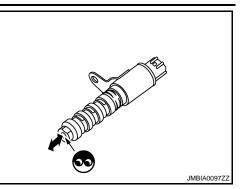
Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve. NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake valve timing control solenoid valve.



P0031, P0032 A/F SENSOR 1 HEATER

Description

INFOID:000000003069147

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SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator	
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Air fuel ratio (A/F) sensor 1 heater control	Air fuel ratio (A/F) sensor 1 heater	C
Mass air flow sensor	Amount of intake air		neater	

The ECM performs ON/OFF duty control of the A/F sensor 1 heater corresponding to the engine operating condition to keep the temperature of A/F sensor 1 element at the specified range.

DTC Logic

INFOID:000000003069148

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	-
P0031	Air fuel ratio (A/F) sensor 1 heater control circuit low	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)	 Harness or connectors (The A/F sensor 1 heater circuit is open or shorted.) A/F sensor 1 heater 	(
P0032	Air fuel ratio (A/F) sensor 1 heater control circuit high	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)	 Harness or connectors (The A/F sensor 1 heater circuit is shorted.) A/F sensor 1 heater 	-

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than between 11V at idle.

>> GO TO 2.

Μ 2. PERFORM DTC CONFIRMATION PROCEDURE 1. Activate "INSPECTION MODE 1" (HBC-97) to start engine, and let engine idle for at least 10 seconds. Check 1st trip DTC. Ν Is 1st trip DTC detected? YES >> Go to EC-133, "Diagnosis Procedure". >> INSPECTION END NO Diagnosis Procedure INFOID:000000003069149 1. CHECK GROUND CONNECTION Ρ Turn ignition switch OFF. 1.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

EC-133

P0031, P0032 A/F SENSOR 1 HEATER

< COMPONENT DIAGNOSIS >

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1 Connector Terminal		Ground	Voltage
Connector	Terminal	Ground	voltage
F44	4	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 F10
- 15A fuse (No. 37)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK A/F SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity	
Connector	Terminal	Connector Terminal		Continuity	
F44	3	F14	4	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 A/F SENSOR 1 HEATER

Refer to EC-135, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

O.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

>> Repair or replace.

P0031, P0032 A/F SENSOR 1 HEATER

< COMPONENT DIAGNOSIS >

Component Inspection

1.CHECK AIR FUEL RATIO (A/F) SENSOR 1

- 1. Turn ignition switch OFF.
- 2. Disconnect A/F sensor 1 harness connector.
- 3. Check resistance between A/F sensor 1 terminals as follows.

Terminals	Resistance
3 and 4	1.8 - 2.44 Ω [at 25°C (77°F)]
3 and 1, 2	Ω^{∞}
4 and 1, 2	(Continuity should not exist)

Is the inspection result normal?

YES	>> INSPECTION END
	>> GO TO 2.
2	

Z.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. **CAUTION:**

• Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

• Before installing new sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> INSPECTION END

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P0037, P0038 HO2S2 HEATER

Description

INFOID:000000003069151

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 2	
Engine coolant temperature sensor	Engine coolant temperature	heater control	Heated oxygen sensor 2 heater
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

Engine speed	Heated oxygen sensor 2 heater	
Above 3,600 rpm	OFF	
More than 3 minutes after engine stopped.	OFF	
 Below 3,600 rpm after the following conditions are met. Engine: After warming up Driving for 3 minutes at a speed of 80 km/h (50 MPH) or more (Keep the vehicle speed as steady as possible during the cruising.) 	ON	

DTC Logic

INFOID:000000003069152

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sen- sor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	 Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) Heated oxygen sensor 2 heater
P0038	Heated oxygen sensor 2 heater control circuit high	The current amperage in the heated oxygen sen- sor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	 Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.) Heated oxygen sensor 2 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.

EC-136

P0037, P0038 HO2S2 HEATER

< COMPONE	ENT DIAGNO)SIS >		[QR25DE]
5. Turn igni	tion switch Of	N (READY).	at least 10 seco	
CAUTIO Always (N:		. ,	nore for at least 3 consecutive minutes. to traffic conditions and obey all traffic laws.
NOTE: Keep the	e vehicle spe	ed as stead	y as possible (during the cruising.
	st trip DTC.			
<u>ls 1st trip DT(</u> YES >> 0	<u>C detected?</u> So to <u>EC-137</u> ,	"Diognosia I	Procedure"	
	NSPECTION		-locedule	
Diagnosis	Procedure	•		INFOID:000000003069153
1. снеск g	ROUND CON	INECTION		
	tion switch Of			
2. Check gr	ound connec	tion E9. Refe	er to Ground Ins	spection in GI-45, "Circuit Inspection".
	ion result nor	mal?		
	GO TO 2. Repair or repla	ace ground c	onnection.	
-	O2S2 POWE	-		
			2 harness conn	nector.
2. Turn igni	tion switch O	N.		
 Check th 	e voltage bet	ween HO252	arness conne	ector and ground.
НО	2\$2			—
Connector	Terminal	Ground	Voltage	
F42	2	Ground	Battery voltage	_
Is the inspect	ion result nor	mal?		_
	GO TO 4. GO TO 3.			
•	MALFUNCTIC		-	
Check the fol				
 IPDM E/R d 	connector F10)		
 15A fuse (N Harpess for 		t hotwoon he	ated oxygen s	ensor 2 and fuse
110111655101		t between ne	ealeu oxygen si	
>> F	Repair open c	ircuit or short	to ground or s	hort to power in harness or connectors.
4.снеск н	02S2 OUTPI	JT SIGNAL (OPEN AND SHORT
	tion switch Of			
	ect ECM harn			nnector and ECM harness connector.
J. CHECK III			02 Hamess CUI	
HC	282	E	ECM	
Connector	Terminal	Connector	Terminal	Continuity
F42	3	F14	13	Existed
4. Also che	ck harness fo	r short to gro	und and short t	to power.
Is the inspect	ion result nor	mal?		

YES >> GO TO 5. NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2 HEATER

P0037, P0038 HO2S2 HEATER

< COMPONENT DIAGNOSIS >

Refer to EC-138, "Component Inspection".

Is the inspection result normal?

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

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK HEATED OXYGEN SENSOR 2 HEATER

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 2 harness connector.
- 3. Check resistance between HO2S2 terminals as follows.

Terminals	Resistance
2 and 3	3.3 - 4.4 Ω [at 25°C (77°F)]
1 and 2, 3, 4	$\infty \Omega$
4 and 1, 2, 3	(Continuity should not exist)

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> INSPECTION END

EC-138

INFOID:000000003069154

P0043, P0044 HO2S3 HEATER

Description

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INFOID:000000003069155

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator	
Camshaft position sensor (PHASE)	Engine speed			
Crankshaft position sensor (POS)		Heated oxygen sensor 3	Heated oxygen sensor 3 heater	
Engine coolant temperature sensor	Engine coolant temperature	heater control	Theated oxygen sensor 5 heater	D
Mass air flow sensor	Amount of intake air			D

The ECM performs ON/OFF control of the heated oxygen sensor 3 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

Engine speed	Heated oxygen sensor 3 heater	F
Above 3,600 rpm	OFF	
More than 3 minutes after engine stopped.	OFF	0
 Below 3,600 rpm after the following conditions are met. Engine: After warming up Driving for 3 minutes at a speed of 80 km/h (50 MPH) or more (Keep the vehicle speed as steady as possible during the cruising.) 	ON	— G

DTC Logic

INFOID:000000003069156

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0043	Heated oxygen sensor 3 heater control circuit low	The current amperage in the heated oxygen sen- sor 3 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 3 heater.)	 Harness or connectors (The heated oxygen sensor 3 heater circuit is open or shorted.) Heated oxygen sensor 3 heater 	ŀ
P0044	Heated oxygen sensor 3 heater control circuit high	The current amperage in the heated oxygen sen- sor 3 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 3 heater.)	 Harness or connectors (The heated oxygen sensor 3 heater circuit is shorted.) Heated oxygen sensor 3 heater 	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at $_{\rm P}$ idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

 Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.

EC-139

- Ν
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- _

P0043, P0044 HO2S3 HEATER

< COMPONENT DIAGNOSIS >

- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON (READY).
- 6. Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

- Keep the vehicle speed as steady as possible during the cruising.
- 7. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-140, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000003069157

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK HO2S3 POWER SUPPLY CIRCUIT

- 1. Disconnect heated oxygen sensor 3 harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between HO2S3 harness connector and ground.

HO2S3 Connector Terminal		Ground	Voltage	
Connector Terminal		Ground		
F102	2	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F58, F101
- IPDM E/R harness connector F10
- 15A fuse (No. 37)
- Harness for open or short between heated oxygen sensor 3 and fuse

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

4.CHECK HO2S3 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check harness continuity between HO2S3 harness connector and ECM harness connector.

HO2S3		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F102	3	F14	17	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

P0043, P0044 HO2S3 HEATER

	P0043, P0044 HO2S3 HE	EATER	
< COMPONENT DIAGNOSIS > [QR25]			
NO >> GO TO 5.			
5. DETECT MALFUNCTIONING PART			
Check the following.Harness connectors F58, F10Harness for open or short bet)1 ween heated oxygen sensor 3 and	ECM	
>> Repair open circuit 6.CHECK HEATED OXYGEN	or short to ground or short to powe SENSOR 3	r in harness or connectors.	
Refer to EC-141, "Component I	nspection".		
Is the inspection result normal?			
YES >> GO TO 8.			
NO >> GO TO 7.			
7.REPLACE HEATED OXYGE			
Replace heated oxygen sensor CAUTION:	3.		
 Discard any heated oxygen 		d from a height of more than 0.5 m (19.7	
• Before installing new oxyg	h as a concrete floor; use a new o en sensor, clean exhaust systen J-43897-12 and approved anti-sei	n threads using Oxygen Sensor Thread	
>> INSPECTION END			
8.CHECK INTERMITTENT IN			
Refer to GI-42, "Intermittent Inc	<u>ident"</u> .		
>> INSPECTION END)		
Component Inspection		INFOID:000000003069158	
1.CHECK HEATED OXYGEN	SENSOR 3 HEATER		
1. Turn ignition switch OFF.			
2. Disconnect heated oxygen	sensor 3 harness connector.		
3. Check resistance between	HO2S3 terminals as follows.		
Terminals	Resistance	—	
2 and 3	3.3 - 4.4 Ω [at 25°C (77°F)]	_	
1 and 2, 3, 4	/-	_	
4 and 1, 2, 3	${}^{\infty\Omega}$ (Continuity should not exist)		
Is the inspection result normal?		_	
YES >> INSPECTION END			
NO $>>$ GO TO 2.			
2.REPLACE HEATED OXYGE	EN SENSOR 3		
Replace heated oxygen sensor CAUTION:	3.	t from a height of more than 0.5 m (19.7	

• Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 p in) onto a hard surface such as a concrete floor; use a new one.

• Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

P0075 IVT CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

P0075 IVT CONTROL SOLENOID VALVE

Description

Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

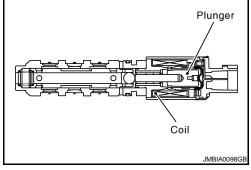
The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.

The longer pulse width advances valve angle.

The shorter pulse width retards valve angle.

When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.





INFOID:000000003069160

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0075	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	 Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) Intake valve timing control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

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

2. Turn ignition switch ON.

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

>> GO TO2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and let engine idle for 5 seconds.

- 2. Check 1st trip DTC.
- Is 1st trip DTC detected?
- YES >> Go to EC-142, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000003069161

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect intake valve timing control solenoid valve harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between intake valve timing control solenoid valve harness connector and ground.

IVT control solenoid valve Connector Terminal		Ground	Voltage	
Connector Terminal		Cround		
F59	1	Ground	Battery voltage	

[QR25DE]

INFOID:000000003069159

P0075 IVT CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

[QR25DE]

NO >> Repair open circuit or short to ground or short to power in harness or connectors. 2. CHECK INTAKE VALVE TIMING 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 intake valve timing control solenoid valve harness connector and ECM harness connector. Image: Terminal connector Terminal Connector Terminal Continuity F59 2 F13 78 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 INTAKE VALVE TIMING CONTROL SOLENOID VALVE Refer to EC-143. "Component Inspection". Is the inspection result normal? YES > GO TO 4. NO >> Replace intake valve timing control solenoid valve. 4. CHECK INTERMITTENT INCIDENT Refer to GI-42. "Intermittent Incident". >> INSPECTION END Component Inspection In Turn ignition switch OFF. 2. Disconnect intake valve timing control solenoid valve harness connector. 3. Check resistance betwe	< COMPONENT I	DIAGNOSIS >			[QR25DE]	
AND SHORT 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between intake valve timing control solenoid valve harness connector and ECM harness connector. IVT control solenoid valve ECM Connector Terminal Stehe spectron result normal? Secondard on short to power in harness or connectors. 3. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE Refer to CI-42, "Intermittent Incident". NO >> Replace intake valve timing control solenoid valve. 4. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I	NO >> Repai	r open circuit or short f	o ground or s	short to power	in harness or connectors.	
ND SHORT 1. Turn ignition switch OFF. Disconnect ECM harness connector. 3. Check the continuity between intake valve timing control solenoid valve harness connector and ECM harness connector. <u>IVT control solenoid valve</u> ECM <u>Connector</u> <u>Terminal</u> <u>F69</u> 2 <u>F13</u> 78 <u>Existed</u> 4. Also check harness for short to ground and short to power. s.the inspection result normal? YES > GO T0 3. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 3. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE Refer to EC-143. "Component Inspection". Is the inspection result normal? YES > GO T0 4. NO >> Replace intake valve timing control solenoid valve. 4.CHECK INTERMITTENT INCIDENT Refer to GI-42, "Intermittent Incident". >> INSPECTION END Component Inspection Control solenoid valve harness connector. 1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I 1. Turi ignition switch OFF. 2. Disconnect intake valve timing control solenoid valve harness connector. 3. Check resistance betwe	• '	•	•	•		
1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between intake valve timing control solenoid valve harness connector and ECM harness connector. 1. Transport solenoid valve ECM Connector Terminal Connector state inspection result normal? YES > GO TO 4. NO > Replace intake valve timing control solenoid valve. 4. CHECK INTAKE VALVE TI						
2. Disconnect ECM harness connector. 3. Check the continuity between intake valve timing control solenoid valve harness connector and ECM harness connector. MT control solenoid valve ECM Connector Terminal Connector Sole Connector Stel inspection result normal? Sole Connector YES > GO TO 4. NO > Replace intake valve timing control solenoid valve. 4. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I 1. Um ignition switch OFF. Existence Disconnect intake valve timing control so		witch OFF				
Image: Non-action Image: Non-action Image: Non-action Image: Non-action Image: Non-action Terminal Connector Terminal Connector Image: Non-action State State State State Image: Non-action State State State State Image: Non-action State State State State State Image: Non-action State Sta						Ε
IVT control solenoid valve ECM Continuity $Connector$ Terminal Connector Terminal F39 2 F13 78 Existed • Also check harness for short to ground and short to power. State State athe inspection result normal? YES > GO TO 3. NO >> Repair open circuit or short to ground or short to power in harness or connectors. C-HECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE Effer to EC-143. "Component Inspection". at he inspection result normal? YES >> GO TO 4. NO >> Replace intake valve timing control solenoid valve. CHECK INTERMITTENT INCIDENT Refer to GI-42. "Intermittent Incident". >> INSPECTION END Component Inspection seconcecconcert. . CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I . . Turn ignition switch OFF. Disconnect intake valve timing control solenoid valve harness connector. . Check resistance between intake valve timing control solenoid valve terminals as follows. Terminals Resistance 1 or 2 and ground ex2 (Continuity should not exist) sthe inspection result normal? YES > GO TO 2. <td></td> <th>-</th> <td>valve timing</td> <td>control solence</td> <th>id valve harness connector and ECM har-</th> <td></td>		-	valve timing	control solence	id valve harness connector and ECM har-	
Connector Terminal Continuity F59 2 F13 78 Existed 4. Also check harness for short to ground and short to power. athe inspection result normal? YES >> GOT03. NO >> Repair open circuit or short to ground or short to power in harness or connectors. Scheck INTAKE VALVE TIMING CONTROL SOLENOID VALVE Refer to EC-143. "Component Inspection". athe inspection result normal? YES >> GO TO 4. NO >> Replace intake valve timing control solenoid valve. 4. CHECK INTERMITTENT INCIDENT Refer to GI-42, "Intermittent Incident". >> INSPECTION END Component Inspection .cHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I . Turn ignition switch OFF. Disconnect intake valve timing control solenoid valve harness connector. . CHECK INTAKE VALVE TIMING control solenoid valve harness connector. . Check resistance between intake valve timing control solenoid valve terminals as follows. Terminals Resistance 1 or 2 and ground $\frac{-62}{(Continuity should not exist)}$ sthe inspection result normal? YES YES > GOTO 2.	ness connecto	or.				(
Connector Terminal Continuity F59 2 F13 78 Existed 4. Also check harness for short to ground and short to power. sthe inspection result normal? YES >> GOT03. NO >> Repair open circuit or short to ground or short to power in harness or connectors. Scheck INTAKE VALVE TIMING CONTROL SOLENOID VALVE Refer to EC-143. "Component Inspection". sthe inspection result normal? YES >> GO TO 4. NO >> Replace intake valve timing control solenoid valve. 4. CHECK INTERMITTENT INCIDENT Refer to GI-42. "Intermittent Incident". sthe inspection Proponent Inspection server. server. ALCHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I . CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I . CHECK INTAKE VALVE TIMING control solenoid valve harness connector. . CHECK INTAKE VALVE TIMING control solenoid valve harness connector. . Check resistance between intake valve timing control solenoid valve terminals as follows. . Terminals Resistance	IV/T control colonoi					
F59 2 F13 78 Existed A. Also check harness for short to ground and short to power. Image: State 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 INTAKE VALVE TIMING CONTROL SOLENOID VALVE Refer to EC-143. "Component Inspection". Is the inspection result normal? YES >> GO TO 4. NO >> Replace intake valve timing control solenoid valve. 4. CHECK INTERMITTENT INCIDENT Refer to GI-42. "Intermittent Incident". >> INSPECTION END Component Inspection CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I 1. Turn ignition switch OFF. 2. Disconnect intake valve timing control solenoid valve harness connector. 3. Check resistance between intake valve timing control solenoid valve terminals as follows. Terminals Resistance 1 and 2 6.7 - 7.7Ω 1 or 2 and ground «Ω (Continuity should not exist) sthe inspection result normal? YES > GO TO 2.				Continuity		
Also check harness for short to ground and short to power. s. Also check harness for short to ground and short to power. s. 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 INTAKE VALVE TIMING CONTROL SOLENOID VALVE Refer to EC-143. "Component Inspection". s. the inspection result normal? YES >> GO TO 4. NO >> Replace intake valve timing control solenoid valve. 4.CHECK INTERMITTENT INCIDENT Refer to GI-42, "Intermittent Incident". >> INSPECTION END Component Inspection CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I I. Turn ignition switch OFF. 2. Disconnect intake valve timing control solenoid valve harness connector. 3. Check resistance between intake valve timing control solenoid valve terminals as follows. Terminals Resistance 1 and 2 6.7 - 7.7Ω 1 or 2 and ground _eΩ (Continuity should not exist) sthe inspection result normal? YES >> GO TO 2.				Existed		
s the inspection result normal? YES >> GO TO 3. NO >> Repair open circuit or short to ground or short to power in harness or connectors. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE Refer to EC-143. "Component Inspection". is the inspection result normal? YES >> GO TO 4. NO >> Replace intake valve timing control solenoid valve. CHECK INTERMITTENT INCIDENT Refer to GI-42. "Intermittent Incident". >> INSPECTION END Component Inspection CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I . Turn ignition switch OFF. . Disconnect intake valve timing control solenoid valve harness connector. . Check resistance between intake valve timing control solenoid valve terminals as follows. Terminals Resistance 1 and 2 6.7 - 7.7Ω 1 or 2 and ground		_	-			
YES >> GO TO 3. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 3. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE Refer to EC-143. "Component Inspection". a the inspection result normal? YES >> GO TO 4. NO >> Replace intake valve timing control solenoid valve. A.CHECK INTERMITTENT INCIDENT Refer to GI-42. "Intermittent Incident". >> INSPECTION END Component Inspection .CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I .CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I .CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I .CHECK INTAKE valve timing control solenoid valve harness connector. .CHECK INTAKE valve timing control solenoid valve harness connector. .CHECK resistance between intake valve timing control solenoid valve terminals as follows. Terminals Resistance 1 or 2 and ground orQ (Continuity should not exist) s the inspection result normal? YES YES >> GO TO 2.		•	nd and short	to power.		
NO >> Repair open circuit or short to ground or short to power in harness or connectors. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE Refer to EC-143. "Component Inspection". is the inspection result normal? YES >> GO TO 4. NO >> Replace intake valve timing control solenoid valve. CHECK INTERMITTENT INCIDENT Refer to GI-42. "Intermittent Incident". >> INSPECTION END Component Inspection .CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I .CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I .CHECK INTAKE VALVE TIMING control solenoid valve harness connector. .CHECK INTAKE valve timing control solenoid valve harness connector. .CHECK INTAKE valve timing control solenoid valve harness connector. . Turn ignition switch OFF. Disconnect intake valve timing control solenoid valve terminals as follows. Terminals Resistance 1 and 2 6.7 - 7.7Ω 1 or 2 and ground $\frac{\sim \Omega}{(Continuity should not exist)}}$ sthe inspection result normal? YES YES >> GO TO 2.						
$\begin{array}{ c c c c c c c } \hline \hline$			o around or s	short to power	in harness or connectors	
Refer to EC-143. "Component Inspection". is the inspection result normal? YES >> GO TO 4. NO >> Replace intake valve timing control solenoid valve. I.CHECK INTERMITTENT INCIDENT Refer to GI-42. "Intermittent Incident". >> INSPECTION END Component Inspection .CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I . Turn ignition switch OFF. Disconnect intake valve timing control solenoid valve harness connector. Check resistance between intake valve timing control solenoid valve terminals as follows. Terminals Resistance 1 or 2 and ground $\stackrel{\circ \Omega}{(Continuity should not exist)}$ st the inspection result normal? YES >> GO TO 2.			-	-		
a the inspection result normal? YES >> GO TO 4. NO >> Replace intake valve timing control solenoid valve. .CHECK INTERMITTENT INCIDENT tefer to GI-42, "Intermittent Incident". .>> INSPECTION END Component Inspection .CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I . Turn ignition switch OFF. . Disconnect intake valve timing control solenoid valve harness connector. . Check resistance between intake valve timing control solenoid valve terminals as follows. Terminals Resistance 1 or 2 and ground				ENOID VALVE		
YES →> GO TO 4. NO →> Replace intake valve timing control solenoid valve. •.CHECK INTERMITTENT INCIDENT refer to GI-42, "Intermittent Incident". →> INSPECTION END Component Inspection •.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I •. Turn ignition switch OFF. •. Disconnect intake valve timing control solenoid valve harness connector. •. Check resistance between intake valve timing control solenoid valve terminals as follows. •			<u>ı"</u> .			
NO >> Replace intake valve timing control solenoid valve. .CHECK INTERMITTENT INCIDENT refer to GI-42, "Intermittent Incident". >> INSPECTION END Component Inspection .CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I . Turn ignition switch OFF. Disconnect intake valve timing control solenoid valve harness connector. Check resistance between intake valve timing control solenoid valve terminals as follows. Terminals Resistance 1 and 2 6.7 - 7.7Ω 1 or 2 and ground						
•.CHECK INTERMITTENT INCIDENT efer to GI-42, "Intermittent Incident". >> INSPECTION END component Inspection •.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I •.CHECK INTAKE VALVE TIMING control solenoid valve harness connector. •.CHECK resistance between intake valve timing control solenoid valve terminals as follows. Terminals Resistance 1 and 2 6.7 - 7.7Ω 1 or 2 and ground ∞Ω (Continuity should not exist) ethe inspection result normal? YES YES >> GO TO 2.			aantral aalan	aidvalva		
Refer to GI-42, "Intermittent Incident". >> INSPECTION END Component Inspection .CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I . Turn ignition switch OFF. . Disconnect intake valve timing control solenoid valve harness connector. . Check resistance between intake valve timing control solenoid valve terminals as follows. Terminals Resistance 1 and 2 6.7 - 7.7Ω 1 or 2 and ground ∞Ω (Continuity should not exist) Sthe inspection result normal? YES YES >> GO TO 2.		•	control solen	olu valve.		
>> INSPECTION END Component Inspection .CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I . Turn ignition switch OFF. Disconnect intake valve timing control solenoid valve harness connector. Check resistance between intake valve timing control solenoid valve terminals as follows. Terminals Resistance 1 and 2 6.7 - 7.7Ω 1 or 2 and ground						
Component Inspection NF010-0000000000000000000000000000000000	efer to <u>GI-42, "In</u>	termittent Incident".				
Component Inspection						
.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I . Turn ignition switch OFF. . Disconnect intake valve timing control solenoid valve harness connector. . Check resistance between intake valve timing control solenoid valve terminals as follows. Terminals Resistance 1 and 2 6.7 - 7.7Ω 1 or 2 and ground ∞Ω (Continuity should not exist) s the inspection result normal? YES >> GO TO 2.	>> INSPE	ECTION END				
 Turn ignition switch OFF. Disconnect intake valve timing control solenoid valve harness connector. Check resistance between intake valve timing control solenoid valve terminals as follows. Terminals Resistance 1 and 2 6.7 - 7.7Ω 1 or 2 and ground ∞Ω (Continuity should not exist) S the inspection result normal? YES >> GO TO 2.	Component In:	spection			INFOID:000000003069162	
 Turn ignition switch OFF. Disconnect intake valve timing control solenoid valve harness connector. Check resistance between intake valve timing control solenoid valve terminals as follows. Terminals Resistance 1 and 2 6.7 - 7.7Ω 1 or 2 and ground ∞Ω (Continuity should not exist) s the inspection result normal? YES >> GO TO 2.						
 Disconnect intake valve timing control solenoid valve harness connector. Check resistance between intake valve timing control solenoid valve terminals as follows. Terminals Resistance 1 and 2 6.7 - 7.7Ω 1 or 2 and ground ^{∞Ω}			NTROL SOLE	NOID VALVE	•1	
Terminals Resistance 1 and 2 $6.7 - 7.7\Omega$ 1 or 2 and ground $\stackrel{\circ \Omega}{(Continuity should not exist)}$ S the inspection result normal? YES						
TerminalsResistance1 and 2 $6.7 - 7.7\Omega$ 1 or 2 and ground $\stackrel{\sim \Omega}{}_{}(Continuity should not exist)}$ s the inspection result normal?YES>> GO TO 2.						
1 and 2 $6.7 - 7.7\Omega$ 1 or 2 and ground $\stackrel{\sim \Omega}{}$ (Continuity should not exist)3 the inspection result normal?YES>> GO TO 2.		ice between intake va				
1 and 2 $6.7 - 7.7\Omega$ 1 or 2 and ground $\stackrel{\circ \Omega}{}$ (Continuity should not exist)s the inspection result normal?YES>> GO TO 2.	Terminals	Resistance				
$ \begin{array}{c c} 1 \text{ or 2 and ground} & & & & & \\ \hline & & & & \\ \hline \hline & & & \\ \hline \hline & & & \\ \hline & & \\ \hline & & & \\ \hline \hline & & \\ \hline & & \\ \hline & & & \\ \hline \hline & & & \\ \hline & & \\ \hline \hline & & $	1 and 2	6.7 - 7.7Ω				
1 or 2 and ground (Continuity should not exist) s the inspection result normal? YES >> GO TO 2.						
YES >> GO TO 2.	1 or 2 and ground		exist)			
YES >> GO TO 2.	s the inspection re	esult normal?				
NO >> Replace intake valve timing control solenoid valve						
			control solen	oid valve.		
2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II	CHECK INTAK	E VALVE TIMING COM	NTROL SOLE	ENOID VALVE	-11	
. Remove intake valve timing control solenoid valve.						

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P0075 IVT CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

[QR25DE]

 Provide 12V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.
 CAUTION:

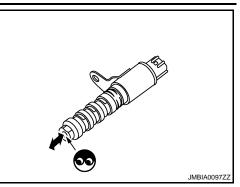
Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve. NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake valve timing control solenoid valve.

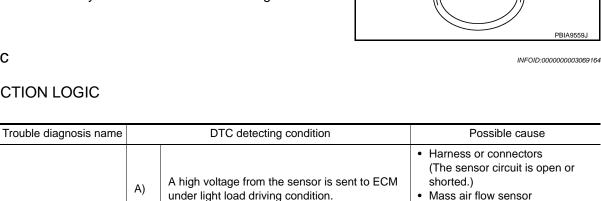


P0101 MAF SENSOR

Description

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.

Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



DTC Logic

DTC No.

P0101

DTC DETECTION LOGIC

Mass air flow sensor cir-

cuit range/performance

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

A low voltage from the sensor is sent to ECM un-

der heavy load driving condition.

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

B)

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

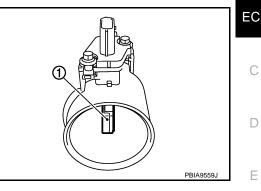
- Activate "INSPECTION MODE 1" (HBC-97) to start engine, and warm up engine to normal operating tem-1. perature.
- 2. Wait at least 10 seconds at idle speed.
- 3. Check 1st trip DTC.
- Is 1st trip DTC detected?
- YES >> Go to EC-147, "Diagnosis Procedure".
- NO-1 >> With CONSULT-III: GO TO 3.
- NO-2 >> With GST: GO TO 5.

 ${f 3.}$ CHECK MASS AIR FLOW SENSOR FUNCTION

Activate "INSPECTION MODE 1" (HBC-97) to start engine, and warm up engine to normal operating tem-1. perature.

EC-145

INFOID:000000003069163



• EVAP control system pressure

(The sensor circuit is open or

EVAP control system pressure

· Intake air temperature sensor

· Harness or connectors

Mass air flow sensor

sensor

shorted.)

sensor

· Intake air leaks

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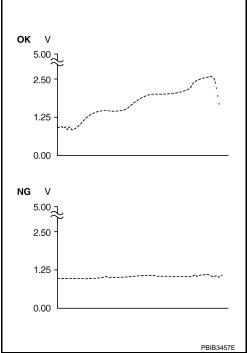
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< COMPONENT DIAGNOSIS >

- 2. Select "DATA MONITOR" mode with CONSULT-III.
- 3. Check the voltage of "MAS A/F SE-B1" with "DATA MONITOR".
- 4. Increases engine speed to about 2,500 rpm.
- 5. Monitor the linear voltage rise in response to engine speed increases.

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Go to EC-147, "Diagnosis Procedure".



4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

- 1. Turn ignition switch OFF.
- 2. Turn ignition switch ON (READY) and drive vehicle.
- 3. Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
THRTL SEN 1-B1	More than 3V
THRTL SEN 2-B1	More than 3V
Shift lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

CAUTION:

Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-147, "Diagnosis Procedure".

```
NO >> INSPECTION END
```

5. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to <u>EC-146. "Component Function Check"</u>. **NOTE:**

Use component function check to check the overall function of the mass air flow sensor circuit. During this check, a DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-147, "Diagnosis Procedure".

Component Function Check

INFOID:000000003069165

1.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

With GST

 Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.

EC-146

< COMPONENT DIAGNOSIS >

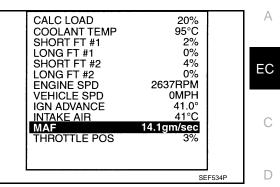
[QR25DE]

2. Select Service \$01 with GST.

- 3. Check the mass air flow sensor signal with Service \$01.
- 4. Check for linear mass air flow sensor signal value rise in response to increases to about 2,500 rpm in engine speed.

Is the inspection result normal?

YES	>> INSPECTION END
NO	>> Go to EC-147, "Diagnosis Procedure".



Diagnosis	Procedure	;			INFOID:000000003069166	
1.INSPECTI	ON START					E
Confirm the d	etected malfu	unction (A or	B). Refer to EC-1	45, "DTC Logic".		
Which malfun	ction is detec	cted?				F
	O TO 3.					
•	io to 2.					
2.CHECK IN	TAKE SYSTI	EM				(
Check the foll	owing for cor	nnection.				
 Air duct Vacuum hos 	Ses					ŀ
		en air duct a	and intake manifol	d		
Is the inspecti	on result nor	mal?				
	O TO 3.					
-	econnect the	•				
3.CHECK GI	ROUND CON	NECTION				
	ion switch OI				eti e e ll	
 Check groups Is the inspection 			er to Ground Inspe	ection in <u>GI-45, "Circuit Inspec</u>	<u>ction"</u> .	
	iO TO 4.	<u>mar:</u>				
	epair or repla	ace ground o	connection.			
4	• •	-	JPPLY CIRCUIT			
			ensor harness con	nector		
	ion switch Of					
3. Check the	e voltage betv	ween MAF s	ensor harness co	nnector and ground.		ľ
		1				
MAF s		Ground	Voltage			1
Connector	Terminal					
F31	5	Ground	Battery voltage			
Is the inspecti		<u>mal?</u>				(
	O TO 6. O TO 5.					
5.DETECT N			г			
Check the foll			1			

Junction block connector E44

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

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

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

EC-147

< COMPONENT DIAGNOSIS >

6.CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

MAF	sensor	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F31	4	F13	56	Existed

4. 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 MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

MAF	sensor	E	CM	Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
F31	3	F13	58	Existed	

2. 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 INTAKE AIR TEMPERATURE SENSOR

Check intake air temperature sensor.

Refer to EC-161, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

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

9.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-285, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace EVAP control system pressure sensor.

10.CHECK MASS AIR FLOW SENSOR

Refer to EC-148, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace mass air flow sensor.

11.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK MASS AIR FLOW SENSOR-I

Turn ignition switch OFF.

INFOID:000000003069167

			P0101 MA	AF SENSC	R			
< COMPON	IENT DIAGNOS	ilS >					[QR25DE]	
	ect all harness c	onnecto	rs disconnected.					0
	ne vehicle. hition switch ON.							А
			t "DATA MONITO	OR" mode.				
6. Select "	MAS A/F SE-B1'	and che	eck indication.					EC
Monitor iten	n Condition	MAS	A/F SE-B1					
MAS A/F SE-		ON Ap	prox. 0.4V					С
		MODE 1	" (<u>HBC-97</u>) to sta	art engine, an	id wa	arm up engine to n	ormal operating tem-	0
perature 8. Depress	, the accelerator	pedal a	nd keep it.					D
9. Shift the CAUTIC		N posit	ion with engine r	unning.				
		or leve	r in the N posit	ion for a lor	ng po	eriod of time. In	the N position, the	_
engine	operates but el	ectricity	cannot be gen	erated.			• •	E
10. Select	MAS A/F SE-B1	' in "Dat	A MONITOR" ar	id check indic	catior	n.		
Monitor iten	n		Condition		MAS	S A/F SE-B1		F
MAS A/F SE-	B1 Idle (Engine is	warmed-u	p to normal operating	g temperature.)	C).9 - 1.2V		
11. Shift the	selector lever to	P posit	ion.					G
12. Fully de 13. Check i	press the accele	rator pe	dal and keep it.					0
T3. Check I	luication.							
Monitor iten	n		Condition			MAS A/F SE-B1		Н
MAS A/F SE-	B1 2,500 rpm (Eng	jine is war	med-up to normal op	erating tempera	ature.)	1.5 - 1.8V		
			hen fully depress					1
_	-	rise in re	esponse to engin	e being incre	ased	d to about 2,500 rp	om.	
	CONSULT-III iition switch OFF							J
	ect all harness c	onnecto	rs disconnected.					0
	ne vehicle. hition switch ON.							
		en ECN	I harness conneo	ctor and grou	nd.			K
-	ECM	Ground	Condition	Voltage				L
Connector	Terminal 58							
	MAF sensor signal)	Ground	Ignition switch ON					M
		MODE 1	" (<u>HBC-97</u>) to sta	art engine, an	id wa	arm up engine to n	ormal operating tem-	
perature 7. Depress	, the accelerator	pedal a	nd keep it.					NI
8. Shift the CAUTIC		o N posit	ion with engine r	unning.				Ν
		or leve	r in the N posit	ion for a lor	ng po	eriod of time. In	the N position, the	
engine	operates but el	ectricity	cannot be gen	erated.	• •		• •	0
9. Check t	ne voltage betwe	en ECIV	I harness conneo	sor and grou	na.			

	ECM	Ground	Condition	Voltage
Connector	Terminal	Ground	Condition	voltage
F13	58 (MAF sensor signal)	Ground	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2V

Shift the selector lever to P position.
 Fully depress the accelerator pedal and keep it.
 Check the voltage between ECM harness connector and ground.

EC-149

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< COMPONENT DIAGNOSIS >

	ECM	Ground	Condition		Voltage
Connector	Terminal	Cround	Condition		voltage
F13	58 (MAF sensor signal)	Ground	2,500 rpm (Engine is warmed-up to perature.)	o normal operating tem-	1.5 - 1.8V
			hen fully depress it. esponse to engine being incre	ased to about 2,500) rpm.
s the insp	ection result norm	<u>al?</u>			
	> GO TO 4. > GO TO 2.				
2.CHECK	K FOR THE CAUS	E OF UI	NEVEN AIR FLOW THROUG	H MASS AIR FLOW	SENSOR
2. Check Crush Malfur Uneve	gnition switch OFF for the cause of u ed air ducts nctioning seal of ai on dirt of air cleane per specification o	neven a r cleane r eleme	nt	sensor. Refer to follo	wing.
	ection result norm		, , , , , , , , , , , , , , , , , , ,		
-	> GO TO 4.				
~	> GO TO 3.				
3. CHECK	K MASS AIR FLOW	V SENS	OR-II		
	DNSULT-III r or replace malfur the vehicle.	ictioning	part.		
2. Lift up 3. Turn iç 1. Conne	gnition switch ON.		t "DATA MONITOR" mode. eck indication.		
2. Lift up 3. Turn iç 1. Conne	gnition switch ON. ect CONSULT-III a "MAS A/F SE-B1"	and ch	eck indication.		
 Lift up Turn ig Conne Select 	gnition switch ON. ect CONSULT-III a "MAS A/F SE-B1" em Condition	and cho			
 Lift up Turn ig Turn ig Conne Select Monitor it MAS A/F SI Activa peratu Activa Peretu Shift th CAUT Never engin 	gnition switch ON. ect CONSULT-III a "MAS A/F SE-B1" em Condition E-B1 Ignition switch te "INSPECTION I ire. ss the accelerator he selector lever to ION: Teave the select e operates but elect	and char MAS ON Ap MODE 1 pedal at o N positi or level ectricity	eck indication. 3 A/F SE-B1 prox. 0.4V " (<u>HBC-97</u>) to start engine, an	ng period of time.	
 Lift up Turn ig Turn ig Conne Select Monitor it MAS A/F SI Activa peratu Activa Peretu Shift th CAUT Never engin 	gnition switch ON. ect CONSULT-III a "MAS A/F SE-B1' em Condition E-B1 Ignition switch te "INSPECTION I ire. ss the accelerator he selector lever to ION: Ieave the select e operates but el "MAS A/F SE-B1'	and char MAS ON Ap MODE 1 pedal at o N positi or level ectricity	eck indication. 3 A/F SE-B1 prox. 0.4V " (HBC-97) to start engine, an nd keep it. ion with engine running. r in the N position for a lor r cannot be generated.	ng period of time.	

- 11. Fully depress the accelerator pedal and keep it.
- 12. Check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 1.8V

13. Fully release accelerator pedal then fully depress it.

14. Check for linear voltage rise in response to engine being increased to about 2,500 rpm.

Without CONSULT-III

- 1. Repair or replace malfunctioning part.
- 2. Lift up the vehicle.
- 3. Turn ignition switch ON.

EC-150

< COMPONENT DIAGNOSIS >

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

		ECM	Ground	Condition	Voltage
-	Connector	Terminal	Cround	Condition	voltage
	F13	58 (MAF sensor signal)	Ground	Ignition switch ON	Approx. 0.4V

 Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.

- 6. Depress the accelerator pedal and keep it.
- 7. Shift the selector lever to N position with engine running. CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

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

	ECM	Ground	Ground Condition	Voltage
Connector	Terminal	Ciouna		voltage
F13	58 (MAF sensor signal)	Ground	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2V

9. Shift the selector lever to P position.

10. Fully depress the accelerator pedal and keep it.

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

	ECM	Ground	Condition	Voltago
Connector	Terminal	Ground	Condition	Voltage
F13	58 (MAF sensor signal) Ground 2,500 rpm (Engine is warmed-up to normal operating tem- perature.) 1.5		1.5 - 1.8V	
			hen fully depress it. esponse to engine being increased to about 2,500) rpm.
ls the insp	ection result norm	<u>al?</u>		
	> INSPECTION E	ND		
•	> GO TO 4.			
4.CHECK	MASS AIR FLOV	V SENS	OR-III	
With CO	ONSULT-III			
	gnition switch OFF			
		v sensor	harness connector and reconnect it again.	
	the vehicle.			
	gnition switch ON.	مماممامم	+ "DATA MONITOD" made	
	"MAS A/F SE-B1		t "DATA MONITOR" mode.	
o. Select	IVIAS A/F SE-DI	and ch		
Monitor it	em Condition		A/F SE-B1	

MAS A/F SE-B1 Ignition switch ON Approx. 0.4V

- Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 8. Depress the accelerator pedal and keep it.
- Shift the selector lever to N position with engine running. CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

10. Select "MAS A/F SE-B1" in "DATA MONITOR" and check indication.

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< COMPONENT DIAGNOSIS >

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2V

- 11. Shift the selector lever to P position.
- 12. Fully depress the accelerator pedal and keep it.
- 13. Check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 1.8V

14. Fully release accelerator pedal then fully depress it.

15. Check for linear voltage rise in response to engine being increased to about 2,500 rpm.

Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Lift up the vehicle.
- 4. Turn ignition switch ON.
- 5. Check the voltage between ECM harness connector and ground.

	ECM	Ground	Condition	Voltage	
Connector Terminal		Ground	Condition	voltage	
F13	58 (MAF sensor signal)	Ground	Ignition switch ON	Approx. 0.4V	

- 6. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 7. Depress the accelerator pedal and keep it.
- 8. Shift the selector lever to N position with engine running. CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

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

ECM		Ground	Ground Condition	
Connector	Terminal	Ground	Condition	Voltage
F13	58 (MAF sensor signal)	Ground	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2V

10. Shift the selector lever to P position.

11. Fully depress the accelerator pedal and keep it.

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

ECM		Ground	Condition	Voltage	
Connector	Terminal	Ciouna	Condition	vollage	
F13	58 (MAF sensor signal)	Ground	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 1.8V	

13. Fully release accelerator pedal then fully depress it.

14. Check for linear voltage rise in response to engine being increased to about 2,500 rpm.

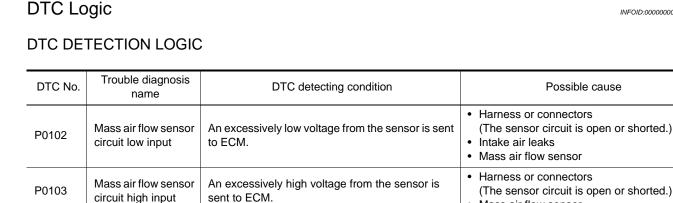
- Is the inspection result normal?
- YES >> INSPECTION END
- NO >> Clean or replace mass air flow sensor.

P0102, P0103 MAF SENSOR

Description

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.

Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds. 3

Which DTC is detected?

P0102 >> GO TO 2.

P0103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

1. Activate "INSPECTION MODE 1" (HBC-97) to start engine, and wait at least 5 seconds.

Check DTC. 2.

Is DTC detected?

YES >> Go to EC-154, "Diagnosis Procedure".

NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-I

- 1. Turn ignition switch ON and wait at least 5 seconds.
- Check DTC. 2.

Is DTC detected?

YES >> Go to EC-154, "Diagnosis Procedure".

NO >> GO TO 4.

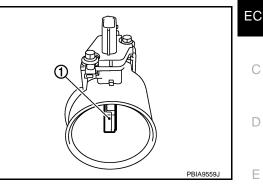
4.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-II

Activate "INSPECTION MODE 1" (HBC-97) to start engine, and wait at least 5 seconds. 1

2. Check DTC.

EC-153

А



· Mass air flow sensor

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Is DTC detected?

YES >> Go to <u>EC-154, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1.INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

P0102 >> GO TO 2. P0103 >> GO TO 3.

2.CHECK INTAKE SYSTEM

Check the following for connection.

Air duct

Vacuum hoses

• Intake air passage between air duct to intake manifold

Is the inspection result normal?

YES >> GO TO 3.

NO >> Reconnect the parts.

3.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in <u>GI-45, "Circuit Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace ground connection.

4.CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.

2. Turn ignition switch ON.

3. Check the voltage between MAF sensor harness connector and ground.

MAF	sensor	Ground	Voltage	
Connector Terminal		Oround	voltage	
F31	5	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

Junction block connector E44

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

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

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

6.CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

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

INFOID:000000003069170

< COMPONENT DIAGNOSIS >

[QR25DE]

MAF	sensor	EC	M	Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
F31	4	F13	56	Existed	
4. Also che	ck harness fo	r short to grour	nd and short	to power.	
•	ion result nor	mal?			
	SO TO 7.	irouit or obort t			
			0	•	h harness or connectors.
				FOR OPEN AN	
1. Check th	e continuity b	etween MAF s	ensor harnes	ss connector an	d ECM harness connector.
	sensor	EC	• • • •		
Connector	Terminal	Connector	Terminal	Continuity	
F31	3	F13	58	Existed	
-	-	_			
	ion result nor	r short to grour	iu anu shoft	to power.	
•	GOTO 8.				
		ircuit or short to	o ground or s	short to power in	n harness or connectors.
<u>~</u>		OW SENSOR			
Refer to EC-1	55. "Compon	nent Inspection	"		
	ion result nor		_		
	GO TO 9.				
^	-	air flow senso	r.		
9.CHECK IN	ITERMITTEN	IT INCIDENT			
Refer to <u>GI-4</u>	2, "Intermitter	nt Incident".			
>>	NSPECTION	END			
Componer	nt Inspectio	on			INFOID:000000003069171
		OW SENSOR-I			
		JW SENSOR-I			
With CON Turn ianit	SULT-III tion switch OF	==			
		connectors di	sconnected.		
3. Lift up the					
	tion switch ON	N. and select "D/)R" mode	
		81" and check i		in mode.	
Monitor item	Conditio	n MAS A/F	SE-B1		
MAS A/F SE-B	1 Ignition switc	ch ON Approx.	0.4V		
		N MODE 1" (<u>H</u>	<u>BC-97</u>) to sta	irt engine, and v	warm up engine to normal operating tem-
perature.		or podel and b	oon it		
		or pedal and ke to N position v		unnina.	
CAUTIO					
					period of time. In the N position, the

10. Select "MAS A/F SE-B1" in "DATA MONITOR" and check indication.

< COMPONENT DIAGNOSIS >

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2V

- 11. Shift the selector lever to P position.
- 12. Fully depress the accelerator pedal and keep it.
- 13. Check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 1.8V

14. Fully release accelerator pedal then fully depress it.

15. Check for linear voltage rise in response to engine being increased to about 2,500 rpm.

Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Lift up the vehicle.
- 4. Turn ignition switch ON.
- 5. Check the voltage between ECM harness connector and ground.

	ECM	Ground	Condition	Voltage	
Connector Terminal		Ground	Condition	voltage	
F13	58 (MAF sensor signal)	Ground	Ignition switch ON	Approx. 0.4V	

- Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 7. Depress the accelerator pedal and keep it.
- 8. Shift the selector lever to N position with engine running. CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

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

ECM		Ground	Condition	Voltage
Connector	Terminal	Ground	Condition	voltage
F13	58 (MAF sensor signal)	Ground	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2V

10. Shift the selector lever to P position.

11. Fully depress the accelerator pedal and keep it.

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

ECM		Ground	Condition	Voltage	
Connector	Terminal	Ciouna	Condition	voltage	
F13	58 (MAF sensor signal)	Ground	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 1.8V	

13. Fully release accelerator pedal then fully depress it.

14. Check for linear voltage rise in response to engine being increased to about 2,500 rpm.

Is the inspection result normal?

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

2. CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MASS AIR FLOW SENSOR

- 1. Turn ignition switch OFF.
- 2. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element

EC-156

< COMPONI	ENT DIAGNOS		70102, P0103	INIAF JEI	130	יה	[QR25DE]	
- Uneven	dirt of air cleane	er elemei	nt air system parts					А
	ion result norm		, i					
NO >> (GO TO 4. GO TO 3.							EC
3.CHECK M	ASS AIR FLOV	V SENS	OR-II					
With CON 1. Repair o 2. Lift up th 3. Turn igni 4. Connect	SULT-III r replace malfur e vehicle. tion switch ON.	nctioning nd selec	part. t "DATA MONITC	DR" mode.				C
Monitor item	Condition	MAS	A/F SE-B1					Е
MAS A/F SE-E	1 Ignition switch	ON Ap	prox. 0.4V					
perature				art engine, an	d wa	rm up engine to normal c	perating tem-	F
 8. Shift the selector lever to N position with engine running. CAUTION: Never leave the selector lever in the N position for a long period of time. In the N position, the 						G		
9. Select "N	IAS A/F SE-B1	in "DAT	r cannot be gene A MONITOR" an	id check indic	ation			Н
Monitor item			Condition		MAS	A/F SE-B1		
MAS A/F SE-E	1 Idle (Engine is	warmed-u	p to normal operating	g temperature.)	0.	9 - 1.2V		
	selector lever to ress the accele dication.							J
Monitor item			Condition			MAS A/F SE-B1		K
		•	med-up to normal op	• •	ture.)	1.5 - 1.8V		
 Fully release accelerator pedal then fully depress it. Check for linear voltage rise in response to engine being increased to about 2,500 rpm. Without CONSULT-III Repair or replace malfunctioning part. 						L		
3. Turn igni	e vehicle. tion switch ON. e voltage betwe	en ECN	I harness connec	ctor and grou	nd.			Μ
	ECM							Ν
Connector	Terminal	Ground	Condition	Voltage				IN
F13 (N	58 IAF sensor signal)	Ground	Ignition switch ON	Approx. 0.4V				0
perature 6. Depress	 Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating tem- perature. 							Ρ

7. Shift the selector lever to N position with engine running. **CAUTION:**

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

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

< COMPONENT DIAGNOSIS >

	ECM	Ground	Condition	Voltago	
Connector	Terminal	Ground	Condition	Voltage	
F13	58 (MAF sensor signal)	Ground	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2V	

9. Shift the selector lever to P position.

10. Fully depress the accelerator pedal and keep it.

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

ECM		Ground	Condition	Voltage	
Connector	Terminal	Ciouna	Condition	vollage	
F13	58 (MAF sensor signal)	Ground	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 1.8V	

12. Fully release accelerator pedal then fully depress it.

13. Check for linear voltage rise in response to engine being increased to about 2,500 rpm.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4.CHECK MASS AIR FLOW SENSOR-III

With CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Lift up the vehicle.
- 4. Turn ignition switch ON.
- 5. Connect CONSULT-III and select "DATA MONITOR" mode.
- 6. Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON	Approx. 0.4V

- Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 8. Depress the accelerator pedal and keep it.
- 9. Shift the selector lever to N position with engine running. CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

10. Select "MAS A/F SE-B1" in "DATA MONITOR" and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2V

11. Shift the selector lever to P position.

12. Fully depress the accelerator pedal and keep it.

13. Check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 1.8V

14. Fully release accelerator pedal then fully depress it.

15. Check for linear voltage rise in response to engine being increased to about 2,500 rpm.

Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Lift up the vehicle.
- 4. Turn ignition switch ON.

EC-158

< COMPONENT DIAGNOSIS >

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

	ECM	Ground	Condition	Voltage	
Connector	Terminal	Giouna	Condition		
F13	58 (MAF sensor signal)	Ground	Ignition switch ON	Approx. 0.4V	

- Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 7. Depress the accelerator pedal and keep it.
- 8. Shift the selector lever to N position with engine running. CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

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

	ECM		d Condition	
Connector	Terminal	Ground	Condition	Voltage
F13	58 (MAF sensor signal)	Ground	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2V

10. Shift the selector lever to P position.

11. Fully depress the accelerator pedal and keep it.

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

	ECM	Ground	Condition	Voltage
Connector	Terminal	Giouna	Condition	voltage
F13	58 (MAF sensor signal)	Ground	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 1.8V

13. Fully release accelerator pedal then fully depress it.

14. Check for linear voltage rise in response to engine being increased to about 2,500 rpm.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Clean or replace mass air flow sensor.

P0112, P0113 IAT SENSOR

Description

The intake air temperature sensor is built-into mass air flow sensor (1). 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.

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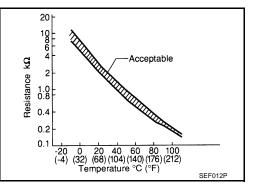
<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance $k\Omega$
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

*: These data are reference values and are measured between ECM terminal 50 (Intake air temperature sensor) and ground.

CAUTION:

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.



DTC Logic

INFOID:000000003069173

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112	Intake air tempera- ture sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	 Harness or connectors (The sensor circuit is open or shorted.)
P0113	Intake air tempera- ture sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Intake air temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

P0112, P0113 IAT SENSOR

[QR25DE]

< COMPONE	ENT DIAGNO)SIS >	, , , , , , , , , , , , , , , , , , , ,			[QR25DE]	
	o to <u>EC-161.</u> NSPECTION		Procedure".			A	
Diagnosis	Procedure)				INFOID:000000003069174	
1.снеск д	EC						
	tion switch O						
2. Check gr Is the inspect			er to Ground Ins	pection in <u>GI-45, "Ci</u>	rcuit Inspection".	С	
YES >> 0	GO TO 2.		_				
•	Repair or repla	•		OWER SUPPLY CIR	СШТ	D	
				mperature sensor) h			
2. Turn ignit	tion switch Of	N				E	
3. Check the	e vollage bei	ween mass a	all now sensor r	arness connector ar	la grouna.		
MAF	sensor	Ground	Voltage	-		F	
Connector	Terminal		_	_			
F31 Is the inspect	2 ion result nor	Ground	Approx. 5V	-		G	
YES >> G	GO TO 3.						
•			-	hort to power in harn		Н	
	tion switch Of		RE SENSOR G	ROUND CIRCUIT FO	DR OPEN AND SHO		
2. Disconne	ect ECM harn	ess connecte				I.	
3. Check the	e continuity b	etween mas	s air flow senso	r harness connector	and ECM harness co	onnector.	
MAF	sensor		ECM	Continuity		J	
Connector	Terminal	Connector	Terminal				
F31	1	F13	56	Existed		K	
4. Also cheo Is the inspect			ound and short t	o power.			
YES >> 0	GO TO 4.					L	
NO >> F 4.CHECK IN			-	hort to power in harn	ess or connectors.		
Refer to EC-1						M	
Is the inspect		-	<u></u> .				
	SO TO 5.	oir flow oop	oor (with intoko	air tamparatura aana		Ν	
5.CHECK IN				air temperature sens	or).		
Refer to GI-42			·			0	
						_	
>> II Componer	NSPECTION					P	
	-					INFOID:000000003069175	
1.CHECK IN	ITAKE AIR TE	EMPERATU	RE SENSOR				

1. Turn ignition switch OFF.

2. Disconnect mass air flow sensor harness connector.

3. Check resistance between mass air flow sensor terminals as follows.

EC-161

P0112, P0113 IAT SENSOR

< COMPONENT DIAGNOSIS >

Terminals	Condition	Resistance $k\Omega$	
1 and 2	Intake air temperature °C (°F)	25 (77)	1.800 - 2.200

Is the inspection result normal?

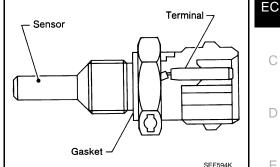
YES >> INSPECTION END

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

P0116 ECT SENSOR

Description

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



Acceptable

0 20 40 60 80 100 (32) (68) (104) (140) (176) (212) Temperature °C (°F)

20

10 6 4

0.

-20

Resistance kΩ 2 1.0 0.4 0.2

<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance $k\Omega$
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

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INFOID:000000003103924

*: These data are reference values and are measured between ECM terminal 46 (Engine coolant temperature sensor) and ground.

CAUTION:

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.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0116 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to EC-166, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0116	Engine coolant temper- ature sensor circuit range/performance	Engine coolant temperature signal from engine coolant temperature sensor does not fluctuate, even when some time has passed after starting the engine with pre-warming up condition.	 Harness or connectors (High or low resistance in the circuit) Engine coolant temperature sensor 	N
				- N

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

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

Turn ignition switch ON. 2.

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

TEST CONDITON:

Before performing the following procedure, do not fill with the fuel.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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P0116 ECT SENSOR

< COMPONENT DIAGNOSIS >

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm it up to normal operating temperature.
- 2. Rev engine up to 2,000 rpm for more than 10 minutes.
- 3. Move the vehicle to a cool place, then stop engine and turn ignition switch OFF.
- 4. Check resistance between "fuel level sensor unit and fuel pump" terminals 4 and 5.

Soak the vehicle. CAUTION: Never turn ignition switch ON during the soaking time. NOTE: Soak time changes depending on ambient air temperature. It may take several hours.

- 6. Repeat step 4.
- 7. Check that resistance value measured at step 6 is 0.5 k Ω higher than resistance value measured at step 4.

If resistance value is more than 0.5 k Ω , go to the following steps. If resistance value is less than 0.5 k Ω , go to step 5.

- 8. Activate "INSPECTION MODE 1" (HBC-97) to start engine, and let it idle for 5 minutes.
- 9. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> EC-164, "Diagnosis Procedure"

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-164, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace engine coolant temperature sensor.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000003103926

INFOID:000000003103925

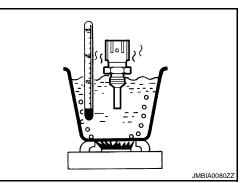
1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor.
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition			Resistance	
			20 (68)	2.37 - 2.63 kΩ	
1 and 2	Temperature	°C (°F)	50 (122)	0.68 - 1.00 kΩ	
			90 (194)	0.236 - 0.260 kΩ	

Is the inspection result normal?

YES >> INSPECTION END



P0116 ECT SENSOR

< COMPONENT DIAGNOSIS >

NO >> Replace engine coolant temperature sensor.

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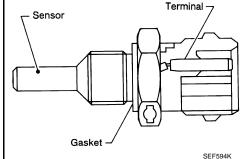
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P0117, P0118 ECT SENSOR

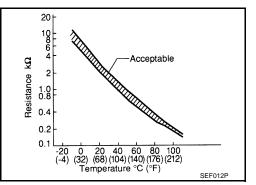
Description

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



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance $k\Omega$
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260



*: These data are reference values and are measured between ECM terminal 46 (Engine coolant temperature sensor) and ground.

CAUTION:

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.

DTC Logic

INFOID:000000003069177

DTC DETECTION LOGIC

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0117	Engine coolant tem- perature sensor cir- cuit low input	An excessively low voltage from the sensor is sent to ECM.	 Harness or connectors (The sensor circuit is open or shorted.)
P0118	Engine coolant tem- perature sensor cir- cuit high input	An excessively high voltage from the sensor is sent to ECM.	Engine coolant temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

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

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 5 seconds.
- 2. Check DTC.

INFOID:000000003069176

P0117, P0118 ECT SENSOR

	ENT DIAGNO		117, 20118	ECT SENSOR	[QR25DE]
s DTC detec					
YES >> 0	Go to <u>EC-167,</u>		<u>Procedure"</u> .		
	NSPECTION				
lagnosis	Procedure	•			INFOID:000000003069178
.CHECK G	ROUND CON	NECTION			
	tion switch OF		r to Ground Inc	postion in CL 45 "Circuit	Increation"
-	ion result nor			pection in <u>GI-45, "Circuit</u>	inspection.
YES >> 0	GO TO 2.				
	Repair or repla	-			
	ect engine coo tion switch Of		ture (ECT) ser	sor harness connector.	
			nsor harness o	connector and ground.	
ECT /	sensor			-	
Connector	Terminal	Ground	Voltage		
F11	1	Ground	Approx. 5V	_	
the inspect	ion result nor	mal?		-	
	GO TO 3.				
			•	hort to power in harness	or connectors.
			RCUIT FOR C	PEN AND SHORT	
	tion switch OF		r		
				s connector and ECM ha	mess connector.
FOT			014		
Connector	sensor Terminal	⊂ Connector	CM Terminal	Continuity	
F11	2	F13	52	Existed	
			und and short		
	ion result nor	•		•	
	GO TO 4.	irouit or chort	to around or o	hart to power in horness.	ar connectore
-			RATURE SEN	hort to power in harness (
	67, "Compor			130K	
	ion result nor		<u></u> .		
	GO TO 5.				
			nperature sens	or.	
	ITERMITTEN				
efer to <u>GI-4</u>	2, "Intermitter	nt Incident".			
>>	NSPECTION	END			
	nt Inspectio				INFOID:000000003069179
-	-				
			RATURE SEN	190K	
	tion switch OF		ture sensor ha	rness connector.	

2. Disconnect engine coolant temperature sensor harness connector.

3. Remove engine coolant temperature sensor.

P0117, P0118 ECT SENSOR

< COMPONENT DIAGNOSIS >

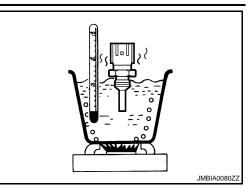
4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Conditio	n	Resistance
		20 (68)	2.37 - 2.63 kΩ
1 and 2	Temperature °C (°F)	50 (122)	0.68 - 1.00 kΩ
		90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor.



P0122, P0123 TP SENSOR

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

DTC

NOTE

P0123

	IC		INFOID:000000003069181
NOTE: If DTC P01	ECTION LOGIC 22 or P0123 is displa C-316, "DTC Logic".	yed with DTC P0643, first perform the	e trouble diagnosis for DTC P0643.
DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	 Harness or connectors (TP sensor 2 circuit is open or shorted.)

An excessively high voltage from the TP sensor

2 is sent to ECM.

2 circuit high input DTC CONFIRMATION PROCEDURE

Throttle position sensor

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds. 1.
- Turn ignition switch ON. 2.

Turn ignition switch OFF and wait at least 10 seconds. 3.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.		Μ
2. PERFORM DTC CONFIRMATION PROCEDURE		
 Turn ignition switch ON (READY). Depress the accelerator pedal to start engine, then keep engine running for at least 1 seco Check DTC. 	nd.	Ν
Is DTC detected?		
YES >> Go to <u>EC-169, "Diagnosis Procedure"</u> . NO >> INSPECTION END		0
Diagnosis Procedure	INFOID:000000003069182	Ρ
1.CHECK GROUND CONNECTION		
 Turn ignition switch OFF. Check ground connection E9. Refer to Ground Inspection in <u>GI-45, "Circuit Inspection"</u>. 		
Is the inspection result normal?		

NO >> Repair or replace ground connection. А

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PBIB0145E



Throttle position sensor

Sensor 1

Seńsor 2

90

45

Electric throttle control actuator

(TP sensor 2)

Throttle valve opening angle (deg)

6.0

4.0

0^L

sensor

Throttle position s output voltage 0

P0122, P0123 TP SENSOR

< COMPONENT DIAGNOSIS >

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

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

Electric throttle	control actuator	Ground	Voltage
Connector	Terminal	Oround	
F57	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.

 ${f 3.}$ CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle	e control actuator	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F57	4	F13	36	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 THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F57	3	F13	38	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 THROTTLE POSITION SENSOR

Refer to EC-171, "Component Inspection".

Is the inspection result normal?

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

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.

2. Go to EC-171, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

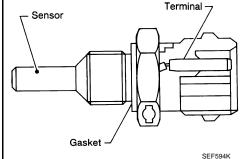
< COMPC	NENT DIAGNOS		P0122, P012	3 TP SENS	OR	[QR25DE]	
	> INSPECTION E					<u> </u>	
Compon	ent Inspection					INFOID:000000003069183	А
1. CHECK	K THROTTLE POS	ITION S	ENSOR				EC
 Recort Perfort Turn ig 	gnition switch OFF nect all harness co m <u>EC-15, "THROT</u> gnition switch ON. nift lever to D positi	onnector		OSITION LEAF	RNING : Special	Repair Requirement".	С
	the voltage betwe		harness connec	ctor and ground	l.		D
	ECM		0				D
Connector	Terminal	Ground	Cond	lition	Voltage		Е
	37			Fully released	More than 0.36V		
F13	(TP sensor 1 signal)	Ground	Accelerator pedal	Fully depressed	Less than 4.75V		
	38 (TD ann an 0 airmel)			Fully released	Less than 4.75V		F
	(TP sensor 2 signal)			Fully depressed	More than 0.36V		
YES > NO >	ection result norma > INSPECTION EN > GO TO 2.	ND					G
	CE ELECTRIC TH			TUATOR			Н
2. Go to	ce electric throttle (EC-171, "Special F	<u>Repair R</u>					I
_	> INSPECTION EN						
Special	Repair Require	ement				INFOID:000000003069184	J
1.PERFC	ORM THROTTLE V	ALVE CI	_OSED POSITIO	ON LEARNING			
Refer to E	C-15, "THROTTLE	VALVE	CLOSED POSIT	FION LEARNIN	G : Special Rep	air Requirement"	Κ
-	>> GO TO 2. 2.PERFORM IDLE AIR VOLUME LEARNING					I	
	C-16, "IDLE AIR V				auiromont"		
Reler lo <u>E</u>	C-TO, IDLE AIR V		LEARNING : Sp	ecial Repair Re	<u>equirement</u>		
>> END					Μ		
						Ν	
						0	

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P0125 ECT SENSOR

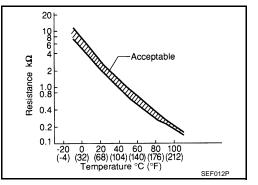
Description

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



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance $k\Omega$
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260



*: These data are reference values and are measured between ECM terminal 46 (Engine coolant temperature sensor) and ground.

CAUTION:

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.

DTC Logic

INFOID:000000003069186

DTC DETECTION LOGIC

NOTE:

- If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to <u>EC-166, "DTC Logic"</u>.
- If DTC P0125 is displayed with P0116, first perform the trouble diagnosis for DTC P0116. Refer to <u>EC-163, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0125	Insufficient engine cool- ant temperature for closed loop fuel control	 Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. Engine coolant temperature is insufficient for closed loop fuel control. 	 Harness or connectors (High resistance in the circuit) Engine coolant temperature sensor Thermostat

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

INFOID:000000003069185

P0125 ECT SENSOR

3. Check that "COOLAN TEMP/S" is above 10°C (50°F). With GST Follow the procedure "With CONSULT-III" above. Is it above 10°C (50°F)? YES $>>$ INSPECTION END NO $>>$ GO TO 3. 3. PERFORM DTC CONFIRMATION PROCEDURE With CONSULT-III 1. Activate "INSPECTION MODE 1" (HBC-97) to start engine, and run engine for 65 minutes at idle speed. 2. Check 1st tip DTC. If "COOLAN TEMP/S" increases to more than 10°C (50°F) within 65 minutes, turn ignition switch OFF because the test result will be OK. CAUTION: Be careful not to overheat engine. With GST Follow the procedure "With CONSULT-III" above. Is 1st trip DTC detected? YES $>>$ EC-173, "Diagnosis Procedure" NO $>>$ INSPECTION END Diagnosis Procedure 1.CHECK GROUND CONNECTION
With CONSULT-III 1. Turn ignition switch ON. 2. Select "DATA MONITOR" mode with CONSULT-III. EC 3. Check that "COOLAN TEMP/S" is above 10°C (50°F). EC With GST Follow the procedure "With CONSULT-III" above. EC Is it above 10°C (50°F)? C YES >> INSPECTION END NO NO >> GO TO 3. 3. PERFORM DTC CONFIRMATION PROCEDURE D With CONSULT-III 1. Activate "INSPECTION MODE 1" (HBC-97) to start engine, and run engine for 65 minutes at idle speed. E 2. Check 1st tip DTC. If "COOLAN TEMP/S" increases to more than 10°C (50°F) within 65 minutes, turn ignition switch OFF F because the test result will be OK. CAUTION: F Be careful not to overheat engine. With GST G Follow the procedure "With CONSULT-III" above. G G Is 1st trip DTC detected? YES >> EC-173, "Diagnosis Procedure" H Diagnosis Procedure IMFORMATION END H Diagnosis Procedure IMFORMATION END H
2. Select "DATA MONITOR" mode with CONSULT-III. EC 3. Check that "COOLAN TEMP/S" is above 10°C (50°F). Image: Comparison of the procedure "With CONSULT-III" above. Is it above 10°C (50°F)? C YES >> INSPECTION END NO >> GO TO 3. D 3. PERFORM DTC CONFIRMATION PROCEDURE D Image: Comparison of the procedure "With CONSULT-III" above. D Image: Comparison of the procedure Temperature of temperature of temperature of temperatemperatemperature of temperature of temperature of t
3. Check that "COOLAN TEMP/S" is above 10°C (50°F). With GST Follow the procedure "With CONSULT-III" above. Is it above 10°C (50°F)? YES $>>$ INSPECTION END NO $>>$ GO TO 3. 3. PERFORM DTC CONFIRMATION PROCEDURE With CONSULT-III 1. Activate "INSPECTION MODE 1" (HBC-97) to start engine, and run engine for 65 minutes at idle speed. 2. Check 1st tip DTC. If "COOLAN TEMP/S" increases to more than 10°C (50°F) within 65 minutes, turn ignition switch OFF because the test result will be OK. CAUTION: Be careful not to overheat engine. With GST Follow the procedure "With CONSULT-III" above. Is 1st trip DTC detected? YES $>>$ EC-173, "Diagnosis Procedure" NO $>>$ INSPECTION END Diagnosis Procedure 1. CHECK GROUND CONNECTION
Follow the procedure "With CONSULT-III" above. C Is it above 10°C (50°F)? YES >> INSPECTION END NO >> GO TO 3. 3.PERFORM DTC CONFIRMATION PROCEDURE D Image: Construct of the state o
Is it above for C (50°F)? YES >> INSPECTION END NO >> GO TO 3. 3. PERFORM DTC CONFIRMATION PROCEDURE
NO >> GO TO 3. 3.PERFORM DTC CONFIRMATION PROCEDURE Image: Strain Stra
3.PERFORM DTC CONFIRMATION PROCEDURE With CONSULT-III 1. Activate "INSPECTION MODE 1" (HBC-97) to start engine, and run engine for 65 minutes at idle speed. 2. Check 1st tip DTC. If "COOLAN TEMP/S" increases to more than 10°C (50°F) within 65 minutes, turn ignition switch OFF because the test result will be OK. CAUTION: Be careful not to overheat engine. With GST Follow the procedure "With CONSULT-III" above. Is 1st trip DTC detected? YES YES NO Diagnosis Procedure Increase Increase
1. Activate "INSPECTION MODE 1" (HBC-97) to start engine, and run engine for 65 minutes at idle speed. E 2. Check 1st tip DTC. If "COOLAN TEMP/S" increases to more than 10°C (50°F) within 65 minutes, turn ignition switch OFF because the test result will be OK. F Be careful not to overheat engine. @With GST Follow the procedure "With CONSULT-III" above. G Is 1st trip DTC detected? YES YES >> EC-173, "Diagnosis Procedure" NO >> INSPECTION END Diagnosis Procedure IMFOLLOWORD CONNECTION
If "COOLAN TEMP/S" increases to more than 10°C (50°F) within 65 minutes, turn ignition switch OFF F because the test result will be OK. CAUTION: Be careful not to overheat engine. F With GST Follow the procedure "With CONSULT-III" above. Follow the procedure "With CONSULT-III" above. G Is 1st trip DTC detected? YES >> EC-173, "Diagnosis Procedure" NO >> INSPECTION END Diagnosis Procedure INFOLE-000000000000000000000000000000000000
CAUTION: F Be careful not to overheat engine. S With GST Follow the procedure "With CONSULT-III" above. G Is 1st trip DTC detected? YES >> EC-173, "Diagnosis Procedure" NO >> INSPECTION END H Diagnosis Procedure INFOID:000000000000000000000000000000000000
With GST G Follow the procedure "With CONSULT-III" above. G Is 1st trip DTC detected? YES >> EC-173, "Diagnosis Procedure" NO >> INSPECTION END Diagnosis Procedure INFOLD:000000000000000000000000000000000000
Follow the procedure "With CONSULT-III" above. G Is 1st trip DTC detected? YES >> EC-173, "Diagnosis Procedure" NO >> INSPECTION END Diagnosis Procedure INFOID.000000000000000000000000000000000000
YES >> EC-173, "Diagnosis Procedure" H NO >> INSPECTION END INFOID:00000003069187 Diagnosis Procedure INFOID:00000003069187 H 1.CHECK GROUND CONNECTION I
NO >> INSPECTION END Diagnosis Procedure 1.CHECK GROUND CONNECTION
1.CHECK GROUND CONNECTION
1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in <u>GI-45, "Circuit Inspection"</u> . J Is the inspection result normal?
YES >> GO TO 2.
NO >> Repair or replace ground connection. K 2.CHECK ENGINE COOLANT TEMPERATURE SENSOR
Refer to EC-173, "Component Inspection".
Is the inspection result normal?
YES >> GO TO 3.
NO >> Replace engine coolant temperature sensor. 3.CHECK THERMOSTAT OPERATION
When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine
coolant does not flow.
<u>Is the inspection result normal?</u> YES >> GO TO 4.
NO >> Repair or replace thermostat. Refer to <u>CO-20, "Removal and Installation"</u> .
4.CHECK INTERMITTENT INCIDENT
Refer to <u>GI-42, "Intermittent Incident"</u> .
>> INSPECTION END
Component Inspection
1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.

P0125 ECT SENSOR

< COMPONENT DIAGNOSIS >

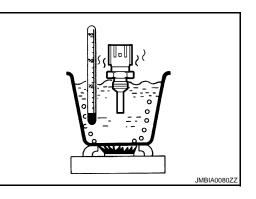
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor.
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Conditio	Resistance	
		20 (68)	2.37 - 2.63 kΩ
1 and 2	Temperature °C (°F)	50 (122)	0.68 - 1.00 kΩ
		90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor.

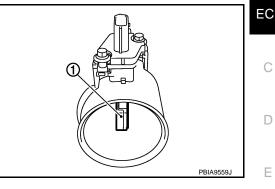


P0127 IAT SENSOR

Description

The intake air temperature sensor is built-into mass air flow sensor (1). 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.



20

0.2

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-20

Resistance kΩ 2 1.0 0.4

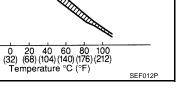
<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance $k\Omega$
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

*: These data are reference values and are measured between ECM terminal 50 (Intake air temperature sensor) and ground.

CAUTION:

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.



Acceptable

DTC Logic

INFOID:000000003069190

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	r
P0127	Intake air temperature too high	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	 Harness or connectors (The sensor circuit is open or shorted) Intake air temperature sensor 	L

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON. 2.
- Turn ignition switch OFF and wait at least 10 seconds. 3.

TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If this test is conducted with the drive wheels lifted, activate "INPSECTION MODE 1" (HBC-97). If a road test is expected to be easier, it is unnecessary to lift up the vehicle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

(P)With CONSULT-III

1. Wait until engine coolant temperature is less than 90°C (194°F)

Turn ignition switch ON.

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P0127 IAT SENSOR

< COMPONENT DIAGNOSIS >

- Select "DATA MONITOR" mode with CONSULT-III.
- Check the engine coolant temperature.
- If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch OFF and cool down engine.

NOTĚ:

Perform the following steps before engine coolant temperature is above 90°C (194°F).

- 2. Turn ignition switch ON.
- 3. Select "DATA MONITOR" mode with CONSULT-III.
- 4. Turn ignition switch ON (READY).
- 5. Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds. CAUTION:

Always drive vehicle at a safe speed.

NOTE:

Never fully release accelerator pedal during the cruising.

6. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

YES >> Go to <u>EC-176, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-176, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

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

3.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK INTAKE AIR TEMPERATURE SENSOR

1. Turn ignition switch OFF.

- 2. Disconnect mass air flow sensor harness connector.
- 3. Check resistance between mass air flow sensor terminals as follows.

Terminals	Condition		Resistance $k\Omega$
1 and 2	Intake air temperature °C (°F)	25 (77)	1.800 - 2.200

Is the inspection result normal?

YES >> INSPECTION END

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

INFOID:000000003069192

INFOID:000000003069191

EC-176

[QR25DE]

P0128 THERMOSTAT FUNCTION

< COMPONENT DIAGNOSIS >

P0128 THERMOSTAT FUNCTION

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0128 is displayed with DTC P0300, P0301, P0302, P0303 or P0304, first perform the trouble diagnosis for DTC P0300, P0301, P0302, P0303, P0304. Refer to <u>EC-242, "DTC Logic"</u>.

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough.

This is due to a leak in the seal or the thermostat stuck open.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the en- gine has run long enough.	 Thermostat Leakage from sealing portion of thermostat Engine coolant temperature sensor
DTC CON	FIRMATION PROC	EDURE	
1.PRECO	NDITIONING		
If DTC Cor	firmation Procedure h	as been previously conducted, always	perform the following before conduct-
ing the nex		weit at least 10 accords	
	inition switch OFF and	I wait at least 10 seconds.	
		l wait at least 10 seconds.	
	CONDITION: results, perform at a	mbient temperature of –10°C (14°F) o	or higher.
 For best 	results, perform at e	engine coolant temperature of -10°C (14°F) to 52°C (126°F).
 Before p 	erforming the follow	ing procedure, do not fill with the fue	I.
>>	> GO TO 2.		
-	RM DTC CONFIRMA	TION PROCEDURE	
(P)With CO			
1. Turn A	/C switch OFF.		
	lower fan switch OFF. Inition switch ON.		
		n "DATA MONITOR" mode with CONSU	LT-III.
	the indication of "COO		
	oelow 52°C (126°F), g above 52°C (126°F), c	o to following step. ool down the engine to less than 52°C (126°F). Then go to next steps.
Activat	e "INSPECTION MOD	DE 1" (<u>HBC-97</u>) to start engine.	, , ,
	t idle for at least 30 mi	nutes. eases to more than 71°C (160°F) with	in 30 minutes, turn ignition switch
OFF b	ecause the test resu		
8. Check	1st trip DTC.		
	procedure "With CON	SULT-III" above.	
	<u>)TC detected?</u>		
	So to <u>EC-177, "Diag</u> INSPECTION END	nosis Procedure".	
Diagnosi	s Procedure		INFOID:000000003069194
л Г			

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to <u>EC-178</u>, "Component Inspection". <u>Is the inspection result normal?</u> A INFOID:000000003069193

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P0128 THERMOSTAT FUNCTION

< COMPONENT DIAGNOSIS >

YES >> GO TO 2.

NO >> Replace engine coolant temperature sensor.

2.CHECK THERMOSTAT

Check thermostat. Refer to CO-20, "Removal and Installation".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace thermostat.

Component Inspection

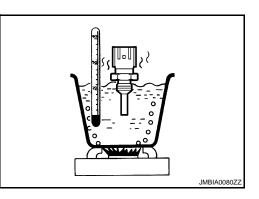
1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor.
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals		Resistance			
			20 (68)	2.37 - 2.63	kΩ
1 and 2	Temperature	°C (°F)	50 (122)	0.68 - 1.00	kΩ
			90 (194)	0.236 - 0.260	kΩ

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace engine coolant temperature sensor.



[QR25DE]

INFOID:000000003069195

EC-178

P0130 A/F SENSOR 1

Description

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the

sensor to ensure the required operating temperature of about 800°C (1,472°F).

e diffusion layer at ge, and this current relative hydrocarir fuel ratio by this ntegrated in the ure of about 800°C

INFOID:000000003069197

DTC Logic

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible Cause	К
P0130	Air fuel ratio (A/F) sensor 1 circuit	A)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in the range other than approx. 2.2V.	Harness or connectors (The A/F sensor 1 circuit is open or shorted.)	1
		B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2V.	A/F sensor 1	L

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

>> GO TO 2.

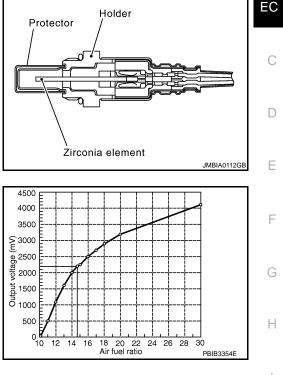
2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

With CONSULT-III

- Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Let it idle for 2 minutes.

EC-179

INFOID:000000003069196



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3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-181, "Diagnosis Procedure".

NO-1 >> With CONSULT-III: GO TO 3.

NO-2 >> Without CONSULT-III: GO TO 7.

3.CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

1. Select "A/F SEN1 (B1)" in "DATA MONITOR" mode with CONSULT-III.

2. Check "A/F SEN1 (B1)"indication.

Does the indication fluctuates around 2.2V?

YES >> GO TO 4.

NO >> Go to <u>EC-181, "Diagnosis Procedure"</u>.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-I

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

2. Turn ignition switch ON (READY).

3. Select "A/F SEN1 (B1) P1276" of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-III.

4. Touch "START".

5. When the following conditions are met, "TESTING" will be displayed on the CONSULT-III screen.

ENG SPEED	950 - 2,600 rpm	
VHCL SPEED SE	More than 70 km/h (43 mph)	
B/FUEL SCHDL	1.0 - 16.0 msec	
Shift lever	D position	

If "TESTING" is not displayed after 20 seconds, retry from step 2. CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

Is "TESTING" displayed on CONSULT-III screen?

YES >> GO TO 5.

NO >> Check A/F sensor 1 function again. GO TO 3.

5. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-II

Release accelerator pedal fully.

NOTE:

Never apply brake during releasing the accelerator pedal.

Which does "TESTING" change to?

COMPLETED>>GO TO 6.

OUT OF CONDITION>>Retry DTC CONFIRMATION PROCEDURE. GO TO 4.

6.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-III

Touch "SELF-DIAG RESULT"

Which is displayed on CONSULT-III screen?

YES >> INSPECTION END

NO >> Go to EC-181, "Diagnosis Procedure".

I.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform Component Function Check. Refer to EC-181, "Component Function Check".

NOTE:

Use component function check to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-181, "Diagnosis Procedure".

< COMPONENT DIAGNOSIS > Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK

[QR25DE]

With GST CAUTION:	EC
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating tem-	
perature.	С
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON (READY). 	
4. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes.	D
 Set D position, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH). 	
NOTÉ:	_
Never apply brake during releasing the accelerator pedal.6. Repeat steps 4 to 5 for five times.	E
7. Stop the vehicle and turn ignition switch OFF.	
 Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. 	F
 Turn ignition switch ON (READY). Repeat steps 4 to 5 for five times. 	
12. Stop the vehicle and connect GST to the vehicle.	G
13. Check 1st trip DTC.	
<u>Is 1st trip DTC detected?</u> YES >> Go to <u>EC-181, "Diagnosis Procedure"</u> .	Н
NO >> INSPECTION END	
Diagnosis Procedure	Ι
1.CHECK GROUND CONNECTION	
1. Turn ignition switch OFF.	J
 Check ground connection E9. Refer to Ground Inspection in <u>GI-45, "Circuit Inspection"</u>. <u>Is the inspection result normal?</u> 	
YES >> GO TO 2.	K
NO >> Repair or replace ground connection.	
2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT	I
 Disconnect A/F sensor 1 harness connector. Turn ignition switch ON. 	
 Check the voltage between A/F sensor 1 harness connector and ground. 	
	Μ
A/F sensor 1 Connector Terminal Ground Voltage	
F44 4 Ground Battery voltage	Ν
Is the inspection result normal?	
YES >> GO TO 4.	0
NO >> GO TO 3.	
3.DETECT MALFUNCTIONING PART	Р
Check the following.IPDM E/R harness connector F10	
• 15A fuse (No. 37)	
 Harness for open or short between A/F sensor 1 and fuse 	
>> Repair or replace harness or connectors.	

4.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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P0130 A/F SENSOR 1

< COMPONENT DIAGNOSIS >

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sei	nsor 1	ECM Connector Terminal		Continuity
Connector	Terminal			Continuity
F44	1	F13	45	Existed
1 44	2	115	49	LAISIGU

4. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

A/F sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal	Ground	Continuity
F44	1	E12	45	Ground	Not existed
F44	2	F13	49	Ground	NUL EXISTED

5. Also check harness for 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

Perform <u>GI-42, "Intermittent Incident"</u>.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace.

6.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

• Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

• Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> INSPECTION END

P0131 A/F SENSOR 1

Description

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the

sensor to ensure the required operating temperature of about 800°C (1,472°F).

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1500 1000 500

0 **1**0 12 14

Protector

INFOID:000000003069201

PBIB3354E

DTC DETECTION LOGIC

DTC Logic

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately low.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause	К
P0131	Air fuel ratio (A/F) sensor 1 circuit low voltage	 The A/F signal computed by ECM from the A/ F sensor 1 signal is constantly approx. 0V. 	 Harness or connectors (The A/F sensor 1 circuit is open or shorted.) A/F sensor 1 	L

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

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

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

>> GO TO 2.

2. CHECK A/F SENSOR FUNCTION

With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Select "A/F SEN1 (B1)" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "A/F SEN1 (B1)" indication.

Holder

Zirconia element

18 20 22 Air fuel ratio

24 26 28

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JMBIA0112GE

With GST

Follow the procedure "With CONSULT-III" above.

Is the indication constantly approx. 0V?

YES >> Go to EC-184, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF, wait at least 10 seconds and then turn ignition switch ON (READY).
- 4. Drive and accelerate vehicle to more than 70 km/h (43 MPH) within 1 minute after turning ignition switch ON (READY).

CAUTION:

Always drive vehicle at a safe speed.

5. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 70 km/h (43 mph)
B/FUEL SCHDL	1.5 - 15.0 msec
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	Suitable position

NOTE:

- Keep the accelerator pedal as steady as possible during the cruising.
- If this procedure is not completed within 150 seconds after turning ignition switch ON (READY) at step 3, return to step 1.
- 6. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

- YES >> Go to EC-184, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect A/F sensor 1 harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	ector Terminal		Voltage
F44	4	Ground	Battery voltage

s the inspection result normal?

<u>is ine</u>	IIIS	pe	CLIOI	res	uit	101	
VEO			<u> </u>		4		

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

 ${f 3.}$ DETECT MALFUNCTIONING PART

INFOID:000000003069202

P0131 A/F SENSOR 1

[QR25DE] < COMPONENT DIAGNOSIS > Check the following. IPDM E/R harness connector F10 А 15A fuse (No. 37) Harness for open or short between A/F sensor 1 and fuse EC >> Repair or replace harness or connectors. 4.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. Check the continuity between A/F sensor 1 harness connector and ECM harness connector. 3. D A/F sensor 1 ECM Continuity Connector Terminal Connector Terminal Е 1 45 F44 F13 Existed 2 49 Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground. F 4. A/F sensor 1 ECM Ground Continuity Connector Terminal Connector Terminal 1 45 F44 F13 Ground Not existed 2 49 Н 5. Also check harness for 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 Perform GI-42, "Intermittent Incident". Is the inspection result normal? YES >> GO TO 6. Κ NO >> Repair or replace. **6.**REPLACE AIR FUEL RATIO (A/F) SENSOR 1 Replace air fuel ratio (A/F) sensor 1. CAUTION: Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Μ Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> INSPECTION END

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P0132 A/F SENSOR 1

Description

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.

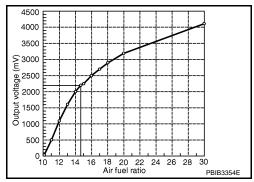
The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the

sensor to ensure the required operating temperature of about 800°C (1,472°F).

Protector Holder

Zirconia element



INFOID:000000003069204

DTC Logic

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately high.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132	Air fuel ratio (A/F) sensor 1 circuit high voltage	• The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5V.	 Harness or connectors (The A/F sensor 1 circuit is open or shorted.) A/F sensor 1

DTC CONFIRMATION PROCEDURE

1.CHECK LOW FUEL WARNING LIGHT

1. Turn ignition switch ON.

2. Check the state of low fuel warning light.

Is low fuel warning light illuminated?

YES >> Refill the fuel until low fuel warning light turned OFF. Then GO TO 2.

NO >> GO TO 2.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

EC-186

INFOID:000000003069203

JMBIA0112GE

P0132 A/F SENSOR 1

< COMPONENT DIAGNOSIS >

3.CHECK A/F SENSOR F	UNCTION	А
	I MODE 1" (HBC-97) to start engine, and warm up engine to normal operating tem-	~
3. Check "A/F SEN1 (B1)	" in "DATA MONITOR" mode with CONSULT-III. " indication.	EC
(a) With GST Follow the procedure "With	CONSULT-III" above	С
Is the indication constantly		
-	"Diagnosis Procedure".	
NO >> GO TO 4.		D
4.PERFORM DTC CONFI	RMATION PROCEDURE	
With CONSULT-III		Е
	F and wait at least 10 seconds.	
4. Drive and accelerate v ON (READY).	i. F, wait at least 10 seconds and then turn ignition switch ON (READY). ehicle to more than 70 km/h (43 MPH) within 1 minute after turning ignition switch	F
CAUTION: Always drive vehicle 5. Maintain the following of	at a safe speed. conditions for about 20 consecutive seconds.	G
ENG SPEED	1,000 - 3,200 rpm	Н
VHCL SPEED SE	More than 70 km/h (43 mph)	
B/FUEL SCHDL	1.5 - 15.0 msec	
COOLAN TEMP/S	More than 70°C (158°F)	I
Selector lever	Suitable position	
NOTE:		J
 If this procedure is at step 3, return to s 6. Check 1st trip DTC. With GST 		K
Follow the procedure "With	CONSULT-III" above.	L
<u>Is 1st trip DTC detected?</u>		
YES >> Go to <u>EC-187.</u> NO >> INSPECTION I	<u>"Diagnosis Procedure"</u> . END	B. 4
Diagnosis Procedure	INFOID:000000003069205	Μ
1.CHECK GROUND CON	NECTION	Ν
 Turn ignition switch OF Check around connection 	F. ion E9. Refer to Ground Inspection in <u>GI-45, "Circuit Inspection"</u> .	
Is the inspection result norr	• •	0
YES >> GO TO 2.		_
	ce ground connection.	
2.CHECK AIR FUEL RATI	O (A/F) SENSOR 1 POWER SUPPLY CIRCUIT	Ρ
1. Disconnect A/F sensor		

Turn ignition switch ON.
 Check the voltage between A/F sensor 1 harness connector and ground.

P0132 A/F SENSOR 1

A/F se	A/F sensor 1 Connector Terminal		Voltage
Connector			vollage
F44	4	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 F10

• 15A fuse (No. 37)

• Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F s	ensor 1	E	Continuity		
Connector	Terminal	Connector Terminal		Continuity	
F44	1	F13	45	Existed	
Г44	2	FIJ	49	Existed	

4. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

A/F s	A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	Ground	Continuity
F44	1	F13	45	Ground	Not existed
1 44	2	115	49	Ground	NOT EXISTED

5. Also check harness for 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

Perform GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace.

O.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. CAUTION:

• Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

• Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> INSPECTION END

P0133 A/F SENSOR 1

Description

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the

sensor to ensure the required operating temperature of about 800°C (1,472°F).

e diffusion layer at ge, and this current relative hydrocar-

0

14

16

12

18 20 22 Air fuel ratio

24 26 28

INFOID:000000003069207

PBIB3354E

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DTC Logic

DTC DETECTION LOGIC

To judge the malfunction of A/F sensor 1, this diagnosis measures response time of the A/F signal computed by ECM from the A/F sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the A/F sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause	
			 Harness or connectors (The A/F sensor 1 circuit is open or shorted.) A/F sensor 1 	L
P0133	Air fuel ratio (A/F) sensor 1 circuit slow response	• The response of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time.	 A/F sensor 1 heater Fuel pressure Fuel injector Intake air leaks 	M
			Exhaust gas leaksPCVMass air flow sensor	Ν

DTC CONFIRMATION PROCEDURE

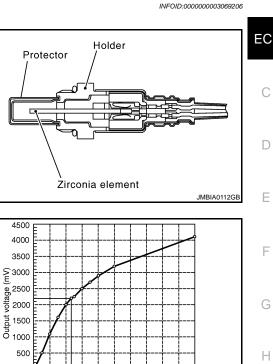
1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds. **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 11V at idle. Do you have CONSULT-III?

EC-189



A

INFOID:000000003069208

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

2. PERFORM DTC CONFIRMATION PROCEDURE

(B) With CONSULT-III

- 1. Turn ignition switch ON (READY).
- 2. Depress accelerator pedal and wait at least 6 minutes. **NOTE:**

If keeping depressing the accelerator pedal for more than 6 minutes, fuel will be cut off after some time. Select "A/F SEN1(B1) P0133" of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-III.

- Select "A/F SEN
 Touch "START".
- Drive vehicle at a speed of 90 km/h (56 MPH) or more until "TESTING" on CONSULT-III changes to "COMPLETED". (It will take approximately 15 seconds.)
 CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

6. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT-III?

OK >> INSPECTION END

NG >> Go to EC-190, "Diagnosis Procedure".

3. PERFORM DTC CONFIRMATION PROCEDURE

With GST

- 1. Turn ignition switch ON (READY).
- 2. Depress accelerator pedal and wait at least 6 minutes. **NOTE:**

If keeping depressing the accelerator pedal for more than 6 minutes, fuel will be cut off after some time.

 Drive vehicle at a speed of 100 km/h (62 MPH) or more for at least 15 consecutive seconds. CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-190, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

2.RETIGHTEN A/F SENSOR 1

Loosen and retighten the A/F sensor 1.

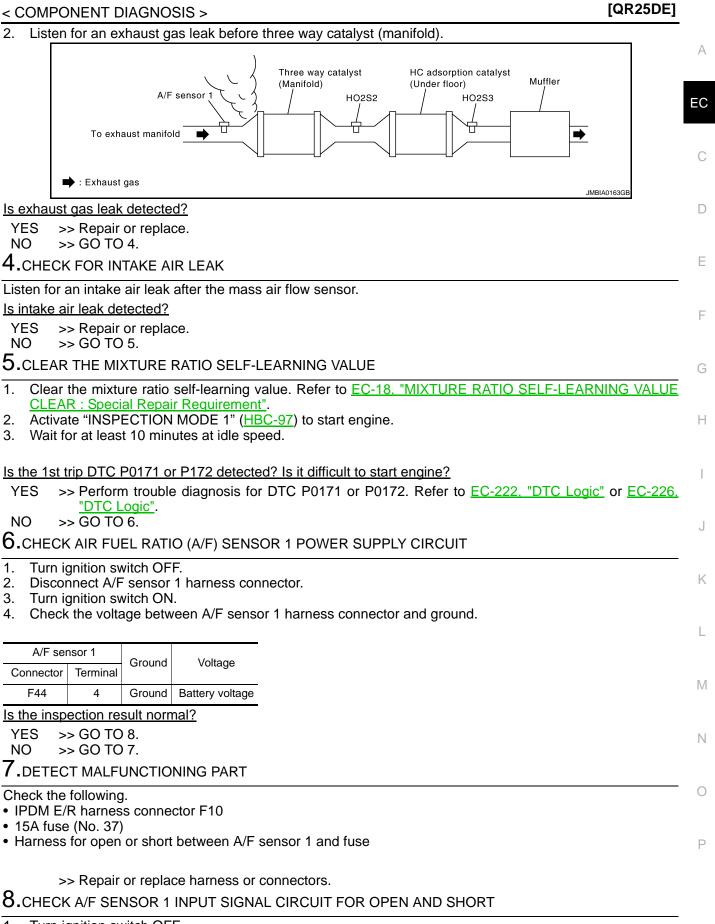
Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3.CHECK EXHAUST GAS LEAK

1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and run engine at idle speed.

P0133 A/F SENSOR 1



1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

P0133 A/F SENSOR 1

A/F sei	nsor 1	EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F44	1	F13	45	Existed
1 44	2	113	49	LAISLEU

4. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

A/F ser	nsor 1	ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal	Ground	Continuity
F44	1	F13	45	Ground	Not existed
Г44	2	г13	49	Ground	NUL EXISTED

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

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

9.CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to EC-135, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 13.

10.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor.

Refer to EC-148, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace mass air flow sensor.

11.CHECK PCV VALVE

Refer to EC-395, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace PCV valve.

12. CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace.

13.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> INSPECTION END

P0137 H02S2

Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

DTC Logic



The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuelcut.

le diagnosis name			
la diagnosis namo			
le ulagriosis name	DTC detecting condition	Possible cause	
d oxygen sensor 2 low voltage	The maximum voltage from the sensor is not reached to the specified voltage.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 Fuel pressure Fuel injector 	
			oxygen sensor 2 ow voltageThe maximum voltage from the sensor is not reached to the specified voltage.(The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III? Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

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

Turn ignition switch ON. 2.

Turn ignition switch OFF and wait at least 10 seconds. 3.

TESTING CONDITION:

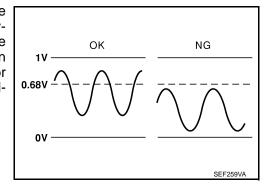
For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30 °C (32 to 86 °F).

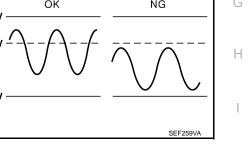
INFOID:000000003069209

Heater pad

Zirconia tube SEF327R







Μ

Ν

Ρ

Holder

[QR25DE]

А

EC

D

F

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON (READY) and select "DATA MONITOR" mode with CONSULT-III.
- 6. Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

Keep the vehicle speed as steady as possible during the cruising.

- 7. Stop the vehicle and shift the selector lever to P position.
- 8. Fully depress the accelerator pedal and keep it until step 11.
- Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
 If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F).
- 10. Select "HO2S2 (B1) P1147" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 11. Touch "START".
 - NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

12. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END

NG >> Go to EC-195, "Diagnosis Procedure".

CAN NOT BE DIAGNOSED>>GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

- 1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- 2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-194, "Component Function Check".

NOTE:

Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-195, "Diagnosis Procedure".

Component Function Check

INFOID:000000003069211

1.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition ON (READY) and drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes.

CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

Keep the vehicle speed as steady as possible during the cruising.

6. Stop vehicle and shift the selector lever to P position.

P0137 HO2S2

< COMPONENT DIAGNOSIS >

7. Check the voltage between ECM harness connector and ground under the following condition.

	ECM	0	round	Condition	Voltago
Connector	Term	inal	rouna	Condition	Voltage
F13	33 (HO2S2			Fully depress the accelerator pedal and keep it, then fully release accelerator pedal.	The voltage should be above 0.68V at least once during this procedure.
the insp	ection res	sult norma	?		
		CTION EN			
		_	lagnos	is Procedure".	
Diagnos	is Proc	edure			INFOID:000000003069212
1.CHECK	GROUN	ID CONN		N	
		itch OFF.			
	-			efer to Ground Inspection in <u>GI-45, "(</u>	Circuit Inspection".
<u>s the insp</u> YES >	<u>ection res</u> > GO TO		<u> </u>		
-			around	d connection.	
~		•	-	ELF-LEARNING VALUE	
					RE RATIO SELF-LEARNING VALUE
<u>CLEA</u>	R : Specia	al Repair I	Require	ement".	
S A 1'					
					ngine idle for at least 10 minutes.
<u>s the 1st t</u>	rip DTC F	20171 det	ected?	Is it difficult to start engine?	
<u>s the 1st t</u> YES >	<u>rip DTC F</u> > Perform	<u>P0171 det</u> n trouble c	ected?		
<u>s the 1st t</u> YES > NO >	rip DTC F > Perform > GO TO	20171 det n trouble c 3.	<u>ected?</u> liagnos	Is it difficult to start engine? is for DTC P0171. Refer to EC-222.	
<u>s the 1st t</u> YES > NO > 3. CHECK	rip DTC F > Perform > GO TO < HO2S2	P0171 det n trouble c 3. GROUNE	<u>ected?</u> liagnos	Is it difficult to start engine?	
<u>s the 1st t</u> YES > NO > 3. CHECk 1. Turn iq 2. Discor	rip DTC F > Perform > GO TO (HO2S2 gnition swonnect heat	P0171 det n trouble c 3. GROUND vitch OFF. tted oxyge	ected? liagnos CIRCL	Is it difficult to start engine? is for DTC P0171. Refer to EC-222. JIT FOR OPEN AND SHORT or 2 harness connector.	
s the 1st t YES > NO > 3.CHECk 1. Turn iq 2. Discor 3. Discor	rip DTC F > Perform > GO TO (HO2S2 gnition sw nnect hea nnect ECI	P0171 det n trouble o 3. GROUND vitch OFF. ated oxyge M harness	ected? liagnos CIRCU en sens	Is it difficult to start engine? is for DTC P0171. Refer to EC-222. JIT FOR OPEN AND SHORT or 2 harness connector.	"DTC Logic".
s the 1st t YES > NO > 3.CHECk 1. Turn iq 2. Discor 3. Discor	rip DTC F > Perform > GO TO (HO2S2 gnition sw nnect hea nnect ECI	P0171 det n trouble o 3. GROUND vitch OFF. ated oxyge M harness	ected? liagnos CIRCU en sens	Is it difficult to start engine? is for DTC P0171. Refer to EC-222. JIT FOR OPEN AND SHORT or 2 harness connector.	"DTC Logic".
s the 1st t YES > NO > 3.CHECk 1. Turn iq 2. Discor 3. Discor	rip DTC F > Perform > GO TO (HO2S2 gnition sw nnect hea nnect ECI (the conti	P0171 det n trouble o 3. GROUND vitch OFF. ated oxyge M harness	ected? liagnos CIRCU n sens conne veen H	Is it difficult to start engine? is for DTC P0171. Refer to EC-222. JIT FOR OPEN AND SHORT or 2 harness connector. octor. O2S2 harness connector and ECM h	"DTC Logic".
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s the 1st t YES > NO > CHECk 1. Turn iq 2. Discor 3. Discor 4. Check HO2 Connector F42	rip DTC F > Perform > GO TO (HO2S2 gnition sw nnect hea nnect ECI (the conti 2S2 Terminal 1 heck harr	P0171 det n trouble o 3. GROUND vitch OFF. tited oxyge M harness inuity betw EC Connector F13 ness for sl	ected? liagnos CIRCU en sens conne veen He :M Termin 35 nort to g	Is it difficult to start engine? is for DTC P0171. Refer to EC-222. JIT FOR OPEN AND SHORT or 2 harness connector. ector. O2S2 harness connector and ECM h	"DTC Logic".
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$\frac{\text{s the 1st t}}{\text{YES}} > \text{NO} > \text{3.CHECk}$ 1. Turn ig 2. Discon 3. Discon 4. Check $\frac{\text{HO2}}{\text{Connector}}$ 5. Also c $\frac{\text{s the insp}}{\text{YES}} > \text{NO} > \text{4.CHECk}$	$\frac{rip DTC F}{Perform} > Perform > GO TO (HO2S2)gnition switched annect heat annect ECI (the contribution)(S2)Terminal 1 heck harr ection resident > GO TO > Repair of (HO2S2)$	P0171 det n trouble o 3. GROUND vitch OFF. ited oxyge M harness inuity betw EC Connector F13 ness for sl sult norma 4. open circu INPUT SI	ected? liagnos CIRCU en sens s conne veen Hu M Termin 35 nort to g I? uit or sh GNAL (Is it difficult to start engine? is for DTC P0171. Refer to EC-222. UIT FOR OPEN AND SHORT or 2 harness connector. octor. O2S2 harness connector and ECM h Continuity al Existed ground and short to power.	"DTC Logic".
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HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal	Ciouna	Continuity
F42	4	F13	33	Ground	Not existed

3. Also check harness for 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 HEATED OXYGEN SENSOR 2

Refer to EC-196. "Component Inspection".

Is the inspection result normal?

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

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000003069213

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2-I

With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition ON (READY) and select "DATA MONITOR" mode with CONSULT-III.
- 6. Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

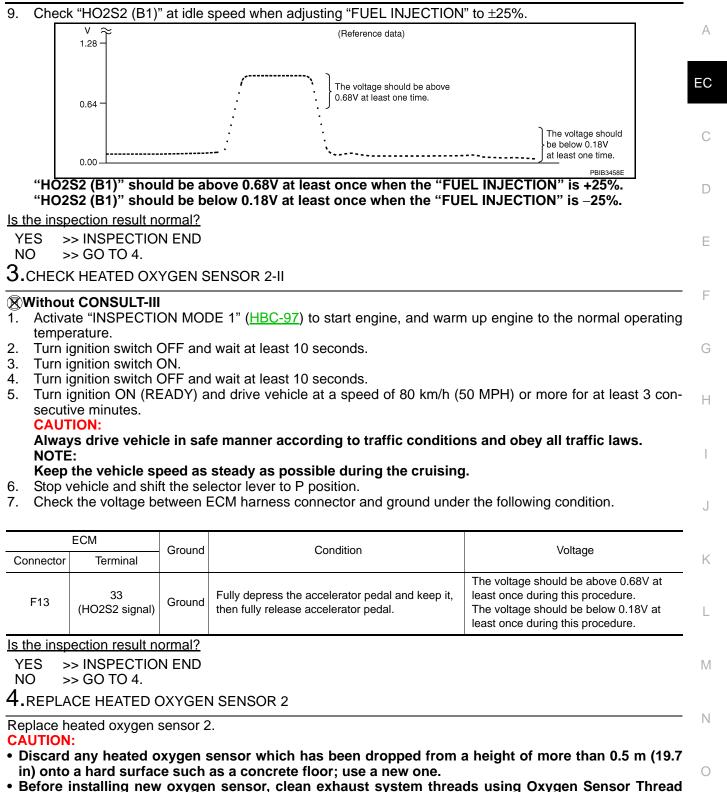
Keep the vehicle speed as steady as possible during the cruising.

- 7. Stop vehicle and shift the selector lever to P position.
- 8. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-III.

P0137 HO2S2

< COMPONENT DIAGNOSIS >

Ρ



>> INSPECTION END

Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

P0138 H02S2

Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

DTC Logic



NG

PBIB1848

PBIB2376F

SEF327F

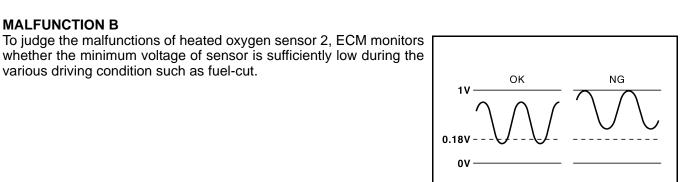
DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/ F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time.

MALFUNCTION A

MALFUNCTION B

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



OK

1.2V

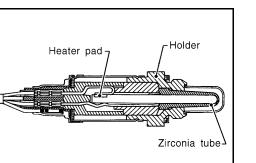
1V

٥v

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
		A)	An excessively high voltage from the sen- sor is sent to ECM.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2
P0138	Heated oxygen sensor 2 circuit high voltage	B)	The minimum voltage from the sensor is not reached to the specified voltage.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 Fuel pressure Fuel injector

various driving condition such as fuel-cut.

INFOID:000000003069214



[QR25DE]

< COMPONENT DIAGNOSIS > [QR:	25DE]
1.preconditioning	A
If DTC Confirmation Procedure has been previously conducted, always perform the following before co- ing the next test.	
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. 	EC
3. Turn ignition switch OFF and wait at least 10 seconds.	
>> GO TO 2.	С
2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A	
1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating perature.	ig tem- D
2. Turn ignition switch OFF and wait at least 10 seconds.	
 Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. 	E
 Turn ignition switch ON (READY). Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. 	
CAUTION: Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.	F
NOTE: Keep the vehicle speed as steady as possible during the cruising.	
7. Check 1st trip DTC.	G
<u>Is 1st trip DTC detected?</u> YES >> Go to <u>EC-200, "Diagnosis Procedure"</u> .	Н
NO-1 >> With CONSULT-III: GO TO 3. NO-2 >> Without CONSULT-III: GO TO 5.	11
3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B	I
NOTE:	
 For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30 °C (32 to 86 °F). Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating perature. 	g tem- J
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. 	
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON (READY) and select "DATA MONITOR" mode with CONSULT-III. 	K
6. Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes.	
CAUTION: Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:	L
Keep the vehicle speed as steady as possible during the cruising.7. Stop the vehicle and shift the selector lever to P position.	M
 Fully depress the accelerator pedal and keep it until step 11. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F). 	
If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (1	58°F). N
 Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II. Touch "START". 	
NOTE: It will take at most 10 minutes until "COMPLETED" is displayed.	0
12. Touch "SELF-DIAG RESULT".	
Which is displayed on CONSULT-III OK >> INSPECTION END	Ρ
NG >> Go to <u>EC-200, "Diagnosis Procedure"</u> . CAN NOT BE DIAGNOSED>>GO TO 4.	
4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALUNCTION B AGAIN	

Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
 Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to <u>EC-200, "Diagnosis Procedure"</u>. **NOTE:**

Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to <u>EC-200, "Diagnosis Procedure"</u>.

Component Function Check

INFOID:000000003069216

1.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition ON (READY) and drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes.

CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

Keep the vehicle speed as steady as possible during the cruising.

- 6. Stop vehicle and shift the selector lever to P position.
- 7. Check the voltage between ECM harness connector and ground under the following condition.

	ECM Groun		Condition	Voltage	
Connector	Terminal	Ground	Condition	voltage	
F13	33 (HO2S2 signal)	Ground	Fully depress the accelerator pedal and keep it, then fully release accelerator pedal	The voltage should be below 0.18V at least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-200, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000003069217

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-198, "DTC Logic".

Which malfunction is detected?

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 harness connector.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between HO2S2 harness connector and ECM harness connector.

< COMPONENT DIAGNOSIS >

HO2	2S2	EC	Continuity	
Connector	Terminal	Connector Terminal		Continuity
F42	1	F13	35	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.

 ${f 4}$. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2	2S2	EC	Continuity	
Connector	Terminal	minal Connector Terminal		Continuity
F42	4	F13	33	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal	Ground	Continuity
F42	4	F13	33	Ground	Not existed

3. Also check harness for 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 HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace harness or connectors.

6.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-203, "Component Inspection".

Is the inspection result normal?

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

7.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 or in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> INSPECTION END

8. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

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9. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace ground connection.

10.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- 1. Clear the mixture ratio self-learning value. Refer to <u>EC-18, "MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement"</u>.
- 2. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start for at least 10 minutes.

Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0172. Refer to <u>EC-226, "DTC Logic"</u>.

NO >> GO TO 11.

11. CHECK H02S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect heated oxygen sensor 2 harness connector.

- 3. Disconnect ECM harness connector.
- 4. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2	HO2S2		ECM		
Connector	Terminal	Connector Terminal		Continuity	
F42	1	F13	35	Existed	

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

Is the inspection result normal?

YES >> GO TO 12.

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

12. CHECK H02S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2	2S2	ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
F42	4	F13	33	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2	2S2	EC	М	Ground	Continuity
Connector	Terminal	Connector	Terminal	Cround	Continuity
F42	4	F13	33	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 13.

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

13.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-203, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 14.

14.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

at least one time.

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< COMPONENT DIAGNOSIS > [QR23DE]	
 CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread 	А
Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.	EC
>> INSPECTION END	
15. CHECK INTERMITTENT INCIDENT	С
Refer to <u>GI-42, "Intermittent Incident"</u> .	
>> INSPECTION END	D
Component Inspection	
1.INSPECTION START	E
Do you have CONSULT-III? Do you have CONSULT-III?	F
YES >> GO TO 2. NO >> GO TO 3.	
2.CHECK HEATED OXYGEN SENSOR 2-1	G
With CONSULT-III	
1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to the normal operating temperature.	Н
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. 	_
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition ON (READY) and select "DATA MONITOR" mode with CONSULT-III. 	I
 Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. CAUTION: 	J
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.	J
Keep the vehicle speed as steady as possible during the cruising.	K
 Stop vehicle and shift the selector lever to P position. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with 	ΓX
CONSULT-III. 9. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to ±25%.	L
$V \approx (Reference data)$	
The voltage should be above	Μ
0.64 –	h 1
The voltage should be below 0.18V	Ν

PBIB3458E "HO2S2 (B1)" should be above 0.68V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)" should be below 0.18V at least once when the "FUEL INJECTION" is -25%.

Is the inspection result normal?

0.00

YES >> INSPECTION END NO >> GO TO 4.

3.CHECK HEATED OXYGEN SENSOR 2-II

Without CONSULT-III

1. Activate "INSPECTION MODE 1" (HBC-97) to start engine, and warm up engine to the normal operating temperature.

< COMPONENT DIAGNOSIS >

- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition ON (READY) and drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes.

CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

Keep the vehicle speed as steady as possible during the cruising.

- 6. Stop vehicle and shift the selector lever to P position.
- 7. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage	
Connector	Terminal	Ground	Condition	voltage	
F13	33 (HO2S2 signal)	Ground	Fully depress the accelerator pedal and keep it, then fully release accelerator pedal.	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.18V at least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Béfore installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> INSPECTION END

P0139 HO2S2

Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

DTC Logic

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0139	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond be- tween rich and lean than the specified time.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 Fuel pressure Fuel injector Intake air leaks 	

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III? Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 5.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

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

Turn ignition switch ON. 2.

Turn ignition switch OFF and wait at least 10 seconds. 3.

TESTING CONDITION:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30 °C (32 to 86 °F).

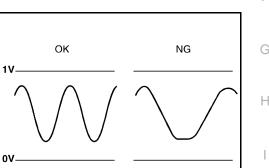
INFOID:000000003069219

Heater pad



INFOID:000000003069220

Holder



F

А

EC

D



SEF302L

Ρ

Ν

Μ

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON (READY) and select "DATA MONITOR" mode with CONSULT-III.
- 6. Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

Keep the vehicle speed as steady as possible during the cruising.

- 7. Stop the vehicle and shift the selector lever to P position.
- 8. Fully depress the accelerator pedal and keep it until step 11.
- Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F). If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F).
- 10. Select "HO2S2 (B1) P0139" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 11. Touch "START".
 - NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

12. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT-III?

- OK >> INSPECTION END
- NG >> GO TO 4.

CAN NOT BE DIAGNOSED>>GO TO 4.

4.PERFORM THE RESULT OF DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- 2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-206, "Component Function Check".

NOTE:

Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-207, "Diagnosis Procedure".

Component Function Check

INFOID:000000003069221

1.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition ON (READY) and drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes.

CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

Keep the vehicle speed as steady as possible during the cruising.

6. Stop vehicle and shift the selector lever to P position.

P0139 HO2S2

< COMPONENT DIAGNOSIS >

7. Check the voltage between ECM harness connector and ground under the following condition.

	ECM	Ground		Condition	Voltage
Connector	Terminal	Croand		Contailion	, indige
F13	33 (HO2S2 signa	al) Ground		e accelerator pedal and keep it, e accelerator pedal	A change of voltage should be more than 0.30V for during this procedure.
s the insp	ection result	normal?			
	> INSPECT				
NO >	> Go to <u>EC-</u>	<u>207, "Dia</u> g	<u>gnosis Procedu</u>	<u>re"</u> .	
Diagnos	is Proced	ure			INF0ID:000000003069222
1. CHECK	K GROUND	CONNEC	TION		
	gnition switc		/		
	•		9. Refer to Gro	und Inspection in <u>GI-45, "</u>	Circuit Inspection".
	ection result	normal?			
	> GO TO 2.	replace or	ound connectio	n	
~	-		O SELF-LEARI		
	the mixture R : Special F			Reter to EC-18, "MIXTUI	RE RATIO SELF-LEARNING VALUE
) to start anging and late	
Z. ACTIVA	ITE INSPEC) lo slari engine, and lel e	ngine idle for at least 10 minutes.
			•	•	ngine idle for at least 10 minutes. ?
ls the 1st t	trip DTC P01	71 or P0'	72 detected? I	s it difficult to start engine	<u>?</u>
l <u>s the 1st t</u> YES >	trip DTC P01 > Perform tr <u>DTC Logi</u>	71 or P0 ² ouble dia	72 detected? I	s it difficult to start engine	-
l <u>s the 1st t</u> YES > NO >	trip DTC P01 > Perform tr <u>"DTC Logi</u> > GO TO 3.	<u>71 or P0′</u> ouble dia <u>c"</u> .	172 detected? I gnosis for DTC	s it difficult to start engine P0171 or P0172. Refer	<u>?</u>
l <u>s the 1st t</u> YES > NO >	trip DTC P01 > Perform tr <u>"DTC Logi</u> > GO TO 3.	<u>71 or P0′</u> ouble dia <u>c"</u> .	172 detected? I gnosis for DTC	s it difficult to start engine	<u>?</u>
Is the 1st to YES > NO > 3.CHECH 1. Turn ig	trip DTC P01 > Perform tr <u>"DTC Logi</u> > GO TO 3. < HO2S2 GF gnition switc	71 or P0′ ouble dia c ["] . COUND C	I <u>72 detected? I</u> gnosis for DTC	s it difficult to start engine P0171 or P0172. Refer PEN AND SHORT	<u>?</u>
Is the 1st to YES > NO > 3.CHECk 1. Turn ig 2. Discord	trip DTC P01 > Perform tr <u>"DTC Logi</u> > GO TO 3. < HO2S2 GF gnition switc nnect heated	71 or P0′ ouble dia c''. OUND C h OFF. d oxygen s	172 detected? I gnosis for DTC IRCUIT FOR O sensor 2 harnes	s it difficult to start engine P0171 or P0172. Refer PEN AND SHORT	<u>?</u>
Is the 1st to YES > NO > 3.CHECK 1. Turn ig 2. Discol 3. Discol	trip DTC P01 > Perform tr <u>"DTC Logi</u> > GO TO 3. (HO2S2 GF gnition switc nnect heated nnect ECM b	71 or P0 ouble dia <u>c"</u> . OUND C h OFF. d oxygen s harness co	172 detected? Is gnosis for DTC IRCUIT FOR O sensor 2 harnes onnector.	s it difficult to start engine P0171 or P0172. Refer PEN AND SHORT	? to <u>EC-222. "DTC Logic"</u> or <u>EC-226.</u>
Is the 1st to YES > NO > 3.CHECK 1. Turn ig 2. Discol 3. Discol	trip DTC P01 > Perform tr <u>"DTC Logi</u> > GO TO 3. (HO2S2 GF gnition switc nnect heated nnect ECM b	71 or P0 ouble dia <u>c"</u> . OUND C h OFF. d oxygen s harness co	172 detected? Is gnosis for DTC IRCUIT FOR O sensor 2 harnes onnector.	s it difficult to start engine P0171 or P0172. Refer PEN AND SHORT	? to <u>EC-222. "DTC Logic"</u> or <u>EC-226.</u>
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Is the 1st to YES > NO > 3.CHECM 1. Turn ig 2. Discon 3. Discon 4. Check	trip DTC P01 > Perform tr <u>"DTC Logi</u> > GO TO 3. < HO2S2 GF gnition switc nnect heated nnect ECM F < the continu	71 or P0 ouble dia c". OUND C h OFF. d oxygen s harness co ity betwee	IT2 detected? Is gnosis for DTC IRCUIT FOR O sensor 2 harnes onnector. en HO2S2 harne	s it difficult to start engine P0171 or P0172. Refer PEN AND SHORT ss connector. ess connector and ECM h	? to <u>EC-222. "DTC Logic"</u> or <u>EC-226.</u>
Is the 1st t YES > NO > 3.CHECH 1. Turn ig 2. Discon 3. Discon 4. Check	trip DTC P01 > Perform tr <u>"DTC Logi</u> > GO TO 3. < HO2S2 GF gnition switc nnect heated nnect ECM F < the continu	<u>71 or P0</u> ouble dia <u>c"</u> . OUND C h OFF. d oxygen s harness co ity betwee ECM	IT2 detected? Is gnosis for DTC IRCUIT FOR O sensor 2 harnes onnector. en HO2S2 harne	s it difficult to start engine P0171 or P0172. Refer PEN AND SHORT ss connector. ess connector and ECM h	? to <u>EC-222. "DTC Logic"</u> or <u>EC-226.</u>
Is the 1st t YES > NO > 3.CHECK 1. Turn ig 2. Discon 3. Discon 4. Check HO2 Connector F42	trip DTC P01 > Perform tr <u>"DTC Logi</u> > GO TO 3. < HO2S2 GF gnition switc nnect heated nnect ECM h < the continu 2S2 Terminal Co 1	71 or P0' ouble dia c". ROUND C h OFF. d oxygen s arness co ity betwee ECM onnector Tr F13	I72 detected? Image: gnosis for DTC gnosis for DTC IRCUIT FOR O sensor 2 harnes onnector. en HO2S2 harnes erminal 35 Existed	s it difficult to start engine P0171 or P0172. Refer PEN AND SHORT ss connector. ess connector and ECM h	? to <u>EC-222. "DTC Logic"</u> or <u>EC-226.</u>
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$\frac{ s \text{ the 1st t}}{ YES >} \\ NO > \\ 3.CHECH \\ 1. Turn ig \\ 2. Discould \\ 1. Turn ig \\ 2. Discould \\ 3. Discould \\ 3. Discould \\ 4. Chech \\ HO2 \\ \hline Connector \\ F42 \\ \hline 5. Also c \\ 1. Sthe insp \\ YES > \\ NO > \\ 4.CHECH \\ 1. Check \\ \hline 1. $	trip DTC P01 > Perform tr "DTC Logi > GO TO 3. < HO2S2 GF gnition switc nnect heated nnect ECM h < the continue 2S2 Terminal Co 1 check harnes ection result > GO TO 4. > Repair ope < HO2S2 INI < the continue	71 or P0' ouble dia c". COUND C h OFF. d oxygen s arness co ity betwee ECM onnector Tr F13 is for shor onormal? en circuit o PUT SIGN ity betwee ECM	I72 detected? If gnosis for DTC IRCUIT FOR O Sensor 2 harnes onnector. en HO2S2 harnes continuity 35 Existed t to ground and or short to grou IAL CIRCUIT F en HO2S2 harnes	s it difficult to start engine PO171 or PO172. Refer PEN AND SHORT ss connector. ess connector and ECM h 	rness or connectors.

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2	2S2	ECM		Ground	Continuity
Connector	Terminal	Connector Terminal		Ground	Continuity
F42	4	F13	33	Ground	Not existed

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 HEATED OXYGEN SENSOR 2

Refer to EC-208, "Component Inspection".

Is the inspection result normal?

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

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2-I

With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition ON (READY) and select "DATA MONITOR" mode with CONSULT-III.
- 6. Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

Keep the vehicle speed as steady as possible during the cruising.

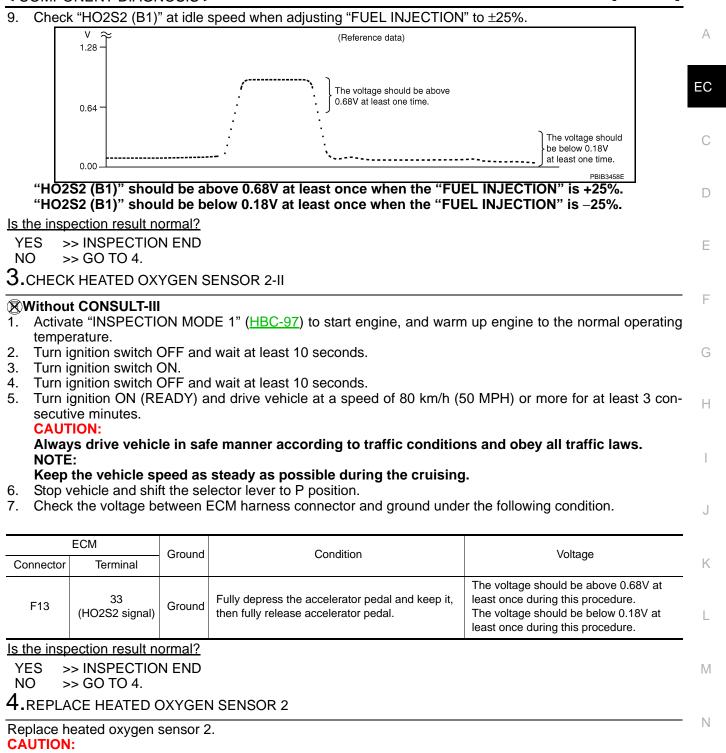
- 7. Stop vehicle and shift the selector lever to P position.
- 8. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-III.

INFOID:000000003069223

P0139 HO2S2

< COMPONENT DIAGNOSIS >

Ρ



- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> INSPECTION END

P0143 H02S3

Description

The heated oxygen sensor 3, after HC adsorption catalyst (Under floor), monitors the oxygen level in the exhaust gas.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

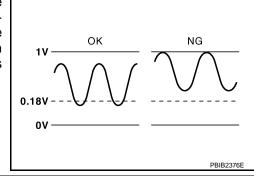
Under normal conditions the heated oxygen sensor 3 is not used for engine control operation.

Holder Heater pad Zirconia tube SEF327F

DTC Logic

DTC DETECTION LOGIC

The heated oxygen sensor 3 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 3, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0143	Heated oxygen sensor 3 circuit high voltage	The minimum voltage from the sensor is not reached to the specified voltage.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 3 Fuel pressure Fuel injector

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds. 3.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

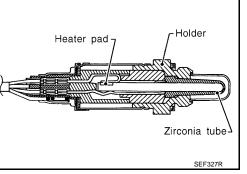
- Activate "INSPECTION MODE 1" (HBC-97) to start engine, and warm up engine to normal operating tem-1. perature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON. 3.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON (READY). 5.
- 6. Repeat following procedure 3 times.
- Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. **CAUTION:**

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

EC-210

INFOID:000000003069224

INFOID:000000003069225



P0143 HO2S3

< COMPONENT DIAGNOSIS >		[QR25DE]
 NOTE: Keep the vehicle speed as stead; Never raise engine speed above Release accelerator pedal fully and s NOTE: 		A
Never turn ignition switch OFF. 7. Check 1st trip DTC.		EC
Is 1st tip DTC detected?		C
YES >> Go to <u>EC-211, "Diagnosis Pre</u> NO >> INSPECTION END	<u>ocedure"</u> .	-
Diagnosis Procedure		INFOID:00000003069226
1. CHECK GROUND CONNECTION		
 Turn ignition switch OFF. Check ground connection E9. Refer to 	to Ground Inspection in <u>GI-45, "Circuit Inspection"</u> .	E
<u>Is the inspection result normal?</u> YES >> GO TO 2.		F
NO >> Repair or replace ground cor		I
2.CLEAR THE MIXTURE RATIO SELF-	LEARNING VALUE	G
1. Clear the mixture ratio self-learning CLEAR : Special Repair Requirement	value. Refer to <u>EC-18, "MIXTURE RATIO SELF-LE.</u> <u>t"</u> .	ARNING VALUE
2. Activate "INSPECTION MODE 1" (HI Is the 1st trip DTC P0172 detected? Is it of	<u>BC-97</u>) to start engine, and let engine idle for at leas difficult to start engine?	t 10 minutes. H
YES >> Perform trouble diagnosis for	DTC P0172. Refer to <u>EC-227, "Diagnosis Procedu</u>	<u>re"</u> .
NO >> GO TO 3. 3.CHECK HO2S3 GROUND CIRCUIT F		I
1. Turn ignition switch OFF.		
 Disconnect heated oxygen sensor 3 Disconnect ECM harness connector. 	harness connector.	J
	3 harness connector and ECM harness connector.	
HO2S3 ECM		K
Connector Terminal Connector Terminal	Continuity	
F102 1 F13 35	Existed	L
5. Also check harness for short to group	nd and short to power.	
<u>Is the inspection result normal?</u> YES >> GO TO 5.		M
NO >> GO TO 4.		
4. DETECT MALFUNCTIONING PART		N
Check the following. • Harness connectors F58, F101		
Harness for open or short between hea	ted oxygen sensor 3 and ECM	0
>> Repair open circuit or short to	o ground or short to power in harness or connectors	
5. CHECK HO2S3 INPUT SIGNAL CIRC	UIT FOR OPEN AND SHORT	P
1. Check the continuity between HO2S3	3 harness connector and ECM harness connector.	

HO2	2S3	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F102	4	F13	34	Existed

P0143 HO2S3

< COMPONENT DIAGNOSIS >

2. Check the continuity between HO2S3 harness connector or ECM harness connector and ground.

HO2	2S3	ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal	Giouna	Continuity
F102	4	F13	34	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F58, F101
- Harness for open or short between heated oxygen sensor 3 and ECM

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

7.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repir or replace.

8.REPLACE HEATED OXYGEN SENSOR 3

Replace heated oxygen sensor 3.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> INSPECTION END

P0144 H02S3

Description

The heated oxygen sensor 3, after HC adsorption catalyst (Under floor), monitors the oxygen level in the exhaust gas.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 3 is not used for engine control operation.

EC Holder Heater pad D Zirconia tube-SEF327R

DTC Logic

DTC DETECTION LOGIC

The heated oxygen sensor 3 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxyger sensor 3, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuelcut.

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	SEF259VA	

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0144	Heated oxygen sensor 3 circuit low voltage	The maximum voltage from the sensor is not reached to the specified voltage.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 3 Fuel pressure Fuel injector Intake air leaks 	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds. 1.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Activate "INSPECTION MODE 1" (HBC-97) to start engine, and warm up engine to normal operating tem-1. perature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON (READY).
- 6. Repeat following procedure 3 times.



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P0144 HO2S3

< COMPONENT DIAGNOSIS >

Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes.

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

- Keep the vehicle speed as steady as possible during the cruising.
- Never raise engine speed above 3,600 rpm in this step. Release accelerator pedal fully and stop vehicle.
- NOTE:
- Never turn ignition switch OFF.
- Check 1st trip DTC.
- Is 1st tip DTC detected?
- YES >> Go to EC-214, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- Clear the mixture ratio self-learning value. Refer to <u>EC-18</u>, "MIXTURE RATIO SELF-LEARNING VALUE <u>CLEAR : Special Repair Requirement</u>".
- 2. Activate "INSPECTION MODE 1"(HBC-97) to start engine, and let engine idle for at least 10 minutes.
- Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?
- YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to <u>EC-222, "DTC Logic"</u> or <u>EC-226,</u> <u>"DTC Logic"</u>.

NO >> GO TO 3.

3.CHECK HO2S3 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 3 harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between HO2S3 harness connector and ECM harness connector.

HO	2S3	ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
F102	1	F13	35	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

Check the following.

Harness connectors F58, F101

Harness for open or short between heated oxygen sensor 3 and ECM

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

5.CHECK HO2S3 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S3 harness connector and ECM harness connector.

EC-214

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P0144 HO2S3

<u> </u>	2\$3	E	CM	O anti i it		
Connector	Terminal	Connector	Terminal	Continuity		
F102	4	F13	34	Existed		
. Check	the contin	uity betwee	n HO2S3 h	arness conr	ector or ECM	harness connector and ground.
HO	2S3	E	СМ	Ground	Continuity	
Connector	Terminal	Connector	Terminal	Ground	Continuity	
F102	4	F13	34	Ground	Not existed	
YES > NO > DETEC Check the Harness	> GO TO 7 > GO TO 6 T MALFUI following. connector	5. NCTIONING s F58, F10 ⁷			nsor 3 and EC	
Refer to <u>G</u>	I-42, "Inter	TTENT INC				
NO >:	> GO TO 8 > Repir or	replace.		0		
			N SENSOR	3		
• Discard	any heate a hard su		sensor whi			om a height of more than 0.5 m (19.7
 Béfore i 		new oxyge	n sensor,	clean exha	se a new one ust system t ed anti-seize	hreads using Oxygen Sensor Thread
 Béfore i Cleaner 	tool J-438	new oxyge	n sensor,	clean exha	ust system t	hreads using Oxygen Sensor Thread
 Béfore i Cleaner 	tool J-438	new oxyge 97-18 or J·	n sensor,	clean exha	ust system t	hreads using Oxygen Sensor Thread

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P0145 HO2S3

Description

The heated oxygen sensor 3, after HC adsorption catalyst (Under floor), monitors the oxygen level in the exhaust gas.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 3 is not used for engine control operation.

Heater pad Heater pad Linconia tube

DTC Logic

DTC DETECTION LOGIC

The heated oxygen sensor 3 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 3, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.

ed oxygen	OK	NG
of the sen- ving condi-		$\overline{ \mathbf{A}}$
		SEF302U

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0145	Heated oxygen sensor 3	It takes more time for the sensor to respond be-	 Harness or connectors
	circuit slow response	tween rich and lean than the specified time.	(The sensor circuit is open or shorted) Heated oxygen sensor 3 Fuel pressure Fuel injector Intake air leaks

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

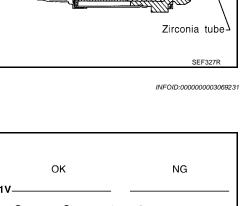
If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON (READY).
- 6. Repeat following procedure 3 times.



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P0145 HO2S3

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Drive v	ehicle at a	a speed of 8	30 km/h (50	,	pre for at least 3 consecutive minutes.
-	rive vehi	cle in safe	manner ac	cording to	traffic conditions and obey all traffic laws.
• Neve Releas	r raise er	ngine spee		600 rpm in 1	during the cruising. his step.
NOTE: Never tu	n ignitio	n switch O	FF		
7. Check					
<u>s 1st tip D</u>	C detecte	ed?			
		<u>2-217, "Diag</u> TION END	<u>anosis Proc</u>	<u>edure"</u> .	
Diagnosi	s Proce	dure			INF01D:000000003069232
.CHECK	GROUNE		TION		
	nition swit		0 Dofor to (Cround Inco	action in CL 45. "Circuit Inspection"
	-	ult normal?	9. Relei lo	Ground msp	ection in <u>GI-45. "Circuit Inspection"</u> .
	- GO TO 2				
			ound conne	ection.	
.CLEAR	THE MIXT	TURE RATI	O SELF-LE	ARNING VA	LUE
. Clear t	he mixture	e ratio self-	learning val	ue. Refer to	EC-18, "MIXTURE RATIO SELF-LEARNING VALUE
<u>CLEAF</u>	: Special	Repair Re	quirement".		
			•		engine, and let idle for at least 10 minutes.
	-				<u>ult to start engine?</u> or P0172. Refer to <u>EC-222, "DTC Logic"</u> or <u>EC-226,</u>
120 //	<u>"DTC Lo</u>		910313 101 1		or 1 0172. Refer to <u>LC-222. DTC Logic</u> of <u>LC-220.</u>
	GO TO 3				
CHECK	HO2S3 G	ROUND C	IRCUIT FO	R OPEN AN	D SHORT
	nition swit				
				rness conne	ctor.
		l harness co uity betwee		arness conr	nector and ECM harness connector.
		,			
HO2	S3	E	СМ		
Connector	Terminal	Connector	Terminal	Continuity	
F102	1	F13	35	Existed	
. Also ch	eck harne	ess for shor	t to ground	and short to	power.
		ult normal?	-		
	GO TO 5				
	GO TO 4				
DETEC		NCTIONING	G PART		
Check the f					
		s F58, F10 [°] or short betw			nsor 3 and ECM
1011633	or open 0		veen nealel	a onygen sei	
>>	Repair	pen circuit (or short to a	round or sh	ort to power in harness or connectors.
_					IN AND SHORT
I. Check	me contin	IUILY DETWEE	н поz53 h	amess conr	nector and ECM harness connector.

P0145 HO2S3

HO	2 S 3	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F102	4	F13	34	Existed

2. Check the continuity between HO2S3 harness connector or ECM harness connector and ground.

НО	2S3	ECM		Ground Continuity	
Connector	Terminal	Connector	Terminal	Ground	Continuity
F102	4	F13	34	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F58, F101

• Harness for open or short between heated oxygen sensor 3 and ECM

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

7.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace.

8.REPLACE HEATED OXYGEN SENSOR

Replace heated oxygen sensor 3.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

>> INSPECTION END

P0146 HO2S3

Description

DTC Logic

DTC DETECTION LOGIC

The heated oxygen sensor 3, after HC adsorption catalyst (Under floor), monitors the oxygen level in the exhaust gas.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 3 is not used for engine control operation.

The heated oxygen sensor 3 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxy-

gen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen 1.2V sensor 3, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut. Н 1V 0V PBIB1848E

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	J
P0146	Heated oxygen sensor 3 circuit no activity detected	An avcassivally high voltage from the sensor is	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 3 	K

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON. 2.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Activate "INSPECTION MODE 1" (HBC-97) to start engine, and warm up engine to normal operating tem-1. perature.
- Turn ignition switch OFF and wait at least 10 seconds. 2.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON (READY).
- Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. **CAUTION:**

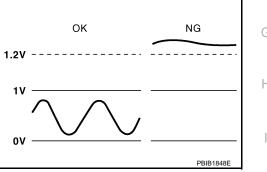
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

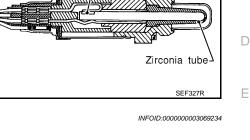
Keep the vehicle speed as steady as possible during the cruising.

7. Check 1st trip DTC.

EC-219

Holder Heater pad





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Is 1st trip DTC detected?

- YES >> Go to EC-220, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK HO2S3 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 3 harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between HO2S3 harness connector and ECM harness connector.

HO	2 S 3	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F102	1	F13	35	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors F58, F101

• Harness for open or short between heated oxygen sensor 3 and ECM

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

4.CHECK HO2S3 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S3 harness connector and ECM harness connector.

HO	2S3	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F102	4	F13	34	Existed

2. Check the continuity between HO2S3 harness connector or ECM harness connector and ground.

HO2S3		ECM		Ground Continuity	
Connector	Terminal	Connector	Terminal	Cround	Continuity
F102	4	F13	34	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors F58, F101

• Harness for open or short between heated oxygen sensor 3 and ECM

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P0146 HO2S3

>> Repair open circuit or short to ground or short to power in harness or connectors. 6.CHECK HO2S3 CONNECTOR FOR WATER	A
Check connectors for water.	EC
Water should not exist.	
Is the inspection result normal? YES >> GO TO 7. NO >> Repair or replace harness or connectors.	С
7. CHECK INTERMITTENT INCIDENT	D
Refer to GI-42, "Intermittent Incident".	
<u>Is the inspection result normal?</u> YES >> GO TO 8.	E
NO >> Repair or replace. 8.REPLACE HEATED OXYGEN SENSOR	_
Replace heated oxygen sensor 3.	F
 CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. 	G
 Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. 	Н
>> INSPECTION END	
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< COMPONENT DIAGNOSIS >

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

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DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171	Fuel injection system too lean	 Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.) 	 Intake air leaks A/F sensor 1 Fuel injector Exhaust gas leaks Incorrect fuel pressure Lack of fuel Mass air flow sensor Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. Clear the mixture ratio self-learning value. Refer to <u>EC-18</u>, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
- 2. Activate "INSPECTION MODE 1" (HBC-97) to start engine, and let engine idle for at least 10 minutes.
- 3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-223, "Diagnosis Procedure".
- NO >> GO TO 3.
- **3.**PERFORM DTC CONFIRMATION PROCEDURE-III
- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON (READY) and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.

Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ±400 rpm
Vehicle speed	Vehicle speed in the freeze frame data \pm 10 km/h (6 MPH)

< COMPONENT DIAGNOSIS >

	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).		
Engine coolant temperature (T) condition	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).		
Check 1st trip DTC.			
1st trip DTC detected?			
YES >> Go to <u>EC-223, "Diagnosis F</u> NO >> INSPECTION END	Procedure".		
iagnosis Procedure	INFGID:00000000		
.CHECK EXHAUST GAS LEAK			
Activate "INSPECTION MODE 1" (
Listen for an exhaust gas leak befor	re three way catalyst (manifold).		
A/F sensor 1	Three way catalyst HC adsorption catalyst (Manifold) (Under floor) Muffler HO2S2 HO2S3		
➡ : Exhaust gas	JMBIA0163GB		
<u>s exhaust gas leak detected?</u> YES >> Repair or replace.			
NO $>>$ GO TO 2.			
CHECK FOR INTAKE AIR LEAK			
. Listen for an intake air leak after the	e mass air flow sensor.		
Check PCV hose connection.			
<u>ntake air leak detected?</u> YES >> Repair or replace.			
NO >> GO TO 3.			
CHECK A/F SENSOR 1 INPUT SIG	NAL CIRCUIT		
 Turn ignition switch OFF. Disconnect corresponding A/F sens Disconnect ECM harness connecto 			
 Check the continuity between A/F s 	ensor 1 harness connector and ECM harness connector.		
A/F sensor 1 ECM Connector Terminal Connector Terminal	Continuity		
1 45			

A/F sei	nsor 1	ECM		Ground	Continuity
Connector	Terminal	Connector Terminal		Ground	Continuity
F44	F44 1 F14		45	Ground	Not existed
1 44	2	1 14	49	Giouna	NUL EXISIEU

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

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< COMPONENT DIAGNOSIS >

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

4.CHECK FUEL PRESSURE

- 1. Release fuel pressure to zero. Refer to EC-454, "Inspection".
- 2. Install fuel pressure gauge and check fuel pressure. Refer to EC-454. "Inspection".

At idling: Approximately 350 kPa (3.57 kg/cm², 51 psi)

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

- YES >> Replace "fuel filter and fuel pump assembly".
- NO >> Repair or replace

6.CHECK MASS AIR FLOW SENSOR

With CONSULT-III

- 1. Install all removed parts.
- 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III.
- 3. For specification, refer to EC-459, "Mass Air Flow Sensor".

With GST

- 1. Install all removed parts.
- 2. Check mass air flow sensor signal in Service \$01 with GST.
- 3. For specification, refer to EC-459, "Mass Air Flow Sensor".
- Is the measurement value within the specification?
- YES >> GO TO 7.
- NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to <u>EC-145</u>, "<u>DTC Logic</u>".

7.CHECK FUNCTION OF FUEL INJECTOR

With CONSULT-III

- 1. Turn ignition switch ON (READY).
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that each circuit produces a momentary engine speed drop.

⊗Without CONSULT-III

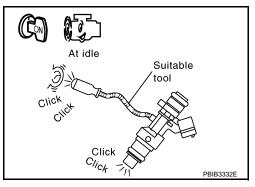
- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine.
- 2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to <u>EC-236, "Diagnosis Procedure"</u>.



8. CHECK FUEL INJECTOR

- 1. Turn ignition switch OFF.
- 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- 3. Disconnect all fuel injector harness connectors.
- 4. Remove fuel tube assembly. Refer to <u>EM-34</u>, "Removal and Installation".
- Keep fuel hose and all fuel injectors connected to fuel tube.
- 5. Disconnect all ignition coil harness connectors.



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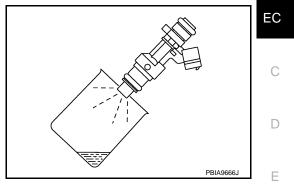
- 6. Prepare pans or saucers under each fuel injector.
- 7. Turn ignition switch ON (READY).
- 8. Depress the accelerator pedal to crank engine. **NOTE:**

If step 8 performed, a certain DTC may be detected.

Fuel should be sprayed evenly for each fuel injector.

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones.



9. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

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P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

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[QR25DE]

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172	Fuel injection system too rich	 Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.) 	 A/F sensor 1 Fuel injector Exhaust gas leaks Incorrect fuel pressure Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-II

- Clear the mixture ratio self-learning value. Refer to <u>EC-18</u>, "MIXTURE RATIO SELF-LEARNING VALUE <u>CLEAR</u>: Special Repair Requirement".
- 2. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and let engine idle for at least 10 minutes.
- 3. Check 1st trip DTC.
- Is 1st trip DTC detected?
- YES >> Go to EC-227, "Diagnosis Procedure".
- NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-III

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON (READY) and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.

Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ±400 rpm
Vehicle speed	Vehicle speed in the freeze frame data \pm 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
Engine coolant temperature (1) condition	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

EC-226

< COMPONENT DIAGNOSIS >

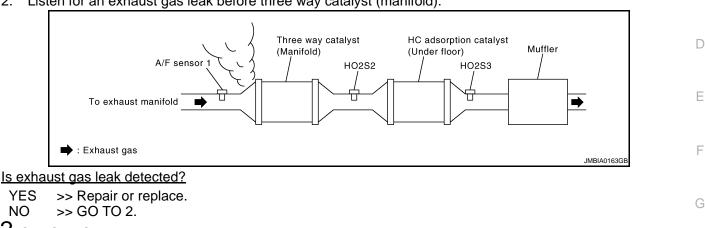
Is 1st trip DTC detected?

- YES >> Go to EC-227, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK EXHAUST GAS LEAK

- Activate "INSPECTION MODE 1" (HBC-97) to start engine. 1.
- 2. Listen for an exhaust gas leak before three way catalyst (manifold).



2.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

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

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect corresponding A/F sensor 1 harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F se	nsor 1	EC	Continuity	
Connector	Terminal	Connector Terminal		Continuity
F44	1	F14	45	Existed
1 44	2	1 14	49	LAISIEU

Μ 5. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

A/F s	ensor 1		EC	М	Ground	nd Continuity	
Connecto	or Termin	al	Connector	Terminal	Clound Continuity		
F44	1		F14	45	Ground	Not existed	
1 44	2		1 14	49	Ciouna	NOT EXISTED	

6. Also check harness for 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 PRESSURE

1. Release fuel pressure to zero. Refer to EC-454, "Inspection".

Install fuel pressure gauge and check fuel pressure. Refer to EC-454, "Inspection". 2.

EC-227

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At idling: Approximately 350 kPa (3.57 kg/cm², 51 psi)

Is the inspection result normal?

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

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

- YES >> Replace "fuel filter and fuel pump assembly".
- NO >> Repair or replace

6.CHECK MASS AIR FLOW SENSOR

With CONSULT-III

- 1. Install all removed parts.
- 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III.
- 3. For specification, refer to EC-459, "Mass Air Flow Sensor".

With GST

- 1. Install all removed parts.
- 2. Check mass air flow sensor signal in "Service \$01" with GST.
- 3. For specification, refer to <u>EC-459, "Mass Air Flow Sensor"</u>.

Is the measurement value within the specification?

- YES >> GO TO 7.
- NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to <u>EC-145, "DTC Logic"</u>.

7.CHECK FUNCTION OF FUEL INJECTOR

(B) With CONSULT-III

- 1. Turn ignition ON (READY).
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that each circuit produces a momentary engine speed drop.

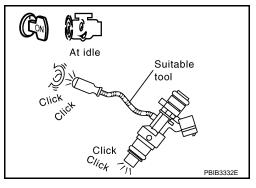
Without CONSULT-III

- 1. Activate "INSPECTION MODE 1" (HBC-97) to start engine.
- 2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to <u>EC-236, "Diagnosis Procedure"</u>.



8. CHECK FUELINJECTOR

- Remove fuel injector assembly. Refer to <u>EM-34, "Removal and Installation"</u>. Keep fuel hose and all fuel injectors connected to fuel tube.
- 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- 3. Disconnect all fuel injector harness connectors.
- 4. Disconnect all ignition coil harness connectors.
- 5. Prepare pans or saucers under each fuel injectors.
- 6. Turn ignition switch ON (READY).
- 7. Depress the accelerator pedal to crank engine.

Make sure fuel does not drip from fuel injector. **NOTE:**

If step 7 performed, a certain DTC may be detected.

EC-228

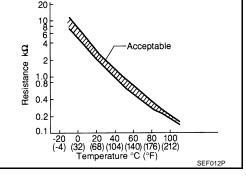
P0172 FUEL INJECTION SYSTEM FUNCTION < COMPONENT DIAGNOSIS >	[QR25DE]
Is the inspection result normal?	
YES >> GO TO 9. NO >> Replace the fuel injectors from which fuel is dripping. Always replace O-ring with	new one.
9. CHECK INTERMITTENT INCIDENT	
Refer to GI-42, "Intermittent Incident".	E
>> INSPECTION END	
>> INSPECTION END	(
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P0181 FTT SENSOR

Description

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel 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. <**Reference data**>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90



*: These data are reference values and are measured between ECM terminal 95 (Fuel tank temperature sensor) and ground. **CAUTION:**

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.

DTC Logic

INFOID:000000003069241

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0181	Fuel tank temperature sensor circuit range/per- formance	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and in- take air temperature sensor.	 Harness or connectors (The sensor circuit is open or shorted) Fuel tank temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Turn ignition switch ON and wait at least 10 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-231, "Diagnosis Procedure".

${\it 3.}$ CHECK ENGINE COOLANT TEMPERATURE

With CONSULT-III

- I. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-III.
- 2. Check "COOLAN TEMP/S" value.

With GST

Follow the procedure "With CONSULT-III" above.

<u>"COOLAN TEMP/S" less than 60°C (140°F)?</u>

YES >> INSPECTION END

EC-230

INFOID:000000003069240

P0181 FTT SENSOR

< COMPONENT		>					[QR25DE]
4.PERFORM D		ATION PR	CEDUR	(E-II			
With CONSUL Cool engine Cool engine Coulombre	down until "CC 10 seconds.	OOLAN TE	EMP/S" is	less than 6	0°C (140	°F).	
With GST Follow the proced		NSULT-III	" above.				
	e <u>tected?</u> > <u>EC-231, "Dia</u> PECTION END		ocedure".				
Diagnosis Pro							INFOID:000000003069242
1.CHECK GROU	JND CONNEC	CTION					
1. Turn ignition 2. Check ground Is the inspection	d connection E		to Ground	Inspection	in <u>GI-45,</u>	. "Circuit Inspecti	<u>on"</u> .
YES >> GO T NO >> Repa 2.CHECK FUEL	ir or replace g			RPOWER	SUPPLY	CIRCUIT	
I. Disconnect "f 2. Turn ignition	uel level sens switch ON.	or unit an	d fuel pur	np" harness	connecto		or and ground.
Fuel level sensor ur	nit and fuel pump						
Connector	Terminal	Ground	Voltage				
B42	4	Ground	Approx. 5V				
s the inspection of YES >> GO T NO >> GO T B. DETECT MAL	TO 4. TO 3.						
Check the following		GPARI					
Harness for ope	ctors E29, B10		M and "fue	el level sens	sor unit ai	nd fuel pump"	
· ·	•		-			narness or conne T FOR OPEN AN	
 Turn ignition Check the co connector. 		en "fuel le	evel senso	r unit and f	uel pump'	" harness conned	ctor and ECM harness
Fuel level sensor ur	nit and fuel pump	E	СМ	Continuity			
Connector	Terminal	Connector	Terminal	Continuity			
B42	5	E10	104	Existed			
3. Also check hi <u>is the inspection i</u> YES >> GO T NO >> GO T	⁻ O 6.		nd and sh	ort to powe	r.		

5. DETECT MALFUNCTIONING PART

P0181 FTT SENSOR

< COMPONENT DIAGNOSIS >

[QR25DE]

Check the following.

- Harness connectors B1, M6
- Harness connectors E30, M1

Harness for open or short between "fuel level sensor unit and fuel pump" and ECM

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

6.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-232, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace "fuel level sensor unit and fuel pump".

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000003069243

1.CHECK FUEL TANK TEMPERATURE SENSOR

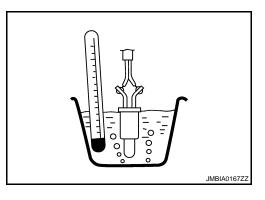
- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 3. Remove fuel level sensor unit.
- 4. Check resistance between "fuel level sensor unit and fuel pump" terminals by heating with hot water as shown in the figure.

Terminals	С	Resistance			
4 and 5	Tomporaturo	Temperature °C (°F	°C (°E)	20 (68)	2.3 - 2.7 kΩ
4 and 5	remperature	°С (°Г)	50 (122)	0.79 - 0.90 kΩ	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump".

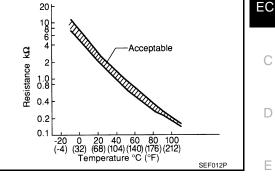


P0182, P0183 FTT SENSOR

Description

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel 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. <**Reference data>**

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90



*: These data are reference values and are measured between ECM terminal 95 (Fuel tank temperature sensor) and ground. CAUTION:

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.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0182	Fuel tank temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (The sensor circuit is open or shorted.)	
P0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Turn ignition switch ON and wait at least 5 seconds.
 Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-233, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

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P0182, P0183 FTT SENSOR

< COMPONENT DIAGNOSIS >

NO >> Repair or replace ground connection.

2.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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

Fuel level sensor u	nit and fuel pump	Ground	Voltage
Connector	Terminal	Clound	voltage
B42	4	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E29, B10

• Harness for open or short between ECM and "fuel level sensor unit and fuel pump"

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

4.CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Check the continuity between "fuel level sensor unit and fuel pump" harness connector and ECM harness connector.

Fuel level sensor u	Fuel level sensor unit and fuel pump			Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
B42	5	E10	104	Existed	

3. 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 connectors B1, M6

Harness connectors E30, M1

• Harness for open or short between "fuel level sensor unit and fuel pump" and ECM

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

6.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-235, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace "fuel level sensor unit and fuel pump".

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

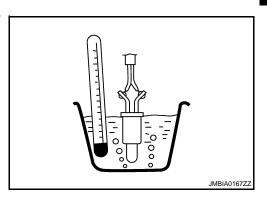
1.CHECK FUEL TANK TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 3. Remove fuel level sensor unit.
- 4. Check resistance between "fuel level sensor unit and fuel pump" terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance
4 and 5	Temperature °C (°F)	20 (68)	2.3 - 2.7 kΩ
		50 (122)	0.79 - 0.90 kΩ

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace "fuel level sensor unit and fuel pump".



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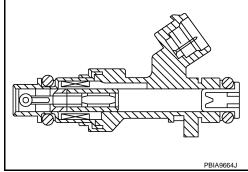
P0201, P0202, P0203, P0204 FUEL INJECTOR

< COMPONENT DIAGNOSIS >

P0201, P0202, P0203, P0204 FUEL INJECTOR

Description

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0201	No. 1 cylinder fuel injector circuit open	An excessively low voltage signal is sent to ECM through the No. 1 fuel injector	 Harness or connectors (No. 1 fuel injector circuit is open or shorted.) No. 1 fuel injector
P0202	No. 2 cylinder fuel injector circuit open	An excessively low voltage signal is sent to ECM through the No. 2 fuel injector	 Harness or connectors (No. 2 fuel injector circuit is open or shorted.) No. 2 fuel injector
P0203	No. 3 cylinder fuel injector circuit open	An excessively low voltage signal is sent to ECM through the No. 3 fuel injector	 Harness or connectors (No. 3 fuel injector circuit is open or shorted.) No. 3 fuel injector
P0204	No. 4 cylinder fuel injector circuit open	An excessively low voltage signal is sent to ECM through the No. 4 fuel injector	 Harness or connectors (No. 4 fuel injector circuit is open or shorted.) No. 4 fuel injector

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON (READY) and wait at least 1 second.
- 2. Check DTC.

Is DTC detected?

- YES >> Go to EC-236, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect fuel injector harness connector.
- 3. Turn ignition switch ON.

EC-236

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P0201, P0202, P0203, P0204 FUEL INJECTOR

< COMPONENT DIAGNOSIS >

4. Check the voltage between fuel injector harness connector and ground.

4. Che	ck the vo	liage beiw	een luei	Injector	namess con	mector an	grouna.	
DTC		Fuel injector		Ground	Valtaga	_		
DIC	Cylinder	Connector	Terminal	Ground	Voltage			
P0201	1	F17	1					
P0202	2	F18	1	Ground	Battery voltag	ne		
P0203	3	F19	1	Croana	Dationy voltag	30		
P0204	4	F20	1					
s the ins	spection r	result norm	<u>nal?</u>					
	>> GO T							
~	>> GO T			DT				
		FUNCTIO	NING PA	RI				
	ne followii	ng. ess connec	otor E10					
	se (No. 3							
			between	fuel inje	ector and fus	se		
^	•	•		-		-	in harness or connector	rs.
3. CHEC	CK FUEL	INJECTO	R OUTP	UT SIGN	NAL CIRCUI	T FOR O	EN AND SHORT	
1. Turn	ignition :	switch OFI	=.					
2. Disc	connect E	CM harne	ss conne		_			
3. Che	ck the co	ntinuity be	tween fu	el injecto	or harness c	onnector	nd ECM harness conne	ctor.
		E			5014			
DTC		Fuel injector			ECM	Continuity		
	Cylinder	Connector	Terminal	Connect				
P0201	1	F17	2		32			
P0202	2	F18	2	F14	31	Existed		
P0203	3	F19	2		30	_		
P0204	4	F20	2		29			
				ground a	and short to	power.		
	-	result norm	nal?					
	>> GO T		cuit or ch	ort to ar	ound or sho	rt to nowe	in harness or connector	re
	•	INJECTO		on to gi		it to powe		15.
		"Compone		<u>ction"</u> .				
	•	result norm	<u>nal?</u>					
	>> GO T		otioning	fuelinie	ator			
_		ace malfun	-	-				
		RMITTENT						
Refer to	<u>GI-42, "Ir</u>	<u>ntermittent</u>	Incident	<u>'</u> -				
Is the ins	-	result norm						
YES		ace IPDM I						
YES				ort to gr	ound or sho	rt to powe	in harness or connector	rs.
YES NO	>> Repa		cuit or sh	ort to gr	ound or sho	rt to powe	in harness or connecto	rs. INFOID:000000003069251
YES NO Compo	>> Repa	ir open cir	cuit or sh า	ort to gr	ound or sho	rt to powe	in harness or connecto	

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	11.1 - 14.3Ω [at 10 -60°C (50 - 140°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning fuel injector.

P0222, P0223 TP SENSOR

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

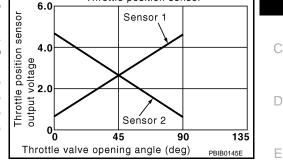
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DTC Logic

DTC DETECTION LOGIC





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DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
P0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	Harness or connectors (TP sensor 1 circuit is open or shorted.)	G
P0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	Electric throttle control actuator (TP sensor 1)	Η
DTC CON	FIRMATION PROCI	EDURE		
1.PRECO	NDITIONING			
ing the nex 1. Turn ig 2. Turn ig 3. Turn ig TESTING (Before per	t test. nition switch OFF and nition switch ON. nition switch OFF and CONDITION:	as been previously conducted, always p I wait at least 10 seconds. I wait at least 10 seconds. g procedure, confirm that battery volu		J
~	RM DTC CONFIRMAT	TION PROCEDURE		
	•	ADY). al to start engine, then keep engine runr	ing for at least 1 second.	N
	<u>ected?</u> → Go to <u>EC-239, "Diag</u> → INSPECTION END	nosis Procedure".		Ν
Diagnosi	s Procedure		INFOID:000000003069254	С
1. CHECK	GROUND CONNECT	TION		
2. Check	nition switch OFF. ground connection E9 ection result normal?	9. Refer to Ground Inspection in <u>GI-45. "</u>	Circuit Inspection".	F

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.

EC-239

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P0222, P0223 TP SENSOR

< COMPONENT DIAGNOSIS >

2. Turn ignition switch ON.

3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle c	control actuator	Ground	Voltage	
Connector	throttle control actuator nector Terminal 57 1	Ciouna	vollage	
F57	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 THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

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

Electric throttle c	EC	Continuity		
Connector	Terminal	Connector	Terminal	Continuity
F57	4	F13	36	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 THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Electric throttle c	control actuator	EC	Continuity		
Connector	Terminal	Connector	Terminal	Continuity	
F57	2	F13	37	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 THROTTLE POSITION SENSOR

Refer to EC-241, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.

2. Go to EC-241, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

P0222, P0223 TP SENSOR

< COMPONENT DIAGNOSIS >

Component Inspection

INFOID:000000003069255

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1.CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set shift lever to D position.
- 6. Check the voltage between ECM harness connector and ground.

	the voltage betwe			Ũ			
	ECM	Ground	Condition Voltage		Voltage		D
Connector	Terminal				renage		
	37			Fully released	More than 0.36V		E
F13	(TP sensor 1 signal)	Ground	Accelerator pedal	Fully depressed	Less than 4.75V		
110	38	Cround		Fully released	Less than 4.75V		
	(TP sensor 2 signal)		Fully depressed	More than 0.36V		F	
YES >: NO >:	<u>ection result norma</u> > INSPECTION EI > GO TO 2. CE ELECTRIC TH	ND	E CONTROL AC	TUATOR			C
2. Go to	ce electric throttle (EC-364, "Special F	<u>Repair R</u>					F
Special I	Repair Require	ement				INFOID:000000003069256	
1.PERFO	RM THROTTLE V	ALVE CI	LOSED POSITIO	ON LEARNING			J
Refer to E	C-15, "THROTTLE	VALVE	CLOSED POSI	TION LEARNIN	G : Special Rep	air Requirement"	
							K
~	> GO TO 2.						
	RM IDLE AIR VOL						
Refer to E	<u>C-16, "IDLE AIR V</u>	OLUME	LEARNING : Sp	ecial Repair Re	equirement"		L
~	> END						
							N
							Ν

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[QR25DE]

< COMPONENT DIAGNOSIS >

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

INFOID:000000003069257

[QR25DE]

DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function	
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire	

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)

On the 1st trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.

When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.

When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off. If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink. When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on. If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.

 Two Trip Detection Logic (Exhaust quality deterioration) For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.

A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	Improper spark plug
P0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	Insufficient compression Incorrect fuel pressure
P0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	The fuel injector circuit is open or shorted
P0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	Fuel injector Intake air leak
P0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	 The ignition signal circuit is open or shorted Lack of fuel Signal plate A/F sensor 1 Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, then keep engine running for at least 15 minutes.
- 6. Check 1st trip DTC.

EC-242

P0300, P0301, P0302, P0303, P0304 MISFIRE [QR25DE] < COMPONENT DIAGNOSIS > Is 1st trip DTC detected? А >> Go to EC-243, "Diagnosis Procedure". YES NO >> GO TO 3. 3.PERFORM DTC CONFIRMATION PROCEDURE-II EC 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch ON (READY) and drive the vehicle under the similar conditions to (1st trip) Freeze С 4. Frame Data for a certain time. Refer to the table below. Hold the accelerator pedal as steady as possible. The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following con-D ditions should be satisfied at the same time. **CAUTION:** Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when Ε

Engine speed	Engine speed in the freeze frame data \pm 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data \pm 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 $^{\circ}$ C (158 $^{\circ}$ F), T should be higher than or equal to 70 $^{\circ}$ C (158 $^{\circ}$ F).
The time to driving vari	es according to the engine speed in the freeze frame data.

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Engine speed	Time	
Around 1,000 rpm	Approximately 10 minutes	
Around 2,000 rpm	Approximately 5 minutes	
More than 3,000 rpm	Approximately 3.5 minutes	
5. Check 1st trip DTC.		
Is 1st trip DTC detected?		
YES >> Go to <u>EC-243,</u> NO >> INSPECTION	<u>"Diagnosis Procedure"</u> . END	
Diagnosis Procedure		INFOID:00000003069258
1. CHECK FOR INTAKE A	IR LEAK AND PCV HOSE	
 Activate "INSPECTION Listen for the sound of Check PCV hose conn 		ine, and run it at idle speed.
Is intake air leak detected?		
YES >> Discover air lea NO >> GO TO 2.	ak location and repair.	
2. CHECK FOR EXHAUST	F SYSTEM CLOGGING	
Turn ignition switch OFF ar	nd visually check exhaust tube, th	nree way catalyst and muffler for dents.
Is the inspection result norr	<u>nal?</u>	
YES-1 >> With CONSUL YES-2 >> Without CONS NO >> Repair or repla	ULT-III: GO TO 4.	

3.PERFORM POWER BALANCE TEST

(P)With CONSULT-III

driving.

Turn ignition switch ON (READY). 1.

Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III. 2.

EC-243

< COMPONENT DIAGNOSIS >

[QR25DE]

3. Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 4.

4.CHECK FUNCTION OF FUEL INJECTOR

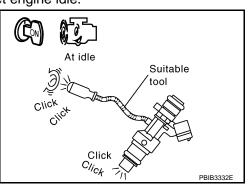
- 1. Activate "INSPECTION MODE 1" (HBC-97) to start engine, and let engine idle.
- 2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to <u>EC-236, "Diagnosis Procedure"</u>.



5. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

- 1. Turn ignition switch OFF.
- Remove fuel pump fuse in IPDM E/R to release fuel pressure. NOTE:

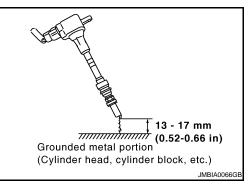
Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- 3. Turn ignition switch ON (READY).
- Depress accelerator pedal and keep it.
 After engine stalls, check DTC. If DTC is detected, erase DTC and go to next steps. If DTC is not detected, go to next steps.
- 6. Turn ignition switch OFF.
- 7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 8. Remove ignition coil and spark plug of the cylinder to be checked.
- 9. Repeat steps 3 to 5 for two or three times to remove combustion gas in the cylinder.
- 10. Connect spark plug and harness connector to ignition coil.
- 11. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 12. Turn ignition switch ON (READY).
- 13. Depress accelerator pedal for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

• Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical



shock while checking, because the electrical discharge voltage becomes 20kV or more.
It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.
NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is mal-functioning.

Is the inspection result normal?

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

6.CHECK FUNCTION OF IGNITION COIL-II

< COMPONENT DIAGNOSIS >

- 1. Turn ignition switch OFF.
- Disconnect spark plug and connect a known-good spark plug. 2.
- Turn ignition switch ON (READY). 3.
- 4. Depress accelerator pedal for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

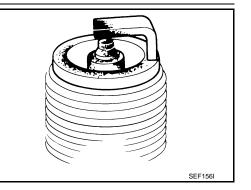
- YES >> GO TO 7.
- NO >> Check ignition coil, power transistor and their circuits. Refer to EC-384, "Component Function Check".

7.CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-19, "SPARK PLUG (PLATI-NUM-TIPPED TYPE) : Removal and Installation".
- NO >> Repair or clean spark plug. Then GO TO 8.



8. CHECK FUNCTION OF IGNITION COIL-III

- 1. Reconnect the initial spark plugs.
- Turn ignition switch ON (READY).
- 3. Depress accelerator pedal for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

- YES >> INSPECTION END
- Κ NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-19, "SPARK PLUG (PLATINUM-TIPPED TYPE) : Removal and Installation".

9.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-21, "Compression pressure".

Is the inspection result normal?

YES >> GO TO 10. NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets. **10.**CHECK FUEL PRESSURE 1. Install all removed parts.

2. Release fuel pressure to zero. Refer to EC-454, "Inspection".

3. Install fuel pressure gauge and check fuel pressure. Refer to EC-454, "Inspection".

At idling: Approximately 350 kPa (3.57 kg/cm², 51 psi)

Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly".

EC-245

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< COMPONENT DIAGNOSIS >

>> Repair or replace. 12. CHECK IDLE SPEED AND IGNITION TIMING

1. Check idle speed.

NO

- For procedure, refer to EC-14, "IDLE SPEED : Special Repair Requirement".
- For specification, refer to EC-459, "Idle Speed".
- Check ignition timing. 2.
- For procedure, refer to EC-14, "IGNITION TIMING : Special Repair Requirement".
- For specification, refer to EC-459, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Follow the EC-11, "BASIC INSPECTION : Special Repair Requirement".

13.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

- Turn ignition switch OFF. 1.
- Disconnect corresponding A/F sensor 1 harness connector. 2.
- 3. Disconnect ECM harness connector.
- Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F44	1	F13	45	Existed
	2	FIJ	49	EXISTED

5. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

A/F sensor 1		EC	М	Ground	Continuity	
Connector	Terminal	Connector	Terminal	Ground	Continuity	
F44	1 F1		45	Ground	Not existed	
Г44	2	115	49	Ground	NUL EXISTED	

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 14.

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

14.CHECK A/F SENSOR 1 HEATER

Refer to EC-135, "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 15.
- NO >> Replace A/F sensor 1.

15. CHECK MASS AIR FLOW SENSOR

(R) With CONSULT-III

Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III.

For specification, refer to EC-459, "Mass Air Flow Sensor".

With GST

Check mass air flow sensor signal in Service \$01 with GST. For specification, refer to EC-459, "Mass Air Flow Sensor".

Is the measurement value within the specification?

YES >> GO TO 16.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-145, "DTC Logic".

16.CHECK SYMPTOM TABLE

Check items on the rough idle symptom in EC-443, "Symptom Table". Is the inspection result normal?

EC-246

< COMPONENT DIAGNOSIS >	[QR25DE]
YES >> GO TO 17.	
NO >> Repair or replace. 17.ERASE THE 1ST TRIP DTC	A
Some tests may cause a 1st trip DTC to be set. Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to <u>EC-86. "Diagno</u> tion".	sis Descrip-
	С
>> GO TO 18. 18. CHECK INTERMITTENT INCIDENT	
Refer to <u>GI-42, "Intermittent Incident"</u> .	D
Noior to <u>or 42, internittent inolonit</u> .	
>> INSPECTION END	E
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P0327, P0328 KS

Description

INFOID:000000003069259

[QR25DE]

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

DTC Logic

INFOID:000000003069260

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detected condition	Possible cause
P0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (The sensor circuit is open or shorted.)
P0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Knock sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON (READY).
- 2. Depress the accelerator pedal to start engine, then keep engine running for at least 5 second.
- 3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-248, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000003069261

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect knock sensor harness connector and disconnect ECM harness connector.
- 2. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock sensor		EC	Continuity	
Connector	Terminal	Connector	Connector Terminal	
F45	2	F13	67	Existed

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

P0327, P0328 KS

< COMPONE	ENT D	IAGNOSI	S >		[QR25DE]	
Is the inspect	ion re	sult norma	<u> ?</u>			
	ото	-				4
•	•	•		-	d or short to power in harness or connectors.	
3. CHECK K	NOCK	SENSOR	INPUT	SIGNAL C	IRCUIT FOR OPEN AND SHORT	Е
1. Check th	e cont	tinuity betw	veen kno	ck sensor	harness connector and ECM harness connector.	
Knock sens	sor	EC	M	Orationity	-	(
Connector Te	erminal	Connector	Terminal	Continuity		
F45	1	F13	61	Existed	-	
2. Also che	ck har	ness for sh	nort to gr	ound and s	short to power.	
Is the inspect	ion re	sult norma	<u> ?</u>			
	от о					
4	-	-		t to groun	d or short to power in harness or connectors.	
4. CHECK K	NOCK	SENSOR	2			
Refer to EC-2	<u>249, "(</u>	Componen	t Inspect	<u>on"</u> .		
s the inspect			<u> ?</u>			
		e knock se		-		
5.CHECK IN				I		
Refer to <u>GI-4</u>	<u>2, "Int</u>	ermittent Ir	<u>ncident"</u> .			
		CTION EN	חו			
_			D			
Componer	nt Ins	spection			INFOID:000000003069262	
1. снеск к	NOCK	SENSOR	2			
1. Turn ianit	tion sv	vitch OFF.				
		ock sensor	harness	connector	r.	
	sistan	ce betwee	n knock	sensor terr	minals as follows.	
NOTE: It is nece	essarv	v to use a	n ohmme	eter which	n can measure more than 10 Μ Ω .	
	-					
Terminals		Res	sistance			
1 and 2	Арр	orox. 532 - 58	8 kΩ [at 20	°C (68°F)]		
CAUTION:						
	•			have beer	n dropped or physically damaged. Use only new ones.	
s the inspect						
		CTION EN e knock se				
	(epiac	C KIIUUK SE	511501.			

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P0335 CKP SENSOR (POS)

Description

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet and Hall IC.

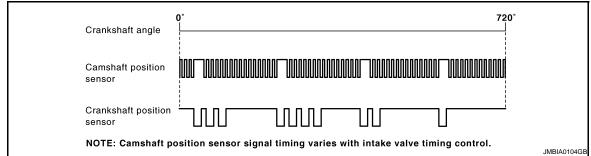
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

ECM receives the signals as shown in the figure.



DTC Logic

INFOID:000000003069264

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sen- sor (POS) circuit	 The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. The crankshaft position sensor (POS) signal is not in the normal pattern during engine running. 	 Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) Crankshaft position sensor (POS) Refrigerant pressure sensor EVAP control system pressure sensor Signal plate

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

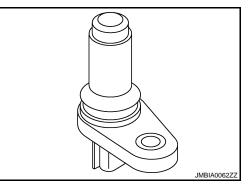
If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds. 1.
- Turn ignition switch ON. 2.
- Turn ignition switch OFF and wait at least 10 seconds. 3.
- **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE



INFOID:000000003069263

P0335 CKP SENSOR (POS)

	P	J335 CKP	SENSO	к (ро;	5)		
< COMPONENT D	DIAGNOSIS >			•		[QR25DE]	
		start engine, tl	hen keep e	engine ru	nning for at least 5 second	ds. A	l.
Is 1st trip DTC dete							
	EC-251, "Diagnosis CTION END	Procedure".				EC	
Diagnosis Proc	edure				In	NFOID:0000000003069265	
1.CHECK GROUN	ND CONNECTION						,
 Turn ignition sv Check around 		er to Ground	Inspection	in GI-45.	"Circuit Inspection".	D)
Is the inspection re							
YES >> GO TO						E	-
· ·	or replace ground of						
Z.CHECK CRANK	SHAFT POSITION	(CKP) SENS	OR (POS)	POWER	R SUPPLY CIRCUIT-I		
	nkshaft position (Cl	<p) (p<="" sensor="" td=""><td>POS) harne</td><td>ss conne</td><td>ector.</td><td>F</td><td></td></p)>	POS) harne	ss conne	ector.	F	
 Turn ignition sv Check the volta 	age between CKP s	ensor (POS)	harness co	onnector	and ground.		
	0	()			0	G	3
CKP sensor (POS)	Ground Voltage						
Connector Terminal	Cround Voltage						
F30 1	Ground Approx. 5V					Н	1
Is the inspection re							
YES >> GO TO NO >> GO TO						I	
•		(CKP) SENS		POWER	R SUPPLY CIRCUIT-II		
1. Turn ignition sv		(0) 02.10				J	J
2. Disconnect EC	M harness connect						
3. Check the con	tinuity between CKF	P sensor (POS	S) harness	connect	or and ECM harness conn		-
CKP sensor (POS)	ECM					K	h
Connector Terminal	Connector Terminal	Continuity					
F30 1	F13 76	Existed				L	-
Is the inspection re							
YES >> GO TC						M	Л
	open circuit.					111	1
4.CHECK CRANK	SHAFT POSITION	(CKP) SENS	OR (POS)	POWER	R SUPPLY CIRCUIT-III		
Check harness for	short to power and	short to grour	nd, betwee	n the foll	owing terminals.	Ν	
ECM		Sensor					
Connector Terminal	Name		Connector	Terminal	-	0)
72	Refrigerant pressure s		E219	1	-		
F13 76	CKP sensor (POS)		F30	1	-	P)
E10 91	EVAP control system	pressure sensor	B41	3	-	1	
Is the inspection re	sult normal?		1		•		
YES >> GO TO							

YES >> GO TO 5. NO >> Repair short to ground or short to power in harness or connectors. NO

5. CHECK COMPONENTS

Check the following.

P0335 CKP SENSOR (POS)

< COMPONENT DIAGNOSIS >

• EVAP control system pressure sensor (Refer to EC-285, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace malfunctioning components.

 ${f 6}.$ CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F30	2	F13	60	Existed

3. 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 CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.

2. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F30	3	F13	65	Existed

3. 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 CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-252, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace crankshaft position sensor (POS).

9.CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace the signal plate.

10.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK CRANKSHAFT POSITION SENSOR (POS)-I

- 1. Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect crankshaft position sensor (POS) harness connector.
- 4. Remove the sensor.

[QR25DE]

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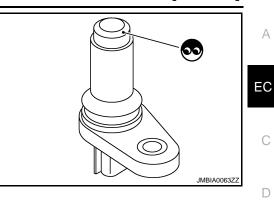
P0335 CKP SENSOR (POS)

< COMPONENT DIAGNOSIS >

5. Visually check the sensor for chipping.

Is the inspection result normal?

- >> GO TO 2. YES
- >> Replace crankshaft position sensor (POS). NO



$2. {\sf CHECK \ CRANKSHAFT \ POSITION \ SENSOR \ (POS)-II}$

Check resistance between crankshaft position sensor (POS) terminals as follows.

Terminals (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or ∞
2 (+) - 3 (-)	
Is the inspection result norma	al?

YES >> INSPECTION END

>> Replace crankshaft position sensor (POS). NO

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< COMPONENT DIAGNOSIS >

P0340 CMP SENSOR (PHASE)

Description

The camshaft position sensor (PHASE) senses the retraction of camshaft (INT) to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.

When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

The sensor consists of a permanent magnet and Hall IC.

When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes. ECM receives the signals as shown in the figure.

> 720° Crankshaft angle Camshaft position sensor Crankshaft position sensor NOTE: Camshaft position sensor signal timing varies with intake valve timing control. JMBIA0104GE

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0340 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-316, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340	Camshaft position sen- sor (PHASE) circuit	 The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. The cylinder No. signal is not sent to ECM during engine running. The cylinder No. signal is not in the normal pattern during engine running. 	Harness or connectors

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON. 2.
- Turn ignition switch OFF and wait at least 10 seconds. 3

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

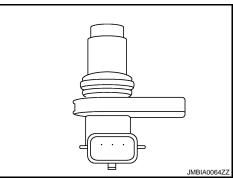
>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

Turn ignition switch ON (READY). 1.

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P0340 CMP SENSOR (PHASE)

< COMPONENT DIAGNOSIS >	[QR25DE]
 Depress the accelerator pedal to start engine, then keep engine running for at least 5 sec Check 1st trip DTC. 	conds.
Is 1st trip DTC detected?	
YES >> Go to <u>EC-255. "Diagnosis Procedure"</u> . NO >> GO TO 3.	EC
3. PERFORM DTC CONFIRMATION PROCEDURE-IL	
 Maintaining engine speed at more than 800 rpm for at least 5 seconds. Check 1st trip DTC. <u>Is 1st trip DTC detected?</u> 	C
YES >> Go to <u>EC-255, "Diagnosis Procedure"</u> . NO >> INSPECTION END	D
Diagnosis Procedure	INFOID:000000003069269
1.CHECK STARTING SYSTEM	
 Turn ignition switch ON (READY). Depress accelerator pedal and keep it. Does the engine turn over? Does the starter motor operate? 	F
YES >> GO TO 2. NO >> Check starting system. 2.CHECK GROUND CONNECTION	G
 Turn ignition switch OFF. Check ground connection E9. Refer to Ground Inspection in <u>GI-45. "Circuit Inspection"</u>. <u>Is the inspection result normal?</u> YES >> GO TO 3. NO >> Repair or replace ground connection. 	F
3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT	
 Disconnect camshaft position (CMP) sensor (PHASE) harness connector. Turn ignition switch ON. Check the voltage between CMP sensor (PHASE) harness connector and ground. 	J
CMP sensor (PHASE) Connector Terminal Ground Voltage	L
F55 1 Ground Approx. 5V	L
Is the inspection result normal? YES >> GO TO 4.	N
NO >> Repair open circuit or short to ground or short to power in harness or connectors.	
4. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT	
 Turn ignition switch OFF. Check the continuity between CMP sensor (PHASE) harness connector and ECM harnes 	ss connector.
CMP sensor (PHASE) ECM	C
Connector Terminal Connector Terminal	
F55 2 F13 64 Existed	P
3. Also check harness for 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 (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.

P0340 CMP SENSOR (PHASE)

< COMPONENT DIAGNOSIS >

[QR25DE]

2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	al Connector Terminal		Continuity
F55	3	F13	69	Existed

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 CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-256, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace camshaft position sensor (PHASE).

7.CHECK CAMSHAFT (INT)

Check the following.

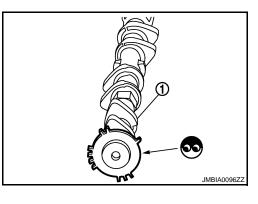
• Accumulation of debris to the signal plate of camshaft (1) rear end

Chipping signal plate of camshaft rear end

Is the inspection result normal?

YES >> GO TO 8.

NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



8. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000003069270

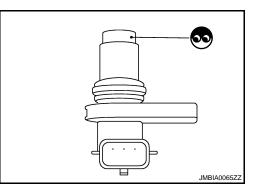
1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

- 1. Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect camshaft position sensor (PHASE) harness connector.
- 4. Remove the sensor.
- 5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace camshaft position sensor (PHASE).



2.CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check resistance camshaft position sensor (PHASE) terminals as follows.

P0340 CMP SENSOR (PHASE)

< COMPONENT DIAGNOSIS >

Terminals (Polarity)	Resistance
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or $\infty \Omega$ [at 25°C (77°F)]
2 (+) - 3 (-)	
Is the inspection res	
YES >> INSPE NO >> Replace	CTION END e camshaft position sensor (I

< COMPONENT DIAGNOSIS >

P0420 THREE WAY CATALYST FUNCTION

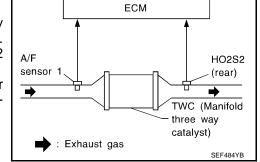
DTC Logic

DTC DETECTION LOGIC

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2.

A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.

When the frequency ratio of A/F sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420	Catalyst system efficien- cy below threshold	 Three way catalyst (manifold) does not oper- ate properly. Three way catalyst (manifold) does not have enough oxygen storage capacity. 	 Three way catalyst (manifold) Exhaust tube Intake air leaks Fuel injector Fuel injector leaks Spark plug Improper ignition timing

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. (P)With CONSULT-III

- Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON (READY).
- 6. Repeat following procedure 2 times.
- Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. **NOTE:**

Keep the vehicle speed as steady as possible during the cruising.

Stop vehicle.
 NOTE:

Never turn ignition switch OFF.

- 7. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-III.
- 8. Drive vehicle at a speed of 80 km/h (50 MPH) or more until "INCMP" of "CATALYST" changes to "CMPLT". **NOTE:**
 - Keep the vehicle speed as steady as possible during the cruising.

F0420 THREE WAT CATALIST FUNCTION	
< COMPONENT DIAGNOSIS >	[QR25DE]
• It will take at most 3 minutes until "INCMP" of "CATALYST" changes to "CMPLT".	
9. Check 1st trip DTC.	
1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal o	perating tem-
perature.	
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. 	
4. Turn ignition switch OFF and wait at least 10 seconds.	
5. Turn ignition switch ON (READY).	
 6. Repeat following procedure 3 times. - Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. 	
NOTE:	
Keep the vehicle speed as steady as possible during the cruising.	
- Stop vehicle. NOTE:	
Never turn ignition switch OFF.	
7. Check 1st trip DTC.	
Is 1st tip DTC detected?	
YES >> Go to <u>EC-259, "Diagnosis Procedure"</u> . NO >> INSPECTION END	
Diagnosis Procoduro	
	INFOID:000000003069272
1.CHECK EXHAUST SYSTEM	
Visually check exhaust tubes and muffler for dent.	
Is the inspection result normal?	
YES >> GO TO 2.	
NO >> Repair or replace.	
2.CHECK EXHAUST GAS LEAK	
 Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine. Listen for an exhaust gas leak before the three way catalyst (manifold). 	
Three way catalyst HC adsorption catalyst	
A/F sensor 1 () (Manifold) (Under floor) Muffler HO2S2 / HO2S3 /	
To exhaust manifold	
➡ : Exhaust gas	
JME	BIA0163GB
Is exhaust gas leak detected?	
YES >> Repair or replace. NO >> GO TO 3.	
3. CHECK INTAKE AIR LEAK	
Listen for an intake air leak after the mass air flow sensor.	
Is intake air leak detected?	
YES >> Repair or replace.	
NO $>>$ GO TO 4.	
4. CHECK IDLE SPEED AND IGNITION TIMING	
1. Check idle speed.	
 For procedure, refer to <u>EC-14, "IDLE SPEED : Special Repair Requirement"</u>. 	
 For specification, refer to <u>EC-459, "Idle Speed"</u>. Check junction timing. 	

- Check ignition timing.
 For procedure, refer to <u>EC-14, "IGNITION TIMING : Special Repair Requirement"</u>.

< COMPONENT DIAGNOSIS >

[QR25DE]

For specification, refer to <u>EC-459, "Ignition Timing</u>".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Follow the EC-11, "BASIC INSPECTION : Special Repair Requirement".

5.CHECK FUEL INJECTOR

1. Turn ignition switch OFF and then turn ON.

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

ECM		Ground	Voltage
Connector	Terminal	Giouna	voltage
F14	29	Ground	Battery voltage
	30		
	31		
	32		

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform <u>EC-236, "Diagnosis Procedure"</u>.

6.CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

- 1. Turn ignition switch OFF.
- 2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
 - NOTE:

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- 3. Turn ignition switch ON (READY).
- 4. Depress accelerator pedal and keep it.
- After engine stalls, check DTC.
 If DTC is detected, erase DTC and go to next steps.
 If DTC is not detected, go to next steps.
- 6. Turn ignition switch OFF.
- 7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 8. Remove ignition coil and spark plug of the cylinder to be checked.
- 9. Repeat steps 3 to 5 for two or three times to remove combustion gas in the cylinder.
- 10. Connect spark plug and harness connector to ignition coil.
- 11. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 12. Turn ignition switch ON (READY).
- 13. Depress accelerator pedal for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

• Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical

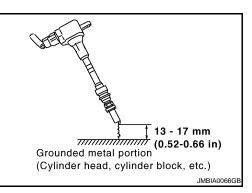
shock while checking, because the electrical discharge voltage becomes 20kV or more.

- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.
- NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is mal-functioning.

Is the inspection result normal?

YES	>> GO TO 10.
NO	>> GO TO 7.



< COMPONENT DIAGNOSIS >

7. CHECK FUNCTION OF IGNITION COIL-II

- 1. Turn ignition switch OFF.
- Disconnect spark plug and connect a known-good spark plug. 2.
- Turn ignition switch ON (READY). 3.
- EC 4. Depress the accelerator pedal to crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

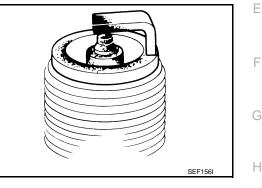
- YES >> GO TO 8.
- NO >> Check ignition coil, power transistor and their circuits. Refer to EC-384, "Diagnosis Procedure".

8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-13, "Removal and Installation".
- NO >> Repair or clean spark plug. Then GO TO 9.



9.CHECK FUNCTION OF IGNITION COIL-III

 Reconnect the initial spark plugs. Turn ignition switch ON (READY). 	-
 Depress the accelerator pedal to crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion. 	s J
Spark should be generated.	
Is the inspection result normal?	LZ.
 YES >> INSPECTION END NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-13, "Remova</u> and Installation". 	К <u>I</u>
10. CHECK FUEL INJECTOR	L
1. Turn ignition switch OFF.	-
 Remove fuel injector assembly. Refer to <u>EM-34, "Removal and Installation"</u>. 	M
Keep fuel hose and all fuel injectors connected to fuel tube.	
3. Disconnect all ignition coil harness connectors.	
 Reconnect all fuel injector harness connectors disconnected. Turn ignition switch ON. 	Ν
Does fuel drip from fuel injector?	
YES >> GO TO 11. NO >> Replace the fuel injector(s) from which fuel is dripping.	0
11.CHECK INTERMITTENT INCIDENT	D
Refer to GI-42, "Intermittent Incident".	- P
Is the trouble fixed?	

- >> INSPECTION END YES
- NO >> Replace three way catalyst assembly.

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P0441 EVAP CONTROL SYSTEM

< COMPONENT DIAGNOSIS >

P0441 EVAP CONTROL SYSTEM

DTC Logic

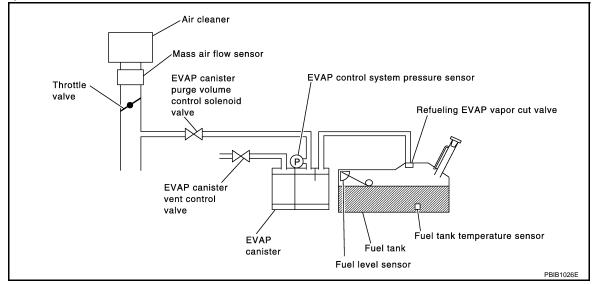
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[QR25DE]

DTC DETECTION LOGIC

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a malfunction is determined.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0441	EVAP control system in- correct purge flow	EVAP control system does not operate proper- ly, EVAP control system has a leak between in- take manifold and EVAP control system pressure sensor.	 EVAP canister purge volume control solenoid valve stuck closed EVAP control system pressure sensor and the circuit Loose, disconnected or improper connection of rubber tube Blocked rubber tube Cracked EVAP canister EVAP canister purge volume control solenoid valve circuit Blocked purge port EVAP canister vent control valve

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III? Do you have CONSULT-III?

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

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

P0441 EVAP CONTROL SYSTEM

< COMPONENT DIAGNOSIS >

•	> GO TO 3. PRM DTC CONFIRMATION PROCEDU	RE-I	A
1. Activa		o start engine, and warm up engine to normal operating tem-	EC
3. Turn i 4. Turn i	gnition switch OFF and wait at least 10 gnition switch ON. gnition switch OFF and wait at least 10		С
6. Select SULT-	111.	IVE SYSTEM" in "DTC WORK SUPPORT" mode with CON-	D
8. Depre "COM	"START". ss the accelerator pedal to start engi PLETED". (It will take at most 10 secor "SELF-DIAG RESULT".	ne, then keep engine running until "TESTING" changes to ds.)	Е
OK >	<u>isplayed on CONSULT-III screen?</u> > INSPECTION END > Go to <u>EC-264, "Diagnosis Procedure</u>	<u>"</u>	F
	ORM COMPONENT FUNCTION CHEC		G
NOTE: Use compo monitoring	omponent function check. Refer to <u>EC-2</u> onent function check to check the overa J. During this check, a 1st trip DTC migh ection result normal?	all monitoring function of the EVAP control system purge flow	Н
YES >	 INSPECTION END Go to <u>EC-264. "Diagnosis Procedure</u> 	<u>"</u>	
Compon	ent Function Check	INFOID:000000003069274	J
1.PERFC	ORM COMPONENT FUNCTION CHEC	ĸ	
1. Lift up		o start engine, and warm up engine to normal operating tem-	К
3. Turn ig 4. Turn ig	 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. 		
 Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and wait at least 150 seconds. Set voltmeter probes to ECM harness connector and ground. 			
	ECM	Ground	Ν
Connector	Terminal		
E10	86 (EVAP control system pressure sensor signal)	Ground	0
	EVAP control system pressure sensor ish and maintain the following condition	value when vehicle is stopped and note it. Ins for at least 1 minute.	_
Vehicle spe	ed 70 km/h (43 MPH) or more		Ρ
Shift lever	D position		

10. Verify that EVAP control system pressure sensor value stays 0.1V less than the value when vehicle is stopped (measured at step 8) for at least 1 second.

Is the inspection result normal?

< COMPONENT DIAGNOSIS >

NO >> Go to EC-264, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000003069275

[QR25DE]

1.CHECK EVAP CANISTER

- 1. Turn ignition switch OFF.
- 2. Check EVAP canister assembly for cracks.

Is the inspection result normal?

- YES-1 >> With CONSULT-III: GO TO 2.
- YES-2 >> Without CONSULT-III: GO TO 3.
- NO >> Replace EVAP canister.

2. CHECK PURGE FLOW

With CONSULT-III

- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to <u>EC-67. "System Diagram"</u>.
- 2. Turn ignition switch ON (READY).
- 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III.
- 4. Rev engine up to 2,000 rpm.
- 5. Touch "Qd" and "Qu" on CONSULT-III screen to adjust "PURG VOL CONT/V" opening and check vacuum existence.

PURG VOL CONT/V	Vacuum
100%	Existed
0%	Not existed

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 4.

 $\mathbf{3}$.CHECK PURGE FLOW

Without CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF.
- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to <u>EC-67. "System Diagram"</u>.
- 4. Lift up the vehicle.
- 5. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and let engine idle.
- 6. Wait at least 150 seconds.
- 7. Vehicle speed is 0 km/h (0 MPH).
- 8. Check vacuum hose for vacuum.

Vacuum should not exist.

- 9. Drive vehicle at a speed of 70 km/h (43 MPH) or more.
- 10. Check vacuum hose for vacuum.

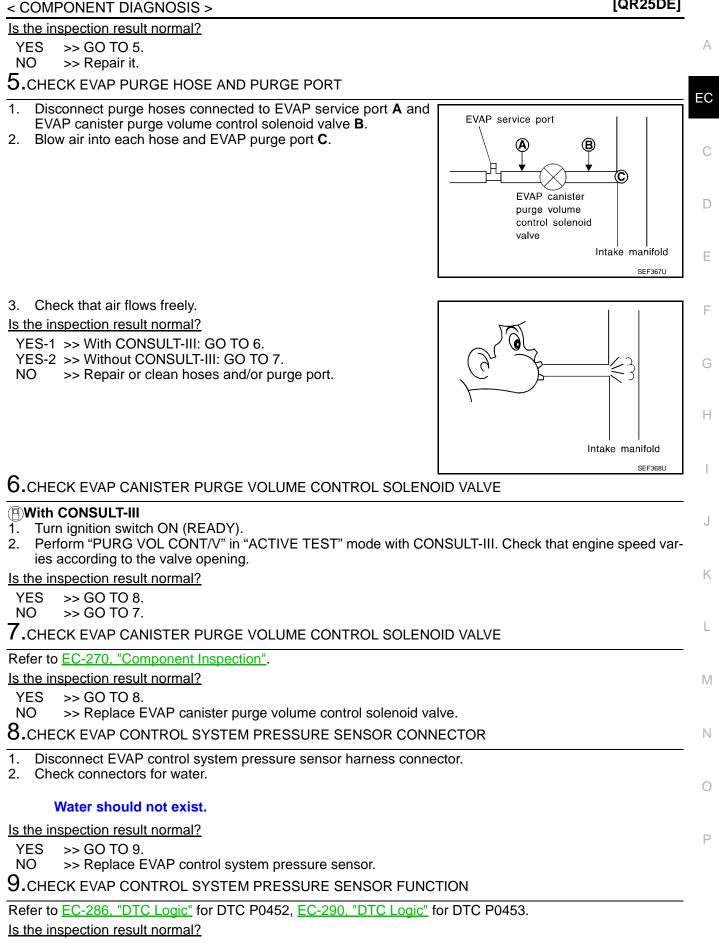
Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 4.

4.CHECK EVAP PURGE LINE

- 1. Turn ignition switch OFF.
- 2. Check EVAP purge line for improper connection or disconnection. Refer to <u>EC-67, "System Diagram"</u>.



P0441 EVAP CONTROL SYSTEM

[QR25DE]

YES >> GO TO 10

P0441 EVAP CONTROL SYSTEM

< COMPONENT DIAGNOSIS >

[QR25DE]

NO >> Replace EVAP control system pressure sensor.

10.check rubber tube for clogging

1. Disconnect rubber tube connected to EVAP canister vent control valve.

2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Clean the rubber tube using an air blower.

11.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-277, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace EVAP canister vent control valve.

12.CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.

Refer to EC-67, "System Diagram".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace it.

13.CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 14.

14. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [QR25DE] < COMPONENT DIAGNOSIS >

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

The EVAP canister purge volume control solenoid valve uses a ON/ OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

DTC Logic

DTC DETECTION LOGIC

DTC No. DTC detecting condition Possible cause Trouble diagnosis name · EVAP control system pressure sensor · EVAP canister purge volume control solenoid valve The canister purge flow is detected during the EVAP canister purge (The valve is stuck open.) specified driving conditions, even when EVAP · EVAP canister vent control valve P0443 volume control solenoid canister purge volume control solenoid valve is valve EVAP canister completely closed. Hoses (Hoses are connected incorrectly or clogged.) DTC CONFIRMATION PROCEDURE 1.PRECONDITIONING If DTC Confirmation Procedure has been previously conducted, always perform the following before conduct-

ing the next test.

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

2. Turn ignition switch ON.

Turn ignition switch OFF and wait at least 10 seconds. 3.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

Do you have CONSULT-III

YES >> GO TO 2.

NO >> GO TO 3.

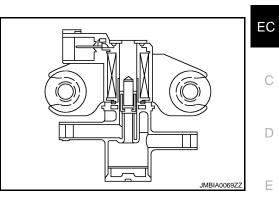
2. PERFORM DTC CONFIRMATION PROCEDURE

(B)With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (HBC-97) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON (READY).
- 6. Depress the accelerator pedal to start engine, then keep engine running for at least 10 seconds.
- 7. Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
- Check that "COMPLETED" is displayed after touching "START". 8. If "COMPLETED" is not displayed, retry from step 1.
- Touch "SELF-DIAG RESULT". 9.

Which is displayed on CONSULT-III?

EC-267



INFOID:000000003069277

INFOID:000000003069276

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P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

[QR25DE]

OK >> INSPECTION END NG >> Go to <u>EC-268</u>, "Diagnosis Procedure".

3.PERFORM DTC CONFIRMATION PROCEDURE

With GST

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Activate "INSPECTION MODE 1" (HBC-97) to start engine, and let engine idle for at least 20 seconds.
- 6. Check 1st trip DTC.

Is 1st trip DTC displayed?

- YES >> Go to EC-268, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000003069278

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

	⁻ purge volume enoid valve	Ground	Voltage	
Connector	Terminal			
F29	1	Ground	Battery voltage	

Is the inspection result normal?

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

2. DETECT MALFUNCTIONING PART

Check the following.

- Junction block E44, E45
- Harness connectors E80, F84
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

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

3. CHECK EVAP CANISTER PURGE VOLUME 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 EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

	EVAP canister purge volume control solenoid valve		ECM	
Connector	Terminal	Connector Terminal		
F29	2	F14	25	Existed

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

Is the inspection result normal?

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS > [QR25D	E1
NO >> Repair open circuit or short to ground or short to power in harness or connectors.	<u> </u>
4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	A
 Disconnect EVAP control system pressure sensor harness connector. Check connectors for water. 	EC
Water should not exist.	
Is the inspection result normal?	C
YES >> GO TO 5.	
NO >> Replace EVAP control system pressure sensor.	
5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	D
Refer to <u>EC-285, "Component Inspection"</u> .	
Is the inspection result normal?	E
YES-1 >> With CONSULT-III: GO TO 6. YES-2 >> Without CONSULT-III: GO TO 7.	
NO >> Replace EVAP control system pressure sensor.	
6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	F
 With CONSULT-III 1. Turn ignition switch OFF. 2. Reconnect harness connectors disconnected. 	G
 Turn ignition switch ON (READY). Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed v ies according to the valve opening. 	ar- ⊢
Is the inspection result normal?	
YES >> GO TO 8. NO >> GO TO 7.	
7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
Refer to EC-270, "Component Inspection".	
Is the inspection result normal?	0
YES >> GO TO 8.	
NO >> Replace EVAP canister purge volume control solenoid valve.	K
8. CHECK RUBBER TUBE FOR CLOGGING	
 Disconnect rubber tube connected to EVAP canister vent control valve. Check the rubber tube for clogging. 	L
Is the inspection result normal?	
YES >> GO TO 9. NO >> Clean the rubber tube using an air blower.	\mathbb{N}
NO >> Clean the rubber tube using an air blower. 9.CHECK EVAP CANISTER VENT CONTROL VALVE	
Refer to EC-277, "Component Inspection".	N
<u>Is the inspection result normal?</u> YES >> GO TO 10.	
NO >> Replace EVAP canister vent control valve.	С
10. CHECK IF EVAP CANISTER SATURATED WITH WATER	
1. Remove EVAP canister assembly with EVAP canister vent control valve and EVAP control system pro- sure sensor attached.	es- P

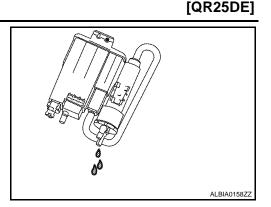
P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

2. Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 11. NO >> GO TO 13.



11.CHECK EVAP CANISTER

Weigh the EVAP canister assembly with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.8 kg (6.2 lb).

Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

13. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

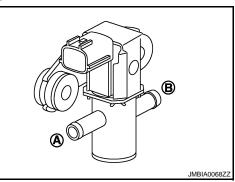
INFOID:000000003069279

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Turn ignition switch ON (READY).
- 5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III.
- Touch "Qd" and "Qu" on CONSULT-III screen to adjust "PURG VOL CONT/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition (PURG VOL CONT/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [QR25DE]

< COMPONENT DIAGNOSIS >

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following 4. conditions.

Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid valve EC

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P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

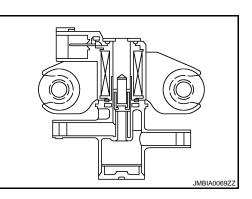
[QR25DE]

INFOID:000000003069280

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

The EVAP canister purge volume control solenoid valve uses a ON/ OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



INFOID:000000003069281

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	 Harness or connectors (The solenoid valve circuit is open or shorted.) EVAP canister purge volume control so- lenoid valve
P0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	 Harness or connectors (The solenoid valve circuit is shorted.) EVAP canister purge volume control so- lenoid valve

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and let engine idle for at least 13 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-272, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000003069282

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Turn ignition switch ON.

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [QR25DE]

< COMPONENT DIAGNOSIS >

Check the voltage between EVAP canister purge volume control solenoid valve harness connector and 4. ground.

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ground.				
	r purge volume enoid valve	Ground	Voltage	-
Connector	Terminal			_
F29	1	Ground	Battery voltage	_
•	ion result nor	<u>mal?</u>		
	GO TO 3. GO TO 2.			
	MALFUNCTIC	NING PAR	г	
Check the fol			•	
Junction blo	ock E44, E45			
	nnectors E80		VAD conjeter p	urge volume control colonoid volve and IDDM E/D
				urge volume control solenoid valve and IPDM E/R urge volume control solenoid valve and ECM
				ů –
>> F	Repair open ci	rcuit or shor	t to ground or s	short to power in harness or connectors.
3. снеск е	VAP CANIST	ER PURGE	VOLUME CON	TROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT
OR OPEN A	ND SHORT			
	tion switch OF			
	ect ECM harne			ge volume control solenoid valve harness connector and
	ness connect			
	r purge volume		ECM	
Connector	enoid valve Terminal	Connector	Terminal	Continuity
F29	2	F14	25	Existed
-			ound and short	
	ion result nor			
	Vith CONSUL) 4.	
	Vithout CONS			
4			•	short to power in harness or connectors.
LCHECK E	VAP CANIST	ER PURGE	VOLUME CON	ITROL SOLENOID VALVE OPERATION
With CON				
	ct all harness		disconnected.	
			ACTIVE TEST	" mode with CONSULT-III. Check that engine speed var-
	ding to the va			
	ion result nor	mal?		
	GO TO 6. GO TO 5.			
				ITROL SOLENOID VALVE
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	<u>ion result nor</u> 60 TO 6.	<u>iiidi (</u>		
		canister pu	rge volume cor	ntrol solenoid valve.
~	ITERMITTEN	•	•	
	0	t la oide et"		

Refer to GI-42, "Intermittent Incident".

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID

VALVE

< COMPONENT DIAGNOSIS >

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INFOID:000000003069283

>> INSPECTION END

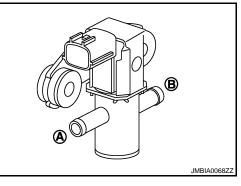
Component Inspection

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Turn ignition switch ON (READY).
- 5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III.
- Touch "Qd" and "Qu" on CONSULT-III screen to adjust "PURG VOL CONT/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition (PURG VOL CONT/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid valve

< COMPONENT DIAGNOSIS >

P0447 EVAP CANISTER VENT CONTROL VALVE

Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

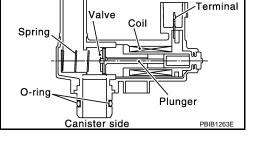
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid value is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System" diagnosis.

DTC Logic

DTC DETECTION LOGIC



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DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
P0447	EVAP canister vent con- trol valve circuit open	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	 Harness or connectors (The valve circuit is open or shorted.) EVAP canister vent control valve 	Н

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON (READY).

2. Depress the accelerator pedal to start engine, then keep engine running for at least 8 seconds.

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to <u>EC-275, "Diagnosis Procedure"</u>.

NO >> INSPECTION END

Diagnosis Procedure

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

BWith CONSULT-III

1. Turn ignition switch OFF and then turn ON.

EC-275

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< COMPONENT DIAGNOSIS >

- 2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Touch "ON/OFF" on CONSULT-III screen.
- 4. Check for operating sound of the valve.

Clicking sound should be heard.

Is the inspection result normal?

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

 \sim 30 10 3.

3.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister vent control valve harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between EVAP canister vent control valve harness connector and ground.

EVAP canister vent control valve		Ground	Voltage
Connector	Terminal	Ground	voltage
B39	1	Ground	Battery voltage

Is the inspection result normal?

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

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E80, F84
- Harness connectors E29, B10
- Harness for open or short between EVAP canister vent control valve and IPDM E/R

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

5. CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between EVAP canister vent control valve harness connector and ECM harness connector.

EVAP canister vent control valve		EC	М	Continuity
Connector	Terminal	Connector	Terminal	Continuity
B39	2	E10	109	Existed

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

Is the inspection result normal?

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YES >> GO TO 7.
NO >> GO TO 6.
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6.DETECT MALFUNCTIONING PART

Check the following.

- Junction block connector E44, E45
- Harness connectors E29, B10
- Harness for open or short between EVAP canister vent control valve and ECM

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

7.CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.

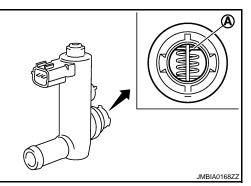
2. Check the rubber tube for clogging.

[QR25DE] < COMPONENT DIAGNOSIS > Is the inspection result normal? YES >> GO TO 8. NO >> Clean the rubber tube using an air blower. 8.CHECK EVAP CANISTER VENT CONTROL VALVE Refer to EC-277, "Component Inspection". Is the inspection result normal? YES >> GO TO 9. NO >> Replace EVAP canister vent control valve. 9. CHECK INTERMITTENT INCIDENT Refer to GI-42, "Intermittent Incident". >> INSPECTION END Component Inspection INFOID:000000003069287 1.CHECK EVAP CANISTER VENT CONTROL VALVE-I 1. Turn ignition switch OFF. 2. Remove EVAP canister vent control valve from EVAP canister.

 Check portion (B) of EVAP canister vent control valve for being rusted.

Is it rusted?

- YES >> Replace EVAP canister vent control valve
- NO >> GO TO 2.



2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-III

- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 4. Check air passage continuity and operation delay time. Make sure new O-ring is installed properly.

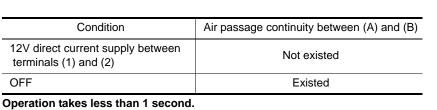
Condition VENT CONTROL/V	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

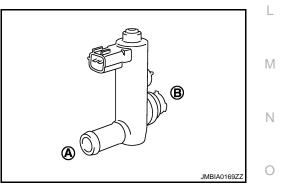
Without CONSULT-III

Check air passage continuity and operation delay time under the following conditions.

Make sure new O-ring is installed properly.



Is the inspection result normal?



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< COMPONENT DIAGNOSIS >

- YES >> GO TO 3.
- NO >> Replace EVAP canister vent control valve

3. CHECK EVAP CANISTER VENT CONTROL VALVE-III

(B) With CONSULT-III

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 3. Check air passage continuity and operation delay time. Make sure new O-ring is installed properly.

Condition VENT CONTROL/V	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT-III

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Check air passage continuity and operation delay time under the following conditions.

Make sure new O-ring is installed properly.

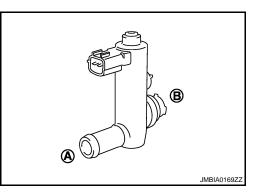
Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve



< COMPONENT DIAGNOSIS >

P0448 EVAP CANISTER VENT CONTROL VALVE

Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

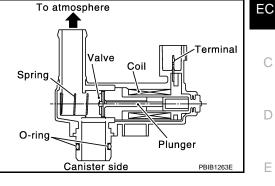
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid value is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System" diagnosis.



DTC DETECTION LOGIC



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DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
P0448	EVAP canister vent con- trol valve close	EVAP canister vent control valve remains closed under specified driving conditions.	 EVAP canister vent control valve EVAP control system pressure sensor and the circuit Blocked rubber tube to EVAP canister vent control valve EVAP canister is saturated with water 	Н

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If this test is conducted with the drive wheels lifted, activate "INPSECTION MODE 1" (<u>HBC-97</u>). If a road test is expected to be easier, it is unnecessary to lift up the vehicle.

>> GO TO 2.		M
2. PERFORM DTC CONFIRMATION PROCEDURE		
1. Turn ignition switch ON (READY) and wait at least 150 seconds.		Ν
2. Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes.		
CAUTION: Always drive vehicle at a safe speed.		-
NOTE:		0
Never fully release accelerator pedal during the cruising.		
3. Check 1st trip DTC.		
Is 1st trip DTC detected?		Ρ
YES >> Go to <u>EC-279, "Diagnosis Procedure"</u> . NO >> INSPECTION END		
Diagnosis Procedure	INFOID:000000003069290	
1.CHECK RUBBER TUBE		

EC-279

[QR25DE]

INFOID:000000003069288

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< COMPONENT DIAGNOSIS >

[QR25DE]

- 1. Turn ignition switch OFF.
- 2. Disconnect rubber tube connected to EVAP canister vent control valve.
- 3. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Clean rubber tube using an air blower.

2. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-277, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace EVAP canister vent control valve.

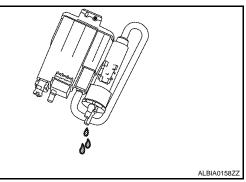
 $\mathbf{3.}$ CHECK IF EVAP CANISTER SATURATED WITH WATER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- 2. Check if water will drain from the EVAP canister.

Does water drain from EVAP canister?

YES >> GO TO 4.

NO >> GO TO 6.



4.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.8 kg (6.2 lb).

Is the inspection result normal?

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

5. DETECT MALFUNCTIONING PART

Check the following.

• EVAP canister for damage

• EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.

2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace EVAP control system pressure sensor.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-285, "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Replace EVAP control system pressure sensor.

< COMPONENT DIAGNOSIS >

[QR25DE]

INFOID:000000003069291

8. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

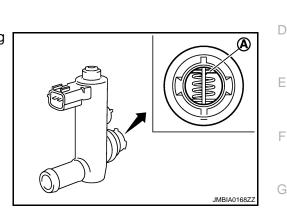
Component Inspection

1.CHECK EVAP CANISTER VENT CONTROL VALVE-I

- 1. Turn ignition switch OFF.
- 2. Remove EVAP canister vent control valve from EVAP canister.
- Check portion (B) of EVAP canister vent control valve for being rusted.

Is it rusted?

- YES >> Replace EVAP canister vent control valve
- NO >> GO TO 2.



2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-III

- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 4. Check air passage continuity and operation delay time. Make sure new O-ring is installed properly.

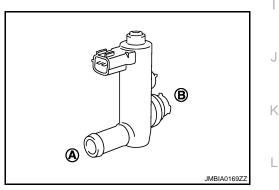
Condition VENT CONTROL/V	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT-III

Check air passage continuity and operation delay time under the following conditions.

Make sure new O-ring is installed properly.



	Condition	Air passage continuity between (A) and (B)
	ect current supply between ils (1) and (2)	Not existed
OFF		Existed
Operatio	n takes less than 1 second.	
Is the in	spection result normal?	-
YES	>> GO TO 3.	
NO	>> Replace EVAP can	ister vent control valve

3. CHECK EVAP CANISTER VENT CONTROL VALVE-III

With CONSULT-III

1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.

2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.

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< COMPONENT DIAGNOSIS >

3. Check air passage continuity and operation delay time. **Make sure new O-ring is installed properly.**

Condition VENT CONTROL/V	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT-III

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Check air passage continuity and operation delay time under the following conditions.

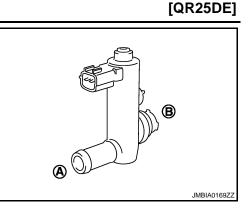
Make sure new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace EVAP canister vent control valve



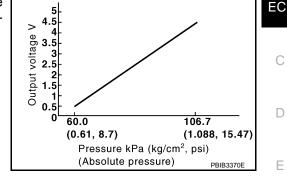
P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



DTC Logic

DTC DETECTION LOGIC

INFOID:000000003069293

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0451	EVAP control system pressure sensor perfor- mance	ECM detects a sloshing signal from the EVAP control system pressure sensor	 Harness or connectors (EVAP control system pressure sensor circuit is shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) EVAP control system pressure sensor Crankshaft position sensor (POS) Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

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

2. Turn ignition switch ON.

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and wait at least 40 seconds.

 Activate INSPECTION MODE 1 (<u>HBC-97</u>) to start engine, and wait at least 40 seconds.
 NOTE: Do not depress accelerator pedal even slightly.
 Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-283, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in <u>GI-45, "Circuit Inspection"</u>.

Is the inspection result normal?

EC-283

INFOID:000000003069292

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INFOID:000000003069294

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P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

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- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

- 1. Disconnect EVAP control system pressure sensor harness connector.
- 2. Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness connector.

 ${f 3.}$ CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch ON.
- 2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

EVAP control syste	em pressure sensor	Ground	Voltage	
Connector	Terminal	Orbund		
B41	3	Ground	Approx. 5V	

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 4.

4.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
F13	72	Refrigerant pressure sensor	E219	1
76		CKP sensor (POS)	F30	1
E10	91	EVAP control system pressure sensor	B41	3

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.

Crankshaft position sensor (POS) (Refer to <u>EC-252, "Component Inspection"</u>.)

Refrigerant pressure sensor

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning component.

6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-285, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace EVAP control system pressure sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

Component Inspection

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1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

- 1. Turn ignition switch OFF.
- Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister.
 Always replace O-ring with a new one.
- 3. Install a vacuum pump to EVAP control system pressure sensor.
- 4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the c following conditions.

	ECM	Condition	Voltage	
Connector	Terminal	[Applied vacuum kPa (kg/cm ² , psi)	voltage	
E10	86	Not applied	1.8 - 4.8V	_
E10 (I	(EVAP control system pressure sensor signal)	-26.7 (-0.272, -3.87)	2.1 to 2.5V lower than above value	E

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/ cm², 14.69 psi).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace EVAP control system pressure sensor

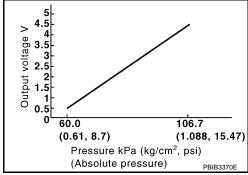
P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



DTC Logic

DTC DETECTION LOGIC

INFOID:000000003069297

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0452	EVAP control system pressure sensor low in- put	An excessively low voltage from the sensor is sent to ECM.	 Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) EVAP control system pressure sensor Crankshaft position sensor (POS) Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Select "DATA MONITOR" mode with CONSULT-III.
- 5. Make sure that "FUEL T/TMP SE" is more than 0°C (32°F).
- 6. Activate "INSPECTION MODE 1" (HBC-97) to start engine, and wait at least 20 seconds.
- 7. Check 1st trip DTC.

With GST

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Set voltmeter probes to ECM harness connector and ground as follows.

EC-286

INFOID:000000003069296

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

[QR25DE]

	ECM				
Connector	-	minal	G	round	
Connector	-	95			
E10	(Fuel tank tempera		al) G	round	
 Turn iç Activati Activati Check <u>Is 1st trip I</u> 	1st trip DTC.	F and wait at MODE 1" (<u>H</u>	least 10 seco <u>BC-97</u>) to sta		d wait at least 20 seconds.
	> Go to <u>EC-287,</u> > INSPECTION		<u>cocedure"</u> .		
Diagnos	is Procedure				INFOID:000000003069298
1. CHECK	GROUND CON	INECTION			
2. Check	gnition switch OF ground connect ection result norr	ion E9. Refer	to Ground In	spection in <u>G</u>	I-45, "Circuit Inspection".
YES >: NO >:	> GO TO 2. > Repair or repla		nnection.		
1. Discor	CONNECTOR			r harness cor	nnector.
	ter should not o		water.		
Is the inspective of the second secon	ection result norr > GO TO 3. > Repair or repla	<u>mal?</u> ace harness co		SENSOR PO	WER SUPPLY CIRCUIT-I
1. Turn ig	gnition switch ON	١.			nsor harness connector and ground.
EVAP contr	ol system pressure s	sensor			
Connec		Grour	nd Volt	age	
B41	3	Grour	nd Appro	ox. 5V	
YES >: NO >:	ection result norr > GO TO 8. > GO TO 4. CEVAP CONTRO				WER SUPPLY CIRCUIT-II
 Turn iç Discor Check 	gnition switch OF	F. ess connector.			e sensor harness connector and ECM har-
	ol system pressure sensor	EC	CM	Continuity	-
	sensor	EC	CM Terminal	Continuity	_

Is the inspection result normal?

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< COMPONENT DIAGNOSIS >

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors B10, E29

• Harness for open or short between EVAP control system pressure sensor and ECM

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

6.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
F13	72	Refrigerant pressure sensor	E219	1
F13	76	CKP sensor (POS)	F30	1
E10	91	EVAP control system pressure sensor	B41	3

Is the inspection result normal?

YES >> GO TO 7.

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

7. CHECK COMPONENTS

Check the following.

Crankshaft position sensor (POS) (Refer to <u>EC-252, "Component Inspection"</u>.)

Refrigerant pressure sensor

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace malfunctioning component.

8.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		E	Continuity	
Connector	Terminal	Connector Terminal		Continuity
B41	1	E10	96	Existed

4. 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 connectors B10, E29

• Harness for open or short between EVAP control system pressure sensor and ECM

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

10.check evap control system pressure sensor input signal circuit for open and short

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

< COMPONENT DIAGNOSIS >

[QR25DE]

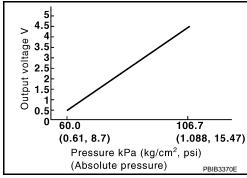
EVAP contr	ol system pressure sensor	ECN	Λ	Continuity	
Connect	or Terminal	Connector	Terminal	- Continuity	
B41	2	E10	86	Existed	
	heck harness for short	to ground and	short to pov	wer.	
	ection result normal?				
	> GO TO 12. > GO TO 11.				
11.dete	CT MALFUNCTIONIN	IG PART			
Check the	following.				
 Harness 	connectors B10, E29				
Harness	for open or short betw	een EVAP con	trol system	pressure sensor and	IECM
>	> Repair open circuit o	r short to arour	nd or short t	o power in harness	or connectors
	CK EVAP CONTROL S	-			
	C-285, "Component Ins				
	ection result normal?	<u></u> -			
YES >:	> GO TO 13.				
	Replace EVAP control	• •	sure sensor		
	CK INTERMITTENT IN				
Refer to <u>G</u>	I-42, "Intermittent Incid	<u>ent"</u> .			
	> INSPECTION END				
-					
Jompon	ent Inspection				INFOID:000000003069299
1.снеск	EVAP CONTROL SY	STEM PRESS	URE SENS	OR	
	nition switch OFF.				
	ve EVAP control system s replace O-ring with		isor with its	harness connector of	connected from EVAP canister.
3. Install	a vacuum pump to EV	AP control syst			
	nition switch ON and on ng conditions.	check output vo	oltage betwe	een ECM harness co	onnector and ground under the
IONOWI	ng contanions.				
	ECM			Condition	Valtage
Connector	Termina	I	[Applied va	acuum kPa (kg/cm ² , psi)	Voltage
E10	86			Not applied	1.8 - 4.8V
210	(EVAP control system pres	sure sensor signal	l) -26	.7 (-0.272, -3.87)	2.1 to 2.5V lower than above value
CAUT					
	ays calibrate the vacu	• • •	-	-	re over 101.3 kPa (1.033 kg/
-	, 14.69 psi).	5 KF a (-0.352)	kg/cm , -13	5.55 psij or pressu	le over 101.5 kra (1.055 kg/
	ection result normal?				
YES >:	> INSPECTION END				
NO >:	> Replace EVAP contrel	ol system press	sure sensor		

< COMPONENT DIAGNOSIS >

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



DTC Logic

DTC DETECTION LOGIC

INFOID:000000003069301

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0453	EVAP control system pressure sensor high in- put	An excessively high voltage from the sensor is sent to ECM.	 Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) EVAP control system pressure sensor Crankshaft position sensor (POS) Refrigerant pressure sensor EVAP canister vent control valve EVAP canister Rubber hose from EVAP canister vent control valve to vehicle frame

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Select "DATA MONITOR" mode with CONSULT-III.
- 5. Make sure that "FUEL T/TMP SE" is more than 0°C (32°F).
- 6. Activate "INSPECTION MODE 1" (HBC-97) to start engine, and wait at least 20 seconds.
- 7. Check 1st trip DTC.

With GST

EC-290

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< COMPONENT DIAGNOSIS >

- Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Set voltmeter probes to ECM harness connector and ground as follows.

					_
	ECM		Ground	_	EC
Connector	Terminal		Ground		
E10	95 (Fuel tank temperature se	nsor signal)	Ground		С
 Turn igr Activate 	ure that the voltage is nition switch OFF and e "INSPECTION MOD 1st trip DTC.	wait at leas	t 10 seconds.	e, and wait at least 20 seconds.	D
YES >>	<u>TC detected?</u> Go to <u>EC-291, "Diag</u> u INSPECTION END	nosis Proced	dure".		E
Diagnosis	s Procedure			INF0ID:000000003069302	F
1.снеск	GROUND CONNECT	ION			
	nition switch OFF.	Pefer to G	round Inspection	in <u>GI-45, "Circuit Inspection"</u> .	G
	ction result normal?			In <u>OF-5. Oreal inspection</u> .	
	GO TO 2. Repair or replace gro	und connoc	tion		Н
-	CONNECTOR				
1. Disconr	nect EVAP control sys			s connector.	
2. Check s	sensor harness conne	ector for wate	er.		
Wate	er should not exist.				J
•	ction result normal?				
	GO TO 3. Repair or replace har	ness conne	ctor.		k
-				POWER SUPPLY CIRCUIT	
1. Turn igr	nition switch ON.			e sensor harness connector and ground.	L
			r by blom procedu		
EVAP contro	l system pressure sensor	Ground	Voltage		N
Connecto	or Terminal	Ground	voltage		
B41	3	Ground	Approx. 5V		N
YES >>	<u>ction result normal?</u> GO TO 8. GO TO 4.				Ν
		STEM PRES	SSURE SENSOF	POWER SUPPLY CIRCUIT-II	С
 Turn igr Disconr Check to the second sec	nition switch OFF. nect ECM harness coi	nnector.		sure sensor harness connector and ECM har-	Ρ

EVAP control syst	em pressure sensor	E	Continuity	
Connector Terminal		Connector	Terminal	Continuity
B41	3	E10	91	Existed

EC-291

< COMPONENT DIAGNOSIS >

Is the inspection result normal?

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

5. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors B10, E29

• Harness for open or short between EVAP control system pressure sensor and ECM

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

6.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	
F13	72	Refrigerant pressure sensor	E219	1	
115	76	CKP sensor (POS)	F30	1	
E10	91	EVAP control system pressure sensor	B41	3	

Is the inspection result normal?

YES >> GO TO 7.

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

7.CHECK COMPONENTS

Check the following.

• Crankshaft position sensor (POS) (Refer to EC-252, "Component Inspection".)

Refrigerant pressure sensor

Is the inspection result normal?

YES >> GO TO 18.

NO >> Replace malfunctioning component.

8.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control syst	em pressure sensor	E	Continuity		
Connector	Connector Terminal		Terminal	Continuity	
B41	1	E10	96	Existed	

4. 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 connectors B10, E29

• Harness for open or short between EVAP control system pressure sensor and ECM

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

 $10. \mbox{check evap control system pressure sensor input signal circuit for open and short$

[QR25DE]

< COMPONENT DIAGNOSIS >

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control syste	em pressure sensor	EC	M	Continuit		
Connector	Terminal	Connector	Terminal	Continuity		E
B41	2	E10	86	Existed	—	
2. Also check h	arness for short	to ground and	short to pow	er.	_	(
Is the inspection	result normal?					
YES >> GO						
NO >> GO		_				
11.DETECT M	ALFUNCTIONIN	G PART				
Check the follow						E
Harness conneHarness for op		een EVAP con	trol system p	ressure sen:	sor and ECM	
			a or of otom p			
>> Repa	air open circuit o	r short to grou	nd or short to	power in ha	rness or connectors.	F
12.CHECK RU		Ū				
1. Disconnect r	ubber tube conn	ected to EVAP	canister ven	nt control val	/e	C
	bber tube for clo					C
Is the inspection	result normal?					
YES >> GO						ŀ
	n the rubber tub	-	•	r or replace i	ubber tube.	
13. CHECK EV			OL VALVE			
Refer to EC-277,		spection".				
Is the inspection						
YES >> GO ⁻ NO >> Repl	TO 14. ace EVAP canis	ter vent contro				
14.CHECK EV						
			SURE SENS	SUK		
Refer to <u>EC-294</u> ,		<u>spection"</u> .				ŀ
<u>Is the inspection</u> YES >> GO						
	ace EVAP contro	ol system pres	sure sensor.			l
15.CHECK IF I				ER		
-					VAP control system pressure sensor	
attached.						Ν
2. Check if wat	er will drain from	the EVAP can	ister.		A Company of the second	
Does water drain		ister?			TING	Ν
YES >> GO NO >> GO						
110 <i>>></i> GU	10 10.					
					Store Contraction	(
					AP .	
					<u> </u>	ŗ
					0~	1

16.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.8 kg (6.2 lb).

EC-293

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< COMPONENT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 18. NO >> GO TO 17.

17. DETECT MALFUNCTIONING PART

Check the following.

• EVAP canister for damage

• EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

18. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000003069303

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.

- 2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. Always replace O-ring with a new one.
- 3. Install a vacuum pump to EVAP control system pressure sensor.
- 4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

	ECM	Condition	Voltage	
Connector	Terminal	[Applied vacuum kPa (kg/cm ² , psi)		
E10	86	Not applied	1.8 - 4.8V	
EIU	(EVAP control system pressure sensor signal)	-26.7 (-0.272, -3.87)	2.1 to 2.5V lower than above value	

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/ cm², 14.69 psi).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace EVAP control system pressure sensor

[QR25DE]

P0456 EVAP CONTROL SYSTEM

DTC Logic

DTC DETECTION LOGIC

This diagnosis detects leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the negative pressure caused by decrease of fuel temperature in the fuel tank after turning ignition switch OFF.

If ECM judges there are no leaks, the diagnosis will be OK.

Air cleaner Mass air flow sensor EVAP canister EVAP control system pressure sensor Throttle purge volume valve control solenoid Refueling EVAP vapor cut valve valve |(P) EVAP canister vent control valve Fuel tank temperature sensor EVAP Fuel tank canister Fuel level sensor PBIB1026E

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0456	Evaporative emission control system leak	 EVAP system has a leak. EVAP system does not operate properly. 	 Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Fuel filler cap remains open or fails to close. Foreign matter caught in fuel filler cap. Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. Foreign matter caught in EVAP canister vent control valve. EVAP canister or fuel tank leaks EVAP purge line (pipe and rubber tube) leaks EVAP purge line rubber tube bent Loose or disconnected rubber tube EVAP canister vent control valve and the circuit EVAP canister purge volume control solenoid valve and the circuit EVAP canister purge volume control solenoid valve and the circuit EVAP canister purge volume control valve is missing or damaged EVAP canister is saturated with water EVAP control system pressure sensor Refueling EVAP vapor cut valve ORVR system leaks Fuel level sensor and the circuit Foreign matter caught in EVAP canister purge volume control valve

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC CONFIRMATION PROCEDURE

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< COMPONENT DIAGNOSIS >

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 4.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (HBC-97) to start engine.
- 2. Select "EVAP DIAG READY" in "DATA MONITOR" mode with CONSULT-III.
- 3. Wait at idle until "OFF" of "EVAP DIAG READY" changes to "ON". **NOTE:**
 - It will take at most 2 hours until "OFF" of "EVAP DIAG READY" changes to "ON".
- 4. Turn ignition switch OFF and wait at least 90 minutes. **NOTE:**

Never turn ignition switch ON during 90 minutes.

- 5. Turn ignition switch ON and select "EVAP LEA DIAG" in "DATA MONITOR" mode with CONSULT-III.
- 6. Check that "EVAP LEA DIAG" indication.

Which is displayed on CONSULT-III?

CMPLT>> GO TO 3.

YET >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 1.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-296, "Diagnosis Procedure".

NO >> INSPECTION END.

4.PERFORM DTC CONFIRMATION PROCEDURE

With GST

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine.
- 2. Wait engine idle for at least 2 hours.
- 3. Turn ignition switch OFF and wait at least 90 minutes. **NOTE:**

Never turn ignition switch ON during 90 minutes.

- 4. Turn ignition switch ON.
- 5. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-296, "Diagnosis Procedure".
- NO >> INSPECTION END.

Diagnosis Procedure

INFOID:000000003069305

1.CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.

< COMPONENT DIAGNOSIS >

[QR25DE]

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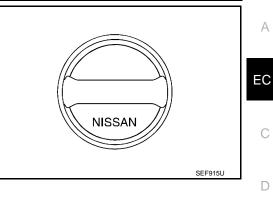
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2. Check for genuine NISSAN fuel filler cap design.
<u>Is the inspection result normal?</u>
YES >> GO TO 2.
NO >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Then retighten until ratcheting sound is heard.

3.CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

Is the inspection result normal?

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

4.CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-300, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel filler cap with a genuine one.

5.CHECK FOR EVAP LEAK

Refer to EC-455, "Inspection".
Is there any leak in EVAP line?
YES >> Repair or replace.
NO >> GO TO 6.
6. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

• EVAP canister vent control valve is installed properly. Refer to <u>EC-457, "Exploded View"</u>.

 EVAP canister vent control valve. Refer to <u>EC-277, "Component Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace EVAP canister vent control valve and O-ring.

1.CHECK IF EVAP CANISTER SATURATED WITH WATER

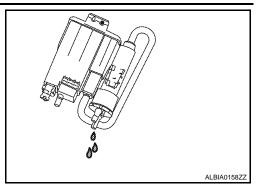
1. Remove EVAP canister assembly with EVAP canister vent control valve and EVAP control system pressure sensor attached.

< COMPONENT DIAGNOSIS >

2. Check if water will drain from the EVAP canister.

Does water drain from EVAP canister?

- YES >> GO TO 8.
- NO-1 >> With CONSULT-III: GO TO 10.
- NO-2 >> Without CONSULT-III: GO TO 11.



8. CHECK EVAP CANISTER

Weigh the EVAP canister assembly with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.8 kg (6.2 lb).

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 10. YES-2 >> Without CONSULT-III: GO TO 11. NO >> GO TO 9.

9.DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

10. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

- 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- 2. Turn ignition switch ON (READY).
- 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
- 4. Touch "Qu" on CONSULT-III screen to increase "PURG VOL CONT/V" opening to 100%.
- 5. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 12.

11.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-III

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.

- 2. Lift up the vehicle.
- 3. Activate "INSPECTION MODE 1" (HBC-97).
- 4. Wait at least 150 seconds.
- 5. Drive vehicle at a speed of 70 km/h (43 MPH) or more.
- 6. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 12. **12.**CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-67, "System Diagram".

EC-298

P0456 EVAP CONTROL SYSTEM	
< COMPONENT DIAGNOSIS >	[QR25DE]
Is the inspection result normal? YES >> GO TO 13.	A
NO >> Repair or reconnect the hose.	
13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	50
Refer to EC-270, "Component Inspection".	EC
Is the inspection result normal?	
YES >> GO TO 14.	С
NO >> Replace EVAP canister purge volume control solenoid valve. 14.CHECK FUEL TANK TEMPERATURE SENSOR	
	D
Refer to <u>EC-232, "Component Inspection"</u> . Is the inspection result normal?	D
YES >> GO TO 15.	
NO >> Replace fuel level sensor unit.	E
15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	
Refer to EC-285, "Component Inspection".	F
Is the inspection result normal?	
YES >> GO TO 16. NO >> Replace EVAP control system pressure sensor.	G
16. CHECK EVAP PURGE LINE	G
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper of	connection
Refer to <u>EC-69. "System Description"</u> .	H
Is the inspection result normal?	
YES >> GO TO 17.	I.
NO >> Repair or reconnect the hose. 17.CLEAN EVAP PURGE LINE	
Clean EVAP purge line (pipe and rubber tube) using air blower.	J
>> GO TO 18.	
18. CHECK EVAP/ORVR LINE	K
Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and	improper con-
nection. For location, refer to EC-390, "Description".	L
Is the inspection result normal?	
YES >> GO TO 19. NO >> Repair or replace hoses and tubes.	M
19 CHECK RECIRCULATION LINE	111
Check recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, lo	ooseness and
improper connection. <u>Is the inspection result normal?</u>	
YES >> GO TO 20.	
NO >> Repair or replace hose, tube or filler neck tube.	0
20. CHECK REFUELING EVAP VAPOR CUT VALVE	
Refer to EC-393, "Component Inspection".	Р
Is the inspection result normal?	
YES >> GO TO 21. NO >> Replace refueling EVAP vapor cut valve with fuel tank.	
21.CHECK FUEL LEVEL SENSOR	
Refer to <u>MWI-44, "Component Inspection"</u> .	
tere to <u>www-44, component inspection</u> .	

EC-299

Is the inspection result normal?

YES >> GO TO 22. NO >> Replace fuel level sensor unit.

22. CHECK INTERMITTENT INCIDENT

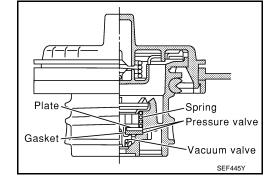
Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK FUEL TANL VACUUM RELIEF VALVE

- 1. Turn ignition switch OFF.
- 2. Remove fuel filler cap.
- 3. Wipe clean valve housing.



Vacuum/Pressure gauge

One-way valve

Fuel filler

Fuel filler cap adapter

cap

ī

4. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi) Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)

Is the inspection result normal?

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

2.REPLACE FUEL FILLER CAP

Replace fuel filler cap. CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

>> INSPECTION END

INFOID:000000003069306

Vacuum/

Pressure

SEF9435

pump

P0460 FUEL LEVEL SENSOR

Description

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0460 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal be- ing varied is sent from the fuel level sensor to ECM.	 Harness or connectors (The CAN communication line is open or shorted) Harness or connectors (The sensor circuit is open or shorted) Combination meter Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and wait maximum of 2 consecutive minutes.
 Check 1st trip DTC.

2. Oncer 13t trip DTO.

Is 1st trip DTC detected?

YES >> Go to <u>EC-301, "Diagnosis Procedure"</u>.

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK COMBINATION METER FUNCTION

Refer to MWI-43, "Component Function Check".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to <u>MWI-35</u>, "Diagnosis Description"

2.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

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P0461 FUEL LEVEL SENSOR

Description

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line.

It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0461 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Driving long distances naturally affect fuel gauge level.

This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0461	Fuel level sensor circuit range/performance	The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long dis- tance.	 Harness or connectors (The CAN communication line is open or shorted) Harness or connectors (The sensor circuit is open or shorted) Combination meter Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-302, "Component Function Check".

Use component function check to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-303, "Diagnosis Procedure".

Component Function Check

INFOID:000000003069312

1.PRECONDITIONING

WARNING:

When performing following procedure, be sure to observe the handling of the fuel. Refer to <u>FL-11</u>, <u>"Removal and Installation"</u>.

TESTING CONDITION:

Before starting component function check, preparation of draining fuel and refilling fuel is required.

Do you have CONSULT-III?

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

2.PERFORM COMPONENT FUNCTION CHECK

With CONSULT-III

NOTE:

Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.

2. Release fuel pressure from fuel line, refer to EC-454, "Inspection".

3. Remove the fuel feed hose on the fuel level sensor unit.

P0461 FUEL LEVEL SENSOR

< COMPONENT DIAGNOSIS >	[QR25DE]	
 Connect a spare fuel hose where the fuel feed hose was removed. Turn ignition switch OFF and wait at least 10 seconds then turn ON (engine stopped). Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-III. 		A
 Check "FUEL LEVEL SE" output voltage and note it. Select "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-III. Touch "ON" and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it. Check "FUEL LEVEL SE" output voltage and note it. 		EC
 Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal). Check "FUEL LEVEL SE" output voltage and note it. Confirm whether the voltage changes more than 0.03V during step 7 to 10 and 10 to 12. 		С
Is the inspection result normal?		
YES >> INSPECTION END NO >> Go to <u>EC-303, "Diagnosis Procedure"</u> .		D
3. PERFORM COMPONENT FUNCTION CHECK		
-		Ε
Without CONSULT-III NOTE:		
Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 L Imp gal) in advance.	JS gal, 6-5/8	F
1. Prepare a fuel container and a spare hose.		
2. Release fuel pressure from fuel line. Refer to <u>EC-454. "Inspection"</u> .		
 Remove the fuel feed hose on the fuel level sensor unit. Connect a spare fuel hose where the fuel feed hose was removed. 		G
5. Turn ignition switch ON.		
 Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment. Confirm that the fuel gauge indication varies. 		Н
8. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).		
9. Confirm that the fuel gauge indication varies. Is the inspection result normal?		I
YES >> INSPECTION END		
NO >> Go to EC-303, "Diagnosis Procedure".		I
Diagnosis Procedure	IFOID:000000003069313	J
1.CHECK COMBINATION METER FUNCTION		K
Refer to <u>MWI-43, "Component Function Check"</u> .		
<u>Is the inspection result normal?</u> YES >> GO TO 2.		L
NO >> Go to <u>MWI-43, "Diagnosis Procedure"</u>		
2. CHECK INTERMITTENT INCIDENT		в. Л
Refer to GI-42, "Intermittent Incident".		Μ
>> INSPECTION END		N
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P0462, P0463 FUEL LEVEL SENSOR

Description

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line.

It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

INFOID:000000003069315

DTC DETECTION LOGIC

NOTE:

• If DTC P0462 or P0463 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

This diagnosis indicates the former, to detect open or short circuit malfunction.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0462	Fuel level sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (The CAN communication line is open or
P0463	Fuel level sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	 shorted) Harness or connectors (The sensor circuit is open or shorted) Combination meter Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 11V and 16V at ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-304, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000003069316

1. CHECK COMBINATION METER FUNCTION

Refer to MWI-43, "Component Function Check".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to <u>MWI-43</u>, "Diagnosis Procedure"

2. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

EC-304

>> INSPECTION END

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P0500 VSS

Description

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from hybrid vehicle control ECU, and the other is from brake ECU. The ECM uses these signals for engine control.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500	Vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	 Harness or connectors (The CAN communication line is open or short- ed) Hybrid vehicle control ECU Brake ECU

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If this test is conducted with the drive wheels lifted, activate "INPSECTION MODE 1" (<u>HBC-97</u>). If a road test is expected to be easier, it is unnecessary to lift up the vehicle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON (READY).
- 2. Drive the vehicle at more than 40 km/h (25 MPH) for at least 2 minutes. CAUTION:

Always drive vehicle at a safe speed.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-306, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK DTC WITH HYBRID VEHICLE CONTROL ECU

Refer to HBC-611, "DTC Index".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace.

2. CHECK BARAKE ECU

Refer to <u>BRC-156, "DTC Index"</u>.

>> INSPECTION END

INFOID:000000003069317

INFOID:000000003069318

P0506 ISC SYSTEM

< COMPONENT DIAGNOSIS >

P0506 ISC SYSTEM

Description

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up and deceleration.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0506	Idle speed control sys- tem RPM lower than ex- pected	The idle speed is less than the target idle speed by 100 rpm or more.	Electric throttle control actuatorIntake air leak	
DTC CON	FIRMATION PROC	EDURE		
1.preco	NDITIONING			
ng the nex 1. Turn ig	t test.	nas been previously conducted, always p I wait at least 10 seconds.	perform the following before conduct-	
3. Turn ig f the targe Special Re	nition switch OFF and et idle speed is out o pair Requirement", I	l wait at least 10 seconds. of the specified value, perform <u>EC-16</u> before conducting DTC Confirmation		
FECTINIC (JUNDITION:			
Before p		ing procedure, confirm that battery ve temperature above –10°C(14°F).	oltage is more than 11V at idle.	
Before p Always p			oltage is more than 11V at idle.	
Before p Always p	perform the test at a	temperature above –10°C(14°F).	oltage is more than 11V at idle.	
Before p Always p >> 2.PERFOI . Activat peratur	■ GO TO 2. RM DTC CONFIRMA [®] e "INSPECTION MOE re.	temperature above –10°C(14°F). TION PROCEDURE DE 1" (<u>HBC-97</u> .) to start engine, and warr		
 Before p Always p >> 2.PERFOI 1. Activat peratur 2. Turn ig 	► GO TO 2. RM DTC CONFIRMA ^T e "INSPECTION MOE re. Inition switch OFF and	temperature above –10°C(14°F). TION PROCEDURE		
 Before p Always p Always p PERFOI Activat peratur Turn ig Turn ig Turn ig Activat 	Serform the test at a GO TO 2. RM DTC CONFIRMA e "INSPECTION MOE re. Inition switch OFF and Inition switch OFF and Inition switch OFF and e "INSPECTION MOE	temperature above –10°C(14°F). TION PROCEDURE DE 1" (<u>HBC-97</u> .) to start engine, and warr	m up engine to normal operating tem-	
 Before p Always p PERFOI Activat peratur Turn ig Turn ig Activat Activat Check 	GO TO 2. RM DTC CONFIRMA e "INSPECTION MOE re. Inition switch OFF and Inition switch OFF and Inition switch OFF and	temperature above –10°C(14°F). TION PROCEDURE DE 1" (<u>HBC-97</u> .) to start engine, and warr I wait at least 10 seconds.	m up engine to normal operating tem-	
 Before p Always p Always p PERFOI Activat peratur Turn ig Turn ig Turn ig Activat Check S 1st trip D YES >> 	GO TO 2. RM DTC CONFIRMAT e "INSPECTION MOD re. Inition switch OFF and Inition switch OFF and Inition switch OFF and Inition switch OFF and 1st trip DTC.	temperature above –10°C(14°F). TION PROCEDURE DE 1" (<u>HBC-97</u> .) to start engine, and warr I wait at least 10 seconds. I wait at least 10 seconds. DE 1" (<u>HBC-97</u> .) to start engine, and let e	m up engine to normal operating tem-	
Always p Always p 2.PERFOI 1. Activat peratur 2. Turn ig 3. Turn ig 3. Turn ig 5. Activat 5.	Serform the test at a GO TO 2. RM DTC CONFIRMAT e "INSPECTION MOE re. Inition switch OFF and Inition switch OFF and witch SPECTION MOE 1st trip DTC. DTC detected? Go to EC-307. "Diag	temperature above –10°C(14°F). TION PROCEDURE DE 1" (<u>HBC-97</u> .) to start engine, and warr I wait at least 10 seconds. I wait at least 10 seconds. DE 1" (<u>HBC-97</u> .) to start engine, and let e	m up engine to normal operating tem-	

1. Activate "INSPECTION MODE 1" (HBC-97) to start.

2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

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[QR25DE]

INFOID:000000003069320

EC-307

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YES >> Discover air leak location and repair.

NO >> GO TO 2. 2.REPLACE ECM

- 1. Replace ECM.
- 2. Go to EC-14. "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

P0507 ISC SYSTEM

< COMPONENT DIAGNOSIS >

P0507 ISC SYSTEM

Description

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value С memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up and deceleration. D

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

	Trouble diagnosis name	DTC detecting condition	Possible cause
P0507	Idle speed control sys- tem RPM higher than expected	The idle speed is more than the target idle speed by 200 rpm or more.	 Electric throttle control actuator Intake air leak PCV system
TC CON	FIRMATION PROCE	EDURE	
.PRECO	NDITIONING		
		as been previously conducted, always	perform the following before conduct-
ng the nex		wait at least 10 seconds.	
. Turn ig	nition switch ON.		
		l wait at least 10 seconds. of the specified value, perform <u>EC-1</u>	6, "IDLE AIR VOLUME LEARNING :
pecial Re	<u>pair Requirement"</u> , b	before conducting DTC Confirmation	
	CONDITION: erforming the follow	ing procedure, confirm that battery	voltage is more than 11V at idle.
		temperature above –10°C(14°F).	j.
	• GO TO 2.		
_	RM DTC CONFIRMAT		
Activat			rm up engine to normal operating tem-
peratu	e "INSPECTION MOD re.	DE 1" (<u>HBC-97</u> .) to start engine, and wa	rm up engine to normal operating tem-
peratu . Turn ig	e "INSPECTION MOD re. Inition switch OFF and		rm up engine to normal operating tem-
peratur . Turn ig . Turn ig . Turn ig . Turn ig	e "INSPECTION MOD re. Inition switch OFF and Inition switch ON. Inition switch OFF and	DE 1" (<u>HBC-97</u> .) to start engine, and wa I wait at least 10 seconds. I wait at least 10 seconds.	
peratu . Turn ig . Turn ig . Turn ig . Activat	e "INSPECTION MOD re. Inition switch OFF and Inition switch ON. Inition switch OFF and e "INSPECTION MOD	DE 1" (<u>HBC-97</u> .) to start engine, and wa I wait at least 10 seconds.	
peratur 2. Turn ig 3. Turn ig 4. Turn ig 5. Activat 5. Check	e "INSPECTION MOD re. Inition switch OFF and Inition switch ON. Inition switch OFF and	DE 1" (<u>HBC-97</u> .) to start engine, and wa I wait at least 10 seconds. I wait at least 10 seconds.	
peratur Turn ig Turn ig Turn ig Activat Check S 1st trip D YES >>	e "INSPECTION MOD re. Inition switch OFF and Inition switch ON. Inition switch OFF and e "INSPECTION MOD 1st trip DTC. <u>OTC detected?</u> > Go to <u>EC-309. "Diag</u>	DE 1" (<u>HBC-97</u> .) to start engine, and wa I wait at least 10 seconds. I wait at least 10 seconds. DE 1" (<u>HBC-97</u> .) to start engine, and let	
peratur . Turn ig . Turn ig . Turn ig . Activat . Check <u>s 1st trip D</u> YES >> NO >>	e "INSPECTION MOD re. Inition switch OFF and Inition switch ON. Inition switch OFF and e "INSPECTION MOD 1st trip DTC. <u>OTC detected?</u> So to <u>EC-309, "Diag</u> INSPECTION END	DE 1" (<u>HBC-97</u> .) to start engine, and wa I wait at least 10 seconds. I wait at least 10 seconds. DE 1" (<u>HBC-97</u> .) to start engine, and let	
peratur Turn ig Turn ig Artivat Activat Check Safet trip D YES NO Safet Safet Safet Safet Safet Safet Safet Safet Safet Safet Safet Safet Safet Safe	e "INSPECTION MOD re. Inition switch OFF and Inition switch ON. Inition switch OFF and e "INSPECTION MOD 1st trip DTC. <u>OTC detected?</u> > Go to <u>EC-309. "Diag</u>	DE 1" (<u>HBC-97</u> .) to start engine, and wa I wait at least 10 seconds. I wait at least 10 seconds. DE 1" (<u>HBC-97</u> .) to start engine, and let	
peratur Turn ig Turn ig Activat Check 1st trip D YES NO S	e "INSPECTION MOD re. Inition switch OFF and Inition switch ON. Inition switch OFF and e "INSPECTION MOD 1st trip DTC. <u>OTC detected?</u> So to <u>EC-309, "Diag</u> INSPECTION END	DE 1" (<u>HBC-97</u> .) to start engine, and wa I wait at least 10 seconds. I wait at least 10 seconds. DE 1" (<u>HBC-97</u> .) to start engine, and let <u>nosis Procedure"</u> .	engine idle for at least 1 minute.

Is the inspection result normal?

YES >> GO TO 2.

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>> Repair or replace. 2. CHECK INTAKE AIR LEAK

- Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine.
 Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Discover air leak location and repair.

NO >> GO TO 3.

3.REPLACE ECM

NO

- 1. Replace ECM.
- 2. Go to EC-14, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

P0603 ECM POWER SUPPLY

Description

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc.

DTC Logic

DTC No.

P0603

DTC DETECTION LOGIC

cuit

Trouble diagnosis name

ECM power supply cir-

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

DTC detecting condition

ECM back-up RAM system does not function

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

- 2. PERFORM DTC CONFIRMATION PROCEDURE
- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Turn ignition switch ON (READY).
- 3. Depress the accelerator pedal to start engine, then keep engine running for at least 1 seconds.
- 4. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.

properly.

- 5. Repeat steps 2 and 4 for four times.
- 6. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to <u>EC-311, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK ECM POWER SUPPLY

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

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

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Possible cause

[ECM power supply (back-up) circuit is

Harness or connectors

open or shorted.]

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P0603 ECM POWER SUPPLY

< COMPONENT DIAGNOSIS >

EC	M			
Connector	Terminal	Ground	Voltage	
F13	77	Ground	Battery voltage	
Is the insp	ection re	sult norr	nal?	
	> GO TC			
-	> GO TC			
			NING PART	
Check the15A fuse				
• IPDM E/	R harnes	s conne		
 Harness 	for open	or shor	between ECN	A and battery
	- Ponair	or ronla	ce harness or	connectors
•	•	•	T INCIDENT	connectors.
Refer to <u>G</u> Is the insp				
-	> GO TC		<u>nar.</u>	
			ce harness or	connectors.
4. PERFC	ORM DTO		RMATION PR	OCEDURE
With CC				
	gnition sv "SELE-[e with CONSULT-III.
	"ERASE			
	rm DTC C-311, "I			OCEDURE.
Gee <u>⊏</u> @With G			<u>IC</u> .	
1. Turn ig	gnition sv			
	Service		n GST. I MATION PRC	
	<u>C-311, "I</u>			
<u>ls the 1st t</u>	rip DTC	<u>P0603 d</u>	isplayed agair	<u>1?</u>
	> GO TC			
_	> INSPE		END	
5.REPLA		1		
		<u>'ADDITI(</u>	ONAL SERVI	CE WHEN REPLACING CONTROL UNIT : Special Repair Require-
>	> INSPE	CTION I	END	

P0605 ECM

Description

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

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause	(-
		A)	ECM calculation function is malfunctioning.		_ 0
P0605	Engine control module	B)	ECM EEP-ROM system is malfunctioning.	• ECM	
		C)	ECM self shut-off function is malfunctioning.		H

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds. 1.
- Turn ignition switch ON. 2.
- Turn ignition switch OFF and wait at least 10 seconds. 3.

>> GO TO 2.

2.perform dtc confirmation procedure for malfunction a

Turn ignition switch ON. 1. Check 1st trip DTC. 2. Is 1st trip DTC detected? YES >> Go to EC-314, "Diagnosis Procedure". NO >> GO TO 3. **3.** PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B 1. Turn ignition switch ON and wait at least 1 second. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON. 2. 3. Check 1st trip DTC. Is 1st trip DTC detected? YES >> Go to EC-314, "Diagnosis Procedure". NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.

Turn ignition switch OFF, wait at least 10 seconds, and then turn ON. 2.

Repeat step 2 for 32 times. 3.

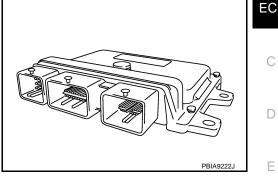
Check 1st trip DTC. 4.

Is 1st trip DTC detected?

EC-313

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YES >> Go to <u>EC-314</u>, "<u>Diagnosis Procedure</u>". NO >> INSPECTION END

Diagnosis Procedure

1.INSPECTION START

With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "SELF-DIAG RESULTS" mode with CONSULT-III.
- 3. Touch "ERASE".
- 4. Perform DTC CONFIRMATION PROCEDURE. See <u>EC-313</u>, "DTC Logic".

With GST

- 1. Turn ignition switch ON.
- 2. Select Service \$04 with GST.
- 3. Perform DTC CONFIRMATION PROCEDURE. See <u>EC-313, "DTC Logic"</u>.

Is the 1st trip DTC P0605 displayed again?

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

2.REPLACE ECM

- 1. Replace ECM.
- 2. Go to EC-14, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

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[QR25DE]

P0607 ECM

Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle mul-EC tiplex 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.

DTC Logic

INFOID:000000003069140

DTC DETECTION LOGIC

	Trouble diagnosis name	DTC detecting condition	Possible cause
P0607	CAN controller	When detecting error during the initial diagnosis of CAN controller of ECM.	• ECM
P0007	HEV SYSTEM CAN controller	When detecting error during the initial diagno- sis of HEV SYSTEM CAN controller of ECM.	
DTC CON	FIRMATION PROCEDU	RE	
1. PERFO	RM DTC CONFIRMATION	PROCEDURE	
1. Turn ig 2. Check	nition switch ON and wait a	at least 3 seconds.	
Is DTC det	-		
	Go to <u>EC-315, "Diagnosis</u>	<u>Procedure"</u> .	
	NSPECTION END		
	s Procedure		INFOID:00000003069141
1.INSPEC	TION START		
With CO 1. Turn ig	Inition switch ON.		
2. Select	"SELF-DIAG RESULTS" m	ode with CONSULT-III.	
4. Perforr	"ERASE". m DTC CONFIRMATION P	ROCEDURE.	
	<u>C-315, "DTC Logic"</u> .		
5. Check (a) Check (b) Check (c) Ch	DTC.		
5. Check	DTC.		
 Check With GS Turn ig Select Perforr 	DTC. T prition switch ON. "Service \$04" with GST. m DTC CONFIRMATION P		
 Check With GS Turn ig Select Perforr 	DTC. T inition switch ON. "Service \$04" with GST. m DTC CONFIRMATION P <u>C-315, "DTC Logic"</u> .		
 Check With GS Turn ig Select Perforr See E(Check Is the DTC 	DTC. T prition switch ON. "Service \$04" with GST. m DTC CONFIRMATION P <u>C-315, "DTC Logic"</u> . DTC. <u>P0607 displayed again?</u>		
5. Check With GS 1. Turn ig 2. Select 3. Perforr See E(4. Check Is the DTC YES >>	DTC. T prition switch ON. "Service \$04" with GST. m DTC CONFIRMATION P <u>C-315. "DTC Logic"</u> . DTC.		

ment".

>> INSPECTION END

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P0643 SENSOR POWER SUPPLY

DTC Logic

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INFOID:000000003069333

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0643	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	 Harness or connectors (TP sensor circuit is shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] Throttle position sensor Camshaft position sensor (PHASE)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON (READY).
- 2. Depress the accelerator pedal to start engine, then keep engine running for at least 1 second.
- 3. Check DTC.

Is DTC detected?

YES >> Go to EC-316. "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. 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
F13	47	Electric throttle control actuator	F57	1
	59	CMP sensor (PHASE)	F55	1

Is the inspection result normal?

YES >> GO TO 3.

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

EC-316

P0643 SENSOR POWER SUPPLY

< COMPONENT DIAGNOSIS > [QR25DE]
3. CHECK CAMSHAFT POSITION SENSOR (PHASE)	
Refer to EC-256, "Component Inspection".	_ A
Is the inspection result normal?	
YES >> GO TO 4. NO >> Replace malfunctioning component.	EC
4. CHECK TP SENSOR	
Refer to EC-171, "Component Inspection".	— C
Is the inspection result normal?	
YES >> GO TO 6. NO >> GO TO 5.	D
5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR	
 Replace electric throttle control actuator. Go to <u>EC-317</u>, "Special Repair Requirement". 	E
>> INSPECTION END	F
6.CHECK INTERMITTENT INCIDENT	
Refer to GI-42, "Intermittent Incident".	G
>> INSPECTION END	
Special Repair Requirement	334
1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	
Refer to EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"	-
>> GO TO 2.	1
2. PERFORM IDLE AIR VOLUME LEARNING	0
Refer to EC-16. "IDLE AIR VOLUME LEARNING : Special Repair Requirement"	K
>> END	
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P0AC4 HV MIL ON REQUEST

Description

This DTC is displayed when a malfunction is detected by HV ECU. Check DTC for HV ECU and perform the trouble diagnosis. Refer to <u>HBC-611</u>, "<u>DTC Index</u>". After repair work, erase DTC in ECM.

P1148 CLOSED LOOP CONTROL

DTC Logic

DTC DETECTION LOGIC NOTE: DTC P1148 is displayed with another DTC for A/F sensor 1. Perform the trouble diagnosis for the corresponding DTC.

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DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1148	Closed loop control function	The closed loop control function for bank 1 does not operate even when vehicle is driving in the specified condition.	 Harness or connectors (The A/F sensor 1 circuit is open or short- ed.) A/F sensor 1 A/F sensor 1 heater 	D

P1195 ENGINE DOES NOT START

< COMPONENT DIAGNOSIS >

P1195 ENGINE DOES NOT START

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1195 is displayed with DTC P0201, P0202, P0203, P0204, first perform the trouble diagnosis for DTC P0201, P0202, P0203, P0204. Refer to <u>EC-236, "DTC Logic"</u>.
- If DTC P1195 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to <u>EC-250, "DTC Logic"</u>.
- If DTC P1195 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to <u>EC-254, "DTC Logic"</u>.
- If DTC P1195 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-313, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1195	Engine does not start	When the engine is abnormal, and the engine does not start.	 Intake air leaks Incorrect PCV hose connection Mass air flow sensor Electric throttle control actuator Fuel injector Fuel run out Incorrect fuel pressure Spark plug Ignition coil Ignition signal circuit is open or shorted Insufficient compression

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON (READY).
- 2. Depress accelerator pedal and wait at least 15 seconds.
- 3. Check DTC.

Is DTC detected?

- YES >> Go to EC-320, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK FOR INTAKE AIR LEAK

- 1. Visually check for the cause of intake air leak after the mass air flow sensor.
- 2. Check PCV hose connection.

Intake air leak detected?

YES >> Repair or replace.

2. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.

EC-320

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P1195 ENGINE DOES NOT START

< COMPONENT DIAGNOSIS >

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- 2. Check if foreign matter is caught between the throttle valve (1) and the housing. А Electric throttle control actuator 2. <⊐ : Vehicle front EC Is the inspection result normal? YES >> GO TO 3. NO >> Remove the foreign matter and clean the electric throttle control actuator inside. ALBIA01502 **3.**CHECK FUEL PUMP FUNCTION D Refer to EC-380, "Component Function Check". Is the inspection result normal? Е YES >> GO TO 4. NO >> Go to EC-380, "Diagnosis Procedure". 4.CHECK MASS AIR FLOW SENSOR F Check mass air flow sensor. Refer to EC-148, "Component Inspection". Is the inspection result normal? YES >> GO TO 5. NO >> Replace mass air flow sensor. **5.**CHECK FUEL PRESSURE Н 1. Release fuel pressure to zero. Refer to EC-454, "Inspection". 2. Install fuel pressure gauge and check fuel pressure. Refer to EC-454. "Inspection". Is the inspection result normal? YES >> GO TO 7. NO >> GO TO 6. **O.** DETECT MALFUNCTIONING PART Check fuel hoses and fuel tubes for clogging. Is the inspection result normal? Κ YES >> Replace "fuel filter and fuel pump assembly". NO >> Repair or replace 7. CHECK FUEL INJECTOR L Check fuel injector. Refer to EC-237, "Component Inspection". Is the inspection result normal? M YES >> GO TO 8. NO >> Replace malfunctioning fuel injector. **8.**CHECK SPARK PLUG Ν Check spark plug. Refer to EM-13, "Removal and Installation". Is the inspection result normal? YES >> GO TO 9. NO >> Clean or replace spark plug. 9.CHECK IGNITION COIL AND CIRCUIT Check ignition coil and circuit. Refer to EC-384, "Component Function Check". Is the inspection result normal? YES >> GO TO 10. NO >> Go to EC-384, "Diagnosis Procedure". 10. CHECK COMPRESSION PRESSURE
- Check compression pressure. Refer to EM-21. "Compression pressure".

EC-321

P1195 ENGINE DOES NOT START

< COMPONENT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 11.

NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

11.CHECK SYMPTOM TABLE

Check items on the no start symptom in EC-443. "Symptom Table".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace.

12. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

P1196 POOR ENGINE POWER

< COMPONENT DIAGNOSIS >

P1196 POOR ENGINE POWER

DTC Logic

	gic		INFOID:000000003069339	
DTC DE ⁻ NOTE:	FECTION LOGIC			EC
 If DTC for DTC If DTC 	; P0201, P0202, P020	3, P0204. Refer to <u>EC-236, "DT(</u>	P0204, first perform the trouble diagnosis <u>Clogic"</u> . e trouble diagnosis for DTC P0335. Refer	С
 If DTC to EC-2 If DTC 	P1196 is displayed w 54, "DTC Logic".	<i>ŕ</i> •	e trouble diagnosis for DTC P0340. Refer e trouble diagnosis for DTC P0605. Refer	D
ECM calc nal sent fi	ulates the target torqu rom HV ECU.	e based on the engine power requed torque based on the generator	uest signal and the engine speed request sig-	E
ECM com	pares the calculated t	arget torque with the estimated to	rque sent from HV ECU.	F
DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	

DIC NO.	I rouble diagnosis name	DIC detecting condition	Possible cause	
P1196	Poor engine power	The estimated torque is excessively low compared with the target torque	 Intake air leaks Incorrect PCV hose connection Mass air flow sensor Electric throttle control actuator Fuel injector Fuel run out Incorrect fuel pressure Spark plug Ignition coil Ignition signal circuit is open or shorted Insufficient compression 	G H I

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conduct-Κ ing the next test.

- Turn ignition switch OFF and wait at least 10 seconds. 1.
- Turn ignition switch ON. 2.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

Do you have CONSULT-III?

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

2. PERFORM DTC CONFIRMATION PROCEDURE

(P)With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (HBC-97) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10seconds.
- 3. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10seconds. 4.
- 5. Turn ignition switch ON (READY).
- Ρ 6. Select "POOR ENG PWR P1196" of "ENGINE PERFORMANCE" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 7. Touch "START".
- 8. Drive vehicle at a speed of 60 km/h (37 MPH) or more until "TESTING" on CONSULT-III changes to "COMPLETED". (It will take approximately 10 seconds.) **CAUTION:**

Always drive vehicle at a safe speed. NOTE:

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EC-323

P1196 POOR ENGINE POWER

< COMPONENT DIAGNOSIS >

Keep the vehicle speed as steady as possible during the cruising.

9. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT-III?

OK >> INSPECTION END

NG >> Go to <u>EC-324</u>, "Diagnosis Procedure".

3.PERFORM DTC CONFIRMATION PROCEDURE

With GST

- Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10seconds.
- 5. Turn ignition switch ON (READY).
- 6. Drive vehicle at a speed of 60 km/h (37 MPH) or more for at least 10 seconds.

CAUTION: Always drive vehicle at a safe speed. NOTE:

Keep the vehicle speed as steady as possible during the cruising.

7. Check DTC.

Is DTC detected?

- YES >> Go to EC-324, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK FOR INTAKE AIR LEAK

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and let engine idle.
- 2. Listen for an intake air leak after the mass air flow sensor.
- 3. Check PCV hose connection.

Intake air leak detected?

- YES >> Repair or replace.
- NO >> GO TO 2.

2.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.

- 2. Remove the intake air duct.
- 3. Check if foreign matter is caught between the throttle valve (1) and the housing.
 - 2. Electric throttle control actuator

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

3.CHECK FUEL PUMP FUNCTION

Refer to EC-380, "Component Function Check".

Is the inspection result normal?

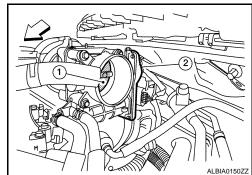
YES >> GO TO 4.

NO >> Go to EC-380, "Diagnosis Procedure".

4.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-148. "Component Inspection".

Is the inspection result normal?



P1196 POOR ENGINE POWER

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P1197 FUEL RUN OUT

DTC Logic

This DTC may be detected if the vehicle continues turning counterclockwise over a certain speed for a length of time.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1197	Fuel run out	Detecting condition for P1196 or P1197 is satisfied and low voltage from the fuel level sensor is sent to ECM		

DTC CONFIRMATION PROCEDURE

1.REFILL FUEL

Refill the fuel until low fuel warning light turned OFF.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1195

Perform DTC CONFIRMATION PROCEDURE for DTC P1195. Refer to EC-320, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to EC-320, "Diagnosis Procedure".

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1196

Perform DTC CONFIRMATION PROCEDURE for DTC P1196. Refer to EC-323, "DTC Logic".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-324, "Diagnosis Procedure".

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< COMPONENT DIAGNOSIS >

P1217 ENGINE OVER TEMPERATURE

DTC Logic

DTC DETECTION LOGIC

NOTE:

• If DTC P1217 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

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.

	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217	Engine over tempera- ture (Overheat)	 Cooling fan does not operate properly (Overheat). Cooling fan system does not operate properly (Overheat). Engine coolant was not added to the system using the proper filling method. Engine coolant is not within the specified range. 	 Harness or connectors (The cooling fan circuit is open or short- ed.) IPDM E/R Cooling fan relays-1 Cooling fan motors Radiator hose Radiator rose Radiator cap Reservoir tank Water pump Thermostat Water control valve
Changing Engine Oil 1. Fill rac use co	alfunction is indicate <u>Engine Coolant"</u> . A <u>"</u> . diator with coolant u polant with the prope	ed, be sure to replace the coolant. Ref Iso, replace the engine oil. Refer to p to specified level with a filling spee r mixture ratio. Refer to <u>MA-10, "Fluid</u> engine to ensure that no water-flow n	MA-17, "ENGINE OIL : Changing d of 2 liters per minute. Be sure to s and Lubricants".
DTC CON	FIRMATION PROC	EDURE	
I DEDEO			
			ion Chock"
Perform co NOTE: Use compo not be conf Is the inspe YES >>	mponent function che onent function check to firmed. <u>ection result normal?</u> > INSPECTION END	ck. Refer to <u>EC-327, "Component Funct</u> o check the overall function of the cooling	
Perform co NOTE: Use compond not be conf Is the inspective YES >> NO >>	mponent function che onent function check to firmed. <u>ection result normal?</u> > INSPECTION END > Go to <u>EC-328. "Diag</u>	ck. Refer to <u>EC-327. "Component Funct</u> o check the overall function of the cooling <u>nosis Procedure"</u> .	
Perform co NOTE: Use componded Is the inspective YES >> NO >> Compon	mponent function che onent function check to firmed. <u>ection result normal?</u> > INSPECTION END	ck. Refer to <u>EC-327. "Component Funct</u> o check the overall function of the cooling <u>nosis Procedure"</u> . ck	

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

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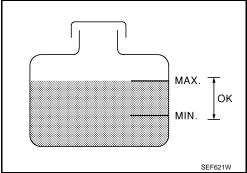
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< COMPONENT DIAGNOSIS >

[QR25DE]

Check the coolant level in the reservoir tank and radiator. **Allow engine to cool before checking coolant level.** <u>Is the coolant level in the reservoir tank and/or radiator below the</u> <u>proper range?</u>

YES >> Go to <u>EC-328, "Diagnosis Procedure"</u>. NO >> GO TO 2.



2. PERFORM COMPONENT FUNCTION CHECK-II

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

YES >> Go to EC-328, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that cooling fan speed varies according to the percent.

Without CONSULT-III

Perform IPDM E/R auto active test and check cooling fan motors operation, refer to <u>PCS-10, "Diagnosis</u> <u>Description"</u>.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-328, "Diagnosis Procedure".

Diagnosis Procedure

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1.CHECK COOLING FAN OPERATION

With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that cooling fan speed varies according to the percent.

Without CONSULT-III

- Perform IPDM E/R auto active test and check cooling fan motors operation, refer to <u>PCS-10</u>, "<u>Diagnosis</u> <u>Description</u>".
- 2. Make sure that cooling fan operates.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Go to <u>EC-376</u>, "Diagnosis Procedure".

2.CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-10, "System Inspection".

Is leakage detected?

YES >> GO TO 3.

NO >> GO TO 4.

 $\mathbf{3}.$ CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak. Refer to CO-10, "System Inspection".

- Hose
- Radiator
- Water pump

P1217 ENGINE OVER TEMPERATURE	
< COMPONENT DIAGNOSIS >	[QR25DE]
>> Repair or replace malfunctioning part.	
4.CHECK RADIATOR CAP	A
Check radiator cap. Refer to CO-14, "Removal and Installation".	
Is the inspection result normal?	EC
YES >> GO TO 5. NO >> Replace radiator cap.	
5. CHECK THERMOSTAT	С
Check thermostat. Refer to CO-20. "Removal and Installation".	
Is the inspection result normal?	D
YES >> GO TO 6.	D
NO >> Replace thermostat.	
6. CHECK WATER CONTROL VALVE	E
Check water control valve. Refer to CO-22, "Removal and Installation".	
Is the inspection result normal?	
YES >> GO TO 7.	F
NO >> Replace water control valve	
I CHECK ENGINE COOLANT TEMPERATURE SENSOR	0
Refer to EC-167, "Component Inspection".	G
Is the inspection result normal?	
YES >> GO TO 8.	Н
NO >> Replace engine coolant temperature sensor.	
8 CHECK MAIN 12 CAUSES	

8.CHECK MAIN 13 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-10, "Fluids and Lubri- cants"
	3	Coolant level	Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	MA-12, "ENGINE COOL- ANT : Changing Engine Coolant"
-	4	Radiator cap	Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm ² , 9 - 14 psi) (Limit)	CO-14, "Removal and In- stallation"
ON* ²	5	Coolant leaks	Visual	No leaks	CO-10, "System Inspec- tion"
ON* ²	6	Thermostat	 Touch the upper and lower radiator hoses 	Both hoses should be hot	CO-20, "Removal and In- stallation"
ON* ¹	7	Cooling fan motor	CONSULT-III	Operating	EC-376, "Component Function Check"
OFF	8	Combustion gas leak	Color checker chemical tester 4 Gas analyzer	Negative	_
ON* ³	9	Coolant temperature gauge	Visual	Gauge less than 3/4 when driving	_
		Coolant overflow to res- ervoir tank	Visual	No overflow during driving and idling	CO-10, "System Inspec- tion"
OFF* ⁴	10	Coolant return from res- ervoir tank to radiator	Visual	Should be initial level in reservoir tank	CO-10, "System Inspec- tion"

EC-329

< COMPONENT DIAGNOSIS >

[QR25DE]

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	11	Water control valve	Remove and inspect the valve	Within the specified value	CO-22, "Removal and In- stallation"
OFF	12	Cylinder head	Straight gauge feeler gauge	0.1 mm (0.004 in) Maxi- mum distortion (warping)	EM-66, "Inspection After Disassembly"
	13	Cylinder block and pis- tons	• Visual	No scuffing on cylinder walls or piston	EM-82, "Inspection After Disassembly"

*1: Turn the ignition switch ON.

*2: Engine running at 2,500 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-8, "Troubleshooting Chart".

>> INSPECTION END

P1225 TP SENSOR

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

sively low.

DTC Logic

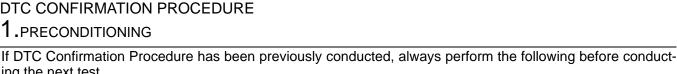
DTC No.

P1225

DTC DETECTION LOGIC

Trouble diagnosis name Closed throttle position

learning performance



ing the next test. Turn ignition switch OFF and wait at least 10 seconds. 1.

2. Turn ignition switch ON.

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

TESTING CONDITION:

1.PRECONDITIONING

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

DTC detecting condition

Closed throttle position learning value is exces-

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON. 2. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch ON. Check 1st trip DTC. 4 Is 1st trip DTC detected? YES >> Go to EC-331, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.

Remove the intake air duct. 2.

EC Throttle position sensor 6.0 sensor Sensor 1 Throttle position s output voltage 0.6 4.0 Seńsor 2 45 90 135 Throttle valve opening angle (deg) Е PBIB0145E

Possible cause

Electric throttle control actuator

(TP sensor 1 and 2)

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P1225 TP SENSOR

< COMPONENT DIAGNOSIS >

- 3. Check if foreign matter is caught between the throttle valve (1) and the housing.
 - 2. Electric throttle control actuator
 - <□ : Vehicle front

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

 $2. {\tt Replace electric throttle control actuator}$

- 1. Replace electric throttle control actuator.
- 2. Go to EC-332. "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

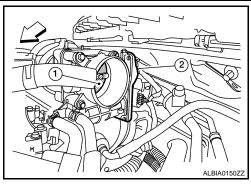
Refer to EC-332, "Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-332, "Special Repair Requirement"

>> END



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[QR25DE]

P1226 TP SENSOR

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

DTC No.

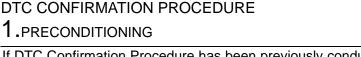
P1226

DTC DETECTION LOGIC

Trouble diagnosis name

Closed throttle position

learning performance



If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

DTC detecting condition

Closed throttle position learning is not per-

formed successfully, repeatedly.

- Turn ignition switch OFF and wait at least 10 seconds. 1.
- Turn ignition switch ON. 2.
- Turn ignition switch OFF and wait at least 10 seconds. 3.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.	L
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Repeat steps 2 and 3 for 32 times. Check 1st trip DTC. 	M
Is 1st trip DTC detected? YES >> Go to EC-333, "Diagnosis Procedure". NO >> INSPECTION END	Ν
Diagnosis Procedure	0
1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY	
1. Turn ignition switch OFF.	Ρ

2. Remove the intake air duct.

EC Throttle position sensor 6.0 sensor Sensor 1 Throttle position s output voltage 0.6 4.0 Seńsor 2 45 90 135 Throttle valve opening angle (deg) Е PBIB0145E

Possible cause

· Electric throttle control actuator

(TP sensor 1 and 2)

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P1226 TP SENSOR

< COMPONENT DIAGNOSIS >

- 3. Check if foreign matter is caught between the throttle valve (1) and the housing.
 - 2. Electric throttle control actuator
 - <□ : Vehicle front

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

 $2. {\tt Replace electric throttle control actuator}$

- 1. Replace electric throttle control actuator.
- 2. Go to EC-332. "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

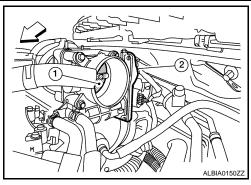
Refer to EC-334, "Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-334, "Special Repair Requirement"

>> END



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[QR25DE]

P1421 COLD START CONTROL

< COMPONENT DIAGNOSIS >

P1421 COLD START CONTROL

Description

ECM controls ignition timing and engine speed when engine is started with prewarming up condition. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

DTC Logic

DTC DETECTION LOGIC

NOTE: If DTC P1421 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No	Trouble diagnosis name	DTC detecting condition	Possible cause
P1421	Cold start emission reduction strategy monitoring	ECM does not control ignition timing and engine speed properly when engine is started with pre- warming up condition.	Lack of intake air volumeFuel injection systemECM
	NFIRMATION PROCEDUR	F	
		-	
			<u> </u>
f DTC Co ng the ne		en previously conducted, always perform t	he following before conduct-
	ignition switch OFF and wait a	at least 10 seconds.	
2. Turn	ignition switch ON.		
	ignition switch OFF and wait a	at least 10 seconds.	
	CONDITION:	cedure, confirm that battery voltage is n	nore than 11V at idle
serence p		searce, commination ballery voltage is in	
	>> GO TO 2.		
~	ORM DTC CONFIRMATION F		
		ROCEDORE	
9	ONSULT-III		
	ignition switch OFF and wait a elector lever to P position.	at least 10 seconds.	
	ignition switch ON.		
4. Make	sure that air conditioner swite	ch and electric load switches (lights, heate	r fan, rear window defogger)
are C			
	t "DATA MONITOR" mode wi	n CONSULT-III. ' indication is between 4°C (39°F) and 36°	C (97°E)
		within the specified value, go to the follow	
lf "CO	OOLAN TEMP/S" indication is	out of the specified value, cool engine dow	
to ste			
7. Conf 70 %		in "DATA MONITOR" mode of "HYBRID S	YSTEM [®] is between 40 and
10 /0			
3. Turn	Ignition Switch ON (READY) a	nd wait for 70 seconds.	
9. Chec	k 1st trip DTC.	nd wait for 70 seconds.	
9. Cheo Cheo With G	k 1st trip DTC. ST		
9. Chec With G 1. Turn	k 1st trip DTC. ST ignition switch OFF and wait a		
9. Cheo	k 1st trip DTC. ST ignition switch OFF and wait a elector lever to P position.		
 Chece With G Turn Set s Turn 	k 1st trip DTC. ST ignition switch OFF and wait a elector lever to P position. ignition switch ON.		r fan, rear window defogger)
 A. Check With G I. Turn 2. Set s 3. Turn 4. Make are C 	k 1st trip DTC. ST ignition switch OFF and wait a elector lever to P position. ignition switch ON. sure that air conditioner swit DFF.	at least 10 seconds. ch and electric load switches (lights, heate	
 Chec With G Turn Set s Turn Turn Make are C Chec 	k 1st trip DTC. ST ignition switch OFF and wait a elector lever to P position. ignition switch ON. sure that air conditioner swit DFF. k engine coolant temperature	at least 10 seconds.	
 Check With G Turn Set s Turn Turn Turn Are C 4°C (k 1st trip DTC. ST ignition switch OFF and wait a elector lever to P position. ignition switch ON. sure that air conditioner swit PFF. k engine coolant temperature 39°F) and 36°C (97°F).	at least 10 seconds. ch and electric load switches (lights, heate	

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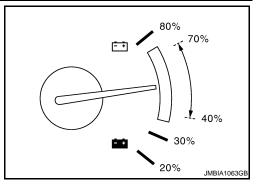
P1421 COLD START CONTROL

< COMPONENT DIAGNOSIS >

- 6. Check high voltage battery status meter in combination meter and confirm that the indication is between 40 and 70 % as shown in the figure.
- 7. Turn ignition switch ON (READY) and wait for 70 seconds.
- 8. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-336. "Diagnosis Procedure".
- NO >> INSPECTION END



Diagnosis Procedure

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1.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-16, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

- YES >> GO TO 2.
- NO >> Follow the instruction of Idle Air Volume Learning.
- 2. CHECK INTAKE SYSTEM

Check for the cause of intake air volume lacking. Refer to the following.

- Crushed intake air passage
- Intake air passage clogging

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part

3.CHECK FUEL INJECTION SYSTEM FUNCTION

Perform DTC CONFIRMATION PROCEDURE for DTC P0171. Refer to EC-222, "DTC Logic".

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Go to <u>EC-223</u>, "Diagnosis Procedure" for DTC P0171.

4.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "SELF DIAG RESULTS" mode with CONSULT-III.
- 3. Touch "ERASE".
- 4. Perform DTC CONFIRMATION PROCEDURE. See <u>EC-335</u>, "DTC Logic".

With GST

- 1. Turn ignition switch ON.
- 2. Select Service \$04 with GST.
- 3. Perform DTC CONFIRMATION PROCEDURE. See <u>EC-335. "DTC Logic"</u>.

Is the 1st trip DTC P1421 displayed again?

- YES >> GO TO 5.
- NO >> INSPECTION END

5.REPLACE ECM

- 1. Replace ECM.
- 2. Go to EC-14, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"

>> INSPECTION END

[QR25DE]

P1564 ASCD STEERING SWITCH

Description

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated. Refer to EC-45, "System Description" for the ASCD function.

DTC Logic

DTC DETECTION LOGIC NOTE:

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-313, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause		
P1564	ASCD steering switch	 An excessively high voltage signal from the ASCD steering switch is sent to ECM. ECM detects that input signal from the ASCD steering switch is out of the specified range. ECM detects that the ASCD steering switch is stuck ON. 	 Harness or connectors (The switch circuit is open or shorted.) ASCD steering switch ECM 	F	
DTC CO	NFIRMATION PRO	DCEDURE		Н	
1.PREC	ONDITIONING				
If DTC Confirmation Procedure has been previously conducted, always perform the following before conduct- ing the next test. 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch ON.					
3. Turn ignition switch OFF and wait at least 10 seconds.					
>> GO TO 2.					
2.perf	2. PERFORM DTC CONFIRMATION PROCEDURE				
 Turn ignition switch ON and wait at least 10 seconds. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds. 					

- Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 6. Check DTC.
- Is DTC detected?
- YES >> Go to EC-337, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

- **1.**CHECK GROUND CONNECTION
- 1. Turn ignition switch OFF.
- Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection". 2.

Is the inspection result normal?

- YS >> GO TO 2.
- NO >> Repair or replace ground connection.
- 2.CHECK ASCD STEERING SWITCH CIRCUIT

(P) With CONSULT-III

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- 1. Turn ignition switch ON.
- 2. Select "MAIN SW", "CANCEL SW", "RESUME/ACC SW" and "SET SW" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check each item indication under the following conditions.

Monitor item	m Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
MAIN SW	MAIN SWICH	Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
CANCEL SW		Released	OFF
RESUME/ACC SW	RESUME/ACCELERATE switch	Pressed	ON
RESUME/ACC SW	RESOME/ACCELERATE SWILLI	Released	OFF
SET SW	SET/COAST switch	Pressed	ON
361 300		Released	OFF

Without CONSULT-III

1. Turn ignition switch ON.

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

ECM		ECM Ground Condition		Voltage
Connector	Terminal	Ground	Condition	voltage
	110 (ASCD steering switch signal)	Ground	MAIN switch: Pressed	Approx. 0V
			CANSEL switch: Pressed	Approx. 1V
E10			SET/COAST switch: Pressed	Approx. 2V
	(RESUME/ACCELERATE switch: Pressed	Approx. 3V
			All ASCD steering switches: Released	Approx. 4V

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 3.

 $\mathbf{3}.$ Check ascd steering switch ground circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Disconnect combination switch harness connector M88.
- 4. Check the continuity between combination switch and ECM harness connector.

Combination switch	EC	Continuity	
Terminal	Connector	Continuity	
16	E10	92	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

Check the following.

Harness connectors M1, E30

Combination switch (spiral cable)

• Harness for open and short between ECM and combination switch

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

EC-338

P1564 ASCD STEERING SWITCH

< COMPONENT DIAGNOSIS >

5.check ascd steering switch input signal circuit for open and short

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

Combination switch	EC	Continuity	
Terminal	Connector Terminal		Continuity
13	E10	85	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

Check the following.

Harness connectors M1, E30

Combination switch (spiral cable)

· Harness for open and 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 EC-339, "Component Inspection".	
Is the inspection result normal?	Н
YES >> GO TO 8.	
NO >> Replace ASCD steering switch.	
8. CHECK INTERMITTENT INCIDENT	I
Refer to GI-42, "Intermittent Incident".	
>> INSPECTION END	J
Component Inspection	INFOID:000000003069356

1.CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector M88.

2. Check the continuity between combination switch harness connector terminals under following conditions. L

Combinat	ion meter	Condition	Resistance
Connector	Terminals	Condition	Resistance
		MAIN switch: Pressed	Approx. 0 Ω
		CANCEL switch: Pressed	Approx. 250 Ω
M88 13 and 16	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

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[QR25DE]

Description

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM and hybrid vehicle control ECU detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to <u>EC-45</u>, "System Description" for the ASCD function.

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-313, "DTC Logic"</u>.
- This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
		A)	When the vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to the ECM at the same time.	 Harness or connectors (The stop lamp switch circuit is shorted.) Harness or connectors (The ASCD brake switch circuit is shorted.) Harness or connectors
P1572	ASCD brake switch	B)	ASCD brake switch signal is not sent to ECM for extremely long time while the ve- hicle is driving.	 Stop lamp switch ASCD brake switch Incorrect stop lamp switch installation Incorrect ASCD brake switch installation ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If this test is conducted with the drive wheels lifted, activate "INPSECTION MODE 1" (<u>HBC-97</u>). If a road test is expected to be easier, it is unnecessary to lift up the vehicle. NOTE:

Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Turn ignition switch ON (READY).
- 2. Press MAIN switch and make sure that CRUISE indicator is displayed in combination meter.
- 3. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

EC-340

INFOID:000000003069357

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VHCL SPEE			Moro the	ın 30 km/h (19	mph)			А
Shift lever	_D 3L		Suitable					
	1st trip DTC.		Guilable	position				
	DTC detected	7						EC
-	> Go to <u>EC-34</u>		osis Pro	cedure".			•	
NO >>	> GO TO 3.	-						С
3. PERFO	RM DTC CON	NFIRMATI	ON PRC	CEDURE F	OR MALFUNCT	ION B		
1. Turn iç conditi CAUT	ions.	EADY) an	d drive	the vehicle	for at least 5 cor	nsecutive seco	nds under the following	C
Alway NOTE:	s drive vehic	le at a saf	fe speed	d.				_
This p	rocedure ma						by driving the vehicle.	E
					ecessary to lift t			
			M					F
VHCL SPEE				n 30 km/h (19	mpn)			
Selector lev	ei		Suitable		al for more than			~
Driving loca	tion		•	•	to come off from			(
			the abov	e-mentioned v	ehicle speed.			
	1st trip DTC.	_						ŀ
-	DTC detected	_						
	> Go to <u>EC-34</u> > INSPECTIO		osis Pro	<u>cedure"</u> .				1
-	is Procedu							
	ST TOCEUU						INFOID:000000003069359	
1. снеск		UNCTION	-1					J
(I) With CO	ONSULT-III							
Turn in	gnition switch				with CONSULT-I			k
	"BRAKE SW					11.		
2. Select					0			
2. Select								
2. Select	T	Condition		Indication				L
2. Select 3. Check Monitor iten	n C			Indication OFF				L
2. Select 3. Check	n C	Condition	pressed					[
 Select Check Monitor iten BRAKE SW Withou Turn ig 	n C /1 Brake pedal t CONSULT-I gnition switch	Condition Slightly dep Fully releas II ON.	oressed sed	OFF ON	tor and ground.			
 Select Check Monitor iten BRAKE SW Withou Turn ig 	n C /1 Brake pedal t CONSULT-I gnition switch	Condition Slightly dep Fully releas II ON.	oressed sed	OFF ON	tor and ground.			
2. Select 3. Check Monitor iten BRAKE SW Withou 1. Turn ig	n C /1 Brake pedal t CONSULT-I gnition switch	Condition Slightly dep Fully releas II ON.	oressed sed CM harn	OFF ON ess connect	Ū	Voltage		Γ
 Select Check Monitor iten BRAKE SW Withou Turn ig 	m C ^{/1} Brake pedal t CONSULT-I gnition switch the voltage b	Condition Slightly dep Fully releas II ON. etween EC	oressed sed	OFF ON ess connect	tor and ground.	Voltage		Ν
 Select Check Monitor iten BRAKE SW Withou Turn ig Check 	n C 1 Brake pedal t CONSULT-I gnition switch the voltage b ECM	Condition Slightly dep Fully releas II ON. etween EC	oressed sed CM harn	OFF ON ess connect	Ū	Voltage Approx. 0V		

Is the inspection result normal?

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

 $2. {\sf CHECK} \text{ OVERALL FUNCTION-II}$

(I) With CONSULT-III

< COMPONENT DIAGNOSIS >

[QR25DE]

Select "BRAKE SW2" and check indication in "DATA MONITOR" mode.

Monitor item	C	Indication	
BRAKE SW2	Brako podal	Slightly depressed	ON
	Блаке рецаг	Fully released	OFF

Without CONSULT-III

Check the voltage between ECM harness connector and ground.

ECM		Ground		Condition	Voltage
Connector	Terminal	Ground	Condition		voltage
E10	106	Ground	Brake pedal	Slightly depressed	Battery voltage
LIU	(Stop lamp switch signal)	Ground	Diake peda	Fully released	Approx. 0V

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 8.

3.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

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

Voltage	Ground	ASCD brake switch		
voltage		Terminal	Connector	
Battery voltage	Ground	1	E37	

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E6
- Junction block connector E46, E48
- 10A fuse (No.3)
- Harness for open or short between ASCD brake switch and fuse

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

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

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

ASCD bra	ke switch	EC	Continuity	
Connector	Terminal	Connector	Continuity	
E37	2	E10	110	Existed

4. 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

COMPONENT DIAGNOSIS >	[QR25DE]
Check the following.	[4.1.202 =]
Junction block connector E45, E46	
Harness for open or short between ASCD brake switch and ECM	
>> Repair open circuit or short to ground or short to power in harness or connectors	S.
CHECK ASCD BRAKE SWITCH	-
Refer to EC-344, "Component Inspection (ASCD Brake Switch)".	
s the inspection result normal?	
YES >> GO TO 13. NO >> Replace ASCD brake switch.	
CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT	
. Turn ignition switch OFF. 2. Disconnect stop lamp switch harness connector.	
B. Check the voltage between stop lamp switch harness connector and ground.	
Stop lamp switch Ground Voltage	
Connector Terminal	
E38 1 Ground Battery voltage	
the inspection result normal?	
YES >> GO TO 10.	
NO >> GO TO 9.	
DETECT MALFUNCTIONING PART	
heck the following.	
Fuse block (J/B) connector E6 10A fuse (No.7)	
Harness for open or short between stop lamp switch and battery	
>> Repair open circuit or short to ground or short to power in harness or connectors	3.
0 . CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
Disconnect ECM harness connector.	
. Check the continuity between ECM harness connector and stop lamp switch harness co	nnector.
ECM ASCD clutch switch	
Connector Terminal Connector Terminal	
E10 106 E38 2 Existed	
Also check harness for short to ground and short to power.	
the inspection result normal?	
YES >> GO TO 12.	
NO >> GO TO 11.	
1. DETECT MALFUNCTIONING PART	
heck the following.	
Fuse block (J/B) connector E6	
Harness for open or short between ECM and stop lamp switch	
	_
>> Repair open circuit or short to ground or short to power in harness or connectors	3.
2.CHECK STOP LAMP SWITCH	
efer to EC-344, "Component Inspection (Stop Lamp Switch)".	
s the inspection result normal?	

YES >> GO TO 13.

NO >> Replace stop lamp switch.

13. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

1.CHECK ASCD BRAKE SWITCH-I

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

Terminals	C	Continuity	
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

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

2.CHECK ASCD BRAKE SWITCH-II

- Adjust ASCD brake switch installation. Refer to BR-11, "Inspection and Adjustment". 1.
- 2. Check the continuity between ASCD brake switch terminals under the following conditions.

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

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace ASCD brake switch.

Component Inspection (Stop Lamp Switch)

1.CHECK STOP LAMP SWITCH-I

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

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
	Diake peual	Slightly depressed	Existed

Is the inspection result normal?

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

2.CHECK STOP LAMP SWITCH-II

Adjust stop lamp switch installation. Refer to BR-11, "Inspection and Adjustment". 1

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

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
	Diake peual	Slightly depressed	Existed

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[QR25DE]

< COMPONENT DIAGNOSIS >	[QR25DE]
Is the inspection result normal?	
YES >> INSPECTION END	А
NO >> Replace stop lamp switch.	
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P1574 ASCD VEHICLE SPEED SENSOR

Description

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from hybrid vehicle ECU, and the other is from brake ECU. The ECM uses these signals for ASCD control. Refer to <u>EC-45</u>, "System Description" for ASCD functions.

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1574 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to <u>EC-306, "DTC Logic"</u>
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-313, "DTC Logic"</u>

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	 Harness or connectors (The CAN communication line is open or shorted.) Hybrid vehicle control ECU Brake ECU

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If this test is conducted with the drive wheels lifted, activate "INPSECTION MODE 1" (<u>HBC-97</u>). If a road test is expected to be easier, it is unnecessary to lift up the vehicle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON (READY).

2. Drive the vehicle at more than 40 km/h (25 MPH). CAUTION:

Always drive vehicle at a safe speed.

3. Check DTC.

Is DTC detected?

YES >> Go to <u>EC-346, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1.CHECK DTC WITH HYBRID VEHICLE CONTROL ECU

Refer to HBC-611, "DTC Index".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace.

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P1574 ASCD VEHICLE SPEED SENSOR

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P1805 BRAKE SWITCH

Description

INFOID:000000003069365

Brake switch signal is applied to the ECM and hybrid vehicle control ECU 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.

DTC Logic

INFOID:000000003069366

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805	Brake switch	A brake switch signal is not sent to ECM for ex- tremely long time while the vehicle is driving.	 Harness or connectors (Stop lamp switch circuit is open or short- ed.) Stop lamp switch

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

- 2. Fully depress the brake pedal for at least 5 seconds.
- 3. Erase the DTC with CONSULT-III.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-348, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000003069367

1.CHECK STOP LAMP SWITCH CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is 1st trip DTC detected?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

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

Stop lam	p switch	Ground	Voltage	
Connector Terminal		Ground	voltage	
E38	1	Ground	Battery voltage	

Is the inspection result normal?

YES	>> GO TO 4.

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

EC-348

P1805 BRAKE SWITCH

			P1805 BRAKE SWITCH	
< COMPO	NENT DIA	GNOSIS >		[QR25DE]
Fuse bloc		nnector E6		
10A fuse			ten leven ewitch end hetten.	A
 Harness 	for open of	r short between s	top lamp switch and battery	
	- Renair or	oon circuit or sho	rt to ground or short to power in harness or connectors.	EC
			UT SIGNAL CIRCUIT FOR OPEN AND SHORT	EC
		harness connect uity between EC	or. I harness connector and stop lamp switch harness connecto	or. C
ECN		Stop Jamp awitch		
		Stop lamp switch	Continuity	D
Connector E10	106	E38 2	Existed	
				E
		-	ound and short to power.	L
<u>Is the inspector</u> YES >>	> GO TO 6			
	> GO TO 6 > GO TO 5			F
5.DETECT	T MAI FUN	ICTIONING PAR	т	
			·	
Check the fFuse block		nnector E6		G
			CM and stop lamp switch	
				Н
>>	> Repair op	pen circuit or sho	rt to ground or short to power in harness or connectors.	
6.CHECK	STOP LA	MP SWITCH		
Refer to EC	C-349, "Co	mponent Inspect	on (Stop Lamp Switch)".	
Is the inspe	ection resu	It normal?		
	> GO TO 7			1
_		stop lamp switch		0
1.CHECK	INTERMI	TTENT INCIDEN	Т	
Refer to GI	-42, "Interr	mittent Incident".		K
>>	> INSPECT	FION END		
Compon	ent Insp	ection (Stop L	amp Switch)	DID:000000003069368
		· ·		
1.CHECK	STOP LA	MP SWITCH-I		M
1. Turn ig	nition swite	ch OFF.		
		amp switch harn		
3. Check	the continu	uity between stop	amp switch terminals under the following conditions.	Ν
Terminals	C	Condition	Continuity	
			Continuity Not existed	~
1 and 2	Brake pedal	Fully released	Not existed	0
L- 4h - '		Slightly depressed	Existed	
Is the inspe				Р
	> INSPEC1 > GO TO 2			
^		MD 9\//ITCU		

2.CHECK STOP LAMP SWITCH-II

Adjust stop lamp switch installation. Refer to <u>BR-11, "Inspection and Adjustment"</u>.
 Check the continuity between stop lamp switch terminals under the following conditions.

P1805 BRAKE SWITCH

< COMPONENT DIAGNOSIS >

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
	Diake peual	Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch.

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< COMPONENT DIAGNOSIS >

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

Description

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

DTC Logic

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DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2100	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	 Harness or connectors (Throttle control motor relay circuit is open) Throttle control motor relay
P2103	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	 Harness or connectors (Throttle control motor relay circuit is shorted) Throttle control motor relay
DTC CON	FIRMATION PROCI	EDURE	
1.PRECO	NDITIONING		
ing the next 1. Turn ig 2. Turn ig 3. Turn ig TESTING (Before per <u>Witch DTC</u> P2100 >>	t test. nition switch OFF and nition switch ON. nition switch OFF and CONDITION:	as been previously conducted, always wait at least 10 seconds. wait at least 10 seconds. g procedure, confirm that battery vol	
•		TION PROCEDURE FOR DTC P2100	
1. Turn ig 2. Turn ig 3. Depres 4. Check Is DTC dete YES >>	nition switch ON and nition switch ON (REA ss the accelerator ped DTC.	wait at least 2 seconds. ADY). al to start engine, then keep engine runi	ning for at least 5 seconds.
3.PERFO	RM DTC CONFIRMAT	TION PROCEDURE FOR DTC P2103	
2. Check Is DTC dete YES >>	DTC.	wait at least 1 second. nosis Procedure".	
Diagnosi	s Procedure		INFOID:000000003069371
1.снеск	THROTTLE CONTRO	OL MOTOR RELAY POWER SUPPLY C	CIRCUIT
1. Turn ig	nition switch OFF.		

EC-351

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P2100, P2103 THROTTLE CONTROL MOTOR RELAY

[QR25DE]

< COMPONENT DIAGNOSIS >

- 2. Disconnect ECM harness connector.
- 3. Disconnect IPDM E/R harness connector F10.
- 4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM	Continuity	
Connector	Terminal	Connector Terminal		Continuity
F14	15	F10	70	Existed

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 THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

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

EC	М	IPDM	Continuity	
Connector Terminal		Connector	Terminal	Continuity
F14	2	F10	54	Existed

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

Is the inspection result normal?

YES >> GO TO 3.

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

3.CHECK FUSE

1. Disconnect 15A fuse (No. 43) from IPDM E/R.

2. Check 15A fuse for blown.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace 15A fuse.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace harness or connectors.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< COMPONENT DIAGNOSIS >

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

DTC DETECTION LOGIC

NOTE: If DTC P2101 is displayed with DTC P2100 or P2119, first perform the trouble diagnosis for DTC P2100 or P2119. Refer to <u>EC-351, "DTC Logic"</u> or <u>EC-360, "DTC Logic"</u>.

P2101 performance ate properly. shorted) • Electric throttle control actuator DTC CONFIRMATION PROCEDURE 1.PRECONDITIONING If DTC Confirmation Procedure has been previously conducted, always perform the following before control	DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
1.PRECONDITIONING If DTC Confirmation Procedure has been previously conducted, always perform the following before con-	P2101		•	(Throttle control motor circuit is open or shorted)
			EDURE	
ing the next test.	If DTC Cor	nfirmation Procedure h	as been previously conducted, always	perform the following before conduct-
1. Turn ignition switch OFF and wait at least 10 seconds.				

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V when engine is running.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 2 seconds.
- 2. Turn ignition switch ON (READY).
- 3. Depress the accelerator pedal to start engine, then keep engine running for at least 5 seconds.
- 4. Check DTC.

Is DTC detected?

- YES >> Go to EC-353, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".
- Is the inspection result normal?
- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

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

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ECM Connector Terminal		Ground	Condition	Voltage
		Ciouna	Condition	vollage
F14	2	Ground	Ignition switch OFF	Approx. 0V
1 14	2	Gibunu	Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 3.

$\mathbf{3}$.check throttle control motor relay power supply circuit

- 1. Disconnect ECM harness connector.
- 2. Disconnect IPDM E/R harness connector F10.
- 3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		EC	Continuity	
Connector	Terminal	Connector Terminal		Continuity
F10	70	F14	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 THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

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

IPDM E/R		EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F10	54	F14	2	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 FUSE

- 1. Disconnect 15A fuse (No. 43) from IPDM E/R.
- 2. Check 15A fuse for blown.

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Replace 15A fuse.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace IPDM E/R.
- NO >> Repair or replace harness or connectors.

7. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

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

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< COMPONENT DIAGNOSIS >

[QR25DE]

Electric throttle c	control actuator	EC	M					А
Connector	Terminal	Connector	Terminal	Continuity				
			5	Not existed				EC
657	5	F14	6	Existed				EC
F57	6	- F14	5	Existed				
	0		6	Not existed				С
	k harness for	-	round an	d short to p	ower.			
Is the inspection		<u>mal?</u>						D
	O TO 8. epair or repla	ice.						
8.CHECK EL	• •		ONTROL		R VISUALL	Y		E
1. Remove th	ne intake air	duct.						
2. Check if for and the ho	oreign matte ousing.	r is caught	betweer	n the throttle	e valve (1)			F
	ectric throttle co	ntrol actuator						
<⊐ : ∨ Is the inspectio	ehicle front	mal?						G
	O TO 9. emove the fo	reign matte	er and cle	an the elec	tric throttle		E A A A A	Н
со	ntrol actuato	r inside.					ALBIA0061ZZ	<u>z</u>
9. CHECK TH	ROTTLE CO	ONTROL M	OTOR					I
Refer to EC-35			<u>tion"</u> .					_
Is the inspection		<u>mal?</u>						J
	O TO 10. O TO 11.							
10.снески			ENT					K
Refer to GI-42								_
Is the inspection								
	O TO 11.							L
	epair or repla							
11.REPLACE				ROLACIU	JATOR			M
	lectric throttl <u>356, "Specia</u>			<u>nt"</u> .				
								Ν
_	SPECTION							
Component	Inspectio	n					INFOID:0000000030693	75
1.снеск тн	ROTTLE CO	ONTROL M	OTOR					
	t electric thread the termination of termination o					als as follows.		Ρ
			_					

5 and 6 Approx. 1 - 15 Ω [at 25 °C (77°F)]

Resistance

Is the inspection result normal?

Terminals

YES >> INSPECTION END

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< COMPONENT DIAGNOSIS >

[QR25DE]

INFOID:000000003069376

NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.

2. Go to EC-356, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-15. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-16. "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

EC-356

P2118 THROTTLE CONTROL MOTOR

Description

The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:000000003069378

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2118	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	 Harness or connectors (Throttle control motor circuit is shorted.) Electric throttle control actuator (Throttle control motor)
TC CON	FIRMATION PROCI	EDURE	
.PRECO	NDITIONING		
		as been previously conducted, always	perform the following before conduct-
g the nex Turn ia		l wait at least 10 seconds.	
. Turn ig	nition switch ON.		
Turn ig	nition switch OFF and	l wait at least 10 seconds.	
~ ~	GO TO 2.		
	RM DTC CONFIRMAT		
		wait at least 2 seconds.	
Turn ig	nition switch ON (REA	ADY).	
Depres Check		al to start engine, then keep engine rur	nning for at least 5 seconds.
DTC det			
	Go to EC-357, "Diag	nosis Procedure".	
lagnosi	s Procedure		INFOID:000000003069379
.CHECK	GROUND CONNECT	TION	
	nition switch OFF.		
). Refer to Ground Inspection in <u>GI-42.</u>	"Intermittent Incident".
	ction result normal? GO TO 2.		
-	Repair or replace gro	ound connection.	
CHECK	THROTTLE CONTRO	OL MOTOR OUTPUT SIGNAL CIRCUI	IT FOR OPEN AND SHORT
		ontrol actuator harness connector.	
Discon	nect ECM harness co		
Check	the continuity betwee	n electric throttle control actuator harn	ess connector and ECM harness con-

[QR25DE]

INFOID:000000003069377

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P2118 THROTTLE CONTROL MOTOR

< COMPONENT DIAGNOSIS >

Electric throttle c	EC	М	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
	5	– F14	5	Not existed
F57	5		6	Existed
	0		5	Existed
	6		6	Not existed

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

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

3.CHECK THROTTLE CONTROL MOTOR

Refer to EC-358, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 5.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace harness or connectors.

5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.

2. Go to EC-358, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

1. CHECK THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.

2. Check resistance between electric throttle control actuator terminals as follows.

 Terminals
 Resistance

 5 and 6
 Approx. 1 - 15 Ω [at 25 °C (77°F)]

Is the inspection result normal?

YES	>> INSPECTION END

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.

2. Go to EC-356, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:000000003069381

INFOID:000000003069380

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

EC-358

COMPONENT DIAGNOSIS >	[QR25DE]
>> GO TO 2.	
2. PERFORM IDLE AIR VOLUME LEARNING	
Refer to EC-16, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"	
>> END	

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< COMPONENT DIAGNOSIS >

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

Description

INFOID:000000003069382

[QR25DE]

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:000000003069383

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P2119	Electric throttle control actuator	A)	Electric throttle control actuator does not func- tion properly due to the return spring malfunc- tion.	Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. Perform dtc confirmation procedure for malfunction A and B

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Set shift lever to D position and wait at least 3 seconds.
- 3. Set shift lever to P or N position.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON and wait at least 1 second.
- 6. Set shift lever to D position and wait at least 3 seconds.
- 7. Set shift lever to P or N position.
- 8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
- 9. Check DTC.

Is DTC detected?

- YES >> Go to EC-361, "Diagnosis Procedure".
- NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Set shift lever to D position and wait at least 3 seconds.
- 3. Set shift lever to P position.
- 4. Turn ignition switch ON (READY).
- 5. Depress the accelerator pedal to start engine, then keep engine running for at least 3 seconds.
- 6. Check DTC.

Is DTC detected?

- YES >> Go to EC-361, "Diagnosis Procedure".
- NO >> INSPECTION END

EC-360

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< COMPONENT DIAGNOSIS >

Diagnosis Procedure

[QR25DE]

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1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY Turn ignition switch OFF. 1. EC 2. Remove the intake air duct. 3. Check if foreign matter is caught between the throttle valve (1) and the housing. 2. Electric throttle control actuator <a>: Vehicle front D Is the inspection result normal? YES >> GO TO 2. NO >> Remove the foreign matter and clean the electric throttle Е control actuator inside. ALBIA0150Z $2. {\tt replace electric throttle control actuator}$ F Replace electric throttle control actuator. 1. 2. Go to EC-332, "Special Repair Requirement". >> INSPECTION END Special Repair Requirement INFOID:000000003069385 Н 1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING Refer to EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement" >> GO TO 2. 2.PERFORM IDLE AIR VOLUME LEARNING Refer to EC-16, "IDLE AIR VOLUME LEARNING : Special Repair Requirement" Κ >> END L Μ Ν

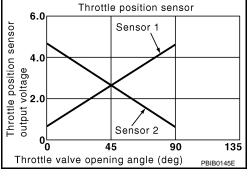
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P2135 TP SENSOR

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-316, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135	Throttle position sensor circuit range/perfor- mance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	 Harness or connector (TP sensor 1 and 2 circuit is open or shorted.) Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON (READY).
- 2. Depress the accelerator pedal to start engine, then keep engine running for at least 1 second.
- 3. Check DTC.

Is DTC detected?

- YES >> Go to EC-362, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

EC-362

INFOID:000000003069388

[QR25DE]

INFOID:000000003069386

INFOID:000000003069387

P2135 TP SENSOR

			P21	35 TP SENSOR	
< COMPONEN	√T DIAGNO	SIS >		[QR25DE]
NO >> Re	pair or repla	ice ground	connecti	on.	
2.снеск тн	ROTTLE PC	SITION S	ENSOR I	POWER SUPPLY CIRCUIT-I	
. Disconnec	t electric thro	ottle contro	ol actuato	r harness connector.	
	on switch ON				
. Check the	voltage betv	veen electi	ric throttie	e control actuator harness connector and ground.	
Electric throttle c	ontrol actuator				
Connector	Terminal	Ground	Voltage		
F57	1	Ground A	Approx. 5V		
s the inspectio					
	D TO 4.	<u>11ai :</u>			
	D TO 3.				
	ROTTLE PC	SITION S	ENSOR I	POWER SUPPLY CIRCUIT-II	
	on switch OF				
. Disconnec	t ECM harne	ess connec			
. Check the	continuity be	etween ele	ectric thro	ttle control actuator harness connector and ground.	
		1			
Electric throttle c		EC	1	Continuity	
Connector	Terminal	Connector	Terminal		
F57	1	F13	47	Existed	
the inspectio	<u>n result norr</u>	<u>mal?</u>			
YES >> GO	D TO 4.				
NO >> Re	pair open ci	rcuit.			
CHECK TH	ROTTLE PC	SITION S	ENSOR (GROUND CIRCUIT FOR OPEN AND SHORT	
. Turn ignitic	on switch OF	F.			
2. Disconnec	t ECM harne	ess connec			
. Check the	continuity be	etween ele	ectric thro	ttle control actuator harness connector and ground.	
Electric throttle c	ontrol actuator	EC	`N/I		
			T	Continuity	
Connector	Terminal	Connector		Eviated	
F57	4	F13	36		
		-	round an	d short to power.	
the inspectio		<u>nal?</u>			
	D TO 5. pair open ci	rcuit or she	ort to are	and or short to power in harness or connectors.	
			•	NPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
. Check the	continuity be	etween ele	ectric thro	ttle control actuator harness connector and ground.	
Electric throttle c	ontrol actuator	EC	`M		
				Continuity	
Connector	Terminal	Connector	Terminal		
F57	2	F13	37	Existed	
	3	_	38		
		-	round an	d short to power.	
s the inspectio		<u>mal?</u>			
	D TO 6.	., .			
•			-	und or short to power in harness or connectors.	
O. CHECK TH	ROTTLE PC	SITION S	ENSOR		

Refer to EC-364, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.

2. Go to EC-364, "Special Repair Requirement".

>> INSPECTION END

8. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000003069389

1. CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.

2. Reconnect all harness connectors disconnected.

3. Perform EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

4. Turn ignition switch ON.

5. Set shift lever to D position.

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

	ECM		Cond	lition	Voltage
Connector	Terminal	Ground	Cond		voltage
	37 (TP sensor 1 signal) 38	Ground	nd Accelerator pedal	Fully released	More than 0.36V
F13				Fully depressed	Less than 4.75V
FIJ				Fully released	Less than 4.75V
	(TP sensor 2 signal)			Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.

2. Go to EC-364, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:000000003069390

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-15. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-16. "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

< COMPONENT DIAGNOSIS >

P2423 HC ADSORPTION CATALYST FUNCTION

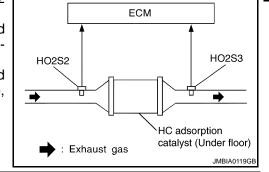
DTC Logic

DTC DETECTION LOGIC

The ECM monitors the phase gap between heated oxygen sensor 2 signal and heated oxygen sensor 3 signal.

The phase gap between heated oxygen sensor 2 signal and heated oxygen sensor 3 signal becomes small as the HC adsorption catalyst (under floor) is deteriorated.

When the phase gap between heated oxygen sensor 2 signal and heated oxygen sensor 3 signal approaches a specified limit value, the HC adsorption catalyst (under floor) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	_
P2423	HC adsorption catalyst efficiency below thresh- old	 HC adsorption catalyst (under floor) does not operate properly. HC adsorption catalyst (under floor) does not have enough oxygen storage capacity. 	 HC adsorption catalyst (under floor) Exhaust tube Intake air leaks Fuel injector Fuel injector leaks Spark plug Improper ignition timing 	G

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conduct-	
ing the next test.	

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. (P)With CONSULT-III

- Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON (READY).
- 6. Repeat following procedure 2 times.
- Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. **NOTE:**

Keep the vehicle speed as steady as possible during the cruising.

Stop vehicle.

Never turn ignition switch OFF.

7. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-III.

- 8. Drive vehicle at a speed of 80 km/h (50 MPH) or more until "INCMP" of "CATALYST" changes to "CMPLT". **NOTE:**
 - Keep the vehicle speed as steady as possible during the cruising.
 - It will take at most 3 minutes until "INCMP" of "CATALYST" changes to "CMPLT".
- 9. Check 1st trip DTC.

EC-365

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With GST

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON (READY).
- 6. Repeat following procedure 3 times.
- Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. **NOTE:**

Keep the vehicle speed as steady as possible during the cruising.

- Stop vehicle.
- NOTE:

Never turn ignition switch OFF.

7. Check 1st trip DTC.

Is 1st tip DTC detected?

YES >> Go to <u>EC-366, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dent.

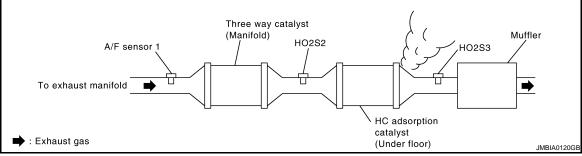
Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace.

2. CHECK EXHAUST GAS LEAK

- 1. Activate "INSPECTION MODE 1" (HBC-97) to start engine.
- 2. Listen for an exhaust gas leak before the HC adsorption catalyst (under floor).



Is exhaust gas leak detected?

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

3.CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 4.

4.CHECK IDLE SPEED AND IGNITION TIMING

For procedure, refer to <u>EC-11, "BASIC INSPECTION : Special Repair Requirement"</u>. For specification, refer to <u>EC-459, "Idle Speed"</u> and <u>EC-459, "Ignition Timing"</u>. Is the inspection result normal?

YES >> GO TO 5. NO >> Follow the <u>EC-11. "BASIC INSPECTION : Special Repair Requirement"</u>. **5.**CHECK FUEL INJECTOR

< COMPONENT DIAGNOSIS >

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

EC	CM				
Connector	Terminal	Ground	Voltage		
	29				
F14	30	Ground	Battery voltage		
F 14	31	Ground	Ballery vollage		
	32	-			
the inspect	ion result nor	mal?			
	GO TO 6.				
	erform <u>EC-2</u> UNCTION OF		sis Procedure".		
AUTION: o the follow	vina procedi	ure in the n	ace where vent	lation is good	d without the combustible.
	tion switch O			ination is good	
	fuel pump fue	se in IPDM E	R to release fue	el pressure.	
NOTE: Do not us	SE CONSULT	-III to releas	e fuel pressure.	or fuel pressure	e applies again during the following pro-
cedure.					,
	tion switch Ol accelerator p		an it		
	ine stalls, che		эр п.		
If DTC is	detected, era	ase DTC and	d go to next steps	5.	
	not detected		steps.		
	tion switch O		nnoctors to avoi	d the electrical	discharge from the ignition coils.
			g of the cylinder		
Repeat s	teps 3 to 5 fo	or two or thre	e times to remov	e combustion	gas in the cylinder.
			onnector to igniti		
			vith gap of 13 - 1 park plug and gro		
	s shown in th		park plug and gr		WEIGH
	tion switch O				Ä
			bout 3 seconds		E .
			veen the spark	plug and the	
grounded	l metal portio	11.			
Spark	should be g	generated.			13 - 17 mm (0.52-0.66 in)
CAUTIO	N:				Grounded metal portion (Cylinder head, cylinder block, etc.)
		to the sparl	c plug and the	ignition coil	JMBIA0066GB
			eful not to get		
					tage becomes 20kV or more.
• It migh NOTE:	i cause to d	amage the I	gnition coll if th	e gap of more	e than 17 mm (0.66 in) is taken.
When th		s than 13 m	nm (0.52 in), the	spark might	be generated even if the coil is mal-
function	U	10			
	ion result nor	mar?			
	GO TO 10. GO TO 7.				
	UNCTION OF	- IGNITION	COIL-II		
Turn ignit	tion switch O	FF.			
			t a known-good	spark plug.	
	tion switch O		a KIIUWII-9000	spain plug.	

3. Turn ignition switch ON (READY).

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< COMPONENT DIAGNOSIS >

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4. Depress the accelerator pedal to crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

YES >> GO TO 8.

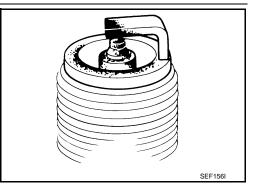
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-384, "Diagnosis Procedure".

8.CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>MA-19</u>, <u>"SPARK PLUG (PLATI-</u><u>NUM-TIPPED TYPE) : Removal and Installation"</u>.
- NO >> Repair or clean spark plug. Then GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

- 1. Reconnect the initial spark plugs.
- 2. Turn ignition switch ON (READY).
- 3. Depress the accelerator pedal to crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>MA-19</u>, "<u>SPARK</u> <u>PLUG (PLATINUM-TIPPED TYPE)</u>: Removal and Installation".

10.CHECK FUEL INJECTOR

- 1. Turn ignition switch OFF.
- Remove fuel injector assembly. Refer to <u>EM-34, "Removal and Installation"</u>. Keep fuel hose and all fuel injectors connected to fuel tube.

3. Disconnect all ignition coil harness connectors.

- Reconnect all fuel injector harness connectors disconnected.
- Turn ignition switch ON. Make sure fuel does not drip from fuel injector.

Is the inspection result normal?

- YES >> GO TO 11.
- NO >> Replace the fuel injector(s) from which fuel is dripping.

11.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the trouble fixed?

- YES >> INSPECTION END
- NO >> Replace HC adsorption catalyst (under floor).

P2A00 A/F SENSOR 1

Description

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the

sensor to ensure the required operating temperature of about 800°C (1,472°F).

INFOID:000000003069394

DTC Logic

DTC DETECTION LOGIC

To judge the malfunction, the A/F signal computed by ECM from the A/F sensor 1 signal is monitored not to be shifted to LEAN side or RICH side.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause	K
P2A00	Air fuel ratio (A/F) sensor 1 circuit range/performance	 The output voltage computed by ECM from the A/F sensor 1 signal is shifted to the lean side for a specified period. The A/F signal computed by ECM from the A/F sensor 1 signal is shifted to the rich side for a specified period. 	 A/F sensor 1 A/F sensor 1 heater Fuel pressure Fuel injector Intake air leaks 	L
	FIRMATION PROCED			M

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conduct-Ν ing the next test.

- Turn ignition switch OFF and wait at least 10 seconds. 1.
- Turn ignition switch ON. 2.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

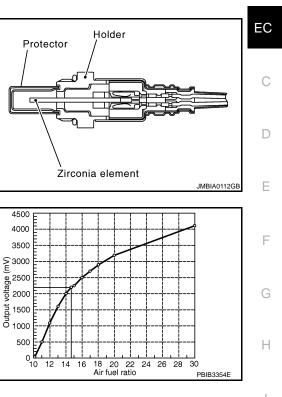
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Clear the mixture ratio self-learning value. Refer to EC-18, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
- 2. Turn ignition switch OFF and wait at least 10 seconds.

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P2A00 A/F SENSOR 1

< COMPONENT DIAGNOSIS >

- Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- 6. Turn ignition switch OFF and wait at least 10 seconds.
- 7. Turn ignition switch ON (READY).
- 8. Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

Keep the vehicle speed as steady as possible during the cruising.

- 9. Stop the vehicle and shift the selector lever to P position.
- 10. Repeat following procedure 4 times.
- Fully depress the accelerator pedal and keep the engine speed 2,500 rpm for 5 minutes.
- Fully release the accelerator pedal.

11. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-370, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000003069395

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

- Is the inspection result normal?
- YES >> GO TO 2.
- NO >> Repair or replace ground connection.
- 2.RETIGHTEN A/F SENSOR 1

1. Loosen and retighten the A/F sensor 1.

Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3.CHECK FOR INTAKE AIR LEAK

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine.
- 2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

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

4.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- Clear the mixture ratio self-learning value. Refer to <u>EC-18</u>, "MIXTURE RATIO SELF-LEARNING VALUE <u>CLEAR</u>: Special Repair Requirement".
- 2. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and let engine idle for at least 10 minutes.
- Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?
- YES >> Perform trouble diagnosis for DTC P0171or P0172. Refer to <u>EC-222, "DTC Logic"</u> or <u>EC-226,</u> <u>"DTC Logic"</u>.

NO >> GO TO 5.

5.CHECK HARNESS CONNECTOR

1. Turn ignition switch OFF.

- 2. Disconnect A/F sensor 1 harness connector.
- 3. Check harness connector for water.

Water should not exit.

P2A00 A/F SENSOR 1

				PZAU	UU A/F SENSOR T
< COMPO	NENT C	IAGNOSI	S >		[QR25DI
s the inspe	ection re	sult norma	<u> ?</u>		
	> GO TO				
	•	or replace			
CHECK	A/F SEI	NSOR 1 P	OWER S	UPPLY	/ CIRCUIT
		vitch ON.			
. Check	the volta	age betwee	en A/F se	ensor 1 l	harness connector and ground.
A/F sen					
r		Ground	Voltage		
Connector F44	Terminal 4	Ground B	attery volta		
		sult norma	-	ige	
	> GO TO		<u>1 :</u>		
	> GO TO				
.DETEC	T MALF	JNCTION	NG PAR	т	
heck the	following	1.			
IPDM E/F	R harnes	s connecto	or F10		
15A fuse Harness			etween <i>I</i>	VF sens	sor 1 and fuse
. 1011000		SI SHOLED			
>>	> Repair	or replace	harness	or conn	nectors.
.CHECK	A/F SEI	NSOR 1 IN	IPUT SIC	SNAL C	CIRCUIT FOR OPEN AND SHORT
		vitch OFF.			
. Discon	nect EC	M harness			
. Check	the cont	inuity betw	/een A/F	sensor	1 harness connector and ECM harness connector.
A/F sen	cor 1	EC	NA.		<u> </u>
Connector	Terminal	Connector	Terminal	Continu	uity
Connector	1	Connector	45		
F44	2	F13	49	Existe	ed
Check		inuity betw	-	/ harne	ess connector or A/F sensor 1 harness connector and ground.
Chook		interty both		vi namo	
A/F sen	isor 1	EC	M		
Connector	Terminal	Connector	Terminal	Ground	d Continuity
E44	1	F 40	45	Cround	
F44	2	F13	49	Ground	d Not existed
Also cl	heck har	ness for sł	nort to po	wer.	
the inspe	ection re	<u>sult norma</u>	<u> ?</u>		
	> GO TO				and an all and the manual of the
	•	•		rt to gro	ound or short to power in harness or connectors.
		NSOR 1 H			
		Componen		ion".	
•		sult norma	<u> ?</u>		
	> GO TO > GO TO				
-		RMITTEN		NT	
		ermittent Ir			
s the inspe	ection re	sult norma	<u>1 /</u>		

YES >> GO TO 11.

NO >> Repair or replace.

11.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

Do you have CONSULT-III?

- YES >> GO TO 12.
- NO >> GO TO 13.

12.CONFIRM A/F ADJUSTMENT DATA

With CONSULT-III

- Turn ignition switch ON.
- 2. Select "A/F ADJ-B1" in "DATA MONITOR" mode with CONSULT-III.
- 3. Make sure that "0.000" is displayed on CONSULT-III screen.
- Is "0.000" displayed?
- YES >> INSPECTION END

NO >> GO TO 13.

13.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Clear the mixture ratio self-learning value. Refer to <u>EC-18</u>, "<u>MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement</u>".

Do you have CONSULT-III?

YES >> GO TO 14.

NO >> INSPECTION END

14.CONFIRM A/F ADJUSTMENT DATA

With CONSULT-III

- Turn ignition switch ON.
- 2. Select "A/F ADJ-B1" in "DATA MONITOR" mode with CONSULT-III.
- 3. Make sure that "0.000" is displayed on CONSULT-III screen.

>> INSPECTION END

ASCD BRAKE SWITCH

< COMPONENT DIAGNOSIS >

ASCD BRAKE SWITCH

Description

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM and hybrid vehicle control ECU detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to <u>EC-45</u>, "System Description" for the ASCD function.

Component Function Check

1. CHECK FOR ASCD BRAKE SWITCH FUNCTION

With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition	Indication	
	Brake pedal	Slightly depressed	OFF
BRARE SWI	Blake pedal	Fully released	ON

Without CONSULT-III

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

Terminal 110 SCD brake switc on result norr ISPECTION efer to <u>EC-37</u>	mal?		Slightly depressed Fully released	Voltage Approx. 0V
CD brake switc on result norn	mal?	d Brake pedal		Approx. 0V
on result norr	mal?		Fully released	
SPECTION			Fully released	Battery voltage
	END.			
	73, "Diagnosis	Procedure".		
Procedure	!			INFOID:00000000306939
CD BRAKE	SWITCH POV	ER SUPPLY CIRCUIT		
on switch OF	F			
		ess connector.		
voltage betv	ween ASCD br	ake switch harness conn	nector and ground.	
vitch				
witch Ground	Voltage			
Ground				
Groundminal1Ground	Battery voltage			
Ground 1 Ground 0n result norr	Battery voltage	· ·		
Ground minal 1 Ground on result norr O TO 3.	Battery voltage			
Ground 1 Ground 1 Ground 0 result norr 0 TO 3. 0 TO 2.	Battery voltage			
	CD BRAKE on switch OF ct ASCD bral on switch Of	CD BRAKE SWITCH POW on switch OFF. ct ASCD brake switch harne on switch ON.	CD BRAKE SWITCH POWER SUPPLY CIRCUIT on switch OFF. ct ASCD brake switch harness connector.	CD BRAKE SWITCH POWER SUPPLY CIRCUIT on switch OFF. ct ASCD brake switch harness connector. on switch ON.

Harness for open or short between ASCD brake switch and fuse

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

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ASCD BRAKE SWITCH

< COMPONENT DIAGNOSIS >

${f 3.}$ CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

ASCD brake switch ECM				Continuity
Connector	Terminal	Connector	Terminal	Continuity
E37	2	E10	110	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.

Junction block connector E45, E46

• Harness for open or short between ASCD brake switch and fuse

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

5.CHECK ASCD BRAKE SWITCH

Refer to EC-374, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace ASCD brake switch.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:000000003069399

1.CHECK ASCD BRAKE SWITCH-I

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

Terminals	C	Continuity	
1 and 2	Brake pedal	Fully released	Existed
	Diake pedal	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to <u>BR-11, "Inspection and Adjustment"</u>.

2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
T anu z	Diake pedal	Slightly depressed	Not existed

Is the inspection result normal?

ASCD BRAKE SWITCH

< COMPONENT DIAGNOSIS >

NO >> Replace ASCD brake switch.

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COOLING FAN

Description

COOLING FAN CONTROL MODULE

Cooling fan control module receives ON/OFF pulse duty signal from IPDM E/R. Corresponding to this ON/OFF pulse duty signal, cooling fan control module sends cooling fan motor operating voltage to cooling fan motor. The revolution speed of cooling fan motor is controlled by duty cycle of the voltage.

COOLING FAN MOTOR

Cooling fan motor receives cooling fan motor operating voltage from cooling fan control module. The revolution speed of cooling fan motor is controlled by duty cycle of the voltage.

Component Function Check

INFOID:000000003069401

1.CHECK COOLING FAN FUNCTION

With CONSULT-III

1. Turn ignition switch ON.

- 2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that cooling fan speed varies according to the percent.

Without CONSULT-III

- 1. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to <u>PCS-10</u>, "<u>Diagnosis</u> <u>Description</u>".
- 2. Make sure that cooling fan operates.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-376, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000003069402

1. CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF.
- 2. Disconnect cooling fan control module harness connector E231.
- 3. Turn ignition switch ON.
- 4. Check the voltage between cooling fan control module harness connector and ground.

Cooling fan c	ontrol module	Ground	Voltage	
Connector	Terminal	Ground	voltage	
E231	3	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 7.

2.CHECK COOLING FAN CONTROL MODULE GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Check the continuity between cooling fan control module harness connector and ground.

Cooling fan co	ontrol module	Ground	Continuity
Connector	Terminal	Ground	Continuity
E231	1	Ground	Existed

3. 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.

EC-376

INFOID:000000003069400

COOLING FAN

< COMPONENT DIAGNOSIS >

 3.CHECK IPDM E/R GROUND CIRCUIT 1. Disconnect IPDM E/R harness connectors E17, E18. 2. Check the continuity between IPDM E/R harness connector and ground. 	A
 Check the continuity between IPDM E/R harness connector and ground. 	
	EC
IPDM E/R Ground Continuity	
E18 12	С
E17 41 Ground Existed	0
3. Also check harness for short to power.	
Is the inspection result normal?	D
YES >> GO TO 4.	
NO >> Repair open circuit or short to power in harness or connectors.	E
4. CHECK COOLING FAN CONTROL SIGNAL CIRCUIT	
1. Disconnect IPDM E/R harness connector E201.	
2. Check the continuity between IPDM E/R harness connector and cooling fan control module harness co	n- F
nector.	
IPDM E/R Cooling fan control module	G
Connector Terminal Connector Terminal	
E201 97 E231 2 Existed	
3. Also check harness for short to ground and short to power.	Н
Is the inspection result normal?	
YES >> GO TO 5.	I
NO >> Repair open circuit or short to ground or short to power in harness or connectors.	
5. CHECK COOLING FAN CONTROL MODULE OUTPUT SIGNAL CIRCUIT	
1. Reconnect all harness connectors disconnected.	J
 Disconnect cooling fan control module harness connectors E232, E233. Turn ignition switch ON. 	
 Turn ignition switch ON. Check the voltage between cooling fan control module harness connector and ground. 	
	K
	K
Cooling fan control module	K
Cooling fan control module Ground Voltage	K
Connector Terminal Ground Voltage E232 4 4	K
Connector Terminal Ground Voltage	K
Connector Terminal Ground Voltage E232 4 Ground Battery voltage	K L M
Connector Terminal Ground Voltage E232 4 Ground Battery voltage E233 6 Battery voltage Is the inspection result normal? YES >> GO TO 6.	L
Connector Terminal Ground Voltage E232 4 Ground Battery voltage E233 6 Ground Battery voltage Is the inspection result normal? YES >> GO TO 6. NO >> Replace cooling fan control module.	L
Connector Terminal Ground Voltage E232 4 Ground Battery voltage E233 6 Battery voltage Is the inspection result normal? YES >> GO TO 6. NO >> Replace cooling fan control module. 6.CHECK COOLING FAN MOTORS -1 AND -2	L
Connector Terminal Ground Voltage E232 4 Ground Battery voltage E233 6 Battery voltage Is the inspection result normal? YES >> GO TO 6. NO >> Replace cooling fan control module. 6.CHECK COOLING FAN MOTORS -1 AND -2 Refer to EC-379, "Component Inspection (Cooling Fan Motor)".	L M
Connector Terminal Ground Voltage E232 4 Ground Battery voltage E233 6 Battery voltage Is the inspection result normal? YES >> GO TO 6. NO >> Replace cooling fan control module. 6.CHECK COOLING FAN MOTORS -1 AND -2 Refer to EC-379, "Component Inspection (Cooling Fan Motor)". Is the inspection result normal?	L M
Connector Terminal Ground Voltage E232 4 Ground Battery voltage E233 6 Battery voltage Is the inspection result normal? YES >> GO TO 6. NO >> Replace cooling fan control module. 6.CHECK COOLING FAN MOTORS -1 AND -2 Refer to EC-379, "Component Inspection (Cooling Fan Motor)". Is the inspection result normal? YES >> GO TO 11.	L M
Connector Terminal Ground Voltage E232 4 Ground Battery voltage Is the inspection result normal? YES >> GO TO 6. NO >> Replace cooling fan control module. 6.CHECK COOLING FAN MOTORS -1 AND -2 Refer to EC-379. "Component Inspection (Cooling Fan Motor)". Is the inspection result normal? YES >> GO TO 11. NO >> Replace cooling fan motor.	L
Connector Terminal Ground Voltage E232 4 Ground Battery voltage E233 6 Ground Battery voltage Is the inspection result normal? YES >> GO TO 6. NO >> Replace cooling fan control module. 6.CHECK COOLING FAN MOTORS -1 AND -2 Refer to EC-379. "Component Inspection (Cooling Fan Motor)". Is the inspection result normal? YES >> GO TO 11.	L M N O

3. Turn ignition switch ON.

4. Check the voltage between cooling fan relay harness connector and ground.

EC-377

Cooling fan relay-1			
Connector Terminal		Ground	Voltage
F82	1	Ground	Battery voltage
LOZ	3	Ciouna	Ballery Vollage

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R harness connector E18
- 50A fusible link (letter O)
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and IPDM E/R

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

$9. {\sf CHECK} \ {\sf COOLING} \ {\sf FAN} \ {\sf CONTROL} \ {\sf MODULE} \ {\sf POWER} \ {\sf SUPPLY} \ {\sf CIRCUIT-III}$

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector E17.
- 3. Check the continuity between cooling fan relay-1 harness connector and IPDM E/R harness connector.

Cooling fan relay-1		IPDN	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E82	2	E17	42	Existed

4. Check the continuity between cooling fan relay harness connector and cooling fan control module harness connector.

Cooling fan relay-1		Cooling fan c	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E82	5	E231	3	Existed

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

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

Harness connector E81, E207

• Harness for open or short between cooling fan relay-1 and cooling fan control module

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

11.CHECK COOLING FAN RELAY-1

Refer to EC-379. "Component Inspection (Cooling Fan Relay)".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace cooling fan relay-1.

12. CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

Is the inspection result normal?

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1.CHECK COOLING FAN MOTOR

>> Replace IPDM E/R.

< COMPONENT DIAGNOSIS >

YES

NO

- 1. Turn ignition switch OFF.
- 2. Disconnect cooling fan control module harness connectors E232, E233.
- 3. Supply cooling fan control module terminals with battery voltage and check operation.

Cool	ing fan contro				
Motor	Motor Connector		ninal	Operation	
Motor	Connector	(+)	(-)		
1	E232	4	5	Cooling fan operates.	
2	E233	6	7	cooling fail operates.	

>> Repair or replace harness connectors.

Component Inspection (Cooling Fan Motor)

Is the inspection result normal?

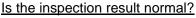
- YES >> INSPECTION END
- NO >> Replace cooling fan motor.

Component Inspection (Cooling Fan Relay)

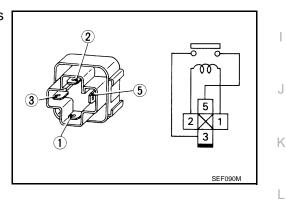
1.CHECK COOLING FAN RELAY-1

- 1. Turn ignition switch OFF.
- 2. Remove cooling fan relay-1.
- 3. Check the continuity between cooling fan relay-1 terminals under the following conditions.

Terminals	Conditions	Continuity
2 and 5	12V direct current supply between terminals 1 and 2	Existed
3 and 5	No current supply	Not existed



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



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FUEL PUMP

[QR25DE]

Sensor	Sensor Input signal to ECM		Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓
Battery	Battery voltage*	1	Fuel pump

*: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine startability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation	
Ignition switch is turned to ON.	Operates for 1 second.	
Engine running and cranking	Operates.	
When engine is stopped	Stops in 1.5 seconds.	
Except as shown above	Stops.	

Component Function Check

1.CHECK FUEL PUMP FUNCTION

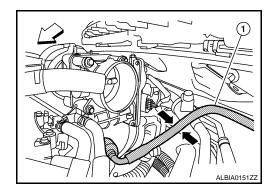
- 1. Turn ignition switch ON.
- 2. Pinch fuel feed hose (1) with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

Is the inspection result normal?

YES >> INSPECTION END

NO >> EC-380, "Diagnosis Procedure".



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Diagnosis Procedure

1.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

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

EC	М	Ground	Voltage	
Connector Terminal		Giouna	voltage	
F14	14	Ground	Battery voltage	

Is the inspection result normal?

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

FUEL PUMP

< COMPONENT DIAGNOSIS >

2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II	A
 Turn ignition switch OFF. Disconnect IDPDM E/R harness connector F10. Check the continuity between IPDM E/R harness connector and ECM harness con 	
ECM IPDM E/R Continuity	
Connector Terminal Connector Terminal	С
F14 14 F10 77 Existed	
Is the inspection result normal?	D
YES >> GO TO 3. NO >> Repair open circuit or short to ground or short to power in harness or conr	
3. CHECK CONDENSER-1 POWER SUPPLY CIRCUIT-I	
1. Reconnect all harness connectors disconnected.	E
 Disconnect condenser-1 harness connector. 	
3. Turn ignition switch ON.	F
4. Check the voltage between condenser-1 harness connector and ground.	
Condenser-1	
Connector Terminal Ground Voltage	G
B17 1 Ground Battery voltage should exist for 1 second after ignition switch is turned to	
Is the inspection result normal?	Н
YES >> GO TO 5.	
NO >> GO TO 4.	
4.CHECK 15A FUSE	
1. Turn ignition switch OFF.	
 Disconnect 15A fuse (No. 32) from IPDM E/R. Check 15A fuse. 	J
Is the inspection result normal?	
YES $>>$ GO TO 6.	IZ.
NO >> Replace fuse.	K
5.CHECK CONDENSER-1 POWER SUPPLY CIRCUIT-II	
1. Disconnect IPDM E/R harness connector E18.	L
2. Check the continuity between IPDM E/R harness connector and condenser-1 harr	ness connector.
	M
IPDM E/R Condenser-1 Continuity	141
Connector Terminal Connector Terminal F18 13 B17 1 Existed	
3. Also check harness for short to ground and short to power.	Ν
Is the inspection result normal?	
YES $>>$ GO TO 13.	0
NO >> GO TO 7.	Ũ
6.DETECT MALFUNCTIONING PART	
Check the following.	P
Harness connectors E29, B10	
 IPDM E/R connector E18 Harness for open or short between IPDM E/R and condenser-1 	
>> Repair open circuit or short to power in harness or connectors.	

EC-381

7. CHECK CONDENSER GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect dropping resistor harness connector.

3. Check the continuity between condenser-1 harness connector and ground.

Conde	Condenser-1		Continuity	
Connector	Terminal	Ground	Continuity	
B17	2	Ground	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 power in harness or connectors.

8.CHECK CONDENSER-1

Refer to EC-383, "Component Inspection (Condenser-1)".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace condenser-1.

9.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

- 1. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- Check the continuity between IPDM E/R harness connector and "fuel level sensor unit and fuel pump" and ground.

IPDM E/R		Fuel level sensor unit and fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E18	13	B42	1	Existed

Is the inspection result normal?

YES >> GO TO 11. NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

Harness connector E29, B10

• Harness for open or short between "fuel level sensor unit and fuel pump" and IPDM E/R

• Harness for open or short between "fuel level sensor unit and fuel pump" and ground

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

11.CHECK FUEL PUMP GROUND CIRCUIT

1. Check the continuity between "fuel level sensor unit and fuel pump" and ground.

Fuel level sensor unit and fuel pump		Ground	Continuity
Connector	Terminal		
B42	3	Ground	Existed

2. Also heck harness for short to power.

Is the inspection result normal?

YES >> GO TO 12.

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

12.CHECK FUEL PUMP

EC-382

FUEL PUMP

< COMPONENT DIAGNOSIS >	[QR25DE]	
Refer to EC-383, "Component Inspection (Fuel Pump)".		
Is the inspection result normal?		A
YES >> GO TO 13. NO >> Replace fuel pump.		
13. CHECK INTERMITTENT INCIDENT		EC
Refer to GI-42, "Intermittent Incident".		
le the increation require normal?		С
<u>Is the inspection result normal?</u> YES >> Replace IPDM E/R.		
NO >> Repair or replace harness or connectors.		D
Component Inspection (Fuel Pump)	INFOID:000000003069408	
1.CHECK FUEL PUMP		E
 Turn ignition switch OFF. Disconnect "fuel level sensor unit and fuel pump" harness connector. Check resistance between "fuel level sensor unit and fuel pump" terminals as follows. 		F
Terminals Resistance 1 and 3 0.2 - 5.0Ω [at 25°C (77°F)]		G
Is the inspection result normal? YES >> INSPECTION END NO >> Replace "fuel level sensor unit and fuel pump".		Н
Component Inspection (Condenser-1) 1.check condenser	INFOID:000000003069409	I
1. Turn ignition switch OFF.		
 Disconnect condenser-1 harness connector. Check resistance between condenser-1 terminals as follows. 		J
Terminal Resistance		K
$\frac{1}{1} \text{ and } 2 \text{Above 1M}\Omega \text{ [at 25°C (77°F)]}$		
Is the inspection result normal? YES >> INSPECTION END		L
NO >> Replace condenser-1.		M
		Ν
		0
		P

IGNITION SIGNAL

Description

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.

Component Function Check

1.INSPECTION START

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON (READY).
- 3. Depress the accelerator pedal to start engine.

Does the engine start?

- YES-1 >> With CONSULT-III: GO TO 2.
- YES-2 >> Without CONSULT-III: GO TO 3.
- NO >> Go to EC-384, "Diagnosis Procedure".

2. IGNITION SIGNAL FUNCTION

With CONSULT-III

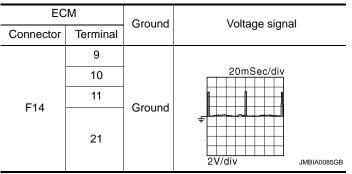
- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON (READY).
- 3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 4. Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-384, "Diagnosis Procedure".
- **3.** IGNITION SIGNAL FUNCTION

Without CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, then let engine idle.
- 2. Read the voltage signal between ECM harness connector and ground.



NOTE:

The pulse cycle changes depending on rpm at idle.

- Is the inspection result normal? YES >> INSPECTION END
- NO >> Go to EC-384, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.

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

INFOID:000000003069412

INFOID:000000003069411

[QR25DE]

EC		Ground	Voltage	
Connector	Terminal	0		
E10 Is the inspe	105	Ground	Battery volta	ge
-	> GO TO		<u></u>	
NO >>	> Go to <mark>E</mark>	<u></u>	"Diagnosis	
2.снеск	IGNITIC	ON COIL	POWER S	UPPLY CI
 Discon Turn ig 	gnition sv	ndenser- vitch ON	2 harness o	
Conde	nser	<u> </u>		
Connector	Terminal	Ground	Voltage	
F26	1	Ground	Battery volta	ge
Is the inspe			nal?	
	> GO TO > GO TO			
•		-	POWER S	
	nition sv nect IPD		⊦F. harness cor	nector F1
			etween IPD	
		_		
IPDM	-		denser-2	Continuity
Connector	Terminal	Connect		
F10	53	F26	1	Existed
4. Also cl			short to gro	ound and s
			<u>"Diagnosis</u>	Procedure
			rcuit or shor	
4. CHECK		NSER-2	2 GROUND	
1. Turn ig	nition sv	vitch OF	F.	
2. Check	the cont	inuity be	etween con	denser-2 h
Conden		Ground	Continuity	
Connector F26	Terminal 2	Ground	Existed	
				wor
3. Also cl			short to po	wei.
•	> GO TO			
			rcuit or shor	t to ground
5.снеск				
Refer to EC	<u>C-388, "</u> (Compon	ent Inspecti	on (Conde
Is the inspe				
	> GO TO			
•	> Replac			
O. CHECK	IGNITIC		POWER S	UPPLY CI

EC-385

< COMPONENT DIAGNOSIS >

- 1. Reconnect all harness connectors disconnected.
- 2. Disconnect ignition coil harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ignition coil harness connector and ground.

	Ignition coil		Ground	Voltage	
Cylinder	Connector	Terminal	Giouna	voltage	
1	F34	3			
2	F35	3	Ground	Battery voltage	
3	F36	3		Dattery voltage	
4	F37	3			

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 IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity	
Cylinder	Connector	Terminal	Giouna	Continuity	
1	F34	2			
2	F35	2	Ground	Existed	
3	F36	2	Giouna	Existed	
4	F37	2			

3. Also check harness for 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 IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
```

1. Disconnect ECM harness connector.

2. Check the continuity between ECM harness connector and ignition coil harness connector.

	Ignition coil		EC	М	Continuity
Cylinder	Connector	Terminal	Connector	Terminal	Continuity
1	F34	1		11	
2	F35	1	F14	10	Existed
3	F36	1	Г 14	9	EXISTED
4	F37	1		21	

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

Is the inspection result normal?

YES >> GO TO 9.

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

9. Check ignition coil with power transistor

Refer to EC-387, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace malfunctioning ignition coil with power transistor.

10.CHECK INTERMITTENT INCIDENT

		IGNITION SIGNAL		
< COMPC	NENT DIAGNOSIS >		[QR25DE]	
Refer to G	I-42, "Intermittent Incident			
				А
>	> INSPECTION END			
Compor	ent Inspection (Ignit	ion Coil with Power Transi	istor) INFOID:000000003069413	EC
1.снеси	(IGNITION COIL WITH P	OWER TRANSISTOR-I		
2. Disco	gnition switch OFF. nnect ignition coil harness resistance between igniti	connector. on coil terminals as follows.		С
Terminals	Resistance Ω [at 25°C (77°F)]			D
1 and 2	Except 0 or ∞			
1 and 3	· · · · · · · · · · · · · · · · · · ·			Ε
2 and 3	Except 0			
Is the insp	ection result normal?			_
•	> GO TO 2.			F
•		ignition coil with power transistor.		
2.CHECK	(IGNITION COIL WITH P	OWER TRANSISTOR-II		G
CAUTION				
	lowing procedure in the gnition switch OFF.	place where ventilation is good	d without the combustible.	Ш
		1 E/R to release fuel pressure.		Н
NOTE				
Do no cedur		ase fuel pressure, or fuel pressure	e applies again during the following pro-	
	gnition switch ON (READ)	<i>(</i>).		
	ss accelerator pedal and l	keep it.		
	engine stalls, check DTC. C is detected, erase DTC a	nd go to next steps.		J
If DTC	is not detected, go to nex			
	gnition switch OFF.	connectors to sweid the electrical	I discharge from the ignition soils	Κ
		blug of the cylinder to be checked	l discharge from the ignition coils.	
9. Repea	at steps 3 to 5 for two or th	ree times to remove combustion		
		s connector to ignition coil.		L
		e spark plug and grounded metal		
portio	n as shown in the figure.		Strugg	M
	gnition switch ON (READ)	about 3 seconds, and check	H I	
		etween the spark plug and the		
groun	ded metal portion.		Ę	Ν
Sp	ark should be generated		13 - 17 mm (0.52-0.66 in)	
CAUT	ION:		Grounded metal portion (Cylinder head, cylinder block, etc.)	0
		ark plug and the ignition coil	JMBIA0066GB	
		areful not to get an electrical use the electrical discharge vol	tage becomes 20kV or more	P
- 14 m	act anno oncornig, Deca	a se the electrical discharge vor	tage becomes zorv of more.	F

shock while checking, because the electrical discharge voltage becomes 20kV or more.
It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.
NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is mal-functioning.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace malfunctioning ignition coil with power transistor.

< COMPONENT DIAGNOSIS >

Component Inspection (Condenser-2)

[QR25DE]

1.CHECK CONDENSER-2

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

Terminals Resistance 1 and 2 Above 1 MΩ [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace condenser-2.

MALFUNCTION INDICATOR LAMP

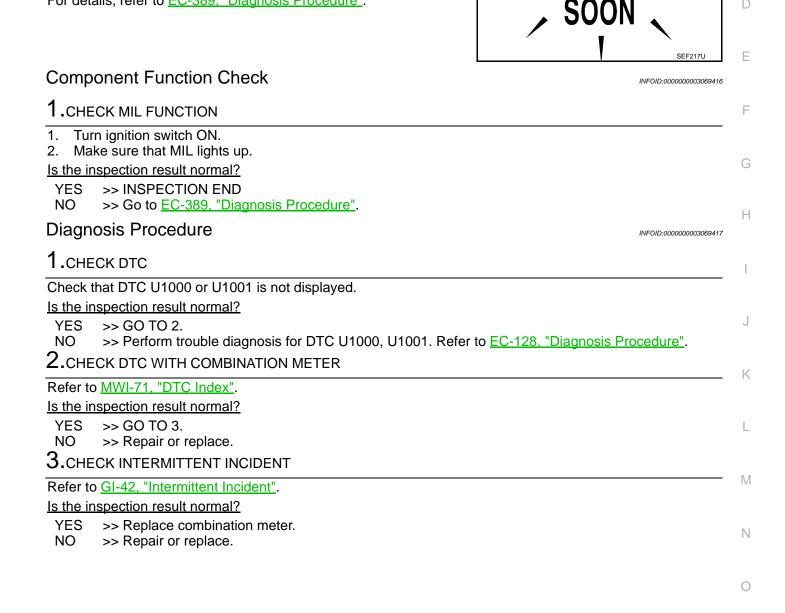
Description

The Malfunction Indicator Lamp (MIL) is located on the combination meter.

The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.

When the engine is started, the MIL should go off. If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.

For details, refer to EC-389, "Diagnosis Procedure".



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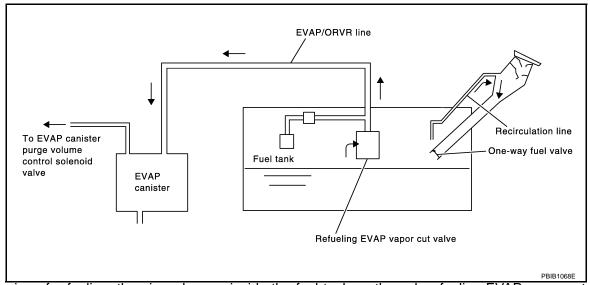
INFOID:000000003069415

SERVICE

< COMPONENT DIAGNOSIS >

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

Description



From the beginning of refueling, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve and EVAP/ORVR line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

WARNING:

When conducting inspections below, be sure to observe the following:

- Put a "CAUTION: FLAMMABLE" sign in workshop.
- Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.
- Be sure to furnish the workshop with a CO₂ fire extinguisher.

CAUTION:

- Before removing fuel line parts, carry out the following procedures:
- Put drained fuel in an explosion-proof container and put lid on securely.
- Release fuel pressure from fuel line. Refer to EC-454, "Inspection".
- Disconnect battery ground cable.
- Always replace O-ring when the fuel gauge retainer is removed.
- Do not kink or twist hose and tube when they are installed.
- Do not tighten hose and clamps excessively to avoid damaging hoses.
- After installation, run engine and check for fuel leaks at connection.
- Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.

Component Function Check

INFOID:000000003069419

1.CHECK ORVR FUNCTION

Check whether the following symptoms are present.

- Fuel odor from EVAP canister is strong.
- Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

Is any symptom present?

YES >> Go to <u>EC-390, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1.INSPECTION START

Check whether the following symptoms are present. A: Fuel odor from EVAP canister is strong. INFOID:000000003069420

[QR25DE]

INFOID:000000003069418

ON BOARD REFUELING VAPOR RECOVERY (ORVR) [QR25DE] < COMPONENT DIAGNOSIS > B: Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling. А Which symptom is present? >> GO TO 2. А >> GO TO 7. В EC 2.CHECK EVAP CANISTER 1 Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. С 2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. The weight should be less than 2.8 kg (6.2 lb). D Is the inspection result normal? >> GO TO 3. YES NO >> GO TO 4. Е 3.CHECK IF EVAP CANISTER SATURATED WITH WATER Check if water will drain from EVAP canister. 1000 Does water drain from the EVAP canister? F YES >> GO TO 4. NO >> GO TO 6. Н ALBIA0158Z **4.**REPLACE EVAP CANISTER Replace EVAP canister with a new one. >> GO TO 5. 5.DETECT MALFUNCTIONING PART Κ Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection. >> Repair or replace EVAP hose. L 6.CHECK REFUELING EVAP VAPOR CUT VALVE Refer to EC-393, "Component Inspection". M Is the inspection result normal? YES >> INSPECTION END NO >> Replace refueling EVAP vapor cut valve with fuel tank. Ν **7.**CHECK EVAP CANISTER 1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. 2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. The weight should be less than 2.8 kg (6.2 lb). Ρ Is the inspection result normal? YES >> GO TO 8. NO >> GO TO 9.

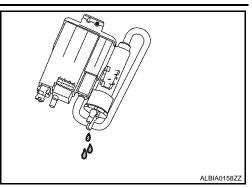
 $\mathbf{8}$.CHECK IF EVAP CANISTER SATURATED WITH WATER

< COMPONENT DIAGNOSIS >

[QR25DE]

Check if water will drain from EVAP canister. <u>Does water drain from the EVAP canister?</u>

YES >> GO TO 9. NO >> GO TO 11.



9.REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

11. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace hoses and tubes.

12.CHECK FILLER NECK TUBE

Check recirculation line for clogging, dents and cracks.

Is the inspection result normal?

- YES >> GO TO 13.
- NO >> Replace filler neck tube.

13. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-393. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

14.CHECK FUEL FILLER TUBE

Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.

Is the inspection result normal?

- YES >> GO TO 15.
- NO >> Replace fuel filler tube.

15.CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

Is the inspection result normal?

YES >> GO TO 16.

NO >> Repair or replace one-way fuel valve with fuel tank.

16.CHECK ONE-WAY FUEL VALVE-II

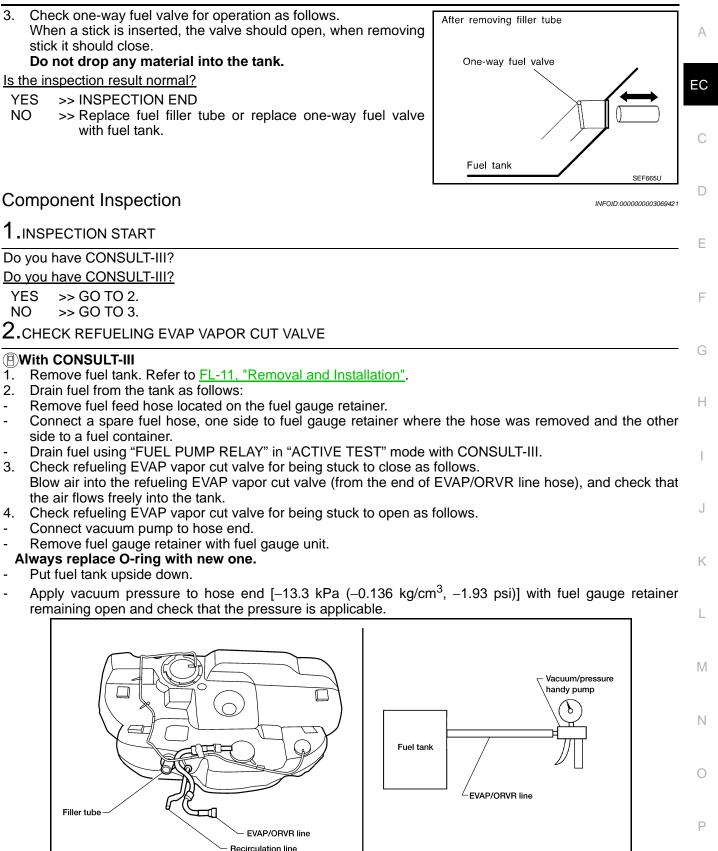
1. Make sure that fuel is drained from the tank.

2. Remove fuel filler tube and hose.

< COMPONENT DIAGNOSIS >

[QR25DE]

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Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

3.CHECK REFUELING EVAP VAPOR CUT VALVE

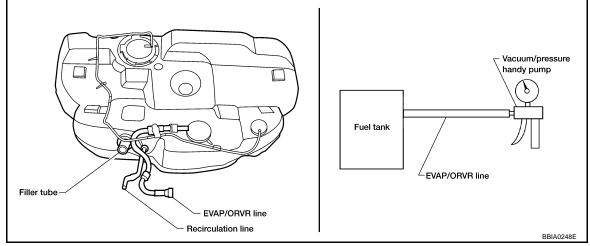
< COMPONENT DIAGNOSIS >

Without CONSULT-III

- 1. Remove fuel tank. Refer to <u>FL-11, "Removal and Installation"</u>.
- 2. Drain fuel from the tank as follows:
- Remove fuel gauge retainer.
- Drain fuel from the tank using a handy pump into a fuel container.
- Check refueling EVAP vapor cut valve for being stuck to close as follows. Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
- 4. Check refueling EVAP vapor cut valve for being stuck to open as follows.
- Connect vacuum pump to hose end.
- Remove fuel gauge retainer with fuel gauge unit.

Always replace O-ring with new one.

- Put fuel tank upside down.
- Apply vacuum pressure to hose end [-13.3 kPa (-0.136 kg/cm³, -1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.



Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace refueling EVAP vapor cut valve with fuel tank.

[QR25DE]

POSITIVE CRANKCASE VENTILATION

Description



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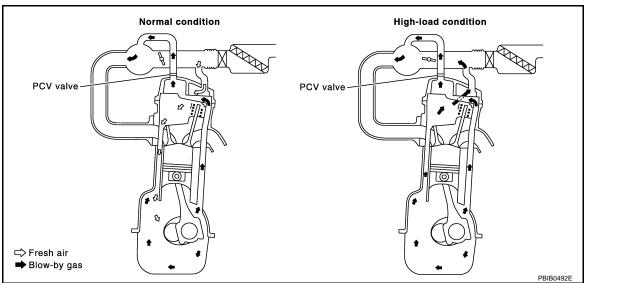
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INFOID:000000003069423

[QR25DE]

INFOID:00000000306



This system returns blow-by gas to the intake manifold.

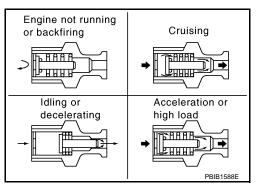
The positive crankcase ventilation (PCV) value is provided to conduct crankcase blow-by gas to the intake manifold.

During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



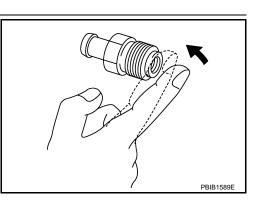
Component Inspection

1.CHECK PCV VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace PCV valve.

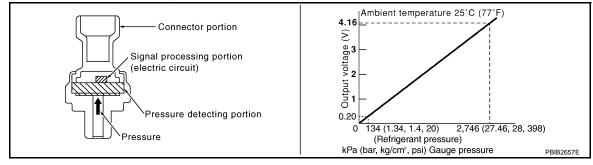


REFRIGERANT PRESSURE SENSOR

Description

INFOID:000000003069424

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.



Component Function Check

INFOID:000000003069425

1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

- 1. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn A/C switch and blower fan switch ON.
- 3. Check the voltage between ECM harness connector and ground.

	ECM	Ground	Voltage
Connector	or Terminal		vollage
E219	39 (Refrigerant pressure sensor signal)	Ground	1.0 - 4.0V

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-396, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000003069426

1.CHECK GROUND CONNECTION

- 1. Turn A/C switch and blower fan switch OFF.
- 2. Turn ignition switch OFF.
- 3. Check ground connection E9. Refer to Ground Inspection in GI-45, "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 harness connector and ground.

Refrigerant pre	essure sensor	Ground	Voltage
Connector	ector Terminal		voltage
E219	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3. [QR25DE]

REFRIGERANT PRESSURE SENSOR

[QR25DE] < COMPONENT DIAGNOSIS > 3. DETECT MALFUNCTIONING PART Check the following. Harness connectors F82, E78 Harness for open or short between ECM and refrigerant pressure sensor EC >> Repair open circuit or short to ground or short to power in harness or connectors. ${f 4}.$ CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch OFF. Disconnect ECM harness connector. 2. 3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connec-D tor. Е Refrigerant pressure sensor ECM Continuity Connector Terminal Connector Terminal F13 E219 3 40 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 Н Check the following. Harness connectors F82, E78 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. ${f 6}.$ CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Check the continuity between ECM harness connector and refrigerant pressure sensor harness connector. Κ Refrigerant pressure sensor ECM Continuity Connector Terminal Connector Terminal E219 2 F13 39 Existed Also check harness for short to ground and short to power. 2. Is the inspection result normal? M YES >> GO TO 8. NO >> GO TO 7. **1**.DETECT MALFUNCTIONING PART Ν Check the following. Harness connectors F82, E78 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-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.

NO >> Repair or replace.

ECU DIAGNOSIS

Reference Value

VALUES ON THE DIAGNOSIS TOOL

NOTE:

• Specification data are reference values.

• Specification data are output/input values which are detected or supplied by the ECM at the connector. * Specification data may not be directly related to their components signals/values/operations.

i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. this IGN TIM-ING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

• If necessary, activate "INSPECTION MODE 1" (HBC-97).

Monitor Item	(Condition	Values/Status				
ENG SPEED	SeeEC-11, "BASIC INSPECTION : Special Repair Requirement".						
MAS A/F SE-B1	See EC-110, "Diagnosis Procedure	See EC-110, "Diagnosis Procedure".					
B/FUEL SCHDL	See EC-110, "Diagnosis Procedure	"					
A/F ALPHA-B1	See EC-110, "Diagnosis Procedure	"_•					
COOLAN TEMP/S	Engine: After warming up		More than 70°C (158°F)				
A/F SEN1 (B1)	Engine: After warming up	Maintaining engine speed at 2,500 rpm	Fluctuates around 2.2 V				
HO2S2 (B1)	are met. - Engine: After warming up - Driving for 3 minutes at a speed of	500 rpm quickly after the following conditions of 80 km/h (50 MPH) or more dy as possible during the cruising.)	0 - 0.3V ←→ Approx. 0.6 - 1.0V				
HO2S3 (B1)	 Engine running after the following Engine: After warming up Driving for 3 minutes at a speed of (Keep the vehicle speed as stead) 		0 - 1.0V				
HO2S2 MNTR (B1)	 Revving engine from idle up to 2,5 are met. Engine: After warming up Driving for 3 minutes at a speed of (Keep the vehicle speed as stead) 	$LEAN \longleftrightarrow RICH$					
VHCL SPEED SE	Turn drive wheels and compare C dication.	CONSULT-III value with the speedometer in-	Almost the same speed as speedometer indication				
BATTERY VOLT	Ignition switch: ON (Engine stopp	ped)	11 – 14V				
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36V				
TP SEN 1-B1	Selector lever: D	Accelerator pedal: Fully depressed	Less than 4.75V				
TP SEN 2-B1*	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36V				
TP SEN 2-DT	Selector lever: D	Accelerator pedal: Fully depressed	Less than 4.75V				
FUEL T/TMP SE	Ignition switch: ON	Indicates fuel tank tempera- ture					
INT/A TEMP SE	Ignition switch: ON	Indicates intake air tempera- ture					
EVAP SYS PRES	Ignition switch: ON	Approx. 1.8 – 4.8V					
FUEL LEVEL SE	Ignition switch: ON	Depending on fuel level of fuel tank					
START SIGNAL	• INSPECTION MODE • Ignition switch: $ON \rightarrow ON$ (READ	YY)	$OFF\toON\toOFF$				

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< ECU DIAGNOSIS >

Monitor Item		Condition	Values/Status	Λ	
CLSD THL POS	Ignition switch: ON (READY)	ENG POWER RQST: 0 kW	ON	— A	
CLOD THE POS	• Ignition switch. ON (READT)	ENG POWER RQST: Except 0 kW	OFF		
		Air conditioner switch: OFF	OFF	EC	
AIR COND SIG	IR COND SIG • Ignition switch: ON (READY) Air conditioner switch: ON (Compressor operates.)		ON		
P/N POSI SW	• Ignition quitable ON	Selector lever: P or N	ON	С	
P/IN POSI 5W	Ignition switch: ON	Selector lever: Except above	OFF		
PW/ST SIGNAL	Ignition switch: ON		OFF		
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON	— D	
	• Ignition switch. ON	Rear window defogger switch and lighting switch: OFF	OFF	E	
IGNITION SW	• Ignition switch: $ON \rightarrow OFF \rightarrow ON$	l I	$ON\toOFF\toON$		
	Ignition switch: ON (READY)	Heater fan switch: ON	ON	F	
HEATER FAN SW	• Ignition switch: ON (READY)	Heater fan switch: OFF	OFF		
	• Ignition quitable ON	Brake pedal: Fully released	OFF		
BRAKE SW	Ignition switch: ON	Brake pedal: Slightly depressed	ON	G	
	Engine: After warming up	Idle	2.0 – 3.0 msec		
INJ PULSE-B1	Selector lever: PNo load	2,500 rpm	1.9 – 2.9 msec	Н	
IGN TIMING	Engine: After warming upSelector lever: N	Idle	11° – 21° BTDC		
	Engine: After warming up	Idle	10% – 35%		
CAL/LD VALUE	Selector lever: PNo load	2,500 rpm	10% – 35%		
	• Engine: After warming up	Idle	1.0 – 5.0 g⋅m/s	J	
MASS AIRFLOW	Selector lever: PNo load	2,500 rpm	4.0 – 12.0 g⋅m/s		
	Engine: After warming up	Vehicle speed: 0 km/h (0 MPH)	0%		
PURG VOL C/V	 150 seconds or more after turning ignition switch ON (READY) 	Vehicle speed: 70 km/h (43 MPH) or more (Accelerator pedal: Depressed)	20% – 90%	— K	
INT/V TIM (B1)	 Engine: After warming up Selector lever: P No load 	Idle	Approx. 20° – 30°CA	L	
INT/V SOL (B1)	 Engine: After warming up Selector lever: P No load 	Idle	Approx. 50% – 60%	M	
FUEL PUMP RLY	 For 1 seconds after turning ignitic Engine running or cranking 	on switch: ON	ON	N	
	Except above		OFF		
VENT CONT/V	Ignition switch: ON	OFF	_		
THRTL RELAY	Ignition switch: ON		ON	0	
HO2S2 HTR (B1)	Engine: Running after warming uDriving for 3 minutes at a speed of		ON	P	
	Engine speed: Above 3,600 rpm	Engine speed: Above 3,600 rpm			

< ECU DIAGNOSIS >

[QR25DE]

Monitor Item		Condition	Values/Status		
HO2S3 HTR (B1)	 Engine speed: Below 3,600 rpr Engine: Running after warming Driving for 3 minutes at a spee (Keep the vehicle speed as stee 	ON			
	Engine speed: Above 3,600 rp		OFF		
VEHICLE SPEED	 Turn drive wheels and compare dication. 	e CONSULT-III value with the speedometer in-	Almost the same speed as the speedometer indication		
IDL A/V LEARN	Engine: running	Idle air volume learning has not been per- formed yet.	YET		
		Idle air volume learning has already been performed successfully.	CMPLT		
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has turned ON.	0 – 65,535 km (0 – 40,723 miles)		
A/F S1 HTR (B1)	Engine: After warming up, idle (More than 140 seconds after s		4 – 100%		
AC PRESS SEN	Engine: IdleBoth A/C switch and blower far	n switch: ON (Compressor operates)	1.0 – 4.0V		
VHCL SPEED SE	Turn drive wheels and compare dication.	e CONSULT-III value with the speedometer in-	Almost the same speed as the speedometer indication		
SET VHCL SPD	Engine: Running	ASCD: Operating	The preset vehicle speed is displayed		
	Ignition switch: ON	MAIN switch: Pressed	ON		
MAIN SW		MAIN switch: Released	OFF		
	• Ignition switch: ON	CANCEL switch: Pressed	ON		
CANCEL SW	Ignition switch: ON	CANCEL switch: Released	OFF		
		RESUME/ACCELERATE switch: Pressed	ON		
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Re- leased	OFF		
		SET/COAST switch: Pressed	ON		
SET SW	 Ignition switch: ON 	SET/COAST switch: Released	OFF		
BRAKE SW1		Brake pedal: Fully released	ON		
(ASCD brake switch)	 Ignition switch: ON 	Brake pedal: Slightly depressed	OFF		
BRAKE SW2		Brake pedal: Fully released	OFF		
(Stop lamp switch)	 Ignition switch: ON 	Brake pedal: Slightly depressed	ON		
VHCL SPD CUT	Ignition switch: ON		NON		
LO SPEED CUT	Ignition switch: ON		NON		
AT OD MONITOR	Ignition switch: ON		OFF		
AT OD CANCEL	Ignition switch: ON		OFF		
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time \rightarrow at the 2nd time	$ON\toOFF$		
SET LAMP	Ignition switch: ON	OFF			
A/F ADJ B1	Engine: running	-0.330 - 0.330			
FAN DUTY	Engine: Running		0 – 100%		
ACCEL PEDAL POSI	Ignition switch: ON				
ENG POWER RQST	Ignition switch: ON (READY)	pedal position Depending on signals from Hybrid vehicle control ECU			
ENG SPEED RQST	Ignition switch: ON (READY)		Depending on signals from Hybrid vehicle control ECU		

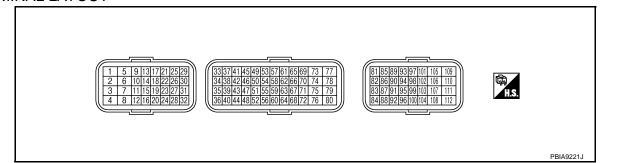
EC-400

< ECU DIAGNOSIS >

Monitor Item	Condition	Values/Status	•
CATALYST TEMP- B1	Engine: Running after warming up	More than 360°C (680°F)	A
ENG START RQST	Ignition switch: ON (READY)	Depending on signals from Hybrid vehicle control ECU	EC
ENG IDLE RQST	Ignition switch: ON (READY)	Depending on signals from Hybrid vehicle control ECU	-
ENG F/C RQST	Ignition switch: ON (READY)	Depending on signals from Hybrid vehicle control ECU	С
EVAP LEAK DIAG	Ignition switch: ON	Depending on condition of EVAP leak diagnosis	D
EVAP DIAG READY	Ignition switch: ON (READY)	Depending on ready condi- tion of EVAP leak diagnosis	-
ENG START DIAG	Ignition switch: ON (READY)	Depending on condition of engine does not start diagno- sis	E
ENG ST DIAG RSLT	Ignition switch: ON (READY)	Depending on result of en- gine does not start diagnosis	F

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

- ECM is located in the engine room left side near inverter with converter assembly.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.
- If necessary, activate "INSPECTION MODE 1" (HBC-97).

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

Term	inal No.	Wire	Description			Value	N
+		color	Signal name	Input/ Output	Condition	(Approx.)	14
2	Ground	G/W	Throttle control motor relay power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)	0
4	Ground	BR/Y	A/F sensor 1 heater	Output	 [Engine is running] Warm-up condition Idle speed (More than 140 seconds after starting engine) 	2.9 - 8.8V★ 50mSec/div 50mS	Ρ

EC-401

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Term	inal No.	Wire	Description			Value	
+		color	Signal name	Input/ Output	Condition	(Approx.)	
5	Ground	L	Throttle control motor (Open)	Output	[Ignition switch: ON]Selector lever: DAccelerator pedal: Fully depressed	0 - 14V★ 1mSec/div ↓ ↓ ↓ ↓ ↓ ↓	JMBIA0083GB
6	Ground	Ρ	Throttle control motor (Close)	Output	[Ignition switch: ON] • Selector lever: D • Accelerator pedal: Fully re- leased	0 - 14V★ 1mSec/div ↓ ↓ ↓ ↓ ↓ ↓	JMBIA0084GB
9 10	Ground	L/B G/R	Ignition signal No. 3 Ignition signal No. 2	Outout	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	0 - 0.2V★ 20mSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	JMBIA0085GB
11 21	Clound	Y/R G/Y	Ignition signal No. 1 Ignition signal No. 4	Output -	[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	0 - 0.3V★ 20mSec/div	JMBIA0086GB
12 16	Ground	В	ECM ground	_	[Engine is running] • Idle speed	Body ground	
13	Ground	R	Heated oxygen sensor 2 heater	Output	 [Engine is running] Engine speed: Below 3,600 rpm after the following conditions are met Engine: after warming up Driving for 3 minutes at a speed of 80 km/h (50 MPH) or more (Keep the vehicle speed as steady as possible during the cruising.) 	10V★ 50mSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓	JMBIA0037GB
					[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)	

[QR25DE]

Term	inal No.	Wire	Description			Value	0
+		Wire color	Signal name	Input/ Output	Condition	Value (Approx.)	A
14	Ground	B/R	Fuel pump relay	Output	 [Ignition switch: ON] For 1 second after turning ignition switch ON [Engine is running] 	0 - 1.0V	EC
					[Ignition switch: ON]More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)	С
15	Ground	0	Throttle control motor relay	Output	[Ignition switch: $ON \rightarrow OFF$]	0 - 1.0V ↓ BATTERY VOLTAGE (11 - 14V) ↓ 0V	D
					[Ignition switch: ON]	0 - 1.0V	
17	Ground	L	Heated oxygen sensor 3 heater	Output	 [Engine is running] Engine speed: Below 3,600 rpm after the following conditions are met Engine: after warming up Driving for 3 minutes at a speed of 80 km/h (50 MPH) or more (Keep the vehicle speed as steady as possible during the cruising.) 	10V★ 50mSec/div F F SV/div JMBIA0037GB	F G H
					 [Engine is running] Engine speed: Above 3,600 rpm [Ignition switch: ON] 	BATTERY VOLTAGE (11 - 14V)	I
24	Ground	W/B	ECM relay	Output	[Engine is running][Ignition switch: OFF]A few seconds after turning ignition switch OFF	0 - 1.0V	K
27	Cround	W/B	(Self shut-off)	Output	 [Ignition switch: OFF] More than a few seconds after turning ignition switch OFF 	BATTERY VOLTAGE (11 - 14V)	L
			EVAP canister purge volume		[Engine is running] • Idle speed	BATTERY VOLTAGE (11 - 14V)★ 50mSec/div € 20V/div JMBIA0087GB	M
25	Ground	P/L	control solenoid valve	Output	 [Engine is running] 150 seconds or more after turning ignition switch ON (READY) Vehicle speed: 70 km/h (43MPH) or more Accelerator pedal: De- pressed 	BATTERY VOLTAGE (11 - 14V)★ 50mSec/div € 10V/div JMBIA0088GB	P

EC-403



[QR25DE]

Term	Terminal No.		Description			Value	
+		Wire color	Signal name	Input/ Output	Condition	(Approx.)	
29 30	Ground	LG/R R/Y	Fuel injector No. 4 Fuel injector No. 3	Output	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	BATTERY VOLTAGE (11 - 14V)★ 50mSec/div	JMBIA0089GB
31 32		R/W R/B	Fuel injector No. 2 Fuel injector No. 1	Cupu	[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	BATTERY VOLTAGE (11 - 14V)★ 50mSec/div	JMBIA0090GB
33	Ground	LG	Heated oxygen sensor 2	Input	 [Engine is running] Revving engine from idle to 2,500 rpm quickly after the following conditions are met Engine: after warming up Driving for 3 minutes at a speed of 80 km/h (50 MPH) or more (Keep the vehicle speed as steady as possible during the cruising.) 	0 - 1.0V	
34	Ground	W/L	Heated oxygen sensor 3	Input	 [Engine is running] Engine running after the following conditions are met Engine: after warming up Driving for 3 minutes at a speed of 80 km/h (50 MPH) or more (Keep the vehicle speed as steady as possible during the cruising.) 	0 - 1.0V	
35	Ground	B/Y	Sensor ground (Heated oxygen sensor 2, Heated oxygen sensor 3)	_	[Engine is running]Warm-up conditionIdle speed	ΟV	
36	Ground	В	Sensor ground (Throttle position sensor)	_	[Engine is running]Warm-up conditionIdle speed	ΟV	
37	Ground	W	Throttle position sensor 1	Input	 [Ignition switch: ON] Selector lever: D Accelerator pedal: Fully released [Ignition switch: ON] Selector lever: D Accelerator pedal: Fully depressed 	More than 0.36V Less than 4.75V	

EC-404



Term	inal No.	14/:	Description			Value	
+		Wire color	Signal name	Input/ Output	Condition	Value (Approx.)	А
38	Ground	R	Throttle position sensor 2	Input	[Ignition switch: ON] • Selector lever: D • Accelerator pedal: Fully re- leased	Less than 4.75V	EC
30	Ground	K		input	[Ignition switch: ON]Selector lever: DAccelerator pedal: Fully depressed	More than 0.36V	C
39	Ground	R	Refrigerant pressure sensor	Input	 [Engine is running] Warm-up condition Both A/C switch and blower fan motor switch: ON (Com- pressor operates) 	1.0 - 4.0V	E
40	Ground	G	Sensor ground (Refrigerant pressure sen- sor)	_	[Engine is running] • Warm-up condition • Idle speed	0V	F
45	Ground	B/W	A/F sensor 1 (bank 1)	Input	[Ignition switch: ON]	2.2V	
46	Ground	Y	Engine coolant temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with engine coolant temperature.	G
47	Ground	В	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5V	ŀ
49	Ground	L	A/F sensor 1	Input	[Engine is running]Warm-up conditionEngine speed: 2,500 rpm	1.8V Output voltage varies with air fuel ratio.	
50	Ground	L/Y	Intake air temperature sen- sor	Input	[Engine is running]	0 - 4.8V Output voltage varies with intake air temperature.	J
52	Ground	LG	Sensor ground (Engine coolant temperature sensor)		[Engine is running] • Warm-up condition • Idle speed	0V	K
56	Ground	G/B	Sensor ground (Mass air flow sensor, Intake air temperature sensor)		[Engine is running]Warm-up conditionIdle speed	0V	
58	Ground	0	Mass air flow sensor	locut	[Engine is running]Warm-up conditionSelector lever: NIdle speed	0.9 - 1.2V	N
50	Ground	0		Input	[Engine is running]Warm-up conditionSelector lever: PEngine speed: 2,500 rpm	1.5 - 1.8V	Ν
59	Ground	G/W	Sensor power supply [Camshaft position sensor (PHASE)]	_	[Ignition switch: ON]	5V	C
60	Ground	Y/B	Sensor ground [Crankshaft position sensor (POS)]	_	[Engine is running]Warm-up conditionIdle speed	0V	F
61	Ground	W	Knock sensor	Input	[Engine is running] • Idle speed	2.5V	
64	Ground	B/R	Sensor ground [Camshaft position sensor (PHASE)]	_	[Engine is running]Warm-up conditionIdle speed	0V	



101111	Terminal No.		Description) (alua
+		Wire color	Signal name	Input/ Output	Condition	Value (Approx.)
65	Ground	W	Crankshaft position sensor	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	1.0 - 6.0★ 1mSec/div F 2V/div JMBIA0091GB
03	Giodina	vv	(POS)	mput	[Engine is running] • Engine speed: 2,500 rpm	1.0 - 6.0★ 1mSec/div + + + + 2V/div JMBIA0092GB
67	Ground	_	Sensor ground (Knock sensor)	_	[Engine is running]Warm-up conditionIdle speed	0V
69	Ground	W/R	Camshaft position sensor (PHASE)	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	1.0 - 6.0★ 10mSec/div 2V/div JMBIA0093GB 1.0 - 6.0★ 10mSec/div
			Sensor power supply		Engine speed is 2,500 rpm	2V/div JMBIA0094GB
72	Ground	LG/B	(Refrigerant pressure sen- sor)		[Ignition switch: ON]	5V
73	Ground	BR	CAN communication line	Input/ Output	_	
74	Ground	Y	CAN communication line	Input/ Output		
76	Ground	R/G	Sensor power supply [Crankshaft position sensor (POS)]		[Ignition switch: ON]	5V
77	Ground	W/L	Power supply for ECM (Back-up)	Input	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)

+		Wire color	Signal name	Input/	Condition	Value (Approx.)	А
			Signal fidille	Output			
78	Ground	R/L	Intake valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	7 - 10V★ 2mSec/div 5V/div JMBIA0095GB	EC C
					[Ignition switch: ON] • ASCD steering switch: OFF [Ignition switch: ON] • MAIN switch: Pressed	4V 0V	E
85	Ground	G/Y	ASCD steering switch	Input	[Ignition switch: ON] • CANCEL switch: Pressed	1V	F
00	Cround	0/1	NOOD Steering switch	input	[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3V	F
					[Ignition switch: ON] • SET/COAST switch: Pressed	2V	G
86	Ground	LG	EVAP control system pres- sure sensor	Input	[Ignition switch: ON]	1.8 - 4.8V	Н
88	Ground	W	Data link connector	Input/ Output	_	_	I
91	Ground	BR/L	Sensor power supply (EVAP control system pres- sure sensor)	_	[Ignition switch: ON]	5V	J
92	Ground	R	Sensor ground (ASCD steering switch)	_	[Engine is running]Warm-up conditionIdle speed	0V	K
				_	[Ignition switch: OFF]	0V	Γ
93	Ground	L/Y	Ignition switch	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)	L
95	Ground	R/Y	Fuel tank temperature sen- sor	Input	[Engine is running]	0 - 4.8V Output voltage varies with fuel tank temperature.	ъ./
96	Ground	V	Sensor ground (EVAP control system pres- sure sensor)	_	[Engine is running]Warm-up conditionIdle speed	0V	Μ
97	Ground	Р	CAN communication line	Input/ Output	_	_	Ν
98	Ground	L	CAN communication line	Input/ Output	_	_	0
99	Ground	Ρ	Engine speed signal output	Output	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	0 - 14V★ 2mSec/div 5V/div JMCIA0009GB	Ρ

Description

< ECU DIAGNOSIS >

Wire

Terminal No.

[QR25DE]

А

Value

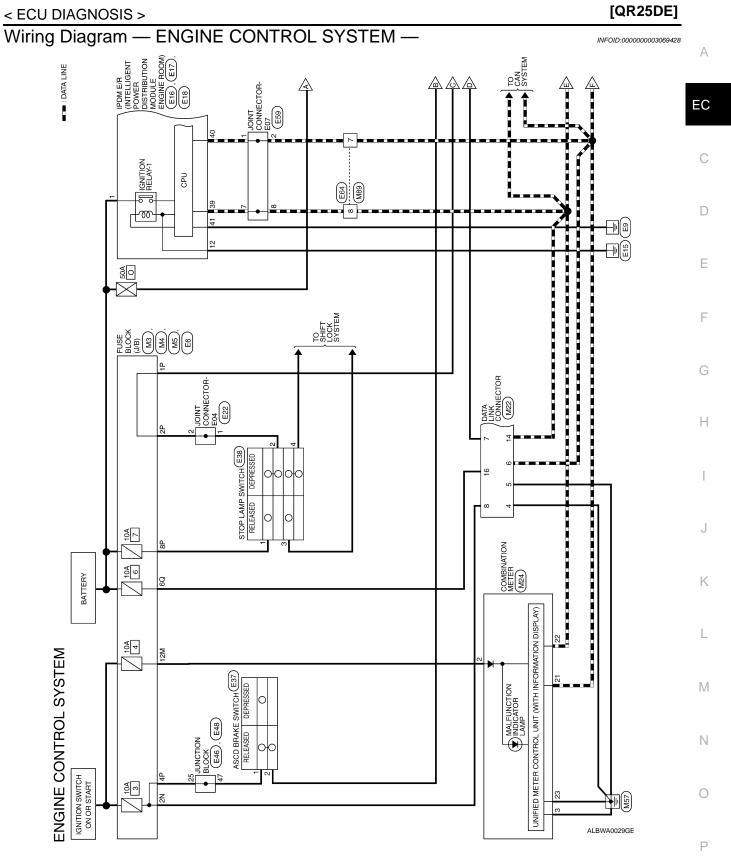


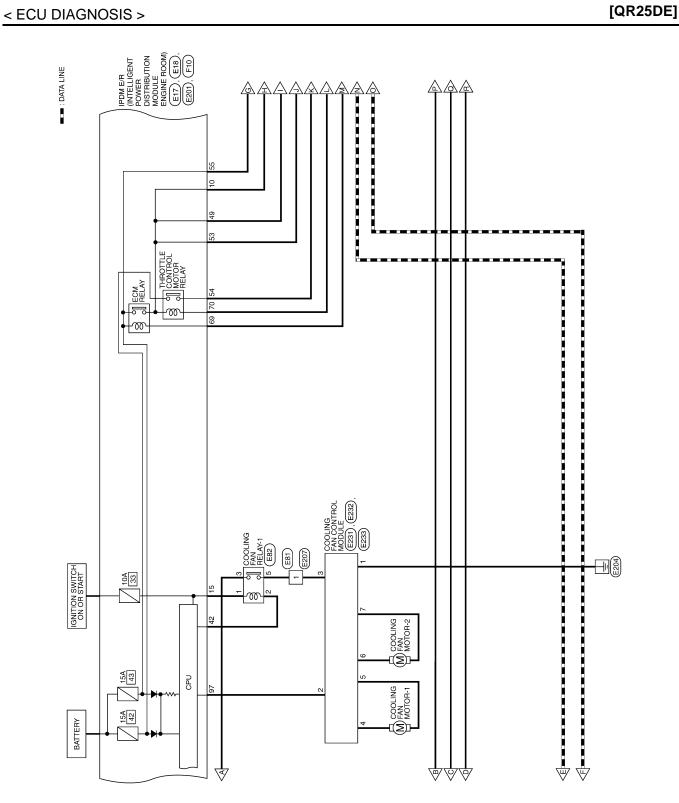
[QR25DE]

Term	inal No.	Wire				Value	
+		color	Signal name	Input/ Output	Condition	(Approx.)	
103	Ground	L	Engine TDC signal output	Output	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	0 - 14V★ 50mSec/div € 5V/div JMCIA0008GB	
104	Ground	B/W	Sensor ground (Fuel tank temperature sen- sor)		[Engine is running]Warm-up conditionIdle speed	0V	
105	Ground	R/G	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)	
					[Ignition switch: OFF] • Brake pedal: Fully released	٥V	
106	Ground	SB	Stop lamp switch	Input	[Ignition switch: OFF]Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)	
107 108	Ground	B B	ECM ground	_	[Engine is running] • Idle speed	Body ground	
109	Ground	LG	EVAP canister vent control valve	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)	
110	Ground	G/B	ASCD brake switch	Input	[Ignition switch: ON] • Brake pedal: Slightly de- pressed	0V	
					[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14V)	
111 112	Ground	B B	ECM ground		[Engine is running] • Idle speed	Body ground	

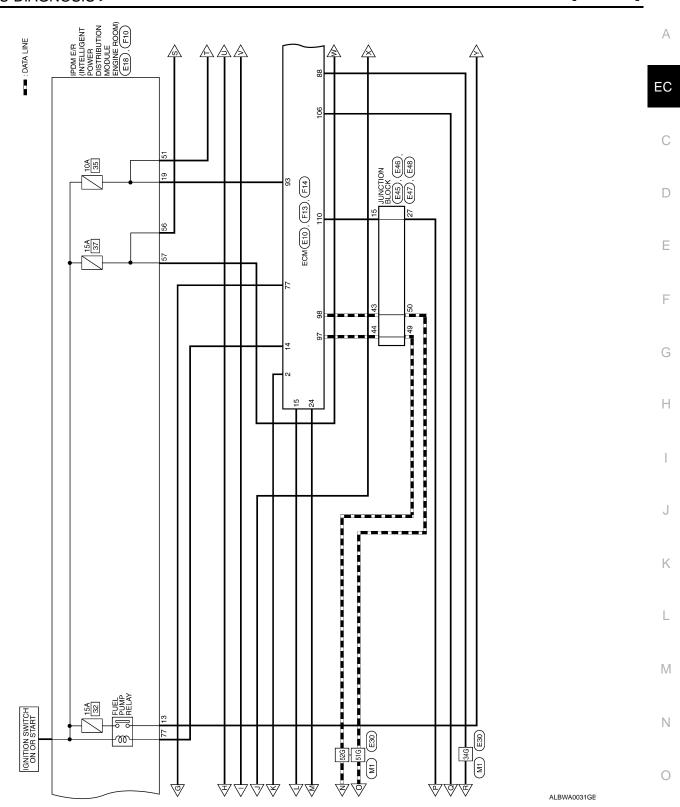
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)







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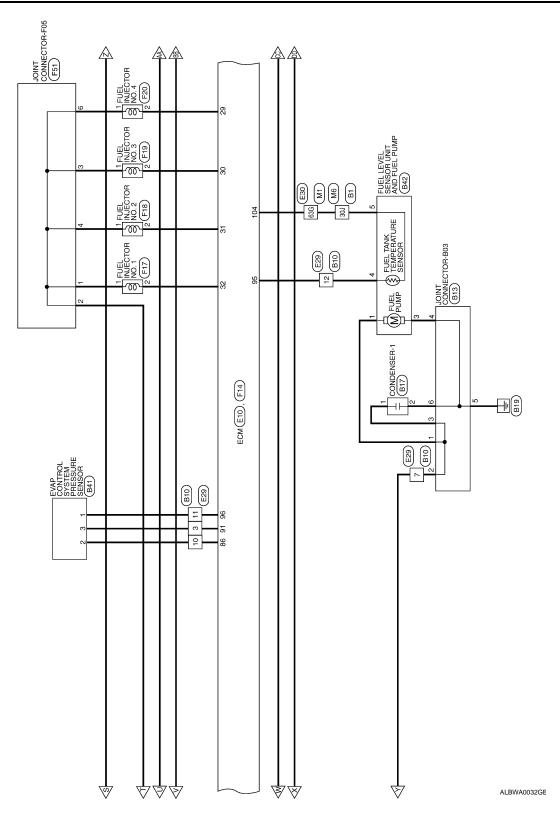


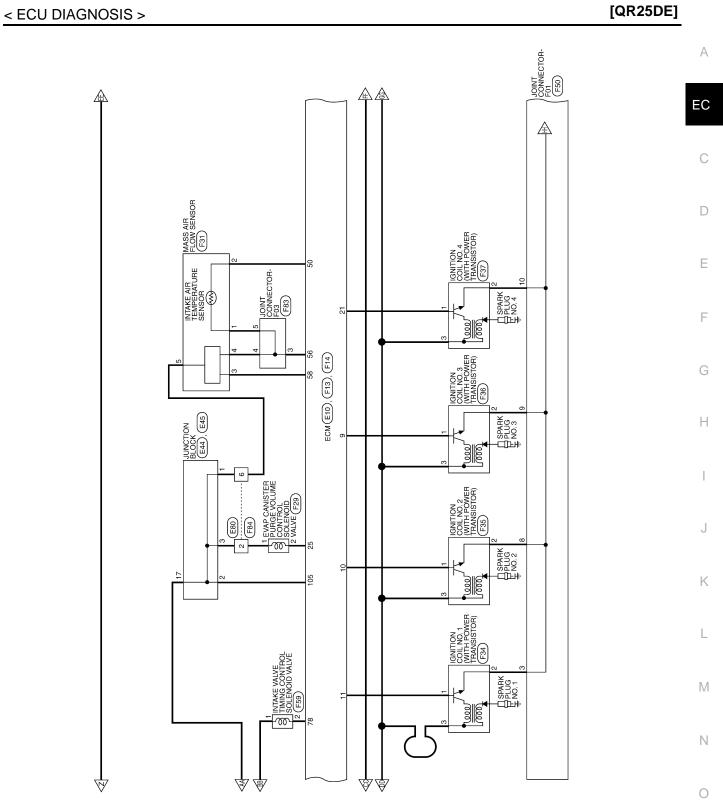
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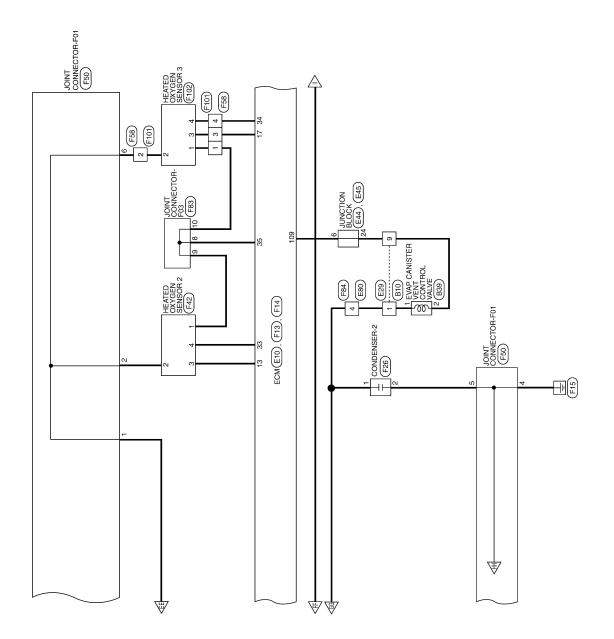
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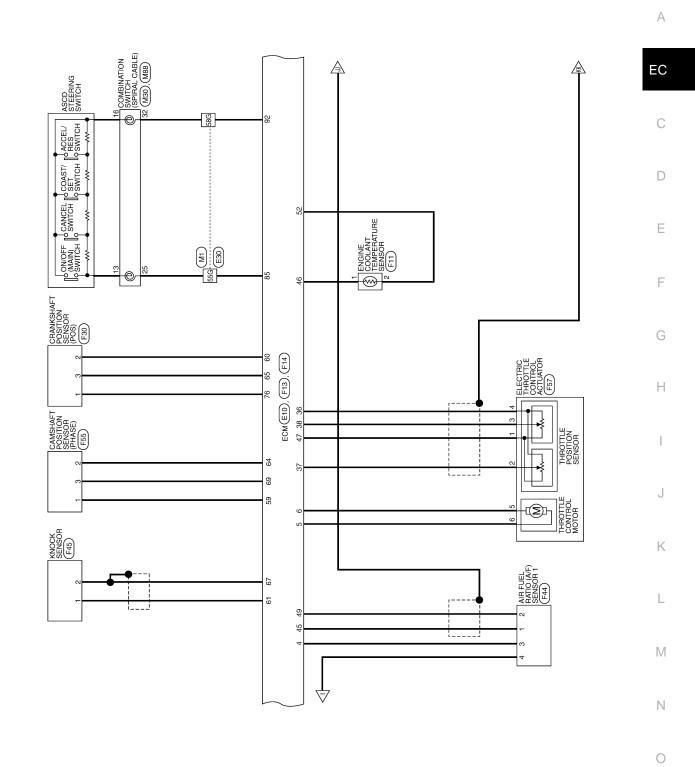


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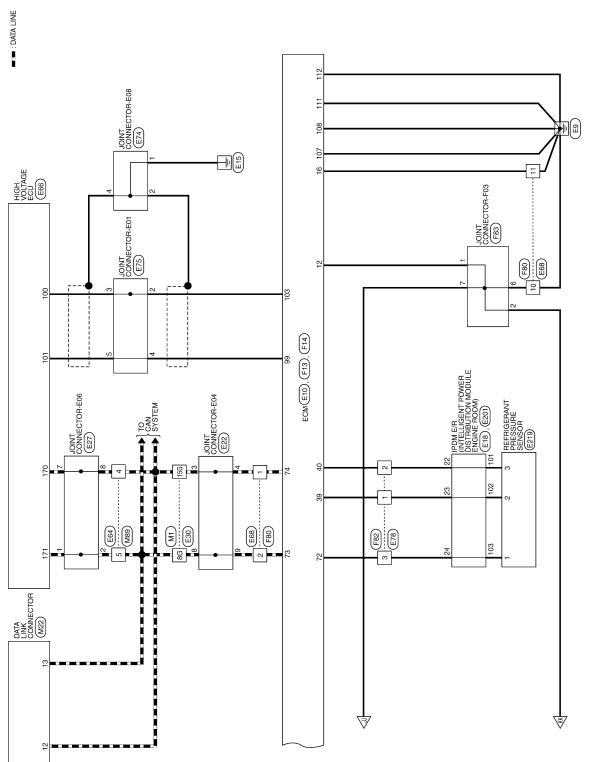


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ECM

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Connector No. M3 Connector Name FUSE BLOCK (J/B) Connector Name FUSE BLOCK (J/B) Connector Color WHITE Minimal No. Minimal Name ZN G	Connector No. M6 Connector Name WIRE TO WIRE Connector Name WIRE TO WIRE Connector Color WHITE Main Main Main Mai	A C D E
Color of wireSignal NameBR-BR-BR-Y-Y-P-P-B/W-B/W-	to. M5 tame FUSE BLOCK (J/B) color WHITE BMIAMMI	G H
I CONNECTORS	Connector No. Connector Name Connector Name Connector Color 12M P	J K
Connector No. M1 Connector No. M1 Connector Name WIRE TO WIRE Connector Color WHITE Connector Color WIRE Connector Color Seconseconseconseconseconseconseconsecons	Connector No. M4 Connector Name FUSE BLOCK (J/B) Connector Color WHITE MA Terminal No. Color of Signal Name 6Q Y/R -	M
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Connector Name Interaction Connector Name Interaction Connector Cold MHTE Connector Cold MHTE Connector Cold MHTE Image: Interaction of white Image: Interaction Image: Interaction MHTE Image: Interaction MHTE <td< th=""><th>ctor Na</th><th>Connector No. M22</th><th></th><th>Connector No.</th><th>. M24</th><th></th><th>Connector No.</th><th></th><th></th></td<>	ctor Na	Connector No. M22		Connector No.	. M24		Connector No.		
1 1	ctor Col	me DA1 lor WHI	A LINK CONNECTOR	Connector Na Connector Col	me COME lor WHITI		Connector Ne Connector Co		BINATION SWITCH AL CABLE)
Color of B Gold GND Signal Name B GND C ON B GND L CANH O KINR O KINR CANH 2 O KINR S S <		9 10 1	<u>3 4 5 6 7 8</u>	H.S.	L		雨 H.S.		1 2 8 8
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0 KLINE 3 B GOID G ICN_SW 2 L CAN-L Y CAN-L 2 P CAN-L Y CAN-L 2 B GND Y CAN-L 23 B GND Y CAN-L 23 B GND Y BATT 23 B GND me COMENTION SWITCH 23 B GND mm COMBINATION SWITCH Comector Name WIEE Commector Name MBB COMBINATION SWITCH Commector Name FUSE Commector Name MBB COMBINATION SWITCH Commector Name FUSE Commector Name MBB COMIN Commector Name FUSE Commector Name FUSE MBB		_	CAN-H		c	NS		ک ن	
G IGN_SW Z L CANH Y CANL Z L CANH Y CANL Z P CANL Y CANL Z N N Onector No M8 Connector No M8 Connector Name WIE TO WIE Connector Name WIE TO WIE Max Connector Name WIE TO WIE Connector Name Sonactor Solor WHIE Connector Name MIE TO WIE Connector Name Wie T Connector Name Sonactor Solor WHIE Connector Name Mie Solor Gonnector Name Mie Connector Name Solor Granting Name Connector Name Connector Name Solor Granting Name Connector Name Connector Name Solor Granting Name Solor Min Solor Solor Solor Solor		0	KLINE	1 () a		23	<u>,</u>	
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Y CANH Z2 B CAN-L YR BATT 23 B GND 0. M88 CAN-L 23 B GND 0. M88 Connector No M89 Connector No E6 0. GRAY Connector No M89 Connector No E6 0. GRAY Connector No M89 Connector No E6 0. GRAY E E Connector No E6 0. GRAY E E E Connector No 0. GRAY E E E E 0. GRAY E E E E 0. E <td></td> <td>BR</td> <td>CAN-L</td> <td>21</td> <td></td> <td></td> <td></td> <td></td> <td></td>		BR	CAN-L	21					
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Connector No. E29 Connector Name WIRE TO WIRE Connector Color WHITE

Connector Name JOINT CONNECTOR-E06 Connector Color BLUE

Connector Name JOINT CONNECTOR-E04 Connector Color BLACK

Connector No. E22

Connector No. E27

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		E
ON BLOCK	Signal Name	
Connector No. E45 Connector Name JUNCTION BLOCK Connector Name JUNCTION BLOCK Connector Color WHITE Terminal No. Color of Signal Nar 15 G/B - 17 R/B - 24 Y -	Connector No. E48 Connector Name JUNCTION BLOCK Connector Name JUNCTION BLOCK MHITE JUNCTION BLOCK Image: Solution of the state of the s	
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P LAMP SWITCH TE Signal Name 	E46 JUNCTION BLOCK WHITE e of B	
Connector No. E38 Connector Name STOP LAMP SWITC Connector Name STOP LAMP SWITC Connector Name NHITE Image: State of the st	G/I All All <td></td>	

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	Terminal No.	Color of Wire	Signal Name	Terminal No.		Color of Wire	Signal Name		Terminal No.	Color of Wire	Signal Name	
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Signal Name	С
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E231	Connector Name COOLING FAN CONTROL	NOUCEL	GRAY			$\begin{pmatrix} 1 & 2 & 3 \end{pmatrix}$		
Connector No. E231	Connector Name		Connector Color GRAY		E		0 U	
Connector No. E219	Connector Name REFRIGERANT PRESSURE	CLINGON	Connector Color BLACK				LO.	
Connector No. E207	Connector Name WIRE TO WIRE	Connector Color BLACK				H.S.		

Signal Name	I	
Color of Wire	Я	
Terminal No.	+	

	E233	Connector Name COOLING FAN MOTOR-2	BLACK
	Connector No.	Connector Name	Connector Color BLACK

EC-424

Connector No.	E232	Connector No.
Connector Name	Connector Name COOLING FAN MOTOR-1	Connector Name
Connector Color BLACK	BLACK	Connector Color
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Color of wire	в	SB
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PWM_POWER PWM_SIG

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Signal Name

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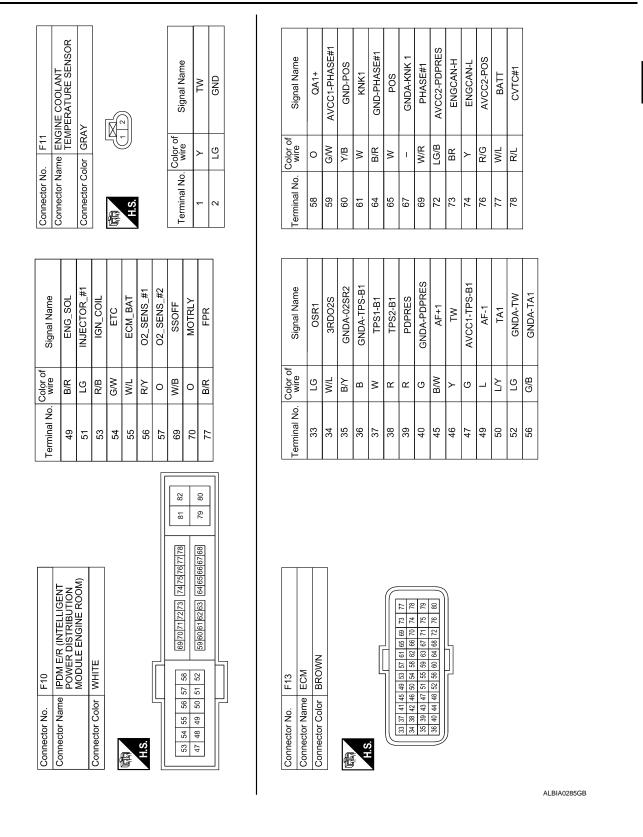
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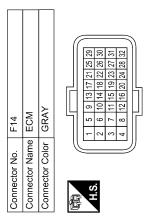
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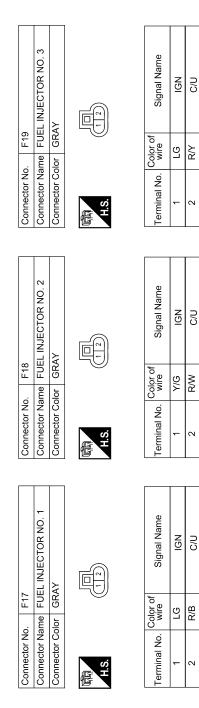
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Signal Name	MOTRLY-B1	GND	3RD02H	IGN #4	SSOF	EVAP	1NJ #4	INJ #3	2# CNI	1# UNI
Color of wire	0	в	L	G/Y	W/B	P/L	LG/R	RN	R/W	R/B
Terminal No.	15	16	17	21	24	25	29	30	31	32

Signal Name	VMOT-B1	AFH1	MOTOR1-B1	MOTOR2-B1	IGN #3	IGN #2	1GN #1	GND	02HR1	FPR
Color of wire	G/W	BR/Υ	L	Ч	L/B	G/R	Y/R	В	Я	B/R
Terminal No.	2	4	2	9	6	10	11	12	13	14



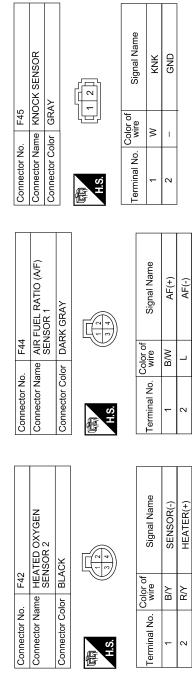


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EC-426

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F29 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE GRAY	Signal Name VBR C/U	F34 IGNITION COIL NO. 1 (WITH POWER TRANSISTOR) GRAY	Signal Name SIGNAL GND VBR	
Connector No. F29 Connector Name EVAP (VOLUN SOLEN SOLEN H.S.	al No. Color of R/W P/L	e z	I No. Color of V/R B B	
Connec Connec	Terminal No.		Terminal No.	
F26 CONDENSER-2 GRAY	Signal Name VBR GND	F31 MASS AIR FLOW SENSOR BLACK	Signal Name TA- CA+ GND VB	
nector No. nector Name nector Color	Terminal No. Color of wire No. Color of NG B B	Connector No. F31 Connector Name MASS / Connector Color BLACK H.S.	Terminal No. Color of wire 1 G/B 2 L/Y 3 0 4 G/B 5 R/G	
F20 FUEL INJECTOR NO. 4 GRAY	Signal Name IGN C/U	F30 CRANKSHAFT POSITION SENSOR (POS) BLACK	Signal Name AVCC2 GND POS	
	, Color of wire Y/G LG/R		 Color of wire W/B Y/B 	
Connector No. Connector Name Connector Color H.S.	Terminal No. 2	Connector No. Connector Name Connector Color	A Terminal No.	

nector Name nector Color	IGNITION COIL NO. 3 (WITH	Connector No.	F37	
onnector Color GRAY	[RANSISTOR)	Connector Name	 IGNITION COIL NO. 4 (WITH POWER TRANSISTOR) 	40.4 (WITH STOR)
[Connector Color	r GRAY	
H.S.		国 H.S.		
Ferminal No.	Signal Name	Terminal No.	Color of Signal Name	Name
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F55 CAMSHAFT POSITION SENSOR (PHASE) BLACK		Signal Name	AVCC1	GND PHASE			F59 INTAKE VALVE TIMING CONTROL SOLENOID VALVE		Signal Name VB C/U
		Color of wire	G/W	W/R					Color of wire B/R R/L
Connector No. Connector Name Connector Color	。 H.S.H	Terminal No.		n w			Connector No. Connector Name	Connector Color	Terminal No.
	19								
F51 JOINT CONNECTOR-F05 BLACK		Signal Name -	I	1 1	1				Same Same Same Same Same Same Same Same
F51 JOINT CONN BLACK	4 3 2 1						F58 WIRE TO WIRE BLACK		Signal Name
lo. F51 lame JOIN color BLA	6	. Color of wire LG	D C	ם ב	ГG				Color of wire wire W R/Y
Connector No. Connector Name Connector Color	子.H.S.H	Terminal No. 1	5 6	υ 4	ω		Connector No. Connector Name Connector Color	成词 H.S.	Terminal No. C
								1	
F50 JOINT CONNECTOR-F01 BLACK		Signal Name -	I	1 1	1 1 1	1 1	F57 ELECTRIC THROTTLE CONTROL ACTUATOR BLACK	9	Signal Name INPUT OUTPUT1 OUTPUT2 GND MOTOR2 MOTOR1
	5 10 9 8	Color of wire R/Y	RY ,	<u></u> п п	B RY B	a a			Color of Wire of Color of Colo
Connector No. Connector Name Connector Color							Connector No. Connector Name Connector Color		
Connec Connec Connec	品.S.H	Terminal No. 1	2 0	ω 4	ω Q Ω	9 10	Connec	H.S.	Terminal No. 1 3 3 6 6

Connector Color BLACK		-erminal No. Color of Signal Name	1 B	2 GR –	3 G/B –	4 G/B _	5 G/B –	6 B –	7 – SHIELD	8 B/Y [–]	9 B/Y [–]	10 B/L [–]	Connector No. F102	Connector Name HEATED OXYGEN	Connector Color GRAV	_	<u></u>	
Conr	晤 H.S.	Term											Conne	Conne			Æ	H.S.
Connector Color WHITE	H.S.	Terminal No. Color of Signal Name	- К Г	2 G –	3 LG/B _								Connector No. F101	Connector Name WIRE TO WIRE	Connector Color BLACK	Į		
or WHITE	9 8 7 6 5 4 3 2 1 2019181716151413121110	Color of Signal Name	-	BR	п	В							F84	Ie WIRE TO WIRE	or BROWN		3 2 1 8 7 6 5 4	
Connector Color WHITE	9 H.S.	Terminal No.	-	2	10	11							Connector No.	Connector Name	Connector Color		倍	<u>ю</u> п

CHELD -	m I Š	6 7 8
I	В	6
-	G/B	5
—	G/B	4
I	G/B	З
-	5	-

Connoctor No		E87
	_	77
Connector Na	ame M	Connector Name WIRE TO WIRE
Connector Color WHITE	olor M	HITE
品.S.H	12	2 4 3 2 1 11 10 9 8 7 6
Terminal No.	Color of wire	of Signal Name

טר		F102	HEATED OXYGEN SENSOR 3	GRAY	
2		inector No.	inector Name	inector Color GRAY	

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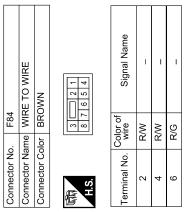
)
明.S.H	

Signal Name	SENSOR(-)	HEATER(+)	HEATER(-)	SENSOR(+)
Color of wire	В	R/Y	Γ	M
Terminal No.	1	2	3	4

)	Signal Name	I	I	I
	Color of wire	В	R/Y	_
	erminal No.	-	2	3

0)				
Color of wire	В	R/Y	_	Μ
Terminal No.	ŀ	2	8	4

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Connector No. F83 Connector Name JOINT CONNECTOR-F03

Connector No. F80 Connector Name WIRE TO WIRE

ECM

				A
Connector No. B13 Connector Name JOINT CONNECTOR-B03 Connector Color WHITE	Signal Name	B41 EVAP CONTROL SYSTEM PRESSURE SENSOR GRAY	Signal Name GND SIGNAL AVCC2	EC C
0. B13 ame JOINT C olor WHITE	Color of wire of SB		Color of wire wire LG BR/L	D
Connector No. Connector Name Connector Color	Terminal No. 1 2 3 4 6 6	Connector No. Connector Name Connector Color	Terminal No. 1 3	E
				F
MRE	Signal Name	B39 EVAP CANISTER VENT CONTROL VALVE BLACK	Signal Name BATT C/U	G
B10 ne WIRE TO WIRE or WHITE 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	Color of wire of signation of signation of signation of signation of signation of the signature of the sinte		Color of wire of LG	Н
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				K
			Signal Name (+) (-)	L
B1 WIRE TO WIRE WHITE U U U U	141 142 221 222 <td>w Signal Name W – CONDENSER-1 WHITE</td> <td></td> <td>M</td>	w Signal Name W – CONDENSER-1 WHITE		M
ctor No.		DJ IN OUR DI NO	Terminal No. Color of 1 Wire 2 B/Y	Ν
Conne Conne H.S.		Conne Conne Conne H.S.	ALBIA0291GB	0

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Fail Safe

DTC RELATED ITEM

Connector Name FUEL LEVEL SENSOR UNIT AND FUEL PUMP

B42

Connector No.

GRAY

ALBIA0292GB

INFOID:000000003069429

IGN GND TEMP_SENS

S/B B/Y R/Y

ი 4 ი

SENSOR -

B/W

Signal Name

Terminal No. Color of

ECM

< ECU DIAGNOSIS >

DTC No.	Detected items	Engine opera	ting condition in fail-safe mode
U0293 U0400 U1020 U1021	CAN communication	ECM stops the engine.The vehicle drives using the motor	Dr.
P0011	Intake valve timing control	 Engine idling stop is inhibited. The signal is not energized to the valve control does not function. 	intake valve timing control solenoid valve and the
P0075	Intake valve timing control solenoid valve	Engine idling stop is inhibited.	
P0101 P0102 P0103	Mass air flow sensor	Engine idling stop is inhibited.Fuel is cut off when engine speed	l is more than 2,400 rpm.
P0117 P0118	Engine coolant tempera- ture sensor circuit		e is running. e determined by ECM based on the following condi- ngine coolant temperature decided by ECM.
		Condition	Engine coolant temperature decided (CONSULT-III display)
		Just as ignition switch is turned ON or START	40°C (104°F)
		Approx 4 minutes or more after en- gine starting	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	in order for the idle position to be	ottle control actuator in regulating the throttle opening within +10 degrees. peed of the throttle valve to be slower than the normal
P0125	Engine coolant tempera- ture sensor	Engine idling stop is inhibited.	
P0171 P0172	Fuel injection system	Engine idling stop is inhibited.	
P0300 P0301 P0302 P0303 P0304	Misfire	Engine idling stop is inhibited.	
P0335	Crankshaft position sensor (POS)	Engine idling stop is inhibited.	
P0340	Camshaft position sensor (PHASE)	Engine idling stop is inhibited.	
P0500	Vehicle speed sensor	When the fail-safe system for vehicl (Highest) while engine is running.	e speed sensor is activated, the cooling fan operates
P0605	ECM	Engine idling stop is inhibited.The engine speed will not rise 2,5	ntrol actuator control, throttle valve is maintained at a) by the return spring.
P0643	Sensor power supply	 Engine idling stop is inhibited. ECM stops the electric throttle confixed opening (approx. 5 degrees) 	ntrol actuator control, throttle valve is maintained at a) by the return spring.
P1195	Engine does not start	 ECM stops the engine according The vehicle drives using the motor 	to the fuel cut request signal sent from HV ECU.

EC-433

< ECU DIAGNOSIS >

DTC No.	Detected items	Engine operating condition in fail-safe mode										
P1196	Poor engine power	ECM stops the engine according to the fuel cut request signal sent from HV ECU.The vehicle drives using the motor.										
P1197	Fuel run out	ECM stops the engine according to the fuel cut request signal sent from HV ECU.The vehicle drives using the motor.										
P1805	Brake switch	ECM controls the electric throttle control actuator by regulating the throttle openin small range. Therefore, acceleration will be poor.										
		Vehicle condition Driving condition										
		When engine is idling Normal										
		When accelerating	Poor acceleration									
P2100 P2103	Throttle control motor relay	 Y Engine idling stop is inhibited. ECM stops the electric throttle control actuator control, throttle valve is maintained a fixed opening (approx. 5 degrees) by the return spring. 										
P2101	Electric throttle control function	 Engine idling stop is inhibited. ECM stops the electric throttle co fixed opening (approx. 5 degrees) 	ontrol actuator control, throttle valve is maintained at a s) by the return spring.									
P2118	Throttle control motor	 Engine idling stop is inhibited. ECM stops the electric throttle co fixed opening (approx. 5 degrees) 	ontrol actuator control, throttle valve is maintained at a s) by the return spring.									
P2119	Electric throttle control ac- tuator	malfunction:)	tor does not function properly due to the return spring ctuator by regulating the throttle opening around the I not rise more than 2,000 rpm.									
		(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.										
		(When ECM detects the throttle valve is stuck open:)Engine idling stop is inhibited.The engine speed will not rise 1,150 rpm or more.										

DTC Inspection Priority Chart

INFOID:000000003069430

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

< ECU DIAGNOSIS >

Priority	Detected items (DTC)	A
1	 U0129 U0293 U1020 1022 CAN communication line U0400 U0418 U1021 U1023 CAN communication U1000 U1001 CAN communication line P0101 P0102 P0103 Mass air flow sensor P0112 P0113 P0127 Intake air temperature sensor P0116 P0117 P0118 P0125 Engine coolant temperature sensor P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor P0128 Thermostat function P0181 P0182 P0183 Fuel tank temperature sensor P0201 - P0204 Fuel injector P0327 P0328 Knock sensor P0340 Camshaft position sensor (POS) P0340 Camshaft position sensor (PHASE) P0460 P0461 P0462 P0463 Fuel level sensor P0500 Vehicle speed sensor P0643 Sensor power supply 	EC C D
2	 P0031 P0032 Air fuel ratio (A/F) sensor 1 heater P0037 P0038 Heated oxygen sensor 2 heater P0043 P0044 Heated oxygen sensor 3 heater 	F
	 P0075 Intake valve timing control solenoid valve P0130 P0131 P0132 P0133 P2A00 Air fuel ratio (A/F) sensor 1 P0137 P0138 P0139 Heated oxygen sensor 2 P0143 P0144 P0145 P0146 Heated oxygen sensor 3 P0441 EVAP control system purge flow monitoring P0443 P0444 P0445 EVAP canister purge volume control solenoid valve 	G
	 P0447 P0448 EVAP canister vent control valve P0451 P0452 P0453 EVAP control system pressure sensor P0603 ECM power supply P1195 Engine does not start P1196 Poor engine power 	Ι
	 P1197 Fuel run out P1217 Engine over temperature (OVERHEAT) P1805 Brake switch P2100 P2103 Throttle control motor relay P2101 Electric throttle control function P2118 Throttle control motor 	J
3	 P0011 Intake valve timing control P0171 P0172 Fuel injection system function P0300 - P0304 Misfire P0420 Three way catalyst function 	_ K
	 P0456 EVAP control system P0506 P0507 Idle speed control system P0AC4 HV ECU MIL ON request P1148 Closed loop control P1421 Cold start control P1421 Cold start control 	Μ
	 P1564 ASCD steering switch P1572 ASCD brake switch P1574 ASCD vehicle speed sensor P2119 Electric throttle control actuator P2423 HC adsorption catalyst 	N - 0

DTC Index

INFOID:000000003069431

 \times :Applicable —: Not applicable P

DT	⁻ C* ¹	Items				Reference
CONSULT-III GST* ²	ECM* ³	(CONSULT-III screen terms)	SRT code	Trip	MIL	page
U0129	0129	LOST COMM (BRAKE)	_	1	×	EC-122
U0293	0293	LOST COMM (HV ECU)		1	×	<u>EC-123</u>

ECM

< ECU DIAGNOSIS >

DT	C* ¹	Items				Reference
CONSULT-III GST* ²	ECM* ³	(CONSULT-III screen terms)	SRT code	Trip	MIL	page
U0400	0400	INVALID (HV ECU)		1	×	EC-124
U0418	0418	INVALID (BRAKE)	_	1	×	<u>EC-126</u>
U1000	1000* ⁴	CAN COMM CIRCUIT	_	1	×	EC-128
U1001	1001* ⁴	CAN COMM CIRCUIT		2		EC-128
U1020	1020	LOST COMM (HV ECU)	—	2	—	<u>EC-123</u>
U1021	1021	INVALID (HV ECU)	—	2	—	<u>EC-124</u>
U1022	1022	LOST COMM (BRAKE)	_	2	—	<u>EC-122</u>
U1023	1023	INVALID (BRAKE)	_	2	—	<u>EC-126</u>
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—	—	Flashing* ⁵	_
P0011	0011	INT/V TIM CONT-B1	_	2	×	<u>EC-129</u>
P0031	0031	A/F SEN1 HTR (B1)	_	2	×	EC-133
P0032	0032	A/F SEN1 HTR (B1)	_	2	×	EC-133
P0037	0037	HO2S2 HTR (B1)	_	2	×	EC-136
P0038	0038	HO2S2 HTR (B1)	_	2	×	<u>EC-136</u>
P0043	0043	HO2S3 HTR (B1)	_	2	×	EC-139
P0044	0044	HO2S3 HTR (B1)	—	2	×	<u>EC-139</u>
P0075	0075	INT/V TIM V/CIR-B1	_	2	×	<u>EC-142</u>
P0101	0101	MAF SEN/CIRCUIT-B1	_	2	×	<u>EC-145</u>
P0102	0102	MAF SEN/CIRCUIT-B1	_	1	×	<u>EC-153</u>
P0103	0103	MAF SEN/CIRCUIT-B1	_	1	×	<u>EC-153</u>
P0112	0112	IAT SEN/CIRCUIT-B1	—	2	×	<u>EC-160</u>
P0113	0113	IAT SEN/CIRCUIT-B1	—	2	×	<u>EC-160</u>
P0116	0116	ECT SEN/CIRC	—	2	×	<u>EC-163</u>
P0117	0117	ECT SEN/CIRC	—	1	×	<u>EC-166</u>
P0118	0118	ECT SEN/CIRC	—	1	×	<u>EC-166</u>
P0122	0122	TP SEN 2/CIRC-B1	—	1	×	<u>EC-169</u>
P0123	0123	TP SEN 2/CIRC-B1	—	1	×	<u>EC-169</u>
P0125	0125	ECT SENSOR	—	2	×	<u>EC-172</u>
P0127	0127	IAT SENSOR-B1	_	2	×	<u>EC-175</u>
P0128	0128	THERMSTAT FNCTN	—	2	×	<u>EC-177</u>
P0130	0130	A/F SENSOR1 (B1)	—	2	×	<u>EC-179</u>
P0131	0131	A/F SENSOR1 (B1)	—	2	×	<u>EC-183</u>
P0132	0132	A/F SENSOR1 (B1)	—	2	×	<u>EC-186</u>
P0133	0133	A/F SENSOR1 (B1)	×	2	×	<u>EC-189</u>
P0137	0137	HO2S2 (B1)	×	2	×	<u>EC-193</u>
P0138	0138	HO2S2 (B1)	×	2	×	<u>EC-198</u>
P0139	0139	HO2S2 (B1)	×	2	×	<u>EC-205</u>
P0143	0143	HO2S3 (B1)	×	2	×	<u>EC-210</u>
P0144	0144	HO2S3 (B1)	×	2	×	<u>EC-213</u>
P0145	0145	HO2S3 (B1)	×	2	×	<u>EC-216</u>
P0146	0146	HO2S3 (B1)		2	×	<u>EC-219</u>

ECM

< ECU DIAGNOSIS >

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DTC	*1	ltems				Reference	А
CONSULT-III GST* ²	ECM* ³	(CONSULT-III screen terms)	SRT code	Trip	MIL	page	
P0171	0171	FUEL SYS-LEAN-B1	—	2	×	<u>EC-222</u>	EC
P0172	0172	FUEL SYS-RICH-B1	_	2	×	<u>EC-226</u>	
P0181	0181	FTT SENSOR	_	2	×	<u>EC-230</u>	-
P0182	0182	FTT SEN/CIRCUIT	_	2	×	<u>EC-233</u>	С
P0183	0183	FTT SEN/CIRCUIT	—	2	×	EC-233	-
P0201	0201	INJECTOR CIRC-CYL1	_	1	_	<u>EC-236</u>	D
P0202	0202	INJECTOR CIRC-CYL2	—	1	—	<u>EC-236</u>	
P0203	0203	INJECTOR CIRC-CYL3	—	1	—	<u>EC-236</u>	-
P0204	0204	INJECTOR CIRC-CYL4		1	_	<u>EC-236</u>	E
P0222	0222	TP SEN 1/CIRC-B1		1	×	<u>EC-239</u>	-
P0223	0223	TP SEN 1/CIRC-B1		1	×	<u>EC-239</u>	_
P0300	0300	MULTI CYL MISFIRE	_	2	×	<u>EC-242</u>	- F
P0301	0301	CYL 1 MISFIRE	_	2	×	<u>EC-242</u>	-
P0302	0302	CYL 2 MISFIRE	_	2	×	<u>EC-242</u>	G
P0303	0303	CYL 3 MISFIRE	_	2	×	<u>EC-242</u>	-
P0304	0304	CYL 4 MISFIRE	_	2	×	<u>EC-242</u>	-
P0327	0327	KNOCK SEN/CIRC-B1		2		<u>EC-248</u>	- H
P0328	0328	KNOCK SEN/CIRC-B1	_	2		<u>EC-248</u>	-
P0335	0335	CKP SEN/CIRCUIT	_	2	×	<u>EC-250</u>	-
P0340	0340	CMP SEN/CIRC-B1		2	×	<u>EC-254</u>	- '
P0420	0420	TW CATALYST SYS-B1	×	2	×	<u>EC-258</u>	-
P0441	0441	EVAP PURG FLOW/MON	×	2	×	EC-262	J
P0443	0443	PURG VOLUME CONT/V	_	2	×	EC-267	-
P0444	0444	PURG VOLUME CONT/V	_	2	×	<u>EC-272</u>	- 12
P0445	0445	PURG VOLUME CONT/V	_	2	×	EC-272	_ K
P0447	0447	VENT CONTROL VALVE	_	2	×	EC-275	-
P0448	0448	VENT CONTROL VALVE	_	2	×	<u>EC-279</u>	L
P0451	0451	EVAP SYS PRES SEN	_	2	×	EC-283	_
P0452	0452	EVAP SYS PRES SEN	_	2	×	EC-286	-
P0453	0453	EVAP SYS PRES SEN		2	×	EC-290	M
P0456	0456	EVAP VERY SML LEAK	×	2	×	EC-295	-
P0460	0460	FUEL LEV SEN SLOSH		2	×	EC-301	N
P0461	0461	FUEL LEVEL SENSOR		2	×	EC-302	-
P0462	0462	FUEL LEVL SEN/CIRC		2	×	EC-304	_
P0463	0463	FUEL LEVL SEN/CIRC		2	×	EC-304	- 0
P0500	0500	VEH SPEED SEN/CIRC	_	2	×	EC-306	-
P0506	0506	ISC SYSTEM		2	×	EC-307	P
P0507	0507	ISC SYSTEM		2	×	EC-309	_
P0603	0603	ECM BACK UP/CIRCUIT	_	2	×	EC-311	-
P0605	0605	ECM	_	1 or 2	× or —	EC-313	_
P0607	0607	ECM		1	×	EC-315	-
P0643	0643	SENSOR POWER/CIRC		1	×	<u>EC-316</u>	-

< ECU DIAGNOSIS >

DTC	× ¹	ltems				Reference
CONSULT-III GST* ²	ECM* ³	(CONSULT-III screen terms)	SRT code	Trip	MIL	page
P0AC4	0AC4	HV ECU MIL REQUEST	_	1	×	<u>EC-318</u>
P1148	1148	CLOSED LOOP-B1	—	1	×	<u>EC-319</u>
P1195	1195	ENGINE NOT START	_	1	×	<u>EC-320</u>
P1196	1196	POOR ENGINE POWER	—	1	×	EC-323
P1197	1197	FUEL RUN OUT	—	1	_	<u>EC-326</u>
P1217	1217	ENG OVER TEMP	—	1	×	<u>EC-327</u>
P1225	1225	CTP LEARNING-B1	—	2	_	EC-331
P1226	1226	CTP LEARNING-B1	—	2	_	EC-333
P1421	1421	COLD START CONTROL	_	2	×	<u>EC-335</u>
P1564	1564	ASCD SW	_	1		<u>EC-337</u>
P1572	1572	ASCD BRAKE SW	—	1	_	<u>EC-340</u>
P1574	1574	ASCD VHL SPD SEN	_	1		<u>EC-346</u>
P1805	1805	BRAKE SW/CIRCUIT	_	2		<u>EC-348</u>
P2100	2100	ETC MOT PWR-B1	_	1	×	<u>EC-351</u>
P2101	2101	ETC FNCTN/CIRC-B1	_	1	×	<u>EC-353</u>
P2103	2103	ETC MOT PWR	_	1	×	<u>EC-351</u>
P2118	2118	ETC MOT-B1	_	1	×	<u>EC-357</u>
P2119	2119	ETC ACTR-B1		1	×	<u>EC-360</u>
P2135	2135	TP SENSOR-B1	_	1	×	<u>EC-362</u>
P2423	2423	HC ADS CATALYST-B1	×	2	×	EC-365
P2A00	2A00	A/F SENSOR1 (B1)	_	2	×	EC-369

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: The troubleshooting for this DTC needs CONSULT-III.

*5: When the ECM is in the mode of displaying SRT status, MIL may flash. For the details, refer to "How to Display SRT Status".

How to Set SRT Code

INFOID:000000003069432

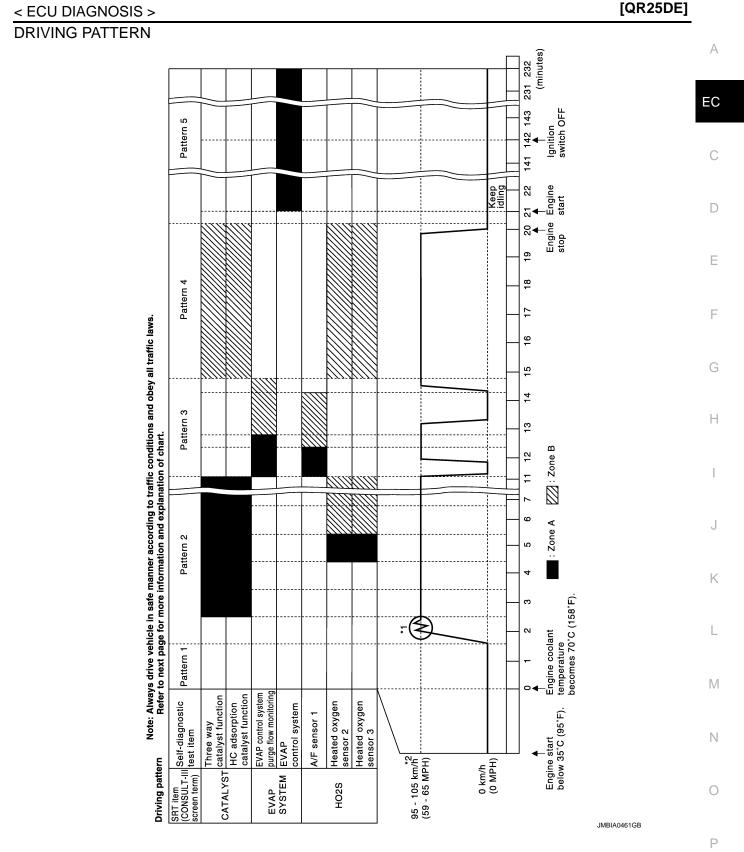
To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

WITH CONSULT-III

Perform corresponding DTC CONFIRMATION PROCEDURE one by one.

WITHOUT CONSULT-III

The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes.



• The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.

Zone A refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest.

Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A. *: Normal conditions refer to the following:

EC-439

< ECU DIAGNOSIS >

- Sea level
- Flat road
- Ambient air temperature: 20 30°C (68 86°F)
- Diagnosis is performed as quickly as possible under normal conditions. Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1:

- The engine is started at the engine coolant temperature of -10 to $35^{\circ}C$ (14 to $95^{\circ}F$)
- (where the voltage between the ECM terminal 46 and ground is 3.0 4.3V).
- The engine must be operated until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 46 and ground is lower than 1.4V).
- The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 95 and ground is less than 4.1V).

Pattern 2:

• When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:

- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during decelerating vehicle speed from 100 km/h (62 MPH) to 0 km/h (0 MPH).

Pattern 4:

- The accelerator pedal must be held very steady during steadystate driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

Pattern 5:

• Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and wait at least 2 hours. Then turn ignition switch OFF and wait at least 90 minutes.

*1: Depress the accelerator pedal until vehicle speed is 100 km/h (62 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 100 km/h (62 MPH) again.

*2: Checking the vehicle speed with GST is advised.

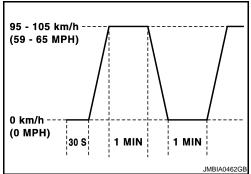
Suggested Transmission Gear Position Set the selector lever in the D position.

Test Value and Test Limit

The following is the information specified in Service \$06 of SAE J1979.

The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

These data (test value and test limit) are specified by On Board Monitor ID (OBDMID), Test ID (TID), Unit and Scaling ID to be displayed on the GST screen.



[QR25DE]

INFOID:000000003069433

ECM

< ECU DIAGNOSIS >

[QR25DE]

	OBD-			li	e and Test mit display)	
Item		Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description
			P0130	85H	0BH	Minimum sensor output voltage for test cycle
		Air fuel ratio (A/F) sensor 1	P0130	86H	0BH	Maximum sensor output voltage for test cycle
	01H	(Bank 1)	P0130	8BH	0BH	Difference in sensor output volt- age
			P2A00	89H	84H	The amount of shift in air fuel ratio
			P2A00	8AH	84H	The amount of shift in air fuel ratio
			P0137	08H	0CH	Maximum sensor output voltage for test cycle
HO2S	02H	Heated oxygen sensor 2	P0138	07H	0CH	Minimum sensor output voltage for test cycle
		(Bank 1)	P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output volt- age
			P0143	07H	0CH	Minimum sensor output voltage for test cycle
	03H	Heated oxygen sensor 3 (Bank 1)	P0144	08H	0CH	Maximum sensor output voltage for test cycle
			P0145	81H	0CH	Difference in sensor output volt- age
			P0146	80H	0CH	Sensor output voltage
			P0420	80H	01H	O2 storage index
CATA-		Three way catalyst function	P0420	82H	01H	Switching time lag engine exhaust index value
LYST	21H	(Bank1)	P2423	83H	0CH	Difference in 3rd O2 sensor out- put voltage
			P2423	84H	84H	O2 storage index in HC trap cata- lyst
			P0456	80H	05H	Leak area index (for more than 0.02inch)
EVAP SYSTEM	3CH	EVAP control system (Very small leak)	P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
			P0456	82H	FDH	Internal pressure of EVAP system at the end of monitoring
	41H	A/F sensor 1 heater (Bank 1)	Low Input:P0031 High Input:P0032	81H	0BH	Converted value of Heater electric current to voltage
HO2S HEATER	42H	Heated oxygen sensor 2 (Bank 1)	Low Input:P0037 High Input:P0038	80H	0CH	Converted value of Heater electric current to voltage
	43H	Heated oxygen sensor 3 (Bank 1)	P0043	80H	0CH	Converted value of Heater electric current to voltage

ECM

< ECU DIAGNOSIS >

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	OBD-			lir	e and Test mit display)	
ltem	MID	Self-diagnostic test item	DTC	TID	Unit and Scaling ID	Description
FUEL	81H	Fuel injection system func-	Enleanment: P0171 Enrichment: P0172	80H	2FH	Long term fuel trim
SYSTEM	оп	tion (Bank 1)	Enleanment: P0171 Enrichment: P0172	81H	24H	The number of lambda control clamped
			P0301	80H	24H	Misfiring counter at 1000rev of the first cylinder
			P0302	81H	24H	Misfiring counter at 1000rev of the second cylinder
			P0303	82H	24H	Misfiring counter at 1000rev of the third cylinder
			P0304	83H	24H	Misfiring counter at 1000rev of the fourth cylinder
	A1H	Multiple Cylinder Misfire	P0300	88H	24H	Misfiring counter at 1000rev of the multiple cylinders
			P0301	89H	24H	Misfiring counter at 200rev of the first cylinder
			P0302	8AH	24H	Misfiring counter at 200rev of the second cylinder
			P0303	8BH	24H	Misfiring counter at 200rev of the third cylinder
			P0304	8CH	24H	Misfiring counter at 200rev of the fourth cylinder
MISFIRE	A2H	No.1 Cylinder Misfire	P0301	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0301	0CH	24H	Misfire counts for last/current driv- ing cycles
	АЗН	No.2 Cylinder Misfire	P0302	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0302	0CH	24H	Misfire counts for last/current driv- ing cycles
	A4H	No.3 Cylinder Misfire	P0303	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0303	0CH	24H	Misfire counts for last/current driv- ing cycles
	A5H	No.4 Cylinder Misfire	P0304	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0304	0CH	24H	Misfire counts for last/current driv- ing cycles

< SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

SYSTEM — BASIC ENGINE CONTROL SYSTEM

							SYM	PTOM							. (
						_					Ξ				
		r (excp. ha)		AT SPOT	NC	LACK OF POWER/POOR ACCELERATION				ш	PERATURE HIGH	MPTION	TION		
		HARD/NO START/RESTART (EXCP. HA)		HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	VER/POOR A	IDLE	HUNTING	ATION	RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE	FUEL CONSUMPTION	DIL CONSUMPTION	Reference page	
		HARD/NO ST	ENGINE STALL	HESITATION ⁽	SPARK KNOC	LACK OF POV	HIGH IDRE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RE	OVERHEATS	EXCESSIVE F	EXCESSIVE OIL		(
Warrant	y symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM		_
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		<u>EC-380</u>	_
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4		<u>EC-454</u>	_
	Fuel injector circuit	1	1	2	3	2		2	2			2		<u>EC-236</u>	_
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4		<u>EC-67</u>	_
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1	<u>EC-395</u>	_
	Incorrect idle speed adjustment	-	_				1	1	1	1		1		<u>EC-14</u>	_
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		<u>EC-353,</u> <u>EC-360</u>	
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1		<u>EC-14</u>	•
	Ignition circuit	1	1	2	2	2		2	2			2		<u>EC-384</u>	
Main po	wer supply and ground circuit	2	2	3	3	3		3	3		2	3		<u>EC-118</u>	
Mass ai	r flow sensor circuit	1			2									<u>EC-145,</u> EC-153	-
Engine	coolant temperature sensor circuit						3			3				<u>EC-166,</u> <u>EC-172</u>	
Air fuel ı	ratio (A/F) sensor 1 circuit		1	2	3	2		2	2			2		EC-179, EC-183, EC-186, EC-189, EC-369	-
Throttle position sensor circuit			•				2			2				EC-169, EC-239, EC-331, EC-333, EC-362	-
Knock s	ensor circuit			2								3		EC-248	•
Cranksh	aft position sensor (POS) circuit	2	2											<u>EC-250</u>	•
Camsha	ft position sensor (PHASE) circuit	3	2											EC-254	•

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< SYMPTOM DIAGNOSIS >

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		SYMPTOM											
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDRE/TOW IDRE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	Reference page
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	
ECM	2	2	3	3	3	3	3	3	3	3	3		<u>EC-311,</u> <u>EC-313</u>
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3		<u>EC-142</u>
Refrigerant pressure sensor circuit		2				3			3		4		EC-396
Hybrid vehicle control ECU	1	1	2		1	1	3	3	1	3			HBC-9

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

							SYM	PTOM	1					
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDRE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	Reference page
Warranty	/ symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	
Fuel	Fuel tank	5												<u>FL-11</u>
	Fuel piping	5		5	5	5		5	5			5		<u>EM-34</u>
	Vapor lock		5											—
	Valve deposit													—
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5			5		

< SYMPTOM DIAGNOSIS >

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		SYMPTOM													
		:P. HA)		ОТ		ACCELERATION					URE HIGH	Z			A EC
		TART (EXC		%FLAT SPOT	IATION	DR ACCELI		(J)) IDLE	'EMPERAT	CONSUMPTION	OIL CONSUMPTION	Reference	С
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE	EXCESSIVE FUEL CON	EXCESSIVE OIL CONS	page	D
			ВN Ш			_				SLC	_		EXO	_	
-	symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM		F
Air	Air duct Air cleaner		_		5	5				5 5	-			<u>EM-23</u> <u>EM-23</u>	I
	Air leakage from air duct (Mass air flow sensor — electric throt- tle control actuator)	5	5	5				5	5			5		<u>EM-23</u>	G
	Electric throttle control actuator						5							<u>EM-24</u>	Н
	Air leakage from intake manifold/Col- lector/Gasket													<u>EM-24</u>	11
Cranking	Signal plate	6										1		<u>EM-70</u>	
Engine	Cylinder head	5	5	5	5	5		5	5			5		<u>EM-62</u>	
	Cylinder head gasket	5	Ŭ	Ŭ	Ũ	5				4	4	Ŭ	3		
	Cylinder block			6 6	6	6		6	6						J
	Piston		6									6	4		
	Piston ring	6												- <u>EM-74</u>	Κ
	Connecting rod														
	Bearing														
) /= h -=	Crankshaft													EM 50	L
Valve mecha-	Timing chain Camshaft		5	5 5	5									<u>EM-50</u>	
nism	Intake valve timing control	5				5		5	5			5		<u>EM-39</u> <u>EM-50</u>	M
	Intake valve	5				5		5	5			5			
	Exhaust valve												3	<u>EM-62</u>	N
Exhaust	Exhaust manifold/Tube/Muffler/Gasket													EN1 00	Ν
Exhluor	Three way catalyst	5	5	5	5	5		5	5			5		<u>EM-28,</u> <u>EX-5</u>	
	HC adsorption catalyst	5	5		Э	5			5			Э		<u>EX-5</u>	0
Lubrica- tion	Oil pan/Oil strainer/Oil pump/Oil filter/ Oil gallery/Oil cooler	5	5	5	5	5		5	5			5		<u>EM-30,</u> <u>LU-11,</u> <u>LU-10,</u> <u>LU-14</u>	Ρ
	Oil level (Low)/Filthy oil													<u>LU-8</u>	

< SYMPTOM DIAGNOSIS >

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							SYM	PTON	1					
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDRE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	Reference page
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	
Cooling	Radiator/Hose/Radiator filler cap													<u>CO-14</u>
	Thermostat		5							5	Ť			<u>CO-20</u>
	Water pump	5			5					5 4	Ť			<u>CO-18</u>
	Water gallery			5		5		5	5		4	5		<u>CO-22</u>
	Cooling fan													<u>CO-16</u>
	Coolant level (Low)/Contaminated coolant													<u>CO-10</u>

1 - 6: The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

< SYMPTOM DIAGNOSIS >

NORMAL OPERATING CONDITION

Description

Description	
FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED) If the engine speed is above 1,800 rpm under no load (for example, the selector lever position is P and engine	
speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled. NOTE:	С
This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, <u>EC-27</u> . "System Description".	D
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< PRECAUTION > PRECAUTION PRECAUTIONS

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

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the "SRS AIRBAG" and "SEAT BELT" of this Service Manual.

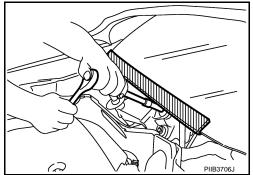
WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the "SRS AIRBAG".
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

Precaution for Procedure without Cowl Top Cover

INFOID:000000003069437

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



INFOID:000000003069438

WARNING:

Comply with the following warnings to prevent any serious accident.

- Disconnect the battery cable (negative terminal) or the power supply fuse before installing, removing, or touching the xenon headlamp (bulb included). The xenon headlamp contains high-voltage generated parts.
- Never work with wet hands.
- Check the xenon headlamp ON-OFF status after assembling it to the vehicle. Never turn the xenon headlamp ON in other conditions. Connect the power supply to the vehicle-side connector. (Turning it ON outside the lamp case may cause fire or visual impairments.)
- Never touch the bulb glass immediately after turning it OFF. It is extremely hot.

CAUTION:

Comply with the following cautions to prevent any error and malfunction.

- Install the xenon bulb securely. (Insufficient bulb socket installation may melt the bulb, the connector, the housing, etc. by high-voltage leakage or corona discharge.)
- Never perform HID circuit inspection with a tester.

Precautions For Xenon Headlamp Service

- Never touch the xenon bulb glass with hands. Never put oil and grease on it.
- Dispose of the used xenon bulb after packing it in thick vinyl without breaking it.
- Never wipe out dirt and contamination with organic solvent (thinner, gasoline, etc.).

PRECAUTIONS

On Board Diagnostic (OBD) System of Engine

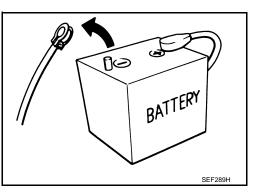
The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

- EC Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL 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-lock-D ing type harness connector. For description and how to disconnect, refer to PG-58, "Description".
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Ε Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EVAP system or fuel injection system, etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.

General Precautions

- 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 and disconnect negative battery 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 ground cable.



- Do not disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.

The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.

- If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values



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PRECAUTIONS

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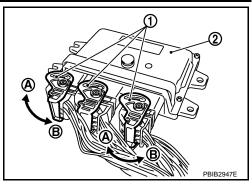
- When connecting ECM harness connector (1), fasten (B) it securely with a lever as far as it will go as shown in the figure.
 - 2. ECM
 - A. Loosen

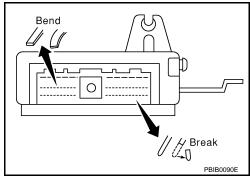
• When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).

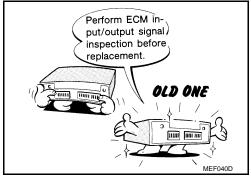
Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.

- 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 ICs.
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harness dry.
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to <u>EC-398</u>, "<u>Reference Value</u>".
- Handle mass air flow sensor carefully to avoid damage.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).
- After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check. The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.









PRECAUTIONS

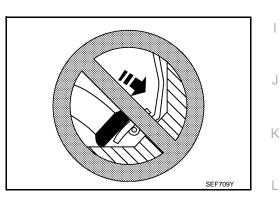
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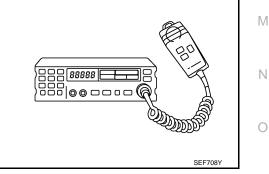
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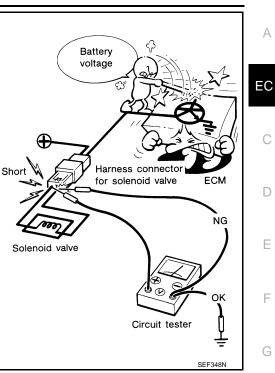
- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's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

- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.
- Do not depress accelerator pedal when starting.
- Immediately after starting, 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 standing-wave ratio can be kept smaller.
- Be sure to ground the radio to vehicle body.







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PREPARATION

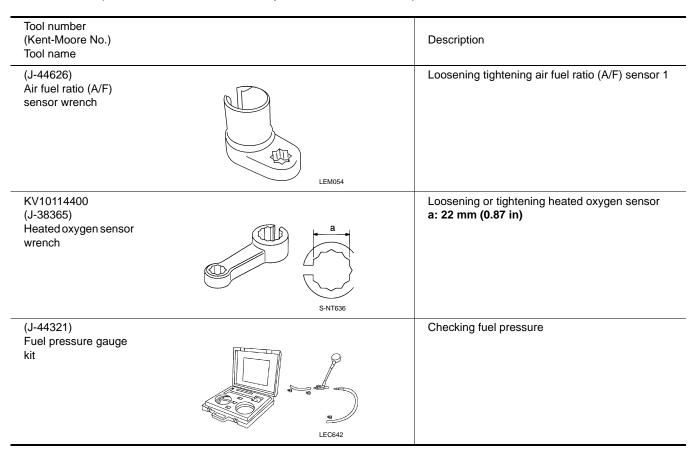
Special Service Tools

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NOTE:

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.



Commercial Service Tools

INFOID:000000003069442

Tool name (Kent-Moore No.)		Description
Leak detector i.e.: (J-41416)	S-NT703	Locating the EVAP leak
EVAP service port adapter i.e.: (J-41413-OBD)	C A A A A A A A A A A A A A A A A A A A	Applying positive pressure through EVAP service port
	S-NT704	

EC-452

PREPARATION

< PREPARATION >

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Tool name (Kent-Moore No.)		Description
Fuel filler cap adapter i.e.: (MLR-8382)		Checking fuel tank vacuum relief valve opening pressure
	EF QUD	
Socket wrench	S-NT815	Removing and installing engine coolant tempera- ture sensor
	19 mm (0.75 in) Nore than 32 mm (1.26 in) S-NT705	
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)	a Mating surface shave cylinder	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti- seize lubricant shown below. a: 18 mm diameter with pitch 1.5 mm for Zirco- nia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Tita- nia Oxygen Sensor
Anti-seize lubricant i.e.: (Permatex TM 133AR or equivalent meeting MIL specifica- tion MIL-A-907)	Flutes AEM488	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.
	S-NT779	

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< ON-VEHICLE MAINTENANCE > ON-VEHICLE MAINTENANCE FUEL PRESSURE

Inspection

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FUEL PRESSURE RELEASE

NOTE:

If following procedure performed, a certain DTC may be detected.

(I) With CONSULT-III

- 1. Lift up the vehicle.
- 2. Turn ignition switch ON (READY).
- 3. Depress the accelerator pedal and keep it.
- Shift the selector lever to N position with engine running.
 CAUTION: Never leave the selector lever in the N position for a lever leave the selector lever in the N position for a lever lever
 - Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.
- 5. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT-III.
- 6. After engine stalls, turn ignition switch OFF.

Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Remove fuel pump fuse located in IPDM E/R.
- 3. Turn ignition switch ON (READY).
- 4. Depress the accelerator pedal and keep it.
- 5. After engine stalls, turn ignition switch OFF.
- 6. Reinstall fuel pump fuse after servicing fuel system.

FUEL PRESSURE CHECK

CAUTION:

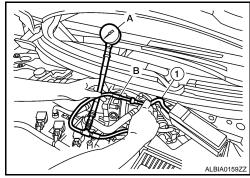
Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger. NOTE:

- Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because L32 models do not have fuel return system.
 Use Fuel Pressure Gauge Kit (J-44321) to check fuel pressure.
- 1. Release fuel pressure to zero.
- 2. Disconnect the fuel quick connector on the engine side.
- Install fuel pressure gauge adapter J-44321-6 (B) with fuel pressure gauge (A).

- 4. Turn ignition switch ON and check for fuel leakage.
- Check DTC. If DTC is detected, erase DTC and go to next steps. If DTC is not detected, go to next steps.
- 6. Activate "INSPECTION MODE 1" (<u>HBC-97</u>) to start engine, and check for fuel leakage.
- 7. Read the indication of fuel pressure gauge.

At idling : Approximately 350 kPa (3.57 kg/cm², 51 psi)

 If result is unsatisfactory, check fuel hoses and fuel tubes for clogging. If OK, Replace "fuel filter and fuel pump assembly". If NG, Repair or replace.



EC-454

^{1 :} Fuel feed hose

EVAP LEAK CHECK

< ON-VEHICLE MAINTENANCE >

EVAP LEAK CHECK

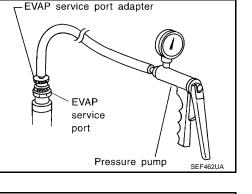
Inspection

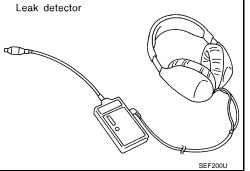
CAUTION:

- Do not use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system. NOTE:
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

(I) WITH CONSULT-III

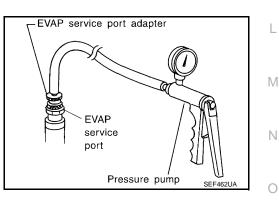
- 1. To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port.
- 2. Turn ignition switch ON.
- 3. Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-III.
- 4. Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
- 5. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
- 6. Remove EVAP service port adapter and hose with pressure pump.
- 7. Locate the leak using a leak detector. Refer to EC-67, "System Diagram".





WITHOUT CONSULT-III

- 1. To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port.
- 2. Apply battery voltage between the terminals of EVAP canister vent control valve to make a closed EVAP system.
- 3. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2 , 0.2 to 0.4 psi).
- 4. Remove EVAP service port adapter and hose with pressure pump.



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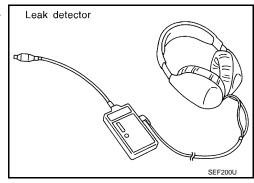
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EVAP LEAK CHECK

< ON-VEHICLE MAINTENANCE >

5. Locate the leak using a leak detector. Refer to <u>EC-67. "System</u> <u>Diagram"</u>.



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EVAP CANISTER

< ON-VEHICLE REPAIR > **ON-VEHICLE REPAIR EVAP CANISTER**

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Exploded View INFOID:000000003069445 EC SEC. 223 (7)8 2 6) (Q) 1111 5 🗙 (4 (3) 🖤 9 (0.9, 80) ALBIA0170GE EVAP control system pressure sen- 2. EVAP canister (MAIN) Bolt 1. 3. sor Hose EVAP canister vent control valve 4. 5. O-ring 6. EVAP canister (SUB) 7. Removal and Installation INFOID:000000003069446 REMOVAL Lift up the vehicle. 1. Remove EVAP canister fixing bolt. 2. 3. Remove EVAP canister. NOTE: The EVAP canister vent control valve and EVAP canister system pressure sensor can be removed without removing the EVAP canister. INSTALLATION Install in the reverse order of removal. NOTE: Tighten EVAP canister fixing bolt to the specified torque. DISASSEMBLY 1. Turn EVAP canister vent control valve counterclockwise. A : Lock В : Unlock (B) 2. Remove the EVAP canister vent control valve.

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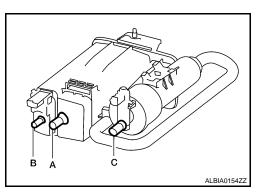
< ON-VEHICLE REPAIR >

ASSEMBLY Assemble in the reverse order of disassembly. CAUTION: Always replace O-ring with a new one.

Inspection

Check EVAP canister as follows:

- 1. Block port (B).
- 2. Blow air into port (A) and check that it flows freely out of port (C).
- 3. Release blocked port (B).
- 4. Apply vacuum pressure to port (B) and check that vacuum pressure exists at the ports (A) and (C).
- 5. Block port (A) and (B).
- 6. Apply pressure to port (C) and check that there is no leakage.



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SERVICE DATA AND SPECIFICATIONS (SDS) < SERVICE DATA AND SPECIFICATIONS (SDS) SERVICE DATA AND SPECIFICATIONS (SDS) SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

Condition	Specification					
No load (in N position)	1,000 ± 50 rpm					
Ignition Timing	INFOID:00000003069449					
Condition	Specification					
No load (in N position)	21 ± 5° BTDC					
Calculated Load Value	INFOID:00000003069450					
Condition	Specification (Using CONSULT-III or GST)					
Condition						
	Specification (Using CONSULT-III or GST)					
At idle	Specification (Using CONSULT-III or GST) 10 – 35 %					
At idle At 2,500 rpm	Specification (Using CONSULT-III or GST) 10 – 35 % 10 – 35 %					
At idle At 2,500 rpm Mass Air Flow Sensor	Specification (Using CONSULT-III or GST) 10 – 35 % 10 – 35 %					

*: Engine is warmed up to normal operating temperature and running under no load.

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