SECTION ECECEC ENGINE CONTROL SYSTEM o

CONTENTS

MR18DE

BASIC INSPECTION8
DIAGNOSIS AND REPAIR WORK FLOW
INSPECTION AND ADJUSTMENT12
BASIC INSPECTION
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT
IDLE SPEED 15 IDLE SPEED : Description 15 IDLE SPEED : Special Repair Requirement 16
IGNITION TIMING
VIN REGISTRATION
ACCELERATOR PEDAL RELEASED POSITION LEARNING
THROTTLE VALVE CLOSED POSITION LEARN- ING17

THROTTLE VALVE CLOSED POSITION LEARNING : Description17 THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement17	F
IDLE AIR VOLUME LEARNING	H
MIXTURE RATIO SELF-LEARNING VALUE CLEAR	l J
SYSTEM DESCRIPTION21	K
ENGINE CONTROL SYSTEM21System Diagram21System Description22Component Parts Location22Component Description27	L
MULTIPORT FUEL INJECTION SYSTEM28	M
System Diagram28System Description28Component Parts Location31Component Description36	Ν
ELECTRIC IGNITION SYSTEM	0
System Diagram 37 System Description 37 Component Parts Location 38 Component Description 43	Ρ
AIR CONDITIONING CUT CONTROL44	
System Diagram44 System Description44 Component Parts Location45	

Component Description50

D

Е

AUTOMATIC SPEED CONTROL DEVICE (ASCD)	51
System Diagram	
System Description	
Component Parts Location	
Component Description	
System Description	
COOLING FAN CONTROL	
System Diagram	
System Description	
Component Parts Location	
Component Description	67
EVAPORATIVE EMISSION SYSTEM	68
System Diagram	68
System Description	68
Component Parts Location	
Component Description	77
INTAKE VALVE TIMING CONTROL	78
System Diagram	
System Description	
Component Parts Location	
Component Description	
ON BOARD DIAGNOSTIC (OBD) SYSTEM .	
Diagnosis Description CONSULT-III Function	
Diagnosis Tool Function	
-	
DTC/CIRCUIT DIAGNOSIS	109
TROUBLE DIAGNOSIS - SPECIFICATION	4.0.0
VALUE	
Description Component Function Check	
Diagnosis Procedure	
C C	
POWER SUPPLY AND GROUND CIRCUIT .	
Diagnosis Procedure	117
U0101 CAN COMM CIRCUIT	. 120
Description	
DTC Logic	
Diagnosis Procedure	120
U0140 CAN COMM CIRCUIT	404
Description	
DTC Logic Diagnosis Procedure	
-	
U1001 CAN COMM CIRCUIT	. 122
Description	
DTC Logic	
Diagnosis Procedure	122
P0011 IVT CONTROL	. 123
DTC Logic	
·	

Diagnosis Procedure 124
Component Inspection 125
P0031, P0032 A/F SENSOR 1 HEATER
Description
DTC Logic
Diagnosis Procedure
Component Inspection 129
P0037, P0038 HO2S2 HEATER
Description
DTC Logic
Component Inspection
P0075 IVT CONTROL SOLENOID VALVE133
Description
DTC Logic
Diagnosis Procedure
Component Inspection134
P0101 MAF SENSOR136
Description136
DTC Logic 136
Component Function Check 137
Diagnosis Procedure138
Component Inspection139
P0102, P0103 MAF SENSOR143
Description
DTC Logic
Diagnosis Procedure
Component Inspection145
P0112, P0113 IAT SENSOR148
Description
DTC Logic
Diagnosis Procedure
Component Inspection 149
P0116 ECT SENSOR150
Description
DTC Logic
Diagnosis Procedure
Component Inspection
P0117, P0118 ECT SENSOR152
Description
DTC Logic
Diagnosis Procedure
P0122, P0123 TP SENSOR155
Description
DTC Logic
Diagnosis Procedure
Component Inspection
Special Repair Requirement 157
P0125 ECT SENSOR158
Description158

DTC Logic Diagnosis Procedure Component Inspection	. 159
P0127 IAT SENSOR	
Description	
DTC Logic	
Diagnosis Procedure Component Inspection	
P0128 THERMOSTAT FUNCTION	
DTC Logic	. 163
Diagnosis Procedure	. 163
Component Inspection	. 164
P0130 A/F SENSOR 1	.165
Description	. 165
DTC Logic	
Component Function Check	
Diagnosis Procedure	. 167
P0131 A/F SENSOR 1	. 169
Description	
DTC Logic	
Diagnosis Procedure	
P0132 A/F SENSOR 1	170
Description	
DESCRIPTION	
Diagnosis Procedure	
-	
P0133 A/F SENSOR 1	
Description	
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 Inspection	
	. 131
P0171 FUEL INJECTION SYSTEM FUNC-	
TION	
DTC Logic	. 200

Diagnosis Procedure	
	-

TION204DTC Logic204Diagnosis Procedure205	A
P0181 FTT SENSOR208Description208DTC Logic208Diagnosis Procedure209Component Inspection210	EC C
P0182, P0183 FTT SENSOR211Description211DTC Logic211Diagnosis Procedure211Component Inspection212	D
P0222, P0223 TP SENSOR214Description214DTC Logic214Diagnosis Procedure214Component Inspection216Special Repair Requirement216	F
P0300, P0301, P0302, P0303, P0304 MIS- FIRE 217 DTC Logic 217 Diagnosis Procedure 218	Н
P0327, P0328 KS 223 Description 223 DTC Logic 223 Diagnosis Procedure 223 Component Inspection 224	l J
P0335 CKP SENSOR (POS)225Description225DTC Logic225Diagnosis Procedure226Component Inspection228	K
P0340 CMP SENSOR (PHASE)229Description229DTC Logic229Diagnosis Procedure230Component Inspection231	M
P0420 THREE WAY CATALYST FUNCTION . 233DTC Logic233Component Function Check234Diagnosis Procedure234	0
P0441 EVAP CONTROL SYSTEM238DTC Logic238Component Function Check239Diagnosis Procedure240Component Inspection (Drain filter)243	Ρ
P0442 EVAP CONTROL SYSTEM244DTC Logic244Diagnosis Procedure245	

P0172 FUEL INJECTION SYSTEM FUNC-

DTC Logic Diagnosis Procedure Component Inspection	251 252
P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE Description DTC Logic Diagnosis Procedure Component Inspection	 256 256 256
P0447 EVAP CANISTER VENT CONTRO VALVE Description DTC Logic Diagnosis Procedure Component Inspection	 259 259 259 259
P0448 EVAP CANISTER VENT CONTRO VALVE Description DTC Logic Diagnosis Procedure Component Inspection	 263 263 263 264
P0451 EVAP CONTROL SYSTEM PRES SURE SENSOR Description DTC Logic Diagnosis Procedure Component Inspection	- 267 267 267
P0452 EVAP CONTROL SYSTEM PRESS SURE SENSOR Description DTC Logic Diagnosis Procedure Component Inspection	 270 270 270 271
P0453 EVAP CONTROL SYSTEM PRES SURE SENSOR Description DTC Logic Diagnosis Procedure Component Inspection	 275 275 275 276
P0455 EVAP CONTROL SYSTEM	

Component Inspection (Fuel filler cap)249 Component Inspection (Drain filter)249

DTC Logic		281
Diagnosis Pi	rocedure	
Component	Inspection (Fuel filler cap)	
Component	Inspection (Drain filter)	286

P0456 EVAP CONTROL SYSTEM	. 287
DTC Logic	287

Component Function Check Diagnosis Procedure Component Inspection (Fuel filler cap) Component Inspection (Drain filter)	289 292
P0460 FUEL LEVEL SENSOR Description DTC Logic Diagnosis Procedure	294 294
P0461 FUEL LEVEL SENSOR Description DTC Logic Component Function Check Diagnosis Procedure	295 295 295
P0462, P0463 FUEL LEVEL SENSOR	297 297
P0500 VSS	299 299 300
P0506 ISC SYSTEM Description DTC Logic Diagnosis Procedure	301 301
P0507 ISC SYSTEM	303 303
P0605 ECM Description DTC Logic Diagnosis Procedure	305 305
P0607 ECM Description DTC Logic Diagnosis Procedure	307 307
P0643 SENSOR POWER SUPPLY DTC Logic Diagnosis Procedure	
P0850 PNP SWITCH	308 310 310 310 311
P0850 PNP SWITCH	308 310 310 310 311 311 311 311

DTC Logic	314
Diagnosis Procedure	
P1217 ENGINE OVER TEMPERATURE .	
DTC Logic	315
Component Function Check	
Diagnosis Procedure	316
P1225 TP SENSOR	319
Description	319
DTC Logic	
Diagnosis Procedure	
Special Repair Requirement	320
P1226 TP SENSOR	321
Description	
DTC Logic	
Diagnosis Procedure	
Special Repair Requirement	322
P1421 COLD START CONTROL	323
Description	
DTC Logic	
Diagnosis Procedure	323
P1550 BATTERY CURRENT SENSOR	325
Description	
DTC Logic	
Diagnosis Procedure	
Component Inspection	327
P1551, P1552 BATTERY CURRENT SEN	
	-
SOR	329
Description	 329 329
Description DTC Logic	 329 329 329
Description DTC Logic Diagnosis Procedure	329 329 329 330
Description DTC Logic Diagnosis Procedure Component Inspection	329 329 329 330 331
Description DTC Logic Diagnosis Procedure Component Inspection P1553 BATTERY CURRENT SENSOR	329 329 329 330 330 331 333
Description DTC Logic Diagnosis Procedure Component Inspection P1553 BATTERY CURRENT SENSOR Description	
Description DTC Logic Diagnosis Procedure Component Inspection P1553 BATTERY CURRENT SENSOR Description DTC Logic	
Description DTC Logic Diagnosis Procedure Component Inspection P1553 BATTERY CURRENT SENSOR Description DTC Logic Diagnosis Procedure	329 329 330 330 331 333 333 333 334
Description DTC Logic Diagnosis Procedure Component Inspection P1553 BATTERY CURRENT SENSOR Description DTC Logic Diagnosis Procedure Component Inspection	
Description DTC Logic Diagnosis Procedure Component Inspection P1553 BATTERY CURRENT SENSOR Description DTC Logic Diagnosis Procedure Component Inspection P1554 BATTERY CURRENT SENSOR	
Description DTC Logic Diagnosis Procedure Component Inspection P1553 BATTERY CURRENT SENSOR Description DTC Logic Diagnosis Procedure Component Inspection P1554 BATTERY CURRENT SENSOR Description	
Description DTC Logic Diagnosis Procedure Component Inspection P1553 BATTERY CURRENT SENSOR Description DTC Logic Diagnosis Procedure Component Inspection P1554 BATTERY CURRENT SENSOR Description DTC Logic	
Description DTC Logic Diagnosis Procedure Component Inspection P1553 BATTERY CURRENT SENSOR Description DTC Logic Diagnosis Procedure Component Inspection P1554 BATTERY CURRENT SENSOR Description DTC Logic DTC Logic DTC Logic	
Description DTC Logic Diagnosis Procedure Component Inspection P1553 BATTERY CURRENT SENSOR Description DTC Logic Diagnosis Procedure Component Inspection P1554 BATTERY CURRENT SENSOR Description DTC Logic DTC Logic DTC Logic DTC Logic Description	
Description DTC Logic Diagnosis Procedure Component Inspection P1553 BATTERY CURRENT SENSOR Description DTC Logic Diagnosis Procedure Component Inspection P1554 BATTERY CURRENT SENSOR Description DTC Logic DTC Logic Component Function Check Diagnosis Procedure Component Inspection	
Description DTC Logic Diagnosis Procedure Component Inspection P1553 BATTERY CURRENT SENSOR Description DTC Logic Diagnosis Procedure Component Inspection P1554 BATTERY CURRENT SENSOR Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P1564 ASCD STEERING SWITCH	
Description DTC Logic Diagnosis Procedure Component Inspection P1553 BATTERY CURRENT SENSOR Description DTC Logic Diagnosis Procedure Component Inspection P1554 BATTERY CURRENT SENSOR Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P1564 ASCD STEERING SWITCH Description	
Description DTC Logic Diagnosis Procedure Component Inspection P1553 BATTERY CURRENT SENSOR Description DTC Logic Diagnosis Procedure Component Inspection P1554 BATTERY CURRENT SENSOR Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P1564 ASCD STEERING SWITCH DESCRIPTION DTC Logic	
Description DTC Logic Diagnosis Procedure Component Inspection P1553 BATTERY CURRENT SENSOR Description DTC Logic Diagnosis Procedure Component Inspection P1554 BATTERY CURRENT SENSOR Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P1564 ASCD STEERING SWITCH Description DTC Logic Description	
Description DTC Logic Diagnosis Procedure Component Inspection P1553 BATTERY CURRENT SENSOR Description DTC Logic Component Inspection P1554 BATTERY CURRENT SENSOR Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P1564 ASCD STEERING SWITCH Description DTC Logic Component Inspection	
Description DTC Logic Diagnosis Procedure Component Inspection P1553 BATTERY CURRENT SENSOR Description DTC Logic Diagnosis Procedure Component Inspection P1554 BATTERY CURRENT SENSOR Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P1564 ASCD STEERING SWITCH Description DTC Logic Diagnosis Procedure Component Inspection P1572 ASCD BRAKE SWITCH	
Description DTC Logic Diagnosis Procedure Component Inspection P1553 BATTERY CURRENT SENSOR Description DTC Logic Diagnosis Procedure Component Inspection P1554 BATTERY CURRENT SENSOR Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P1564 ASCD STEERING SWITCH Description DTC Logic Diagnosis Procedure Component Inspection P1572 ASCD BRAKE SWITCH Description	
Description DTC Logic Diagnosis Procedure Component Inspection P1553 BATTERY CURRENT SENSOR Description DTC Logic Diagnosis Procedure Component Inspection P1554 BATTERY CURRENT SENSOR Description DTC Logic Component Function Check Diagnosis Procedure Component Inspection P1564 ASCD STEERING SWITCH Description DTC Logic Diagnosis Procedure Component Inspection P1572 ASCD BRAKE SWITCH	

Component Inspection (ASCD Brake Switch)348 Component Inspection (ASCD Clutch Switch)349 Component Inspection (Stop Lamp Switch)349	А
P1574 ASCD VEHICLE SPEED SENSOR 351 Description	EC
P1715 INPUT SPEED SENSOR	С
DTC Logic	D
P1805 BRAKE SWITCH	E
P2100, P2103 THROTTLE CONTROL MO-	
TOR RELAY357Description357DTC Logic357Diagnosis Procedure357	G
P2101 ELECTRIC THROTTLE CONTROL	Н
FUNCTION360Description360DTC Logic360Diagnosis Procedure360Component Inspection363	Ι
Special Repair Requirement	J
P2118 THROTTLE CONTROL MOTOR364Description364DTC Logic364Diagnosis Procedure364Component Inspection365Special Repair Requirement365	K
P2119 ELECTRIC THROTTLE CONTROL ACTUATOR	
Description	M
P2122, P2123 APP SENSOR	0
Description	O P
P2127, P2128 APP SENSOR	
Description	
Component Inspection	

P2135 TP SENSOR 375
Description375
DTC Logic375
Diagnosis Procedure
Component Inspection
Special Repair Requirement
P2138 APP SENSOR 378
Description378
DTC Logic
Diagnosis Procedure
Component Inspection
Special Repair Requirement
P2A00 A/F SENSOR 1
Description
DTC Logic
Diagnosis Procedure
ASCD BRAKE SWITCH
Component Function Check
Diagnosis Procedure
Component Inspection (ASCD Brake Switch)388
Component Inspection (ASCD Clutch Switch)388
ASCD INDICATOR 390
Description
Component Function Check
Diagnosis Procedure
COOLING FAN 391
Description
Component Function Check
Diagnosis Procedure
Component Inspection
ELECTRICAL LOAD SIGNAL
Description
Component Function Check
Diagnosis Procedure
-
FUEL INJECTOR 395
Description
Component Function Check
Diagnosis Procedure
FUEL PUMP 398
Description
Component Function Check
Diagnosis Procedure
Component Inspection400
IGNITION SIGNAL 401
Description
Component Function Check401
Diagnosis Procedure401
Component Inspection (Ignition Coil with Power
Transistor)404
Component Inspection (Condenser)405

MALFUNCTION INDICATOR LAMP 406 Description 406 Component Function Check 406 Diagnosis Procedure 406
ON BOARD REFUELING VAPOR RECOV- ERY (ORVR)407
Description
POSITIVE CRANKCASE VENTILATION413 Description
Component Inspection 413
REFRIGERANT PRESSURE SENSOR414 Description414
Component Function Check
ECU DIAGNOSIS INFORMATION416
ECM
 —
SYMPTOM DIAGNOSIS460
ENGINE CONTROL SYSTEM SYMPTOMS460 Symptom Table
NORMAL OPERATING CONDITION464 Description464
PRECAUTION465
PRECAUTIONS
SIONER"465Precaution for Procedure without Cowl Top Cover. 465On Board Diagnosis (OBD) System of Engine andCVT465General Precautions466
PREPARATION469
PREPARATION469
Special Service Tools
PERIODIC MAINTENANCE471

FUEL PRESSURE	
Inspection	
EVAP LEAK CHECK	
Inspection	

REMOVAL AND INSTALLATION 475

EVAP CANISTER47	5
Exploded View47	5
Removal and Installation47	5
Inspection47	6

SERVICE DATA AND SPECIFICATIONS (SDS)	A
SERVICE DATA AND SPECIFICATIONS (SDS)	EC
Idle Speed 477 Ignition Timing 477 Calculated Load Value 477 March Air Flore 477	С
Mass Air Flow Sensor477	D

Ν

Μ

Е

F

G

Н

J

Κ

L

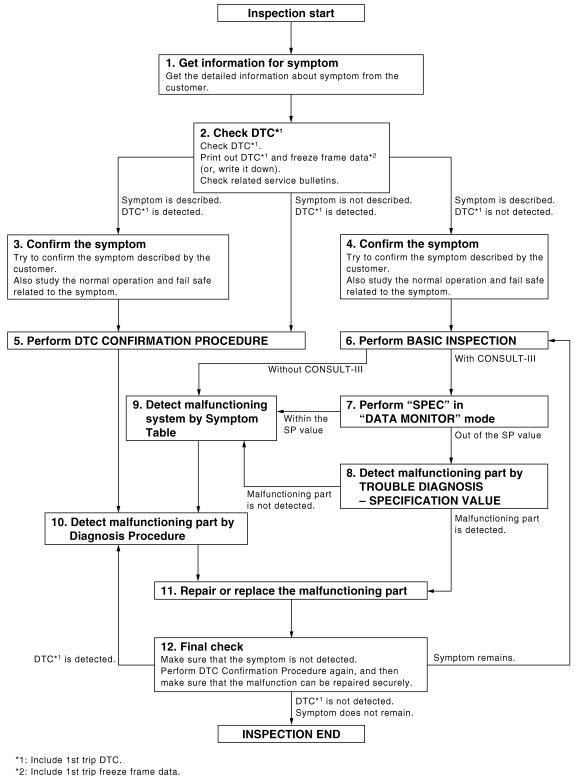
0

- Ρ

BASIC INSPECTION DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

OVERALL SEQUENCE



INFOID:000000004833140

< BASIC INSPECTION >

[MR18DE]

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-11, "Diagnostic Work Sheet"</u> .)
>> GO TO 2.
2.CHECK DTC
1. Check DTC.
 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 "How to Erase DTC and 1st Trip DTC" in EC-85. "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-460, "Symptom Table"</u>.) 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-464</u> , " <u>Description</u> " and <u>EC-445</u> , "Fail <u>Safe</u> ".
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-464</u> , " <u>Description</u> " and <u>EC-445</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-447, "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 Intermittent Incident according to <u>EC-110. "Diagnosis Procedure"</u> .
6.PERFORM BASIC INSPECTION
Perform <u>EC-12, "BASIC INSPECTION : Special Repair Requirement"</u> .
Do you have CONSULT-III?

< BASIC INSPECTION >

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

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 using "SPEC" of "DATA MONITOR" mode with CONSULT-III. Refer to <u>EC-109, "Component Function Check"</u>.

Are they within the SP value?

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

f 8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-110, "Diagnosis Procedure".

Is malfunctioning part detected?

YES >> GO TO 11.

NO >> GO TO 9.

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to <u>EC-460. "Symptom Table"</u> based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure. For details, refer to "Circuit Inspection" in <u>GI-37. "Circuit Inspection"</u>.

Is malfunctioning part detected?

YES >> GO TO 11.

NO >> Monitor input data from related sensors or check the voltage of related ECM terminals using CON-SULT-III. Refer to <u>EC-416, "Reference Value"</u>.

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

- 1. Repair or replace the malfunctioning part.
- 2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
- Check DTC. If DTC is displayed, erase it. Refer to "How to Erase DTC and 1st Trip DTC" in <u>EC-85, "Diag-nosis Description"</u>.

>> GO TO 12.

12.FINAL CHECK

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function 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 make sure

that the symptom is not detected.

Is DTC detected and does symptom remain?

- YES-1 >> DTC is detected: GO TO 10.
- YES-2 >> Symptom remains: GO TO 6.
- NO >> 1. Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM (Refer to "How to Erase DTC and 1st Trip DTC" in <u>EC-85, "Diagnosis Description"</u>.) and TCM (Refer to <u>TM-91, "Diagnosis Description"</u>.).
 - 2. If the completion of SRT is needed, drive vehicle under the specific "DRIVING PATTERN" in <u>EC-451, "How to Set SRT Code"</u>.
 - 3. INSPECTION END

DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

Diagnostic Work Sheet

DESCRIPTION

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

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

Utilize a diagnostic worksheet like the one on the WORKSHEET SAMPLE 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		
	Startability	Impossible to start No combust Partial combustion affected by th Partial combustion NOT affected Possible but hard to start Other	hrottle position d by throttle position	
Symptoms	🗌 Idling	□ No fast idle □ Unstable □ H □ Others [High idle 🛛 Low idle]	
- , , , , , , , , , , , , , , , , , , ,	Driveability	Stumble Surge Knock Intake backfire Exhaust backfi Others [— ·	
	Engine stall	At the time of start While idling While accelerating While dece Just after stopping While load	elerating	
Incident occu	rrence			
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes		
Weather conditions				
	Weather	🗌 Fine 🗌 Raining 🗌 Snowing	Others []	
	Temperature	🗌 Hot 🗌 Warm 🗌 Cool 🗌] Cold 🔲 Humid °F	
Engine conditions Cold During warm-up After warm-up Engine speed				
Road conditions				
Driving conditions		 Not affected At starting While idling At racing While accelerating While cruising While decelerating While turning (RH/LH) 		
Vehicle speed I <				
Malfunction indicator lamp				

 KEY POINTS

 WHAT
 Vehicle & engine model

 WHEN
 Date, Frequencies

 WHERE
 Road conditions

 HOW
 Operating conditions, Weather conditions,

Symptoms

INFOID:000000004833141

SEF907L

[MR18DE]

EC

С

D

F

Н

Κ

L

Μ

Ν

Ρ

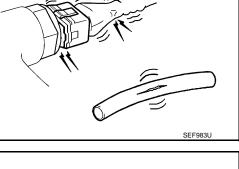
< BASIC INSPECTION >

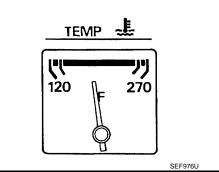
INSPECTION AND ADJUSTMENT BASIC INSPECTION

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. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
- 4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge. Ensure engine stays below 1,000 rpm.

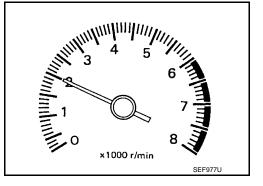




- 5. Run engine at about 2,000 rpm for about 2 minutes under no load.
- 6. Make sure that no DTC is displayed with CONSULT-III or GST.

<u>Is any</u>	<u>DTC</u>	dete	ctec	<u>;</u>
YES	>>	GO	то	2.

120	~~ 00 TO Z.
NO	>> GO TO 3.



2.REPAIR OR REPLACE

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

>> GO TO 3

3.CHECK IDLE SPEED

1. Run engine at about 2,000 rpm for about 2 minutes under no load.

Revision: 2009 March

INFOID:000000004833142

< BASIC INSPECTION >

[MR18DE]

А

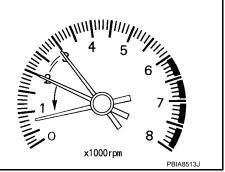
EC

С

- 2. Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
- Check idle speed.
 For procedure, refer to <u>EC-16</u>, "IDLE SPEED : Special Repair <u>Requirement"</u>. For specification, refer to <u>EC-477</u>, "Idle Speed".

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> GO TO 4.



PBIA8513J	
4.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING	D
 Stop engine. Perform <u>EC-17. "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement"</u>. 	Е
>> GO TO 5. 5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	F
Perform EC-17, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".	
>> GO TO 6.	G
6.PERFORM IDLE AIR VOLUME LEARNING	Н
Perform EC-17, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".	
<u>Is Idle Air Volume Learning carried out successfully?</u> YES >> GO TO 7. NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.	I
7.CHECK IDLE SPEED AGAIN	1
 Start engine and warm it up to normal operating temperature. Check idle speed. For procedure, refer to <u>EC-16</u>, "IDLE SPEED : Special Repair Requirement". For specification, refer to <u>EC-477</u>, "Idle Speed". 	K
Is the inspection result normal? YES >> GO TO 10. NO >> GO TO 8.	L
8. DETECT MALFUNCTIONING PART	
 Check the Following. Check camshaft position sensor (PHASE) and circuit. Refer to <u>EC-229, "DTC Logic"</u>. Check crankshaft position sensor (POS) and circuit. Refer to <u>EC-225, "DTC Logic"</u>. 	M
<u>Is the inspection result normal?</u> YES >> GO TO 9. NO >> Repair or replace. Then GO TO 4.	Ν
9. CHECK ECM FUNCTION	0
 Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is rare.) Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to <u>SEC-9, "ECM RECOMMUNICATING FUNCTION : Special Repair Requirement"</u> or <u>SEC-200, "ECM</u> 	P
RECOMMUNICATING FUNCTION : Special Repair Requirement".	

>> GO TO 4. 10.CHECK IGNITION TIMING

1. Run engine at idle.

< BASIC INSPECTION >

 Check ignition timing with a timing light. For procedure, refer to <u>EC-16, "IGNITION TIMING : Special Repair Requirement"</u>. For specification, refer to <u>EC-477, "Ignition Timing"</u>.

Is the inspection result normal?

YES >> GO TO 19.

NO >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- 1. Stop engine.
- Perform <u>EC-17, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Require-</u> ment".

>> GO TO 12.

12.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-17. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-17, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 14.

- NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.
- **14.**CHECK IDLE SPEED AGAIN
- 1. Start engine and warm it up to normal operating temperature.
- Check idle speed.
 For procedure, refer to <u>EC-16</u>, "IDLE SPEED : Special Repair Requirement".
 For specification, refer to <u>EC-477</u>, "Idle Speed".

Is the inspection result normal?

- YES >> GO TO 15.
- NO >> GO TO 17.
- **15.**CHECK IGNITION TIMING AGAIN
- 1. Run engine at idle.
- Check ignition timing with a timing light. For procedure, refer to <u>EC-16, "IGNITION TIMING : Special Repair Requirement"</u>. For specification, refer to <u>EC-477, "Ignition Timing"</u>.

Is the inspection result normal?

YES >> GO TO 19.

NO >> GO TO 16.

16.CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-43, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 17.

NO >> Repair the timing chain installation. Then GO TO 4.

17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-229, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-225, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 18.

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

< BASIC INSPECTION >	[MR18DE]
18. CHECK ECM FUNCTION	
 Substitute another known-good ECM to check ECM function. (ECM may be the cause of a this is rare.) Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition ke <u>EC-15. "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair R</u> 	an incident, but ey IDs. Refer to
>> GO TO 4.	
19.INSPECTION END	(
If ECM is replaced during this BASIC INSPECTION procedure, perform <u>EC-15, "ADDITIO</u> WHEN REPLACING CONTROL UNIT : Special Repair Requirement".	NAL SERVICE
>> INSPECTION END ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT	I
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Descripti	INFOID:000000004833143
When replacing ECM, this procedure must be performed.	
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special F quirement	Repair Re-
1.PERFORM INITIALIZATION OF NATS SYSTEM AND REGISTRATION OF ALL NATS IGNI	ITION KEY IDS
Refer to <u>SEC-9</u> , "ECM RECOMMUNICATING FUNCTION : Special Repair Requirement" or <u>S</u> <u>RECOMMUNICATING FUNCTION : Special Repair Requirement</u> ".	
>> GO TO 2.	
2.PERFORM VIN REGISTRATION	
Refer to EC-16, "VIN REGISTRATION : Special Repair Requirement".	
>> GO TO 3.	
3. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING	
Refer to EC-17, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair	Requirement".
>> GO TO 4.	
4. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	1
Refer to EC-17, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Require	ement".
>> GO TO 5.	I
5. PERFORM IDLE AIR VOLUME LEARNING	
Refer to EC-17, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".	(
>> END	
IDLE SPEED	
IDLE SPEED : Description	INFOID:000000004833145

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

[MR18DE]

< BASIC INSPECTION >

IDLE SPEED : Special Repair Requirement

1.CHECK IDLE SPEED

(I) With CONSULT-III

Check idle speed in "DATA MONITOR" mode with CONSULT-III.

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

1. Attach timing light to No. 1 ignition coil (1) wire as shown.

<□ : Vehicle front

2. Check ignition timing.

1 : Timing indicator

>> INSPECTION END

VIN REGISTRATION

VIN REGISTRATION : Description

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

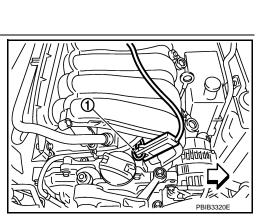
Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).

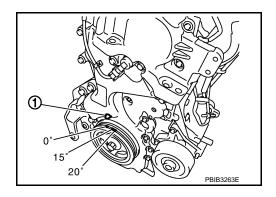
VIN REGISTRATION : Special Repair Requirement

1.CHECK VIN

Check the VIN of the vehicle and note it. Refer to GI-18, "Model Variation".

>> GO TO 2.





INFOID:000000004833150

INFOID:000000004833149

INFOID:000000004833146

[MR18DE]

INFOID:000000004833147

INFOID-000000004833148

2009 Z12

< BASIC INSPECTION >

< BASIC INSPECTION > [
2. PERFORM VIN REGISTRATION	
With CONSULT-III Turn ignition switch ON and engine stopped. Select "VIN REGISTRATION" in "WORK SUPPORT" mode. Select "VIN REGISTRATION" in "WORK SUPPORT" mode.	E
>> END ACCELERATOR PEDAL RELEASED POSITION LEARNING	
ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description INFOLD:00000004833151	
Accelerator Pedal Released Position Learning is a function of ECM to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected.	
ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Re- quirement	
1.start	
 Make sure that accelerator pedal is fully released. Turn ignition switch ON and wait at least 2 seconds. 	
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON and wait at least 2 seconds. Turn ignition switch OFF and wait at least 10 seconds. 	
>> 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	
1.start	
 Make sure that accelerator pedal is fully released. 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.	

< BASIC INSPECTION >

[MR18DE]

- Learning will be cancelled if any of the following conditions are missed for even a moment.
- Battery voltage: More than 12.9 V (At idle)
- Engine coolant temperature: 70 100°C (158 212°F)
- Selector lever: P or N (CVT), Neutral (M/T)
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
- CVT models
- With CONSULT-III: Drive vehicle until "FLUID TEMP SE" in "DATA MONITOR" mode of "TRANSMISSION" system indicates less than 0.9 V.
- Without CONSULT-III: Drive vehicle for 10 minutes.
- M/T models

Drive vehicle for 10 minutes.

Do you have CONSULT-III?

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

2. IDLE AIR VOLUME LEARNING

With CONSULT-III

- 1. Perform Accelerator Pedal Released Position Learning. Refer to <u>EC-17, "ACCELERATOR PEDAL</u> <u>RELEASED POSITION LEARNING : Special Repair Requirement"</u>.
- 2. Perform Throttle Valve Closed Position Learning. Refer to <u>EC-17</u>, "<u>THROTTLE VALVE CLOSED POSI-</u> <u>TION LEARNING : Special Repair Requirement</u>".
- 3. Start engine and warm it up to normal operating temperature.
- 4. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
- 5. Touch "START" and wait 20 seconds.

Is "CMPLT" displayed on CONSULT-III screen?

YES >> GO TO 4.

NO >> GO TO 5.

3. IDLE AIR VOLUME LEARNING

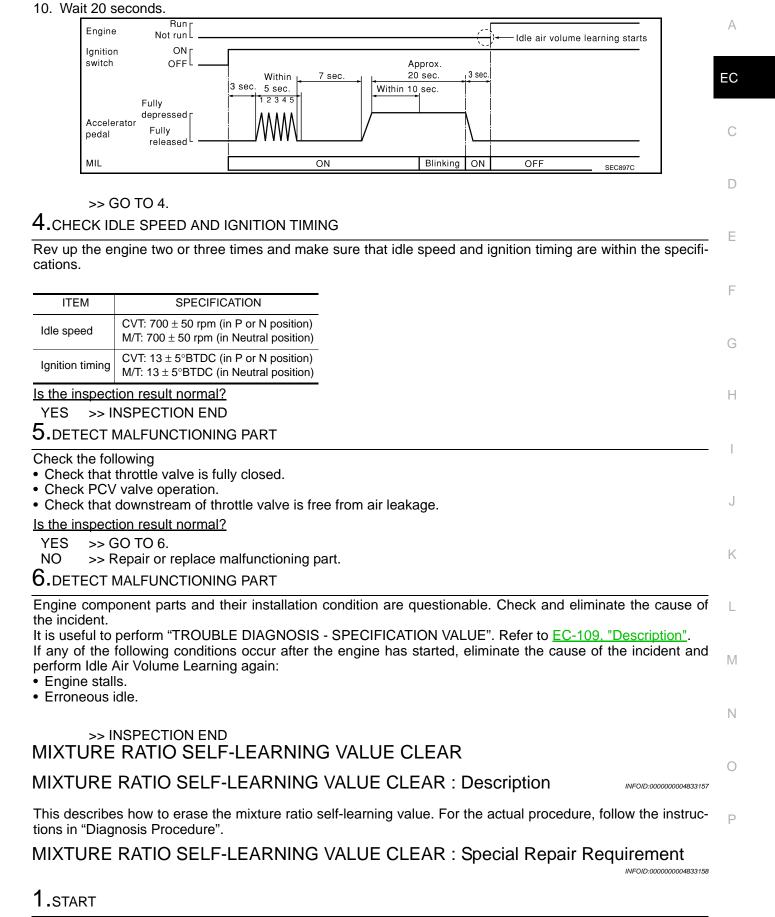
Without CONSULT-III

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.
- 1. Perform Accelerator Pedal Released Position Learning. Refer to <u>EC-17, "ACCELERATOR PEDAL</u> <u>RELEASED POSITION LEARNING : Special Repair Requirement"</u>.
- 2. Perform Throttle Valve Closed Position Learning. Refer to <u>EC-17</u>, "<u>THROTTLE VALVE CLOSED POSI-</u> <u>TION LEARNING : Special Repair Requirement</u>".
- 3. Start engine and warm it up to normal operating temperature.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
- 6. Repeat the following procedure quickly five times within 5 seconds.
- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.
- 7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops blinking and turned ON.
- 8. Fully release the accelerator pedal within 3 seconds after the MIL turned ON.
- 9. Start engine and let it idle.

< BASIC INSPECTION >

[MR18DE]



With	CONSU	и т.ш
VVILII	CONSU	

< BASIC INSPECTION >

- 1. Start engine and warm it up 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".

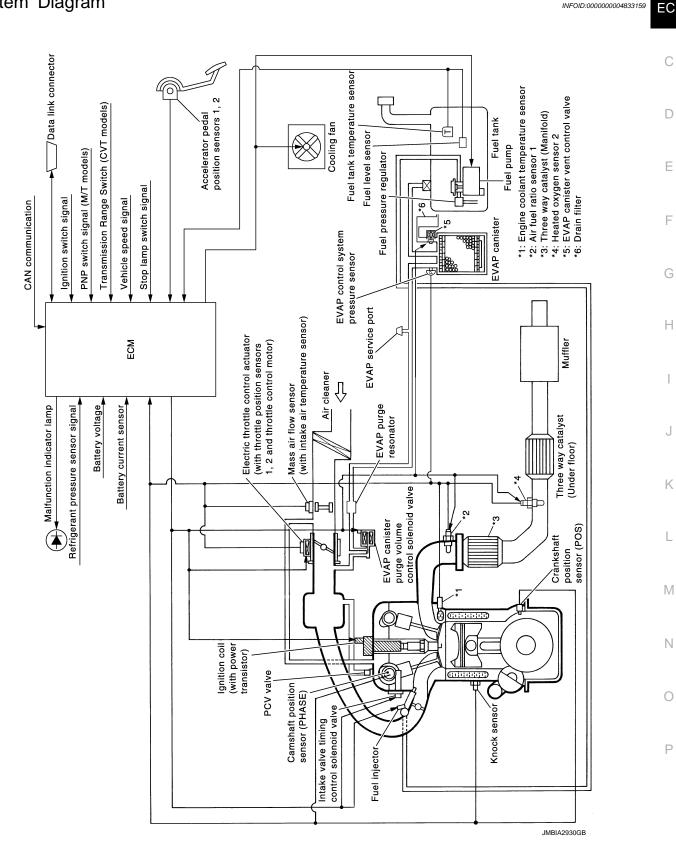
With GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF.
- 3. Disconnect mass air flow sensor harness connector.
- 4. Restart engine and let it idle for at least 5 seconds.
- 5. Stop engine and reconnect mass air flow sensor harness connector.
- 6. Select Service \$03 with GST. Make sure DTC P0102 is detected.
- 7. Select Service \$04 with GST to erase the DTC P0102.

>> END

SYSTEM DESCRIPTION ENGINE CONTROL SYSTEM

System Diagram



[MR18DE]

INFOID:000000004833159

А

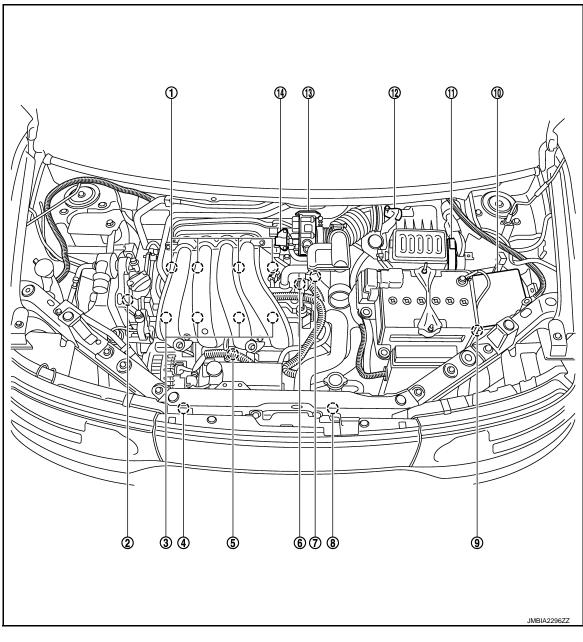
< SYSTEM DESCRIPTION >

System Description

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

Component Parts Location

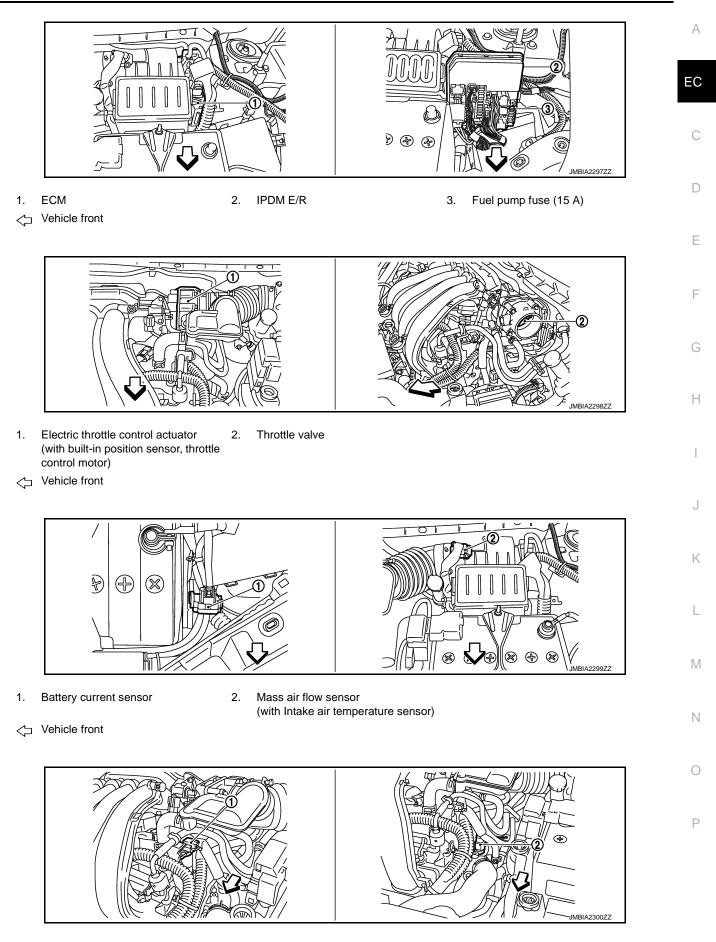
INFOID:000000004833161



- 1. Ignition coil (with power transistor) and spark plug
- 4. Refrigerant pressure sensor
- 7. Engine coolant temperature sensor
- 10. IPDM E/R
- Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- 2. Intake valve timing control solenoid 3. valve
- 5. Knock sensor
- 8. Cooling fan motor
- 11. ECM
- 14. EVAP canister purge volume control solenoid valve
- Fuel injector
- 6. Camshaft position sensor (PHASE)
- 9. Battery current sensor
- 12. Mass air flow sensor (with intake air temperature sensor)

< SYSTEM DESCRIPTION >

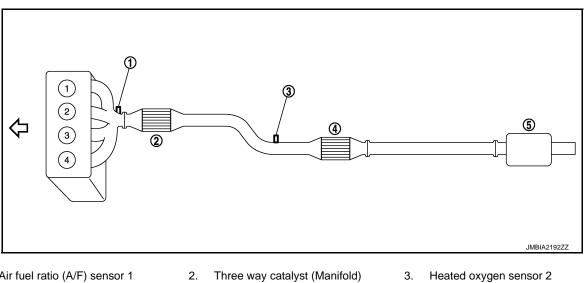
[MR18DE]



< SYSTEM DESCRIPTION >

- 1. Camshaft position sensor (PHASE) 2.
- Engine coolant temperature sensor

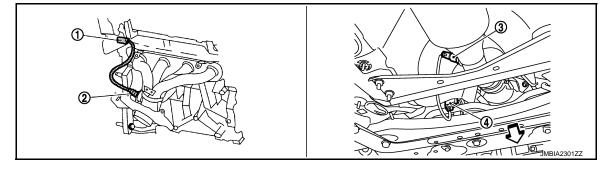
√ Vehicle front



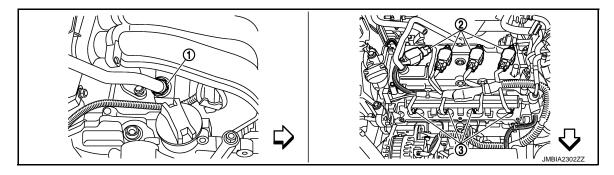
- Air fuel ratio (A/F) sensor 1 1.
- 5. Muffler

3. Heated oxygen sensor 2

- 4. Three way catalyst (under floor)
- √ Vehicle front



- 1. Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1 3. Heated oxygen sensor 2 connector
- Heated oxygen sensor 2 harness 4. connector
- ✓⊃ Vehicle front



PCV valve 1.

2. Ignition coil (with power transistor) 3. Fuel injector and spark plug

√ Vehicle front

< SYSTEM DESCRIPTION >

[MR18DE]

А

EC

С

D

Ε

F

G

Н

J

Κ

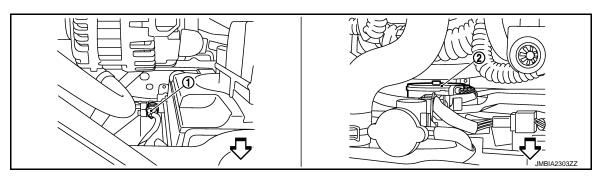
L

Μ

Ν

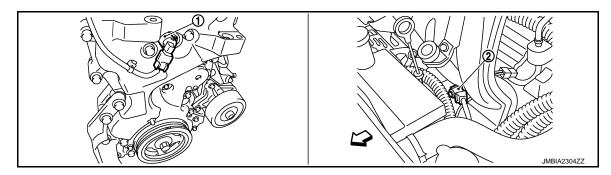
Ο

Ρ

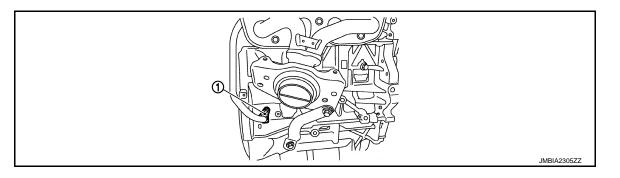


- 1. Refrigerant pressure sensor 2. C
- 2. Cooling fan motor

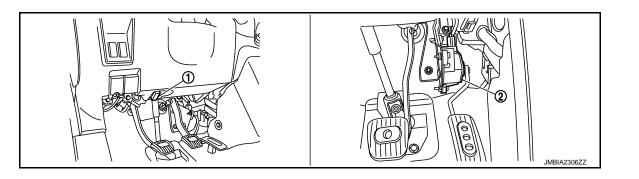
✓ Vehicle front



- 1. Intake valve timing control solenoid 2. Knock sensor valve
- ✓ Vehicle front

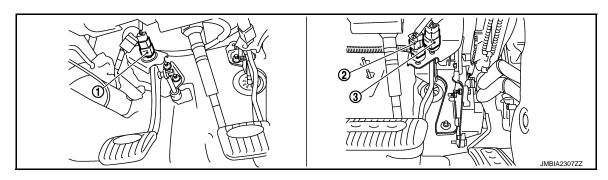


1. Crankshaft position sensor (POS)

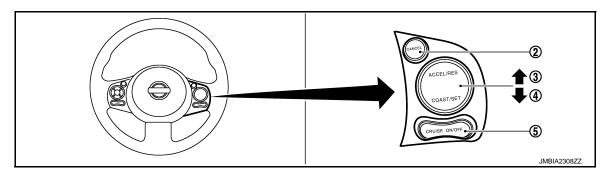


- 1. Data link connector
- 2. Accelerator pedal position sensor

< SYSTEM DESCRIPTION >

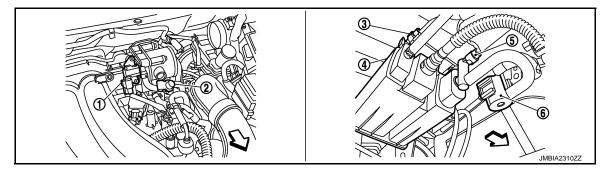


- 1. ASCD clutch switch
- 2. ASCD brake switch
- 3. Stop lamp switch



- 1. ASCD steering switch
- 2. CANSEL switch
- 4. SET/COST switch
- 5. MAIN switch

- 3. RESUME/ACCELERATE switch
- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- 4. Fuel tank temperature sensor
- ✓ Vehicle front



- 1. EVAP canister purge volume control 2. EVAP service port solenoid valve
- 3. EVAP control system pressure sensor



< SYSTEM DESCRIPTION >

4. EVAP canister √→ Vehicle front

Component Description

Drain filter

[MR18DE]

А

INFOID:000000004833162

Component	Reference	
A/F sensor 1	EC-165. "Description"	
A/F sensor 1 heater	EC-127, "Description"	
Accelerator pedal position sensor	EC-368, "Description"	
ASCD brake switch	EC-344, "Description"	
ASCD steering switch	EC-341, "Description"	
ASCD vehicle speed sensor	EC-351, "Description"	
Battery current sensor	EC-325, "Description"	
Camshaft position sensor (PHASE)	EC-229, "Description"	
Crankshaft position sensor (POS)	EC-225, "Description"	
Cooling fan motor	EC-60, "System Description"	
Electric throttle control actuator	EC-366, "Description"	
Engine coolant temperature sensor	EC-152, "Description"	
EVAP canister purge volume control solenoid valve	EC-251, "Description"	
EVAP canister vent control valve	EC-259, "Description"	
EVAP control system pressure sensor	EC-267, "Description"	
Fuel injector	EC-395, "Description"	
Fuel level sensor	EC-294, "Description"	
Fuel pump	EC-398, "Description"	
Fuel tank temperature sensor	EC-208, "Description"	
Heated oxygen sensor 2	EC-180, "Description"	
Heated oxygen sensor 2 heater	EC-130, "Description"	
Ignition signal	EC-401, "Description"	
Intake air temperature sensor	EC-148. "Description"	
Intake valve timing control solenoid valve	EC-78, "System Description"	
Knock sensor	EC-223, "Description"	
Mass air flow sensor	EC-136, "Description"	
Park/neutral position switch	EC-310, "Description"	
PCV valve	EC-413, "Description"	
Refrigerant pressure sensor	EC-414, "Description"	
Stop lamp switch	EC-354, "Description"	
Throttle control motor	EC-364, "Description"	
Throttle control motor relay	EC-357, "Description"	
Throttle position sensor	EC-155, "Description"	

Ρ

< SYSTEM DESCRIPTION >

MULTIPORT FUEL INJECTION SYSTEM

System Diagram

Crankshaft position sensor (POS)	Engine speed ^{*2} & 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		
Heated oxygen sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		Fuel injection & mixture ratio
Park/neutral position (PNP) switch (M/T models)	Gear position	ЕСМ	control ► Fuel injector
Transmission Range Switch (CVT models)	Gear position		
Battery	Battery voltage ^{*2}		
	Engine knocking condition		
Knock sensor	Density of oxygen in exhaust gas		
Heated oxygen sensor 2*1	Power steering operation		
EPS control unit	Vehicle speed		
ABS actuator and electric unit (control unit)			
BCM	Air conditioner ON signal		
*1 : This sensor is not used to control the en *2 : ECM determines the start signal status b	by the signals of engine speed and ba		age.

System Description

INFOID:000000004833164

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed* ³		
Camshaft position sensor (PHASE)	Piston position		Fuel injector
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	_	
Accelerator pedal position sensor	Accelerator pedal position	Fuel injection & mixture ratio control	
Park/neutral position (PNP) switch (M/T models)	Gear position		
Transmission range switch (CVT models)	Gear position		
Battery	Battery voltage*3		
Knock sensor	Engine knocking condition		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		
EPS control unit	Power steering operation* ²		
ABS actuator and electric unit (control unit)	Vehicle speed*2		
BCM	Air conditioner ON signal*2		

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

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



INFOID:000000004833163

< SYSTEM DESCRIPTION >

*3: ECM determines the start signal status by the signals of engine speed and battery voltage.

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.

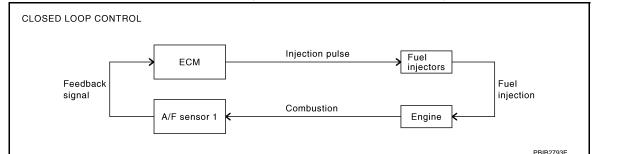
<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (CVT models)
- 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 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-165</u>, "<u>Description</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 M oxygen sensor 2.

Open Loop Control

The open loop system condition refers to when the ECM detects any of the following conditions. Feedback ontrol 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 (CVT models)
- 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

EC-29

А

D

Н

Κ

Ρ

< SYSTEM DESCRIPTION >

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.

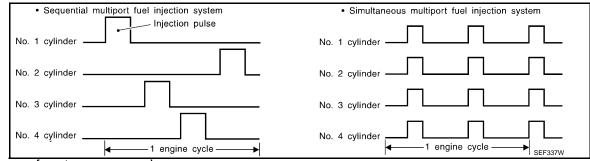
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"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 over time to compensate for continual deviation of the short-term fuel trim from the central value. Continual 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 ignition 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 when the engine is being started and/or if the fail-safe system (CPU) is operating.

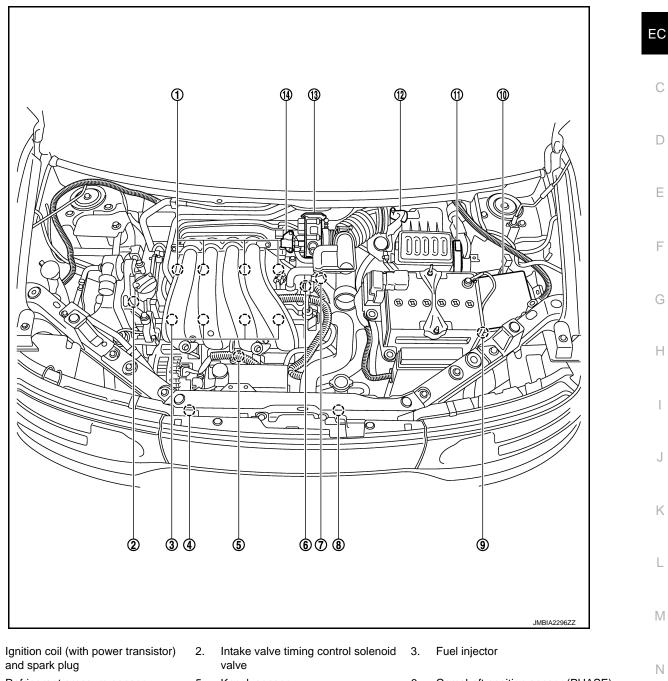
FUEL SHUT-OFF

Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

< SYSTEM DESCRIPTION >

Component Parts Location

[MR18DE]



- 4. Refrigerant pressure sensor
- 7. Engine coolant temperature sensor
- 10. IPDM E/R

1.

- Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- 5. Knock sensor
- 8. Cooling fan motor
- 11. ECM
- 14. EVAP canister purge volume control solenoid valve
- 6. Camshaft position sensor (PHASE)
- 9. Battery current sensor
- 12. Mass air flow sensor (with intake air temperature sensor)

Ρ

Ο

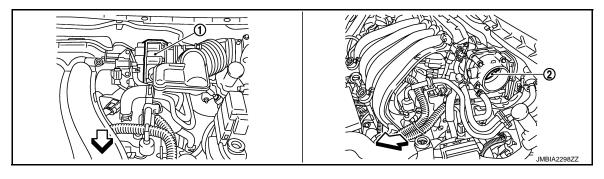
< SYSTEM DESCRIPTION >

1. ECM

2. IPDM E/R

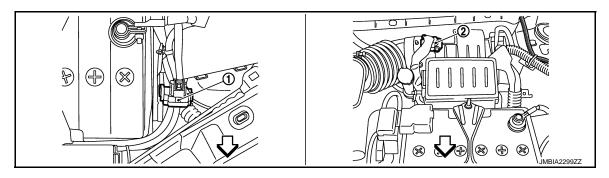
3. Fuel pump fuse (15 A)

✓ Vehicle front



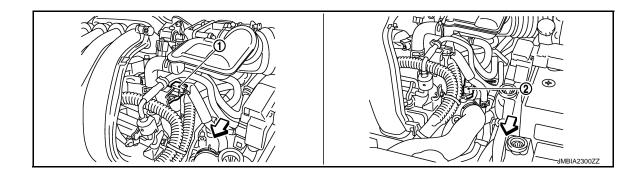
- 1. Electric throttle control actuator 2. (with built-in position sensor, throttle control motor)
- ✓ Vehicle front

Throttle valve



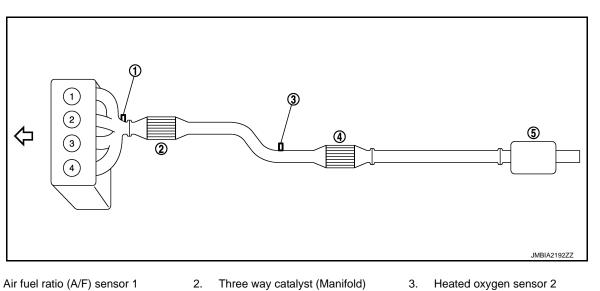
- 1. Battery current sensor
- 2. Mass air flow sensor (with Intake air temperature sensor)

√ Vehicle front



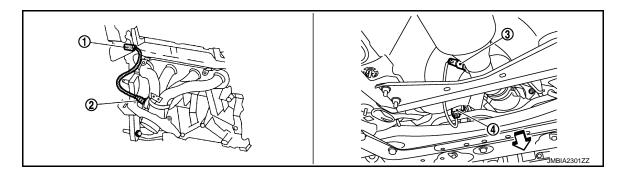
< SYSTEM DESCRIPTION >

- 1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor
- ✓ Vehicle front

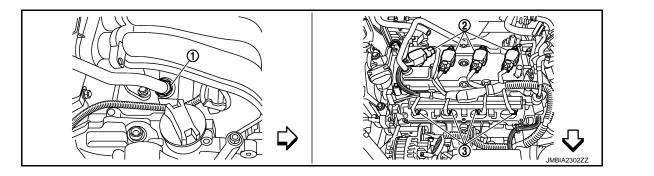


- 1.
- 5. Muffler
- 3. Heated oxygen sensor 2

- Three way catalyst (under floor) 4.
- Vehicle front \triangleleft



- 1. Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1 3. Heated oxygen sensor 2 connector
- Heated oxygen sensor 2 harness 4. connector
- ✓⊃ Vehicle front



PCV valve 1.

2. Ignition coil (with power transistor) 3. Fuel injector and spark plug

√ Vehicle front

А

EC

С

D

Ε

F

G

Н

J

Κ

L

Μ

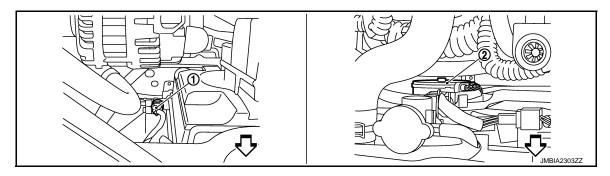
Ν

Ο

Ρ

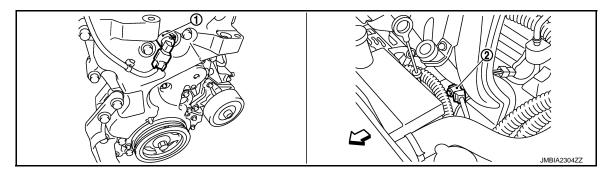
< SYSTEM DESCRIPTION >

[MR18DE]

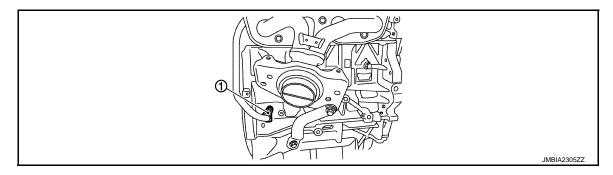


- 1. Refrigerant pressure sensor
- 2. Cooling fan motor

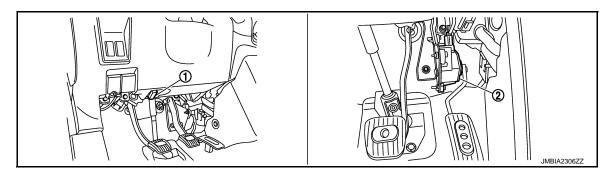
✓ Vehicle front



- 1. Intake valve timing control solenoid 2. Knock sensor valve
- ✓ Vehicle front



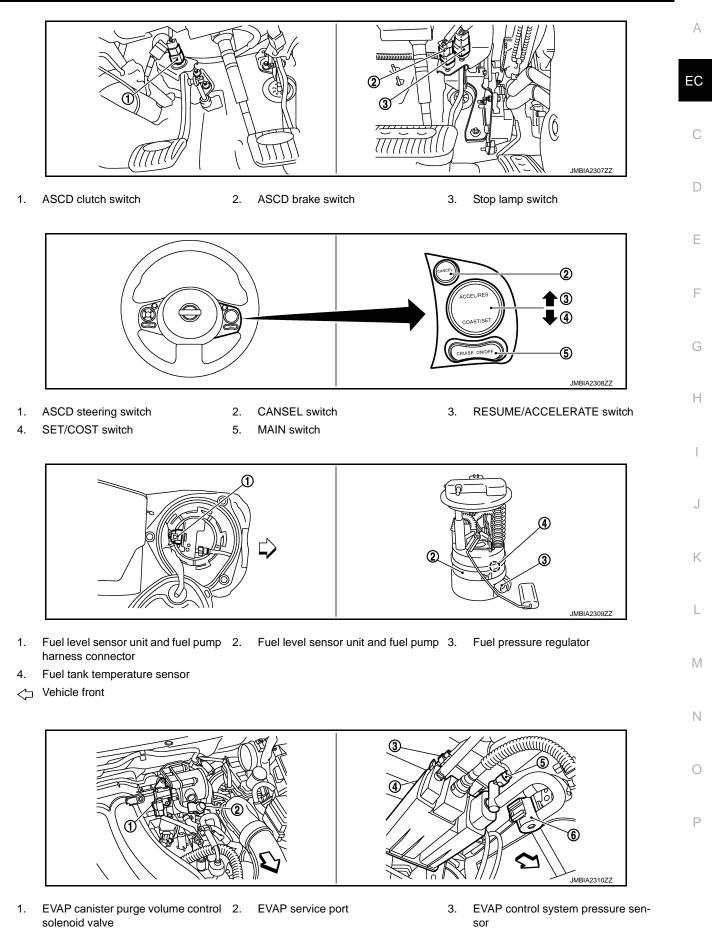
1. Crankshaft position sensor (POS)



- 1. Data link connector
- 2. Accelerator pedal position sensor

< SYSTEM DESCRIPTION >

[MR18DE]





< SYSTEM DESCRIPTION >

Component Description

4. EVAP canister √→ Vehicle front

5. EVAP canister vent control valve 6.

Drain filter

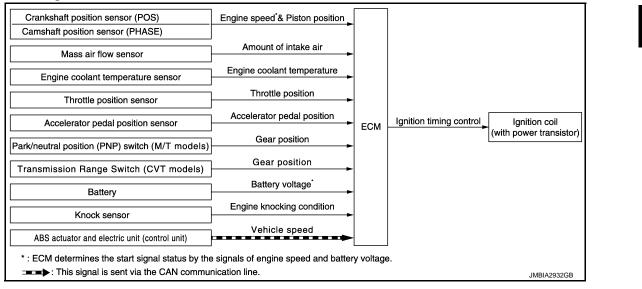
INFOID:000000004833166

Component	Reference
A/F sensor 1	EC-165. "Description"
Accelerator pedal position sensor	EC-368. "Description"
Camshaft position sensor (PHASE)	EC-229, "Description"
Crankshaft position sensor (POS)	EC-225, "Description"
Engine coolant temperature sensor	EC-152, "Description"
Fuel injector	EC-395. "Description"
Heated oxygen sensor 2	EC-180, "Description"
Intake air temperature sensor	EC-148. "Description"
Knock sensor	EC-223. "Description"
Mass air flow sensor	EC-136, "Description"
Park/neutral position switch	EC-310, "Description"
Throttle position sensor	EC-155, "Description"

< SYSTEM DESCRIPTION >

ELECTRIC IGNITION SYSTEM

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS)	Engine speed* ²		Ignition coil (with power transistor)	
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			
Accelerator pedal position sensor	Accelerator pedal position	Ignition timing control		
Battery	Battery voltage*2			
Knock sensor	Engine knocking			
Park/neutral position (PNP) switch (M/T models)	Gear position			
Transmission range switch (CVT models)	Gear position			
ABS actuator and electric unit (control unit)	Vehicle speed*1			

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

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

Ignition order: 1 - 3 - 4 - 2

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

Н

INFOID:000000004833167

INFOID:000000004833168

А

EC

D

F

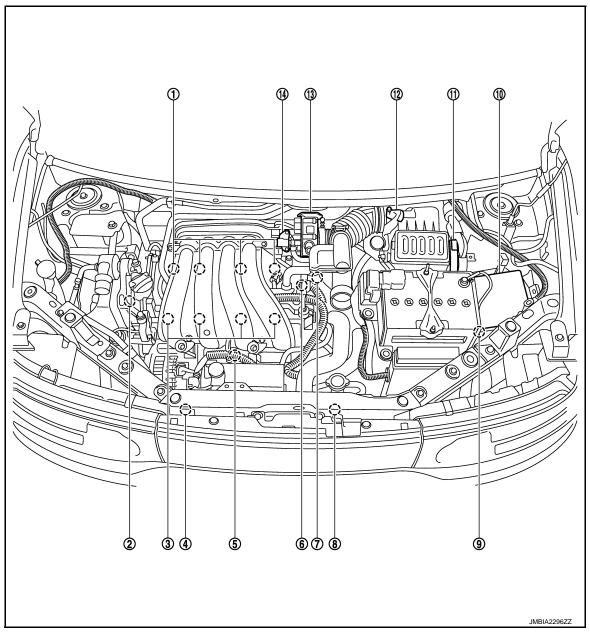
< SYSTEM DESCRIPTION >

[MR18DE]

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.

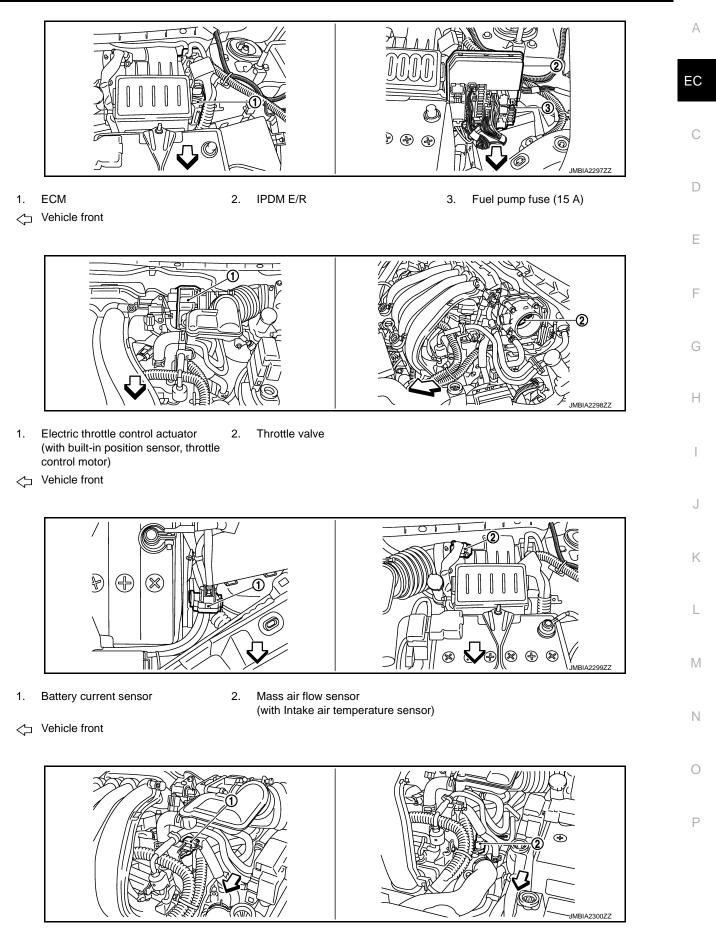
Component Parts Location

INFOID:000000004833169



- 1. Ignition coil (with power transistor) and spark plug
- 4. Refrigerant pressure sensor
- 7. Engine coolant temperature sensor
- 10. IPDM E/R
- Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- 2. Intake valve timing control solenoid 3. valve
- 5. Knock sensor
- 8. Cooling fan motor
- 11. ECM
- 14. EVAP canister purge volume control solenoid valve
- Fuel injector
- 6. Camshaft position sensor (PHASE)
- 9. Battery current sensor
- 12. Mass air flow sensor (with intake air temperature sensor)

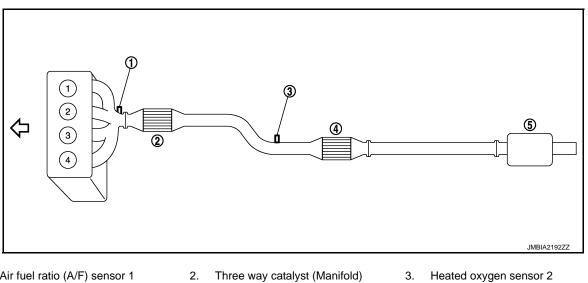
< SYSTEM DESCRIPTION >



< SYSTEM DESCRIPTION >

- 1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor

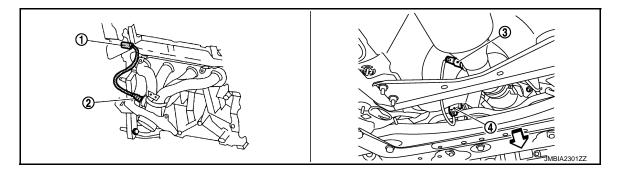
√ Vehicle front



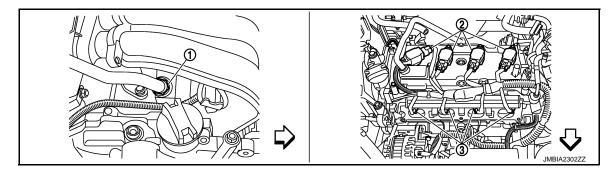
- Air fuel ratio (A/F) sensor 1 1.
- 5. Muffler

3. Heated oxygen sensor 2

- 4. Three way catalyst (under floor)
- Vehicle front \triangleleft



- 1. Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1 3. Heated oxygen sensor 2 connector
- Heated oxygen sensor 2 harness 4. connector
- ✓⊃ Vehicle front



PCV valve 1.

- 2. Ignition coil (with power transistor) 3. Fuel injector and spark plug
- √ Vehicle front

< SYSTEM DESCRIPTION >

[MR18DE]

А

EC

С

D

Ε

F

G

Н

J

Κ

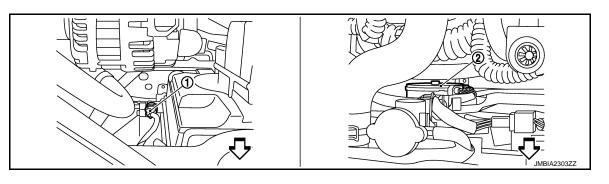
L

Μ

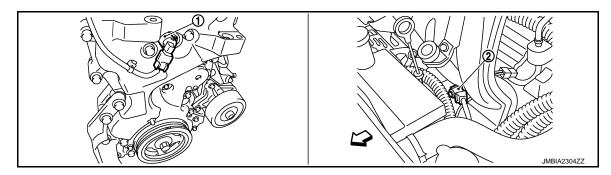
Ν

Ο

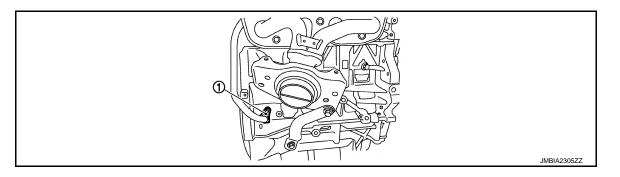
Ρ



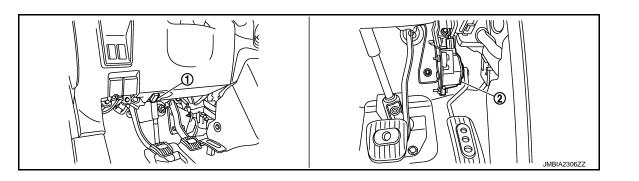
- 1. Refrigerant pressure sensor 2. C
- 2. Cooling fan motor
- ✓ Vehicle front



- 1. Intake valve timing control solenoid 2. Knock sensor valve
- ✓ Vehicle front

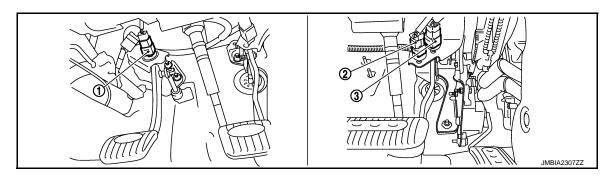


1. Crankshaft position sensor (POS)

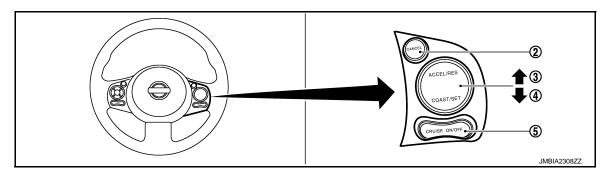


- 1. Data link connector
- 2. Accelerator pedal position sensor

< SYSTEM DESCRIPTION >

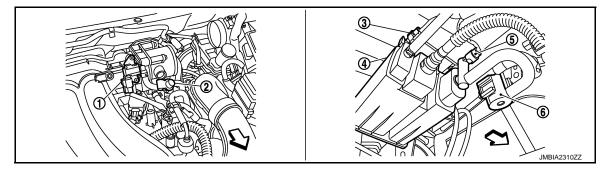


- 1. ASCD clutch switch
- 2. ASCD brake switch
- 3. Stop lamp switch



- 1. ASCD steering switch
- 2. CANSEL switch
- 4. SET/COST switch
- 5. MAIN switch

- 3. RESUME/ACCELERATE switch
- JMBIA2309ZZ
- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- 4. Fuel tank temperature sensor
- ✓ Vehicle front



- 1. EVAP canister purge volume control 2. EVAP service port solenoid valve
- 3. EVAP control system pressure sensor



EVAP canister vent control valve

5.

< SYSTEM DESCRIPTION >

4. EVAP canister✓ Vehicle front

Vehicle speed sensor

Component Description

Component	Reference		
Accelerator pedal position sensor	EC-368, "Description"		
Camshaft position sensor (PHASE)	EC-229, "Description"		
Crankshaft position sensor (POS)	EC-225, "Description"		
Engine coolant temperature sensor	EC-152, "Description"		
Ignition signal	EC-401, "Description"		
Knock sensor	EC-223. "Description"		
Mass air flow sensor	EC-136, "Description"		
Park/neutral position switch	EC-310. "Description"		
Throttle position sensor	EC-155. "Description"		

EC-299, "Description"

6. Drain filter

[MR18DE]

INFOID:000000004833170

А

EC

С

D

Е

F

G

Н

J

Κ

L

Μ

Ν

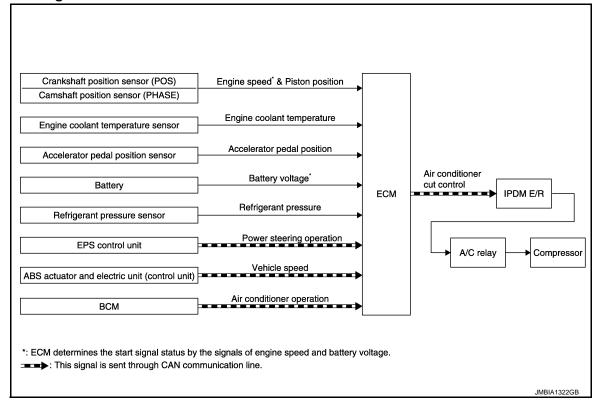
Ο

Ρ

< SYSTEM DESCRIPTION >

AIR CONDITIONING CUT CONTROL

System Diagram



System Description

INFOID:000000004833172

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator		
Air conditioner switch*1	Air conditioner ON signal				
Accelerator pedal position sensor	Accelerator pedal position		IPDM E/R ↓ Air conditioner relay ↓ Compressor		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed* ²				
Engine coolant temperature sensor	Engine coolant temperature	Air conditioner			
Battery	Battery voltage*2	cut control			
Refrigerant pressure sensor	Refrigerant pressure				
EPS control unit	Power steering operation				
ABS actuator and electric unit (control unit)	Vehicle speed*1				
BCM	Air conditioner ON signal* ¹				

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

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

This system improves engine operation when the air conditioner is used.

Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- · When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.

EC-44

INFOID:000000004833171

ⓓ

(13)

12

ⓓ

1

< SYSTEM DESCRIPTION >

- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

1

Component Parts Location



Ignition coil (with power transistor)

Engine coolant temperature sensor

(with built in throttle position sensor

Refrigerant pressure sensor

13. Electric throttle control actuator

and spark plug

10. IPDM E/R

Revision: 2009 March

1.

4.

7.

2.

5.

8.

11.

Knock sensor

solenoid valve

ECM

Cooling fan motor

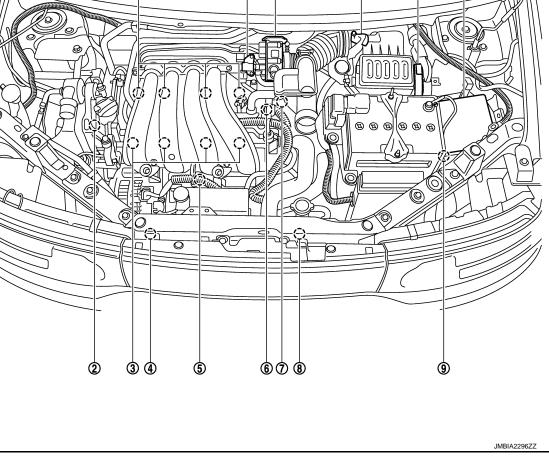
Intake valve timing control solenoid 3. valve

14. EVAP canister purge volume control

EC-45

- Camshaft position sensor (PHASE) 6. 0
- 9. Battery current sensor
- 12. Mass air flow sensor (with intake air temperature sensor)

Fuel injector



INFOID:000000004833173

А

EC

D

Ε

F

Н

Κ

L

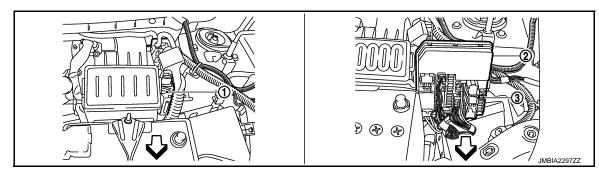
Μ

Ν

Ρ

< SYSTEM DESCRIPTION >

[MR18DE]

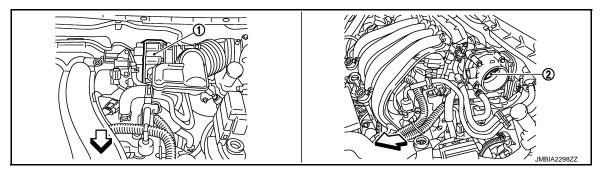


1. ECM

2. IPDM E/R

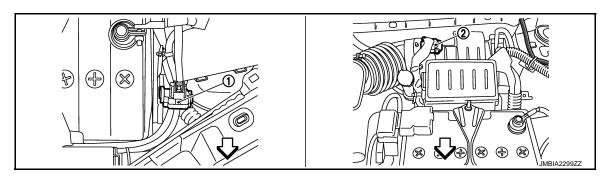
3. Fuel pump fuse (15 A)

∠ Vehicle front



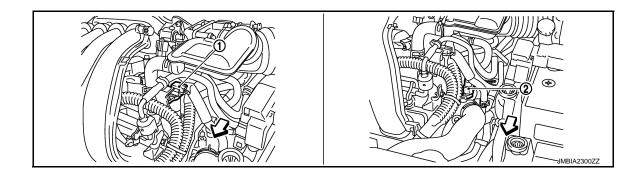
- 1. Electric throttle control actuator 2. (with built-in position sensor, throttle control motor)
- ✓ Vehicle front

Throttle valve



- 1. Battery current sensor
- 2. Mass air flow sensor (with Intake air temperature sensor)

√ Vehicle front



< SYSTEM DESCRIPTION >

- 1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor

✓ Vehicle front



EC

С

D

Е

F

G

Н

J

Κ

L

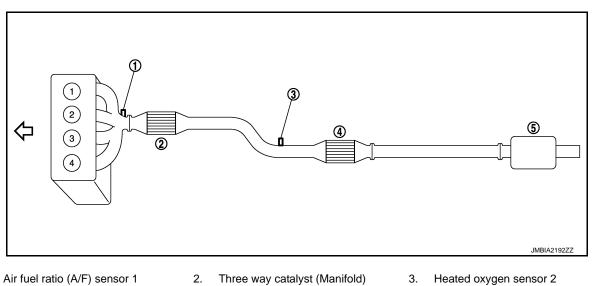
Μ

Ν

Ο

Ρ

А

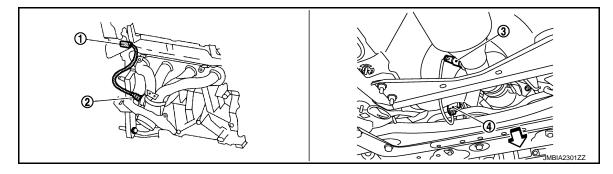


- 1.

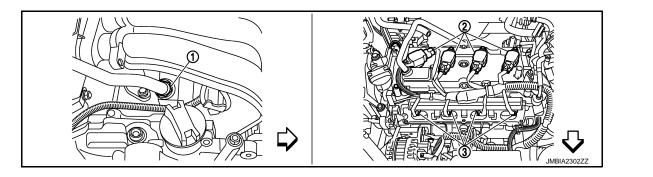
3. Heated oxygen sensor 2

- Three way catalyst (under floor) 4.
- 5. Muffler

Vehicle front \triangleleft



- 1. Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1 3. Heated oxygen sensor 2 connector
- Heated oxygen sensor 2 harness 4. connector
- ✓⊃ Vehicle front

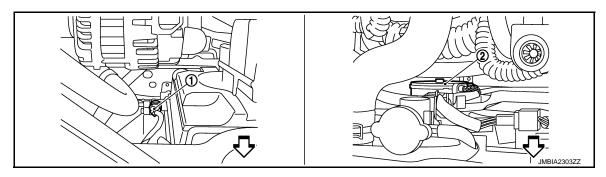


PCV valve 1.

2. Ignition coil (with power transistor) 3. Fuel injector and spark plug

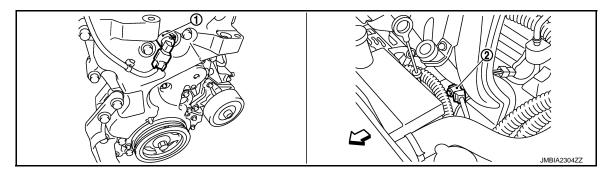
√ Vehicle front

< SYSTEM DESCRIPTION >

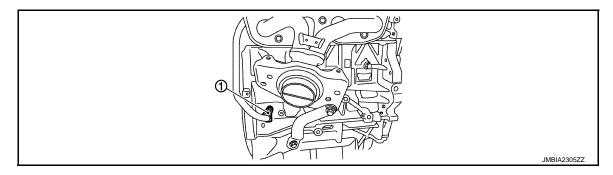


- 1. Refrigerant pressure sensor
- 2. Cooling fan motor

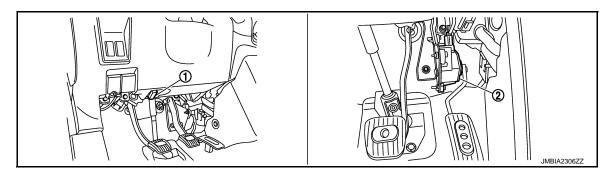
✓ Vehicle front



- 1. Intake valve timing control solenoid 2. Knock sensor valve
- ✓ Vehicle front

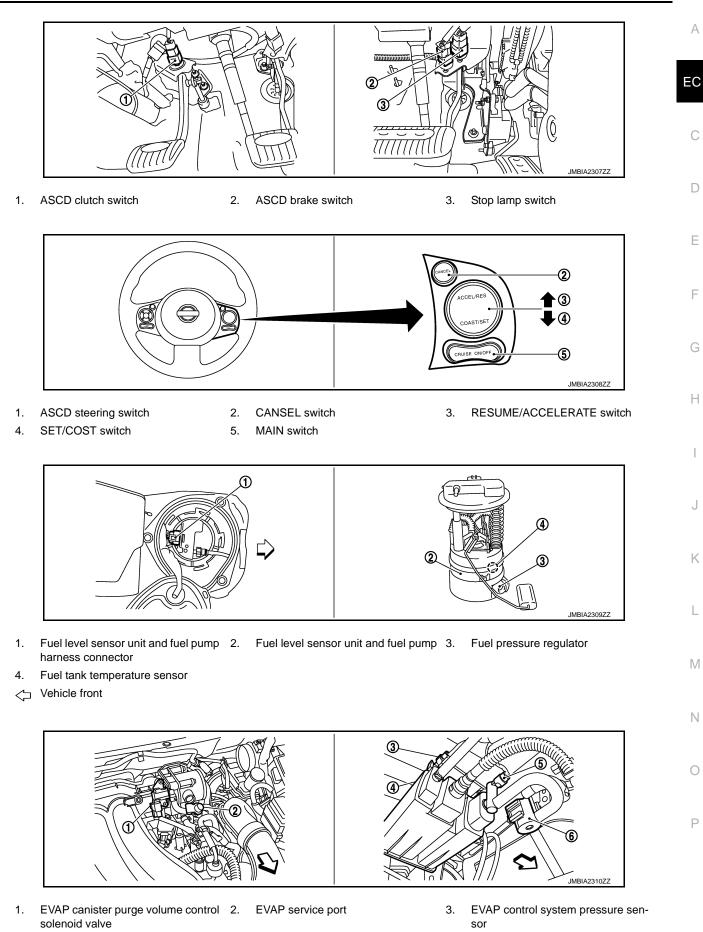


1. Crankshaft position sensor (POS)



- 1. Data link connector
- 2. Accelerator pedal position sensor

< SYSTEM DESCRIPTION >





< SYSTEM DESCRIPTION >

4. EVAP canister

5. EVAP canister vent control valve

6. Drain filter

√ Vehicle front

Component Description

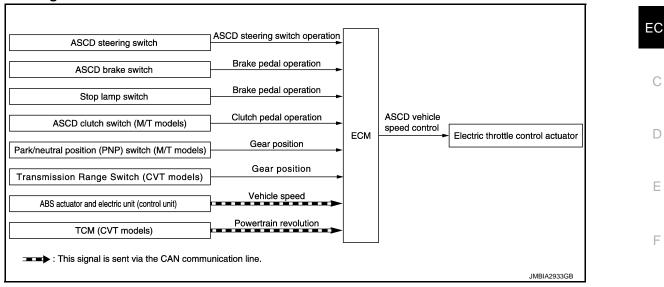
INFOID:000000004833174

Component	Reference
Accelerator pedal position sensor	EC-368, "Description"
Camshaft position sensor (PHASE)	EC-229, "Description"
Crankshaft position sensor (POS)	EC-225, "Description"
Engine coolant temperature sensor	EC-152, "Description"
Refrigerant pressure sensor	EC-414, "Description"

< SYSTEM DESCRIPTION >

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
ASCD steering switch	ASCD steering switch operation			
ASCD brake switch	Droke nodel energian	_	Electric throttle control actuator	
Stop lamp switch	Brake pedal operation			
ASCD clutch switch (M/T models)	Clutch pedal operation	ASCD vehicle		
Park/neutral position (PNP) switch (M/T models)	Gear position	speed control		
Transmission range switch (CVT models)	Gear position	_		
ABS actuator and electric unit (control unit)	Vehicle speed*			
TCM (M/T models)	Powertrain revolution*			

*: This signal is sent to the ECM via the 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).

ECM controls throttle angle of electric throttle control actuator to regulate engine speed. Operation status of ASCD is indicated by CRUISE lamp and SET lamp in combination meter. If any malfunction occurs in the ASCD system, it automatically deactivates control. NOTE:

Always drive vehicle in a 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.

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 maintain the new set speed.

EC-51

INFOID:000000005040365

INFOID:00000000504036

А

D

Н

Ν

Ρ

Μ

< SYSTEM DESCRIPTION >

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
- Clutch pedal is depressed or gear position is changed to neutral position (M/T models)
- Selector lever position is changed to N, P, R
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- TCS system is operated

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.

• Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.

When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ ACCELERATE switch.

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

If MAIN switch is turned to OFF while 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 maintain the new set speed.

RESUME OPERATION

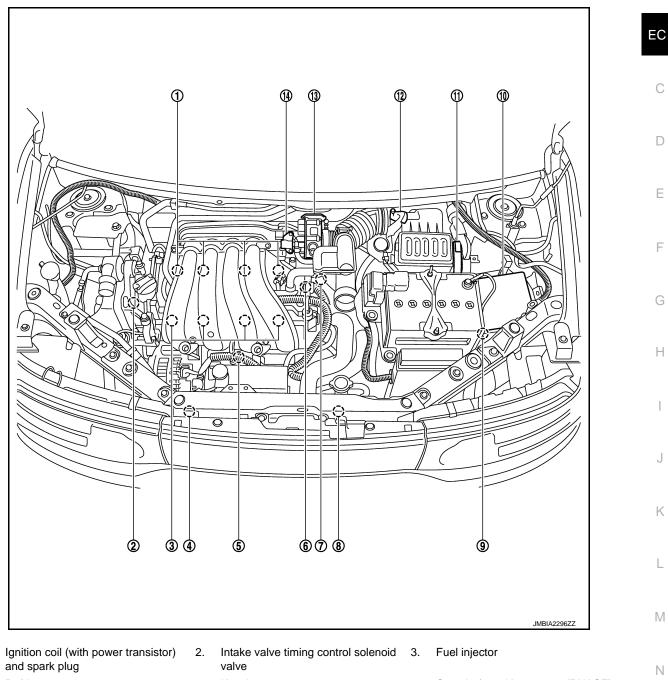
When the RESUME/ACCELERATE switch is pressed after cancel operation other than pressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released
- Clutch pedal is released (M/T models)
- Selector lever position is other than P and N (CVT models)
- Vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)

< SYSTEM DESCRIPTION >

Component Parts Location

[MR18DE]



- 4. Refrigerant pressure sensor
- 7. Engine coolant temperature sensor
- 10. IPDM E/R

1.

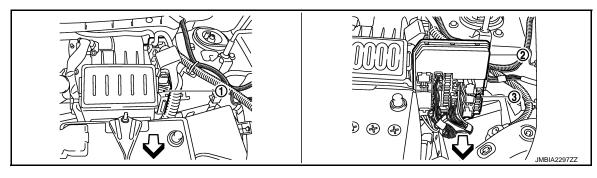
- Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- 5. Knock sensor
- 8. Cooling fan motor
- 11. ECM
- 14. EVAP canister purge volume control solenoid valve
- 6. Camshaft position sensor (PHASE)
- 9. Battery current sensor
- 12. Mass air flow sensor (with intake air temperature sensor)

Ρ

0

< SYSTEM DESCRIPTION >

[MR18DE]

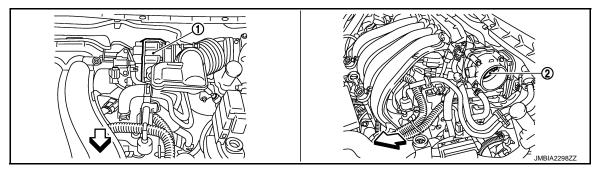


1. ECM

2. IPDM E/R

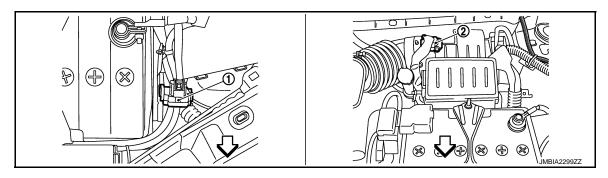
3. Fuel pump fuse (15 A)

✓ Vehicle front



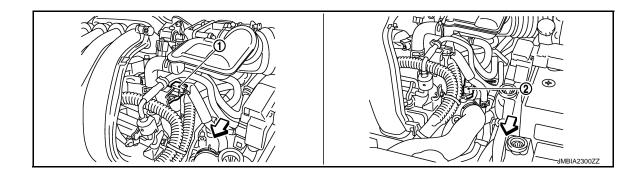
- 1. Electric throttle control actuator 2. (with built-in position sensor, throttle control motor)
- ✓ Vehicle front

Throttle valve



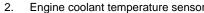
- 1. Battery current sensor
- 2. Mass air flow sensor (with Intake air temperature sensor)

√ Vehicle front



< SYSTEM DESCRIPTION >

- 1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor
- ✓⊃ Vehicle front



А

EC

С

D

Е

F

G

Н

J

Κ

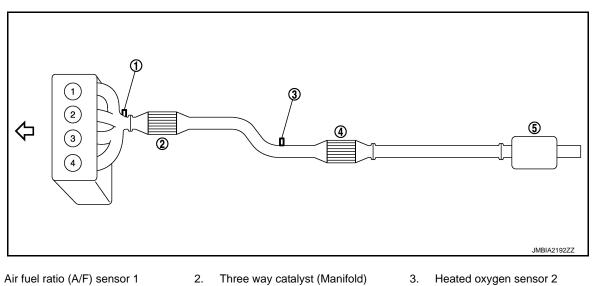
L

Μ

Ν

0

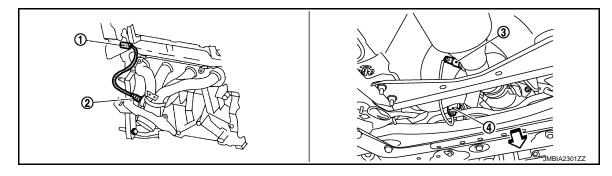
Ρ



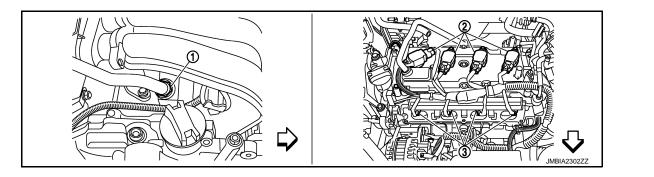
- 1.

- 4.
- Three way catalyst (under floor)
- 5. Muffler

Vehicle front \triangleleft



- 1. Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1 3. Heated oxygen sensor 2 connector
- Heated oxygen sensor 2 harness 4. connector
- ✓ Vehicle front



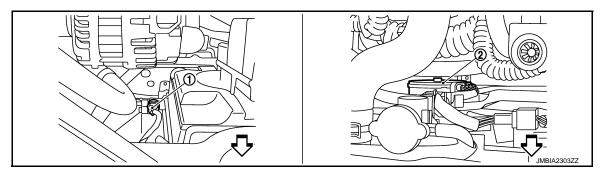
PCV valve 1.

2. Ignition coil (with power transistor) 3. Fuel injector and spark plug

√ Vehicle front

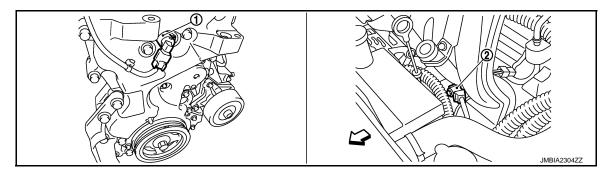
< SYSTEM DESCRIPTION >

[MR18DE]

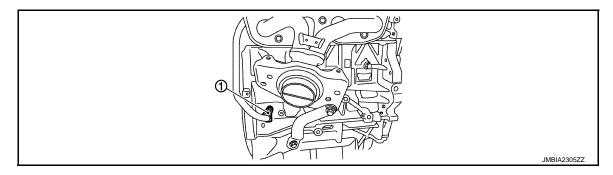


- 1. Refrigerant pressure sensor
- 2. Cooling fan motor

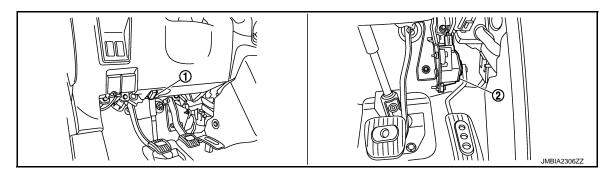
✓ Vehicle front



- 1. Intake valve timing control solenoid 2. Knock sensor valve
- ✓ Vehicle front

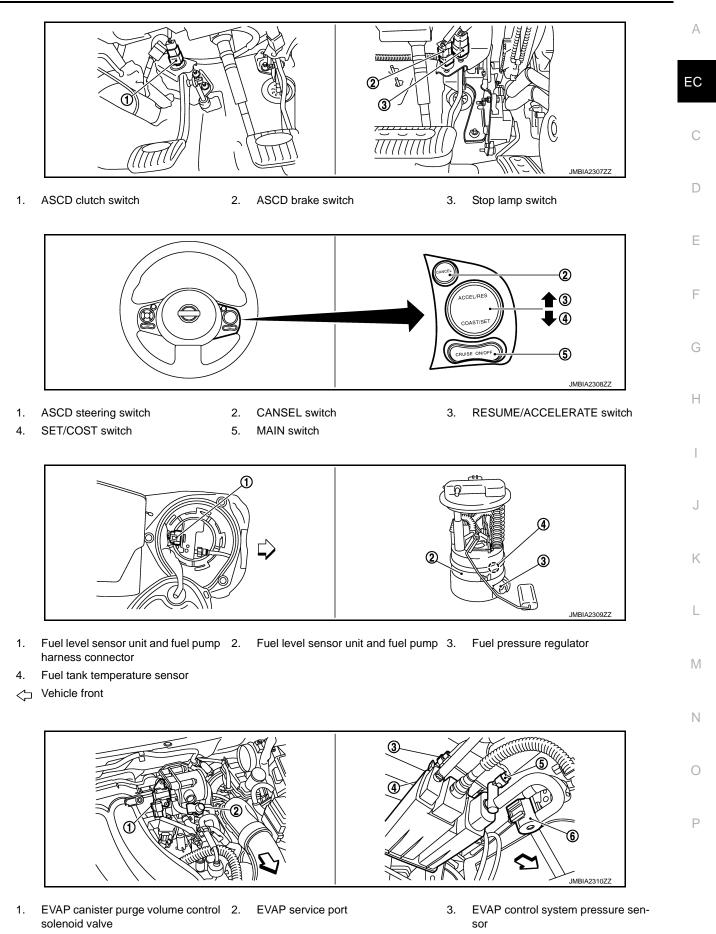


1. Crankshaft position sensor (POS)



- 1. Data link connector
- 2. Accelerator pedal position sensor

< SYSTEM DESCRIPTION >



< SYSTEM DESCRIPTION >

4. EVAP canister √→ Vehicle front

5. EVAP canister vent control valve

6. Drain filter

INFOID:000000005040366

[MR18DE]

Component Description

Component	Reference
ASCD steering switch	EC-341, "Description"
ASCD brake switch	EC-344, "Description"
ASCD indicator	EC-390, "Description"
Stop lamp switch	EC-344, "Description"
Electric throttle control actuator	EC-366, "Description"

CAN COMMUNICATION

System 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. Refer to LAN-23, "CAN Communication Signal Chart", about CAN communication for detail.

D

Е

F

Н

Κ

L

Μ

А

[MR18DE]

INFOID:000000004833175

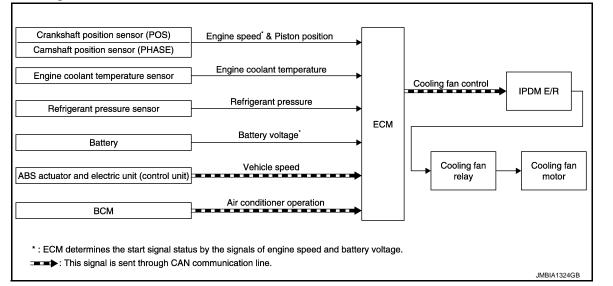
EC-59

Ν

Ρ

< SYSTEM DESCRIPTION >

COOLING FAN CONTROL



System Description

INFOID:000000004833177

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed ^{*1}	Cooling fan control		
Battery	Battery voltage*1		IPDM E/R ↓ Cooling fan relay ↓ Cooling fan motor	
ABS actuator and electric unit (control unit)	Vehicle speed*2			
Engine coolant temperature sensor	Engine coolant temperature			
BCM	Air conditioner ON signal*2			
Refrigerant pressure sensor	Refrigerant pressure			

*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.

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

SYSTEM DESCRIPTION

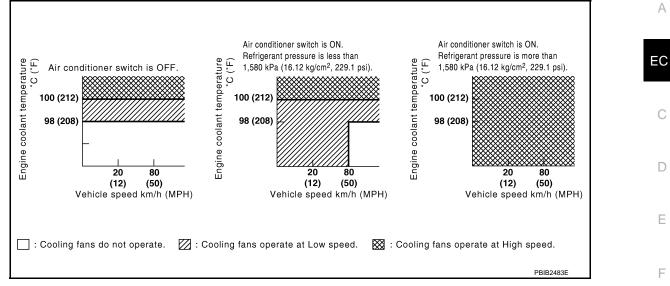
ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, refrigerant pressure, air conditioner ON signal. Then control system has 3-step control [HIGH/LOW/OFF].

INFOID:000000004833176

< SYSTEM DESCRIPTION >

[MR18DE]

Cooling Fan Operation



Cooling Fan Relay Operation

The ECM controls cooling fan relays via the CAN communication line.

Cooling for around		Cooling fan relay		-
Cooling fan speed	1	2	3	
Stop (OFF)	OFF	OFF	OFF	
Low (LOW)	ON	OFF	OFF	-
High (HI)	ON	ON	ON	

J

Κ

L

Μ

Ν

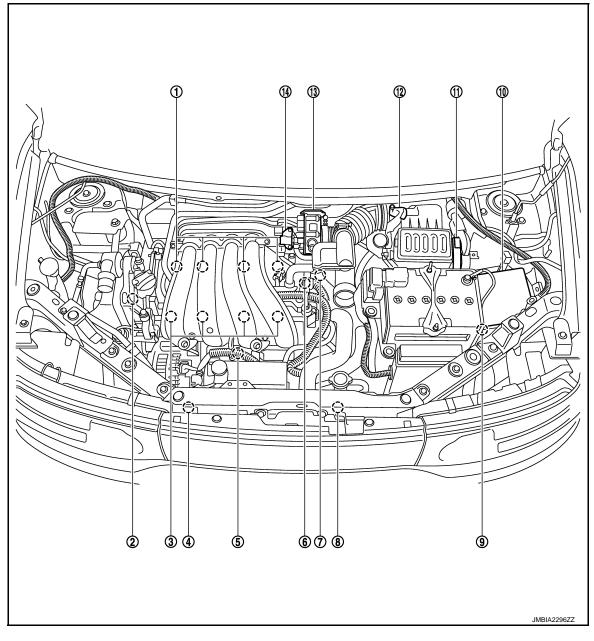
Ο

Ρ

< SYSTEM DESCRIPTION >

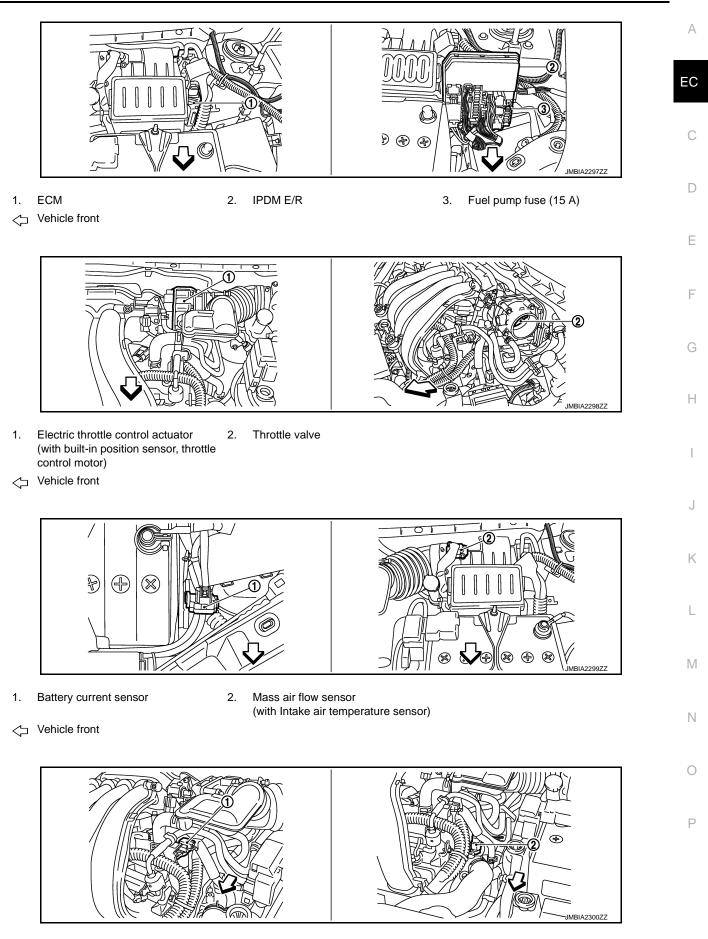
Component Parts Location

INFOID:000000004833178



- 1. Ignition coil (with power transistor) and spark plug
- 4. Refrigerant pressure sensor
- 7. Engine coolant temperature sensor
- 10. IPDM E/R
- 13. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- 2. Intake valve timing control solenoid 3. valve
- 5. Knock sensor
- 8. Cooling fan motor
- 11. ECM
- 14. EVAP canister purge volume control solenoid valve
- Fuel injector
- 6. Camshaft position sensor (PHASE)
- 9. Battery current sensor
- 12. Mass air flow sensor (with intake air temperature sensor)

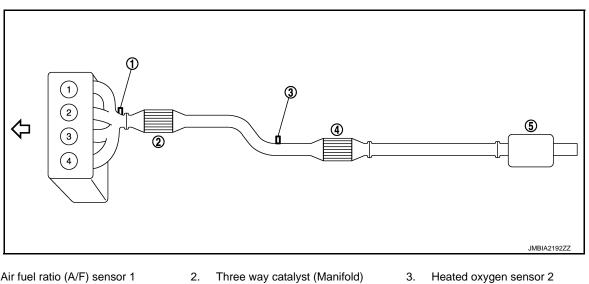
< SYSTEM DESCRIPTION >



< SYSTEM DESCRIPTION >

- 1. Camshaft position sensor (PHASE) 2.
- Engine coolant temperature sensor

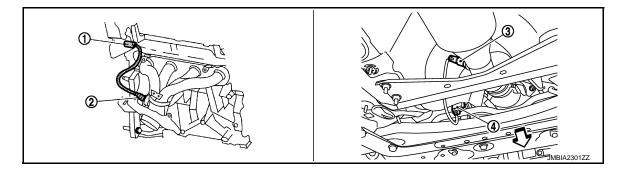
✓ Vehicle front



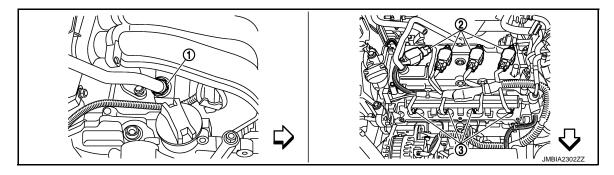
- Air fuel ratio (A/F) sensor 1 1.
- 5. Muffler

3. Heated oxygen sensor 2

- Three way catalyst (under floor)
- 4. Vehicle front \triangleleft



- 1. Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1 3. Heated oxygen sensor 2 connector
- Heated oxygen sensor 2 harness 4. connector
- ✓⊃ Vehicle front



PCV valve 1.

2. Ignition coil (with power transistor) 3. Fuel injector and spark plug

√ Vehicle front

< SYSTEM DESCRIPTION >

[MR18DE]

А

EC

С

D

Ε

F

G

Н

J

Κ

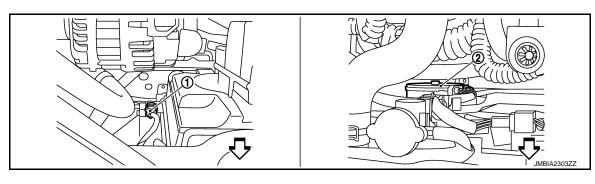
L

Μ

Ν

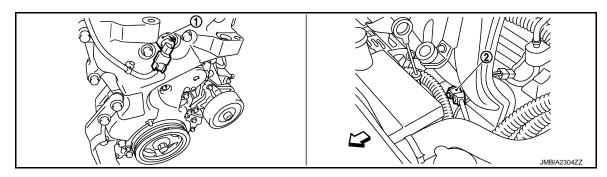
Ο

Ρ

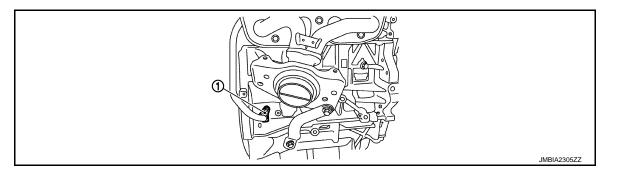


- 1. Refrigerant pressure sensor 2. Co
- 2. Cooling fan motor

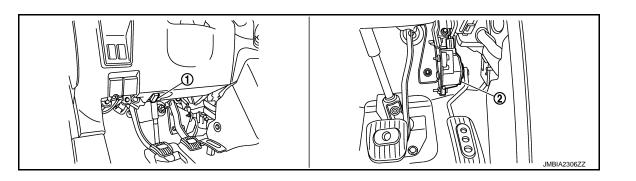
✓ Vehicle front



- 1. Intake valve timing control solenoid 2. Knock sensor valve
- ✓ Vehicle front

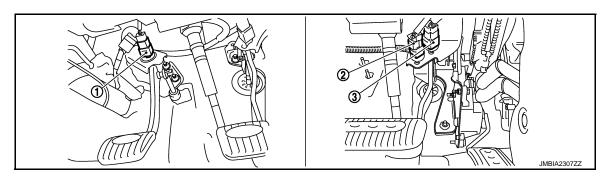


1. Crankshaft position sensor (POS)

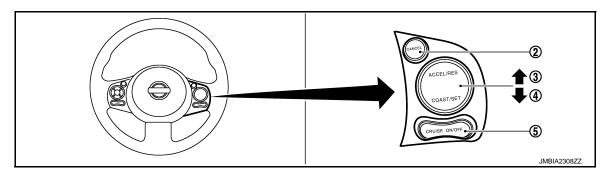


- 1. Data link connector
- 2. Accelerator pedal position sensor

< SYSTEM DESCRIPTION >

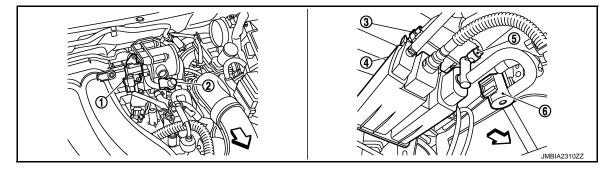


- 1. ASCD clutch switch
- 2. ASCD brake switch
- 3. Stop lamp switch



- 1. ASCD steering switch
- 2. CANSEL switch
- 4. SET/COST switch
- 5. MAIN switch

- 3. RESUME/ACCELERATE switch
- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- 4. Fuel tank temperature sensor
- ✓ Vehicle front



- 1. EVAP canister purge volume control 2. EVAP service port solenoid valve
- 3. EVAP control system pressure sensor



< SYSTEM DESCRIPTION >

4. EVAP canister

5. EVAP canister vent control valve 6.

[MR18DE]

Drain filter

INFOID:000000004833179

√ Vehicle front

Component Description

Component	Reference	
Camshaft position sensor (PHASE)	EC-229, "Description"	С
Crankshaft position sensor (POS)	EC-225, "Description"	
Cooling fan motor	EC-60, "System Description"	
Engine coolant temperature sensor	EC-152, "Description"	D
Refrigerant pressure sensor	EC-414, "Description"	

А

EC

Е

F

G

Н

J

Κ

L

Μ

Ν

Ο

Ρ

< SYSTEM DESCRIPTION >

EVAPORATIVE EMISSION SYSTEM

System Diagram

Crankshaft position sensor	Engine speed [*] & Piston position]	
Camshaft position sensor		•		
Mass air flow sensor	Amount of intake air	•		
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	→	I manage flags a second	VAP canister urge volume
Accelerator pedal position sensor	Accelerator pedal position	ECM	CO	ontrol solenoid alve
Battery	Battery voltage*	•		
Fuel tank temperature sensor	Fuel temperature in fuel tank	•		
EVAP control system pressure sensor	Pressure in purge line	•		
ABS actuator and electric unit (control unit)	Vehicle speed	•		
* : ECM determines the start signal status by	the signals of engine speed and battery volt	ade.		
This signal is sent via the CAN com				JMBIA2944GB

System Description

INFOID:000000004833181

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed ^{*1}				
Mass air flow sensor	Amount of intake air	_	EVAP canister purge vol- ume control solenoid valve		
Engine coolant temperature sensor	Engine coolant temperature				
Battery	Battery voltage*1				
Throttle position sensor	Throttle position	EVAP canister			
Accelerator pedal position sensor	Accelerator pedal position	purge flow control			
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				
ABS actuator and electric unit (control unit)	Vehicle speed*2				

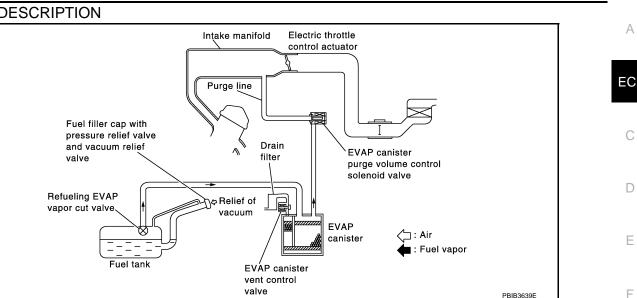
*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

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

INFOID:000000004833180

< SYSTEM DESCRIPTION >

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 Н proportionally regulated as the air flow increases.

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

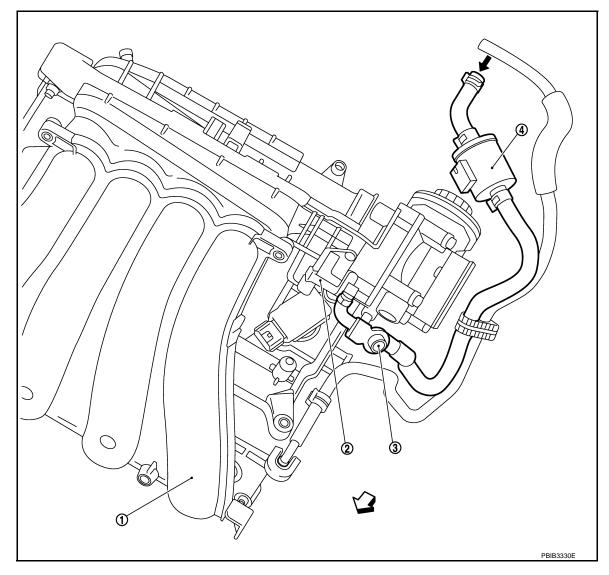
EVAPORATIVE EMISSION LINE DRAWING

- Κ
- L

 - Μ
 - Ν

 - Ρ

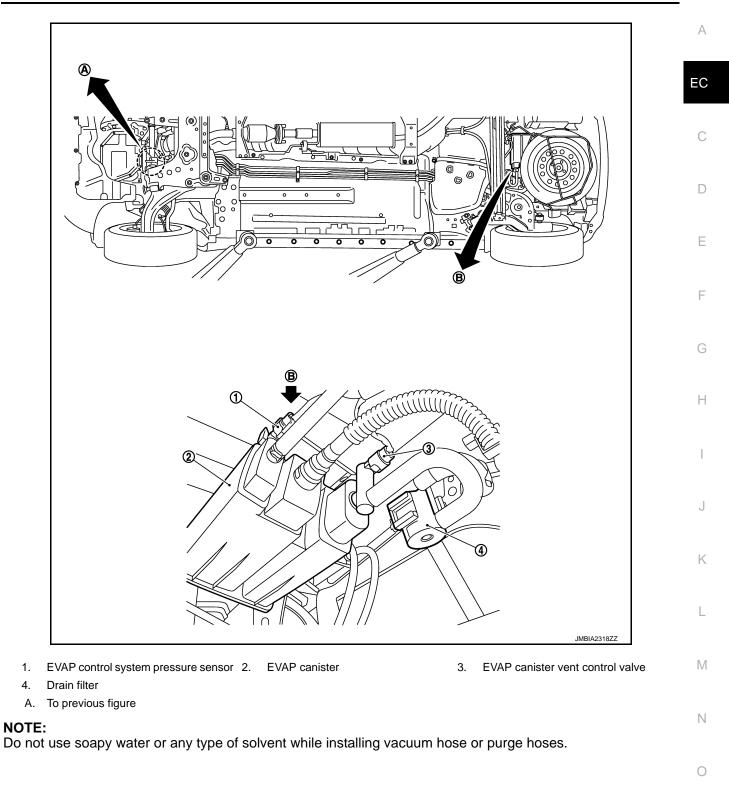
< SYSTEM DESCRIPTION >



- 1. Intake manifold collector
- 2. EVAP canister purge volume control 3. EVAP service port solenoid valve
- 4. EVAP purge resonator
- ✓⊃ Vehicle front

From next figure

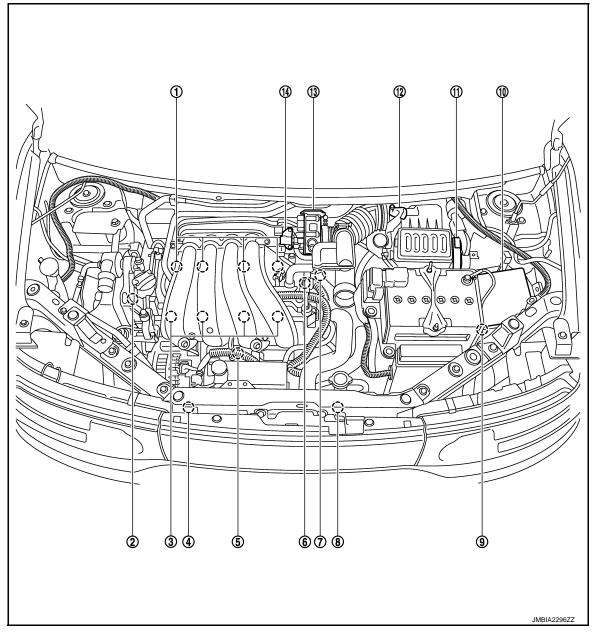
< SYSTEM DESCRIPTION >



< SYSTEM DESCRIPTION >

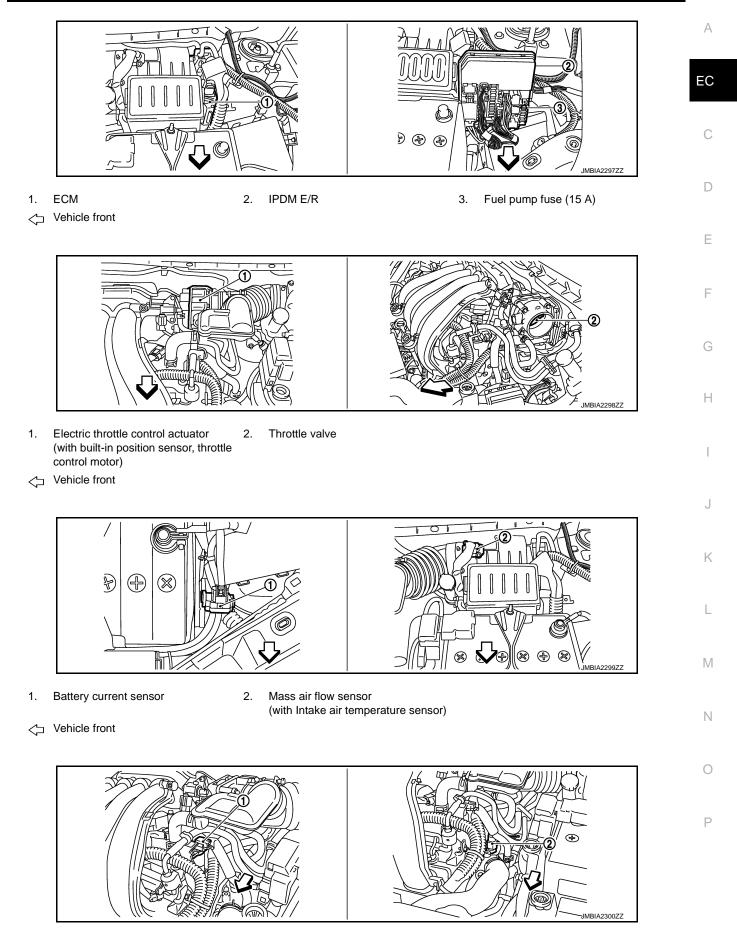
Component Parts Location

INFOID:000000004833182



- 1. Ignition coil (with power transistor) and spark plug
- 4. Refrigerant pressure sensor
- 7. Engine coolant temperature sensor
- 10. IPDM E/R
- Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- 2. Intake valve timing control solenoid 3. valve
- 5. Knock sensor
- 8. Cooling fan motor
- 11. ECM
- 14. EVAP canister purge volume control solenoid valve
- Fuel injector
- 6. Camshaft position sensor (PHASE)
- 9. Battery current sensor
- 12. Mass air flow sensor (with intake air temperature sensor)

< SYSTEM DESCRIPTION >



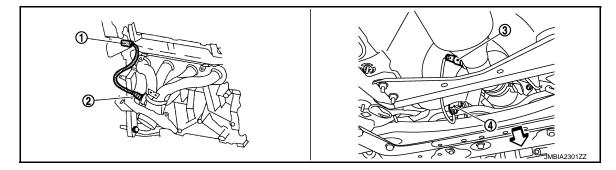
< SYSTEM DESCRIPTION >

- 1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor
- √ Vehicle front

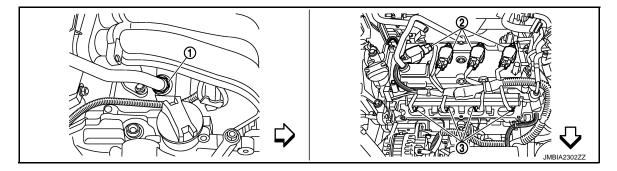


- Æ 1 2 \Diamond 5 4 3 2 (4)JMBIA2192ZZ
- Air fuel ratio (A/F) sensor 1 1.
- 2. Three way catalyst (Manifold) 5. Muffler
- 3. Heated oxygen sensor 2

- 4. Three way catalyst (under floor)
- √ Vehicle front



- 1. Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1 3. Heated oxygen sensor 2 connector
- Heated oxygen sensor 2 harness 4. connector
- ✓⊃ Vehicle front



PCV valve 1.

2. Ignition coil (with power transistor) 3. Fuel injector and spark plug

√ Vehicle front

< SYSTEM DESCRIPTION >

[MR18DE]

А

EC

С

D

Ε

F

G

Н

J

Κ

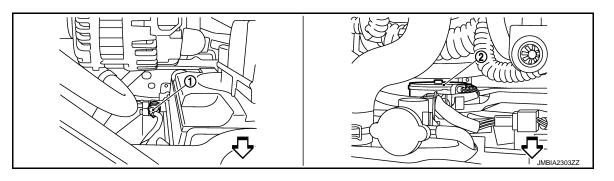
L

Μ

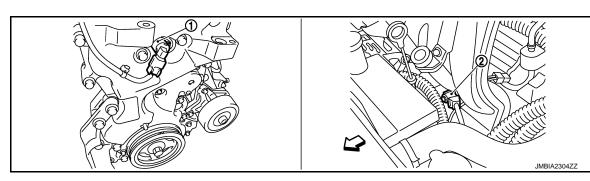
Ν

Ο

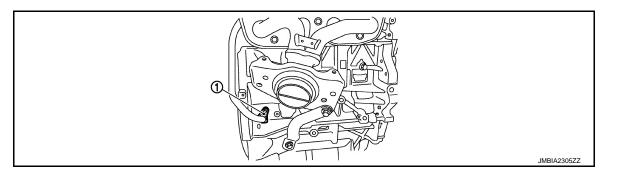
Ρ



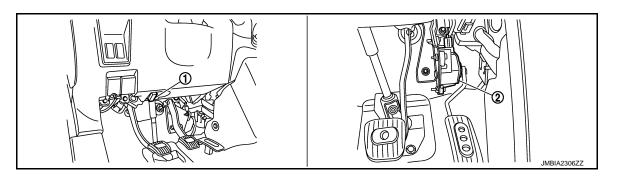
- 1. Refrigerant pressure sensor 2. Cooling fan motor
- ✓ Vehicle front



- 1. Intake valve timing control solenoid 2. Knock sensor valve
- ✓ Vehicle front

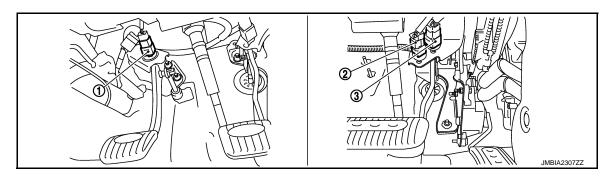


1. Crankshaft position sensor (POS)

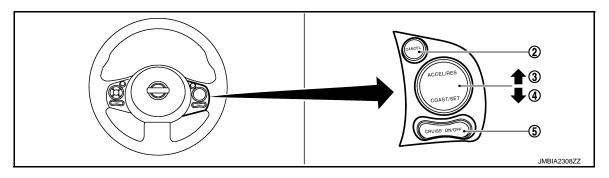


- 1. Data link connector
- 2. Accelerator pedal position sensor

< SYSTEM DESCRIPTION >

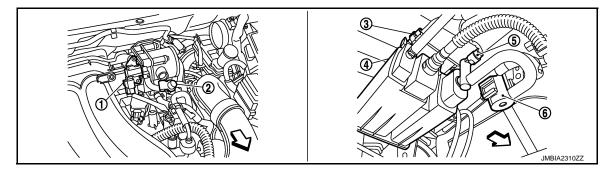


- 1. ASCD clutch switch
- 2. ASCD brake switch
- 3. Stop lamp switch



- 1. ASCD steering switch
- 2. CANSEL switch
- 4. SET/COST switch
- 5. MAIN switch

- 3. RESUME/ACCELERATE switch
- JMBIA2309ZZ
- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- 4. Fuel tank temperature sensor
- ✓ Vehicle front



- 1. EVAP canister purge volume control 2. EVAP service port solenoid valve
- 3. EVAP control system pressure sensor



< SYSTEM DESCRIPTION >

4. EVAP canister √→ Vehicle front

5. EVAP canister vent control valve 6

alve 6. Drain filter

[MR18DE]

INFOID:000000004833183

А

EC

Component Description

Component	Reference	
A/F sensor 1	EC-165, "Description"	
Accelerator pedal position sensor	EC-368, "Description"	
Camshaft position sensor (PHASE)	EC-229, "Description"	
Crankshaft position sensor (POS)	EC-225, "Description"	
Engine coolant temperature sensor	EC-152, "Description"	
EVAP canister purge volume control solenoid valve	EC-251, "Description"	
EVAP control system pressure sensor	EC-267, "Description"	
Fuel tank temperature sensor	EC-208, "Description"	
Mass air flow sensor	EC-136. "Description"	
Throttle position sensor	EC-155, "Description"	

Н

J

Κ

L

Μ

Ν

Ο

Ρ

G

< SYSTEM DESCRIPTION >

INTAKE VALVE TIMING CONTROL

System Diagram

System Description

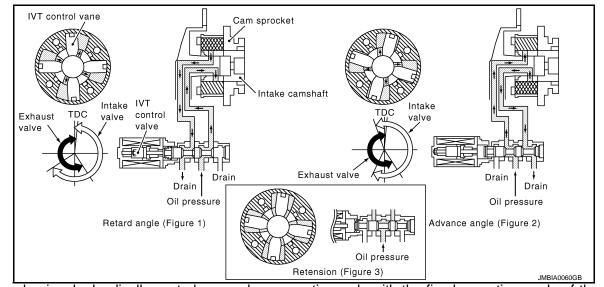
INFOID:000000004833185

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 speed and piston position			
Engine coolant temperature sensor	Engine coolant temperature	Intake valve timing control	Intake valve timing control solenoid valve	
ABS actuator and electric unit (control unit)	Vehicle speed*			
Combination meter				

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

SYSTEM DESCRIPTION



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

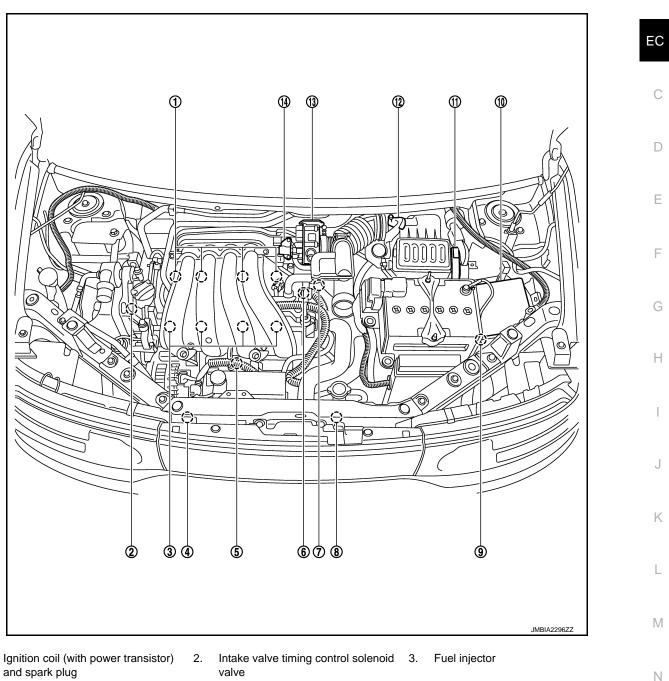
The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing (IVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing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

< SYSTEM DESCRIPTION >

Component Parts Location

[MR18DE]

А



- 4. Refrigerant pressure sensor
- Engine coolant temperature sensor 7.
- 10. IPDM E/R

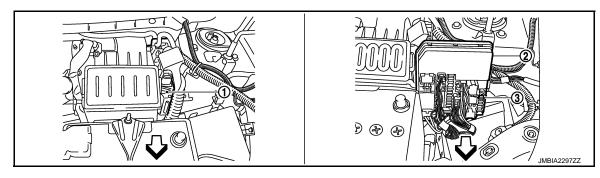
1.

- 13. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- valve
- 5. Knock sensor
- 8. Cooling fan motor
- 11. ECM
- 14. EVAP canister purge volume control solenoid valve
- 6. Camshaft position sensor (PHASE)
- 9. Battery current sensor
- 12. Mass air flow sensor (with intake air temperature sensor)

0

< SYSTEM DESCRIPTION >

[MR18DE]

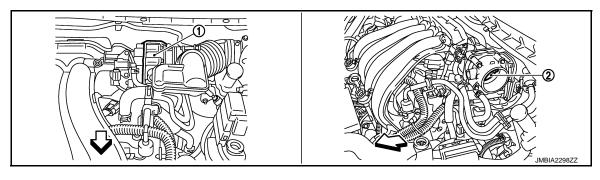


1. ECM

2. IPDM E/R

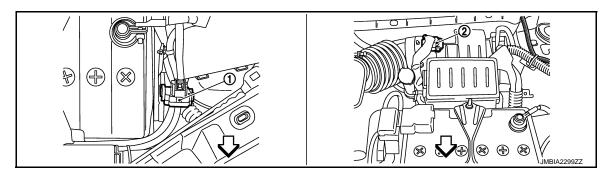
3. Fuel pump fuse (15 A)

√ Vehicle front



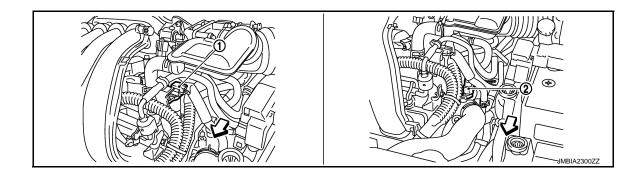
- 1. Electric throttle control actuator 2. (with built-in position sensor, throttle control motor)
- ✓ Vehicle front

Throttle valve



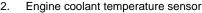
- 1. Battery current sensor
- 2. Mass air flow sensor (with Intake air temperature sensor)

√ Vehicle front



< SYSTEM DESCRIPTION >

- 1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor
- ✓ Vehicle front



[MR18DE]

А

С

D

Ε

F

G

Н

J

Κ

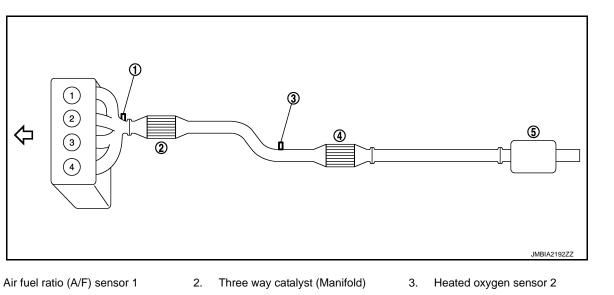
L

Μ

Ν

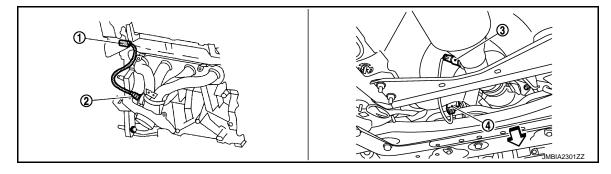
Ο

Ρ

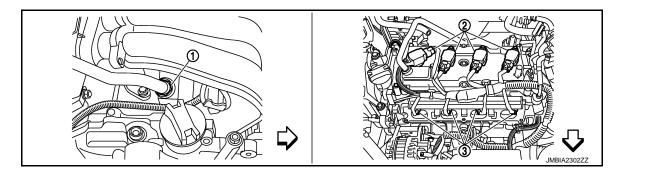


- 1. Three way catalyst (under floor) 4.
- 5. Muffler

Vehicle front \triangleleft



- 1. Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1 3. Heated oxygen sensor 2 connector
- Heated oxygen sensor 2 harness 4. connector
- ✓⊃ Vehicle front

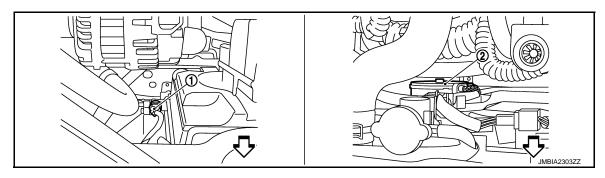


PCV valve 1.

2. Ignition coil (with power transistor) 3. Fuel injector and spark plug

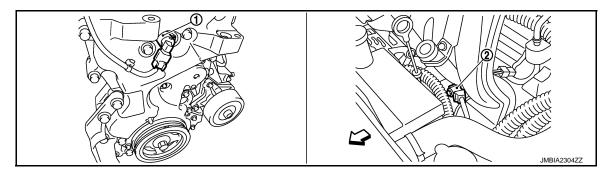
√ Vehicle front

< SYSTEM DESCRIPTION >

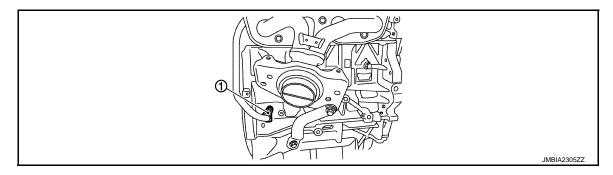


- 1. Refrigerant pressure sensor
- 2. Cooling fan motor

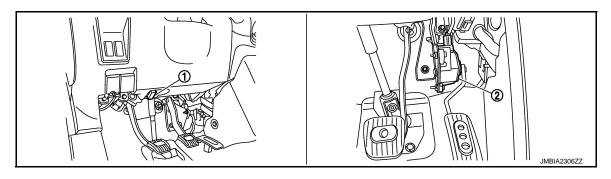
✓ Vehicle front



- 1. Intake valve timing control solenoid 2. Knock sensor valve
- ✓ Vehicle front

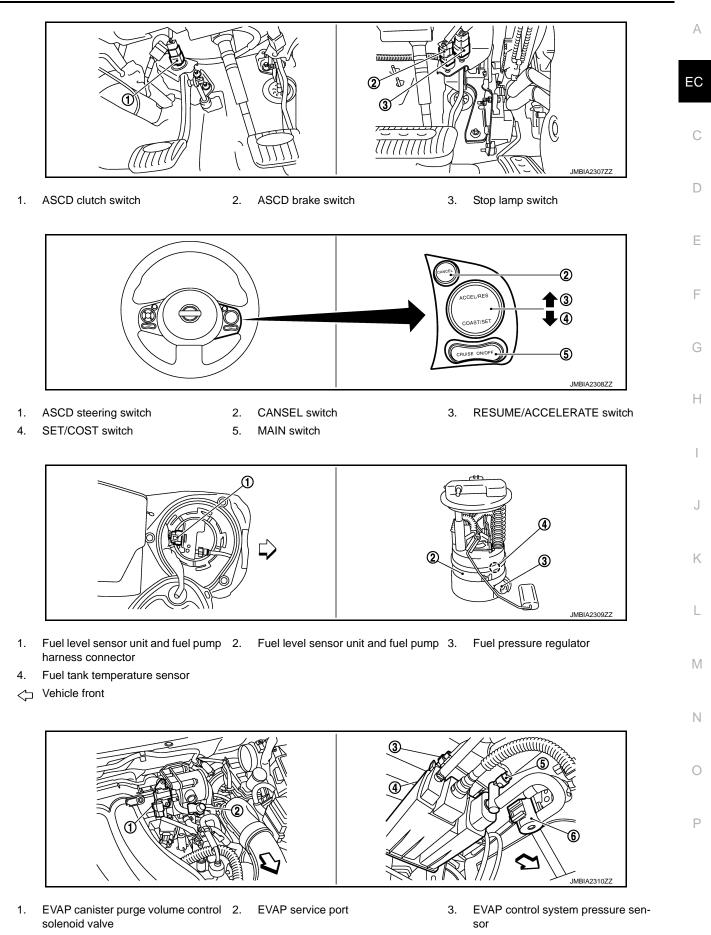


1. Crankshaft position sensor (POS)



- 1. Data link connector
- 2. Accelerator pedal position sensor

< SYSTEM DESCRIPTION >





< SYSTEM DESCRIPTION >

4. EVAP canister

5.

EVAP canister vent control valve Drain filter 6.

[MR18DE]

✓ Vehicle front

Component Description

INFOID:000000004833187

Component	Reference
Camshaft position sensor (PHASE)	EC-229, "Description"
Crankshaft position sensor (POS)	EC-225, "Description"
Engine coolant temperature sensor	EC-152, "Description"
Intake valve timing control solenoid valve	EC-78, "System Description"

< SYSTEM DESCRIPTION >

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

А

EC

Κ

L

INFOID:000000004833188

[MR18DE]

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	G
CONSULT-III	×	×	×	×	×	×	_	
GST	×	×	×		×	×	×	Н
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-445</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.

						×: App	olicable —: I	Not applicable
		MIL			D.	DTC 1st trip DTC		
ltems	1s [:]	t trip	2nc	l trip	1.04 41	On al trip		On d trip
Kono	Blinking	Lighting up	Blinking	Lighting up	1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
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 (Refer to <u>EC-448, "DTC Index"</u> .)	_	×	_	_	×	_	_	_
Except above	—	_	—	×	_	×	×	_

DTC AND FREEZE FRAME DATA

DTC and 1st Trip DTC

< SYSTEM DESCRIPTION >

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 recur, 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 DTC and 1st Trip DTC".

For malfunctions in which 1st trip DTCs are displayed, refer to <u>EC-448</u>, "<u>DTC Index</u>". 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-8</u>, "Work Flow". 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. 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			
2		Except the above items (Includes CVT related items)			
3	1st trip freeze frame data				

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 or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and 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 DTC and 1st Trip DTC".

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

(B) With CONSULT-III

CONSULT-III displays the DTC in "SELF DIAGNOSTIC RESULT" mode. Examples: P0340, P0850, P1148, etc.

[MR18DE] < SYSTEM DESCRIPTION > These DTCs are prescribed by SAE J2012. (CONSULT-III also displays the malfunctioning component or system.) А 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]. EC With GST GST (Generic Scan Tool) displays the DTC in Diagnostic Service \$03. Examples: P0340, P0850, P1148, etc. These DTCs are prescribed by SAE J2012. No Tools The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0340, 0850, 1148, etc. D These DTCs are controlled by NISSAN. NOTE: 1st trip DTC No. is the same as DTC No. Output of a DTC indicates a malfunction. However, GST and 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. Therefore, using CONSULT-III (if available) is recommended. F How to Erase DTC and 1st Trip DTC (P) With CONSULT-III NOTE: 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. If the DTC is not for CVT related items (<u>EC-448, "DTC Index"</u>), skip step 1. Н 1. Erase DTC in TCM. Refer to TM-91, "Diagnosis Description". 2. Select "ENGINE" with CONSULT-III. Select "SELF DIAGNOSTIC RESULT". 3 4. Touch "ERASE". (DTC in ECM will be erased.) With GST NOTE: 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. 1. Select Service \$04 with GST (Generic Scan Tool). No Tools Κ NOTE: 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. L Erase DTC in ECM. Refer to HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). If the battery is disconnected, the emission-related diagnostic information will be cleared within 24 hours. Μ The following data are cleared when the ECM memory is erased. Diagnostic trouble codes - 1st trip diagnostic trouble codes Ν - 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 Ρ 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".

< SYSTEM DESCRIPTION >

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:

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)	Performance Priority*	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420
EVAP SYSTEM	2	EVAP control system purge flow monitoring	P0441
	1	EVAP control system	P0442
	2	EVAP control system	P0456
HO2S	2	Air fuel ratio (A/F) sensor 1	P0133
		Heated oxygen sensor 2	P0137
		Heated oxygen sensor 2	P0138
		Heated oxygen sensor 2	P0139
EGR/VVT SYSTEM	3	Intake value timing control function	P0011

*: If completion of several SRTs is required, perform driving patterns (DTC CONFIRMATION PROCEDURE), one by one based on the priority for models with CONSULT-III.

SRT Set Timing

SRT is set as "CMPLT" after self-diagnosis has been performed one or more times. Completion of SRT is 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-diagn	osis result	$\begin{array}{c c} \mbox{Ignition cycle} \\ \hline \mbox{Diagnosis} & \leftarrow \mbox{ON} \rightarrow & \mbox{OFF} \rightarrow & O$				$F \leftarrow ON \rightarrow$
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"

< SYSTEM DESCRIPTION >

[MR18DE]

D

Е

F

Κ

L

Μ

Ν

Ρ

NG exists	Case 3	P0400	OK	OK	—	—	٨
		P0402	_	_	_	_	A
		P1402	NG	_	NG	NG (Consecutive NG)	EC
		(1st trip) DTC	1st trip DTC	_	1st trip DTC	DTC (= MIL ON)	_
		SRT of EGR	"INCMP"	"INCMP"	"INCMP"	"CMPLT"	С

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 If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indi-

If one of more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will a cate "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 H
 memory must be erased from ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate "INCMP". NOTE:

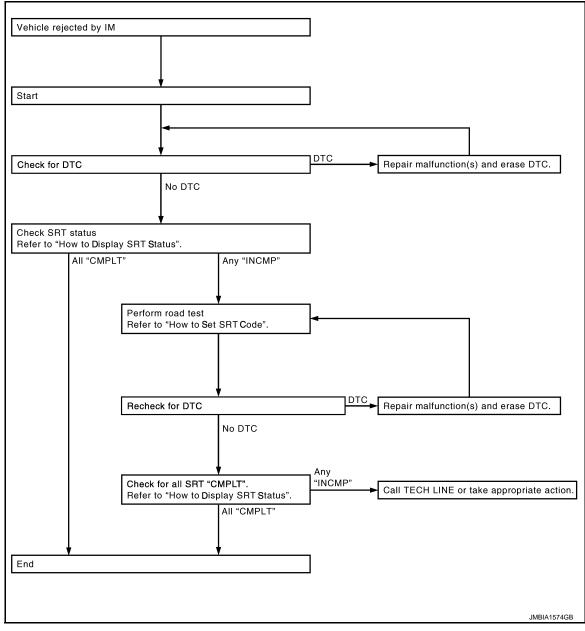
SRT can be set as "CMPLT" together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates "CMPLT".

SRT Service Procedure

< SYSTEM DESCRIPTION >

[MR18DE]

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 figure.



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)

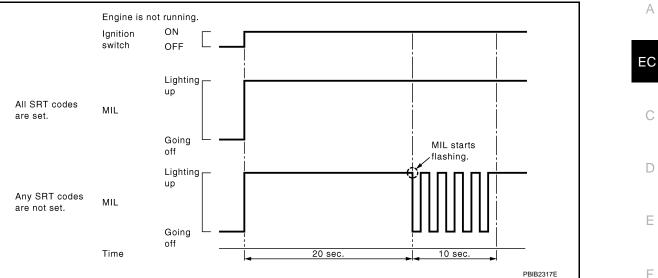
NO TOOLS

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.

< SYSTEM DESCRIPTION >

When any SRT codes are not set, MIL will flash periodically for 10 seconds.

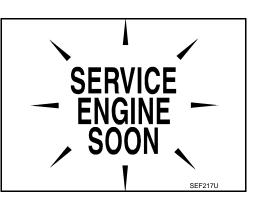


MALFUNCTION INDICATOR LAMP (MIL)

Description

The MIL is located on the instrument panel.

- The MIL will light up when the ignition switch is turned ON with-1. out the engine running. This is a bulb check. If the MIL does not light up, refer to EC-406. "Component Function Check".
- 2. 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.



On Board Diagnostic System Function

The on board diagnostic system has the following three functions.

Н

J

Κ

L

Μ

Ν

Ρ

< SYSTEM DESCRIPTION >

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit.
	Engine running	MALFUNCTION WARNING	 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	Ignition switch in ON position	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>406, "Description"</u>.

Diagnostic Test Mode I — Malfunction Warning

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

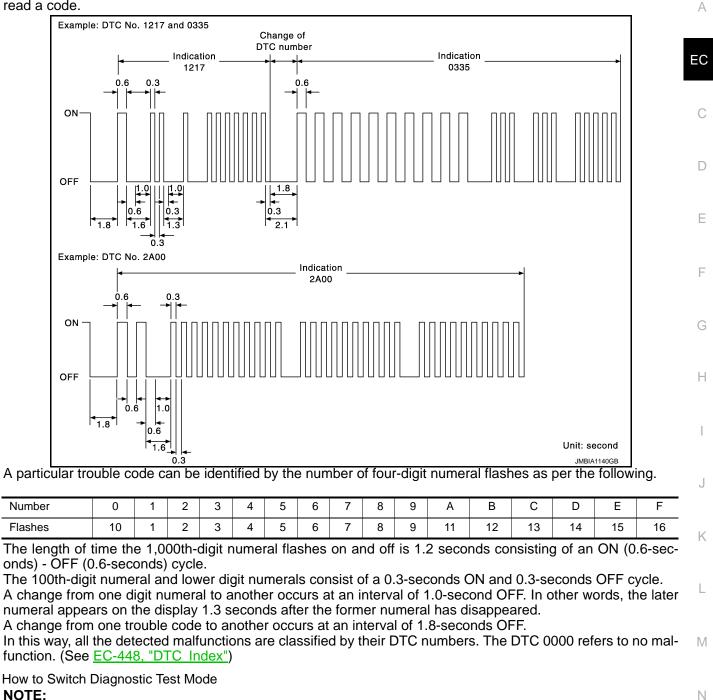
This DTC number is clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

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-

< SYSTEM DESCRIPTION >

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.



- 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)
- Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds. 1.
- 2. Repeat the following procedure quickly five times within 5 seconds.
- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.
- Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MIL starts 3. blinking.
 - NOTE:

Do not release the accelerator pedal for 10 seconds if MIL start blinking during this period. This blinking is displaying SRT status and is continued for another 10 seconds.

EC-93

Ρ

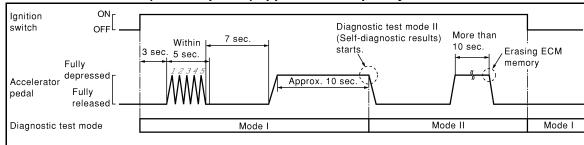
< SYSTEM DESCRIPTION >

PBIB0092E

4. Fully release the accelerator pedal.

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

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



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

- Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to "HOW TO SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)".
- 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.

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 RESULT" 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".

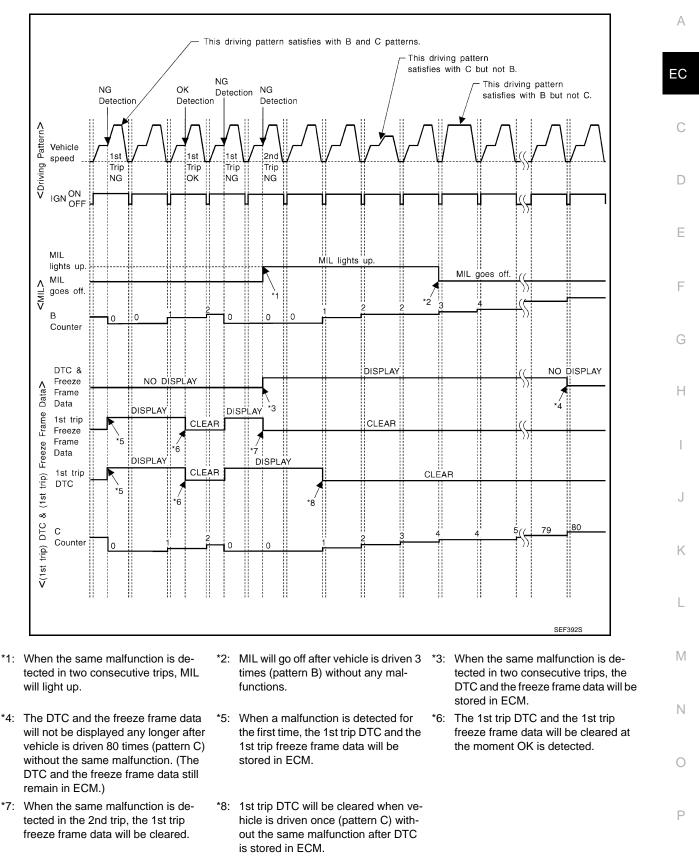
For details about patterns A and B under Other, see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM".

*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>", "Fuel Injection System"

< SYSTEM DESCRIPTION >



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

Driving pattern B means the vehicle operation as per the following:

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

Revision: 2009 March

EC-95

< SYSTEM DESCRIPTION >

- 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 per the following:

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 per the following:

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"

< SYSTEM DESCRIPTION >

А This driving pattern satisfies with A and B patterns This driving pattern EC satisfies with A but not B. NG This driving pattern NG NG OK Detection satisfies with B but not A. Detection Detection Detectior Pattern> Vehicle 15 speed CDriving Trip Trip Trip Trip D ок NG NG NG ON IGN OFF MIL Μ́Ш lights up lights up. MIL goes off 2 MIL < MIL> F goes off. ٠j в 0 Ω 0 0 Counter DTC & NO DISPLAY DISPLAY Data> Freeze NO DISPLAY)) Н Frame Data DİSPLAY DISPLAY *3 Frame 1st trip CLEAR CLEAR Freeze Freeze Frame 5 ۴6 Data DİSPLAY DISPLAY CLEAR CLËAR 1st trip trip) DTC (1st *6 0 ∞ŏ DTC Α 40 39 5 Counter 0 trip) Κ <(1st L SEF393SD Μ *1: When the same malfunction is de-*2: MIL will go off after vehicle is driven 3 *3: When the same malfunction is detected in two consecutive trips, MIL times (pattern B) without any maltected in two consecutive trips, the will light up. functions. DTC and the freeze frame data will be stored in ECM. Ν

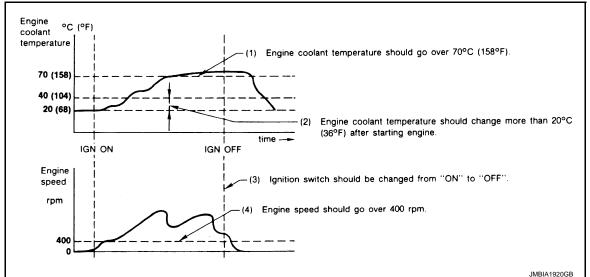
- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will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

Ρ

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

< SYSTEM DESCRIPTION >

<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 per the following:

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:000000004833189

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-III screen.
Self diagnostic result	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/results can be confirmed.
Function test	This mode is used to inform customers when their vehicle condition requires periodic mainte- nance.
ECU Identification	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

EC-98

< SYSTEM DESCRIPTION >

[MR18DE]

				DIAGNO	OSTIC TES	T MODE			A
	Item Crankshaft position sensor (POS)			nostic Re- ult			DTC & SRT CONFIRMATION		_
			Item Work Support DTC*1 FRAME DATA*2		Data Monitor	Active Test	SRT STATUS	DTC WORK SUP- PORT	E
	Crankshaft position sensor (POS)		×	×	×				-
	Camshaft position sensor (PHASE)		×	×	×				-
	Mass air flow sensor		×		×				-
	Engine coolant temperature sensor		×	×	×	×			-
	Air fuel ratio (A/F) sensor 1		×		×		×	×	-
	Heated oxygen sensor 2		×		×		×	×	-
	Vehicle speed signal		×	×	×				-
	Accelerator pedal position sensor		×		×				-
	Throttle position sensor		×	×	×				-
	Fuel tank temperature sensor		×		×	×			-
	EVAP control system pressure sensor		×		×				-
	Intake air temperature sensor		×	×	×				-
	Knock sensor		×						-
	Refrigerant pressure sensor				×				-
INPUT	Closed throttle position switch (accelerator pedal position sensor signal)				×				-
	Air conditioner ON signal				×				-
INPUT	Park/neutral position (PNP) switch (M/T models)		×		×				-
	Transmission range switch (CVT models)		×		×				-
i	Stop lamp switch		×		×				-
	Power steering operation signal				×				-
	Battery voltage				×				-
	Load signal				×				-
	Primary speed sensor		×		×				-
	Fuel level sensor signal		×		×				-
	Battery current sensor		×		×				-
	ASCD steering switch		×		×				-
	ASCD brake switch		×		×				-
	ASCD clutch switch		×		×				-

0

Ρ

< SYSTEM DESCRIPTION >

[MR18DE]

			DIAGNOSTIC TEST MODE							
				Self Diagnostic Re- sult				DTC & SRT CONFIRMATION		
	Item		Work Support	DTC*1	FREEZE FRAME DATA*2	Data Monitor	Active Test	SRT STATUS	DTC WORK SUP- PORT	
	Fuel injector					×	×			
		Power transistor (Ignition timing)				×	×			
T S	TS	Throttle control motor relay		×		×				
PAR		Throttle control motor		×						
NENT		EVAP canister purge volume control sole- noid valve		×		×	×		×	
ИРО	⊢	Air conditioner relay				×				
S	OUTPUT	Fuel pump relay	×			×	×			
Ь	Го	Cooling fan relay		×		×	×			
NTR		Air fuel ratio (A/F) sensor 1 heater		×		×		×* ³		
S	ENGINE CONTROL COMPONENT PARTS OUTPUT	Heated oxygen sensor 2 heater		×		×		×* ³		
IN D		EVAP canister vent control valve	×	×		×	×			
ВŇ		Intake valve timing control solenoid valve		×		×	×			
		Alternator				×	×			
		Calculated load value			×	×				

X: Applicable

*1: This item includes 1st trip DTCs.

*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-85</u>, "<u>Diagnosis Description</u>".

*3: Always "CMPLT" is displayed.

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	 FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS. 	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	• 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 CON- TROL MIXTURE RATIO RETURNS TO THE ORIGI- NAL COEFFICIENT.	When clearing mixture ratio self- learning value

< SYSTEM DESCRIPTION >

[MR18DE]

Н

WORK ITEM	CONDITION	USAGE	٨
EVAP SYSTEM CLOSE	CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS.	When detecting EVAP vapor leak point of EVAP system	A
	 IGN SW ON ENGINE NOT RUNNING AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). 		EC
	 NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM FUEL TANK TEMP. IS MORE THAN 0°C (32°F). 		С
	 WITHIN 10 MINUTES AFTER STARTING "EVAP SYSTEM CLOSE" WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITION EXCEPT 		D
	ABOVE, CONSULT-III WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. NOTE: WHEN STARTING ENGINE, CONSULT-III MAY DIS- PLAY "BATTERY VOLTAGE IS LOW. CHARGE		Е
	BATTERY", EVEN IN USING CHARGED BATTERY.		F
	IN THIS MODE, VIN IS REGISTERED IN ECM.	When registering VIN in ECM	
TARGET IDLE RPM ADJ*	IDLE CONDITION	When setting target idle speed	G
TARGET IGN TIM ADJ*	IDLE CONDITION	When adjusting target ignition timing	G

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

SELF DIAGNOSTIC RESULT MODE

Self Diagnostic Item Regarding items of DTC and 1st trip DTC, refer to <u>EC-448</u>, "DTC Index".)

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DTC	The engine control component part/control system has a trouble code that is displayed as DTC. (Refer to <u>EC-448</u> , " <u>DTC Index</u> ".)
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
CAL/LD VALUE [%]	• The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	• The engine coolant temperature at the moment a malfunction is detected is displayed.
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.
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.
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH-P/S [%]	• The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	• The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	• The intake air temperature at the moment a malfunction is detected is displayed.

< SYSTEM DESCRIPTION >

[MR18DE]

Freeze frame data item*	Description
FUEL SYS-B2	
L-FUEL TRM-B2 [%]	
S-FUEL TRM-B2 [%]	These items displayed but are not applicable to this model.
INT MANI PRES [kPa]	
COMBUST CONDITION	

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

DATA MONITOR MODE

Monitored Item

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 dis- played. 	 When the engine is stopped, a certain value is indicated. When engine is running specification range is indicated in "SPEC".
B/FUEL SCHDL	ms	 "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. 	• When engine is running specifica- tion range is indicated in "SPEC".
A/F ALPHA-B1	%	 The mean value of the air-fuel ratio feedback correc- tion factor per cycle is indicated. 	 When the engine is stopped, a certain value is indicated. This data also includes the data for the air-fuel ratio learning control. When engine is running specification range is indicated in "SPEC".
COOLAN TEMP/S	°C or °F	 The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sen- sor) is displayed. 	• When the engine coolant tempera- ture sensor is open or short-cir- cuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is dis- played.
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.	
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 combination meter is displayed.	
BATTERY VOLT	V	• The power supply voltage of ECM is displayed.	
ACCEL SEN 1		The accelerator pedal position sensor signal voltage is	ACCEL SEN 2 signal is converted
ACCEL SEN 2	V	displayed.	by ECM internally. Thus, it differs from ECM terminal voltage signal.
TP SEN 1-B1		The throttle position sensor signal voltage is dis-	TP SEN 2-B1 signal is converted
TP SEN 2-B1	V	played.	by ECM internally. Thus, it differs from ECM terminal voltage signal.
FUEL T/TMP SE	°C or °F	• The fuel temperature (determined by the signal volt- age of the fuel tank temperature sensor) is displayed.	

< SYSTEM DESCRIPTION >

Monitored item	Unit	Description	Remarks
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 pressure 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 signals of engine speed and battery voltage. 	 After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS	ON/OFF	 Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor sig- nal. 	
AIR COND SIG	ON/OFF	 Indicates [ON/OFF] condition of the air conditioner switch determined by the air conditioner ON signal. 	
P/N POSI SW	ON/OFF	 Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal (M/T models) or Trans- mission range switch signal (CVT models). 	
PW/ST SIGNAL	ON/OFF	 [ON/OFF] condition of the power steering system (de- termined by the signal sent from EPS control unit) is indicated. 	
LOAD SIGNAL	ON/OFF	 Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or light- ing switch is in 2nd position. OFF: Both rear window defogger switch and lighting switch are OFF. 	
IGNITION SW	ON/OFF	 Indicates [ON/OFF] condition from ignition switch signal. 	
HEATER FAN SW	ON/OFF	 Indicates [ON/OFF] condition from the heater fan switch signal. 	
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 compen- sated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
IGN TIMING	BTDC	 Indicates the ignition timing computed by ECM ac- cording 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 cur- rent air flow divided by peak air flow.	
MASS AIRFLOW	g⋅m/s	 Indicates the mass air flow computed by ECM accord- ing to the signal voltage of the mass air flow sensor. 	
PURG VOL C/V	%	 Indicates the EVAP canister purge volume control so- lenoid valve control value computed by the ECM ac- cording to the input signals. The opening becomes larger as the value increases. 	
INT/V TIM(B1)	°CA	Indicates [°CA] of intake camshaft advance angle.	
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. 	
AIR COND RLY	ON/OFF	• The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY	ON/OFF	 Indicates the fuel pump relay control condition deter- mined by ECM according to the input signals. 	

< SYSTEM DESCRIPTION >

[MR18DE]

Monitored item	Unit	Description	Remarks
VENT CONT/V	ON/OFF	 The control condition of the EVAP canister vent control valve (determined by ECM according to the input sig- nals) is indicated. ON: Closed OFF: Open 	
THRTL RELAY	ON/OFF	 Indicates the throttle control motor relay control condi- tion determined by the ECM according to the input sig- nals. 	
COOLING FAN	HI/LOW/ OFF	 Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI: High speed operation LOW: Low speed operation OFF: Stop 	
HO2S2 HTR (B1)	ON/OFF	 Indicates [ON/OFF] condition of heated oxygen sen- sor 2 heater determined by ECM according to the in- put signals. 	
I/P PULLY SPD	rpm	 Indicates the engine speed computed from the input speed sensor signal. 	
VEHICLE SPEED	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
IDL A/V LEARN	YET/CMPLT	 Display the condition of Idle Air Volume Learning YET: Idle air volume learning has not been performed yet. CMPLT: Idle air volume learning has already been per- formed 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. 	
AC PRESS SEN	V	The signal voltage from the refrigerant pressure sensor is displayed.	
A/F ADJ-B1	_	• Indicates the correction of factor stored in ECM. The factor is calculated from the difference between the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 signal.	
BUT CUR SEN	mV	 The signal voltage of battery current sensor is dis- played. 	
ALT DUTY SIG	ON/OFF	 The control condition of the power generation voltage variable control (determined by ECM according to the input signals) is indicated. ON: Power generation voltage variable control is ac- tive. OFF: Power generation voltage variable control is in- active. 	
ALT DUTY	%	• Indicates the duty ratio of the power generation com- mand value. The ratio is calculated by ECM based on the battery current sensor signal.	
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter 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/ACC switch signal. 	

Revision: 2009 March

< SYSTEM DESCRIPTION >

Monitored item	Unit	Description	Remarks	٨
SET SW	ON/OFF	Indicates [ON/OFF] condition from SET switch signal.		A
BRAKE SW1	ON/OFF	 Indicates [ON/OFF] condition from ASCD brake switch signal and ASCD clutch switch signal (M/T models). 		EC
BRAKE SW2	ON/OFF	 Indicates [ON/OFF] condition of stop lamp switch signal. 		
VHCL SPD CUT	NON/CUT	 Indicates the vehicle cruse 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 oper- ation is cut off. 		C
LO SPEED CUT	NON/CUT	 Indicates the vehicle cruse condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low and ASCD operation is cut off. 		E
AT OD MONITOR	ON/OFF	 Indicates [ON/OFF] condition of CVT O/D according to the input signal from the TCM. 		
AT OD CANCEL	ON/OFF	 Indicates [ON/OFF] condition of CVT O/D cancel re- quest signal from the TCM. 		G
CRUISE LAMP	ON/OFF	 Indicates [ON/OFF] condition of CRUISE lamp deter- mined by the ECM according to the input signals. 		Н
SET LAMP	ON/OFF	 Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals. 		1 1

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	JUDGMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	 Engine: Return to the original trouble condition Change the amount of fuel injec- tion using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	 Harness and connectors Fuel injector Air fuel ratio (A/F) sensor 1
IGNITION TIMING	 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 Learning.
POWER BALANCE	 Engine: After warming up, idle the engine. A/C switch OFF Selector lever: P or N position (CVT), Neutral position (M/T) 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
COOLING FAN*	 Ignition switch: ON Turn the cooling fan "LOW", "HI" and "OFF" using CONSULT-III. 	Cooling fan moves and stops.	 Harness and connectors IPDM E/R (Cooling fan relay) Cooling fan motor
ENG COOLANT TEMP	 Engine: Return to the original trouble condition Change the engine coolant tem- perature using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	 Harness and connectors Engine coolant temperature sensor Fuel injector

J

< SYSTEM DESCRIPTION >

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
FUEL PUMP RELAY	 Ignition switch: ON (Engine stopped) 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
PURG VOL CONT/V	 Engine: After warming up, run engine at 1,500 rpm. Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-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" using the CONSULT-III and listen to operating sound. 	Solenoid valve makes an operating sound.	Harness and connectorsSolenoid valve
V/T ASSIGN ANGLE	 Engine: Return to the original trouble condition Change intake valve timing us- ing CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	 Harness and connectors Intake valve timing control solenoid valve
ALTERNATOR DUTY	 Engine: idle. Change duty ratio using CON- SULT-III. 	Battery voltage cangees.	 Harness and connectors IPDM E/R Alternator

*: 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-85, "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	EVP SML LEAK P0442/P1442*	P0442	<u>EC-244</u>
	EVP SML LEAK P0442/P1442	P0455	<u>EC-281</u>
	EVP V/S LEAK P0456/P1456*	P0456	<u>EC-287</u>
	PURG VOL CN/V P1444	P0443	<u>EC-251</u>
	PURG FLOW P0441	P0441	<u>EC-238</u>
A/F SEN1	A/F SEN1 (B1) P1278/P1279	P0133	<u>EC-175</u>
	A/F SEN1 (B1) P1276	P0130	<u>EC-165</u>
HO2S2	HO2S2 (B1) P1146	P0138	<u>EC-186</u>
	HO2S2 (B1) P1147	P0137	<u>EC-180</u>
	HO2S2 (B1) P139	P0139	<u>EC-194</u>

*: DTC P1442, P1456 does not apply to this model but appears in DTC Work Support Mode screens.

Diagnosis Tool Function

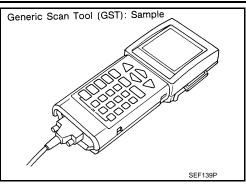
INFOID:000000004833190

DESCRIPTION

< SYSTEM DESCRIPTION >

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

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

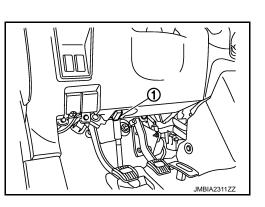


FUNCTION

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 EC-448, "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 (1), which is located under LH dash panel.
- 3. Turn ignition switch ON.



[MR18DE]

D

С

А

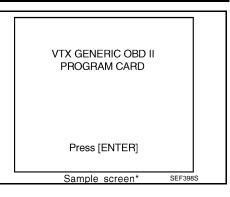
EC

Ο

Ρ

< SYSTEM DESCRIPTION >

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

< DTC/CIRCUIT DIAGNOSIS >

DTC/CIRCUIT 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 \square 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 correction)
- 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)

Component Function Check

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)
- Atmospheric temperature: 20 30°C (68 86°F)
- Engine coolant temperature: 75 95°C (167 203°F)
- Transmission: Warmed-up

- CVT models: After the engine is warmed up to normal operating temperature, drive vehicle until "FLUID TEMP SE" (CVT fluid temperature sensor signal) indicates more than 60°C (140°F).

- M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied
- Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.
- Engine speed: Idle

>> GO TO 2.

2.PERFORM "SPEC" OF "DATA MONITOR" MODE

With CONSULT-III NOTE:

Perform "SPEC" in "DATA MONITOR" mode in maximum scale display.

- 1. Perform EC-12, "BASIC INSPECTION : Special Repair Requirement".
- Select "B/FUEL SCHDL", "A/F ALPHA-B1" and "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode with CONSULT-III.

EC-109

- 3. Make sure that monitor items are within the SP value.
- Is the inspection result normal?
- YES >> END
- NO >> Go to EC-110, "Diagnosis Procedure".

INFOID:000000004833191

INEOID-000000004833192

А

EC

F

Н

Κ

L

Μ

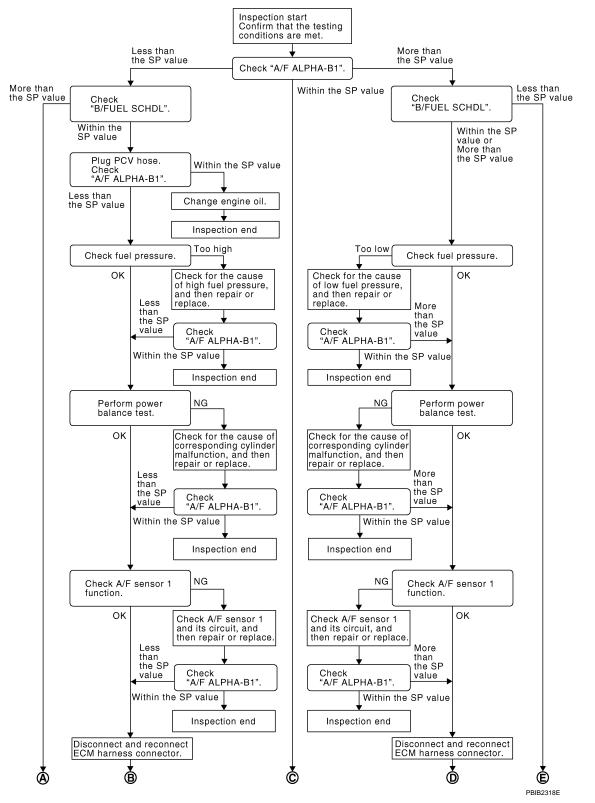
Ρ

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

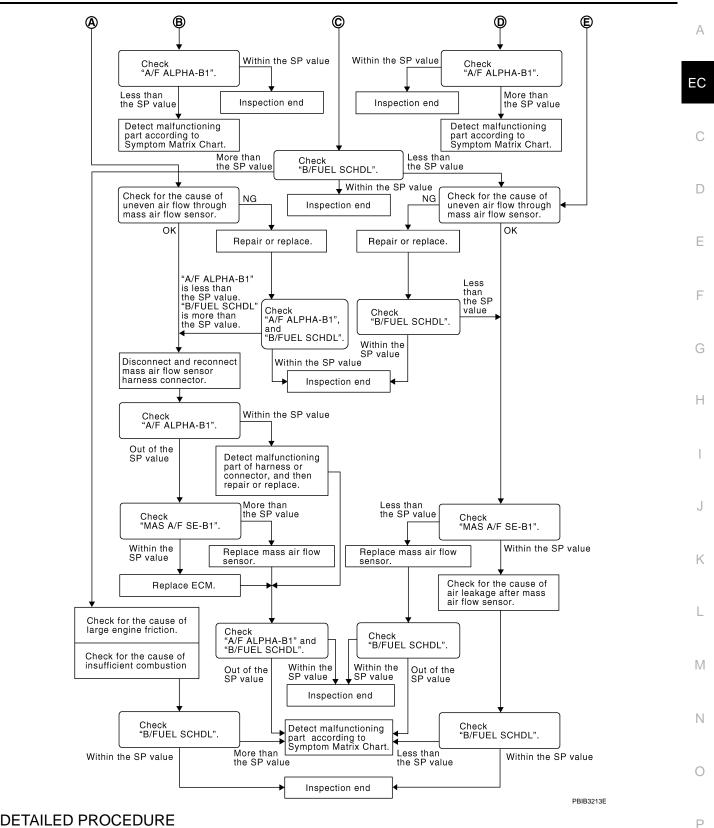
[MR18DE]

OVERALL SEQUENCE



< DTC/CIRCUIT DIAGNOSIS >

[MR18DE]



1.CHECK "A/F ALPHA-B1"

With CONSULT-III

- 1. Start engine.
- Confirm that the testing conditions are met. Refer to <u>EC-109, "Component Function Check"</u>.
- 3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

NOTE:

Check "A/F ALPHA-B1" for approximately 1 minute because it 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 within the SP value.

Is the measurement value within the SP value?

- YES >> GO TO 4.
- 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 within the SP value.

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. Stop the engine.
- 2. Disconnect PCV hose, and then plug it.
- 3. Start engine.
- Select "Ă/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 5.

NO >> GO TO 6.

5.CHANGE ENGINE OIL

- 1. Stop the engine.
- 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

Check fuel pressure. (Refer to EC-471, "Inspection".)

Is the inspection result normal?

YES >> GO TO 9.

NO-1 >> Fuel pressure is too high: Replace "fuel filter and fuel pump assembly" and then GO TO 8.

NO-2 >> Fuel pressure is too low: GO TO 7.

I.DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging

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.

8.CHECK "A/F ALPHA-B1"

< DTC/CIRCUIT DIAGNOSIS >	[MR18DE]
 Start engine. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indi the SP value. 	cation is within A
Is the measurement value within the SP value?	
YES >> INSPECTION END NO >> GO TO 9.	EC
9. PERFORM POWER BALANCE TEST	
 Perform "POWER BALANCE" in "ACTIVE TEST" mode. Make sure that the each cylinder produces a momentary engine speed drop. 	C
Is the inspection result normal? YES >> GO TO 12.	D
NO >> GO TO 10.	
10. DETECT MALFUNCTIONING PART	Е
 Check the following. Ignition coil and its circuit (Refer to <u>EC-401. "Component Function Check"</u>.) Fuel injector and its circuit (Refer to <u>EC-395. "Component Function Check"</u>.) Intake air leakage In any empression pressure (Defer to <u>EM 21. "Inspection"</u>.) 	F
 Low compression pressure (Refer to <u>EM-21, "Inspection"</u>.) Is the inspection result normal? 	
YES >> Replace fuel injector and then GO TO 11.	G
NO >> Repair or replace malfunctioning part and then GO TO 11.	
11.CHECK "A/F ALPHA-B1"	Η
 Start engine. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indi the SP value. 	cation is within
Is the measurement value within the SP value?	
YES >> INSPECTION END NO >> GO TO 12.	J
12.CHECK A/F SENSOR 1 FUNCTION	
 Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1. For DTC P0130, refer to <u>EC-165, "DTC Logic"</u>. For DTC P0131, refer to <u>EC-169, "DTC Logic"</u>. For DTC P0132, refer to <u>EC-172, "DTC Logic"</u>. For DTC P0133, refer to <u>EC-175, "DTC Logic"</u>. For DTC P0133, refer to <u>EC-382, "DTC Logic"</u>. 	K
Is any DTC detected?	
YES >> GO TO 15. NO >> GO TO 13.	M
13. CHECK A/F SENSOR 1 CIRCUIT	
Perform DIAGNOSTIC PROCEDURE according to corresponding DTC.	N
>> GO TO 14. 14. снеск "а/ғ аlрна-в1"	0
 Start engine. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indi the SP value. 	cation is within P
Is the measurement value within the SP value? YES >> INSPECTION END NO >> GO TO 15.	
15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR	
1. Stop the engine.	

< DTC/CIRCUIT DIAGNOSIS >

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

>> GO TO 16.

16.CHECK "A/F ALPHA-B1"

- 1. Start engine.
- Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

- YES >> INSPECTION END
- NO >> Detect malfunctioning part according to <u>EC-460, "Symptom Table"</u>.
- 17.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

- YES >> INSPECTION END
- NO-1 >> More than the SP value: GO TO 18.
- NO-2 >> Less than the SP value: GO TO 25.

18. DETECT MALFUNCTIONING PART

- 1. 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.
- 2. 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.

19.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 21.

NO >> Repair or replace malfunctioning part, and then GO TO 20.

20. CHECK "A/F ALPHA-B1", AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1" and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> "B/FUEL SCHDL" is more, "A/F ALPHA-B1" is less than the SP value: GO TO 21.

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.

- 2. Disconnect mass air flow sensor harness connector.
- 3. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 22.

< DTC/CIRCUIT DIAGNOSIS >	[MR18DE]
22.CHECK "A/F ALPHA-B1"	
 Start engine. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure the SP value. 	that the indication is within
Is the measurement value within the SP value?	
 YES >> Detect malfunctioning part of mass air flow sensor circuit and repair i Logic". Then GO TO 29. NO >> GO TO 23. 	it. Refer to <u>EC-136, "DTC</u>
23. CHECK "MAS A/F SE-B1"	
Select "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that SP value.	the indication is within the
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 24.REPLACE ECM	D 29.
1. Replace ECM.	
2. Perform EC-15, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT	<u> </u>
<u>ment"</u> .	
>> GO TO 29.	
25. CHECK INTAKE SYSTEM	
Check for the cause of uneven air flow through mass air flow sensor. Refer to the for	llowing.
Crushed air ductsMalfunctioning 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"	
Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that SP value.	the indication is within the
Is the measurement value within the SP value?	
YES >> INSPECTION END	
NO >> Less than the SP value: GO TO 27. 27 outpot (100 A / 50 C P / 100	
27.CHECK "MAS A/F SE-B1"	
Select "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that SP value.	the indication is within the
Is the measurement value within the SP value?	
YES >> GO TO 28.	2 20
NO >> Less than the SP value: Replace mass air flow sensor, and then GO TO 28.CHECK INTAKE SYSTEM	J 3U.
 Check for the cause of air leak after the mass air flow sensor. Refer to the following 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 	
 Disconnection or cracks of EVAP purge hose open stuck of EVAP canister purge 	e volume control solenoid

- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

• Malfunctioning seal of intake air system, etc.

>> GO TO 30.

29.CHECK "A/F ALPHA-B1" AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1" and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to <u>EC-460, "Symptom Table"</u>.

30.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and then make sure that the indication is within the SP value.

Is the measurement value within the SP value?

- YES >> INSPECTION END
- NO >> Detect malfunctioning part according to <u>EC-460. "Symptom Table"</u>.

< DTC/CIRCUI	_		LY AND G	ROUND CIRCUIT	[MR18DE]	
POWER S			ID CIRCU	IT		
Diagnosis P					INFOID:000000004833197	А
1.CHECK GR	OUND CONNE	CTION			Ξ	C
2. Check grou		E38. Refer to G	GI-37, "Circuit I	Inspection".		С
Is the inspection YES >> GC NO >> Re) TO 2.	<u>r</u> ground connect	tion.			0
2.CHECK ECK		-		ORT		D
	ECM harness continuity betwo	connectors. een ECM harne	ess connector a	and ground.		Е
EC	СМ	Ground	Continuity	_		
Connector	Terminal	Giouna	Continuity	_		F
F7	10					
E16	11 108	Ground	Existed			G
Is the inspectionYES>> GCNO>> GC 3. DETECT MARK) TO 4.) TO 3. ALFUNCTIONIN	?				H
Check the follow • Harness conr • Harness for o	nectors F1, E8	tween ECM an	d ground			J
>> Re 4. CHECK ECM		t or short to pov PPLY CIRCUIT-		or connectors.		K
2. Turn ignitio	ECM harness on switch ON. woltage betwee	connectors. n ECM harness	connector an	d ground.		L
EC	СМ	Ground	Voltage	_	ļ	M
Connector	Terminal			_		
E16	93	Ground	Battery voltage			Ν
) TO 6.) TO 5.					0
Check the follow • 15 A fuse (No • Harness for o	o. 62)	tween ECM an	d fuse			Ρ
>> Re	pair open circui	t or short to gro	ound or short to	o power in harness or connecto	ors.	
6.CHECK ECM		PLY CIRCUIT-	II			
	n switch OFF a n switch ON ar	nd wait at least d then OFF.	10 seconds.			

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

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

E	CM	Ground	Voltage
Connector	Terminal	Ground	voltage
E16	105	Ground	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0 V.

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 9.

7.CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch ON.

2. Check the voltage between IPDM E/R harness connector and ground.

IPDN	/I E/R	Ground	Voltage
Connector	Terminal	Giodila	voltage
E14	44	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace IPDM E/R. Refer to PCS-35, "Removal and Installation"(WITH I-key) or PCS-65, "Removal and Installation"(WITHOUT I-KEY).

8.CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

>> INSPECTION END

9.CHECK ECM POWER SUPPLY CIRCUIT-IV

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Check the voltage between ECM harness connector and ground.

E	CM	Ground	Voltage
Connector	Terminal	Giodila	voltage
F7	32	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 10.

10. CHECK ECM POWER SUPPLY CIRCUIT-V

- 1. Disconnect ECM harness connector.
- 2. Disconnect IPDM E/R harness connector E14.
- 3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

E	CM	IPDI	M E/R	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E7	32	E14	40	Existed

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

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCU			LY AND GF	ROUND CIRCU	IT [MR18DE]
	MALFUNCTION				<u> </u>
Check the follo	wing.	-			
Harness conrHarness for or		tween ECM and	d IPDM E/R		
					E
>> Re 12.снеск г		t or short to gro	und or short to	power in harness o	r connectors.
1. Disconnect	t 20 A fuse (No.	43) from IPDM	E/R.		
2. Check 20 A		2			
	<u>n result normal'</u>) TO 15.	<u>(</u>			
NO >> Re	place 20 A fuse				
	CM POWER SU		T-VI		
	t ECM harness t IPDM E/R harr		E14.		
				nd IPDM E/R harne	ss connector.
	СМ		/I E/R		
Connector	Terminal	Connector	Terminal	Continuity	
F16	105	E14	43	Existed	
4. Also check	harness for sho	ort to ground an	d short to powe	er.	
	n result normal	<u>?</u>			
) TO 15.) TO 14.				
14.DETECT	MALFUNCTION	IING PART			
Check the follo					
 Harness conr Harness for one 	nectors E8, F1	tween ECM and	IPDM E/R		
. —		-	und or short to	power in harness o	r connectors.
15.CHECK IN	NTERMITTENT	INCIDENT			
	"Intermittent Ind				
	<u>n result normal</u> place IPDM E		CS-35. "Remo	val and Installatio	<u>n"</u> (WITH I-key) or <u>PCS-65.</u>
<u>"Re</u>	emoval and Inst	allation"(WITHC	OUT I-KEY) .		
NO >> Re	pair open circui	t or short to gro	und or short to	power in harness o	r connectors.

Ρ

U0101 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:000000004833200

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0101	Lost communication with TCM	When ECM is not transmitting or receiving CAN communication signal of OBD (emission-related diagnosis) with TCM for 2 seconds or more.	 CAN communication line between TCM and ECM (CAN communication line is open or 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-120, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000004833202

Go to LAN-14, "Trouble Diagnosis Flow Chart".

INFOID:000000004833199

U0140 CAN COMM CIRCUIT

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:000000005040123 D

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0140	Lost communication with BCM	When ECM is not transmitting or receiving CAN communication signal of OBD (emission related diagnosis) with BCM for 2 seconds or more.	CAN communication line between BCM and ECM (CAN communication line is open or shorted)
DTC CON	FIRMATION PROCEI	DURE	
1.PERFO	RM DTC CONFIRMATI	ON PROCEDURE	
 Turn ig Check 	nition switch ON and wa	ait at least 3 seconds.	
	<u>ected?</u> > <u>EC-121, "Diagnosis Pr</u> > INSPECTION END	ocedure".	
Diagnosi	s Procedure		INFOID:000000005040124
Go to LAN-	-14, "Trouble Diagnosis	Flow Chart".	

[MR18DE]

INFOID:000000005040122

С

L

Μ

Ν

Ρ

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:000000004833208

INFOID:000000004833210

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 3 seconds.
- 2. Check 1st trip DTC.
- Is 1st trip DTC detected?

YES >> EC-122, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

Go to LAN-14. "Trouble Diagnosis Flow Chart".

INFOID:000000004833207

< DTC/CIRCUIT DIAGNOSIS > P0011 IVT CONTROL

DTC Logic

А

EC

INFOID:000000004833211

[MR18DE]

DTC DETECTION LOGIC **NOTE**:

If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for EC-308, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
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
DTC CO	NFIRMATION PROC	EDURE	
1.PREC	ONDITIONING		
east 10 s TESTING	econds before conduct CONDITION:	ing the next test.	vays turn ignition switch OFF and wait at ry voltage is between 10 V and 16 V at
>	>> GO TO 2.		
2.PERFC	ORM DTC CONFIRMA	FION PROCEDURE-I	
With C	ONSULT-III		
1. Turn i 2. Start o 3. Maint	engine and warm it up	select "DATA MONITOR" mode with to normal operating temperature.	n CONSULT-III. nds. Hold the accelerator pedal as steady
1. Turn i 2. Start o 3. Maint	ignition switch ON and engine and warm it up ain the following condi ssible.	select "DATA MONITOR" mode with to normal operating temperature. tions for at least 6 consecutive seco	
1. Turn i 2. Start (3. Maint as po	ignition switch ON and engine and warm it up ain the following condi- ssible.	select "DATA MONITOR" mode with to normal operating temperature. tions for at least 6 consecutive seco	
 Turn i Start o Maint as po 	ignition switch ON and engine and warm it up ain the following condi ssible. ED 500 - 2,00 TEMP/S More than	select "DATA MONITOR" mode with to normal operating temperature. ions for at least 6 consecutive seco prpm 60°C (140°F)	
 Turn i Start o Maint as po ENG SPEE COOLAN⁻¹ 	ignition switch ON and engine and warm it up ain the following condit ssible. ED 500 - 2,00 TEMP/S More than CHDL More than ver P or N pos	select "DATA MONITOR" mode with to normal operating temperature. ions for at least 6 consecutive seco 0 rpm 60°C (140°F) 4.2 msec	
 Turn i Start o Maint as po ENG SPEE COOLAN ⁻ B/FUEL SO Selector le Stop v Checl With G 	ignition switch ON and engine and warm it up ain the following condit ssible. ED 500 - 2,00 TEMP/S More than CHDL More than ver P or N pos Neutral po vehicle with engine run k 1st trip DTC. ST	select "DATA MONITOR" mode with to normal operating temperature. ions for at least 6 consecutive seco 0 rpm 60°C (140°F) 4.2 msec tion (CVT) sition (M/T) ning and let engine idle for 10 secon	nds. Hold the accelerator pedal as steady - - - -
 Turn i Start of Maint as po ENG SPEE COOLAN⁻¹ B/FUEL SO Selector le Stop v Check With G Follow the 	ignition switch ON and engine and warm it up ain the following condit ssible. ED 500 - 2,00 TEMP/S More than CHDL More than ver P or N pos Neutral po vehicle with engine run k 1st trip DTC. ST e procedure "With CON	select "DATA MONITOR" mode with to normal operating temperature. ions for at least 6 consecutive seco 0 rpm 60°C (140°F) 4.2 msec tion (CVT) sition (M/T) ning and let engine idle for 10 secon	nds. Hold the accelerator pedal as steady - - - -
 Turn i Start of Start of Maint as po ENG SPEE COOLAN ⁻ B/FUEL SO Selector le Selector le Stop v Stop v Checl With G Follow the Ist trip YES > 	ignition switch ON and engine and warm it up ain the following condit ssible. ED 500 - 2,00 TEMP/S More than CHDL More than ver P or N pos Neutral po vehicle with engine run k 1st trip DTC. ST e procedure "With CON <u>DTC detected?</u> >> Go to <u>EC-124, "Diac</u>	select "DATA MONITOR" mode with to normal operating temperature. ions for at least 6 consecutive seco 0 rpm 60°C (140°F) 4.2 msec tion (CVT) sition (M/T) ning and let engine idle for 10 secon SULT-III" above.	nds. Hold the accelerator pedal as steady - - - -
 Turn i Start of Start of Maint as po ENG SPEE COOLAN B/FUEL SO Selector le Selector le Stop v Check Stop v Check Stop v /ol>	ignition switch ON and engine and warm it up ain the following condi- ssible. ED 500 - 2,00 TEMP/S More than CHDL More than ver P or N pos Neutral po vehicle with engine run k 1st trip DTC. ST e procedure "With CON DTC detected?	select "DATA MONITOR" mode with to normal operating temperature. ions for at least 6 consecutive seco 0 rpm 60°C (140°F) 4.2 msec tion (CVT) sition (M/T) ning and let engine idle for 10 secon SULT-III" above.	nds. Hold the accelerator pedal as steady - - - -

ENG SPEED	1,200 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 65°C (149°F)

< DTC/CIRCUIT DIAGNOSIS >

Selector lever	1st or 2nd position
Driving location	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 <u>EC-124, "Diagnosis Procedure"</u> NO >> INSPECTION END

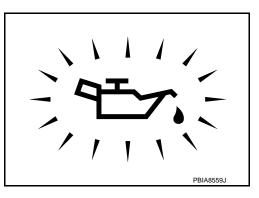
Diagnosis Procedure

1. CHECK OIL PRESSURE WARNING LAMP

- 1. Start engine.
- 2. Check oil pressure warning lamp and confirm it is not illuminated.

Is oil pressure warning lamp illuminated?

- YES >> Go to LU-13, "Inspection".
- NO >> GO TO 2.



 $2. {\sf CHECK} \text{ intake valve timing control solenoid valve}$

Refer to EC-125, "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-228, "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-231, "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Replace camshaft position sensor (PHASE).

5.CHECK CAMSHAFT (INTAKE)

Check the following.

INFOID:000000004833212

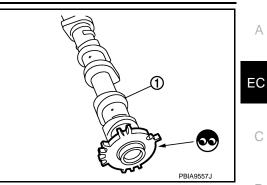
< DTC/CIRCUIT DIAGNOSIS >

- 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 6.
-----	--------------------	-------

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

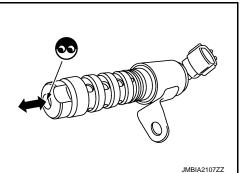


		PBIA9557J
6.CHECK TIMING	G CHAIN INSTALLATION	
Check service rec	ords for any recent repairs that may cau	use timing chain misaligned.
Are there any serv	ice records that may cause timing chair	in misaligned?
YES >> Check	timing chain installation. Refer to <u>EM-4</u> D 7.	43, "Removal and Installation".
7.CHECK LUBRI	CATION CIRCUIT	F
Refer to LU-7, "Ins	pection", "INSPECTION AFTER INSTA	ALATION".
Is the inspection re	esult normal?	0
YES >> GO TO		
•	lubrication line.	
	MITTENT INCIDENT	H
Refer to <u>GI-34, "In</u>	termittent Incident".	
	ECTION END	
Component In	spection	INFOID:000000004833213
1.CHECK INTAK	E VALVE TIMING CONTROL SOLENO	DID VALVE-I
	ake valve timing control solenoid valve	e harness connector. I solenoid valve terminals as per the following.
Terminals	Resistance	L
1 and 2	6.7 - 7.7 Ω [at 20°C (68°F)]	
1 or 2 and ground	$\stackrel{\infty}{\longrightarrow} \Omega$ (Continuity should not exist)	N
Is the inspection re	esult normal?	
YES >> GO TO NO >> Repla	D 2. ce intake valve timing control solenoid v	valve
	0	
	E VALVE TIMING CONTROL SOLENO	
	e valve timing control solenoid valve. DC between intake valve timing contro	rol solenoid
	s 1 and 2, and then interrupt it. Make su	
plunger move	s as shown in the figure.	
CAUTION: Do not apply	12 V DC continuously for 5 seconds	

not apply 12 v DC continuously for 5 s 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?



[MR18DE]

С

< DTC/CIRCUIT DIAGNOSIS >

YES >> INSPECTION END

NO >> Replace intake valve timing control solenoid valve.

< DTC/CIRCUIT DIAGNOSIS >

P0031, P0032 A/F SENSOR 1 HEATER

Description

А

EC

E

Κ

L

Μ

Ν

Ρ

INFOID:000000004833214

[MR18DE]

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	С
Mass air flow sensor	Amount of intake air		Tiedlei	

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:000000004833215

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 	G
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 	H

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for at least 10 seconds.
 Check 1at trip DTC
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-127, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to Ground Inspection in GI-37, "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 air fuel ratio (A/F) sensor 1 harness connector.

2. Turn ignition switch ON.

EC-127

INFOID:000000005151324

P0031, P0032 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	Terminal	Ground	vollage
F50	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- IPDM E/R harness connector E15
- 15 A fuse (No. 61)
- 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 se	ensor 1	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F50	3	F7	8	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, short to ground or short to power in harness or connectors.

5.CHECK A/F SENSOR 1 HEATER

Refer to EC-129, "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 malfunctioning 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 [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

1.CHECK INTERMITTENT INCIDENT

Perform GI-34, "Intermittent Incident".

>> Repair or replace.

P0031, P0032 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection

INFOID:000000004833218

А

EC

D

Ε

F

Н

Κ

L

Μ

Ν

Ρ

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 per the following.

Terminals	Resistance
3 and 4	1.8 - 2.44 Ω [at 20°C (68°F)]
3 and 1, 2	$\infty \Omega$
4 and 1, 2	(Continuity should not exist)

Is the inspection result normal?

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

2.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 Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P0037, P0038 HO2S2 HEATER

Description

INFOID:000000004833219

INFOID:000000004833220

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
 Below 3,600 rpm after the following conditions are met. Engine: After warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	ON

DTC Logic

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 sensor 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 sensor 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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

EC-130

P0037, P0038 HO2S2 HEATER

< DTC/CIRCUI	T DIAGNOSIS	>	0000 11020	2	[MR18DE]
YES >> Go NO >> INS	to <u>EC-131, "Dia</u> SPECTION END	agnosis Proced	lure".		ŀ
Diagnosis P					INFOID:00000004833222
					E
1.CHECK GR		CTION			
	n switch OFF.	E38. Refer to 🤆	GI-37, "Circuit Ir	nspection".	
Is the inspection		<u>)</u>			C
YES >> GO NO >> Rej	pair or replace (ground connect	tion.		r
2. СНЕСК НО	2S2 POWER S	JPPLY CIRCU	IT		Ε
	heated oxygen	sensor 2 (HO2	2S2) harness co	onnector.	E
	voltage betweer	n HO2S2 harne	ess connector a	nd ground.	L
	000			-	,
Connector	2S2 Terminal	Ground	Voltage		F
F30	2	Ground	Battery voltage	-	
Is the inspection	n result normal?	2		-	0
YES >> GO NO >> GO					
3.DETECT MA		IG PART			ŀ
Check the follow	wing.				
 Harness conn IPDM E/R cor 					I
15 A fuse (NoHarness for o	o. 61)	twoon bootod c	wygon concor (2 and fusa	
	peri di silon be	Iween nealeu (xygen sensor z		
		-		power in harness or con	nectors.
4.CHECK HO2		IGNAL CIRCU	IT FOR OPEN	AND SHORT	ŀ
	n switch OFF. ECM harness	connector			
			ness connecto	r and ECM harness conn	ector.
HO	2S2	F	СМ		
Connector	Terminal	Connector	Terminal	- Continuity	Ν
F30	3	F7	5	Existed	
	harness for sho	-	nd short to pow	er.	Ν
<u>Is the inspection</u> YES >> GC		<u>,</u>			
NO >> Rej	pair open circui	-		power in harness or con	nectors.
5.CHECK HEA	ATED OXYGEN	SENSOR 2 HI	EATER		
Refer to EC-132					F
Is the inspection YES >> GC		<u> </u>			
NO >> GO) TO 6.				
6. REPLACE H	IEATED OXYG	EN SENSOR 2			

Replace heated oxygen sensor 2. CAUTION:

P0037, P0038 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

- 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 Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000004833223

1.CHECK HEATED OXYGEN SENSOR 2 HEATER

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
- 3. Check resistance between HO2S2 terminals as per the following.

Terminals	Resistance
2 and 3	3.3 - 4.4 Ω [at 25°C (77°F)]
1 and 2, 3, 4	$\Omega \propto$
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 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 Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

P0075 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT 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.

Trouble diagnosis name

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.

DTC Logic

DTC No.

DTC DETECTION LOGIC

Plunger

Coil

Possible cause

Е

F

А

EC

PBIB1842E

000000004833225	

P0075	Intake valve timing control solenoid valve circuit		oltage is sent to the ECM valve timing control solenoid	 Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) Intake valve timing control solenoid valve 	Н
DTC CO	NFIRMATION PROC	CEDURE			
1.PREC	ONDITIONING				
				ys turn ignition switch OFF and wait at	
least 10 s	econds before conduc	ting the next t	est.		J
;	>> GO TO2.				
2.PERF	ORM DTC CONFIRM	ATION PROCE	DURE		К
	engine and let it idle fo	or 5 seconds.			IX
	k 1st trip DTC. DTC detected?				
	> Go to <u>EC-133</u> , "Dia	gnosis Proced	ure".		L
NO :	>> INSPECTION END	-			
Diagnos	sis Procedure			INFOID:000000004833227	Μ
1. CHEC	K INTAKE VALVE TIM	ING CONTRO	L SOLENOID VALVE PO	OWER SUPPLY CIRCUIT	
1. Turn	ignition switch OFF.				Ν
	onnect intake valve tim ignition switch ON.	ing (IVT) conti	ol solenoid valve harnes	s connector.	
		intake valve ti	ming control solenoid va	lve harness connector and ground.	0
Connee	ontrol solenoid valve	Ground	Voltage		Ρ
F41	1	Ground	Battery voltage		
Is the ins	pection result normal?		, , , , , , , , , , , , , , , , , , , ,		
	>> GO TO 3.				
•	>> GO TO 2.				
∠. DETE	CT MALFUNCTIONIN	G PART			

DTC detecting condition

INFOID:000000004833224

P0075 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

Check the following.

- Harness connectors E8, F1
- IPDM E/R connector E14

Harness for open or short between IVT control solenoid valve and IPDM E/R

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

 $\mathbf{3}.$ 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 IVT control solenoid valve harness connector and ECM harness connector.

IVT control s	IVT control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	Continuity	
F41	2	F8	73	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 INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-134, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace intake valve timing control solenoid valve.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000004833228

1. 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 per the following.

Terminals	Resistance
1 and 2	6.7 - 7.7 Ω [at 20°C (68°F)]
1 or 2 and ground	${}^\infty \Omega$ (Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace intake valve timing control solenoid valve.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve.

P0075 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

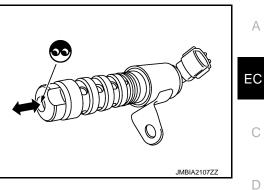
Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.
 CAUTION:

Do not apply 12 V 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.



Е

F

Н

J

Κ

L

Μ

Ν

0

Ρ

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.

D PBIA9559J

DTC Logic

DTC DETECTION LOGIC

INFOID:000000004833230

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
		A)	A high voltage from the sensor is sent to ECM under light load driving condition.	 Harness or connectors (The sensor circuit is open or shorted.) Mass air flow sensor EVAP control system pressure sensor
P0101	Mass air flow sensor cir- cuit range/performance	B)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	 Harness or connectors (The sensor circuit is open or shorted.) Intake air leaks Mass air flow sensor EVAP control system pressure sensor Intake air temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch ON) instead of running engine at idle speed.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Start engine and warm it up to normal operating temperature.
- 2. Run engine for at least 10 seconds at idle speed.
- 3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-138, "Diagnosis Procedure".

- NO-1 >> With CONSULT-III: GO TO 3.
- NO-2 >> Without CONSULT-III: GO TO 5.
- $\mathbf{3}$. Check mass air flow sensor function

1. Turn ignition switch ON.

 Start engine and warm it up to normal operating temperature. If engine cannot be started, go to <u>EC-138</u>, "Diagnosis Procedure". INFOID:000000004833229

< DTC/CIRCUIT DIAGNOSIS >

- 3. Select "DATA MONITOR" mode with CONSULT-III.
- 4. Check the voltage of "MAS A/F SE-B1" with "DATA MONITOR".
- 5. Increases engine speed to about 4,000 rpm.
- 6. Monitor the linear voltage rise in response to engine speed increases.

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Go to EC-138, "Diagnosis Procedure".

А οκ ν 5.00 EC 2.50 1.25 С 0.00 D NG V 5.00J Е 2.50 1.25 F 0.00 PBIB3457E

4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm	
TP SEN 1-B1	More than 1.5 V	I
TP SEN 2-B1	More than 1.5 V	
Selector lever	Suitable position	J
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.	
CAUTION: Always drive vel 2. Check 1st trip DT	ehicle at a safe speed. TC.	K
Is 1st trip DTC detected		L
YES >> Go to <u>EC</u> NO >> INSPECT	C-138, "Diagnosis Procedure". TION END	
5.PERFORM COMP	PONENT FUNCTION CHECK FOR MALFUNCTION B	M
	function check. Refer to <u>EC-137, "Component Function Check"</u> .	
NOTE: Use component funct check, a DTC might n	ction check to check the overall function of the mass air flow sensor circunter not be confirmed.	uit. During this N
Is the inspection resultYES>> INSPECTNO>> Go to EC		0
Component Fund	ction Check	INFOID:000000004833231
1.PERFORM COMP	PONENT FUNCTION CHECK FOR MALFUNCTION B	
With GSTStart engine and start	warm it up to normal operating temperature.	

2. Select Service \$01 with GST.

EC-137

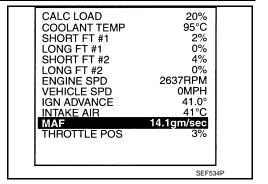
Н

< DTC/CIRCUIT DIAGNOSIS >

- 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 4,000 rpm in engine speed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-138, "Diagnosis Procedure".



Diagnosis Procedure

INFOID:000000004833233

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to <u>EC-136, "DTC Logic"</u>.

Which malfunction is detected?

- A >> GO TO 3. B >> GO TO 2.
- Δ >> GO 10 2.
- 2. CHECK INTAKE SYSTEM

Check the following for connection.

- Air duct
- Vacuum hoses
- Intake air passage between air duct and 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 E38. Refer to GI-37, "Circuit Inspection".

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	Ground	voltage
F4	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- 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.

O.CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

EC-138

[MR18DE]

< DTC/CIRCUIT DIAGNOSIS >

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
-	F4	4	F8	52	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	Continuity	
Connector	Terminal	Connector Terminal		Continuity
F4	3	F8	45	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-149, "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-269, "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-139, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace mass air flow sensor.

11.CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK MASS AIR FLOW SENSOR-I

With CONSULT-III

1. Turn ignition switch OFF.

2. Reconnect all harness connectors disconnected.

3. Start engine and warm it up to normal operating temperature.

INFOID:000000004833234

А

EC

Е

F

Н

Κ

Μ

Ν

P

< DTC/CIRCUIT DIAGNOSIS >

4. Connect CONSULT-III and select "DATA MONITOR" mode.

5. 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 (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temper- ature.)	0.7 - 1.1 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
	Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition	Voltage	
Connector	Terminal	Ground	Condition	voltage	
		Ignition switch ON (Engine stopped.)	Approx. 0.4 V		
F8	45 (MAF sensor signal)	Ground	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V	
10			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V	
			Idle to about 4,000 rpm	0.7 - 1.1 V to Ap- prox. 2.4 V*	

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END

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 the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

Is the inspection result normal?

 ${
m 3.}$ CHECK MASS AIR FLOW SENSOR-II

With CONSULT-III

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Connect CONSULT-III and select "DATA MONITOR" mode.
- 4. Select "MAS A/F SE-B1" and check indication.

< DTC/CIRCUIT DIAGNOSIS >

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temper- ature.)	0.7 - 1.1 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
	Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Ground Condition		
Connector	Terminal	Ground	Condition	Voltage	
F8 (MAF			Ignition switch ON (Engine stopped.)	Approx. 0.4 V	
	45 (MAF sensor C signal)	Oracia	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V	
		Ground	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V	
			Idle to about 4,000 rpm	0.7 - 1.1 V to Ap- prox. 2.4 V*	

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END

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. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT-III and select "DATA MONITOR" mode.
- 5. 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 (Engine stopped.)	Approx. 0.4 V	-
	Idle (Engine is warmed-up to normal operating temper- ature.)	0.7 - 1.1 V	-
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V	-
	Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*	(

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Check the voltage between ECM harness connector and ground.

А

EC

D

Е

F

Н

Κ

Ρ

< DTC/CIRCUIT DIAGNOSIS >

ECM		Ground	Condition	Voltage	
Connector	Terminal	Glound	Condition	voltage	
		coor Cround	Ignition switch ON (Engine stopped.)	Approx. 0.4 V	
F11	45 (MAF sensor Ground signal)		Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V	
		Giouna	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V	
			Idle to about 4,000 rpm	0.7 - 1.1 V to Ap- prox. 2.4 V*	

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Clean or replace mass air flow sensor.

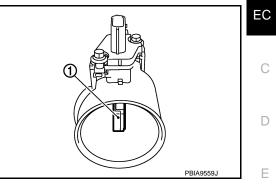
< DTC/CIRCUIT DIAGNOSIS >

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 Logic

DTC DETECTION LOGIC

DTC No. Trouble diagnosis name DTC detecting condition Possible cause Harness or connectors An excessively low voltage from the sensor is Mass air flow sensor circuit (The sensor circuit is open or shorted.) P0102 sent to ECM. Intake air leaks low input · Mass air flow sensor Н · Harness or connectors An excessively high voltage from the sensor is Mass air flow sensor circuit P0103 (The sensor circuit is open or shorted.) high input sent to ECM. · Mass air flow sensor DTC CONFIRMATION PROCEDURE 1.PRECONDITIONING If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test. Which DTC is detected? Κ P0102 >> GO TO 2. P0103 >> GO TO 3. 2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102 L 1. Start engine and wait at least 5 seconds. Check DTC. 2. M Is DTC detected? YES >> Go to EC-144, "Diagnosis Procedure". NO >> INSPECTION END **3.** PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-I Ν 1. Turn ignition switch ON and wait at least 5 seconds. Check DTC. 2. Is DTC detected? YES >> Go to EC-144, "Diagnosis Procedure". NO >> GO TO 4. ${f 4}.$ PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-II 1. Start engine and wait at least 5 seconds. 2. Check DTC. Is DTC detected? YES >> Go to EC-144, "Diagnosis Procedure".

А

F

INFOID:000000004833236

[MR18DE]

>> INSPECTION END

NO

INFOID:000000004833235

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

[MR18DE]

INFOID:000000004833238

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.

 $\mathbf{3}$. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E38. Refer to GI-37, "Circuit Inspection".

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	Glound		
F4	5	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E8,F1

• 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.

MAF sensor		ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
F4	4	F8	52	Existed	

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

Is the inspection result normal?

P0102, P0103 MAF SENSOR [MR18DE] < DTC/CIRCUIT DIAGNOSIS > YES >> GO TO 7. NO >> Repair open circuit or short to ground or short to power in harness or connectors. А 7.CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Check the continuity between MAF sensor harness connector and ECM harness connector. EC MAF sensor ECM Continuity Connector Terminal Connector Terminal F4 3 F8 45 Existed 2. Also check harness for short to ground and short to power. D 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. Е 8.CHECK MASS AIR FLOW SENSOR Refer to EC-145, "Component Inspection". Is the inspection result normal? F YES >> GO TO 9. NO >> Replace mass air flow sensor. 9. CHECK INTERMITTENT INCIDENT Refer to GI-34, "Intermittent Incident". Н >> INSPECTION END **Component Inspection** INFOID:000000004833239 1.CHECK MASS AIR FLOW SENSOR-I (P)With CONSULT-III Turn ignition switch OFF. 1. 2. Reconnect all harness connectors disconnected. Start engine and warm it up to normal operating temperature. 3. Connect CONSULT-III and select "DATA MONITOR" mode. 4 Κ Select "MAS A/F SE-B1" and check indication. 5. Monitor item Condition MAS A/F SE-B1 Ignition switch ON (Engine stopped.) Approx. 0.4 V Idle (Engine is warmed-up to normal operating temper-0.7 - 1.1 V M ature.) MAS A/F SE-B1 2,500 rpm (Engine is warmed-up to normal operating 1.3 - 1.7 V temperature.) Ν Idle to about 4,000 rpm 0.7 - 1.1 V to Approx. 2.4 V* *: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Check the voltage between ECM harness connector and ground.

Ρ

P0102, P0103 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

E	ECM		Ground Condition	
Connector	Terminal	Giodila	Condition	Voltage
			Ignition switch ON (Engine Approx. stopped.)	
F8	45 (MAF sensor signal)	Ground	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
18			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
			Idle to about 4,000 rpm	0.7 - 1.1 V to Ap- prox. 2.4 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END

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 the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK MASS AIR FLOW SENSOR-II

With CONSULT-III

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Connect CONSULT-III and select "DATA MONITOR" mode.
- 4. Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	MAS A/F SE-B1
	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temper- ature.)	0.7 - 1.1 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
	Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Check the voltage between ECM harness connector and ground.

P0102, P0103 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

E	CM				/
Connector	Terminal	Ground	Condition	Voltage	
			Ignition switch ON (Engine stopped.)	Approx. 0.4 V	E
F8	45 (MAF sensor	Ground	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V	
10	signal)	Ground	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V	(
			Idle to about 4,000 rpm	0.7 - 1.1 V to Ap- prox. 2.4 V*	[
			ne being increased to about 4,000 rpm.		
YES >> INS	n result normal? SPECTION ENE TO 4.	-			I
4	SS AIR FLOW S	SENSOR-III			
 Turn ignitic Disconnect Start engin 	n switch OFF. t mass air flow s e and warm it u	p to normal op	s connector and reconnect it aga erating temperature.	ain.	(
	ONSULT-III and .S A/F SE-B1" a		MONITOR" mode.		
			allon.		ŀ
Monitor item		Condition	MAS A/	F SE-B1	
Monitor item	Ignition switch ON			F SE-B1 x. 0.4 V	
	_	I (Engine stopped	I.) Approx		
Monitor item MAS A/F SE-B1	Idle (Engine is wa ature.)	I (Engine stopped rmed-up to norma	I.) Approx al operating temper- 0.7 -	x. 0.4 V	×
MAS A/F SE-B1	Idle (Engine is wa ature.) 2,500 rpm (Engine temperature.) Idle to about 4,00	I (Engine stopped rmed-up to norma e is warmed-up to 0 rpm	I.) Approx al operating temper- 0 normal operating 1.3 - 0.7 - 1.1 V to	x. 0.4 V 1.1 V 1.7 V Approx. 2.4 V*	
MAS A/F SE-B1 *: Check for li	Idle (Engine is wa ature.) 2,500 rpm (Engine temperature.) Idle to about 4,00 near voltage rise in	I (Engine stopped rmed-up to norma e is warmed-up to 0 rpm	Approx al operating temper- 0.7 - 0 normal operating 1.3 -	x. 0.4 V 1.1 V 1.7 V Approx. 2.4 V*	
MAS A/F SE-B1 *: Check for li Without CO	Idle (Engine is wa ature.) 2,500 rpm (Engine temperature.) Idle to about 4,00 near voltage rise in NSULT-III	I (Engine stopped rmed-up to norma e is warmed-up to 0 rpm	I.) Approx al operating temper- 0 normal operating 1.3 - 0.7 - 1.1 V to	x. 0.4 V 1.1 V 1.7 V Approx. 2.4 V*	·
MAS A/F SE-B1 *: Check for li Without CO I. Turn ignitic 2. Disconnect	Idle (Engine is wa ature.) 2,500 rpm (Engine temperature.) Idle to about 4,00 near voltage rise in NSULT-III on switch OFF. t mass air flow s	I (Engine stopped rmed-up to norma e is warmed-up to 0 rpm response to engin eensor harness	I.) Approximation al operating temper- 0.7 - o normal operating 1.3 - 0.7 - 1.1 V to 0.7 - 1.1 V to ne being increased to about 4,000 rpm. s connector and reconnect it again	x. 0.4 V 1.1 V 1.7 V Approx. 2.4 V*	
MAS A/F SE-B1 *: Check for li Without CO . Turn ignitic 2. Disconnec 3. Start engin	Idle (Engine is wa ature.) 2,500 rpm (Engine temperature.) Idle to about 4,00 near voltage rise in NSULT-III on switch OFF. t mass air flow s e and warm it u	I (Engine stopped rmed-up to norma e is warmed-up to 0 rpm response to engin eensor harness o to normal op	I.) Approximation al operating temper- 0.7 - o normal operating 1.3 - 0.7 - 1.1 V to 0.7 - 1.1 V to ne being increased to about 4,000 rpm. s connector and reconnect it against aperating temperature.	x. 0.4 V 1.1 V 1.7 V Approx. 2.4 V*	
MAS A/F SE-B1 *: Check for li Without CO I. Turn ignitic 2. Disconnect 3. Start engin	Idle (Engine is wa ature.) 2,500 rpm (Engine temperature.) Idle to about 4,00 near voltage rise in NSULT-III on switch OFF. t mass air flow s e and warm it u	I (Engine stopped rmed-up to norma e is warmed-up to 0 rpm response to engin eensor harness o to normal op	I.) Approximation al operating temper- 0.7 - o normal operating 1.3 - 0.7 - 1.1 V to 0.7 - 1.1 V to ne being increased to about 4,000 rpm. s connector and reconnect it again	x. 0.4 V 1.1 V 1.7 V Approx. 2.4 V*	I
MAS A/F SE-B1 *: Check for li Without CO 1. Turn ignitic 2. Disconnec 3. Start engin 4. Check the	Idle (Engine is wa ature.) 2,500 rpm (Engine temperature.) Idle to about 4,00 near voltage rise in NSULT-III on switch OFF. t mass air flow s e and warm it u	I (Engine stopped rmed-up to norma e is warmed-up to 0 rpm response to engin eensor harness o to normal op n ECM harnes	I.) Approximation al operating temper- 0.7 - o normal operating 1.3 - 0.7 - 1.1 V to 0.7 - 1.1 V to ne being increased to about 4,000 rpm. s connector and reconnect it against a connector and reconnect it against a connector and ground.	x. 0.4 V 1.1 V 1.7 V Approx. 2.4 V*	,
MAS A/F SE-B1 *: Check for li Without CO 1. Turn ignitic 2. Disconnec 3. Start engin 4. Check the	Idle (Engine is wa ature.) 2,500 rpm (Engine temperature.) Idle to about 4,00 near voltage rise in NSULT-III on switch OFF. t mass air flow s e and warm it u voltage betweer	I (Engine stopped rmed-up to norma e is warmed-up to 0 rpm response to engin eensor harness o to normal op	I.) Approximation al operating temper- 0.7 - o normal operating 1.3 - 0.7 - 1.1 V to 0.7 - 1.1 V to ne being increased to about 4,000 rpm. s connector and reconnect it against aperating temperature.	x. 0.4 V 1.1 V 1.7 V Approx. 2.4 V*	I
MAS A/F SE-B1 *: Check for li Without CO . Turn ignitic 2. Disconnect 3. Start engin 4. Check the Effective Effec	Idle (Engine is wa ature.) 2,500 rpm (Engine temperature.) Idle to about 4,00 near voltage rise in NSULT-III on switch OFF. t mass air flow s e and warm it u voltage betweer	I (Engine stopped rmed-up to norma e is warmed-up to 0 rpm response to engin eensor harness o to normal op n ECM harnes	I.) Approximation al operating temper- 0.7 - o normal operating 1.3 - 0.7 - 1.1 V to 0.7 - 1.1 V to ne being increased to about 4,000 rpm. s connector and reconnect it against a connector and reconnect it against a connector and ground.	x. 0.4 V 1.1 V 1.7 V Approx. 2.4 V*	I
MAS A/F SE-B1 *: Check for li Without CO 1. Turn ignitic 2. Disconnec 3. Start engin 4. Check the End Connector	Idle (Engine is wa ature.) 2,500 rpm (Engine temperature.) Idle to about 4,00 near voltage rise in NSULT-III on switch OFF. t mass air flow s e and warm it u voltage between CM Terminal	I (Engine stopped rmed-up to norma e is warmed-up to 0 rpm response to engin eensor harness o to normal op n ECM harnes Ground	I.) Approximation al operating temper- 0.7 - o normal operating 1.3 - 0.7 - 1.1 V to 0.7 - 1.1 V to ne being increased to about 4,000 rpm. sconnector and reconnect it against and reconnect it against and reconnect it against and ground. S connector and ground. Condition Ignition switch ON (Engine	x. 0.4 V 1.1 V 1.7 V Approx. 2.4 V* ain. Voltage	I
MAS A/F SE-B1 *: Check for li Without CO 1. Turn ignitic 2. Disconnect 3. Start engin 4. Check the	Idle (Engine is wa ature.) 2,500 rpm (Engine temperature.) Idle to about 4,00 near voltage rise in NSULT-III on switch OFF. t mass air flow s e and warm it u voltage betweer	I (Engine stopped rmed-up to norma e is warmed-up to 0 rpm response to engin eensor harness o to normal op n ECM harnes	I.) Approximate al operating temper- 0.7 - o normal operating 1.3 - 0.7 - 1.1 V to 0.7 - 1.1 V to ne being increased to about 4,000 rpm. sconnector and reconnect it against a sconnector and ground. s connector and ground. Condition Ignition switch ON (Engine stopped.) Idle (Engine is warmed-up to normal	x. 0.4 V 1.1 V 1.7 V Approx. 2.4 V* ain. Voltage Approx. 0.4 V	

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Clean or replace mass air flow sensor.

Idle to about 4,000 rpm

0.7 - 1.1 V to Ap-

prox. 2.4 V*

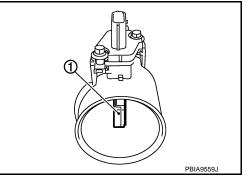
Ρ

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.

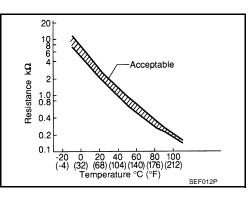
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (k Ω)
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 46 (Intake air temperature sensor) and ground.



INFOID:000000004833241

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name DTC detecting condition		Possible cause
P0112	Intake air 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.)
P0113	Intake air temperature 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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> 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-148, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-37, "Circuit Inspection".

EC-148

INFOID:000000004833240

P0112, P0113 IAT SENSOR

		P0112,	P0113 IA I	SENSUR	
< DTC/CIRCU	IT DIAGNOSIS	;>			[MR18DE]
Is the inspectio	n result normal'	<u>?</u>			
	D TO 2.	_			
-	pair or replace	•			
2.CHECK INT	AKE AIR TEMP	PERATURE SEN	NSOR POWER	SUPPLY CIRCUIT	
		sensor (with inta	ake air tempera	ture sensor) harness c	connector.
	on switch ON.	n mana air flaw			
3. Check the	vollage betwee	n mass air now	sensor names	s connector and groun	u.
MAF	sensor			_	
Connector	Terminal	Ground	Voltage		
	5	Ground	Approx. 5 V	_	
	-		Applox. 5 V	-	
	<u>n result normal'</u>) TO 3.	<u>{</u>			
		t or short to aro	und or short to	power in harness or co	onnectors.
•	• •	-		D CIRCUIT FOR OPE	
	on switch OFF.				
	t ECM harness	connector.			
			w sensor harn	ess connector and EC	M harness connector.
MAF	sensor	E	CM	Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
F4	4	F8	52	Existed	
4. Also check	harness for sho	ort to ground an	d short to pow	er.	
Is the inspectio	<u>n result normal</u> '	<u>?</u>			
	D TO 4.	_			
4	• •	-		power in harness or co	onnectors.
4.CHECK INT	AKE AIR TEMP	PERATURE SEN	NSOR		
Refer to EC-14	<u>9, "Component</u>	Inspection".			
	n result normal'	<u>?</u>			
	D TO 5.	()	h intelve einten		
_	•	•	n intake air ten	nperature sensor).	
	ERMITTENT IN				
Refer to GI-34,	"Intermittent Inc	<u>cident"</u> .			
		_			
>> INS	SPECTION END)			
Component	Inspection				INFOID:00000004833244
1			1000		
I .CHECK INT	AKE AIR TEMP	ERATURE SEN	NSOR		
	on switch OFF.				
	t mass air flow s stance between			s as per the following.	
J. UIEUK IESI					
Terminals		Condition		Resistance (kΩ)	
1 and 2	Intake air tempera		25 (77)	1.800 - 2.200	
			20 (11)	1.000 2.200	

Is the inspection result normal?

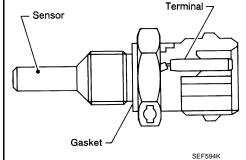
YES >> INSPECTION END

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.



20

<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (k Ω)
-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 38 (Engine coolant temperature sensor) and ground.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0116 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117, P0118. Refer to <u>EC-152, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0116	Engine coolant temperature sensor circuit range/perfor- mance	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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC confirmation procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. 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.
- 5. Soak the vehicle until the resistance between "fuel level sensor unit and fuel pump" terminals 4 and 5 becomes 0.5 k Ω higher than the value measured before soaking. CAUTION:

Never turn ignition switch ON during the soaking time.

INFOID:000000004833245

P0116 ECT SENSOR

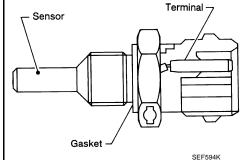
< DTC/CIRCU	IT DIAGNOSIS >			[MR18DE]
	e changes depending on amb le and let it idle for 5 minutes. trip DTC	ient air tempe	rature. It may take	several hours.
Is 1st trip DTC	-			EQ
YES >> <u>EC</u>	-151, "Diagnosis Procedure". SPECTION END			
Diagnosis P	Procedure			INFOID:000000004833247
1. CHECK GR	OUND CONNECTION			
	on switch OFF.			
-	und connection E38. Refer to G	<u> 31-37, "Circuit li</u>	nspection".	
	<u>n result normal?</u> D TO 2.			E
	pair or replace ground connect	ion.		
2.CHECK EN	GINE COOLANT TEMPERATU	JRE SENSOR		F
·	1, "Component Inspection".			F
	n result normal?			
	D TO 3.			G
•	place engine coolant temperat	ure sensor.		
	ERMITTENT INCIDENT			
Refer to GI-34.	"Intermittent Incident".			
>> INI	SPECTION END			
_				I
Component	Inspection			INFOID:00000004833248
1.CHECK EN	GINE COOLANT TEMPERATU	JRE SENSOR		J
1. Turn ignitic	on switch OFF.			
2. Disconnec	t engine coolant temperature s		connector.	k
	ngine coolant temperature sens istance between engine coola		sensor terminals	
shown in th				by noaling with not watch do
				L
Terminals	Condition	Ι	Resistance	
		20 (68)	2.37 - 2.63 kΩ	Ν
1 and 2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00 kΩ	
		90 (194)	0.236 - 0.260 kΩ	
	n result normal?			Ν
	SPECTION END place engine coolant temperat	ure sensor.		
				C

Р

P0117, P0118 ECT SENSOR

Description

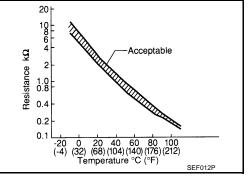
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The 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 38 (Engine coolant temperature sensor) and ground.



DTC Logic

INFOID:000000004833250

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0117	Engine coolant 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.)
P0118	Engine coolant temperature sensor circuit 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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

- YES >> Go to EC-152, "Diagnosis Procedure". >> INSPECTION END
- NO

Diagnosis Procedure

1. CHECK GROUND CONNECTION

Turn ignition switch OFF. 1.

INFOID:000000004833249

P0117, P0118 ECT SENSOR

EDTC/CIRCUIT DIAGNOSIS > [MR18DE] 2. Check ground connection E38. Refer to GI-37, "Circuit Inspection". A Is the inspection result normal? PC YES >> GO TO 2. PC NO >> Repair or replace ground connection. C 2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT PC 1. Disconnect engine coolant temperature (ECT) sensor harness connector. C 2. Turn inginition switch ON. C 3. Check the voltage between ECT sensor harness connector and ground. C Important Immall Voltage D Important Immall Connector Imminal F28 1 Ground Approx.5V Important Immall Control Approx.5V E Scheck ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF So GO TO 3. G 2. Oheck the continuity between ECT sensor harness connector and ECM harness connector. G 3. Check the continuity between ECT sensor harness connector and ECM harness connector. G 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES YES >> GO TO 4. NO NO we Repair open circuit or short to ground or short	2. Check ground connection B38. Refer to GE37. "Circuit Inspection". A Is the inspection result normal? A VES >> GO TO 2. VES >> GO TO 2. In the inspection result normal? Connector 2. Check ECT SENSOR POWER SUPPLY CIRCUIT E 1. Disconnect engine coolant temperature (ECT) sensor harness connector. Connector 2. Turn ignition switch ON. C 3. Check the voltage between ECT sensor harness connector and ground. C Connector Terminal Ground Voltage Extension Ground Aprox.5V E Is the inspection result normal? E NO >> Repair open circuit or short to ground or short to power in harness or connectors. 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F E 1. Turn ignition switch OFF E Solsconnector. G Connector Terminal Continuity E 2. Check Kend harness connector. G G 3. Check the continuity between ECT sensor harness connector and ECM harness connector. G 4. Also check harness for short to ground and short to power in harness or connectors. J 4. A			P0117,	P0118 ECT	SENSOR		
Is the inspection result normal? A YES >> GOTD 2. NO >> Repair or replace ground connection. EC 2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT EC 1. Disconnect engine coolant temperature (ECT) sensor harness connector. C 1. Turn ignition switch OFF. D 2. Check the voltage between ECT sensor harness connector and ground. C Term ignition switch OFF. E 3. Check the continuity between ECT sensor harness connectors. C 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF. E 2. Disconnect ECM harness connector. G 3. Check the continuity between ECT sensor harness connector and ECM harness connector. G Connector Terminal Connector Terminal Continuity F 4. Also check harness for short to ground and short to power in harness or connectors. J 4. Also check harness for short to ground and short to power in harness or connectors. J 4. Also check harness for short to ground and short to power in harness or connectors. J 4. Also check harness for short to ground and short to power in harness or connectors. J 4. Also check harness for short to ground or short to power in harness or connectors.	Is the inspection result normal? A YES >> GO TO 2. NO >> Repair or replace ground connection. E 2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT E 1. Disconnect engine coolant temperature (ECT) sensor harness connector. C 1. Unin ginition switch ON. C 2. Check the voltage between ECT sensor harness connector and ground. C Image: Sensor Terminal Cound Approx. 5V E Is the inspection result normal? E YES >> GO TO 3. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 3.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF. E 2. Disconnect ECT Marness connector. G Image: Connector Terminal Connector Terminal Continuity F 4. Also check harness for short to ground and short to power. Is Is the inspection result normal? K YES > GO TO 4. I NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. Also check harness for short to ground or short to power in harness or connectors. J 4. CHECK RENGI	< DTC/CIRCU	IT DIAGNOSIS	; >			[MR18DE]	
VES >> GO TO 2. NO >> Repair or replace ground connection. 2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT EC 1 Disconnect engine coolant temperature (ECT) sensor harness connector. C 2. Check the voltage between ECT sensor harness connector and ground. C Image: Connector Terminal Ground Voltage D Connector Terminal Ground Approx.5 V E Is the inspection result normal? E YES >> GO TO 3. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF E 2. Disconnect ECM harness connector. G Image: Connector Terminal Connector Terminal Continuity F 2. Check the continuity between ECT sensor harness connector and ECM harness connector. G Image: Connector Terminal Connector Terminal Existed E 4. Also check harness for short to ground and short to power in harness or connectors. J YES >> GO TO 4. NO NO >> Repair open circuit or short to ground or short to power in harness or connectors. J <tr< td=""><td>YES ⇒ GO TO 2. NO >> Repair or replace ground connection. 2 2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT E Connector sension content temperature (ECT) sensor harness connector. C 3. Check the voltage between ECT sensor harness connector and ground. C C <u>ECT sensor</u> Ground Voltage D <u>Connector</u> <u>Terminal</u> Ground Approx. 5 V E Is the inspection result normal? E NO >> Repair open circuit or short to ground or short to power in harness or connectors. C 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F E Disconnect ECM harness connector. F 1. Turn ignition switch OFF. E Disconnect ECM harness connector. G G 2. Check the continuity between ECT sensor harness connector and ECM harness connector. F G G 3. Check harness for short to ground and short to power. Is the inspection result normal? H 4. Also check harness for short to ground or short to power in harness or connectors. J A. Check ENGINE COOLANT TEMPERATURE SENSOR I VS > Repair open circuit or short to ground or short to power in ha</td><td>2. Check grou</td><td>und connection</td><td>E38. Refer to 🤆</td><td><u> 37, "Circuit In</u></td><td><u>spection"</u>.</td><td></td><td></td></tr<>	YES ⇒ GO TO 2. NO >> Repair or replace ground connection. 2 2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT E Connector sension content temperature (ECT) sensor harness connector. C 3. Check the voltage between ECT sensor harness connector and ground. C C <u>ECT sensor</u> Ground Voltage D <u>Connector</u> <u>Terminal</u> Ground Approx. 5 V E Is the inspection result normal? E NO >> Repair open circuit or short to ground or short to power in harness or connectors. C 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F E Disconnect ECM harness connector. F 1. Turn ignition switch OFF. E Disconnect ECM harness connector. G G 2. Check the continuity between ECT sensor harness connector and ECM harness connector. F G G 3. Check harness for short to ground and short to power. Is the inspection result normal? H 4. Also check harness for short to ground or short to power in harness or connectors. J A. Check ENGINE COOLANT TEMPERATURE SENSOR I VS > Repair open circuit or short to ground or short to power in ha	2. Check grou	und connection	E38. Refer to 🤆	<u> 37, "Circuit In</u>	<u>spection"</u> .		
NO >> Repair or replace ground connection. EC 2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT Indicator and temperature (ECT) sensor harness connector. C 1. Disconnect engine coolant temperature (ECT) sensor harness connector. C C 2. Turn ignition switch ON. C C 3. Check the voltage between ECT sensor harness connector and ground. C 3. Check the voltage between ECT sensor harness connector and ground. C 3. Check the voltage between ECT sensor harness connector and ground. C 3. Check the voltage between ECT sensor harness connector and ground. C 4. As proved to result normal? E 2. Check ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 3. Check the continuity between ECT sensor harness connector and ECM harness connector. G 3. Check the continuity between ECT sensor harness connector and ECM harness connector. G 4. Also check harness for short to ground and short to power. Is the inspection result normal? H YES >> GO TO 4. NO >> Replair open circuit or short to ground or short to power in harness or connectors. J 4. Also check harness for short to ground or short to power in harness or connectors. J Connectore </td <td>NO >> Repair or replace ground connection. EC 2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT I. Disconnect engine coolant temperature (ECT) sensor harness connector. C 3. Turn ignition switch ON. C C 3. Check the voltage between ECT sensor harness connector and ground. C Connector Terminal Ground Voltage D is the inspection result normal? E NO >> Repair open circuit or short to ground or short to power in harness or connectors. C 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F E 1. Turn ignition switch OFF. E Connector Terminal Continuity 2. Oheck the continuity between ECT sensor harness connector and ECM harness connector. G Connect ECM harness connector. G 3. Check the continuity between ECT sensor harness connector and ECM harness connector. G Connector Terminal Continuity H 2. Segor 0.4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. Also check harness for short to ground or short to power in harness or connectors. J K 3. Check tragine coolant temperature sensor. S</td> <td></td> <td></td> <td><u>?</u></td> <td></td> <td></td> <td></td> <td>А</td>	NO >> Repair or replace ground connection. EC 2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT I. Disconnect engine coolant temperature (ECT) sensor harness connector. C 3. Turn ignition switch ON. C C 3. Check the voltage between ECT sensor harness connector and ground. C Connector Terminal Ground Voltage D is the inspection result normal? E NO >> Repair open circuit or short to ground or short to power in harness or connectors. C 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F E 1. Turn ignition switch OFF. E Connector Terminal Continuity 2. Oheck the continuity between ECT sensor harness connector and ECM harness connector. G Connect ECM harness connector. G 3. Check the continuity between ECT sensor harness connector and ECM harness connector. G Connector Terminal Continuity H 2. Segor 0.4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. Also check harness for short to ground or short to power in harness or connectors. J K 3. Check tragine coolant temperature sensor. S			<u>?</u>				А
2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT EC 1. Disconnect engine coolant temperature (ECT) sensor harness connector. C 2. Check the voltage between ECT sensor harness connector and ground. C Turn ignition switch ON. C 0. Check the voltage between ECT sensor harness connector and ground. C Terminal Ground Voltage 2.Check ECT Sensor Ground Approx.5 V Is the inspection result normal? E VS >> Repair open circuit or short to ground or short to power in harness or connectors. F 3.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF. E D 2. Oheck the continuity between ECT sensor harness connector and ECM harness connector. G Term familial Connector Terminal Existed 4. Also check harness for short to ground and short to power. Isthe inspection result normal? H YS >> GO TO 4. No >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. Also check harness for short to ground or short to power in harness or connectors. J C-Check ENGINE COOLANT TEMPERATURE SENSOR I NO >> R	2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT EC 1. Disconnect engine coolant temperature (ECT) sensor harness connector.							_
2. Check EVT SerVice Normal Super Linkolit 1. Disconnect engine coolant temperature (ECT) sensor harness connector. 2. Turn ignition switch ON. 3. Check the voltage between ECT sensor harness connector and ground. Image: Connector Interminal Ground Voltage Connector Terminal Ground Approx.5 V Is the inspection result normal? YES YES 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between ECT sensor harness connector and ECM harness connector. Genetor Terminal Connector Terminal Connector Terminal Existent 1. Turn ignition switch OFF. 2. Disconnect ECM harness for short to ground and short to power. 3. 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. J. Also check harness for short to ground or short to power. Is the inspection result normal? YES > GO TO 5. NO >> Replair open circuit or short to ground or short to power in harness or connectors. J. OHECK ENGINE COOLANT TEMPERATURE SENSOR </td <td>2. OLECK EU SUSION FORMER SUPER CIRCUIT 1. Disconnect engine coolant temperature (ECT) sensor harness connector. 2. Turn ignition switch ON. 3. Check the voltage between ECT sensor harness connector and ground. ECT sensor Connector Terminal Ground Voltage D ECT sensor Connector Terminal Ground Approx.5V Is the inspection result normal? VES SO OT 0.3. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between ECT sensor harness connector and ECM harness connector. G Connector Terminal Connector Connector Terminal Connector Connector Connector Connector FB 44 EXISTON FB Connector FB Connector FB Connector Connector Connector Connector Connector FB Connector Connector Connector FB Connector Connec</td> <td>•</td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td>EC</td>	2. OLECK EU SUSION FORMER SUPER CIRCUIT 1. Disconnect engine coolant temperature (ECT) sensor harness connector. 2. Turn ignition switch ON. 3. Check the voltage between ECT sensor harness connector and ground. E CT sensor Connector Terminal Ground Voltage D E CT sensor Connector Terminal Ground Approx.5V Is the inspection result normal? VES SO OT 0.3. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check the continuity between ECT sensor harness connector and ECM harness connector. G Connector Terminal Connector Connector Terminal Connector Connector Connector Connector FB 44 EXISTON FB Connector FB Connector FB Connector Connector Connector Connector Connector FB Connector Connector Connector FB Connector Connec	•		-				EC
2. Turn ignition switch ON. C 3. Check the voltage between ECT sensor harness connector and ground. C Image: Connector Terminal Ground Ground Approx.5V D Is the inspection result normal? E YES >> GO TO 3. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF. D 2. Disconnect ECM harness connector. G Momentary Ect sensor Terminal Connector Terminal Continuity Existed 4. Also check the continuity between ECT sensor harness connector and ECM harness connector. H Momentary F28 > 2 or F8 ECM Continuity YES >> GO TO 4. H NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. Also check harness for short to ground or short to power in harness or connectors. J YES >> GO TO 4. N NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR K Scheck CH INTERMITTENT INCIDENT K N	2. Turn ignition switch ON. C 3. Check the voltage between ECT sensor harness connector and ground. C Image: Connector Terminal Ground Approx.5 V D Is the inspection result normal? E YES > GO TO 3. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF. D bisconnect ECM harness connector. 3. Check the continuity between ECT sensor harness connector and ECM harness connector. G Image: Connector Terminal Connector Terminal Connector Terminal Connector Terminal Connector Terminal Connector Terminal Connector. H Image: Connector Terminal Connector Terminal Connector Terminal Connector. H Is the inspection result normal? H YES >> GO TO 4. H NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. Also check harness for short to short to ground or short to power in harness or connectors. J YES >> GO TO 4. NO >> Replar open circuit or short to ground or short to power in harness or connectors. J 8. Check KENGINE COOLANT TEMPERATURE SENSOR K S S <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							
ECT sensor Ground Voltage is the inspection result normal? F23 i Ground Approx.5 V is the inspection result normal? F23 i Ground Approx.5 V is the inspection result normal? F2 F23 i Ground Approx.5 V is the inspection result normal? F3 Ground or short to ground or short to power in harness or connectors. G 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F G 1. Turn ignition switch OFF. Disconnect ECM harness connector. G 2. Check the continuity between ECT sensor harness connector and ECM harness connector. G <u>Connector Terminal 2 F8 44 Existed</u> H 4. Also check harness for short to ground and short to power. H Is the inspection result normal? YES S GO T04. NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR K Refer to CE-153. 'Component Inspection''. K Is the inspection result normal? YES YES >> GO T0 5. NO >> Replace engine coolant temperature sensor. S. CHECK	ECT sensor Ground Voltage F28 1 Ground Approx. 5 V Is the inspection result normal? E YES >> GO TO 3. NO NO >> Repair open circuit or short to ground or short to power in harness or connectors. G 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF. E 2. Disconnect ECM harness connector. G Monnector ECT sensor ECT sensor ECT sensor ECT sensor interminal Continuity F28 2 F8 44 EXate Connector Terminal Continuity F28 > GO TO 4. F NO >> Repair open circuit or short to ground or short to power. Is the inspection result normal? YES >> GO TO 4. NO > NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. Also check harness for short to ground and short to power in harness or connectors. J Mo >> Repair open circuit or short to ground and short to power in harness or connectors. J A.check ENGINE COOLANT TEMPERATURE SENSO	2. Turn ignitio	on switch ON.		-		:	С
Connector Terminal Ground Approx. 5 V Is the inspection result normal? F YES >> GO TO 3. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF. Disconnect ECM harness connector. 3. Check the continuity between ECT sensor harness connector and ECM harness connector. G Image: Connector Terminal Connector Terminal Continuity F F28 2 F8 44 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? H YES >> GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES YES >> GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR K Is the inspection result normal? K YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. L <tr< td=""><td>Connector Terminal Ground Approx.5 V Is the inspection result normal? F28 1 Ground Approx.5 V Is the inspection result normal? F F F F NO >> Repair open circuit or short to ground or short to power in harness or connectors. F 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF. Sickneet ECM harness connector. G 3. Check the continuity between ECT sensor harness connector and ECM harness connector. G Image: Connector Terminal Continuity YES > GO TO 4. F8 44 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES YES > GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR K K K YES > GO TO 5. NO >> Replace engine coolant temperature sensor. L J. CHECK INTERMITTENT INCIDENT K M No >> Replace engine coolant temperature sensor. L Deteck ENGINE COO</td><td></td><td><u>j</u></td><td></td><td></td><td>J</td><td></td><td></td></tr<>	Connector Terminal Ground Approx.5 V Is the inspection result normal? F28 1 Ground Approx.5 V Is the inspection result normal? F F F F NO >> Repair open circuit or short to ground or short to power in harness or connectors. F 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF. Sickneet ECM harness connector. G 3. Check the continuity between ECT sensor harness connector and ECM harness connector. G Image: Connector Terminal Continuity YES > GO TO 4. F8 44 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES YES > GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR K K K YES > GO TO 5. NO >> Replace engine coolant temperature sensor. L J. CHECK INTERMITTENT INCIDENT K M No >> Replace engine coolant temperature sensor. L Deteck ENGINE COO		<u>j</u>			J		
$\begin{array}{ c c c c c }\hline \hline Connector & Terminal & Crossing & Foldage & Fo$	Connector Terminal Croading Totalge Is the inspection result normal? Is the inspection result normal? Is YES >> GO TO 3. NO >> Repair open circuit or short to ground or short to power in harness or connectors. Is Question result normal? F Is Is inspection result normal? F 1. Turn ignition switch OFF. Disconnect ECM harness connector. G G 2. Disconnect ECM harness connector. G G Is Methods the continuity between ECT sensor harness connector and ECM harness connector. G Image: Connector Terminal Connector Terminal Continuity H A. Also check harness for short to ground and short to power. Is 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. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR K K VES >> GO TO 5. NO >> Replace engine coolant temperature sensor. L 5. CHECK INTERMITTENT INCIDENT NO >> Refer to GI-34. "Intermittent Incident". M NO >> Replace engine coolant temperature sensor harness connector. </td <td>ECT</td> <td>sensor</td> <td>Ground</td> <td>Voltago</td> <td></td> <td></td> <td>D</td>	ECT	sensor	Ground	Voltago			D
is the inspection result normal? E YES >> GO TO 3. NO >> Repair open circuit or short to power in harness or connectors. 3.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF. 2. 2. Disconnect ECM harness connector. G Image: Connector Terminal Connector Terminal Continuity Continuity F28 2 F8 44 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? H YES >> GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. Also check harness for short to ground and short to power. Is the inspection result normal? H YES >> GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4.CHECK ENGINE COOLANT TEMPERATURE SENSOR K K K Refer to EC-153. "Component Inspection". K K S.CHECK INTERMITTENT INCIDENT M >> INSPECTION END M Component Inspection >> INSPECTION END M M 1. Turn ignition switch OFF. <td>Is the inspection result normal? F YES >> GO TO 3. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF. Source terminal 2. Disconnect ECM harness connector. G Image: Sensor interval in the inspection result normal? F 4. Also check harness for short to ground and short to power. I Is the inspection result normal? YES YES >> GO TO 4. NO >> Repair open circuit or short to ground or short to power. Is the inspection result normal? YES YES >> GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR Refer to EC-153. "Component Inspection". Is the inspection result normal? YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. 5. CHECK INTERMITTENT INCIDENT Refer to GI-34. "Intermittent Incident". >> INSPECTION END Component Inspection M 1.</td> <td>Connector</td> <td>Terminal</td> <td>Glound</td> <td>voltage</td> <td></td> <td></td> <td></td>	Is the inspection result normal? F YES >> GO TO 3. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF. Source terminal 2. Disconnect ECM harness connector. G Image: Sensor interval in the inspection result normal? F 4. Also check harness for short to ground and short to power. I Is the inspection result normal? YES YES >> GO TO 4. NO >> Repair open circuit or short to ground or short to power. Is the inspection result normal? YES YES >> GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR Refer to EC-153. "Component Inspection". Is the inspection result normal? YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. 5. CHECK INTERMITTENT INCIDENT Refer to GI-34. "Intermittent Incident". >> INSPECTION END Component Inspection M 1.	Connector	Terminal	Glound	voltage			
Notice inspection result normalize F YES >> GO TO 3. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF. E 2. Disconnect ECM harness connector. G Important to solve the continuity between ECT sensor harness connector and ECM harness connector. G Important to the continuity between ECT sensor harness connector and ECM harness connector. H Important to the continuity between ECT sensor harness connector and ECM harness connector. H Important to the continuity between ECT sensor harness connector and ECM harness connector. H Important to the continuity between ECT sensor harness connector and ECM harness connector. H Important to ground and short to power. Is the inspection result normal? H YES >> GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR K K YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. L 5. CHECK INTERMITTENT INCIDENT N <td>YES >> GO TO 3. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF. Disconnect ECM harness connector. G 3. Check the continuity between ECT sensor harness connector and ECM harness connector. G Image: Connect ECM harness connector. G Image: Connector Terminal Connector Connectors. H 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. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR K Is the inspection result normal? YES >> GO TO 5. K YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. L 5. CHECK INTERMITTENT INCIDENT Senter Gol:34. "Interm</td> <td>F28</td> <td>1</td> <td>Ground</td> <td>Approx. 5 V</td> <td></td> <td></td> <td></td>	YES >> GO TO 3. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF. Disconnect ECM harness connector. G 3. Check the continuity between ECT sensor harness connector and ECM harness connector. G Image: Connect ECM harness connector. G Image: Connector Terminal Connector Connectors. H 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. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR K Is the inspection result normal? YES >> GO TO 5. K YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. L 5. CHECK INTERMITTENT INCIDENT Senter Gol:34. "Interm	F28	1	Ground	Approx. 5 V			
NO >> Repair open circuit or short to ground or short to power in harness or connectors. F 3.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF. E 2. Disconnect ECM harness connector. G 3. Check the continuity between ECT sensor harness connector and ECM harness connector. G Image: Connector Terminal Connector Terminal Connector Terminal Continuity H Image: Connector Terminal Connector Terminal Connector Terminal Existed H 4. Also check harness for short to ground and short to power. H Is the inspection result normal? YES YES >> GO TO 4. J NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR K Refer to EC-153. "Component Inspection". K Is the inspection result normal? YES YES >> GO TO 5. M NO >> Replace engine coolant temperature sensor. L 5.CHECK INTERMITTENT INCIDENT M Refer to GI-34. "Intermittent Incident". M >> INSPECTION END ************************************	NO >> Repair open circuit or short to ground or short to power in harness or connectors. F 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF. Somect ECM harness connector. G 3. Check the continuity between ECT sensor harness connector and ECM harness connector. G Image: Connect C M harness connector Terminal Continuity Continuity H Image: Connect C Terminal Connector Terminal Continuity H H Image: Connect C Terminal Connector Terminal Continuity H Image: Connect C Terminal Connector Terminal Continuity H Image: Connect C Terminal Connector Terminal Content to power. H Image: Connect C Terminal Connector Terminal Connector Terminal Content to power. H Image: Connect C Terminal Connector Terminal Content to power. H Image: Sold C A. NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR K K Is the inspection result normal? YES >> GO TO 5. K YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. L 5. CHECK INTERMITTENT INCIDENT M >> IN	Is the inspectio	n result normal?	?				E
3.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF. Bisconnect ECM harness connector. G 3. Check the continuity between ECT sensor harness connector and ECM harness connector. G Image: the inspection result normal? F Continuity YES > GO TO 4. H NO > Repair open circuit or short to ground and short to power in harness or connectors. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR K Refer to EC-153. "Component Inspection". K Is the inspection result normal? YES YES > GO TO 5. NO >> Replace engine coolant temperature sensor. L 5.CHECK INTERMITTENT INCIDENT M Refer to GI-34. "Intermittent Incident". M >> INSPECTION END M Component Inspection M 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR N 1. Turn ignition switch OFF. O 2. Disconnect engine coolant temperature sensor harness connector. O 3. Benove engine coolant temperature sensor. O	3.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT F 1. Turn ignition switch OFF. 3. Check the continuity between ECT sensor harness connector and ECM harness connector. G Check the continuity between ECT sensor harness connector and ECM harness connector. G ECT sensor ECM Connector Terminal Connector result normal? YES S GO TO 5. NO S Replace engine colant temperature sensor. L Intermittent Incident* M Scheck KINTERMITTENT INCIDENT M Check RISINE COOLANT TEMPERATURE SENSOR Nospelection Nospelection<!--</td--><td></td><td></td><td></td><td></td><td></td><td></td><td></td>							
1. Turn ignition switch OFF. G 2. Disconnect ECM harness connector. G image: the inspection result normal? ECM YES >> GO TO 4. NO >> Repair open circuit or short to ground and short to power. Is the inspection result normal? YES YES >> GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. J. CHECK ENGINE COOLANT TEMPERATURE SENSOR Refer to EC-153. "Component Inspection". Is the inspection result normal? YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. LCHECK INTERMITTENT INCIDENT Refer to GI-34. "Intermittent Incident". >> INSPECTION END Component Inspection MO PECLONDEND Component Inspection Monoponent Inspection MO PECLONDEND Component Inspection MO Disconnect cengine coolant temperature sensor harness connector. N 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR 0 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR	1. Turn ignition switch OFF. G 2. Disconnect ECM harness connector. G ECT sensor ECM harness connector. Continuity between ECT sensor harness connector and ECM harness connector. H ECT sensor ECM connector Terminal Connector Connector Connector Connector Terminal Connector Terminal Connector Connectors. Check ENGINE COOLANT TEMPERATURE SENSOR Disconnect engine coolant temperature sensor harness connector. Sensor Conlant temperature sensor terminals by heating with hot water as P </td <td>•</td> <td></td> <td>-</td> <td></td> <td></td> <td>s or connectors.</td> <td>F</td>	•		-			s or connectors.	F
2. Disconnect ECM harness connector. G 3. Check the continuity between ECT sensor harness connector and ECM harness connector. H <u>ECT sensor</u> <u>ECT sensor</u> H <u>ECT sensor</u> <u>ECT sensor</u> H <u>ECT sensor</u> <u>ECT sensor</u> H <u>ECT sensor</u> <u>ECT sensor</u> H <u>ECT sensor</u> <u>ECT sensor</u> H <u>ECT sensor</u> <u>Ect sensor</u> H <u>Ect sensor</u> <u>Ect sensor</u> H <u>Esten inspection result normal?</u> H VES >> GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. <u>J</u> CHECK ENGINE COOLANT TEMPERATURE SENSOR K Refer to <u>EC-153. "Component Inspection"</u> . Is the inspection result normal? YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. L SINSPECTION END Component Inspection M	2. Disconnect ECM harness connector. G 3. Check the continuity between ECT sensor harness connector and ECM harness connector. H <u>ECT sensor</u> <u>ECT sensor</u> H <u>ECT sensor</u> <u>ECT sensor</u> H <u>ECT sensor</u> <u>ECT sensor</u> H <u>ECT sensor</u> <u>ECT sensor</u> H <u>ECT sensor</u> <u>ECT sensor</u> H <u>ECT sensor</u> <u>ECT sensor</u> H <u>ECT sensor</u> <u>ECT sensor</u> H <u>Estenspection result normal?</u> YES >> GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4.CHECK ENGINE COOLANT TEMPERATURE SENSOR K Refer to <u>GL-153</u> . "Component Inspection". K S. Check INTERMITTENT INCIDENT M S- INSPECTION END M Check ENGINE COOLANT TEMPERATURE SENSOR M				T FOR OPEN A	ND SHORT		1
3. Check the continuity between ECT sensor harness connector and ECM harness connector. Image: Connector Image: Connector Image: Continuity Image: Connector Image:	3. Check the continuity between ECT sensor harness connector and ECM harness connector. Image: Connector Image: Continuity Image: Context Image: Continuit Image: Continuity Image: Continuity Image: Co							
ECT sensor ECM Continuity Connector Terminal Connector Terminal F28 2 F8 44 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? I YES > GO TO 4. J J NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR K Refer to EC-153. "Component Inspection". K Is the inspection result normal? YES YES > GO TO 5. K NO >> Replace engine coolant temperature sensor. L 5. CHECK INTERMITTENT INCIDENT M Refer to GI-34, "Intermittent Incident". M >> INSPECTION END M Component Inspection NO 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR N 1. Turn ignition switch OFF. O 2. Disconnect engine coolant temperature sensor harness connector. O 3. Remove engine coolant temperature sensor. S	ECT sensor ECM Continuity Connector Terminal Connector Terminal F28 2 F8 44 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? I YES > GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. J A. CHECK ENGINE COOLANT TEMPERATURE SENSOR Refer to EC-153, "Component Inspection". K Is the inspection result normal? YES >> GO TO 5. K YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. L 5. CHECK INTERMITTENT INCIDENT Refer to GI-34, "Intermittent Incident". M >> INSPECTION END NO >> Represent temperature sensor harness connector. N 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR O 0 N N 1. Turn ignition switch OFF. O O 0 0 2. Disconnect engine coolant temperature sensor harness connector. 0 0 0 3. Remove engine coolant temperature sensor terminals by heating with hot water as P				r harness conne	ector and ECM	harness connector.	G
Connector Terminal Continuity F28 2 F8 44 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. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR K Refer to EC-153, "Component Inspection". K Is the inspection result normal? YES YES > GO TO 5. NO >> Replace engine coolant temperature sensor. 5. CHECK INTERMITTENT INCIDENT Refer to GI-34, "Intermittent Incident". >> INSPECTION END Component Inspection M 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.	Connector Terminal Connector Terminal Continuity F28 2 F8 44 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? Is YES >> GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR Refer to EC-153, "Component Inspection". K Is the inspection result normal? YES >> GO TO 5. K YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. L 5. CHECK INTERMITTENT INCIDENT Refer to GI-34, "Intermittent Incident". M >> INSPECTION END M >> INSPECTION END M 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR N N 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR N 1. Turn ignition switch OFF. Q Disconnect engine coolant temperature sensor harness connector. O 3. Remove engine coolant temperature sensor harness connector. Remove engine coolant temperature sensor terminals by heating with hot water as P							
Connector Terminal Connector Terminal Connector F28 2 F8 44 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? Is YES >> GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR Refer to EC-153. "Component Inspection". K Is the inspection result normal? YES >> GO TO 5. K NO >> Replace engine coolant temperature sensor. L L 5. CHECK INTERMITTENT INCIDENT M >> INSPECTION END M Component Inspection NO >> Replace engine coolant temperature sensor. N 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR M Acheck ENGINE COOLANT TEMPERATURE SENSOR 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR N 1. Turn ignition switch OFF. O 2. Disconnect engine coolant temperature sensor harness connector. O 3. Remove engine coolant temperature sensor. O	Connector Terminal Connector Terminal Connector F28 2 F8 44 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? Is YES > GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR Refer to EC-153. "Component Inspection". K Is the inspection result normal? YES > GO TO 5. K YES > GO TO 5. NO >> Replace engine coolant temperature sensor. L 5. CHECK INTERMITTENT INCIDENT Refer to GI-34, "Intermittent Incident". M >> INSPECTION END M >> Represent temperature sensor harness connector. N 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR 0 N N 1. Turn ignition switch OFF. 0 0 0 0 2. Disconnect engine coolant temperature sensor harness connector. 0 0 0 3. Remove engine coolant temperature sensor terminals by heating with hot water as P	ECT	sensor	E	СМ			Н
4. Also check harness for short to ground and short to power. I Is the inspection result normal? YES YES >> GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. J. CHECK ENGINE COOLANT TEMPERATURE SENSOR Refer to EC-153, "Component Inspection". Is the inspection result normal? YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. L 5.CHECK INTERMITTENT INCIDENT Refer to GI-34, "Intermittent Incident". M >> INSPECTION END M Component Inspection NF00000000482253 1. Turn ignition switch OFF. 0 1. Turn ignition switch OFF. 0 2. Disconnect engine coolant temperature sensor harness connector. 0 3. Remove engine coolant temperature sensor. 0	4. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR Refer to EC-153. "Component Inspection". Is the inspection result normal? YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. L 5. CHECK INTERMITTENT INCIDENT Refer to GI-34. "Intermittent Incident". M >> INSPECTION END M Component Inspection M A.CHECK ENGINE COOLANT TEMPERATURE SENSOR N 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR N 1. Turn ignition switch OFF. O 2. Disconnect engine coolant temperature sensor harness connector. O 3. Remove engine coolant temperature sensor. 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as	Connector	Terminal	Connector	Terminal	Continuity		11
Is the inspection result normal? YES >> GO TO 4. J NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR K Refer to EC-153, "Component Inspection". Is the inspection result normal? K YES >> GO TO 5. K NO >> Replace engine coolant temperature sensor. L 5. CHECK INTERMITTENT INCIDENT M Refer to GI-34, "Intermittent Incident". M >> INSPECTION END M N 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR O 1. Turn ignition switch OFF. O 2. Disconnect engine coolant temperature sensor harness connector. O 3. Remove engine coolant temperature sensor. O	Is the inspection result normal? YES >> GO TO 4. J NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR K Refer to EC-153, "Component Inspection". K Is the inspection result normal? YES YES >> GO TO 5. L NO >> Replace engine coolant temperature sensor. L 5. CHECK INTERMITTENT INCIDENT M Refer to GI-34, "Intermittent Incident". M >> INSPECTION END M Component Inspection N 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR N 1. Turn ignition switch OFF. O 2. Disconnect engine coolant temperature sensor harness connector. O 3. Remove engine coolant temperature sensor. 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as	F28	2	F8	44	Existed		
YES >> GO TO 4. J NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR K Refer to EC-153, "Component Inspection". Is the inspection result normal? K YES >> GO TO 5. L NO >> Replace engine coolant temperature sensor. L 5. CHECK INTERMITTENT INCIDENT M Refer to GI-34, "Intermittent Incident". M >> INSPECTION END M Component Inspection 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR O 1. Turn ignition switch OFF. O 2. Disconnect engine coolant temperature sensor harness connector. O 3. Remove engine coolant temperature sensor. O	YES >> GO TO 4. J NO >> Repair open circuit or short to ground or short to power in harness or connectors. J 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR K Refer to EC-153. "Component Inspection". K Is the inspection result normal? YES YES >> GO TO 5. L NO >> Replace engine coolant temperature sensor. L 5. CHECK INTERMITTENT INCIDENT M Refer to GI-34. "Intermittent Incident". M >> INSPECTION END M Component Inspection N 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR N 1. Turn ignition switch OFF. O 2. Disconnect engine coolant temperature sensor harness connector. O 3. Remove engine coolant temperature sensor. 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as	4. Also check	harness for sho	ort to ground ar	nd short to powe	er.		
NO >> Repair open circuit or short to ground or short to power in harness or connectors. 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR Refer to EC-153, "Component Inspection". Is the inspection result normal? YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. L 5. CHECK INTERMITTENT INCIDENT Refer to GI-34, "Intermittent Incident". M >> INSPECTION END M Component Inspection N 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR 0 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR 0 1. Turn ignition switch OFF. 0 2. Disconnect engine coolant temperature sensor harness connector. 0 3. Remove engine coolant temperature sensor. 0	NO >> Repair open circuit or short to ground or short to power in harness or connectors. 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR Refer to EC-153, "Component Inspection". Is the inspection result normal? YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. L 5. CHECK INTERMITTENT INCIDENT Refer to GI-34, "Intermittent Incident". M >> INSPECTION END Component Inspection N 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR 0 1. Turn ignition switch OFF. 0 2. Disconnect engine coolant temperature sensor harness connector. 0 3. Remove engine coolant temperature sensor. 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as	Is the inspectio	n result normal?	<u>?</u>				
4.CHECK ENGINE COOLANT TEMPERATURE SENSOR Refer to EC-153, "Component Inspection". Is the inspection result normal? YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. L 5.CHECK INTERMITTENT INCIDENT Refer to GI-34, "Intermittent Incident". M >> INSPECTION END M Component Inspection N 1.CHECK ENGINE COOLANT TEMPERATURE SENSOR O 1. Turn ignition switch OFF. O 2. Disconnect engine coolant temperature sensor harness connector. O	4.CHECK ENGINE COOLANT TEMPERATURE SENSOR Refer to EC-153, "Component Inspection". Is the inspection result normal? YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. L 5.CHECK INTERMITTENT INCIDENT Refer to GI-34, "Intermittent Incident". M >> INSPECTION END M Component Inspection N 1.CHECK ENGINE COOLANT TEMPERATURE SENSOR 0 1. Turn ignition switch OFF. 0 2. Disconnect engine coolant temperature sensor harness connector. 0 3. Remove engine coolant temperature sensor. 0 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as P							I
Refer to EC-153, "Component Inspection". K Is the inspection result normal? YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. L 5. CHECK INTERMITTENT INCIDENT M Refer to GI-34, "Intermittent Incident". M >> INSPECTION END M 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR 0 1. Turn ignition switch OFF. 0 2. Disconnect engine coolant temperature sensor harness connector. 0 3. Remove engine coolant temperature sensor. 0	Refer to EC-153, "Component Inspection". K Is the inspection result normal? YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. L 5.CHECK INTERMITTENT INCIDENT M Refer to GI-34, "Intermittent Incident". M >> INSPECTION END M Component Inspection N 1.CHECK ENGINE COOLANT TEMPERATURE SENSOR O 1. Turn ignition switch OFF. O 2. Disconnect engine coolant temperature sensor harness connector. O 3. Remove engine coolant temperature sensor. P	4		0		power in harnes	s or connectors.	0
Is the inspection result normal? YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. L 5.CHECK INTERMITTENT INCIDENT Refer to GI-34, "Intermittent Incident". M >> INSPECTION END M Component Inspection N 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR 0 1. Turn ignition switch OFF. 0 2. Disconnect engine coolant temperature sensor harness connector. 0 3. Remove engine coolant temperature sensor. 0	Is the inspection result normal? YES >> GO TO 5. L YES >> Replace engine coolant temperature sensor. L 5.CHECK INTERMITTENT INCIDENT M Refer to G1-34, "Intermittent Incident". M >> INSPECTION END M Component Inspection NFORD-000000483253 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR O 1. Turn ignition switch OFF. O 2. Disconnect engine coolant temperature sensor harness connector. O 3. Remove engine coolant temperature sensor. O 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as P	4.CHECK EN	GINE COOLAN	T TEMPERATU	JRE SENSOR			
YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. 5.CHECK INTERMITTENT INCIDENT Refer to GI-34, "Intermittent Incident". >> INSPECTION END 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.	YES >> GO TO 5. NO >> Replace engine coolant temperature sensor. 5.CHECK INTERMITTENT INCIDENT Refer to GI-34, "Intermittent Incident". >> INSPECTION END Component Inspection I.CHECK ENGINE COOLANT TEMPERATURE SENSOR 1. Turn ignition switch OFF. 2. Disconnect engine coolant temperature sensor harness connector. 3. Remove engine coolant temperature sensor terminals by heating with hot water as							Κ
NO >> Replace engine coolant temperature sensor. L 5.CHECK INTERMITTENT INCIDENT M Refer to GI-34, "Intermittent Incident". M >> INSPECTION END M Component Inspection N 1.CHECK ENGINE COOLANT TEMPERATURE SENSOR 0 1. Turn ignition switch OFF. 0 2. Disconnect engine coolant temperature sensor harness connector. 0 3. Remove engine coolant temperature sensor. 0	NO >> Replace engine coolant temperature sensor. L 5.CHECK INTERMITTENT INCIDENT Refer to GI-34, "Intermittent Incident". M >> INSPECTION END M Component Inspection N 1.CHECK ENGINE COOLANT TEMPERATURE SENSOR 0 1. Turn ignition switch OFF. 0 2. Disconnect engine coolant temperature sensor harness connector. 0 3. Remove engine coolant temperature sensor terminals by heating with hot water as P			<u>?</u>				
5.CHECK INTERMITTENT INCIDENT Refer to GI-34, "Intermittent Incident". >> INSPECTION END Component Inspection Incheck ENGINE COOLANT TEMPERATURE SENSOR 1. Turn ignition switch OFF. 2. Disconnect engine coolant temperature sensor harness connector. 3. Remove engine coolant temperature sensor.	5.CHECK INTERMITTENT INCIDENT Refer to GI-34, "Intermittent Incident". M >> INSPECTION END Component Inspection INFOID:0000004833253 N 1.CHECK ENGINE COOLANT TEMPERATURE SENSOR 1. Turn ignition switch OFF. 0 2. Disconnect engine coolant temperature sensor harness connector. 0 3. Remove engine coolant temperature sensor. 0 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as P			olant temperat	ure sensor			
Refer to GI-34, "Intermittent Incident". M >> INSPECTION END NFOLD:0000004832253 N Component Inspection N 1.CHECK ENGINE COOLANT TEMPERATURE SENSOR 0 1. Turn ignition switch OFF. 0 2. Disconnect engine coolant temperature sensor harness connector. 0 3. Remove engine coolant temperature sensor. 0	Refer to GI-34, "Intermittent Incident". M >> INSPECTION END NFOID:0000004833253 N 1.CHECK ENGINE COOLANT TEMPERATURE SENSOR O O 1. Turn ignition switch OFF. O O 2. Disconnect engine coolant temperature sensor harness connector. O O 3. Remove engine coolant temperature sensor. P P	_		•				
>> INSPECTION END Component Inspection NFOID:0000004833253 N 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.	 >> INSPECTION END 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 							
Component Inspection N 1.CHECK ENGINE COOLANT TEMPERATURE SENSOR 0 1. Turn ignition switch OFF. 0 2. Disconnect engine coolant temperature sensor harness connector. 0 3. Remove engine coolant temperature sensor. 0	Component Inspection N 1.CHECK ENGINE COOLANT TEMPERATURE SENSOR 0 1. Turn ignition switch OFF. 0 2. Disconnect engine coolant temperature sensor harness connector. 0 3. Remove engine coolant temperature sensor. 0 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as P	Refer to GI-34,	<u>Intermittent Inc</u>	<u>cident"</u> .				\mathbb{M}
Component Inspection N 1.CHECK ENGINE COOLANT TEMPERATURE SENSOR 0 1. Turn ignition switch OFF. 0 2. Disconnect engine coolant temperature sensor harness connector. 0 3. Remove engine coolant temperature sensor. 0	Component Inspection N 1.CHECK ENGINE COOLANT TEMPERATURE SENSOR 0 1. Turn ignition switch OFF. 0 2. Disconnect engine coolant temperature sensor harness connector. 0 3. Remove engine coolant temperature sensor. 0 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as P	>> INS	SPECTION END	ר				
 CHECK ENGINE COOLANT TEMPERATURE SENSOR Turn ignition switch OFF. Disconnect engine coolant temperature sensor harness connector. Remove engine coolant temperature sensor. 	 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 P 							N
 Turn ignition switch OFF. Disconnect engine coolant temperature sensor harness connector. Remove engine coolant temperature sensor. 	 Turn ignition switch OFF. Disconnect engine coolant temperature sensor harness connector. Remove engine coolant temperature sensor. Check resistance between engine coolant temperature sensor terminals by heating with hot water as P 						INFOID:000000004833253	T N
 Disconnect engine coolant temperature sensor harness connector. Remove engine coolant temperature sensor. 	 Disconnect engine coolant temperature sensor harness connector. Remove engine coolant temperature sensor. Check resistance between engine coolant temperature sensor terminals by heating with hot water as P 	1. CHECK EN	GINE COOLAN	T TEMPERATU	JRE SENSOR			
3. Remove engine coolant temperature sensor.	 Remove engine coolant temperature sensor. Check resistance between engine coolant temperature sensor terminals by heating with hot water as 							0
\mathbf{v}	4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as					connector.		
4. Check resistance between engine coolant temperature sensor tempinals by heating with not water as						sensor termina	als by heating with hot water as	Ρ
shown in the figure.		shown in th	ne 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

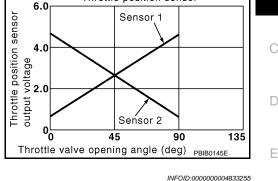
NO >> Replace engine coolant temperature sensor.

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 potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



Throttle position sensor

DTC Logic

NOTE: If DTC P0122 or P0123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-308, "DTC Logic"</u>.

Κ

L

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.)	-
P0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	Electric throttle control actuator (TP sensor 2)	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

DTC DETECTION LOGIC

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Start engine and let it idle for 1 second. 1. M 2. Check DTC. Is DTC detected? YES >> Go to EC-155, "Diagnosis Procedure". Ν NO >> INSPECTION END Diagnosis Procedure INFOID:000000004833257 1. CHECK GROUND CONNECTION 1. Turn ignition switch OFF. Ρ Check ground connection E38. Refer to <u>GI-37, "Circuit Inspection"</u>. Is the inspection result normal? YES >> GO TO 2. NO >> Repair or replace ground connection. 2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT 1 Disconnect electric throttle control actuator harness connector. 2. Turn ignition switch ON.

Revision: 2009 March

EC-155

[MR18DE]

INFOID:000000004833254

EC

А

P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle	lectric throttle control actuator		Voltage	
Connector	Terminal	Ground	voltage	
F29	2	Ground	Approx. 5 V	

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 control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F29	4	F8	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	ctric throttle control actuator		ECM	
Connector	Terminal	Connector	Terminal	Continuity
F29	3	F8	34	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-157, "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. Perform EC-157, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

>> INSPECTION END

P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection

1.CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-17, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set selector lever to D (CVT) or 1st (M/T) position.
- 6. Check the voltage between ECM harness connector and ground.

	~~~						
	CM	Ground	Co	ndition	Voltage		
Connector	Terminal				-		
	33 (TP sensor			Fully released	More than 0.36V		
50	1 signal)	Oneveral	Accelerator	Fully de- pressed	Less than 4.75V		
F8	34	Ground	pedal	Fully released	Less than 4.75V		
	(TP sensor 2 signal)			Fully de- pressed	More than 0.36V		
Is the inspe	ection resul	t normal	?				
	INSPECT		C				
~	• GO TO 2.						
<b>Z</b> .REPLAC	CE ELECTI	RIC THR	OTTLE CO	NTROL ACTU	JATOR		
			ontrol actuat				
2. Perforr	m <u>EC-157.</u>	"Special	Repair Req	<u>uirement"</u> .			
>>	INSPECT	ION EN	C				
Special F	Repair Re	equirer	nent			INF0ID:000000004833259	
1.PERFO	RM THRO	TTLE VA	LVE CLOSE	D POSITION	LEARNING		
Refer to EC	C-17, "THR	OTTLE	ALVE CLO	SED POSITIC	N LEARNIN	IG : Special Repair Requirement"	
>>	• GO TO 2.						
2.PERFO	RM IDLE A	IR VOLI	JME LEARN	IING			
Refer to EC	C-17, "IDLE	AIR VO	LUME LEA	RNING : Spec	ial Repair Re	aquirement"	
>>	> END						

Ρ

INFOID:000000004833258

А

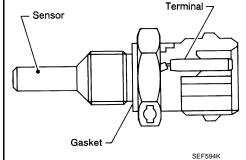
EC

С

## 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.



20 10 6

#### <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 38 (Engine coolant temperature sensor) and ground.

INFOID:000000004833261

## DTC Logic

# DTC DETECTION LOGIC **NOTE**:

- If DTC P0125 is displayed with P0116, first perform the trouble diagnosis for DTC P0116. Refer to <u>EC-150, "DTC Logic"</u>.
- If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to <u>EC-152, "DTC Logic"</u>.

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

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### >> GO TO 2.

## 2.CHECK ENGINE COOLANT TEMPERATURE SENSOR FUNCTION

#### With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "DATA MONITOR" mode with CONSULT-III.
- 3. Check that "COOLAN TEMP/S" is above 10°C (50°F).

#### With GST

## EC-158

## **P0125 ECT SENSOR**

	-
< DTC/CIRCUIT DIAGNOSIS > [MR18DE	]
Follow the procedure "With CONSULT-III" above.	٥
Is it above 5°C (41°F)?	А
YES >> INSPECTION END NO >> GO TO 3.	
3. PERFORM DTC CONFIRMATION PROCEDURE	EC
With CONSULT-III	_
1. Start engine and run it for 65 minutes at idle speed.	С
<ol> <li>Check 1st tip DTC.</li> <li>If "COOLAN TEMP/S" indication increases to more than 10°C (50°F) within 65 minutes, stop engine</li> </ol>	ē
because the test result will be OK.	
CAUTION: Be careful not to overheat engine.	D
With GST	
Follow the procedure "With CONSULT-III" above.	E
Is 1st trip DTC detected?	
YES >> <u>EC-159, "Diagnosis Procedure"</u> NO >> INSPECTION END	F
Diagnosis Procedure	
1.CHECK GROUND CONNECTION	G
1. Turn ignition switch OFF.	
<ol> <li>Check ground connection E38. Refer to <u>GI-37, "Circuit Inspection"</u>. <u>Is the inspection result normal?</u></li> </ol>	Н
YES >> GO TO 2.	
NO >> Repair or replace ground connection.	I
2. CHECK ENGINE COOLANT TEMPERATURE SENSOR	
Refer to EC-159, "Component Inspection".	-
Is the inspection result normal?	J
YES >> GO TO 3. NO >> Replace engine coolant temperature sensor.	
3. CHECK THERMOSTAT OPERATION	Κ
When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine	e
coolant does not flow.	L
Is the inspection result normal?	
YES >> GO TO 4. NO >> Repair or replace thermostat. Refer to <u>CO-20, "Removal and Installation"</u> .	р. Л
4. CHECK INTERMITTENT INCIDENT	Μ
Refer to <u>GI-34, "Intermittent Incident"</u> .	-
	Ν
>> INSPECTION END	
Component Inspection	63 0
1. CHECK ENGINE COOLANT TEMPERATURE SENSOR	
1. Turn ignition switch OFF.	P
<ol> <li>Disconnect engine coolant temperature sensor harness connector.</li> <li>Remove engine coolant temperature sensor.</li> </ol>	
<ol> <li>Remove engine coolant temperature sensor.</li> <li>Check resistance between engine coolant temperature sensor terminals by heating with hot water a</li> </ol>	S
shown in the figure.	

## **P0125 ECT SENSOR**

#### < DTC/CIRCUIT DIAGNOSIS >

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

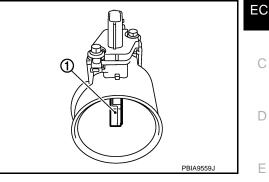
NO >> Replace engine coolant temperature sensor.

## 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.

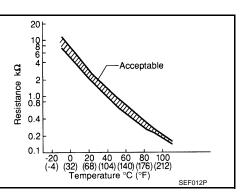
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



#### <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 46 (Intake air temperature sensor) and ground.



INFOID:000000004833265

Н

Ν

Ρ

## DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
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.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Intake air temperature sensor</li> </ul>	K

## DTC CONFIRMATION PROCEDURE

#### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

This test 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.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

#### (B) With CONSULT-III

- 1. Wait until engine coolant temperature is less than 96°C (205°F)
- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-III.
- Check the engine coolant temperature.
- If the engine coolant temperature is not less than 96°C (205°F), turn ignition switch OFF and cool down engine.

#### NOTE:

Perform the following steps before engine coolant temperature is above 96°C (205°F).

## EC-161

## INFOID:000000004833264

[MR18DE]

## P0127 IAT SENSOR

#### < DTC/CIRCUIT DIAGNOSIS >

2. Turn ignition switch ON.

- 3. Select "DATA MONITOR" mode with CONSULT-III.
- 4. Start engine.

5. Hold vehicle speed at more than 70 km/h (43 MPH) for 95 consecutive seconds.

## CAUTION:

## Always drive vehicle at a safe speed.

6. Check 1st trip DTC.

#### With GST

Follow the procedure "With CONSULT-III" above.

#### Is 1st trip DTC detected?

YES >> Go to EC-162, "Diagnosis Procedure".

NO >> INSPECTION END

### **Diagnosis Procedure**

### 1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E38. Refer to GI-37, "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-162, "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-34, "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 per the following.

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:000000004833266

## **P0128 THERMOSTAT FUNCTION**

#### < DTC/CIRCUIT 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-217, "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 engine has run long enough.	<ul> <li>Thermostat</li> <li>Leakage from sealing portion of thermostat</li> <li>Engine coolant temperature sensor</li> </ul>	E

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

- For best results, perform at ambient temperature of –10°C (14°F) or higher.
- For best results, perform at engine coolant temperature of -10°C (14°F) to 52°C (126°F).
- Before performing the following procedure, do not fill with the fuel.

>> GO TO 2. 2.PERFORM DTC CONFIRMATION PROCEDURE	I
With CONSULT-III Turn A/C switch OFF.	J
<ol> <li>Turn blower fan switch OFF.</li> <li>Turn ignition switch ON.</li> <li>Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-III.</li> <li>Check the indication of "COOLAN TEMP/S"</li> </ol>	K
<ul> <li>If it is below 52°C (126°F), go to following step.</li> <li>If it is above 52°C (126°F), cool down the engine to less than 52°C (126°F). Then go to next steps.</li> <li>6. Start engine.</li> </ul>	L
7. Drive vehicle for 10 consecutive minutes under the following conditions.         VHCL SPEED SE       More than 56km/h (35MPH)	Μ
CAUTION: Always drive vehicle at a safe speed. NOTE: IS "COOLAN TEMP/S" indication increases to more than 71°C (160°E) within 10 minutes, turn igni	Ν
<ul> <li>If "COOLAN TEMP/S" indication increases to more than 71°C (160°F) within 10 minutes, turn ignition switch OFF because the test result will be OK.</li> <li>8. Check 1st trip DTC.</li> <li>With GST</li> </ul>	0
Follow the procedure "With CONSULT-III" above. <u>Is 1st trip DTC detected?</u> YES >> Go to <u>EC-163, "Diagnosis Procedure"</u> . NO >> INSPECTION END	Ρ
Diagnosis Procedure	
1. CHECK ENGINE COOLANT TEMPERATURE SENSOR	
Refer to EC-164, "Component Inspection".	

#### Revision: 2009 March

INFOID:000000005040130

EC

С

D

F

Н

А

## **P0128 THERMOSTAT FUNCTION**

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

#### YES >> GO TO 2.

NO >> Replace engine coolant temperature sensor.

## 2. CHECK THERMOSTAT

Refer to CO-21, "Inspection".

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	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
- NO >> Replace engine coolant temperature sensor.

## 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  $\lambda$  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).

## **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	Κ
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. 2.2 V.	Harness or connectors     (The A/F sensor 1 circuit is open     or shorted.)	L	
	Circuit	B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.	A/F sensor 1	

#### DTC CONFIRMATION PROCEDURE

#### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

## With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Let it idle for 2 minutes.
- Check 1st trip DTC.

## Is 1st trip DTC detected?

YES >> Go to EC-167, "Diagnosis Procedure".

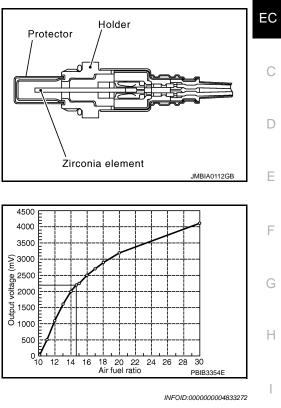
## EC-165

M

Ρ

INFOID:000000004833271

А



## P0130 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

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 2.2 V?

YES >> GO TO 4.

NO >> Go to EC-167, "Diagnosis Procedure".

**4.**PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-I

1. Select "A/F SEN1 (B1) P1276" of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-III.

2. Touch "START".

3. When the following conditions are met, "TESTING" will be displayed on the CONSULT-III screen.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 64 km/h (40 mph)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	D position (CVT) 5th position (M/T)

# If "TESTING" is not displayed after 20 seconds, retry from step 2. CAUTION:

#### Always drive vehicle at a safe speed.

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-167, "Diagnosis Procedure".

**I.** PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform Component Function Check. Refer to <u>EC-166, "Component Function Check"</u>.

#### 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-167, "Diagnosis Procedure".

Component Function Check

INFOID:000000004833273

#### **1.**PERFORM COMPONENT FUNCTION CHECK

#### With GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.

## P0130 A/F SENSOR 1

#### < DTC/CIRCUIT DIAGNOSIS >

< DTC/CIRCUI	T DIAGNOSIS	>		[MR18DE]			
fully until th CAUTION:	e vehicle speed	decreases to	(CVT) or 1st pc 50 km/h (31 MF	psition (M/T), then release the accelerator pedal PH).	А		
NOTÉ:		-			EC		
	y brake during r ps 2 to 3 for five		ccelerator pedal		LC		
	hicle and turn i		DFF.				
	st 10 seconds a	0	ne.		С		
<ol> <li>Repeat step</li> <li>Stop the ve</li> </ol>	ps 2 to 3 for five hicle.	e umes.					
9. Check 1st t	rip DTC.				D		
Is 1st trip DTC							
	to <u>EC-167, "Dia</u> SPECTION END		lure".		_		
Diagnosis P		-			E		
				INF01D:000000004833275			
<b>1.</b> CHECK GRO	JUND CONNE	CTION			F		
	n switch OFF.						
2. Check grou			<u> 31-37, "Circuit In</u>	<u>spection</u> .	G		
YES >> GO		<u>-</u>					
	pair or replace (	ground connect	ion.				
2.CHECK AIR	FUEL RATIO (	A/F) SENSOR	1 POWER SUP	PLY CIRCUIT	Н		
	A/F sensor 1 h	arness connec	tor.				
	n switch ON.	n A/F sensor 1	harness conner	ctor and ground.			
	inago sorrool						
A/F se	nsor 1	Cround	) /alta sa		J		
Connector	Terminal	Ground	Voltage				
F50	4	Ground	Battery voltage				
Is the inspection		2			Κ		
YES >> GO NO >> GO							
3.DETECT MA					L		
<ul><li>Check the follow</li><li>Harness conn</li></ul>					M		
• IPDM E/R har		r E15					
<ul><li>15 A fuse (No</li><li>Harness for o</li></ul>		tween A/F sens	sor 1 and fuse				
-			-		Ν		
	>> Repair or replace harness or connectors.						
4.CHECK A/F	4.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT						
	n switch OFF.						
	ECM harness		1 harness conr	nector and ECM harness connector.	Р		
2. 2.1001( 110 (					1		

A/F se	ensor 1	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F50	1	- F8	49	Existed
F30	2	ГО	53	Existed

## EC-167

## P0130 A/F SENSOR 1

#### < DTC/CIRCUIT DIAGNOSIS >

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F se	ensor 1	Ground	Continuity	
Connector	Connector Terminal		Continuity	
F50	1	Ground	Not existed	
F30	2	Giouna	NOL EXISTED	
E	CM	Ground	Continuity	
Connector Terminal		Giodria	Continuity	
F8	49	Ground	Not existed	
10	= 0	Giouna	NUL EXISIEU	

5. Also check harness for short to power.

53

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-34, "Intermittent Incident".

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 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 Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> 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  $\lambda$  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).

## **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 low.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause	Κ
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. 0 V.	<ul> <li>Harness or connectors (The A/F sensor 1 circuit is open or shorted.)</li> <li>A/F sensor 1</li> </ul>	L

#### DTC CONFIRMATION PROCEDURE

#### **1.**PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

## TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 2.

2. CHECK A/F SENSOR FUNCTION

#### With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Select "A/F SEN1 (B1)" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "A/F SEN1 (B1)" indication.

#### With GST

Follow the procedure "With CONSULT-III" above.

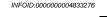
Is the indication constantly approx. 0 V?

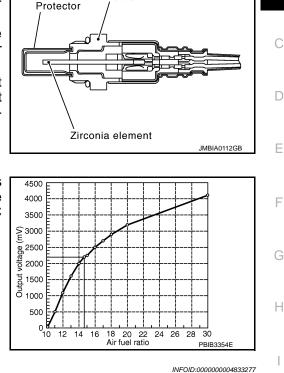
M

Ν

А

EC





Holder

YES >> Go to EC-170, "Diagnosis Procedure".

NO >> GO TO 3.

 ${\it 3.}$  PERFORM DTC CONFIRMATION PROCEDURE

#### With CONSULT-III

- 1. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
- 2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine. CAUTION:

#### Always drive vehicle at a safe speed.

3. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	Suitable position

#### NOTE:

• Keep the accelerator pedal as steady as possible during the cruising.

• If this procedure is not completed within 1 minute after restarting engine at step 1, return to step

- 1.
- 4. Check 1st trip DTC.

#### With GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

YES >> Go to EC-170, "Diagnosis Procedure".

NO >> INSPECTION END

### **Diagnosis Procedure**

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E38. Refer to <u>GI-37, "Circuit Inspection"</u>.

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	Terminal	Giodila	voltage	
F50	4	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

**3.** DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E8, F1

- IPDM E/R harness connector E15
- 15 A fuse (No. 61)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

## EC-170

## P0131 A/F SENSOR 1

#### < DTC/CIRCUIT DIAGNOSIS >

#### [MR18DE]

А

EC

D

Е

F

Н

Κ

L

### **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 se	A/F sensor 1		ECM	
Connector	Terminal	Connector	Terminal	Continuity
F50	1	F8	49	Existed
1.50	2	10	53	LVISION

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F se	A/F sensor 1		Continuity	
Connector	Terminal	Ground	Continuity	
F50	1	Ground	Not existed	
FOU	2	Ground	NOT EXISTED	

ECM		Ground	Continuity	
Connector	Terminal	Ground	Continuity	
F8	49	Ground	Not existed	
10	53	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-34, "Intermittent Incident".

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

 Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

 $\cap$ 



## 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  $\lambda$  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).

## 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. 5 V.	<ul> <li>Harness or connectors (The A/F sensor 1 circuit is open or shorted.)</li> <li>A/F sensor 1</li> </ul>

#### DTC CONFIRMATION PROCEDURE

#### **1.**PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 2.

## 2. CHECK A/F SENSOR FUNCTION

#### With CONSULT-III

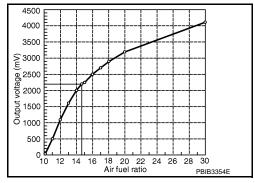
- T. Start engine and warm it up to normal operating temperature.
- 2. Select "A/F SEN1 (B1)" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "A/F SEN1 (B1)" indication.

#### With GST

Follow the procedure "With CONSULT-IIII" above.

Is the indication constantly approx. 5 V?

## EC-172



INFOID:000000004833280

JMBIA0112GB

C DTC/CIRCUIT DIAGNO		32 A/F SENSO	R 1 [MR18DE]	
YES $>>$ Go to <u>EC-173.</u> NO $>>$ GO TO 3.		lure".	<u> </u>	
$\mathbf{B}$ .perform dtc confi	RMATION PROCE	DURE		
<ul> <li>With CONSULT-III</li> <li>Turn ignition switch OFI</li> <li>Drive and accelerate ve CAUTION: Always drive vehicle a</li> </ul>	whicle to more than		estart engine. within 20 seconds after restarting engine.	E
3. Maintain the following c		t 20 consecutive se	conds.	
ENG SPEED	1,000 - 3,200 rpm			
VHCL SPEED SE	More than 40 km/h (2	25 mph)		
B/FUEL SCHDL	1.5 - 9.0 msec			
Selector lever	Suitable position			
NOTE: • Keep the accelerato • If this procedure is r 1.			g the cruising. restarting engine at step 1, return to step	
I. Check 1st trip DTC.	CONSULT-III" abc	ove.		
s 1st trip DTC is detected? YES >> Go to <u>EC-173.</u> NO >> INSPECTION E		lure".		
Diagnosis Procedure			INFOID:000000004833283	
CHECK GROUND CON	NECTION			
. Turn ignition switch OF 2. Check ground connection		21.27 "Circuit Inspo	ction"	
s the inspection result norm		<u>BI-S7, Circuit Inspe</u>	<u>cuor</u> .	
YES >> GO TO 2.				
NO >> Repair or replace				
CHECK AIR FUEL RATIO	O (A/F) SENSOR	1 POWER SUPPLY	′ CIRCUIT	
Disconnect A/F sensor		tor.		
<ol> <li>Turn ignition switch ON</li> <li>Check the voltage betw</li> </ol>		harness connector	and ground.	
A/F sensor 1				
Connector Terminal	Ground	Voltage		
F50 4	Ground	Battery voltage		
s the inspection result norm	nal?	<u> </u>		
YES >> GO TO 4. NO >> GO TO 3.				
<b>B.</b> DETECT MALFUNCTIO	NING PART			
Check the following. Harness connectors E8, F IPDM E/R harness conne 15 A fuse (No. 61)				

>> Repair or replace harness or connectors.

## P0132 A/F SENSOR 1

#### < DTC/CIRCUIT DIAGNOSIS >

## 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 se	ensor 1	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F50	1	F8	49	Existed
1.50	2	10	53	LAISIEU

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity	
Connector	Terminal	Ground	Continuity	
F50	1	Ground	Not existed	
150	2	Glound	NOT EXISTED	

ECM		Ground	Continuity	
Connector	Terminal	Ground	Continuity	
F8	49	Ground	Not existed	
10	53	Glound	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-34, "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 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 Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> 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  $\lambda$  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).

## 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	
P0133	Air fuel ratio (A/F) sensor 1 circuit slow response	<ul> <li>The response of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time.</li> </ul>	<ul> <li>Harness or connectors (The A/F sensor 1 circuit is open or shorted.)</li> <li>A/F sensor 1</li> <li>A/F sensor 1 heater</li> <li>Fuel pressure</li> <li>Fuel injector</li> <li>Intake air leaks</li> <li>Exhaust gas leaks</li> <li>PCV</li> <li>Mass air flow sensor</li> </ul>	M

## DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

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

#### Do you have CONSULT-III? YES

>> GO TO 2. >> GO TO 5. NO

2.PERFORM DTC CONFIRMATION PROCEDURE-I

INFOID:000000004833284

JMBIA0112GB

PBIB3354E

INFOID:000000004833285

EC Holder

Protector

4500

4000

3500

€ 3000 2500 voltage 2000

Output 1500 1000

> 500 0 -10 12 14 16 18 20 22 24 26 28 30

Zirconia element

Air fuel ratio

D

F

Н

А

Ρ

## P0133 A/F SENSOR 1

#### < DTC/CIRCUIT DIAGNOSIS >

#### (B) With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Select "A/F SEN1(B1) P1278/P1279" of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 6. Touch "START".

#### Is "COMPLETED" displayed on COUSULT-III?

YES >> GO TO 3

NO >> GO TO 4.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT-III?

OK >> INSPECTION END

NG >> Go to EC-177, "Diagnosis Procedure".

**4.**PERFORM DTC CONFIRMATION PROCEDURE

- 1. After perform the following procedure, "TESTING" will be displayed on the CONSULT-III screen.
- Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
- Fully release accelerator pedal and then let engine idle for about 10 seconds.
- If "TESTING" is not displayed after 10 seconds, go to EC-109, "Component Function Check".
- Wait for about 20 seconds at idle under the condition that "TESTING" is displayed on the CONSULT-III screen.
- 3. Make sure that "TESTING" changes to "COMPLETED".
- If "TESTING" changed to "OUT OF CONDITION", go to EC-109, "Component Function Check".
- 4. Touch "SELF-DIAG RESULT".

#### Which is displayed on CONSULT-III?

- OK >> INSPECTION END
- NG >> Go to <u>EC-177, "Diagnosis Procedure"</u>.

**5.**CHECK AIR-FUEL RATIO SELF-LEARNING VALUE

#### With GST

- T. Start engine and warm it up to normal operating temperature.
- 2. Select Service \$01 with GST.
- 3. Calculate the total value of "Short-term fuel trim" and "Long-term fuel trim" indications.

Is the total percentage within ±15%?

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

6.DETECT MALFUNCTIONING PART

Check the following.

- Intake air leaks
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Fuel injector
- Incorrect PCV hose connection
- PCV valve
- Mass air flow sensor

>> Repair or replace malfunctioning part.

## 7. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 3. Let engine idle for 1 minute.
- 4. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.

## EC-176

## P0133 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >	[MR18DE]
<ol> <li>Fully release accelerator pedal and then let engine idle for about 1 minute.</li> <li>Check 1st trip DTC detected?.</li> </ol>	
Is 1st trip DTC detected?	
YES >> Go to <u>EC-177, "Diagnosis Procedure"</u> . NO >> INSPECTION END	
Diagnosis Procedure	INFOID:000000004833287
1. CHECK GROUND CONNECTION	
1. Turn ignition switch OFF.	
2. Check ground connection E38. Refer to <u>GI-37, "Circuit Inspection"</u> .	
<u>Is the inspection result normal?</u> YES >> GO TO 2.	
NO >> Repair or replace ground connection.	
2.RETIGHTEN A/F SENSOR 1	
Loosen and retighten the A/F sensor 1. Refer to EM-29, "Exploded View".	
>> GO TO 3.	
3.CHECK EXHAUST GAS LEAK	
<ol> <li>Start engine and run it at idle.</li> <li>Listen for an exhaust gas leak before three way catalyst (manifold).</li> </ol>	
A/F sensor 1 HO2S2 / Under floor) Muffler	]
➡ : Exhaust gas	PBIB1216E
Is exhaust gas leak detected?	
YES >> Repair or replace. NO >> GO TO 4.	
4. 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 5.	
5.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE	
<ol> <li>Clear the mixture ratio self-learning value. Refer to <u>EC-19, "MIXTURE RATIO SELF-</u> <u>CLEAR : Special Repair Requirement".</u></li> </ol>	<u>LEARNING VALUE</u>
2. Run engine for at least 10 minutes at idle speed.	
Is the 1st trip DTC P0171 or P172 detected? Is it difficult to start engine?	
YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to <u>EC-200</u> . "DTC	<u>Logic</u> or <u>EC-204.</u>
<u>"DTC Logic"</u> . NO >> GO TO 6.	
6. Check air fuel ratio (A/F) sensor 1 power supply circuit	
<ol> <li>Disconnect A/F sensor 1 harness connector.</li> <li>Turn ignition switch ON.</li> <li>Check the voltage between A/F sensor 1 harness connector and ground.</li> </ol>	

## EC-177

## P0133 A/F SENSOR 1

#### < DTC/CIRCUIT DIAGNOSIS >

A/F se	A/F sensor 1 Ground Voltage		Voltage	
Connector	Terminal	Glound	vollage	
F50	4	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

## 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- IPDM E/R harness connector E15
- 15 A fuse (No. 61)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

## $\mathbf{8}$ .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 se	ensor 1	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F50	1	F8	49	Existed
	2		53	Existed

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity	
Connector	Terminal	Gibuna	Continuity	
F50	1 Grou		Not existed	
150	2	Ground	NOT EXISTED	

ECM		Ground	Continuity
Connector	Terminal	Ground	Continuity
F8	49	Cround	Not existed
ГО	53	Ground	INOL 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-129, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 13.

**10.**CHECK MASS AIR FLOW SENSOR

Refer to <u>EC-139</u>, "Component Inspection". Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS > [MR18DE]	
YES >> GO TO 11.	
NO >> Replace mass air flow sensor. 11.CHECK PCV VALVE	А
Refer to <u>EC-413, "Component Inspection"</u> . Is the inspection result normal?	EC
YES >> GO TO 12.	
NO >> Repair or replace PCV valve.	С
12. CHECK INTERMITTENT INCIDENT	0
Perform GI-34, "Intermittent Incident".	
Is the inspection result normal?	D
YES >> GO TO 13. NO >> Repair or replace.	
13.REPLACE AIR FUEL RATIO (A/F) SENSOR 1	Е
Replace air fuel ratio (A/F) sensor 1. CAUTION:	F
• Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard	Г
<ul> <li>surface such as a concrete floor; use a new one.</li> <li>Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).</li> </ul>	G
>> INSPECTION END	Η
	I
	1
	J
	Κ
	1
	Μ
	Ν
	0
	Р

## P0137 HO2S2

## Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.

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 1 V in richer conditions to 0 V 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 maximum voltage of the sensor is sufficiently high during the various driving condition such as fuelcut.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0137	Heated oxygen sensor 2 circuit low voltage	The maximum voltage from the sensor is not reached to the specified voltage.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> <li>Fuel pressure</li> <li>Fuel injector</li> <li>Intake air leaks</li> </ul>

#### 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

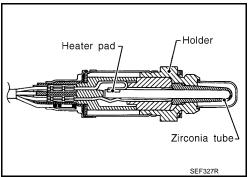
If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

**3.**PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III



ΟK

1V

0V

0.68V



INFOID:000000004833289

NG

SEF259VA

< DTC/CIRCUIT DIAGNOSIS >	[MR18DE]	
<ol> <li>Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Turn ignition switch OFF and wait at least 10 seconds.</li> </ol>		А
<ol> <li>Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute in 5. Let engine idle for 1 minute.</li> <li>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 70°C (158°F).</li> </ol>	E	EC
<ol> <li>Open engine hood.</li> <li>Select "HO2S2 (B1) P1147" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-</li> <li>Follow the instruction of CONSULT-III.</li> <li>NOTE:</li> </ol>	-111.	С
It will take at most 10 minutes until "COMPLETED" is displayed. 10. Touch "SELF-DIAG RESULT". Which is displayed on CONSULT-III screen?		D
OK >> INSPECTION END NG >> Go to <u>EC-182, "Diagnosis Procedure"</u> . CAN NOT BE DIAGNOSED>>GO TO 4.		Е
4. PERFORM DTC CONFIRMATION PROCEDURE AGAIN		F
<ol> <li>Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).</li> <li>Perform DTC CONFIRMATION PROCEDURE again.</li> <li>&gt;&gt; GO TO 3.</li> </ol>		G
5.PERFORM COMPONENT FUNCTION CHECK		Н
Perform component function check. Refer to <u>EC-181, "Component Function Check"</u> . NOTE:		
Use component function check to check the overall function of the heated oxygen sensor 2 circl check, a 1st trip DTC might not be confirmed. Is the inspection result normal? YES >> INSPECTION END	uit. During this	1
NO >> Go to <u>EC-182, "Diagnosis Procedure"</u> .		J
Component Function Check	INFOID:0000000004833290	K
1.PERFORM COMPONENT FUNCTION CHECK-I		I.
<ul> <li>Without CONSULT-III</li> <li>Start engine and warm it up to normal operating temperature.</li> <li>Turn ignition switch OFF and wait at least 10 seconds.</li> <li>Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute 4.</li> <li>Let engine idle for 1 minute.</li> <li>Check the voltage between ECM harness connector and ground under the following conditioned and the second seco</li></ul>		L

E	СМ	Ground Condition		Voltage	Ν
Connector	Terminal	Ground	Condition	voltage	
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure.	0

Is the inspection result normal?

YES >> INSPECTION END NO C

>> GO TO 2.

Check the voltage between ECM harness connector and ground under the following condition.

Ρ

# < DTC/CIRCUIT DIAGNOSIS >

E	CM	Ground	Condition	Voltage
Connector	Terminal	Ground	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END NO >> GO TO 3.

NO >> GO TO 3

# **3.**PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground under the following condition.

E	CM	Ground	Condition	Voltage
Connector	Terminal	Glound	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure.

## Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-182, "Diagnosis Procedure".

# Diagnosis Procedure

# **1.**CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to <u>GI-37, "Circuit Inspection"</u>.
- 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-19</u>, "MIXTURE RATIO SELF-LEARNING VALUE <u>CLEAR : Special Repair Requirement"</u>.
- 2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

- YES >> Perform trouble diagnosis for DTC P0171. Refer to <u>EC-200, "DTC Logic"</u>.
- NO >> GO TO 3.

**3.**CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

## 1. Turn ignition switch OFF.

- 2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO	2S2	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F30	1	F8	59	Existed

5. 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 HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

# EC-182

INFOID:000000004833292

# < DTC/CIRCUIT DIAGNOSIS >

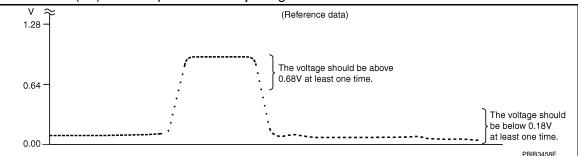
НС	02S2	E	СМ			А
Connector	Terminal	Connector	Terminal	- Continuity		
F30	4	F8	50	Existed		EC
2. Check the ground.	continuity betw	een HO2S2 ha	arness connec	tor and ground,	or ECM harness connector and	
HC	02S2			-		С
Connector	Terminal	Ground	Continuity			
F30	4	Ground	Not existed	_		D
				_		
E	СМ	Ground	Continuity	_		E
Connector	Terminal			_		
F8	50	Ground	Not existed	_		
	harness for sho	•				F
	<u>n result normal?</u> ) TO 5.	2				
		t or short to gro	und or short to	power in harnes	s or connectors.	G
-	ATED OXYGEN	-				
Refer to EC-18	3, "Component	Inspection".				- Н
-	n result normal?					
	D TO 7.					
•	D TO 6.					
<b>O.</b> REPLACE F	HEATED OXYG	EN SENSOR 2				_
<ul><li>surface such</li><li>Before insta</li></ul>	n as a concrete Iling new sens service tool (J	floor; use a n or, clean exha	ew one. aust system tl	hreads using O	nan 0.5 m (19.7 in) onto a hard xygen Sensor Thread Cleaner ti-seize Lubricant (commercial	K
>> IN\$	SPECTION END	)				
	ERMITTENT IN					
	"Intermittent Ind					M
		J				Ν
Component	Inspection				INFOID:00000000483329	3
1.INSPECTIO	N START					0
Do you have C	ONSULT-III?					-
Do you have C						Р
	) TO 2. ) TO 3.					
•	ATED OXYGEN					
		JUNJUK Z				-
2. Start engin		p to normal ope	erating tempera	ode with CONSL ature.	JLT-III.	

Revision: 2009 March

# EC-183

## < DTC/CIRCUIT DIAGNOSIS >

- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. 4.
- Let engine idle for 1 minute. 5.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with 6. CONSULT-III.
- 7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to  $\pm 25\%$ .



"HO2S2 (B1)" should be above 0.68 V at least once when the "FUEL INJECTION" is + 25%. "HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is – 25%.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

**3.**CHECK HEATED OXYGEN SENSOR 2-I

#### Without CONSULT-III

- Start engine and warm it up to normal operating temperature. 1.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. 3.
- Let engine idle for 1 minute. 4.
- Check the voltage between ECM harness connector and ground under the following condition. 5.

E	CM	Ground	Condition	Voltage
Connector	Terminal	Giouna	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

## 4.CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground under the following condition.

Connector     Terminal       F8     50 (HO2S2 signal)       Ground     Keeping engine speed at idle for 10 minutes	EC	CM	Ground Condition		Voltage
F8 50 (HO2S2 signal) Ground Ground Keeping engine speed at idle for 10 at least once during this proce minutes The voltage should be below (	Connector	Terminal	Glound	Condition	voltage
	F8		Ground		The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

YES >> INSPECTION END

NO >> GO TO 5.

**5.**CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground under the following condition.

## < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

E	СМ		Oran I'll a	Ve ke s
Connector	Terminal	Ground	Condition	Voltage
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
the inspection	on result normal?	2		
	SPECTION END	)		
	D TO 6.			
	HEATED OXYGI			
Replace heate	d oxygen sensoi	r 2.		
Discard any surface such Before insta	h as a concrete Illing new sens I service tool (J	floor; use a n or, clean exh	lew one. aust system threads using C	han 0.5 m (19.7 in) onto a hard Oxygen Sensor Thread Cleaner hti-seize Lubricant (commercial
>> IN	SPECTION END	)		

# P0138 HO2S2

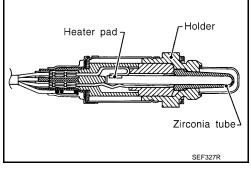
# Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.

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 1 V in richer conditions to 0 V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



# **DTC** Logic

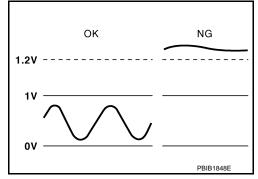
INFOID:000000004833295

# 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.

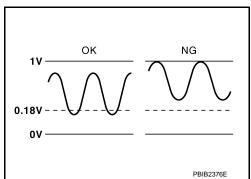
# MALFUNCTION A

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.



# MALFUNCTION B

To judge the malfunctions of heated oxygen sensor 2, 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
		A)	An excessively high voltage from the sensor is sent to ECM.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> </ul>
P0138	Heated oxygen sensor 2 circuit high voltage	B)	The minimum voltage from the sensor is not reached to the specified voltage.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> <li>Fuel pressure</li> <li>Fuel injector</li> </ul>

INFOID:000000004833294

[MR18DE]

DTC CONFIRMATION PROCEDURE
1. PRECONDITIONING
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
>> GO TO 2.
2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A
<ol> <li>Start engine and warm it up to normal operating temperature.</li> <li>Turn ignition switch OFF and wait at least 10 seconds.</li> <li>Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.</li> <li>Let engine idle for 2 minutes.</li> <li>Check 1st trip DTC.</li> </ol>
Is 1st trip DTC detected?
YES >> Go to <u>EC-188, "Diagnosis Procedure"</u> . NO-1 >> With CONSULT-III: GO TO 3. NO-2 >> Without CONSULT-III: GO TO 5.
<b>3.</b> PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B
NOTE:
For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F). 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III. 2. Start engine and warm it up to normal operating temperature.
<ol> <li>Turn ignition switch OFF and wait at least 10 seconds.</li> <li>Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.</li> <li>Let engine idle for 1 minute.</li> </ol>
<ol> <li>Make sure that "COOLAN TEMP/S" indication is more than 70°C (158°F).</li> <li>If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).</li> </ol>
<ol> <li>Open engine hood.</li> <li>Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.</li> <li>Follow the instruction of CONSULT-III.</li> <li>NOTE:</li> </ol>
It will take at most 10 minutes until "COMPLETED" is displayed.
Which is displayed on CONSULT-III
OK >> INSPECTION END NG >> Go to <u>EC-188, "Diagnosis Procedure"</u> . CAN NOT BE DIAGNOSED>>GO TO 4.
4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALUNCTION B AGAIN
<ol> <li>Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).</li> <li>Perform DTC CONFIRMATION PROCEDURE again.</li> </ol>
>> GO TO 3.
5. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B
Perform component function check. Refer to <u>EC-188, "Diagnosis Procedure"</u> . <b>NOTE:</b> 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. <u>Is the inspection result normal?</u>
YES >> INSPECTION END
NO >> Go to <u>EC-188, "Diagnosis Procedure"</u> .
Component Function Check
1.PERFORM COMPONENT FUNCTION CHECK-I

< DTC/CIRCUIT DIAGNOSIS >

#### Without CONSULT-III

- T. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector and ground under the following condition.

E	СМ	Ground	Condition	Voltage
Connector	Terminal	Glound	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

# 2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground under the following condition.

E	ECM		Condition	Voltage
Connector	Terminal	Ground	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

# **3.** PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground under the following condition.

E	ECM		Condition	Voltage
Connector	Terminal	Ground	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to <u>EC-188, "Diagnosis Procedure"</u>.

# Diagnosis Procedure

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to <u>EC-186. "DTC Logic"</u>.

Which malfunction is detected?

A >> GO TO 2.

B >> GO TO 9.

2. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E38. Refer to GI-37, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

**3.**CHECK HO2S2 CONNECTOR FOR WATER

INFOID:000000004833298

TC/CIRCUI	T DIAGNOSIS	5 >			[MR18DE]
	heated oxygen nectors for wate	n sensor 2 harn er.	ess connector.		
Water s	hould not exis	st.			
	n result normal?	<u>?</u>			
ES >> GO O >> Rep		harness or conr	nectors		
•	•		OPEN AND SH	ORT	
	ECM harness				
			ness connector	and ECM harness conne	ector.
		_	<b></b>		
HO2			CM	Continuity	
Connector	Terminal	Connector	Terminal	Eviatod	
F30	1	F8	59	Existed	
	narness for sho n result normal?	0	nd short to powe	1.	
S >> GO		<u>.</u>			
		t or short to gro	ound or short to p	oower in harness or conr	ectors.
-	-	-	FOR OPEN AN		
				and ECM harness conne	actor
	Jointinuity Detwe				
HO2	2S2	E	СМ		
1	2S2 Terminal	E	CM Terminal	Continuity	
Connector F30	Terminal 4	Connector F8	Terminal 50	Existed	
Connector F30	Terminal 4	Connector F8	Terminal 50		harness connector and
Connector F30 Check the	Terminal 4 continuity betw	Connector F8 /een HO2S2 ha	Terminal 50 arness connecto	Existed	harness connector and
Connector F30 Check the ground. HO2 Connector	Terminal 4 continuity betw	Connector F8	Terminal 50	Existed	harness connector and
Connector F30 Check the ground. HO2	Terminal 4 continuity betw 2S2	Connector F8 /een HO2S2 ha	Terminal 50 arness connecto	Existed	harness connector and
Connector F30 Check the ground. HO2 Connector F30	Terminal 4 continuity betw 2S2 Terminal 4	Connector F8 /een HO2S2 ha	Terminal 50 arness connecto Continuity	Existed	harness connector and
Connector F30 Check the ground. HO2 Connector F30 EC	Terminal 4 continuity betw 2S2 Terminal 4 CM	Connector F8 /een HO2S2 ha	Terminal 50 arness connecto Continuity	Existed	harness connector and
Connector F30 Check the ground. HO2 Connector F30 EC Connector	Terminal 4 continuity betw 2S2 Terminal 4 CM Terminal	Connector F8 /een HO2S2 ha Ground Ground	Terminal 50 arness connecto Continuity Not existed Continuity	Existed	harness connector and
Connector F30 Check the ground. HO2 Connector F30 EC Connector F8	Terminal 4 continuity betw 2S2 Terminal 4 CM Terminal 50	Connector F8 /een HO2S2 ha Ground Ground Ground Ground	Terminal 50 arness connecto Continuity Not existed	Existed	harness connector and
Connector F30 Check the ground. HO2 Connector F30 EC Connector F8 Also check	Terminal 4 continuity betw 2S2 Terminal 4 CM Terminal 50 harness for sho	Connector F8 /een HO2S2 ha Ground Ground Ground Ort to power.	Terminal 50 arness connecto Continuity Not existed Continuity	Existed	harness connector and
Connector F30 Check the ground. HO2 Connector F30 EC Connector F8 Also check he inspectior	Terminal 4 continuity betw 2S2 Terminal 4 CM Terminal 50 harness for sho	Connector F8 /een HO2S2 ha Ground Ground Ground Ort to power.	Terminal 50 arness connecto Continuity Not existed Continuity	Existed	harness connector and
Connector F30 Check the ground. HO2 Connector F30 EC Connector F8 Also check he inspectior S >> GO	Terminal 4 continuity betw 2S2 Terminal 4 CM Terminal 50 harness for sho n result normal?	Connector F8 /een HO2S2 ha Ground Ground Ground Ort to power. 2	Terminal 50 arness connecto Continuity Not existed Continuity Not existed	Existed	
Connector F30 Check the ground. HO2 Connector F30 EC Connector F8 Also check he inspectior ES >> GO D >> Rep	Terminal 4 continuity betw 2S2 Terminal 4 CM Terminal 50 harness for sho n result normal?	Connector F8 /een HO2S2 ha Ground Ground Ground Ort to power. ? t or short to gro	Terminal 50 arness connecto Continuity Not existed Continuity Not existed	Existed or and ground, or ECM	
Connector F30 Check the ground. HO2 Connector F30 EC Connector F8 Also check he inspectior ES >> GO D >> Rep CHECK HEA	Terminal 4 continuity betw 2S2 Terminal 4 CM Terminal 50 harness for sho presult normal? 0 TO 6. pair open circuit ATED OXYGEN	Connector F8 /een HO2S2 ha Ground Ground Ground Ort to power. ? t or short to ground I SENSOR 2	Terminal 50 arness connecto Continuity Not existed Continuity Not existed	Existed or and ground, or ECM	
Connector F30 Check the ground. HO2 Connector F30 EC Connector F8 Also check he inspectior ES >> GO D >> Rep CHECK HEA er to EC-191	Terminal 4 continuity betw 2S2 Terminal 4 CM Terminal 50 harness for sho n result normal? TO 6. pair open circuit ATED OXYGEN 1. "Component	Connector F8 /een HO2S2 ha Ground Ground Ground ort to power. 2 t or short to gro I SENSOR 2 Inspection".	Terminal 50 arness connecto Continuity Not existed Continuity Not existed	Existed or and ground, or ECM	
Connector F30 Check the ground. HO2 Connector F30 EC Connector F8 Also check he inspectior ES >> GO D >> Rep CHECK HEA er to EC-191 he inspectior	Terminal 4 continuity betw 2S2 Terminal 4 CM Terminal 50 harness for sho bar result normal? TO 6. bair open circuit ATED OXYGEN 1. "Component barresult normal?	Connector F8 /een HO2S2 ha Ground Ground Ground ort to power. 2 t or short to gro I SENSOR 2 Inspection".	Terminal 50 arness connecto Continuity Not existed Continuity Not existed	Existed or and ground, or ECM	
Connector F30 Check the ground. HO2 Connector F30 EC Connector F8 Also check he inspectior ES >> GO D >> Rep CHECK HEA fer to EC-191 he inspectior ES >> GO D >> GO	Terminal 4 continuity betw 2S2 Terminal 4 CM Terminal 50 harness for sho presult normal? TO 6. pair open circuit ATED OXYGEN 1. "Component presult normal? TO 8. TO 7.	Connector F8 /een HO2S2 ha Ground Ground Ground ort to power. 2 t or short to gro I SENSOR 2 Inspection".	Terminal 50 arness connecto Continuity Not existed Continuity Not existed	Existed or and ground, or ECM	

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.

# EC-189

#### < DTC/CIRCUIT DIAGNOSIS >

 Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

8.CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

## >> INSPECTION END

**9.**CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-37, "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

- Clear the mixture ratio self-learning value. Refer to <u>EC-19</u>, "MIXTURE RATIO SELF-LEARNING VALUE <u>CLEAR : Special Repair Requirement"</u>.
- 2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0172. Refer to <u>EC-204, "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.

HO	HO2S2		ECM		
Connector	Terminal	Connector	Terminal	Continuity	
F30	1	F8	59	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.

НО	HO2S2		ECM		
Connector	Terminal	Connector	Terminal	Continuity	
F30	4	F8	50	Existed	

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

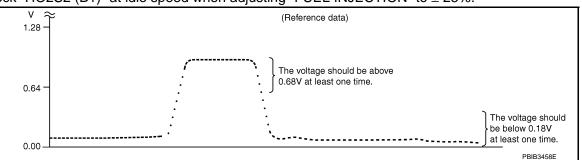
НО	2S2	Ground	Continuity	
Connector	Terminal	Gibana	Continuity	
F30	4	Ground	Not existed	

# < DTC/CIRCUIT DIAGNOSIS >

EC	:M			
Connector	Terminal	Ground	Continuity	
F8	50	Ground	Not existed	
3. Also check	harness for she	ort to power.		
Is the inspection		<u>?</u>		
	TO 13.	t or chort to are	und or short to	power in harness or connectors.
13.снеск н		-		Jower in namess of connectors.
Refer to EC-19				
Is the inspection				
YES >> GO	TO 15.	-		
	TO 14.			
14.REPLACE	HEATED OXY	GEN SENSOR	2	
Replace heated	l oxygen senso	r 2.		
	sensor which	has been drop	oped from a he	ight of more than 0.5 m (19.7 in) onto a hard
		floor; use a n		-
				reads using Oxygen Sensor Thread Cleaner d approved Anti-seize Lubricant (commercial
service tool).				
· _	SPECTION END			
<b>15.</b> CHECK IN				
Refer to <u>GI-34,</u>	"Intermittent Inc	<u>cident"</u> .		
>> INS		)		
Component				INFOID:000000004833299
4				INFOID:00000004633299
	N START			
Do you have CO				
<u>Do you have CO</u> YES >> GO				
YES >> GO NO >> GO				
2.CHECK HEA	ATED OXYGEN	SENSOR 2		
1. Turn ignitio	n switch ON an			de with CONSULT-III.
			erating tempera	ure.
		nd wait at least engine speed b		nd 4,000 rpm for at least 1 minute under no load.
5. Let engine	idle for 1 minut	e.		
6. Select "FUI CONSULT-		IN ACTIVE T	EST mode, an	d select "HO2S2 (B1)" as the monitor item with
50.0021				

## < DTC/CIRCUIT DIAGNOSIS >





"HO2S2 (B1)" should be above 0.68 V at least once when the "FUEL INJECTION" is + 25%. "HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is – 25%.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

**3.**CHECK HEATED OXYGEN SENSOR 2-1

## Without CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal	Glound	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

## **4.**CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground under the following condition.

E	ECM		Condition	Voltage
Connector	Terminal	Ground Condition		voltage
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

**5.**CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground under the following condition.

## < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

E	CM	Ground	Condition	Voltage
Connector	Terminal	Ground	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
s the inspectio	n result normal?	-		
		)		
-	) TO 6. IEATED OXYGI			
CAUTION:	l oxygen sensoi			
	sensor which as a concrete			han 0.5 m (19.7 in) onto a haro
Before insta	lling new sens	or, clean exha	aust system threads using O	xygen Sensor Thread Cleane
[commercial service tool)		-43897-18 or 、	J43897-12)] and approved An	ti-seize Lubricant (commercia
Service (001)	•			
>> INS	SPECTION END	)		

# P0139 HO2S2

# Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.

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 1 V in richer conditions to 0 V 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 between rich and lean than the specified time.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> <li>Fuel pressure</li> <li>Fuel injector</li> <li>Intake air leaks</li> </ul>

# 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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

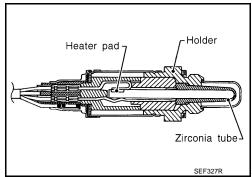
# **3.** PERFORM DTC CONFIRMATION PROCEDURE

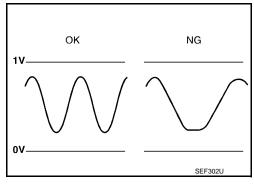
## With CONSULT-III

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to normal operating temperature.

# EC-194

#### 2009 Z12





INFOID:000000004833300

INFOID:000000004833301

			0133110232	
< DTC/CIRCU	IT DIAGNOSIS	; >		[MR18DE]
	idle for 1 minute		etween 3,500 and 4,000 rpm fo	or at least 1 minute under no load.
<ol> <li>6. Select "HC</li> <li>7. Follow the</li> </ol>			n "DTC WORK SUPPORT" mo	de with CONSULT-III.
			PLETED" is displayed.	
	LF-DIAG RESU			
OK >> IN	<u>ved on CONSU</u> SPECTION ENI D TO 4.			
	DIAGNOSED>	>GO TO 4.		
4.PERFORM	THE RESULT O	OF DTC CONFI	RMATION PROCEDURE	
	on switch OFF a TC CONFIRMA		hicle in a cool place (soak the URE again.	vehicle).
_	) TO 3. COMPONENT		ECK	
				Chook"
NOTE:			C-195, "Component Function	<u>CHECK</u> .
	t function check DTC might no		verall function of the heated ox	tygen sensor 2 circuit. During this
	n result normal			
	SPECTION END			
NO >> Go	o to <u>EC-196, "Di</u>	agnosis Proced	<u>ure"</u> .	
Component	Function Ch	neck		INFOID:000000004833302
1.PERFORM	COMPONENT	FUNCTION CH	ECK-I	
Without CO	NSULT-III			
1. Start engin	e and warm it u		erating temperature.	
	on switch OFF a			or at least 1 minute under no load.
4. Let engine	idle for 1 minute	е.	· · · ·	
5. Check the	voltage betwee	n ECM harness	connector and ground under t	he following condition.
E	СМ		<b>O</b>	
Connector	Terminal	Ground	Condition	Voltage
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.8 V at least once during this procedure.
	n result normal			
	SPECTION ENI ) TO 2.	)		
	J 10 Z.			

NO >> GO TO 2.

**2.** PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground under the following condition.

E	СМ	Ground	Ground Condition Voltage		
Connector	Terminal	Ground	Condition	voltage	
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.8 V at least once during this procedure.	

## Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

Ο

# **3.**PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground under the following condition.

E	ECM		Condition	Voltage	
Connector	Terminal	Ground	Condition	voltage	
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.8 V at least once during this procedure.	

Is the inspection result normal?

#### YES >> INSPECTION END

NO >> Go to EC-196, "Diagnosis Procedure".

## Diagnosis Procedure

INFOID:000000004833304

# **1.**CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-37, "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

- 1. Clear the mixture ratio self-learning value. Refer to <u>EC-19, "MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement"</u>.
- 2. Run engine for at least 10 minutes at idle speed.

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-200, "DTC Logic"</u> or <u>EC-204,</u> <u>"DTC Logic"</u>.

NO >> GO TO 3.

 $\mathbf{3}$ . CHECK HO2S2 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.

НО	2S2	E	Continuity	
Connector	Terminal	Connector Terminal		
F30	1	F8	59	Existed

5. 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 HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO	2S2	E	Continuity	
Connector	Terminal	Connector Terminal		
F30	4	F8	50	Existed

Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

# < DTC/CIRCUIT DIAGNOSIS >

HO2S2

HO	2S2	Crowned	Continuity	
Connector	Terminal	Ground	Continuity	
F30	4	Ground	Not existed	
E	СМ	Ground	Continuity	
Connector	Terminal			
F8	50	Ground	Not existed	
3. Also check		•		
Is the inspection YES >> GC		<u>?</u>		
	) TO 5. pair open circui	t or short to arc	ound or short to	power in harness or connectors.
5.CHECK HEA		-		F
Refer to EC-19				
Is the inspection				
•	) TO 7.	_		
•	) TO 6.			
<b>6.</b> REPLACE H	IEATED OXYG	EN SENSOR 2		
<ul> <li>Before instal [commercial service tool)</li> </ul>	service tool (.	sor, clean exha J-43897-18 or d	aust system th	reads using Oxygen Sensor Thread Cleaner d approved Anti-seize Lubricant (commercial
_				
7.CHECK INT		-		
Refer to GI-34.	"Intermittent Ind	<u>cident"</u> .		
>> INS		ר		
Component				
Component	Inspection			INFOID:00000004833305
1.INSPECTIO	N START			
Do you have Co	ONSULT-III?			
<u>Do you have C</u>	ONSULT-III?			
	) TO 2.			
•	TO 3.			
2.CHECK HEA	ATED OXYGEN	I SENSOR 2		
<ol> <li>Start engine</li> <li>Turn ignitio</li> <li>Start engine</li> </ol>	n switch ON an e and warm it u n switch OFF a	p to normal ope nd wait at least engine speed b	erating tempera 10 seconds.	ode with CONSULT-III. ture. nd 4,000 rpm for at least 1 minute under no load.

- 5. Let engine idle for 1 minute.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with 6. CONSULT-III.

А

EC

С

D

Ε

F

G

Н

J

Κ

L

Μ

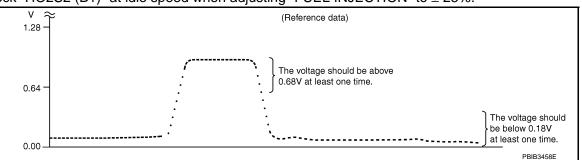
Ν

Ο

Ρ

## < DTC/CIRCUIT DIAGNOSIS >





"HO2S2 (B1)" should be above 0.68 V at least once when the "FUEL INJECTION" is + 25%. "HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is – 25%.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

**3.**CHECK HEATED OXYGEN SENSOR 2-1

## Without CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground Condition		Voltage
Connector	Terminal	Glound	Condition voltage	
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

#### **4.**CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground under the following condition.

E	ECM		Condition	Voltage	
Connector	Terminal	Ground	Condition	voltage	
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

**5.**CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground under the following condition.

## < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

E	CM	Ground	Condition	Voltage
Connector	Terminal	Ground	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
s the inspectio	n result normal?	-		
		)		
-	) TO 6. IEATED OXYGI			
CAUTION:	l oxygen sensoi			
	sensor which as a concrete			han 0.5 m (19.7 in) onto a haro
Before insta	lling new sens	or, clean exha	aust system threads using O	xygen Sensor Thread Cleane
[commercial service tool)		-43897-18 or 、	J43897-12)] and approved An	ti-seize Lubricant (commercia
Service (001)	•			
>> INS	SPECTION END	)		

## < DTC/CIRCUIT DIAGNOSIS >

# P0171 FUEL INJECTION SYSTEM FUNCTION

# **DTC Logic**

INFOID:000000004833306

[MR18DE]

## 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	<ul> <li>Fuel injection system does not operate properly.</li> <li>The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)</li> </ul>	<ul> <li>Intake air leaks</li> <li>A/F sensor 1</li> <li>Fuel injector</li> <li>Exhaust gas leaks</li> <li>Incorrect fuel pressure</li> <li>Lack of fuel</li> <li>Mass air flow sensor</li> <li>Incorrect PCV hose connection</li> </ul>

## DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

## >> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Clear the mixture ratio self-learning value. Refer to <u>EC-19</u>, "MIXTURE RATIO SELF-LEARNING VALUE <u>CLEAR</u>: Special Repair Requirement".
- 2. Start engine.
- Is it difficult to start engine?

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

**3.**RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too. Crank engine while depressing accelerator pedal.

NOTE:

When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Go to EC-201, "Diagnosis Procedure".

NO >> Check exhaust and intake air leak visually.

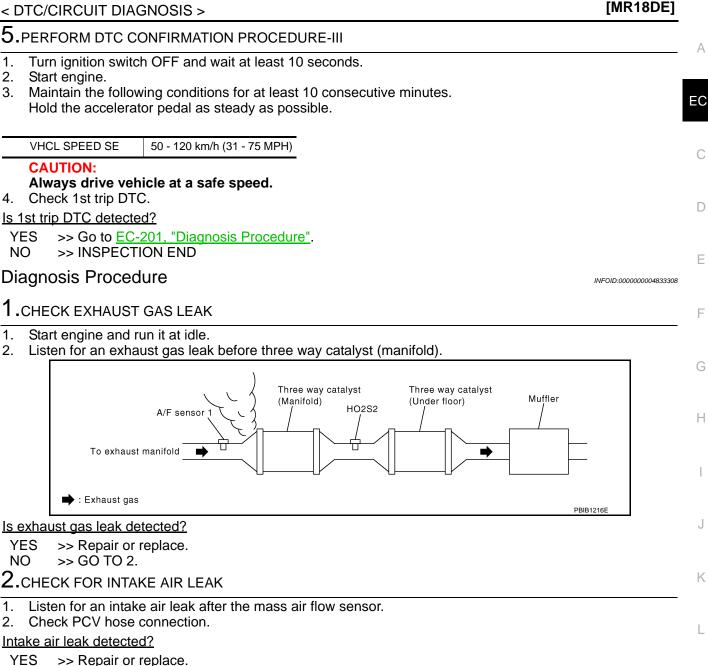
4.PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. Start engine and let it idle for at least 5 minutes.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-201, "Diagnosis Procedure".

NO >> GO TO 5.



NO >> GO TO 3.

## ${f 3.}$ 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	ensor 1	ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
F50	1	F8	49	Existed	
1 50	2	1.0	53	LVISIGO	

5. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

Μ

Ν

Ρ

## < DTC/CIRCUIT DIAGNOSIS >

A/F se	ensor 1	Ground	Continuity	
Connector	Terminal	Giodila	Continuity	
F50	1	Ground	Not existed	
1.50	2	Ground	Not existed	

ECM		Ground	Continuity	
Connector	Terminal	Ground	Continuity	
F8	49	Ground	Not existed	
ГО	53	Ground	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. Check fuel pressure. Refer to EC-471, "Inspection".

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

#### (B) 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-477, "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-477, "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-136. "DTC Logic"</u>.

**7.**CHECK FUNCTION OF FUEL INJECTOR

## With CONSULT-III

- 1. Start engine.
- 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. Let engine idle.

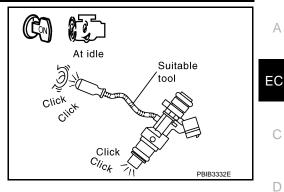
## < DTC/CIRCUIT DIAGNOSIS >

#### 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-395, "Component Function Check"</u>.



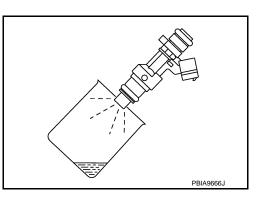
# 8. CHECK FUEL INJECTOR

- 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-35</u>, "<u>Removal and Installation</u>". Keep fuel hose and all fuel injectors connected to fuel tube.
- 5. Disconnect all ignition coil harness connectors.
- 6. Prepare pans or saucers under each fuel injector.
- 7. Crank engine for about 3 seconds.

#### 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-34, "Intermittent Incident".

>> INSPECTION END

Е

F

Н

Κ

L

Μ

Ν

Ρ

## < DTC/CIRCUIT DIAGNOSIS >

P0172 FUEL INJECTION SYSTEM FUNCTION

# DTC Logic

INFOID:000000004833309

[MR18DE]

## 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	<ul> <li>Fuel injection system does not operate properly.</li> <li>The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)</li> </ul>	<ul> <li>A/F sensor 1</li> <li>Fuel injector</li> <li>Exhaust gas leaks</li> <li>Incorrect fuel pressure</li> <li>Mass air flow sensor</li> </ul>

# DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

## >> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Clear the mixture ratio self-learning value. Refer to <u>EC-19, "MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement"</u>.
- 2. Start engine.

Is it difficult to start engine?

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

NO *>>* GO 10 4. **N** 

**3.**RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.

Crank engine while depressing accelerator pedal.

#### NOTE:

When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Go to EC-205, "Diagnosis Procedure".

NO >> Check exhaust and intake air leak visually.

**4.**PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. Start engine and let it idle for at least 5 minutes.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

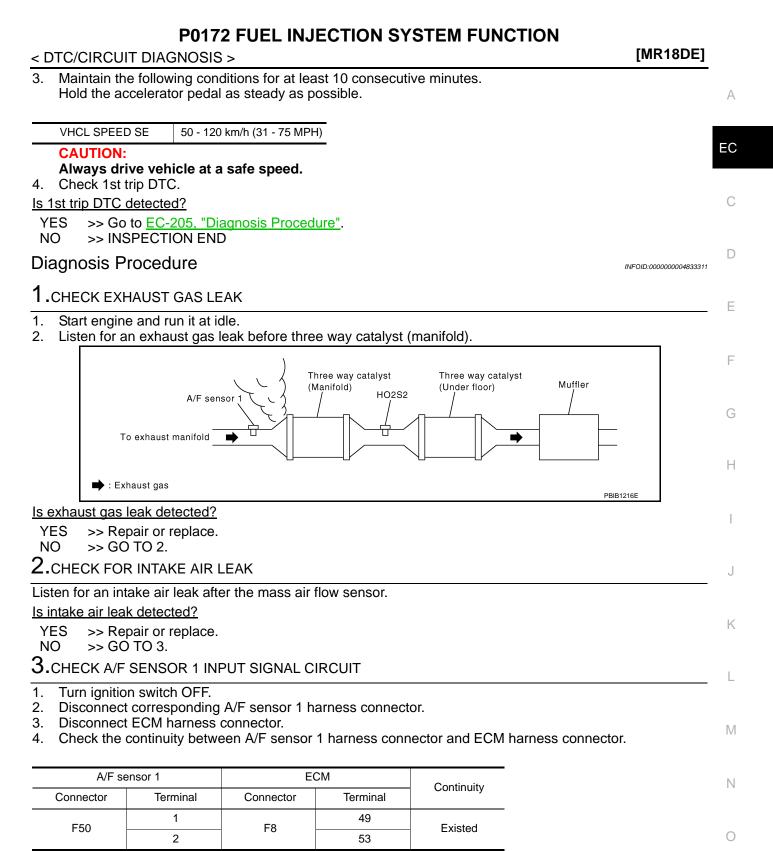
YES >> Go to EC-205, "Diagnosis Procedure".

NO >> GO TO 5.

# 5. PERFORM DTC CONFIRMATION PROCEDURE-III

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

2. Start engine.



5. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F se	ensor 1	Ground	Continuity
Connector	Terminal	Ground	Continuity
F50	1	Ground	Not existed

Ρ

## < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

ECM		Ground	Continuity	
Connector	Terminal	Gibuna	Continuity	
F8	49	Ground	Not existed	
10	53	Ground	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. Check fuel pressure. Refer to <u>EC-471, "Inspection"</u>.

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-477, "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-477, "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-136</u>, "<u>DTC Logic</u>".

**7.**CHECK FUNCTION OF FUEL INJECTOR

## With CONSULT-III

- 1. Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that each circuit produces a momentary engine speed drop.

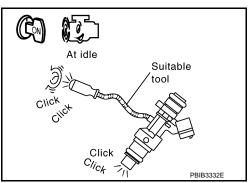
## Without CONSULT-III

- 1. Let engine idle.
- 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-395, "Component Function Check"</u>.



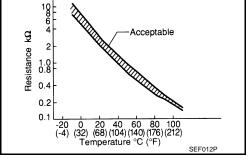
# < DTC/CIRCUIT DIAGNOSIS >

<b>Ö.</b> CHECK FUEL INJECTOR	A
<ol> <li>Remove fuel injector assembly. Refer to <u>EM-35</u>, "<u>Removal and Installation</u>". Keep fuel hose and all fuel injectors connected to fuel tube.</li> <li>Confirm that the engine is cooled down and there are no fire hazards near the vehicle.</li> </ol>	
<ol> <li>Disconnect all fuel injector harness connectors.</li> </ol>	EC
4. Disconnect all ignition coil harness connectors.	
<ol> <li>Prepare pans or saucers under each fuel injectors.</li> <li>Crank engine for about 3 seconds.</li> </ol>	С
Make sure fuel does not drip from fuel injector.	_
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.	D
9. CHECK INTERMITTENT INCIDENT	
	- E
Refer to <u>GI-34, "Intermittent Incident"</u> .	
>> INSPECTION END	
	F
	G
	Н
	11
	1
	J
	17
	K
	L
	M
	Ν
	0
	Р
	r

# 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**>



201

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 43 (Fuel tank temperature sensor) and ground.

# DTC Logic

# 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.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Fuel tank temperature sensor</li> </ul>

# DTC CONFIRMATION PROCEDURE

# **1.**PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

## >> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Turn ignition switch and wait at least 10 seconds.
- 2. Check 1st trip DTC.
- Is 1st trip DTC detected?

YES >> Go to EC-209, "Diagnosis Procedure".

NO >> GO TO 3.

3.CHECK ENGINE COOLANT TEMPERATURE

#### With CONSULT-III

- 1. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-III.
- 2. Check "COOLAN TEMP/S" indication.

#### With GST

Follow the procedure "With CONSULT-III" above.

Is "COOLAN TEMP/S" indication less than 60°C (140°F)?

- YES >> INSPECTION END
- NO >> GO TO 4.

**4.**PERFORM DTC CONFIRMATION PROCEDURE-II

## With CONSULT-III

- 1. Cool engine down until "COOLAN TEMP/S" indication is less than 60°C (140°F).
- 2. Wait at least 10 seconds.

# EC-208

INFOID:000000004833312

INFOID:000000004833313

# P0181 FTT SENSOR

		PUT	OI FII SEN	130K	
< DTC/CIRCU	IT DIAGNOSIS	;>			[MR18DE]
3. Check 1st	trip DTC.				
Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature     Signature	edure "With CC	NSULT-III" abo	ive.		
Is 1st trip DTC					
	to <u>EC-209, "Di</u>		ure".		
NO >> INS	SPECTION END	0			
Diagnosis P	rocedure				INFOID:000000004833315
<b>1.</b> CHECK GR		CTION			
	on switch OFF.				
-	und connection n result normal?		<u>61-34, "Intermitte</u>	ent incident".	
	) TO 2.	<u>.</u>			
NO >> Re	pair or replace	-			
2.CHECK FUE	EL TANK TEMP	ERATURE SEI	NSOR POWER	SUPPLY CIRCU	Т
	on switch OFF.				
	t "fuel level sens on switch ON.	sor unit and fue	I pump" harness	s connector.	
•		n "fuel level ser	nsor unit and fue	el pump" harness	connector and ground.
	unit and fuel pump	Ground	Voltage		
Connector	Terminal				
B40	4	Ground	Approx. 5 V		
	<u>n result normalí</u> ) TO 4.	<u>{</u>			
	D TO 3.				
3. DETECT M/	ALFUNCTIONIN	NG PART			
Check the follo					
	nectors B4, M79 nectors M77, E1				
<ul> <li>Harness conr</li> </ul>		05			
<ul> <li>Harness for or</li> </ul>	pen or short be	tween ECM and	d "fuel level sen	sor unit and fuel	pump"
>> Po	nair anan airaui	t or chort to are	und or chort to i	oower in harness	or connector
4		0	•		OPEN AND SHORT
		LINATORE SET		CIRCOILLOK	
	on switch OFF. t combination m	eter harness co	onnector.		
	continuity betwe	een "fuel level s	ensor unit and f	uel pump" harnes	ss connector and ECM harness
connector.					
Fuel level sensor	unit and fuel pump	Combina	tion meter		
Connector	Terminal	Connector	Terminal	Continuity	
B40	5	M34	24	Existed	
4. Also check	harness for sho	ort to ground ar	nd short to powe	er.	
	n result normal?	<u>?</u>			
	D TO 6. D TO 5.				
_	ALFUNCTIONIN				
		NG FARI			
<ul> <li>Check the follow</li> <li>Harness conr</li> </ul>	wing. nectors M79, B4	Ļ			
		-			

# P0181 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

# [MR18DE]

• Harness for open or short between "fuel level sensor unit and fuel pump" and combination meter

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

# **6.**CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-210, "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-34, "Intermittent Incident".

#### >> INSPECTION END

## Component Inspection

INFOID:000000004833316

# 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
4 810 5		50 (122)	0.79 - 0.90 kΩ

Is the inspection result normal?

YES >> INSPECTION END

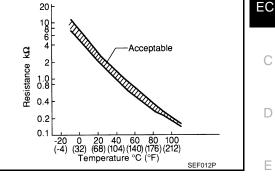
NO >> Replace "fuel level sensor unit and fuel pump".

# 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 43 (Fuel tank temperature sensor) and 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.	<ul> <li>Harness or connectors</li> <li>(The sensor circuit is open or shorted.)</li> </ul>
P0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Fuel tank temperature sensor

## DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE	L
<ol> <li>Turn ignition switch ON and wait at least 5 seconds.</li> <li>Check 1st trip DTC.</li> </ol>	
Is 1st trip DTC detected?	$\mathbb{N}$
YES >> Go to <u>EC-211, "Diagnosis Procedure"</u> . NO >> INSPECTION END	
Diagnosis Procedure	Ν
1.CHECK GROUND CONNECTION	0
<ol> <li>Turn ignition switch OFF.</li> <li>Check ground connection E38. Refer to <u>GI-34, "Intermittent Incident"</u>.</li> </ol>	0
Is the inspection result normal?	Ρ
YES >> GO TO 2. NO >> Repair or replace ground connection.	
2. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT	
<ol> <li>Turn ignition switch OFF.</li> <li>Disconnect "fuel level sensor unit and fuel pump" harness connector.</li> </ol>	

Turn ignition switch ON. 3.

Check the voltage between "fuel level sensor unit and fuel pump" harness connector and ground. 4.

## EC-211

F

Н

Κ

А

INFOID:000000004833317

INFOID:000000004833318

# P0182, P0183 FTT SENSOR

## < DTC/CIRCUIT DIAGNOSIS >

Fuel level sensor	unit and fuel pump	Ground	Voltage
Connector	Terminal	Ground	voltage
B40	4	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

**3.** DETECT MALFUNCTIONING PART

Check the following.

Harness connectors B4, M79

• Harness connectors M77, E105

• Harness connectors E8, F1

• 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. Disconnect combination meter harness connector.
- 3. Check the continuity between "fuel level sensor unit and fuel pump" harness connector and ECM harness connector.

Fuel level sensor unit and fuel pump		unit and fuel pump Combination meter		Continuity	
Connector	Terminal	Connector Terminal		Continuity	
B40	5	M34	24	Existed	

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

Is the inspection result normal?

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

**5.**DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M79, B4

• Harness for open or short between "fuel level sensor unit and fuel pump" and combination meter

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

## **6.**CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-212, "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-34, "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.

INFOID:000000004833321

# P0182, P0183 FTT SENSOR

## < DTC/CIRCUIT DIAGNOSIS >

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
4 810 5		50 (122)	0.79 - 0.90 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump".

А

EC

С

D

Е

F

G

Н

J

Κ

L

Μ

Ν

Ο

Ρ

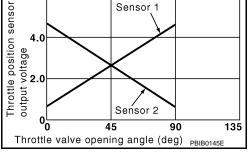
[MR18DE]

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 potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



Throttle position sensor

6.0

DTC Logic

#### INFOID:000000004833323

#### NOTE: If DTC P0222 or P0223 is displayed with DTC P0643 ,first perform the troble diagnosis for DTC P0643. Refer to EC-229, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
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.)
P0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	<ul> <li>Electric throttle control actuator (TP sensor 1)</li> </ul>

# DTC CONFIRMATION PROCEDURE

## **1.**PRECONDITIONING

DTC DETECTION LOGIC

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- 2. Check DTC.

#### Is DTC detected?

YES >> Go to <u>EC-214, "Diagnosis Procedure"</u>. NO >> INSPECTION END

# Diagnosis Procedure

1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-37, "Circuit Inspection".

#### Is the inspection result normal?

- 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.
- 2. Turn ignition switch ON.

Revision: 2009 March

# EC-214

#### 2009 Z12

INFOID:000000004833325

INFOID:000000004833322

# P0222, P0223 TP SENSOR

# 

[MR18DF]

DTC/CIRCU	IT DIAGNOSIS	5 >			[MR18DE]
B. Check the	voltage betweel	n electric throttle	e control actuate	or harness connector and grou	ınd.
	a sectoral a structure				
Connector	control actuator Terminal	Ground	Voltage		
F29	2	Ground	Approx. 5 V		ł
-	n result normal?		Approx. o V		-
YES >> GC NO >> Re	) TO 3. pair open circui	t or short to grou		oower in harness or connector	
		ION SENSOR	1 GROUND CIF	CUIT FOR OPEN AND SHOP	RT
. Disconnect	n switch OFF. ECM harness continuity betwo		ottle control actu	ator harness connector and E	CM harness con-
Electric throttle	control actuator	EC	СМ	Orationity	
Connector	Terminal	Connector	Terminal	Continuity	
F29	4	F8	36	Existed	
Also check	harness for sho	ort to ground an	d short to powe	r.	
/ES >> GC	) TO 4.	_	und or short to	power in harness or connector	S.
YES >> GC NO >> Re .CHECK THF	) TO 4. pair open circui ROTTLE POSIT	t or short to grou	1 INPUT SIGN	oower in harness or connector L CIRCUIT FOR OPEN AND ator harness connector and E	SHORT
YES >> GC NO >> Re •CHECK THF • Check the nector.	) TO 4. pair open circui ROTTLE POSIT	t or short to grou	1 INPUT SIGN	L CIRCUIT FOR OPEN AND ator harness connector and E	SHORT
YES >> GC NO >> Re CHECK THF Check the nector.	0 TO 4. pair open circui ROTTLE POSIT continuity betwo	t or short to grou	1 INPUT SIGNA	L CIRCUIT FOR OPEN AND	SHORT
YES >> GC NO >> Re • CHECK THE Check the nector. Electric throttle Connector F29	D TO 4. pair open circui ROTTLE POSIT continuity betwo control actuator Terminal 1	t or short to grou FION SENSOR een electric thro EC Connector F8	1 INPUT SIGNA ottle control actu CM Terminal 33	L CIRCUIT FOR OPEN AND ator harness connector and E Continuity Existed	SHORT
YES >> GC NO >> Re CHECK THF Check the nector. Electric throttle Connector F29 Also check the inspection YES >> GC NO >> Re	D TO 4. pair open circui ROTTLE POSIT continuity betwo control actuator Terminal 1 harness for sho n result normal?	t or short to grou FION SENSOR een electric thro Connector F8 ort to ground an ? t or short to grou	1 INPUT SIGNA ottle control actu CM Terminal 33 od short to powe	L CIRCUIT FOR OPEN AND ator harness connector and E Continuity Existed	SHORT CM harness con-
YES >> GC NO >> Re CHECK THF Check the nector. Electric throttle Connector F29 Also check the inspection YES >> GC NO >> Re CHECK THF	0 TO 4. pair open circui ROTTLE POSIT continuity betwo control actuator Terminal 1 harness for sho n result normal? 0 TO 5. pair open circui ROTTLE POSIT	t or short to grou FION SENSOR een electric thro Connector F8 ort to ground an ? t or short to grou FION SENSOR	1 INPUT SIGNA ottle control actu CM Terminal 33 od short to powe	AL CIRCUIT FOR OPEN AND lator harness connector and E Continuity Existed r.	SHORT CM harness con-
YES >> GC NO >> Re CHECK THE Check the nector. Electric throttle Connector F29 Also check the inspection YES >> GC CHECK THE efer to <u>EC-21</u> the inspection YES >> GC	0 TO 4. pair open circui ROTTLE POSIT continuity betwo control actuator Terminal 1 harness for sho n result normal? 0 TO 5. pair open circui ROTTLE POSIT 6. "Component n result normal? 0 TO 7.	t or short to grou FION SENSOR een electric thro Connector F8 ort to ground an ? t or short to grou FION SENSOR Inspection".	1 INPUT SIGNA ottle control actu CM Terminal 33 od short to powe	AL CIRCUIT FOR OPEN AND lator harness connector and E Continuity Existed r.	SHORT CM harness con-
YES >> GC NO >> Re CHECK THF Check the nector. Electric throttle Connector F29 Also check the inspection YES >> GC NO >> Re CHECK THF efer to EC-210 the inspection YES >> GC NO >> GC	o TO 4. pair open circui ROTTLE POSIT continuity betwo control actuator Terminal 1 harness for sho n result normal? O TO 5. pair open circui ROTTLE POSIT 6. "Component n result normal? O TO 7. O TO 6.	t or short to grou FION SENSOR een electric thro Connector F8 ort to ground an ? t or short to grou FION SENSOR Inspection". ?	1 INPUT SIGNA ottle control actu CM Terminal 33 id short to powe	AL CIRCUIT FOR OPEN AND lator harness connector and E Continuity Existed r.	SHORT CM harness con-
YES >> GC NO >> Re CHECK THE Check the nector. Electric throttle Connector F29 Also check s the inspection YES >> GC NO >> Re CHECK THE Refer to EC-210 Sthe inspection YES >> GC NO >> GC NO >> GC NO >> GC NO >> GC NO >> GC	o TO 4. pair open circui ROTTLE POSIT continuity betwo control actuator Terminal 1 harness for sho n result normal? O TO 5. pair open circui ROTTLE POSIT 6. "Component n result normal? O TO 7. O TO 6. ELECTRIC THR ectric throttle co	t or short to grou FION SENSOR een electric thro Connector F8 ort to ground an ? t or short to grou FION SENSOR Inspection". ?	1 INPUT SIGNA ottle control actu CM Terminal 33 id short to powe und or short to p	AL CIRCUIT FOR OPEN AND lator harness connector and E Continuity Existed r.	SHORT CM harness con-
NO >> Re I.CHECK THE Check the nector. Electric throttle Connector F29 Connector F20 Connector F20 Connector F20 F20 F20 F20 F20 F20 F20 F20	o TO 4. pair open circui ROTTLE POSIT continuity betwo control actuator Terminal 1 harness for sho n result normal? O TO 5. pair open circui ROTTLE POSIT 6. "Component n result normal? O TO 7. O TO 6. ELECTRIC THR ectric throttle co C-216, "Special	t or short to grou FION SENSOR een electric thro Connector F8 ort to ground an ? t or short to grou FION SENSOR Inspection". ? COTTLE CONTR pontrol actuator. Repair Required	1 INPUT SIGNA ottle control actu CM Terminal 33 id short to powe und or short to p	AL CIRCUIT FOR OPEN AND lator harness connector and E Continuity Existed r.	SHORT CM harness con-
YES $>>$ GC NO $>>$ Re 1.CHECK THE Check the nector. Electric throttle Connector F29 2. Also check s the inspection YES $>>$ GC NO $>>$ Re 0.CHECK THE Refer to EC-210 S the inspection YES $>>$ GC NO $>>$ Re 0.CHECK THE Refer to EC-210 S the inspection YES $>>$ GC NO $>>$ GC 0.CHECK THE Refer to EC-210 S the inspection YES $>>$ GC NO $>>$ GC 0.REPLACE E Replace elector Perform EC >> INS	o TO 4. pair open circui ROTTLE POSIT continuity betwo control actuator Terminal 1 harness for sho n result normal? O TO 5. pair open circui ROTTLE POSIT 6. "Component n result normal? O TO 7. O TO 6. ELECTRIC THR ectric throttle co	t or short to grou FION SENSOR een electric thro Connector F8 ort to ground an ? t or short to grou FION SENSOR Inspection". ? COTTLE CONTR pontrol actuator. Repair Requirer D	1 INPUT SIGNA ottle control actu CM Terminal 33 id short to powe und or short to p	AL CIRCUIT FOR OPEN AND lator harness connector and E Continuity Existed r.	SHORT CM harness con-

>> INSPECTION END

# Component Inspection

[MR18DE]

# 1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-17, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set selector lever to D (CVT) or 1st (M/T) position.
- 6. Check the voltage between ECM harness connector and ground.

ECM					
Connector	Terminal	Ground	Condition		Voltage
	33 (TR sonsor			Fully released	More than 0.36V
F8	(TP sensor 1 signal)	Ground	Accelerator	Fully de- pressed	Less than 4.75V
34 (TP sensor 2 signal)	Ground	pedal	Fully released	Less than 4.75V	
	`				Fully de- pressed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

**2.**REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.

2. Perform EC-216, "Special Repair Requirement".

# >> INSPECTION END

Special Repair Requirement

INFOID:000000004833327

# **1.**PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-17, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-17, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

# < DTC/CIRCUIT DIAGNOSIS >

# P0300, P0301, P0302, P0303, P0304 MISFIRE

# **DTC Logic**

INFOID:000000004833328

[MR18DE]

#### 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, when 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 cylinders 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	J
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.	<ul> <li>The ignition signal circuit is open or shorted</li> <li>Lack of fuel</li> <li>Signal plate</li> <li>A/F sensor 1</li> <li>Incorrect PCV hose connection</li> </ul>	K

#### DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

# >> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Restart engine and let it idle for about 15 minutes.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-218, "Diagnosis Procedure".
- NO >> GO TO 3.
- **3.**PERFORM DTC CONFIRMATION PROCEDURE-II
- 1. Turn ignition switch OFF and wait at least 10 seconds.

EC

D

Ε

F

Н

Μ

Ν

Ρ

#### < DTC/CIRCUIT DIAGNOSIS >

2. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze 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 conditions should be satisfied at the same time.

#### **CAUTION:**

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

Engine speed	Engine speed in the freeze frame data $\pm400$ rpm
Vehicle speed	Vehicle speed in the freeze frame data $\pm$ 10 km/h (6 MPH)
Base fuel schedule	Base fuel schedule in freeze frame data $\times$ (1 $\pm$ 0.1)
Engine coolant temperature (T)	When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).
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).

The time to driving varies according to the engine speed in the freeze frame data.

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

#### 3. Check 1st trip DTC.

#### Is 1st trip DTC detected?

- YES >> Go to EC-218, "Diagnosis Procedure".
- NO >> INSPECTION END

# Diagnosis Procedure

# **1**.CHECK FOR INTAKE AIR LEAK AND PCV HOSE

- 1. Start engine and run it at idle speed.
- 2. Listen for the sound of the intake air leak.
- 3. Check PCV hose connection.

#### Is intake air leak detected?

- YES >> Discover air leak location and repair.
- NO >> GO TO 2.

# 2. CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

Is the inspection result normal?

- YES-1 >> With CONSULT-III: GO TO 3.
- YES-2 >> Without CONSULT-III: GO TO 4.
- NO >> Repair or replace it.
- ${\it 3.}$  PERFORM POWER BALANCE TEST

#### With CONSULT-III

- 1. Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that each circuit produces a momentary engine speed drop.

#### Is the inspection result normal?

YES	>> GO TC	9.

**4.**CHECK FUNCTION OF FUEL INJECTOR

1. Start engine and let engine idle.

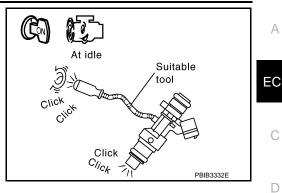
#### < DTC/CIRCUIT DIAGNOSIS >

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 EC-396. "Component Inspection".



# 5. CHECK FUNCTION OF IGNITION COIL-I

#### CAUTION:

#### Do the following procedure in the place where ventilation is good without the combustible.

- Turn ignition switch OFF. 1.
- 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 pro-F cedure.

- 3. Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- 5. Turn ignition switch OFF.
- Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 7. Remove ignition coil and spark plug of the cylinder to be checked.
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 9. Connect spark plug and harness connector to ignition coil.
- 10. 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.
- 11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

#### Spark should be generated.

#### CAUTION:

- During the operation, always stay 0.5 m (19.7 in) away from the spark plug and the ignition coil within. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken. NOTE:

Μ When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

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

**6.**CHECK FUNCTION OF IGNITION COIL-II

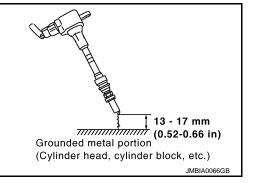
- 1. Turn ignition switch OFF.
- 2. Disconnect spark plug and connect a known-good spark plug.
- 3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and P the grounded metal portion.

#### 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-401, "Component Function Check".



Revision: 2009 March

# EC-219

[MR18DE]

Е

Н

Ν

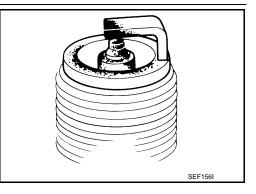
# < DTC/CIRCUIT DIAGNOSIS >

# 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 <u>EM-113. "Spark Plug"</u>.
- NO >> Repair or clean spark plug. Then GO TO 8.



# 8. CHECK FUNCTION OF IGNITION COIL-III

- 1. Reconnect the initial spark plugs.
- 2. Crank engine 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
- NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-113, "Spark Plug"</u>.

**9.**CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-21, "Inspection".

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. Check fuel pressure. Refer to EC-471, "Inspection".

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".

NO >> Repair or replace.

12. CHECK IGNITION TIMING

Check the following items. Refer to <u>EC-12, "BASIC INSPECTION : Special Repair Requirement"</u>. For specification, refer to <u>EC-477, "Ignition Timing"</u>.

Is the inspection result normal?

YES >> GO TO 13.

NO >> Follow the EC-12, "BASIC INSPECTION : Special Repair Requirement".

13. 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.

# < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

A/F sei	nsor 1	E	CM	Continuity	
Connector	Terminal	Connector	Terminal	- Continuity	
550	1	50	49	Existed	
F50 –	2	F8	53	Existed	
Check the o and ground		een A/F senso	r 1 harness co	nnector and gro	und, or ECM harness connecto
A/F sei	nsor 1			-	
Connector	Terminal	Ground	Continuity		
	1	<b>a</b> .		-	
F50	2	Ground	Not existed		
				-	
EC	M			-	
Connector	Terminal	Ground	Continuity		
	49		<b>N</b>	-	
F8 –	53	Ground	Not existed		
Also check	harness for sh	ort to power.		-	
<b>4</b> .CHECK A/	oair open circui F SENSOR 1 I ), "Component	HEATER	ound or short to	power in harne	ss or connectors.
10 >> Rep 4.CHECK A/ efer to <u>EC-129</u> the inspection ES >> GO 10 >> Rep 5	pair open circui F SENSOR 1 I <u>9, "Component</u> <u>1 result normal</u> TO 15. Dace A/F sense	HEATER Inspection". ? or 1.	ound or short to	power in harne	ss or connectors.
$\begin{array}{llllllllllllllllllllllllllllllllllll$	pair open circui F SENSOR 1 I <u>9, "Component</u> <u>1 result normal</u> TO 15. place A/F sense ASS AIR FLOV	HEATER Inspection". ? or 1.	ound or short to	power in harne	ss or connectors.
10 >> Rep 4.CHECK A/ efer to EC-129 the inspection ES >> GO 10 >> Rep 5.CHECK M/ With CONSU heck "MASS A	pair open circui F SENSOR 1 I <u>0, "Component</u> <u>1 result normal</u> TO 15. place A/F sense ASS AIR FLOV I <b>LT-III</b> NR FLOW" in "	HEATER Inspection". ? or 1. V SENSOR DATA MONITO	R" mode with C		ss or connectors.
$\begin{array}{llllllllllllllllllllllllllllllllllll$	pair open circui F SENSOR 1 I <u>0, "Component</u> <u>1 result normal</u> TO 15. place A/F sense ASS AIR FLOV I <b>LT-III</b> NR FLOW" in "	HEATER Inspection". ? or 1. V SENSOR	R" mode with C		ss or connectors.
$\begin{array}{llllllllllllllllllllllllllllllllllll$	bair open circui F SENSOR 1 I <u>0, "Component</u> TO 15. Dace A/F sense ASS AIR FLOW ILT-III AIR FLOW" in " n, refer to <u>EC-4</u> flow sensor sig	HEATER Inspection". 2 or 1. V SENSOR DATA MONITO 77, "Mass Air F gnal in Service	R" mode with C Flow Sensor". \$01 with GST.		ss or connectors.
$\begin{array}{llllllllllllllllllllllllllllllllllll$	bair open circui F SENSOR 1 I <u>0, "Component</u> <u>1 result normal</u> TO 15. blace A/F sense ASS AIR FLOV IL <b>T-III</b> NR FLOW" in " n, refer to <u>EC-4</u> flow sensor sig n, refer to <u>EC-4</u>	HEATER Inspection". ? or 1. V SENSOR DATA MONITO 77, "Mass Air F gnal in Service 77, "Mass Air F	IR" mode with C Flow Sensor". \$01 with GST. Flow Sensor".		ss or connectors.
$\begin{array}{llllllllllllllllllllllllllllllllllll$	pair open circui F SENSOR 1 I <u>a result normal</u> TO 15. Dace A/F sense ASS AIR FLOV ILT-III AIR FLOW" in " a, refer to <u>EC-4</u> flow sensor sig a, refer to <u>EC-4</u>	HEATER Inspection". 2 or 1. V SENSOR DATA MONITO 77, "Mass Air F gnal in Service	IR" mode with C Flow Sensor". \$01 with GST. Flow Sensor".		ss or connectors.
$\begin{array}{llllllllllllllllllllllllllllllllllll$	bair open circui F SENSOR 1 I <u>a result normal</u> TO 15. blace A/F sense ASS AIR FLOW ILT-III AIR FLOW" in " a, refer to <u>EC-4</u> flow sensor sig a, refer to <u>EC-4</u> nent value with TO 16.	HEATER Inspection". ? or 1. V SENSOR DATA MONITO .77, "Mass Air F gnal in Service .77, "Mass Air F in the specifica	R" mode with C Flow Sensor". \$01 with GST. Flow Sensor". tion?	ONSULT-III.	
$\begin{array}{llllllllllllllllllllllllllllllllllll$	bair open circui F SENSOR 1 I <u>a result normal</u> TO 15. blace A/F sense ASS AIR FLOW ILT-III AIR FLOW" in " a, refer to <u>EC-4</u> flow sensor sig a, refer to <u>EC-4</u> nent value with TO 16. eck connectors	HEATER Inspection". ? or 1. V SENSOR DATA MONITO .77, "Mass Air F gnal in Service .77, "Mass Air F in the specifica	R" mode with C <u>Flow Sensor</u> ". \$01 with GST. <u>Flow Sensor</u> ". <u>ition?</u> hinals or loose of	ONSULT-III.	ne mass air flow sensor circuit o
$\begin{array}{llllllllllllllllllllllllllllllllllll$	bair open circui F SENSOR 1 I <u>a result normal</u> TO 15. blace A/F sense ASS AIR FLOW ILT-III AIR FLOW" in " a, refer to <u>EC-4</u> flow sensor sig a, refer to <u>EC-4</u> nent value with TO 16. eck connectors	HEATER Inspection". 2 or 1. V SENSOR DATA MONITO 77, "Mass Air F gnal in Service 77, "Mass Air F in the specifica for rusted term C-136, "DTC L	R" mode with C <u>Flow Sensor</u> ". \$01 with GST. <u>Flow Sensor</u> ". <u>ition?</u> hinals or loose of	ONSULT-III.	
4.CHECK A/ fer to EC-129 the inspection ES >> GO O >> Rep 5.CHECK M/ With CONSU heck "MASS A r specification With GST heck mass air r specification the measuren ES >> GO IO >> Che grou 6.CHECK SN	bair open circui F SENSOR 1 I <u>A "Component</u> TO 15. Dace A/F sense ASS AIR FLOW IL <b>T-III</b> AR FLOW" in " A, refer to <u>EC-4</u> flow sensor sig A, refer to <u>EC-4</u> nent value with TO 16. eck connectors und. Refer to <u>E</u>	HEATER Inspection". 2 or 1. V SENSOR DATA MONITO 77, "Mass Air F gnal in Service 77, "Mass Air F in the specifica for rusted term C-136, "DTC L LE	R" mode with C <u>Flow Sensor</u> ". \$01 with GST. <u>Flow Sensor</u> ". <u>ition?</u> hinals or loose of	CONSULT-III.	
$\begin{array}{llllllllllllllllllllllllllllllllllll$	bair open circui F SENSOR 1 I <u>A "Component</u> TO 15. Dace A/F sense ASS AIR FLOW IL <b>T-III</b> AR FLOW" in " A, refer to <u>EC-4</u> flow sensor sig A, refer to <u>EC-4</u> nent value with TO 16. eck connectors und. Refer to <u>E</u>	HEATER Inspection". ? or 1. V SENSOR DATA MONITO 77, "Mass Air F gnal in Service 77, "Mass Air F in the specifica for rusted term C-136, "DTC L LE symptom in EC	R" mode with C Flow Sensor". \$01 with GST. Flow Sensor". tion? hinals or loose c ogic".	CONSULT-III.	
$\begin{array}{llllllllllllllllllllllllllllllllllll$	bair open circui F SENSOR 1 I D. "Component TO 15. Dace A/F sense ASS AIR FLOW ILT-III VIR FLOW" in " h, refer to EC-4 flow sensor sig h, refer to EC-4 flow sensor sig h, refer to EC-4 flow sensor sig h, refer to EC-4 nent value with TO 16. Eck connectors und. Refer to E AMPTOM TABI the rough idle h result normal TO 17.	HEATER Inspection". ? or 1. V SENSOR DATA MONITO 77, "Mass Air F gnal in Service 77, "Mass Air F in the specifica for rusted term C-136, "DTC L LE symptom in EC	R" mode with C Flow Sensor". \$01 with GST. Flow Sensor". tion? hinals or loose c ogic".	CONSULT-III.	
$\begin{array}{llllllllllllllllllllllllllllllllllll$	bair open circui F SENSOR 1 I <u>A result normal</u> TO 15. Dace A/F sense ASS AIR FLOV ILT-III AIR FLOW" in " a, refer to <u>EC-4</u> flow sensor sig a, refer to <u>EC-4</u> flow sensor sig and. Refer to <u>EC-4</u> MPTOM TABI the rough idle <u>a result normal</u>	HEATER Inspection". 2 or 1. V SENSOR DATA MONITO 77, "Mass Air F gnal in Service 77, "Mass Air F in the specifica for rusted term C-136, "DTC L LE symptom in EC 2	R" mode with C Flow Sensor". \$01 with GST. Flow Sensor". tion? hinals or loose c ogic".	CONSULT-III.	

Trip DTC" in <u>EC-85. "Diagnosis Description"</u>.

>> GO TO 18.

< DTC/CIRCUIT DIAGNOSIS >

 $18. {\sf check intermittent incident}$ 

Refer to GI-34, "Intermittent Incident".

>> INSPECTION END

# < DTC/CIRCUIT DIAGNOSIS >

# P0327, P0328 KS

# Description

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:000000004833331

# DTC DETECTION LOGIC

	Trouble diagnosis name	D	TC detected condit	ion	Possible cause	
P0327	Knock sensor circuit low input	An excessive sent to ECM.	ly low voltage from	the sensor is	<ul> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> </ul>	
P0328	Knock sensor circuit high input	An excessive sent to ECM.	y high voltage from	the sensor is	<ul> <li>(The sensor circuit is open or shorted.)</li> <li>Knock sensor</li> </ul>	
DTC CON	IFIRMATION PROCE	EDURE				
1.PRECC	NDITIONING					
least 10 se TESTING Before pe	conds before conducti	ng the next te	est.		urn ignition switch OFF and wait at age is more than 10 V at idle.	
•	> GO TO 2. RM DTC CONFIRMAT	ION PROCE	DURE			
2. Check <u>Is 1st trip [</u> YES >:	ngine and run it for at l 1st trip DTC. <u>DTC detected?</u> > Go to <u>EC-223, "Diag</u> > INSPECTION END			J.		
Diagnos	is Procedure				INF01D:000000004833333	
4	GROUND CONNECT	ION				
I.CHECK						
1. Turn iç	nition switch OFF.					
1. Turn ig 2. Check	ground connection E3	8. Refer to <u>G</u>	I-37, "Circuit In	spection".		
1. Turn ig 2. Check <u>Is the insp</u>	ground connection E3 ection result normal?	8. Refer to <u>G</u>	I-37, "Circuit In	spection".		
1. Turn ig 2. Check Is the insp YES > NO >	ground connection E3 <u>ection result normal?</u> > GO TO 2. > Repair or replace gro	ound connecti	on.			
1. Turn ig 2. Check <u>Is the insp</u> YES >: NO >	ground connection E3 ection result normal? > GO TO 2.	ound connecti	on.		RT	
1. Turn ig 2. Check Is the insp YES > NO > 2.CHECK 1. Discor 2. Discor	ground connection E3 ection result normal? > GO TO 2. > Repair or replace gro KNOCK SENSOR GF nect knock sensor har	ound connecti ROUND CIRC mess connec nnector.	on. CUIT FOR OPE tor.	N AND SHO	RT CM harness connector.	
1. Turn iç 2. Check <u>Is the insp</u> YES > NO > <b>2.</b> CHECK 1. Discor 2. Discor 3. Check	ground connection E3 ection result normal? > GO TO 2. > Repair or replace gro KNOCK SENSOR GF nect knock sensor har	ound connecti ROUND CIRC ness connec nnector. n knock sense	on. CUIT FOR OPE tor.	N AND SHO		

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

F8

Is the inspection result normal?

2

YES >> GO TO 3.

F12

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

# EC-223

40

Existed

INFOID:000000004833330

А

EC

# P0327, P0328 KS

#### < DTC/CIRCUIT DIAGNOSIS >

# $\mathbf{3}.$ Check knock sensor input signal circuit for open and short

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

Knock	Knock sensor		ECM	
Connector	Terminal	Connector	Terminal	Continuity
F12	1	F8	37	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

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

# **4.**CHECK KNOCK SENSOR

Refer to EC-224, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace knock sensor.

**5.**CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

#### >> INSPECTION END

Component Inspection

# **1.**CHECK KNOCK SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect knock sensor harness connector.
- 3. Check resistance between knock sensor terminals as per the following.
- NOTE:

It is necessary to use an ohmmeter which can measure more than 10  $\text{M}\Omega.$ 

Terminals	Resistance
1 and 2	Approx. 532 - 588 kΩ [at 20°C (68°F)]

#### CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones. Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace knock sensor.

# P0335 CKP SENSOR (POS)

#### < DTC/CIRCUIT DIAGNOSIS >

# 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.

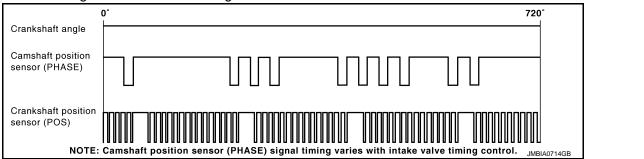
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

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:000000004833336

# DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor (POS) circuit	<ul> <li>The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking.</li> <li>The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running.</li> <li>The crankshaft position sensor (POS) signal is not in the normal pattern during engine run- ning.</li> </ul>	<ul> <li>Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] (Refrigerant pressure sensor circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Battery current sensor circuit is short-ed.)</li> <li>Crankshaft position sensor (POS)</li> <li>Refrigerant pressure sensor</li> <li>Accelerator pedal position sensor</li> <li>EVAP control system pressure sensor</li> <li>Signal plate</li> <li>Battery current sensor</li> </ul>

# DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

# [MR18DE]

INFOID:000000004833335

PBIA9209J

EC

D

Е

F

Н

# P0335 CKP SENSOR (POS)

#### < DTC/CIRCUIT DIAGNOSIS >

# 2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.

If engine does not start, crank engine for at least 2 seconds.

#### 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-226, "Diagnosis Procedure".

NO >> INSPECTION END

# Diagnosis Procedure

# 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-37, "Circuit Inspection".

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

# **2.**CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-I

#### 1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.

2. Turn ignition switch ON.

3. Check the voltage between CKP sensor (POS) harness connector and ground.

CKP sensor (POS)		Ground	Voltage
Connector	Connector Terminal		voltage
F20	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

# **3.**CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch ON.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sen	sor (POS)	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F20	1	F8	75	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

**4.**CHECK CKP SENSOR POWER SUPPLY CIRCUIT

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

E	СМ	Sensor		
Connector	Terminal	Name	Connector	Terminal
	74	Refrigerant pressure sensor	E49	3
F8	75	CKP sensor (POS)	F20	1
	76	EVAP control system pressure sen- sor	B21	3
	77	Battery current sensor	F51	1
E16	102	APP sensor	E110	5

# P0335 CKP SENSOR (POS)

< DTC/CIRCUIT DIAGNOSIS				[MR18DE]
Is the inspection result normal	?			
YES >> GO TO 5. NO >> Repair short to gro	ound or short to	power in harne	ess or connectors.	Ą
5. CHECK COMPONENTS				
Check the following.				E0
• Buttery current sensor (Refe				
<ul> <li>EVAP control system pressu</li> <li>Refrigerant pressure sensor</li> </ul>				)
Is the inspection result normal	•	4, Diagnosis i	<u>locedure</u> .)	
YES >> GO TO 6.	-			
NO >> Replace malfunction	oning compone	nts.		C
6.CHECK APP SENSOR				
Refer to EC-370, "Component	Inspection".			E
Is the inspection result normal	<u>?</u>			
YES >> GO TO 12.				
NO >> GO TO 7.				F
7.REPLACE ACCELERATOR		MBLY		
<ol> <li>Replace accelerator pedal</li> <li>Perform <u>EC-370</u>, "Special</li> </ol>		ment"		0
2. Tenom <u>LO-370, Opecial</u>		<u>inent</u> .		
>> INSPECTION ENI	C			L
8. CHECK CKP SENSOR (PC	)S) GROUND C		OPEN AND SHORT	ŀ
1. Turn ignition switch OFF.	-,			
2. Check the continuity betwee	een CKP senso	r (POS) harnes	s connector and ECM	narness connector.
CKP sensor (POS)	EC	CM	Continuity	
Connector Terminal	Connector	Terminal		0
F20 2	F8	62	Existed	
3. Also check harness for she		d short to powe	er.	k
<u>Is the inspection result normal</u> YES >> GO TO 9.	<u> </u>			
	t or short to gro	und or short to	power in harness or co	nnectors.
9.CHECK CKP SENSOR (PC	-		•	
1. Disconnect ECM harness				
2. Check the continuity betwee		r (POS) harnes	s connector and ECM	harness connector.
CKP sensor (POS)	EC	CM	Continuity	Ν
Connector Terminal	Connector	Terminal	Continuity	1
F20 3	F8	61	Existed	
3. Also check harness for she	•	d short to powe	er.	C
Is the inspection result normal	?			
YES >> GO TO 10. NO >> Repair open circui	t or chort to gro	und or short to	nower in herness or as	nnectors
	•		power in harness or co	
10.CHECK CRANKSHAFT F		50K (PUS)		
Refer to <u>EC-228</u> , "Component				
<u>Is the inspection result normal</u> YES >> GO TO 11.	<u>(</u>			
YES >> GO TO 11.	ft position sense	or (POS)		

NO >> Replace crankshaft position sensor (POS).

< DTC/CIRCUIT DIAGNOSIS >

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace the signal plate.

12. CHECK INTERMITTENT INCIDENT

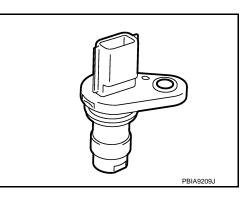
Refer to GI-34, "Intermittent Incident".

# >> 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.
- 5. Visually check the sensor for chipping.
- Is the inspection result normal?
- YES >> GO TO 2.
- NO >> Replace crankshaft position sensor (POS).



# 2.CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance between crankshaft position sensor (POS) terminals as per the following.

Terminals (Polarity)	Resistance [ $\Omega$ at 25°C (77°F)]
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or ∞
2 (+) - 3 (-)	-

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace crankshaft position sensor (POS).

INEOID:000000004833339

#### < DTC/CIRCUIT 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.

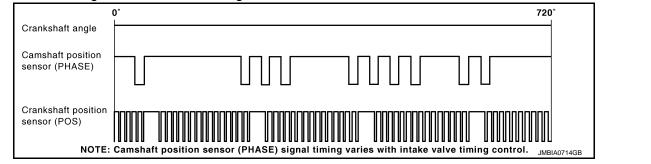
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

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.



# DTC Logic

DTC DETECTION LOGIC

#### NOTE:

If DTC P0340 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-308, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0340	Camshaft position sensor (PHASE) circuit	<ul> <li>The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking.</li> <li>The cylinder No. signal is not sent to ECM during engine running.</li> <li>The cylinder No. signal is not in the normal pattern during engine running.</li> </ul>	<ul> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Camshaft position sensor (PHASE)</li> <li>Camshaft (INT)</li> <li>Starter motor</li> <li>Starting system circuit</li> <li>Dead (Weak) battery</li> </ul>	L

# DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

>> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE-I

- Start engine and let it idle for at least 5 seconds. If engine does not start, crank engine for at least 2 seconds.
- 2. Check 1st trip DTC.





EC

D

F

Н

Κ

Ν

Ρ



PBIA9875J

< DTC/CIRCUIT DIAGNOSIS >

Is 1st trip DTC detected?

YES >> Go to EC-230, "Diagnosis Procedure".

NO >> GO TO 3.

**3.**PERFORM DTC CONFIRMATION PROCEDURE-I

1. Maintaining engine speed at more than 800 rpm for at least 5 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-230, "Diagnosis Procedure".

NO >> INSPECTION END

# Diagnosis Procedure

# **1.**CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

YES >> GO TO 2.

NO >> Check starting system (Refer to <u>STR-2, "Work Flow"</u>.).

2. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E38. Refer to GI-37, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

 $\mathbf{3.}$  CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.

2. Turn ignition switch ON.

3. Check the voltage between CMP sensor (PHASE) harness connector and ground.

CMP sense	or (PHASE)	Ground	Voltago
Connector	Connector Terminal		Voltage
F26	1	Ground	Approx. 5 V

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 CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sense	or (PHASE)	ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
F26	2	F8	63	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.

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

1. Disconnect ECM harness connector.

2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

# < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

CMP sensor (PHASE)	EC	M	Quart's it	
Connector Termin	al Connector	Terminal	Continuity	_
F26 3	F8	65	Existed	
3. Also check harness f	-	d short to powe	ər.	
<u>s the inspection result no</u> YES >> GO TO 6.	<u>ormar:</u>			
	circuit or short to grou	und or short to	power in harnes	ss or connectors.
<b>6.</b> CHECK CAMSHAFT I	POSITION SENSOR	(PHASE)		
Refer to <u>EC-231, "Comp</u> o				
s the inspection result no	ormal?			
YES >> GO TO 7. NO >> Replace cam	shaft position sensor	(PHASE).		
CHECK CAMSHAFT	•			
Check the following.				
Accumulation of debris Chipping signal plate of		camshaft (1) re	ear end	E
s the inspection result no				
YES >> GO TO 8.				
	ris and clean the sig	inal plate of ca	amshaft	
rear end of th	eplace camshaft.			
				And a
_				PBIA9557J
<b>$B.$CHECK INTERMITTE</b>	NT INCIDENT			
Refer to <u>GI-34, "Intermitte</u>	ent Incident".			
>> INSPECTION				
Component Inspect				INEC (D. 00000000 40000 44
· · ·				INF01D:00000004833344
CHECK CAMSHAFT		(PHASE)-I		
<ol> <li>Turn ignition switch C</li> <li>Loosen the fixing bol</li> </ol>				
<ol> <li>Disconnect camshaft</li> </ol>	position sensor (PHA	ASE) harness o	connector.	
. Remove the sensor.	near for chinning			
<ol> <li>Visually check the set s the inspection result no</li> </ol>				
YES >> GO TO 2.				
	shaft position sensor	(PHASE).		

# 2.CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check resistance camshaft position sensor (PHASE) terminals as per the following.

# < DTC/CIRCUIT DIAGNOSIS >

Terminals (Polarity)	Resistance [ $\Omega$ at 25°C (77°F)]
1 (+) - 2 (-)	

1 (+) - 3 (-)	
2 (+) - 3 (-)	

Except 0 or  $\infty$ 

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace camshaft position sensor (PHASE).

# **P0420 THREE WAY CATALYST FUNCTION**

#### < DTC/CIRCUIT DIAGNOSIS >

# P0420 THREE WAY CATALYST FUNCTION

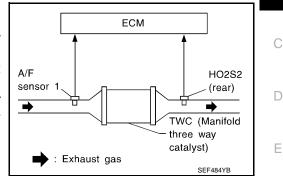
# **DTC Logic**

# 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 efficiency below threshold	<ul> <li>Three way catalyst (manifold) does not operate properly.</li> <li>Three way catalyst (manifold) does not have enough oxygen storage capacity.</li> </ul>	<ul> <li>Three way catalyst (manifold)</li> <li>Exhaust tube</li> <li>Intake air leaks</li> <li>Fuel injector</li> <li>Fuel injector leaks</li> <li>Spark plug</li> <li>Improper ignition timing</li> </ul>

# DTC CONFIRMATION PROCEDURE

**1.**INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 7.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

Do not hold engine speed for more than the specified minutes below.

>> GO TO 3.

# **3.** PERFORM DTC CONFIRMATION PROCEDURE-I

#### With CONSULT-III

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- Make sure that "COOLAN TEMP/S" indication is more than 70°C (158°F). If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
- 7. Open engine hood.
- 8. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-III.
- 9. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
- 10. Check the indication of "CATALYST".

Which is displayed on CONSULT-III screen?

# EC-233

INFOID:000000004833345

А

EC

F

Н

Κ

L

Μ

Ν

# P0420 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

CMPLT>> GO TO 6. INCMP>> GO TO 4.

**4.**PERFORM DTC CONFIRMATION PROCEDURE-II

1. Wait 5 seconds at idle.

 Rev engine up to 2,000 to 3,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take approximately 5 minutes).

Does the indication change to "CMPLT"?

YES >> GO TO 6.

NO >> GO TO 5.

**5.**PERFORM DTC CONFIRMATION PROCEDURE AGAIN

- 1. Stop engine and cool it down to less than 70°C (158°F).
- 2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

**6.**PERFORM DTC CONFIRMATION PROCEDURE-III

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-234, "Diagnosis Procedure".

NO >> INSPECTION END

7.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-234, "Component Function Check".

# NOTE:

Use component function check to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-234, "Diagnosis Procedure".

# **Component Function Check**

INFOID:000000004833346

**1.**PERFORM COMPONENT FUNCTION CHECK

# Without CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Open engine hood.
- 6. Check the voltage between ECM harness connector and ground under the following condition.

E	ECM		ECM		Condition	Voltage
Connector	Terminal	Ground	Condition	Voltage		
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at 2,500 rpm constant under no load	The voltage fluctuation cycle takes more than 5 seconds. 1 cycle: $0.6 - 1.0 \rightarrow 0 - 0.3 \rightarrow 0.6 - 1.0$		

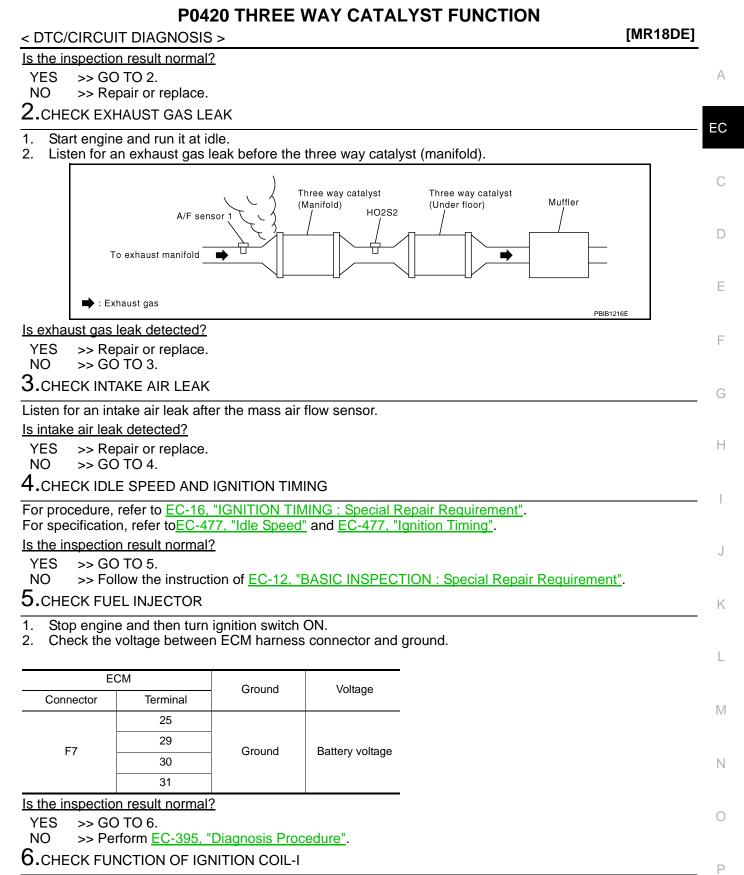
#### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-234, "Diagnosis Procedure".

# Diagnosis Procedure

**1.**CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dent.



# **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.

# **P0420 THREE WAY CATALYST FUNCTION**

#### < DTC/CIRCUIT DIAGNOSIS >

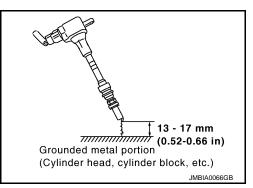
[MR18DE]

- 3. Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- 5. Turn ignition switch OFF.
- 6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 7. Remove ignition coil and spark plug of the cylinder to be checked.
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 9. Connect spark plug and harness connector to ignition coil.
- 10. 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.
- 11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

#### Spark should be generated.

#### CAUTION:

• During the operation, always stay 0.5 m (19.7 in) away from the spark plug and the ignition coil. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV 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.

**I**.CHECK FUNCTION OF IGNITION COIL-II

- 1. Turn ignition switch OFF.
- 2. Disconnect spark plug and connect a known-good spark plug.
- 3. 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.

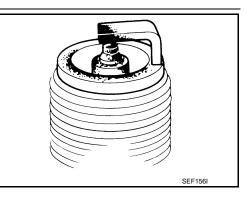
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-401, "Diagnosis Procedure".

#### **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>EM-113, "Spark Plug"</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. Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

#### Spark should be generated.

# **P0420 THREE WAY CATALYST FUNCTION**

< DTC/CIRCUIT DIAGNOSIS > [MR18DE]	
<u>Is the inspection result normal?</u> YES >> INSPECTION END NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-113, "Spark</u> <u>Plug"</u> .	A
	EC
<ol> <li>Turn ignition switch OFF. Refer to <u>EM-35, "Removal and Installation"</u>.</li> <li>Remove fuel injector assembly. Keep fuel hose and all fuel injectors connected to fuel tube.</li> <li>Disconnect all ignition coil harness connectors.</li> <li>Reconnect all fuel injector harness connectors disconnected.</li> </ol>	С
5. Turn ignition switch ON. Does fuel drip from fuel injector?	D
YES >> GO TO 11. NO >> Replace the fuel injector(s) from which fuel is dripping. 11.CHECK INTERMITTENT INCIDENT	E
Refer to <u>GI-34, "Intermittent Incident"</u> .	F
Is the inspection result normal? YES >> Replace three way catalyst assembly. NO >> Repair or replace harness or connector	G
	Н
	I
	J
	K
	L

Μ

Ν

Ο

Ρ

#### < DTC/CIRCUIT DIAGNOSIS >

# P0441 EVAP CONTROL SYSTEM

# **DTC Logic**

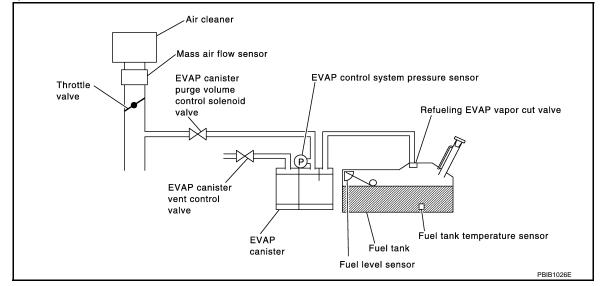
DTC DETECTION LOGIC

#### NOTE:

# If DTC P0441 is displayed with other DTC such as P2122, P2123, P2127, P2128 or P2138, first perform trouble diagnosis for other DTC.

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 properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sen- sor.	<ul> <li>EVAP canister purge volume control solenoid valve stuck closed</li> <li>EVAP control system pressure sensor and the circuit</li> <li>Loose, disconnected or improper connection of rubber tube</li> <li>Blocked rubber tube</li> <li>Cracked EVAP canister</li> <li>EVAP canister purge volume control solenoid valve circuit</li> <li>Accelerator pedal position sensor</li> <li>Blocked purge port</li> <li>EVAP canister vent control valve</li> <li>Drain filter</li> </ul>

#### DTC CONFIRMATION PROCEDURE

**1.**INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

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

2. PRECONDITIONING

Revision: 2009 March

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

	P0441 EVAP CONTROL SYSTEM	
< DTC/CIRCUIT DIAGNOSIS	S > [MR18DE]	
TESTING CONDITION: Always perform test at a tem	perature of 5°C (41°F) or more.	А
Awayo perform test at a tem		~
>> GO TO 3.		
<b>3.</b> PERFORM DTC CONFIRM	IATION PROCEDURE-I	EC
<ol> <li>Turn ignition switch OFF a</li> <li>Start engine and let it idle</li> </ol>	p to normal operating temperature. nd wait at least 10 seconds. for at least 70 seconds. 41" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CON-	С
SULT-III. 5. Touch "START".		D
Is COMPLETED displayed on	CONSULT-III screen?	
YES >> GO TO 5. NO >> GO TO 4.		Ε
4.PERFORM DTC CONFIRM		
When the following conditions	are met, "TESTING" will be displayed on the CONSULT-III screen. Maintain the ESTING" changes to "COMPLETED". (It will take at least 35 seconds.)	F
		G
Selector lever		
VHCL SPEED SE	32 - 120 km/h (20 - 75 mph)	Н
ENG SPEED	500 - 3,800 rpm	П
B/FUEL SCHDL	1.0 - 10.0 msec	
COOLAN TEMP/S	More than 0°C (32°F)	
•	for a long time, retry from step 2.	1
Is "COMPLETED" displayed or	n CONSULT-III screen?	0
YES >> GO TO 5. NO >> Perform DTC CON	IFIRMATION PROCEDURE again, GO TO 3.	
5.PERFORM DTC CONFIRM		Κ
Touch "SELF-DIAG RESULT".		I
Which is displayed on CONSU		
OK >> INSPECTION ENI NG >> Go to <u>EC-240, "Di</u>		
6.PERFORM COMPONENT	-	M
	heck. Refer to <u>EC-239, "Component Function Check"</u> .	
NOTE: Use component function check	to check the overall monitoring function of the EVAP control system purge flow	Ν
• •	a 1st trip DTC might not be confirmed.	
Is the inspection result normal	_	0
YES >> INSPECTION ENI NO >> Go to EC-240, "Dia		
Component Function Ch		P
1.PERFORM COMPONENT		I
Without CONSULT-III 1. Lift up drive wheels.		
2. Start engine and warm it u	p to normal operating temperature.	
	nd wait at least 10 seconds.	
4. Start engine and wait at le	asi 10 seculius.	

#### < DTC/CIRCUIT DIAGNOSIS >

#### 5. Set voltmeter probes to ECM harness connector and ground.

	ECM				
Connector	Terminal	Ground			
F8	42 (EVAP control system pressure sensor signal)	Ground			

6. Check EVAP control system pressure sensor value at idle speed and note it.

7. Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch	ON
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Selector lever	Any position other than P, N or R

8. Verify that EVAP control system pressure sensor value stays 0.1 V less than the value at idle speed (measured at step 6 for at least 1 second.

#### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-240, "Diagnosis Procedure".

#### Diagnosis Procedure

# **1.**CHECK EVAP CANISTER

1. Turn ignition switch OFF.

2. Check EVAP canister 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-68</u>, "System <u>Description</u>".
- 2. Start engine and let it idle.
- 3. Select "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 C/V" opening and check vacuum existence.

PURG VOL C/V	Vacuum
100%	Existed
0%	Not existed

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 4.

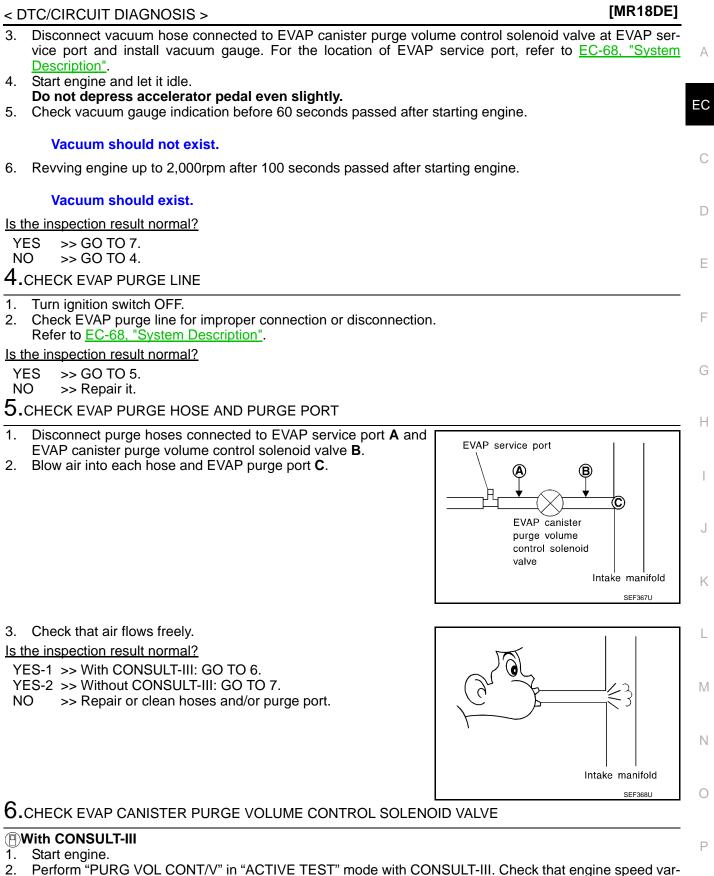
3.CHECK PURGE FLOW

#### **Without CONSULT-III**

1. Start engine and warm it up to normal operating temperature.

2. Stop engine.

Revision: 2009 March



Is the inspection result normal?

ies according to the valve opening.

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

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-254, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP canister purge volume control solenoid valve.

 $\mathbf{8}$ . 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 9.

NO >> Replace EVAP control system pressure sensor.

9.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to EC-270. "DTC Logic" for DTC P0452, EC-275. "DTC Logic" for DTC P0453.

Is the inspection result normal?

YES >> GO TO 10.

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 DRAIN FILTER

Refer to EC-243. "Component Inspection (Drain filter)".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace drain filter.

12.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-261, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace EVAP canister vent control valve.

**13.**CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.

Refer to EC-473, "Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace it.

**14.**CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 15.

**15.**CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

#### < DTC/CIRCUIT DIAGNOSIS >

# >> INSPECTION END

# Component Inspection (Drain filter)

# 1. CHECK DRAIN FILTER

- 1. Check visually for insect nests in the drain filter air inlet.
- 2. Check visually for cracks or flaws in the appearance.
- 3. Check visually for cracks or flaws in the hose.
- 4. Blow air into port A and check that it flows freely out of port B.
- 5. Block port B.
- 6. Blow air into port A and check that there is no leakage.
- Is the inspection result normal?

#### YES >> INSPECTION END

NO >> Replace drain filter.

Port A To atmosphere Port B To canister PBIB3641E

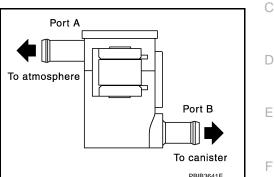
Н

#### Revision: 2009 March

#### INFOID:000000004833351

А

EC



J

Κ

L

Μ

Ν

0

Ρ

< DTC/CIRCUIT DIAGNOSIS >

# P0442 EVAP CONTROL SYSTEM

# DTC Logic

DTC DETECTION LOGIC

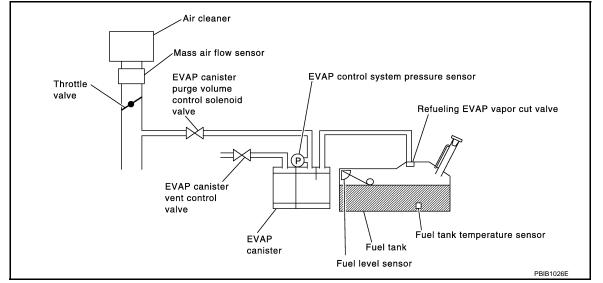
#### NOTE:

# If DTC P0442 is displayed with DTC P0456, first perform the trouble diagnosis for DTC P0456. Refer to <u>EC-287, "DTC Logic"</u>.

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.

If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following "Vacuum test" conditions.

The EVAP canister vent control valve is closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve will then be opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0442	EVAP control system small leak detected (negative pressure)	EVAP control system has a leak, EVAP control system does not operate properly.	<ul> <li>Incorrect fuel tank vacuum relief valve</li> <li>Incorrect fuel filler cap used</li> <li>Fuel filler cap remains open or fails to close.</li> <li>Foreign matter caught in fuel filler cap.</li> <li>Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>Foreign matter caught in EVAP canister vent control valve.</li> <li>EVAP canister or fuel tank leaks</li> <li>EVAP purge line (pipe and rubber tube) leaks</li> <li>EVAP canister vent control valve and the circuit</li> <li>Loose or disconnected rubber tube</li> <li>EVAP canister purge volume control solenoid valve.</li> <li>Fuel tank temperature sensor</li> <li>O-ring of EVAP canister vent control valve is missing or damaged</li> <li>EVAP control system pressure sensor</li> <li>Fuel level sensor and the circuit</li> <li>Refueling EVAP vapor cut valve</li> <li>ORVR system leaks</li> </ul>

#### **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.

# P0442 EVAP CONTROL SYSTEM < DTC/CIRCUIT DIAGNOSIS > • If the fuel filler cap is not tightened properly, the MIL may come on.

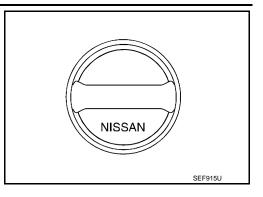
< DTC/CIRCOTT DIAGNOSIS >	
<ul> <li>If the fuel filler cap is not tightened properly, the MIL may come on.</li> <li>Use only a genuine NISSAN rubber tube as a replacement.</li> </ul>	А
DTC CONFIRMATION PROCEDURE	
1.PRECONDITIONING	EC
<ul> <li>If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.</li> <li>TESTING CONDITION:</li> <li>Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.</li> </ul>	С
<ul> <li>Always perform test at a temperature of 0 to 30°C (32 to 86°F).</li> </ul>	D
NOTE: Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.	D
Do you have CONSULT-III? YES >> GO TO 2. NO >> GO TO 3.	Е
2.PERFORM DTC CONFIRMATION PROCEDURE	F
<ul> <li>With CONSULT-III</li> <li>Turn ignition switch ON.</li> <li>Turn ignition switch OFF and wait at least 10 seconds.</li> <li>Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.</li> <li>Make sure that the following conditions are met.</li> </ul>	G
COOLAN TEMP/S: 0 - 70°Č (32 - 158°F)	Н
INT/A TEMP SE: 0 - 30°C (32 - 86°F) 5. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode	
with CONSULT-III. Follow the instruction displayed. <b>NOTE:</b>	I
If the engine speed cannot be maintained within the range displayed on the CONSULT-III screen, go to <u>EC-12, "BASIC INSPECTION : Special Repair Requirement"</u> .	J
Which is displayed on CONSULT-III screen?	
OK >> INSPECTION END NG >> Go to <u>EC-245, "Diagnosis Procedure"</u> .	Κ
3. PERFORM COMPONENT FUNCTION CHECK	
With GST	L
<b>NOTE:</b> Be sure to read the explanation of DRIVING PATTERN in <u>EC-451, "How to Set SRT Code"</u> before driving vehicle.	
<ol> <li>Start engine.</li> <li>Drive vehicle according to DRIVING PATTERN.</li> </ol>	Μ
<ol> <li>Stop vehicle.</li> <li>Turn ignition switch OFF, wait at least 10 seconds and then turn ON.</li> <li>Select Service \$07 with GST.</li> </ol>	Ν
Is 1st trip DTC displayed?	
YES-1 >> P0441: Go to <u>EC-240. "Diagnosis Procedure"</u> . YES-2 >> P0442: Go to <u>EC-245. "Diagnosis Procedure"</u> . NO >> INSPECTION END	0
Diagnosis Procedure	Ρ
1.CHECK FUEL FILLER CAP DESIGN	
1. Turn ignition switch OFF.	

#### < DTC/CIRCUIT DIAGNOSIS >

#### 2. Check for genuine NISSAN fuel filler cap design.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace with genuine NISSAN fuel filler cap.



[MR18DE]

# 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-249, "Component Inspection (Fuel filler cap)".

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-473, "Inspection".

Is there any leak in EVAP line?

YES >> Repair or replace.

NO >> GO TO 6.

**6.**CHECK DRAIN FILTER

Refer to EC-249, "Component Inspection (Drain filter)".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace drain filter.

**7.**CHECK EVAP CANISTER VENT CONTROL VALVE

#### Check the following.

- EVAP canister vent control valve is installed properly. Refer to <u>EC-475, "Exploded View"</u>.
- EVAP canister vent control valve. Refer to <u>EC-261, "Component Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace EVAP canister vent control valve and O-ring.

f 8.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

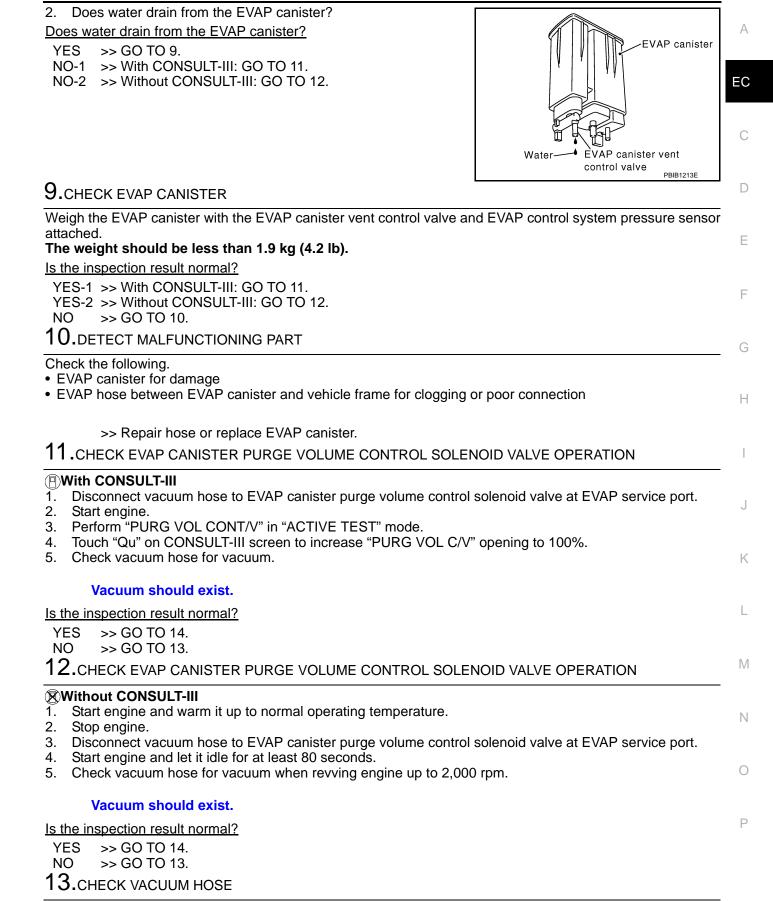
1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

# EC-246



#### < DTC/CIRCUIT DIAGNOSIS >

#### [MR18DE]



Check vacuum hoses for clogging or disconnection. Refer to <u>EC-68</u>, "System Description". Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 14.

NO >> Repair or reconnect the hose.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-254. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace EVAP canister purge volume control solenoid valve.

**15.**CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-210, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace fuel level sensor unit.

**16.**CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to <u>EC-267, "DTC Logic"</u>.

Is the inspection result normal?

YES >> GO TO 17.

NO >> Replace EVAP control system pressure sensor.

**17.**CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to <u>EC-68, "System Description"</u>.

Is the inspection result normal?

YES >> GO TO 18.

NO >> Repair or reconnect the hose.

**18.**CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 19.

**19.**CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to <u>EC-407, "Description"</u>.

Is the inspection result normal?

YES >> GO TO 20.

NO >> Repair or replace hoses and tubes.

20. CHECK RECIRCULATION LINE

Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 21.

NO >> Repair or replace hose, tube or fuel filler tube.

21. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-410, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> GO TO 22.

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

22.CHECK FUEL LEVEL SENSOR

Refer to MWI-42, "Component Function Check".

Is the inspection result normal?

YES >> GO TO 23.

#### < DTC/CIRCUIT DIAGNOSIS >

NO >> Replace fuel level sensor unit.

23. CHECK INTERMITTENT INCIDENT

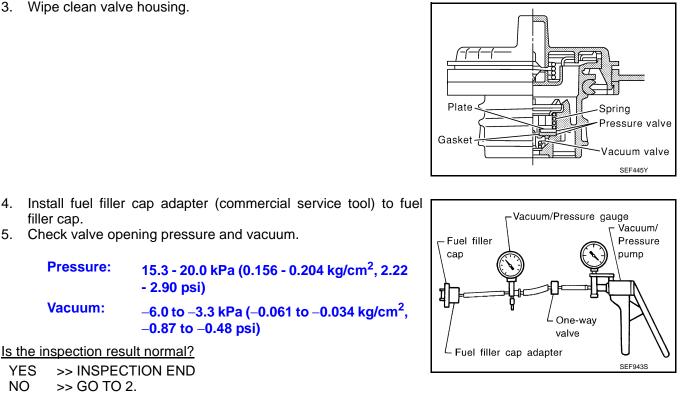
Refer to GI-34, "Intermittent Incident".

# >> INSPECTION END

# Component Inspection (Fuel filler cap)

# **1.**CHECK FUEL FILLER CAP

- Turn ignition switch OFF. 1.
- 2. Remove fuel filler cap.
- 3. Wipe clean valve housing.



2.REPLACE FUEL FILLER CAP

# Replace fuel filler cap.

#### **CAUTION:**

YES

NO

4.

5.

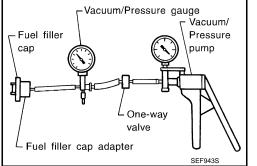
Μ Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.

>> INSPECTION END		Ν
Component Inspection (Drain filter)	INFOID:000000004833355	
<b>1.</b> CHECK DRAIN FILTER		0

Check visually for insect nests in the drain filter air inlet. 1.

Check visually for cracks or flaws in the appearance. 2.

3. Check visually for cracks or flaws in the hose.



Ρ

[MR18DE]

INFOID:000000004833354

А

EC

D

Ε

F

Н

Κ

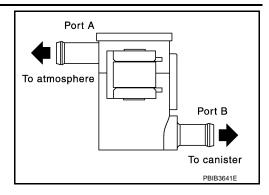
L

#### < DTC/CIRCUIT DIAGNOSIS >

- 4. Blow air into port A and check that it flows freely out of port B.
- 5. Block port B.
- 6. Blow air into port A and check that there is no leakage.

#### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace drain filter.



#### [MR18DE]

#### P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [MR18DE] < DTC/CIRCUIT DIAGNOSIS >

# P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

# Description

The EVAP canister purge volume control solenoid valve is used 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.

# PBIA9215J

INFOID:000000004833357

INFOID:000000004833356

# F

Н

L

D

Е

# DTC Logic

# DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
P0443	EVAP canister purge volume control solenoid	A	The canister purge flow is detected during the vehicle is stopped while the engine is running, even when EVAP canister purge volume control solenoid valve is completely closed.	<ul> <li>EVAP control system pressure sensor</li> <li>EVAP canister purge volume control solenoid valve (The valve is stuck open.)</li> <li>EVAP canister vent control valve</li> </ul>
P0443	1 0	В	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control sole- noid valve is completely closed.	<ul> <li>EVAP canister</li> <li>Hoses <ul> <li>(Hoses are connected incorrectly or clogged.)</li> </ul> </li> </ul>

# DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at Κ least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

- Perform DTC CONFIRMATION PROCEDURE when the fuel is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Always perform test at a temperature of 5 to 60°C (41 to 140°F).

	•	•	,	
Cool the vehicle s	so that engine coolant	temperature become	s same leve	as ambient temperature.

<u>Do you have CONSULT-III</u> YES >> GO TO 2.	M
NO >> GO TO 4. 2.PERFORM DTC CONFIRMATION PROCEDURE A	Ν
<ul> <li>With CONSULT-III</li> <li>Turn ignition switch ON.</li> <li>Select "DATA MONITOR" mode with CONSULT-III.</li> <li>Check that the following condition are met.</li> </ul>	0
<ul> <li>FUEL T/TMP SE: 0 - 35°C (32 - 95°F)</li> <li>4. Start engine and wait at least 60 seconds.</li> <li>5. Check 1st trip DTC.</li> </ul>	Ρ

#### Is 1st trip DTC detected?

>> Go to EC-252, "Diagnosis Procedure". YES

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE B

# (P)With CONSULT-III

А

EC

# P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### < DTC/CIRCUIT DIAGNOSIS >

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 5. Touch "START".
- 6. Start engine and let it idle until "TESTING" on CONSULT-III changes to "COMPLETED". (It will take approximately 10 seconds.)
  - If "TESTING" is not displayed after 5 minutes, retry from step 2.
- 7. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT-III?

OK >> INSPECTION END

NG >> Go to EC-252, "Diagnosis Procedure".

#### **4.**PERFORM DTC CONFIRMATION PROCEDURE A

#### With GST

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

	ECM	Ground	Voltage (V)	
Connector	Terminal	Ground		
F8	43 (Fuel tank temperature sensor signal)	Ground	3.1 - 4.0	

- 3. Start engine and wait at least 60 seconds.
- 4. Check 1st trip DTC.

#### Is 1st trip DTC detected?

- YES >> Go to EC-252, "Diagnosis Procedure".
- NO >> GO TO 5.
- **5.**PERFORM DTC CONFIRMATION PROCEDURE

#### With GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and let it idle for at least 20 seconds.
- 4. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to <u>EC-252</u>, "Diagnosis Procedure".

NO >> INSPECTION END

#### Diagnosis Procedure

INFOID:000000004833359

[MR18DE]

# 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.

EVAP canister purge volume control solenoid valve		Ground	Voltage
Connector	Terminal		
F32	1	Ground	Battery voltage

Is the inspection result normal?

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

# EC-252

# P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

2. DETECT MALFUNCTIONING PART А Check the following. Harness connectors E8, F1 IPDM E/R harness connector E14 EC 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.  ${f 3.}$  CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT D 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and 3. E ECM harness connector. EVAP canister purge volume control F ECM solenoid valve Continuity Connector Terminal Connector Terminal F32 2 F7 9 Existed Also check harness for short to ground and short to power. 4 Is the inspection result normal? Н YFS >> GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 4.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 5. Κ NO >> Replace EVAP control system pressure sensor.  ${f 5.}$ CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR Refer to EC-269, "Component Inspection". Is the inspection result normal? YES-1 >> With CONSULT-III: GO TO 6. M YES-2 >> Without CONSULT-III: GO TO 7. NO >> Replace EVAP control system pressure sensor.  ${f 6}.$ CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE Ν (R)With CONSULT-III 1. Turn ignition switch OFF. 2. Reconnect harness connectors disconnected. 3. Start engine. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed var-4. ies according to the valve opening. Ρ Is the inspection result normal? YES >> GO TO 8. NO >> GO TO 7. **1.**CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE Refer to EC-254, "Component Inspection".

Is the inspection result normal?

[MR18DE]

# P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 8.
- NO >> Replace EVAP canister purge volume control solenoid valve.

**8.**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 9.

NO >> Clean the rubber tube using an air blower.

**9.**CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-261, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace EVAP canister vent control valve.

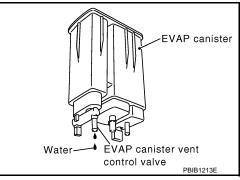
10. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- 2. Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 11.

NO >> GO TO 13.



[MR18DE]

# **11.**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 1.9 kg (4.2 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-34, "Intermittent Incident".

>> INSPECTION END

**Component Inspection** 

INFOID:000000004833360

# 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.

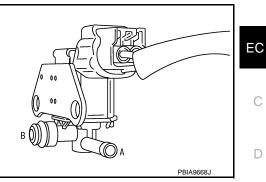
# EC-254

# P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

- 4. Turn ignition switch ON.
- 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 C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



[MR18DE]

А

Ε

F

Н

Κ

L

Μ

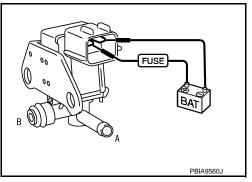
Ν

Ρ

#### 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)
12 V 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

## P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

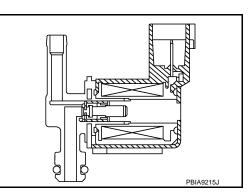
[MR18DE]

INFOID:000000004833361

# P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

# Description

The EVAP canister purge volume control solenoid valve is used 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:000000004833362

# 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	<ul> <li>Harness or connectors (The solenoid valve circuit is open or shorted.)</li> <li>EVAP canister purge volume con- trol solenoid valve</li> </ul>
P0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	<ul> <li>Harness or connectors (The solenoid valve circuit is short- ed.)</li> <li>EVAP canister purge volume con- trol solenoid valve</li> </ul>

# DTC CONFIRMATION PROCEDURE

# 1.CONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

# **TESTING CONDITION:**

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

>> GO TO 2.

# **2.** PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for at least 13 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-256. "Diagnosis Procedure".

NO >> INSPECTION END

# Diagnosis Procedure

INFOID:000000004833364

# 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.

# EC-256

# P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

# < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

EVAP canister purge volume control solenoid valve     Ground     Voltage       Connector     Terminal     Ground     Battery voltage	
Connector Terminal	
E32 1 Ground Battony voltage	
1 Ground Battery Voltage	
s the inspection result normal?	
YES >> GO TO 3. NO >> GO TO 2.	
2. DETECT MALFUNCTIONING PART	
Check the following.	
IPDM E/R harness connector E14	
<ul> <li>Harness connectors E8, F1</li> <li>Harness for open or short between EVAP canister purge volume control solenoid valve and IPI</li> </ul>	
Harness for open or short between EVAP canister purge volume control solenoid valve and Fr Harness for open or short between EVAP canister purge volume control solenoid valve and EC	
>> 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 SIGN	NAL CIRCUIT
<ol> <li>Turn ignition switch OFF.</li> <li>Disconnect ECM harness connector.</li> </ol>	
3. Check the continuity between EVAP canister purge volume control solenoid valve harness c	connector and
ECM harness connector.	
EVAP canister purge volume control solenoid valve ECM Continuity	
Connector Terminal Connector Terminal	
F32 2 F7 9 Existed	
<ol> <li>Also check harness for short to ground and short to power.</li> </ol>	
s the inspection result normal?	
YES-1 >> With CONSULT-III: GO TO 4. YES-2 >> Without CONSULT-III: GO TO 5.	
NO >> Repair open circuit or short to ground or short to power in harness or connectors.	
CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
With CONSULT-III	
1. Reconnect all harness connectors disconnected.	
2. Start engine.	
<ol> <li>Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that enginies according to the valve opening.</li> </ol>	ne speed var-
s the inspection result normal?	
YES >> GO TO 6.	
NO >> GO TO 5.	
<b>D</b> .CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
Refer to EC-258, "Component Inspection".	
s the inspection result normal?	
YES >> GO TO 6.	
NO >> Replace EVAP canister purge volume control solenoid valve.	
O.CHECK INTERMITTENT INCIDENT	
Refer to <u>GI-34, "Intermittent Incident"</u> .	

# >> INSPECTION END

# P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### < DTC/CIRCUIT DIAGNOSIS >

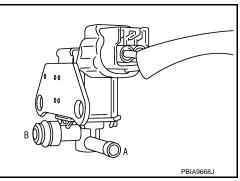
# Component Inspection

# 1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### BWith 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.
- 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 C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



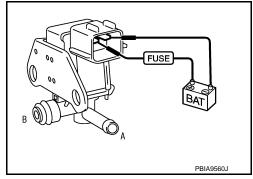
#### **Without CONSULT-III**

- 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)
12 V 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



[MR18DE]

#### < DTC/CIRCUIT 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.

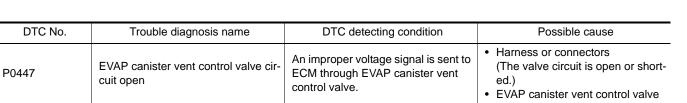
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

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



# DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

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

>> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

Touch "ON/OFF" on CONSULT-III screen.

Check for operating sound of the valve.

<ol> <li>Start engine and wait at least 8 seconds.</li> <li>Check 1st trip DTC.</li> </ol>	L
Is 1st trip DTC detected?         YES       >> Go to EC-259, "Diagnosis Procedure".         NO       >> INSPECTION END	Μ
Diagnosis Procedure	⁵⁹ N
1.INSPECTION START	
Do you have CONSULT-III? Do you have CONSULT-III?	0
YES >> GO TO 2. NO >> GO TO 3.	Р
2.CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT	_
<ul> <li>With CONSULT-III</li> <li>Turn ignition switch OFF and then turn ON.</li> <li>Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-III.</li> </ul>	

To atmosphere

Spring

O-ring

Valve

Canister side

Coil

PBIB1263E

INFOID:000000004833367

Plunger

Terminal

[MR18DE]

D

А

EC

E

F

Н

Κ

2009 Z12

3.

4

# EC-259

< DTC/CIRCUIT DIAGNOSIS >

#### Clicking sound should be heard.

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 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
B20	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 E8, F1
- Harness connectors E105, M77
- Harness connectors M79, B4
- 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		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
B20	2	F7	28	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.

 $\mathbf{C}$ 

# 6. DETECT MALFUNCTIONING PART

#### Check the following.

Junction block connector E8, F1

Harness connectors E105, M77

- Harness connectors M79, B4
- · Harness for open or short between EVAP canister vent control valve and ECM

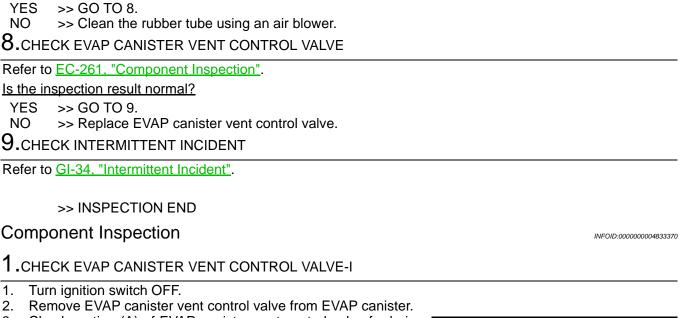
>> Repair open circuit or short to ground or short to power in harness or connectors.

# **7.**CHECK RUBBER TUBE FOR CLOGGING

- 1. Disconnect rubber tube connected to EVAP canister vent control valve.
- 2. Check the rubber tube for clogging.

Is the inspection result normal?

# EC-260



Check portion (A) of EVAP canister vent control valve for being rusted.

#### Is it rusted?

1.

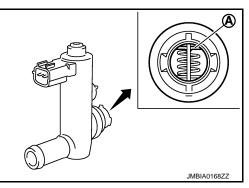
2.

NO

NO

- YES >> Replace EVAP canister vent control valve.
- NO >> GO TO 2.

< DTC/CIRCUIT DIAGNOSIS >



[MR18DE]

А

EC

D

E

F

Н

Κ

# 2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

#### (P)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.

VENT CONT/V condition	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.

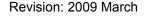
Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

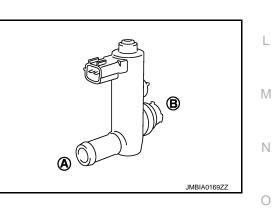
#### Operation takes less than 1 second.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace EVAP canister vent control valve.







#### < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

# 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.
- 3. Check air passage continuity and operation delay time. Make sure new O-ring is installed properly.

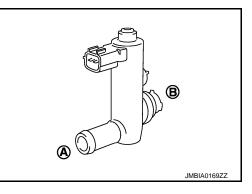
VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

#### 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)
12 V 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.

#### < DTC/CIRCUIT 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.

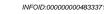
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

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 Logic**

# DTC DETECTION LOGIC



[MR18DE]

# To atmosphere Valve Coil O-ring Canister side PBIB1263E

#### INFOID:000000004833372

Κ

Μ

Ρ

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	(
P0448	EVAP canister vent control valve close	EVAP canister vent control valve remains closed under specified driving conditions.	<ul> <li>EVAP canister vent control valve</li> <li>EVAP control system pressure sensor and the circuit</li> <li>Blocked rubber tube to EVAP canister vent control valve</li> <li>EVAP canister is saturated with water</li> </ul>	F

### DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

### >> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

#### With CONSULT-III

- 1. Turn ignition switch ON and wait at least 5 seconds.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 4. Start engine and let it idle for at least 1 minute.
- 5. Repeat next procedures three times.
- Increase the engine speed up to 3,000 to 3,500 rpm and keep it for 2 minutes and 50 seconds to 3 minutes.  $$\mathbb{N}$$

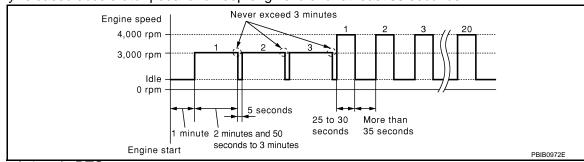
#### Never exceed 3 minutes.

- Fully released accelerator pedal and keep engine idle for about 5 seconds.
- 6. Repeat next procedure 20 times.
- Quickly increase the engine speed up to 4,000 to 4,500 rpm or more and keep it for 25 to 30 seconds.



# < DTC/CIRCUIT DIAGNOSIS >





### 7. Check 1st trip DTC.

#### With GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

- YES >> Go to EC-264, "Diagnosis Procedure".
- NO >> INSPECTION END

# Diagnosis Procedure

INFOID:000000004833374

[MR18DE]

# **1.**CHECK RUBBER TUBE

- 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-265, "Component Inspection".

Is the inspection result normal?

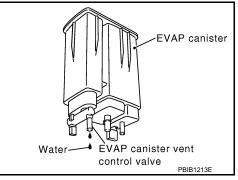
YES >> GO TO 3.

NO >> Replace EVAP canister vent control valve.

3.CHECK IF EVAP CANISTER IS 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 1.9 kg (4.2 lb).

Is the inspection result normal?

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

5. DETECT MALFUNCTIONING PART

P0448 EVAP CANISTER VENT CONTROL VALVE	
< DTC/CIRCUIT DIAGNOSIS > [MR18DE]	
<ul><li>Check the following.</li><li>EVAP canister for damage</li><li>EVAP hose between EVAP canister and vehicle frame for clogging or poor connection</li></ul>	A
>> Repair hose or replace EVAP canister.	EC
6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
<ol> <li>Disconnect EVAP control system pressure sensor harness connector.</li> <li>Check connectors for water.</li> </ol>	С
Water should not exist.	D
Is the inspection result normal?	D
YES >> GO TO 7.	
NO >> Replace EVAP control system pressure sensor. 7.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	Е
Refer to EC-269, "Component Inspection".	
Is the inspection result normal?	F
YES >> GO TO 8.	
NO >> Replace EVAP control system pressure sensor.	G
8.CHECK INTERMITTENT INCIDENT	G
Refer to <u>GI-34, "Intermittent Incident"</u> .	
>> INSPECTION END	Н
Component Inspection	I
1.CHECK EVAP CANISTER VENT CONTROL VALVE-I	
1. Turn ignition switch OFF.	J
<ol> <li>Remove EVAP canister vent control valve from EVAP canister.</li> <li>Check portion (A) of EVAP canister vent control valve for being</li> </ol>	
rusted.	K
Is it rusted?	
YES >> Replace EVAP canister vent control valve.	
	L
	$\mathbb{M}$
JMBIA0168ZZ	
2.CHECK EVAP CANISTER VENT CONTROL VALVE-II	Ν
With CONSULT-III	
<ol> <li>Reconnect harness connectors disconnected.</li> <li>Turn ignition switch ON.</li> </ol>	$\bigcirc$
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.	0
	Ρ

#### < DTC/CIRCUIT DIAGNOSIS >

4. Check air passage continuity and operation delay time. Make sure new O-ring is installed properly.

Dovision:	2000	March
Revision:	2009	March

VENT CONT/V condition	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)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

# Operation takes less than 1 second.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace EVAP canister 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.
- 3. Check air passage continuity and operation delay time. Make sure new O-ring is installed properly.

VENT CONT/V condition	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.

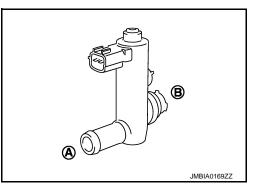
#### Make sure new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

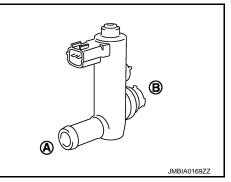
#### Operation takes less than 1 second.

#### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace EVAP canister vent control valve.



# [MR18DE]

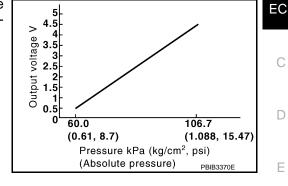


## < DTC/CIRCUIT DIAGNOSIS >

# 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

DTC No. DTC detecting condition Possible cause Trouble diagnosis name Harness or connectors (EVAP control system pressure sensor circuit is shorted.) [Crankshaft position sensor (POS) circuit Н is shorted.] (Accelerator pedal position sensor circuit EVAP control system is shorted.) ECM detects a sloshing signal from the EVAP P0451 pressure sensor perfor-(Refrigerant pressure sensor circuit is control system pressure sensor mance shorted.) (Battery current sensor circuit is shorted.) EVAP control system pressure sensor Crankshaft position sensor (POS) Accelerator pedal position sensor · Refrigerant pressure sensor • Battery current sensor Κ

# DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

# >> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

Ν Turn ignition switch OFF and wait at least 10 seconds. 1. 2. 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? Ρ YES >> Go to EC-267. "Diagnosis Procedure". >> INSPECTION END NO Diagnosis Procedure INFOID:000000004833378 1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E38. Refer to GI-37, "Circuit Inspection".

EC-267

А

INFOID:000000004833376

INFOID:000000004833377

[MR18DE]

F

L

Μ

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

 $2. \mathsf{CHECK} \ \mathsf{EVAP} \ \mathsf{CONTROL} \ \mathsf{SYSTEM} \ \mathsf{PRESSURE} \ \mathsf{SENSOR} \ \mathsf{CONNECTOR} \ \mathsf{FOR} \ \mathsf{WATER}$ 

- 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.

# $\mathbf{3.}$ 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 system pressure sen- sor		Ground	Voltage
Connector	Terminal		
B21	3	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 8.

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 Se		isor		
Connector	Terminal	Name	Connector	Terminal
	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
F8	76	EVAP control system pressure sen- sor	B21	3
	77	Battery current sensor	F51	1
E16	102	APP sensor	E110	5

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.

- Battery current sensor (Refer to EC-327, "Component Inspection".)
- Crankshaft position sensor (POS) (Refer to EC-228, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-414, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning component.

**6.**CHECK APP SENSOR

Refer to EC-370, "Component Inspection".

Is the inspection result normal?

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

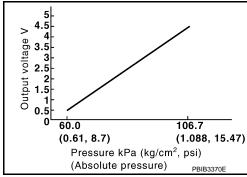
			[MR18DE]
	IT DIAGNOSIS >		
.REPLACE /	ACCELERATOR PEDAL ASSE	MBLY	
	ccelerator pedal assembly C-370, "Special Repair Require	ement".	
>> IN	SPECTION END		
	AP CONTROL SYSTEM PRES	SURE SENSOR	-
efer to EC-26	9, "Component Inspection".		
•	n result normal?		
	D TO 9. place EVAP control system pre	Secure sensor	
	ERMITTENT INCIDENT	-33016 3611301.	
	"Intermittent Incident".		
>> IN	SPECTION END		
Component	Inspection		INFOID:00000004833379
.CHECK EV	AP CONTROL SYSTEM PRES	SURE SENSOR	
. Turn ignitic	AP CONTROL SYSTEM PRES		or connected from EVAP canister
. Turn ignitic . Remove E <b>Always re</b> . Install a va	on switch OFF. VAP control system pressure s <b>place O-ring with a new one.</b> Icuum pump to EVAP control sy on switch ON and check output onditions.	ensor with its harness connectorystem pressure sensor. voltage between ECM harness Condition	or connected from EVAP canister.
. Turn ignitic Remove E <b>Always re</b> Install a va Turn ignitic	on switch OFF. VAP control system pressure s <b>place O-ring with a new one.</b> Iccuum pump to EVAP control sy on switch ON and check output onditions. ECM Terminal	ensor with its harness connectory ystem pressure sensor. voltage between ECM harness Condition [Applied vacuum kPa (kg/cm ² , psi)	connector and ground under the Voltage
<ul> <li>Turn ignitic</li> <li>Remove E</li> <li>Always re</li> <li>Install a va</li> <li>Turn ignitic</li> <li>following c</li> </ul>	on switch OFF. VAP control system pressure s <b>place O-ring with a new one.</b> Icuum pump to EVAP control sy on switch ON and check output onditions.	ensor with its harness connectory ystem pressure sensor. voltage between ECM harness Condition [Applied vacuum kPa (kg/cm ² , psi) Not applied	Connector and ground under the Voltage 1.8 - 4.8 V
Turn ignitic Remove E <b>Always re</b> Install a va Turn ignitic following c	on switch OFF. VAP control system pressure s <b>place O-ring with a new one.</b> Iccuum pump to EVAP control sy on switch ON and check output onditions. ECM Terminal 42	ensor with its harness connectory ystem pressure sensor. voltage between ECM harness Condition [Applied vacuum kPa (kg/cm ² , psi)	connector and ground under the Voltage
Turn ignitic Remove E Always re Install a va Turn ignitic following c Connector F8 CAUTION • Always • Do not a cm ² , 14. the inspectio YES >> IN	Image: constraint of the system pressure is a control system pressure is a control system pressure is a control of the system pressure is a control of the system pressure is a control system pressure is control system pressure is control system p	ensor with its harness connector ystem pressure sensor. voltage between ECM harness Condition [Applied vacuum kPa (kg/cm ² , psi) Not applied -26.7 (-0.272, -3.87) Jauge when using it. 2 kg/cm ² , -13.53 psi) or press	Connector and ground under the Voltage 1.8 - 4.8 V
Turn ignitic Remove E Always re Install a va Turn ignitic following c Connector F8 CAUTION • Always • Do not a cm ² , 14. the inspectio YES >> INS	on switch OFF. VAP control system pressure s place O-ring with a new one. Icuum pump to EVAP control sy on switch ON and check output onditions. ECM ECM (EVAP control system pressure sensor signal) calibrate the vacuum pump g apply below -93.3 kPa (-0.952 69 psi). on result normal? SPECTION END	ensor with its harness connector ystem pressure sensor. voltage between ECM harness Condition [Applied vacuum kPa (kg/cm ² , psi) Not applied -26.7 (-0.272, -3.87) Jauge when using it. 2 kg/cm ² , -13.53 psi) or press	Voltage 1.8 - 4.8 V 2.1 to 2.5 V lower than above value
Turn ignitic Remove E Always re Install a va Turn ignitic following c Connector F8 CAUTION • Always • Do not a cm ² , 14. the inspectio YES >> IN	on switch OFF. VAP control system pressure s place O-ring with a new one. Icuum pump to EVAP control sy on switch ON and check output onditions. ECM ECM (EVAP control system pressure sensor signal) calibrate the vacuum pump g apply below -93.3 kPa (-0.952 69 psi). on result normal? SPECTION END	ensor with its harness connector ystem pressure sensor. voltage between ECM harness Condition [Applied vacuum kPa (kg/cm ² , psi) Not applied -26.7 (-0.272, -3.87) Jauge when using it. 2 kg/cm ² , -13.53 psi) or press	Voltage 1.8 - 4.8 V 2.1 to 2.5 V lower than above value
Turn ignitic Remove E Always re Install a va Turn ignitic following c Connector F8 CAUTION • Always ( • Do not a cm ² , 14. the inspectio YES >> IN	on switch OFF. VAP control system pressure s place O-ring with a new one. Icuum pump to EVAP control sy on switch ON and check output onditions. ECM ECM (EVAP control system pressure sensor signal) calibrate the vacuum pump g apply below -93.3 kPa (-0.952 69 psi). on result normal? SPECTION END	ensor with its harness connector ystem pressure sensor. voltage between ECM harness Condition [Applied vacuum kPa (kg/cm ² , psi) Not applied -26.7 (-0.272, -3.87) Jauge when using it. 2 kg/cm ² , -13.53 psi) or press	Voltage 1.8 - 4.8 V 2.1 to 2.5 V lower than above value

### < DTC/CIRCUIT 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:000000004833381

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0452	EVAP control system pressure sensor low input	An excessively low voltage from the sensor is sent to ECM.	<ul> <li>Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Battery current sensor circuit is shorted.)</li> <li>EVAP control system pressure sensor</li> <li>Crankshaft position sensor (POS)</li> <li>Accelerator pedal position sensor</li> <li>Refrigerant pressure sensor</li> <li>Refrigerant pressure sensor</li> <li>Battery current sensor</li> <li>Battery current sensor</li> </ul>

# DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

# **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. Start engine and warm it up 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" indication is more than 0°C (32°F).
- 6. Start engine and wait at least 20 seconds.
- 7. Check 1st trip DTC.

#### With GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Set voltmeter probes to ECM harness connector and ground as per the following.

# EC-270

INFOID:000000004833380

## < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

	EC	CM		Ground		А
Connector		Terminal				
F8	(Fuel tan	43 k temperature sens	sor signal)	Ground		EC
4. Turn ignitio		nd wait at least	10 seconds.			С
YES >> Go	to <u>EC-271, "Dia</u> SPECTION END		<u>ure"</u> .			D
Diagnosis P	rocedure				INFOID:00000004833383	Е
1.CHECK GR		CTION				
	n switch OFF.	E38. Refer to G	I-37, "Circuit In	spection".		F
Is the inspectio		2				
NO >> Re	) TO 2. pair or replace (	ground connect	ion.			G
2.снеск со	NNECTOR					
	EVAP control s			s connector.		
Water s	hould not exis	t.				Ι
NO >> Re	) TO 3. pair or replace l	narness connec		R POWER SUP	PLY CIRCUIT-I	J
1. Turn ignitio	n switch ON.					К
2. Check the	voltage betweel	n EVAP control	system pressu	e sensor harnes	ss connector and ground.	
•	tem pressure sen-					L
	or Tanaaina a l	Ground	Voltage			
Connector B21	Terminal 3	Ground	Approx. 5 V			M
Is the inspectio			Approx. 5 V			
•	TO 10.	<u>r</u>				
	TO 4.					Ν
4.CHECK EVA	AP CONTROL S	SYSTEM PRES	SURE SENSO	R POWER SUP	PLY CIRCUIT-II	
<ol> <li>Turn ignitio</li> <li>Disconnect</li> </ol>	n switch OFF. ECM harness continuity betw	connector.			arness connector and ECM har-	O P
-	tem pressure sen- or	E	CM	Continuity		
Connector	Terminal	Connector	Terminal	····,		
B21	3	F8	76	Existed		

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

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

5. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors B4, M79

Harness connectors M77, E105

Harness connectors E8, F1

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 CIRCUIT

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

ECM		Sensor			
Connector	Terminal	Name Connector		Terminal	
	74	Refrigerant pressure sensor	E49	3	
	75	CKP sensor (POS)	F20	1	
F8	76	EVAP control system pressure sen- sor	B21	3	
	77	Battery current sensor	F51	1	
E16	102	APP sensor	E110	5	

#### 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.

- Battery currtent sensor (Refer to EC-327, "Component Inspection".)
- Crankshaft position sensor (POS) (Refer to <u>EC-228, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to EC-414, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace malfunctioning component.

**8.**CHECK APP SENSOR

Refer to EC-370, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 9.

9.Replace accelerator pedal assembly

1. Replace accelerator pedal assembly

2. Perform EC-370, "Special Repair Requirement".

#### >> INSPECTION END

10.check evap control system pressure sensor ground circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

# < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

EVAP control system pre	ssure sen-	EC	CM	Continuity	-
	erminal	Connector	Terminal	Continuity	
B21	1	F8	51	Existed	-
4. Also check harne	ess for sho	rt to ground and	d short to powe	er.	- I
s the inspection resul	<u>lt normal?</u>				
YES >> GO TO 1 NO >> GO TO 1					
<b>11.</b> DETECT MALFU	JNCTIONI	NG PART			
Check the following. Harness connectors Harness connectors Harness connectors Harness for open or	s M77, E1( s E8, F1		ntrol system pr	essure sensor a	and ECM
2.CHECK EVAP C	CONTROL	SYSTEM PRE	SSURE SENS	SOR INPUT SIC	ss or connectors. GNAL CIRCUIT FOR OPEN AND
. Check the contin ness connector.	uity betwe	en EVAP cont	rol system pre	ssure sensor h	arness connector and ECM har-
EVAP control system pre sor	ssure sen-	EC	СМ	Continuity	
Connector Te	erminal	Connector	Terminal		_
B21	2	F8	42	Existed	
2. Also check harne		rt to ground and	d short to powe	er.	
<u>s the inspection resu</u> YES >> GO TO 1-					
NO >> GO TO 1	3.				
<b>13.</b> DETECT MALFU	UNCTION	ING PART			
Check the following. <ul> <li>Harness connectors</li> </ul>					
<ul> <li>Harness connectors</li> <li>Harness connectors</li> </ul>		)5			
Harness for open or		ween EVAP co	ntrol system pr	essure sensor	and ECM
		-		•	ss or connectors.
14.CHECK EVAP C	ONTROL	SYSTEM PRE	SSURE SENS	OR	
Refer to <u>EC-274, "Co</u>		nspection".			
s the inspection resu					
YES >> GO TO 1 NO >> Replace I		trol system pre	seura sonsor		
15.CHECK INTERN		•	33015 SEIISUI.		
Refer to <u>GI-34, "Interr</u>	mittent Inc	ident".			

>> INSPECTION END

## < DTC/CIRCUIT DIAGNOSIS >

# Component Inspection

[MR18DE]

# 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)	voltage
	42	Not applied	1.8 - 4.8 V
F8	(EVAP control system pressure sensor signal)	-26.7 (-0.272, -3.87)	2.1 to 2.5 V 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?

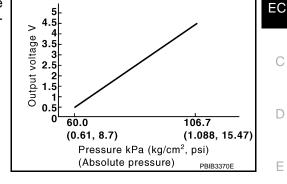
- YES >> INSPECTION END
- NO >> Replace EVAP control system pressure sensor

#### < DTC/CIRCUIT 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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0453	EVAP control system pres- sure sensor high input	An excessively high voltage from the sensor is sent to ECM.	<ul> <li>Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Accelerator pedal circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Battery current sensor circuit is shorted.)</li> <li>EVAP control system pressure sensor</li> <li>Crankshaft position sensor (POS)</li> <li>Accelerator pedal position sensor</li> <li>Refrigerant pressure sensor</li> <li>EVAP canister vent control valve</li> <li>EVAP canister</li> <li>Rubber hose from EVAP canister vent control valve to vehicle frame</li> <li>Battery current sensor</li> </ul>

## DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **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. Start engine and warm it up 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" indication is more than 0°C (32°F).
- 6. Start engine and wait at least 20 seconds.
- 7. Check 1st trip DTC.

With GST

# EC-275

INFOID:000000004833385

INFOID:000000004833386

А

F

Ν

Ρ

## < DTC/CIRCUIT DIAGNOSIS >

- 1. Start engine and warm it up to normal operating temperature.
- 2. Set voltmeter probes to ECM harness connector and ground as per the following.

	ECM	Ground	
Connector	ector Terminal		
F8	43 (Fuel tank temperature sensor signal)	Ground	

- 3. Make sure that the voltage is less than 4.2 V.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and wait at least 20 seconds.
- 6. Check 1st trip DTC.

#### Is 1st trip DTC detected?

- YES >> Go to EC-276, "Diagnosis Procedure".
- NO >> INSPECTION END

# Diagnosis Procedure

# 1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-37, "Circuit Inspection".

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

# 2. CHECK CONNECTOR

- 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.

# 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.

,	tem pressure sen- or	Ground	Voltage
Connector Terminal			
B21 3		Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 4.

4

# **4.**CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

INFOID:000000004833388

# < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

	stem pressure sen- sor	ECM		Continuity		
Connector	Terminal	Connector	Terminal	0 0		
B21	3	F8	76	Existed		
•	n result normal	?				
NO >> GC	D TO 6. D TO 5.					
	ALFUNCTIONII	NG PART				
Harness conr	nectors B4, M79 nectors M77, E					
	nectors E8, F1 open or short be	tween EVAP cor	ntrol system pre	essure sensor a	nd ECM	
>> Re	pair open circu	t or short to grou	ind or short to p	oower in harnes	s or connectors.	
CHECK SEI	NSOR POWER	SUPPLY CIRCL	ЛТ			
heck harness	for short to pov	ver and short to	ground, betwee	en the following	terminals.	
	CM		Ser			
Connector	Terminal	Nan	-	Connector	Terminal	
	74	Refrigerant pressu		E49	3	
F8	75	CKP sensor (POS)		F20	1	
76		EVAP control system pressure sen- sor		B21	3	
	77	Battery current ser	isor	F51	1	
-	102 n result normal	APP sensor		E110	5	
the inspection YES >> GC NO >> Re .CHECK CO heck the follo Battery current Crankshaft por Refrigerant p the inspection YES >> GC	n result normal TO 7. Pair short to gro MPONENTS wing. ntsensor (Refer osition sensor ( ressure sensor ( ressure sensor on result normal TO 8.	to <u>EC-327, "Con</u> POS) (Refer to <u>EC-414</u> ?	nponent Inspec C-228, "Comp 4, "Diagnosis P	E110 End of the second	S.	
the inspectio (ES >> GC NO >> Re .CHECK CO heck the follo Battery curren Crankshaft po Refrigerant p the inspectio (ES >> GC NO >> Re	n result normal D TO 7. Pair short to gro MPONENTS wing. Intsensor (Refer Distion sensor ( ressure sensor ( ressure sensor ( n result normal D TO 8. Place malfuncti	2 pund or short to p to <u>EC-327, "Con</u> POS) (Refer to <u>E</u> (Refer to <u>EC-41</u> 4	nponent Inspec C-228, "Comp 4, "Diagnosis P	E110 End of the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second	S.	
the inspectio (ES >> GC NO >> Re .CHECK CO heck the follo Battery curren Crankshaft po Refrigerant p the inspectio (ES >> GC NO >> Re .CHECK API	n result normal D TO 7. Pair short to gro MPONENTS wing. Intsensor (Refer Distion sensor ( ressure sensor ( ressure sensor ( n result normal D TO 8. P SENSOR	2 pund or short to p to <u>EC-327. "Cor</u> POS) (Refer to <u>E</u> (Refer to <u>EC-414</u> ? oning componen	nponent Inspec C-228, "Comp 4, "Diagnosis P	E110 End of the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second	S.	
the inspectio (ES >> GC NO >> Re .CHECK CO heck the follo Battery curren Crankshaft po Refrigerant p the inspectio (ES >> GC NO >> Re .CHECK API efer to <u>EC-37</u>	n result normal D TO 7. Pair short to gro MPONENTS wing. Intsensor (Refer Distion sensor ( ressure sensor ( ressure sensor ( n result normal D TO 8. Place malfuncti	<u>?</u> bund or short to p to <u>EC-327, "Con</u> POS) (Refer to <u>E</u> (Refer to <u>EC-414</u> ? oning componen <u>Inspection"</u> .	nponent Inspec C-228, "Comp 4, "Diagnosis P	E110 End of the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second	S.	
the inspectio         YES       >> GC         YO       >> Re         •CHECK CO         heck the follo         Battery current         Crankshaft por         Crankshaft por         Refrigerant p         the inspectio         YES       >> GC         •CHECK API         efer to EC-37         the inspectio         YES       >> GC         YES       >> GC         YES       >> GC         YES       >> GC         YES       >> GC	n result normal ) TO 7. pair short to gro MPONENTS wing. ntsensor (Refer osition sensor ( ressure sensor n result normal ) TO 8. place malfuncti P SENSOR 0. "Component n result normal ) TO 10. ) TO 10. ) TO 9.	2 pund or short to p to <u>EC-327, "Con</u> POS) (Refer to <u>E</u> (Refer to <u>EC-414</u> ? oning componen <u>Inspection"</u> . ?	nponent Insper C-228, "Comp 4, "Diagnosis P t.	E110 End of the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second	S.	
the inspection YES >> GC NO >> Re CHECK CO CHECK CO Check the follo Battery current Crankshaft por Refrigerant por the inspection YES >> GC NO >> Re CHECK API CHECK API CHECK API Sefer to EC-37 Sthe inspection YES >> GC NO >> GC	n result normal ) TO 7. pair short to gro MPONENTS wing. ntsensor (Refer osition sensor ( ressure sensor n result normal ) TO 8. place malfuncti P SENSOR 0. "Component n result normal ) TO 10. ) TO 10. ) TO 9.	<u>?</u> bund or short to p to <u>EC-327, "Con</u> POS) (Refer to <u>E</u> (Refer to <u>EC-414</u> ? oning componen <u>Inspection"</u> .	nponent Insper C-228, "Comp 4, "Diagnosis P t.	E110 End of the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second	S.	
the inspection (ES >> GC NO >> Re .CHECK CO heck the follo Battery current Crankshaft por Refrigerant p the inspection (ES >> GC NO >> Re .CHECK APP efer to EC-37 the inspection (ES >> GC NO >> GC .REPLACE A Replace ac	n result normal ) TO 7. pair short to gro MPONENTS wing. ntsensor (Refer osition sensor ( ressure sensor n result normal ) TO 8. place malfuncti P SENSOR 0, "Component n result normal ) TO 10. ) TO 10. ) TO 9. ACCELERATOF ccelerator peda	2 2 2 5 5 5 5 5 5 5 5 5 5 5 5 5	nponent Insper C-228, "Comp 4, "Diagnosis P t. t.	E110 End of the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second	S.	

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

#### SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sen- sor		E	Continuity	
Connector	Terminal	Connector Terminal		
B21	1	F8	51	Existed

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

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

**11.** DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors B4, M79
- Harness connectors M77, E105
- Harness connectors E8, F1

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.

12.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sen- sor		E	Continuity	
Connector	Terminal	Connector Terminal		*
B21	2	F8	42	Existed

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

#### Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 13.

13. DETECT MALFUNCTIONING PART

#### Check the following.

• Harness connectors B4, M79

• Harness connectors M77, E105

• Harness connectors E8, F1

• 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.

# 14.CHECK RUBBER TUBE

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 15.

NO >> Clean the rubber tube using an air blower, repair or replace rubber tube.

15. CHECK EVAP CANISTER VENT CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS > Refer to <u>EC-261, "Component Inspection"</u> .	[MR18DE]
Is the inspection result normal?	
YES >> GO TO 16.	
NO >> Replace EVAP canister vent control valve.	
<b>16.</b> CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	
Refer to EC-279, "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 17.	
NO >> Replace EVAP control system pressure sensor.	
17.CHECK IF EVAP CANISTER IS SATURATED WITH WATER	
<ol> <li>Remove EVAP canister with EVAP canister vent control valve a attached.</li> </ol>	nd EVAP control system pressure sensor
<ol> <li>Check if water will drain from the EVAP canister.</li> </ol>	
Does water drain from EVAP canister?	
YES >> GO TO 18.	EVAP canister
NO >> GO TO 20.	r   yy
	a Ker
	Water EVAP canister vent control valve
	PBIB1213E
18. CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve a attached.	and EVAP control system pressure sensor
The weight should be less than 1.9 kg (4.2 lb).	
Is the inspection result normal?	
YES >> GO TO 20.	
NO >> GO TO 19.	
19. DETECT MALFUNCTIONING PART	
<ul><li>Check the following.</li><li>EVAP canister for damage</li></ul>	
<ul> <li>EVAP canister for damage</li> <li>EVAP hose between EVAP canister and vehicle frame for clogging</li> </ul>	or poor connection
	·
>> Repair hose or replace EVAP canister.	
20. CHECK INTERMITTENT INCIDENT	
Refer to GI-34, "Intermittent Incident".	
>> INSPECTION END	
Component Inspection	INF0/D:000000004833389
1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	
<ol> <li>Turn ignition switch OFF.</li> <li>Remove EVAP control system pressure sensor with its harness of</li> </ol>	connector connected from EVAP canister
Always replace O-ring with a new one.	
<ol><li>Install a vacuum pump to EVAP control system pressure sensor.</li></ol>	

- Install a vacuum pump to EVAP control system pressure sensor.
   Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

# < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

	ECM	Condition	Voltage	
Connector	Terminal	[Applied vacuum kPa (kg/cm ² , psi)	voltage	
50	42	Not applied	1.8 - 4.8 V	
F8	(EVAP control system pressure sensor signal)	-26.7 (-0.272, -3.87)	2.1 to 2.5 V 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

#### < DTC/CIRCUIT DIAGNOSIS >

# P0455 EVAP CONTROL SYSTEM

# **DTC** Logic

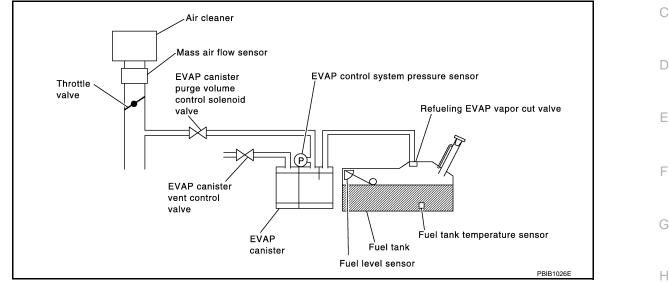
INFOID:000000004833390

[MR18DE]

А

## DTC DETECTION LOGIC

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in EVAP system between the fuel tank and EVAP canister purge volume control solenoid valve.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0455	EVAP control system gross leak detected	EVAP control system has a very large leak such as fuel filler cap fell off, EVAP control system does not operate properly.	<ul> <li>Fuel filler cap remains open or fails to close.</li> <li>Incorrect fuel tank vacuum relief valve</li> <li>Incorrect fuel filler cap used</li> <li>Foreign matter caught in fuel filler cap.</li> <li>Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>Foreign matter caught in EVAP canister vent control valve.</li> <li>EVAP canister or fuel tank leaks</li> <li>EVAP purge line (pipe and rubber tube) leaks</li> <li>EVAP canister vent control valve and the circuit</li> <li>EVAP canister purge volume control solenoid valve and the circuit</li> <li>EVAP canister vent control valve and the circuit</li> <li>EVAP canister purge volume control solenoid valve and the circuit</li> <li>EVAP canister purge volume control solenoid valve and the circuit</li> <li>EVAP canister purge volume control solenoid valve and the circuit</li> <li>EVAP canister purge volume control solenoid valve and the circuit</li> <li>EVAP canister purge volume control solenoid valve and the circuit</li> <li>EVAP canister purge volume control solenoid valve and the circuit</li> <li>EVAP canister purge volume control solenoid valve and the circuit</li> <li>EVAP control system pressure sensor</li> <li>QRVR system leaks</li> <li>Drain filter</li> </ul>

#### 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

1.PRECONDITIONING

< DTC/CIRCUIT DIAGNOSIS >

## **CAUTION:**

#### Never remove fuel filler cap during the DTC CONFIRMATION PROCEDURE.

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

#### **TESTING CONDITION:**

- Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedures.

Do you have CONSULT-III?

YES >> GO TO 2. NO

>> GO TO 4.

2.PERFORM DTC CONFIRMATION PROCEDURE

# (P)With CONSULT-III

- ĭ. Tighten fuel filler cap securely until ratcheting sound is heard.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds. 3.
- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III. 4.
- 5. Make sure that the following conditions are met. COOLAN TEMP/S: 0 - 100°C (32 - 212°F) INT/A TEMP SE: 0 - 60°C (32 - 140°F)
- Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.

Follow the instruction displayed.

#### NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-III screen, go to EC-12, "BASIC INSPECTION : Special Repair Requirement".

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END NG >> GO TO 3.

3.CHECK DTC

# Check DTC.

Which DTC is detected?

P0455 >> Go to EC-282, "Diagnosis Procedure".

P0442 >> Go to EC-245, "Diagnosis Procedure".

**4.** PERFORM DTC CONFIRMATION PROCEDURE

# With GST

#### NOTE:

Be sure to read the explanation of DIRVING PATTERN in EC-451, "How to Set SRT Code" before driving vehicle.

- 1. Start engine.
- 2. Drive vehicle according to DRIVING PATTERN.
- 3. Stop vehicle.
- Turn ignition switch OFF, wait at least 10 seconds and then turn ON. 4.
- 5. Check 1st trip DTC.

### Is 1st trip DTC detected?

YES-1 >> P0455: Go to EC-282, "Diagnosis Procedure".

- YES-2 >> P0442: Go to EC-245, "Diagnosis Procedure".
- YES-3 >> P0441: Go to EC-240, "Diagnosis Procedure".
- NO >> INSPECTION END

# Diagnosis Procedure

**1.**CHECK FUEL FILLER CAP DESIGN

#### < DTC/CIRCUIT DIAGNOSIS > Turn ignition switch OFF.

1.

[MR18DE]

Check for genuine NISSAN fuel filler cap design. 2. А Is the inspection result normal? YES >> GO TO 2. NO >> Replace with genuine NISSAN fuel filler cap. EC С NISSAN D SEF915U 2. CHECK FUEL FILLER CAP INSTALLATION Check that the cap is tightened properly by rotating the cap clockwise. Е 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 F 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. Н NO >> GO TO 4. **4.**CHECK FUEL TANK VACUUM RELIEF VALVE Refer to EC-285, "Component Inspection (Fuel filler cap)". Is the inspection result normal? YES >> GO TO 5. NO >> Replace fuel filler cap with a genuine one. 5.CHECK EVAP PURGE LINE Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or Κ disconnection. Refer to EC-68, "System Description". Is the inspection result normal? L YES >> GO TO 6. NO >> Repair or reconnect the hose. **Ó.**CLEAN EVAP PURGE LINE M Clean EVAP purge line (pipe and rubber tube) using air blower. >> GO TO 7. Ν 7. CHECK DRAIN FILTER Refer to EC-286, "Component Inspection (Drain filter)". Is the inspection result normal? YES >> GO TO 8. NO >> Replace drain filter. **8.**CHECK EVAP CANISTER VENT CONTROL VALVE Check the following. EVAP canister vent control valve is installed properly. Refer to EC-475, "Exploded View".

• EVAP canister vent control valve. Refer to EC-261, "Component Inspection".

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

#### YES >> GO TO 9.

NO >> Repair or replace EVAP canister vent control valve and O-ring.

**9.**CHECK FOR EVAP LEAK

#### Refer to EC-473, "Inspection".

Is there any leak in EVAP line?

- YES >> Repair or replace.
- NO-1 >> With CONSULT-III: GO TO 10.
- NO-2 >> Without CONSULT-III: GO TO 11.

10. Check evap canister purge volume control solenoid value operation

#### With CONSULT-III

- 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- 2. Start engine.
- 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
- 4. Touch "Qu" on CONSULT-III screen to increase "PURG VOL C/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**

- T. Start engine and warm it up to normal operating temperature.
- 2. Stop engine.
- 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- 4. Start engine and let it idle for at least 80 seconds.
- 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

#### Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 12.

12.CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-68. "System Description".

Is the inspection result normal?

- YES-1 >> With CONSULT-III: GO TO 13.
- YES-2 >> Without CONSULT-III: GO TO 14.
- NO >> Repair or reconnect the hose.

**13.**CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### With CONSULT-III

- 1. Start engine.
- 2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 15.

NO >> GO TO 14.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-254, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

PU455 EVAP CONTROL SYSTEM				
< DTC/CIRCUIT DIAGNOSIS >	[MR18DE]			
NO >> Replace EVAP canister purge volume control solenoid valve.				
15. CHECK FUEL TANK TEMPERATURE SENSOR	A			
Refer to EC-210, "Component Inspection".				
Is the inspection result normal?	EC			
YES >> GO TO 16.				
NO >> Replace fuel level sensor unit.				
16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	С			
Refer to <u>EC-269. "Component Inspection"</u> .				
<u>Is the inspection result normal?</u> YES >> GO TO 17.	D			
NO >> Replace EVAP control system pressure sensor.				
17. CHECK EVAP/ORVR LINE	Е			
Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and in				
nection. For location, refer to EC-407, "Description".				
Is the inspection result normal?	F			
YES >> GO TO 18. NO >> Repair or replace hoses and tubes.				
NO >> Repair or replace hoses and tubes. <b>18.</b> CHECK RECIRCULATION LINE	G			
Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, loo improper connection.	seness and			
Is the inspection result normal?	Н			
YES >> GO TO 19.				
NO >> Repair or replace hose, tube or fuel filler tube.	1			
19. CHECK REFUELING EVAP VAPOR CUT VALVE				
Refer to EC-410, "Component Inspection (Refueling EVAP vapor cut valve)".				
Is the inspection result normal?	J			
YES >> GO TO 20. NO >> Replace refueling EVAP vapor cut valve with fuel tank.				
20. CHECK INTERMITTENT INCIDENT				
Refer to GI-34, "Intermittent Incident".				
Nelei lo <u>Or-54, Intermittent incident</u> .	1			
>> INSPECTION END	L			
Component Inspection (Fuel filler cap)	FO/D-000000000000000000000000000000000000			
	FOID:000000004833392			
1.CHECK FUEL FILLER CAP				
1. Turn ignition switch OFF.	N			
<ol> <li>Remove fuel filler cap.</li> <li>Wipe clean valve housing.</li> </ol>	1.4			
	0			
	P			
	Spring			
Gasket	Pressure valve			
	Vacuum valve			
	SEF445Y			

#### < DTC/CIRCUIT DIAGNOSIS >

- 4. Install fuel filler cap adapter (commercial service tool) to fuel filler cap.
- 5. 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 illuminate.

>> INSPECTION END

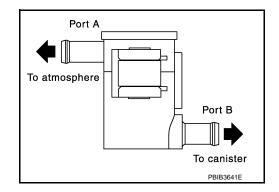
Component Inspection (Drain filter)

# **1.**CHECK DRAIN FILTER

- 1. Check visually for insect nests in the drain filter air inlet.
- 2. Check visually for cracks or flaws in the appearance.
- 3. Check visually for cracks or flaws in the hose.
- 4. Blow air into port A and check that it flows freely out of port B.
- 5. Block port B.
- 6. Blow air into port A and check that there is no leakage.

#### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace drain filter.



[MR18DE]

Vacuum/

Pressure

pump

SEF9435

-Vacuum/Pressure gauge

One-way

valve

- Fuel filler

Fuel filler cap adapter

cap

1

INFOID:000000004833393

#### < DTC/CIRCUIT DIAGNOSIS >

# P0456 EVAP CONTROL SYSTEM

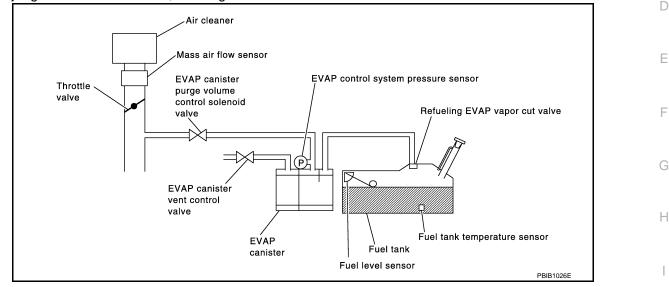
# **DTC Logic**

DTC DETECTION LOGIC

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.

If ECM judges a leak which corresponds to a very small leak, the very small leak P0456 will be detected. If ECM judges a leak equivalent to a small leak, EVAP small leak P0442 will be detected.

If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0456	Evaporative emission control system very small leak (negative pressure check)	<ul> <li>EVAP system has a very small leak.</li> <li>EVAP system does not operate properly.</li> </ul>	<ul> <li>Incorrect fuel tank vacuum relief valve</li> <li>Incorrect fuel filler cap used</li> <li>Fuel filler cap remains open or fails to close.</li> <li>Foreign matter caught in fuel filler cap.</li> <li>Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>Foreign matter caught in EVAP canister vent control valve.</li> <li>EVAP canister or fuel tank leaks</li> <li>EVAP purge line (pipe and rubber tube) leaks</li> <li>EVAP purge line rubber tube bent</li> <li>Loose or disconnected rubber tube</li> <li>EVAP canister purge volume control solenoid valve and the circuit</li> <li>EVAP canister purge volume control solenoid valve and the circuit</li> <li>EVAP canister purge volume control solenoid valve and the circuit</li> <li>EVAP canister purge volume control solenoid valve and the circuit</li> <li>EVAP canister vent control valve and the circuit</li> <li>EVAP canister purge volume control valve is missing or damaged</li> <li>EVAP canister is saturated with water</li> <li>EVAP control system pressure sensor</li> <li>Refueling EVAP vapor cut valve</li> <li>ORVR system leaks</li> <li>Fuel level sensor and the circuit</li> <li>Foreign matter caught in EVAP canister purge volume control solenoid valve</li> </ul>

#### **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.

INFOID:000000004833394

EC

С

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

#### • Use only a genuine NISSAN rubber tube as a replacement.

DTC CONFIRMATION PROCEDURE

**1.**INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

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

 $\gamma = 2$ 

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

NOTE:

- If DTC P0456 is displayed with P0442, first perform trouble diagnosis for DTC P0456.
- After repair, make sure that the hoses and clips are installed properly.
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

TESTING CONDITION:

- Open engine hood before conducting following procedure.
- If any of following conditions are met just before the DTC CONFIRMATION PROCEDURE, leave the vehicle for more than 1 hour.
- Fuel filler cap is removed.
- Fuel is refilled or drained.
- EVAP component parts is/are removed.
- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

### >> GO TO 3.

**3.**PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Make sure the following conditions are met.

FUEL LEVEL SE: 0.25 - 1.4 V COOLAN TEMP/S: 0 - 32°C (32 - 90°F) FUEL T/TMP SE: 0 - 35°C (32 - 95°F) INT A/TEMP SE: More than 0°C (32°F)

If NG, turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the "FUEL LEVEL SE" meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1.

- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Select "EVAP V/S LEAK P0456/P1456" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.

Follow the instruction displayed. **NOTE:** 

If the engine speed cannot be maintained within the range displayed on CONSULT-III screen, go to <u>EC-12, "BASIC INSPECTION : Special Repair Requirement"</u>.

Which is displayed on CONSULT-III?

OK >> INSPECTION END

NG >> Go to EC-289, "Diagnosis Procedure".

**4.**PERFORM COMPONENT FUNCTION CHECK

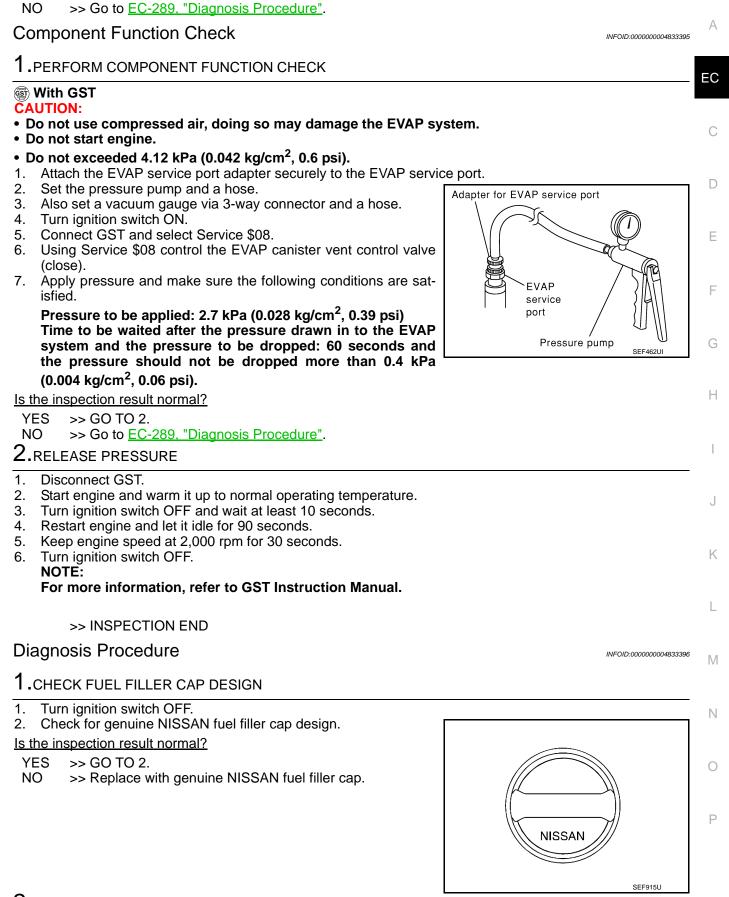
Perform component function check. Refer to EC-289, "Component Function Check".

#### NOTE:

Use component function check to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END



# 2.CHECK FUEL FILLER CAP INSTALLATION

< DTC/CIRCUIT DIAGNOSIS >

Check that the cap is tightened properly by rotating the cap clockwise.

[MR18DE]

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-292, "Component Inspection (Fuel filler cap)".

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-473, "Inspection".

Is there any leak in EVAP line?

YES >> Repair or replace.

NO >> GO TO 6.

**6.**CHECK DRAIN FILTER

Refer to EC-293, "Component Inspection (Drain filter)".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace drain filter.

7. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly. Refer to <u>EC-475. "Exploded View"</u>.
- EVAP canister vent control valve. Refer to <u>EC-261, "Component Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 8.

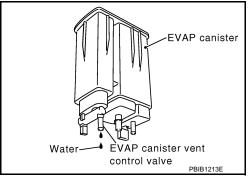
NO >> Repair or replace EVAP canister vent control valve and O-ring.

8.CHECK IF EVAP CANISTER IS 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 9.
- NO-1 >> With CONSULT-III: GO TO 11.
- NO-2 >> Without CONSULT-III: GO TO 12.



# 9. 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 1.9 kg (4.2 lb).

< DTC/CIRCUIT DIAGNOSIS >	[MR18DE]
Is the inspection result normal?	
YES-1 >> With CONSULT-III: GO TO 11.	/
YES-2 >> Without CONSULT-III: GO TO 12. NO >> GO TO 10.	
	E
10.DETECT MALFUNCTIONING PART	
<ul><li>Check the following.</li><li>EVAP canister for damage</li></ul>	
<ul> <li>EVAP callister for damage</li> <li>EVAP hose between EVAP canister and vehicle frame for clogging or poor connection</li> </ul>	(
>> Repair hose or replace EVAP canister.	
11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	[
With CONSULT-III	
<ol> <li>Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP se</li> </ol>	rvice port.
2. Start engine.	
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.	
<ol> <li>Touch "Qu" on CONSULT-III screen to increase "PURG VOL CONT/V" opening to 100%.</li> <li>Check vacuum hose for vacuum.</li> </ol>	I
Vacuum should exist.	,
Is the inspection result normal?	(
YES >> GO TO 14.	
NO >> GO TO 13.	ŀ
12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
Without CONSULT-III	
1. Start engine and warm it up to normal operating temperature.	
<ol> <li>Stop engine.</li> <li>Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP se</li> </ol>	rvice port
4. Start engine and let it idle for at least 80 seconds.	
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.	
Vacuum should exist.	
	ł
<u>Is the inspection result normal?</u> YES >> GO TO 15.	
NO >> GO TO 13.	1
13. снеск vacuum hose	
Check vacuum hoses for clogging or disconnection. Refer to <u>EC-68</u> , "System Description".	
Is the inspection result normal?	Γ
YES >> GO TO 14.	
NO >> Repair or reconnect the hose.	,
14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	1
Refer to EC-252, "Diagnosis Procedure".	
Is the inspection result normal?	(
YES >> GO TO 15.	
NO >> Replace EVAP canister purge volume control solenoid valve.	
15. CHECK FUEL TANK TEMPERATURE SENSOR	F
Refer to EC-210, "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 16.	
NO >> Replace fuel level sensor unit.	

 $16. {\sf check evap control system pressure sensor}$ 

< DTC/CIRCUIT DIAGNOSIS >

Refer to EC-269, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 17.

NO >> Replace EVAP control system pressure sensor.

**17.**CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to <u>EC-68, "System Description"</u>.

Is the inspection result normal?

YES >> GO TO 18.

NO >> Repair or reconnect the hose.

**18.**CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 19.

**19.**CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to <u>EC-407, "Description"</u>.

Is the inspection result normal?

YES >> GO TO 20.

NO >> Repair or replace hoses and tubes.

20. CHECK RECIRCULATION LINE

Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 21.

NO >> Repair or replace hose, tube or fuel filler tube.

21. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-410, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> GO TO 22.

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

22. CHECK FUEL LEVEL SENSOR

Refer to FL-8, "Inspection".

Is the inspection result normal?

YES >> GO TO 23.

NO >> Replace fuel level sensor unit.

23. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

>> INSPECTION END

### Component Inspection (Fuel filler cap)

**1.**CHECK FUEL FILLER CAP

1. Turn ignition switch OFF.

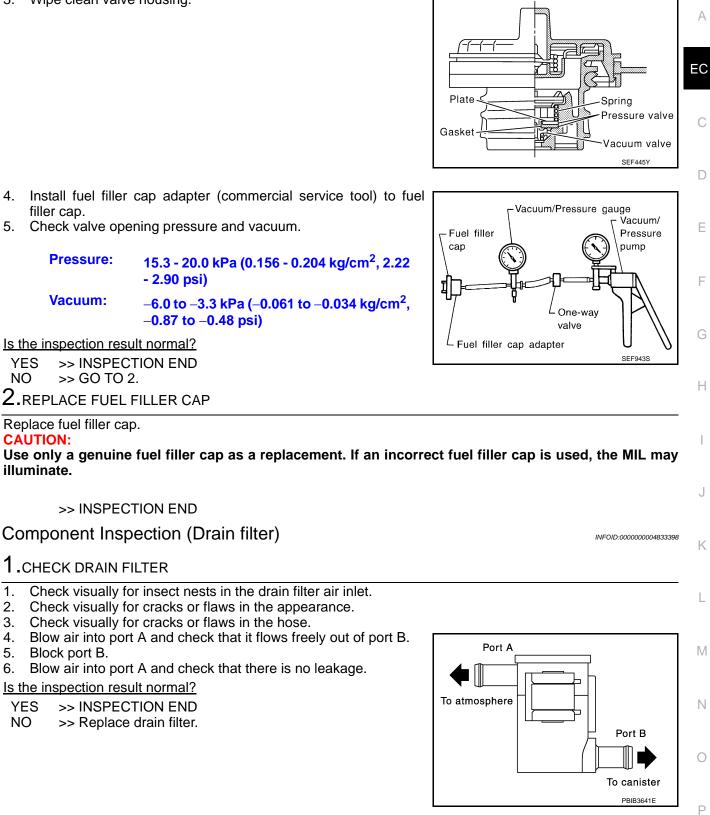
2. Remove fuel filler cap.

[MR18DE]

INFOID:000000004833397

#### < DTC/CIRCUIT DIAGNOSIS >

3. Wipe clean valve housing.



[MR18DE]

# 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 via the 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:000000004833400

# DTC DETECTION LOGIC

#### NOTE:

- If DTC P0460 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0460 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-307, "DTC Logic"</u>.

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.	<ul> <li>Harness or connectors (The CAN communication line is open or shorted)</li> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Combination meter</li> <li>Fuel level sensor</li> </ul>

### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### >> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and wait maximum of 2 consecutive minutes.
- 2. Check 1st trip DTC.

#### Is 1st trip DTC detected?

- YES >> Go to EC-294, "Diagnosis Procedure".
- NO >> INSPECTION END

### Diagnosis Procedure

INFOID:000000004833401

#### **1.**CHECK COMBINATION METER FUNCTION

Refer to MWI-30, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Refer to <u>MWI-42</u>, "Component Function Check"

2. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

>> INSPECTION END

INFOID:000000004833399

# **P0461 FUEL LEVEL SENSOR**

### < DTC/CIRCUIT DIAGNOSIS >

# 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 via the 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:000000004833403

### DTC DETECTION LOGIC

NOTE:

- If DTC P0461 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0461 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-307, "DTC Logic"</u>.

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 F been driven.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
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.	<ul> <li>Harness or connectors (The CAN communication line is open or shorted)</li> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Combination meter</li> <li>Fuel level sensor</li> </ul>	Н

### DTC CONFIRMATION PROCEDURE

### **1.**PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to <u>EC-295</u>, "<u>Component Function Check</u>". 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 <u>EC-296, "Diagnosis Procedure"</u>.

### Component Function Check

INFOID:000000004833404

L

M

Ν

Ρ

1.PRECONDITIONING

#### WARNING:

When performing following procedure, be sure to observe the handling of the fuel. Refer to <u>FL-2,</u> <u>"General Precautions"</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  $\ell$  (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.

INFOID:000000004833402

А

EC

D

# P0461 FUEL LEVEL SENSOR

#### < DTC/CIRCUIT DIAGNOSIS >

- 2. Release fuel pressure from fuel line, refer to <u>EC-471, "Inspection"</u>.
- 3. Remove the fuel feed hose on the fuel level sensor unit.
- 4. Connect a spare fuel hose where the fuel feed hose was removed.
- 5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.
- 6. Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-III.
- 7. Check "FUEL LEVEL SE" output voltage and note it.
- 8. Select "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-III.
- 9. Touch "ON" and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
- 10. Check "FUEL LEVEL SE" output voltage and note it.
- 11. Fill fuel into the fuel tank for 30  $\ell$  (7-7/8 US gal, 6-5/8 Imp gal).
- 12. Check "FUEL LEVEL SE" output voltage and note it.

13. Confirm whether the voltage changes more than 0.03 V during step 7 to 10 and 10 to 12.

Is the inspection result normal?

#### YES >> INSPECTION END

NO >> Go to EC-296, "Diagnosis Procedure".

**3.**PERFORM COMPONENT FUNCTION CHECK

# Without CONSULT-III

# Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 $\ell$ (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-471, "Inspection".
- 3. Remove the fuel feed hose on the fuel level sensor unit.
- 4. Connect a spare fuel hose where the fuel feed hose was removed.
- 5. Turn ignition switch ON.
- 6. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
- 7. Confirm that the fuel gauge indication varies.
- 8. Fill fuel into the fuel tank for 30  $\ell$  (7-7/8 US gal, 6-5/8 Imp gal).
- 9. Confirm that the fuel gauge indication varies.

#### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-296, "Diagnosis Procedure".

#### **Diagnosis** Procedure

INFOID:000000004833405

[MR18DE]

### **1.**CHECK COMBINATION METER FUNCTION

Refer to MWI-30, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Refer to <u>MWI-42, "Component Function Check"</u>

2. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

# 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 via the CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output volt-

age changes depending on the movement of the fuel mechanical float.

### DTC Logic

INFOID:000000004833407

### DTC DETECTION LOGIC

NOTE:

- If DTC P0462 or P0463 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0462 or P0463 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-307, "DTC Logic"</u>.

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.	<ul> <li>shorted)</li> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Combination meter</li> <li>Fuel level sensor</li> </ul>	ŀ

### DTC CONFIRMATION PROCEDURE

### **1.**PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 11 V and 16 V at K ignition switch ON.

>> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds. M 2. Check 1st trip DTC. Is 1st trip DTC detected? YES >> Go to EC-297, "Diagnosis Procedure". Ν NO >> INSPECTION END Diagnosis Procedure INFOID:000000004833408 1. CHECK COMBINATION METER FUNCTION Refer to MWI-30, "CONSULT-III Function (METER/M&A)". Ρ Is the inspection result normal? YFS >> GO TO 2. NO >> Refer to MWI-42, "Component Function Check" 2.CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

INFOID:000000004833406

EC

D

Е

F

L

### < DTC/CIRCUIT DIAGNOSIS > P0500 VSS

# Description

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

# DTC Logic

DTC DETECTION LOGIC NOTE:

- If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-307, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0500	Vehicle speed sensor	The vehicle speed signal sent to ECM is almost 0 km/h (0 MPH) even when vehicle is being driven.	<ul> <li>Harness or connectors (The CAN communication line is open or shorted)</li> <li>Harness or connectors (The vehicle speed signal circuit is open or shorted)</li> <li>Wheel sensor</li> <li>Combination meter</li> <li>ABS actuator and electric unit (control unit)</li> </ul>	F

### 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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### >> GO TO 3.

3.CHECK VEHICLE SPEED SIGNAL

#### NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a M road test is expected to be easier, it is unnecessary to lift the vehicle.

- (P)With CONSULT-III
- Start engine. 1.
- Ν Read "VHCL SPEED SE" in "DATA MONITOR" mode with CONSULT-III. The vehicle speed on CON-2. SULT-III should exceed 10 km/h (6 mph) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Go to EC-300, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

Select "DATA MONITOR" mode with CONSULT-III. 1.

- 2. Warm engine up to normal operating temperature.
- 3. Maintain the following conditions for at least 50 consecutive seconds. **CAUTION:**

#### Always drive vehicle at a safe speed.

INFOID:000000004833409

INFOID:000000004833410

D

Е

Н

Κ

L

Ρ

ENG SPEED	CVT: 1,600 - 6,000 rpm M/T: 2,200 - 6,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	CVT: 5.5 - 31.8 msec M/T: 4.0 - 31.8 msec
Selector lever	Except P or N position (CVT) Except Neutral position (M/T)
PW/ST SIGNAL	OFF

4. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-300, "Diagnosis Procedure".

NO >> INSPECTION END

#### **5.**PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-300, "Component Function Check".

Use component function check to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-300, "Diagnosis Procedure".

### **Component Function Check**

**1.**PERFORM COMPONENT FUNCTION CHECK

#### With GST

- 1. Lift up drive wheels.
- 2. Start engine.
- Read vehicle speed signal in Service \$01 with GST. The vehicle speed signal on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-300, "Diagnosis Procedure".

#### Diagnosis Procedure

INFOID:000000004833412

INFOID:000000004833411

# 1. CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

#### Refer to BRC-22, "CONSULT-III Function".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace.

2. CHECK COMBINATION METER

Refer to MWI-30, "CONSULT-III Function (METER/M&A)".

# **P0506 ISC SYSTEM**

## < DTC/CIRCUIT DIAGNOSIS >

# P0506 ISC SYSTEM

# Description

INFOID:000000004833413

[MR18DE]

Ε

F

А

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, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

**DTC Logic** 

INFOID:000000004833414

### 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 system RPM lower than expected	The idle speed is less than the target idle speed by 100 rpm or more.	<ul><li>Electric throttle control actuator</li><li>Intake air leak</li></ul>
DTC CON	FIRMATION PROCED	DURE	
1.PRECO	NDITIONING		
least 10 sec If the targe Special Re TESTING C • Before po	conds before conducting at idle speed is out of pair Requirement", be CONDITION: erforming the followin	g the next test.	
-	GO TO 2.		
	RM DTC CONFIRMATIO		
<ol> <li>Turn ig</li> <li>Start er</li> </ol>	nition switch OFF and w	normal operating temperature. vait at least 10 seconds. ast 1 minute at idle speed.	
	TC detected?		
	Go to <u>EC-301, "Diagno</u> INSPECTION END	osis Procedure".	
Diagnosi	s Procedure		INFOID:000000004833415
1.снеск	INTAKE AIR LEAK		
	ngine and let it idle. for an intake air leak afte	er the mass air flow sensor.	
	r leak detected?		
	<ul> <li>Discover air leak locati</li> <li>GO TO 2.</li> </ul>	on and repair.	
2.REPLAC			
1. Stop er	ngine.		
2. Replac	e ECM.		

# P0506 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

3. Perform <u>EC-15</u>. "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

# P0507 ISC SYSTEM

### < DTC/CIRCUIT DIAGNOSIS >

# P0507 ISC SYSTEM

# Description

INFOID:000000004833416

[MR18DE]

А

Ε

F

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let EC 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, deceleration, and engine load (air conditioner, power steering and cooling fan D operation, etc.).

DTC Logic

INFOID:000000004833417

### DTC DETECTION LOGIC

#### NOTE:

If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0507	Idle speed control system RPM higher than expected	The idle speed is more than the target idle speed by 200 rpm or more.	<ul> <li>Electric throttle control actuator</li> <li>Intake air leak</li> <li>PCV system</li> </ul>
DTC CON	FIRMATION PROCED	URE	·
	NDITIONING		
If DTC Cor	firmation Procedure has	s been previously conducted, always	turn ignition switch OFF and wait at
least 10 se	conds before conducting	the next test.	
		the specified value, perform <u>EC-17</u> , fore conducting DTC Confirmation	
<b>TESTING</b>	CONDITION:	-	
		g procedure, confirm that battery von nperature above –10°C(14°F).	oltage is more than 11 V at idle.
Aiways p			
>>	• GO TO 2.		
2.PERFO	RM DTC CONFIRMATIC	N PROCEDURE	
1. Start e	ngine and warm it up to r	normal operating temperature.	
	nition switch OFF and w		
	1st trip DTC.	ist 1 minute at idle speed.	
	TC detected?		
	Go to EC-303, "Diagno	<u>sis Procedure"</u> .	
NO >>	INSPECTION END		
Diagnosi	s Procedure		INFOID:000000004833418
	PCV HOSE CONNECTI		
	at PCV hose is connected	<u> </u>	
	ection result normal?	a correctly.	
	• GO TO 2.		
	Repair or replace.		
2.снеск	INTAKE AIR LEAK		
1 Start e	ngine and let it idle		

Start engine and let it idle. Ί.

Listen for an intake air leak after the mass air flow sensor. 2.

#### Is intake air leak detected?

- YES >> Discover air leak location and repair.
- NO >> GO TO 3.

# **3.**REPLACE ECM

- 1. Stop engine.
- 2. Replace ECM.
- 3. Perform <u>EC-15. "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Require-</u> ment".

# 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	G
		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.		Н
DTC CON	FIRMATION PROC	EDU	RE		

### ONFIRMATION PROCEDURE

# 1.PRECONDITIONING

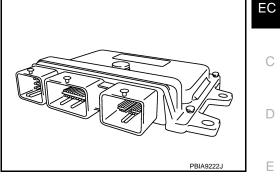
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

### >> GO TO 2.

22 GO TO 2.	
2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A	K
<ol> <li>Turn ignition switch ON.</li> <li>Check 1st trip DTC.</li> </ol>	
Is 1st trip DTC detected?	1
YES $>>$ Go to <u>EC-306, "Diagnosis Procedure"</u> . NO $>>$ GO TO 3.	L
<b>3.</b> PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B	M
<ol> <li>Turn ignition switch ON and wait at least 1 second.</li> <li>Turn ignition switch OFF, wait at least 10 seconds and then turn ON.</li> <li>Check 1st trip DTC.</li> </ol>	Ν
Is 1st trip DTC detected?	
YES >> Go to <u>EC-306, "Diagnosis Procedure"</u> . NO >> GO TO 4.	0
<b>4.</b> PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C	
<ol> <li>Turn ignition switch ON and wait at least 1 second.</li> <li>Turn ignition switch OFF, wait at least 10 seconds and then turn ON.</li> <li>Repeat step 2 for 32 times.</li> <li>Check 1st trip DTC.</li> </ol>	Ρ
Is 1st trip DTC detected?	
YES >> Go to <u>EC-306. "Diagnosis Procedure"</u> .	

INFOID:000000004833422

INFOID:000000004833423



F

J

### Diagnosis Procedure

[MR18DE]

# **1.**INSPECTION START

- 1. Turn ignition switch ON.
- 2. Erase 1st trip DTC. Refer to "How to Erase DTC and 1st Trip DTC" in EC-85, "Diagnosis Description".
- 3. Perform DTC CONFIRMATION PROCEDURE. Refer to EC-305, "DTC Logic".

Is the 1st trip DTC P0605 displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

# 2.REPLACE ECM

- 1. Replace ECM.
- 2. Perform <u>EC-15</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

# 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:000000004833426 D

[MR18DE]

INFOID:000000004833425

## DTC DETECTION LOGIC

	Trouble diagnosis name	DTC detecting condition	Possible cause
P0607	CAN communication bus	When detecting error during the initial diagnosis of CAN controller of ECM.	• ECM
DTC CONF	IRMATION PROCED	URE	
1.PERFOR	M DTC CONFIRMATIO	N PROCEDURE	
1. Turn igni 2. Check D	ition switch ON.		
s DTC detec	-		
	Go to <u>EC-307, "Diagnos</u>	sis Procedure".	
	INSPECTION END		
Diagnosis	Procedure		INFOID:00000004833427
- 1			
	ION START		
	ition switch ON.	rase DTC and 1st Trip DTC" in . <u>EC-85, "D</u>	liagnosis Description"
		PROCEDURE. Refer to <u>EC-307, "DTC L</u>	
4. Check D	-		
	20607 displayed again?		
-	GO TO 2. INSPECTION END		
2.REPLACE			
	5014		
1. Replace		SERVICE WHEN REPLACING CONTRO	LUNIT : Special Repair Require-
1. Replace		SERVICE WHEN REPLACING CONTRO	L UNIT : Special Repair Require-
1. Replace 2. Perform		SERVICE WHEN REPLACING CONTRO	L UNIT : Special Repair Require-
1. Replace 2. Perform <u>ment"</u> .		SERVICE WHEN REPLACING CONTRO	L UNIT : Special Repair Require-
1. Replace 2. Perform <u>ment"</u> .	EC-15. "ADDITIONAL S	SERVICE WHEN REPLACING CONTRO	L UNIT : Special Repair Require-

С

Ρ

# P0643 SENSOR POWER SUPPLY

# DTC Logic

INFOID:000000004833428

### 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.	<ul> <li>Harness or connectors (APP sensor 1 circuit is shorted.) (TP sensor circuit is shorted.) (Battery current sensor circuit is shorted.) (PSP sensor circuit is shorted.) [Camshaft position sensor (PHASE) circuit is shorted.]</li> <li>Accelerator pedal position sensor</li> <li>Throttle position sensor</li> <li>Battery current sensor</li> <li>Power steering pressure sensor</li> <li>Camshaft position sensor (PHASE)</li> </ul>

### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

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

>> GO TO 2.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- 2. Check DTC.

#### Is DTC detected?

- YES >> Go to EC-308, "Diagnosis Procedure".
- NO >> INSPECTION END

### **Diagnosis** Procedure

# 1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-37, "Circuit Inspection".

#### Is the inspection result normal?

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

# 2. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

#### 1. Disconnect accelerator pedal position (APP) sensor harness connector.

- 2. Turn ignition switch ON.
- 3. Check the voltage between APP sensor harness connector and ground.

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

Is the inspection result normal?

```
YES >> GO TO 7.
```

NO >> GO TO 3.

### EC-308

INFOID:000000004833430

# P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

А

# 3. CHECK SENSOR POWER SUPPLY CIRCUITS

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

E	СМ	Se	ensor		EC
Connector	Terminal	Name	Connector	Terminal	
F8	72	Electric throttle control actuator	F29	2	
Fð	78	CMP sensor (PHASE)	F26	1	С
E16	106	APP sensor	E110	4	
NO >> Re 4.CHECK CO	) TO 4. pair short to gr MPONENTS	l <u>?</u> ound or short to power in harne	ess or connector	S.	D
<u>Is the inspectio</u> YES >> GC	sition sensor (F <u>n result norma</u> ) TO 5.	PHASE) (Refer to <u>EC-231, "Cor</u> <u>I?</u> t position sensor (PHASE).	nponent Inspecti	<u>on"</u> .)	F
<b>5.</b> CHECK TP	-				G
					Н
•		ROTTLE CONTROL ACTUATO	R		I
2. Perform <u>E(</u> <u>ment</u> ".	<u>C-17, "ACCELI</u>	ontrol actuator. ERATOR PEDAL RELEASED I	POSITION LEAF	NING : Special R	<u>tepair Require-</u> J
>> INS <b>7.</b> CHECK API	SPECTION EN P SENSOR	D			K
Refer to <u>EC-37</u> Is the inspectio	0, "Componen				L
NO >> GC	) TO 8.	R PEDAL ASSEMBLY			Μ
1. Replace ad	celerator peda				N
9.CHECK INT		NCIDENT			0
Refer to <u>GI-34.</u> >> INS	SPECTION EN				Р

# P0850 PNP SWITCH

### Description

For CVT models, transmission range switch is turn ON when the selector lever is P or N. For M/T models, park/neutral position (PNP) range switch is ON when the selector lever is Neutral position. ECM detects the position because the continuity of the line (the ON) exists.

# DTC Logic

INFOID:000000004833432

## DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0850	Park/neutral position switch	For CVT models, the signal of transmission range switch is not changed in the process of engine starting and driving. For M/T models, the signal of the park/neu- tral position (PNP) switch is not changed in the process of engine starting and driving.	<ul> <li>Harness or connectors [The transmission range switch circuit is open or shorted.(CVT models)] [The park/neutral position (PNP) switch circuit is open or shorted.(M/T models)]</li> <li>Transmission range switch (CVT mod- els)</li> <li>Park/neutral position (PNP) switch (M/T models)</li> </ul>

### 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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

### >> GO TO 3.

3.CHECK PNP SWITCH FUNCTION

#### BWith CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-III. Then check the "P/N POSI SW" signal under the following conditions.

Selector lever position	Known-good signal
N or P position (CVT) Neutral position (M/T)	ON
Except above position	OFF

Is the inspection result normal?

YES >> GO TO 4.

NO >> Go to EC-311, "Diagnosis Procedure".

#### 4. PERFORM DTC CONFIRMATION PROCEDURE

1. Select "DATA MONITOR" mode with CONSULT-III.

- 2. Start engine and warm it up to normal operating temperature.
- 3. Maintain the following conditions for at least 60 consecutive seconds. CAUTION:

Always drive vehicle at a safe speed.

INFOID:000000004833431

ENG SPEED		1,200 - 6,375 rpm	<b>`</b>			
COOLAN TEMP/S	3	More than 70°C (		-		
B/FUEL SCHDL		2.5 - 31.8 msec	100 1 )	-		
VHCL SPEED SE		More than 64 km	/h (40 mnh)	-		
Selector lever		Suitable position		-		<u> </u>
4. Check 1st t	rin DTC	Cultable poellien				
ls 1st trip DTC of	•					
YES >> Go	to <u>EC-311, "Dia</u> PECTION END		ure".			
5.PERFORM	COMPONENT F	FUNCTION CH	ECK			
Perform compo NOTE:	nent function ch	neck. Refer to E	<u>EC-311, "Compo</u>	onent Function	Check".	
Use component the park/neutral firmed. Is the inspection YES >> INS	position (PNP) <u>n result normal?</u> PECTION END	switch circuit (I	M/T models). Di			(CVT models) or might not be con-
_	to <u>EC-311, "Dia</u>	-	<u>ure"</u> .			
Component	runction Un	IECK				INFOID:000000004833433
	COMPONENT F		ECK			
<b>1</b> .PERFORM ( 1. Turn ignitio	COMPONENT F	UNCTION CH		around under 1	the following cor	ditions.
<b>1</b> .PERFORM ( 1. Turn ignitio	COMPONENT F	UNCTION CH		ground under t	the following cor	ditions.
<b>1</b> .PERFORM ( 1. Turn ignitio	COMPONENT F n switch ON. voltage betweer	FUNCTION CH	connector and	-		ditions.
1.PERFORM ( 1. Turn ignitio 2. Check the v	COMPONENT F n switch ON. voltage betweer	UNCTION CH	connector and	ground under t	the following cor	ditions.
1. PERFORM ( 1. Turn ignitio 2. Check the v	COMPONENT F n switch ON. voltage betweer CM Terminal 69 (PNP switch sig-	FUNCTION CH	connector and	-		ditions.
1. PERFORM ( 1. Turn ignitio 2. Check the v EC Connector	COMPONENT F n switch ON. voltage betweer CM Terminal 69	FUNCTION CH	connector and	dition P or N (CVT)	Voltage	ditions.
1. PERFORM ( 1. Turn ignitio 2. Check the v EC Connector F8 Is the inspection	COMPONENT F n switch ON. voltage betweer CM Terminal 69 (PNP switch sig- nal)	FUNCTION CH n ECM harness Ground Ground	connector and	dition P or N (CVT) Neutral (M/T)	Voltage Approx. 0 V	ditions.
1. PERFORM ( 1. Turn ignitio 2. Check the v EC Connector F8 s the inspection YES >> INS	COMPONENT F n switch ON. voltage betweer CM Terminal 69 (PNP switch sig- nal) n result normal? SPECTION END	FUNCTION CH n ECM harness Ground Ground	connector and Con Selector lever	dition P or N (CVT) Neutral (M/T)	Voltage Approx. 0 V	ditions.
1. PERFORM ( 1. Turn ignitio 2. Check the v EC Connector F8 Is the inspection YES >> INS NO >> Go	COMPONENT F n switch ON. voltage betweer CM Terminal 69 (PNP switch sig- nal) n result normal? SPECTION END to <u>EC-311, "Dia</u>	FUNCTION CH n ECM harness Ground Ground	connector and Con Selector lever	dition P or N (CVT) Neutral (M/T)	Voltage Approx. 0 V	
1.PERFORM ( 1. Turn ignitio 2. Check the v EC Connector F8 Is the inspection YES >> INS NO >> Go Diagnosis P	COMPONENT F n switch ON. voltage betweer CM Terminal 69 (PNP switch sig- nal) n result normal? SPECTION END to EC-311, "Dia rocedure	FUNCTION CH n ECM harness Ground Ground	connector and Con Selector lever	dition P or N (CVT) Neutral (M/T) Except above	Voltage Approx. 0 V Battery voltage	INF0ID:000000004833435
1.PERFORM ( 1. Turn ignitio 2. Check the v EC Connector F8 Is the inspection YES >> INS NO >> Go Diagnosis P	COMPONENT F n switch ON. voltage betweer CM Terminal 69 (PNP switch sig- nal) n result normal? SPECTION END to EC-311, "Dia rocedure	FUNCTION CH n ECM harness Ground Ground	connector and Con Selector lever	dition P or N (CVT) Neutral (M/T) Except above	Voltage Approx. 0 V	INF0ID:000000004833435
1. PERFORM ( 1. Turn ignitio 2. Check the v Connector F8 S the inspection YES $>>$ INS NO $>>$ Go Diagnosis P 1. CHECK TRA 1. Turn ignitio	COMPONENT F n switch ON. voltage betweer CM Terminal 69 (PNP switch sig- nal) n result normal? SPECTION END to EC-311, "Dia rocedure	FUNCTION CH n ECM harness Ground Ground 2 agnosis Proced	connector and Con Selector lever <u>ure"</u> . H (CVT) OR PN	dition P or N (CVT) Neutral (M/T) Except above	Voltage Approx. 0 V Battery voltage /T) POWER SUF	INF0ID:000000004833435
1.PERFORM ( 1. Turn ignitio 2. Check the v Connector F8 Is the inspection YES >> INS NO >> Go Diagnosis P 1.CHECK TRA 1. Turn ignitio 2. Disconnect tor. 3. Turn ignitio 4. Check the v	COMPONENT F n switch ON. voltage betweer CM Terminal 69 (PNP switch sig- nal) n result normal? FPECTION END to EC-311, "Dia rocedure NSMISSION R n switch OFF. transmission ra n switch ON.	FUNCTION CH n ECM harness Ground Ground Ange Switch (CN	connector and Con Selector lever <u>ure"</u> . H (CVT) OR PN /T) or park/neut	dition P or N (CVT) Neutral (M/T) Except above IP SWITCH (M. tral position (PI	Voltage Approx. 0 V Battery voltage /T) POWER SUF	INFOID:000000004833435 PPLY CIRCUIT
1.PERFORM ( 1. Turn ignitio 2. Check the v Connector F8 Is the inspection YES >> INS NO >> Go Diagnosis P 1.CHECK TRA 1. Turn ignitio 2. Disconnect tor. 3. Turn ignitio	COMPONENT F n switch ON. voltage betweer CM Terminal 69 (PNP switch sig- nal) n result normal? FPECTION END to EC-311, "Dia rocedure NSMISSION R n switch OFF. transmission ra n switch ON.	FUNCTION CH n ECM harness Ground Ground Ange Switch (CN	connector and Con Selector lever <u>ure"</u> . H (CVT) OR PN /T) or park/neut	dition P or N (CVT) Neutral (M/T) Except above IP SWITCH (M. tral position (PI	Voltage Approx. 0 V Battery voltage /T) POWER SUF	INFOID:00000004833435 PPLY CIRCUIT harness connec-
1.PERFORM ( 1. Turn ignitio 2. Check the v Connector F8 Is the inspection YES >> INS NO >> Go Diagnosis Pl 1.CHECK TRA 1. Turn ignitio 2. Disconnect tor. 3. Turn ignitio 4. Check the v ground.	COMPONENT F n switch ON. voltage betweer CM Terminal 69 (PNP switch sig- nal) n result normal? FPECTION END to EC-311, "Dia rocedure NSMISSION R n switch OFF. transmission ra n switch ON. voltage betweer	FUNCTION CH n ECM harness Ground Ground Ange Switch (CN	connector and Con Selector lever <u>ure"</u> . H (CVT) OR PN /T) or park/neut	dition P or N (CVT) Neutral (M/T) Except above IP SWITCH (M. tral position (PI	Voltage Approx. 0 V Battery voltage /T) POWER SUF	INFOID:00000004833435 PPLY CIRCUIT harness connec-
1. PERFORM ( 1. Turn ignitio 2. Check the v EC Connector F8 Is the inspection YES >> INS NO >> Go Diagnosis P 1.CHECK TRA 1. Turn ignitio 2. Disconnect tor. 3. Turn ignitio 4. Check the v ground. Transmission ran PNP swi	COMPONENT F n switch ON. /oltage betweer CM Terminal 69 (PNP switch sig- nal) n result normal? SPECTION END to EC-311, "Dia rocedure NSMISSION R n switch OFF. transmission ra n switch ON. /oltage betweer	FUNCTION CH n ECM harness Ground Ground Ange Switch (CN	connector and Con Selector lever <u>ure"</u> . H (CVT) OR PN /T) or park/neut	dition P or N (CVT) Neutral (M/T) Except above IP SWITCH (M. tral position (PI	Voltage Approx. 0 V Battery voltage /T) POWER SUF	INFOID:00000004833435 PPLY CIRCUIT harness connec-
1.PERFORM (         1. Turn ignitio         2. Check the v         Connector         F8         Is the inspection         YES         YES         NO         Diagnosis P         1. CHECK TRA         1. Turn ignitio         2. Disconnect tor.         3. Turn ignitio         4. Check the v ground.         Transmission ran PNP swi         Connector	COMPONENT F n switch ON. voltage betweer CM Terminal 69 (PNP switch sig- nal) n result normal? FPECTION END to EC-311, "Dia rocedure NSMISSION R n switch OFF. transmission ra n switch OFF. transmission ra n switch ON. voltage betweer	FUNCTION CH a ECM harness Ground Ground C agnosis Proced ANGE SWITCH ange switch (CN ange switch (CN	connector and Con Selector lever <u>ure"</u> . H (CVT) OR PN /T) or park/neut range switch (C	dition P or N (CVT) Neutral (M/T) Except above IP SWITCH (M. tral position (PI	Voltage Approx. 0 V Battery voltage /T) POWER SUF	INFOID:00000004833435 PPLY CIRCUIT harness connec-
1. PERFORM (         1. Turn ignitio         2. Check the v         EC         Connector         F8         s the inspection         YES         YES         NO         Diagnosis P         1. CHECK TRA         1. Turn ignitio         2. Disconnect tor.         3. Turn ignitio         4. Check the v ground.         Transmission ran PNP swi	COMPONENT F n switch ON. /oltage betweer CM Terminal 69 (PNP switch sig- nal) n result normal? SPECTION END to EC-311, "Dia rocedure NSMISSION R n switch OFF. transmission ra n switch ON. /oltage betweer	FUNCTION CH a ECM harness Ground Ground C agnosis Proced ANGE SWITCH ange switch (CN ange switch (CN	connector and Con Selector lever <u>ure"</u> . H (CVT) OR PN /T) or park/neut range switch (C	dition P or N (CVT) Neutral (M/T) Except above IP SWITCH (M. tral position (PI	Voltage Approx. 0 V Battery voltage /T) POWER SUF	INFOID:00000004833435 PPLY CIRCUIT harness connec-

Revision: 2009 March

2. DETECT MALFUNCTIONING PART

Check the following.

NO

Harness connectors E8, F1

>> GO TO 2.

- IPDM E/R harness connector E43 (M/T)
- IPDM E/R harness connector E45 (CVT)
- 10 A fuse (No. 51) (M/T)
- 10 A fuse (No. 54) (CVT)
- Harness for open or short between PNP switch and fuse

#### Is the inspection result normal?

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

# $\mathbf{3}.$ Check PNP switch input signal circuit for open and short

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between transmission range switch (CVT) or PNP switch (M/T) harness connector and ECM harness connector.

Transmission range switch (CVT) / PNP switch (M/T)		ECM		Continuity	
Connector	Terminal	Connector Terminal			
F21 (CVT)	2	E9 60		Existed	
F23 (M/T)	3	F8 69		LABIEU	

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 TRANSMISSION RANGE SWITCH (CVT) OR PNP SWITCH (M/T)

Refer to TM-103. "Component Inspection (Park/Neutral Position Switch)" (CVT) or TM-8. "PARK/NEUTRAL POSITION (PNP) SWITCH : Component Inspection" (M/T).

Is the inspection result normal?

YES >> GO TO 5.

NO  $\rightarrow$  >> Replace transmission range switch (CVT) or PNP switch (M/T).

**5.**CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

DTC detecting condition

The closed loop control function for bank 1 does

not operate even when vehicle is driving in the

The closed loop control function for bank 2 does

not operate even when vehicle is driving in the

specified condition.

specified condition.

#### < DTC/CIRCUIT DIAGNOSIS >

# P1148 CLOSED LOOP CONTROL

Trouble diagnosis name

Closed loop control function

## DTC Logic

DTC No.

P1148

DTC DETECTION LOGIC NOTE: DTC P1148 is displayed with another DTC for A/F sensor 1. Perform the trouble diagnosis for the corresponding DTC. INFOID:000000004833436

Possible cause

(The A/F sensor 1 circuit is open or

· Harness or connectors

• A/F sensor 1 heater

shorted.)

• A/F sensor 1

EC

С

Ε

F

Н

Κ

L

Μ

Ν

Ρ

А

# EC-313

### P1212 TCS COMMUNICATION LINE

#### < DTC/CIRCUIT DIAGNOSIS >

# P1212 TCS COMMUNICATION LINE

### Description

This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and "ABS actuator and electric unit (control unit)".

Be sure to erase the malfunction information such as DTC not only for "ABS actuator and electric unit (control unit)" but also for ECM after TCS related repair.

### DTC Logic

INFOID:000000004922383

### DTC DETECTION LOGIC

#### NOTE:

- If DTC P1212 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to <u>EC-120, "DTC Logic"</u>.
- If DTC P1212 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-307, "DTC Logic"</u>.

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1212	TCS communication line	ECM can not receive the information from "ABS actuator and electric unit (control unit)" continuously.	<ul> <li>Harness or connectors (The CAN communication line is open or short- ed.)</li> <li>ABS actuator and electric unit (control unit)</li> <li>Dead (Weak) battery</li> </ul>

### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for at least 10 seconds.
- 2. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to <u>EC-314, "Diagnosis Procedure"</u>. NO >> INSPECTION END

### Diagnosis Procedure

Go to GI-30, "Work Flow".

INFOID:000000004922384

INFOID:000000004922382

#### < DTC/CIRCUIT 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 DTC P1217 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-307, "DTC Logic".

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

D When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217	Engine over temperature (Overheat)	<ul> <li>Cooling fan does not operate properly (Overheat).</li> <li>Cooling fan system does not operate properly (Overheat).</li> <li>Engine coolant was not added to the system using the proper filling method.</li> <li>Engine coolant is not within the specified range.</li> </ul>	<ul> <li>Harness or connectors (The cooling fan circuit is open or shorted.)</li> <li>IPDM E/R (Cooling fan relay-1)</li> <li>Cooling fan relays-2 and -3</li> <li>Cooling fan motor</li> <li>Radiator hose</li> <li>Radiator</li> <li>Radiator cap</li> <li>Reservoir tank</li> <li>Water pump</li> <li>Thermostat</li> <li>Water control valve</li> </ul>
CAUTION:	alfunction is indicat	ted, be sure to replace the coolant. I	Pefer to CO-9 "Draining" Also
		LU-8, "Refilling".	
1. Fill rad	liator with coolant up	to specified level with a filling speed	of 2 liters per minute. Be sure to reeze Coolant Mixture Ratio".
1. Fill rad use co	liator with coolant up olant with the prope		reeze Coolant Mixture Ratio".
<ol> <li>Fill rad use co</li> <li>After re</li> </ol>	liator with coolant up olant with the prope	o to specified level with a filling speed r mixture ratio. Refer to <u>MA-11, "Anti-F</u> engine to ensure that no water-flow noi	reeze Coolant Mixture Ratio".
<ol> <li>Fill rad use co</li> <li>After re</li> </ol>	liator with coolant up olant with the proper efilling coolant, run e	o to specified level with a filling speed r mixture ratio. Refer to <u>MA-11, "Anti-F</u> engine to ensure that no water-flow noi EDURE	reeze Coolant Mixture Ratio".
<ol> <li>Fill rad use con</li> <li>After re</li> <li>DTC CONI</li> <li>PERFOR</li> <li>Perform cor</li> </ol>	liator with coolant up olant with the proper efilling coolant, run e FIRMATION PROCE RM COMPONENT FU	o to specified level with a filling speed r mixture ratio. Refer to <u>MA-11, "Anti-F</u> engine to ensure that no water-flow noi EDURE	r <u>eeze Coolant Mixture Ratio"</u> . se is emitted.
<ol> <li>Fill rad use con</li> <li>After re</li> <li>DTC CONF</li> <li>PERFOF</li> <li>Perform cor</li> <li>NOTE:</li> </ol>	liator with coolant up olant with the proper efilling coolant, run e FIRMATION PROCE RM COMPONENT FU mponent function chec	o to specified level with a filling speed r mixture ratio. Refer to <u>MA-11, "Anti-F</u> engine to ensure that no water-flow noi EDURE NCTION CHECK ck. Refer to <u>EC-315, "Component Functio</u>	reeze Coolant Mixture Ratio". se is emitted. n Check".
<ol> <li>Fill rad use con</li> <li>After re</li> <li>DTC CONF</li> <li>PERFOF</li> <li>Perform cor</li> <li>NOTE:</li> </ol>	liator with coolant up olant with the proper efilling coolant, run e FIRMATION PROCE RM COMPONENT FU mponent function check to	o to specified level with a filling speed r mixture ratio. Refer to <u>MA-11, "Anti-Fr</u> engine to ensure that no water-flow noi EDURE NCTION CHECK	reeze Coolant Mixture Ratio". se is emitted. n Check".
<ol> <li>Fill rad use con</li> <li>After re</li> <li>DTC CONF</li> <li>DTC CONF</li> <li>PERFOF</li> <li>Perform cor</li> <li>NOTE:</li> <li>Use componist of the confi</li> </ol>	liator with coolant up olant with the proper efilling coolant, run e FIRMATION PROCE RM COMPONENT FU mponent function check to	o to specified level with a filling speed r mixture ratio. Refer to <u>MA-11, "Anti-F</u> engine to ensure that no water-flow noi EDURE NCTION CHECK ck. Refer to <u>EC-315, "Component Functio</u>	reeze Coolant Mixture Ratio". se is emitted. n Check".
<ol> <li>Fill rad use con</li> <li>After re</li> <li>DTC CONF</li> <li>DTC CONF</li> <li>PERFOF</li> <li>Perform cor</li> <li>NOTE:</li> <li>Use componist of the inspense</li> <li>YES &gt;&gt;</li> </ol>	liator with coolant up olant with the proper efilling coolant, run e FIRMATION PROCE RM COMPONENT FU mponent function check nent function check to irmed. ction result normal?	o to specified level with a filling speed r mixture ratio. Refer to <u>MA-11, "Anti-F</u> engine to ensure that no water-flow noi EDURE NCTION CHECK ck. Refer to <u>EC-315, "Component Functio</u> check the overall function of the cooling f	reeze Coolant Mixture Ratio". se is emitted. n Check".
<ol> <li>Fill rad use con</li> <li>After re</li> <li>DTC CONF</li> <li>DTC CONF</li> <li>PERFOF</li> <li>Perform cor</li> <li>NOTE:</li> <li>Use componist of the inspense</li> <li>YES &gt;&gt;</li> </ol>	liator with coolant up olant with the proper efilling coolant, run e FIRMATION PROCE RM COMPONENT FU mponent function check nent function check to irmed.	o to specified level with a filling speed r mixture ratio. Refer to <u>MA-11, "Anti-F</u> engine to ensure that no water-flow noi EDURE NCTION CHECK ck. Refer to <u>EC-315, "Component Functio</u> check the overall function of the cooling f	reeze Coolant Mixture Ratio". se is emitted. n Check".
<ol> <li>Fill rad use con</li> <li>After re</li> <li>DTC CONF</li> <li>DTC CONF</li> <li>PERFOF</li> <li>Perform cor</li> <li>NOTE:</li> <li>Use component</li> <li>Use component</li> <li>the inspension</li> <li>YES &gt;&gt;</li> <li>NO &gt;&gt;</li> </ol>	liator with coolant up olant with the proper efilling coolant, run e FIRMATION PROCE RM COMPONENT FU mponent function check nent function check to irmed. ction result normal?	o to specified level with a filling speed r mixture ratio. Refer to <u>MA-11, "Anti-F</u> engine to ensure that no water-flow noi EDURE NCTION CHECK ck. Refer to <u>EC-315, "Component Functio</u> check the overall function of the cooling f	reeze Coolant Mixture Ratio". se is emitted. n Check".
<ol> <li>Fill rad use con</li> <li>After re</li> <li>DTC CONF</li> <li>DTC CONF</li> <li>PERFOF</li> <li>Perform cor</li> <li>NOTE:</li> <li>Use componist the inspension of the confil</li> <li>Is the inspension of the second</li></ol>	liator with coolant up olant with the proper efilling coolant, run e FIRMATION PROCE RM COMPONENT FU mponent function check nent function check to irmed. <u>ction result normal?</u> INSPECTION END Go to <u>EC-316, "Diagr</u>	o to specified level with a filling speed r mixture ratio. Refer to <u>MA-11, "Anti-Fr</u> engine to ensure that no water-flow noi EDURE NCTION CHECK ck. Refer to <u>EC-315. "Component Functio</u> check the overall function of the cooling f	n Check".

sure fluid escaping from the radiator.

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.

INFOID:000000004833437

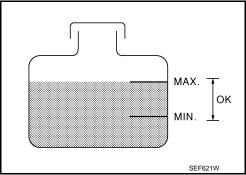
А

#### < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

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 proper range?</u>

YES >> Go to <u>EC-316</u>, "Diagnosis Procedure". 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-316, "Diagnosis Procedure".

NO >> GO TO 3.

**3.**PERFORM COMPONENT FUNCTION CHECK-III

#### With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that cooling fan motor operates at each speed (LOW/HI).

#### Without CONSULT-III

Perform IPDM E/R auto active test and check cooling fan motor operation. Refer to <u>PCS-11, "Diagnosis</u> <u>Description"</u>.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-316, "Diagnosis Procedure".

### **Diagnosis Procedure**

**1.**CHECK COOLING FAN OPERATION

### With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that cooling fan motor operates at each speed (LOW/HI).

### **Without CONSULT-III**

- Perform IPDM E/R auto active test and check cooling fan motor operation. Refer to <u>PCS-11, "Diagnosis</u> <u>Description"</u>.
- 2. Make sure that cooling fan motor operates at each speed (Low/High).

#### Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Go to <u>EC-391</u>, "Diagnosis Procedure".

**2.**CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-9. "Inspection".

Is leakage detected?

YES >> GO TO 3.

NO >> GO TO 4.

3.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak.

- Hose (Refer to <u>CO-23, "Inspection"</u>.)
- Radiator (Refer to CO-15, "Inspection".)
- Water pump (Refer to <u>CO-18, "Inspection"</u>)

INFOID:000000004833439

FIZI/ ENGINE OVER TEMPERATURE	
< DTC/CIRCUIT DIAGNOSIS >	[MR18DE]
>> Repair or replace malfunctioning part.	
4. CHECK RADIATOR CAP	A
Check radiator cap. Refer to CO-12, "RADIATOR CAP : Inspection".	
Is the inspection result normal?	EC
YES >> GO TO 5.	
NO >> Replace radiator cap.	
5.CHECK THERMOSTAT	С
Check thermostat. Refer to CO-21, "Inspection".	
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-24, "Water Control Valve".	
Is the inspection result normal?	
YES >> GO TO 7.	F
NO >> Replace water control valve	
7. CHECK ENGINE COOLANT TEMPERATURE SENSOR	0
Refer to EC-153, "Component Inspection".	G
Is the inspection result normal?	
YES >> GO TO 8.	Н
NO >> Replace engine coolant temperature sensor.	
8. CHECK MAIN 12 CAUSES	

If the cause cannot be isolated, check the following.

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	Blocked radiator     Blocked condenser     Blocked radiator grille     Blocked bumper	Visual	No blocking	_
-	2	Coolant mixture	Coolant tester	MA-11, "Anti-Freeze Coo	plant Mixture Ratio"
-	3	Coolant level	Visual	Coolant up to MAX level in reservoir tank and ra- diator filler neck	CO-9. "Inspection"
-	4	Radiator cap	Pressure tester	CO-12, "RADIATOR CAP	P : Inspection"
ON* ²	5	Coolant leaks	Visual	No leaks	CO-9, "Inspection"
ON* ²	6	Thermostat	Touch the upper and lower radiator hoses	Both hoses should be hot	CO-21, "Inspection"
ON* ¹	7	Cooling fan motor	CONSULT-III	Operating	EC-391, "Component Function Check"
OFF	8	Combustion gas leak	Color checker chemi- cal tester 4 Gas ana- lyzer	Negative	_
ON* ³	9	Coolant temperature     gauge	• Visual	Gauge less than 3/4 when driving	_
		Coolant overflow to reservoir tank	• Visual	No overflow during driv- ing and idling	CO-9, "Inspection"
OFF ^{*4}	10	Coolant return from reservoir tank to radi- ator	Visual	Should be initial level in reservoir tank	CO-9, "Inspection"

#### < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	11	Cylinder head	Straight gauge feeler gauge	0.1 mm (0.004 in) Maxi- mum distortion (warp- ing)	EM-67, "Disassembly and Assembly"
	12	Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	EM-95, "Inspection"

*1: Turn the ignition switch ON.

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

*3: Drive at 90 km/h (56 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

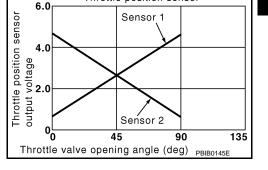
For more information, refer to CO-4, "Troubleshooting Chart".

# 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 potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



Possible cause

Throttle position sensor

# **DTC** Logic

### DTC DETECTION LOGIC

DTC No. Trouble diagnosis name

F

DIG NO.	riouble diagnosis name	Di O detecting condition	
P1225	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	Electric throttle control actuator (TP sensor 1 and 2)
DTC CON	NFIRMATION PROC	EDURE	
1.PRECO	ONDITIONING		
least 10 se	econds before conduc	has been previously conducted, always tur ting the next test.	n ignition switch OFF and wait at
	CONDITION:		
before pe	errorining the followi	ng procedure, confirm that battery voltag	e is more than 10 v at idle.
>	> GO TO 2.		
2.PERFC	ORM DTC CONFIRMA	TION PROCEDURE	
	gnition switch ON.		
	gnition switch OFF an gnition switch ON.	d wait at least 10 seconds.	
	< 1st trip DTC.		
ls 1st trip	DTC detected?		
	<ul> <li>&gt; Go to <u>EC-319, "Dia</u></li> <li>&gt; INSPECTION END</li> </ul>	gnosis Procedure".	
Diagnos	sis Procedure		INFOID:00000004833442
<b>1.</b> CHECK	K ELECTRIC THROT	TLE CONTROL ACTUATOR VISUALLY	

DTC detecting condition

#### 1. Turn ignition switch OFF.

2. Remove the intake air duct.

INFOID:000000004833440

INFOID:000000004833441

А

EC

D

Е

Ρ

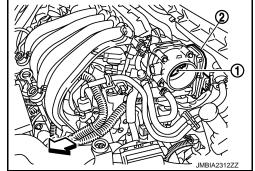
# P1225 TP SENSOR

#### < DTC/CIRCUIT DIAGNOSIS >

- 3. Check if foreign matter is caught between the throttle valve (1) and the housing.
- Electric throttle control actuator (2)

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside.



**2.**REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace electric throttle control actuator.
- 2. Perform EC-320, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:000000004833443

[MR18DE]

**1.**PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-17, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-17, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

# 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 potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.

#### 6.0 4.0 Sensor 1 4.0 4.0 Sensor 2 Sensor 2 5 Sensor 2 90 135 Throttle valve opening angle (deg) PBIB0145E

Possible cause

Throttle position sensor

#### INFOID:000000004833445

# **DTC** Logic

DTC No.

### DTC DETECTION LOGIC

Trouble diagnosis name

	Ľ

Κ

А

EC

D

Е

P1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	Electric throttle control actuator (TP sensor 1 and 2)	
DTC CONFIRMATION PROCEDURE  1. PRECONDITIONING				

DTC detecting condition

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test. **TESTING CONDITION:** 

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

#### 2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.	
<ol> <li>Turn ignition switch OFF, wait at least 10 seconds.</li> <li>Turn ignition switch ON.</li> <li>Repeat steps 2 and 3 for 32 times.</li> <li>Check 1st trip DTC.</li> </ol>	L
Is 1st trip DTC detected? YES >> Go to <u>EC-321, "Diagnosis Procedure"</u> . NO >> INSPECTION END	Μ
Diagnosis Procedure	Ν
1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY	
<ol> <li>Turn ignition switch OFF.</li> <li>Remove the intake air duct.</li> </ol>	0
	Ρ

INFOID:000000004833444

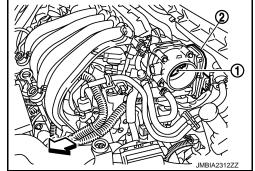
# P1226 TP SENSOR

#### < DTC/CIRCUIT DIAGNOSIS >

- 3. Check if foreign matter is caught between the throttle valve (1) and the housing.
- Electric throttle control actuator (2)

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside.



**2.**REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace electric throttle control actuator.
- 2. Perform EC-322, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:000000004833447

[MR18DE]

**1.**PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-17, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-17, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

# P1421 COLD START CONTROL

#### < DTC/CIRCUIT DIAGNOSIS >

# P1421 COLD START CONTROL

### Description

ECM controls ignition timing and engine idle speed when engine is started with pre-warming 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 idle speed properly when engine is started with pre-warming up condition.	<ul><li>Lack of intake air volume</li><li>Fuel injection system</li><li>ECM</li></ul>	E
				F

### DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

>> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

#### (P)With CONSULT-III

9					
	Turn ignition		1		
	LITER IGNITION	SWITCH UFF	and wait at	least 10	seconds
	I WITT IGHT		und wan ut	iouot io	00001100.

- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-III. 3.
- Check that the "COOLAN TEMP/S" indication is between 4°C (39°F) and 36°C (97°F). If "COOLAN TEMP/S" indication is within the specified value, go to the following step. If "COOLAN TEMP/S" indication is out of the specified value, cool engine down or warm engine up and go to step 1.
- 5. Start engine and let it idle for 5 minutes.
- 6. Check 1st trip DTC.

#### With GST

Follow the procedure "With CONSULT-III" above.

### Is 1st trip DTC detected?

- YES >> Go to EC-323, "Diagnosis Procedure".
- >> INSPECTION END NO

# Diagnosis Procedure

1 PERFORM IDLE AIR VOLUME LEARNING

Perform EC-17, "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

INFOID:000000004833450

А

EC

D

Н

INFOID:000000004833449

INFOID:000000004833448

M

Κ

L

Ν

Ρ

# P1421 COLD START CONTROL

< DTC/CIRCUIT DIAGNOSIS >

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-200, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Go to <u>EC-201, "Diagnosis Procedure"</u> for DTC P0171.

**4.**PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

- 2. Erase 1st trip DTC. Refer to "How to Erase DTC and 1st Trip DTC" in EC-85. "Diagnosis Description".
- 3. Perform DTC CONFIRMATION PROCEDURE. Refer to <u>EC-323</u>, "DTC Logic".

Is the 1st trip DTC P1421 displayed again?

YES >> GO TO 5.

NO >> INSPECTION END

**5.**REPLACE ECM

- 1. Replace ECM.
- 2. Perform <u>EC-15</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

#### < DTC/CIRCUIT DIAGNOSIS >

# P1550 BATTERY CURRENT SENSOR

### Description

The power generation voltage variable control enables fuel consumption to be decreased by reducing the EC engine load which is caused by the power generation of the generator. The battery current sensor is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to PCS-69. "System Description".

#### **CAUTION:**

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then the battery discharge may occur.

### DTC Logic

INFOID:000000005151143

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1550	Battery current sensor circuit range/performance	The output voltage of the battery current sensor remains within the specified range while engine is running.	<ul> <li>Harness or connectors (Battery current sensor circuit is open or shorted.) [Crankshaft position sensor (POS) cir- cuit is shorted.] (EVAP control system pressure sensor circuit is shorted.) (Accelerator pedal position sensor cir- cuit is shorted.) (Refrigerant pressure sensor circuit is shorted.)</li> <li>Battery current sensor</li> <li>Crankshaft position sensor (POS)</li> <li>EVAP control system pressure sensor</li> <li>Accelerator pedal position sensor</li> <li>Refrigerant pressure sensor</li> </ul>

#### 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 8 V at idle.

>> GO TO 2. 2. PERFORM DTC CONFIRMATION PROCEDURE Start engine and wait at least 10 seconds. Ρ 1. Check 1st trip DTC. 2.

#### Is 1st trip DTC detected?

YES >> Go to EC-326, "Diagnosis Procedure".

NO >> INSPECTION END А

С

D

Е

Μ

Ν

INFOID:000000005151142

#### < DTC/CIRCUIT DIAGNOSIS >

### Diagnosis Procedure

INFOID:000000005151144

#### **1.**CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E38. Refer to Ground Inspection in GI-37, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

# 2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

- 1. Disconnect battery current sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between battery current sensor harness connector and ground.

Battery cur	rent sensor	Ground	Voltage	
Connector	Terminal	Glound		
F53	1	Ground	Approx. 5 V	

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

# **3.**CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-II

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

Battery cur	rent sensor	E	Continuity	
Connector	Terminal	Connector Terminal		Continuity
F53	1	F8 77		Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

4. CHECK SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor			
Connector	Terminal	erminal Name		Terminal	
	74	Refrigerant pressure sensor	E49	1	
	75	CKP sensor (POS)	F20	1	
F8	76	EVAP cotrol system pressure sen- sor	B21	3	
	77	Battery current sensor	F53	1	
E16	102	APP sensor	E110	5	

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.

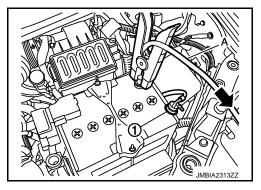
- Crankshaft position sensor (POS) (Refer to EC-228, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-269. "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-414, "Diagnosis Procedure".)

# EC-326

_			ENTSENSOR	[MR18DE]				
< DTC/CIRCUIT DIAGNOSIS	>							
Is the inspection result normal? YES >> GO TO 6.				А				
NO >> Replace malfunctio	ning componen	ts.		1 4				
6.CHECK APP SENSOR	0			EC				
Refer to EC-381, "Component I	efer to EC-381, "Component Inspection".							
Is the inspection result normal?								
YES >> GO TO 11. NO >> GO TO 7.				С				
<b>7.</b> REPLACE ACCELERATOR	PEDAL ASSEM	IRI Y						
1. Replace accelerator pedal a				D				
2. Go to <u>EC-381. "Special Rep</u>		<u>nt"</u> .						
				Е				
>> INSPECTION END 8.CHECK BATTERY CURREN				-				
	II SENSOR G		JIT FOR OPEN AND SHORT					
<ol> <li>Turn ignition switch OFF.</li> <li>Disconnect ECM harness c</li> </ol>	onnector.			F				
3. Check the continuity betwee	en battery curre	ent sensor harr	ess connector and ECM harness	connector.				
Battery current sensor	EC	M		G				
Connector Terminal	Connector	Terminal	Continuity					
F53 2	F8	68	Existed	Н				
4. Also check harness for sho	rt to around and	short to powe	er.					
Is the inspection result normal?	5	I		1				
YES >> GO TO 9.				I				
	-	•	wer in harness or connectors.	<del>.</del>				
			CIRCUIT FOR OPEN AND SHOR	0				
1. Check the continuity betwee	en battery curre	ent sensor narr	ess connector and ECM harness	connector.				
Battery current sensor	EC	M		K				
Connector Terminal	Connector	Terminal	Continuity					
F53 3	F8	58	Existed	I				
2. Also check harness for sho	rt to ground and	d short to powe	er.					
Is the inspection result normal?								
YES >> GO TO 10. NO >> Repair open circuit,	short to around	h or short to pr	wer in harness or connectors.	M				
10. CHECK BATTERY CURRI	-							
Refer to EC-327, "Component In				N				
Is the inspection result normal?								
YES >> GO TO 11.				0				
NO >> Replace battery neg	-	sembly.		-				
11.CHECK INTERMITTENT I								
Refer to <u>GI-34, "Intermittent Inc</u>	ident".			P				
>> INSPECTION END								
Component Inspection				INFOID:000000005151145				
1. CHECK BATTERY CURREN								

#### < DTC/CIRCUIT DIAGNOSIS >

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable.
- 4. Install jumper cable (Å) between battery negative terminal and body ground.
  - 1 : Battery negative terminal
  - : To body ground
- 5. Turn ignition switch ON.
- 6. Check the voltage between ECM harness connector and ground.



Connector	+	-	Voltage
Connector	Terminal	Terminal	
F8	58 (Battery current sensor signal)	68	Approx. 2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery".

#### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace battery negative cable assembly.

#### < DTC/CIRCUIT DIAGNOSIS >

# P1551, P1552 BATTERY CURRENT SENSOR

### Description

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to <u>PCS-69. "System Description"</u>.

#### **CAUTION:**

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then the battery discharge may occur.

### **DTC Logic**

INFOID:000000005151146

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1551	Battery current sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors     (Battery current sensor circuit is open     restarted)
P1552	Battery current sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	or shorted.) [Crankshaft position sensor (POS) cir- cuit is shorted.] (Power steering pressure sensor cir- cuit is shorted.) (Accelerator pedal position sensor cir- cuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Battery current sensor • Crankshaft position sensor (POS) • Power steering pressure sensor • Accelerator pedal position sensor • 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:** 

Before performing the following procedure, confirm that battery voltage is more than 8 V with ignition switch ON

#### >> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

- 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-330, "Diagnosis Procedure".

NO >> INSPECTION END

INFOID:000000005184772

А

EC

С

D

Е

L

Μ

Ν

P

### < DTC/CIRCUIT DIAGNOSIS >

### Diagnosis Procedure

INFOID:000000005184775

#### **1.**CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E38. Refer to Ground Inspection in GI-37, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

# 2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

- 1. Disconnect battery current sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between battery current sensor harness connector and ground.

Battery cur	rent sensor	Ground	Voltage	
Connector	Terminal	Glound		
F53	1	Ground	Approx. 5 V	

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

# **3.**CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-II

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

Battery cur	rent sensor	E	Continuity	
Connector	Terminal	Connector Terminal		Continuity
F53	1	F8 77		Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

4.CHECK SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor			
Connector	Terminal	erminal Name		Terminal	
	74	Refrigerant pressure sensor	E49	1	
	75	CKP sensor (POS)	F20	1	
F8	76	EVAP cotrol system pressure sen- sor	B21	3	
	77	Battery current sensor	F53	1	
E16	102	APP sensor	E110	5	

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

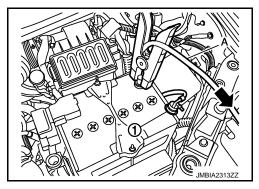
#### Check the following.

- Crankshaft position sensor (POS) (Refer to EC-228, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-269. "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-414, "Diagnosis Procedure".)

< DTC/CIRCU	IT DIAGNOSIS	,			[MR18DE]	
	n result normal	<u>?</u>				٨
	D TO 6. place malfunction	onina componei	nts			А
6.CHECK API	-	ering compone				
	1, "Component	Inspection"				EC
	n result normal					
YES >> GO	D TO 11.	-				С
	D TO 7.					
	ACCELERATOR		MBLY			
	ccelerator pedal		ont"			D
2. 00 to <u>Lo t</u>			<u></u> .			
>> IN\$	SPECTION END	2				Е
8.CHECK BAT	TTERY CURRE	NT SENSOR G	ROUND CIRCU	JIT FOR OPEN AND	SHORT	
	on switch OFF.					F
	t ECM harness		ent sensor harr	less connector and E	CM harness connector.	
5. Oneck the	continuity betwe	sen ballery curr	ent sensor nan			C
Battery cu	rrent sensor	EC	CM			G
Connector	Terminal	Connector	Terminal	Continuity		
F53	2	F8	68	Existed		Н
4. Also check	harness for sho	ort to ground an	d short to powe	er.		
NO >> Re 9.CHECK BA	TTERY CURRE	NT SENSOR IN	IPUT SIGNAL	ower in harness or con CIRCUIT FOR OPEN ness connector and E0		J
Potton/ ou	rrent concer	E	<b>N</b> /			K
Connector	rrent sensor Terminal		CM Terminal	Continuity		1.
F53	3	Connector F8	58	Existed		
	harness for sho	_				L
	n result normal?		p			
	) TO 10. pair open circui	- t, short to groun	d or short to po	ower in harness or con	nectors.	M
	0, "Component					Ν
	n result normal					
	D TO 11.					0
	place battery ne	-	sembly.			0
	NTERMITTENT					
Refer to <u>GI-34,</u>	"Intermittent Ind	<u>cident"</u> .				Ρ
>> IN:	SPECTION END	)				
Component					INFOID:000000005184778	
					ini 012.00000003104178	
	TTERY CURRE	NT SENSOR				

#### < DTC/CIRCUIT DIAGNOSIS >

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable.
- 4. Install jumper cable (Å) between battery negative terminal and body ground.
  - 1 : Battery negative terminal
  - + : To body ground
- 5. Turn ignition switch ON.
- 6. Check the voltage between ECM harness connector and ground.



Connector	+	-	Voltage
Connector	Terminal	Terminal	
F8	58 (Battery current sensor signal)	68	Approx. 2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery".

#### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace battery negative cable assembly.

#### < DTC/CIRCUIT DIAGNOSIS >

# P1553 BATTERY CURRENT SENSOR

### Description

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to <u>PCS-69. "System Description"</u>.

#### **CAUTION:**

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then the battery discharge may occur.

#### **DTC** Logic

INFOID:000000005151147

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1553	Battery current sensor perfor- mance	The signal voltage transmitted from the sensor to ECM is higher than the amount of the maximum power generation.	<ul> <li>Harness or connectors (Battery current sensor circuit is open or shorted.) [Crankshaft position sensor (POS) cir- cuit is shorted.] (Power steering pressure sensor cir- cuit is shorted.) (Accelerator pedal position sensor cir- cuit is shorted.) (Refrigerant pressure sensor circuit is shorted.)</li> <li>Battery current sensor</li> <li>Crankshaft position sensor (POS)</li> <li>Power steering pressure sensor</li> <li>Accelerator pedal position sensor</li> <li>Refrigerant pressure sensor</li> <li>Accelerator pedal position sensor</li> <li>Refrigerant pressure sensor</li> </ul>

#### 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 8 V at idle.

>> GO TO 2.
2.PERFORM DTC CONFIRMATION PROCEDURE
1. Start engine and wait at least 10 seconds.
2. Check 1st trip DTC.
Is 1st trip DTC detected?

#### Is 1st trip DTC detected?

YES >> Go to EC-334, "Diagnosis Procedure".

NO >> INSPECTION END

# [MR18DE]

EC

С

D

Е

Μ

Ν

INFOID:000000005184773

#### < DTC/CIRCUIT DIAGNOSIS >

### Diagnosis Procedure

INFOID:000000005184776

#### **1.**CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E38. Refer to Ground Inspection in GI-37, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

# 2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

- 1. Disconnect battery current sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between battery current sensor harness connector and ground.

Battery cur	rent sensor	Ground	Voltage	
Connector Terminal		Glound	voltage	
F53	1	Ground	Approx. 5 V	

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

# **3.**CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-II

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

Battery cur	rent sensor	E	CM	Continuity
Connector Terminal		Connector	Terminal	Continuity
F53	1	F8	77	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

4. CHECK SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor		
Connector Terminal		Name	Connector	Terminal
	74	Refrigerant pressure sensor	E49	1
	75	CKP sensor (POS)	F20	1
F8	76	EVAP cotrol system pressure sen- sor	B21	3
	77	Battery current sensor	F53	1
E16	102	APP sensor	E110	5

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.

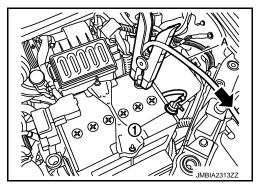
- Crankshaft position sensor (POS) (Refer to EC-228, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-269. "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-414, "Diagnosis Procedure".)

### EC-334

				ENT SENSOR	[MR18DE]
< DTC/CIRCUI					
Is the inspection YES >> GO		<u>_</u>			
		oning componen	its.		,
6.CHECK APP		0			
Refer to EC-381	, "Component	Inspection".			E
Is the inspection	n result normal?	<u>-</u>			
	TO 11.				(
NO >> GO <b>7.</b> REPLACE A					
I			/IDL1		
	celerator pedal 81, "Special Re	pair Requireme	<u>nt"</u> .		-
•	PECTION END				I
8.CHECK BAT	TERY CURREI	NT SENSOR G	ROUND CIRCU	JIT FOR OPEN AND	SHORT
	n switch OFF.				
	ECM harness of continuity between		ent sensor harr	ess connector and E	CM harness connector.
	-	-			(
Battery cur	rent sensor	EC	М	Continuity	
Connector	Terminal	Connector	Terminal		
F53	2	F8	68	Existed	ł
		ort to ground and	d short to powe	er.	
Is the inspection					
YES >> GO NO >> Rep		, short to ground	d or short to po	ower in harness or con	inectors.
•	•	•	•	CIRCUIT FOR OPEN	
					CM harness connector.
	-	-			
Battery curr	rent sensor	EC	М	Continuity	ł
Connector	Terminal	Connector	Terminal		
F53	3	F8	58	Existed	
		ort to ground and	d short to powe	er.	
Is the inspection YES >> GO	TO 10.	<u>,</u>			η
		, short to ground	d or short to po	wer in harness or con	
10.снеск в	ATTERY CURR	ENT SENSOR			
Refer to EC-340	), "Component	Inspection".			
Is the inspection					
	TO 11.				(
		gative cable as	sembly.		
11.CHECK IN					
Refer to <u>GI-34.</u>	"Intermittent Inc	<u>sident"</u> .			F
~~ INIQ	PECTION END	)			
		<i>,</i>			
	Inchantian				
<b>1.</b> снеск ват	Inspection				INFOID:000000005184779

#### < DTC/CIRCUIT DIAGNOSIS >

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable.
- 4. Install jumper cable (Å) between battery negative terminal and body ground.
  - 1 : Battery negative terminal
  - : To body ground
- 5. Turn ignition switch ON.
- 6. Check the voltage between ECM harness connector and ground.



Connector	+	-	Voltage
Connector	Terminal	Terminal	
F8	58 (Battery current sensor signal)	68	Approx. 2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery".

#### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace battery negative cable assembly.

#### < DTC/CIRCUIT DIAGNOSIS >

# P1554 BATTERY CURRENT SENSOR

### Description

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to <u>PCS-69. "System Description"</u>.

#### **CAUTION:**

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then the battery discharge may occur.

#### **DTC** Logic

INFOID:000000005151148

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1554	Battery current sensor perfor- mance	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.	<ul> <li>Harness or connectors (Battery current sensor circuit is open or shorted.)</li> <li>[Crankshaft position sensor (POS) cir- cuit is shorted.]</li> <li>(Power steering pressure sensor cir- cuit is shorted.)</li> <li>(Accelerator pedal position sensor cir- cuit is shorted.)</li> <li>(Refrigerant pressure sensor circuit is shorted.)</li> <li>Battery current sensor</li> <li>Crankshaft position sensor (POS)</li> <li>Power steering pressure sensor</li> <li>Accelerator pedal position sensor</li> <li>Refrigerant pressure sensor</li> <li>Accelerator pedal position sensor</li> <li>Refrigerant pressure sensor</li> </ul>

#### DTC CONFIRMATION PROCEDURE

**1.**PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-337, "Component Function Check".
NOTE:
Use component function check to check the overall function of the battery current sensor circuit. During this
check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

	-
YES	>> INSPECTION END

NO >> Go to EC-338, "Diagnosis Procedure".

#### Component Function Check

### **1.**PRECONDITIONING

#### **TESTING CONDITION:**

• Before performing the following procedure, confirm that battery voltage is more than 12.8 V at idle.

 Before performing the following procedure, confirm that all load switches and A/C switch are turned OFF.

>> GO TO 2.

INFOID:000000005151149

INFOID:000000005184774

А

EC

С

D

Е

M

Ν

C

Ρ

#### < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

INFOID:000000005184777

# 2. PERFORM COMPONENT FUNCTION CHECK

#### With CONSULT-III

- 1. Start engine and let it idle.
- 2. Select "BAT CUR SEN" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "BAT CUR SEN" indication for 10 seconds.

# "BAT CUR SEN" should be above 2,300 mV at least once.

#### **Without CONSULT-III**

- 1. Start engine and let it idle.
- 2. Check the voltage between ECM harness connector and ground.

Connector	+	-	Voltage
Connector	Terminal	Terminal	
F8	58 (Battery current sensor signal)	68	Above 2.3 V at least once

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-338, "Diagnosis Procedure"

#### Diagnosis Procedure

# 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to Ground Inspection in <u>GI-37, "Circuit Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

### 2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

- 1. Disconnect battery current sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between battery current sensor harness connector and ground.

Battery cur	rent sensor	Ground	Voltage
Connector Terminal		Gibuna	voltage
F53	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

# **3.**CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.

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

Battery cur	rent sensor	E	CM	Continuity
Connector Terminal		Connector	Terminal	Continuity
F53	1	F8	77	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

**4.**CHECK SENSOR POWER SUPPLY CIRCUIT

#### < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

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

E	CM		Sensor	
Connector	Terminal	Name	Connector	Terminal
	74	Refrigerant pressure sensor	E49	1
	75	CKP sensor (POS)	F20	1
F8	76	EVAP cotrol system pressure sor	e sen-B21	3
	77	Battery current sensor	F53	1
E16	102	APP sensor	E110	5
NO >> Re .CHECK CC check the follo Crankshaft p EVAP contro Refrigerant p the inspection YES >> GO NO >> Re .CHECK AP Refer to EC-38	OMPONENTS owing. I osition sensor ( I system pressu pressure sensor on result normal O TO 6. eplace malfuncti	oning components.	Component Inspection	<u>on"</u> .)
YES >> GO NO >> GO REPLACE Replace a	O TO 11. O TO 7. ACCELERATOF ccelerator peda	R PEDAL ASSEMBLY		
-	SPECTION ENI	D NT SENSOR GROUND		I AND SHORT
2. Disconnec	on switch OFF. ct ECM harness continuity betw		or harness connector	and ECM harness connector.
Battery cu	irrent sensor	ECM	Continuity	-
Connector	Terminal	Connector Termi	nal	
	2	F8 68	Existed	-
F53	harness for sh	ort to ground and short to	power.	=
		on to ground and short to		
Also check	on result normal	-		
I. Also check s the inspection YES >> G	on result normal O TO 9.	2		
4. Also check <u>s the inspection</u> YES >> GO NO >> Re	on result normal O TO 9. epair open circui	-		

#### < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

Battery current sensor		E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F53	3	F8	58	Existed

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

Is the inspection result normal?

YES >> GO TO 10.

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

**10.**CHECK BATTERY CURRENT SENSOR

Refer to EC-340, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace battery negative cable assembly.

11.CHECK INTERMITTENT INCIDENT

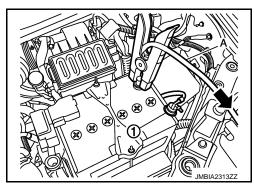
Refer to GI-34, "Intermittent Incident".

#### >> INSPECTION END

#### **Component Inspection**

### 1.CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable.
- Install jumper cable (Å) between battery negative terminal and body ground.
  - 1 : Battery negative terminal
  - : To body ground
- 5. Turn ignition switch ON.
- 6. Check the voltage between ECM harness connector and ground.



Connector	+ -		Voltage
Connector	Terminal	Terminal	
F8	58 (Battery current sensor signal)	68	Approx. 2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery".

#### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace battery negative cable assembly.

INFOID:000000005184780

### < DTC/CIRCUIT DIAGNOSIS >

# 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-51, "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-305, "DTC Logic".

	Trouble diagnosis name	DTC detecting condition	Possible cause
P1564	ASCD steering switch	<ul> <li>An excessively high voltage signal from the ASCD steering switch is sent to ECM.</li> <li>ECM detects that input signal from the ASCD steering switch is out of the specified range.</li> <li>ECM detects that the ASCD steering switch is stuck ON.</li> </ul>	<ul> <li>Harness or connectors (The switch circuit is open or shorted.)</li> <li>ASCD steering switch</li> <li>ECM</li> </ul>
	NFIRMATION PRO	DCEDURE	
1.PRECO	ONDITIONING		
		re has been previously conducted, alw ucting the next test.	ays turn ignition switch OFF and wait at
~	> GO TO 2.	MATION PROCEDURE	
		MATION PROCEDURE	
2. Wait a 3. Press		least 10 seconds, then release it and w r at least 10 seconds, then release it an	
			u wall al least 10 seconds.
J. 11000		ERATE SWITCH for at least 10 seconds,	then release it and wait at least 10 sec-
onds.			then release it and wait at least 10 sec-
onds. 6. Press		n for at least 10 seconds, then release i	then release it and wait at least 10 sec-
onds. 6. Press 7. Checł <u>Is DTC de</u>	SET/COAST switcl < DTC. <u>ttected?</u>	n for at least 10 seconds, then release i	then release it and wait at least 10 sec-
onds. 6. Press 7. Checl <u>Is DTC de</u> YES >	SET/COAST switcl < DTC. <u>ttected?</u>	n for at least 10 seconds, then release i iagnosis Procedure".	then release it and wait at least 10 sec-
onds. 6. Press 7. Checł <u>Is DTC de</u> YES > NO >	SET/COAST switcl < DTC. <u>stected?</u> > Go to <u>EC-341, "D</u> > INSPECTION EN	n for at least 10 seconds, then release i iagnosis Procedure".	then release it and wait at least 10 sec- t and wait at least 10 seconds.
onds. 6. Press 7. Check I <u>s DTC de</u> YES > NO > Diagnos	SET/COAST switcl < DTC. <u>stected?</u> So to <u>EC-341, "D</u> NSPECTION EN sis Procedure	n for at least 10 seconds, then release i <u>iagnosis Procedure"</u> . ID	then release it and wait at least 10 sec-
onds. 6. Press 7. Check I <u>s DTC de</u> YES > NO > Diagnos <b>1.</b> CHECH	SET/COAST switcl CDTC. <u>stected?</u> Solution Section	n for at least 10 seconds, then release i <u>iagnosis Procedure"</u> . ID	then release it and wait at least 10 sec- t and wait at least 10 seconds.
onds. 6. Press 7. Check <u>Is DTC de</u> YES > NO > Diagnos 1.CHECK 1. Turn i	SET/COAST switcl CDTC. Stected? Solution Section Section Section State Structure CONNE State Structure CONNE State Structure State State	n for at least 10 seconds, then release i <u>iagnosis Procedure"</u> . ID ECTION	then release it and wait at least 10 sec- t and wait at least 10 seconds.
onds. 6. Press 7. Check <u>Is DTC de</u> YES > NO > Diagnos <b>1.</b> CHECk 1. Turn i 2. Check	SET/COAST switcl CDTC. Stected? Solution Section Section Section State Structure CONNE State Structure CONNE State Structure State State	n for at least 10 seconds, then release i <u>iagnosis Procedure"</u> . ID ECTION	then release it and wait at least 10 sec- t and wait at least 10 seconds.
onds. 6. Press 7. Check Is DTC de YES > NO > Diagnos 1.CHECk 1. Turn i 2. Check Is the insp YES >	SET/COAST switcl CDTC. Stected? Solution Section EN State of the section EN State of the section Switch OFF. Comparison	n for at least 10 seconds, then release i liagnosis Procedure". ID ECTION In E38. Refer to Ground Inspection in <u>GI</u> <u>I?</u>	then release it and wait at least 10 sec- t and wait at least 10 seconds.
onds. 6. Press 7. Check <u>Is DTC de</u> YES > Diagnos 1.CHECk 1. Turn i 2. Check Is the insp YES >	SET/COAST switch tected? Solution of <u>EC-341, "D</u> Solution setting Solution switch OFF. Comparison of the setting Comparison of the setting Solution switch OFF. Comparison of the setting Solution setti	n for at least 10 seconds, then release i <u>iagnosis Procedure"</u> . ID ECTION	then release it and wait at least 10 sec- t and wait at least 10 seconds.

А

EC

С

D

INFOID:000000005040369

INFOID:000000005040370

1. Turn ignition switch ON.

#### < DTC/CIRCUIT DIAGNOSIS >

- 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	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
MAIN SW		Released	OFF
	CANCEL switch	Pressed	ON
CANCEL SW		Released	OFF
RESUME/ACC	RESUME/ACCELERATE switch	Pressed	ON
SW	RESUME/ACCELERATE SWICH	Released	OFF
SET SW	SET/COAST switch	Pressed	ON
3E1 3W	SET/COAST SWILCH	Released	OFF

#### **Without CONSULT-III**

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals.

ECM				
Connector	+ -		Condition	Voltage
Connector	Terminal	Terminal		
	94 (ASCD steering switch signal)	95	MAIN switch: Pressed	Approx. 0V
			CANSEL switch: Pressed	Approx. 1V
			SET/COAST switch: Pressed	Approx. 2V
E16			RESUME/ACCELERATE switch: Pressed	Approx. 3V
			All ASCD steering switches: Re- leased	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 M352.
- 4. Check the continuity between combination switch and ECM harness connector.

Combination switch	E	Continuity	
Terminal	Connector Terminal		
16	E16	95	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 M77, E105
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

### EC-342

### DTC/CIPCUIT DIAGNOSIS

[MR18DF]

< DTC/CIRCUI	T DIAGNOSIS	>			[MR18DE]
_ ·	•	-		power in harness or connec	
<b>D.</b> CHECK ASC	D STEERING	SWITCH INPU	T SIGNAL CIR	CUIT FOR OPEN AND SHO	)RT
I. Check the c	continuity betwe	en ECM harne	ess connector a	nd combination switch.	
combination switch	EC	CM			•
Terminal	Connector	Terminal	Continuity		
13	E16	94	Existed		
. Also check	harness for sho	ort to ground an	nd short to powe	er.	
	n result normal?	•			
YES >> GO					
NO >> GO					
	LFUNCTIONIN	IG PART			
heck the follov	ving. ectors M77, E1	05			
	switch (spiral ca				
Harness for op	pen and short b	etween ECM a	and combination	switch	
-					
-	-	-	ound or short to	power in harness or connec	ctors.
	D STEERING				
	3, "Component				
<u>s the inspection</u> YES >> GO	n result normal?	2			
	blace ASCD ste	ering switch.			
	ERMITTENT IN	-			
efer to GI-34	"Intermittent Ind	cident"			
>> INS	PECTION END	)			
component	Inspection				INFOID:000000005040372
-CHECK ASC	D STEERING	SWITCH			
			ole) harness cor	pheetor	
				s connector terminals under	r following conditions.
Combinati	ion switch	-	114		
Connector	Terminals	Con	dition	Resistance	

Combinat	tion switch	Condition	Resistance
Connector	Terminals	Condition	Resistance
		MAIN switch: Pressed	Approx. 0 Ω
		CANCEL switch: Pressed	Approx. 250 Ω
		SET/COAST switch: Pressed	Approx. 660 Ω
M302	13 and 16	RESUME/ACCELERATE switch: Pressed	Approx. 1,480 Ω
		All ASCD steering switches: Re- leased	Approx. 4,000 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch

#### < DTC/CIRCUIT DIAGNOSIS >

### P1572 ASCD BRAKE SWITCH

### Description

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to <u>EC-51</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-305, "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/ (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are ser to the ECM at the same time.	<ul> <li>(The stop lamp switch circuit is shorted.)</li> <li>Harness or connectors (The ASCD brake switch circuit is shorted.)</li> </ul>
P1572	ASCD brake switch	ASCD brake switch signal is not sent to B) ECM for extremely long time while the ve hicle is driving.	<ul> <li>Harness or connectors (The ASCD clutch switch circuit is shorted.)</li> <li>Stop lamp switch</li> <li>ASCD brake switch</li> <li>ASCD clutch switch</li> <li>Incorrect stop lamp switch installation</li> <li>Incorrect ASCD brake switch installation</li> <li>Incorrect ASCD clutch switch installation</li> <li>ECM</li> </ul>

### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### 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. Start engine.
- 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.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position

4. Check DTC.

INFOID:000000005040373

INEOID:000000005040374

		P1572 A	SCD BRAKE SWITCH		
< DTC/CIRCU	IT DIAGNOSIS	i >			[MR18DE]
s DTC detecte	<u>d?</u>				
NO >> GC	o to <u>EC-345, "Dia</u> D TO 3.	-			
<b>B</b> .PERFORM	DTC CONFIRM	IATION PROCE	DURE FOR MALFUNCTION E	3	
		st 5 consecutive	e seconds under the following of	conditions.	
	ive vehicle at a	safa shaad			
NOTE:		i sale speed.			
			the drive wheels lifted in the		iving the vehicle.
If a road te	est is expected	to be easier, i	t is unnecessary to lift the ve	nicie.	
Vehicle speed		More than 30 km	/h (19 mph)		
Selector lever		Suitable position			
		Depress the brak	e pedal for more		
Driving location		than five seconds	e-mentioned vehi-		
		cle speed.			
. Check DT(	C.	L			
SDTC detecte	<u>d?</u>				
	to <u>EC-345, "Di</u>		ure".		
	SPECTION END	J			
Diagnosis P	rocedure				INFOID:000000005040375
	ERALL FUNCT	ION-I			
With CONS					
. Turn ignitic	on switch ON.				
			R" mode with CONSULT-III.		
. Check DR	ARE SWI INUI		e following conditions.		
Monitor item		Con	dition	Indication	-
	Brake pedal (CV1	Γ)	Slightly depressed	OFF	-
BRAKE SW1		clutch pedal (M/T)	Fully released	ON	_
Without CC	NSULT-III		-		-
. Turn ignitic	on switch ON.				
. Check the	voltage betwee	n ECM harness	connector terminals.		
	ECM				
	+	_	Condition		Voltage
Connector	Terminal	Terminal	Condition		Vollago
	100	iomina		Slightly de-	
E16	(ASCD brake	108	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	pressed	Approx. 0V
	switch signal)		Brake pedal and clutch pedal (M/T)	Fully released	Battery voltage
s the inspectio	n result normal	<u>?</u>			
	) TO 2.				
	D TO 3.				
CHECK OV	ERALL FUNCT	ION-II			

With CONSULT-III
 Select "BRAKE SW2" and check indication in "DATA MONITOR" mode with CONSULT-III.

#### < DTC/CIRCUIT DIAGNOSIS >

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal	Slightly de- pressed	ON
		Fully released	OFF

#### **Without CONSULT-III**

Check the voltage between ECM harness connector terminals.

	ECM				
Connector	+	-	Condition		Voltage
Connector	Terminal	Terminal	]		
E16	99 (Stop lamp	108	Brake pedal	Slightly de- pressed	Battery voltage
	switch signal)			Fully released	Approx. 0V

#### Is the inspection result normal?

YES >> GO TO 16.

NO >> GO TO 11.

# **3.**CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT-I

- 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.

ASCD bra	ake switch	Ground	Voltago
Connector	Connector Terminal		Voltage
E112	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 9.

NO-1 >> CVT models: GO TO 4.

NO-2 >> M/T models: GO TO 5.

#### **4.**DETECT MALFUNCTIONING PART

#### Check the following.

Harness connectors E105, M77

• 10 A fuse (No. 2)

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.

# $5. {\sf check} \ {\sf ascd} \ {\sf clutch} \ {\sf switch} \ {\sf power} \ {\sf supply} \ {\sf circuit}$

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

ASCD clu	itch switch	Ground	Voltage
Connector	Connector Terminal		vollage
E111	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.

### EC-346

### < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

10 A fuse (No		177 tween ASCD cl	utch switch and	l fuse		
		ITCH POWER S		•	s or connectors.	
	on switch OFF.					
		witch harness c een ASCD clut		ess connector a	and ASCD brake swi	itch harness
ASCD clu	utch switch	ASCD bra	ake switch			
Connector	Terminal	Connector	Terminal	Continuity		
E111	4	E112	1	Existed		
CHECK ASC efer to <u>EC-34</u> the inspectio YES >> GC YO >> Re .CHECK ASC Turn ignitic Disconnec	pair open circui CD CLUTCH SV 9. "Component n result normal" O TO 16. place ASCD clu CD BRAKE SW on switch OFF. t ECM harness	VITCH Inspection (ASC ? Itch switch. ITCH INPUT SI connector.	CD Clutch Swite	<u>ch)"</u> . Г FOR OPEN A	ND SHORT	ector.
NO >> Re .CHECK AS( efer to <u>EC-34</u> the inspection (ES >> GC NO >> Re .CHECK AS( Disconnect Check the ASCD br	pair open circui CD CLUTCH SV 9. "Component n result normal" D TO 16. place ASCD clu CD BRAKE SW on switch OFF. t ECM harness continuity betwo	VITCH Inspection (ASC itch switch. ITCH INPUT SI connector. een ASCD brake EC	CD Clutch Swite GNAL CIRCUI ⁻ e switch harnes	<u>ch)"</u> . Г FOR OPEN A	ND SHORT	ector.
NO >> Re .CHECK AS( efer to <u>EC-34</u> <u>the inspectio</u> (ES >> GC NO >> Re .CHECK AS( Turn ignitic Disconnec Check the <u>ASCD br</u> <u>Connector</u>	pair open circui CD CLUTCH SV 9. "Component n result normal" D TO 16. place ASCD clu CD BRAKE SW on switch OFF. t ECM harness continuity betwee ake switch	VITCH Inspection (ASC 2 utch switch. ITCH INPUT SI connector. een ASCD brake EC Connector	CD Clutch Swite GNAL CIRCUIT e switch harnes CM Terminal	Ch)".	ND SHORT	ector.
NO >> Re .CHECK AS( efer to <u>EC-34</u> the inspection (ES >> GC NO >> Re .CHECK AS( Disconnector Check the <u>ASCD br</u> <u>Connector</u> E112	pair open circui CD CLUTCH SV 9. "Component n result normal" O TO 16. place ASCD clu CD BRAKE SW on switch OFF. t ECM harness continuity betwo ake switch Terminal 2	VITCH Inspection (ASC 2 utch switch. ITCH INPUT SI connector. een ASCD brake EC Connector E16	CD Clutch Swite GNAL CIRCUIT e switch harnes CM Terminal 100	Ch)". FOR OPEN A ss connector an Continuity Existed	ND SHORT	ector.
NO >> Re .CHECK ASC efer to <u>EC-34</u> the inspectio (ES >> GC NO >> Re .CHECK ASC Turn ignitic Disconnec Check the <u>ASCD br</u> <u>Connector</u> E112 Also check the inspectio (ES >> GC NO >> Re	pair open circui CD CLUTCH SV 9, "Component n result normal" D TO 16. place ASCD clu CD BRAKE SW on switch OFF. t ECM harness continuity betwee ake switch Terminal 2 t harness for she n result normal" D TO 10. pair open circui	VITCH Inspection (ASC Inspection (ASC Itch switch. ITCH INPUT SI connector. een ASCD brake COnnector E16 ort to ground an t or short to grout	CD Clutch Swite GNAL CIRCUIT e switch harnes CM Terminal 100 d short to powe	Ch)". FFOR OPEN A ss connector an Continuity Existed er.	ND SHORT	ector.
NO >> Re CHECK ASC efer to EC-34 the inspectio (ES >> GC NO >> Re CHECK ASC Turn ignitic Disconnect Check the ASCD br Connector E112 Also check the inspectio (ES >> GC NO >> Re O.CHECK ASC	pair open circui CD CLUTCH SV 9, "Component n result normal" D TO 16. place ASCD clu CD BRAKE SW on switch OFF. t ECM harness continuity betwee ake switch Terminal 2 t harness for she n result normal" D TO 10. pair open circui SCD BRAKE S	VITCH Inspection (ASC Inspection (ASC Itch switch. ITCH INPUT SI connector. een ASCD brake COnnector E16 ort to ground an t or short to grout	CD Clutch Swite GNAL CIRCUIT e switch harnes CM Terminal 100 d short to powe und or short to	TFOR OPEN A SS CONNECTOR A Continuity Existed Pr.	ND SHORT d ECM harness conn	ector.

Disconnect stop lamp switch harness connector.
 Check the voltage between stop lamp switch harness connector and ground.

#### < DTC/CIRCUIT DIAGNOSIS >

Stop lan	np switch	Ground	Voltage
Connector	Terminal	Giouna	voltage
E114 (M/T) E115 (CVT)	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors E105, M77

• 10A fuse (No.11)

· 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.

# 13. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.

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

ECM		Stop lan	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E16	99	E114 (M/T) E115 (CVT)	2	Existed

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

Is the inspection result normal?

YES >> GO TO 15.

NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

• 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.

**15.**CHECK STOP LAMP SWITCH

Refer to EC-349, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace stop lamp switch.

16. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

>> INSPECTION END

#### Component Inspection (ASCD Brake Switch)

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.

INFOID:000000005040376

#### < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

Terminals	Cor	ndition	Continuity		
		Fully released	Existed		-
1 and 2	Brake pedal	Slightly de- pressed	Not existed		
s the inspectio	n result normal	?			
	SPECTION EN	D			
	D TO 2.				
2.CHECK AS	CD BRAKE SW	/ITCH-II			
				ction and Adjustment".	
2. Check the	continuity betw	een ASCD blak	e switch terminals	under the following conditions.	
Terminals	Cor	ndition	Continuity		
Torrinitaio		Fully released	Existed		
1 and 2	Brake pedal	Slightly de-	Existed		
		pressed	Not existed		
s the inspectio	n result normal	?	·		
	SPECTION EN				
NO >> Re	place ASCD br	ake switch.			
Component	Inspection	(ASCD Cluto	h Switch)	INFOID:0000000050	40377
	•	·	,		
.CHECK AS	CD CLUTCH S	WITCH-I			
. Turn ignitic	on switch OFF.				
		switch harness of			
3. Check the	continuity betw	een ASCD cluto	h switch terminals	under the following conditions.	
Terminals	Cor	ndition	Continuity		
		Fully released	Existed		
1 and 2	Clutch pedal	Slightly de-			
		pressed	Not existed		
s the inspectio	n result normal	?			
	SPECTION EN	D			
	D TO 2.				
CHECK AS	CD CLUTCH S	WITCH-II			
. Adjust ASC	CD clutch switc	h installation. Re	efer to BR-7, "Inspe	ction and Adjustment".	—
				under the following conditions.	
Terminals	Cor	ndition	Continuity		
		Fully released	Existed		
1 and 2	Clutch pedal	Slightly de-	Not existed		
		pressed			
•	n result normal				
	SPECTION EN				
NO >> Re	place ASCD cl	utch switch.			
Component	Inspection	(Stop Lamp	Switch)	INF01D:000000050-	40378
	OP LAMP SWI ⁻	ICH-I	-		
. Turn ignitic	on switch OFF.				

1. Turn ignition switch OFF.

Disconnect stop lamp switch harness connector.
 Check the continuity between stop lamp switch terminals under the following conditions.

Revision: 2009 March

#### EC-349

#### < DTC/CIRCUIT DIAGNOSIS >

Terminals	Condition		Continuity
		Fully released	Not existed
1 and 2	Brake pedal	Slightly de- pressed	Existed

Is the inspection result normal?

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

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to <u>BR-7</u>, "Inspection and Adjustment".

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

Terminals	Condition		Continuity
		Fully released	Not existed
1 and 2	Brake pedal	Slightly de- pressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch.

### P1574 ASCD VEHICLE SPEED SENSOR

#### < DTC/CIRCUIT DIAGNOSIS >

# P1574 ASCD VEHICLE SPEED SENSOR

# Description

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-51, "System Description" for ASCD functions.

### DTC Logic

DTC DETECTION LOGIC

#### NOTE:

- If DTC P1574 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-122, "DTC Logic".
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-299, "DTC Logic"
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-305, "DTC Logic"
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer F to EC-307, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
P1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	<ul> <li>Harness or connectors (The CAN communication line is open or shorted.)</li> <li>ABS actuator and electric unit (control unit)</li> <li>TCM</li> <li>ECM</li> </ul>	Н

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### >> GO TO 2.

### 2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine. 1. 2. Drive the vehicle at more than 40 km/h (25 MPH). **CAUTION:** Always drive vehicle at a safe speed. Μ 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. Ν 3. Check DTC. Is DTC detected? YES >> Go to EC-351, "Diagnosis Procedure". >> INSPECTION END NO Diagnosis Procedure INFOID:00000000504038 CHECK DTC WITH TCM Check DTC with TCM. Refer to TM-91, "Diagnosis Description". Is DTC detected?
- NO >> GO TO 2.
- YES >> Perform trouble shooting relevant to DTC indicated.

INFOID:000000005040379

INFOID:000000005040380

D

Е

Κ



< DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

2.check dtc with "abs actuator and electric unit (control unit)"

Refer to BRC-22, "CONSULT-III Function".

Is DTC detected?

NO >> INSPECTION END

YES >> Perform trouble shooting relevant to DTC indicated.

# **P1715 INPUT SPEED SENSOR**

#### < DTC/CIRCUIT DIAGNOSIS >

# P1715 INPUT SPEED SENSOR

### Description

ECM receives input speed sensor signal from TCM via the CAN communication line. ECM uses this signal for engine control.

### DTC Logic

INFOID:000000004833452

INFOID:000000004833451

### DTC DETECTION LOGIC

NOTE:

- If DTC P1715 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to <u>EC-225, "DTC Logic"</u>.
- If DTC P1715 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to <u>EC-229, "DTC Logic"</u>.
- If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-305, "DTC Logic"</u>.
- If DTC P1715 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer F to <u>EC-307, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
P1715	Input speed sensor (TCM output)	Input speed sensor signal is different from the theoretical value calculated by ECM from output speed sensor signal and en- gine rpm signal.	<ul> <li>Harness or connectors (The CAN communication line is open or short- ed)</li> <li>Harness or connectors (Input speed sensor circuit is open or shorted)</li> <li>TCM</li> </ul>	Η

#### DTC CONFIRMATION PROCEDURE

### **1.**PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

### 2. PERFORM DTC CONFIRMATION PROCEDURE

<ol> <li>Start engine and drive the vehicle at more than 50 km/h (31 MPH) for at least 5 seconds. CAUTION:</li> </ol>	L
Always drive vehicle at a safe speed.	
2. Check 1st trip DTC.	N
Is 1st trip DTC detected?	
YES >> Go to <u>EC-353, "Diagnosis Procedure"</u> . NO >> INSPECTION END	Ν
Diagnosis Procedure	33453
1.снеск отс with тсм	С
Check DTC with TCM. Refer to TM-92, "CONSULT-III Function (TRANSMISSION)".	
Is the inspection result normal?	_
YES >> GO TO 2.	F
NO >> Perform trouble shooting relevant to DTC indicated.	
2.REPLACE TCM	

Replace TCM.

>> INSPECTION END

D

Κ

# P1805 BRAKE SWITCH

### Description

INFOID:000000004833454

[MR18DE]

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

### DTC Logic

INFOID:000000004833455

### 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 extremely long time while the vehicle is driving.	<ul><li>Harness or connectors (Stop lamp switch circuit is open or shorted.)</li><li>Stop lamp switch</li></ul>

### 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.
- 4. Check 1st trip DTC.

#### Is 1st trip DTC detected?

- YES >> Go to EC-354, "Diagnosis Procedure".
- NO >> INSPECTION END

### **Diagnosis Procedure**

## **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 de- pressed	Illuminated

Is the inspection result normal?

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 lan	np switch	Ground	Voltage	
Connector	Connector Terminal		voltage	
E114 (M/T) E115 (CVT)	1	Ground	Battery voltage	

Is the inspection result normal?

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

# **3.** DETECT MALFUNCTIONING PART

Check the following.

INFOID:000000004833457

# **P1805 BRAKE SWITCH**

DTC/CIRCU					
B10/01100	IT DIAGNOSIS	S >		[MR18DE	
	nectors E7, M6	Э			
10 A fuse (No Harness for o	o. 7) open or short be	etween stop lam	p switch and ba	tterv	
>> Re	pair open circui	t or short to gro	und or short to	power in harness or connectors.	
CHECK ST	OP LAMP SWIT	CH INPUT SIG	NAL CIRCUIT	FOR OPEN AND SHORT	
	t ECM harness				-
			ss connector ar	nd stop lamp switch harness connector.	
E	СМ	Stop lan	np switch	Continuity	
Connector	Terminal	Connector	Terminal	Contracty	
E16	99	E114 (M/T) E115 (CVT)	2	Existed	
Also check	(harpeas for ah	. ,	d abort to pour		
	charness for sh	-	ia short to powe	r.	
•	on result normal [:] D TO 5.	<u>.</u>			
		t or short to gro	und or short to	power in harness or connectors.	
	OP LAMP SWIT	-			
	5, "Component		n Lamn Switch)	n	_
	on result normal		<u>p Lamp Ownen</u>	-	
	D TO 6.	<u>-</u>			
	eplace stop lamp	o switch.			
CHECK INT	ERMITTENT IN	NCIDENT			
	ERMITTENT IN				_
efer to <u>GI-34</u> ,		<u>cident"</u> .			_
efer to <u>GI-34</u> >> IN	"Intermittent In SPECTION ENI	<u>cident"</u> . D	Switch)		_
efer to <u>GI-34,</u> >> IN	"Intermittent In	<u>cident"</u> . D	Switch)	INF01D:000000048334	58
efer to <u>GI-34,</u> >> IN: omponent	"Intermittent In SPECTION ENI	<u>cident"</u> . D (Stop Lamp S	Switch)	INFOID:0000000048334	58
efer to <u>GI-34</u> , >> IN omponent .CHECK STO	"Intermittent In SPECTION ENI	<u>cident"</u> . D (Stop Lamp S	Switch)	INFOID:0000000048334	58
efer to <u>GI-34</u> , >> IN Omponent CHECK STO Turn ignitic Disconnec	"Intermittent In SPECTION ENI Inspection ( OP LAMP SWIT on switch OFF. t stop lamp swit	<u>cident"</u> . D (Stop Lamp S -CH-I cch harness con	nector.		58
efer to <u>GI-34</u> , >> IN Omponent CHECK STO Turn ignitic Disconnec	"Intermittent In SPECTION ENI Inspection ( OP LAMP SWIT on switch OFF. t stop lamp swit	<u>cident"</u> . D (Stop Lamp S -CH-I cch harness con	nector.	INFOID:0000000048334	58
efer to <u>GI-34</u> , >> IN Omponent CHECK STO Turn ignitic Disconnec Check the	. "Intermittent In SPECTION ENI Inspection ( OP LAMP SWIT on switch OFF. t stop lamp swit continuity betwo	cident". D (Stop Lamp S CH-I cch harness con een stop lamp s	nector. witch terminals		58
efer to <u>GI-34</u> , >> IN Omponent CHECK STo Turn ignitic Disconnec	. "Intermittent In SPECTION ENI Inspection ( OP LAMP SWIT on switch OFF. t stop lamp swit continuity betwo	cident". D (Stop Lamp S CH-I cch harness con een stop lamp s	nector. witch terminals Continuity		58
efer to <u>GI-34</u> , >> IN Omponent CHECK STO Turn ignitic Disconnec Check the	. "Intermittent In SPECTION ENI Inspection ( OP LAMP SWIT on switch OFF. t stop lamp swit continuity betwo	cident". D (Stop Lamp S CH-I cch harness con een stop lamp s dition Fully released	nector. witch terminals Continuity Not existed		58
ifer to <u>GI-34</u> , >> IN Omponent CHECK STO Turn ignitic Disconnec Check the Terminals	"Intermittent In SPECTION ENI Inspection ( OP LAMP SWIT on switch OFF. t stop lamp swit continuity betwo	cident". D (Stop Lamp S CH-I cch harness con een stop lamp s	nector. witch terminals Continuity		
efer to <u>GI-34</u> , >> IN CMPONENT CHECK STO Turn ignitic Disconnec Check the Terminals 1 and 2	"Intermittent In SPECTION ENI Inspection ( OP LAMP SWIT on switch OFF. t stop lamp swit continuity betwo	cident". D (Stop Lamp S CH-I cch harness con een stop lamp s dition Fully released Slightly de- pressed	nector. witch terminals Continuity Not existed		
efer to <u>GI-34</u> , >> IN: Dmponent CHECK STO Turn ignitic Disconnec Check the Terminals 1 and 2 the inspectic ES >> IN:	"Intermittent In         SPECTION ENI         Inspection (         OP LAMP SWIT         on switch OFF.         t stop lamp swit         continuity betwo         Con         Brake pedal         on result normal         SPECTION ENI	cident". D (Stop Lamp S CH-I cch harness con een stop lamp s dition Fully released Slightly de- pressed ?	nector. witch terminals Continuity Not existed		
efer to <u>GI-34</u> , >> IN: Dmponent CHECK STO Turn ignitic Disconnec Check the Terminals 1 and 2 the inspectic ES >> IN: IO >> GO	"Intermittent In         SPECTION ENI         SPECTION ENI         Inspection (         OP LAMP SWIT         on switch OFF.         t stop lamp swit         continuity betwo         Con         Brake pedal         on result normal         SPECTION ENI         OTO 2.	cident". D (Stop Lamp S CH-I cch harness con een stop lamp s dition Fully released Slightly de- pressed 2 D	nector. witch terminals Continuity Not existed		
efer to <u>GI-34</u> , >> IN: Omponent CHECK STO Turn ignitic Disconnec Check the Terminals 1 and 2 the inspectic (ES >> IN: NO >> GO	"Intermittent In         SPECTION ENI         Inspection (         OP LAMP SWIT         on switch OFF.         t stop lamp swit         continuity betwo         Con         Brake pedal         on result normal         SPECTION ENI	cident". D (Stop Lamp S CH-I cch harness con een stop lamp s dition Fully released Slightly de- pressed 2 D	nector. witch terminals Continuity Not existed		
efer to <u>GI-34</u> , >> IN: OMPONENT .CHECK STO Turn ignitic Disconnec Check the Terminals 1 and 2 the inspectic (ES >> IN: NO >> GO .CHECK STO	"Intermittent In         SPECTION ENI         SPECTION ENI         Inspection (         OP LAMP SWIT         on switch OFF.         t stop lamp swit         continuity betwo         Con         Brake pedal         on result normal         SPECTION ENI         OP LAMP SWIT	cident". D (Stop Lamp S CH-I cch harness con een stop lamp s dition Fully released Slightly de- pressed 2 D CH-II	nector. witch terminals Continuity Not existed Existed	under the following conditions.	
efer to <u>GI-34</u> , >> IN: Omponent CHECK STO Turn ignitic Disconnec Check the Terminals 1 and 2 the inspectic (ES >> IN: NO >> GO CHECK STO Adjust stop	"Intermittent In         SPECTION ENI         SPECTION ENI         Inspection (         OP LAMP SWIT         on switch OFF.         t stop lamp swit         continuity betwo         Con         Brake pedal         on result normal         SPECTION ENI         OP LAMP SWIT         on result normal         SPECTION ENI         OP LAMP SWIT         on amp switch in	cident". D (Stop Lamp S CH-I cch harness con een stop lamp s dition Fully released Slightly de- pressed ? D CH-II stallation. Refer	nector. witch terminals Continuity Not existed Existed		
efer to <u>GI-34</u> , >> IN: omponent .CHECK STO Turn ignitic Disconnec Check the Terminals 1 and 2 the inspectic (ES >> IN: NO >> GO .CHECK STO Adjust stop	"Intermittent In         SPECTION ENI         SPECTION ENI         Inspection (         OP LAMP SWIT         on switch OFF.         t stop lamp swit         continuity betwo         Con         Brake pedal         on result normal         SPECTION ENI         OP LAMP SWIT         on result normal         SPECTION ENI         OP LAMP SWIT         on amp switch in	cident". D (Stop Lamp S CH-I cch harness con een stop lamp s dition Fully released Slightly de- pressed ? D CH-II stallation. Refer	nector. witch terminals Continuity Not existed Existed	under the following conditions.	
efer to <u>GI-34</u> , >> IN: <b>OMPONENT</b> <b>.</b> CHECK STO Turn ignitic Disconnec Check the Terminals 1 and 2 <u>the inspectic</u> (ES >> IN: NO >> GO <b>.</b> CHECK STO Adjust stop	"Intermittent In         SPECTION ENI         SPECTION ENI         Inspection (         OP LAMP SWIT         on switch OFF.         t stop lamp swit         continuity betwo         Con         Brake pedal         on result normal         SPECTION ENI         OP LAMP SWIT         on result normal         SPECTION ENI         OP LAMP SWIT         on amp switch in         continuity betwo	cident". D (Stop Lamp S CH-I cch harness con een stop lamp s dition Fully released Slightly de- pressed ? D CH-II stallation. Refer	nector. witch terminals Continuity Not existed Existed	under the following conditions.	
efer to <u>GI-34</u> , >> IN: OMPONENT .CHECK STO Turn ignitic Disconnec Check the Terminals 1 and 2 the inspectic YES >> IN: NO >> GO .CHECK STO Adjust stop Check the	"Intermittent In         SPECTION ENI         SPECTION ENI         Inspection (         OP LAMP SWIT         on switch OFF.         t stop lamp swit         continuity betwo         Con         Brake pedal         on result normal         SPECTION ENI         OP LAMP SWIT         on result normal         SPECTION ENI         OP LAMP SWIT         on amp switch in         continuity betwo	cident". D (Stop Lamp S CH-I tch harness con een stop lamp s dition Fully released Slightly de- pressed CH-II stallation. Refer een stop lamp s	nector. witch terminals Continuity Not existed Existed	under the following conditions.	

Is the inspection result normal?

pressed

# P1805 BRAKE SWITCH

#### < DTC/CIRCUIT DIAGNOSIS >

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

## P2100, P2103 THROTTLE CONTROL MOTOR RELAY

#### < DTC/CIRCUIT 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

INFOID:000000004833460

D

С

А

EC

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause		
P2100	Throttle control motor relay circuit openECM detects a voltage of power source for throttle control motor is excessively low.		<ul> <li>Harness or connectors (Throttle control motor relay circuit is open)</li> <li>Throttle control motor relay</li> </ul>		
P2103	3 Throttle control motor relay circuit short ECM detect the throttle control motor relay is stuck ON. • Harness or connectors (Throttle control motor re shorted) • Throttle control motor re				
	IFIRMATION PROC	EDURE			
least 10 se TESTING Before per Witch DTC P2100 >>	conds before conduct CONDITION: rforming the followin is detected? > GO TO 2.	has been previously conducted, always ing the next test. I <b>g procedure, confirm that battery vo</b>			
•	> GO TO 3. RM DTC CONFIRMA ⁻	TION PROCEDURE FOR DTC P2100			
<ol> <li>Start e</li> <li>Check</li> <li><u>Is DTC det</u></li> </ol>	ngine and let it idle for DTC.				
NO >>	> INSPECTION END				
		TION PROCEDURE FOR DTC P2103			
<ol> <li>Turn ig</li> <li>Check</li> <li><u>Is DTC det</u></li> </ol>	DTC.	wait at least 1 second.			
YES >>	> Go to <u>EC-357, "Diag</u> > INSPECTION END	nosis Procedure".			
Diagnosi	is Procedure		INFOID:000000004833462		
1.снеск	THROTTLE CONTRO	OL MOTOR RELAY POWER SUPPLY (	CIRCUIT-I		
	nition switch OFF. the voltage between I	ECM harness connector and ground.			

INFOID:000000004833459

# P2100, P2103 THROTTLE CONTROL MOTOR RELAY

#### < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

E	CM	Ground	Voltage
Connector	Connector Terminal		voltage
F7	15	Ground	Battery voltage

#### OK or NG

OK >> GO TO 5.

NG >> GO TO 2.

# 2. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

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

ECM		IPDN	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F7	15	E15	57	Existed

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

Is the inspection result normal?

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

NO >> GO IO 3.

 ${\it 3.}$  detect malfunctioning part

Check the following.

Harness connectors E8, F1

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

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

#### **4.**CHECK FUSE

1. Disconnect 15 A fuse (No. 64) from IPDM E/R.

2. Check 15 A fuse for blown.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace 15 A fuse.

#### 5.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

Check the voltage between ECM harness connector and ground under the following conditions.

ECM		Ground	Condition	Voltage	
Connector	Terminal	Giodila	Condition	voltage	
F7	2	Ground	Ignition switch: OFF	Approximately 0 V	
17	2	Giodila	Ignition switch: ON	Battery voltage	

OK or NG

OK >> GO TO 8.

NG >> GO TO 6.

#### $\mathbf{6}$ .CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Disconnect IPDM E/R harness connector.

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

# P2100, P2103 THROTTLE CONTROL MOTOR RELAY

#### < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

EC	M	IPDM	I E/R	Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
F7	2	E15	54	Existed	
		ort to ground and	d short to powe	r.	
	n result normal?	<u>&gt;</u>			
'ES >> GO IO >> GO					
eck the follov Harness conn	ectors E8, F1				
larness for o	pen or short be	tween ECM and	IPDM E/R		
			und or short to	power in harness or connectors	
CHECK INT	ERMITTENT IN	CIDENT			
	"Intermittent Inc				
	result normal?				
	blace IPDM E/R	t. narness or conn	actors		
			601013.		

## P2101 ELECTRIC THROTTLE CONTROL FUNCTION

#### < DTC/CIRCUIT DIAGNOSIS >

# P2101 ELECTRIC THROTTLE CONTROL FUNCTION

### Description

INFOID:000000004833463

[MR18DE]

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. ECM controls the throttle valve opening angle in response to driving condition via the throttle control motor.

### DTC Logic

INFOID:000000004833464

#### DTC DETECTION LOGIC

NOTE:

- If DTC P2101 is displayed with DTC P2100, first perform the trouble diagnosis for DTC P2100. Refer to <u>EC-357, "DTC Logic"</u>.
- If DTC P2101 is displayed with DTC P2119, first perform the trouble diagnosis for DTC P2119. Refer to <u>EC-366, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2101	Electric throttle control performance	Electric throttle control function does not operate properly.	<ul> <li>Harness or connectors (Throttle control motor circuit is open or shorted)</li> <li>Electric throttle control actuator</li> </ul>

### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 11 V when engine is running.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

- 2. Start engine and let it idle for 5 seconds.
- 3. Check DTC.

Is DTC detected?

YES >> Go to EC-360. "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to <u>GI-37, "Circuit Inspection"</u>.

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 under the following conditions.

INFOID:000000004833466

## P2101 ELECTRIC THROTTLE CONTROL FUNCTION

#### < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

Connector	CM				
	Terminal	Ground	Condition	Voltage	
	2	Ground	Ignition switch: OFF	Approx. 0 V	E
F7	2	Ground	Ignition switch: ON	Battery voltage	-
s the inspection	n result normal?	<u>&gt;</u>			
YES >> GO NO >> GO					
$\boldsymbol{b}$ .CHECK THF	ROTTLE CONT	ROL MOTOR F	RELAY POWER	SUPPLY CIRC	UIT
<ol> <li>Disconnect</li> <li>Disconnect</li> </ol>	n switch OFF. ECM harness IPDM E/R harr continuity betwe	ness connector.		nd IPDM E/R ha	irness connector.
IPDN	/I E/R	E	СМ		
Connector	Terminal	Connector	Terminal	Continuity	
E15	57	F7	15	Existed	
5. Also check	harness for sho	ort to ground ar	nd short to powe	er.	
<u>s the inspection</u>	n result normal?	2			
YES >> GO					
NO >> GO					
	LFUNCTIONIN	IG PART			
Check the follov Harness conn					
	pen or short be	tween ECM an	d IPDM F/R		
_					
-	-	-	ound or short to	-	ss or connectors.
D.CHECK THE	ROTTLE CONT	ROL MOTOR F	ound or short to RELAY INPUT \$	SIGNAL CIRCU	T-II
D.CHECK THE	ROTTLE CONT	ROL MOTOR F	ound or short to RELAY INPUT \$	SIGNAL CIRCU	
CHECK THE	COTTLE CONT	ROL MOTOR F	ound or short to RELAY INPUT S ess connector a	SIGNAL CIRCU	T-II
CHECK THE Check the o	ROTTLE CONT	ROL MOTOR F een ECM harne	ound or short to RELAY INPUT S ess connector an	SIGNAL CIRCU	T-II
CHECK THE	COTTLE CONT	ROL MOTOR F	ound or short to RELAY INPUT S ess connector a	SIGNAL CIRCUI	T-II
CHECK THE Check the of IPDM Connector E15	ROTTLE CONT continuity betwee M E/R Terminal 54	ROL MOTOR F een ECM harne E Connector F7	Pund or short to RELAY INPUT S Pess connector an CM Terminal 2	SIGNAL CIRCUI nd IPDM E/R ha Continuity Existed	T-II
CHECK THE Check the of IPDN Connector E15 Also check	ROTTLE CONT continuity betwee M E/R Terminal 54	ROL MOTOR F een ECM harne E Connector F7 ort to ground ar	ound or short to RELAY INPUT S ess connector an CM Terminal	SIGNAL CIRCUI nd IPDM E/R ha Continuity Existed	T-II
CHECK THE Check the of IPDM Connector E15 Also check s the inspection YES >> GC	ROTTLE CONT continuity betwee A E/R Terminal 54 harness for sho n result normal?	ROL MOTOR F een ECM harne E Connector F7 ort to ground ar	Pund or short to RELAY INPUT S Pess connector an CM Terminal 2	SIGNAL CIRCUI nd IPDM E/R ha Continuity Existed	T-II
CHECK THE Check the of IPDA Connector E15 Also check s the inspection YES >> GC NO >> GC	ROTTLE CONT continuity betwee A E/R Terminal 54 harness for sho n result normal? TO 7. TO 6.	ROL MOTOR F een ECM harne E Connector F7 ort to ground ar	Pund or short to RELAY INPUT S Pess connector an CM Terminal 2	SIGNAL CIRCUI nd IPDM E/R ha Continuity Existed	T-II
Check THF Check the of IPDM Connector E15 Also check s the inspection YES >> GC NO >> GC	ROTTLE CONT continuity betwee A E/R Terminal 54 harness for sho n result normal?	ROL MOTOR F een ECM harne E Connector F7 ort to ground ar	Pund or short to RELAY INPUT S Pess connector an CM Terminal 2	SIGNAL CIRCUI nd IPDM E/R ha Continuity Existed	T-II
CHECK THE Check the of IPDM Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector Connector Con	ROTTLE CONT continuity betwee A E/R Terminal 54 harness for sho n result normal? 0 TO 7. 0 TO 7. 0 TO 6. ALFUNCTIONIN wing. nectors E8, F1	ROL MOTOR F een ECM harne Connector F7 ort to ground ar 2 IG PART	ound or short to RELAY INPUT S ess connector an CM Terminal 2 nd short to powe	SIGNAL CIRCUI nd IPDM E/R ha Continuity Existed	T-II
CHECK THE Check the of IPDM Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Con	ROTTLE CONT continuity betwee A E/R Terminal 54 harness for sho n result normal? TO 7. TO 7. TO 6. ALFUNCTIONIN wing.	ROL MOTOR F een ECM harne Connector F7 ort to ground ar 2 IG PART	ound or short to RELAY INPUT S ess connector an CM Terminal 2 nd short to powe	SIGNAL CIRCUI nd IPDM E/R ha Continuity Existed	T-II
CHECK THE Check the of IPDM Connector E15 Also check s the inspection YES >> GC NO >> GC DETECT MA Check the follow Harness for o	ROTTLE CONT continuity betwee A E/R Terminal 54 harness for sho n result normal? TO 7. TO 7. TO 6. ALFUNCTIONIN wing. hectors E8, F1 pen or short be	ROL MOTOR F een ECM harne Connector F7 ort to ground ar P IG PART	ound or short to RELAY INPUT S ess connector an CM Terminal 2 nd short to powe	SIGNAL CIRCUI nd IPDM E/R ha Continuity Existed er.	T-II irness connector.
CHECK THE Check the of IPDM Connector E15 Also check s the inspection YES >> GC NO >> GC DETECT MA Check the follow Harness for o >> Rep	ROTTLE CONT continuity betwee M E/R Terminal 54 harness for sho n result normal? 0 TO 7. 0 TO 6. ALFUNCTIONIN wing. hectors E8, F1 pen or short be pair open circuit	ROL MOTOR F een ECM harne Connector F7 ort to ground ar P IG PART	ound or short to RELAY INPUT S ess connector an CM Terminal 2 nd short to powe	SIGNAL CIRCUI nd IPDM E/R ha Continuity Existed er.	T-II
CHECK THE Check the of PDM Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector E15 Connector Connector E15 Connector Connector E15 Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector Connector E15 Connector Connect	ROTTLE CONT continuity betwee M E/R Terminal 54 harness for sho n result normal? 0 TO 7. 0 TO 7. 0 TO 6. ALFUNCTIONIN wing. hectors E8, F1 pen or short be pair open circuit SE	ROL MOTOR F een ECM harne Connector F7 ort to ground ar 2 IG PART tween ECM and t or short to gro	ound or short to RELAY INPUT S ess connector an CM Terminal 2 nd short to powe d IPDM E/R ound or short to	SIGNAL CIRCUI nd IPDM E/R ha Continuity Existed er.	T-II irness connector.
Check the of th	ROTTLE CONT continuity betwee M E/R Terminal 54 harness for sho n result normal? 0 TO 7. 0 TO 6. ALFUNCTIONIN wing. hectors E8, F1 pen or short be pair open circuit	ROL MOTOR F een ECM harne Connector F7 ort to ground ar 2 IG PART tween ECM and t or short to gro	ound or short to RELAY INPUT S ess connector an CM Terminal 2 nd short to powe d IPDM E/R ound or short to	SIGNAL CIRCUI nd IPDM E/R ha Continuity Existed er.	T-II irness connector.

## P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 8. NO >> Replace 15 A fuse.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

#### Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace harness or connectors.

## 9.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.

Electric throttle	control actuator	E	Continuity	
Connector	Connector Terminal		Terminal	Continuity
	5	F7	1	Not existed
E20	5		4	Existed
F29	6	17	1	Existed
		-	4	Not existed

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

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace.

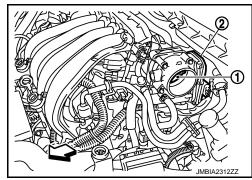
10. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- 1. Remove the intake air duct.
- 2. Check if foreign matter is caught between the throttle valve (1) and the housing.
- Electric throttle control actuator (2)

Is the inspection result normal?

YES >> GO TO 11.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside.



## **11.**CHECK THROTTLE CONTROL MOTOR

Refer to EC-363, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 13.

12. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace harness or connectors.

**13.**REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunction electric throttle control actuator.

2. Perform EC-363, "Special Repair Requirement".

## P2101 ELECTRIC THROTTLE CONTROL FUNCTION

#### < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

>> INSPECTION END		А
Component Inspection	INFOID:000000004833467	
1. CHECK THROTTLE CONTROL MOTOR		EC
<ol> <li>Turn ignition switch OFF.</li> <li>Disconnect electric throttle control actuator harness connector.</li> <li>Check the resistance between electric throttle control actuator terminals as per the following</li> </ol>	g.	С
Terminals Resistance		D
5 and 6 Approx. 1 - 15 Ω [at 25°C (77°F)]		
Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 2.		E
2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR		F
<ol> <li>Replace electric throttle control actuator.</li> <li>Perform <u>EC-363, "Special Repair Requirement"</u>.</li> </ol>		G
>> INSPECTION END		0
Special Repair Requirement	INFOID:000000004833468	Н
<b>1.</b> PERFORM THROTTLE VALVE CLOSED POSITION LEARNING		
Refer to EC-17, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Require	ment"	
		I
>> GO TO 2. 2.PERFORM IDLE AIR VOLUME LEARNING		J
Refer to EC-17, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"		
		K
>> END		
		L
		M
		1 V I
		Ν
		IN
		$\circ$
		0
		Ρ

## 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. ECM controls the throttle valve opening angle in response to driving conditions via the throttle control motor.

## DTC Logic

INFOID:000000004833470

INFOID:000000004833472

## 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.	<ul> <li>Harness or connectors (Throttle control motor circuit is shorted.)</li> <li>Electric throttle control actuator (Throttle control motor)</li> </ul>

## DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### >> GO TO 2.

## 2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 2 seconds.
- 2. Start engine and let it idle for 5 seconds.
- 3. Check DTC.

#### Is DTC detected?

- YES >> Go to EC-364, "Diagnosis Procedure".
- NO >> INSPECTION END

## **Diagnosis Procedure**

#### **1.**CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-37, "Circuit Inspection".

Is the inspection result normal?

#### YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Electric throttle	control actuator	E	Continuity	
Connector	Connector Terminal		Terminal	Continuity
	5		1	Not existed
E20	5	6 F7	4	Existed
F29	6		1	Existed
			4	Not existed

INFOID:000000004833469

## P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >	[MR18DE]
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-365, "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 4. NO >> GO TO 5.	
4. CHECK INTERMITTENT INCIDENT	
Refer to GI-34, "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. Perform <u>EC-365</u> , "Special Repair Requirement".	
>> INSPECTION END	
Component Inspection	INFOID:000000004833473
1 ALLEAK TUDATTUE AANTADA MATAD	
1.CHECK THROTTLE CONTROL MOTOR	
1. Turn ignition switch OFF.	
<ol> <li>Disconnect electric throttle control actuator harness connector.</li> <li>Check the resistance between electric throttle control actuator terminals as per the</li> </ol>	following.
	lonothing
Terminals Resistance	
5 and 6 Approx. 1 - 15 Ω [at 25°C (77°F)]	
Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 2.	
Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 2.	
$\begin{array}{llllllllllllllllllllllllllllllllllll$	
Is the inspection result normal?         YES       >> INSPECTION END         NO       >> GO TO 2.         2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR         1. Replace electric throttle control actuator.	
Is the inspection result normal?         YES       >> INSPECTION END         NO       >> GO TO 2.         2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR         1. Replace electric throttle control actuator.         2. Perform EC-365. "Special Repair Requirement".	
Is the inspection result normal?         YES       >> INSPECTION END         NO       >> GO TO 2.         2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR         1. Replace electric throttle control actuator.	
Is the inspection result normal?         YES       >> INSPECTION END         NO       >> GO TO 2. <b>2.</b> REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR         1. Replace electric throttle control actuator.         2. Perform EC-365. "Special Repair Requirement".         >> INSPECTION END	INF0ID:000000004833474
Is the inspection result normal?         YES       >> INSPECTION END         NO       >> GO TO 2.         2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR         1. Replace electric throttle control actuator.         2. Perform EC-365. "Special Repair Requirement".         >> INSPECTION END         Special Repair Requirement	INFOID:00000004833474
Is the inspection result normal?         YES       >> INSPECTION END         NO       >> GO TO 2.         2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR         1. Replace electric throttle control actuator.         2. Perform EC-365. "Special Repair Requirement".         >> INSPECTION END         Special Repair Requirement         1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	
Is the inspection result normal?         YES       >> INSPECTION END         NO       >> GO TO 2.         2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR         1. Replace electric throttle control actuator.         2. Perform EC-365. "Special Repair Requirement".         >> INSPECTION END         Special Repair Requirement         1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	
Is the inspection result normal?         YES       >> INSPECTION END         NO       >> GO TO 2.         2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR         1. Replace electric throttle control actuator.         2. Perform EC-365. "Special Repair Requirement".         >> INSPECTION END         Special Repair Requirement	
Is the inspection result normal?         YES       >> INSPECTION END         NO       >> GO TO 2.         2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR         1. Replace electric throttle control actuator.         2. Perform EC-365. "Special Repair Requirement".         >> INSPECTION END         Special Repair Requirement         1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING         Refer to EC-17. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair	

>> END

## P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

## P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

## Description

INFOID:000000004833475

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 feeds the voltage signal to the ECM. The ECM judges the current opening angle of the throttle valve and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.

### DTC Logic

INFOID:000000004833476

## DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P2119 Electric throttle cor actuator		А	Electric throttle control actuator does not function properly due to the return spring malfunction.	
		В	Throttle valve opening angle in fail-safe mode is not in specified range.	Electric throttle control actuator
		С	ECM detect the throttle valve is stuck open.	

### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### >> 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 selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
- 3. Set selector lever to P (CVT) or Neutral (M/T) 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 selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
- 7. Set selector lever to P (CVT) or Neutral (M/T) 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-366, "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 selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
- 3. Set selector lever to P (CVT) or Neutral (M/T) position.
- 4. Start engine and let it idle for 3 seconds.
- 5. Check DTC.

#### Is DTC detected?

- YES >> Go to EC-366, "Diagnosis Procedure".
- NO >> INSPECTION END

#### **Diagnosis Procedure**

## **1.**CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- 1. Turn ignition switch OFF.
- 2. Remove the intake air duct.

## EC-366

2009 Z12

INFOID:000000004833477

[MR18DE]

## P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

#### < DTC/CIRCUIT DIAGNOSIS >

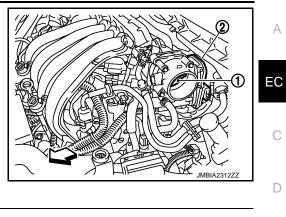
- 3. Check if foreign matter is caught between the throttle valve (1) and the housing.
- Electric throttle control actuator (2) -

Is the inspection result normal?

YES >> GO TO 2.

S

>> Remove the foreign matter and clean the electric throttle NO control actuator inside.



[MR18DE]

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR	D
<ol> <li>Replace electric throttle control actuator.</li> <li>Perform <u>EC-367, "Special Repair Requirement"</u>.</li> </ol>	E
>> INSPECTION END	
Special Repair Requirement	F
1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING Refer to EC-17, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"	G
>> GO TO 2. 2.PERFORM IDLE AIR VOLUME LEARNING	Н
Refer to EC-17, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"	
>> END	1
	J

Κ

L

Μ

Ν

Ο

Ρ

#### < DTC/CIRCUIT DIAGNOSIS >

## P2122, P2123 APP SENSOR

## Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

DTC Logic

### DTC DETECTION LOGIC

#### NOTE:

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-308, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	Harness or connectors     (APP sensor 1 circuit is open or shorted.)
P2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	<ul> <li>Accelerator pedal position sensor (APP sensor 1)</li> </ul>

#### DTC CONFIRMATION PROCEDURE

### **1**.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

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

>> GO TO 2.

#### 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- 2. Check DTC.

#### Is DTC detected?

YES >> Go to EC-368, "Diagnosis Procedure".

NO >> INSPECTION END

## Diagnosis Procedure

### **1.**CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to <u>GI-37, "Circuit Inspection"</u>.
- Is the inspection result normal?
- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.

## EC-368

INFOID:000000004833482

Accelerator pedal position sensor Sensor 1 Sensor 1 2.0 Sensor 2 Release Depress Accelerator pedal position sensor



INFOID:000000004833479

## P2122, P2123 APP SENSOR

#### < DTC/CIRCUIT DIAGNOSIS >

#### 2. Turn ignition switch ON.

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

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

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.

## ${ m 3.}$ CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

#### 1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

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

	APP sensor		ECM		Continuity
_	Connector	Terminal	Connector	Terminal	Continuity
	E110	2	E16	111	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 APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

APPs	sensor	EC	CM		
Connector	Terminal	Connector	Terminal	Continuity	
E110	3	E16	110	Existed	
2. Also check <u>Is the inspection</u> YES >> GC		•	d short to powe	ðr.	ł
	pair open circuit	t or short to gro	und or short to	power in harness or connectors.	l
Refer to <u>EC-370</u> Is the inspection YES >> GC NO >> GC	n result normal? TO 7.				Ν
<b>6.</b> REPLACE A	CCELERATOR	PEDAL ASSE	MBLY		٦
	celerator pedal 2-370, "Special		<u>ment"</u> .		(
>> INS 7.CHECK INT	SPECTION ENE				F

Refer to GI-34, "Intermittent Incident".

>> INSPECTION END

EC

D

Е

F

Н

## P2122, P2123 APP SENSOR

## < DTC/CIRCUIT DIAGNOSIS >

## Component Inspection

INFOID:000000004833483

[MR18DE]

## 1. CHECK ACCELERATOR PEDAL POSITION SENSOR

- 1. Reconnect all harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Check the voltage between ECM harness connector and ground.

E	ECM		Condition		Voltage	
Connector	Terminal	Ground	Condition		vollage	
	110			Fully released	0.6 - 0.9 V	
E16	(APP sensor 1 signal)	Ground	Accelerator ped-	Fully depressed	3.9 - 4.7 V	
LIU	103	Glound	al	Fully released	0.3 - 0.6 V	
	(APP sensor 2 signal)			Fully depressed	1.95 - 2.4 V	

Is the inspection result normal?

#### YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.

2. Perform EC-370. "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:000000004833484

**1.**PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-17, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-17, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

**3.**PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-17, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

#### < DTC/CIRCUIT DIAGNOSIS >

## P2127, P2128 APP SENSOR

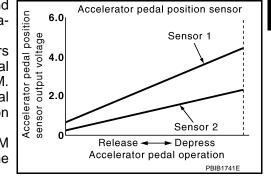
### Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

### **DTC Logic**



#### INFOID:000000004833486

F

D

E

А

EC

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	Harness or connectors     (APP sensor 2 circuit is open or shorted.)
P2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	<ul> <li>[Crankshaft position sensor (POS) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Battery current sensor circuit is shorted.)</li> <li>Accelerator pedal position sensor (APP sensor 2)</li> <li>Crankshaft position sensor (POS)</li> <li>Refrigerant pressure sensor</li> <li>EVAP control system pressure sensor</li> <li>EVAP control system pressure sensor</li> <li>Battery current sensor</li> </ul>

#### DTC CONFIRMATION PROCEDURE

#### **1.**PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test. **TESTING CONDITION:** 

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- 2. Check DTC.

#### Is DTC detected?

YES >> Go to <u>EC-371, "Diagnosis Procedure"</u>. NO >> INSPECTION END

#### Diagnosis Procedure

#### **1.**CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E38. Refer to GI-37, "Circuit Inspection".

INFOID:000000004833488

INFOID:000000004833485

M

Ν

## P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.

2. Turn ignition switch ON.

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

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 3.

#### **3.**CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E110	5	E16	102	Existed

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 SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
F11	76	EVAP control system pressure sen- sor	B104	3
	77	Battery current sensor	F51	1
E16	102	APP sensor	E12	5

#### 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-228, "Component Inspection"</u>.)
- EVAP control system pressure sensor (Refer to EC-269. "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-414, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace malfunctioning component.

**6.**CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

## EC-372

## P2127, P2128 APP SENSOR

#### < DTC/CIRCUIT DIAGNOSIS >

2. Disconnect ECM harness connector.

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

APP	APP sensor		ECM	
Connector	Terminal	Connector	Terminal	Continuity
E110	1	E16	104	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 APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

APP	sensor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E110	6	E16	103	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.	CHE	CK APP	SENSOF	۲	
-			"		

Refer to EC-373. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 9.

9.replace accelerator pedal assembly

1. Replace accelerator pedal assembly.

Perform <u>EC-374, "Special Repair Requirement"</u>.

>> INSPECTION END

**10.**CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

#### >> INSPECTION END

#### **Component Inspection**

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.

2. Turn ignition switch ON.

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

E	ECM		Condition		Voltage	
Connector	Terminal	Ground	Condition		vollage	
	110			Fully released	0.6 - 0.9 V	
E16	(APP sensor 1 signal)	Ground	Accelerator ped-	Fully depressed	3.9 - 4.7 V	
LIU	103	Glound	al	Fully released	0.3 - 0.6 V	
	(APP sensor 2 signal)			Fully depressed	1.95 - 2.4 V	

А

EC

D

Е

F

Н

Κ

L

Μ

INFOID:000000004833489

Ν

Ρ

## P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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

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

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.

2. Perform EC-374, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:000000004833490

**1.**PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-17. "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-17. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

**3.**PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-17, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

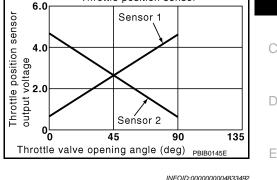
#### < DTC/CIRCUIT DIAGNOSIS >

## 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 potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



Throttle position sensor

## 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-308, "DTC Logic"</u>.

Κ

L

А

EC

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.	<ul> <li>Harness or connector (TP sensor 1 or 2 circuit is open or shorted.)</li> <li>Electric throttle control actuator (TP sensor 1 or 2)</li> </ul>	H

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### TESTING CONDITION:

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

>> GO TO 2.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

Start engine and let it idle for 1 second. 1. M 2. Check DTC. Is DTC detected? YES >> Go to EC-375, "Diagnosis Procedure". Ν NO >> INSPECTION END Diagnosis Procedure INFOID:000000004833494 1.CHECK GROUND CONNECTION 1. Turn ignition switch OFF. Check ground connection E38. Refer to GI-37, "Circuit Inspection". 2. Ρ Is the inspection result normal? YES >> GO TO 2. NO >> Repair or replace ground connection. 2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT 1. Disconnect electric throttle control actuator harness connector.

2. Turn ignition switch ON.

## EC-375

# [MR18DE]

INFOID:000000004833491

## P2135 TP SENSOR

#### < DTC/CIRCUIT DIAGNOSIS >

3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle	Electric throttle control actuator		Voltage
Connector	Terminal	Ground	voltage
F29	2	Ground	Approx. 5 V

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.

 ${\it 3.}$  check throttle position sensor ground circuit for open and short

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

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

Electric throttle	Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	Continuity	
F29	4	F8	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 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F29	1	F8	33	Existed
F29	3	ГО	34	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-377, "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. Perform EC-377, "Special Repair Requirement".

#### >> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

>> INSPECTION END

## P2135 TP SENSOR

## < DTC/CIRCUIT DIAGNOSIS >

## **Component Inspection**

## 1.CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-377. "Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set selector lever to D (CVT) or 1st (M/T) position.
- 6. Check the voltage between ECM harness connector and ground.

E	СМ	Ground	Co	ndition	Voltage		[
Connector	Terminal	Ground	00	Indition	voltage		
	33 (TP sensor			Fully released	More than 0.36V		
F8	(1P sensor 1 signal)	Ground	Accelerator	Fully de- pressed	Less than 4.75V		
ГО	34 (TP sensor	Ground	pedal	Fully released	Less than 4.75V		
	2 signal)			Fully de- pressed	More than 0.36V		(
NO >>	> INSPECT > GO TO 2.		5	NTROL ACTU	JATOR		ł
1. Replac	ce electric t	hrottle co	ontrol actuat <u>Repair Req</u>	or.			
>:	> INSPECT	ION ENI	C				,
Special F	Repair Re	equirer	nent			INFOID:00000004833496	
<b>1.</b> PERFO	RM THRO	TTLE VA	LVE CLOSE	ED POSITION	LEARNING		ŀ
Refer to EC	C-17, "THR	OTTLE \	/ALVE CLO	SED POSITIC	ON LEARNIN	G : Special Repair Requirement"	
>:	> GO TO 2.						l
2.PERFO	RM IDLE A		JME LEARN	NING			
Refer to EC	C-17, "IDLE	AIR VO	LUME LEAI	RNING : Spec	ial Repair Re	auirement"	ľ
>>	> END						1
							(

[MR18DE]

INFOID:000000004833495

А

EC

С

Ρ

## Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

### DTC Logic

### DTC DETECTION LOGIC

#### NOTE:

If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-308, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138	Accelerator pedal position sensor circuit range/per- formance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	<ul> <li>Harness or connector (APP sensor 1 or 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system sensor circuit is shorted.) (Battery current sensor circuit is shorted.)</li> <li>Accelerator pedal position sensor (APP sensor 1 or 2)</li> <li>Crankshaft position sensor (POS)</li> <li>Refrigerant pressure sensor</li> <li>EVAP control system pressure sensor</li> <li>Battery current sensor</li> </ul>

#### DTC CONFIRMATION PROCEDURE

### **1.**PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### TESTING CONDITION:

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

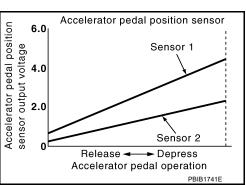
>> GO TO 2.

### 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- 2. Check DTC.

Is DTC detected?

- YES >> Go to EC-379, "Diagnosis Procedure".
- NO >> INSPECTION END



INFOID:000000004833497

INFOID:000000004833498

< DTC/CIRCUI	T DIAGNOSIS	>			[MR18DE]
Diagnosis P	rocedure				INFOID:000000004833500
1.CHECK GRO		CTION			
<ol> <li>Turn ignitio</li> <li>Check grou</li> <li>Is the inspection</li> </ol>	n switch OFF. Ind connection n result normal?	E38. Refer to <u>(</u>	GI-37, "Circuit In	spection".	E
YES >> GC NO >> Re <b>2.</b> CHECK APF	pair or replace 🤅				
1. Disconnect 2. Turn ignitio	accelerator pennistric n switch ON.	dal position (Af	PP) sensor harn		
	sensor				
Connector	Terminal	Ground	Voltage		
E110	4	Ground	Approx. 5 V		
3. СНЕСК АРГ	pair open circui P SENSOR 2 P	OWER SUPPL	•	ower in harness or connec	tors.
			1		
APP s	sensor Terminal	Ground	Voltage		
E110	5	Ground	Approx. 5 V		
YES >> GC NO >> GC 4.CHECK APF 1. Turn ignitio	) TO 4. P SENSOR 2 P n switch OFF.		Y CIRCUIT-II		
2. Disconnect	ECM harness		r harness conne	ector and ECM harness cor	nnector.
APP s	sensor	E	СМ	Continuity	
Connector	Terminal	Connector	Terminal		
E110	4	E16	106	Existed	
I <u>s the inspection</u> YES >> GC NO >> Rej <b>5.</b> CHECK SEN	) TO 5. pair open circui [:]	t or short to gro		ower in harness or connec	tors.
				en the following terminals.	

Ρ

#### < DTC/CIRCUIT DIAGNOSIS >

ECM		Sensor			
Connector Terminal		Name	Connector	Terminal	
	74	Refrigerant pressure sensor	E17	3	
	75	CKP sensor (POS)	F15	1	
F8	76	EVAP control system pressure sen- sor	B104	3	
	77	Battery current sensor	F51	1	
E16	102	APP sensor	E12	5	

Is the inspection result normal?

YES >> GO TO 6.

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

#### 6.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to EC-228, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-269, "Component Inspection".)
- Refrigerant pressure sensor (Refer to <u>EC-414, "Diagnosis Procedure".)</u>

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace malfunctioning component.

7. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between APP sensor harness connector and ECM harness connector as per the following.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E110	2	E16	111	Existed
ETTU	1	LIU	104	LAISted

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

Is the inspection result normal?

YES >> GO TO 8.

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

8.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector as per the following.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E110	3	E16	110	Existed
EIIO	6	EIO	103	Existed

2. 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 shot to power in harness or connectors.

**9.**CHECK APP SENSOR

Refer to <u>EC-381, "Component Inspection"</u>. <u>Is the inspection result normal?</u>

Revision: 2009 March

≤ DTC/CIRCUIT DIAGNOSIS >       [MR18DE]         YES       >> GO TO 11.         NO       >> GO TO 10.         10.REPLACE ACCELERATOR PEDAL ASSEMBLY
NO       >> GO TO 10.         10. REPLACE ACCELERATOR PEDAL ASSEMBLY         1. Replace accelerator pedal assembly.         2. Perform EC-381. "Special Repair Requirement".         >> INSPECTION END         11. CHECK INTERMITTENT INCIDENT         Refer to GL-34. "Intermittent Incident".         >> INSPECTION END         Component Inspection         1. CHECK ACCELERATOR PEDAL POSITION SENSOR         1. Reconnect all harness connectors disconnected.         2. Turn ignition switch ON.         3. Check the voltage between ECM harness connector and ground.         E16       Ion all foround all foround all epidemeened.         Image: Signal)       Ground all epidemeened.         Is the inspection result normal?         YES       > INSPECTION END         NO       >> GO TO 2.         2. REPLACE ACCELERATOR PEDAL ASSEMBLY         1. Replace accelerator pedal assembly.         2. Perform EC-381. "Special Repair Requirement".         >> INSPECTION END
10.REPLACE ACCELERATOR PEDAL ASSEMBLY         1. Replace accelerator pedal assembly.         2. Perform EC-381, "Special Repair Requirement".         >> INSPECTION END         11.CHECK INTERMITTENT INCIDENT         Refer to QI-34, "Intermittent Incident".         >> INSPECTION END         Component Inspection         ***********************************
1. Replace accelerator pedal assembly.         2. Perform EC-381. "Special Repair Requirement".         >> INSPECTION END         11. CHECK INTERMITTENT INCIDENT         Refer to GI-34. "Intermittent Incident".         >> INSPECTION END         Component Inspection         ***********************************
>> INSPECTION END         11.check INTERMITTENT INCIDENT         Refer to GI-34. "Intermittent Incident".         >> INSPECTION END         Component Inspection         1.check ACCELERATOR PEDAL POSITION SENSOR         1. Reconnect all harness connectors disconnected.         2. Turn ignition switch ON.         3. Check the voltage between ECM harness connector and ground. <ul> <li></li></ul>
11.CHECK INTERMITTENT INCIDENT         Refer to GI-34. "Intermittent Incident".         >> INSPECTION END         Component Inspection         1.CHECK ACCELERATOR PEDAL POSITION SENSOR         1. Reconnect all harness connectors disconnected.         2. Turn ignition switch ON.         3. Check the voltage between ECM harness connector and ground.         ECM         Connector Terminal         (APP sensor 1         (APP sensor 1         (APP sensor 2         signal)         (APP sensor 2         (Signal)         (APP sensor 2         signal)         (APP sensor 2         signal)         (APP sensor 2         (Brown 4         (APP sensor 2         (Brown 4         (Brown 4         (Brown 4         (Brown 4         (Brown 4         (Brown 4
Refer to GI-34, "Intermittent Incident".         >> INSPECTION END         Component Inspection         1. CHECK ACCELERATOR PEDAL POSITION SENSOR         1. Reconnect all harness connectors disconnected.         2. Turn ignition switch ON.         3. Check the voltage between ECM harness connector and ground.         Image: Connector Terminal for the voltage of the voltage o
>> INSPECTION END Component Inspection ************************************
Component Inspection       Detected Accelerator PEDAL POSITION SENSOR         1. Reconnect all harness connectors disconnected.       .         2. Turn ignition switch ON.       .         3. Check the voltage between ECM harness connector and ground.       . <u>ECM</u> Ground Condition Voltage        Voltage <u>E16</u> (APP sensor 1 signal) (APP sensor 2 signal)       Ground Ground       Condition       Voltage <u>Sthe inspection result normal?</u> YES >> INSPECTION END NO >> GO TO 2.       Sthe Inspectator pedal assembly.       . <u>Perform EC-381. "Special Repair Requirement".</u> >> INSPECTION END <u>Special Repair Requirement".</u> >> INSPECTION END
Component Inspection       Detected and the problem of t
1. CHECK ACCELERATOR PEDAL POSITION SENSOR         1. Reconnect all harness connectors disconnected.         2. Turn ignition switch ON.         3. Check the voltage between ECM harness connector and ground.         Image: Connector Image: Image
1. Reconnect all harness connectors disconnected.         2. Turn ignition switch ON.         3. Check the voltage between ECM harness connector and ground.         Image: Second S
<ul> <li>2. Turn ignition switch ON.</li> <li>3. Check the voltage between ECM harness connector and ground.</li> <li>ECM Ground Condition Voltage</li> <li>Connector Terminal II0 (APP sensor 1 signal) Ground Accelerator ped-al Ground III depressed 3.9 - 4.7 V Fully depressed 3.9 - 4.7 V Fully depressed 0.3 - 0.6 V Fully depressed 1.95 - 2.4 V</li> <li>S the inspection result normal?</li> <li>YES &gt;&gt; INSPECTION END NO &gt;&gt; GO TO 2.</li> <li>2. REPLACE ACCELERATOR PEDAL ASSEMBLY</li> <li>1. Replace accelerator pedal assembly.</li> <li>2. Perform EC-381, "Special Repair Requirement".</li> </ul>
$\frac{ECM}{Connector}  \overline{Terminal} \\ \hline Connector}  \overline{Terminal} \\ \hline 100 \\ \hline (APP sensor 1 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\ (APP sensor 2 \\ signal) \\ \hline 103 \\$
Connector     Terminal     Ground     Condition     Voltage       110 (APP sensor 1 signal)     110 (APP sensor 2 signal)     Accelerator ped- al     Fully released     0.6 - 0.9 V       Fully depressed     3.9 - 4.7 V     Fully released     0.3 - 0.6 V       (APP sensor 2 signal)     Ground     Accelerator ped- al     Fully released     0.3 - 0.6 V       YES     >> INSPECTION END NO     >> GO TO 2.     Sthe inspector result normal?       2. REPLACE ACCELERATOR PEDAL ASSEMBLY     I. Replace accelerator pedal assembly.       2. Perform EC-381. "Special Repair Requirement".       >> INSPECTION END
Connector       Terminal       Image: Connector       Terminal       Image: Connector       Terminal       Image: Connector         Herminal       100       (APP sensor 1 signal)       Ground       Accelerator ped- al       Fully released       0.6 - 0.9 V         Fully depressed       3.9 - 4.7 V       Fully released       0.3 - 0.6 V         (APP sensor 2 signal)       Ground       Fully released       0.3 - 0.6 V         sthe inspection result normal?       Fully depressed       1.95 - 2.4 V         Sthe inspection result normal?       YES       > INSPECTION END         NO       >> GO TO 2.       Screen accelerator pedal assembly.         Perform EC-381. "Special Repair Requirement".       >> INSPECTION END         >> INSPECTION END       Special Repair Requirement".
E16       (APP sensor 1 signal) 103 (APP sensor 2 signal)       Ground       Accelerator ped- al       Fully depressed       3.9 - 4.7 V Fully released         Sthe inspection result normal? YES       >> INSPECTION END NO       >> GO TO 2.         2. REPLACE ACCELERATOR PEDAL ASSEMBLY         .       Replace accelerator pedal assembly.         .       Perform EC-381. "Special Repair Requirement".         >> INSPECTION END
E16       signal) 103 (APP sensor 2 signal)       Ground       Accelerator ped- al       Fully depressed       3.9 - 4.7 V         Fully released       0.3 - 0.6 V       Fully released       0.3 - 0.6 V         Fully depressed       1.95 - 2.4 V         S the inspection result normal?         YES       >> INSPECTION END NO         NO       >> GO TO 2.         2.REPLACE ACCELERATOR PEDAL ASSEMBLY         .       Replace accelerator pedal assembly.         2.       Perform EC-381, "Special Repair Requirement".         >> INSPECTION END
Individuation     Individuation       (APP sensor 2 signal)     Fully depressed       1.95 - 2.4 V       s the inspection result normal? YES >> INSPECTION END NO >> GO TO 2.       2.REPLACE ACCELERATOR PEDAL ASSEMBLY       1. Replace accelerator pedal assembly.       2. Perform EC-381. "Special Repair Requirement".       >> INSPECTION END
is the inspection result normal?         YES       >> INSPECTION END         NO       >> GO TO 2.         2.REPLACE ACCELERATOR PEDAL ASSEMBLY         1. Replace accelerator pedal assembly.         2. Perform EC-381. "Special Repair Requirement".         >> INSPECTION END
YES >> INSPECTION END NO >> GO TO 2. 2.REPLACE ACCELERATOR PEDAL ASSEMBLY 1. Replace accelerator pedal assembly. 2. Perform EC-381. "Special Repair Requirement". >> INSPECTION END
<ul> <li>2.REPLACE ACCELERATOR PEDAL ASSEMBLY</li> <li>1. Replace accelerator pedal assembly.</li> <li>2. Perform <u>EC-381, "Special Repair Requirement"</u>.</li> <li>&gt;&gt; INSPECTION END</li> </ul>
<ol> <li>Replace accelerator pedal assembly.</li> <li>Perform <u>EC-381, "Special Repair Requirement"</u>.</li> <li>&gt; INSPECTION END</li> </ol>
<ol> <li>Perform <u>EC-381, "Special Repair Requirement"</u></li> <li>&gt;&gt; INSPECTION END</li> </ol>
Special Repair Requirement INFOID:00000004833502
.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING
Refer to EC-17, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
>> GO TO 2.
2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING
Refer to EC-17, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
>> GO TO 3.
<b>3.</b> PERFORM IDLE AIR VOLUME LEARNING
Refer to EC-17, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

#### < DTC/CIRCUIT DIAGNOSIS >

## 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  $\lambda$  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).

## 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
P2A00	Air fuel ratio (A/F) sensor 1 circuit range/performance	<ul> <li>The output voltage computed by ECM from the A/F sensor 1 signal is shifted to the lean side for a specified period.</li> <li>The A/F signal computed by ECM from the A/F sensor 1 signal is shifted to the rich side for a specified period.</li> </ul>	<ul> <li>A/F sensor 1</li> <li>A/F sensor 1 heater</li> <li>Fuel pressure</li> <li>Fuel injector</li> <li>Intake air leaks</li> </ul>

## DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

## TESTING CONDITION:

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

#### >> GO TO 2.

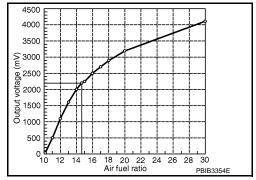
## 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Clear the mixture ratio self-learning value. Refer to <u>EC-19, "MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement"</u>.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.

## EC-382

#### 2009 Z12

Protector Holder



Zirconia element

INFOID:000000004833503

JMBIA0112GB

## P2A00 A/F SENSOR 1

< DTC/CIRCUI	T DIAGNOSIS	)>			[MR18DE]
6. Check 1st t	trip DTC.				
Is 1st trip DTC	detected?				
		agnosis Proced	<u>ure"</u> .		_
NO >> INS	SPECTION END	2			
Diagnosis P	rocedure				INFOID:000000004833506
1.CHECK GR	OUND CONNE	CTION			
	n switch OFF.				
-			<u> 31-37, "Circuit In</u>	spection".	
	<u>n result normal'</u>	<u>?</u>			
YES >> GC NO >> Re		ground connect	ion		
-	RNESS CONNE	•			
	: A/F sensor 1 h ness connector	arness connector	tor.		
Water s	hould not exit				
	n result normal'	<u>?</u>			
YES >> GC					
-		harness connec	ctor.		
<b>3.</b> RETIGHTEN	A/F SENSOR	1			
>> GC 4.CHECK FOF	) TO 4. R INTAKE AIR I	LEAK			
		arness connect	or.		
	e and run it at id		air flow sensor		
ls intake air leal		k alter the mass			
YES >> GC					
	pair or replace.				
<b>5.</b> CLEAR THE	MIXTURE RA	TIO SELF-LEAI	RNING VALUE		
				9. "MIXTURE RATIO SELF-LE	ARNING VALUE
<u> CLEAR : S</u>	<u>pecial Repair R</u>	equirement".			
0		minutes at idle	•		
•			Is it difficult to s	<b>_</b>	
	rform trouble d <u>FC Logic"</u> .	agnosis for DT	C P0171or P0	172. Refer to <u>EC-200, "DTC L</u>	<u>.ogic"</u> or <u>EC-204,</u>
	) TO 6.				
<b>3.</b> CHECK A/F	SENSOR 1 PC	WER SUPPLY	CIRCUIT		
		arness connec			
	n switch ON.				
3. Check the	voltage betwee	n A/F sensor 1	harness connec	tor and ground.	
۸/E oc	ensor 1				
Connector	Terminal	Ground	Voltage		
F50	4	Ground	Battery voltage		
100	т	Ciouna	Ballory Vollage		

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

## P2A00 A/F SENSOR 1

#### < DTC/CIRCUIT DIAGNOSIS >

## 7. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E8, F1
- IPDM E/R harness connector E45
- 10 A fuse (No. 54)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

#### $\mathbf{8}$ .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 ser	nsor 1	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F50	1	F8	49	Existed
150	2	10	53	LXISIGU

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F ser	nsor 1	Ground	Continuity	
Connector	Terminal	Ground		
F50	1	Ground	Not existed	
1.50	2	Ciouna	NOT EXISTED	

EC	М	Ground	Continuity	
Connector	Terminal		Continuity	
F8	49	Ground	Not existed	
10	53		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 A/F SENSOR 1 HEATER

Refer to EC-129, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 11.

NO >> GO TO 11.

10. CHECK INTERMITTENT INCIDENT

Perform GI-34, "Intermittent Incident".

Is the inspection result normal?

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.

• 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.

## EC-384

## P2A00 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS > [MR18DE]	
• Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).	А
Do you have CONSULT-III?	
YES >> GO TO 12. NO >> GO TO 13.	EC
12.confirm a/f adjustment data	
With CONSULT-III	С
<ol> <li>Turn ignition switch ON.</li> <li>Select "A/F ADJ-B1" in "DATA MONITOR" mode with CONSULT-III.</li> <li>Make sure that "0.000" is displayed on CONSULT-III screen.</li> </ol>	D
Is "0.000" displayed?	
YES >> INSPECTION END	Е
NO $\Rightarrow$ GO TO 13. <b>13.</b> CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE	
Clear the mixture ratio self-learning value. Refer to <u>EC-19</u> , " <u>MIXTURE RATIO SELF-LEARNING VALUE</u>	_
<u>CLEAR : Special Repair Requirement</u> ".	F
Do you have CONSULT-III?	
YES >> GO TO 14. NO >> INSPECTION END	G
14. CONFIRM A/F ADJUSTMENT DATA	
	Н
<ul> <li>With CONSULT-III</li> <li>Turn ignition switch ON.</li> <li>Select "A/F ADJ-B1" in "DATA MONITOR" mode with CONSULT-III.</li> <li>Make sure that "0.000" is displayed on CONSULT-III screen.</li> </ul>	I
>> INSPECTION END	J
	K
	L
	M
	Ν
	0
	Ρ

## Description

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to EC-51, "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 SW1 Brake pedal (CVT) Brake pedal and clutch peo		Slightly de- pressed	OFF
	Brake pedal and clutch pedal (M/T)	Fully released	ON

#### **Without CONSULT-III**

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

	ECM				
Connector	+	-	Condition		Voltage
Connector	Terminal	Terminal			
E16	100 (ASCD brake	108	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly de- pressed	Approx. 0 V
	switch signal)		Brake pedal and clutch pedal (M/1)	Fully released	Battery voltage

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-386, "Diagnosis Procedure".

## Diagnosis Procedure

INFOID:000000005040384

## 1.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT-I

- 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.

ASCD brake switch		Ground	Voltage	
Connector	Terminal	Giodila	voltage	
E112	1	Ground	Battery voltage	

#### Is the inspection result normal?

- YES >> GO TO 7.
- NO-1 >> CVT models: GO TO 2.
- NO-2 >> M/T models: GO TO 3.

## 2. DETECT MALFUNCTIONING PART

Harness connectors E105, M77

[MR18DE]

		ASCI	D BRAKE S	NITCH	
< DTC/CIRCUI	T DIAGNOSIS	>		[MR18DE]	
<ul><li> 10 A fuse (No</li><li> Harness for or</li></ul>		tween ASCD b	rake switch and	fuse	А
5					
3.CHECK ASC	•	-		power in harness or connectors.	EC
			R SUPPLY CIRC		
<ol> <li>Disconnect</li> <li>Turn ignition</li> </ol>	n switch OFF. ASCD clutch s n switch ON. voltage betweer			connector and ground.	С
ASCD clut	tch switch				D
Connector	Terminal	Ground	Voltage		
E111	3	Ground	Battery voltage		Е
Is the inspection YES >> GO NO >> GO 4.DETECT MA	TO 5. TO 4.	_			F
Check the follow • Harness conn • 10 A fuse (No	ectors E105, M	77			G
Harness for op	pen or short be				Н
5.CHECK ASC 1. Turn ignition	D BRAKE SWI	TCH POWER	SUPPLY CIRCU	oower in harness or connectors. IIT-II	I
	ASCD brake so continuity betw			ess connector and ASCD brake switch harness	J
ASCD clut	tch switch	ASCD br	ake switch		Κ
Connector	Terminal	Connector	Terminal	Continuity	1.
E111	4	E112	1	Existed	
		-	nd short to powe	r.	L
Is the inspection YES >> GO NO >> Rep 6.CHECK ASC	TO 6. pair open circuit	or short to gro	ound or short to	power in harness or connectors.	M
Refer to EC-388	3. "Component	Inspection (AS	CD Clutch Swite	<u>h)"</u> .	
Is the inspection YES >> GO		-			Ν
		_			
I CHECK ASC	place ASCD clu		IGNAL CIRCUIT	FOR OPEN AND SHORT	N O
<ol> <li>Turn ignition</li> <li>Disconnect</li> </ol>	blace ASCD clu CD BRAKE SWI n switch OFF. ECM harness of	TCH INPUT S		FOR OPEN AND SHORT	
<ol> <li>Turn ignition</li> <li>Disconnect</li> </ol>	Diace ASCD clu CD BRAKE SWI n switch OFF. ECM harness o continuity betwe	TCH INPUT Si connector. een ASCD brak		FOR OPEN AND SHORT	0

ASCD bra	ake switch	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E112	2	E16	100	Existed

#### < DTC/CIRCUIT DIAGNOSIS >

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

Is the inspection result normal?

YES >> GO TO 8.

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

**8.**CHECK ASCD BRAKE SWITCH

Refer to EC-388, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace ASCD brake switch.

**9.**CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

#### >> INSPECTION END

### Component Inspection (ASCD Brake Switch)

**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	Condition		Continuity
		Fully released	Existed
1 and 2	Brake pedal	Slightly de- pressed	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 BR-7, "Inspection and Adjustment".

2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
		Fully released	Existed
1 and 2	Brake pedal	Slightly de- pressed	Not existed

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace ASCD brake switch.

## Component Inspection (ASCD Clutch Switch)

## 1.CHECK ASCD CLUTCH SWITCH-I

1. Turn ignition switch OFF.

2. Disconnect ASCD clutch switch harness connector.

3. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
		Fully released	Existed
1 and 2	Clutch pedal	Slightly de- pressed	Not existed

[MR18DE]

INFOID:000000005040385

INFOID:000000005040386

< DTC/CIRCU	IT DIAGNOSIS	6>			[MR18DE]
YES >> IN NO >> GO	on result normal SPECTION EN D TO 2.	D			A
2.CHECK AS	CD CLUTCH S	WITCH-II			EC
<ol> <li>Adjust AS0</li> <li>Check the</li> </ol>	CD clutch switch continuity betw	n installation. Re een ASCD cluto	efer to <u>BR-7, "In</u> h switch termin	nspection and Adjustment". nals under the following conditions	
Terminals	Cor	dition	Continuity	-	С
		Fully released	Existed	-	
1 and 2	Clutch pedal	Slightly de- pressed	Not existed	-	D
YES >> IN	on result normal SPECTION EN place ASCD clu	D		-	E
					F
					G
					Н
					I
					J
					K
					IX.
					L
					Μ
					Ν
					0
					Р

## ASCD INDICATOR

## < DTC/CIRCUIT DIAGNOSIS >

## ASCD INDICATOR

## Description

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

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

SET lamp illuminates when following conditions are met.

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

SET lamp remains lit during ASCD control.

Refer to EC-51, "System Description" for the ASCD function.

## Component Function Check

INFOID:000000005040388

INFOID:000000005040389

## **1.**ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CON	SPECIFICATION	
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time →at the 2nd time	$ON\toOFF$
	MAIN switch: ON	ASCD: Operating	ON
SET LAMP	When vehicle speed: Be- tween 40 km/h (25 MPH) and 190 km/h (118 MPH) (For the Middle East), 40 km/h (25 MPH) and 160 km/h (100 MPH) (Except for the Middle East)	ASCD: Not operating	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to <u>EC-390, "Diagnosis Procedure"</u>.

## Diagnosis Procedure

**1.**CHECK DTC

Check that DTC U1001 is not displayed.

Is DTC detected?

NO >> GO TO 2.

YES >> Perform trouble diagnosis for DTC U1001. Refer to <u>EC-122, "DTC Logic"</u>.

2.CHECK COMBINATION METER OPERATION

Refer to MWI-6, "METER SYSTEM : System Description".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Check combination meter circuit. Refer to <u>MWI-6, "METER SYSTEM : System Diagram"</u>.

**3.**CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

>> INSPECTION END

INFOID:000000005040387

## **COOLING FAN**

## < DTC/CIRCUIT DIAGNOSIS >

## COOLING FAN

## Description

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

## COOLING FAN MOTOR

#### Models without A/C

The cooling fan operates at each speed when the current flows in the cooling fan motor as prt the following.

Cooling fan	Cooling fan motor terminals		
Speed	(+)	(-)	
	1	3 and 4	
	2	3 and 4	
Low (LOW)	1 and 2	3	
	1 and 2	4	
High (HI)	1 and 2	3 and 4	

#### Models with A/C

The cooling fan operates at high (HI) speed when the current flows, and operates at low (LOW) speed when cooling fan motor and the resistor are circuited in series.

Component Function Check	004833508
1. CHECK COOLING FAN FUNCTION	
With CONSULT-III	
<ol> <li>Turn ignition switch ON.</li> <li>Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-III.</li> <li>Touch "LOW" and "Hi" on the CONSULT-III screen.</li> <li>Check that cooling fan operates at each speed.</li> </ol>	J
<ul> <li>Without CONSULT-III</li> <li>Perform IPDM E/R auto active test and check cooling fan motor operation. Refer to <u>PCS-11, "Diag</u> <u>Description"</u> or <u>PCS-42, "Diagnosis Description"</u>.</li> <li>Check that cooling fan operates at each speed.</li> </ul>	<u>nosis</u> K
Is the inspection result normal?	L
YES >> INSPECTION END NO >> Refer to <u>EC-391, "Diagnosis Procedure"</u> .	Μ
Diagnosis Procedure	
1. CHECK GROUND CONNECTION	N
<ol> <li>Turn ignition switch OFF.</li> <li>Check ground connection E21. Refer to Ground Inspection in <u>GI-37, "Circuit Inspection"</u>. <u>Is the inspection result normal?</u></li> </ol>	
YES >> GO TO 2.	0
NO >> Repair or replace ground connection.	
2. CHECK COOLING FAN MOTOR CIRCUIT	Р
<ol> <li>Disconnect cooling fan motor harness connector.</li> <li>Check the continuity between IPDM E/R harness connector and cooling fan motor harness connector</li> </ol>	or.

INFOID:000000004833507

А

EC

С

D

Ε

F

## **COOLING FAN**

#### < DTC/CIRCUIT DIAGNOSIS >

IPDN	/I E/R	Cooling	Continuity		
Connector Terminal		Connector Terminal		Continuity	
E10	5		1	Existed	
LIU	7	E62	2		
E11	10	<b>†</b>	3		

3. Check the continuity between cooling fan motor harness connector and ground.

Cooling	fan motor	Ground	Continuity
Connector Terminal		Giodila	Continuity
E62	4	Ground	Existed

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

OK or NG

OK >> GO TO 4.

NG >> GO TO 3.

**3.** DETECT MALFUNCTIONING PART

Check the following.

Harness for open or short between cooling fan motor and IPDM E/R

Harness for open or short between cooling fan motor and ground

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

#### **4.**CHECK COOLING FAN MOTOR

Refer to EC-392, "Component Inspection".

#### OK or NG

OK >> GO TO 5.

NG >> Replace cooling fan motor.

5. CHECK INTERMITTENT INCIDENT

Perform GI-34, "Intermittent Incident".

#### <u>OK or NG</u>

OK >> Replace IPDM E/R. Refer to <u>PCS-35</u>, "<u>Removal and Installation</u>"(WITH I-Key) or <u>PCS-65</u>, "<u>Removal and Installation</u>"(WITHOUT I-Key).

NG >> Repair or replace harness or connector.

#### **Component Inspection**

INFOID:000000004833511

#### COOLING FAN MOTOR

- 1. Disconnect cooling fan motor harness connectors.
- 2. Supply cooling fan motor terminals with battery voltage and check operation.

	Speed	term	inals
	Opeeu	(+)	(—)
Cooling fan mo- tor	Low	1	4
		2	3
	High	1 and 2	3 and 4

#### Cooling fan motor should operate.

If NG, replace cooling fan motor.

## **ELECTRICAL LOAD SIGNAL**

#### < DTC/CIRCUIT DIAGNOSIS >

## ELECTRICAL LOAD SIGNAL

## Description

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred via the CAN communication line.

### **Component Function Check**

## 1. CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

- 1. Turn ignition switch ON.
- 2. Connect CONSULT-III and select "DATA MONITOR" mode.
- 3. Select "LOAD SIGNAL" and check indication under the following conditions.

Monitor item	Condition	Indication	
LOAD SIGNAL	Rear window defogger switch	ON	ON
	Real window delogger switch	OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-393, "Diagnosis Procedure".

## 2. CHECK LIGHTING SWITCH FUNCTION

Check "LOAD SIGNAL" indication under the following conditions.

Monitor item	Con	Indication	
LOAD SIGNAL	Lighting switch	ON at 2nd posi- tion	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.

#### NO >> Go to EC-393, "Diagnosis Procedure".

## ${ m 3.check}$ heater fan control switch function

Select "HEATER FAN SW" and check indication under the following conditions.

Monitor item	Condition	Indication	
HEATER FAN	Heater fan control switch	ON	ON
SW	Theater fair control switch	OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-393, "Diagnosis Procedure".

## Diagnosis Procedure

**1.**INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to <u>EC-393, "Compo-nent Function Check"</u>.

Which circuit is related to the incident?

Rear window defogger>>GO TO 2.

Headlamp>>GO TO 3. Heater fan>>GO TO 4.

## 2.CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to DEF-4, "Work Flow".

## EC-393

INFOID:000000004833514

INFOID:000000004833512

INEOID:000000004833513

EC

D

Е

F

Н

Κ

L

Μ

Ν

Ρ

А

## ELECTRICAL LOAD SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

>> INSPECTION END

 $\mathbf{3.}$  Check headlamp system

Refer to EXL-5, "Work Flow".

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Refer to HA-3, "Work Flow".

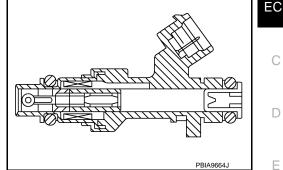
>> INSPECTION END

## < DTC/CIRCUIT DIAGNOSIS >

## 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.



## Component Function Check

**1.**INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.

NO >> Go to EC-395, "Diagnosis Procedure".

2.CHECK FUEL INJECTOR FUNCTION

#### With CONSULT-III

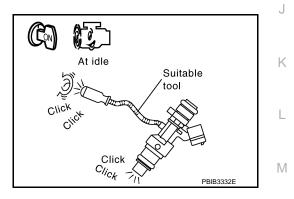
- 1. Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that each circuit produces a momentary engine speed drop.
- 🛞 Without CONSULT-III
- 1. Let engine idle.
- 2. Listen to each fuel injector operating sound.

#### Clicking noise should be heard.

#### Is the inspection result normal?

#### YES >> INSPECTION END

NO >> Go to EC-395, "Diagnosis Procedure".



## **Diagnosis Procedure**

INFOID:000000004833518

Ν

Ρ

## 1.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

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

INFOID:000000004833515

INFOID:000000004833516

A

F

Н

## **FUEL INJECTOR**

#### < DTC/CIRCUIT DIAGNOSIS >

	Fuel injector	Ground	Voltage		
Cylinder	Connector Terminal			Giouna	
1	F37	1			
2	F38	1	Ground	Battery voltage	
3	F39	1	Glound		
4	F40	1	1		

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

#### 2. DETECT MALFUNCTIONING PART

Check the following.

• IPDM E/R harness connector E15

• 15 A fuse (No. 62)

• Harness for open or short between fuel injector and fuse

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

## $\mathbf{3}$ . Check fuel injector output signal circuit for open and short

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

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

	Fuel injector		E	Continuity	
Cylinder	Connector	Terminal	Connector	Terminal	Continuity
1	F37	2		31	
2	F38	2	F7	30	Existed
3	F39	2		29	Existed
4	F40	2	1	25	

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

Is the inspection result normal?

YES >> GO TO 4.

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

#### **4.**CHECK FUEL INJECTOR

Refer to EC-396, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning fuel injector.

**5.**CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

#### Is the inspection result normal?

YES >> Replace IPDM E/R.

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

#### **Component Inspection**

INFOID:000000004833519

## **1.**CHECK FUEL INJECTOR

1. Turn ignition switch OFF.

2. Disconnect fuel injector harness connector.

3. Check resistance between fuel injector terminals as per the following.

## EC-396

## **FUEL INJECTOR**

## < DTC/CIRCUIT DIAGNOSIS >

Tern	ninals	Resistance
1 a	and 2	11.1 - 14.5 Ω [at 10 - 60°C (50 - 140°F)]
Is the ir	nspectio	n result normal?
YES		SPECTION END
NO	>> Re	place malfunctioning fuel injecto

Μ

G

Н

J

Κ

L

Ν

0

Р

## < DTC/CIRCUIT DIAGNOSIS > FUEL PUMP

## Description

INFOID:000000004833520

Sensor	Input signal to ECM	ECM function Actuator	
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control ↓	
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 start ability. 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
- >> EC-398, "Diagnosis Procedure". NO

## **Diagnosis** Procedure

1.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

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

E	CM	Ground	Voltage
Connector	Terminal	Glound	voltage
F7	23	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

		K		
X		JM	BIA2314ZZ	

INFOID:000000004833523

INFOID:000000004833521

## **FUEL PUMP**

DIC/CIRCOI	T DIAGNOSIS	>				[MR18DE]
<ol> <li>Disconnect</li> <li>Turn ignition</li> </ol>	n switch OFF. IDPDM E/R ha n switch ON. voltage betweer		or E13. Irness connector	and ground.		
IPDM	1 E/R					
Connector	Terminal	Ground	Voltage			-
E13	31	Ground	Battery voltage			
the inspectior	n result normal?	?				
′ES >> GO IO >> GO	) TO 3.	_				
DETECT MA	ALFUNCTIONIN	IG PART				
heck the follow	wing. onnectors E8, F	1				
	pen or short be		d IPDM E/R			
	I					
>> Rep	pair open circuit	t or short to gro	ound or short to p	ower in harness	s or connectors.	
CHECK FUE		ER SUPPLY C	IRCUIT-III			
Turn ignitio	n switch OFF.					
i un ignito.						
Reconnect	all harness con					
Reconnect Disconnect	all harness con "fuel level sens		nected. el pump" harness	connector.		
Reconnect Disconnect Turn ignition	all harness con "fuel level sens n switch ON.	sor unit and fue	el pump" harness		connector and g	ound.
Reconnect Disconnect Turn ignition	all harness con "fuel level sens n switch ON.	sor unit and fue	el pump" harness		connector and g	ound.
Reconnect Disconnect Turn ignition Check the	all harness con "fuel level sens n switch ON.	sor unit and fue n "fuel level ser	el pump" harness	pump" harness	connector and g	round.
Reconnect Disconnect Turn ignition Check the	all harness con "fuel level sens n switch ON. voltage betweer	sor unit and fue	el pump" harness	pump" harness	connector and g	ound.
Reconnect Disconnect Turn ignition Check the v	all harness con "fuel level sens n switch ON. voltage betweer unit and fuel pump	sor unit and fue n "fuel level ser	el pump" harness	pump" harness	connector and g	ound.
Reconnect Disconnect Turn ignition Check the v uel level sensor of Connector B40 the inspection	all harness con "fuel level sens n switch ON. voltage betweer unit and fuel pump Terminal 1 n result normal?	sor unit and fue n "fuel level ser Ground Ground	el pump" harness nsor unit and fuel Volta Battery voltage sho	pump" harness	connector and g	ound.
Reconnect Disconnect Turn ignition Check the v uel level sensor of Connector B40 the inspection 'ES >> GO	all harness con "fuel level sens n switch ON. voltage betweer unit and fuel pump Terminal 1 n result normal? D TO 8.	sor unit and fue n "fuel level ser Ground Ground	el pump" harness nsor unit and fuel Volta Battery voltage sho	pump" harness	connector and g	ound.
Reconnect Disconnect Turn ignition Check the v uel level sensor v Connector B40 the inspection ES >> GO	all harness con "fuel level sens n switch ON. voltage betweer unit and fuel pump Terminal 1 <u>n result normal?</u> ) TO 8. ) TO 5.	sor unit and fue n "fuel level ser Ground Ground	el pump" harness nsor unit and fuel Volta Battery voltage sho	pump" harness	connector and g	round.
Reconnect Disconnect Turn ignition Check the v uel level sensor v Connector B40 the inspection (ES >> GO IO >> GO CHECK FUS	all harness con "fuel level sens n switch ON. voltage betweer unit and fuel pump Terminal 1 n result normal? 0 TO 8. 0 TO 5. SE	sor unit and fue n "fuel level ser Ground Ground	el pump" harness nsor unit and fuel Volta Battery voltage sho	pump" harness	connector and g	ound.
Reconnect Disconnect Turn ignition Check the v uel level sensor v Connector B40 the inspection (ES >> GO IO >> GO CHECK FUS Turn ignition	all harness con "fuel level sens n switch ON. voltage betweer unit and fuel pump Terminal 1 n result normal? 0 TO 8. 0 TO 5. SE n switch OFF.	sor unit and fue n "fuel level ser Ground Ground	el pump" harness nsor unit and fuel Volta Battery voltage sho ond after ignition s	pump" harness	connector and g	round.
Reconnect Disconnect Turn ignition Check the v uel level sensor v Connector B40 the inspection (ES >> GO IO >> GO CHECK FUS Turn ignition	all harness con "fuel level sens n switch ON. voltage betweer unit and fuel pump Terminal 1 n result normal? 0 TO 8. 0 TO 5. SE n switch OFF. 15 A fuse (No.	sor unit and fue n "fuel level ser Ground Ground	el pump" harness nsor unit and fuel Volta Battery voltage sho ond after ignition s	pump" harness	connector and g	ound.
Reconnect Disconnect Turn ignition Check the v uel level sensor of B40 the inspection (ES >> GO IO >> GO CHECK FUS Turn ignition Disconnect Check 15 A	all harness con "fuel level sens n switch ON. voltage betweer unit and fuel pump Terminal 1 n result normal? 0 TO 8. 0 TO 5. SE n switch OFF. 15 A fuse (No.	sor unit and fue n "fuel level ser Ground Ground 2 60) from IPDM	el pump" harness nsor unit and fuel Volta Battery voltage sho ond after ignition s	pump" harness	connector and g	round.
Reconnect Disconnect Turn ignition Check the v uel level sensor of B40 the inspection (ES >> GO CHECK FUS Turn ignition Disconnect Check 15 A the inspection (ES >> GO	all harness con "fuel level sens n switch ON. voltage betweer unit and fuel pump Terminal 1 n result normal? 0 TO 8. 0 TO 5. 5E n switch OFF. 15 A fuse (No. A fuse. n result normal? 0 TO 6.	sor unit and fue n "fuel level ser Ground Ground ? 60) from IPDM	el pump" harness nsor unit and fuel Volta Battery voltage sho ond after ignition s	pump" harness	connector and g	ound.
Reconnect Disconnect Turn ignition Check the v Connector B40 the inspection (ES >> GO ONO >> GO CHECK FUS Turn ignition Disconnect Check 15 A the inspection (ES >> GO NO >> Rep	all harness con "fuel level sens n switch ON. voltage betweer unit and fuel pump Terminal 1 n result normal? 0 TO 8. 0 TO 5. 5E n switch OFF. 15 A fuse (No. A fuse. n result normal? 0 TO 6. place15 A fuse.	sor unit and fue n "fuel level ser Ground Ground <u>2</u> 60) from IPDM <u>2</u>	el pump" harness nsor unit and fuel Volta Battery voltage sho ond after ignition s	pump" harness	connector and g	round.
Reconnect Disconnect Turn ignition Check the v Connector B40 the inspection (ES >> GO ONO >> GO CHECK FUS Turn ignition Disconnect Check 15 A the inspection (ES >> GO NO >> Rep	all harness con "fuel level sens n switch ON. voltage betweer unit and fuel pump Terminal 1 n result normal? 0 TO 8. 0 TO 5. 5E n switch OFF. 15 A fuse (No. A fuse. n result normal? 0 TO 6.	sor unit and fue n "fuel level ser Ground Ground <u>2</u> 60) from IPDM <u>2</u>	el pump" harness nsor unit and fuel Volta Battery voltage sho ond after ignition s	pump" harness	connector and g	ound.
Reconnect Disconnect Turn ignition Check the v Fuel level sensor of Connector B40 the inspection YES >> GO VO >> GO CHECK FUS Turn ignition Disconnect Check 15 A the inspection YES >> GO VO >> Rep CHECK FUE Disconnect	all harness con "fuel level sens n switch ON. voltage betweer unit and fuel pump Terminal 1 n result normal? 0 TO 8. 0 TO 5. SE n switch OFF. 15 A fuse (No. A fuse. n result normal? 0 TO 6. place15 A fuse. EL PUMP POWI IPDM E/R harr	sor unit and fue n "fuel level ser Ground Ground 2 60) from IPDM 2 ER SUPPLY C ness connector	el pump" harness nsor unit and fuel Volta Battery voltage sho ond after ignition s IRCUIT-IV E15.	pump" harness		
Reconnect Disconnect Turn ignition Check the v Connector B40 the inspection (ES >> GO VO >> GO CHECK FUS Turn ignition Disconnect Check 15 A the inspection (ES >> GO VO >> Rep CHECK FUE Disconnect	all harness con "fuel level sens n switch ON. voltage betweer unit and fuel pump Terminal 1 1 n result normal? 0 TO 8. 0 TO 5. 5E n switch OFF. 15 A fuse (No. A fuse. n result normal? 0 TO 6. place15 A fuse. EL PUMP POWI IPDM E/R harr continuity betw	sor unit and fue n "fuel level ser Ground Ground 2 60) from IPDM 2 ER SUPPLY C ness connector	el pump" harness nsor unit and fuel Volta Battery voltage sho ond after ignition s IRCUIT-IV E15.	pump" harness	s connector and g	

IPDM E/R		Fuel level sensor unit and fuel pump		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E15	36	B40	1	Existed

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

#### Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 7.

Ρ

## < DTC/CIRCUIT DIAGNOSIS >

## 7. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors B1, M18
- Harness connectors M77, E105

• Harness for open or short between IPDM E/R and "fuel level sensor unit and fuel pump"

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

## 8.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	Ground	Continuity	
B40	3	Ground	Existed	

2. Also heck harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

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

## 9.CHECK FUEL PUMP

Refer to EC-400, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace "fuel level sensor unit and fuel pump".

**10.**CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

#### Is the inspection result normal?

- YES >> Replace IPDM E/R.
- NO >> Repair or replace harness or connectors.

## **Component Inspection**

## **1.**CHECK FUEL PUMP

- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 3. Check resistance between "fuel level sensor unit and fuel pump" terminals as per the following.

Terminals	Resistance
1 and 3	0.2 - 5.0 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump".

INFOID:000000004833524

## < DTC/CIRCUIT DIAGNOSIS >

## **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	INFOID:000000004833526	С
1.INSPECTION START		
Turn ignition switch OFF, and restart engine.		D
Does the engine start?		
YES-1 >> With CONSULT-III: GO TO 2. YES-2 >> Without CONSULT-III: GO TO 3. NO >> Go to <u>EC-401, "Diagnosis Procedure"</u> .		E
2. IGNITION SIGNAL FUNCTION		F
		1
<ol> <li>Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.</li> <li>Make sure that each circuit produces a momentary engine speed drop.</li> </ol>		G
Is the inspection result normal?		0
YES >> INSPECTION END NO >> Go to <u>EC-401, "Diagnosis Procedure"</u> . <b>3.</b> IGNITION SIGNAL FUNCTION		Н

#### **Without CONSULT-III**

1. Let engine idle.

2. Read the voltage signal between ECM harness connector and ground.

EC	CM	Cround	Voltogo oignol
Connector	Terminal	Ground	Voltage signal
	17		
	18		
<b>F</b> 40	21	Oracial	
F10	22	Ground	≥> 2.0 V/Div 50 ms/Div T
			PBIA9265J

#### NOTE:

The pulse cycle changes depending on rpm at idle.

Is the	inspection	result	normal?

YES	>> INSPECTION END	
-		

NO >> Go to EC-401, "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.

EC	CM	Ground	Voltage
Connector	Terminal	Ground	voltage
E16	105	Ground	Battery voltage

[MR18DE]

INFOID:000000004833525

А

EC

- Ν
- INFOID:000000004833528
  - Ρ

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-117, "Diagnosis Procedure".

**2.**CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.

2. Disconnect Condenser harness connector.

3. Turn ignition switch ON.

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

Cond	lenser	Ground	Voltage
Connector	Terminal	Glound	voltage
F13	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 3.

 ${
m 3.}$  CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.

- 2. Disconnect IPDM E/R harness connector E43.
- 3. Check the continuity between IPDM E/R harness connector and condenser harness connector.

IPDM E/R		Condenser		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E14	44	F26	1	Existed

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

Is the inspection result normal?

YES >> Go to EC-117, "Diagnosis Procedure".

NO >> GO TO 4.

## **4.**DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E8, F1

IPDM E/R harness connector E43

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

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

## 5. CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

#### 1. Turn ignition switch OFF.

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

Cond	enser	Ground	Continuity
Connector	Terminal	Ground	Continuity
E13	2	Ground	Existed

3. Also check harness for 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 CONDENSER

Refer to EC-405, "Component Inspection (Condenser)".

Is the inspection result normal?

YES >> GO TO 7.

CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V         Reconnect all harmess connectors disconnected.         Disconnect ignition coil harmess connector and ground.         Voltage between ignition coil harmess connector and ground.         Voltage         Voltage <th colsp<="" th=""><th>) &gt;&gt; Re</th><th>IT DIAGNOSIS</th><th></th><th></th><th></th><th>[WH</th><th>R18DE]</th></th>	<th>) &gt;&gt; Re</th> <th>IT DIAGNOSIS</th> <th></th> <th></th> <th></th> <th>[WH</th> <th>R18DE]</th>	) >> Re	IT DIAGNOSIS				[WH	R18DE]
Reconnect all harness connectors disconnected.         Disconnect ignition coil harness connector.         Turn ignition coil         Cylinder         Connector         1       F33         2       F34         3       F35         4       F36         3       F36         4       F36         5       > GO TO 8.         C>       >> Repair open circuit or short to ground or short to power in harness or connectors.         DECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT         Turn ignition switch OFF.         Check the continuity between ignition coil harness connector and ground.         Vinder       Connector         1       F33         2       F34         2       F34         2       Turn ignition switch OFF.         Check the continuity between ignition coil harness connector and ground.         Vinder       Connector         1       F33         2       F34       2         3       F35       2         Also check harness for short to power.       Existed         2       F34       2         3       F35       1         5		•						
Disconnect ignition coil harness connector. Turn ignition switch ON. Cylinder Connector Terminal Ground Voltage 1 F33 3 2 F34 3 3 F35 3 4 F36 3 Connector Terminal Ground Battery voltage De inspection result normal? S >> GO TO 8. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT Turn ignition switch OFF. Check the continuity between ignition coil harness connector and ground. Elignifich coil Cylinder Connector Terminal Ground Continuity 1 F33 2 2 F34 2 Check the continuity between ignition coil harness connector and ground. Elignifich coil Cylinder Connector Terminal Ground Existed 2 F34 2 3 F35 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 4 F36 2 5 >> GO TO 9. Check the continuity between ECM harness connector and ignition coil harness connectors. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT Disconnect ECM harness connector. Check the continuity between ECM harness connector and ignition coil harness connector. Check the continuity between ECM harness connector. Check the continuity between ECM harness connector. Check the continuity between ECM harness connector. Check the continuity between ECM harness connector and ignition coil harness connector. Check the continuity between ECM harness connector and ignition coil harness connector. Check the continuity between ECM harness connector and ignition coil harness connector. Continuity 1 F3 F33 1 F35 1 F35 F35 F35 F35 F35 F35 F35 F35 F35 F35								
Cylinder         Connector         Terminal         Ground         Voltage           1         F33         3	Disconnect Turn ignitio	t ignition coil har on switch ON.	ness connector	r.	or and ground.			
Cylinder         Connector         Terminal         Ground         Voltage           1         F33         3		Ignition coil						
1       F33       3         2       F34       3         3       F35       3         4       F36       3         be inspection result normal?       S         S       >> GO TO 8.         D       >> Repair open circuit or short to ground or short to power in harness or connectors.         DHECK IGNTION COLL GROUND CIRCUIT FOR OPEN AND SHORT         Turn ignition switch OFF.         Check the continuity between ignition coil harness connector and ground.         1       F33       2         2       F34       2         3       F35       2         4       F36       2         4       F36       2         Also check harness for short to power.       Existed         a       F35       2         4       F36       2         Also check Ignition coil to result normal?       Ground or short to power in harness or connectors.         CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT       Disconnect ECM harness connector.         Check the continuity between ECM harness connector and ignition coil harness connector.       Existed         Cylinder       Connector       Terminal       Continuity         1       F33       1	Cylinder	_	Terminal	Ground	Voltage			
3       F35       3       Ground       Battery voltage         4       F36       3       Ground       Battery voltage         2       >> SO TO 8.       >>       >>       Sepair open circuit or short to ground or short to power in harness or connectors.         CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT         Turn ignition switch OFF.         Check the continuity between ignition coil harness connector and ground.         Ignition coil         Qround         Qround         2         Ignition coil         Continuity         1         1         Ground         Continuity         1         Ignition coil         Continuity         1         2         1         2         Also check harness for short to power.         a inspection result normal?         S > GO TO 9.       >>         >> Repair open circuit or short to ground or short to power in harness connector.         CHECK	-	F33	3					
3       F35       3         4       F36       3         e inspection result normal?         SS       > GO TO 8.         D       >> Repair open circuit or short to ground or short to power in harness or connectors.         CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT         Turn ignition switch OFF.         Check the continuity between ignition coil harness connector and ground.         Image: Inspection result normal?         2       F34         2       F34         2       F34         2       F34         3       F35         4       F36         2       F34         3       F35         4       F36         5       > GO TO 9.         Cold Cold Cold Controman?         S       >>>> Repair open circuit or short to ground or short to power in harness or connectors.         CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         Disconnect ECM harness connector.         Check the continuity between ECM harness connector and ignition coil harness connector.         Check the continuity between ECM harness connector and ignition coil harness connector.         Check the continuity between ECM harness connector and ignition coil harness connector.         C	2	F34	3	- ·				
inspection result normal2         IS       >> GO TO 8.         >>> Repair open circuit or short to ground or short to power in harness or connectors.         CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT         Turn ignition switch OFF.         Check the continuity between ignition coil harness connector and ground.         Image: Connector Terminal       Ground         Continuity         2       F34       2         3       F35       2         4       F36       2         Also check harness for short to power.       Existed         is precision result normal?       S         S       > S O TO 9.         D       >> Repair open circuit or short to ground or short to power in harness or connectors.         CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         Disconnect ECM harness connector.         CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         Disconnect ECM harness connector.         Check the continuity between ECM harness connector and ignition coil harness connector.         Check the continuity between ECM harness connector and ignition coil harness connector.         Check the continuity between ECM harness connector Terminal       Continuity         1       F33       1       17       22 <td< td=""><td>3</td><td>F35</td><td>3</td><td>Ground</td><td>Battery voltage</td><td></td><td></td></td<>	3	F35	3	Ground	Battery voltage			
S       >> GO TO 8.         >> Repair open circuit or short to ground or short to power in harness or connectors.         CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT         Turn ignition switch OFF.         Check the continuity between ignition coil harness connector and ground.         Image: Connector interview ignition coil harness connector and ground.         Image: Connector interview ignition coil harness connector and ground.         Image: Connector interview ignition coil harness connector and ground.         Image: Connector interview ignition coil harness connector and ground.         Image: Connector interview ignition coil harness connector and ground.         Image: Connector interview ignition coil harness connector and ground is the continuity is the control is the cont is the cont is the cont is the cont is the control i	4	F36	3					
>> Repair open circuit or short to ground or short to power in harness or connectors.         CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT         Turn ignition switch OFF.         Check the continuity between ignition coil harness connector and ground.         Image: Interview of the continuity between ignition coil harness connector and ground.         Image: Interview of the continuity between ignition coil harness connector and ground.         Image: Interview of the continuity between ignition coil harness connector and ground.         Image: Interview of the continuity between ignition coil harness connector and ground.         Image: Interview of the continuity between ignition coil harness connectors.         Image: Interview of the continuity of the context of th	ne inspectio	n result normal?						
CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT         Turn ignition coil off.         Ignition coil         Ignition coil harness connector and ground.         Ignition coil         Continuity         1       F33       2         2       F34       2         3       F35       2         4       F36       2         Also check harness for short to power.       Enspection result normal?         S       >> GO TO 9.         >       >> Repair open circuit or short to ground or short to power in harness or connectors.         CHECK IGNITION COLL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         Disconnect ECM harness connector.         Check the continuity between ECM harness connector and ignition coil harness connector.         Check the continuity between ECM harness connector and ignition coil harness connector.         Image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: terminal image: te								
Turn ignition switch OFF.         Check the continuity between ignition coil harness connector and ground.         Ignition coil         Continuity         A group         Existed         Continuity         Contector       Continuity<			0		•	s or connectors.		
Check the continuity between ignition coil harness connector and ground.         Ignition coil       Continuity         Connector       Terminal         1       F33       2         2       F34       2         3       F35       2         4       F36       2         Also check harness for short to power.       Existed         einspection result normal?       ES         S       >> GO TO 9.       >>         >>       >> Repair open circuit or short to ground or short to power in harness or connectors.         CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         Disconnect ECM harness connector.         Check the continuity between ECM harness connector and ignition coil harness connector.         Cylinder       Connector         Ignition coil       ECM         Cylinder       Connector         Ignition coil       F7         13       F35         3       F35         4       F36         1       F33         1       F33         2       F34         3       F35         4       F36         1       18				IT FOR OPEN	AND SHORT			
Ignition collGroundContinuity1F3322F3423F3524F362Also check harness for short to power.te inspection result normal?S>> GO TO 9.D>> Repair open circuit or short to ground or short to power in harness or connectors.CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORTDisconnect ECM harness connector.Check the continuity between ECM harness connector and ignition coil harness connector.Check the continuity between ECM harness connector and ignition coil harness connector.Check the continuity between ECM harness connector and ignition coil harness connector.Check the continuity between ECM harness connector and ignition coil harness connector.Check the continuity between ECM harness connector and ignition coil harness connector.Check the continuity between ECM harness connector and ignition coil harness connector.Check the continuity between ECM harness connector in terminal1F331F72F343F351F72F343F351F72F343F36121Also check harness for short to ground and short to power.te inspection result normal?S> GO TO 10.Check IGNITION COIL WITH POWER TRANSISTORer to EC-404. "Component Inspection (Ignition Coil with Power Transistor)".			on ignition acit	harnoss conse	otor and around			
CylinderConnectorTerminalGroundContinuity1F332	Check the	continuity betwe		namess conne	ctor and ground			
CylinderConnectorTerminalGroundContinuity1F332		Ignition coil						
1       F33       2         2       F34       2         3       F35       2         4       F36       2         Also check harness for short to power.       Existed         te inspection result normal?       S         S       >> GO TO 9.         0       >> Repair open circuit or short to ground or short to power in harness or connectors.         CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         Disconnect ECM harness connector.         Check the continuity between ECM harness connector and ignition coil harness connector.         Check the continuity between ECM harness connector Terminal         1       F33       1         2       F34       1         3       F35       1         1       F33       1         2       F34       1         3       F35       1         4       F36       1         Also check harness for short to ground and short to power.       Existed         2       F34       1         3       F35       1         4       F36       1         2       S       1         3       F35       1	Cylinder	_	Terminal	Ground	Continuity			
3F352GroundExisted4F3624F362Also check harness for short to power. ne inspection result normal?S> GO TO 9.0>> Repair open circuit or short to ground or short to power in harness or connectors.CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORTDisconnect ECM harness connector.Check the continuity between ECM harness connector and ignition coil harness connector.CylinderConnectorIgnition coilECMCylinderConnector1F331F72F343F351F721F364F361F333F35121Also check harness for short to ground and short to power. te inspection result normal?ES> GO TO 10.0>> Repair open circuit or short to ground or short to power in harness or connectors.CHECK IGNITION COIL WITH POWER TRANSISTORer to EC-404. "Component Inspection (Ignition Coil with Power Transistor)".	-	F33	2					
3       F35       2         4       F36       2         Also check harness for short to power.         the inspection result normal?         ISS       >> GO TO 9.         D       >> Repair open circuit or short to ground or short to power in harness or connectors.         CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         Disconnect ECM harness connector.         Check the continuity between ECM harness connector and ignition coil harness connector.         Cylinder       Connector         Ignition coil       ECM         Cylinder       Connector         1       F33         1       F33         2       F34         3       F35         4       F36         1       F36         2       F34         3       F35         4       F36         4       F36         1       F36         2       F34         3       F35         4       F36         4       F36         5       > GO TO 10.         0       >> Repair open circuit or short to ground or short to power in harness or connectors.         .CHECK IGNITION CO	2	F34	2					
Also check harness for short to power. he inspection result normal? S >> GO TO 9. D >> Repair open circuit or short to ground or short to power in harness or connectors. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT Disconnect ECM harness connector. Check the continuity between ECM harness connector and ignition coil harness connector. $\frac{Ignition coil}{Connector} \frac{ECM}{Terminal} \frac{Connector}{Terminal} \frac{Continuity}{1}$ $\frac{1}{2} + \frac{F33}{1} \frac{17}{22} + \frac{18}{21} + \frac{17}{22} + \frac{18}{21} + \frac{18}$	3	F35	2	Ground	Existed			
Image: Inspection result normal?         Image: Solution of the second strength	4	F36	2					
$\begin{array}{l lllllllllllllllllllllllllllllllllll$	Also check	harness for sho	ort to power.					
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	<u>ne inspectio</u>	<u>n result normal?</u>						
CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         Disconnect ECM harness connector.         Check the continuity between ECM harness connector and ignition coil harness connector.         Ignition coil       ECM         Ignition coil       ECM         Continuity         Continuity         Connector       Terminal         Continuity         Connector       Terminal         Continuity         Contector       Terminal       Continuity         Ignition coil       ECM       Continuity         Connector       Terminal       Continuity         Ignition coil       Ferminal       Continuity         Ignition coil <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>								
Disconnect ECM harness connector.Check the continuity between ECM harness connector and ignition coil harness connector.Ignition coilECMContinuityCylinderConnectorTerminalContinuity1F331F7182F341F7224F36121Also check harness for short to ground and short to power. the inspection result normal?ExistedS>> GO TO 10.>> Repair open circuit or short to ground or short to power in harness or connectors.CHECK IGNITION COIL WITH POWER TRANSISTOREven Transistor)".		• •	•		•			
Check the continuity between ECM harness connector and ignition coil harness connector.Ignition coilECMContinuityCylinderConnectorTerminalContinuity1F331172F341F7183F351224F36121Also check harness for short to ground and short to power.the inspection result normal?S> GO TO 10.> Repair open circuit or short to ground or short to power in harness or connectors.CHECK IGNITION COIL WITH POWER TRANSISTORer to EC-404. "Component Inspection (Ignition Coil with Power Transistor)".				. CIRCUIT FOR	R OPEN AND SH	HORT		
Ignition coilECMContinuityCylinderConnectorTerminalConnector1F331172F341F73F351F74F36121Also check harness for short to ground and short to power.te inspection result normal?S>> GO TO 10.O>> Repair open circuit or short to ground or short to power in harness or connectors.CHECK IGNITION COIL WITH POWER TRANSISTORer to EC-404. "Component Inspection (Ignition Coil with Power Transistor)".				a annatar a	ad ignition acil b	ornoon connoctor		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		continuity betwee		ss connector a	iu ignition coll n			
CylinderConnectorTerminalConnectorTerminal1F331 $1$ $17$ 2F341 $F7$ $18$ 3F351 $22$ 4F361 $21$ Also check harness for short to ground and short to power.ne inspection result normal?S >> GO TO 10.>> Repair open circuit or short to ground or short to power in harness or connectors.CHECK IGNITION COIL WITH POWER TRANSISTORer to EC-404. "Component Inspection (Ignition Coil with Power Transistor)".	CHECK THE	-			-			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $				E	CM			
3       F35       1       F7       22         4       F36       1       21       Existed         Also check harness for short to ground and short to power.       21       21         Also check harness for short to ground and short to power.       21       21         ES       >> GO TO 10.       >> Repair open circuit or short to ground or short to power in harness or connectors.         O       >> Repair open circuit or short to ground or short to power in harness or connectors.         O       -> Repair open circuit or short to ground or short to power in harness or connectors.         O       -> Repair open circuit or short to ground or short to power in harness or connectors.         O       -> Repair open circuit or short to ground or short to power in harness or connectors.         O       -> Repair open circuit or short to ground or short to power in harness or connectors.         O       -> Repair open circuit or short to ground or short to power in harness or connectors.         O       -> Repair open circuit or short to ground or short to power in harness or connectors.         O       -> Repair open circuit or short to ground or short to power in harness or connectors.         O       -> Repair open circuit or short to ground or short to power in harness or connectors.		Ignition coil	Terminal			Continuity		
3       F35       1       22         4       F36       1       21         Also check harness for short to ground and short to power.       21         Also check harness for short to ground and short to power.       1         be inspection result normal?       25         S       >> GO TO 10.         D       >> Repair open circuit or short to ground or short to power in harness or connectors.         I.CHECK IGNITION COIL WITH POWER TRANSISTOR         er to EC-404, "Component Inspection (Ignition Coil with Power Transistor)".	Cylinder	Ignition coil Connector			Terminal	Continuity		
Also check harness for short to ground and short to power. <u>he inspection result normal?</u> ES >> GO TO 10. D >> Repair open circuit or short to ground or short to power in harness or connectors. CHECK IGNITION COIL WITH POWER TRANSISTOR er to <u>EC-404, "Component Inspection (Ignition Coil with Power Transistor)"</u> .	Cylinder 1	Ignition coil Connector F33	1	Connector	Terminal 17			
<ul> <li>the inspection result normal?</li> <li>S &gt;&gt; GO TO 10.</li> <li>&gt;&gt; Repair open circuit or short to ground or short to power in harness or connectors.</li> <li>CHECK IGNITION COIL WITH POWER TRANSISTOR</li> <li>to EC-404, "Component Inspection (Ignition Coil with Power Transistor)".</li> </ul>	Cylinder 1 2	Ignition coil Connector F33 F34	1	Connector	Terminal 17 18			
<ul> <li>the inspection result normal?</li> <li>S &gt;&gt; GO TO 10.</li> <li>&gt;&gt; Repair open circuit or short to ground or short to power in harness or connectors.</li> <li>CHECK IGNITION COIL WITH POWER TRANSISTOR</li> <li>to EC-404, "Component Inspection (Ignition Coil with Power Transistor)".</li> </ul>	Cylinder 1 2 3	Ignition coil Connector F33 F34 F35	1 1 1	Connector	Terminal 17 18 22			
<ul> <li>&gt;&gt; Repair open circuit or short to ground or short to power in harness or connectors.</li> <li>CHECK IGNITION COIL WITH POWER TRANSISTOR</li> <li>er to EC-404, "Component Inspection (Ignition Coil with Power Transistor)".</li> </ul>	Cylinder 1 2 3 4	Ignition coil Connector F33 F34 F35 F36	1 1 1 1 1	Connector F7	Terminal           17           18           22           21			
CHECK IGNITION COIL WITH POWER TRANSISTOR er to EC-404, "Component Inspection (Ignition Coil with Power Transistor)".	Cylinder 1 2 3 4 Also check	Ignition coil Connector F33 F34 F35 F36 harness for sho	1 1 1 1 ort to ground an	Connector F7	Terminal           17           18           22           21			
er to EC-404, "Component Inspection (Ignition Coil with Power Transistor)".	Cylinder 1 2 3 4 Also check he inspectio ES >> GC	Ignition coil Connector F33 F34 F35 F36 harness for sho n result normal? D TO 10.	1 1 1 1 ort to ground an	F7 d short to powe	Terminal           17           18           22           21	Existed		
	Cylinder 1 2 3 4 Also check ne inspectio ES >> GC D >> Re	Ignition coil Connector F33 F34 F35 F36 A harness for sho n result normal? D TO 10. pair open circuit	1 1 1 ort to ground an	F7 d short to powe	Terminal           17           18           22           21	Existed		
	Cylinder 1 2 3 4 Also check he inspectio ES >> GC D >> Re D. CHECK IC	Ignition coil Connector F33 F34 F35 F36 harness for sho n result normal? D TO 10. pair open circuit GNITION COIL V	1 1 1 ort to ground an cor short to grou	F7 F7 d short to powe und or short to TRANSISTOR	Terminal 17 18 22 21 er. power in harnes	Existed		

#### < DTC/CIRCUIT DIAGNOSIS >

NO >> Replace malfunctioning ignition coil with power transistor.

## 11.CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

#### >> INSPECTION END

Component Inspection (Ignition Coil with Power Transistor)

## **1.**CHECK IGNITION COIL WITH POWER TRANSISTOR-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ignition coil harness connector.
- 3. Check resistance between ignition coil terminals as per the following.

Terminals	Resistance [ $\Omega$ at 25°C (77°F)]
1 and 2	Except 0 or ∞
1 and 3	Except 0
2 and 3	Except 0

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning ignition coil with power transistor.

**2.**CHECK IGNITION COIL WITH POWER TRANSISTOR-II

#### **CAUTION:**

#### Do the following procedure in the place where ventilation is good without the combustible.

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. 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.

- 4. Start engine.
- 5. After engine stalls, crank it two or three times to release all fuel pressure.
- 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. Crank engine for 5 seconds or more 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. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

#### Spark should be generated.

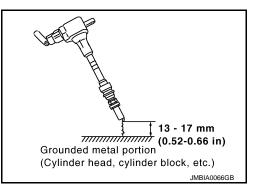
#### CAUTION:

- During the operation, always stay 0.5 cm (19.7 in) away from the spark plug and the ignition coil. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV 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 malfunctioning.

Is the inspection result normal?

YES >> INSPECTION END



INFOID:000000004833529

IGNITION SIGNAL		
< DTC/CIRCUIT DIAGNOSIS >	[MR18DE]	
NO >> Replace malfunctioning ignition coil with power transistor.		
Component Inspection (Condenser)	INFOID:000000004833530	А
1.CHECK CONDENSER		EC
1. Turn ignition switch OFF.		
<ol> <li>Disconnect condenser harness connector.</li> <li>Check resistance between condenser terminals as per the following.</li> </ol>		С
Terminals Resistance		
1 and 2 Above 1 MΩ [at 25°C (77°F)]		D
Is the inspection result normal?		
YES >> INSPECTION END		_
NO >> Replace Condenser.		E
		F
		G
		Н
		J
		Κ
		L
		_
		M
		Ν
		0
		Р

## < DTC/CIRCUIT DIAGNOSIS >

## 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-85, "Diagnosis Description".

# SERVICE ENGINE SOON

## **Component Function Check**

**1.**CHECK MIL FUNCTION

1. Turn ignition switch ON.

2. Make sure that MIL lights up.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-406, "Diagnosis Procedure".

## **Diagnosis Procedure**

1.CHECK DTC

Check that DTC UXXXX is not displayed.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble diagnosis for DTC UXXXX.

2. CHECK DTC WITH METER

Refer to <u>MWI-30, "CONSULT-III Function (METER/M&A)"</u>.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

**3.**CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter.

NO >> Repair or replace.

INFOID:000000004833534

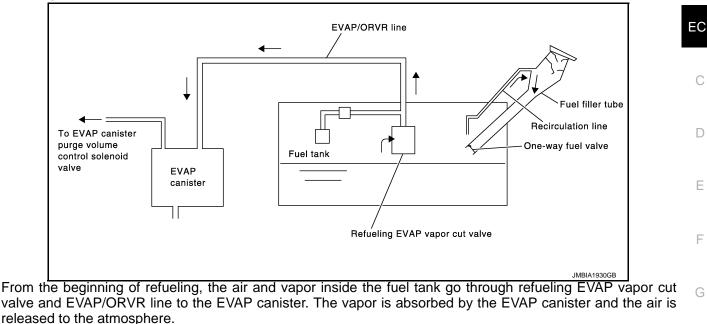
INFOID:000000004833532

INFOID:000000004833531

## < DTC/CIRCUIT DIAGNOSIS >

## ON BOARD REFUELING VAPOR RECOVERY (ORVR)

## Description



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:

<ul> <li>When conducting inspections below, be sure to observe the following:</li> <li>Put a "CAUTION: FLAMMABLE" sign in workshop.</li> <li>Do not smoke while servicing fuel system. Keep open flames and sparks away from wo</li> <li>Be sure to furnish the workshop with a CO₂ fire extinguisher.</li> <li>CAUTION:</li> </ul>	ا <b>rk area.</b> J
<ul> <li>Before removing fuel line parts, carry out the following procedures:</li> <li>Put drained fuel in an explosion-proof container and put lid on securely.</li> <li>Release fuel pressure from fuel line. Refer to <u>EC-471, "Inspection"</u>.</li> <li>Disconnect battery ground cable.</li> <li>Always replace O-ring when the fuel gauge retainer is removed.</li> </ul>	K
<ul> <li>Do not kink or twist hose and tube when they are installed.</li> <li>Do not tighten hose and clamps excessively to avoid damaging hoses.</li> <li>After installation, run engine and check for fuel leaks at connection.</li> <li>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.</li> </ul>	
Component Function Check	INFOID:000000004833536
1.CHECK ORVR FUNCTION	Ν
<ul><li>Check whether the following symptoms are present.</li><li>Fuel odor from EVAP canister is strong.</li><li>Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.</li></ul>	C
Is any symptom present?         YES       >> Go to EC-407, "Diagnosis Procedure".         NO       >> INSPECTION END	P
Diagnosis Procedure	INFOID:000000004833537
1.INSPECTION START	
Check whether the following symptoms are present.	

A: Fuel odor from EVAP canister is strong.

INFOID:000000004833535

А

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

EVAP canister

PBIB1213E

ÈVAP canister vent

control valve

Water-

B: Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

Which symptom is present?

A >> GO TO 2. B >> GO TO 8.

2. 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 1.9 kg (4.2 lb).

Is the inspection result normal?

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

 ${
m 3.check}$  if evap canister is saturated with water

Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 4. NO >> GO TO 7.



Replace EVAP canister with a new one.

>> GO TO 5.

**5.**CHECK DRAIN FILTER

Refer to EC-412, "Component Inspection (Drain filter)".

Is the inspection result normal?

OK >> GO TO 6.

NO >> Replace drain filter.

**6.**DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

**7.**CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-410, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

8. CHECK EVAP CANISTER

- 1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

>> GO TO 9.

>> GO TO 10.

YES

NO

#### [MR18DE]

А

9. CHECK IF EVAP CANISTER IS SATURATED WITH WATER	A
Check if water will drain from EVAP canister.	EC
Does water drain from the EVAP canister? YES >> GO TO 10.	EVAP canister
YES >> GO TO 10. NO >> GO TO 13.	
	С
	D
	Water EVAP canister vent control valve
10	PBIB1213E
<b>10.</b> REPLACE EVAP CANISTER	
Replace EVAP canister with a new one.	
	F
>> GO TO 11.	
11.CHECK DRAIN FILTER	G
Refer to EC-412, "Component Inspection (Drain filter)".	6
Is the inspection result normal?	
OK >> GO TO 12.	Н
NO >> Replace drain filter.	
12. DETECT MALFUNCTIONING PART	
Check the EVAP hose between EVAP canister and vehicle frame for c	clogging or poor connection.
>> Repair or replace EVAP hose.	
13. CHECK VENT HOSES AND VENT TUBES	0
	value for elegging kink lessences and
Check hoses and tubes between EVAP canister and refueling control improper connection.	valve for clogging, kirk, looseness and K
Is the inspection result normal?	
YES >> GO TO 14.	
NO >> Repair or replace hoses and tubes.	L
14. CHECK RECIRCULATION LINE	
Check recirculation line for clogging, dents and cracks.	M
Is the inspection result normal?	171
YES >> GO TO 15.	
NO >> Replace fuel filler tube.	Ν
15. CHECK REFUELING EVAP VAPOR CUT VALVE	
Refer to EC-410, "Component Inspection (Refueling EVAP vapor cut v	(2)(2)"
Is the inspection result normal?	<u>(alve)</u> . O
YES >> GO TO 16.	
NO >> Replace refueling EVAP vapor cut valve with fuel tank.	D
16. CHECK FUEL FILLER TUBE	P
	dents and gracks
Check fuel filler tube and hose connected to the fuel tank for clogging,	
<u>Is the inspection result normal?</u> YES >> GO TO 17.	

YES >> GO TO 17.

NO >> Replace fuel filler tube.

#### < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]

INFOID:000000004833538

## 17.CHECK ONE-WAY FUEL VALVE-I

## Check one-way valve for clogging.

Is the inspection result normal?

- YES >> GO TO 18.
- NO >> Repair or replace one-way fuel valve with fuel tank.

## 18. CHECK ONE-WAY FUEL VALVE-II

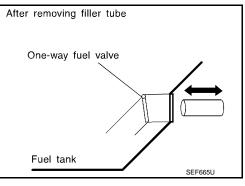
- 1. Make sure that fuel is drained from the tank.
- 2. Remove fuel filler tube and hose.
- Check one-way fuel valve for operation as per the following. When a stick is inserted, the valve should open, when removing stick it should close.

#### Do not drop any material into the tank.

Is the inspection result normal?

#### YES >> INSPECTION END

NO >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.



## Component Inspection (Refueling EVAP vapor cut valve)

## **1.**INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 3.

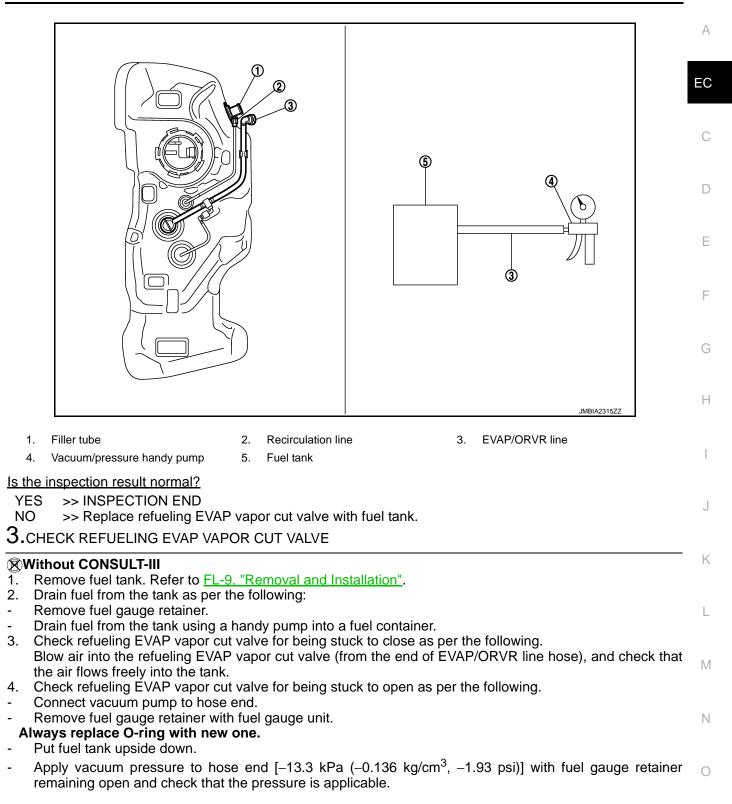
2.CHECK REFUELING EVAP VAPOR CUT VALVE

#### (B) With CONSULT-III

- 1. Remove fuel tank. Refer to FL-9, "Removal and Installation".
- 2. Drain fuel from the tank as per the following:
- Remove fuel feed hose located on the fuel gauge retainer.
- Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
- Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-III.
- Check refueling EVAP vapor cut valve for being stuck to close as per the following. 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 per the following.
- 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.

## < DTC/CIRCUIT DIAGNOSIS >

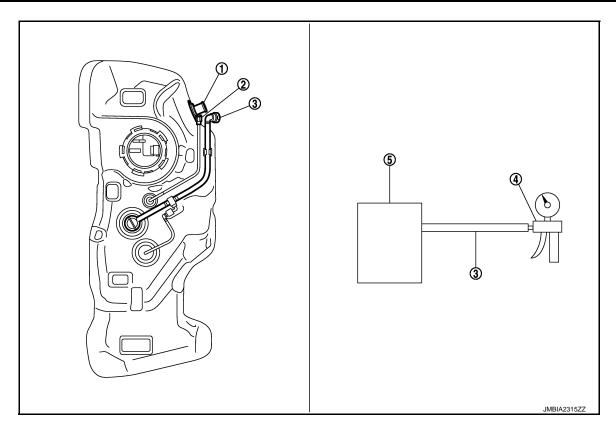
[MR18DE]



Ρ

## < DTC/CIRCUIT DIAGNOSIS >

[MR18DE]



- 1. Filler tube
- 4. Vacuum/pressure handy pump
- 2. **Recirculation line** Fuel tank
- 3. EVAP/ORVR line

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

5.

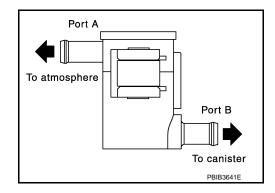
## Component Inspection (Drain filter)

## 1. CHECK DRAIN FILTER

- 1. Check visually for insect nests in the drain filter air inlet.
- 2. Check visually for cracks or flaws in the appearance.
- 3. Check visually for cracks or flaws in the hose.
- 4. Blow air into port A and check that it flows freely out of port B.
- 5. Block port B.
- Blow air into port A and check that there is no leakage. 6.

#### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace drain filter.



INFOID:000000004833539

## < DTC/CIRCUIT DIAGNOSIS >

## POSITIVE CRANKCASE VENTILATION

## Description

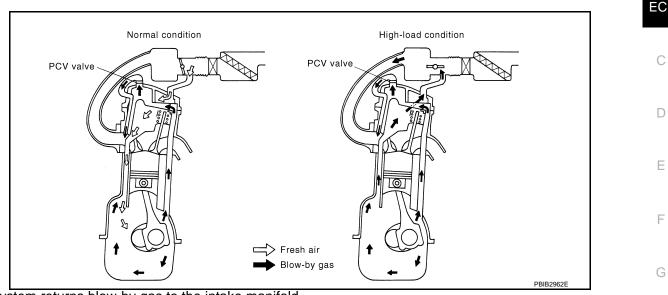
#### INFOID:000000004833540

[MR18DE]

D

Н

Κ



This system returns blow-by gas to the intake manifold.

The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

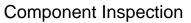
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

The ventilating air is 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.



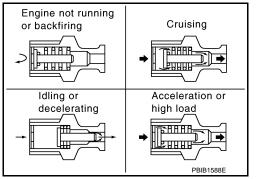


With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.

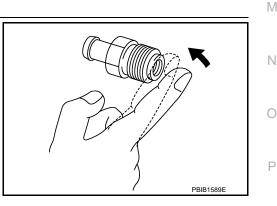
Is the inspection result normal?

YES	>> INSPECTION END
NO	

NO >> Replace PCV valve.



INFOID:00000000483354



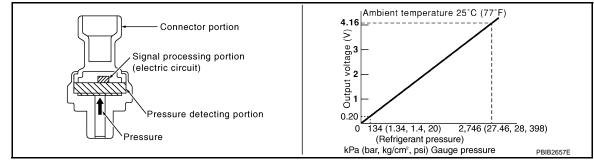
## < DTC/CIRCUIT DIAGNOSIS >

## REFRIGERANT PRESSURE SENSOR

## Description

INFOID:000000004833542

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:000000004833543

## 1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

- 1. Start engine and warm it up 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	Terminal	Ground		
F8	41 (Refrigerant pressure sensor sig- nal)	Ground	1.0 - 4.0V	

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-414, "Diagnosis Procedure".

## **Diagnosis Procedure**

## **1.**CHECK GROUND CONNECTION

- 1. Turn A/C switch and blower fan switch OFF.
- 2. Stop engine.
- 3. Turn ignition switch OFF.
- 4. Check ground connection E38. Refer to <u>GI-37, "Circuit Inspection"</u>.

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

## 2.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

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

Refrigerant pr	essure sensor	Ground	Voltage	
Connector	Terminal	Ground		
E49	3	Ground	Approx. 5 V	

Is the inspection result normal?

YES >> GO TO 4.

## EC-414

#### 2009 Z12

INFOID:000000004833545

## **REFRIGERANT PRESSURE SENSOR**

	R	EFRIGERA	NT PRESS	URE SENSOR		
< DTC/CIRCUI	T DIAGNOSIS	>			[MR18DE]	
NO >> GC	) TO 3.					
<b>3.</b> DETECT MA	LFUNCTIONIN	IG PART				А
Check the follow						
Harness conr			<b>.</b>			EC
<ul> <li>Harness for o</li> </ul>	pen or snort be	tween ECIM and	refrigerant pre	essure sensor	ļ	
>> Re	nair onen circuit	t or short to arou	ind or short to	power in harness or con	nectors	
	•	•		CIRCUIT FOR OPEN		С
		CESSURE SEN	SOK GROUNI			
	n switch OFF. ECM harness	connector				D
			oressure sense	or harness connector an	d ECM harness connec-	_
tor.						
						Е
	essure sensor	EC		Continuity		
Connector	Terminal	Connector	Terminal			F
E49	1	F8	48	Existed		1
		ort to ground an	d short to powe	er.		
Is the inspection		2				G
YES >> GC NO >> GC						
5.DETECT MA						
						Н
<ul> <li>Check the follow</li> <li>Harness conr</li> </ul>						
Harness for o		tween ECM and	l refrigerant pre	essure sensor		
>> Re	pair open circui	t or short to grou	und or short to	power in harness or con	nectors.	
6.CHECK REF	RIGERANT PR	RESSURE SEN	SOR INPUT S	IGNAL CIRCUIT FOR O	PEN AND SHORT	J
1. Check the	continuity betwo	een ECM harne	ss connector a	and refrigerant pressure	sensor harness connec-	
tor.						Κ
	essure sensor	EC		Continuity		
Connector	Terminal	Connector	Terminal			L
E49	2	F8	41	Existed		
		ort to ground an	d short to powe	er.		M
Is the inspection		2				IVI
YES >> GC NO >> GC						
<b>7.</b> DETECT MA						Ν
		IG PART				
<ul> <li>Check the follow</li> <li>Harness conr</li> </ul>						
<ul> <li>Harness for o</li> </ul>		tween ECM and	refrigerant pre	essure sensor		0
			P.			
>> Re	pair open circui	t or short to grou	und or short to	power in harness or con	nectors.	Ρ
8.CHECK INT	•	-				-
Refer to GI-34,						
Is the inspection						
		-				

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

# ECU DIAGNOSIS INFORMATION ECM

**Reference Value** 

## VALUES ON THE DIAGNOSIS TOOL

Remarks:

• 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 TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

Monitor Item	C	Values/Status		
ENG SPEED	Run engine and compare CONSU	ILT-III value with the tachometer indication.	Almost the same speed as the tachometer indication.	
MAS A/F SE-B1	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 (158F)		
A/F SEN1 (B1)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V	
HO2S2 (B1)	are met.	00 rpm quickly after the following conditions	0 - 0.3 V $\leftarrow \rightarrow$ Approx. 0.6 - 1.0 V	
HO2S2 MNTR (B1)	5 S S	<ul> <li>Engine: After warming up</li> <li>After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>		
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer in- dication.		Almost the same speed as speedometer indication	
BATTERY VOLT	Ignition switch: ON (Engine stopped)		11 - 14 V	
ACCEL SEN 1	Ignition switch: ON     (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9 V	
ACCEL SEN I		Accelerator pedal: Fully depressed	4.0 - 4.8 V	
	Ignition switch: ON     (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9 V	
ACCEL SEN 2 ^{*1}		Accelerator pedal: Fully depressed	3.9 - 4.8 V	
	<ul> <li>Ignition switch: ON (Engine stopped)</li> <li>Selector lever position: D (CVT) or 1st (M/T)</li> </ul>	Accelerator pedal: Fully released	More than 0.36 V	
TP SEN 1-B1		Accelerator pedal: Fully depressed	Less than 4.75 V	
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V	
TP SEN 2-B1* ¹	<ul> <li>(Engine stopped)</li> <li>Selector lever position: D (CVT) or 1st (M/T)</li> </ul>	Accelerator pedal: Fully depressed	Less than 4.75 V	
START SIGNAL	• Ignition switch: $ON \rightarrow START \rightarrow C$	DN	$OFF\toON\toOFF$	
	Ignition switch: ON	Accelerator pedal: Fully released	ON	
CLSD THL POS	(Engine stopped)	Accelerator pedal: Slightly depressed	OFF	
	• Engine: After warming up, idle the	Air conditioner switch: OFF	OFF	
AIR COND SIG	• Engine: After warming up, lote the engine	Air conditioner switch: ON (Compressor operates.)	ON	
P/N POSI SW	Ignition switch: ON	Selector lever position: P or N (CVT) or Neutral (M/T)	ON	
		Selector lever position: Except above	OFF	

## < ECU DIAGNOSIS INFORMATION >

Monitor Item	C	ondition	Values/Status	
PW/ST SIGNAL	• Engine: After warming up, idle the	Steering wheel: Not being turned	OFF	
	engine	Steering wheel: Being turned	ON	
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON	E
		Rear window defogger switch and lighting switch: OFF	OFF	
IGNITION SW	• Ignition switch: $ON \rightarrow OFF \rightarrow ON$		$ON \rightarrow OFF \rightarrow ON$	
HEATER FAN SW	• Engine: After warming up, idle the	Heater fan switch: ON	ON	
HEATER FAIL SW	engine	Heater fan switch: OFF	OFF	
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	OFF	
DRARE SW		Brake pedal: Slightly depressed	ON	
	<ul> <li>Engine: After warming up</li> <li>Selector lever position: P or N</li> </ul>	Idle	2.0 - 3.0 msec	
INJ PULSE-B1	<ul> <li>Selector lever position: P or N (CVT) or Neutral (M/T)</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	2,000 rpm	1.9 - 2.9 msec	
	Engine: After warming up	Idle	8 - 18°BTDC	
IGN TIMING	<ul> <li>Selector lever position: P or N (CVT) or Neutral (M/T)</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	2,000 rpm	25 - 45°BTDC	
	Engine: After warming up	Idle	10 - 35%	
CAL/LD VALUE	<ul> <li>Selector lever position: P or N (CVT) or Neutral (M/T)</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	2,500 rpm	10 - 35%	
	Engine: After warming up	Idle	1.0 - 4.0 g·m/s	
MASS AIRFLOW	<ul> <li>Selector lever position: P or N (CVT) or Neutral (M/T)</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	2,500 rpm	2.0 - 10.0 g·m/s	
	Engine: After warming up	ldle	0%	
PURG VOL C/V	<ul> <li>Selector lever position: P or N (CVT) or Neutral (M/T)</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	2,000 rpm	0 - 50%	
	Engine: After warming up	Idle	–5 - 5°CA	
INT/V TIM (B1)	<ul> <li>Selector lever position: P or N (CVT) or Neutral (M/T)</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	2,000 rpm	Approx. 0 - 40°CA	
	<ul> <li>Engine: After warming up</li> <li>Selector lever position: P or N</li> </ul>	Idle	0 - 2%	
INT/V SOL (B1)	<ul><li>(CVT) or Neutral (M/T)</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	2,000 rpm	Approx. 0 - 90%	
		Air conditioner switch: OFF	OFF	
AIR COND RLY	Engine: After warming up, idle the engine	Air conditioner switch: ON (Compressor operates)	ON	
FUEL PUMP RLY	<ul><li>For 1 second after turning ignition</li><li>Engine running or cranking</li></ul>	switch: ON	ON	
	Except above		OFF	
THRTL RELAY	Ignition switch: ON		ON	

## < ECU DIAGNOSIS INFORMATION >

Monitor Item	C	condition	Values/Status
		Engine coolant temperature is 98°C (208°F) or less	OFF
COOLING FAN	<ul> <li>Engine: After warning up, idle the engine</li> <li>Air conditioner switch: OFF</li> </ul>	Engine coolant temperature is between 98°C (208°F) and 99°C (210°F)	LOW
		Engine coolant temperature is 100°C (212°F) or more	HIGH
HO2S2 HTR (B1)	<ul> <li>Engine speed: Below 3,600 rpm a</li> <li>Engine: After warming up</li> <li>Keeping the engine speed betwee idle for 1 minute under no load</li> </ul>	fter the following conditions are met. en 3,500 and 4,000 rpm for 1 minute and at	ON
VEHICLE SPEED	• Turn drive wheels and compare C dication.	ONSULT-III value with the speedometer in-	Almost the same speed as the speedometer indication
		Idle air volume learning has not been per- formed yet.	YET
IDL A/V LEARN	Engine: running	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 the (More than 140 seconds after star		4 - 100%
AC PRESS SEN	<ul><li>Engine: Idle</li><li>Both A/C switch and blower fan sw</li></ul>	witch: ON (Compressor operates)	1.0 - 4.0 V
EVAP SYS PRES	Ignition switch: ON		Approx 1.8 - 4.8 V
VENT CONT/V	Ignition switch: ON		OFF
I/P PULLY SPD	Vehicle speed: More than than 20	km/h (12MPH)	Almost the same speed as the tachometer indication.
A/F ADJ-B1	Engine: Running		-0.330 - 0.330
FUEL T/TMP SE	Ignition switch: ON		Indicates fuel tank tempera- ture.
INT/A TEMP SE	Ignition switch: ON		Indicates intake air tempera- ture.
FUEL LEVEL SE	Ignition switch: ON		Depending on fuel level of fuel tank.
BAT CUR SEN	<ul> <li>Engine speed: Idle</li> <li>Battery: Fuel charged*²</li> <li>Selector lever: P or N (CVT), Neut</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	tral (M/T)	Approx 2,600 - 3,500 mV
ALT DUTY	Engine: Idle		0 - 80%
	Power generation voltage variable	e control: Operating	ON
ALT DUTY SIG	Power generation voltage variable	e control: Not operating	OFF
VHCL SPEED SE	• Turn drive wheels and compare C dication.	ONSULT-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.
MAIN SW	Ignition switch: ON	MAIN switch: pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	Ignition switch: ON	CANCEL switch: pressed	ON
		CANCEL switch: Released	OFF
SET SW	Ignition switch: ON	SET/COAST switch: pressed	ON
	.g	SET/COAST switch: Released	OFF

#### < ECU DIAGNOSIS INFORMATION >

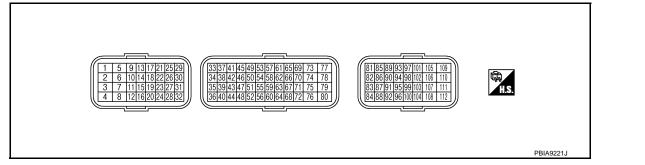
#### [MR18DE]

Monitor Item	C	Condition	Values/Status	
RESUME/ACC SW		RESUME/ACCELERATE switch: pressed	ON	A
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Re- leased	OFF	EC
BRAKE SW1		<ul> <li>Brake pedal:Fully released (CVT)</li> <li>Brake pedal and clutch pedal:Fully released (M/T)</li> </ul>	ON	С
(ASCD brake switch)	• Ignition switch: ON	<ul> <li>Brake pedal:Slightly depressed (CVT)</li> <li>Brake pedal and/or clutch pedal:Slight- ly depressed (M/T)</li> </ul>	OFF	D
BRAKE SW2	SW2	Brake pedal:Fully released	OFF	
(stop lamp switch)	Ignition switch: ON	Brake pedal:Slightly depressed	ON	
VHCL SPD CUT	Ignition switch: ON	L	NON	E
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	$ON \to OFF$	G
	MAIN switch: ON	ASCD: Operating	ON	
SET LAMP	<ul> <li>Vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)</li> </ul>	ASCD: Not operating	OFF	Н

*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

*: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery"

#### **TERMINAL LAYOUT**



## PHYSICAL VALUES

#### NOTE:

- ECM is located in the engine room left side near battery.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.

0

Ρ

Κ

L

Μ

Ν

## < ECU DIAGNOSIS INFORMATION >

#### Terminal No. Description Value Condition Input/ (Approx.) + _ Signal name Output 3.2 ∨★ 1mSec/div [Ignition switch: ON] 108 1 Throttle control motor · Engine stopped Output (P) • Shift lever: D (CVT), 1st (M/T) (B) (Open) • Accelerator pedal: Fully depressed 5V/div JMBIA0324GB 108 BATTERY VOLTAGE 2 Throttle control motor re-Input [Ignition switch: ON] (SB) (B) (11 - 14 V) lay power supply 2.9 - 8.8 V 🖈 50mSec/div [Engine is running] · Warm-up condition 3 53 A/F sensor 1 heater Output · Engine speed: Idle speed (G) (B) (Mpre than 140 seconds after starting engine) 10V/div JMBIA0325GB 1.8 V★ 5mSec/div [Ignition switch: ON] 4 108 Throttle control motor Engine stopped Output (L) (B) (Close) • Shift lever: D (CVT), 1st (M/T) · Accelerator pedal: Fully released 5V/div JMBIA0326GB 10 V★ [Engine is running] · Engine speed: Below 3,600 rpm af-50mSec/div ter the following conditions are met - Engine: after warming up Keeping the engine speed between -3,500 and 4,000 rpm for 1 minute 5 59 Heated oxygen sensor 2 Output and at idle for 1 minute under no (O) (G) heater load 10V/div JMBIA0325GB

[Ignition switch: ON]Engine stopped

[Engine is running]

• Engine speed: Above 3,600 rpm

BATTERY VOLTAGE

(11 - 14 V)

## < ECU DIAGNOSIS INFORMATION >

## [MR18DE]

Terminal No. Description				Value	0		
+	_	Signal name	Input/ Output	Condition	(Approx.)	A	
9	108	EVAP canister purge vol- ume control solenoid valve	U8 umo control solonoid	Output	<ul><li>[Engine is running]</li><li>Idle speed</li><li>Accelerator pedal: Not depressed even slightly, after engine starting</li></ul>	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div 50mSec/div 10V/div JMBIA0327GB	C D
(P)	(B)			<ul> <li>[Engine is running]</li> <li>Engine speed: About 2,000 rpm (More than 100 seconds after start- ing engine.)</li> </ul>	10 V★ 50mSec/div 50mSec/div 10V/div JMBIA0328GB	E	
10 (B) 11 (B)	_	ECM ground	_	_	_	G	
15 (Y)	108 (B)	Throttle control motor re- lay	Output	[Ignition switch: OFF] [Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V) 0 - 1.0 V	H	
17 (R) 18 (LG)	108	Ignition signal No. 1 Ignition signal No. 2	Output	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed NOTE: The pulse cycle changes depending on rpm at idle</li> </ul>	0 - 0.3 V★ 50mSec/div 2V/div JMBIA0329GB	J	
21 (G) 22 (SB)	(B)	Ignition signal No. 4 Ignition signal No. 3		<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,500 rpm</li></ul>	0.2 - 0.5 V★ 50mSec/div 2V/div JMBIA0330GB	M	
23 (GR)	108 (B)	Fuel pump relay	Output	<ul> <li>[Ignition switch: ON]</li> <li>For 1 second after turning ignition switch ON</li> <li>[Engine is running]</li> </ul>	0 - 1.0 V	N	

Ρ

< ECU DIAGNOSIS INFORMATION >

Tern	ninal No.	Description			Value		
+	-	Signal name	Input/ Output	Condition	(Approx.)		
25 (V) 29 (Y)	108	Fuel injector No. 4 Fuel injector No. 3	Output	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> <li>NOTE:</li> <li>The pulse cycle changes depending on rpm at idle</li> </ul>	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div € 10V/div JMBIA0331GB		
30 (O)	(B)	Fuel injector No. 2	Culput	[Engine is running]	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div		
31 (L)		Fuel injector No. 1		<ul> <li>Warm-up condition</li> <li>Engine speed: 2,000 rpm</li> </ul>	TOV/div JMBIA0332GB		
28 (W)	108 (B)	EVAP canister vent con- trol valve	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)		
32 (P)	108 (B)	ECM relay (Self shut-off)	Output	<ul> <li>[Engine is running]</li> <li>[Ignition switch: OFF]</li> <li>A few seconds after turning ignition switch OFF</li> <li>[Ignition switch: OFF]</li> <li>More than a few seconds after turn</li> </ul>	0 - 1.0 V BATTERY VOLTAGE		
				More than a few seconds after turn- ing ignition switch OFF	(11 - 14 V)		
33	36	I brottlo position concor 1	Throttle position sensor 1	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36 V
(LG)	(Y)					input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed
34	36	Throttle position sensor 2	locut	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75 V		
(V)	(Y)		Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36 V		
36 (Y)	_	Sensor ground (Throttle position sensor)	_	_	-		
37 (W)	40 (B)	Knock sensor	Input	[Engine is running] • Idle speed	2.5 V		
38 (P)	44 (B)	Engine coolant tempera- ture sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.		
40 (B)	—	Sensor ground (Knock sensor)	_	_	_		

## < ECU DIAGNOSIS INFORMATION >

Term	ninal No.	Description			Value
+	-	Signal name	Input/ Output	Condition	Value (Approx.)
41 (GR)	48 (BR)	Refrigerant pressure sen- sor	Input	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Both A/C switch and blower fan motor switch: ON (Compressor operates)</li> </ul>	1.0 - 4.0 V
42 (V)	51 (O)	EVAP control system pressure sensor	Input	[Ignition switch: ON]	1.8 - 4.8 V
43 (P)	108 (B)	Fuel tank temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with fuel tank temperature.
44 (B)	_	Sensor ground (Engine coolant tempera- ture sensor)	_	_	_
45	52	Mass air flow sensor	Input	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	0.7 - 1.1 V
(G)	(LG)		mput	[Engine is running] • Warm-up condition • Engine speed : 2,500 rpm	1.3 - 1.7 V
46 (V)	55 (O)	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.
48 (BR)	_	Sensor ground (Refrigerant pressure sensor)	_	_	_
49 (W)	53 (B)	A/F sensor 1	Input	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000 rpm</li></ul>	Approximately 1.8 V Output voltage varies with air fuel ratio.
50 (W)	59 (O)	Heated oxygen sensor 2	Input	<ul> <li>[Engine is running]</li> <li>Revving engine from idle to 3,000 rpm quickly after the following conditions are met</li> <li>Engine: after warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0 V
51 (O)	_	Sensor ground (EVAP control system pressure sensor)		_	_
52 (LG)	_	Sensor ground (Mass air flow sensor)		_	_
53 (B)	—	Sensor ground (A/F sensor 1)	_	_	_
55 (O)	_	Sensor ground (Intake air temperature sensor)	_		
58 (GR)	68 (SB)	Battery current sensor	Input	[Engine is running] • Battery: Fully charged * ¹ • Idle speed	2.6 - 3.5 V
59 (O)	_	Sensor ground (Heated oxygen sensor 2)		_	_

## < ECU DIAGNOSIS INFORMATION >

Tern	ninal No.	Description			Value	
+	-	Signal name	Input/ Output	Condition	(Approx.)	
61	61 62 Crankshaft position sen-	Input	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> <li>NOTE:</li> <li>The pulse cycle changes depending on rpm at idle</li> </ul>	4.0 V★ 5mSec/div € 2V/div JMBIA0333GB		
(W)	(R)	sor (POS)	sor (POS)	SOF (POS)	[Engine is running] • Engine speed: 2,000 rpm	4.0 V★ 5mSec/div € 2V/div JMBIA0334GB
62 (R)	_	Sensor ground [Crankshaft position sen- sor (POS)]	_	_	_	
63 (BR)	_	Sensor ground [Camshaft position sen- sor (PHASE)]	_	_	_	
65		Camshaft position sensor	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> <li>NOTE:</li> <li>The pulse cycle changes depending on rpm at idle</li> </ul>	0 - 5.0★ 20mSec/div 20mSec/div 20mSec/div 20mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 30mSec/div 3		
(G)	(BR)	(PHASE)	Input	[Engine is running] • Engine speed is 2,000 rpm	0 - 5.0★ 20mSec/div 	
68 (SB)	_	Sensor ground (Battery current sensor)		_	_	
69 (L)	108 (B)	PNP switch	Input	[Ignition switch: ON] • Shift lever: P or N (CVT), Neutral (M/ T) [Ignition switch: ON] • Shift lever: Except above	BATTERY VOLTAGE (11 - 14 V) 0 V	
72 (O)	36 (Y)	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5 V	

## < ECU DIAGNOSIS INFORMATION >

Term	ninal No.	Description			Value			
+	-	Signal name	Input/ Output	Condition	(Approx.)	A		
				[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)	E		
73 (P)	108 (B)	Intake valve timing control solenoid valve	Output	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>When revving engine up to 2,000rpm Quickly</li></ul>	7 - 10 V★			
74 (W)	108 (B)	Sensor power supply (Refrigerant pressure sensor)	Input	[Ignition switch: ON]	5 V	- E		
75 (BR)	62 (R)	Sensor power supply [Crankshaft position sen- sor (POS)]	_	[Ignition switch: ON]	5 V	F		
76 (W)	51 (O)	Sensor power supply [EVAP control system pressure sensor]	—	[Ignition switch: ON]	5 V			
77 (Y)	108 (B)	Sensor power supply [Battery current sensor]	_	[Ignition switch: ON]	5 V	ŀ		
78 (O)	63 (BR)	Sensor power supply [Camshaft position sen- sor (PHASE)]		[Ignition switch: ON]	5 V			
83 (L)	108 (B)	CAN communication line	Input/ Output	_	-	-		
84 (P)	108 (B)	CAN communication line	Input/ Output	_	-			
88 (LG)	108 (B)	Data link connector	Input/ Output	_	-	k		
93	108	Ignition switch	Input	[Ignition switch: OFF]	0 V BATTERY VOLTAGE	-		
(L)	(B)			[Ignition switch: ON]	(11 - 14 V)			
				[Ignition switch: ON] • ASCD steering switch: OFF	4 V	- N		
						[Ignition switch: ON] <ul> <li>MAIN switch: Pressed</li> </ul>	0 V	11
94 (SB)	95 (BR)	ASCD steering switch	Input	[Ignition switch: ON] • CANCEL switch: Pressed	1 V	١		
				[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3 V			
				[Ignition switch: ON] • SET/COAST switch: Pressed	2 V	-		
95 (BR)	_	Sensor ground (ASCD steering switch)		_	-	F		
99 (W)	108 (B)	Stop lamp switch	Input	<ul><li>[Ignition switch: OFF]</li><li>Brake pedal: Fully released</li></ul>	0 V	-		
(**)	(0)			<ul><li>[Ignition switch: OFF]</li><li>Brake pedal: Slightly depressed</li></ul>	BATTERY VOLTAGE (11 - 14 V)			

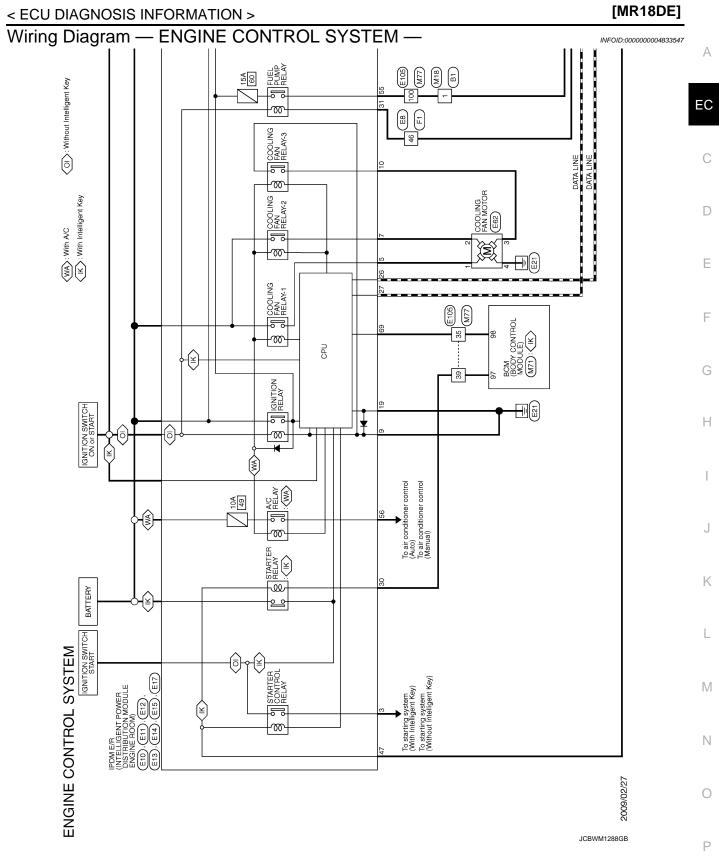
## < ECU DIAGNOSIS INFORMATION >

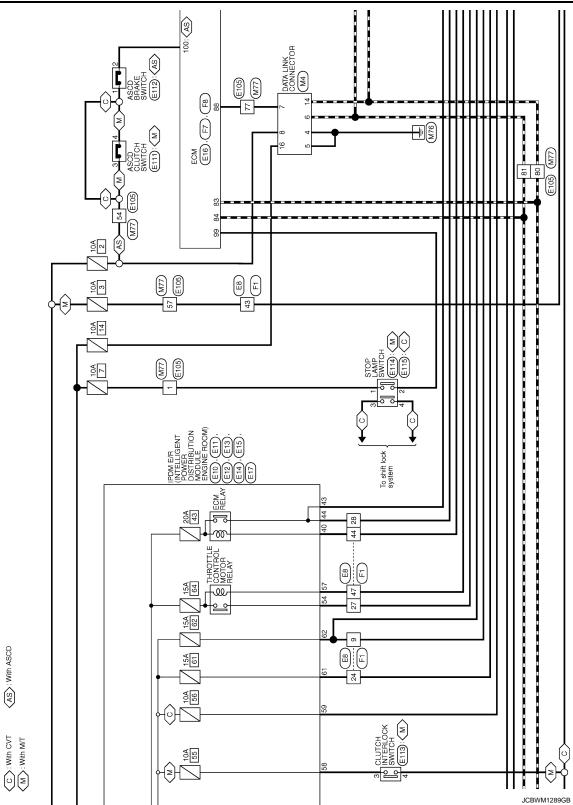
## [MR18DE]

Terminal No.		Description			Value
+	-	Signal name	Input/ Output	Condition	(Approx.)
100 (SB)	108 (В)	ASCD brake switch	Input	<ul> <li>[Ignition switch: ON]</li> <li>Brake pedal: Slightly depressed (CVT)</li> <li>Brake pedal and clutch pedal: Slightly depressed (M/T)</li> </ul>	0 V
				<ul> <li>[Ignition switch: ON]</li> <li>Brake pedal: Fully released (CVT)</li> <li>Brake pedal and/or clutch pedal: Fully released (M/T)</li> </ul>	BATTERY VOLTAGE (11 - 14 V)
102 (O)	108 (B)	Sensor power supply (Accelerator pedal posi- tion sensor 2)		[Ignition switch: ON]	5 V
103 (G)	104 (R)	Accelerator pedal posi- tion sensor 2	Input	<ul><li>[Ignition switch: ON]</li><li>Engine stopped</li><li>Accelerator pedal: Fully released</li></ul>	0.3 - 0.6 V
				<ul><li>[Ignition switch: ON]</li><li>Engine stopped</li><li>Accelerator pedal: Fully depressed</li></ul>	1.95 - 2.4 V
104 (R)	_	Sensor ground (Accelerator pedal posi- tion sensor 2)	_	_	_
105 (G)	108 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
106 (V)	108 (B)	Sensor power supply (Accelerator pedal posi- tion sensor 1)	_	[Ignition switch: ON]	5 V
108 (B)	_	ECM ground	_	_	_
110 (BR)	111 (Y)	Accelerator pedal posi- tion sensor 1	Input	<ul><li>[Ignition switch: ON]</li><li>Engine stopped</li><li>Accelerator pedal: Fully released</li></ul>	0.6 - 0.9 V
				<ul><li>[Ignition switch: ON]</li><li>Engine stopped</li><li>Accelerator pedal: Fully depressed</li></ul>	3.9 - 4.7 V
111 (Y)		Sensor ground (Accelerator pedal posi- tion sensor 1)	_	_	_

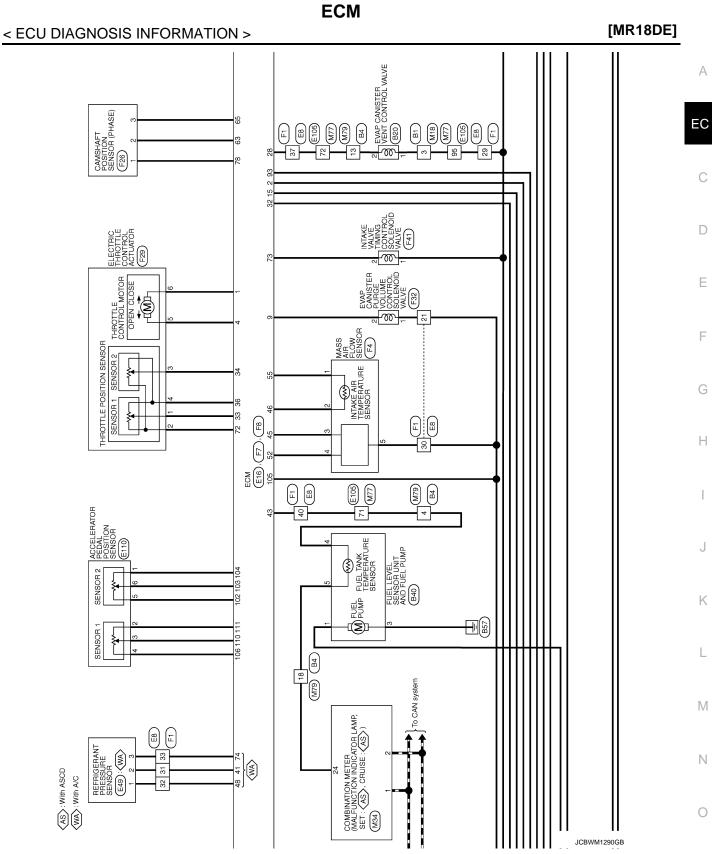
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

*1: Before measuring the terminal voltage, confirm that the battery is fully changed. Refer to PG-3, "How to Handle Battery"





AS>: With ASCD



Ρ

А

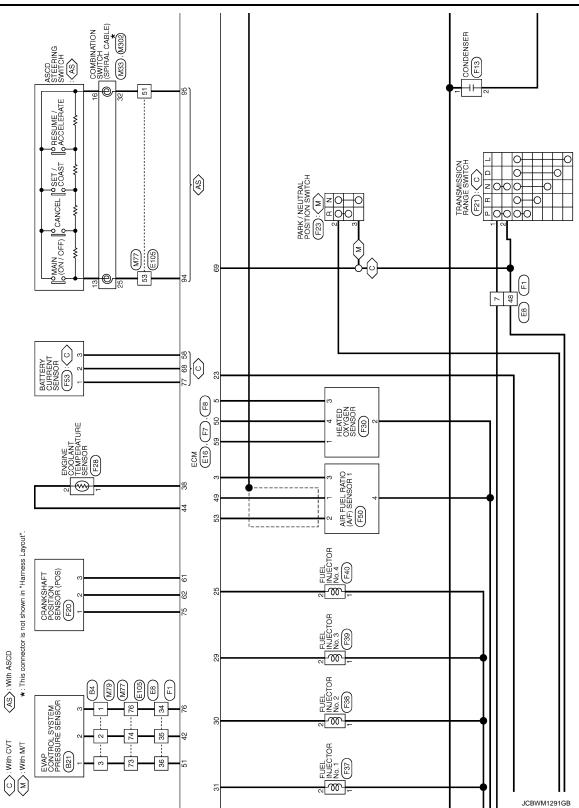
Ε

F

J

Κ

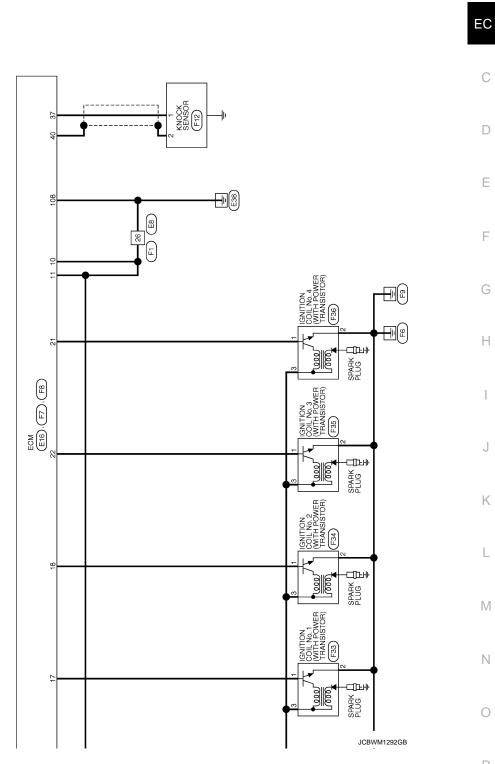
L





F

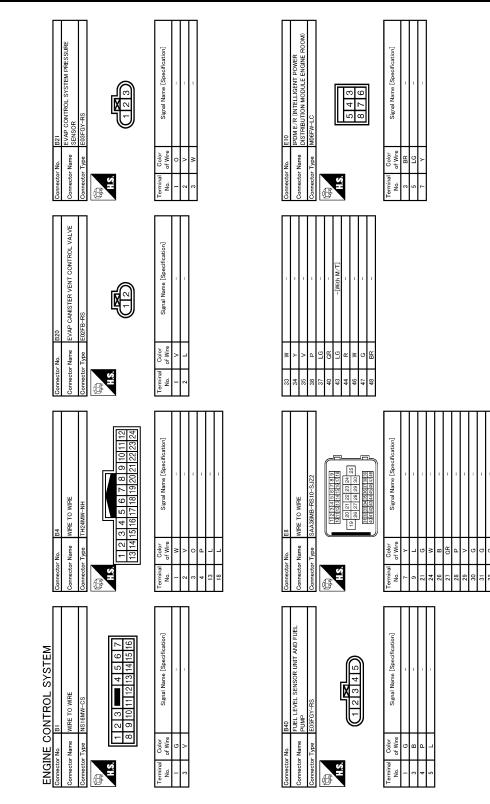
J



Ρ

ECM

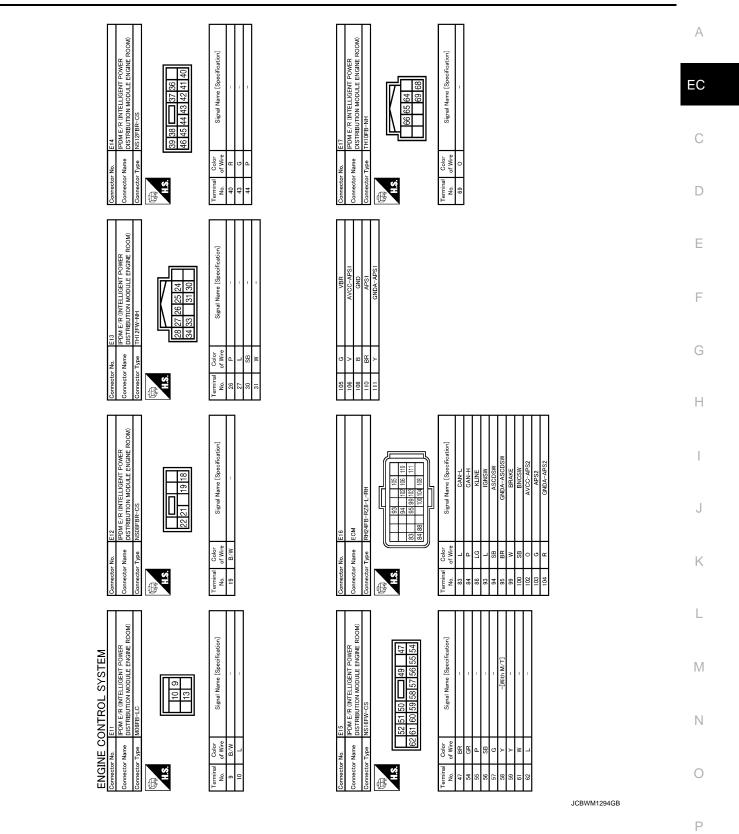
## < ECU DIAGNOSIS INFORMATION >



JCBWM1293GB

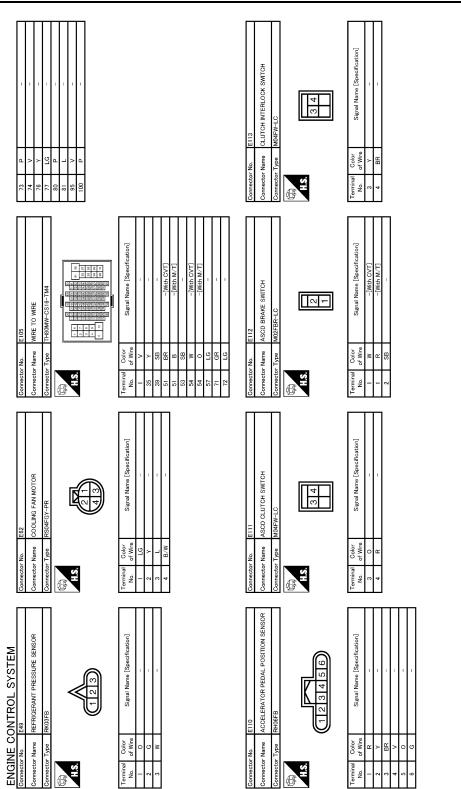
# < ECU DIAGNOSIS INFORMATION >

## [MR18DE]



ECM

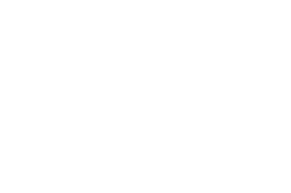
Revision: 2009 March

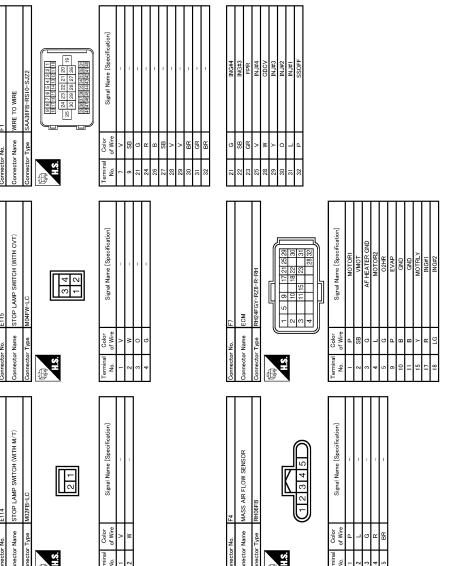


JCBWM1295GB

Ж 뜽>

46 48





JCBWM1296GB

ENGINE CONTROL SYSTEM

erminal No.

H.S.

ß

H.S.

erminal No.

А

EC

С

D

Е

F

G

Н

J

Κ

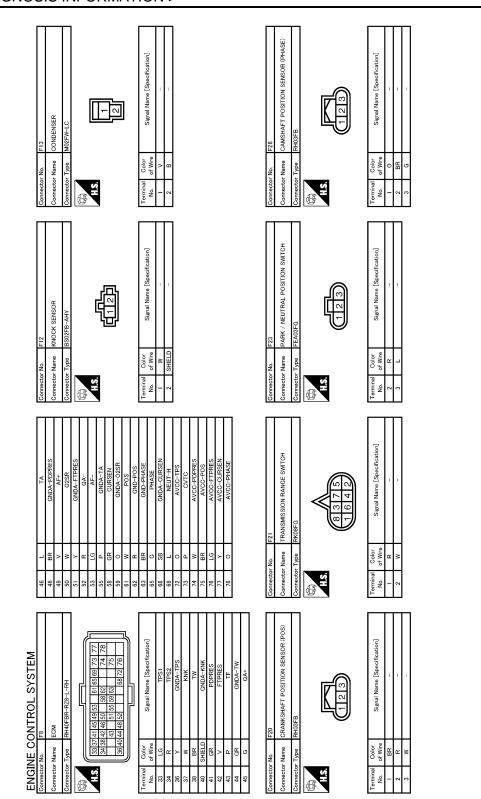
L

Μ

Ν

Ο

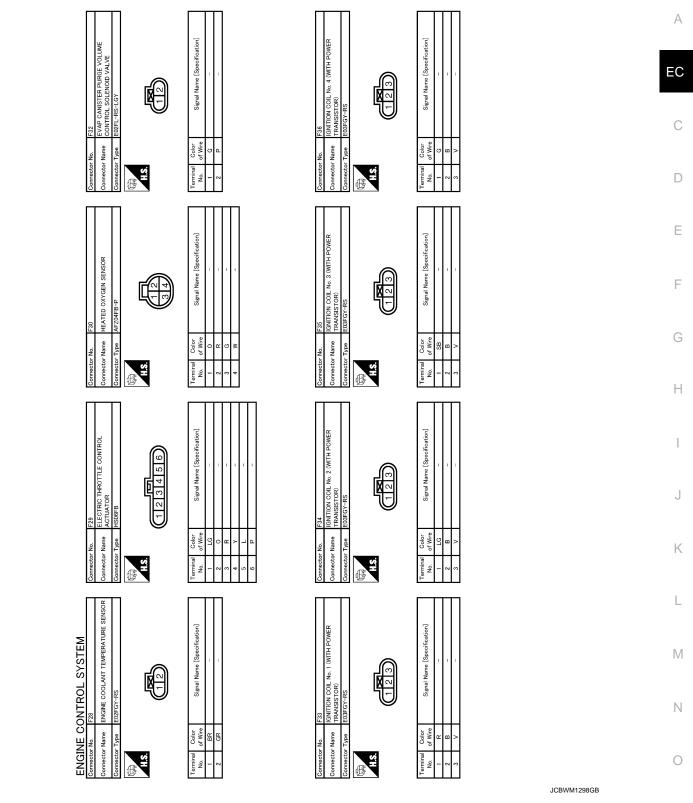
# < ECU DIAGNOSIS INFORMATION >



ECM

JCBWM1297GB

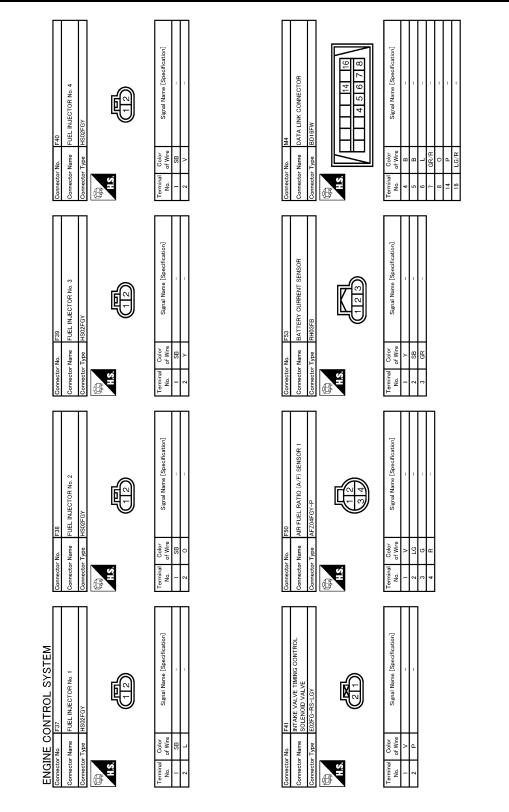
#### < ECU DIAGNOSIS INFORMATION >



Ρ

#### < ECU DIAGNOSIS INFORMATION >

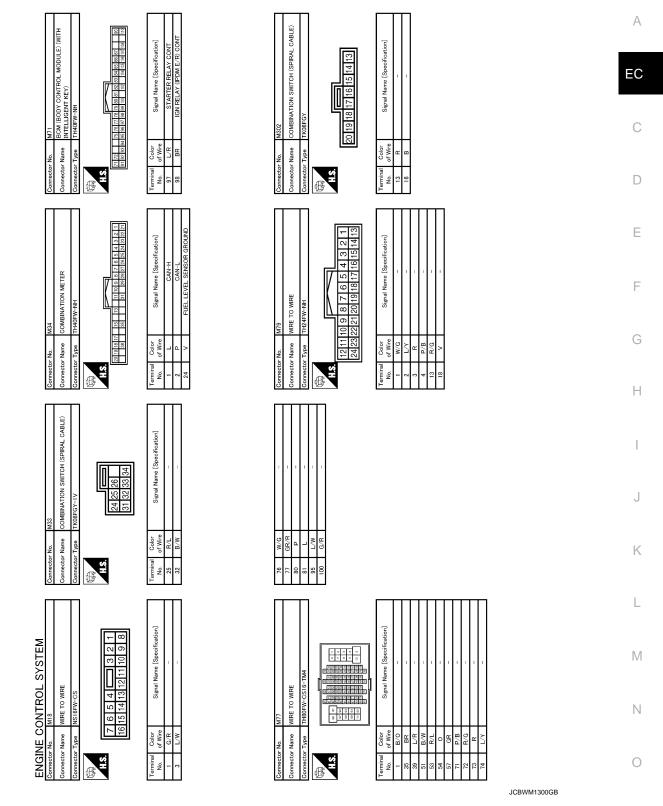
[MR18DE]



JCBWM1299GB

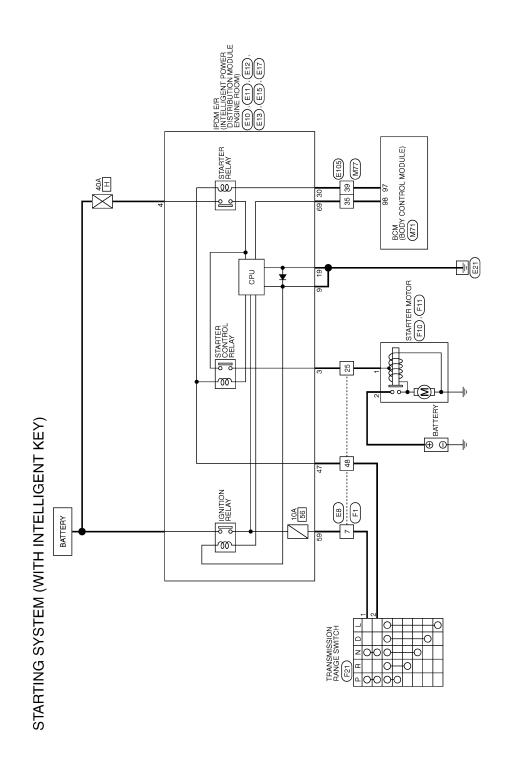
# < ECU DIAGNOSIS INFORMATION >

## [MR18DE]



ECM

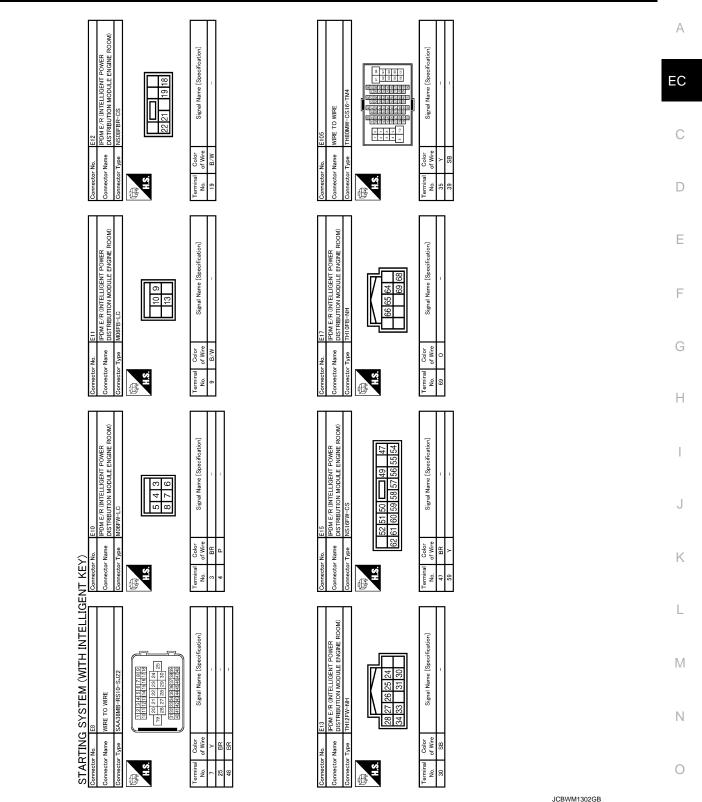
Ρ



2009/02/27

JCBWM1301GB

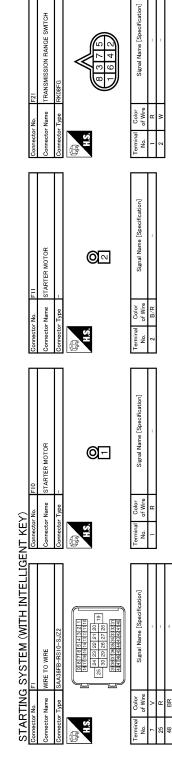
# < ECU DIAGNOSIS INFORMATION >

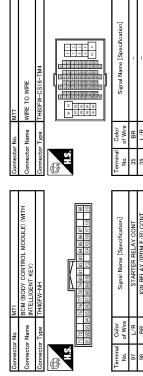


**ECM** 

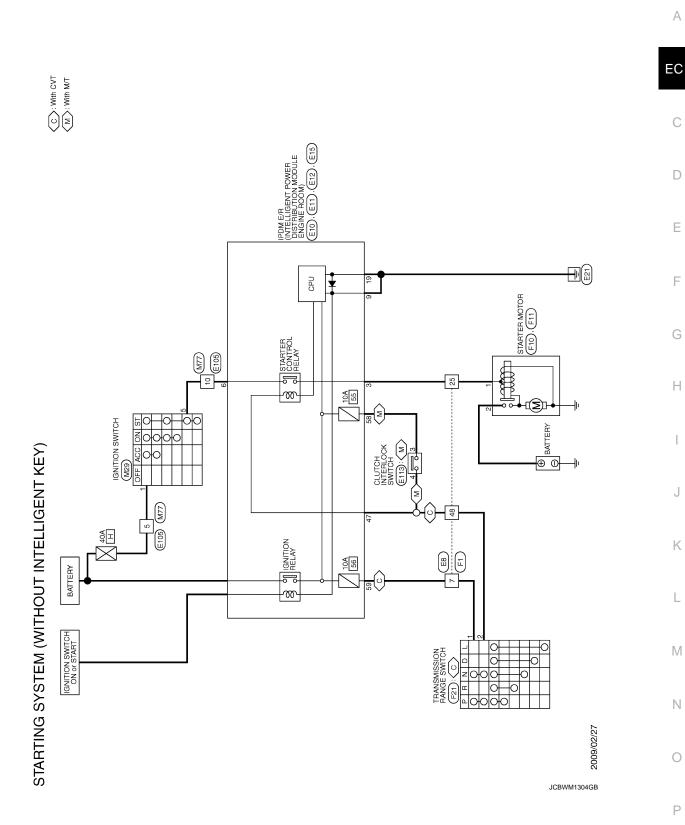
Revision: 2009 March

Ρ



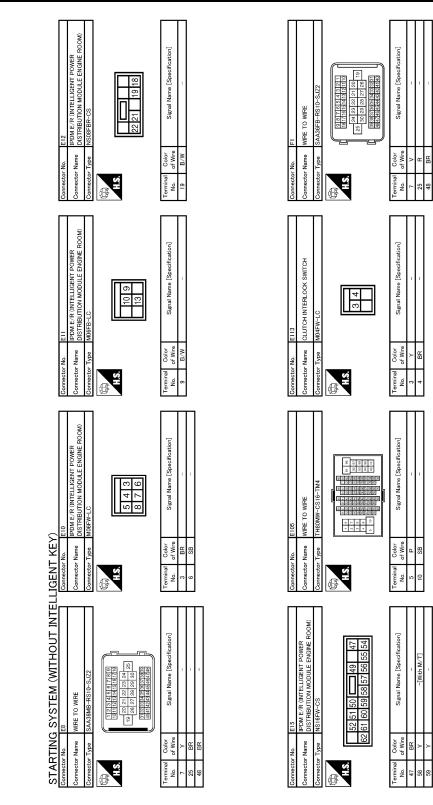


JCBWM1303GB

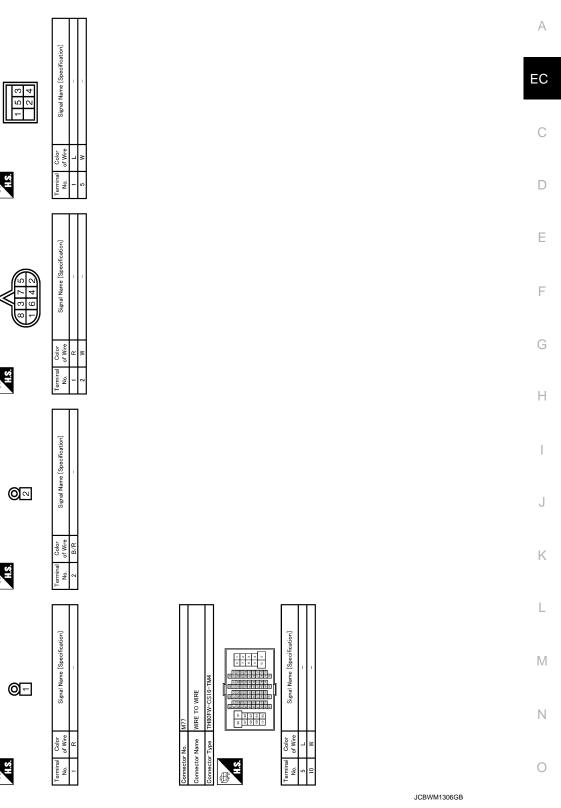


#### < ECU DIAGNOSIS INFORMATION >

[MR18DE]



JCBWM1305GB



## Fail Safe

## NON DTC RELATED ITEM

STARTING SYSTEM (WITHOUT INTELLIGENT KEY)

GNITION SWITCH

- Name

TRANSMISSION RANGE SWITCH

ctor Name

**TARTER MOTOR** 

nector Name

STARTER MOTOR

tor Name

INFOID:000000004833548

Ρ

#### < ECU DIAGNOSIS INFORMATION >

Detected items	Engine operating condition in fail-safe mode	Remarks
Malfunction indicator lamp circuit	Engine speed will not rise more than 2,500 rpm due to the fuel cut	When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system. Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function. The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.

## DTC RELATED ITEM

DTC No.	Detected items	Engine opera	ating condition in fail-safe mode			
P0011	Intake valve timing control	The signal is not energized to the in control does not function.	take valve timing control solenoid valve and the valve			
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more that	n 2,400 rpm due to the fuel cut.			
P0117 P0118	Engine coolant tempera- ture sensor circuit	•	determined by ECM based on the following condition oolant 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)			
		More than approx. 4 minutes after engine starting	80°C (176°F)			
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)			
		When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.				
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening is order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.				
P0643	Sensor power supply	ECM stops the electric throttle cont fixed opening (approx. 5 degrees)	rol actuator control, throttle valve is maintained at a by the return spring.			
P0605	ECM	(When ECM calculation function is ECM stops the electric throttle cont fixed opening (approx. 5 degrees)	rol actuator control, throttle valve is maintained at a			
P1805	Brake switch	ECM controls the electric throttle control actuator by regulating the throttle opening to 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	ECM stops the electric throttle cont fixed opening (approx. 5 degrees)	rol actuator control, throttle valve is maintained at a by the return spring.			
P2101	Electric throttle control function	•	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.			
P2118	Throttle control motor	ECM stops the electric throttle cont fixed opening (approx. 5 degrees)	rol actuator control, throttle valve is maintained at a by the return spring.			

#### < ECU DIAGNOSIS INFORMATION >

DTC No.	Detected items	Engine operating condition in fail-safe mode	
P2119	Electric throttle control ac- tuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.	EC
		(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.	C
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P (CVT), Neutral (M/T) position, and engine speed will not exceed 1,000 rpm or more.	D
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.	E

## DTC Inspection Priority Chart

INFOID:000000005040139

[MR18DE]

# If some DTCs are displayed at the same time, perform inspections one by one based on the following priority $$_{\rm G}$$

Ο

Р

#### < ECU DIAGNOSIS INFORMATION >

Priority	Detected items (DTC)
2	<ul> <li>P0031 P0032 Air fuel ratio (A/F) sensor 1 heater</li> <li>P0037 P0038 Heated oxygen sensor 2 heater</li> <li>P0075 Intake valve timing control solenoid valve</li> <li>P0130 P0131 P0132 P0133 P2A00 Air fuel ratio (A/F) sensor 1</li> <li>P0137 P0138 P0139 Heated oxygen sensor 2</li> <li>P0441 EVAP control system purge flow monitoring</li> <li>P0443 P0444 P0445 EVAP canister purge volume control solenoid valve</li> <li>P0447 P0448 EVAP canister vent control valve</li> <li>P0451 P0452 P0453 EVAP control system pressure sensor</li> <li>P0710 P0715 P0720 P0740 P0744 P0745 P0746 P0776 P0778 P0840 P1740 P1777 P1778 CVT related sensors, solenoid valves and switches</li> <li>P1217 Engine over temperature (OVERHEAT)</li> <li>P1805 Brake switch</li> <li>P2100 P2103 Throttle control motor relay</li> <li>P2101 Electric throttle control function</li> <li>P2118 Throttle control motor</li> </ul>
3	<ul> <li>P0011 Intake valve timing control</li> <li>P0171 P0172 Fuel injection system function</li> <li>P0300 - P0304 Misfire</li> <li>P0420 Three way catalyst function</li> <li>P0442 P0456 EVAP control system (SMALL LEAK, VERY SMALL LEAK)</li> <li>P0455 EVAP control system (GROSS LEAK)</li> <li>P0506 P0507 Idle speed control system</li> <li>P1148 Closed loop control</li> <li>P1212 TCS communication line</li> <li>P1421 Cold start control</li> <li>P1564 ASCD steering switch</li> <li>P1572 ASCD brake switch</li> <li>P1574 ASCD vehicle speed sensor</li> <li>P1715 Input speed sensor</li> <li>P2119 Electric throttle control actuator</li> </ul>

## DTC Index

INFOID:000000005040140

×:Applicable —: Not applicable

						: Het applicable
DTC	×1	- Items				Reference
CONSULT-III GST* ²	ECM* ³	(CONSULT-III screen terms)	SRT code	Trip	MIL	page
U0101	0101* ⁴	LOST COMM (TCM)	—	1	×	<u>EC-120</u>
U0140	0140* ⁴	LOST COMM (BCM)	—	1	×	<u>EC-121</u>
U1001	1001* ⁴	CAN COMM CIRCUIT	_	2	—	EC-122
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_	_	Flashing* ⁷	_
P0011	0011	INT/V TIM CONT-B1	×	2	×	<u>EC-123</u>
P0031	0031	A/F SEN1 HTR (B1)	_	2	×	<u>EC-127</u>
P0032	0032	A/F SEN1 HTR (B1)	_	2	×	<u>EC-127</u>
P0037	0037	HO2S2 HTR (B1)	_	2	×	<u>EC-130</u>
P0038	0038	HO2S2 HTR (B1)	_	2	×	<u>EC-130</u>
P0075	0075	INT/V TIM V/CIR-B1	_	2	×	EC-133
P0101	0101	MAF SEN/CIRCUIT-B1	_	2	×	<u>EC-136</u>
P0102	0102	MAF SEN/CIRCUIT-B1	_	1	×	<u>EC-143</u>
P0103	0103	MAF SEN/CIRCUIT-B1	—	1	×	EC-143
P0112	0112	IAT SEN/CIRCUIT-B1	—	2	×	EC-148
P0113	0113	IAT SEN/CIRCUIT-B1		2	×	<u>EC-148</u>

#### < ECU DIAGNOSIS INFORMATION >

DTC	*1	- Items				Reference	А
CONSULT-III GST* ²	ECM* ³	(CONSULT-III screen terms)	SRT code	Trip	MIL	page	7.
P0116	0116	ECT SEN/CIRC	_	2	×	<u>EC-150</u>	EC
P0117	0117	ECT SEN/CIRC	_	1	×	EC-152	
P0118	0118	ECT SEN/CIRC	_	1	×	EC-152	-
P0122	0122	TP SEN 2/CIRC-B1	_	1	×	<u>EC-155</u>	С
P0123	0123	TP SEN 2/CIRC-B1	_	1	×	<u>EC-155</u>	-
P0125	0125	ECT SENSOR	_	2	×	<u>EC-158</u>	D
P0127	0127	IAT SENSOR-B1	_	2	×	<u>EC-161</u>	
P0128	0128	THERMSTAT FNCTN	_	2	×	<u>EC-163</u>	-
P0130	0130	A/F SENSOR1 (B1)	_	2	×	EC-165	E
P0131	0131	A/F SENSOR1 (B1)	_	2	×	EC-169	-
P0132	0132	A/F SENSOR1 (B1)	_	2	×	<u>EC-172</u>	F
P0133	0133	A/F SENSOR1 (B1)	×	2	×	<u>EC-175</u>	Г
P0137	0137	HO2S2 (B1)	×	2	×	<u>EC-180</u>	-
P0138	0138	HO2S2 (B1)	×	2	×	<u>EC-186</u>	G
P0139	0139	HO2S2 (B1)	×	2	×	<u>EC-194</u>	-
P0171	0171	FUEL SYS-LEAN-B1	_	2	×	<u>EC-200</u>	
P0172	0172	FUEL SYS-RICH-B1	_	2	×	<u>EC-204</u>	H
P0181	0181	FTT SENSOR	_	2	×	<u>EC-208</u>	-
P0182	0182	FTT SEN/CIRCUIT	_	2	×	EC-211	
P0183	0183	FTT SEN/CIRCUIT	_	2	×	EC-211	-
P0222	0222	TP SEN 1/CIRC-B1	_	1	×	<u>EC-214</u>	
P0223	0223	TP SEN 1/CIRC-B1	_	1	×	<u>EC-214</u>	J
P0300	0300	MULTI CYL MISFIRE	_	2	×	EC-217	-
P0301	0301	CYL 1 MISFIRE	_	2	×	EC-217	K
P0302	0302	CYL 2 MISFIRE	_	2	×	<u>EC-217</u>	-
P0303	0303	CYL 3 MISFIRE	_	2	×	EC-217	-
P0304	0304	CYL 4 MISFIRE	_	2	×	EC-217	L
P0327	0327	KNOCK SEN/CIRC-B1	_	2	—	EC-223	-
P0328	0328	KNOCK SEN/CIRC-B1	_	2	—	EC-223	M
P0335	0335	CKP SEN/CIRCUIT	_	2	×	EC-225	111
P0340	0340	CMP SEN/CIRC-B1	_	2	×	EC-229	-
P0420	0420	TW CATALYST SYS-B1	×	2	×	EC-233	Ν
P0441	0441	EVAP PURG FLOW/MON	×	2	×	EC-238	-
P0442	0442	EVAP SMALL LEAK	×	2	×	<u>EC-244</u>	0
P0443	0443	PURG VOLUME CONT/V	_	2	×	EC-251	0
P0444	0444	PURG VOLUME CONT/V	_	2	×	<u>EC-256</u>	-
P0445	0445	PURG VOLUME CONT/V	—	2	×	<u>EC-256</u>	Р
P0447	0447	VENT CONTROL VALVE	_	2	×	<u>EC-259</u>	-
P0448	0448	VENT CONTROL VALVE	—	2	×	EC-263	-
P0451	0451	EVAP SYS PRES SEN	_	2	×	<u>EC-267</u>	-
P0452	0452	EVAP SYS PRES SEN	_	2	×	<u>EC-270</u>	-
P0453	0453	EVAP SYS PRES SEN	-	2	×	EC-275	-

#### < ECU DIAGNOSIS INFORMATION >

DTC	×1	ltomo				Reference
CONSULT-III GST* ²	ECM* ³	- Items (CONSULT-III screen terms)	SRT code	Trip	MIL	page
P0455	0455	EVAP GROSS LEAK	—	2	×	<u>EC-281</u>
P0456	0456	EVAP VERY SML LEAK	×* ⁶	2	×	<u>EC-287</u>
P0460	0460	FUEL LEV SEN SLOSH	_	2	×	<u>EC-294</u>
P0461	0461	FUEL LEVEL SENSOR	_	2	×	<u>EC-295</u>
P0462	0462	FUEL LEVL SEN/CIRC	_	2	×	<u>EC-297</u>
P0463	0463	FUEL LEVL SEN/CIRC	_	2	×	<u>EC-297</u>
P0500	0500	VEH SPEED SEN/CIRC*5	_	2	×	<u>EC-299</u>
P0506	0506	ISC SYSTEM	_	2	×	<u>EC-301</u>
P0507	0507	ISC SYSTEM		2	×	EC-303
P0605	0605	ECM	_	1 or 2	× or —	EC-305
P0607	0607	ECM	_	1 (CVT) 2 (M/T)	× (CVT) — (M/T)	<u>EC-307</u>
P0643	0643	SENSOR POWER/CIRC	_	1	×	<u>EC-308</u>
P0705	0705	PNP SW/CIRC	—	2	×	<u>TM-101</u>
P0710	0710	ATF TEMP SEN/CIRC*8		1	×	<u>TM-104</u>
P0715	0715	INPUT SPD SEN/CIRC		2	×	<u>TM-107</u>
P0720	0720	VEH SPD SEN/CIR AT*5		2	×	<u>TM-110</u>
P0740	0740	TCC SOLENOID/CIRC		2	×	<u>TM-114</u>
P0744	0744	A/T TCC S/V FNCTN	_	2	×	<u>TM-117</u>
P0745	0745	L/PRESS SOL/CIRC	_	2	×	<u>TM-120</u>
P0746	0746	PRS CNT SOL/A FCTN		1	×	<u>TM-122</u>
P0776	0776	PRS CNT SOL/B FCTN		2	×	<u>TM-124</u>
P0778	0778	PRS CNT SOL/B CIRC	_	2	×	<u>TM-126</u>
P0840	0840	PRS CNT SOL/A CIRC	_	2	×	<u>TM-128</u>
P0850	0850	P-N POS SW/CIRCUIT	—	2	×	<u>EC-310</u>
P1148	1148	CLOSED LOOP-B1	—	1	×	<u>EC-313</u>
P1212	1212	TCS/CIRC	—	2	—	<u>EC-314</u>
P1217	1217	ENG OVER TEMP	—	1	×	<u>EC-315</u>
P1225	1225	CTP LEARNING-B1	—	2	_	<u>EC-319</u>
P1226	1226	CTP LEARNING-B1	—	2	—	<u>EC-321</u>
P1421	1421	COLD START CONTROL	—	2	×	<u>EC-323</u>
P1550	1550	BAT CURRENT SENSOR	—	2	—	<u>EC-325</u>
P1551	1551	BAT CURRENT SENSOR	—	2	—	<u>EC-329</u>
P1552	1552	BAT CURRENT SENSOR	—	2	—	<u>EC-329</u>
P1553	1553	BAT CURRENT SENSOR	—	2	—	<u>EC-333</u>
P1554	1554	BAT CURRENT SENSOR	—	2	—	<u>EC-337</u>
P1564	1564	ASCD SW	—	1	-	<u>EC-341</u>
P1572	1572	ASCD BRAKE SW	—	1	_	<u>EC-344</u>
P1574	1574	ASCD VHL SPD SEN	—	1	—	<u>EC-351</u>
P1610	1610	LOCK MODE	—	2	_	<u>SEC-31</u>
P1611	1611	ID DISCORD, IMMU-ECM	—	2		<u>SEC-32</u>
P1612	1612	CHAIN OF ECM-IMMU	—	2	—	<u>SEC-34</u>

#### < ECU DIAGNOSIS INFORMATION >

#### [MR18DE

DTC	*1	lta ma				Deferrer	А
CONSULT-III GST* ²	ECM* ³	- Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page	A
P1614	1614	CHAIN OF IMMU-KEY	_	2	_	SEC-6	EC
P1615	1615	DIFFERENCE OF KEY	_	2	_	SEC-6	-
P1715	1715	IN PULY SPEED	_	2	_	<u>EC-353</u>	-
P1740	1740	LU-SLCT SOL/CIRC	_	2	×	<u>TM-143</u>	С
P1777	1777	STEP MOTR CIRC	_	1	×	<u>TM-146</u>	-
P1778	1778	STEP MOTR FNC	_	2	×	<u>TM-149</u>	D
P1805	1805	BRAKE SW/CIRCUIT	_	2	—	<u>EC-354</u>	
P2100	2100	ETC MOT PWR-B1	_	1	×	<u>EC-357</u>	-
P2101	2101	ETC FNCTN/CIRC-B1	_	1	×	<u>EC-360</u>	E
P2103	2103	ETC MOT PWR	_	1	×	<u>EC-357</u>	-
P2118	2118	ETC MOT-B1	_	1	×	<u>EC-364</u>	F
P2119	2119	ETC ACTR-B1	_	1	×	<u>EC-366</u>	- F
P2122	2122	APP SEN 1/CIRC	_	1	×	<u>EC-368</u>	-
P2123	2123	APP SEN 1/CIRC	_	1	×	<u>EC-368</u>	G
P2127	2127	APP SEN 2/CIRC	_	1	×	<u>EC-371</u>	-
P2128	2128	APP SEN 2/CIRC	_	1	×	<u>EC-371</u>	-
P2135	2135	TP SENSOR-B1	_	1	×	<u>EC-375</u>	- H
P2138	2138	APP SENSOR	—	1	×	<u>EC-378</u>	-
P2A00	2A00	A/F SENSOR1 (B1)	_	2	×	EC-382	-

*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 fail-safe operations for both self-diagnoses occur, the MIL illuminates.

*6: SRT code will not be set if the self-diagnostic result is NG.

*7: When the ECM is in the mode that displays SRT status, MIL may flash. For the details, refer to "How to Display SRT Status" in EC-451, "How to Set SRT Code".

*8: When erasing this DTC, always use CONSULT-III or GST.

#### How to Set SRT Code

To set all SRT codes, self-diagnoses for the SRT items must be performed one or more times. Refer to EC-85. Μ "Diagnosis Description", "SYSTEM READINESS TEST (SRT) CODE", "SRT Item".

Each diagnosis may require a long period of actual driving under various conditions.

#### (P)WITH CONSULT-III

Ν Perform corresponding DTC CONFIRMATION PROCEDURE one by one based on Performance Priority in the table on "SRT Item".

#### **WITHOUT CONSULT-III**

The most efficient driving pattern in which SRT codes can be properly set is explained below. The driving pattern should be performed one or more times to set all SRT codes.

Ρ

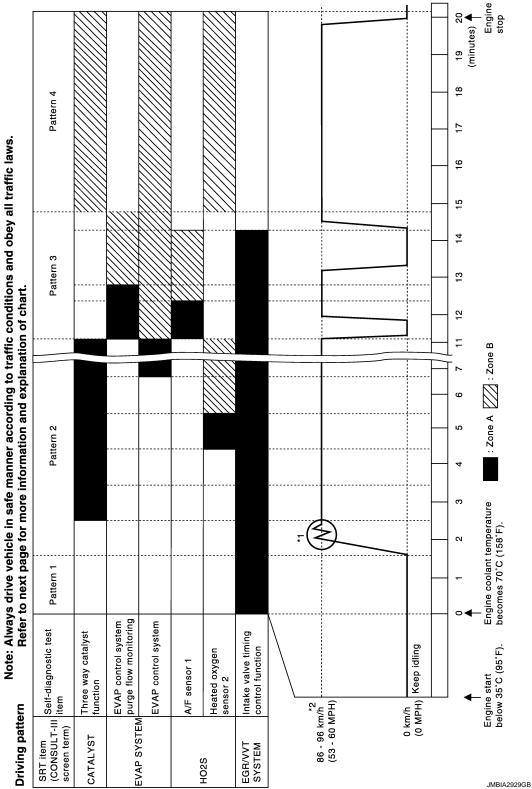
Κ

L

INFOID:000000004833551







• 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:

## < ECU DIAGNOSIS INFORMATION >

- 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)], diagno-EC sis may also be performed.

ECM

Pattern 1:

- The engine is started at the engine coolant temperature of –10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 38 and ground is 3.0 - 4.3 V).
- The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 38 and ground is lower than 1.4 V).
- The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 43 and ground is less than 4.1 V).
- 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 90 km/h (56 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 again.

*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.

*2: Checking the vehicle speed with GST is advised.

Suggested Transmission Gear Position for Models Set the selector lever in the D position.

#### Suggested Upshift Speeds for M/T Models

Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.

		on in low altitude areas 9 m (4,000 ft)]:	For quick acceleration in low alti- tude areas and high altitude areas [over 1,219 m (4,000 ft)]:		
Gear change	ACCEL shift position [km/h (MPH)]	CRUISE shift point [km/h (MPH)]	km/h (MPH)		
1st to 2nd	15 (9)	21 (13)	15 (9)		
2nd to 3rd	25 (16)	38 (24)	30 (19)		
3rd to 4th	40 (25)	55 (34)	45 (28)		
4th to 5th	45 (28)	74 (46)	50 (31)		

## 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 and can be displayed on the GST screen.

The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (eq., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

86 - 96 km/h-(53 - 60 MPH) 0 km/h (0 MPH) 1 MIN 30 S **1 MIN** 



Κ

INFOID:000000004833552

PBIB2244E

А

D

Ε

F

Н

#### < ECU DIAGNOSIS INFORMATION >

ltem	OBD-	Self-diagnostic test item	DTC	li	mit	Description
liem	MID	Sell-diagnostic test item	DIC	TID	IDID83H0BHMinimum sensor output voltage for cycle84H0BHMaximum sensor output voltage for cycle85H0BHMinimum sensor output voltage for cycle86H0BHMaximum sensor output voltage for cycle87H04HResponse rate: Response ratio (Le Rich)88H04HResponse rate: Response ratio (Re Lean)89H84HThe amount of shift in air fuel ratio 8BH0BHDifference in sensor output voltage for cycle87H04HResponse rate: Response ratio (Re Lean)88H04H89H84HThe amount of shift in air fuel ratio Response gain at the limited freque orth07H0CH0AHMaximum sensor output voltage for cycle	Description
			P0131	83H	0BH	Minimum sensor output voltage for test cycle
			P0131	84H	0BH	Maximum sensor output voltage for test cycle
			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)	P0133	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0133	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A00	89H	84H	The amount of shift in air fuel ratio
			P2A00	8AH	84H	The amount of shift in air fuel ratio
HO2S			P0130	8BH	0BH	Difference in sensor output voltage
			P0133	8CH	83H	Response gain at the limited frequency
			P0138	07H	0CH	Minimum sensor output voltage for test cycle
	02H	Heated oxygen sensor 2 (Bank 1)	P0137	08H	0CH	Maximum sensor output voltage for test cycle
			P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
			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
			P0146	80H	0CH	Sensor output voltage
			P0145	81H	0CH	Difference in sensor output voltage

#### < ECU DIAGNOSIS INFORMATION >

	OBD-		DTO	li	e and Test mit display)		
Item	MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description	EC
			P0151	83H	0BH	Minimum sensor output voltage for test cycle	С
			P0151	84H	0BH	Maximum sensor output voltage for test cycle	
			P0150	85H	0BH	Minimum sensor output voltage for test cycle	D
		Air fuel ratio (A/E) concor 1	P0150	86H	0BH	Maximum sensor output voltage for test cycle	E
	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P0153	87H	04H	Response rate: Response ratio (Lean to Rich)	
			P0153	88H	04H	Response rate: Response ratio (Rich to Lean)	F
			P2A03	89H	84H	The amount of shift in air fuel ratio	
			P2A03	8AH	84H	The amount of shift in air fuel ratio	G
HO2S			P0150	8BH	0BH	Difference in sensor output voltage	-
			P0153	8CH	83H	Response gain at the limited frequency	
		Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle	-
	06H		P0157	08H	0CH	Maximum sensor output voltage for test cycle	
			P0158	80H	0CH	Sensor output voltage	•
			P0159	81H	0CH	Difference in sensor output voltage	
		Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle	J
	07H		P0164	08H	0CH	Maximum sensor output voltage for test cycle	k
			P0166	80H	0CH	Sensor output voltage	-
			P0165	81H	0CH	Difference in sensor output voltage	
			P0420	80H	01H	O2 storage index	
	0.411	Three way catalyst function	P0420	82H	01H	Switching time lag engine exhaust index value	N
21H	21H	(Bank1)	P2423	83H	0CH	Difference in 3rd O2 sensor output volt- age	-
CATA-			P2423	84H	84H	O2 storage index in HC trap catalyst	N
LYST			P0430	80H	01H	O2 storage index	-
	2011	Three way catalyst function	P0430	82H	01H	Switching time lag engine exhaust index value	C
	22H	(Bank2)	P2424	83H	0CH	Difference in 3rd O2 sensor output volt- age	-
			P2424	84H	84H	O2 storage index in HC trap catalyst	P

#### < ECU DIAGNOSIS INFORMATION >

					e and Test	
	OBD-				mit display)	
ltem	MID	Self-diagnostic test item	DTC	TID	Unit and Scaling ID	Description
			P0400	80H	96H	Low Flow Faults: EGR temp change rate (short term)
			P0400	81H	96H	Low Flow Faults: EGR temp change rate (long term)
EGR SYSTEM	31H	EGR function	P0400	82H	96H	Low Flow Faults: Difference between max EGR temp and EGR temp under idling condition
			P0400	83H	96H	Low Flow Faults: Max EGR temp
			P1402	84H	96H	High Flow Faults: EGR temp increase rate
			P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
	35H	VVT Monitor (Bank1)	P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
	0011		P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
VVT			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
SYSTEM		I VVT Monitor (Bank2)	P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
	2011		P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
	36H		P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3BH	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)
EVAP SYSTEM	3CH	EVAP control system leak	P0456	80H	05H	Leak area index (for more than 0.02 inch)
	301	(Very small leak)	P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close
	41H	A/F sensor 1 heater (Bank 1)	Low Input:P0031 High Input:P0032	81H	0BH	Converted value of Heater electric cur- rent to voltage
	42H	Heated oxygen sensor 2 heat- er (Bank 1)	Low Input:P0037 High Input:P0038	80H	0CH	Converted value of Heater electric cur- rent to voltage
O2 SEN- SOR	43H	Heated oxygen sensor 3 heat- er (Bank 1)	P0043	80H	0CH	Converted value of Heater electric cur- rent to voltage
HEATER	45H	A/F sensor 1 heater (Bank 2)	Low Input:P0051 High Input:P0052	81H	0BH	Converted value of Heater electric cur- rent to voltage
	46H	Heated oxygen sensor 2 heat- er (Bank 2)	Low Input:P0057 High Input:P0058	80H	0CH	Converted value of Heater electric cur- rent to voltage
	47H	Heated oxygen sensor 3 heat- er (Bank 2)	P0063	80H	0CH	Converted value of Heater electric cur- rent to voltage

#### < ECU DIAGNOSIS INFORMATION >

#### [MR18DE]

ltem	OBD-	Self-diagnostic test item	DTC	li	e and Test mit display)	Description	A
nem	MID	Sen-diagnostic test item	DIC	TID	Unitand Scaling ID	Description	EC
			P0411	80H	01H	Secondary Air Injection System Incor- rect Flow Detected	С
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary Air Injection System Insufficient Flow	0
		Secondary Air system	P2445	82H	01H	Secondary Air Injection System Pump Stuck Off	D
SEC- OND- ARY AIR	71H		P2448	83H	01H	Secondary Air Injection System High Airflow	E
			Bank1: P2440 Bank2: P2442	84H	01H	Secondary Air Injection System Switch- ing Valve Stuck Open	
			P2440	85H	01H	Secondary Air Injection System Switch- ing Valve Stuck Open	F
			P2444	86H	01H	Secondary Air Injection System Pump Stuck On	
	81H	Fuel injection system function	P0171 or P0172	80H	2FH	Long term fuel trim	G
FUEL	011	(Bank 1)	P0171 or P0172	81H	24H	The number of lambda control clamped	
SYSTEM	82H	Fuel injection system function	P0174 or P0175	80H	2FH	Long term fuel trim	Н
	0211	(Bank 2)	P0174 or P0175	81H	24H	The number of lambda control clamped	

J

Κ

L

Μ

Ν

0

Ρ

#### < ECU DIAGNOSIS INFORMATION >

	OBD-			li	e and Test mit display)			
Item	MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description		
			P0301	80H	24H	Misfiring counter at 1000 revolution of the first cylinder		
			P0302	81H	24H	Misfiring counter at 1000 revolution of the second cylinder		
			P0303	82H	24H	Misfiring counter at 1000 revolution of the third cylinder		
			P0304	83H	24H	Misfiring counter at 1000 revolution of the fourth cylinder		
			P0305	84H	24H	Misfiring counter at 1000 revolution of the fifth cylinder		
			P0306	85H	24H	Misfiring counter at 1000 revolution of the sixth cylinder		
		Multiple Cylinder Misfires			P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder
			P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder		
				P0300	88H	24H	Misfiring counter at 1000 revolution of the multiple cylinders	
			P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder		
MISFIRE	A1H		Multiple Cylinder Mistires	P0302	8AH	24H	Misfiring counter at 200 revolution of the second cylinder	
			P0303	8BH	24H	Misfiring counter at 200 revolution of the third cylinder		
			P0304	8CH	24H	Misfiring counter at 200 revolution of the fourth cylinder		
			P0305	8DH	24H	Misfiring counter at 200 revolution of the fifth cylinder		
				P0306	8EH	24H	Misfiring counter at 200 revolution of the sixth cylinder	
			P0307	8FH	24H	Misfiring counter at 200 revolution of the seventh cylinder		
			P0308	90H	24H	Misfiring counter at 200 revolution of the eighth cylinder		
			P0300	91H	24H	Misfiring counter at 1000 revolution of the single cylinder		
			P0300	92H	24H	Misfiring counter at 200 revolution of the single cylinder		
			P0300	93H	24H	Misfiring counter at 200 revolution of the multiple cylinders		

#### < ECU DIAGNOSIS INFORMATION >

#### [MR18DE]

	OBD-			li	e and Test mit display)		А
Item	MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description	EC
	A2H	No. 1 Cylinder Misfire	P0301	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	С
			P0301	0CH	24H	Misfire counts for last/current driving cy- cles	
	АЗН	No. 2 Cylinder Misfire	P0302	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	D
			P0302	0CH	24H	Misfire counts for last/current driving cy- cles	Ε
	A4H	No. 3 Cylinder Misfire	P0303	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	F
			P0303	0CH	24H	Misfire counts for last/current driving cy- cles	G
	A5H	No. 4 Cylinder Misfire	P0304	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	Н
MISFIRE			P0304	0CH	24H	Misfire counts for last/current driving cy- cles	
MISFIRE	A6H	No. 5 Cylinder Misfire	P0305	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	I
			P0305	0CH	24H	Misfire counts for last/current driving cy- cles	J
	A7H	No. 6 Cylinder Misfire	P0306	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	K
			P0306	0CH	24H	Misfire counts for last/current driving cy- cles	
	A8H	No. 7 Cylinder Misfire	P0307	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	L
			P0307	0CH	24H	Misfire counts for last/current driving cy- cles	M
	А9Н	No. 8 Cylinder Misfire	P0308	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	Ν
			P0308	0CH	24H	Misfire counts for last/current driving cy- cles	0

Ρ

#### < SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS

## ENGINE CONTROL SYSTEM SYMPTOMS

## Symptom Table

#### SYSTEM — BASIC ENGINE CONTROL SYSTEM

							S	/MPT	ОМ						
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warrant	y symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	<u>EC-398</u>
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			<u>EC-471</u>
	Fuel injector circuit	1	1	2	3	2		2	2			2			<u>EC-395</u>
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			<u>EC-68</u>
Air	Positive crankcase ventilation sys- tem	3	3	4	4	4	4	4	4	4		4	1		<u>EC-413</u>
	Incorrect idle speed adjustment						1	1	1	1		1			<u>EC-16</u>
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	<u>EC-360</u> <u>EC-364</u>
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			<u>EC-16</u>
	Ignition circuit	1	1	2	2	2		2	2			2			<u>EC-401</u>
Main po	wer supply and ground circuit	2	2	3	3	3		3	3		2	3			<u>EC-117</u>
Mass ai	r flow sensor circuit	1			2										<u>EC-136</u> EC-143
Engine	coolant temperature sensor circuit						3			3					<u>EC-150</u> <u>EC-152</u>
Air fuel ı	ratio (A/F) sensor 1 circuit		1	2	3	2		2	2			2			EC-165 EC-169 EC-172 EC-175 EC-382
Throttle	position sensor circuit						2			2					EC-155 EC-214 EC-319 EC-321 EC-375
Accelera	ator pedal position sensor circuit			3	2	1									EC-368 EC-371 EC-378
Knock s	ensor circuit			2								3			EC-223

Revision: 2009 March

INFOID:000000005040146

#### < SYMPTOM DIAGNOSIS >

#### SYMPTOM А OVERHEATS/WATER TEMPERATURE HIGH LACK OF POWER/POOR ACCELERATION ίΨ (EXCP. EC DEAD (UNDER CHARGE) HESITATION/SURGING/FLAT SPOT EXCESSIVE FUEL CONSUMPTION EXCESSIVE OIL CONSUMPTION SPARK KNOCK/DETONATION SLOW/NO RETURN TO IDLE HARD/NO START/RESTART Reference **ROUGH IDLE/HUNTING** HIGH IDLE/LOW IDLE page IDLING VIBRATION D **ENGINE STALL** BATTERY Ε AE AA AB AC AD AG AH AJ AK AM HA Warranty symptom code AF AL F Crankshaft position sensor (POS) circuit 2 2 EC-225 Camshaft position sensor (PHASE) circuit EC-229 3 2 Vehicle speed signal circuit 2 3 3 3 EC-299 EC-305 ECM 2 2 3 3 3 3 3 3 3 3 3 EC-307 Intake valve timing control solenoid valve cir-Н 3 2 1 3 2 2 3 3 EC-123 cuit transmission range switch circuit 3 3 3 3 3 EC-310 PNP switch circuit 3 3 3 3 3 EC-310 2 3 3 4 EC-414 Refrigerant pressure sensor circuit 3 Electrical load signal circuit EC-393 Air conditioner circuit 2 2 3 3 3 3 3 3 3 3 2 HAC-212 ABS actuator and electric unit (control unit) 4 **BRC-85**

1 - 6: The numbers refer to the order of inspection.

(continued on next table)

#### SYSTEM — ENGINE MECHANICAL & OTHER

L

Μ

Ν

Ρ

Κ

#### < SYMPTOM DIAGNOSIS >

							S`	YMPT	OM						
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty	symptom code	A A	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank Fuel piping Vapor lock Valve deposit Poor fuel (Heavy weight gas-	5	5	5	5	5		5	5			5	-		FL-13 FL-4 — —
Air	oline, Low octane) Air duct Air cleaner Air leakage from air duct (Mass air flow sensor — elec- tric throttle control actuator) Electric throttle control actua- tor Air leakage from intake mani-	5	5	5	5	5	5	5	5	5		5			EM-15 EM-26
Cranking	fold/Collector/Gasket Battery Generator circuit	1	1	1		1		1	1					1	PG-3 CHG-5
	Starter circuit Signal plate Transmission range switch PNP switch	3 6 4 4	-									1			<u>STR-2</u> <u>EM-86</u> <u>TM-101</u> (CVT) <u>TM-8</u> (M/T)
Engine	Cylinder head Cylinder head gasket Cylinder block Piston	5	5	5	5	5	-	5	5	-	4	5	3		<u>EM-65</u>
	Piston ring Connecting rod Bearing Crankshaft	6	6	6	6	6		6	6			6			<u>EM-86</u>

#### < SYMPTOM DIAGNOSIS >

#### [MR18DE]

			SYMPTOM													0
		(EXCP. HA)		SPOT		LERATION					OVERHEATS/WATER TEMPERATURE HIGH	NOI	Z	RGE)	•	A EC
		ESTART (E)		ING/FLAT SI	FONATION	OF POWER/POOR ACCELERATION	щ	JNG		I TO IDLE	R TEMPER/	CONSUMPTION	EXCESSIVE OIL CONSUMPTION	(UNDER CHARGE)	Reference page	С
		HARD/NO START/RESTART	E STALL	HESITATION/SURGING/FLAT	SPARK KNOCK/DETONATION	DE POWER/F	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	EATS/WATE	FUEL	SIVE OIL CO	DEAD		D
		HARD/N	ENGINE	HESITA	SPARK	LACK C	HIGH ID	ROUGH	IDLING	SLOW/I	OVERH	EXCESSIVE	EXCES	BATTERY		E
Warranty	symptom code	A A	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	Ť	F
Valve	Timing chain														<u>EM-42</u>	
mecha-	Camshaft	-													<u>EM-53</u>	
nism	Intake valve timing control	5	5	5	5	5		5	5			5			<u>EM-42</u>	G
	Intake valve	-											_		EM OF	
	Exhaust valve	-											3		<u>EM-65</u>	Н
Exhaust	Exhaust manifold/Tube/Muf- fler/Gasket	5	5	5	5	5		5	5			5			<u>EM-29</u> EX-4	
	Three way catalyst														<u>LX-4</u>	
Lubrica- tion	Oil pan/Oil strainer/Oil pump/ Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			<u>EM-32</u> <u>LU-7</u> <u>LU-11</u>	J
	Oil level (Low)/Filthy oil														<u>LU-7</u>	
Cooling	Radiator/Hose/Radiator filler cap														<u>CO-12</u> <u>CO-12</u>	K
	Thermostat	-								5					<u>CO-20</u>	
	Water pump	5	5	5	5	5		5	5		4	5			<u>CO-18</u>	
	Water gallery	Э	Э	Э	Э	Э		5	5		4	Э			<u>CO-2</u>	L
	Cooling fan														<u>EC-391</u>	
	Coolant level (Low)/Contami- nated coolant									5					<u>CO-2</u>	Μ
NVIS (NIS tem — NA	SSAN Vehicle Immobilizer Sys- ATS)	1	1												<u>SEC-15</u>	Ν

1 - 6: The numbers refer to the order of inspection.

0

Ρ

## NORMAL OPERATING CONDITION

< SYMPTOM DIAGNOSIS >

## NORMAL OPERATING CONDITION

### Description

INFOID:000000004833554

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 2,500 rpm under no load (for example, the selector lever position is neutral and engine speed is over 2,500 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 2,000 rpm, then fuel cut will be cancelled. **NOTE:** 

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, <u>EC-28</u>, <u>"System Description"</u>.

# PRECAUTION PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" INFOID:000000004833555

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 "SUPPLEMENTAL RESTRAINT SYS-TEM" and "SEAT BELTS" 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 "SUPPLEMENTAL RESTRAINT SYSTEM".
- 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.

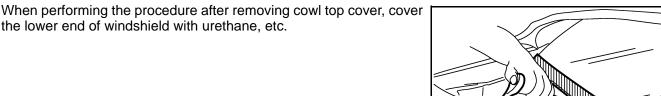
PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

#### WARNING:

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

## Precaution for Procedure without Cowl Top Cover

the lower end of windshield with urethane, etc.



 $\langle \mathcal{A} \rangle$ 

INFOID:000000004833556

PIIB3706J

INFOID:000000004833557

Κ



Ν

Ρ

## On Board Diagnosis (OBD) System of Engine and CVT

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:

- 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-locking type harness connector. For description and how to disconnect, refer to PG-85, "Description".

А

EC

D

Е

F

Н

## PRECAUTIONS

#### < PRECAUTION >

- 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.
- 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 and TCM (Transmission control module) 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 negative battery cable.
- Do not disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.

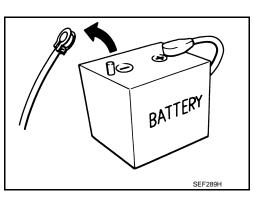
The ECM will now start to self-control at its initial value. Thus, engine operation can vary slightly in this case. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.

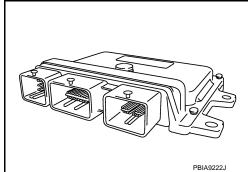
- If the battery is disconnected, the following emission-related diagnostic information will be cleared within 24 hours.
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values
- When connecting 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

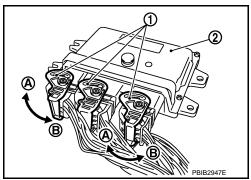
• When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).

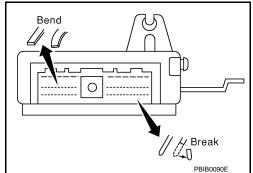
Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.

- 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 mal-







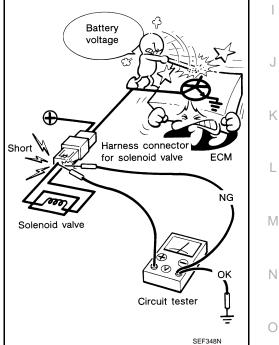


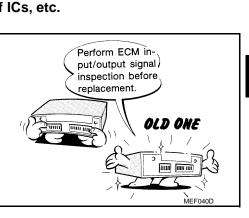
INFOID:000000004833558

< PRECAUTION >

functions 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-416</u>, "Reference Value".
- 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.
- 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.





SERVICE

ENGIN



А

EC

D

Ε

F

Н

SEF217U

Ρ

## PRECAUTIONS

#### • 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.

• Do not rev up engine just prior to shutdown.

- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel level sensor (3)

ily.

< PRECAUTION >

- Fuel tank temperature sensor (4)

• When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.

· Immediately after starting, do not rev up engine unnecessar-

- 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.

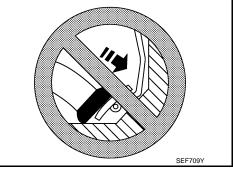
Do not let them run parallel for a long distance.

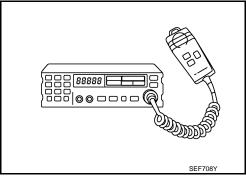
- Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
- Be sure to ground the radio to vehicle body.

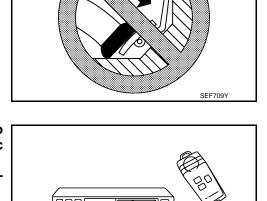
0

[MR18DE]

JMBIA2316ZZ







## PREPARATION

# < PREPARATION > PREPARATION PREPARATION

## Special Service Tools

#### NOTE:

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name		Description
(J-44321) Fuel pressure gauge kit	LEC642	Checks fuel pressure
(J-44321-6) Fuel pressure adapter	LBIA0376E	Connects fuel pressure gauge to quick connector type fuel lines.
KV10118400 Fuel tube adapter	РЫВЗО43Е	Measures fuel pressure
ommercial Servic	e Tools	INFOID:0000000483356
Tool name	e Tools	INFOID:00000000483356
Ommercial Servic Tool name (Kent-Moore No.) Leak detector i.e.: (J-41416)	e Tools	
Tool name (Kent-Moore No.) Leak detector		Description
Tool name (Kent-Moore No.) Leak detector		Description

INFOID:000000004833559

EC

## PREPARATION

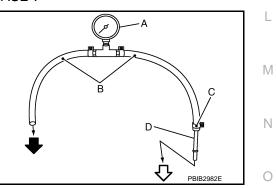
#### < PREPARATION >

Tool name (Kent-Moore No.)		Description
Fuel filler cap adapter i.e.: (MLR-8382)		Checks fuel tank vacuum relief valve opening pressure
Socket wrench	S-NT815 19 mm (0.75 in) 12 mm 12 mm 12 mm 12 mm 12 mm 12 mm 12 mm 12 mm 13 mm 12 mm 13 mm 13 mm 14 mm 15 mm 15 mm 15 mm 15 mm 16 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 mm 17 m	Removes and installs engine coolant temperature sensor
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)	Mating surface shave cylinder Flutes	Reconditions 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)	S-NT779	Lubricates oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

# < PERIODIC MAINTENANCE > PERIODIC MAINTENANCE FUEL PRESSURE

Inspection	INFOID:000000004833561	EC
FUEL PRESSURE RELEASE		
With CONSULT-III		С
<ol> <li>Turn ignition switch ON.</li> <li>Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT-III.</li> <li>Start engine.</li> </ol>		D
<ol> <li>After engine stalls, crank it two or three times to release all fuel pressure.</li> <li>Turn ignition switch OFF.</li> </ol>		E
🛞 Without CONSULT-III		
<ol> <li>Remove fuel pump fuse located in IPDM E/R.</li> <li>Start engine.</li> </ol>		F
<ol> <li>After engine stalls, crank it two or three times to release all fuel pressure.</li> <li>Turn ignition switch OFF.</li> <li>Reinstall fuel pump fuse after servicing fuel system.</li> </ol>		G
FUEL PRESSURE CHECK CAUTION: Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger. NOTE:		Η
. Prenare name or coursers under the disconnected fuel line because the fuel may spil	Louis The fuel	

- Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because C11 models do not have fuel return system.
- The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.
- Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains seal ability with O-rings inside.
- Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.
- 1. Release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".
- 2. Prepare fuel hose for fuel pressure check B and fuel tube adapter (KV10118400) D, then connect fuel pressure gauge A.
  - <>: To quick connector
  - 🖛: To fuel tube (engine side)
  - C: Clamp
  - Use suitable fuel hose for fuel pressure check (genuine NIS-SAN fuel hose without quick connector).
  - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
  - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
  - Use Pressure Gauge to check fuel pressure.
- 3. Remove fuel hose. Refer to EM-35, "Removal and Installation".
  - Do not twist or kink fuel hose because it is plastic hose.



J

Κ

Ρ

А

## FUEL PRESSURE

#### < PERIODIC MAINTENANCE >

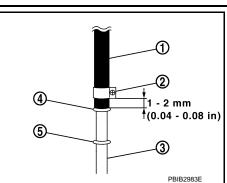
- 4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.
  - No.2 spool (5)
  - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
  - Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
  - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
  - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
  - When reconnecting fuel line, always use new clamps.
  - Use a torque driver to tighten clamps.
  - Install hose clamp to the position within 1 2 mm (0.04 0.08 in).

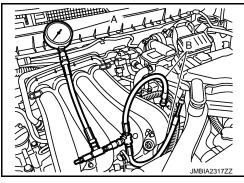
## Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

- Make sure that clamp screw does not contact adjacent parts.
- 5. Connect fuel tube adapter to quick connector.
  - A: Fuel pressure gauge
  - B: Fuel hose for fuel pressure check
- 6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
- 7. Turn ignition switch ON and check for fuel leakage.
- 8. Start engine and check for fuel leakage.
- 9. Read the indication of fuel pressure gauge.
  - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
  - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.

## At idling: Approximately 350 kPa (3.57 kg/cm², 51 psi)

- 10. If result is unsatisfactory, go to next step.
- 11. Check the following.
  - Fuel hoses and fuel tubes for clogging
  - Fuel filter for clogging
  - Fuel pump
  - Fuel pressure regulator for clogging
  - If OK, replace fuel pressure regulator.
  - If NG, repair or replace.
- 12. Before disconnecting Fuel Pressure Gauge and Fuel Pressure Adapter J-44321-6, release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".





## **EVAP LEAK CHECK**

## < PERIODIC MAINTENANCE >

# EVAP LEAK CHECK

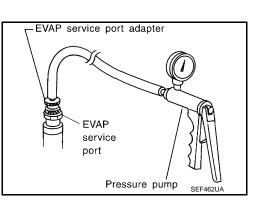
#### Inspection

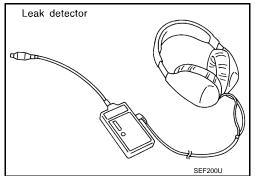
#### **CAUTION:**

- 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 [commercial service tool: (J-41413-OBD)] to the EVAP service port may cause a leak.

#### WITH CONSULT-III

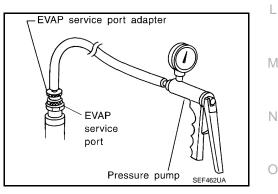
- 1. Install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.
- 2. Turn ignition switch ON.
- Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-III.
- 4. Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
- 5. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
- Remove EVAP service port adapter [commercial service tool: (J-41413-OBD)] and hose with pressure pump.
- Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to <u>EC-68</u>, "System Description".





## **WITHOUT CONSULT-III**

- 1. Install EVAP service port adapter [commercial service tool: (J-41413-OBD)] 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.
- 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/cm², 0.2 to 0.4 psi).
- Remove EVAP service port adapter [commercial service tool: (J-41413-OBD)] and hose with pressure pump.





D

Ε

Н

Κ

А

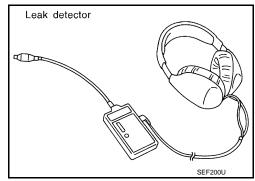
[MR18DE]

INFOID:000000004833562

## **EVAP LEAK CHECK**

#### < PERIODIC MAINTENANCE >

 Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to <u>EC-68, "System Description"</u>.



## < REMOVAL AND INSTALLATION > **REMOVAL AND INSTALLATION EVAP CANISTER**

## **Exploded View**

А

EC

D

Е

F

Н

Κ

L

Μ

Ν

Ρ

[MR18DE]

INFOID:000000004833563

EVAP control system pressure sensor O-ring 💽 EVAP canister EVAP canister vent control valve O-ring 💽 PBIB1214E INFOID:000000004833564 PBIB3091E Assemble in the reverse order of disassembly. Always replace O-ring with a new one. EC-475 2009 Z12

## REMOVAL

- 1. Lift up the vehicle.
- 2. Remove EVAP canister fixing bolt.

🖸 8.0 - 10.7 N•m, (0.81 - 1.1 kg-m, 71 - 95 in-lb)

Remove EVAP canister. 3.

**Removal and Installation** 

#### NOTE:

The EVAP canister vent control valve and EVAP canister system pressure sensor can be removed without removing the EVAP canister.

#### INSTALLATION

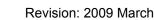
Install in the reverse order of removal.

#### NOTE:

Tighten EVAP canister fixing bolt to the specified torque.

#### DISASSEMBLY

- 1. Turn EVAP canister vent control valve counterclockwise.
- Lock (A)
- Unlock (B)
- Remove the EVAP canister vent control valve. 2.



ASSEMBLY

CAUTION:

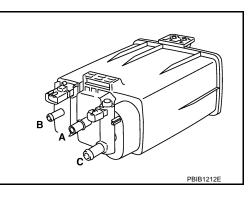
## **EVAP CANISTER**

#### < REMOVAL AND INSTALLATION >

## Inspection

Check EVAP canister as per the following:

- 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.



## SERVICE DATA AND SPECIFICATIONS (SDS)

## < SERVICE DATA AND SPECIFICATIONS (SDS)

# SERVICE DATA AND SPECIFICATIONS (SDS) SERVICE DATA AND SPECIFICATIONS (SDS)

## Idle Speed

Transmission	Condition	Specification	
CVT	No load* (in P or N position)	$700\pm50$ rpm	
M/T	No load* (in Neutral position)	$700\pm50$ rpm	
*: Under the following conditions			Г

*: Under the following conditions

A/C switch: OFF

• Electric load: OFF (Lights, heater fan & rear window defogger)

Steering wheel: Kept in straight-ahead position

## Ignition Timing

F

Н

Е

Transmission	Condition	Specification
CVT	No load* (in P or N position)	$13 \pm 5^{\circ} BTDC$
M/T	No load* (in Neutral position)	$13 \pm 5^{\circ}BTDC$
*. Under the following conditions		

*: Under the following conditions

A/C switch: OFF

· Electric load: OFF (Lights, heater fan & rear window defogger)

• Steering wheel: Kept in straight-ahead position

## Calculated Load Value

Condition	Specification (Using CONSULT-III or GST)	
At idle	10 – 35 %	
At 2,500 rpm	10 – 35 %	
		- 1

## Mass Air Flow Sensor

Supply voltage	Battery voltage (11 – 14 V)	
Output voltage at idle	0.9 – 1.3V*	_
Mass air flow (Using CONSULT-III or GST)	1.0 – 4.0 g·m/sec at idle* 2.0 – 10.0 g·m/sec at 2,500 rpm*	M

*: Engine is warmed up to normal operating temperature and running under no load.

Ν

Ρ

INFOID:000000004833566

INFOID:000000004833567

INFOID:000000004833568

INFOID:000000004833569

# EC

А